

January 18, 2024



Ma'alaea Village Association Wastewater Working Group
and
Ma'alaea Wastewater Association



Ma'alaea Regional Wastewater Reclamation System
(MRWRS)

*A revolutionary solution to
community-scale wastewater challenges in Maui*

*Cleaning up Ma'alaea Bay
while supporting long-term security and reducing costs
for the Ma'alaea community*

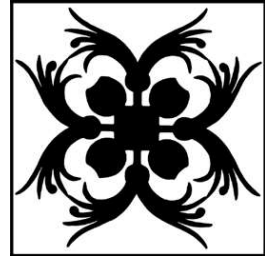
Tapani Vuori
Peter Cannon
Travis Liggett MS
David Whitney PE

MVA Vice President
MVA Board Member
WWG Technical Administrator
MRWRS Project Manager

The history and future of Ma'alaea Regional Wastewater Reclamation System

October 2018	Town hall meeting attended by Sina Pruder - wastewater #1 community issue
September 2019	B&C feasibility report - funded by Hono Kai, Lau loa, Ma'alaea Triangle & Council
Early 2020	Mahi Pono pledged 10 acres for MRWRS treatment plant & greenbelt
January 2022	GIA application - \$250,000 awarded for preliminary design work
April 2022	County Council approved \$9,500,000 SRF budget amendment to build MRWRS
June 2022	\$33,700 South Maui County Council budget grant for survey study by Kelly King
October 2022	County of Maui applied for State Revolving Fund (SRF) funding
November 2022	HI DOH published SRF priorities with MRWRS ranked #6 out of 108 proposals
March 2023	GIA grant administered, preliminary design work began Preliminary Design Report delivered to Mayor Bissen's staff
July 2023	EA draft delivered, Mayor Bissen signed LOI for \$9,500,000 FY2025 grant
July - Dec 2023	Ma'alaea Wastewater Association formation, Basis of Design Report development
July 2024	Initiate detailed design work
Early 2025	Permitting complete, MWA initiates contracts & begins installation
Late 2025	Installation complete, operations and ratepaying commence

Project Partners



1. Ma'alaea Wastewater Association
2. Ma'alaea Village Association
3. Born and Raised Earth
4. Reef Power LLC
5. Maui Nui Marine Resource Council
6. Mahi Pono
7. Maui County Council & staff
(Council Members King and Cook)
8. Maui Mayor Richard Bissen & staff
9. United States Senate & staff
(Senator Schatz)
10. Hawaii State Department of Health
Wastewater Branch
11. Hawaii State Legislature Grant in Aid
Program (Senator McKelvey)
12. University of Hawaii Sea Grant
13. EcoSolutions LLC
14. Maui Native Nursery
15. Sunshine Vetiver Solutions
16. Sandia National Laboratories
17. Rich Earth Institute
18. Aecos
19. Fukumoto Engineering
20. Environmental Assistants LLC
21. Rural Community Assistance Corporation
22. Fykor LLC
23. Pacific Legacy
24. Wastewater Alternatives and Innovations
(Stuart Coleman)
25. County of Maui Office of Economic
Development
26. Brown and Caldwell
27. Water Quality Consulting, Inc.
(Robin Knox)
28. Steve Parabolicoli

28 project partners

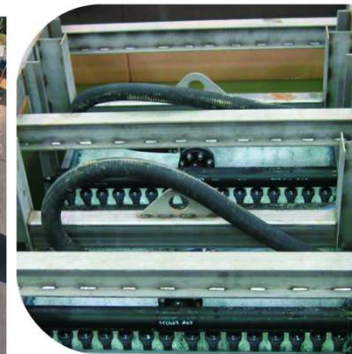
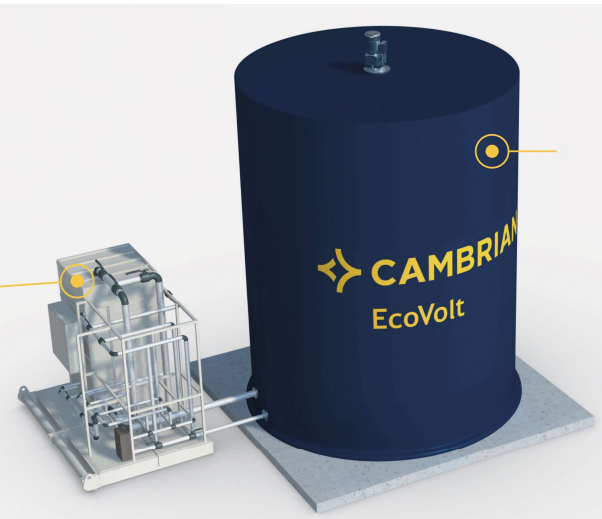
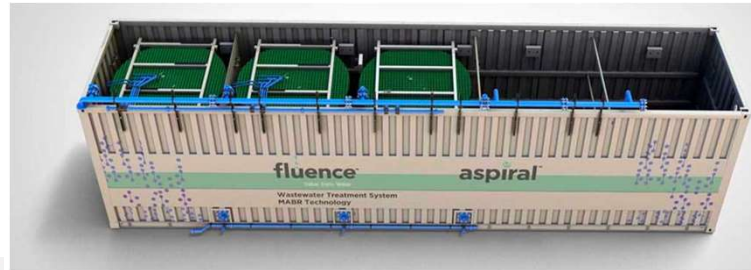
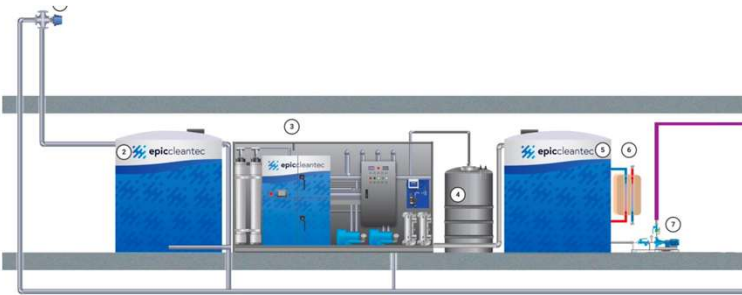
Ma'alaea Regional Wastewater Reclamation System benefits

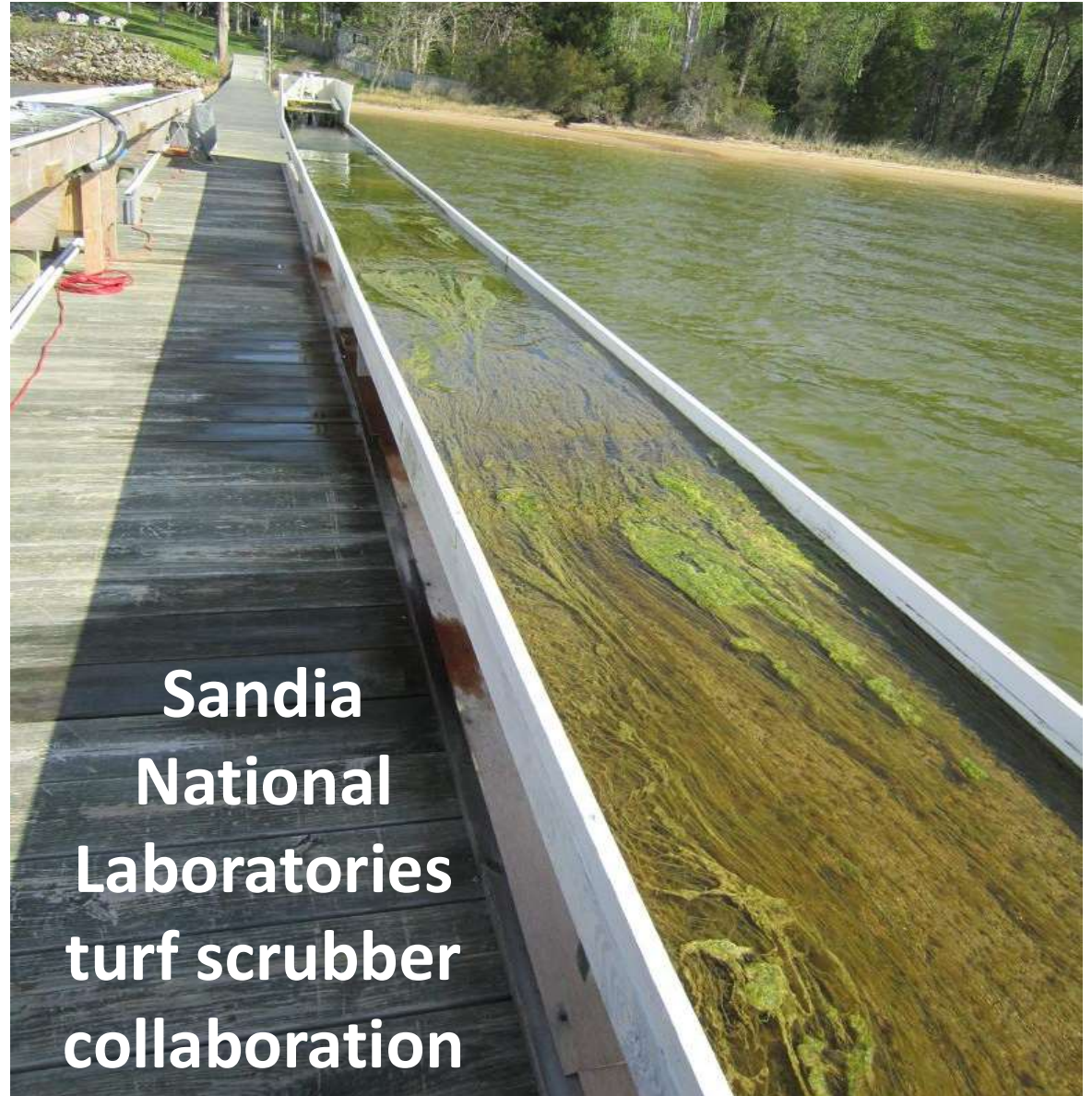
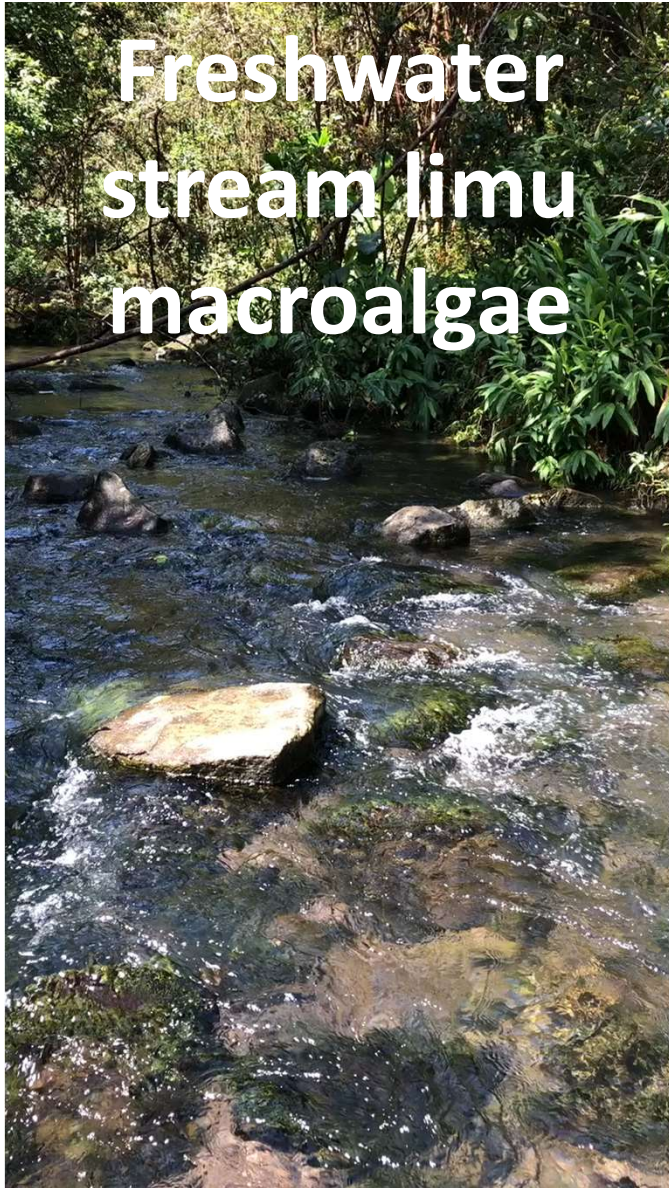
1. MRWRS is a community led solution developed over 5 years of work by MVA
2. Provides a major improvement to the health of all marine life in Ma'alaea Bay
3. Creates substantial fire break protection with native plants & sprinklers
4. Preliminary Design Report had 25 reviewers in the community
5. Eliminates injection well discharges in Ma'alaea by 2026
6. Makes more engineering and economic sense than Central Maui conveyance
7. Presents a far faster solution than Central Maui conveyance
8. Will provide a model for community-scale wastewater solutions
9. Regional design provides a solution for Hawaii's 88,000 cesspool problem
10. Eliminates substandard wastewater plants and majority of Maui injection wells
11. Demonstrates that our community can unite & solve problems
12. Some treatment technology solutions are likely to provide "surplus revenue"
13. Provides landscape irrigation water to save millions of gallons per year

System Specification

- Designed for at least 50 years service, is scalable and can meet future regulation
- Eliminate injection wells in Ma'alaea by serving residences, Triangle & Harbor
- Cutting edge advanced secondary treatment delivered in pretested package plant
- 100% UV disinfection to R-1 standards or better
- 100% irrigation reuse disposal to customer landscaping and greenbelt fire break
- Greenbelt fire break planted with native Hawaiian tree and groundcover plants
- 100% solar PV power with grid backup
- Storage pond / wetland for treated effluent storage before irrigation reuse
- Sludge-to-biochar pyrolysis for biosolids reuse
- Algal turf scrubber growing freshwater stream macroalgae limu polishes nutrients
- Grinder pumps & small diameter, pressurized conveyance
- Meet or exceed R-1 effluent water quality standards

Modular Package Plant Treatment Options: Membrane Bioreactor (MBR) Moving Bed Bioreactor (MBBR) Aerated Granular Sludge (AGS)





Sludge to biochar pyrolysis

Secondary treatment biosolids reuse with pyrolysis conversion of sludge to biochar

Pyrolysis: chemical process of decomposition by heat in the absence of oxygen to convert biosolids generated by the biological treatment process into biochar, transforming a waste product into something beneficial

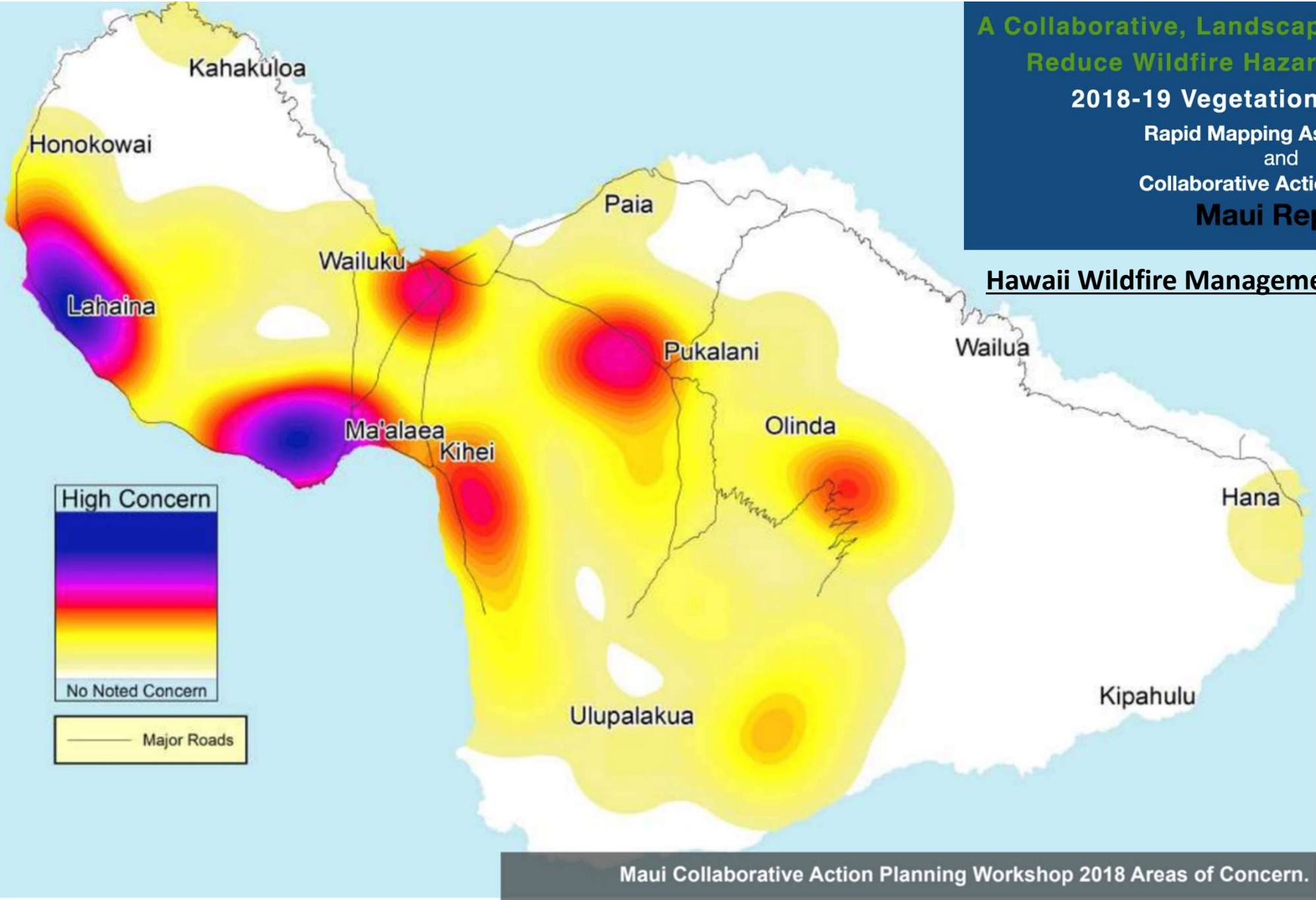
Biochar: a charcoal-like substance produced using a pyrolysis process

- pyrolysis sterilizes sludge and reduces contamination in biosolids
- biochar safely stores carbon to reduce greenhouse gasses
- biochar will be reused to fortify and stabilize soils
- biochar removes pharmaceuticals from reuse water
- woody biomass from site clearing & turf scrubber limu biomass can be pyrolyzed
- National Science Foundation pyrolysis pilot grant with Rich Earth Institute



A Collaborative, Landscape-Level Approach to Reduce Wildfire Hazard Across Hawai'i
2018-19 Vegetation Management
Rapid Mapping Assessment
and
Collaborative Action Planning
Maui Report

Hawaii Wildfire Management Association report



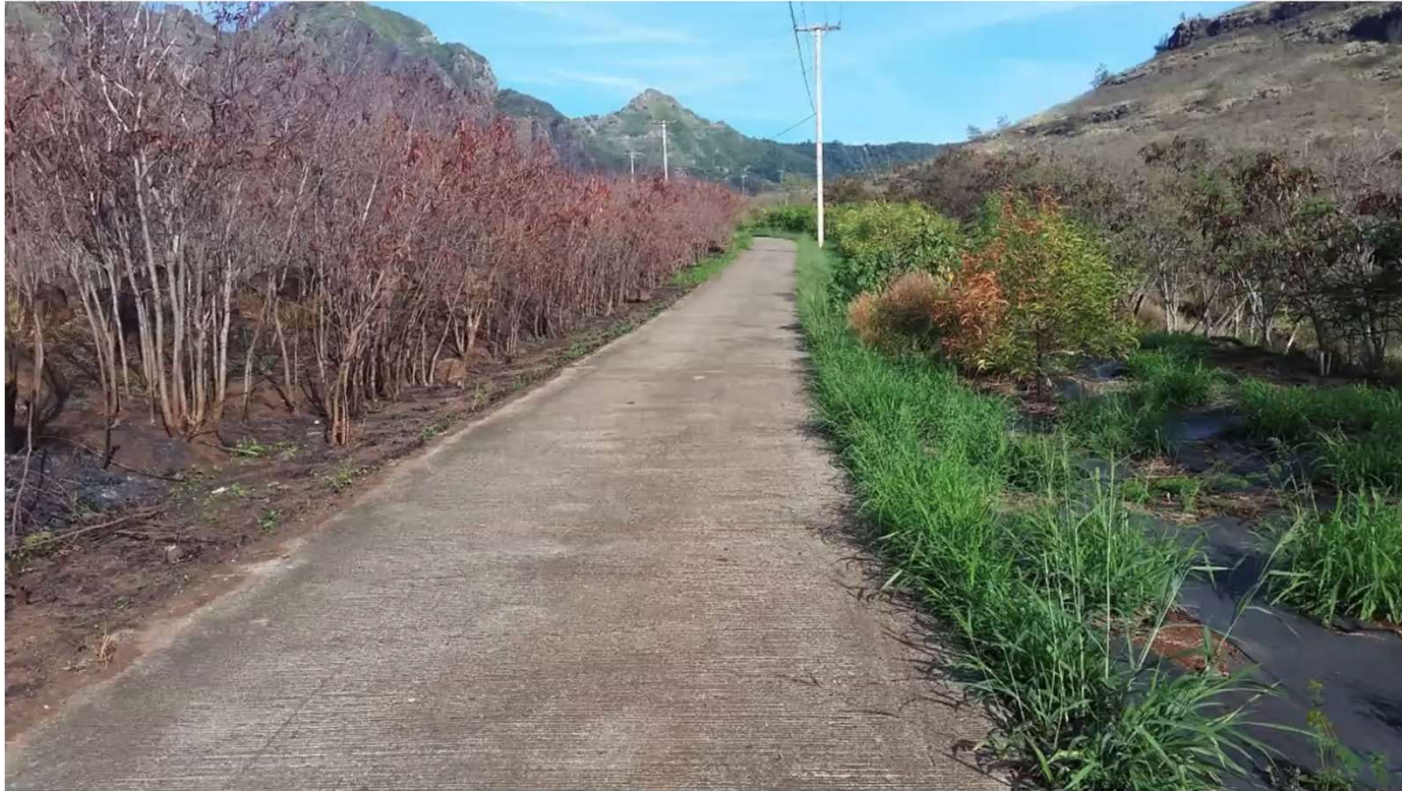




Greenbelt Site 7/25/2022

Irrigation Reuse Disposal Greenbelt Fire Breaks

- Eliminates discharge into groundwater & ocean
- Optimized to be an effective wind & fire break for Ma'alaea Village
- Planted with native Hawaiian tree and groundcover species to restore habitat
- Planted with native lei flowers to support pollinators
- Planted with vetiver to reduce sediment transport potential in the watershed
- Provides model for 100% reuse installations at Maui municipal facilities
- Provides model for irrigation reuse fire break in Kihei-Wailea
- Provides ideal application for all that reuse water discharging into injection



DOFAW Greenbreak

Photos: Ryan Peralta

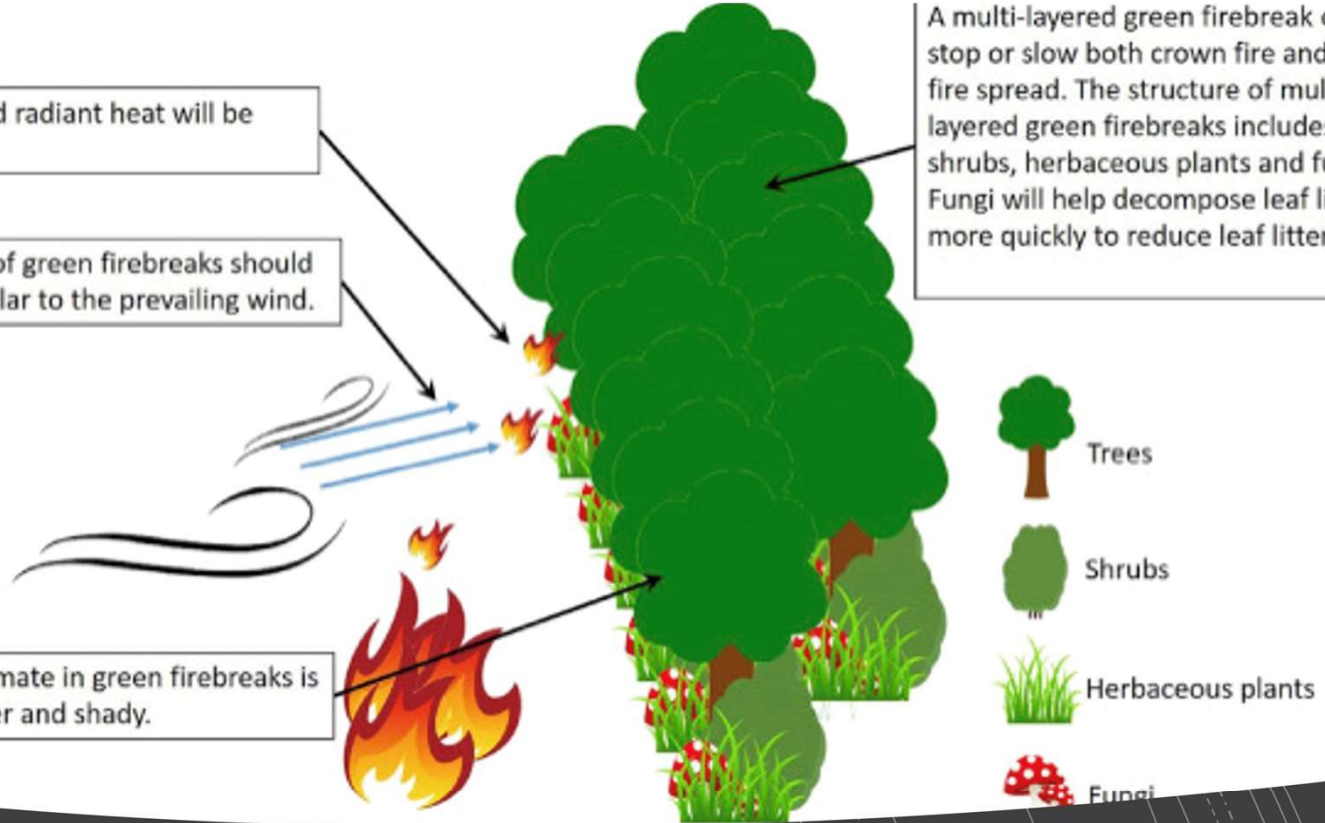


Firebrands and radiant heat will be blocked.

The direction of green firebreaks should be perpendicular to the prevailing wind.

The microclimate in green firebreaks is cooler, wetter and shady.

A multi-layered green firebreak can stop or slow both crown fire and ground fire spread. The structure of multi-layered green firebreaks includes trees, shrubs, herbaceous plants and fungi. Fungi will help decompose leaf litter more quickly to reduce leaf litter loads.



Green strips or Green firebreaks – good idea – but do they work?....

- Reduced maintenance costs
- Enhance biodiversity
- Effective...*a fire that occurred in Fujian, China in 2000, was stopped by green firebreaks, but was not halted by a 12 m wide road*
- *Improve microclimate*
- *Reduced invasion*

Hawaiian Name	Scientific Name	English name
HIGH IRRIGATION RATE SPECIES		
'Ahu'awa	<i>Cyperus javanicus</i>	Javanese Flatsedge
Makaloa	<i>Cyperus laevigatus</i>	Smooth Flatsedge
Kaluhā	<i>Bolboschoenus maritimus</i>	Saltmarsh Bulrush
'Ae'Ae	<i>Bacopa monierri</i>	Water Hyssop
-	<i>Chrysopogon zizanioides</i>	Vetiver
GRADIENT MOISTURE ZONE PLANTINGS / WINDBREAK UNDERSTORY		
Pili grass	<i>Heteropogon contortus</i>	Spear grass
Mau Akiaki	<i>Fimbristylis cymose</i>	Hurricane Grass
Kāwelu grass	<i>Eragrostis variabilis</i>	Variable Lovegrass
A'ali'i	<i>Dodonea viscosa</i>	Broadleaf Hopbush
WINDBREAK SPECIES		
Loulu	<i>Pritchardia spp.</i>	Fan Palm
Koai'a	<i>Acacia koaia</i>	Hawaiian Koa
Hala	<i>Pandanus tectorius</i>	Screw Pine
Milo	<i>Thespesia populnea</i>	Portia Tree
Naio	<i>Myoporum sandwicense</i>	False Sandalwood
Alahe'e	<i>Psydrax odorata</i>	Needlewood
Neneleau	<i>Rhus sandwicensis</i>	Hawaiian Sumac

NATIVE AND CANOE PLANT FOOD FOREST SPECIES		
`Ape	<i>Alocasia macrorrhizos</i>	elephant's ear
`Awa	<i>Piper methysticum</i>	kava
`Awapuhi Kuahiwi	<i>Zingiber zerumbet</i>	shampoo ginger
Hau	<i>Hibiscus tiliaceus</i>	Sea hibiscus
Ipu	<i>Lagenaria siceraria</i>	gourd
Kalo	<i>Colocasia esculenta</i>	taro
Kamani	<i>Calophyllum inophyllum</i>	Alexandrian laurel
Ki	<i>Cordyline fruticosa</i>	ti
Kō	<i>Saccharum officinarum</i>	sugar cane
Kou	<i>Cordia subcordata</i>	kou
Kukui	<i>Aleurites moluccana</i>	candlenut
Mai`a	<i>Musa x paradisiaca</i>	banana
Milo	<i>Thespesia populnea</i>	portia tree
Niu	<i>Cocos nucifera</i>	coconut
Noni	<i>Morinda citrifolia</i>	Indian mulberry
`Ohe	<i>Schizostachyum glaucifolium</i>	bamboo
`Ohi`a `Ai	<i>Syzygium malaccense</i>	mountain apple
`Olena	<i>Curcuma longa</i>	turmeric
Pia	<i>Tacca leontopetaloides</i>	Polynesian arrowroot
`Uala	<i>Ipomoea batatas</i>	sweet potato
Uhi	<i>Dioscorea alata</i>	yam
`Ulu	<i>Artocarpus altilis</i>	breadfruit
Wauke	<i>Broussonetia papyrifera</i>	paper mulberry

LEI SPECIES		
Akia	<i>Wikstroemia uva-ursi</i>	Bear's grape
Hinahina	<i>Heliotropium anomalum</i>	Beach heliotrope
Kului	<i>Nototrichium sandwicense</i>	Hawaiian rockwort
Kupukupu	<i>Nephrolepis cordifolia</i>	Tuberous sword fern
Ma'o	<i>Gossypium tomentosum</i>	Hawaiian cotton
Maile	<i>Alyxia oliviformis</i>	Hawaiian dogbane
Palapalai	<i>Microlepia strigosa</i>	Rigid lace fern
Ulei	<i>Osteomeles anthyllidifolia</i>	Hawaiian Rose
Wiliwili	<i>Erythrina sandwicensis</i>	Coral tree

Windbreak Tree and Shrub Species*

MRWRS elevation 40 ft



Loulu - *Pritchardia* spp.
 -Height 18-20 ft
 -Footprint 20 ft



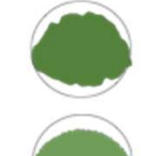
Neneleau - *Rhus sandwicensis*
 -Height 25 ft
 -Footprint 20 ft



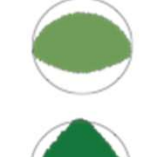
Koai'a - *Acacia koaia*
 -Height 25 ft
 -Footprint 20 ft



Hala - *Pandanus tectorius*
 -Height 18 ft
 -Footprint 20 ft



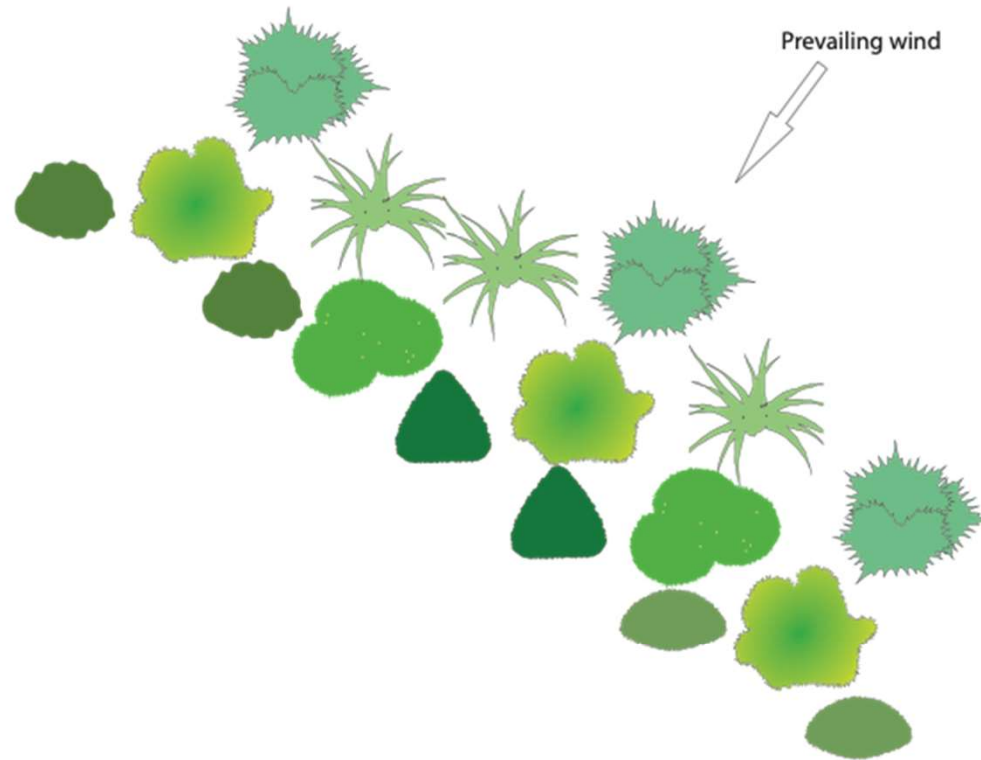
Milo - *Thespesia populnea*
 -Height 15-30 ft
 -Footprint 15 ft



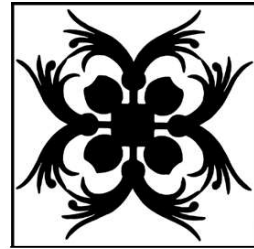
Naio - *Myoporum sandwicense*
 -Height 15-30 ft
 -Footprint 15 ft



Alahe'e - *Psydrax odorata*
 -Height 15-20 ft
 -Footprint 15 ft



Prevailing wind



maui Native Nursery









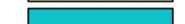



*Mature plant footprint in feet

Scale 20'

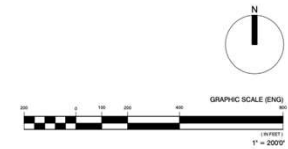
100'

DESIGN LEGEND











-  EXISTING TOPO
-  PROPOSED TOPO
-  PROPOSED SEWER FORCE MAIN
-  PROPOSED R1 IRRIGATION WATER
-  PROPOSED FENCE
-  PROPOSED GREENBELT
-  PROPOSED ALGAE TURF SCRUBBER
-  PROPOSED SOLAR PANELS
-  IRRIGATION WATER STORAGE POND
-  PROPOSED GRAVEL ACCESS ROAD

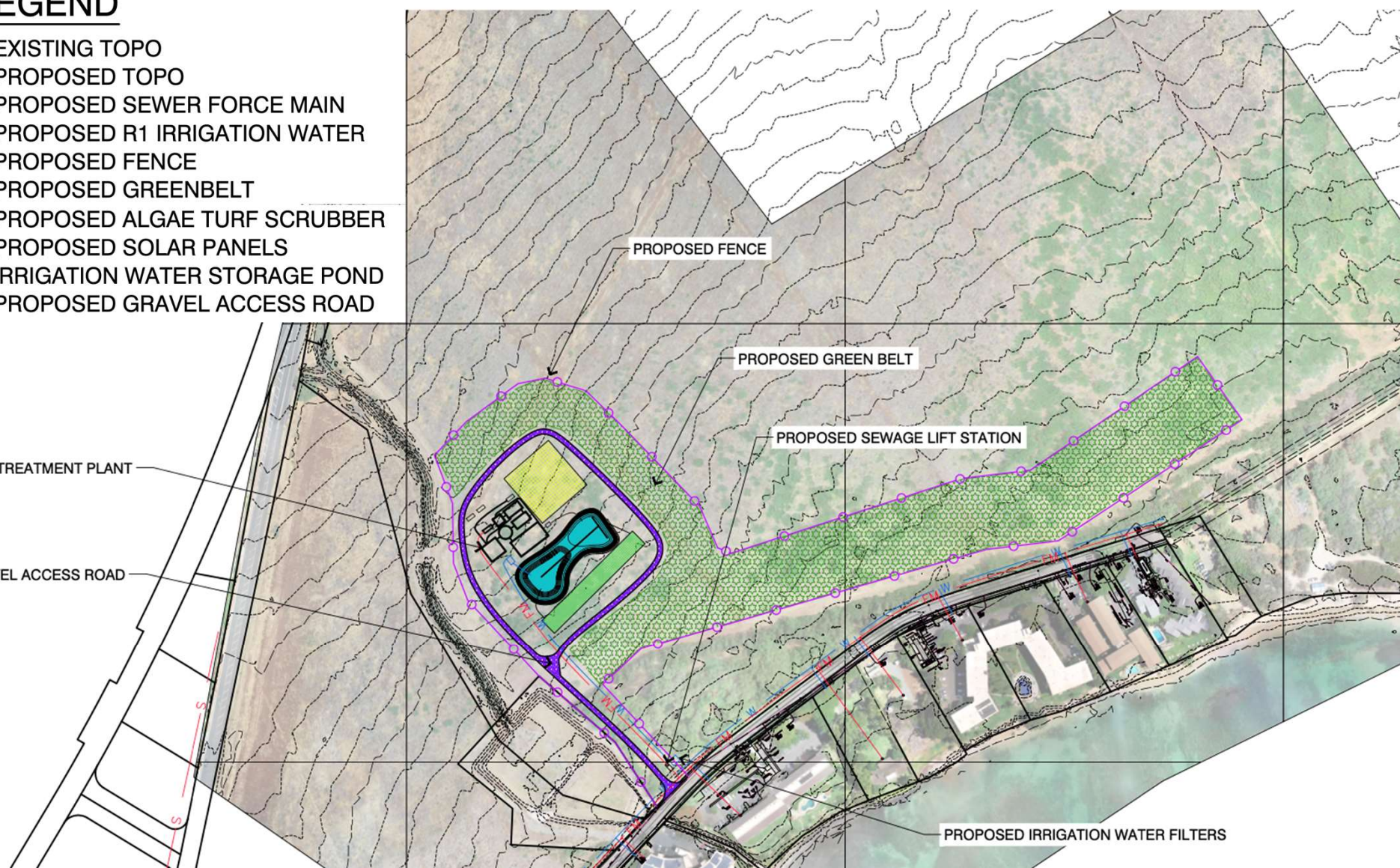


PROJECT SITE PLAN
SCALE: 1" = 200'



DESIGN LEGEND

-  EXISTING TOPO
-  PROPOSED TOPO
-  PROPOSED SEWER FORCE MAIN
-  PROPOSED R1 IRRIGATION WATER
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-  IRRIGATION WATER STORAGE POND
-  PROPOSED GRAVEL ACCESS ROAD



The Kihei Irrigation Reuse Firebreak

13 miles long	
70,752 ft long	
200 ft wide	
14,150,400 ft ² area	
325 acres area	
3,668,000 Kihei plant flow gal/day	
1,942,000 Kihei reuse gal/day	
1,726,000 Kihei injection gal/day	
5,313 gal/acre/day	

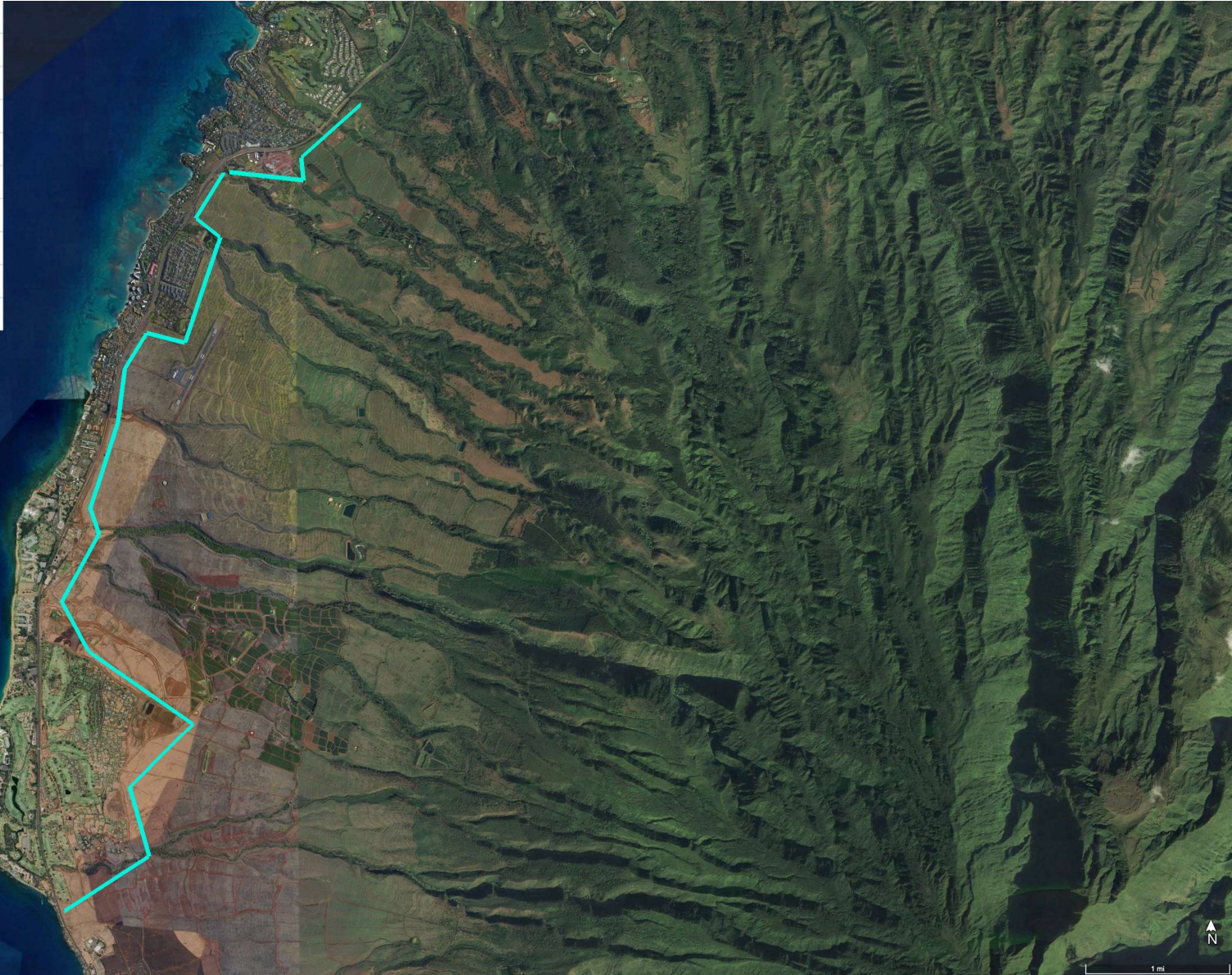


Estimated cost \$13,000,000

The Lahaina-Kaanapali Irrigation Reuse Firebreak

17 miles long	
89,760 ft long	
200 ft wide	
17,952,000 ft ² area	
412 acres area	
4,368,000 Lahaina plant flow gal/day	
1,672,000 Lahaina reuse gal/day	
2,696,000 Lahaina injection gal/day	
6,542 gal/acre/day	

Estimated cost
\$17,000,000

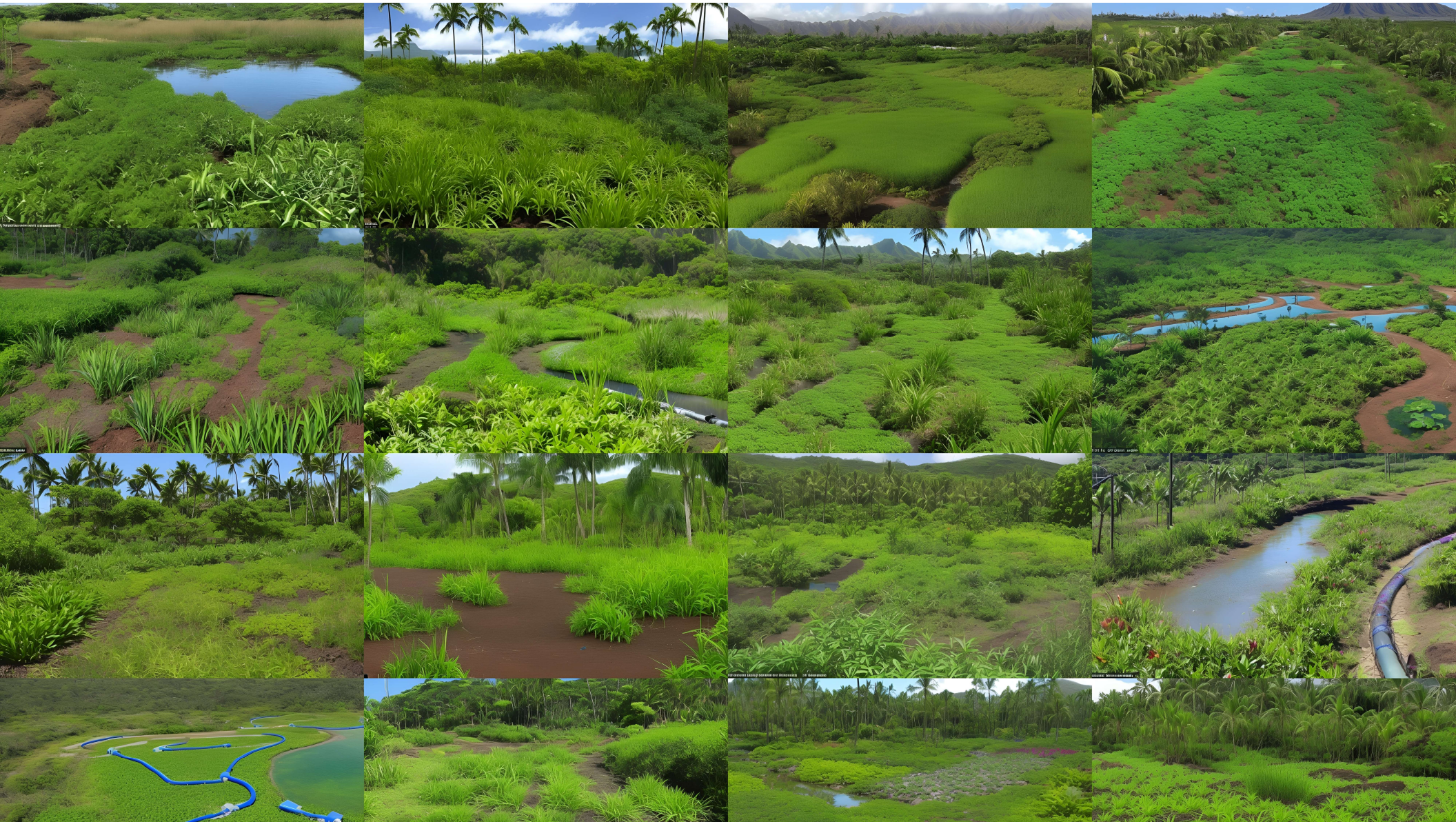


The Lahaina-Kaanapali Irrigation Reuse Firebreak

17 miles long	
89,760 ft long	
200 ft wide	
17,952,000 ft ² area	
412 acres area	
4,368,000 Lahaina plant flow gal/day	
1,672,000 Lahaina reuse gal/day	
2,696,000 Lahaina injection gal/day	
6,542 gal/acre/day	



Estimated cost \$17,000,000



Ma'alaea Wastewater Association 501(c)(12) next steps

- New mutual benefit cooperative nonprofit organization in formation to build and operate Ma'alaea Regional Wastewater Reclamation System
- 10 condo AOAOs, Ma'alaea Triangle and Harbor are invited to become members
- Organizational meeting will be called when nonprofit status is granted by IRS
- Request for each invited AOAO Board
 - Designate a contact person from each AOAO / member organization
 - Name
 - Email address
 - Phone number
- Visit maalaeawastewater.org to view this presentation

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**MA'ALAEA
WASTEWATER
ASSOCIATION**

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