Worst Case Scenario: Difficult Sites

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October 24, 2023

Materials being presented represent our own opinions and not the opinions of NOWRA.

Agenda

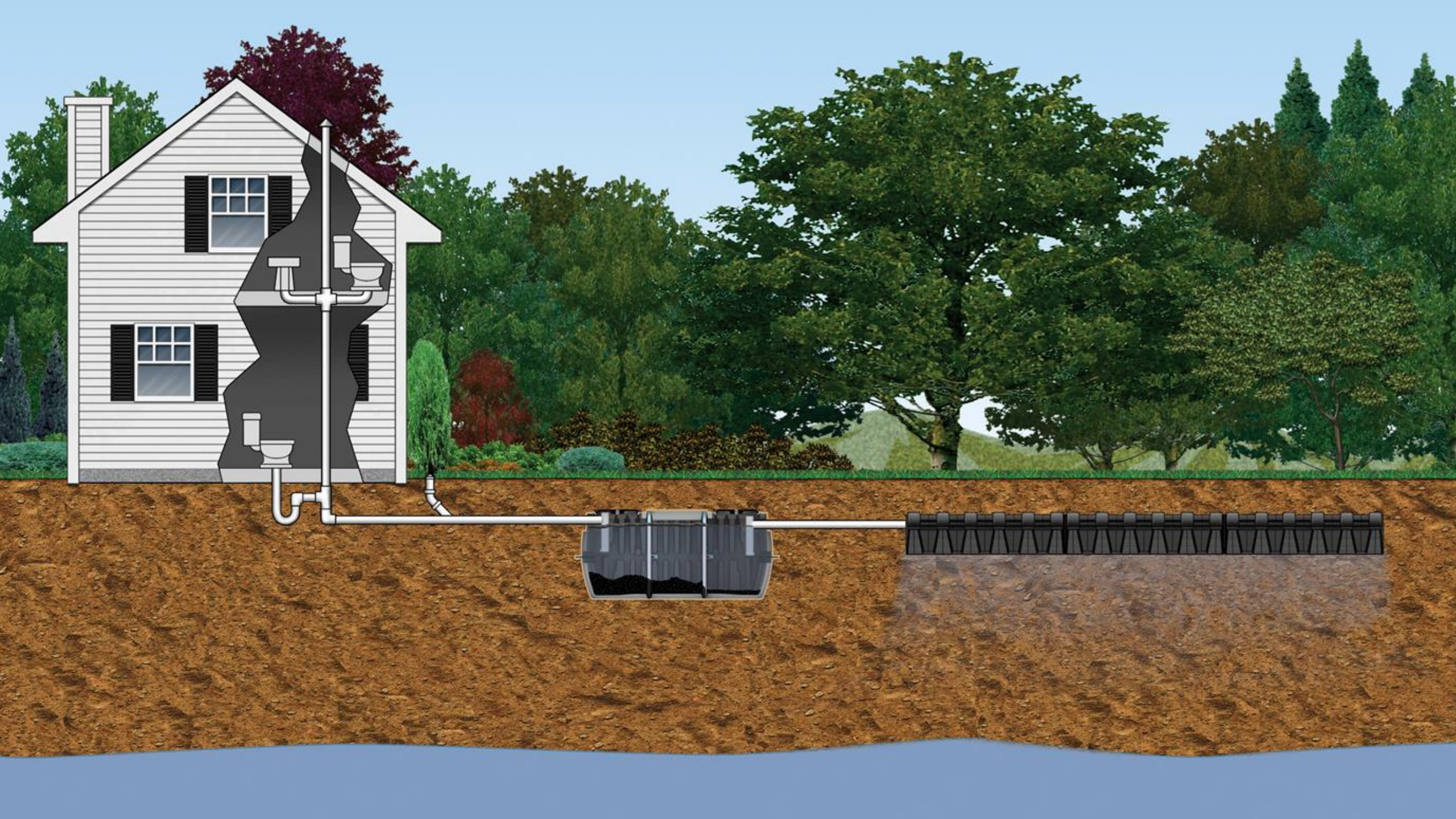
- About us
- Decentralized System Overview
- What makes a site difficult?
- Challenges:
  - Environmentally Sensitive Areas/Strict Effluent Limits
  - High Water Tables
  - Tight Soils
  - Remote Areas
  - Small Lots
- Summary
- Questions

About Us

What are your most common site challenges?

Nobody has responded yet.

Hang tight! Responses are coming in.



What Makes a Site Difficult?

Environmentally Sensitive Areas

Environmentally Sensitive Areas

- Sites close to a waterbody
- Advanced treatment technologies
- Nutrient limits, such as nitrogen and phosphorus
  - Chesapeake Bay Foundation efforts
- Disinfection
  - UV, Chlorination
  - Reduces potential for waterborne diseases

Hawaii Coastal Retreat

cesspools conversion

15,000 Gallons Per Day, a Series of ATU’s and Pump Vault


High Water Table

High Water Table

Table 4.3.

Summary of Separation Distances between Systems Using Naturally Occurring Undisturbed Soils and Limiting Site Factors.

Site Factor	In-Ground System[1]		Shallow-Placed System[1]	
	Septic Tank Effluent	Secondary Effluent	Septic Tank Effluent	Secondary Effluent
Bed Rock	18"	12"	n/a	18"
Restriction	18"	12"	n/a	18"
Shrink-Swell Soil	18"	12"	n/a	18"
Slope	50%	50%	n/a	50%
Perc Rate	5-120 mpi	5-120 mpi	n/a	5-45 mpi
Water Table	18"	12"	n/a	12"

[1]The separation distances for in-ground and shallow-placed systems are measured from the trench bottom or other infiltrative interface vertically down to listed site factor.


Tight Soils

Tight Soils

Table 5.4.
Area Requirements for Absorption Trenches Receiving Septic Tank Effluent.

Percolation Rate (Minutes/Inch)	Area Required (Ft^2/100 Gals)			Area Required (Ft^2/Bedroom)		
	Gravity	Gravity Gravelless	Low Pressure Distribution	Gravity	Gravity Gravelless	Low Pressure Distribution
5	110	83	110	165	124	165
10	120	90	120	180	135	180
15	132	99	132	198	149	198
20	146	110	146	218	164	218
25	158	119	158	237	178	237
30	174	131	164	260	195	255
35	191	143	170	286	215	260
40	209	157	176	314	236	264
45	229	172	185	344	258	279
50	251	188	193	376	282	293
55	275	206	206	412	309	309
60	302	227	217	452	339	325
65	331	248	228	496	372	342
70	363	272	240	544	408	359
75	398	299	251	596	447	375
80	437	328	262	656	492	394
85	479	359	273	718	539	409
90	525	394	284	786	590	424
95	575	489	288	862	733	431
100	631	536	316	946	804	473
105	692	588	346	1038	882	519
110	759	645	379	1138	967	569
115	832	707	416	1248	1061	624
120	912	775	456	1368	1163	684

https://law.lis.virginia.gov/admincode/title12/agency5/chapter610/section950/
https://greywateraction.org/how-do-percolation-test/

Tight Soils

Example:
- 3 Bedroom Home
- Gravity Distribution

Area Required (10 mpi):
540 sf
(180 sf/bedroom * 3 bedrooms)

Area Required (90 mpi):
2,358 sf
(786 sf/bedroom * 3 bedrooms)

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Remote Areas

StackPath (horsefarmsandcountryhomes.com)

Remote Areas

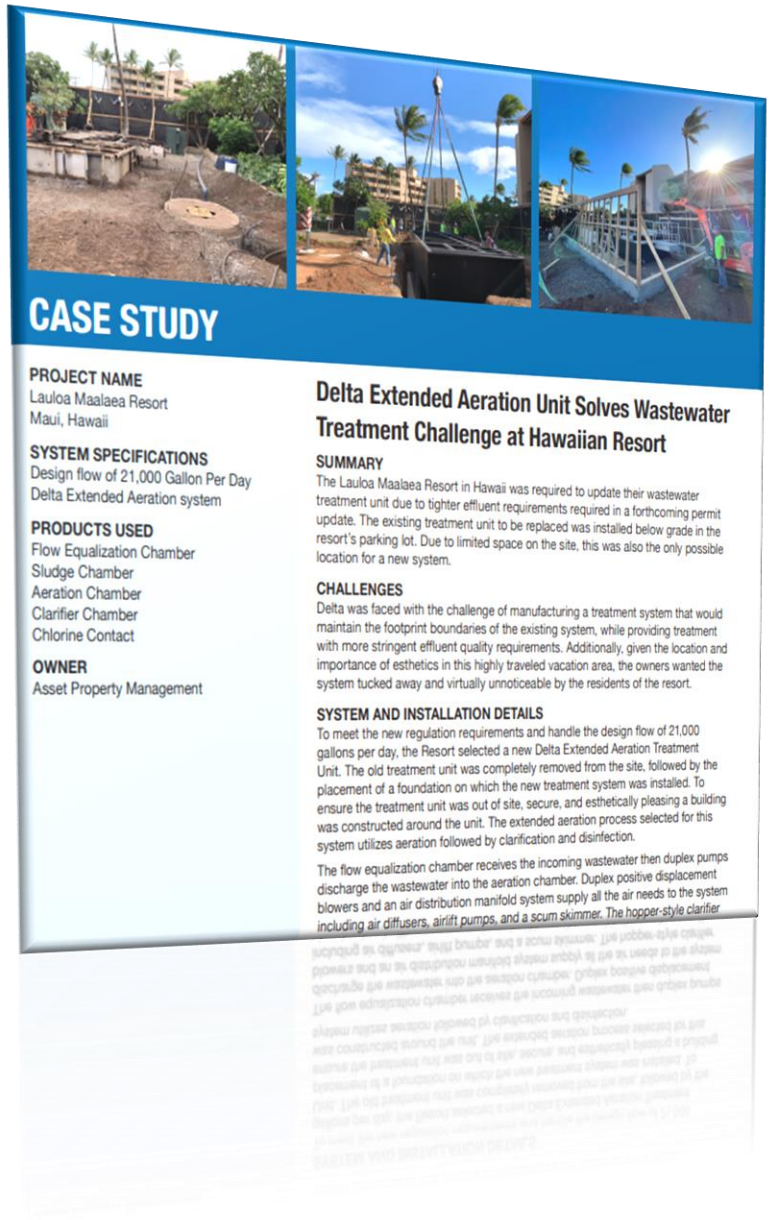
Transportation of materials

Sustainability

Resource availability

Small Lots

Alternative Septic Systems For Small Lots in NH, ME & MA (ajfoss.com)



CASE STUDY

PROJECT NAME
Lauloa Maalaea Resort
Maui, Hawaii

SYSTEM SPECIFICATIONS
Design flow of 21,000 Gallon Per Day
Delta Extended Aeration system

PRODUCTS USED
Flow Equalization Chamber
Sludge Chamber
Aeration Chamber
Clarifier Chamber
Chlorine Contact

OWNER
Asset Property Management

Delta Extended Aeration Unit Solves Wastewater Treatment Challenge at Hawaiian Resort

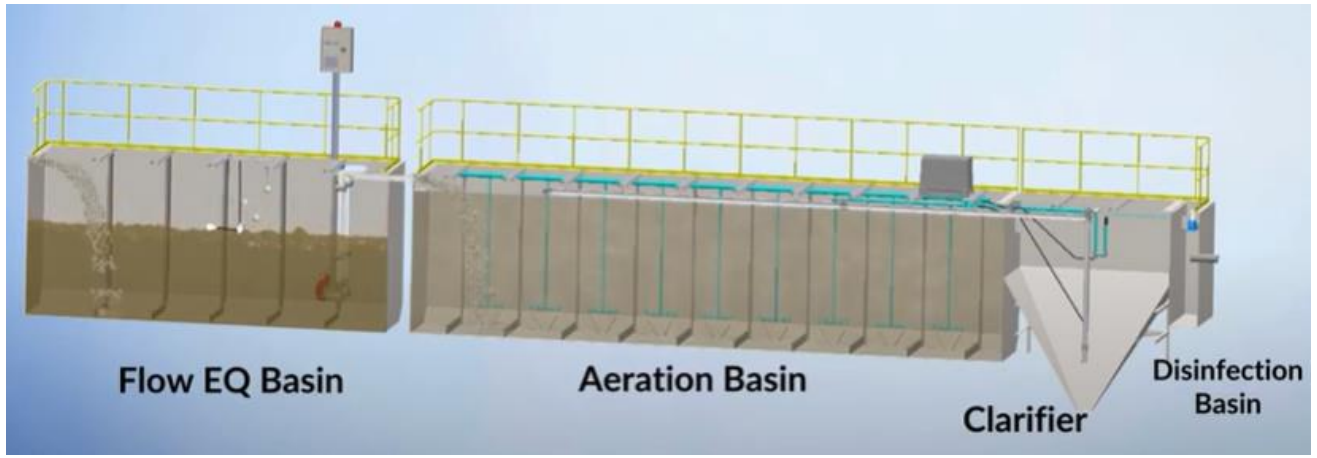
SUMMARY
The Lauloa Maalaea Resort in Hawaii was required to update their wastewater treatment unit due to tighter effluent requirements required in a forthcoming permit update. The existing treatment unit to be replaced was installed below grade in the resort's parking lot. Due to limited space on the site, this was also the only possible location for a new system.

CHALLENGES
Delta was faced with the challenge of manufacturing a treatment system that would maintain the footprint boundaries of the existing system, while providing treatment with more stringent effluent quality requirements. Additionally, given the location and importance of esthetics in this highly traveled vacation area, the owners wanted the system tucked away and virtually unnoticeable by the residents of the resort.

SYSTEM AND INSTALLATION DETAILS
To meet the new regulation requirements and handle the design flow of 21,000 gallons per day, the Resort selected a new Delta Extended Aeration Treatment Unit. The old treatment unit was completely removed from the site, followed by the placement of a foundation on which the new treatment system was installed. To ensure the treatment unit was out of site, secure, and esthetically pleasing a building was constructed around the unit. The extended aeration process selected for this system utilizes aeration followed by clarification and disinfection.

The flow equalization chamber receives the incoming wastewater then duplex pumps discharge the wastewater into the aeration chamber. Duplex positive displacement blowers and an air distribution manifold system supply all the air needs to the system including air diffusers, airlift pumps, and a scum skimmer. The hopper-style clarifier

- Hawaii resort
- Footprint and treatment challenges
- 21,000 gpd
- BOD/TSS requirement of 20/20 mg/l
- Solution: Extended Aeration



Additional Design Challenges for Consideration

- High strength waste
- Cold Climates
- Difficult topography
- O&M
  - Finding providers
  - Designing with O&M in mind

Summary

- Effluent concentration requirements vary by location and design.
- Soil characteristics and groundwater conditions affect tank and drainfield design and installation.
- Sustainability and efficiency is decentralized treatment system design in remote areas and areas with small lots.

Questions?
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Thank you!

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