

Submitted to the Planning Board by
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Innovative Alternative (IA) Septic Systems

The LRD plans to use an Amphidrome System for the cluster of 21 houses plus a Community House. An IA clustered system of this size has not been used in Oak Bluffs and probably nowhere on the island. There is no doubt that the individual IA systems may have a stop-gap value in the right circumstances: however, clustered systems can create compounding problems. I remind you that any failure or downtime equals the cumulative effect of 22 dwellings failing at the same time. How long does it remain in a failed state while pumping excess nitrogen into the Lagoon...until a technician arrives from off-island to decide what parts should be ordered?

Since this is a new process in the most fragile of areas, considerable care must be taken in approving the clustered system. At this time Oak Bluffs is not prepared for IA systems individually or in a cluster. It is noted that Solar Energy Systems were incorporated into the Oak Bluffs By-Laws, Section 12; however, IA systems like Solar Energy are new technologies that should be considered and regulated before implementation. In addition to required changes to the by-laws, there are other factors to consider, such as:

- Are there hearing procedures in place specifically designed for clustered alternative septic systems?
- Are there defined liabilities and monetary penalties for the owners and operators regarding non-compliance of clustered IA systems?
- Are the monetary penalties proportional to the number of homes on the system?
- Are there Board of Health septic permit requirements specific for clustered IA systems?
- Are the inspection and laboratory testing analysis procedures defined?
- Are independent inspections and tests mandated and performed at applicant's expense with results going to the town?
- Does the Town select the independent testing facility?
- Does the Town have the personnel to take on this new workload of reviewing tests, monitoring compliance, and enforcement when there are variances to the procedures?
- Will any bond relating to system failure be adequate and recurring after each failure?
- Is the town liable and subject to lawsuits by the future homeowners, because the Town knowingly issued a Special Permit for an IA system without due diligence?
- Is there a mandatory requirement for an escrow account to address routine and emergency maintenance?
- Will the future homeowners understand the limitations, intricacies and maintenance cost of an IA system?
- Is there an estimate of cost of maintenance for at least 20 years?

- Will there be a written agreement stating that the owners are required to pay for all associated inspections, maintenance and repairs?
- Is there a mandate for additional land to be made available to be used when the system fails and a second system is required?
- Is there a backup system requirement for those times when system failures require a long term fix?

Amphidrome Complexity and Need for Maintenance

A member of the Planning Board at the 12/14/17 meeting suggested that more information about IA systems should be gathered before a decision could be made. He is correct; IA systems are not necessarily the panacea that many believe them to be. ... see information below from the internet which may help understand the process.

The Amphidrome system which will be used at LRD is considered to be a complex system that will need close monitoring and maintenance to be effective. The following excerpt from the referenced site takes you through one cycle of the Amphidrome system. I do not know if the clustered system will be more or less complex; however, the biological, mechanical, and electronic processes should be similar.

<http://www.barnstablecountyhealth.org/resources/publications/compendium-of-information-on-alternative-onsite-septic-system-technology/sequencing-batch-reactors>

STEP 1. At 3:30 AM each day, the system discharges to the leaching facility using discharge pump until the low water float is activated.

STEP 2. Flow begins to enter the system causing sewage to flow into the Amphidrome Reactor and equalize elevation in the clearwell. Process air is bubbling up through the chamber, opposite the liquid flow direction. This a nitrification stage.

STEP 3. Recirculation pump activates and pumps clearwell liquid back through the Amphidrome Reactor, forcing the liquid level up to the return line. Again, process air is still entering the lower part of the unit and bubbling up through the effluent, continuing to create conditions for nitrification.

STEP 4. Liquid from the treatment unit beginning to flow back to the septic tank via the return line, and mixes with fresh sewage coming in. The now-nitrified effluent enters the anoxic conditions of the septic tank and begins to denitrify using the sewage as a carbon-food source.

Step 4 – The recirculation pump in the clearwell goes off and allows the septic tank and clearwell to once again equilibrate liquid elevations. Since the process air is not applied during the passage through the Amphidrome Reactor, anoxic conditions result in denitrification (Denite®) (10AM-11:30AM).

STEP 5 – At 11:30 AM, is a repetition of STEP 3 – process air on (reverse ColOX®)

STEP 6. – At 12:00 noon, is a repetition of STEP 4 with process air on (forward ColOX®)

STEP 7 – At 3:00 PM, is a repetition of STEP 3 – process air on (reverse ColOX®)

STEP 8 – At 3:30 PM, is a repetition of STEP 4 – process air off (Denite®)

STEP 9 – At 4:30 PM, is a repetition of STEP 3 – process air on (reverse ColOX®)

STEP 10 – At 5:00 PM, is a repetition of STEP 4 with process air on (forward ColOX®)

STEP 11 – At 7:30 PM, is a repetition of STEP 3 – process air on (reverse ColOX®)

STEP 12 – At 8:00 PM, is a repetition of STEP 4 with process air on (forward ColOX®)

STEP 13 – At 11:00 PM, is a repetition of STEP 3, with higher air input for the purpose of scouring media, dislodging sludge and allowing it to recycle to the septic tank (BACKWASH).

STEP 14 – At 11:30 PM, is a repetition of STEP 4 – process air off(Denite®)

STEP 15 – Is a repetition of STEP 1

Below is a link to a video that graphically gives you an idea of the moving parts and the physical components of an Amphirome system:

<http://youtu.be/BCERCpRITpo>

At the May 12, 2016 ***“Innovative Alternate (I/A) Conference: Cleaning Up Our Waters”*** sponsored by the MVC, some comments were made about an I/A system’s risks and its cost of maintenance. This conference was videotaped and should be available online. At that conference, Mike Giggey of Wright-Pierce explained that I/A systems are generally less proven and are influenced by uncontrollable factors. He also stated I/A systems risk underperforming and should have a backup. Importantly, he explained that the cost to maintain the system is approximately 5% of the initial cost of the system per year.

Problems and Complexity Recognized by Mass DEP

<http://www.mass.gov/eea/docs/dep/water/compliance/mhoa1104.pdf>

I/A Technology In The Field

Equipment issues

- Pump failures – too many.
- Pump problems, i.e- continuous recycle when intermittent required.
- Timer and relay failures – too many.
- Inadequate information on all systems, especially poor O&M information on large commercial and multifamily systems.
- Lack of education of System owner – they do not understand system limits especially at large facilities.

MADEP

Amphidrome Operation and Maintenance Manual...see p. 29 for troubleshooting

<http://www.mass.gov/eea/docs/dep/water/wastewater/o-thru-v/omamphid.pdf>

Barnstable County Study of Single and Multi-family Systems

<http://buzzardsbay.org/etistuff/bched-alternative-septic-sytems-2007.pdf>

PERFORMANCE OVERVIEW – ALL TECHNOLOGIES COMBINED – SINGLE AND MULTI-FAMILY

A review of all available data shows that there is significant variability in the performance of systems within the same technology and among all tested technologies (Figures 7, 8, 9 and 10). Using data only from those systems having four or more samples, it appears that single-family units maintain an overall better performance with 69% exhibiting median TN values of 19 mg/L or less (Figure 8), compared with 60% of the multi-family units (Figure 10). This questions the common assumption that larger systems serving more than one residence perform better than single-family systems, at least for multi-family units with flows less than 10,000 gal/day.

Questions about Maintenance

- Who on the Island is capable of servicing the system?
- Who will respond to the alarms and emergency failures?
- How long will it take?
- If off-island, how will they get a ferry reservation in July and August?
- Are they available on weekends and holidays?
- What will this cost?
- Is there an escrow account planned to pay for this?
- What percentage of time will the system be in a failed state?

Ownership of the System

LRD has said publicly that they foresee that at some time in the future, the town will take over the operation and expense of the system. Eventually they backed away from this position, but it doesn't mean that it won't come up again if the costs become too big of a burden. The residents of LRD could raise the issue themselves.

- What assurances are there that the town won't become liable?
- Would it be unreasonable of the residents to argue that the town is a party to the septic system, because it approved a Special Permit without an IA section in the by-laws?

Grinder Pumps - A Significant Part of the System

Each house on the Amphidrome System will have an E/One grinder pump located near or in the dwelling. The town of Chelmsford, MA recently had to institute a policy that dealt with grinder pumps because of the burden being placed on the residents. The people of Chelmsford formed the Sewer Fairness Alliance for equal protection regarding grinder pumps. See the following links regarding Chelmsford.

<http://patch.com/massachusetts/chelmsford/grinder-pump-concerns-draw-crowd-of-residents-to-selectmens-meeting>

<http://www.townofchelmsford.us/DocumentCenter/View/8637>

<http://chelmsford.wickedlocal.com/article/20140502/news/140509077>

<http://sfa-chelmsford.org/>

As recently as this January, 2018, the town of Falmouth had a grinder pump issue because of cold weather. In this case the fix may have been easy, but part of the cost was paid by the town.

<https://fhmna.org/frozen-grinder-pump-issue-resolved-by-the-town-at-no-cost-to-owners-posted-1-11-18>

At the MVC *“Innovative Alternate (I/A) Conference: Cleaning Up Our Waters”* held on May 12, 2016 Dave Thompson of Edgartown, a speaker at the conference, was critical of I/A systems to the extent that when he considers putting sewers into a new area, he targets locations which have I/A systems already employed. He also explained the need to train his staff on the repair and the replacement of E/One grinder pumps because of their cost and inconvenience to the homeowner.

Grinder pumps are the subject in an Edgartown meeting...see following link, page 5:

http://www.edgartown-ma.us/WWC_02_18_2014.pdf

Oak Bluffs' sewer rules and regulations seem to have little information about grinder pumps, but I may be searching in the wrong place. The following links bring you to some pages from towns that have written grinder pump policy and those that try to address the issue:

<https://www.town.sturbridge.ma.us/sites/sturbridgema/files/uploads/document3.pdf>

https://www.grafton-ma.gov/sites/graftonma/files/uploads/sewer_use_ordinance_6_4_09.pdf

- see page 27 of 51:

https://www.capenews.net/falmouth/news/town-will-assume-responsibility-for-maintaining-grinder-pumps/article_d75edc53-9f9e-5a3f-a0f9-830b56278d7b.html

<http://www.groton-ct.gov/depts/pubwks/docs/Grinder%20Pump%20Website%20info%20the%20hurricane.pdf>

It becomes apparent that the complexity of the main system itself isn't the only issue; because all dwellings (26 including the Community House) will have grinder pumps; and also, beneath the streets of Double Ox Road and Hope's Way there are likely to be additional pumps transferring the wastewater to the septic plant.