Alternative Septic System Update 3

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Project Background

- Located at 1955 North Echo Canyon Rd. Page Springs, AZ
- Client: Adam Bringhurst
- Alternative septic system design selection
- Irrigation design for vineyard
- Water quality analysis of well water
- 1-ft topographic map of property

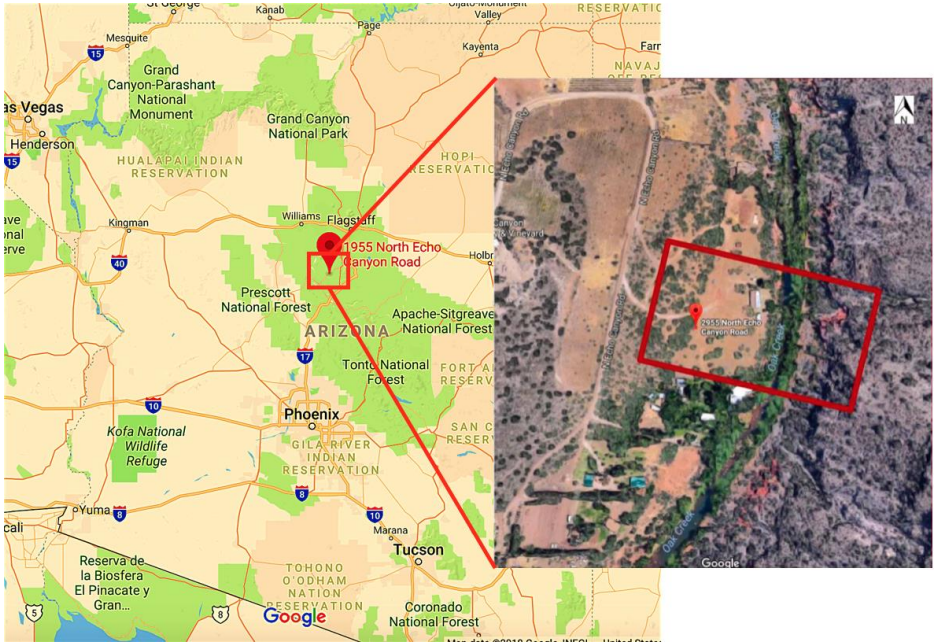

Figure 1, Site Location [1]

Schedule

Table 1: Team Schedule

Task No.	Task	Start Date	End Date
2.0	Off-Site Technical Analysis	2/3/18	2/5/18
3.0	Alt Septic System Design Evaluation	2/5/18	3/25/18
3.2	Technical Requirements	2/23/18	3/18/18
3.3	Evaluation of Systems	3/19/18	3/28/18
4.0	Irrigation System Design Evaluation	2/5/18	3/15/18
4.2	Evaluation of Systems	2/13/18	3/4/18
4.3	System Analysis	2/24/18	3/28/18
5.0	System Design	3/30	4/19

Aerobic Septic System

- Pros
  - Little space required
  - Results in less groundwater pollution
- Cons
  - Higher up-front cost
  - Frequent maintenance required
  - Continuous flow

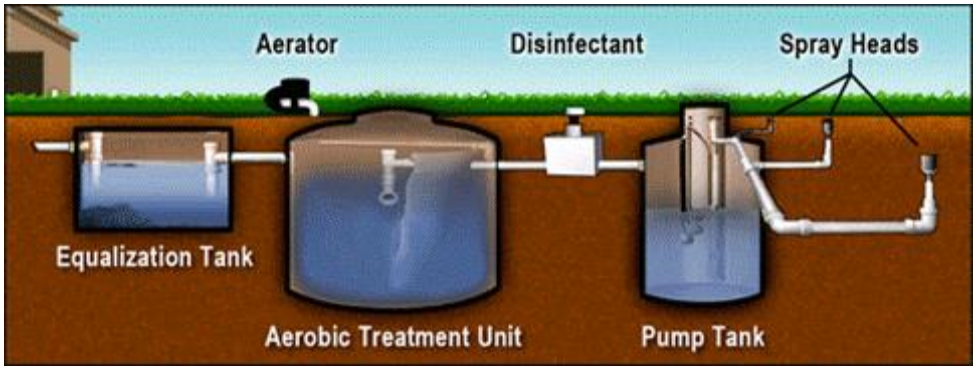

Figure 1: Aerobic Septic System [2]

Wisconsin Mound

- Pros
  - System will function in rain
  - Protects the water table
- Cons
  - Expensive
  - Lots of space required
  - Mound requires materials to be brought in
  - More pipelines required across entire property
  - Not visually appealing

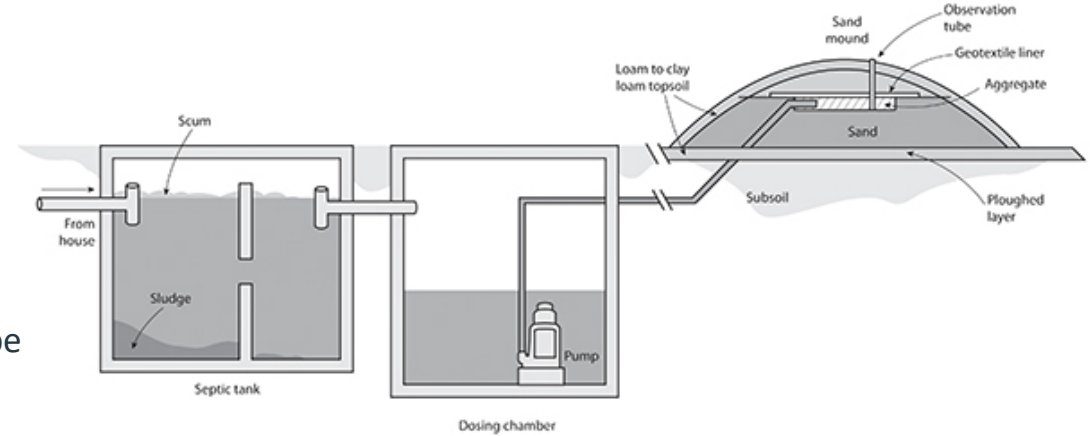

Figure 2: Wisconsin Mound Septic System [3]

Sequencing Batch Reactor (Selected System)

- Pros
  - Single reactor vessel
  - Eliminates additional clarifiers
  - Ideal for low/intermittent flow conditions
  - Cheaper than aerobic septic system
- Cons
  - Frequent maintenance required

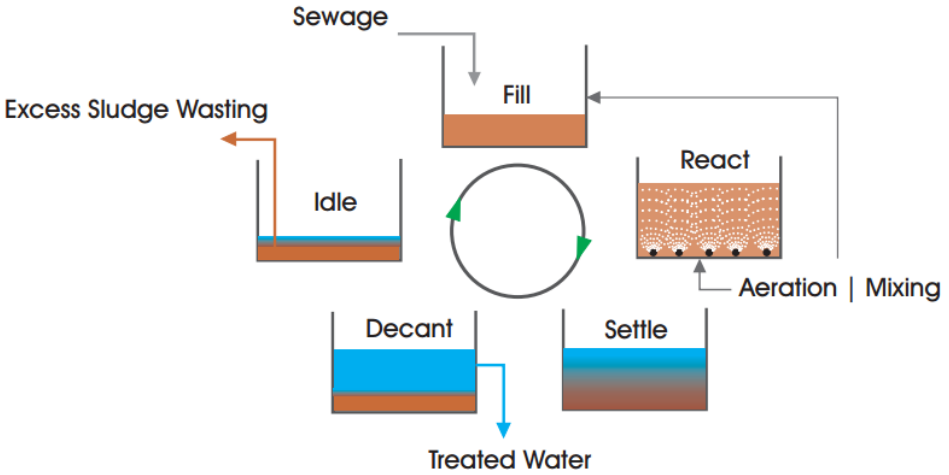

Figure 3: Aerobic Septic System [4]

Drip Irrigation

- Allows a controlled amount of water to be precisely delivered to its target
- 90% field application efficiency
- Has potential to increase crop yields by 20-90%
- Relatively cheap to install
- Less money spent on utilities and labor

Figure 4: Drip Irrigation [4]

Maximum Water Requirements

- Assumptions:
  - 1500 vines/acre
  - Vine spacing of 6x8 feet
  - 1-2 acres of vineyard
  - Maximum evapotranspiration
  - Maximum crop coefficients
  - Minimum efficiency for drip irrigation = 0.8
  - July demand (hottest/driest)
  - ¼” tubing

Table 2: Maximum Water Requirements

Max. yearly requirements	11.4 acre-ft/yr/acre
Total	**10200 gpd/acre**
	15 gph/row

References:

[1] Google Maps. [Online]. Available: https://www.google.com/maps/search/1955 N Echo Canyon Rd. Page springs AZ/@34.7765732,-111.9062815,13.87z. [Accessed: 22-Feb-2018].

[2] *Integrated Environment, Inc - Oklahoma Septic System Service, Pumping, and Aerobic*. [Online]. Available: http://www.oklahomasepticsystem.com/index.cfm?page=aerobic. [Accessed: 27-Mar-2018].

[3] "Sand mounds," *WaterNSW*. [Online]. Available: https://www.waternsw.com.au/water-quality/catchment/living/wastewater/systems/sand-mounds. [Accessed: 27-Mar-2018].

[4] "Organic Product Ashwamegh," [Online]. Available: http://www.ethicsinfinity.com/EthicsProduct-sequencing-batch-reactors-sbr. [Accessed: 27-Mar-2018].

[5] A. Kerstein, "The Impact of Drip Irrigation: 'More Crop Per Drop,'" *BORGEN*, 29-Feb-2016. [Online]. Available: http://www.borgenmagazine.com/impact-drip-irrigation-crop-per-drop/. [Accessed: 27-Mar-2018].

Questions?