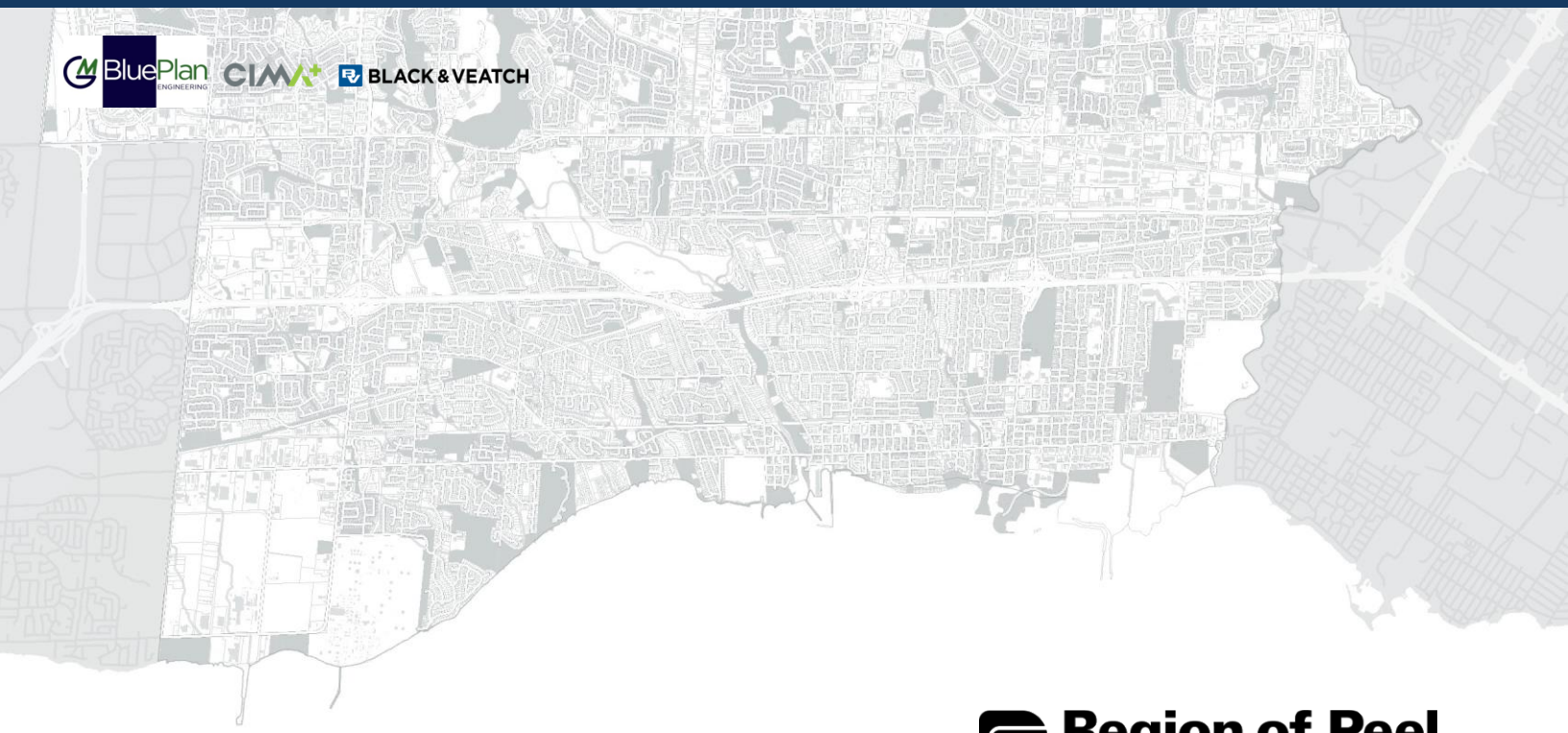

Region of Peel
working with you

Schedule C Municipal Class Environmental Assessment

G.E. Booth Water Resource Recovery Facility

Volume 0: Executive Summary

For Public Review

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Prepared by: GM BluePlan Engineering
Contact Person: Chris Hamel, P.Eng. - President
E: chris.hamel@gmblueplan.ca
Royal Centre, 3300 Highway No. 7
Suite 402, Vaughan, Ontario, L4K 4M3
P: 416 703 0667

E.0 Executive Summary

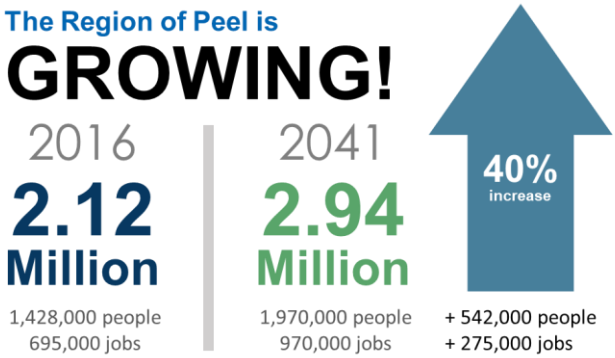
E.1 Introduction

E.1.1 Background and Study Purpose

The Regional Municipality of Peel ("Region of Peel" or "The Region") lake-based wastewater system consists of two (2) Water Resource Recovery Facilities (WRRFs) (formerly referred to as Wastewater Treatment Plants [WWTPs]): the Clarkson WRRF and the G.E. Booth WRRF, and two (2) major interconnected trunk sewer systems (East and West) which convey flows through sewage pumping stations, force mains, trunk sewers, and local gravity sanitary sewers, to the treatment plants for final treatment and discharge to Lake Ontario.

Both the Clarkson and G.E. Booth WRRFs are conventional activated sludge facilities, with rated capacities of 350 megalitres per day (MLD) and 518 MLD, respectively. The G.E. Booth WRRF is currently approaching its capacity limits, as the five (5) -year average daily flow (ADF) to the G.E. Booth WRRF is approximately 450 MLD. Currently, the ADF to the Clarkson WRRF is approximately 220 MLD.

The East and West trunk sewer systems are approximately divided by the watershed boundary between the Etobicoke Creek and the Credit River. The two (2) systems are currently connected via the West-to-East Sanitary Trunk Sewer, which can be used to divert some wastewater flows by gravity from the west trunk system to the east trunk system at Highway 407. In addition, an East-to-West Sanitary Trunk Sewer Diversion is currently being constructed, to help alleviate capacity challenges at the G.E. Booth WRRF, and allow the Region to better optimize wastewater flows and loadings in their systems. The diversion is a deep gravity tunneled trunk sewer of 2400 millimeter (mm) diameter that extends 11 kilometers (km) between Spring Creek and the Credit River, aligned primarily along Derry Road. Construction of the gravity trunk sewer diversion is expected to be completed by 2026.



The Region's Growth Management process and 2020 Water and Wastewater Master Plan identified that there will be significant population and employment growth across the Region of Peel. With this approved growth to year 2041 and vision for growth beyond 2041, the WRRFs together will not have the capacity to meet the needs of the Region's citizens and to continue to protect the environment, even with the East-to-West Trunk Sewer Diversion in place. Additional wastewater treatment capacity is therefore required at the G.E. Booth and Clarkson WRRFs.

Wastewater consists of liquid and solids components. The liquids and solids components are separated and treated at the WRRFs. The treated liquid component, known as effluent, is discharged to Lake Ontario through outfall pipes at both WRRFs. The effluent meets Ontario Ministry of the Environment,

Conservation, and Parks (MECP) quality criteria for protecting human health and the environment. The separated solids are treated to produce sludge. If the sludge has been treated in a manner such that it can be safely used on land, it is referred to as biosolids. Currently, digested sludge generated at Clarkson WRRF is dewatered and hauled by truck approximately 18 km to the G.E. Booth WRRF for incineration. The residual ash slurry from the incineration process is transferred to two (2) on-site settling lagoons which are dredged regularly and stored on-site in the ash ponds and berms. The existing incineration process at the G.E. Booth WRRF has challenges related to its capacity, long-term sustainability, cost effectiveness, and reliability. Therefore, improving the current Regional biosolids management program is also required.

The purpose of this Class Environmental Assessment (Class EA) study is to identify a preferred regional solution for meeting wastewater treatment capacity requirements and managing biosolids in the Peel lake-based system, and to develop a preferred design concept for expanding the G.E. Booth WRRF.

E.1.2 Schedule C Class EA Process

Increases in wastewater treatment capacity and the management of biosolids require the completion of a Schedule C Municipal Class Environmental Assessment (Class EA) in accordance with the Municipal Engineers Association (MEA) Municipal Class EA (October 2000, as amended in 2007, 2011, 2015, and 2023), to meet Ontario EA Act requirements. The following phases of the Class EA process must be completed for both the Clarkson WRRF and the G.E. Booth WRRF:

Phase 1: Problem or Opportunity Definition.

Phase 2: Identification and Evaluation of Alternative Solutions on a regional service area basis.

Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution, including assessment of treatment technologies and conceptual designs on a WRRF specific basis.

Phase 4: Documentation of the Class EA process for both WRRFs in separate Environmental Study Reports (ESRs).

Consultation and engagement with the public, government agencies, Indigenous Communities, and other stakeholders is an important and necessary component of each phase in the Class EA process.

This ESR documents the Class EA process and results for the G.E. Booth WRRF Schedule C undertaking, including the consultation and engagement program. The interrelated nature of the Region's wastewater collection and conveyance systems means that the solution established for the Clarkson WRRF is dependent on the solution selected for the G.E. Booth WRRF. Consequently, this Class EA has been completed in conjunction with the Clarkson WRRF Class EA through to the end of Phase 2.

Details on the Clarkson WRRF EA are documented in the Clarkson WRRF Environmental Study Report (ESR) which was completed and filed in May 2023. The preferred alternative long-term plan is to expand the Clarkson WRRF from 350 MLD to 500 MLD, and to treat the sludge produced onsite instead of trucking it to the G.E. Booth WRRF for incineration. Sludge produced at the Clarkson WRRF will be treated and managed at the Clarkson WRRF in the long-term.

E.1.3 Value Engineering

To provide independent expert input into the Class EA process before finalizing the preferred design concept, the Region of Peel undertook a Value Engineering (VE) study. Experts in the planning, design, and construction of wastewater treatment facilities were retained independently of the Class EA project team to review study information and provide input. The final recommendations in this ESR reflects input from the VE team.

E.2 Project Need and Objectives

As indicated on Error! Reference source not found., additional wastewater treatment capacity is needed w ithin the Peel lake-based system to meet the needs of Peel's citizens and to continue to protect the environment. In addition, there are long-term risks associated with solely using incineration to manage the solids from both the Clarkson WRRF and the G.E. Booth WRRF.

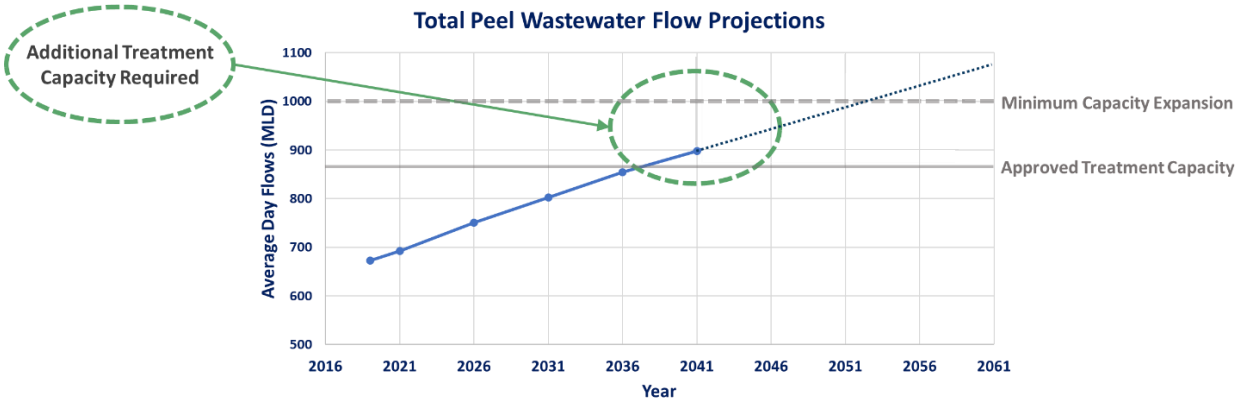


Figure E-1 Peel Wastewater Flow Projections

Peel's goal is to provide reliable wastewater collection, treatment and biosolids management now and in the future. The Study Opportunity Statement for the G.E. Booth WRRF is shown below.

Study Opportunity Statement

In conjunction with the Clarkson WRRF Class EA, the G.E. Booth WRRF Class EA will develop a solution for treating wastewater in the lake-based Peel system that will:

- Meet future needs associated with population growth, new regulations, climate change, energy efficiency, and wet weather flow management.
- Address community expectations regarding level of service, odour, air/noise, water quality, protection of the environment, and aesthetics.
- Provide greater flexibility and reliability in wastewater and biosolids management.

The G.E. Booth WRRF Class EA will also develop a preferred design concept to address the outfall capacity for the G.E. Booth WRRF.

The Region's goal is to provide reliable wastewater collection, treatment, and management now and for the future. The G.E. Booth WRRF Class EA meets this goal by developing a preferred solution and design concept which meets the key objectives presented in Error! Reference source not found.

Table E-1 Class EA Objectives

Key Objective	Description
Long-term sustainability	• Region-wide wastewater and biosolids management with operational flexibility • Multiple biosolids product marketing opportunities • Resource recovery through beneficial use
Resiliency	• Manage wet weather flows • Adapt to changing conditions • Built in redundancy in treatment processes
Environmental Protection	• Mitigate risks to natural environments • Meet air and effluent quality requirements
Community Acceptability	• Managing odour and noise • Limiting truck traffic • Visually appealing designs and landscaping
Ease of Operations	• Operator acceptability • Proven processes
Energy Efficiency and Reduce Greenhouse Gas (GHG) Emissions	• Supporting Peel's GHG reduction goals • Energy reduction and reuse opportunities
Fiscally Responsible	• Balance lifecycle costs, while protecting the environment and communities

E.3 Existing Conditions

Two (2) study areas have been defined for this Class EA: the regional study area and the local study area as shown in **Figure E-2**, and described below.

E.3.1 Regional Study Area

The Regional study area is the entire service area for both the Clarkson WRRF and the G.E. Booth WRRF, which includes the West Trunk System that conveys flows to the Clarkson WRRF and the East Trunk System that conveys flows to the G.E. Booth WRRF. The Regional study area also includes the area serviced by the planned diversion of flows through the East-to-West Diversion trunk sewer, currently under construction. The Regional study area is considered in the Phase 2 evaluation of alternative solutions.

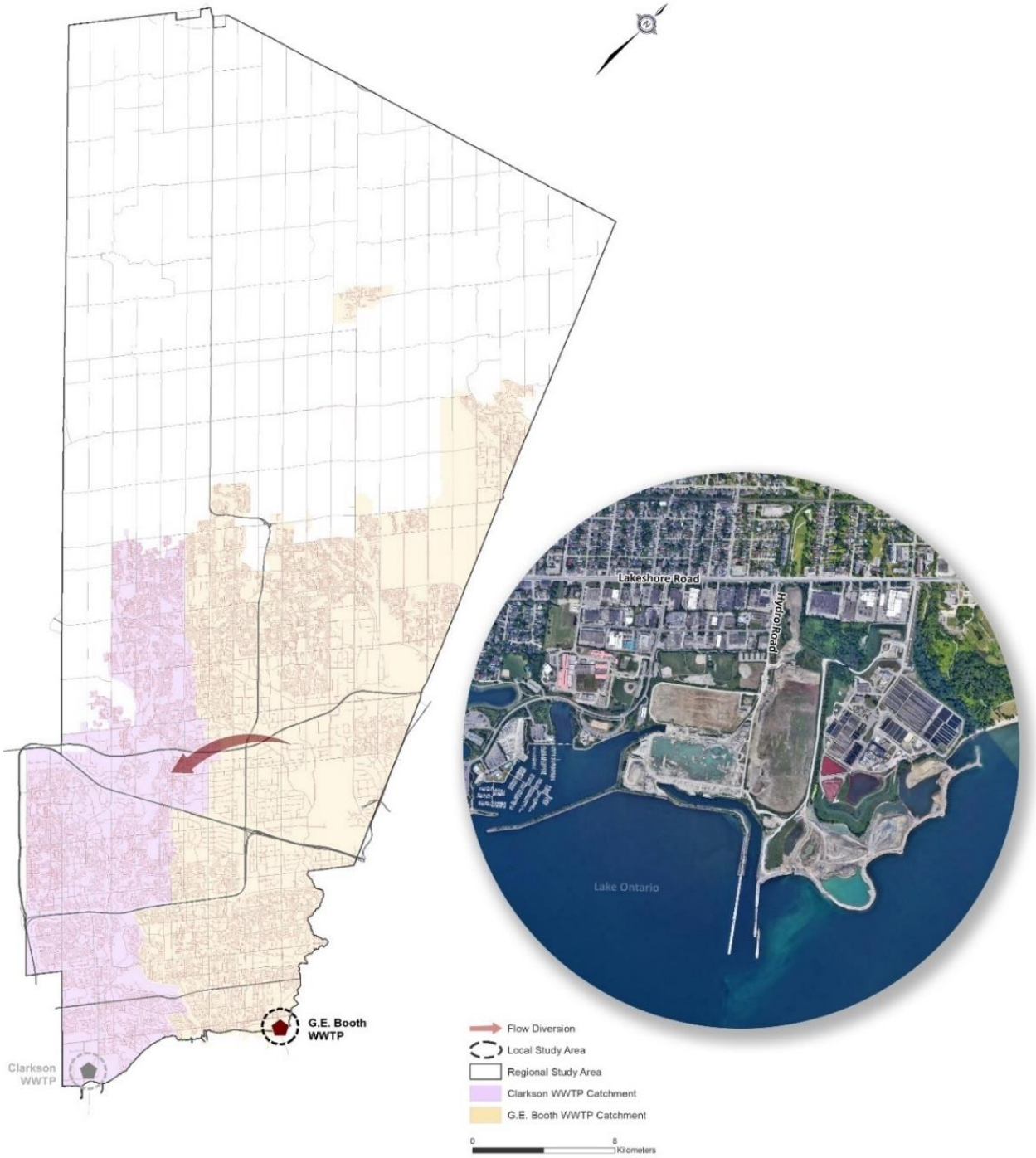


Figure E-2. Regional and Local Study Area

E.3.2 G.E. Booth WRRF Study Area

The local study area is the G.E. Booth WRRF and surrounding area. The site and surrounding land uses are shown on **Figure E-1**. The G.E. Booth WRRF is located in the southeast corner of the City of Mississauga, south of Lakeshore Road East, between Dixie Road and Cawthra Road. The site is identified

as commercial/industrial (CIC), with much of it fully developed with treatment facilities and associated infrastructure. Few natural features remain on site. However, there are key natural environmental features surrounding the G.E. Booth WRRF including Applewood Creek and Marie Curtis Park to the east, Serson Creek along the western property limits, the developing Jim Tovey Lakeview Conservation Area (JTLCA) immediately to the south, and Lake Ontario at its shoreline.

Lands north of the plant are predominantly residential, with some mixed use along Lakeshore Road East. The area to the west of the site will be developed as a mixed-use community, known as the Lakeview Village. The Lakeview Village will support a variety of residential building types, parkland, cultural and employment uses, with buildings featuring environmentally sustainable designs. The development will also include a District Energy Centre (DEC). The DEC is a thermal energy centre which will pump treated effluent from the G.E. Booth WRRF through heat exchangers to provide heating and cooling to buildings in Lakeview Village.

As a result of past military uses in the area, there are also designated heritage properties within and adjacent to the property, including the Long Branch Indoor and Outdoor Rifle Ranges, the Small Arms Limited Building, and the Arsenal Lands Water Tower.

Figure E-1: Areas Surrounding the G.E. Booth WRRF

E.4 Phase 2: Identification and Evaluation of Alternative Solutions

A range of integrated alternative solutions were considered during Phase 2, balancing the needs and opportunities for both the G.E. Booth and Clarkson WRRFs in three (3) areas: wastewater treatment, sludge treatment/biosolids management, and outfall capacity.

Phase 2 addressed important technical questions that guided the development and assessment of alternative regional solutions. As Peel's wastewater systems are integrated, Phase 2 activities for both the G.E. Booth WRRF and Clarkson WRRF Class EAs were undertaken together.

Questions Answered During Phase 2

What is the overall concept for wastewater treatment in Peel?

Should there be an expansion at one (1) or both existing Water Resource Recovery Facilities? If so, how large should the expansions be?

Is there enough outfall capacity or will additional capacity be required? If additional capacity is required, how and where should it be provided?

How much solids capacity do the WRRFs have and how should the end products (biosolids) be managed?

E.4.1 Alternative Solutions

As a first step in Phase 2, a long list of wastewater treatment, sludge treatment/biosolids management, and outfall alternatives were developed and screened as to their ability to meet the project opportunity statement. Based on the screening, five (5) alternative solutions to meet future treatment requirements within the Region of Peel were developed. For each alternative solution, diversion requirements through the East-to-West Diversion Trunk Sewer (in consideration of the available flow diversion capabilities), and schedules for expansion were established. In addition, capacity analyses were undertaken to identify liquid and solid unit process needs for each alternative. In developing the solids treatment needs, the diversion requirements and associated differing solids contents of the wastewater between the G.E. Booth WRRF and the Clarkson WRRF service areas were also considered (i.e., the G.E. Booth WRRF service area has more industrial users than the Clarkson WRRF service area). The following alternative solutions were developed:

Alternative Solution 1: Maintain G.E. Booth WRRF at 518 MLD, Expand Clarkson WRRF to 500 MLD, Independently Treat Biosolids at Each Site, New Effluent Pumping Station at the G.E. Booth WRRF.

Alternative Solution 2: Expand G.E. Booth WRRF to 550 MLD, Expand Clarkson WRRF to 450 MLD, Independently Treat Biosolids at Each Site and either:

a. New Outfall at G.E. Booth WRRF; or
b. Peak Flow Diversion to the Clarkson WRRF (new Effluent Pumping Station at G.E. Booth WRRF and Real Time Control (RTC) in the collection system).

Alternative Solution 3: Expand G.E. Booth WRRF to 550 MLD, Expand Clarkson WRRF to 500 MLD, Independently Treat Biosolids at Each Site, New Outfall at G.E. Booth WRRF.

Alternative Solution 4: Expand G.E. Booth WRRF to 600 MLD, Expand Clarkson WRRF to 400 MLD, Independently Treat Biosolids at Each Site and either:

a. New Outfall at G.E. Booth WRRF; or
b. Peak Flow Diversion to the Clarkson WRRF (new Effluent Pumping Station at G.E. Booth WRRF and RTC in collection system).

Alternative Solution 5: Expand G.E. Booth WRRF to 600 MLD, Expand Clarkson WRRF to 500 MLD, Treat Biosolids at Each Site, New Outfall at G.E. Booth WRRF.

These alternatives were assessed using a multi-criteria evaluation approach, which considered all components of the environment as defined under Ontario's EA Act – natural, social, cultural, technical, and economic considerations. The public and stakeholders were given the opportunity to help develop the criteria. The impacts for each criterion were described and rated by a team of engineers, scientists, planners, and Region staff based on the conceptual design assumptions, technical evaluations, and environmental inventories completed as part of Phase 2 of the Class EA. In assigning impact ratings, net effects (effects after mitigation) were considered. Impact ratings were summed for each criteria category and normalized, such that each category (i.e., natural, social/cultural, technical, and economic) was weighted equally at 25 percent (%) each. The alternative with the highest score was deemed to have the least net impact and was recommended as the preferred solution.

E.4.2 Preferred Alternative Solution

Alternative Solution 3 (Expand G.E. Booth WRRF to 550 MLD, Expand Clarkson WRRF to 500 MLD, Independently Treat Biosolids at Each Site and New Outfall at G.E. Booth WRRF) ranked highest overall and was selected as the preferred solution (see **Figure E-2**). As illustrated on **Figure E-2**, the overall solution involves flow diversion, expansions at both WRRFs, treatment of sludge and management of end products at each plant independently, and a new outfall at the G.E. Booth WRRF.

Alternative Solution 3

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Expand G.E. Booth WRRF to 550 MLD, Expand Clarkson WRRF to 500 MLD, Treat Biosolids at Each Site and New Outfall at G.E. Booth WRRF

Clarkson WRRF

Wastewater

- Expand from 350 MLD to 500 MLD

Biosolids

- Provide treatment of biosolids
- Beneficial land use of biosolids products

Outfall / Peak Flow Management

- No change

Expansion Scheduling: Upgrade by 2029

G.E. Booth WRRF

Wastewater

- Expand from 518 MLD to 550 MLD

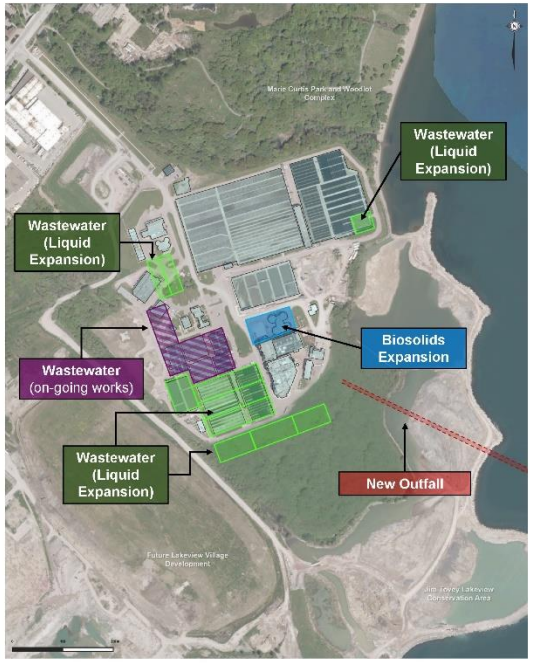
Biosolids

- Maintain existing incinerators; manage sludge in excess of the incinerator capacity

Outfall / Peak Flow Management

- New outfall

Expansion Scheduling: Upgrade by 2041



East-to-West Diversion Requirements

Divert 80 MLD (ADF) in 2026
Divert 150 MLD (ADF) by 2031

Figure E-2: Preferred Regional Solution

Figure E-3 presents the flow diversion and expansion requirements for the G.E. Booth WRRF. To meet future needs, 80 MLD from the G.E. Booth WRRF service area will need to be diverted to the Clarkson WRRF catchment via the East-to-West Diversion, starting in 2026 when the diversion becomes operational. In 2029, the rated capacity of the Clarkson WRRF would be expanded from 350 MLD to 500 MLD, increasing capacity at the Clarkson WRRF; which would allow for diversion of an additional 70 MLD by 2031, for total of 150 MLD, before the G.E. Booth WRRF reaches 90% of its approved capacity. In 2041, the G.E. Booth WRRF would reach 90% of its approved capacity, triggering expansion from 518 MLD to 550 MLD. Expansion facilities at the G.E. Booth WRRF must be in service by 2041 to meet wastewater treatment needs.

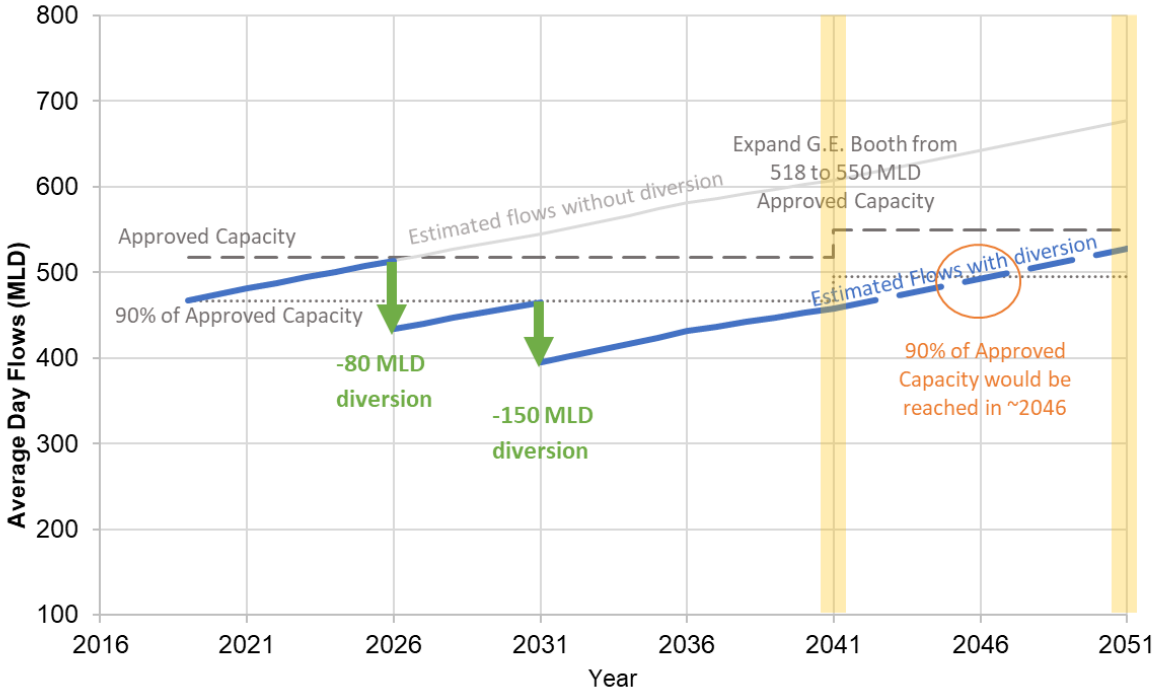


Figure E-3: Preferred Solution: Diversion and Expansion Approach for the G.E. Booth WRRF

E.5 Phase 3: Identification and Evaluation of Alternative Treatment and Design Concepts

Phase 3 of this Class EA process examined alternative treatment technologies and design concepts for the G.E. Booth WRRF. The wastewater (liquid) treatment, sludge treatment/biosolids management, and outfall components of the treatment system were assessed separately, and an overall preferred conceptual design for the G.E. Booth WRRF was developed.

Questions Answered During Phase 3

What technologies should be used to treat wastewater (liquid and solids components)?

How should biosolids be managed?

What is the preferred design concept to expand the G.E. Booth WRRF? (i.e., How should the site look?)

What measures should be put in place to control impacts to the natural, social, and cultural environments, and protect the community?

Site specific environmental investigations, including a natural feature assessment, archaeological assessment, receiving water impact analysis, land use review, and GHG emission analysis were undertaken to support the evaluation. VE input was also instrumental in assessing the alternatives and establishing the preferred design concept.

E.5.1 Wastewater Treatment

A long list of alternative wastewater treatment technologies for application at the G.E. Booth WRRF were identified and reviewed against the Phase 3 screening criteria. In order to pass the screening and be carried forward for further evaluation, a technology must be proven to be applicable at large WRRFs, proven to be reliable with a successful track record, proven to be compatible with existing processes, and able to support the Region's energy reduction and Greenhouse Gas (GHG) emission goals. Alternative design concepts were developed based on the short list of technologies, assessed using a multi-criteria evaluation approach, and reviewed against the Region's key objectives (refer to **Error! R eference source not found.**). A preferred wastewater treatment design concept for the G.E. Booth WRRF expansion was then selected.

E.5.1.1 Disinfection Alternatives

The screening criteria were applied to the long list of disinfection technologies. Ozonation and peracetic acid technologies did not pass the screening process. The resulting short-listed disinfection technologies were:

- **Chlorination/Dechlorination:** This technology involves expanding the existing disinfection facility at the G.E. Booth WRRF using chlorination and dechlorination. This disinfection approach is integrated into the existing outfall; however, a new outfall will be required to service the expanded capacity of the G.E. Booth WRRF at 550 MLD.
- **Ultraviolet (UV):** This technology involves construction of a new UV disinfection facility including in-channel UV disinfection systems and power equipment. The secondary effluent will be diverted to the new UV facility before discharging to the new outfall.

Based on the detailed evaluation, both chlorination/dechlorination and UV disinfection received a similar total score, with UV disinfection having a slightly higher score. To confirm UV disinfection as the

preferred alternative, it was reviewed against the key priorities of the Region. UV disinfection best aligns with the Region's objectives of Environmental Protection, Community Acceptability, and Fiscal Responsibility and was therefore selected as the preferred disinfection alternative.

E.5.1.2 Wastewater Treatment Design Concepts

Four (4) wastewater design concepts were developed based on the short list of secondary treatment technologies with preliminary treatment, primary treatment, and disinfection common to all four (4) design concepts. These design concepts are as follows:

1. **Design Concept 1: Expansion of existing facility using the Conventional Activated Sludge (CAS) process:** This design involves expanding the G.E. Booth WRRF to a rated capacity of 550 MLD with new CAS process trains which are consistent with the existing facility and would follow the same operating philosophy.

2. **Design Concept 2: CAS Process Optimized with Chemically Enhanced Primary Treatment (CEPT):** This alternative involves expanding the G.E. Booth WRRF with new CAS process trains optimized with CEPT. The addition of metal salts and polymer upstream of the primary clarifiers would aid with solids settling, reducing the organic and solids load to the secondary treatment process. This would reduce the size of the aeration tanks and the energy consumption required for aeration. Furthermore, the high energy solids from primary treatment would allow for more biogas production through anaerobic digestion.

3. **Design Concept 3A: Expansion of Existing Facility Using the CAS Process Optimized with a High-Rate Treatment Facility:** This alternative involves expanding the G.E. Booth WRRF using the CAS process to bring the plant capacity to 550 MLD. However, in this concept, wet weather flows would be diverted to a new headworks and high-rate treatment facility for treatment. This concept would eliminate the need for construction of a new treatment train in the lagoon area (as required for Design Concepts 1 and 2).

4. **Design Concept 3B: Expansion of Existing Facility Using the CAS Process Optimized utilizing Real Time Control (RTC) in the Collection System:** This alternative involves expanding the G.E. Booth WRRF using the CAS process to bring the plant capacity to 550 MLD. However, in this concept, RTC would be used in the collection system to attenuate peak flows to the G.E. Booth WRRF. Similar to Concept 3A, this concept would eliminate the need for construction of a new treatment train in the lagoon area (as required for Design Concepts 1 and 2).

Detailed evaluation of the four (4) design concepts showed that alternatives which managed wet weather flows (i.e., Alternatives 3A and 3B) rated slightly higher than the other concepts. This is because these alternatives required less tankage on site, as peak flows are managed in the system. **Design Concept 3B: Expansion Using CAS Optimized with RTC** was selected as the preferred as it best aligned with the Region's key objectives of: Resiliency, Community Acceptability, Ease of Operation, and Fiscal Responsibility.

E.5.2 Sludge Treatment/Biosolids Management

Sludge treatment/biosolids management design concepts were developed and assessed using a similar approach to that which was used to assess wastewater treatment alternatives. A long list of sludge treatment technologies was identified and reviewed against the Phase 3 screening criteria. In order to pass the screening and be carried forward for further evaluation, a technology must be proven to be applicable at large WRRFs, proven to be reliable with a successful track record, proven to be compatible with existing processes, and able to support the Region's energy reduction and greenhouse gas (GHG) emission goals. To confirm that markets were available for the end products of the sludge treatment process, a biosolids product market assessment was also completed. Alternative design concepts were developed based on the short list of technologies and end use markets, assessed using a multi-criteria evaluation approach, and reviewed against the Region's key objectives (refer to **Table E-1**). A preferred sludge treatment/ biosolids management design concept for the G.E. Booth WRRF was then selected.

E.5.2.1 Sludge Treatment/Biosolids Management Alternatives

Based on the short list of treatment technologies and input from the Value Engineering (VE) team, six (6) design concepts were developed as described below. All alternatives include decommissioning of the ash lagoons and storage pond and construction of an ash dewatering facility. While developing these alternatives, the operational limitations and remaining service life of the existing incineration facility was considered, along with potential phasing of the solids management improvements, and the long-term vision for solids management at the G.E. Booth WRRF.

1. **Design Concept 1: Expand Incineration:** There are four (4) fluidized bed incinerators at the G.E. Booth WRRF which can meet the capacity requirements within the 20-year planning horizon. However, they do not have sufficient capacity at the expanded design flow of 550 MLD. This alternative involves constructing two (2) additional incinerators to allow the G.E. Booth WRRF to operate four (4) incinerators with two (2) as standby. The ash from incineration will be either beneficially used or landfilled. Continuing with incineration would require replacement of the four existing incinerators at their end of their respective service life.

2. **Design Concept 2: Transport Additional Solids Off Site to the Clarkson WRRF for Management:** Similar to Design Concept 1, the existing four (4) incinerators can meet the capacity requirements within the 20-year planning horizon. However, they do not have sufficient capacity at the expanded design flow of 550 MLD. For this alternative, solids in excess of the incinerator capacity at 550 MLD would be transported to the Clarkson WRRF for management. The anticipated maximum volume of solids for transport is 20 dt/d which would require an average of ten (10) semi-tank trailers daily. The solids would be transported in liquid form to minimize the potential for odour and discharged to the high strength waste receiving facility at the Clarkson WRRF to be blended with the solids from the Clarkson facility. The ash from incineration will be either beneficially used or landfilled.

3. **Design Concept 3: Thermal Hydrolysis Process (THP) followed by Anaerobic Digestion prior to Incineration**: This alternative involves the construction of a THP and anaerobic digestion system

to stabilize a portion of the solids generated at the G.E. Booth WRRF prior to incineration. Digestion would reduce the mass of solids to be incinerated and lower the volatile solids content in the dewatered cake prior to incineration, which would increase the capacity of the incineration units and eliminate the need for their expansion. This option allows the Region to diversify their biosolids management program by transporting digested sludge off-site for management by third-party vendors. Biogas generated during anaerobic digestion would also be collected for beneficial use. The ash from incineration will be either beneficially used or landfilled.

4. **Design Concept 4: Third-Party Management of Additional Solids**: Similar to Design Concept 1, the existing four (4) incinerators can meet the capacity requirements within the 20-year planning horizon. However, they do not have sufficient capacity at the expanded design flow of 550 MLD. In this alternative, for solids exceeding the capacity of the existing incineration facility at 550 MLD, third-party biosolids management firms would be contracted to transport and manage the un-stabilized solids. The ash from incineration will be either beneficially used or landfilled.

5. **Design Concept 5: Anaerobic Digestion, Dewatering and Direct Thermal Drying**: This alternative moves away from incineration beyond 2041 and includes construction of an anerobic digestion system and direct thermal drying facility. To transition from incineration to drying, eight (8) new digesters, seven (7) duty with one (1) standby, would be constructed to stabilize the solids. Following digestion, the biosolids would be dewatered and dried in a new direct drying facility. On-site storage of the stabilized and dried biosolids would be provided through the construction of two elevated silos. The biosolids product would be beneficially used on agriculture lands as a NASM (digested sludge) or marketed to the public as a fertilizer (dried product). The biogas generated during anaerobic digestion would be collected for beneficial use onsite.

6. **Design Concept 6: Anaerobic Digestion Prior to Incineration**: This alternative includes construction of four (4) new anaerobic digesters, three (3) duty, one (1) standby. Anaerobic digestion would reduce the volatile solids entering the incinerator units which would increase the capacity of the incinerators. This would allow the incinerators to adequately serve the G.E. Booth WRRF within the 20-year planning horizon as well as provide the Region with the time and flexibility to identify a long-term sludge management strategy at 550 MLD that meets the needs of the surrounding community. The long-term strategy could be a continuation of incineration or implementation of different technologies, such as drying or THP. This alternative also offers the opportunity to utilize the biogas generated during anaerobic digestion for on-site use, along with exporting the digested biosolids for beneficial use.

The detailed evaluation process resulted in all six (6) design concepts for biosolids management producing similar scores, with **Design Concept 6 (Anaerobic Digestion prior to Incineration)** scoring slightly higher than the other alternatives. A review of the alternatives against the Region's key priorities indicates that Design Concept 6 also aligns best with Region's key objectives of: Sustainability, Community Acceptability, and Fiscal Responsibility. This is primarily due to its ease of operation, long-term sustainability, resiliency, and opportunities for energy recovery. This design concept allows the

digested sludge to be beneficially land applied. The Region is also exploring beneficial reuse options for incinerator ash, including use of the ash in the production of concrete, asphalt, and bricks.

E.5.3 New Outfall

The effluent from the G.E. Booth WRRF is currently discharged to Lake Ontario through a 3.65-metre diameter and 1,400-metre length outfall with discharge port diffusers in the last 212 metre section. The existing outfall has a rated peak capacity of 1,523 MLD per the approved ECA; however, it can only handle flows of approximately 1,200 MLD before flooding of the secondary clarifier launders. As such, the existing outfall would not meet future needs and a new outfall would be designed to meet long-term future needs and minimize the risks of flooding the secondary weirs.

To identify a preferred design concept for the outfall, evaluations were completed of alternative shaft locations and pipe alignments. The outfall shaft is the on-site access point for the outfall tunnel construction. The shaft is used to set up and launch the tunneling equipment and to remove the tunnel spoil and waste material during excavation. The outfall consists of the outfall pipe and diffusers and extends deep into Lake Ontario.

E.5.3.1 Outfall Shaft

The development of locations for the outfall shaft considered site footprint, the need to avoid construction on the JTLCA property, and the required proximity to existing plant connections and the DEC. Three (3) alternative locations for the outfall shaft were considered as identified on **Figure E-4**. Alternative 1 scored more favourably than or similar to Alternatives 2 and 3 for all criteria categories – Natural, Social/Cultural, Technical, and Costs. Therefore, the recommended location for the new outfall shaft is Alternative 1. This location is east of the existing disinfection building, between the existing ash storage pond and the JTLCA. The proposed shaft location is located within the ridge running on the southeast side of the plant and has an approximate 4 metre elevation difference from the nearest road surface which would require re-grading. The site can be accessed by a facility road (East Drive). The Alternative 1 location is close (~170 m) to the existing outfall shaft and other utilities. This location provides an opportunity to connect to the existing outfall and diversion structures, existing utilities, and the DEC.

Figure E-4: Alternative Outfall Shaft Locations and Staging Areas

E.5.3.2 Outfall Alignment

Outfall alignment alternatives depend on the plant outlet location and bathymetry. The plant outlet location provides a starting point for the various corridor alternatives, while bathymetry provides an indication of the different potential locations where the outfall would extend into Lake Ontario. Generally, bathymetry influences the length required to reach deep waters efficiently, necessitating shorter supply pipe length and providing greater dilution volumes closer to shore. Based on the results from the RWIA, the new outfall tunnel will be 6 metres in diameter and 3,000 metres in length with the diffusers located along the last 1,000 metres (therefore beginning 2,000 metres offshore).

When considering the outlet location, bathymetry data, and a length of 3,000 metres, four (4) alignment corridors alternatives were identified, as illustrated on **Figure E-5**. **Outfall Alignment Alternative B** (Central, Parallel to Existing Outfall) scored highest and was therefore selected as the preferred. Alternative B is centrally located from the IPZ 1 areas for both the A.P. Kennedy and R.L. Clark WTPs and is generally parallel to the existing outfall. Alternative B is also located most favourably with respect to the current direction and bathymetry.

Figure E-5: Outfall Alignment Alternatives

E.6 Preferred Alternative

E.6.1 Site Expansion Concept

E.6.1.1 Site Plan

Based on the assessment of alternatives, the following design components are proposed to expand the G.E. Booth WRRF from its existing rated average day flow capacity of 518 MLD to 550 MLD:

- Expansion of wastewater treatment process using Conventional Activated Sludge (CAS) technology;
- A new UV system to replace the existing chlorination/dechlorination disinfection system;
- New anaerobic digestion upstream of incineration; and
- A new outfall.

The site plan for expansion is illustrated on **Figure E-6**.

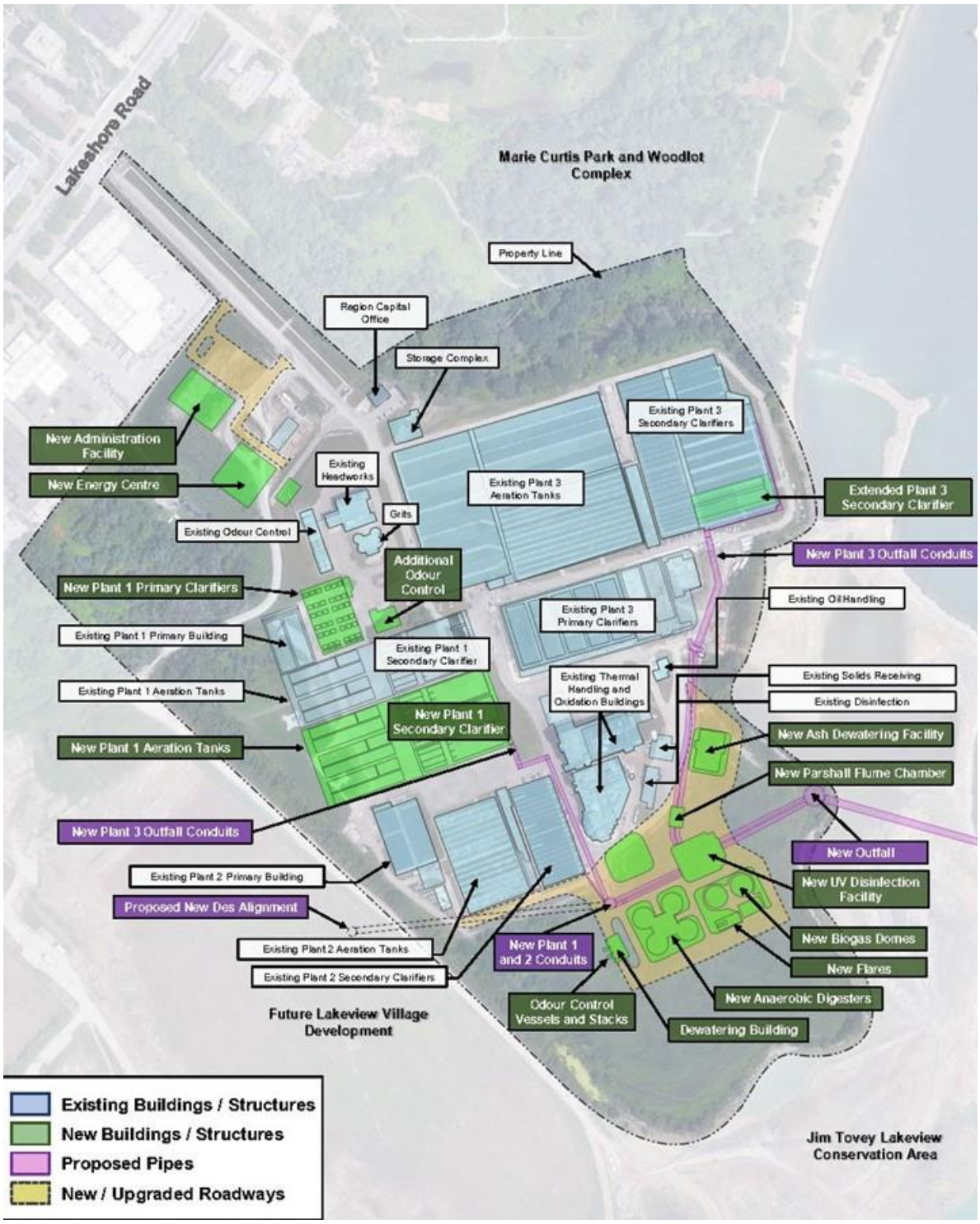


Figure E-6: G.E. Booth WRRF Design Components

E.6.1.2 New Outfall

The new outfall would be designed to allow treated effluent to flow by gravity from the plant and be dispersed into the lake via the diffuser risers and ports. The new outfall tunnel would be a 3,000 metre length, 6 metre diameter pipe with diffusers that begin 2,000 metres offshore. There would be a total of 68 diffuser ports, spaced 15 metres apart along a length of 1,000 metres. Initially, the first 250 metres of diffuser ports would be capped providing a peak flow capacity of 2,100 MLD. The capped ports would be opened as required to provide additional peak flow capacity beyond 2,100 MLD in the future. This higher peak capacity allows the Region flexibility to meet longer term needs during the lifespan of the outfall (i.e., 75 to 100 years), as well as adapt to future conditions relating to climate change. Based on the tunnel diameter, depth, and subsurface conditions (geologic and hydrogeologic characteristics) along the tunnel alignment, a single shield Tunnel Boring Machine (TBM) is identified as the preferred tunnel excavation method.

The outfall tunnel would be connected to a new 20 metre diameter onshore outfall shaft which would receive disinfected effluent from the new UV disinfection facility. The shaft is the primary access point for tunnel construction. The shaft would be used to set up and launch the TBM, transport materials and equipment into the tunnel, and to remove the tunnel spoil and waste material during excavation. After excavation of the tunnel, the TBM would be disassembled and retrieved.

The existing outfall, although not sufficient size and length to meet future needs, is structurally sound and therefore would remain in place and be used during maintenance or emergency situations, as required.

E.6.1.3 Project Costs Estimates and Schedule

The capital cost estimate for the G.E. Booth WRRF expansion and new outfall scope of work is estimated to be in the magnitude of $1.2 billion. The capital cost estimate for the G.E. Booth WRRF expansion scope of work is summarized in **Table E-0-2**.

Table E-0-2: Conceptual Capital Cost Estimate

Description	Amount (2023 $)
Yard Works	$52,529,000
Administration Facility	$16,704,000
Primary Clarifiers	$41,819,000
Primary Building	$14,780,000
Aeration Tanks	$29,608,000
Blower Building	$6,628,000
Secondary Clarifiers	$22,259,000
UV Disinfection Facility	$26,395,000
Ash Dewatering Facility	$40,820,000
Anaerobic Digestion with Biosolids Exportation	$152,100,000
Outfall	$209,704,000
Electrical (Incl. New Service and Energy Center)	$32,718,000
SUBTOTAL FOR CONSTRUCTION	**$646,064,000**
Subtotal for Construction (Rounded)	**$646,000,000**
Construction Contingency & Estimating Allowance (30%)	$193,800,000
Engineering (15%)	$96,900,000
General Contractor Overhead, Profit, Mobilization & Bond (15%)	$96,900,000
TOTAL CAPITAL COST ESTIMATE (ROUNDED)	**$1,033,600,000**

Given the magnitude and complexity of the expansion, it is recommended that the work be completed as a program consisting of several projects/contracts. It is recommended that the proposed expansion at the G.E. Booth WRRF be packaged into seven (7) separate engineering assignments as follows:

- Engineering Assignment 1: Ash Dewatering, DES, and Old Plant 1 Demolition
- Engineering Assignment 2: Energy Center
- Engineering Assignment 3: Administration Facility
- Engineering Assignment 4: New Digesters and Beneficial Gas Reuse
- Engineering Assignment 5: New Outfall and UV Disinfection Facility
- Engineering Assignment 6: Plant 1 and Plant 3 Expansion
- Engineering Assignment 7: Future Solids Management Solution

This program will be refined further during detailed design. A high-level conceptual construction schedule is presented below in **Figure E-7**. It demonstrates the suggested timing of the engineering assignments to complete the required works in order to provide additional treatment capacity by 2039. The engineering assignments will need to occur in parallel with staggered start dates to avoid tendering contracts at the same time.

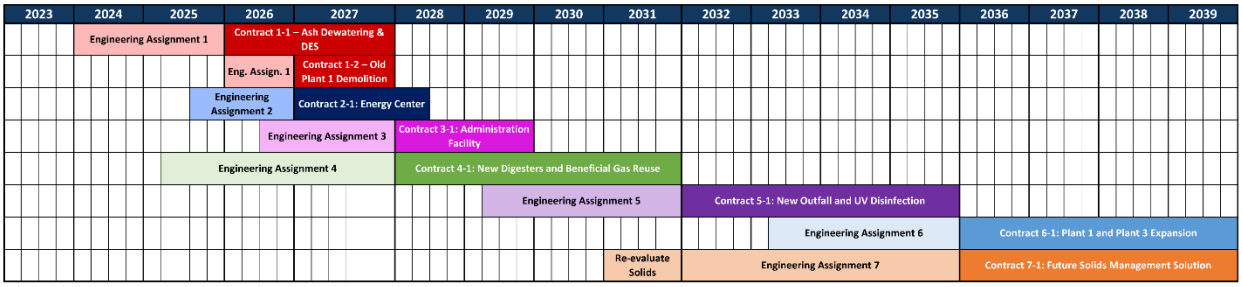


Figure E-7: Proposed Engineering Assignment and Contract Schedule

E.6.2 Real Time Control (RTC)

The Region plans to implement RTC based on the recommendations of their recently completed study: *Real Time Control Implementation – Assessment of Existing Sanitary Trunk and Collection System (Stantec, October 2022)*. The study identified numerous flow control sites where RTC can be integrated into the sewer system to manage peak wet weather flows. The implementation is proposed to be done in stages to minimize implementation risks and provide greater assurances of the long-term sustainability of the strategy. Its implementation would provide the following benefits to the Region:

- Opportunity to attain an enhanced level of service and system performance relative to the Region's minimum design objectives.
- Added operational visibility and flexibility for both collection system and treatment system operators.
- Added flexibility for managing and adapting to changing growth, climate conditions, and servicing requirements.
- Opportunity to realize significant cost savings in planned capacity upgrades and expansions to the Region's WRRFs.

The preferred solution for the G.E. Booth WRRF includes RTC as it eliminates the need to expand the headworks and reduces the need for an additional treatment train.

E.7 Impacts, Mitigation, and Net Effects

Several assessments were completed on the preferred design concepts to better understand the potential impacts of the proposed facility expansion and new outfall, and to identify measures to mitigate these impacts. These included natural heritage studies and inventories, a receiving water assessment, archaeological inventories (on-site and marine), desktop geotechnical and hydrogeological studies, an Air Quality Assessment, an Acoustic (Noise) Assessment, a Phase 1 Environmental Site Assessment, source water studies, and a review of social environmental characteristics. Based on extensive studies and discussions with approval agencies and the public, mitigation measures have been established to protect the community and the environment. A summary of the impacts, mitigation measures, and net effects of the preferred alternative are presented in **Table E-1** and **Table E-0-2**, for the plant expansion and new outfall, respectively.

Table E-0-3 Summary of Impacts and Mitigation Measures from G.E. Booth WRRF Expansion

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Natural Environment				
• Natural Heritage Features	• Preparation and adherence to a frac-out contingency plan for the trenchless installation of the DEC piping under Serson Creek. • Barn Swallow nests were identified on Blower Building 1 which is immediately adjacent to an expansion area. Care should be taken to not harass or harm nesting Barn Swallows during construction. • Where possible, construction activities should be timed outside of the nighttime and early morning periods during the bat and bird breeding seasons (April 1st to September 30th). • New lighting should be directed away from the existing woodlands to avoid impact to wildlife activities. • While isolated, where tree removals are proposed the following measured should be considered: • Tree removals to occur outside of the active bat roosting window (April 1st to September 30th) and Migratory Bird window (early April to end of August); • To reduce the spread of invasive species, all trees should be disposed of locally. • New facilities should be located as far as feasibly possible from the JTLCA to minimize impacts to natural areas from noise, light, bird collisions, etc. • An ecologist will undertake an onsite investigation of the lagoon prior to removal to screen for: turtles, amphibians, and fish, and if species are found, the Region will ensure proper removal and/or relocation of species. • Landscaping and site restoration following construction; opportunities to plant buffer plantings surrounding the vegetation to the east, west, and south will also be explored during detailed design.	Onsite investigation during design to screen for: turtles, amphibians, and fish in the ash lagoon area prior to removal.	Monitoring during construction.	No net effects expected.
• Lake Ontario Water Quality	Total phosphorus (TP) concentrations in the final effluent will be reduced so the total loadings to Lake Ontario do not increase as flows increase. The Receiving Water Impact Assessment (RWIA) indicated that Provincial Water Quality Objectives (PWQOs) will continue to be met.	RWIA, including assimilative capacity study has been completed through this EA, and is acceptable to the MECP. New effluent limits and objectives for the expanded plant have been identified and will be included in the new Environmental Compliance Approval (ECA) for Sewage.	Monitoring during operations as per new ECA requirements.	No net effects expected.
• Source Water Protection	Water treatment plant intakes within the Credit Valley Source Protection Area (i.e., Burlington, Burloak, Oakville, Lorne Park, A.P. Kennedy, and R.L. Clark water treatment plant intakes) are protected by minimizing the risks of disinfection failure at the G.E. Booth WRRF. Adequate UV disinfection system redundancy and stand-by power will be included as part of the design. To further reduce risk, Peel will continue to apply best management practices during operation and maintenance, including spill prevention and response plans and training procedures.	Treatment redundancy and stand-by power needs will be confirmed through detailed design.	Continue to update Standard Operating Procedures (SOPs), including spill prevention and response plans.	Low risk of net effects.

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
• Expansion could potentially increase runoff, impact water quality, and decrease infiltration.	• A hydrologic analysis will be conducted and presented within the SWM report to demonstrate that site-wide drainage conditions will be maintained to pre-development conditions. SWM controls will be recommended to maintain the water quantity and quality to pre-development levels. The SWM will be a combination of site regrading and conveyance of stormwater across the site towards Lake Ontario. Site drainage structures will be designed in accordance with Region of Peel and/or City of Mississauga Standards. • Potential impacts of increased runoff will be controlled to protect water quality.	• Prepare a Stormwater Management Plan. • Develop and implement a site-specific spill management plan. Maintain all necessary mitigation measures on-site in the event of a spill.	Additional monitoring requirements to be identified during detailed design.	No net effects expected.
Social/ Cultural Environment				
• New administration building has the potential to impact adjacent designated heritage properties.	A qualified heritage consultant should be contracted during design to confirm that the proposed location of the administration building does not impact cultural heritage resources (Long Branch Indoor and Outdoor Rifle Ranges)	Cultural Heritage Evaluation Report (CHER)	N/A	No net effects expected.
• New treatment processes have the potential to increase odour and air emissions	• Air dispersion modelling has been completed. Odour and air emissions will be reduced from current levels through implementation of the Region's planned odour control measures for the existing and expanded plant. • Odour mitigation measures planned include covering the channels and primary clarifiers, along with air emission control systems. • In addition, best management practices for the mitigation of air emissions and odour will continue to be implemented.	Detailed design to confirm odour control measures and obtain Amended ECA (Air and Noise).	Additional monitoring requirements to be identified during detailed design and identified in the Amended ECA (Air and Noise).	TBD.
• New treatment processes have the potential to increase noise impacts at nearby sensitive receptors.	An Acoustic Assessment Report (AAR) has been prepared. The applicable MECP NPC - 300 limits will be met for the expanded plant.	Detailed design to confirm noise attenuation measures and obtain Amended ECA (Air and Noise).	Additional monitoring requirements to be identified during detailed design and identified in the Amended ECA (Air and Noise).	TBD.
• Increased truck traffic during construction. • Increased truck traffic during operations to transport ash products for beneficial use.	Truck traffic and truck loading for construction and operations to meet by-law requirements.	• Traffic management plan (construction) • Traffic management plans to meet Peel and City of Mississauga requirements.	N/A	Low net effects.
• Expansion of facilities may change the visual character of the area.	• New buildings will be designed to be complimentary to the existing buildings on-site to provide the visual character of a coordinated campus. • Removal of ash lagoons, site landscaping and buffers will be part of the design. • These improvements are important due to the increased visual exposure of the facility to the public from the adjacent Lakeview Village development and walking paths in the JTLCA.	Architectural features will be confirmed through detailed design.	N/A	Positive net effects.
• Potential impacts to undiscovered archaeological resources	Two (2) Stage 1 Archaeological Assessments (AAs) were completed. The study area is considered free of further archaeological concern based on both studies.	No additional studies needed.	Should previously undocumented archaeological resources be discovered during construction, the Region of Peel will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented.	Risks of discovering archaeological resources during construction considered low given AA findings.

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Technical Considerations				
• Geotechnical and hydrogeological challenges during construction	• Based on the preliminary investigations, the geotechnical conditions on the site are suitable to support the proposed structures and substructures. • The soil overburden and the bedrock are anticipated to have a relatively lower permeability that will likely preclude the free flow of water, and significant issues with groundwater control during construction are not expected.	• Further geotechnical and hydrogeological field investigations are required during detailed design to confirm construction approach, dewatering needs, and approval requirements (PTTW). • Bathymetry study recommended to confirm lake topography as part of the geotechnical investigation.	N/A	No net effects expected.
• Areas of Potential Environmental Concern (APEC)	Phase 1 Environmental Site Assessment indicated that there are eight (8) APECs on site with potential for designated substances such as asbestos.	During detailed design, additional investigations are recommended for expansion works in any of the on-site APEC areas. The investigations could be carried out in the context of a Phase 2 ESA to identify soil and groundwater quality with greater certainty, such as to support an excess soils management plan or a construction dewatering plan or to identify potential hazards in areas to be excavated.	N/A	No net effects expected.
• Climate change adaptability	• RTC in collection system helps manage peak flow events. • G.E. Booth WRRF is located outside of the Regional Floodplain. • Facilities designed with redundancy. • Hydraulic analysis indicates that at higher lake levels predicted as a result of climate change, the new outfall will have the capacity to meet needs under design flows.	Process designs to be confirmed through detailed design.	N/A	No net effects expected.

Table E-4 Summary of Impacts and Mitigation Measures - New Outfall

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Natural Environment				
Aquatic habitat and species	Measures to mitigate impacts to be developed during detailed design based on further marine investigations, but may include: ○ Protection of shoreline; through shoreline stabilization, if required; ○ Barriers to fish movement; ○ Noise generation to scare fish away from construction area; and, ○ Habitat restoration.	During design it is recommended that the following be completed: • General habitat mapping using underwater UAV's. • Detailed habitat mapping, benthic, and mussel sampling to be undertaken to confirm aquatic habitats and species along the tunnel alignment, particular in the diffuser area. • Targeted fish community sampling to be completed in the Fall and Spring, depending on the type of substrates encountered. Bathymetry study also recommended to confirm lake topography and potential aquatic habitats.	Monitoring during construction by aquatic biologist.	No net effects expected.
Lake Ontario Water Quality	New outfall extending deeper into Lake Ontario allows the Region to better meet PWQO and protect shoreline and sensitive users.	Outfall design and construction method to be discussed with MECP during design to receive ECA approval and approval to construct.	Monitoring plant operations during operations as per new ECA requirements.	No net effects expected.
Source Water Protection	New outfall was located to avoid water treatment plant intake IPZs (i.e., A.P. Kennedy, and R.L. Clark water treatment plant intakes).	Treatment redundancy and stand-by power needs will be confirmed through detailed design.	Continue to update Standard Operating Procedures (SOPs), including spill prevention and response plans.	Low risk of net effects.
Shoreline Protection	The outfall shaft is located north of JTLCA. The construction area will be protected through measures such as limiting work areas, temporary sedimentation fencing, and other sedimentation and erosion control measures to minimize impacts to the JTLCA, fish habitats and the shoreline.	The Region will work with the CVC and City of Mississauga to develop plans to protect the JTLCA and shoreline during detailed design.	Monitoring during construction by environmental specialist.	No net effects expected.
Social/Cultural Environment				
Outfall Construction Related Impacts	Best construction management practices will be implemented to control noise, vibrations, odour, and sedimentation during tunnelling operations. Access to the JTLCA to be maintained for CVC during construction.	Detailed CMP and EMP to be developed during design.	Monitoring during construction by environmental specialist	No net effects expected.
Navigable Waters	• Measures to mitigate impacts of outfall construction on navigable waters, may include avoiding shipping lanes where possible, coordinating with Transport Canada regarding shipping and construction schedules, restricting access to construction areas through use mooring buoys or other markers. • During operation, mooring buoys or other markers could be used to mark the location of the diffusers.	Permits from Transport Canada to be received during detailed design.	N/A	No net effects expected.

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Potential impacts to undiscovered archaeological resources	A desktop marine archaeological assessment was conducted for the near-shore areas for the new outfall alignment. No records of archaeological potential were found to exist.	No additional studies needed.	• Should previously undocumented marine archaeological resources be discovered during construction, the Region of Peel will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented.	Risks of discovering marine archaeological resources during construction considered low given AA findings.
Technical Considerations				
Geotechnical and hydrogeological challenges during construction	• Based on the tunnel diameter, depth, and subsurface conditions (geologic and hydrogeologic characteristics) along tunnel alignment, a single shield Tunnel Boring Machine (TBM) is identified as the preferred tunnel excavation method. • Precast segmental lining (single pass method) is recommended for the G.E. Booth WRRF outfall tunnel lining. The rationale behind this recommendation is that the precast segmental lining generally has superior quality and reduced overall construction duration compared to cast-in-place concrete lining.	Further geotechnical and hydrogeological field investigations are required during detailed design to confirm construction methods. Key components of the geotechnical investigation program: • Soil and rock borehole drilling and analysis. • Soil, rock, and water sampling with laboratory testing and analysis. • Groundwater flow testing and monitoring.	N/A	No net effects expected.
Climate change adaptability	• Real Time Control (RTC) in collection system helps manage peak flow events. • G.E. Booth WRRF is located outside of the Regional Floodplain. • Facilities designed with redundancy. • Hydraulic analysis indicates that at higher lake levels predicted as a result of climate change, the new outfall will have the capacity to meet needs under design flows.	Process designs to be confirmed through detailed design.	N/A	No net effects expected.

The G.E. Booth WRRF is surrounded by sensitive land uses, including Applewood Creek and Marie Curtis Park to the east, the planned Lakeview Village Development to the west, JTLCA immediately to the south, and residential and commercial properties north of the G.E. Booth WRRF. A key objective of the Region of Peel is community acceptability. Odour will be controlled through containment, collection, and treatment methods, with the goal of reducing odours from the G.E. Booth WRRF. Noise controls will also be implemented to mitigate any noise impacts exceeding applicable guidelines. The expansion facilities will be designed to complement the aesthetics of the existing buildings on site and improve the overall site itself. The ash lagoons will be removed, tanks covered, and the site landscaped to include plantings and buffers. Plans to manage stormwater, dewatering, truck traffic, and excess soils will be established during detailed design.

Water quality will be protected through the construction and operation of the new outfall. The RWIA indicated that PWQOs will continue to be met. The Natural Heritage Characterization and Impact Assessments have shown that there are limited natural habitats and species at risk that will be negatively impacted through construction. The expansion has been planned to provide sufficient avoidance and protection of surrounding sensitive areas, including the JTLCA, Applewood Creek, and Lake Ontario. Stage 1 AA and marine assessments were undertaken as part of the Class EA and have cleared the expansion areas of archaeological potential.

Energy recovery and GHG emission reductions are important goals of the Region of Peel, and the preferred alternative has been developed to align with these goals. Biogas recovery from anaerobic digestion can be used on the G.E. Booth WRRF site to supply energy to support plant operations. The digested sludge may also be beneficially land applied. Most significantly, however, is that the expansion project will support the DEC planned on the Lakeview Development site. By using the treated effluent from the G.E. Booth WRRF to provide heating and cooling to buildings in the future Lakeview Village development, the DEC will significantly reduce GHG emissions and the carbon footprint of the Region of Peel and City of Mississauga.

Overall, the preferred alternative will have neutral to positive net effects on the environment and community. Renderings of the G.E. Booth WRRF before and after expansion are illustrated in **Figure E-8** and **Figure E-9**, respectively.

Figure E-8: Existing G.E. Booth WRRF

Figure E-9: Proposed Expansion of G.E. Booth WRRF

E.8 Risk Management

From the outset of the study, individual risks were identified, assessed for likelihood and consequence severity, and monitored through each phase of the Class EA process. As the study progressed and additional investigations and consultation were conducted, the overall design concept was developed to minimize risks. Following the Class EA process, pre-identified risks will continue to be monitored and managed as identified in **Table E-5**.

Table E-5 Preferred Design Concept: Risk Management during Design, Construction, and Operation

Risk Description	Risk Strategy Implementation Plan
Construction	• Detailed on-site geotechnical, hydrogeological, and ESA investigations to be completed during detailed design. • Extensive investigations work will also be carried out for the outfall during detailed design, including geotechnical and hydrogeological, habitat mapping, and benthic, mussel and targeted fish community sampling. • Separate contracts and staging of works.
Operational	• Additional operator training for new UV disinfection facility. • Potential operational complexities associated with integration with the DEC. Additional operating training for the DEC operations.
Long-Term Sustainability	• Continue to monitor long-term wastewater treatment needs to ensure timing of expansion and that adequate space is available at G.E. Booth WRRF to meet long-term needs. • The RTC option is designed for wet weather flow management and will reduce the potential for bypassing at the G.E. Booth WRRF, thereby providing long-term sustainability with respect to climate change. • The outfall is sized taking into consideration the lifespan of the outfall (i.e., 75 to 100 years) and is therefore designed to meet needs well beyond the year 2041.
Compliance	• Treatment process proven reliable in meeting proposed effluent and biosolids quality requirements. • Continue to work with MECP to receive ECA (sewage, air noise). • Ensure appropriate operator training.
Procurement	• Planned as seven (7) separate engineering assignments for coordinated delivery of multiple contracts within a congested site.
Biosolids Market Availability	• Several discussions with third-party management firms; all have indicated interest in managing the Region's biosolids products. • There is also an opportunity for the beneficial use of ash.
Bill 23 Implications for Project Schedule	• During this Class EA process, Bill 23 (More Homes Built Faster Act, 2022) was passed. Although the implications of this Bill are being assessed, it is expected to increase the rate of growth within the Region relative to that forecasted in the 2020 Master Plan. Therefore, while the proposed expansion works would not change, they may be required earlier than anticipated. • The Region is exploring opportunities to begin construction of the new outfall and expansion works as soon as possible. • Alternate delivery methods are also being explore to fast track design and construction. One of the alternative delivery approaches that can be considered by the Region to advance these projects is the Construction Manager at Risk (CMAR) model.

Risk Description	Risk Strategy Implementation Plan
Community Acceptability	• Continue to communicate with local public regarding schedule for construction, as well as input into the long-term biosolids management strategy. • Extensive odour controls are planned and underway, to reduce odours generated at the plant. Likewise, noise impacts will be controlled. • Removal of ash lagoons, site landscaping, and buffer areas are part of the preferred design. • Energy recovery and GHG emission reduction are an important part of the preferred solution. • Biogas recovery from anaerobic digestion can be used on the G.E. Booth WRRF site to supply energy to support plant operations. • The digested sludge may also be beneficially land applied. • Treated effluent will be used in the DEC to support heating and cooling of buildings in the Lakeview Village Development, thereby significantly reducing GHG emissions and the Region of Peel and City of Mississauga's carbon footprint.

E.9 Consultation and Engagement

Consultation is an integral component of the Class EA process, enabling the Region to inform the public about the study while eliciting input from interested and affected parties throughout the study process. The primary goals of the consultation and engagement process were to:

- Present clear and concise information to stakeholders at key stages of the study process;
- Solicit community, Indigenous Community, regulatory, and other stakeholder input; and,
- Meet and exceed MEA Municipal Class EA consultation requirements for Schedule C projects.

A broad range of methods for interested parties to provide input were employed including meetings, notices, comment forms at public consultation events and online or virtual consultation opportunities including by email, web page, or virtual meetings. Key agencies that were engaged through the Class EA included the City of Mississauga, the Credit Valley Conservation Authority (CVC), and the MECP. In addition, the Mississaugas of the Credit First Nation (MCFN), the Huron-Wendat First Nation, and the Haudenosaunee Development Institute (HDI) expressed their interest and were engaged during the study, including review and input into archaeological assessments and other study information.

Three (3) virtual Public Information Centres (PICs) were held to solicit input at key milestones of the Class EA process. These milestones included introducing the study's problem and opportunity statement, describing regional alternatives for treating wastewater and sludge, managing biosolids, and design concepts for expanding the G.E. Booth WRRF and constructing a new outfall. Although few comments were received, numerous visits to the website were made to view the PIC information.

Comments received during the process primarily focused on understanding the impacts of the G.E. Booth WRRF expansion and new outfall and how these impacts would be controlled or avoided. All comments received from the public and stakeholders were addressed and considered in the assessment of alternatives and the development of the overall preferred concept for the G.E. Booth WRRF. Input

received helped to define the control, mitigation, avoidance, and restoration measures required to protect the environment and community.

E.10 Summary and Conclusions

The G.E. Booth WRRF Schedule C Class EA has developed a preferred regional solution for managing flows within the lake-based Peel wastewater collection system and a design concept for expanding the G.E. Booth WRRF to meet future wastewater treatment needs to the year 2041. The preferred solution, design concept, and current infrastructure planning and technology principles will help the Region respond to changing regulations and needs well into the future.

Key components of the preferred alternative are:

- **Diversion of Flows**: Diversion of flows through the East-to-West Trunk sewer will alleviate current capacity challenges at the G.E. Booth WRRF, while taking advantage of surplus capacity at the Clarkson WRRF.
- **Real Time Control:** The Region of Peel is committed to implementing RTC in the collection system to manage peak flows to improve system performance, increase operation flexibility, and realize cost savings in planned capacity upgrades and expansions to the Region's WRRFs. Reducing peak flows eliminates the need to expand the headworks and reduces the need for an additional treatment train at the G.E. Booth WRRF.
- **Expansion of G.E. Booth WRRF Capacity:** The G.E. Booth WRRF will be expanded from a rated average flow capacity of 518 MLD to 550 MLD by the year 2041. The G.E. Booth WRRF will be expanded using technology similarly used at the plant (CAS). New Plant 1 primary and secondary facilities are planned, along with expansion of the Plant 3 secondary treatment system are planned to provide the additional treatment capacity.
- **UV Disinfection:** Disinfection at the G.E. Booth WRRF is currently provided through chlorination/dechlorination. The Region plans to replace this existing disinfection system with a new UV disinfection facility sized to handle the expanded flow capacity.
- **Optimization of the Sludge Management System:** The sludge management system at the G.E. Booth WRRF will be optimized and expanded. Four (4) new anaerobic digesters are planned to stabilize a portion of the primary sludge to increase the existing operational capacity of the incinerators. The biogas produced by the digesters will be stored and used to supply energy to support operation of the plant. Finally, a new ash dewatering facility is planned to allow the decommissioning of the existing ash lagoons.
- **New Outfall:** A new outfall will be constructed with a diameter of approximately six (6) metres and a length of about 3,000 metres (with the last 1,000 metres being the diffuser).
- **New Energy Centre:** As part of the expansion, a new centrally located power generation facility is planned to manage the supply of normal and emergency power to all buildings and processes on the G.E. Booth WRRF site.
- **New Administration Building:** A new administration building is planned near the main entrance of the site, off Lakeshore Road West.

Recognizing that the G.E. Booth WRRF is surrounded by sensitive land uses, including Applewood Creek and Marie Curtis Park to the east, the planned Lakeview Village Development to the west, JTLCA immediately to the south, and residential and commercial properties north of the G.E. Booth WRRF, measures to protect the community and the environment are an integral part of the expansion project. Odour will be controlled through containment, collection, and treatment methods, with the goal of reducing odours from the G.E. Booth WRRF. Noise controls will also be implemented to mitigate any noise impacts exceeding applicable guidelines. The expansion facilities will be designed to complement the aesthetics of the existing buildings on site and improve the overall site itself. The ash lagoons will be removed, tanks covered, and the site landscaped to include plantings and buffers. Plans to manage stormwater, dewatering, truck traffic, and excess soils will be established during detailed design.

Water quality will be protected through the construction and operation of the new outfall. The RWIA indicated that PWQOs will continue to be met. The Natural Heritage Characterization and Impact Assessments have shown that there are limited natural habitats and species at risk that will be negatively impacted through construction. The expansion has been planned to provide sufficient avoidance and protection of surrounding sensitive areas, including JTLCA, Applewood Creek and Lake Ontario. Stage 1 AA and marine assessments were undertaken as part of the Class EA and have cleared the expansion areas of archaeological potential.

Energy recovery and GHG emission reduction are important goals of the Region of Peel, and the preferred alternative has been developed to align with these goals. Biogas recovery from anaerobic can be used on the G.E. Booth WRRF site to supply energy to support plant operations. The digested sludge may also be beneficially land applied. Most significantly, however, is that the expansion project will support the DEC planned on the Lakeview Development site. By using the treated effluent from the G.E. Booth WRRF to provide heating and cooling to buildings in the Lakeview Village Development, the DEC will significantly reduce GHG emissions and the Region of Peel and City of Mississauga's carbon footprint.

Consultation with the public, government agencies, Indigenous Communities, and other stakeholders was undertaken throughout the course of the Class EA study and to date. Emphasis was placed on consulting and engaging with the MCFN, the Huron-Wendat First Nation, and the HDI as the site is located on their traditional lands. These communities were engaged through the Class EA, including review and input into AAs, and other study information. HDI is also reviewing the draft ESR, and their comments will be considered in finalizing the ESR and the subsequent design stage. No concerns to date have been expressed regarding the Class EA assessment and its results.

Following approval of this Schedule C Class EA Study, the Region of Peel is committed to:

- Continue to consult and coordinate with key review agencies during detailed design including the City of Mississauga, MECP, MNR, and CVC to ensure design, mitigation, and monitoring requirements are reviewed and approved;
- Complete additional investigations as required during detailed design, including geotechnical (on-land and marine), hydrogeological, hydrologic, environmental site assessments (ESAs), and subsurface utility investigations (SUE);

- Complete cultural heritage assessment report if required based on location of Administration Building in relation to existing heritage buildings;
- Continue to consult with the City of Mississauga and CVC during detailed design to ensure the protection of the JTLCA and shoreline during construction and to ensure long-term access to the JTLCA through the G.E. Booth facility for CVC;
- Complete wildlife rescue operations as required during the removal of the ash lagoons;
- Complete marine investigations during detailed design to ensure fish habitat is protected;
- Develop plans to manage stormwater, dewatering, truck traffic, and excess soils during detailed design;
- Obtain Amended Environmental Compliance Approval (ECAs) for Air and Noise;
- Implement the approved mitigation and monitoring measures during design and construction; and,
- Continue to monitor environmental, regulatory, and market trends to effectively plan for meeting wastewater treatment and biosolids management needs beyond the year 2041.