



Headworks BIO Creates a Unique Solution for a Unique Facility

Background

Camp Sunshine, on the shores of beautiful Lake Sebago in the State of Maine, is a very special camp facility providing respite, support and a joyful experience for children with life-threatening illnesses together with their immediate families. The camp continues to expand, now supporting over 350 people during the busiest weeks. The growing seasonal camp population and increasingly stringent local discharge limits made it necessary to upgrade the wastewater treatment facility to ensure long term attention to completing the Camp Sunshine mission. The result was a system below the ground, neatly landscaped above!

Challenges

As a privately funded charity organization, capital costs understandably needed to be minimized as much as possible. The Camp Sunshine board of directors selected local consultant Woodard & Curran to determine the facility loading patterns, future capacity requirements, and develop a preliminary design. W&C worked together with the Headworks BIO technical experts who applied their unique MBBR retrofit engineering skills to the task. By combining the space efficient ActiveCell920 MBBR media with a combination of existing tanks and two new prefabricated concrete tanks, the team was able to provide not only a cost effective solution, but one with a small footprint and an unobtrusive profile.

Customer: Camp Sunshine
Industry: Municipal

KEY FACTS

- Wastewater Flow: 79.5 m³/day (21,000 GPD)
- BOD₅: Influent < 350 mg/L
Effluent limit < 15 mg/L
- TSS: Influent < 88 mg/L
Effluent limit < 15 mg/L
- Alkalinity: 375 mg/L
- pH: 7 - 9
- Temperature: 10 – 25 °C (50 – 77 °F)

“With their proven track record in MBBR technology, and especially in retrofits, Headworks BIO was the easy choice for the project,” stated W&C Project Manager Brian Cataldo, PE. Headworks BIO’s MBBR technology is characterized by simple operational requirements. It is a more robust system compared with an activated sludge system, and as a result are less prone to process upsets because of the attached biofilm. This offers distinct advantages to facilities like Camp Sunshine where the operators typically are also responsible for many other aspects of the camp’s operation and have only limited time to manage the wastewater system.

Another key consideration is the flexibility of the system to deal with extreme changes in flow rates. The peak flows occur during the busy summer months, but become more intermittent during the fall season. During the winter, the flows are reduced to less than 10 % of the peak flows. However, this abruptly ends in mid-February when the first full camp occurs for the year and the flow suddenly spikes up significantly. The Headworks BIO MBBR system maintains the bacteria on the carriers during the slow months, allowing them to rapidly reproduce upon a sudden increase in load with minimal ramp-up time. We like to think of the system as providing nice little apartments for the bacteria to live in, away from the harsh outside swirling world around them.

Process

The system is a three-stage MBBR designed to remove BOD and nitrify the wastewater, with a pre-anoxic MBBR tank removing the nitrates. The new system treats up to 21,000 GPD (79.5 m³/day) to meet limits for BOD/TSS/TN of 15/15/15 mg/L, respectively.

In the pre-anoxic reactor, nitrified effluent from aerobic reactors is recycled and contacted with the influent wastewater. In the absence of dissolved oxygen, oxygen from the nitrates is used for BOD oxidation by heterotrophic bacteria. In the meantime, nitrates are reduced to nitrites and then to nitrogen gas. Nitrogen gas leaves the anoxic reactor as an inert gas, thereby removing nitrogen from the wastewater. A specially designed mixer for use with MBBR plastic media is provided to maintain movement of the media.

The second and third tanks are operated under aerobic conditions so that bacteria will consume the BOD and nitrify the ammonia in the wastewater while utilizing the oxygen for metabolism and growing the bacterial colonies on the media. In addition to providing oxygen for the bacteria, the aeration grids also supply mixing energy to maintain complete-mix conditions in the reactors. The effluent is clarified through a unique repurposing of the old cone-bottom trickling filters from the original system.

Installation

The treatment system is almost all below ground with neatly landscaped grounds making it very inconspicuous to camp visitors, in spite of being relatively centrally located on the property.

The Camp Sunshine plant was success-fully installed and commissioned in August 2013. For this project, Headworks BIO provided the process design, MBBR media (ActiveCell₉₂₀), aeration grids,



Installation of ActiveCell₉₂₀ media supplied by Headworks BIO Inc.

retention screens, mixers, and bioreactor blowers.

The Headworks BIO team worked enthusiastically on this project for a cause they all deeply appreciated.

“ *We are very pleased with the performance of the plant, and the product and service provided by Headworks BIO.* ”

*- Ryan McAlister
Plant Operator, Camp
Sunshine*