
Project Completion Report

Amherstburg Wastewater Treatment Plant Upgrades and Expansion

Prepared for
The Federation of Canadian Municipalities

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1. Background

The Town of Amherstburg (Town) was formed in 1998 when the former Town of Amherstburg and the Townships of Anderdon and Malden amalgamated. The Town is located in southwestern Ontario, in Essex County, and is approximately 200 square kilometers, with a population of 21,556 in 2011 (Statistics Canada, 2011).

The Amherstburg WWTP receives wastewater flows from the main urban area of the Town of Amherstburg. Effluent from the plant is discharged to the Detroit River. In 2005, the Town completed a Class Environmental Assessment (EA) which determined that the Amherstburg Wastewater Treatment Plant (WWTP) was approaching its approved capacity. Moreover, the need to upgrade the Amherstburg WWTP from primary to secondary treatment was recognized by the Ontario Ministry of the Environment (MOE) and by other parties, including the International Joint Commission on the Great Lakes and the Detroit River Canadian Cleanup Committee.

The original WWTP was replaced by a larger conventional activated sludge plant which was commissioned in 2012. Upgrades at the Amherstburg WWTP included improvements to the headworks, grit removal system, screening, primary clarification, and aeration systems. The introduction of secondary treatment included providing bioreactor tanks with fine bubble diffusion and secondary clarifiers. The Project also included improvements to the dewatering system and the provision of an ultraviolet disinfection system and odour control system. The plant is now rated for an average daily flow of 9,500 m³/day and a peak flow of 31,000 m³/d.

Two of the Town's other wastewater facilities will be affected by the Project. The Edgewater Lagoons are approaching their approved treatment capacity limits and are unable to accommodate future population growth while operating under current effluent quality guidelines. The Boblo Island Sewage Treatment Plant (STP) is in need of upgrades to meet Health and Safety requirements as well as effluent quality requirements. The service areas of these two plants will be connected to the new Amherstburg WWTP, and the Edgewater Lagoons and Boblo Island Sewage Treatment Plant will both be decommissioned.

2. Project Team

The principal contact for the Project is:

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The Project Team consisted of the following:

- Town of Amherstburg (Owner)
- CH2M HILL Canada Ltd. (Lead Consultant)
- Facca Inc. (General Contractor)
- R. C. Spencer & Associates (Sub-Consultant to CH2M HILL)
- Sub-Contractors and Equipment Suppliers (reporting to Facca Inc.).

3. Project Implementation

Project Innovation

Upgrading and expanding the Amherstburg WWTP such that it is capable of handling the flows from the Edgewater Lagoons and Boblo Island STP sewage service areas was a creative and innovative approach to efficiently manage sewage flows within the Town. It allowed the Town to take advantage of existing infrastructure and economies of scale by focusing on a single design at a single facility.

The upgraded WWTP incorporates the latest technologies for treatment of wastewater. Chemically enhanced primary treatment is used to reduce the loading from the influent wastewater, which reduced the size requirements for the secondary treatment system and ultimately resulted in lower capital costs. A fine bubble aeration system was installed to improve oxygen transfer, minimize energy consumption, and minimize greenhouse gas emissions.

Another leading practice that was employed was the pre-selection of bioreactor air blowers, ultraviolet disinfection, and a dewatering centrifuge. This evaluation process facilitated a tender evaluation on specific equipment that takes life cycle costing into consideration on the basis of energy, chemical, and operations and maintenance data provided by the equipment manufacturers.

The Amherstburg WWTP is also a leading edge facility in terms of its odour control system. The system is a unique two-stage biological odour control system. The first stage of the odour control system features a biotrickling filter to remove hydrogen sulfide and the second stage features a biofilter to remove ammonia, volatile organic compounds, and reduced sulfur compounds. There have been limited full-scale installations of this type of odour control system in Canada, but the foul airflow that has been observed at the Amherstburg WWTP's required an innovative solution.

Implementation Schedule

One of the main Project risks that was identified in the planning stages was slips in the Project schedule. The Project completion was delayed by nearly a year. The general contractor that was contracted to complete the Upgrades and Expansion of the Amherstburg WWTP, Facca Inc., did not meet its obligations with respect to the completion schedule specified in the contract and did not complete the contract work until May, 2013. The Project was originally scheduled to be completed in June of 2012.

4. Project Budget and Financial Savings

The total Project cost was \$34.1 million. The Project was funded by the Canada-Ontario Municipal Rural Infrastructure Fund (COMRIF), the Green Municipal Fund (GMF), reserved funds from consumer rates, and development charges.

The decision to redirect flows from the Edgewater Lagoons and Boblo Island STP saves the Town from having to spend money on upgrades and expansions to these facilities. This will also result in savings in operational costs. In addition, the upgraded WWTP features the innovative environmental technologies, practices, and processes that were selected or designed to perform with higher efficiency in terms of power requirements, operations, maintenance costs and hours, and chemical feed.

5. Environmental Benefits

Direct Environmental Benefits

The direct environmental benefits of this Project are the improved effluent quality in terms of five-day carbonaceous biochemical oxygen demand, total suspended solids, and total residual chlorine. Additionally, the expanded plant capacity will reduce the number of plant bypass and combined sewer overflow events that currently discharge directly to the Detroit River. The Amherstburg WWTP discharges final effluent that meets stringent limits for ammonia nitrogen, total phosphorus, Escherichia coli (E. coli), and pH.

Indirect Environmental Benefits

Indirect environmental benefits include positive effects to air, water, land, biodiversity, waste, and energy. Improvements to river water quality will benefit the residents of Amherstburg and Essex County and visitors to the area who use local beaches. These improvements will also assist in meeting Canada and Ontario's commitment to improved water quality in the Detroit River.

The expected result of the Amherstburg WWTP Upgrade and Expansion Project work is improved water quality in the Detroit River through the implementation of better technology designed to meet more comprehensive treatment parameters and more stringent effluent limits specified in its regulatory Environmental Compliance Approval (ECA) issued by the MOE.

6. Socioeconomic Benefits

Social Benefits

The community of Amherstburg and the general area of Essex County and all other jurisdictions on the Detroit River and Lake Erie downstream from Amherstburg area will benefit from the improved water quality. The resulting reduction in the frequency and duration of bypasses will reduce the frequency of beach closures and the improvement of the community quality of life and the overall health of the river.

In terms of the costs to the consumer, the upgrade and expansion of the WWTP took place at the location of the previous WWTP. This took advantage of the past investments made into the old WWTP facility and was therefore cost-effective and highly compatible with the existing infrastructure in the area. The Project also took advantage of the existing outfall, pump station and portions of the raw sewage forcemain and effluent pipeline to the pump station. This limits the social and environmental impacts to the Town since this infrastructure was already in place.

Since the growth in population is expected to be focused in the downtown area (serviced by the Amherstburg WWTP) beyond 2013, the total uncommitted reserve capacity of the WWTP will be able to assist the Town with revitalization of its downtown core. The uncommitted reserve capacity will allow the Town to issue building permits for the service area, facilitating economic development in the area and community revitalization.

During the EA, two Public Information Centers (PICs) were held. Comment sheets received during the PICs communicated that there was support for the Project (as the expanded Amherstburg WWTP capacity would allow the Edgewater Lagoons could be decommissioned). None of the comment sheets expressed any opposition to the upgrade and expansion of the Amherstburg WWTP.

Economic Benefits

With the Amherstburg WWTP and Edgewater Lagoons approaching their capacity limits and the Boblo Island STP in need of upgrades to meet health and safety and effluent requirements, the increased design capacity of the Amherstburg WWTP was calculated in consideration for expanding the Plant's service area to include areas presently serviced by the Edgewater Lagoons and Boblo Island STP. This decision saves the Town from having to spend money on upgrades and expansions to the aforementioned facilities, and will also provide savings in operational costs.

A few new areas will also be added to the Amherstburg WWTP service area. These additional service areas will include a sizeable area identified for heavy industrial activity, a smaller area designated for light industrial activity, and two other areas designated for residential use. Providing sewage services to these areas will allow for their development and resultant positive contributions to the local economy.

The Amherstburg WWTP Upgrade and Expansion features the addition of innovative environmental technologies, practices, and processes that were selected or designed to perform with higher efficiency in terms of power requirements, operations, maintenance costs and hours, and chemical feed.

Although the Amherstburg WWTP runs more efficiently than the previous plant, sewage rate increases will be inevitable. However, the use of low life cycle cost equipment, consolidating the service areas from the three facilities, and upgrading the Amherstburg WWTP was the most economical choice and will ultimately result in a smaller sewage rate increase for consumers.

7. Lessons Learned

Overall, the Amherstburg WWTP Upgrades and Expansion was a successful project. The increased plant capacity will nearly eliminate sewage bypasses to the Detroit River, and the treatment technologies that were implemented greatly improve the effluent water quality. As the new WWTP was constructed at the location of the existing plant, there was minimal disruption to the public during construction. The consolidation of the Edgewater Lagoons and Boblo Island STP sewersheds is an economical and efficient solution and was favorably received by the public.

One of the most important takeaway lessons from the Project was related to the project delays. When the Town entered a contract with the general contractor, the schedule that was stipulated in this contract coincided with the schedules that formed part of the agreements that were arranged with funding partners. The delay in the Project schedule therefore compromised the funding that was to be provided by the partners. As such, it was necessary to maintain transparency with the funding partners, and keep them consistently updated with regards to the project challenges and schedule delays. Through consistent communication with the funding partners, the project funding was able to be secured despite the schedule delays.

It was also noted that the delay in Project completion may have been avoided if the Town had selected a different contractor. In the future, it may be preferred to create a more rigorous contractor selection process for projects of this size and complexity.

8. Project Photographs

FIGURE 1

Amherstburg WWTP Administration Building - Interior



FIGURE 2

Amherstburg WWTP Administration Building - Exterior



FIGURE 3

Amherstburg WWTP Administration Building - Exterior



FIGURE 4

Amherstburg WWTP Clarifiers and Aeration Tanks



FIGURE 5

Amherstburg WWTP Clarifiers and Aeration Tanks



FIGURE 6

Amherstburg WWTP Clarifiers and Aeration Tanks



FIGURE 7

Amherstburg WWTP Clarifiers and Aeration Tanks



FIGURE 8

Amherstburg WWTP Landscaped Property



FIGURE 9

Amherstburg WWTP Property



FIGURE 10
Amherstburg WWTP Property



FIGURE 11
Amherstburg WWTP Property

