



**SANITAIRE**

a xylem brand

Case study

# Sanitaire Silver Series in Liberty, NY

Sanitaire Bioloop® retrofit reduces energy consumption by 43 percent

When a broken shaft caused a malfunction in one of the brush aerators at the village of Liberty, New York Wastewater Treatment Plant (WWTP), the village worked with its engineers, Delaware Engineering, to develop a plan for repair and upgrade.

## Scope

The plant's secondary treatment consists of two separate oxidation ditches, each 1 million gallons in volume and each capable of treating the permitted capacity of 2 million gallons per day (MGD), followed by clarification and UV disinfection. Before upgrade, each racetrack-designed basin was equipped with two brush aerators, each driven by a 50-horsepower (37-kW) motor, for a total of 100 horsepower (74.6 kW) per basin. The brushes provided both aeration and mixing, maintaining complete solids suspension while providing flow circulation in the extended aeration basin.

Brush aerators such as those previously installed at the Liberty WWTP keep solids suspended, but they are highly energy intensive for sustaining dissolved oxygen levels. Their added disadvantage of having one speed and one fixed depth makes it almost impossible to adjust them for changing conditions. After evaluating several options for retrofitting the basins, Delaware Engineering recommended submersible mixing combined with fine bubble diffused aeration as the most cost-efficient treatment, and one that would also improve control and flexibility.

Separating oxygen transfer from mixing allows each device to do what it does most efficiently, resulting in significant energy savings, which is the cornerstone of the bioloop process. Combining highly efficient submersible mixers with efficient fine bubble diffused aeration provides superior oxygen transfer and treatment at a fraction of the energy costs of brush aerators.



The village of Liberty, NY WWTP oxidation ditch

**END USER:** Village of Liberty, NY  
**ENGINEER:** Delaware Engineering  
**ORDER DATE:** 2012  
**COMPLETION:** 2015

Keeping aeration separate from mixing also allows operators to control the dissolved oxygen concentration more efficiently, allowing reduced aeration during periods of reduced oxygen demand without sacrificing circulation around the oxidation ditch and risking solids settling.

Oxygen transfer is a function of water depth, with deeper submergence of the fine bubble diffusers allowing more contact between the bubbles and the water, yielding higher transfer efficiency. With a depth of approximately 14 feet (4.3 meters), the basins at the Liberty WWTP proved ideal for a fine bubble diffused aeration retrofit.

### Solution

Delaware Engineers recommended a Xylem Sanitaire aeration system, adding fine bubble diffused aeration with Silver Series II membrane disc diffusers and a separate, highly efficient Flygt 4410 mixer. The Silver Series aeration system is known for its robust service, with its special high-grade EPDM elastomeric membranes delivering a long service life of 10 years or more.

The Sanitaire Silver Series fine bubble diffused aeration system distributes air through 720 diffusers, 360 on each side of the basin. Two 50-horsepower (37-kW) blowers, equipped with variable frequency drives (VFDs), provide air to the diffusers at peak flow and loading, with a third identical blower installed as a standby.

The upgrade has produced substantial energy savings at the Liberty WWTP, reducing aeration and mixing energy consumption by 43 percent, from 100 horsepower (74.6 kW) to less than 57 horsepower (42.5 kW), saving more than \$36,000 per year while providing more stable treatment.

### Results

Due to their superior oxygen transfer efficiency, Sanitaire Silver Series II diffusers are among the most efficient fine bubble diffusers in the industry. With a Standard Oxygen Transfer Efficiency (SOTE) of 6.56 percent per meter (2 percent per foot) of submergence, the diffusers deliver an approximate SOTE of 24 percent for the basins at the village of Liberty. Higher transfer efficiency means less total air is required to meet the demand, and with an extremely low pressure drop across the membrane, blower power consumption can also be minimized.



The oxidation ditches are retrofitted with 360 Sanitaire Silver Series diffusers.

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