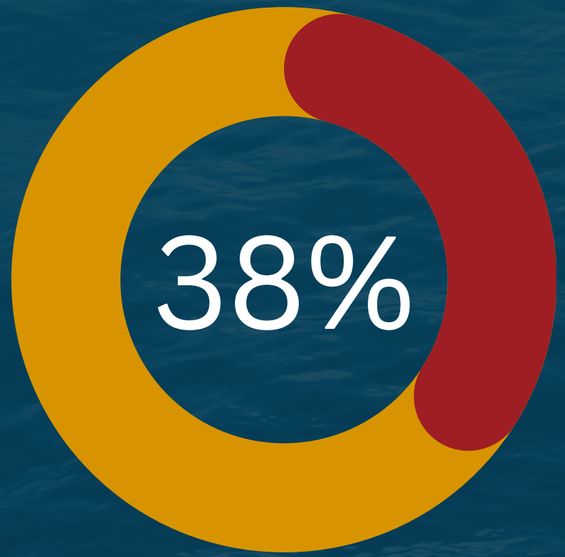
HAWAIIAN HOTSPOT

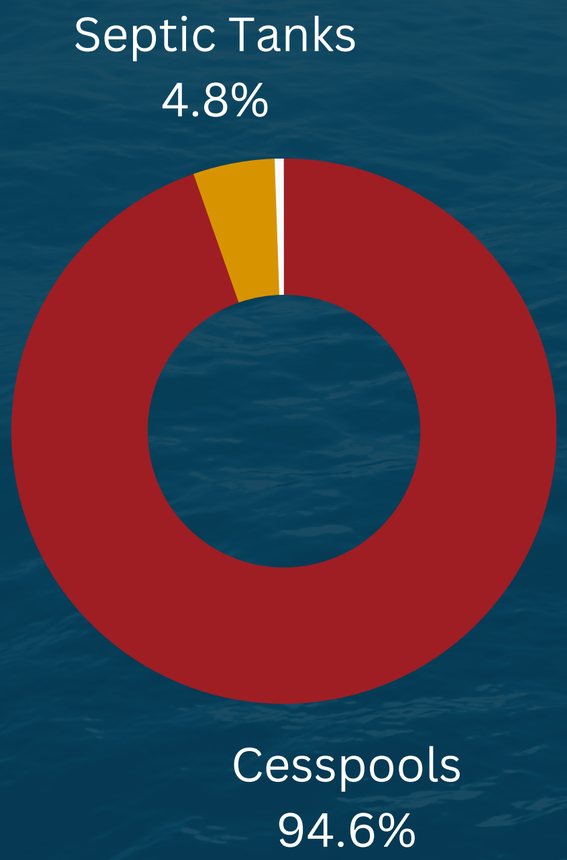
HAWAIIAN INNOVATION IN ONSITE WASTEWATER TREATMENT

James Roberts
WaiHome LLC

Hawaii Population Served by OSDS

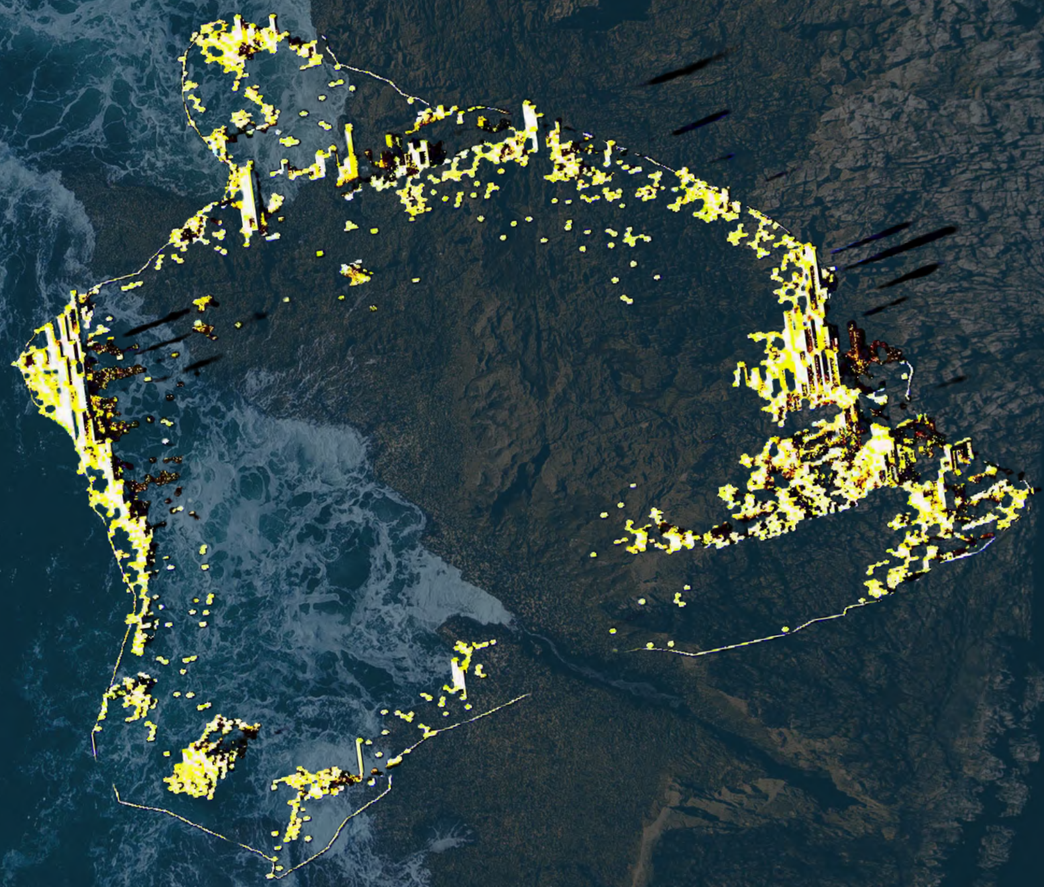


OSDS TYPES IN HAWAII



Hawaiian Constraints

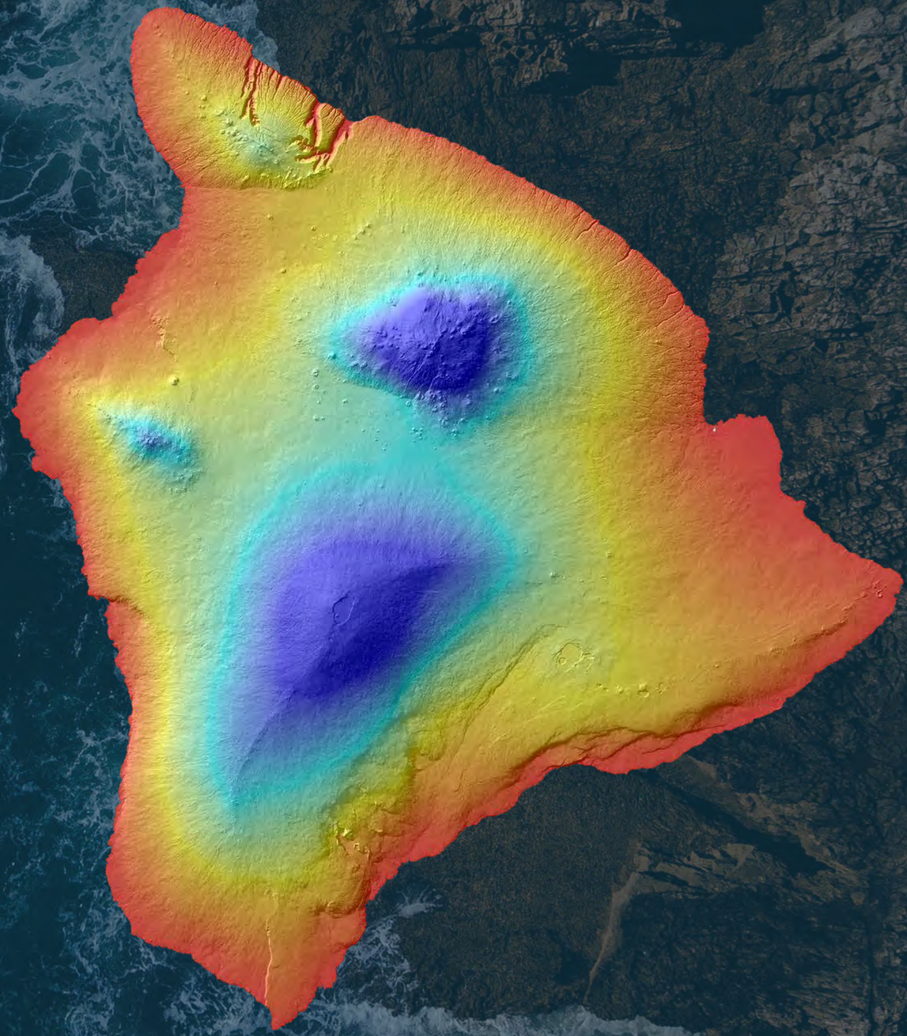
Proximity to Water



Hawaiian Constraints

Proximity to Water

Site Grade

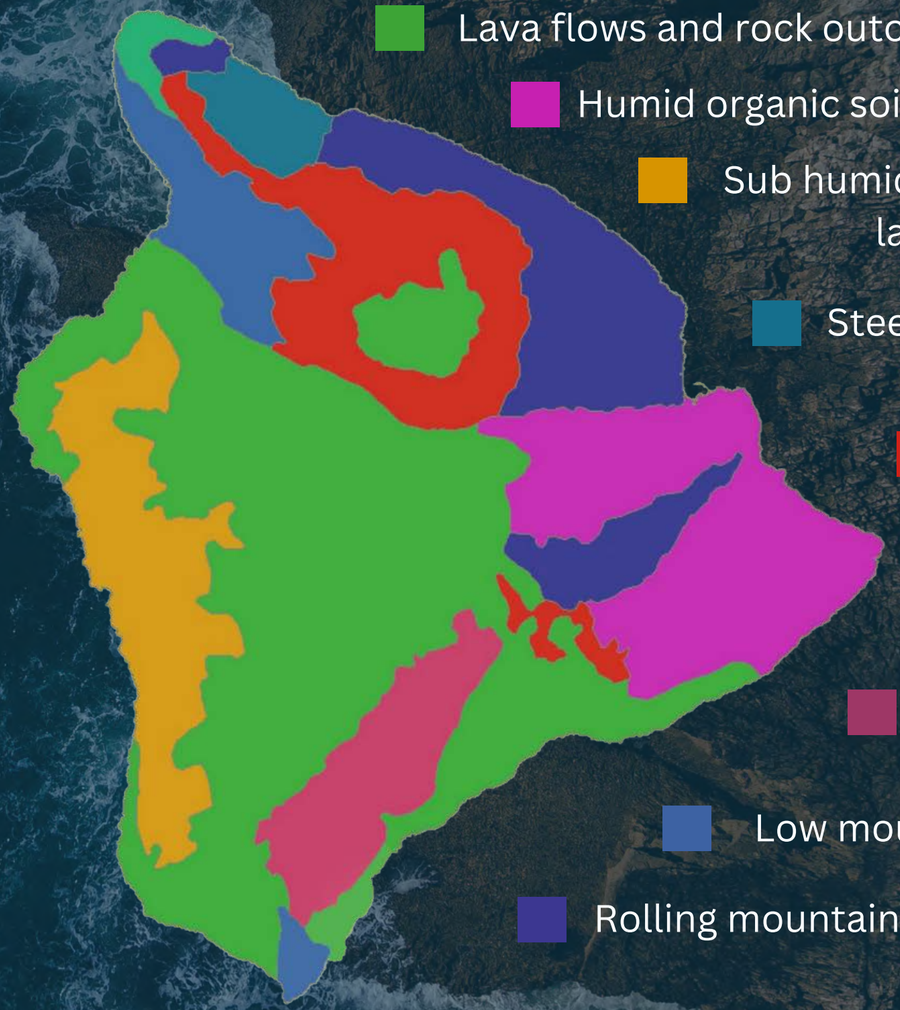


Hawaiian Constraints

Proximity to Water

Site Grade

Soil Type



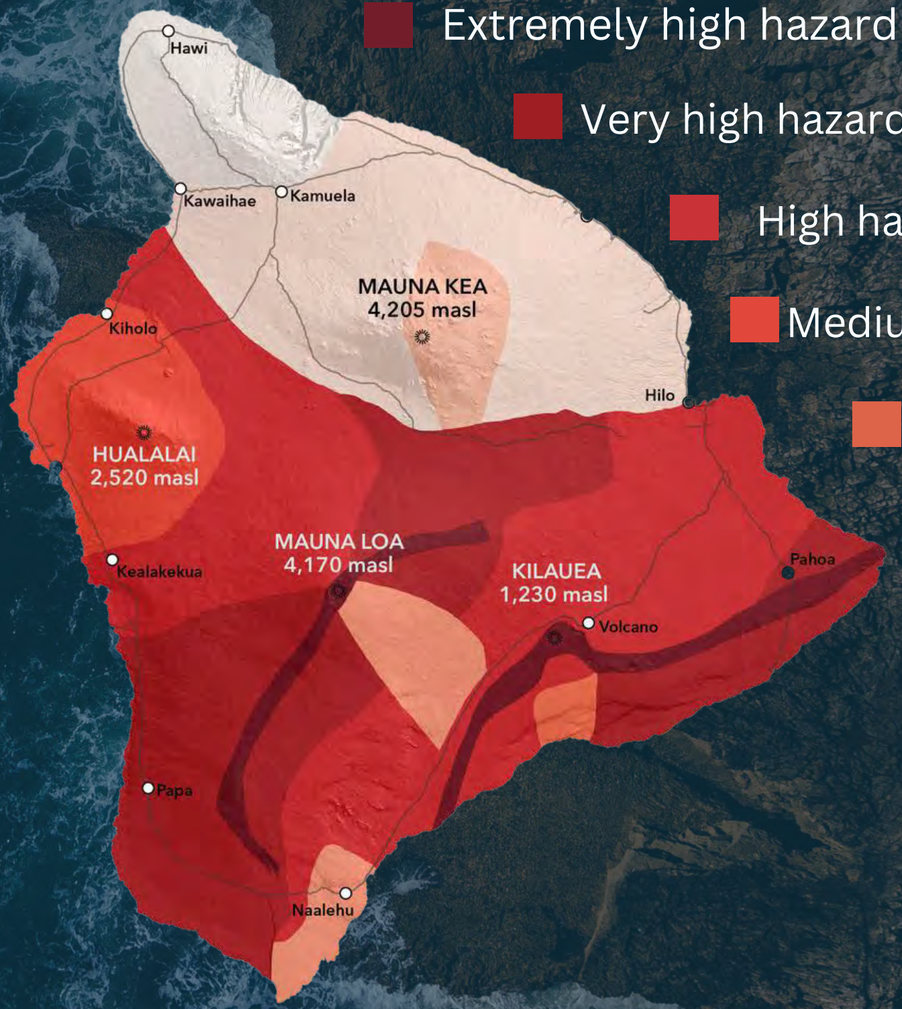
Hawaiian Constraints

Proximity to Water

Site Grade

Soil Type

Volcanism



Hawaiian Constraints

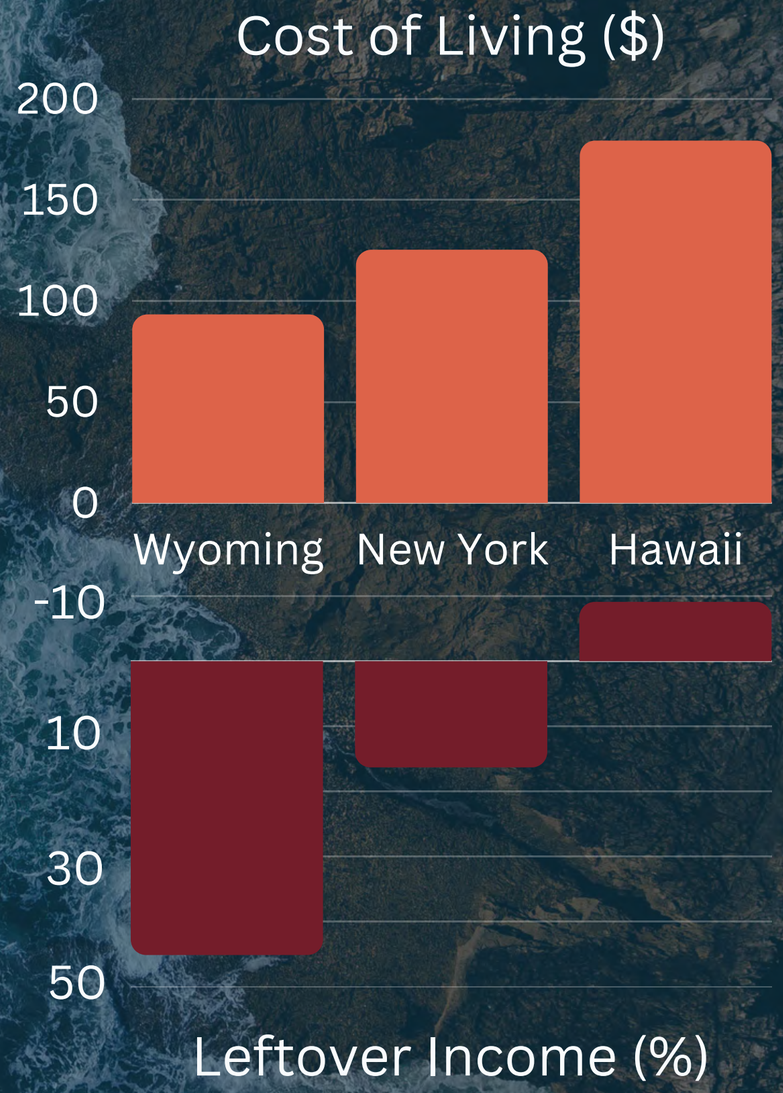
Proximity to Water

Site Grade

Soil Type

Volcanism

Hawaii Tax



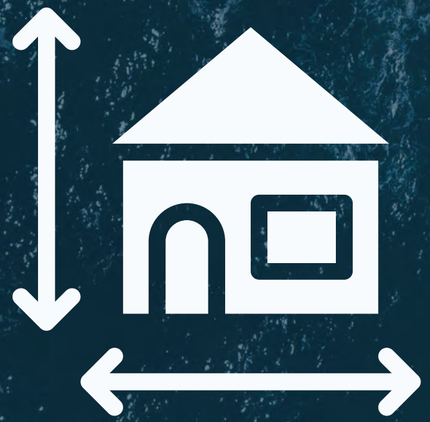
Hawaiian Constraints

Proximity to Water

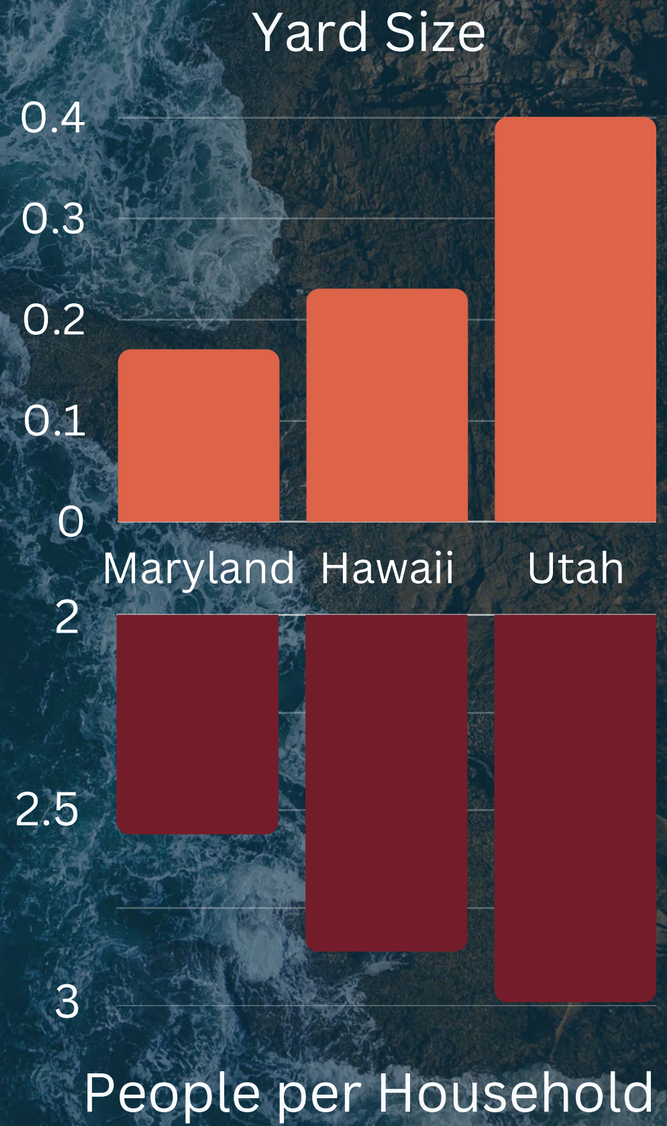
Site Grade

Soil Type

Volcanism



Small Properties



Import Cost

Hawaiian Constraints

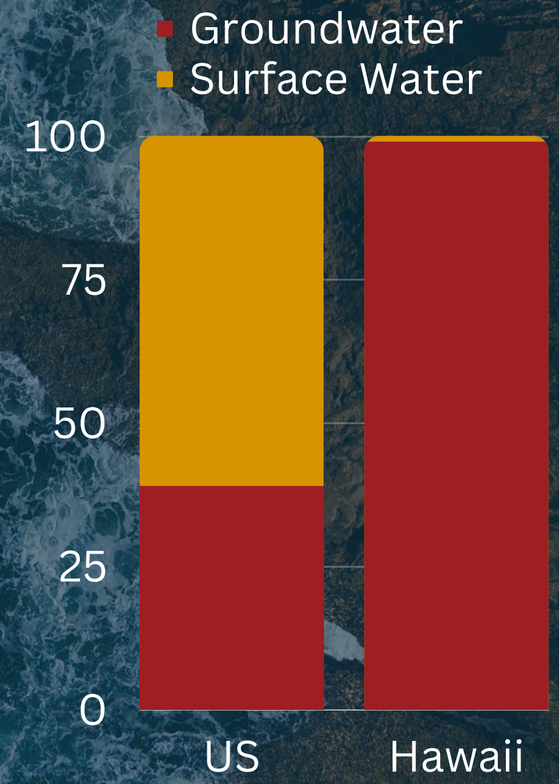
Proximity to Coast

Site Grade

Soil Type

Volcanism

Aquifer Proximity



Import Cost

Small Properties

Hawaiian Constraints

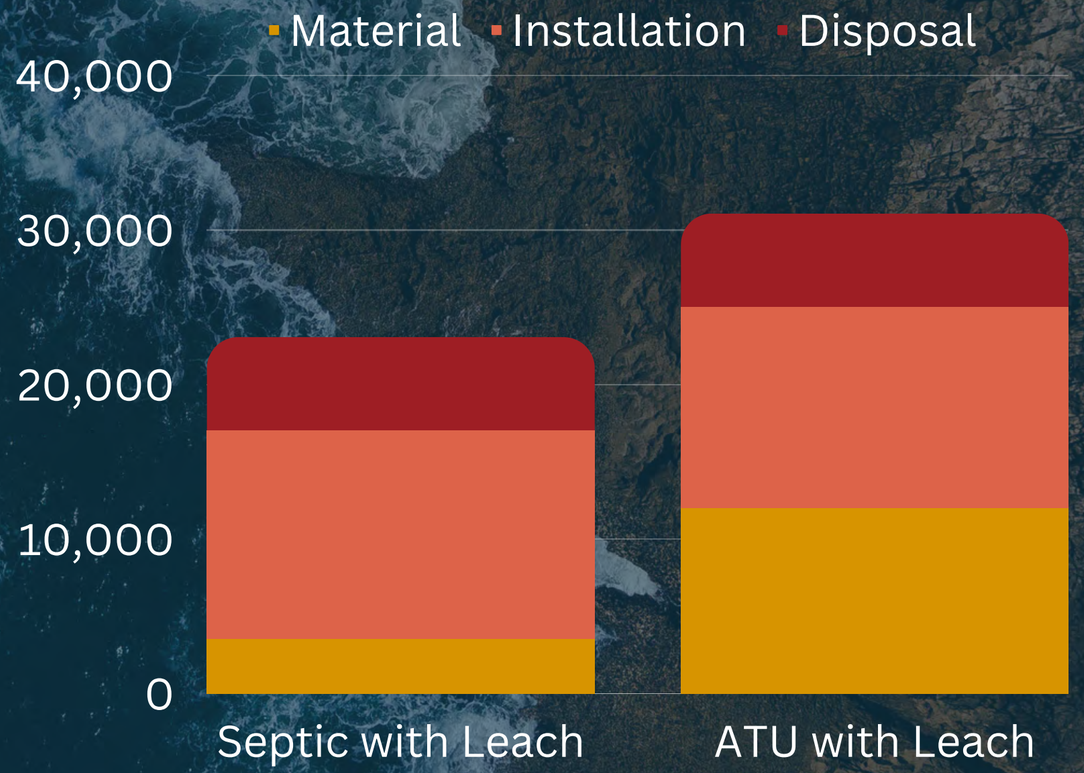
Proximity to Coast

Site Grade

Soil Type

Volcanism

Cost



Import Cost

Small Properties

Aquifer Proximity

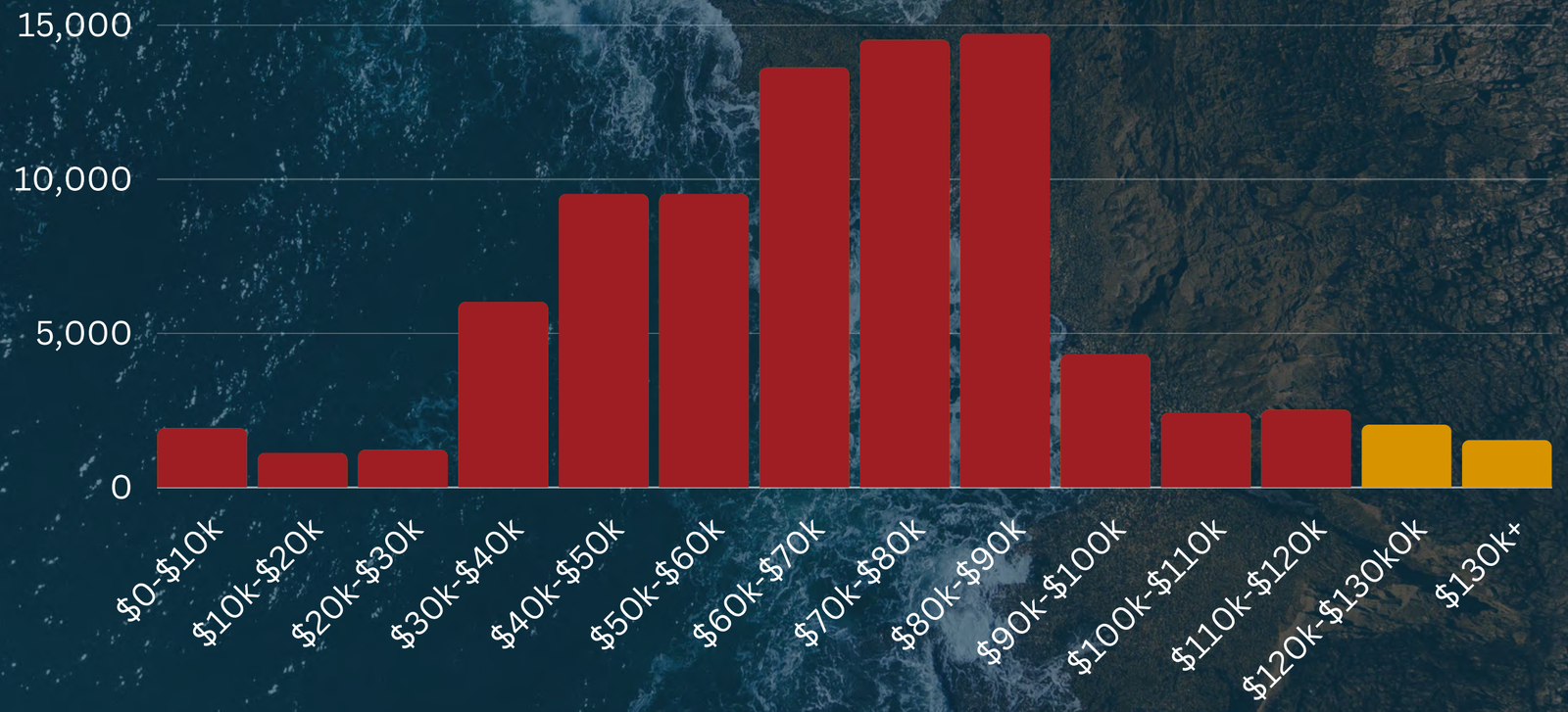
Hawaiian Constraints

Proximity to Coast

Site Grade

Soil Type

Volcanism



Import Cost

Small Properties

Aquifer Proximity

Cost

Hawaiian Constraints

Proximity to Coast

Site Grade

Soil Type

Volcanism

"ART LIVES FROM CONSTRAINTS AND DIES FROM FREEDOM"

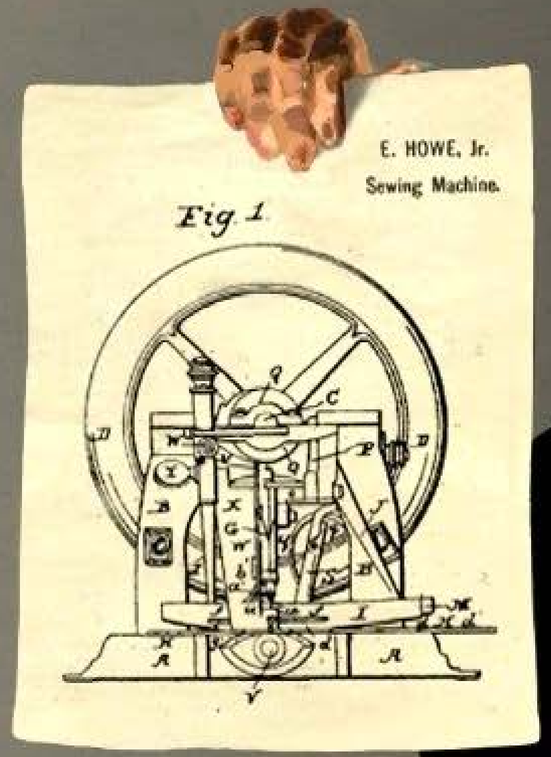
-LEONARDO DAVINCI

Import Cost

Small Properties

Aquifer Proximity

Cost


E. HOWE, Jr.
Sewing Machine.
Fig. 1.

"FOSSE-MOURAS"

LA VIDANGEUSE AUTOMATIQUE

de M. Louis M. Mouras

• VESOUL, FRANCE •

OR

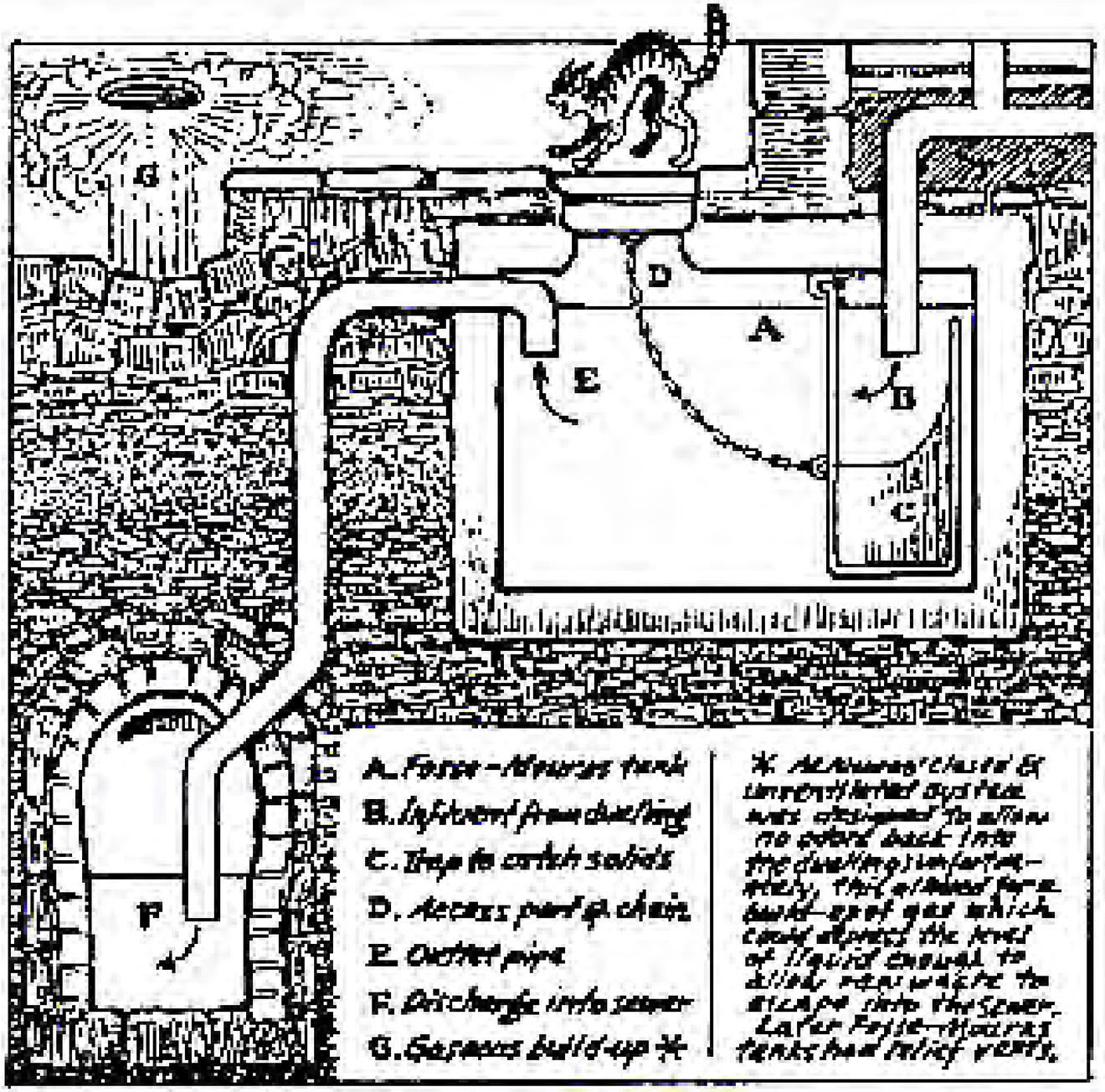
"MOURAS'"

AUTOMATIC

SCAVENGER

Circa

1860

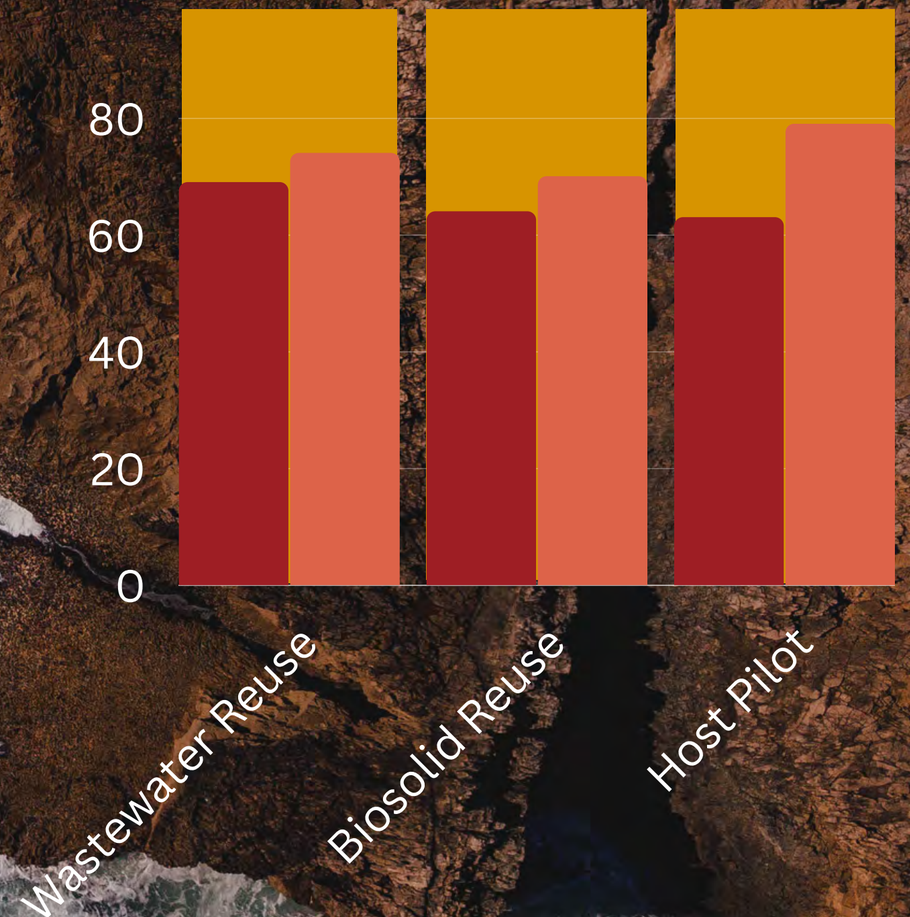


Hawaiian Assets

89%

of Hawaii residents participate in ocean activities at least once per month

Cultural Significance



Hawaiian Assets

Cultural Significance

Economic Significance

16%
of Hawaii jobs are in ocean sectors

$6B
directly generated annually by ocean industries

$23B
indirectly generated annually by tourism

Hawaiian Assets

Cultural Significance

Economic Significance

Federal Support

Hawaiian Assets

Cultural Significance

Economic Significance

Federal Support

Past Experience

100K - 1M
pre-european contact population

100%
locally sourced food

100%
locally managed wastes

Hawaiian Assets

Cultural Significance

Economic Significance

Federal Support

Experience

Culture of Innovation


Saturn
Mars
Antares

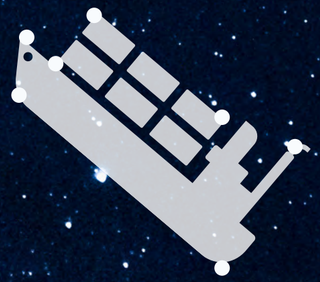
High Effluent Quality

High Effluent Quality

Compact







High Effluent Quality

Compact

Avoid Excavation

High Effluent Quality

Compact

Avoid Excavation

<$16,000/Household










High Effluent Quality

Compact

Avoid Excavation

<$16,000/Household

Mobile










High Effluent Quality

Compact

Avoid Excavation

<$16,000/Household

Mobile

Liquid and Solids Reuse Possible

WaiHome

Island Centered Wastewater Product Development

WAIHOME SOLUTION SUITE

COMPOSTING/ URINE DIVERTING TOILETS

Divert solids to focus on liquid blackwater from urine and kitchen

PATU

Algae Photobioreactor as a “Passive Aerobic Treatment Unit”

RAIL

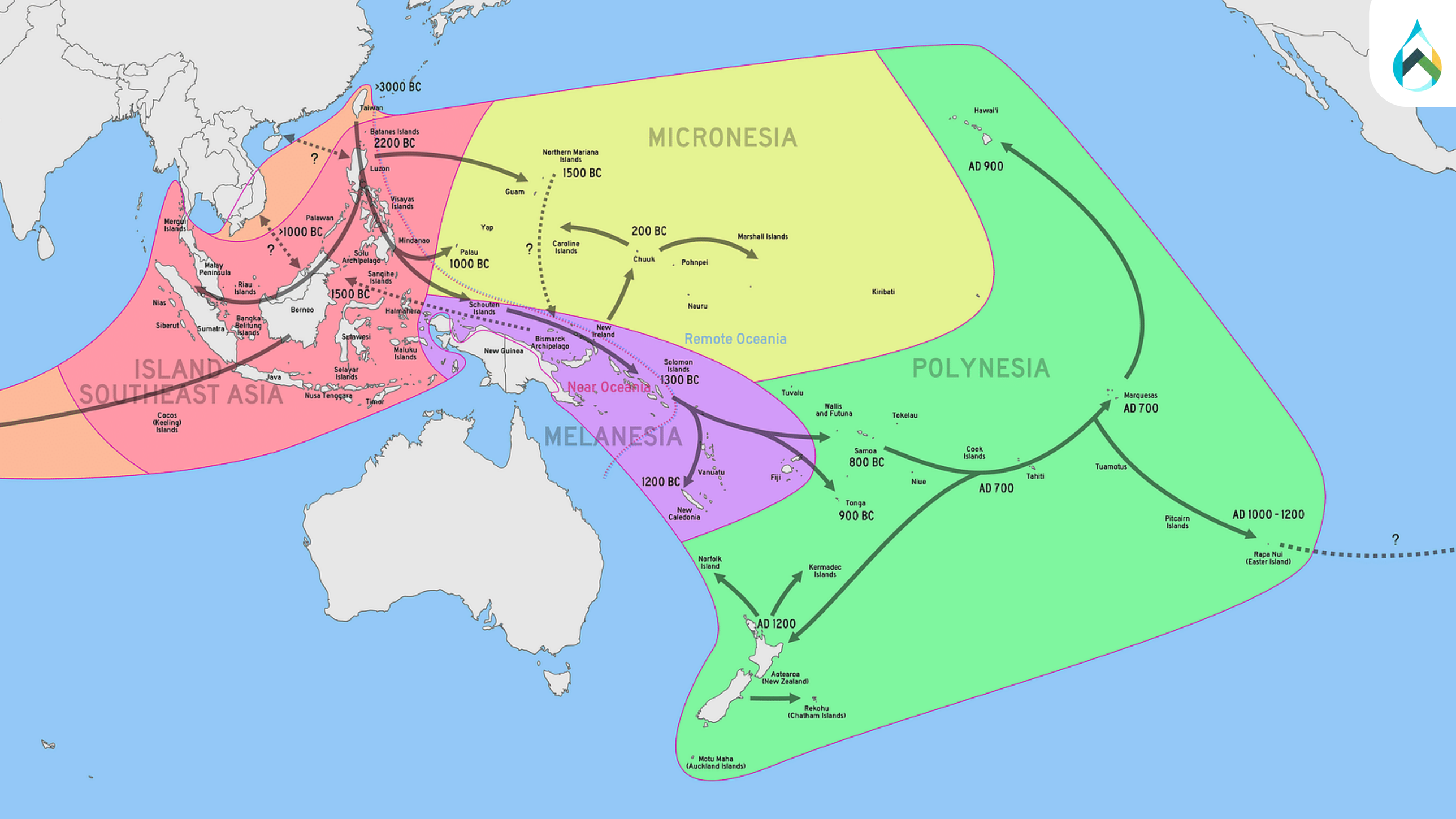
Aboveground alternative to conventional leachfields

HCC CURRICULUM DEVELOPMENT

DACUM Research Chart for IWS Specialist

July 19-20, 2023

DUTIES	TASKS								
A. Maintain Current IWS Knowledge	A.1 Read industry technical publications (e.g., journals, academic publications)	A.2 Maintain stakeholder relationships (e.g., DOH, homeowners, contractors)	A.3 Network with industry professionals	A.4 Research certified technologies	A.5 Monitor IWS regulations	A.6 Monitor financing options	A.7 Monitor IWS legislation	A.8 Participate in professional development (e.g., professional associations, certifications)	A.9 Attend professional conferences
B. Conduct Site Assessments	B.1 Identify applicable regulatory requirements (e.g., HAR11-62-31)	B.2 Research site soil classifications (e.g., depth to water table, depth to bedrock, soil type)	B.3 Conduct homeowner interview (e.g., number of occupants, floor plans, future plans)	B.4 Perform visual site observations (e.g., barriers, grade, property lines)	B.5 Measure relevant dimensions (e.g., open spaces, setback distances)	B.6 Perform percolation test	B.7 Sketch site layout	B.8 Capture site photographs	B.9 Capture aerial imagery
	B.10 Evaluate existing utilities	B.11 Consolidate site assessment data							
C. Evaluate IWS Options	C.1 Analyze site assessment data	C.2 Consolidate design criteria	C.3 Identify IWS design options	C.4 Analyze IWS design options (e.g., LCA, performance, homeowner preference)	C.5 Identify financial support opportunities	C.6 Establish stakeholder consensus	C.7 Finalize IWS preliminary report		
D. Prepare Permit Applications	D.1 Prepare variance permit application	D.2 Coordinate variance process	D.3 Perform design calculations	D.4 Draft construction drawings	D.5 Gather DOH permit documents	D.6 Complete site evaluation/percolation test form	D.7 Acquire signed owner certification form	D.8 Compile technical specifications (e.g., manufacturing, design, product)	D.9 Prepare preliminary permit application
	D.10 Review preliminary permit application with engineer	D.11 Complete permit application	D.12 Monitor application status						
E. Facilitate Construction Process	E.1 Solicit contractor bids	E.2 Present contractor options to homeowner	E.3 Review contractor submittal	E.4 Facilitate construction schedule	E.5 Conduct pre-construction onsite meeting	E.6 Photograph installation process	E.7 Complete daily report	E.8 Report unforeseen conditions	E.9 Inspect installed system
	E.10 Prepare IWS as-builts	E.11 Obtain signed CCF	E.12 Prepare construction inspection report	E.13 Compile final closure packet	E.14 Review O&M manual with homeowner	E.15 Identify maintenance program	E.16 Establish maintenance contract with homeowner		


>3000 BC
Taiwan
Batanes Islands
2200 BC
Luzon
Visayas Islands
Mindanao
Palawan
>1000 BC
Mergui Islands
Malay Peninsula
Riau Islands
Nias
Siberut
Sumatra
Bangka Belitung Islands
Borneo
Sulu Archipelago
Sangihe Islands
1500 BC
Halmahera
Sulawesi
Maluku Islands
Selayar Islands
Java
Nusa Tenggara
Timor
Cocos (Keeling) Islands
ISLAND SOUTHEAST ASIA
MICRONESIA
Northern Mariana Islands
1500 BC
Guam
Yap
Palau
1000 BC
Caroline Islands
200 BC
Chuuk
Pohnpei
Marshall Islands
Kiribati
Nauru
Remote Oceania
Schouten Islands
New Ireland
Bismarck Archipelago
New Guinea
Solomon Islands
1300 BC
Near Oceania
MELANESIA
Vanuatu
1200 BC
New Caledonia
Fiji
Tonga
900 BC
Tuvalu
Wallis and Futuna
Tokelau
Samoa
800 BC
Niue
Cook Islands
AD 700
Tahiti
Marquesas
AD 700
Tuamotus
Pitcairn Islands
AD 1000 - 1200
Rapa Nui (Easter Island)
Hawai'i
AD 900
POLYNESIA
Norfolk Island
Kermadec Islands
AD 1200
Aotearoa (New Zealand)
Rekohu (Chatham Islands)
Motu Maha (Auckland Islands)

WE ARE NOT GOING TO BE ABLE TO OPERATE OUR SPACESHIP EARTH SUCCESSFULLY NOR FOR MUCH LONGER UNLESS WE SEE IT AS A WHOLE SPACESHIP AND OUR FATE AS COMMON. IT HAS TO BE EVERYBODY OR NOBODY.

BUCKMINSTER FULLER