



CASE STUDY - Ascot Corner, Quebec

Municipal Lagoon Augmented for BOD Intensification (Increasing Organic Load Treatment Capacity)

Project highlights

Municipality: Ascot Corner, QC, population 3,500
 Total investment: CAN\$560,000
 Products: 3 ECOFIXE modules installed in existing aerated lagoons.

- Allowed for 40% increase in flow and 70% in organic load.
- 300 additional housing units can be built.
- 20% reduction in energy consumption
- 80% less greenhouse gas emissions than other option considered (per third party analysis)

Economic benefits:

- 37% less expensive to acquire than the closest solution.
- 65% reduced annual maintenance costs

Lagoon Overview

In much of the world, wastewater treatment is carried out using aerated lagoons, a reliable, efficient and inexpensive process composed of basins where wastewater undergoes a natural process of sanitation over 12 to 20 days. Microorganisms in the water break down organic load, transforming it into its component elements. This process requires oxygen and can be accelerated by the addition of aerators. A sludge byproduct settles to the bottom of the lagoons and must be removed every few years. The role of aerated lagoons is to receive all sanitary wastewater, to treat it biologically, and to retain the sludge produced. It is the easiest and most economic way to operate wastewater treatment systems.

Project Baseline



Lagoons face the following challenges related to population growth and climate:

- Saturation of the lagoons' treatment capacity;
- Difficulty maintaining performance of the sanitation process in the winter;
- Difficulty maintaining performance during major hydraulic flows, such as heavy rainfall or the melting of snow;

More than 70% of municipalities across North America use aerated lagoons; in Canada, aerated lagoons are the most common wastewater treatment process. There are more than 3,200 municipal aerated lagoons and they face all the challenges noted above.

Parameters	Current (2015)	Needs short term	Needs Long term
Flow (US gal)/min (m ³ /d)	40 (215)	69 (375)	92 (500)
Organic load lb/d (kg BOD ₅ /d)	55 (25)	165 (75)	198 (90)



CASE STUDY - Ascot Corner, Quebec

Municipal Lagoon Augmented for BOD Intensification

Current problems and restrictions

The municipality's development plan includes several residential projects as well as the expansion of its industrial park. For several years, development projects have been carried out incrementally, in small blocks of 3, 5 or 10 dwellings, because the wastewater treatment plant (aerated lagoons) had almost reached full capacity and every project requires extensive effort to be approved by the Ministry of the Environment. This has hindered the municipality's development efforts and compromised the entire economic and social vitality of the municipality.

Options Considered

New aerated lagoon

The option to build an additional aerated lagoon would be the most expensive to implement and would require the largest footprint. The additional aeration requirement would increase capital cost, maintenance, energy consumption and GHG emissions. Maintenance would be costly over time with sludge removal required every 5 years. The environmental impacts would be significant because the municipality would have had to build a new lagoon over a currently wooded area.

MBBR

The municipality considered a MBBR (Moving Bed Biofilm Reactor) as an option to increase the treatment capacity of its aerated lagoons. MBBRs involves the construction of one or more concrete tanks for the biological reactor, typically before the first lagoon. The MBBR tanks are filled with a fluidized media (moving in the water) to fix and concentrate the biomass and significantly increase the biological load (BOD₅) which can be treated. The existing lagoons are then used for polishing and sludge storage.

The municipality decided against proceeding with the MBBR because of its disadvantages: it is very expensive to purchase, has high lifetime energy consumption (blowers must keep the media in suspension), requires new infrastructure (screening system, circulation pump, high flow rate/low pressure blowers) and annual sludge removal (due to the small size of the tank).

This all increases project cost, lifetime O&M, lifecycle electricity consumption/cost and GHGs.

The ECOFIXE solution and its advantages

Each ECOFIXE module has a stainless-steel enclosure with a flotation system and contains fixed bed media which supports and maximizes biomass development. The media intensifies treatment capacity by increasing the surface area available to attached growth microorganisms.

Direct installation in the existing lagoons meant that no new construction or infrastructure was required. Assembly and installation were quick and easy (less than a week) with no interruption to the treatment process.

Each ECOFIXE module has four fine-bubble aerators attached underside, directly oxygenating the biomass. This aeration system is more efficient than standard coarse bubble aeration resulting in a net reduction of energy consumption.

The modules do not interfere with the sludge removal (it can be carried out while keeping the modules in place) and the efficiency of the fixed-media means there is no increase in sludge removal requirements.

Once installed, the ECOFIXE system is self-sufficient, and does not require an operator to be present.



CASE STUDY - Ascot Corner, Quebec

Municipal Lagoon Augmented for BOD Intensification

ADVANTAGES OF THE ECOFIXE SYSTEM

- No new construction/ additional land required;
- Fast and simple installation (within a week);
- Low operating and maintenance costs;
- Modular;
- Locally manufactured;
- Sturdy;
- Energy efficient;
- No chemicals;
- Stable and constant performance.

IMPACT ON GREENHOUSE GAS EMISSIONS

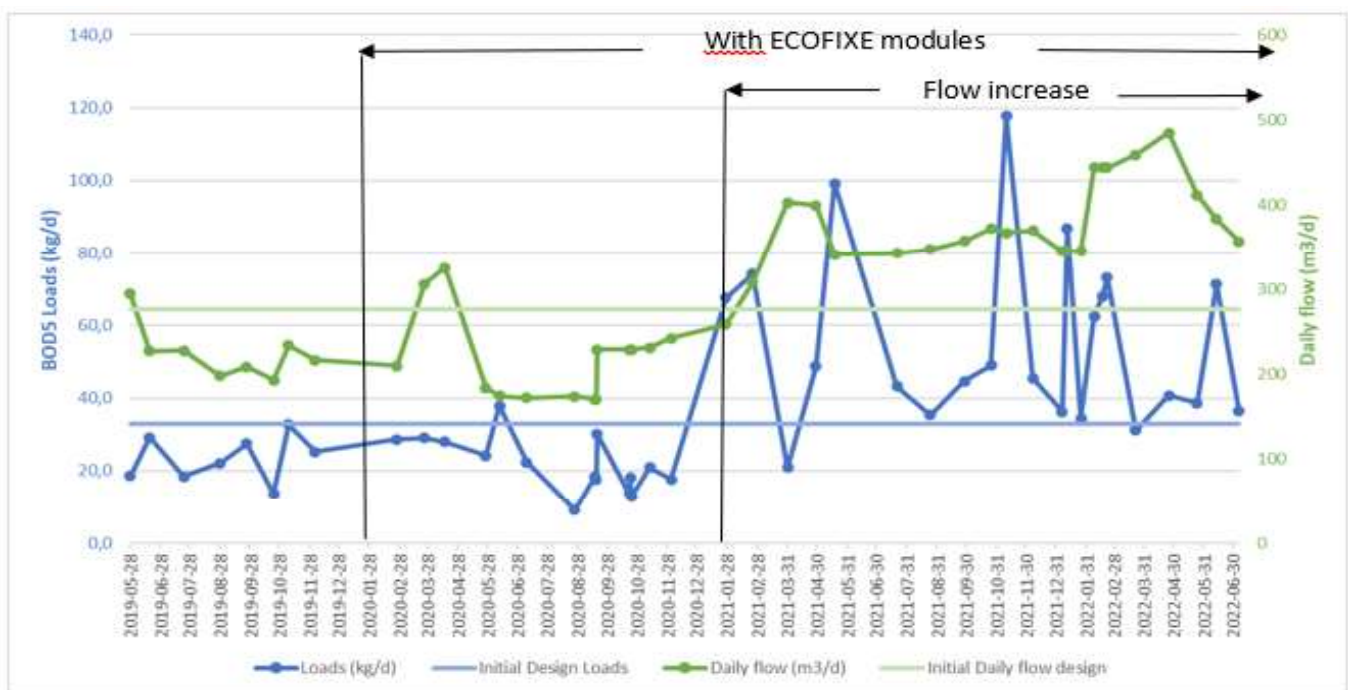
An average of 30% of a typical municipality's GHG emissions come from wastewater treatment. The expansion of aerated lagoons greatly increases GHG emissions, which in turn contributes to climate change.

For Ascot Corner, an independent third party has demonstrated that the ECOFIXE system emits 80% less GHG than a comparable MBBR installation over its lifetime. This is a major step for Ascot Corner to protect the environment using Technologies Ecofixe's solutions.

Performance

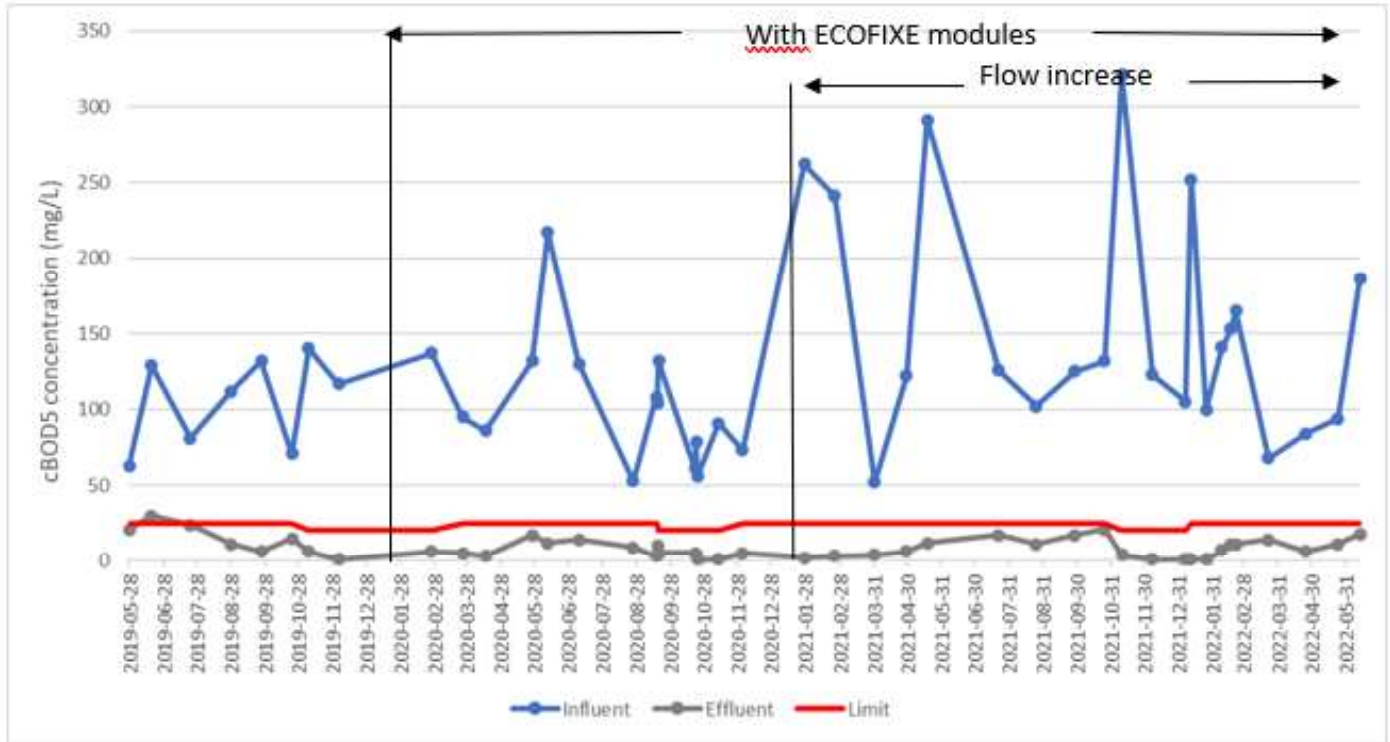
Ecofixe's internally developed modelling tool is used to design custom projects to meet the municipality's needs. The model considers the current parameters (organic load, flow, etc.) as well as the requirements for short and long-term additional treatment capacity. For this project, the Technologies Ecofixe team determined that three ECOFIXE modules are required.

The ECOFIXE modules expanded the treatment capacity of Ascot Corner's aerated lagoons allowing for a 40% increase in flow and a 70% increase in organic load. The modules removed 95% of the increased organic load.



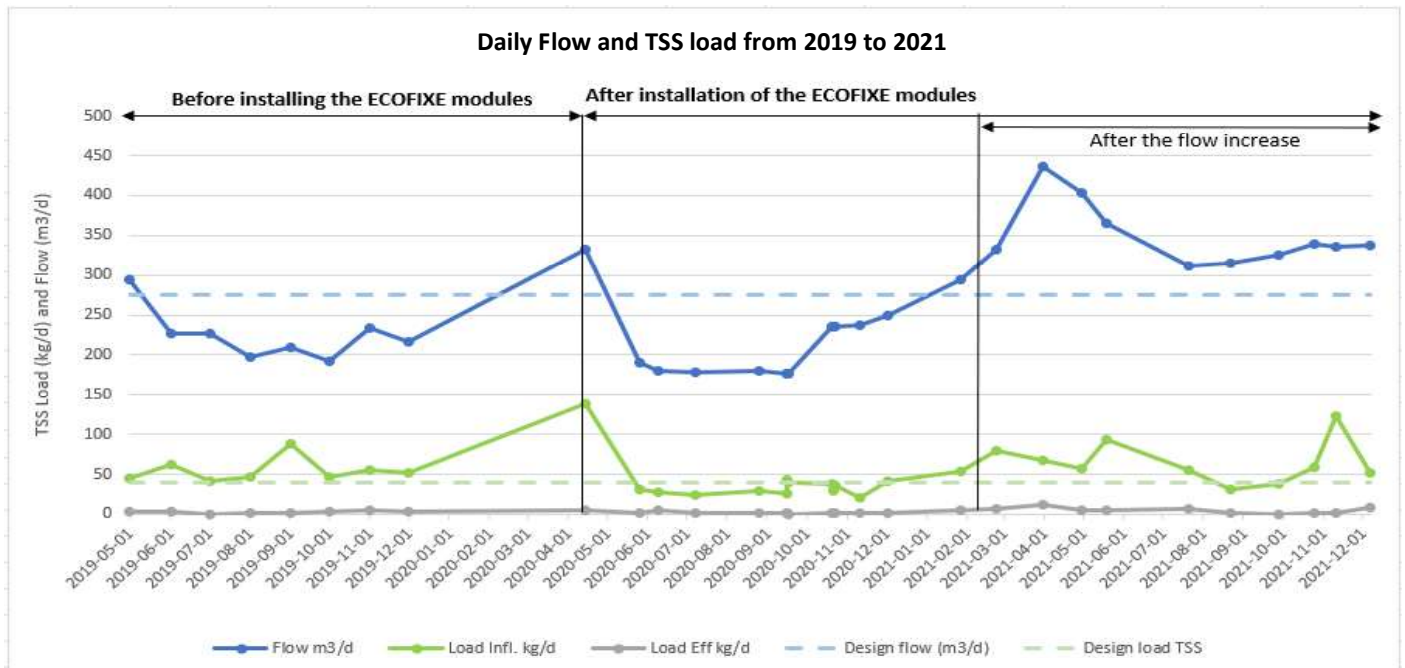
Influent BOD5 loads and daily flow

Influent BOD5 concentration vs Effluent BOD5 concentration

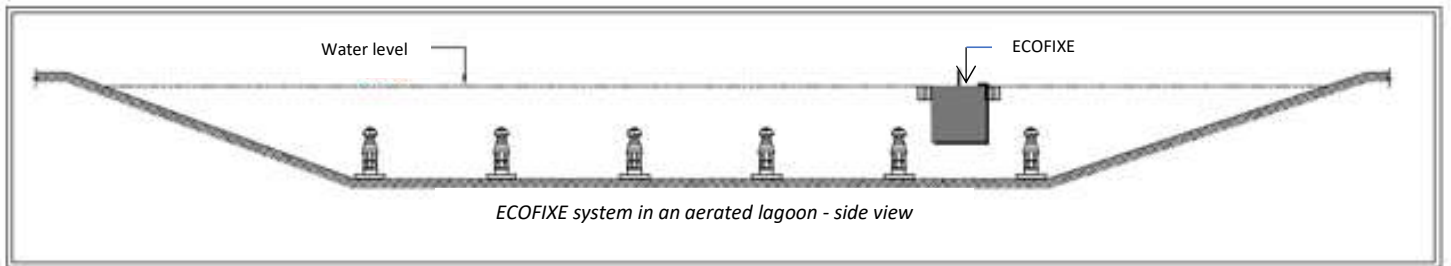


The ECOFIXE modules maintained BOD limits of 20 mg/l in summer (July to September) and 25 mg/l in winter. Additionally, although the main objective of the ECOFIXE system is to optimize the organic load removal, modules also have a positive impact on TSS removal.

Daily Flow and TSS load from 2019 to 2021



Installation



The ECOFIXE module components are prefabricated in the factory and are then transported to the site for assembly and installation.

Onsite, the modules are hung on the suspension system and submerged into the aerated lagoon.

The installation is completed and fully functional in only 1 to 2 weeks. All the steps are carried out without interrupting the treatment process.



Completed installation of ECOFIXE at Ascot Corner