



AQUA-AEROBIC SYSTEMS, INC.  
A Metawater Company

# SUCCESS STORIES

## PLANT NAME AND LOCATION

LEE WASTEWATER TREATMENT FACILITY – LEE, MA

## DESIGN DAILY FLOW / PEAK FLOW

1.5 MGD (5,679 M<sup>3</sup>/DAY) / 3.96MGD (14,991 M<sup>3</sup>/DAY)

## AQUA-AEROBIC SOLUTION

4-BASIN AquaSBR® SYSTEM, 2 AquaDisk® FILTERS (8-DISK) UTILIZING OptiFiber PA2-13® PILE CLOTH MEDIA

## LEE WWTF RECEIVES EPA AWARD FOR ACHIEVING LOW LEVEL NUTRIENT LIMITS

Lee Wastewater Treatment Facility (WWTF), located in Massachusetts, has one of the most eco-friendly, efficient treatment facilities in New England. The plant received an award for its excellent treatment performance in 2012 from the Environmental Protection Agency (EPA), 4 years after start-up. Lee WWTF met a new EPA standard for removing phosphorus, well below the regulatory 0.2 mg/l limit.

The newly built, state-of-the-art sewage treatment plant went online in March 2008 with a 4-basin AquaSBR® system coupled with 2 (8-disk) AquaDisk® filters to obtain ultra-low nutrient effluent levels of 0.1 mg/l TP and 3.0 mg/l TN (without supplemental carbon addition). The new treatment system was also designed with the flexibility to support multiple-point chemical injection. Effluent from the AquaDisk filters is sent to ultraviolet (UV) disinfection and is reused for makeup water for polymer system flushing and washing down the plant prior to discharging into the Housatonic River. Since the river is a habitat for fish, wildlife, as well as contact recreation, it's crucial that the plant meets its ultra-low nutrient effluent.

The small town of Lee (5,200 in 2014) accepts residential septic from Berkshire County for treatment as a revenue to offset its operating expenses but limits it to

1.4% of the incoming sewage flow to consistently achieve its low effluent nutrient objective.

The new facility replaced a 40 year old, 1 MGD extended aeration activated sludge system, which was approaching its design life, and was designed for a TP limit of 1.0 mg/l. The town chose Aqua-Aerobic Systems, Inc. (AASI) technologies due to their energy-efficiency and capability of meeting future stringent permit limits. AASI provided operators with 2 weeks of on-site, hands-on training so that the staff could adapt to the new equipment and supervisory control and data acquisition (SCADA) system.



Aerial view of the 4-basin AquaSBR® system and buildings housing the 2 AquaDisk® filters and other treatment equipment. The plant is located nearby the receiving Housatonic River (shown right).

## AquaSBR® SYSTEM PROCESS

The AquaSBR system operates on a simple concept of introducing a quantity of waste to a reactor, treating the waste in an adequate time period, and subsequently discharging a volume of effluent plus waste sludge that is equal to the original volume of waste introduced to the reactor. This "Fill and Draw" principle of operation involves the basic steps of Fill, React, Settle, Decant, and Sludge Waste. The system may be designed to include seven individual phases of operation but the inclusion or duration of any individual phase is based upon specific waste characteristics and effluent objectives.

Where nutrient removal is required, a simple adjustment to the SBR's operating strategies permits nitrification, denitrification, and biological phosphorus removal. Optimum performance is attained when two or more reactors are utilized in a predetermined sequence of operation.

## AquaDisk® FILTER PROCESS

Clarified effluent from the AquaSBR system enters the filter and flows by gravity through the cloth media of the stationary hollow disks. The filtrate exits through the hollow shaft which supports the individual disks and flows to the effluent channel. As solids accumulate on the surface of the media, the water level surrounding the disks rises. Once a predetermined level is reached, the disks rotate and the media surface is automatically vacuum backwashed clean. Heavier solids settle to the bottom of the tank and are then pumped to a digester or to the plant headworks.

## DESIGN CHARACTERISTICS

Lee WWTF is equipped with 4 SBR reactors, each is 80 ft. (24.4 m) in diameter and contains an AquaDDM® Direct-Drive Mixer and fine bubble aeration system to provide mixed aerobic, anoxic and anaerobic conditions. Treated water from the reactors is sent to a post-equalization basin with gravity flow discharge to the two cloth media filters. Each cloth media filter unit provides 430 ft<sup>2</sup> of effective filtration area. The OptiFiber PA2-13® cloth media offers a 10 um nominal rating.

A SCADA control system provides operation automation and monitors the plant. The online system allows AASI to remotely troubleshoot any issues if needed.

## AVERAGE OPERATING DATA (2014)

LOADING	DESIGN INFLUENT	AVG INFLUENT	AVG EFFLUENT	PERMIT EFFLUENT
Avg Flow mgd	1.9	0.67	NA	NA
Peak Flow mgd	3.83	1.35	NA	NA
BOD <sub>5</sub> mg/l	232	126	4	10
TSS mg/l	230	156	2.9	10
TKN mg/l	40	24	---	---
TN mg/l	---	---	1.38	6.0
Total P mg/l (Apr-Oct) (Nov-Mar)	8	5.5	0.1	0.2
	8	5.5	0.44	1.0

## AquaSBR® SYSTEM ADVANTAGES

- All components retrievable and accessible
- Tolerates variable hydraulic loads
- Controls filamentous growth
- Tolerates variable organic loads
- Provides quiescent settling
- Separation of aeration and mixing
- Lower installation costs
- Return activated sludge pumping eliminated
- Small footprint
- Simple to expand or upgrade
- One company accountability

## AquaDisk® FILTER ADVANTAGES

- Utilizes engineered cloth filtration media
- Produces consistent, reuse-quality effluent
- Requires lower backwash rates
- Tolerates extreme variations in load
- Filters continuously during backwash
- Low operation and maintenance
- Operates in a small footprint
- Eliminates sand media and underdrains



Superintendent, Alan Zerbato visually inspects one of the AquaDisk filter units.  
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