

# Hawai'i County Cesspool Conversion Task Force Report

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Prepared by the County of Hawai'i  
Cesspool Conversion Task Force

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# I. Introduction

## 1.1 The Hawai'i County Cesspool Conversion Task Force

In 2025, Hawai'i County Mayor Kimo Alameda convened a group of community advocates, policymakers and environmental scientists to form the Hawai'i County Cesspool Conversion Task Force (CCTF).<sup>1</sup> Building on the 2022 work of the statewide Cesspool Conversion Working Group, the CCTF's objective was to utilize existing reports, plans and resources, together with new research and exploratory community conversations, to create an action plan that would address the unique cultural, ecological and geographic needs of Hawai'i Island.

The CCTF's efforts, as reflected in this report, consider the full breadth of the cesspool conversion challenge across Hawai'i Island, taking a comprehensive view of both the challenges and the potential solutions that could be leveraged for successful outcomes for our Hawai'i Island communities. The view of this task force is that the County government has a central role to play, but cannot — and should not — shoulder the cost and implementation burden for the entirety of this effort alone. Alongside the County, the State, as well as community organizations and nonprofits, private companies and individual property owners all have a role to play in bringing these solutions to fruition. In many conversations about this issue, these groups or institutions are siloed by what they can operationally or legally be responsible for. However, it is only by looking holistically at the bigger picture for Hawai'i Island's cesspool conversion challenge that we can identify opportunities for novel collaborations and creative solutions.

## 1.2 Seeking solutions that work for Hawai'i County

Across Hawai'i, there are approximately 83,000 existing cesspools, including roughly 49,000 on Hawai'i Island alone — the highest concentration in the state. Collectively, these cesspools release an estimated 52-55 million gallons of raw sewage every day,<sup>2</sup> contaminating drinking water supplies, streams and coastal ecosystems. The untreated waste carries pathogens and nutrients that put families at risk of illness, accelerate the decline of coral reefs and threaten food security by degrading nearshore fisheries. Some cesspools sit just a few hundred feet from drinking water wells or perennial streams, while

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<sup>1</sup> Please see [Appendix A](#) for a listing of the Hawai'i County Cesspool Conversion Task Force Members.

<sup>2</sup> Hawai'i State Department of Health, Wastewater Branch: "Cesspools in Hawai'i". <https://health.hawaii.gov/wastewater/home/cesspools/>.

others discharge directly into reef ecosystems leading to coral death and loss of shoreline protection. A USGS study found that just a 1-meter loss in the height of coral reefs in Hawai'i would increase flooding across the islands, putting nearly 10,000 people and nearly \$1 billion in property and economic activity at risk.<sup>3</sup> These high-risk areas, based on geography and hydrology, require urgent upgrades well before the 2050 deadline.

Converting these cesspools is not simple, easy or cheap. The unique geography and geology of Hawai'i Island mean that cookie-cutter plans from other municipalities don't always fit here. County-owned and managed sewer systems are a foundational component of the long-term solution for some places, but cannot feasibly extend to serve the many remote and rural communities that give Hawai'i Island its character and beauty. Individual household conversions to septic systems are expensive — with a median price of \$40,000 and upper range of \$70,000 — when at the same time, many of our families are struggling to make ends meet day-to-day.<sup>4</sup> The median annual household income on our island is \$74,580,<sup>5</sup> which means that a typical septic conversion could cost an average family half of what they would make in a year.

From a policy standpoint, there are mandates in place and enforcement measures that put a timeline to our community's need to deal with these conversions. In 2017, the State Legislature passed Act 125, requiring conversion of all existing cesspools by 2050.

Solutions are possible, and our communities here on Hawai'i Island are calling for change. For more than a century, the people of Hawai'i have voiced concerns about the impact of untreated waste on the health of Hawai'i's environment and communities. Mass sewage spill events, dating back as early as 1911 in Honolulu and as recently as the summer of 2024 in Hilo, have heightened awareness of these issues. Neighborhoods and community organizations are working together to find creative solutions, research new technologies and seek funding to offset the burden to individual families.

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<sup>3</sup> Storlazzi, C.D., Reguero, B.G., Cole, A.D., Lowe, E., Shope, J.B., Gibbs, A.E., Nickel, B.A., McCall, R.T., van Dongeren, A.R., Beck, M.W., 2019, Rigorously valuing the role of U.S. coral reefs in coastal hazard risk reduction: U.S. Geological Survey Open-File Report 2019-1027.

<sup>4</sup> Bastatewide average is 10 percent. <https://www.unitedforalice.org/county-reports/hawaii#9>

<sup>5</sup> 2023 Point in Time daed on the most recent data available, 38 percent of Hawai'i Island's households are at or below the ALICE (Asset-Limited, Income-Constrained, Employed) threshold, greater than the statewide average of 35 percent. Of those households, 17 percent of Hawai'i Island families are below the poverty threshold, while the sta from the 2025 State of ALICE in Hawai'i report. <https://www.unitedforalice.org/county-reports/hawaii#9>

The County of Hawai'i has been working proactively to meet this aggressive target through the development of its Island-Wide Integrated Wastewater Management Plan (IWWMP), which will be released in 2026. The IWWMP is a thoughtful planning tool developed by subject matter experts at the County of Hawai'i Department of Environmental Management (DEM), intended to help inform the County's legislative branch and explore possible long-term solutions for cesspool conversion. The IWWMP looks at how the County could approach expanding existing sewer systems and creating new sewer districts and how private owners can perform cesspool conversions to approved Individual Wastewater Systems (IWS).<sup>6</sup> On a statewide scale, HDOH's Wastewater Branch has been working to prepare studies, tools and resources for communities to support this large-scale effort throughout the islands.

The Hawai'i County Cesspool Conversion Working Group gratefully acknowledges the large body of work developed by subject matter experts, policymakers and community representatives throughout the state which provides the foundation for the research and recommendations included in this report. Please refer to Appendix B for recommended additional resources produced by these prior efforts.

The following report serves as a roadmap for cesspool conversion on Hawai'i Island by presenting potential solutions to the technical, financial, workforce and community engagement needs related to conversion. The information contained in the report is intended to support Hawai'i County in tailoring and advancing recommendations made by the statewide cesspool working group in Hawai'i Island's unique geographies and communities. Most importantly, the report was created to build momentum and support for pilot programs, policy changes and funding necessary for the people of Hawai'i Island to succeed in our collective efforts by 2050.

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<sup>6</sup> County of Hawai'i Department of Environmental Management, *Island-Wide Integrated Wastewater Management Plan*, accessed October 20, 2025, <https://www.dem.hawaiiicounty.gov/projects/integrated-wastewater-management-plan>.

## II. Situational Analysis

### 2.1. Environmental and Health Risk Review

#### Overview

Cesspools are a substandard wastewater management system in which raw, untreated sewage leaches into the subsoil, containing harmful bacteria and pathogens that can spread serious disease. In the state of Hawai'i, 90% of drinking water for residents and visitors is sourced from groundwater. Cesspools jeopardize this precious water source as well as ocean waters.<sup>7</sup> Extensive research has shown the harm of raw sewage contamination both environmentally, to coral reefs and nearshore areas, and to humans through disease transmission. Implementing a plan for cesspool conversion is critical to address the potential for contaminated drinking water, recreational water use in streams or the ocean, as well as damages to coastal waters, coral reefs and their inhabitants. Cesspools ultimately cause harm to humans, water, animals and potentially the economy.

Cesspools are used more in Hawai'i than any other state and are the most common domestic waste depository.<sup>8</sup> Beyond legislative mandate, urgency to convert is driven by mounting health and environmental damage that, if left unaddressed, threatens Hawai'i's tourism economy which depends on the state's viability as a desirable destination.

#### Environmental Risks

Cesspools are directly damaging Hawai'i's coral reefs, which are incredibly valuable culturally, economically and ecologically. Reefs provide important habitat for marine life, hold cultural significance, generate tourism to Hawai'i, and provide essential protection from climate disasters. Addressing the urgent issue of cesspool conversion will protect our reefs, which **in turn protects us, too.**

#### Reef Die-off

Sewage runoff from cesspools leads to an excess of nutrients like nitrogen and phosphorus in nearshore waters. These excess nutrients stimulate overgrowth of algae, creating harmful algal blooms (HABs) which smother corals and kill reefs, and also pose a risk to

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<sup>7</sup> Wastewater Branch, "Cesspools in Hawai'i," Government, State of Hawai'i Department of Health, accessed October 20, 2025, <https://health.hawaii.gov/wastewater/home/cesspools/>.

<sup>8</sup> Cesspool Conversion Working Group, *Final Report to the 2023 Regular Session Legislature* (State of Hawai'i Department of Health, 2022).

human health. Hawai'i has historically had issues of large-scale blooms of *Cladophora sericea* and *Hypnea musciformis* in Maui, often washing ashore in large mats.<sup>9, 10</sup> Excess nutrients can also lead to coral disease outbreaks and coral growth anomalies.<sup>11, 12</sup>

On Hawai'i Island, coral die-off is progressing significantly: Puakō reef cover has declined from 53% to less than 5% in recent years. In West Hawai'i, a landmark study determined that reefs under the influence of adjacent cesspools and septic systems (IWS) have a much elevated rate of coral loss from 2003-2022.<sup>13</sup> Further study of West Hawai'i shows that at least 42% of the coastline is contaminated by wastewater.<sup>14</sup> Coral die-off, while often attributed solely to warming ocean temperatures, is also influenced by algal blooms and nutrient pollution – like from adjacent cesspools – which puts coral under stress. Stressed corals, once confronted with marine heat waves, are much more susceptible to die-off and much less likely to recover.<sup>15</sup>

### Value of reefs

In the Kumulipo, the Hawaiian creation chant, the very first being to be created is a coral polyp — our most ancient ancestor, the foundation for all other life.<sup>16</sup> Coral has long been

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<sup>9</sup> Jennifer E. Smith et al., "Characterization of a Large-Scale Ephemeral Bloom of the Green Alga *Cladophora Sericea* on the Coral Reefs of West Maui, Hawai'i," *Marine Ecology Progress Series* 302 (November 2005): 77-91, <https://doi.org/10.3354/meps302077>.

<sup>10</sup> University of Hawai'i Botany Department, "Hypnea Musciformis," Education, Marine Algae of Hawai'i, 2001, [https://www.hawaii.edu/reefalgae/invasive\\_algae/rhodo/hypnea\\_musciformis.htm](https://www.hawaii.edu/reefalgae/invasive_algae/rhodo/hypnea_musciformis.htm).

<sup>11</sup> Devon K. Aguiar et al., "Detection and Impact of Sewage Pollution on South Kohala's Coral Reefs, Hawai'i," *Marine Pollution Bulletin* 188 (March 2023): 114662, <https://doi.org/10.1016/j.marpolbul.2023.114662>.

<sup>12</sup> County of Hawai'i, "Integrated Climate Action Plan for the Island of Hawai'i", June 2023, [https://records.hawaiicounty.gov/WebLink/1/edoc/135070/County%20of%20Hawaii%20-%20Integrated%20Climate%20Action%20Plan%20\(2023\).pdf](https://records.hawaiicounty.gov/WebLink/1/edoc/135070/County%20of%20Hawaii%20-%20Integrated%20Climate%20Action%20Plan%20(2023).pdf)

<sup>13</sup> Gove, J.M., G.J. Williams, J. Lecky, E. Brown, E. Conklin, C. Counsell, G. Davis, M.K. Donovan, K. Falinski, L. Kramer, K. Kozar, N. Li, J.A. Maynard, A. McClutheon, S.A. McKenna, B.J. Neilson, A. Safaie, C. Teague, R. Whittier, and G.P. Asner. 2023. Coral reefs benefit from reduced land-sea impacts under ocean warming. *Nature* [doi.org/10.1038/s41586-023-06394-w](https://doi.org/10.1038/s41586-023-06394-w)

<sup>14</sup> Hondula, K.L., R.E. Martin, and G.P. Asner. 2025. Variability in contamination of submarine groundwater discharge into West Hawai'i coral reefs. *Frontiers in Marine Science* 12:1634234 [doi.org/10.3389/fmars.2025.1634234](https://doi.org/10.3389/fmars.2025.1634234)

<sup>15</sup> Blue Water GIS and Jovan J. Hall, "Wahi Pana - A Sacred Place," ArcGIS StoryMaps, September 24, 2024, <https://storymaps.arcgis.com/stories/69512f9bca69405fa7d35a5f8ee43c13>.

<sup>16</sup> The Nature Conservancy, "Restoring Reefs to Build Resilience," The Nature Conservancy Stories in Hawai'i, May 23, 2024, <https://www.nature.org/en-us/about-us/where-we-work/united-states/hawaii/stories-in-hawaii/coral-reef-restoration-and-repair/>.

revered, and the necessity of our reefs for sustaining life has been well-understood in Hawaiian culture.

Reefs are essential for protecting our coastal communities and the \$836 million worth of coastal infrastructure across the State of Hawai'i.<sup>17</sup> A healthy reef can dissipate up to 97% of wave energy, mitigating storm-related flooding and erosion. Additionally, reefs reduce beach erosion by generating and trapping sand, keeping our shorelines more resilient. The loss of even one meter of reef height can double the cost of storm damage on coastal infrastructure and properties.<sup>18</sup> Studies have estimated that protecting just the top 1 meter of coral reef height across the main Hawaiian Islands could prevent \$629 million of building damage each year.<sup>19</sup> One of the best ways to make our reefs more resilient to all pressures is to remove land-based sources of pollution, including sewage, from our coastal waters.<sup>20</sup>

Reefs also provide habitat for more than 7,000 species of marine life, including fish, invertebrates and endangered species like the honu (green sea turtle). 25 percent of Hawaiian marine life is endemic, found nowhere else in the world.<sup>21</sup> Reefs allow for subsistence fishing and food-gathering, immense benefits in tourism revenue and important ecosystem services that keep us and our species safe.<sup>22</sup> It is our kuleana to protect our reefs — both for the sake of the corals and reef species and the safety of our communities. Rapidly addressing the issue of cesspools is one of the most important ways we can preserve our reefs before it is too late.

## Health Risks

Cesspools are essentially a hole in the ground and do not treat wastewater. Untreated wastewater liquids flow out the perforated sides of the cesspool, while the solids are held in the hole and may slowly leach out over time. Other treatment systems reduce the amount of harmful pathogens, in turn reducing the potential damage of the effluent to human health, as well as reducing the amount of organic matter and nutrients. Once the

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<sup>17</sup> State of Hawai'i Department of Land and Natural Resources, Division of Aquatic Resources, "Coral Restoration In Hawai'i," ArcGIS StoryMaps, November 23, 2022, <https://storymaps.arcgis.com/stories/0b568cb99a6d49eabb1ecfa90b25c4a7>.

<sup>18</sup> The Nature Conservancy, 2024.

<sup>19</sup> State of Hawai'i, "Makai Restoration Action Plan: Hawai'i Coral Reef Strategy 2030," 2025, 9.

<sup>20</sup> Hawai'i Division of Aquatic Resources, 2017, Coral Bleaching Recovery Plan: Identifying Management Responses to Promote Coral Recovery in Hawai'i. Social Science Research Institute, University of Hawai'i

<sup>21</sup> The Nature Conservancy, 2024.

<sup>22</sup> State of Hawai'i, "Makai Restoration Action Plan", 21.

untreated sewage water leaches out the sides of the cesspool, it can travel extremely rapidly through the volcanic subsoil in Hawai'i. These high travel speeds mean there is little time for any nutrients or pathogens to be filtered out through the soil before it reaches the shore or groundwater aquifers.<sup>23</sup>

Cesspool discharge contains pathogens, viruses and bacteria that can spread disease. Effluent released from cesspools also contains excess nutrients, such as nitrogen and phosphorus, which can damage sensitive ecosystems like coral reefs. In addition to human waste, sewage also carries a range of other pollutants into our drinking and swimming water — including pharmaceuticals, heavy metals and cleaning chemicals.<sup>24</sup>

### **Contaminated Drinking Water**

Hawai'i Island's drinking water is primarily sourced from groundwater aquifers. There are confirmed contaminations of private wells from human wastewater, and the high prevalence of cesspools endangers our public water supply as well. For example, many residents in the Kea'au area rely on privately owned wells for their water, which can be contaminated by cesspool leaching. There is little soil here to mitigate cesspool leaching, and 50% of the domestic wells sampled in this area tested positive for fecal indicator bacteria. 25% tested positive for *E. coli*. This indicates a potential for disease transmission from the 9,300 cesspools in the Kea'au area to make residents sick from their household drinking water.<sup>25</sup> Groundwater contamination is an urgent and immediate concern for human health, whether in private wells or public water supply.

### **Contaminated Beaches/Swimming Areas**

When wastewater runs off into our beaches, people can become seriously ill. Hawai'i has a high prevalence of waterborne infections associated with recreational water use. According to the Hawai'i DOH Clean Water Branch, the most common illness associated with swimming or wading in contaminated beaches is gastroenteritis. More severe infections like hepatitis A, conjunctivitis, salmonellosis, *E. coli*, giardiasis, typhoid and cholera can be contracted through exposure to sewage.<sup>26</sup> A 2025 study by researchers at Arizona State

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<sup>23</sup> Wiegner TN, Colbert SL, Abaya LM, Panelo J, Remple K, Nelson CE. 2021. Identifying locations of sewage pollution within a Hawaiian watershed for coastal water quality management actions. *Journal of Hydrology: Regional Studies*. 38:100947.

<sup>24</sup> State of Hawai'i Department of Health, "Cesspools in Hilo and Kea'au," Community Meeting, University of Hawai'i at Hilo, July 25, 2018.

<sup>25</sup> Environmental Management Division, *Report to 2018 Regular Session Legislature*.

<sup>26</sup> Clean Water Branch, "Beach Monitoring Program," Government, State of Hawai'i Department of Health, accessed October 20, 2025, <https://health.hawaii.gov/cwb/beach-monitoring-program/>.

University surveyed 47 sites along the West Hawai'i shoreline. Enterococcus was in 42% of the sites sampled, and 23% of those sites exceeded health risk thresholds.<sup>27</sup> A survey of sewage indicators at ten beaches around Hawai'i Island found five beaches that were "wastewater dominated" or "wastewater influenced".<sup>28</sup>

### High Infection Levels

Scientists often use fecal indicator bacteria (FIB), which are markers of contamination specifically from sewage rather than other sources and include *Enterococcus* spp., *Clostridium perfringens* and human-associated *Bacteroides*.<sup>29</sup> *Enterococcus* spp. levels at Puakō are often more than two times higher than Hawai'i DOH standards.<sup>30</sup> While *Enterococcus* is a common FIB and the primary FIB used by the Hawai'i Clean Water Branch in beach monitoring, it has its limitations in tropical regions. Because it can multiply in soil and decaying vegetation, which are common in tropical regions, it is not always indicative of recent fecal contamination.<sup>31</sup> There are other clear indicators of contamination from sewage, such as pharmaceuticals, cleaning chemicals, and human gut-specific bacteria, that also travel from cesspools into our nearshore environments and risk human and ecosystem health.<sup>32</sup> These have been used to identify human sewage in groundwater springs in Puakō and Hilo (Wiegner et al. 2021, McKenzie 2022, Nakoa 2023).

### Beach Closures

The Hawai'i Department of Health's Clean Water Branch conducts routine beach monitoring under the Hawai'i Beach Monitoring Program. The goal of the program is to reduce the risk of illness to users of Hawai'i's beaches due to sewage pollution by issuing public advisories when warranted. Beach closures occur when the Enterococci levels (a regulated fecal indicator) are found in exceedance to the EPA Beach Act Value (BAV) threshold of 130 enterococci per 100 mL of water, and are posted on the Clean Water

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<sup>27</sup> Kelly L. Hondula et al., "Variability in Contamination of Submarine Groundwater Discharge into West Hawai'i Coral Reefs," *Frontiers in Marine Science* 12 (August 2025), <https://doi.org/10.3389/fmars.2025.1634234>.

<sup>28</sup> Smith, C.M., Whittier, R.B., Amato, D.W., Dailer, M.L., Colbert, S.L., Shuler, C.K., Altman-Kurosaki N.T., Vasconcellos, S., Markel, A.C., Ornelas, B., 2021. State-wide assessment of wastewater pollution intrusion into coastal regions of the Hawaiian Islands. Professional report prepared for the 2022 Hawai'i State Legislature, Hawai'i State Department of Health, & the Cesspool Conversion Working Group. ACT 132, SLH 2018, ACT 170, SLH 2019. p. 85.

<sup>29</sup> Aguiar et al., "Sewage Pollution on South Kohala's Coral Reefs".

<sup>30</sup> Abaya LM, Wiegner TN, Colbert SL, Beets JP, Carlson KA, Kramer KL, Most R, Couch CS. 2018 A multi-indicator approach for identifying shoreline sewage pollution hotspots adjacent to coral reefs. *Marine Pollution Bulletin*. 129(1):70-80. <https://doi.org/10.1016/j.marpolbul.2018.02.005>

<sup>31</sup> Hawai'i Wai Ola, 2024, 15

<sup>32</sup> State of Hawai'i Department of Health, 2018

Branch's [Water Quality Advisories](#) webpage. People can also subscribe to receive [alerts](#) about water quality advisories.

The BAV is the associated illness rate of 36 illnesses/1,000 swimmers or waders. Enterococci levels greater than 130/100 mL indicates that there may be an increased probability of risk of illness due to pathogens that cause gastrointestinal (GI) illness in swimmers and waders of the affected beach. Recent closures include:

- Honaunau Bay - 2 Step (Jul 3, 2025) - Enterococci levels above the threshold (137/100 mL);
- Miloli'i (Jul 3, 2025) - Enterococci levels at twice the threshold (254/100 mL);
- Honoli'i Cove (Mar 11, 2025) - Enterococci levels at 2.2 times the threshold (288/100 mL); and
- Richardson Ocean Center (Jul 16, 2024) - Enterococci levels at 2.8 times the threshold (364/100 mL).<sup>33</sup>

Beach closures negatively impact both the tourism industry in Hawai'i and locals by limiting access for recreation and subsistence fishing. Quickly addressing the issue of cesspool conversion will help to reduce beach closures and their social and economic impacts due to sewage contamination.

### **Increased Risk Factors for Hawai'i Island**

On Hawai'i Island, much of the contaminated water enters the ocean through groundwater discharge, rather than surface streams and rivers. Hawai'i Island's volcanic landbase is highly permeable, which allows sewage to travel very quickly through these especially porous rocks. This is compared to areas with more loamy or sandy soil, which can better filter wastewater as it slowly percolates downwards.<sup>34</sup> Lava tubes also rapidly transport contaminated water, especially during flood events. These tubes can carry cesspool discharge, especially if cesspools penetrate into the lava tube system or if they have been used as sewage and solid waste dumps, such as areas of Kaumana Cave, a lava tube cave system near Hilo.<sup>35</sup>

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<sup>33</sup> Clean Water Branch, "Beach Monitoring Program."

<sup>34</sup> Hondula et al., "Submarine Groundwater Discharge".

<sup>35</sup> William R Halliday, "Raw Sewage and Solid Waste Dumps in Lava Tube Caves of Hawaii Island," *Journal of Cave and Karst Studies* 65, no. 1 (2003): 68–75.

Additionally, communities built at the water's edge like Puakō and many others, often have almost no topsoil and sit atop fractured basalt rock. This means it's nearly impossible for the soil to filter anything from cesspools before it reaches the groundwater.<sup>36</sup> Dye tracer studies in Puakō have shown that sewage can reach the shoreline in the span of three hours to ten days, due to the permeable geology and high groundwater table.<sup>37</sup> Projected sea level rise will worsen cesspool pollution, as it will further shrink the "soil treatment zone" — the amount of soil between the cesspool and the groundwater.<sup>38</sup>

Harbor breakwaters, shallow tide pool frontages and other manmade and natural features can lead to stagnated water in coastal areas. Without dilution through mixing with ocean water, sewage discharge can accumulate to high levels in these still, shallow waters, which are often popular recreational areas.<sup>39</sup>

Increased coastal development leads to higher levels of sewage contamination both in offshore waters and in groundwater.<sup>40</sup> Development is associated with more impervious surfaces (like parking lots), which allow faster runoff of pollutants into the shore.<sup>41</sup> As development on Hawai'i Island continues, we must be cognizant of the impact of that development on pollution in our groundwater and nearshore waters and take proactive measures to remove environmentally damaging cesspools.

## 2.2. Localizing the Statewide Cesspool Conversion Plan for Hawai'i County

Over 80,000 cesspools exist across the Hawaiian Islands.<sup>42</sup> As noted in previous sections, these cesspools greatly deteriorate the quality of fresh and ocean waters. The quality of water impacts humans and animals, risking safe use for households, hospitals and communities, as well as destroying safe access to inhabitants of the ocean, from coral to

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<sup>36</sup> Paula Dobbyn, "Cesspools Threaten Big Island Reef Rich With Sea Life," Honolulu Civil Beat, November 20, 2024, <https://www.civilbeat.org/2024/11/hawaiis-love-affair-cesspools-ruining-reefs/>.

<sup>37</sup> Tracy N. Wiegner et al., "Identifying Locations of Sewage Pollution within a Hawaiian Watershed for Coastal Water Quality Management Actions," *Journal of Hydrology: Regional Studies* 38 (December 2021): 100947, <https://doi.org/10.1016/j.ejrh.2021.100947>.

<sup>38</sup> Environmental Management Division, *Report to the 2018 Regular Session Legislature Relating to Cesspools and Prioritization for Replacement* (State of Hawai'i Department of Health, 2017).

<sup>39</sup> Environmental Management Division, *Report to 2018 Regular Session Legislature*.

<sup>40</sup> Hondula et al., "Submarine Groundwater Discharge", 7.

<sup>41</sup> Hondula et al., "Submarine Groundwater Discharge," 3.

<sup>42</sup> Hawai'i State Department of Health, 2022, *Final Report to the 2023 Regular Session Legislature*, [https://health.hawaii.gov/wastewater/files/2022/11/ccwg\\_final\\_report.pdf](https://health.hawaii.gov/wastewater/files/2022/11/ccwg_final_report.pdf).

fish to swimmers.

The state of Hawai'i's plan to convert cesspools is an effort that includes generations of legislators, industry leaders across many sectors and community voices. Act 125, enacted in 2017, requires the conversion of all cesspools in Hawai'i by 2050 to approved wastewater treatment systems.<sup>43</sup> This act directed the Department of Health (DOH) to investigate the scope of this monumental task stated by the legislature. Then, on July 5, 2018, SB2567, or Act 132 "RELATING TO CESSPOOLS," was enacted by the legislature to 1) establish a cesspool working group and 2) enact a sewage examination study.<sup>44</sup> Act 132 stated:

The legislature finds that public health and the quality of Hawai'i's drinking water, streams, ground waters, nearshore marine areas, and ocean are being harmed by water pollution from cesspools. Drinking water, public recreation, and the precious coral reefs, on which Hawai'i's economy, shoreline, recreation, fisheries, and native species depend, are or may be harmed by such pollution.

As per the Act, a Cesspool Conversion Working Group (CCWG) was established within the Department of Health in 2018. In 2022, the CCWG submitted a final report to the Legislature in 2023. This report detailed specific recommendations and a timeline for the state to proceed with cesspool conversions. Simultaneously, and as per the bill, the DOH released a report related to financing cesspools to determine essential aspects of the questions of affordability<sup>45</sup> as well as technology<sup>46</sup> related to cesspool conversion. As of 2025, the question of how to implement the conversion of tens of thousands of cesspools remains a concern, particularly on Hawai'i Island, which has the highest concentration of cesspools in the state.<sup>47</sup>

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<sup>43</sup> Hawai'i State Department of Health, Environmental Management Division, *Report to the Twenty-Ninth Legislature, State of Hawai'i: 2018 Regular Session - Relating to Cesspools and Prioritization for Replacement*, <https://health.hawaii.gov/opppd/files/2017/12/Act-125-HB1244-HD1-SD3-CD1-29th-Legislature-Cesspool-Report.pdf>.

<sup>44</sup> Hawai'i Legislature 2018, *Senate Bill 2567 SD2 HD2 CD1: Relating to Cesspools*, Act 132, 29th Legislature, Regular Session, enacted 2018, State of Hawai'i, Honolulu.

<sup>45</sup> Hawai'i State Department of Health, 2021, *Summary Report: Cesspool Conversions Finance Research*, <https://health.hawaii.gov/wastewater/files/2021/02/financefinalreportr.pdf>.

<sup>46</sup> Michael Mezzacapo and Christopher Shuler, 2022, *2022 Hawai'i Cesspool Hazard Assessment & Prioritization Tool*, accessed on November 3, 2025, <https://health.hawaii.gov/wastewater/files/2022/11/prioritizationtoolreport.pdf>.

<sup>47</sup> Hawai'i State Department of Health, *Cesspools in Hawai'i*, accessed on November 3, 2025, <https://health.hawaii.gov/wastewater/home/cesspools/>.

The Department of Health (DOH) 2022 report for the legislature details the complexities of the problem as well as the complexities of the solutions. While there is no singular solution for converting all cesspools, there are evidence-backed solutions that address this multi-faceted issue.

The Hawai'i County CCTF is charged with making recommendations and proposing actions that center public health, environmental protection and financial feasibility. An important part of this effort is a review of the key factors in cesspool conversion for the state of Hawai'i; the CCTF offers an analysis of which factors are critical for meeting the 2050 goal, focusing on the key components necessary for the County.

Although this section will focus on statewide interventions, Hawai'i Island has a specific interest in this legislation due to the high number of cesspools on island and their priority status. As a result, Hawai'i Island has a unique opportunity to lead the state in designing and implementing a plan that works locally and bears relevance to other islands.

## **Key Considerations for Conversion**

The reports and data created by the Department of Health and the Cesspool Working Group provide evidence-based descriptions of how cesspools impact Hawai'i and the necessary steps to eradicate them. The key findings from these reports and other reports produced by the DOH, CCWG, subject matter experts and other partners distill into specific categories that the Hawai'i County plan should consider:

- Cesspools are environmentally inadequate systems that damage the quality of fresh and ocean water.
- Enacting a statewide cesspool conversion plan will require cross-coordination from numerous entities, including the state, banks, workforce experts and the community.
- Some cesspools cause more damage than others and should be removed and replaced as soon as possible.
- The cost of upgrading cesspools can be prohibitive and require creative financing solutions and community support.<sup>48</sup>

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<sup>48</sup> Hawai'i Department of Health, 2022

These findings echo insights gleaned from the national conversation on cesspool conversion.<sup>49</sup> While there is no universal solution, the challenges Hawai'i faces regarding cesspools are not unique. Environmental and health pressures combined with financial and infrastructure barriers make cesspool conversion an urgent and complex issue that requires immediate attention and long-term planning.

Below, each section provides additional context to the key consideration for conversion. These key considerations form the foundation for perceived challenges and recommendations.

## **Important Stakeholders**

*Enacting a statewide cesspool conversion plan will require cross-coordination from numerous entities, including: the state, banks, workforce experts and the community. Various stakeholders will be impacted by a statewide commitment to converting cesspools. These include but are not limited to:*

- Individual homeowners or landowners who have a cesspool on their property;
- The state legislature and county governments, who will impact funding and affordability options to offset the costs of funding cesspool conversions;
- County leaders who will need to communicate and execute implementation plans in their communities;
- Financial institutions that will need to provide loans and financing for cesspool conversions;
- State of Hawai'i Departments, including the Department of Health, Wastewater Branch;
- Businesses related to cesspool conversions in manufacturing, technology, geology and construction related to cesspool conversions;
- Researchers with expertise in monitoring water pollution and other environmental impacts of cesspools; and
- Workforce-related entities, organizations and partners, including the University of Hawai'i.

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<sup>49</sup> The Cesspool Conversion Working Group commissioned a report on other U.S. states' cesspool conversion policies, produced by the University of Hawai'i Water Research Center and Hawai'i Sea Grant College Program. [This 2019 report](#) examines six states that have undertaken significant efforts to phase out cesspools and other outdated OWTs. There are a number of key themes that emerged out of this research, which may inform policy and planning within a Hawai'i context. Please see [Appendix C](#) for further discussion of these models from other U.S. states.

Each of these stakeholders is interconnected and interested in how this plan to convert cesspools by 2050 will be implemented. From potential liabilities for homeowners to potential opportunities for business owners, addressing the concerns and interests of all implied parties is critical to developing a viable plan for conversion.

## **Prioritizing Cesspool Upgrades**

Due to the large number of cesspools, and in order to begin the conversion process, the Department of Health began to determine which cesspools are the most harmful to health and the environment. *Some cesspools cause more damage than others and should be removed and replaced as soon as possible.* Though all cesspools are considered substandard technology, some are located in areas more likely to contribute to pollution and contamination of waters. The 2018 Legislature Report by the Department of Health, Wastewater Branch issued definitions and thresholds for four levels of priority for determining cesspool conversion, which were then updated in 2022.

The 2022 report prepared by researchers at the University of Hawai'i for use by the Department of Health and the Cesspool Conversion Working Group designed a "Hawai'i Cesspool Prioritization Tool (HCPT)." The tool is meant to help identify areas that pose the "most significant hazards" to water pollution. The HCPT places each geographic area into one of three prioritization categories:

- **Priority Level 1:** Greatest potential to impact human well-being and the environment and are directly adjacent to sensitive environmental assets like coral reefs or drinking water aquifers.
- **Priority Level 2:** Rank behind Priority 1, but still pose a significant hazard to human well-being and the environment. May be close to sensitive environmental assets like streams or drinking water aquifers.
- **Priority Level 3:** Still impact human well-being and the environment but may be further away from sensitive environmental assets or areas that may directly impact human well-being.<sup>50</sup>

The HCPT reevaluated the 2018 priority areas, resulting in a shift in priority ranking due to increases in available data and changes in methodology; namely, risk factors and use of

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<sup>50</sup> "Hawai'i Cesspool Hazard Assessment & Prioritization Tool," University, University of Hawaii Sea Grant, accessed November 25, 2025, <https://seagrant.soest.hawaii.edu/cesspools-tool/>.

census-designated tracts to group scores. With the updated 2022 assessment, three areas of Hawai'i Island were determined as Priority 1: Holualoa, Kailua, and Kawaihae-Waikoloa.<sup>51</sup>

**Hawai'i Island cesspool breakdown, using HCPT 2022 assessment:**

- 9% (3 tracts) / 5,119 cesspools (11%) = Priority Level 1
- 15% (5 tracts) / 2,619 cesspools (6%) = Priority Level 2
- 76% (25 tracts) / 40,858 cesspools (84%) = Priority Level 3 (Updated 2022)

There are numerous ways to measure and determine a prioritization scale for cesspool conversion. Below are the fifteen key factors the Hawai'i Cesspool Prioritization Tool (HCPT) considers for which cesspools may have the greatest impact on health. Even if a statewide plan does not seek to use this specific tool, these factors outline the numerous geographical and environmental considerations related to cesspools.

- 1. Distance to municipal or domestic drinking water wells;**
- 2. Well capture zones;**
- 3. Distance to streams and wetlands;**
- 4. Distance to the coastline;**
- 5. Sea level rise zones;**
- 6. Precipitation;**
- 7. Depth to groundwater;**
- 8. Groundwater flow paths;**
- 9. Soil characteristics;**
- 10. Cesspool density;**
- 11. Coral cover;**
- 12. Fish biomass/recovery potential;**
- 13. Beach user-days;**
- 14. Proximity to a lifeguarded beach; and**
- 15. Coastal ocean circulation proxy.<sup>52</sup>**

Though this tool can help identify which cesspools may be considered “priority” for conversion, they note that there are numerous factors to consider, including *cost and timeline*. And, there were problems with the accuracy and number of OSDS used in their model that could have led to underestimating the Priority in some areas. In application, this

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<sup>51</sup> Mezzacapo, Michael, and Christopher Shuler. *2022 Hawai'i Cesspool Hazard Assessment & Prioritization Tool*. WRRRC-SR-2022-02. University of Hawai'i Water Resources Research Center, 2022.

<sup>52</sup> Michael Mezzacapo and Christopher Shuler, 2022

tool and fifteen metrics were utilized to prioritize which cesspools pose the most significant hazards.

Tract Name	Tract ID	Cesspool Count	Priority Category	Island-Specific Priority Rank
Holualoa	91	1761	Priority 1	1
Kailua	116	1334	Priority 1	2
Kawaihae-Waikoloa	89	2024	Priority 1	3
Hilo: Keaukaha-Pana'ewa	145	934	Priority 2	4
Hilo: Villa: Franca-Kaiko'o	142	151	Priority 2	5
Kaumalumu-Keahou	92	654	Priority 2	6
Hilo: University-Houselots	141	549	Priority 2	7
Kealakehe	74	530	Priority 2	8
Hilo: Puainako	140	1582	Priority 3	9
Hilo: Pu'u'ueo-Downtown	143	350	Priority 3	10
Hualalai	121	1141	Priority 3	11
Pauka'a-Wailea	119	963	Priority 3	12
Konawaena	94	1059	Priority 3	13
Waimea-Pu'u Anahulu	118	2375	Priority 3	14
North Hilo	113	855	Priority 3	15
Upper Waiakea Forest Reserve	115	670	Priority 3	16
Kalaoa	90	1916	Priority 3	17
Hilo: Haihai	123	1510	Priority 3	18
South Kona	117	1999	Priority 3	19
Hilo: Kawaihau	125	1608	Priority 3	20
Hilo: Piihonua-Kaumana	124	1828	Priority 3	21
Hawaiian Paradise Park	97	4187	Priority 3	22
North Kohala	122	2131	Priority 3	23
Honoka'a-Kukuihaele	93	1329	Priority 3	24
Pahoa	95	2137	Priority 3	25
Hilo: Kahuku-Kaumana	144	1192	Priority 3	26
Ka'u	112	2481	Priority 3	27
Kea'au	110	1515	Priority 3	28
Pa'auhau-Pa'auilo	120	971	Priority 3	29
Kalapana-Kapoho	75	1175	Priority 3	30
Orchidland-Ainaloa	96	1663	Priority 3	31
Volcano-Mt. View	114	1371	Priority 3	32
Upper Puna (Puna Mauka)	111	2651	Priority 3	33

Figure 1: Updated Hawai'i Island Priority Upgrade Areas Established by HCPT in 2022.<sup>53</sup>

<sup>53</sup> Michael Mezzacapo and Christopher Shuler, 2022

**Cesspools:  
Prioritization  
Category by Tract**

- Priority 1
- Priority 2
- Priority 3

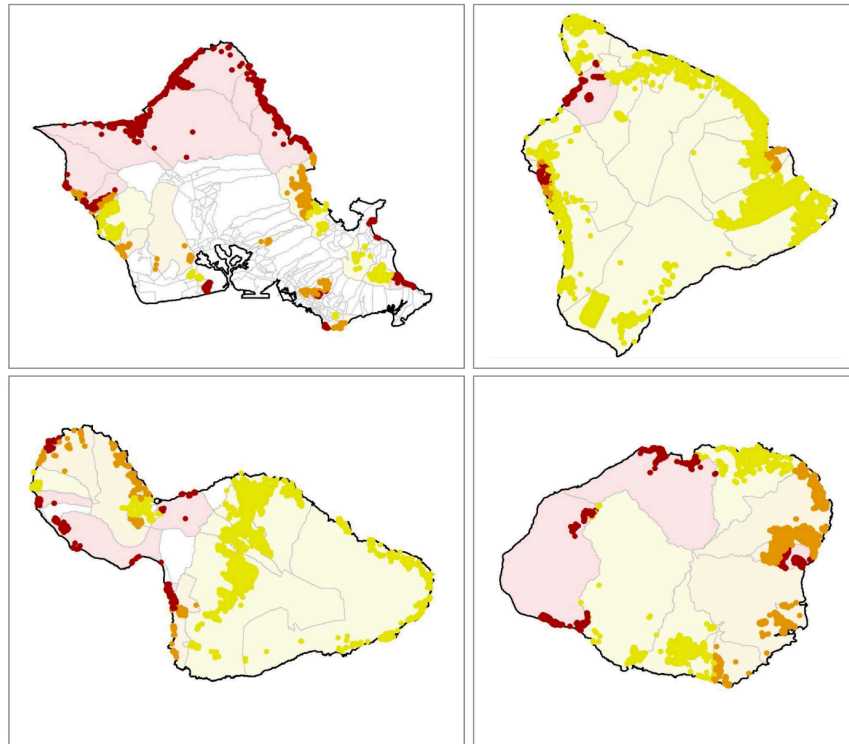


Figure 2: Identifying priority cesspool conversion utilizing HCPT.<sup>54</sup>

Identifying which cesspools cause the most impact on the health of people and the environment and prioritizing their conversion is a critical component of the statewide plan for conversion. Though the state may have determined what cesspools are top priority for conversion, a critical first step for upgrading systems is financing them.

### **Affordability and Financing for Cesspool Upgrades**

The cost of upgrading cesspools can be prohibitive and require creative financing solutions. In 2017, the Department of Health initially estimated that the replacement of a cesspool would cost around \$20,000 or more per system, with a total cost of \$1.75 billion. According to the DOH, *how* the new standard system needs to be installed will impact cost. For example, options like connecting to an already existing sewage treatment system, connecting multiple homes to a system or large-scale treatment systems will vary in cost. Four years later, a report on technologies was produced for the Department of Health that

<sup>54</sup> Michael Mezzacapo and Christopher Shuler, 2022

determined that the estimated cesspool conversion cost would range from \$9,000 to \$60,000 depending on various factors.<sup>55</sup>

A statewide conversion plan requires careful consideration for how funding and financing will impact stakeholders including homeowners, banks and the state:

- Affordable and reasonable financing options for homeowners and landowners;
- Determining cesspool conversion materials and labor cost adjusted for today's dollars;
- Providing appropriate and adequate financing for low-income households and senior citizens/kūpuna;
- Access to loans from financial institutions; and
- State and federal funding opportunities.

The cost of cesspool conversion is tremendous and poses a financial burden that many homeowners in Hawai'i simply cannot shoulder without significant support in the form of reduced cost, subsidies and/or alternative financing solutions. The effort to convert the tens of thousands of cesspools will require creativity and coordination across numerous industries and stakeholders. Engaging these key stakeholders and taking their perspectives and concerns into account is critical to building the momentum and securing the commitment needed to complete the monumental and expensive task of replacing cesspools across the state of Hawai'i.

For a more detailed discussion of six other States' pertinent examples for Hawai'i's situations, please see [Appendix C](#).

## 2.3. Community Engagement Review

Across Hawai'i Island, many shoreline communities are concerned about water quality along with the environmental and public health issues caused by cesspools. Some have lived with poor water quality and the health issues related to it for generations.<sup>56</sup> Community engagement and active participation in driving solutions is critical to the success of the cesspool conversion mandate by 2050. Whether the state can reach its goals

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<sup>55</sup> Carollo Engineers, 2021

<sup>56</sup> "Keaukaha Community Seeks Solutions to Wastewater Woes - Ka Wai Ola," accessed October 23, 2025, <https://kawaiola.news/aina/keaukaha-community-seeks-solutions-to-wastewater-woes/>.

will depend on whether it can adequately address the concerns of residents and educate homeowners on conversion options and resources.

Concerns over poor water quality and its impact on public health have long been issues in Hawai'i. News coverage from recent years shows concerns have increased in light of compounding factors such as climate change and reductions in federal funding for water quality monitoring. In Keaukaha, residents' concerns about strong sewage odors and possible health risks led to a 2025 study that confirmed fast-moving sewage in groundwater.<sup>57</sup> In Miloli'i, swimmers exposed to sewage-tainted seawater have reported staph infections and gastrointestinal ailments, including vomiting and diarrhea. "We've had families who have gotten sick," says resident Kaimi Kaupiko.<sup>58</sup> Organizations representing ocean users, such as the Surfrider Foundation, have sounded the alarm over water quality issues.<sup>59</sup> The July 2024 Hawai'i Wai Ola Data Analysis Report found frequent exceedances of regulatory standards and fecal indicator bacteria across the three case study areas of Kahalu'u, Keaukaha, and Puakō, corroborated by historical data from the HDOH (2005-2019). "It is definitely a common misconception — tropical turquoise beaches in a remote island chain = safe water," says Hanna Lilley, Surfrider's Hawai'i Regional Manager.

But as Hawai'i gets closer to the deadline to convert all of the state's cesspools to sounder systems, everyone — from environmental experts to residents — is expressing concern about the financial and logistical feasibility.

In some communities on Hawai'i Island, early indicators suggest the majority of residents are willing to support cesspool conversions if someone else pays for them. Communities like Puakō have invested over \$2.5M of community funding and decades of services to investigate solutions for cesspool conversion and organized an official 501c3 non-profit, Puakō for Reefs, with the sole focus to manage cesspool conversion. The Kahalu'u and Miloli'i communities have also invested in trying to build collaborative solutions for cesspool conversion with over a decade of community engagement. These communities are actively navigating how to implement solutions.

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<sup>57</sup> U. H. News, "UH Hilo Study Confirms Sewage Leaks into Keaukaha Waters | University of Hawai'i System News," February 4, 2025, <https://www.hawaii.edu/news/2025/02/04/keaukaha-waters-sewage-study/>.

<sup>58</sup> Paula Dobbyn, "Cesspools Threaten Big Island Reef Rich With Sea Life," Honolulu Civil Beat, November 20, 2024, <https://www.civilbeat.org/2024/11/hawaiis-love-affair-cesspools-ruining-reefs/>.

<sup>59</sup> "Why Are Hawai'i's Waters So Laden with Bacteria? - Surfer," accessed October 29, 2025, <https://www.surfer.com/news/hawaii-ocean-bacteria-surfrider>.

Based on an informal poll of community meeting attendees, more than 90% of residents in Puakō and Miloli'i are convinced that cesspools are a problem, and 70% or more are willing to do something about the problem if someone else pays for it, according to Greg Asner, who is the director of Arizona State University's Center for Global Discovery and Conservation Science and also runs a marine science lab in Miloli'i.

This attitude of "yes to conversion, as long as someone else pays" stems from the fact that the vast majority of Hawai'i residents cannot afford to pay for upgrades. About 85% of homeowners who have cesspools cannot afford a septic tank conversion, which can carry a median price tag of \$40,000. While many recognize and live with the threats posed by cesspools, they are concerned about and bound by the financial (and logistical) feasibility of converting them.

When faced with the financial burden of conversion and the environmental impacts of water pollution, many homeowners wonder whether their cesspool is directly contributing to the problem. Drawing this connection to a specific community or property could be a key element in convincing homeowners that action is needed not only theoretically, but practically and urgently.

Community outreach efforts are underway to better understand the concerns of residents and explore solutions. On Hawai'i Island, the Hawai'i County Mayor's Office has begun to gather community input from the high-priority areas of Puakō, Keaukaha, Miloli'i and Kahalu'u as of this writing. The primary themes that are emerging across these communities are concerns over economics, distrust and fatigue over fragmented communication by government officials, and a desire for environmental protection, health equity and locally driven solutions. These efforts build upon many organizations' collective work through community meetings, surveys and outreach efforts in recent years.

## 2.4 Financial Review: Funding Cesspool Conversions on Hawai'i Island

In reports commissioned and produced by the Department of Health, cesspool conversion on Hawai'i Island is estimated to cost ~\$2 billion.<sup>60</sup> The cost of conversion is prohibitive for many homeowners, and both Hawai'i County and individual homeowners will require financial support. Given the scale, County and individual homeowners cannot realistically

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<sup>60</sup> Hawai'i State Department of Health, *Summary Report: Cesspool Conversions Finance Research*, <https://health.hawaii.gov/wastewater/files/2021/02/financefinalreportr.pdf>.

bear the entire financial burden alone. Funding must be a collective effort, spread across all levels of government (federal, state and county) and blending funding sources between public, philanthropic, and private financing. In addition, costs must be spread out over a long period of time and have economies of scale to make conversion feasible for homeowners.

Importantly, there will be yearly maintenance costs for any system moving forward. These costs would be conveyed either through semiannual maintenance of single systems or a monthly maintenance fee for distributed or County systems.

Across Hawai'i Island, there are 49,000 cesspools on Hawai'i Island. Of those, an estimated ~7,000 of the cesspools were designated Priority 1 and 2 areas, due to the millions of gallons of effluent that flow into groundwater and popular nearshore areas frequented by residents and tourists.

Addressing the most problematic areas first, specifically the ~7,000 Priority 1 and 2 cesspools on Hawai'i Island, allows for prudent financial planning. Starting with priority conversions allows for creating a phase system for builds over the next 30 years. This phasing is necessary to:

- Investigate **financing** programs that can spread the significant spending over a longer period;
- Allow **manufacturers** to produce and supply necessary components at a sustainable rate; and
- Ensure the **labor force** has a steady pipeline of installations over a generation, supporting a stable workforce.

However, there are many funding opportunities to supplement costs to individuals and the County.<sup>61</sup>

## Overall Cost, Segmented

These three considerations of financing, manufacturing and labor, as well as ongoing operation and maintenance, lay a foundation for understanding the overall costs county-wide, community by community and household by household. Each of these groupings has its own unique financial circumstances to consider. To secure and manage

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<sup>61</sup> A current list of available funding resources, maintained by CCTF member WAI, can be found at <https://www.waicleanwater.org/financingwastewater>.

the necessary funding, the overall cost must be segmented and addressed through different mechanisms.

**County-Wide Infrastructure:** Addresses centralized sewer systems and major community-scale projects.

- Requires substantial state and federal funding to support the necessary infrastructure build;
- Will likely necessitate County bonding to secure capital; and
- Some homeowner upfront costs will also be required to tie into the new system.

**Community by Community Systems:** Addresses decentralized or cluster-based wastewater treatment. These community systems are designed to site-specific needs, and therefore range widely in their specifications and technology.

- Requires state and federal dollars for the build-out of these smaller, localized systems;
- Homeowners would incur a **monthly fee** to the system owner to process the wastewater; and
- Homeowners would also incur a **yearly maintenance cost** for system upkeep and inspection.

**Household by Household Conversion:** Addresses individual septic systems or advanced treatment units.

- Requires tools to offset the high cost of deployment with **Federal, State and County incentives;**
- Requires further offsetting of these costs by **long-lead and low-interest loans** through programs like the Clean Water State Revolving Fund (SRF) or other programs that make the cost to borrow cheaper than regular conventional rates; and
- The primary mechanism for assistance would be targeted toward priority communities 1 and 2 with an **180% Area Median Income (AMI) cap** to assist households who cannot afford other means of conversion.

Which of the three conversion methods chosen – sewer expansion, decentralized system, or individual household conversion – will depend on a variety of criteria, including but not limited to: cost estimate, lot size, proximity to existing sewer, DOH cesspool priority,

cesspool density, and available WWTP capacity.<sup>62</sup> The forthcoming County Integrated Wastewater Management Plan will inform which of the conversion methods is recommended for various areas of Hawai'i Island.

## Funding Options for Private, Public and Homeowner Solutions

These distinct entities — County, community and household — will have unique financial needs related to cesspool conversion. The scale and duration of converting cesspools across the Hawaiian Islands, and Hawai'i Island specifically, may require additional funding options for private, public and homeowner solutions. These solutions include grants, loans and federal funding. Presently, there are various funds, programs and loans that may directly apply to those seeking funding options for conversions. These funding options can be combined to ease the cost of conversion for individual homeowners.

Grants and Loans (Federal Funding)		
Program	Description	Key Financial Details
<b>Clean Water State Revolving Fund (CWSRF)</b>	Primary federal source providing low-interest loans to states for water pollution control, including decentralized systems and cesspool conversions.	Hawai'i's CWSRF had total assets of <b>\$638.8 million</b> as of June 30, 2024.
<b>USDA Rural Decentralized Water Systems Grant Program (DWS)</b>	Provides grants to qualified nonprofits to create revolving loan funds for homeowners in rural areas.	Loans can have a <b>1% fixed interest rate</b> , a maximum term of 20 years and a maximum loan amount of <b>\$15,000</b> per household.
<b>USDA Single-Family Housing Repair Loans and Grants</b>	Offers financial assistance for home repairs and improvements, including cesspool replacement.	Loans up to <b>\$20,000</b> at a <b>1% interest rate</b> . Grants up to <b>\$7,500</b> for applicants 62 years or older to remove health and safety hazards.

<sup>62</sup> DEM Private correspondence, 24 Nov 2025.

<b>Grants and Loans (Federal Funding)</b>		
<b>USDA Water &amp; Waste Disposal Loan &amp; Grant Program</b>	Provides long-term, low-interest loans to entities (governments, non-profits, tribes) to finance water and waste disposal projects in eligible rural areas.	N/A
<b>EPA Section 319 Grants</b>	Given to states to control nonpoint source pollution (like runoff from failing cesspools). Requires a non-federal match of 30% to 100%.	Administered by the DOH's Polluted Runoff Control Program.
<b>Water Infrastructure Finance and Innovation Act (WIFIA)</b>	Federal credit program for large-scale water and wastewater infrastructure projects (minimum size of \$5 million for small communities).	Can be used by state revolving fund programs to finance projects.
<b>Community Development Block Grant (CDBG)</b>	HUD program that can fund cesspool alternatives or septic connections.	Funding must be applied to low-to moderate-income households.
<b>PTA Negotiations</b>	Funds for cesspool conversions are being contemplated as part of a larger compensation package during lease negotiations for Pohakuloa Training Area (PTA).	N/A

*Figure 3: Federal grant and loan funding options available for cesspool conversion.*

**Tax Credits and Rebate Programs**

Act 188 of the 2025 Hawai'i State Legislature (HB879) provides a significant opportunity to help fund cesspool conversions in Hawai'i County. The legislation strengthens the Cesspool Compliance Pilot Grant Project by increasing the maximum grant amount available to homeowners from \$20,000 to \$30,000 per project, making conversions more financially feasible for residents facing high construction and permitting costs.

Additionally, the Act appropriates \$5 million for the grant program in each of the fiscal years 2025-2026 and 2026-2027, ensuring a steady funding source to support ongoing and

new conversion efforts. To further enhance implementation capacity, the Act also allocates funds to create a full-time, permanent Engineer III position within the Hawai'i Department of Health's Wastewater Branch, providing technical expertise and oversight to assist with project planning, permitting and compliance.<sup>63</sup> Collectively, these measures make Act 188 a key tool for expanding and accelerating cesspool conversion efforts in Hawai'i County, helping protect groundwater, coastal ecosystems and public health.

## Other Financing Solutions

Wastewater experts and elected officials across the state are advocating for creative funding solutions and lower-cost options to make cesspool conversion more feasible for residents. In 2024, Kaua'i County launched the state's first reimbursement program for homeowners, which sought to provide grants to 100 homeowners to assist in cesspool conversions to septic systems. The county received more than 200 applicants.<sup>64</sup> In 2025, the Department of Hawaiian Homelands initiated a pilot program for the Wai'anae Valley Community to explore solutions and a timeline for cesspool conversion.<sup>65</sup> Members of the Honolulu City Council are exploring a measure to use funds from the climate resiliency fund to convert outdated systems on O'ahu.<sup>66</sup> On Hawai'i Island, the County's Office of Housing and Community Development recently announced its Home Improvement Loan Program (HILP) for low- and moderate-income homeowners.<sup>67</sup> The program would provide loans of \$2,000 and \$50,000 at a 3% interest rate. Cesspool upgrades are eligible under this program. As residential cesspool grant funding becomes available, the office of housing can distribute funds through this established program. Communities could also pursue

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<sup>63</sup> Act 188: A Bill for an Act Relating to Cesspool Conversions, HB879, State of Hawai'i (2025).

<sup>64</sup> Léo Azambuja, "Cesspools: Too Environmentally Harmful To Keep, Too Expensive To Get Rid Of," Honolulu Civil Beat, September 12, 2024, <https://www.civilbeat.org/2024/09/cesspools-too-environmentally-harmful-to-keep-too-expensive-to-get-rid-of/>.

<sup>65</sup> "Wai'anae Valley Cesspool Conversion Pilot Project | Department of Hawaiian Home Lands," accessed October 22, 2025, <https://dhhl.hawaii.gov/po/waianae-valley-cesspool-conversion-pilot-project>.

<sup>66</sup> Ian Bauer, "City Council discusses helping with cesspool conversion," March 10, 2025, <https://www.staradvertiser.com/2025/03/10/hawaii-news/city-council-discusses-helping-with-cesspool-conversion/>

<sup>67</sup> Emma Caires, "Loan Program Seeks to Help Lower-Income Big Island Homeowners Maintain Properties," Hawai'i Public Radio, August 1, 2025, <https://www.hawaiipublicradio.org/local-news/2025-07-31/loan-program-seeks-to-help-lower-income-big-island-homeowners-maintain-properties>.

mechanisms such as Improvement Districts and Community Facilities Districts, which are mechanisms laid out by the County of Hawai'i to finance community scale projects.<sup>68</sup>

The following options offer a relatively small amount of funding compared to the overall estimated costs for cesspool conversions. However, these options offer a potential pathway to help catalyze larger amounts of money to assist priority areas with conversions. The Hawai'i State Legislature can also influence and decide whether to add to this funding stream. There are numerous financial funding possibilities to support the statewide cesspool conversion plan. And, in order to support the conversion process, challenges and potential solutions must be considered. The CCTF offers these ideas as a starting point for further study:

- **Private/Mortgage Loans:** A policy change at the state or county level could be enacted to require cesspool conversions at the point of sale of homes and include the cost in mortgage financing where necessary. A corresponding increase in grant and/or loan amounts to prevent undue financial hardship on homeowners could also be recommended along with this method. See Appendix C: Massachusetts and Rhode Island for examples of point-of-sale financing.
- **On-Bill Financing Programs:** The County could assess a monthly fee on utility bills (similar to sewer connections) to finance conversions over time. See Appendix C: Maryland for an example of monthly fee financing.
- **Green Fee funds:** in 2025, Act 96 was signed into law, using an incremental increase in Transient Accommodation Taxes to fund initiatives that increase Hawai'i's resilience to climate change impacts. The current structure of the law requires legislative appropriations as the mechanism for funding to be distributed on an annual basis to state agencies and counties.<sup>69</sup>

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<sup>68</sup> Chapter 12: Improvements by Assessments; Chapter 32: Special Improvements Financing by Community Facilities Districts, Hawai'i County Code, amended 2016.

<sup>69</sup> As of this writing, possible amendments to Act 96 are under discussion - primarily with regard to enabling bonding as an allowable use of Green Fee funds, as well as creating a more direct pathway for community groups and nonprofits to receive Green Fee funds for appropriate projects. The CCTF recommends an amendment to enable bonding; see [V. Recommendations](#).

## III. Conversion Challenges

The key considerations for achieving complete cesspool conversion on Hawai'i Island by 2050, from engaging stakeholders to financing the upgrades, each have unique challenges. These challenges require additional examination in order to execute this plan. This section will focus on elements of the statewide plan analysis and which specific challenges arise in execution, including measuring the dangers of cesspools, collaboration and conflict between stakeholders, prioritizing, executing and managing upgrades, and financing and funding cesspool upgrades.

**Based on the analysis above, we have identified four key challenges to cesspool conversion: accurate and detailed water quality measurements to quantify the danger of cesspools, engaging and educating a diverse range of stakeholders, navigating the various complexities of conversion execution, and financing cesspool upgrades.**

### 3.1 Measuring the Dangers of Cesspools

Measuring water quality is an important aspect of a properly functioning waste management system, and is essential to quantifying the harm caused by cesspool runoff.<sup>70</sup> Continuous and trustworthy data that demonstrates the impact of cesspools on groundwater and nearshore waters is important evidence for communities to convey the importance of conversion.

There are numerous technical and procedural considerations for measuring water quality that will impact the conversion plan and execution. These considerations include laboratories, staff, funding, testing and data management, and approval processes. The important procedural elements of measuring cesspools range from funding for an office and staff that are able to measure, examination of results and approval of water quality measurements. Each of those steps requires technical elements, including expertise and execution, to be able to measure water quality and issue approvals.

These considerations present unique challenges related to cost, expertise and effectiveness of the process itself. For example, an existing or new office must be assigned

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<sup>70</sup> Hawai'i State Department of Health, *Summary Report: Cesspool Conversions Finance Research*, <https://health.hawaii.gov/wastewater/files/2021/02/financefinalreportr.pdf>.

to this task, dedicated staff must be trained, a process for determining how the water quality will be measured and examined must be established, and the actual process of issuing approvals (or citations and violations) of the water quality must be established.<sup>71</sup> Currently, the State of Hawai'i and the Division of Aquatic Resources is actively working to improve access and accuracy to measuring the dangers of cesspools for both human and coastal health. Thus, DOH has recommended more research about evaluating coastal areas, existing watersheds and aquifers.<sup>72</sup> The Division of Aquatic Resources and partners WAI, CORAL, and TNC are preparing a Statewide Water Quality Monitoring Systems Map and GIS layer to identify gaps and opportunities to secure clean water. Hawai'i Wai Ola, a quality assured citizen science water quality monitoring program, continues to gather data on shoreline water quality to quantify the impact of cesspools. Measuring the impact and benefit of cesspool conversion is a critical part of designing a successful generational conversion plan and will require layers of stakeholder action and support.

Additionally, Hawai'i Island has unique geological and geographical features that pose challenges to measuring water accurately. Extensive research is required to better understand how these complex geological and geographical characteristics impact groundwater. For example, in August 2025, the University of Hawai'i at Mānoa and Scripps Institution of Oceanography conducted research to confirm whether there is a massive underground reservoir of fresh water beneath the seafloor. Peter Kannberg, who led this research project and is an associate researcher at the University of Hawai'i Mānoa School of Ocean and Earth Science and Technology, stated:

If proven, this deep water could explain long-standing mysteries about Hawai'i Island's water cycle — namely, why observed coastal discharge doesn't match estimated groundwater recharge... In simple terms, a lot of water is missing from current models.<sup>73</sup>

This potential finding disputes conventional thinking about hydrology in the Hawaiian Islands and reveals a deep need for additional research. In addition to gaps and potential

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<sup>71</sup> Hawai'i State Department of Health, 2021

<sup>72</sup> Hawai'i State Department of Health, Environmental Management Division, *Report to the Twenty-Ninth Legislature, State of Hawai'i: 2018 Regular Session – Relating to Cesspools and Prioritization for Replacement*, <https://health.hawaii.gov/opppd/files/2017/12/Act-125-HB1244-HD1-SD3-CD1-29th-Legislature-Cesspool-Report.pdf>.

<sup>73</sup> University of Hawai'i System News, "Searching for freshwater off Hawai'i Island could solve mystery," accessed November 9, 2025, <https://www.hawaii.edu/news/2025/08/03/searching-for-freshwater-off-hawaii-island/>.

disputes within research and academic communities, community members have also called for further research that pinpoints *where* and *how* cesspools from a particular neighborhood or community are contributing to groundwater and/or nearshore pollution. Localizing research and focusing on this level of specificity may prove challenging from not only a scientific but also a cost perspective.

## 3.2. Fostering Collaboration Between Stakeholders

Engaging stakeholders and facilitating shared solutions is an important aspect of the statewide cesspool conversion plan. Stakeholders will need engagement, support and education in order to convert the many thousands of cesspools across Hawai'i Island. There are four main groups of stakeholders, including, but not limited to: homeowners (and homeowners' associations), business owners, financial institutions and government. While the County has considered the needs of numerous stakeholders, engaging stakeholders is a challenging task in and of itself. And, despite these efforts, there is still potential for various challenges to arise between stakeholders.

In some cases, the relationships between stakeholders are symbiotic and mutually beneficial. For example, a construction company will need employees that have the training and skills to complete cesspool conversions. In this instance, a relationship might be forged between the company and a workforce organization or local college, or a bank creating favorable loans for homeowners who need support financing their cesspool conversion.

As described in the [section on financing pathways](#), there is a significant cost for converting cesspools. Thus, an inherent tension exists between the State, which is requiring conversion; the County, which is obligated to update certain wastewater systems; and the homeowner, who must pay for some or all of the conversion either in the form of increased sewer rates or taxes, or by outright paying for an individual system.

Each stakeholder has their own needs related to the conversion plan, and each stakeholder may require technical, departmental or financial support. For example, homeowners will need clear information about conversion and finances and education about available technologies for conversion.<sup>74</sup> In this case, there are opportunities for cross-sector collaboration in determining how information is shared and communities are supported in

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<sup>74</sup> Hawai'i State Department of Health, *Summary Report: Cesspool Conversions Finance Research*, <https://health.hawaii.gov/wastewater/files/2021/02/financefinalreportr.pdf>.

this transitional phase. Whether you are a homeowner or a financial institution, there are important supports needed in order to foster collaboration between stakeholders.

### 3.3. Prioritizing, Executing and Managing Upgrades

There are myriad complexities in prioritizing, executing and managing upgrades to cesspool systems. This process involves the efforts of numerous stakeholders, including multiple levels of government, engineers, contractors, homeowners and landowners, and, in the case of private conversions, lenders. At various stages, these parties will need to interact to convert cesspools. Each stakeholder group faces a significant challenge:

- **Homeowners** need resources on options and financing.
- **Construction companies** will require materials, workers and steady funding resources.
- **Financial institutions** (and possibly the State) will need to offer adequate financing to fund these projects.
- **The County** will require the capital and human resources to extend municipal sewer lines as well as to manage permitting processes for individual conversions and processing of applications for wastewater improvement districts. Taken together, the County will need increased administrative, planning, engineering, construction and permitting capacity.
- **The State** will need personnel and resources to track and approve conversions.

All of these challenges are interrelated and could be improved or exacerbated by other stakeholders. From a process perspective, conversion can be broken down into three main steps, each of which comes with its own challenges outlined below.

#### **Step 1: Determine which cesspools are the highest priority and need to be converted first.**

Although the statewide cesspool conversion plan provides a detailed measuring tool for determining priority based on the 15 indicators outlined. Technological and geological factors can impose limitations on the ability to measure negative impact of specific cesspools.

In addition, other factors such as geology, location and qualification for various technical solutions and financing instruments may also play a role in determining prioritization and feasibility for conversion. The County will need to develop a prioritization matrix specific to the county to determine where to allocate resources.

## **Step 2: Execute conversion of the systems, including physical, geographic and geological challenges.**

Hawai'i Island poses specific physical, structural and workforce challenges related to the conversion process.

### **Geographic and Geological Challenges**

- **Limited Centralized Sewer:** A majority of the population lacks access to a centralized sewer system, forcing reliance on more expensive and complex individual wastewater systems (like septic). Centralized sewer systems have limitations on where they can be effectively and affordably installed, leading to high conversion costs for the county.
- **Volcanic Rock:** The young volcanic rock substrate on Hawai'i Island makes tank installation far more costly and challenging than in soil-based areas.
- **Limited Topsoil:** The scarcity of topsoil on the island makes leach fields difficult to install and operate effectively.
- **Porous Near-Shore Rocks:** Prevalent in close-to-shore properties, this allows effluent to travel quickly and directly into near-shore waters.
- **Shipping and Manufacturing Logistics:** Septic tanks are made almost exclusively on the continent, and shipping them to Hawai'i contributes a huge upfront cost and logistical challenge.
- **Community Design:** Many communities do not have access to County water and have small household lot sizes, which cannot accommodate proper leachfield design.

### **Economic Challenges**

- **Workforce development:** Hawai'i Island will need a concerted workforce development effort to establish the capacity to complete cesspool conversions at the necessary scale, including funding sources for these kinds of initiatives. Training,<sup>75</sup> equipment subsidies and/or small business loans/incentives are needed to increase the conversion workforce, fostering competition and accelerating the work.

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<sup>75</sup> Workforce development efforts have begun in partnership with independent nonprofits like WAI, which provide a valuable pilot to study for possible expansion. Please see <https://www.waicleanwater.org/dwrtc> for more information on these existing training opportunities.

- **Economic Opportunity:** Conversion represents a potential opportunity for local residents to create small business and living-wage jobs that do not require significant investment in post-secondary education. Current estimates suggest a minimum of **six septic system installation crews** working consistently from now until **2050** is required just to tackle the priority 1 and 2 conversions alone.<sup>76</sup>

### **Step 3: Monitoring and maintaining updated systems for proper use.**

Each conversion solution requires a maintenance and monitoring plan that will need to be managed at the individual, community and/or County level. The Hawai'i DOH has created a new Surface Water Protection Branch which will oversee the maintenance and operation of individual wastewater systems (IWS). Once a conversion solution is implemented — whether sewer extension, neighborhood-scale distributed systems or IWS — the County will need a procedure for monitoring the waste management system. Challenges related to this monitoring relate to the workforce responsible and the budget responsible.<sup>77</sup>

## 3.4. Financing and Funding Cesspool Upgrades

Fair and affordable financing options are essential for individuals who need to convert their substandard systems. Operationally, financing and funding are critical to executing any conversion plan. This particular challenge is foundational to many of the other challenges. For stakeholders, understanding and solving the funding issue is paramount to making the completion of the conversion plan possible. These considerations include:

- **High Costs:** Integrated sewer costs are in the hundreds of millions to service some communities. Individual septic conversion estimates carry **a median price of \$40,000 but can cost as much as \$70,000.**
- **Financial Burden:** The high cost places a significant financial burden on many families without robust grant and cost-offsetting programs.
- **Ongoing Maintenance:** All future options will have ongoing costs (yearly maintenance for septic, monthly fees for sewer).
- **Rising Costs:** Costs for shipping and manufacturing of septic tanks and accessories are tied to the rising cost of petroleum.
- **Funding Gap:** A significant funding gap needs to be addressed for less affluent communities.

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<sup>76</sup> Based on calculating worker, equipment and materials availability combined with the number of cesspools.

<sup>77</sup> Hawai'i State Department of Health, *Summary Report: Cesspool Conversions Finance Research*, <https://health.hawaii.gov/wastewater/files/2021/02/financefinalreportr.pdf>.

The cost of converting cesspools is prohibitive to two key stakeholder groups: the County, and the homeowners and landowners that must finance the upgrade. Managing cesspools adds considerable costs and responsibilities onto the County, particularly in tracking water quality and the status of cesspool upgrades. Individual homeowners or landowners have a significant cost related to converting their waste management system. Combining potential funding streams can alleviate these financial stressors both on the County and homeowners, and will have to be customized to each community based on their unique needs.

There are numerous factors in the statewide plan that may cause challenges for the County and all stakeholders, and this conversion effort could face potential challenges at every step of the way. Assessing priority areas, building, maintaining and monitoring are all interconnected and have specific financial and operational needs. Cost is a critical challenge to overcome. Without proper financing options, homeowners will avoid cesspool conversions, leading to community conflict and potential noncompliance with the state mandate. In order to test the technology, finances and challenges of cesspool conversion in Hawai'i, case studies provide an opportunity to simulate a project from start to finish.

## IV. Case Studies: Opportunities for Progress

### 4.1. Solutions and Collaborations with Hawai'i Island Communities



*Figure 4: Hawai'i Island case study locations: Puakō, Keaukaha, Miloli'i and Kahalu'u*

Within the 2018 Legislature Report, the Hawai'i Department of Health Wastewater Branch outlined four priority levels to determine cesspool conversion, as well as a list of priority upgrade areas. Additionally, the 2022 Hawai'i Cesspool Prioritization Tool (HCPT), prepared by University of Hawai'i researchers for the DOH and CCTF, laid out the key factors that determine the level of risk a given cesspool poses to the surrounding environment. The four "case study" locations included in this report were identified in the 2018 Legislative Report and were also chosen to explore the potential pathways for cesspool conversion and the various barriers and challenges that communities across Hawai'i may face in converting cesspools.

The four case study locations include Puakō, Keaukaha, Miloli'i and Kahalu'u. The technological solutions for each area, based on geography, geology, community sentiment and pre-existing infrastructure, represent a range of possible solutions to examine, from

sewer extension to neighborhood-scale small treatment systems to IWS conversions. Each of these communities has had long-standing grassroots conversations about the need for conversion. At the time of the writing of this report, further community input is required to ensure that conversion plans align with community needs and priorities; the intention of this section is to propose a viable pathway for each community to consider.

The overarching common concerns for all four of these areas include a heavy reliance on cesspools currently, proximity to shore and porous volcanic soil that allows for rapid transport of sewage into the ocean.<sup>78</sup> This section outlines these four case studies, including a brief overview and update on the status of cesspool conversion currently, the unique or key factors to consider in this community and the immediate next steps. The Next Steps sections aim to address the logical or easily feasible action items in these particular communities based on previous work and community desire.

This section does not aim to lay out the entire pathway of total cesspool conversion for each case study. There are many choices that have to be made as the County discusses options with each community. Financing pathways will also be a determining factor as to how these projects might come to fruition. The Recommendations section covers broader paths forward for the County of Hawai'i and other communities.

## 4.2. Puakō

Puakō is a small coastal community in South Kohala. Within the South Kohala District, there are approximately 4,500 cesspools, and all of the cesspools within Puakō, Waikōloa, 'Anaeho'omalū and Waikōloa Village are Priority 1.<sup>79</sup> There are no County-run WWTPs in South Kohala; however, there are 10 privately owned and operated WWTPs within the South Kohala District.<sup>80</sup>

Puakō is characterized by a long history of strong community involvement. The Puakō community has been highly active on this issue for over 15 years, including creating a 501(c)(3) nonprofit, Puakō For Reefs (PFR), focused on the issue of wastewater runoff. They hold annual fundraisers and, as of the creation of this report, have already spent \$2 million

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<sup>78</sup> Ecosolutions, "Miloli'i Clean Water Project Engineering Report," July 28, 2025.

<sup>79</sup> Michael Mezzacapo and Christopher Shuler, *2022 Hawai'i Cesspool Hazard Assessment & Prioritization Tool*, WRRRC-SR-2022-02 (University of Hawai'i Water Resources Research Center, 2022).

<sup>80</sup> Clean Water for Reefs Puakō, Hawai'i, "Puakō and South Kohala Regional Wastewater Master Plan," ArcGIS StoryMaps, June 13, 2024, <https://storymaps.arcgis.com/stories/0779d87eb08549e296ade72f5b33dbbe>.

on feasibility studies.<sup>81</sup> A 2017 study conducted by Aqua Engineering and CORAL researched alternatives for the most cost effective and environmentally beneficial solution for Puakō.<sup>82</sup> This study recommended a decentralized private system or connecting to the nearby utility, as outlined below.

### **Recommended Next Steps**

Puakō for Reefs (PFR), a nonprofit 501(c)(3) founded by Puakō residents, petitioned the County of Hawai'i to form a Community Facilities District (CFD) in August 2025, by submitting a preliminary CFD application to the County of Hawai'i Department of Finance. A CFD is a special taxing district that the County could authorize to finance public improvements and services in a specific area, in this case, the Puakō community.<sup>83</sup> If a CFD is ultimately approved through the various levels of evaluation (County, County Council, and community vote), the CFD special tax would be included as a part of the annual County property taxes that Puakō residents pay. The CFD special tax would be collected from Puakō residents to finance the installation of sewer lines that connect homes in the neighborhood to the nearby privately owned wastewater treatment plant (WWTP) at Mauna Lani Resort. The Mauna Lani WWTP has agreed in principle to this plan and confirmed that their plant can accommodate the additional capacity for treatment. Puakō residents have also met with representatives from the U.S. Department of Agriculture (USDA), who confirmed that the Puakō area is eligible for a USDA loan.<sup>84</sup> PFR has requested that the County be the borrower for the proposed USDA loan and take ownership of the

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<sup>81</sup> Karen Anderson, "Puakō as a Model for Community-Initiated Cesspool Conversions Proposal to EMC and Cesspool Conversion Task Force," Puakō for Reefs, August 2025, [https://drive.google.com/file/d/1uk4f\\_ZXHo1WXgpx\\_zgh2BfYwsjIU8jY\\_/view?usp=embed\\_facebook](https://drive.google.com/file/d/1uk4f_ZXHo1WXgpx_zgh2BfYwsjIU8jY_/view?usp=embed_facebook).

<sup>82</sup> CORAL, Aqua Engineering, "Puakō, Hawai'i Feasibility Study and Preliminary Engineering Report, Amendment #1" June 2017.

<sup>83</sup> The County of Hawai'i has granted a CFD in the past in Kaloko Heights, which allowed improvements and extensions of sewer lines. Kaloko Heights residents, in affiliation with Redwood Capital Finance Company (RCFC), entered into an agreement with the County to establish a CFD as a mechanism for financing the wastewater extension project. While the Kaloko Heights subdivision was initially designed with cesspools as the primary wastewater management method, regulations changed amid the design process, so the plans were reconfigured to account for installing sewer lines and connecting to a County WWTP. The County of Hawai'i issued \$14.425 million in Special Tax Revenue Bonds to finance the sewer improvements. The tax is imposed on Kaloko Heights residents, except for those in the affordable housing sections of the subdivision (Environment Hawai'i, 2023). Further details about CFDs and the approval process are outlined in [this document](#).

<sup>84</sup> Puakō is not eligible for a USDA grant, because the average income of households in the community is above the grant threshold.

system.<sup>85</sup> The ownership and maintenance responsibility for the sewer lines remains an outstanding question to be resolved.

The imperative for cesspool conversion provides steep challenges across the State and County. We acknowledge these challenges, and seek to use these case studies to identify roadblocks and create pathways for other communities to follow. Puakō as a community is motivated to serve as a model for other communities and are well on their way to do so, given their PFR nonprofit and preliminary CFD application. Puakō may become a strong example for other communities who also have access to a nearby private WWTP.

### 4.3. Keaukaha

Keaukaha, extending from Hilo Harbor to Lehia/Puumaile, is a community near Hilo with extraordinary beaches, cultural sites, traditional fish ponds and a close-knit community, including many families residing on Department of Hawaiian Home Lands lots. The community's homes are very close to sea level and have an extremely high density<sup>86</sup> of individual onsite wastewater disposal systems (OSDS), or cesspools. The bottoms of many cesspools in Keaukaha are below sea level, and even those further inland likely flood with seawater during high tide. When cesspools have contact with the tidal water table, it allows for rapid transmission of sewage into the ocean and less time for soil to treat the wastewater.<sup>87</sup>

A significant number of streams and groundwater flows into Hilo Bay, further intensified by heavy rainfall in the areas upslope of Hilo. The 2018 DOH report found 8,700 cesspools in the Hilo Bay Area that discharge into these streams and groundwater, however the recommended reassessment would likely detect higher numbers of cesspools. The breakwater in Hilo Bay prevents the discharge from mixing with ocean water, essentially trapping the bacteria and sewage runoff within Hilo Bay.<sup>88</sup>

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<sup>85</sup> Anderson, "Puakō as a Model for Cesspool Conversions."

<sup>86</sup> Areas with 15 OSDS/km<sup>2</sup> or more have the potential to contaminate groundwater, and densities higher than 61 OSDS/km<sup>2</sup> are highly likely to impact ecosystem health from wastewater. Nakoia 2023 measured 14 areas in Keaukaha from Reeds Bay to Lehai — 11 had greater than 15 OSDS/km<sup>2</sup>, and in particular the Puhi Bay area had up to 112 OSDS/km<sup>2</sup>. Nakoia, J.W.P., III., 2022. Dilution of sewage pollution in the coastal waters of Hilo, Hawai'i, U.S.A.: An area with high river and groundwater inputs. M.S. Thesis, University of Hawai'i at Hilo, Tropical Conservation Biology and Environmental Science Graduate Program.

<sup>87</sup> McKenzie T, Habel S, Dulai H. 2021. Sea-level rise drives wastewater leakage to coastal waters and storm drains. *Limnology and Oceanography Letters*. 6(3):154-63.

<sup>88</sup> Environmental Management Division, *Report to 2018 Regular Session Legislature*.

Keaukaha Census Tract was assessed as Priority 2 by the 2022 Hawai'i Cesspool Hazard Assessment & Prioritization Tool, but many cesspools along the shoreline were assessed as Priority 1 when analyzed at the finer-scale census block-groups. A high priority is reasonable given the extremely high density of OSDS and the rapid transport of wastewater into the ocean. Dye tracer tests conducted on homes in Keaukaha showed travel times and flow rates faster than areas that were listed as Priority 1 (Puakō, West Maui). At homes close to the shoreline, dye reached the ocean in less than a day. This is 15 times faster than previous estimates of groundwater flow in the Hilo area.<sup>89</sup>

Keaukaha is known for its loko i'a (fishponds), and protecting the loko i'a is a high priority for the Keaukaha community, restoring and maintaining Hawaiian cultural traditions. Keaukaha is also home to the Keaukaha Homestead, the second established Hawaiian Homestead. The Native Hawaiian families in Keaukaha Homestead have already been disproportionately affected by pollution and sewage from the Hilo International Airport construction and the Hilo Sewage Treatment plant.<sup>90</sup>

### **Recommended Next Steps**

Most homes along the immediate Keaukaha shoreline are connected to the Hilo WWTP. Homes near the shoreline (makai of the airport) are on individual OSDS but could consider connecting to the Hilo WWTP, if capacity allows, given the proximity of existing sewer lines near the shoreline. Reassessment of Keaukaha is recommended due to the fast flow rates of wastewater in dye tracer tests and the high density of OSDS.<sup>91</sup> Reassessment, potentially leading to reprioritization, could catalyze resources to upgrade cesspools in this area and manage environmental impact. In Keaukaha, collaboration with the Department of Hawaiian Home Lands (DHHL) and a strong effort toward local workforce development will be essential in order to design and implement a conversion plan.

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<sup>89</sup> Waiki SM, Colbert SL, Wiegner TN, Puniwai N, Nakoa III JW, Storie NM, Nelson CE, Overly AN, Mcdermid KJ, Aguiar DK. 2025. Sewage pollution from onsite sewage disposal systems and an offshore wastewater treatment plant outfall in coastal waters of Keaukaha, Hawai'i Island. *Journal of Hydrology: Regional Studies*. 57:102122.

<sup>90</sup> Carter M. 2022. *Effects of Development on Native Hawaiian Communities* (Senior Thesis, The University of Arizona.).

<sup>91</sup> Waiki SM, Colbert SL, Wiegner TN, Puniwai N, Nakoa III JW, Storie NM, Nelson CE, Overly AN, Mcdermid KJ, Aguiar DK. 2025. Sewage pollution from onsite sewage disposal systems and an offshore wastewater treatment plant outfall in coastal waters of Keaukaha, Hawai'i Island. *Journal of Hydrology: Regional Studies*. 57:102122

## 4.4. Miloli'i

Miloli'i is a remote, coastal community that consists of a fishing village (50 homes), a subdivision (~270 homes and 645 additional vacant lots), plus privately owned agricultural land and State land. Known as the "Last Hawaiian Fishing Village," Miloli'i Village has a strong cultural legacy of traditional fishing practices. The offshore region around Miloli'i is also protected for fishing access and marine resources in a Community-Based Subsistence Fishing Area comprised of an 'Ōpelu Traditional Management Zone and Pu'uhonua (marine sanctuary) Areas.<sup>92</sup> The historic value and present significance of these marine areas for biodiversity and subsistence fishing make Miloli'i a high priority for cesspool conversion and septic system avoidance.

Miloli'i Subdivision is also experiencing faster population growth than the rest of Hawai'i County, making conversion especially important as development increases. Between 2010 and 2022, Miloli'i's population grew by 11.3% compared to the State of Hawai'i's 5.6% growth. Additionally, the per-year average growth of new homes built in Hawai'i County was 0.9%, while Miloli'i's was approximately 8%.<sup>93</sup>

Miloli'i faces unique challenges, in addition to their proximity to shore, porous rock and reliance on cesspools and septic systems with open leach fields. Miloli'i is a remote community with limited access to water and utilities. There are no municipal utilities other than power within the Miloli'i subdivision, and no utilities at all within the Miloli'i village. Each home relies on rainwater catchment or hauled water for its water supply. There are no wastewater treatment plants, no existing sewer lines and limited access to potable water.<sup>94</sup>

Current Hawai'i County Zoning Ordinances and/or HDOH Administrative Rules (HAR) related to minimum lot size and setbacks for Individual Wastewater Systems (IWS) are a major challenge in dense, small-lot communities like Miloli'i and potentially others. While IWS are authorized in Miloli'i Village and Miloli'i Subdivision, septic systems are ineffective in the rock substrates and likely still allow effluent into the marine waters. Community wastewater with onsite disposal (including drain/leach fields) would also still allow effluent into nearby marine waters.<sup>95</sup>

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<sup>92</sup> Ecosolutions, "Miloli'i Clean Water Project Engineering Report," July 28, 2025.

<sup>93</sup> Ecosolutions, "Miloli'i Engineering Report."

<sup>94</sup> Ecosolutions, "Miloli'i Engineering Report."

<sup>95</sup> Ecosolutions, "Miloli'i Engineering Report."

## Recommended Next Steps

Considering the difficulties that would likely ensue from implementing community-wide IWS in Miloli'i, the other likely option would be to opt for a sewer system and a wastewater treatment plant of some form, neither of which currently exist in Miloli'i. Further research is required to explore funding options to finance sewer creation as well as the individual steps from design to permitting to construction for complete installation. This report focuses rather on the potential for an alternative wastewater treatment plant that is regenerative and could provide water for reuse.

One proposal for treatment is a community Wastewater Reclamation Facility (WWRF) that generates recycled water for onsite reuse. The WWRF is a regenerative and holistic treatment method for purifying wastewater, using natural plant processes. It can be designed to incorporate native plants and canoe crops, simultaneously contributing to restoring native and culturally significant plant species in the area.<sup>96</sup>

Given the limited water supply in Miloli'i, this additional source of usable water would be a great benefit to the community. The quality of water expected from this wastewater system is R1 water, the highest quality recycled water allowed for irrigation (spray or drip), firefighting and cleaning. R1 use requires a distribution system and specialized operators, which could be included in initial designs given the fact that if Miloli'i were to opt for a sewer and WWRF system, it would have to be built from the ground up. Wastewater Alternatives and Innovations (WAI) has produced a Preliminary Engineering Report (PER) that includes greater detail of the WWRF, including potential land parcels for the facility. There are various possible structures for ownership of the facility, including but not limited to: a non-profit (which the existing Miloli'i HOA could be a member of); a Community Facilities District; third-party ownership by a for-profit business (services are sold to community members); co-op system where profits are shared with owner-members, including residents, service providers, and adjacent landowners; a public/municipal system owned and operated by the County; or a public/private partnership paid for by the County but operated privately.<sup>97</sup> Further research is required to determine the best funding mechanisms for the Miloli'i WWRF and sewer system, as well as the best ownership structure.

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<sup>96</sup> Ecosolutions, "Miloli'i Engineering Report."

<sup>97</sup> Ecosolutions, "Miloli'i Engineering Report."

## 4.5. Kahalu'u

Kahalu'u is a major residential and tourism area outside of Kailua-Kona, with dense urban development within 10-500 m of the reef. Kahalu'u was assessed as Priority 2, as it faces mounting ecological pressure from development and urbanization — with 400,000 beachgoers per year, the reefs and beaches of Kahalu'u suffer physical damage, as well as impaired water quality due to cesspools and urban development mauka. However, the Priority ranking was based on an incomplete data set that missed more than 60 cesspools within 250 yards of the shoreline. A dye tracer test at Kahalu'u Bay measured the fastest flow of groundwater on Hawai'i Island from a cesspool to the shoreline at greater than 300 yards per day.<sup>98</sup> Although it is increasingly urban, Kahalu'u does currently qualify for USDA Rural Development Funding, as it is just outside of the Kailua-Kona census tract.<sup>99</sup>

Cultural and historical protection is especially important in Kahalu'u, as it is home to many important ancient Hawaiian historical sites and rich cultural heritage. These precious cultural sites require great attention and care, especially as they are threatened by sea level rise and increasing development.

Additionally, Kahalu'u Bay is home to an ecologically and economically important coral reef system. The bay's shallow and protected nature provides a nursery for rare corals, endemic species found nowhere else in the world, and threatened honu. Therefore, protecting Kahalu'u reefs now has significant ramifications for the future health and existence of these rare and threatened species.<sup>100</sup>

### **Recommended Next Steps**

Kahalu'u could consider either a private or a public option for converting their wastewater systems. The private option would involve connecting to a privately owned WWTP. This area of Kahalu'u could connect to the privately owned He'eia WWTP, which currently serves the Keauhou Resort. Initial assessments suggest capacity at He'eia WWTP is available.<sup>101</sup> A public alternative could be a public sewer system improvement district. A wastewater improvement district allows the County to implement tailored rules (e.g., mandatory connection) and facilitate special financing mechanisms. The County of Hawai'i has

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<sup>98</sup> Kamau I. 2024. Predicting Sea Level Rise Impacts to Coastal Wastewater Infrastructures and Water Quality Along the Kailua-Kona Shoreline (Master's thesis, University of Hawai'i at Hilo).

<sup>99</sup> Protect Kahalu'u Bay Working Group, "Kahalu'u Sewerage System Options — Background Information and Request for Opinion," April 13, 2023.

<sup>100</sup> Hawai'i Wai Ola, *Hawai'i Wai Ola Data Analysis Report* (2024).

<sup>101</sup> Protect Kahalu'u Bay Working Group, "Kahalu'u Sewerage System Options."

previously implemented a sewer system improvement district in Lono Kona that was County-owned and operated. To finance the Lono Kona system, they used County CIP funds, a USDA Rural Development grant and a USDA low-interest loan with long amortization.<sup>102</sup> Considering that Kahalu'u currently qualifies for a USDA Rural Development grant but is quickly urbanizing, acting sooner rather than later to secure a Rural Development grant could be advisable.

## V. Recommendations

In evaluating the current situation and opportunities for progress, the CCTF has identified concrete, specific actions to help advance this effort. This section will detail the recommendations for the County that can help advance a more community-oriented, financially feasible and strategically designed plan to replace thousands of cesspools. This effort to remove substandard waste management systems will positively impact human and environmental health for current and future generations.

- **Identify creative financing that works for Hawai'i County's unique needs**
  - Create financial possibilities for the County and homeowners, especially low-income homeowners, as a top priority.
  - Examples may include state-issued "green bonds" and subsidies for low-income households, among other options discussed earlier in this report in section [2.4 Financial Review - Other Financing Solutions](#).
  - Seek large-scale funding now for downstream implementation priorities, using all available pathways, including State, Federal and private financing.
  - Ensure that long-term operations & maintenance budgetary needs are accounted for in planning and funding requests.
  - Facilitate cross-departmental collaboration between County Departments of Finance, Housing, Environmental Management, and OSCER to outline a successful financing plan.
- **Work with case study communities to develop solutions and demonstrate success**
  - Work with the communities discussed in this report's case studies – Puakō, Keaukaha, Miloli'i and Kahalu'u – to determine a path forward.

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<sup>102</sup> Protect Kahalu'u Bay Working Group, "Kahalu'u Sewerage System Options."

- If desired by community members, plan a cesspool conversion strategy in each of these neighborhoods using the technologies and solutions best suited to their unique needs.
- Seek and secure funding to support the conversion projects, using one or more of the sources discussed in section [2.4. Financial Review](#).
- Develop a prioritization methodology: a transparent, data-driven "Prioritization Matrix" (scoring risk, readiness, cost and equity) that will provide a clear pathway for how the County will select the next priority areas after these initial projects are initiated.
- **Sustain a long-term campaign for community involvement and information sharing**
  - Continue development and planning to implement the "For the Water we Share" campaign concept as envisioned by Hawai'i County's Department for Environmental Management — a comprehensive and inclusive public information campaign.
  - Develop a clear, phased timeline for community engagement. Plan for a sustained, regular cadence of community engagement across the island, which will support trust-building as well as normalization and acceptance of the need for action.
- **Support further research and reporting to understand and improve environmental impacts and water quality testing**
  - Encourage regular, concise, publicly available nearshore water quality reporting that consolidates testing information from various academic and community based water quality monitoring efforts.
  - Monitor and evaluate potential impacts in mauka communities as well for a complete picture of cesspool impacts throughout the County to prioritize our cesspool conversion efforts accordingly.
  - Partner with Hawai'i Wai Ola and other quality assured monitoring groups to support ongoing water quality monitoring of priority areas.
- **Collaborate with local institutions for workforce development**
  - Collaborate with the Hawai'i County Research and Development Department, specifically the Workforce Development branch, to convene nonprofits, unions, community colleges and other training organizations, and industry leaders.
  - Co-design a collaborative approach to technical training, hiring placements and streamlined bidding for conversion projects of all types contemplated by this report.

- Work with various workforce development projects such as Work4Water and Workforce4Water to contribute to training personnel in installation, monitoring, and maintenance.
- **Increase Hawai'i County's administrative & staffing capacity to support cesspool conversions**
  - Define roles and responsibilities to ensure clear lines of accountability for program oversight, management and execution, including identifying a lead entity and defining the integrated roles of the relevant County departments.
  - Create new, funded positions (e.g., program managers, coordinators, inspectors) to manage this work.
- **Consider policy interventions at the County and State levels**
  - Work with the Hawai'i County Environmental Management Commission to outline opportunities to support and objectives for additional technical capacity.
  - Work with the Hawai'i Department of Commerce and Consumer Affairs (DCCA) to propose a bill for consideration by the Hawai'i State Legislature to require cesspool conversions as a condition of sale for property ownership transfers.
  - Work with the Governor's office to propose an amendment to Bill 96 to enable Green Fee funds to be used in bonding to facilitate large-scale investments in green infrastructure, such as cesspool conversions.
  - Introduce state legislation to expand capacity at the Department of Health & improve treatment systems
  - Support a bill at the Hawai'i State Legislature to increase capacity at the Hawai'i Dept. Of Health's Wastewater Branch by hiring new staff and creating a new Cesspool Technical Advisory Group to help: update outmoded regulations, expedite the permitting process for cesspool conversions, and introduce new, more affordable treatment systems.
  - Support a bill at the Hawai'i State Legislature to require that individual wastewater systems (IWS) within 200 feet of the coast or a water body include denitrification treatment to reduce nutrient loading and algal overgrowth to protect coral reefs.
  - Support a bill at the Hawai'i State Legislature bill to expand the successful pilot project from 2023 that created \$20,000-\$30,000 rebates and grants to help homeowners in Priority Areas 1 & 2 convert their cesspools.

- **Develop a clear Land Use and Infrastructure Map to guide Hawai'i Island conversion strategy**
  - Designate areas by best fit for conversion option: Sewer Extension, Community Decentralized Systems, or Individual IWS.
  - Utilize criteria such as proximity to existing sewer, lot size, available WWTP capacity.
  - Develop cost estimates for each conversion option.
- **Develop an Operations and Maintenance Plan**
  - Plan should also include a workforce development plan that outlines the staffing and certifications necessary to accomplish operations and maintenance.
  - Could include monitoring and reporting on septic conversions.
  - Explore mechanisms of long-term funding for Operations & Maintenance.
  - Work with the Dept. Of Health's new Surface Water Protection Branch to develop guidelines for operations and maintenance of treatment systems.
- **Develop a Project Success Matrix**
  - Matrix should outline metrics for assessing successful cesspool conversion
  - Could include demonstrable nutrient reduction, community sentiment, financial cost.
- **Develop a follow-up Phase 2 of the task force for implementation partnership**
  - Could bring in new people to the task force with skills pertaining to implementation and workforce development.
  - Focus on addressing workforce needs and feasibility.
  - Develop procedures for compliance enforcement and a streamlined conversion permitting process.
  - Formalize capacity analysis with potential private WWTP operators to officially confirm long-term capacity and contractual terms.

## VI. Conclusion

The CCTF represents a broad range of subject matter experts and community perspectives, with a shared goal to develop innovative solutions that utilize new and existing technologies in ways that best serve and make the most sense for our unique communities on Hawai'i Island. We see clearly that there is no one-size-fits-all solution when it comes to cesspool conversion. We need to take into account the unique geographic, environmental, economic and community-level factors that inform what the best approach is for the different areas of Hawai'i Island.

From connecting to centralized County sewer systems to decentralized community-specific systems to alternative on-site treatment options, including high- and low-pressure septic systems, all need to be deployed where they can be the most effective in terms of feasibility, cost and quality.

It is clear that this collective effort will require significant investment to convert the cesspools on Hawai'i Island and that we cannot expect local families to bear the full financial burden.

The CCTF strongly recommends pursuit of multiple funding and policy pathways to cover the work that needs to be done at the federal, state, county and private levels. We need to be creative and seek other solutions that can help spread the cost across households and over time to ensure that we do not overburden local residents.

This is a monumental task, so having clear priorities is paramount. Our efforts moving forward will be guided by the most current science. Our priority actions will be informed by reliable data that shows where the biggest risks and impacts are for the health of our water, land and people. This starts with our near-shore communities as our top priority based on existing evidence.

There are huge workforce development opportunities as we look at the near-term and long-term needs to achieve our goals when it comes to cesspool conversion. There is currently demand for the tools and skilled labor to convert cesspools, and this need is only going to grow over time as we identify priority communities and identify funding pathways to get the work done. Now is the time to start training our homegrown workforce, providing them with the support they need to stand up and operate local businesses that will be able to get the job done now and into the future.

Cesspool conversion is an opportunity to create living-wage jobs for local people that will allow them to stay on island and meaningfully contribute to their communities. Hawai'i Island has the opportunity to serve as a model and leader for the entire state. Implementing a strategically driven cesspool conversion plan has the potential to provide exciting and transformative economic opportunities for numerous industries and stakeholders. While costs remain one of the most critical challenges, creative funding and collaboration across groups may reveal unique opportunities to complete one of the most ambitious infrastructure plans in the history of the state.

## VII. Appendices

- A. Hawai'i County Cesspool Conversion Task Force Members
- B. Recommended Resources
- C. Relevant Examples from U.S. States

## Appendix A: Hawai'i County Cesspool Conversion Task Force Members

The Hawai'i Island Cesspool Conversion Task Force was convened by Mayor Kimo Alameda in 2025.

### **Chair:**

Mayor Kimo Alameda, County of Hawai'i

### **Advisory Group:**

Greg Asner, Director, 'Āko'ako'a Reef Restoration of Hawai'i

Stuart Coleman, Executive Director, Wastewater Alternatives Innovations (WAI)

Jocelyn Herbert, Hawai'i Director, Resources Legacy Fund

Kelly Hartman, Environmental Management Planner, Hawai'i County Department of Environmental Management

### **Members:**

Laura Acasio, Administrator, County of Hawai'i Office of Sustainability

Neil Azevedo, Deputy Director, County of Hawai'i Public Works

Bill Brilhante, Managing Director, County of Hawai'i

Steven Colbert, Associate Professor of Marine Science, University of Hawai'i at Hilo

Kehaulani Costa, Housing Administrator, County of Hawai'i

Jeff Darrow, Planning Director, County of Hawai'i

Sharon Hirota, Program Manager, County of Hawai'i Office of Housing and Community Development

Craig Kawaguchi, Deputy Director, County of Hawai'i Department of Environmental Management

Councilmember Heather Kimball, Hawai'i County Council

Keiko Mercado, Assistant Housing Administrator, County of Hawai'i

Erica Perez, Senior Program Manager, Coral Reef Alliance

Chris Sparber, Acting Division Chief, County of Hawai'i Wastewater Division

Councilmember Rebecca Villegas, Hawai'i County Council

The task force was assisted by Andy Winer of the Wayfinder Group and facilitated through a Memorandum of Understanding partnership with the Resources Legacy Fund, with support from Karey Kapoi LLC and Pa'akai Communications.

## Appendix B: Recommended Resources

The Hawai'i County Cesspool Conversion Working Group gratefully acknowledges the large body of work developed by subject matter experts, policymakers and community representatives throughout the state, which provides the foundation for the research and recommendations included in this report. A recommended list of resources produced by these prior efforts follows here.

### REPORT TO THE TWENTY-NINTH LEGISLATURE STATE OF HAWAI'I 2018 REGULAR SESSION RELATING TO CESSPOOLS AND PRIORITIZATION FOR REPLACEMENT

Prepared by The State of Hawai'i Department of Health Environmental Management  
Division

### CESSPOOL CONVERSION FINANCE RESEARCH SUMMARY REPORT

Prepared by Carollo Engineers

### CESSPOOL CONVERSION TECHNOLOGIES RESEARCH SUMMARY REPORT

Prepared by Carollo Engineers

### IDENTIFYING POTENTIAL KNOWLEDGE GAPS FOR HAWAI'I'S CESSPOOL CONVERSION PLAN

Prepared by Michael Mezzacapo, University of Hawai'i Sea Grant College Program  
University of Hawai'i Water Resources Research Center

### FINANCING CESSPOOL CONVERSIONS IN HAWAI'I

Prepared by the Statewide Cesspool Conversion Working Group

### A MULTI-STATE REGULATION AND POLICY SURVEY OF ONSITE WASTEWATER TREATMENT SYSTEM UPGRADE PROGRAMS

Prepared by Michael Mezzacapo, University of Hawai'i Sea Grant College Program  
University of Hawai'i Water Resources Research Center

### INVESTIGATION OF CESSPOOL UPGRADE ALTERNATIVES IN UPCOUNTRY MAUI FINAL REPORT

Prepared by Roger Babcock (1), Megan D. Barnes (2), Adrienne Fung (1), Whitney Goodell  
(2), Kirsten L. L. Oleson (2)

(1) Department of Civil and Environmental Engineering, Water Resources Research  
Center

(2) Department of Natural Resources and Environmental Management University of Hawai'i Mānoa

2022 HAWAI'I CESSPOOL HAZARD ASSESSMENT & PRIORITIZATION TOOL – 2022 UPDATE REPORT & TECHNICAL APPENDICES

Prepared by Michael Mezzacapo, University of Hawai'i Sea Grant College Program  
University of Hawai'i Water Resources Research Center and Christopher Shuler, Ph.D.,  
University of Hawai'i Water Resources Research Center

PRESENTATIONS FOR THE JANUARY 4, 2023 EEP/AEN INFORMATION BRIEFING ON THE CESSPOOL CONVERSION WORKING GROUP

Prepared by the Statewide Cesspool Conversion Working Group

CESSPOOL CONVERSION WORKING GROUP FINAL REPORT TO THE 2023 REGULAR SESSION LEGISLATURE

Prepared by the Statewide Cesspool Conversion Working Group

WORKING TOGETHER FOR CLEAN WATER

Prepared by the Coral Reef Alliance

VARIABILITY IN CONTAMINATION OF SUBMARINE GROUNDWATER DISCHARGE INTO WEST HAWAI'I CORAL REEFS

Prepared by Kelly L. Hondula, Roberta E. Martin and Greg P. Asner

## Appendix C: Relevant Examples from U.S. States

The CCTF reviewed A Multi-State Regulation and Policy Survey of Onsite Wastewater Treatment System Upgrade Programs, authored by the Statewide Cesspool Conversion Working Group in 2019.

The Cesspool Conversion Working Group commissioned a report on other U.S. states' cesspool conversion policies, produced by the University of Hawai'i Water Research Center and Hawai'i Sea Grant College Program. This 2019 report examines six states that have undertaken significant efforts to phase out cesspools and other outdated OWTs.<sup>103</sup> There are a number of key themes that emerged out of this research, which may inform policy and planning within a Hawai'i context:

1. **Conversions take time and concerted long-term effort.** Many conversions required revisions throughout the process, which on average was 12 years. Many states added additional ordinances on top of State guidance — however, this possibility must be carefully examined to ensure it does not lead to greater confusion or difficulty accomplishing the program.
2. **Conversions require long-term funding and administrative support, including in workforce and technology.** For example, Vermont and Massachusetts both chose to develop digitized wastewater tracking systems, an investment in new technology. Workforce capacity for cesspool conversion is a particular concern for Hawai'i and will require support in problem-solving and creative solutions.
3. **Financial challenges were present across all programs detailed in this report.** Significant capital is needed to meet these goals, and **blended funding sources are a common option in order to reach the total capital goal.** Examples of blended funding sources could include collaboration between Federal, State and county or city government, or town-level funding.

Collaboration between State and local (county or city) governments has aided in securing sufficient initial funding. State funding is particularly useful in the initial stages of a project to get it off the ground, and then they can create a financial game plan to acquire more needed funding down the road. For example, Suffolk County,

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<sup>103</sup> A Multi-State Regulation and Policy Survey of Onsite Wastewater Treatment System Upgrade Programs, Cesspool Conversion Working Group, 2022, 47.

NY, received over \$500 million from the State of New York for initial sewer infrastructure expansion and cesspool upgrades. Smaller, town-level funding has also been blended in, such as community preservation funds and taxes on property transfers.

4. **Administration of projects could be accomplished by a variety of offices or departments, including public-private partnerships.** Hawai'i should determine who ought to administer these projects based on accessibility of funding, and public-private partnership is a viable option. For example, the State of Washington partnered with Craft3, a nonprofit that provided Clean Water Loans, which helped homeowners finance their septic system repair and replacement. This could be a good option in Hawai'i considering the issue of a limited workforce. Tapping into private companies for construction and/or financing could unlock a greater number of workers.
5. **There is an additional need to address the outdated codes and regulations that have led to these substandard conditions.** Changing plumbing codes and assessing new onsite wastewater treatment technologies and pilot projects can help ensure our solutions are permanent and resilient in the future.
6. **Extensive public education and outreach programs were critical to success.** It is necessary to carefully consider community input and gain a well-rounded understanding of the unique challenges and needs of each community. Successful states adapted their plans to those unique challenges as much as possible. More problems like lack of public approval and lack of compliance are likely to appear if public outreach is insufficient.<sup>104</sup>

Synthesizing and building upon that research, the CCTF offers six state-level examples of wastewater management, each of which provides useful parallels or learnings for Hawai'i Island.

## Case studies

In this report, we examine the wastewater management policies in six states — Vermont, Massachusetts, New York, Rhode Island, Maryland and Florida. Each is included for

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<sup>104</sup> Cesspool Conversion Working Group, *Final Report to the 2023 Regular Session Legislature* (State of Hawai'i Department of Health, 2022).

different elements of their wastewater systems that are pertinent to our situation in Hawai'i.

## **Vermont**

### **Decentralized Wastewater Systems for Rural Communities**

Vermont is a state in the Northeast that is mountainous, heavily forested and primarily rural. It is not coastal; however, nutrient runoff from both sewage and agriculture is of concern because many of Vermont's rivers and streams run off into Lake Champlain, a large lake that spans much of the western border of the state. Vermont is the second-least populated state in the U.S. (643,077 residents in 2020), and the challenges posed by this small, widely dispersed population are comparable to those in more rural areas of Hawai'i, where widespread public sewer is not available.<sup>105</sup> Therefore, the decentralized approach Vermont has taken to wastewater management is pertinent for Hawai'i and should be considered as a potential option for areas of Hawai'i where connection to a municipal sewer system is not feasible or recommended.

### **Decentralized Approach**

As of 2022, 157 of the 255 towns in Vermont — around 60% — had no municipal sewer system, according to the Vermont Agency of Natural Resources.<sup>106</sup> These towns are often sparsely populated, spaced far apart and separated by mountains. Therefore, broadly expanding municipal sewer lines across the state was not a feasible approach; rather, Vermont opted for more individualized and decentralized systems.

A decentralized system allows for a mix of conventional or A/I/E septic systems that serve clusters of buildings. Cluster systems can have onsite or offsite disposal, include onsite septic tanks or connected gravity sewers, and serve anywhere from just a few properties to a full village. A decentralized system allows for much more flexibility and adaptation to the local population's needs and allows individual communities to essentially "mix and match" their wastewater management to best fit their needs.<sup>107</sup>

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<sup>105</sup> U.S. Census Bureau, "Vermont Census Bureau Profile," 2020, <https://data.census.gov/profile/Vermont?g=0400000US50>.

<sup>106</sup> Vermont Agency of Natural Resources, "Wastewater Systems in Vermont," ArcGIS, March 15, 2022, <https://gis-vtanr.hub.arcgis.com/maps/VTANR::wastewater-systems-in-vermont/about>.

<sup>107</sup> Vermont Department of Housing and Community Affairs, "Wastewater Solutions for Vermont Communities," January 2008, <file:///Users/pearltulay/Downloads/DHCD-Planning-WW-Treatment-Options-Guidance.pdf>.

Vermont’s wastewater management runs on a permitting system where homeowners must hold a water/wastewater (WW) permit from the Wastewater System and Potable Water Supply Program. New construction of a wastewater system or buildings, conversion to a year-round residence from seasonal residence, and major modifications to existing wastewater systems will require a new permit.<sup>108</sup> This permitting system again allows for much more agency for individual homeowners to manage their own waste systems.

## **Massachusetts**

### **More Stringent Local Regulations, Sensitive Coastal Ecosystems, State Financing**

First passed in 1995, Massachusetts’ Title 5 legislation regulates proper siting, construction and maintenance of onsite wastewater treatment systems (OWTS). It has been continually amended, most recently in 2023. Title 5 requires inspection of OWTS prior to property transfer or dwelling enlargement.<sup>109</sup> Additionally, it requires a soil evaluation test to be performed by a soil evaluator who is approved by the Massachusetts Department of Environmental Protection (MassDEP). If an OWTS fails inspection, it must be repaired or replaced within two years.<sup>110</sup> Title 5 is the minimum regulation, but more stringent requirements are placed by a Local Board of Health or County. Local Boards of Health implement and enforce Title 5. MassDEP oversees and assists LBH when needed.

### **Sensitive Environments**

Barnstable County, which spans the Cape Cod coastal region of Massachusetts, is the most similar MA county to Hawai’i Island in concerns related to fragile coastal ecosystems. Barnstable County has added more requirements to the existing Title 5 legislation to better account for environmental needs. They require I/A/E systems near fragile watersheds, public water supplies, private wells and nitrogen-sensitive embayments.<sup>111</sup> Hawai’i could consider implementing more stringent requirements on a town or county basis for more fragile watersheds.

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<sup>108</sup> State of Vermont Department of Environmental Conservation, “Environmental Protection Rules: Wastewater System and Potable Water Supply Rules,” August 27, 2018, <https://dec.vermont.gov/sites/dec/files/dwgwp/rorules/pdf/2018.08.27%20-%20Amended%20Unannounced%20WWPWS%20Rules.pdf>.

<sup>109</sup> Michael Mezzacapo, *A Multi-State Regulation and Policy Survey of Onsite Wastewater Treatment System Upgrade Programs*, SR-2020-02, with Darren Lerner, Water Resources Research Center Sewage Contamination Study (University of Hawai’i Water Resources Research Center, 2019), <https://health.hawaii.gov/wastewater/files/2019/11/OnsiteReport.pdf>.

<sup>110</sup> Massachusetts State Environmental Code, Title 5, Pub. L. No. 310 CMR 15.000, Ma. (2023).

<sup>111</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 46.

Considering the close geographic proximity of houses in Barnstable County (Cape Cod is a narrow peninsula around 60 miles long), the recommended conversion type is to add new sewer districts and connect homes to existing community sewer lines. This may not be as feasible in some areas of Hawai'i Island given the more spread-out and rural communities, compared to a small, thin islet with relatively closely spaced homes. However, this conversion type has been proposed in a few of the Hawai'i case study areas, which are discussed in further detail in a later section.

## **Funding**

Massachusetts Title 5 includes a **tax credit** for eligible homeowners, which is **equal to 40% of the costs** (design and construction) of upgrading or repairing their septic system. This credit against personal income tax can be imposed up to \$1,500 per year, with a maximum credit of \$6,000 over four years.

Another source of financial assistance for homeowners is **low-interest loans** through the Massachusetts Housing Finance Agency (MHFA) and the Rural Economic Development Service Loan program. MassDEP allocated \$13 million for financing loans for septic repairs and contracted MHFA to administer this loan program. Eligible municipalities can also make **low-interest 20-year loans** to low-to-moderate-income homeowners through the Betterment Fund Program.<sup>112</sup>

Overall, Massachusetts finances cesspool conversions at a state level, with a statewide tax credit or low-interest loans primarily administered by state-level agencies. However, there is also an option for town-level loan allocation. Towns are more responsible for creating more stringent environmental requirements but may fund these conversions using state sources.

## **Suffolk County, New York**

### **Municipal Sewer Expansion, Fragile Coastal Ecosystem**

Suffolk County, New York, constitutes most of Long Island, with an area of 1,461 square miles and a similar population to Hawai'i (1.48 million people, as of 2018). This region is primarily coastal, surrounded by the Long Island Sound to the north and the Atlantic Ocean to the south, so they have similar concerns about coastal and aquatic resources. Suffolk County has also suffered beach closures, harmful algal blooms, greater destruction from storms (due to lack of coastal vegetation as erosion prevention) and widespread fish

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<sup>112</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 48-49.

species die-off. Additionally, like Hawai'i, Suffolk County's primary drinking water source is underground aquifers, which are at risk of cesspool contamination.<sup>113</sup>

In order to change cesspool requirements, Suffolk County has repeatedly amended their existing County Sanitary Code. Residents are required to connect to the community sewer in areas where there are preexisting sewer lines or if they are in sensitive subsoil or groundwater zones. Of their three Priority Critical Areas for conversion, the highest priority is residential parcels where the groundwater travel time to surface waters is **0-2 years**.<sup>114</sup> For comparison, dye tracer studies have found the groundwater travel time to the beach at Kapoho was **20 minutes** and at Puakō was **3 hours to 10 days**.<sup>115</sup>

### **Funding Municipal Sewer Expansion**

Nearly 75% of Suffolk County does not have municipal sewer service. Hawai'i estimates, while less well-constrained, show a similar lack of municipal sewer systems. Suffolk County is undertaking a widespread effort to extend municipal sewer lines as an alternative to OWTS and cesspools. In December 2024, a \$13.7 million sewer expansion was completed in the downtown area of Central Islip, Suffolk County.<sup>116</sup> This expansion was funded via a blend of governmental sources, including federal (U.S. Department of Commerce), state (NY Department of State Downtown Revitalization Initiative), county (Suffolk County) and town (Town of Islip). This exemplifies the benefit of blending funding sources to achieve these more costly projects. Hawai'i could also consider taking a blended funding approach and draw from multiple levels of government, with the caveat that the cost of sewer expansion would be significantly higher in Hawai'i than in this case study. Even with higher costs, municipal sewer expansion may still be a viable path forward for many communities in Hawai'i. However, the difference may lie in what these municipal sewer lines eventually connect to. Rather than a municipal wastewater treatment plant, Hawai'i municipal sewer lines may connect to a variety of treatment options, including privately owned WWTPs and Wastewater Reclamation Facilities (WWRF), as discussed in the case studies covered earlier in this report.

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<sup>113</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 13.

<sup>114</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 18.

<sup>115</sup> State of Hawai'i Department of Health, "Cesspools in Hilo and Kea'au," 2018.

<sup>116</sup> Monica R Martinez, "Sewer Expansion Grows Opportunities for Central Islip," Government, The New York State Senate, December 4, 2024, <https://www.nysenate.gov/newsroom/press-releases/2024/monica-r-martinez/sewer-expansion-grows-opportunities-central-islip>.

In November 2024, Suffolk County passed Proposition 2, amending the Suffolk County Water Quality Restoration Act. Proposition 2 raised sales taxes by 0.125% in order to pay for sewer expansion. Voters overwhelmingly supported this proposition, with 72% voting yes.<sup>117</sup> This increased sales tax is directed into a fund for connecting homes to existing sewer lines and replacing cesspools with I/A systems where sewers are not feasible. It is projected to generate an estimated \$49 million in additional revenue, which will become available for use in 2026.<sup>118</sup> Their Comprehensive Water Resources Management Plan of 2015 also recommends the creation of privately run sewer districts where municipal sewer is not available. Prior to these recent funding sources, much of the grant and loan programs available in Suffolk County were created from pilot funds, which do not provide a steady or sustainable source of funding long-term.<sup>119</sup>

## Rhode Island

### Small Budget, Small State, Coastal Ecosystems

Similar to Hawai'i, Rhode Island is a small state (1,045 square miles), much of which is coastal (400 miles of coastline), with a relatively small population (1.06 million people, as of 2018). A significant area of Rhode Island is within the Narragansett Bay, New England's largest estuary, so sea level rise and nearshore environments are of similar concern in Rhode Island to Hawai'i.<sup>120</sup>

The Rhode Island Cesspool Act of 2007 was passed, requiring replacement of all cesspools within the 200-foot zones next to tidal waters, drinking water reservoirs and public wells. However, these efforts proved to be quite slow and labor-intensive, taking years to replace only about 1,000 cesspools. Rhode Island identified the success of neighboring Massachusetts' "point-of-sale model," the requirement of cesspool replacement when property was being sold or transferred. In 2016, Rhode Island amended the Cesspool Act to integrate this point-of-sale model, rather than solely identifying problematic cesspools

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<sup>117</sup> Michael P. Guerriero, "The Suffolk County Water Quality Restoration Act – Proposition 2," Professional, Farrell Fritz Attorneys, November 22, 2024, <https://www.farrellfritz.com/insights/tax-tracker/the-suffolk-county-water-quality-restoration-act-proposition-2/>.

<sup>118</sup> Adopting Local Law No. 32-2024, to Adopt a Charter Law Pursuant to the Suffolk County Water Quality Restoration Act (Chapter 58 of the New York State Laws of 2023, Amended) to Amend Article XII of the Suffolk County Charter in Order to Extend and Revise the Suffolk County Drinking Water Protection Program and to Establish a New Water Quality Restoration Fund Supported by an Additional One Eighth Percent (1/8%) Sales and Use Tax, Pub. L. Nos. 32-2024, 526-2024 (2024), <https://www.scnylegislature.us/DocumentCenter/View/95808/Introductory-Resolution-1461-24-PDF>.

<sup>119</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 17.

<sup>120</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 1.

based on geography. Cesspools in Rhode Island can either be connected to municipal sewer systems or replaced with a conventional OWTS (septic tank).<sup>121</sup>

## **Funding**

Rhode Island has faced challenges in budget and resources, particularly in the preliminary environmental research and in streamlining permitting of new I/A/E systems. As an attempt to reduce costs, they attempted to work with manufacturers and municipalities to streamline permitting; however, it was not successful.

Towns are generally responsible for designing their own management plans and allocating funds for cesspool conversion. Towns are provided with federal, state or EPA funds to develop a municipal Onsite Wastewater Management Program (OWMP) outlining their town's specific plan for managing septic systems. In an OWMP, towns can include more stringent regulations, particularly for environmentally sensitive areas. Once a town has an OWMP, they are then eligible to apply for the Community Septic System Loan Program, **low-interest loans** to incentivize homeowners. The **Sewer Tie-In Loan Fund (STILF)** also provides low-interest loans for homeowners to connect to local sewer systems.<sup>122</sup> Similar to Massachusetts' Barnstable County, this is a good solution for closely spaced homes with preexisting sewer systems but may not be as applicable in more rural regions of Hawai'i.

Minimal enforcement mechanisms exist at the State level. Towns are responsible for managing, allocating funds and enforcing non-compliance. As a smaller state with a smaller budget, this town or county-level responsibility may be a good model for Hawai'i, rather than a statewide top-down management system.<sup>123</sup> Especially considering the varied needs and challenges of the different islands, county-level regulation and enforcement may be the best fit.

## **Maryland**

### **Unique Funding Methods**

Maryland is one of six states that border or are within the Chesapeake Bay watershed, the largest estuary in the United States. Pollution and nutrient over-enrichment, particularly nitrogen, have degraded the water quality in Chesapeake Bay. The Bay is crucially important to the economy and ecology of bordering states, especially Maryland. Much of

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<sup>121</sup> The Rhode Island Cesspool Act of 2007, 23-19.15 Ri. (2007), <https://webserver.rilegislature.gov/Statutes/TITLE23/23-19.15/INDEX.HTM>.

<sup>122</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 12.

<sup>123</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 13.

Maryland’s focus is on reducing nitrogen loading into Chesapeake Bay; however, cesspools are not widespread in Maryland.<sup>124</sup> Instead, this section is pertinent in assessing the funding mechanisms Maryland has employed to fund more general nutrient reduction efforts. Hawai‘i could consider designing funding mechanisms similar to those in place in Maryland.

### **Two Novel Funds**

The Bay Restoration Fund (BRF) **charges user fees** on both municipal sewer and private OWTS users to cover upgrades. The BRF charges a fee of \$5.00 per month on all municipal sewer customers in order to cover upgrades to OWTS and municipal wastewater treatment plants. The fee is deposited into an interest-earning fund, where eligible municipal wastewater facilities that connect to the Chesapeake Bay can use the funding for upgrades. These funds can also be used by homeowners to connect existing houses to public sewer systems. The BRF also charges a \$60 annual fee from each user who is served by an OWTS, 60% of which goes to septic system upgrades, and the other 40% to farmers planting cover crops. This integrates mitigation efforts outside of just septic systems — supporting cover crops reduces nutrient and sediment runoff from agriculture.<sup>125</sup>

The other unique funding mechanism is the Water Quality Trading Program, which creates a public market where towns get credits for nitrogen, phosphorus and sediment reductions.<sup>126</sup>

**Credits can be earned by upgrading** their OWTS and sewer systems. The Water Quality Trading Program was created as part of Maryland’s Clean Water Commerce Act of 2017 and reverses the typical cycle of projects receiving top-down funding from government agencies into a market where successful outcomes of nutrient reduction projects can be purchased.<sup>127</sup> Further research is needed to determine whether similar funding mechanisms would be a good fit for Hawai‘i, but considering the efficiency needed to meet the 2050 cesspool conversion goal, incorporating creativity in funding will be essential.

## **Florida**

### **Managed Retreat and Sea Level Rise**

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<sup>124</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 52-55.

<sup>125</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*, 56.

<sup>126</sup> Maryland Department of the Environment, “Water Quality Trading Program,” Government, Maryland.Gov, accessed October 22, 2025, <https://mde.maryland.gov/programs/water/WOT/Pages/default.aspx>.

<sup>127</sup> Mezzacapo, *Multi-State Regulation and Policy Survey*.

Florida is a coastal state with similar concerns to Hawai'i in regard to shallow groundwater and fragile ecosystems. With an estimated 2.6 million OWTS (one-third of the state), converting cesspools as well as septic tanks has become a priority for the state due to growing concerns over groundwater contamination, ecosystem degradation, particularly in lagoons and the Everglades, and sea level rise.<sup>128</sup> Florida is one of the most vulnerable states to sea level rise and storms, as it is extremely low in elevation, has 8,436 miles of coastline, and much of the geography of the state consists of estuaries, swamps and lagoons. The emphasis in Florida is on converting both cesspools and septic tanks into A/I/E systems, as there have been issues of septic tank leakage due to Florida's sandy soil and porous limestone rock. These leaks create similar issues of nitrogen and phosphorus overflow and algal overgrowth to those in Hawai'i. Both sewage contamination and saltwater intrusion from sea level rise are concerns for drinking water in Florida.<sup>129</sup>

To address the widespread threats to aquatic ecosystems, Florida requires the creation of a Basin Management Action Plan (BMAP) for each lagoon, lake and spring system. In addition to regulations on wastewater treatment, BMAPs address agriculture, stormwater infrastructure and permit limits.<sup>130</sup> In 2023, Florida passed HB 1379, a law requiring that all traditional septic systems within a BMAP, including cesspools, must either be connected to a sewer system or a specialized nutrient-reducing treatment system. If there is no public sewer system, as is the case for much of Hawai'i, only enhanced nutrient-reducing wastewater treatment systems that achieve at least 65% nitrogen reduction are authorized.<sup>131</sup>

### **Managed Retreat**

As sea levels continue to rise and extreme storms continue to intensify, more coastal communities around the world are considering "managed retreat," the voluntary and permanent relocation of people and structures further inland. The aim of managed retreat is generally twofold: to proactively get people and infrastructure out of harm's way and to undertake environmental mitigation projects such as converting land to salt marsh,

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<sup>128</sup> Carollo Engineers, *Cesspool Conversion Technologies Research Summary Report* (Hawai'i State Department of Health, 2021).

<sup>129</sup> Michael D Lemonick, "The Future Is Now for Sea Level Rise in South Florida," Climate Central, April 6, 2012, <https://www.climatecentral.org/news/the-future-is-now-for-sea-level-rise-in-south-florida>.

<sup>130</sup> Florida Department of Environmental Protection, *Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies* (2024), <https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report>.

<sup>131</sup> Florida Springs and Aquifer Protection Act, 28–373 Fl. § Natural Resources: Conservation, Reclamation, and Use (2023), <https://www.flsenate.gov/Laws/Statutes/2023/Chapter373/All>.

grasslands and sand dunes. Beginning in 2009, the city of Punta Gorda, Florida, has begun to implement several managed retreat actions, laid out in their Climate Adaptation Plan and amended in 2019. These actions include relocating city-owned infrastructure and important historical buildings to less flood-prone areas inland. Additionally, the city is buying properties with recurrent flood damage from residents, so residents may use that income to move further inland. Once the city owns these flood-damaged properties, they will restore them to their natural conditions, and many of these waterfront or low-lying areas have been designated as public parks. This restricts attempts of development, preserving them as coastal protection buffers, while simultaneously creating public spaces. The city is also installing living shorelines, converting land to salt marsh and other more resilient coastal ecosystems that can reduce storm surge and damage to buildings.<sup>132</sup>

With such a sensitive and potentially controversial topic, the most important element for Punta Gorda was that their Adaptation Plan was developed through a “citizen-driven process.” Extensive community input and co-designing of response plans led to residents creating a variety of adaptation options that had broad community support, including managed retreat. This is an important example of how effective community engagement can build support for potentially controversial strategies like managed retreat.

### **Restrictions on New Coastal Development**

Punta Gorda’s restrictions on new coastal development could also be an example for Hawai‘i to consider; however, these more stringent restrictions on new development are also due to the issue of land subsidence in Florida. Across Florida and much of the northern Gulf Coast, physical and human activities are causing the land to sink, which increases sea level rise in Florida more than the global average.<sup>133</sup> Restrictions on coastal development may be more applicable in Florida than Hawai‘i due to this phenomenon.

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<sup>132</sup> Katie Spidalieri et al., *Managing the Retreat from Rising Seas: Punta Gorda, Florida Climate Adaptation and Comprehensive Plans and Updates* (Georgetown Climate Center, 2020).

<sup>133</sup> Office of the State Climatologist, “Sea Level Rise,” Florida Climate Center, Florida State University, accessed October 23, 2025, <https://climatecenter.fsu.edu/topics/sea-level-rise>.