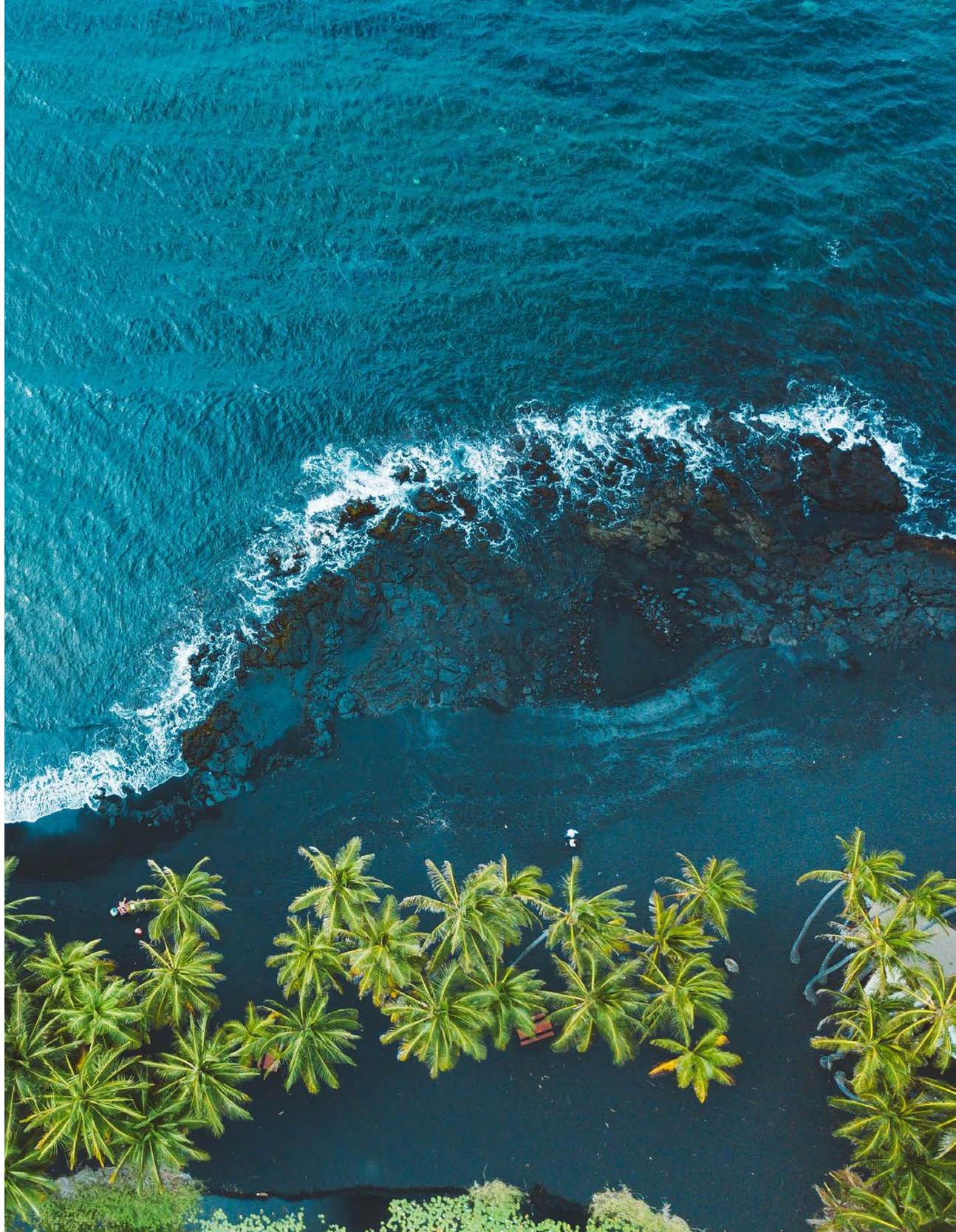
Mata

Solid Waste Interceptor

Practical Wastewater Infrastructure For Hawai‘i

WaiHome



Executive Summary

This report has been prepared to demonstrate the practical need for approval of the Mata Solid Waste Interceptor as an alternative treatment technology to support the State's 2050 cesspool conversion mandate.

Through site observations, community engagement, and neighborhood-scale analysis, this report identifies common conditions in Hawai'i where septic systems are impractical for cesspool conversion, and introduces Mata as a site-responsive alternative. It is evident that community members across the state have a shared desire to convert their cesspools, but that the cost of current systems is the dominant roadblock. Conversions in these communities will not be achieved without alternative technologies that are affordable and site-responsive.

This report identifies common conditions in Hawai'i where septic systems are impractical for cesspool conversion, and introduces Mata as a site-responsive alternative.

Contents

WAIHOME

Barriers to Cesspool Conversion in Hawai‘i

In Hawai‘i, 38% of homes rely on individual wastewater systems. Over 90% of them are cesspools.[1]

Despite the urgency of the 2050 replacement mandate to protect aquatic ecosystems and water resources, the pace of cesspool conversion remains slow. At 400 conversions per year, only about 10,200 systems will be converted by 2050. Conversion rates would need to increase to 3,500 systems per year or 10 per day to meet the deadline.

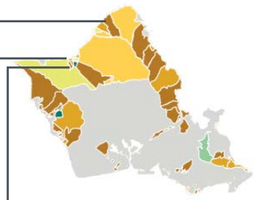
This report identifies five common site conditions that limit the feasibility of cesspool conversion with conventional septic systems. These conditions significantly increase installation costs—typically ranging from $30,000 to $60,000—and have been identified by property owners as primary barriers to conversion. Even when $20,000 conversion grants were awarded to homeowners in 2023, just 55 of 225 homeowners could afford to move forward with a septic system installation.[2] Five residential districts exemplifying these site conditions and showing low conversion rates in the five years following the conversion mandate are presented.

The **Mata Solid Waste Interceptor** is introduced as a pragmatic, site-responsive alternative for homes in these areas to accelerate cesspool conversion and support progress toward the State’s 2050 mandate.

Small Residential Lots

Coastal Exposure

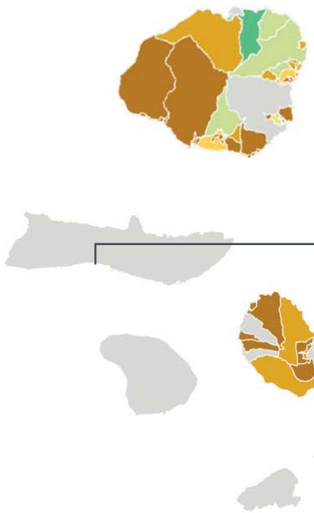
Highground Water Tables



Cesspool Upgrades by Census Block Group

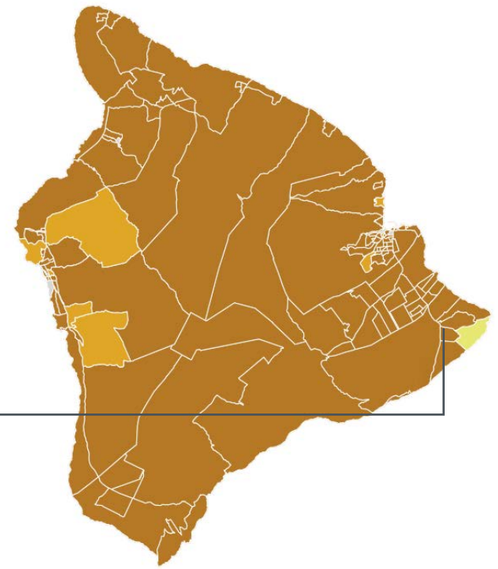
On Pace — No Upgrades

Group (>100 Cesspools) 2017-2022, Color scale capped at 15%.[7]

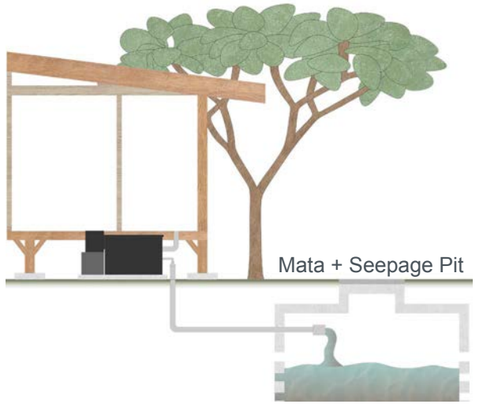


Excavation Prohibited

Shallow Bedrock



Mata Solid Waste Interceptor



Mata is an above-ground solid waste interceptor designed to simplify wastewater system installation in challenging site conditions common across Hawai‘i.

The unit is installed beside homes with raised foundations and intercepts the existing sewer line. Solids are separated using an auger screen and diverted for dehydration and thermal sterilization. Liquids flow into a converted cesspool or another disposal system.

90%
Solid Removal Rate[3]

47%
Nitrogen Removal[3]

87%
Organic Removal[3]

$10,000
Typical installed price when cesspool used as seepage pit.

3’x5’
Footprint

Aboveground: Suitable for lots with shallow bedrock or high groundwater, Mata eliminates the need for excavation and reduces installation costs. For flood-prone installations, Mata can be strapped to the 3” concrete pad to improve stability during high-water events.

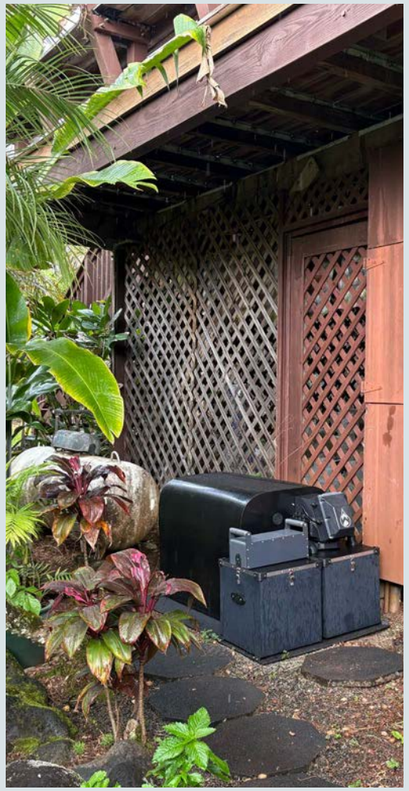
Compact: Designed for small or constrained properties, Mata fits alongside existing structures and does not require heavy equipment access.

Simple Installation: Can be installed in 1–2 days, making it well-suited for communities with limited access to specialized labor or machinery.

Primary+ Treatment: Effectively separates solids before soil discharge, capturing and stabilizing nutrients in the solid fraction, helping to reduce nutrient loading to the environment.

For sites requiring NSF 245 effluent quality prior to disposal, Mata can be paired with a range of aboveground liquid polishing systems provided by established treatment manufacturers.

Mata is the first wastewater technology designed to improve the operation of cesspools, elevating treatment levels beyond what an entire septic system offers.



For cesspool upgrades or completely new builds, Mata provides advanced Primary+ treatment.

Mata - Design Response to Hawai‘i Constraints

This table contrasts how Hawaii site conditions impact the feasibility of septic systems and solid waste interceptors.

	 **Shallow Bedrock**	 **Small Residential Lots**	 **High Groundwater Tables**	 **Coastal Exposure**	 **Excavation Prohibited**
Site Challenge	Shallow volcanic bedrock	Limited available space and heavy equipment access	Flood exposure and high groundwater levels	Sandy soils provide limited in-soil treatment	Iwi kūpuna in subsurface soils
Septic System Failure	Expensive excavation for underground installation	Destruction of existing infrastructure and landscape for install	Risk of tank buoyancy and raw sewage overflows	Minimal TN removal for reef protection	Long construction delays or ceasing of project
Mata Design Response	Aboveground treatment paired with structurally stable bedrock seepage pit	Compact footprint with no heavy installation equipment required	Sealed to 14” of flooding; can be elevated further with structure	Estimated 90% of particulate nitrogen removed aboveground	Installable without excavation. Compatible existing structures
Highlighted Community	Leilani Estates, Hawai‘i	Sunset, Oah‘u	Waialua, Oah‘u	Pikai, Oah‘u	Kaunakakai, Moloka‘i

Shallow Bedrock

Case Study | Suburban development, Puna, Hawai‘i

Hawai‘i County has over half of the State’s cesspools and the lowest median household income. This disparity is exacerbated by the prevalence of shallow volcanic bedrock that drives up excavation costs for septic systems. Further, with over 7,000 households with cesspools located in high or very high volcanic risk areas, there is little motivation for these expensive infrastructure investments.

These factors are reflected in policy, which allowed new legal cesspool installations for several years after the ban.

321
New Cesspools[7]

21
New Septic Systems[8]

For every septic system installed, 10 cesspools were installed.[4]

Puna District

“It’s called Mata, —it dries your poop. … It could be an alternative to a septic tank. It’s above ground, you don’t have to install it [underground], and it will be lower cost … This is the kind of innovation that we need here in our community.” — **Rep. Greggor Ilagan, Hawai‘i State Representative (Puna)**

Leilani Estates

Leilani Estates is built directly on the lower East Rift Zone of Kīlauea, with over 2,300 parcels and a near-total reliance on cesspools. Shaped by rapid rural growth over highly porous volcanic bedrock—the neighborhood reflects broader conditions across Puna. In this community, the cost of excavating through bedrock is compounded by volcanic risk as 25% of homes here were destroyed in a 2018 lava flow. Zero cesspool upgrades were completed during the five year study period, while 9 new cesspools were installed. It is highly unlikely that homeowners in this community will ever upgrade to septic.

876
Total Cesspools

0
Upgrades[7]

3
Priority Level of Cess.

$40,000+
Septic System Estimate[6]

$39,000
Average price for a vacant lot in Puna District[5]

2018 Lava Flow

Off-grid homes, situated on the 2018 lava flow.[9]

Mata represents an alternative approach designed for volcanic conditions. By shifting primary treatment above ground and capturing solids before they enter the subsurface, Mata reduces reliance on excavation, heavy machinery, and centralized infrastructure.

Small Residential Lots

Case Study | Residential Census Block, 1036, Sunset, O'ahu

Sunset Beach, in addition to being a major economic driver on the North Shore, is one of the most densely developed residential areas in the State. The median lot size is approximately half of the modern minimum required to have a septic system onsite.

Upgrade to septic systems would require significant site disturbance, including the removal of lanais, landscaping, and carports, while still presenting design challenges. Although technically feasible, the high cost continues to deter upgrades.

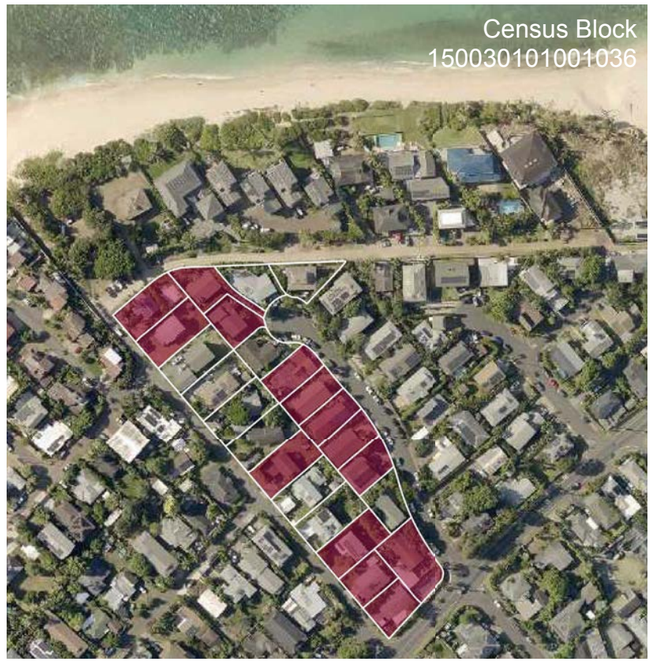
14
Total Cesspools

0
Septic System Upgrades[7]

1
Priority Level of Cesspool

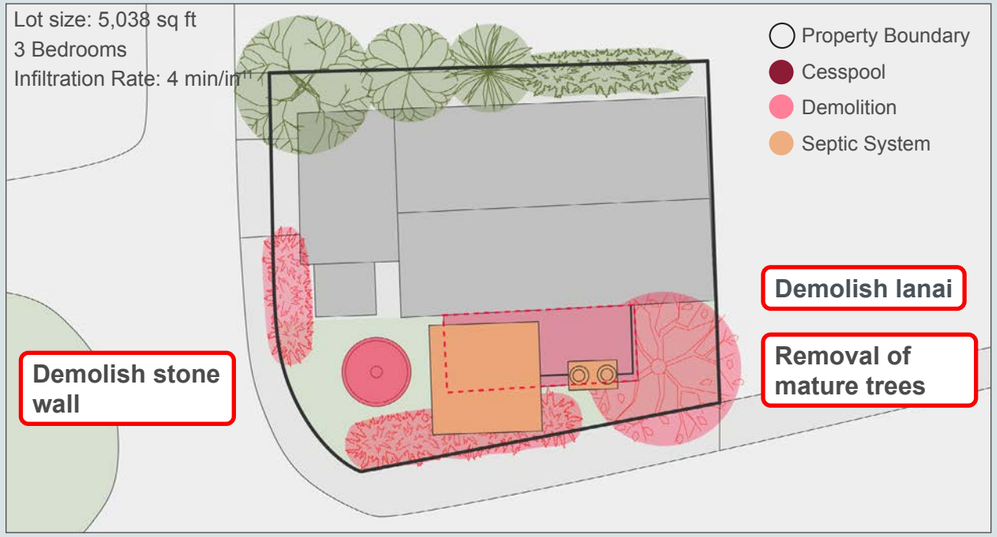
5,140
Median Lot Area, sq ft[10]

10,000
Minimum land area (sq ft) for IWS per HARS 11-62[12]

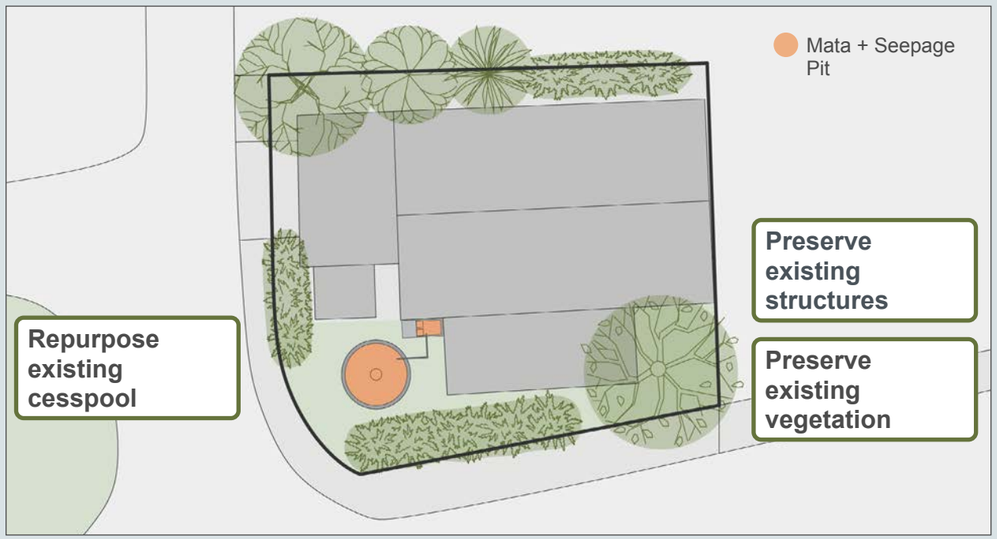


""I've seen septic systems go into one of the homes here - nothing about that system made sense for my property." - **Resident.**

Septic System + Leach Field



Mata + Seepage Pit



High Ground Water Properties

Case study | Residential Census Block 4001, Waialua, Oah‘u

73% of homes in the study community have a cesspool within the Kaukonahua or Kiikii stream corridors. 22 of the 31 cesspools are located directly on the stream bank. This is a daily hazard to watershed health with amplified nutrient transport risk during storm events and flood conditions.
There were no septic upgrades in the 5 year study window with homeowners citing high costs due to minimal space and risks of flooding and flotation during high water events. There is concern septic systems will offer little additional nutrient removal or flood resilience.

1
Priority Level of Cess.

31
Total Cesspools

0
Septic System Upgrades[7]

22
<100 M from Stream + within Sea Level Rise, 2100[14]

$50,000
Typical Upgrade Estimate[13]

“We were quoted roughly $100,000 because our carport would need to be removed... and a subsequent retaining wall would need to be built.” - **Resident.**

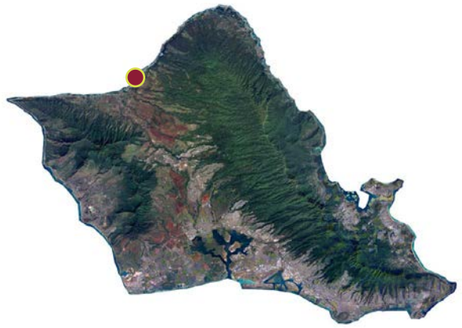
Septic System + Leach Field

Mata + Seepage Pit

WAIHOME

Coastal Exposure

Case Study | Residential Census Block 1009, Haleʻiwa, Oʻahu



Pikai Neighborhood District, located on the shore of Kaiaka Bay, is representative of the low-elevation coastal neighborhoods common on the North Shore. Their proximity to the reef means reducing nutrient and bacterial discharge is a top priority. Unfortunately, compact properties, sandy soils, and shallow groundwater have increased upgrade costs at a time when homeowners are hesitant to invest in properties vulnerable to sea level rise. There were zero upgrades during the five-year study period.

36
Total Cesspools

36
Cesspools in 2100 Sea Level Rise Zone

0
Septic System Upgrades[7]

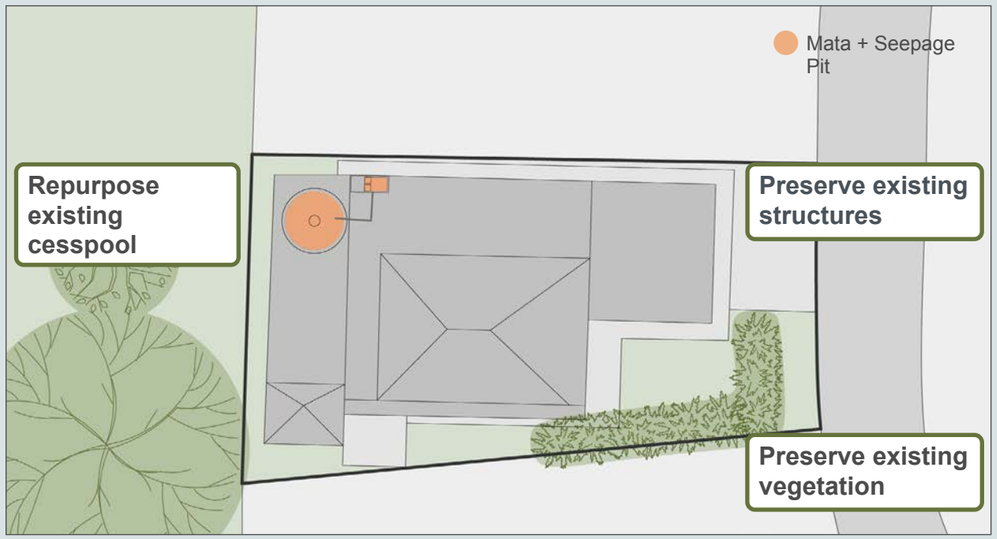
1
Priority Level of Cess.

$50,000
Typical Upgrade Estimate[16]

"We make taking care of our āina and surrounding parks and beaches a top priority. Like most of our neighbors in Hale'iwa with cesspools on 50 X 100 foot lots we are continuously looking for better, environmentally safe and affordable waste management solutions." **D. P. Holloway, Resident**

Septic System + Leach Field

Mata + Seepage Pit



WaiHome

Prohibited Excavation

Case Study | Affordable Housing Project, Molokaʻi

Molokaʻi is a largely rural island with exceptionally limited sewer access. Many residential areas currently serviced by cesspools overlap with landscapes where iwi kūpuna are known to be present. Subsurface excavation in these areas introduces not only technical challenges, but the risk of disturbing ancestral remains—triggering regulatory review, project delays, and irreversible cultural harm.

1
Priority Level of Cess.

1,050
Priority 1 Cesspools[18]

High
Burial Probability (Coastal zone)[19]

These challenges extend beyond homeowners. Lands identified for development by Department of Hawaiian Homelands and other developers commonly overlap with areas where iwi kūpuna are present, making subsurface excavation both a technical and cultural risk. Required archaeological surveys, monitoring, and discoveries can introduce significant delays, redesigns, and added costs. As a result, conventional underground infrastructure often becomes impractical.

"The presence of an archaeologically and culturally significant area on the southwest corner of the property that precludes excavation...the minimal ground disturbance required for WaiHome's aboveground system makes it a unique option." **Christian O'Connor. Director of Development, Kalaniana'ole Development**

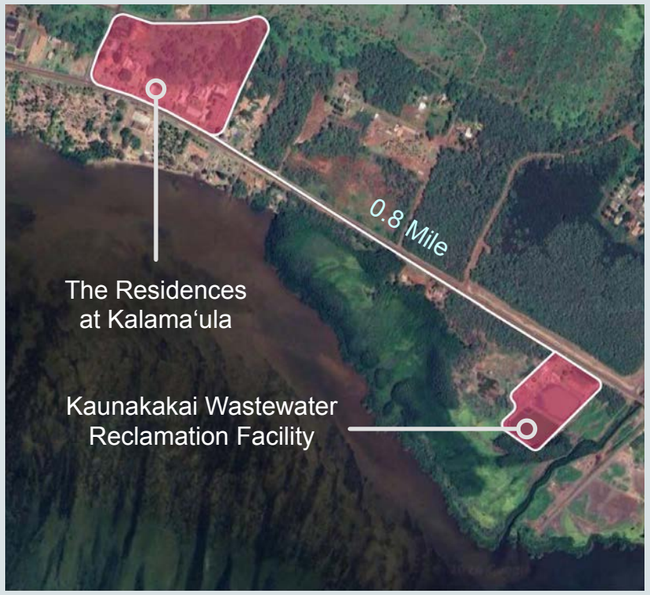
Residences at Kalamaʻula.

The Residences at Kalamaʻula is a beneficiary-led affordable housing project addressing the critical need for kūpuna (elder) housing. A key constraint at the Kalamaʻula site is the presence of a known archaeologically and culturally significant area in the southwest corner of the property, meaning excavation on the site is likely to cause project delays.

The Kalaniana'ole team has expressed strong interest in installing Mata units at each of the 47 residences for solids separation and treatment. Liquid effluent would then be conveyed to the local wastewater treatment facility via a shallow, low-pressure sewer—reducing project costs, avoiding archaeological delays, and minimizing loading on the municipal system.

0.8
Miles between Kalamaʻula and Wastewater reclamation facility

47
Proposed Kūpuna Housing Units



The hybrid application of Mata—pairing on-site solids separation with a low-pressure sewer connection—presents a strong opportunity for a DHHL–County shared infrastructure strategy, eliminating the need for on-site disposal while delivering pretreated flow to the Kaunakakai Wastewater Reclamation Facility.

References

Endnotes

1 “Wastewater.” Health.hawaii.gov, health.hawaii.gov/cwb/clean-water-branch-home-page/polluted-runoff-control-program/wastewater/.

2 State of Hawaii Department of Health. Cesspool Pilot Grant Program. State of Hawaii Department of Health, Dec. 2023.

3 Madsen, Heather, and Sayanti Ghosh. Evaluation Report: WaiHome LLC Mata Solid Waste Interceptor. 23. 2026.

4 “On-Site Sewage Disposal Systems - Hawaii Island.” Hawaii.gov, Hawai‘i Statewide GIS Program, 2018, geoportal.hawaii.gov/datasets/HiStateGIS::on-site-sewage-disposal-systems-hawaii-island/explore. Accessed 9 Apr. 2026.

5 “Puna Vacant Land & Lot Parcels.” Hawaiiluxuryhomes.com, 2026, www.hawaiiluxuryhomes.com/puna-vacant-land-lot-parcels/. Accessed 9 Apr. 2026.

6 Homeowner estimate

7 Hawai‘i Department of Health, Wastewater Branch. (2022). Onsite sewage disposal system (OSDS) permitting dataset, Hawai‘i, March 2017–March 2022 [Unpublished dataset provided to authors]. Accessed 9 Apr. 2026.

8 Data range from 2017-2022. Cross analysis of Type IV and Type II, “On-Site Sewage Disposal Systems - Hawaii Island.”

9 Photo: Nathan Eagle, Civil Beat, 2023

10 “QPublic - City and County of Honolulu, HI - Map.” Schneidercorp.com, Department of Budget and Fiscal Services, 2024, qpublic.schneidercorp.com/Application.aspx?AppID=1045&LayerID=23342&PageTypeID=1&PageID=0. Accessed 9 Apr. 2026.

11 Estimated infiltration rate 4 min/in

12 Amendment and Compilation of Chapter 11-62 Hawaii Administrative Rules. 21 Mar. 2016, health.hawaii.gov/opppd/files/2015/06/11-62-Wastewater-Systems.pdf. Accessed 8 Apr. 2026.

13 Homeowner estimate

14 “QPublic - City and County of Honolulu, HI - Map.”

15 Estimated infiltration rate 30 min/in

16 Homeowner Estimate.

17 Estimated infiltration rate 30 min/in

18 “ArcGIS Web Application.” Hawaii.edu, Sea Grant, 2025, seagrant.soest.hawaii.edu/app/. Accessed 8 Apr. 2026.

19 Probability considered due to proximity to coast and historical settlement zones. “On-Site Sewage Disposal Systems - Molokai.”