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Meeting Minutes

To	George Meservey, Director of Planning & Community Development Michael Domenica, PE, Program Manager
CC	Betsy Shreve-Gibb, AICP, AECOM Project Director Martin "Reggie" Donoghue, P.E., AECOM
Subject	**Town of Orleans, MA** **Water Quality and Wastewater Planning** **Task 10.1.B.3 - Demonstration Projects – Design and Implementation - Nitrogen Removing Biofilters - Massachusetts Alternative Septic System Test Center Site Visit**
Project Number	60476644
From	Thomas Parece, P.E., AECOM Project Manager
Date	October 14, 2017

1. Attendees and Affiliation

Alan McClennan, Orleans Selectman and Water Quality Advisory Committee	George Heufelder, Director of BCDHE
Mark Owen, AECOM	Reggie Donoghue, AECOM

2. Background

On October 14, 2016, a site visit was made to the Massachusetts Alternative Septic System Test Center (MASSTC) at Otis Air National Guard Base. MASSTC is a division of the Barnstable County Department of Health and Environment (BCDHE) and was established to provide performance information on various alternative onsite septic system technologies. The center receives effluent from the wastewater treatment plant located on an adjacent property that serves the base. The effluent is used in the technology testing and then and returned to the plant for disposal. The tour of the facility was guided by George Heufelder, the Director of BCDHE.

3. Overview

The systems being tested at the time of the tour included a mix of proprietary and public technologies. The focus of the tour was the nonproprietary Nutrient Removing Biofilters (NRB) presently being tested at the facility. An NRB is comprised of a sand based "nitrification layer" underlain by a "denitrification layer" of sand mixed with finely ground wood. The system is installed following a standard septic tank and pump chamber that intermittently time doses a low pressure distribution system.

4. Observations

- Test tanks located in an insulated trailer were observed. Nitrification was being tested for a variety of media and saturation conditions.
- Several test beds were observed including systems that were being tested for the State of New York and were constructed with soil imported from Long Island.
- Testing found that a silt/soil mix placed over a sandy layer resulted in ponding of effluent above the textural interface between the two layers. This condition was not the case when sandy soil was placed over soil that included some silt or soils with a similar texture.
- Nitrification of the effluent in the upper sand layer was followed by heterotrophic denitrification in the lower sand/wood layer.
- Nitrification was found to still take place in the upper sandy stratum even with low pH (acidic) conditions resulting from the use native sands. This is contrary to what was expected. This may allow the use of native Title 5 sand for the nitrifying layer without having to mix silt with the sand.
- A GeoMat leaching system is used in conjunction with a low pressure timed dose pump system to distribute the effluent to the soil absorption field. The GeoMat is comprised of a core of fused entangled plastic filaments with a geotextile fabric bonded to one side. A pressure distribution line is installed on top of the core and covered with another layer of geotextile product.
- Testing has found that a shallow soil absorption field with 18inches of sand placed over an 18-inch layer of a sand/sawdust mix should be sufficient for nitrification and denitrification.
- The estimated construction cost for an NRB system would be approximately $5,000 more expensive than a conventional system.
- It is estimated that approximately 10 percent to 17 percent of the nitrogen is removed by uptake through vegetation above the systems.
- There is a concern that if the saw dust dries out during a summer dry spell, the wood can begin to compost and produce carbon dioxide gas and use up some of the carbon in the wood. So far, this has not been an issue.
- A drip pan lysimeter is used to collect samples of treated effluent below the NRB system.
- A residential sewage disposal system with NRB technology was recently installed under the guidance of the BCDHE and more are to follow. The systems will be monitored for nitrogen removal performance.