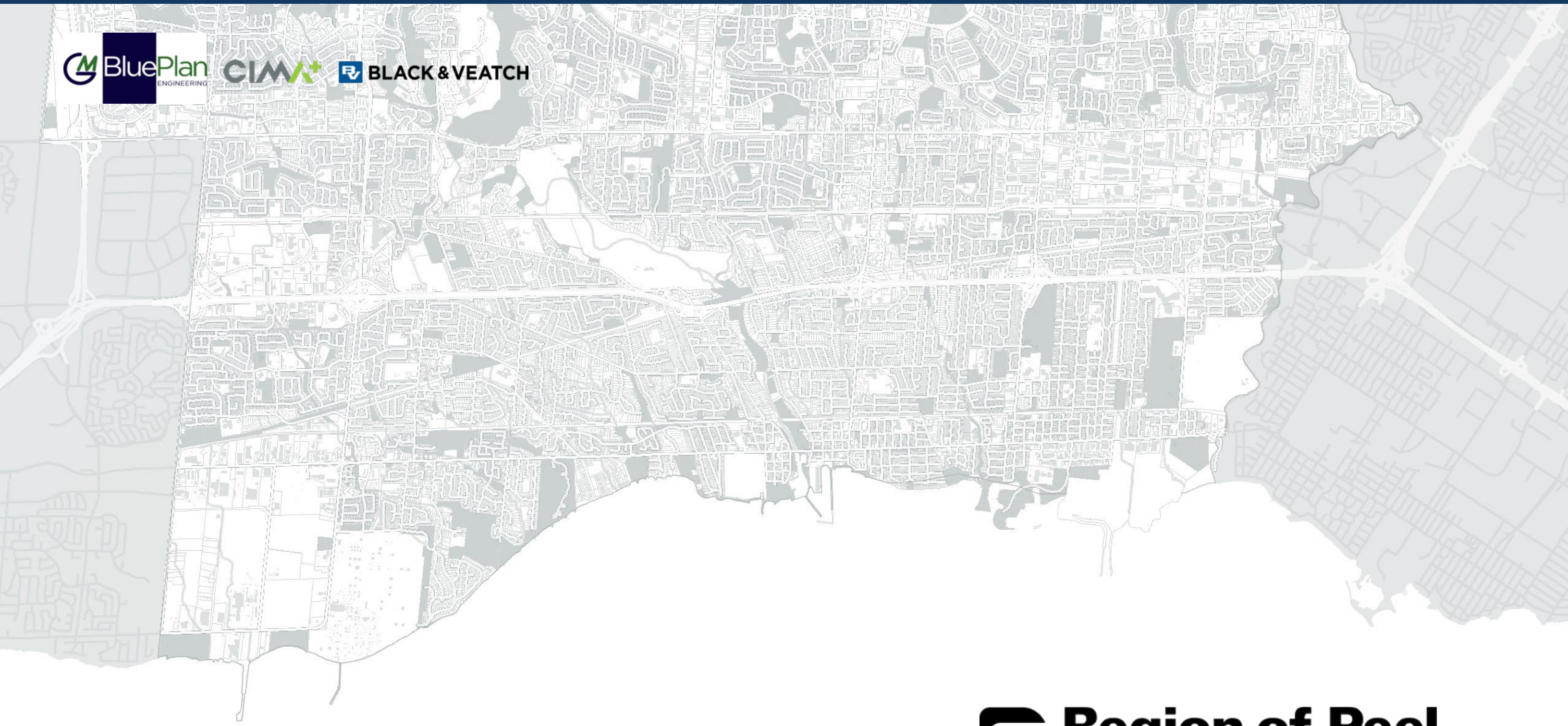

Region of Peel
working with you

Schedule C Municipal Class Environmental Assessment

Clarkson Water Resource Recovery Facility

Volume 0: Executive Summary

For Public Review

May 2023

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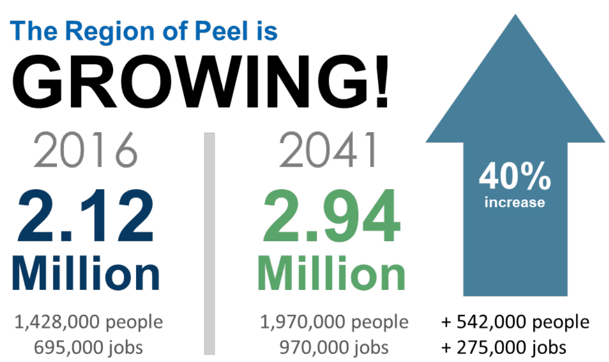
E.1 Introduction

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. Two (2) major interconnected trunk sewer systems (East Trunk System and West Trunk System), consisting of local gravity sanitary sewers, sewage pumping stations, forcemains, and trunk sewers, convey wastewater to the WRRFs 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 million litres per day (MLD) and 518 MLD, respectively. The G.E. Booth WRRF is approaching its capacity limits, as the historical 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 flow 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 flow and loading in their systems. The East-to-West Diversion System consists of a deep, tunnelled, 2400 millimeter (mm) diameter gravity trunk sewer that extends 11 kilometer (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 significant population and employment growth across the Region of Peel. With this approved growth to year 2041 and vision for growth beyond 2041, the existing WRRFs together would not have the capacity to meet the needs of Peel's citizens and 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. Through the treatment process the liquid and solids components are separated and treated. The treated liquid component, known as effluent, is discharged to Lake Ontario through outfall pipes. 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 a 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 trucks 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 has challenges related to its capacity, long-term sustainability, cost effectiveness, and reliability. Therefore, improving the current program, including consideration for the beneficial use of biosolids, is 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 Clarkson WRRF.

E.1.2 Schedule C Class EA Process

Expansion of wastewater treatment capacity and the management of biosolids requires the completion of a Schedule C Municipal Class Environmental Assessment in accordance with the Municipal Engineers Association (MEA) Municipal Class EA (October 2000, as amended in 2007, 2011, 2015, and 2023), to meet Ontario Environmental Assessment 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.

The Environmental Study Report (ESR) documents the Class EA process and results for the Clarkson 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 G.E. Booth WRRF Class EA through to the end of Phase 2.

E.1.3 Study Areas

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-1**. 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.

The Local study area is the Clarkson WRRF and surrounding area. The Clarkson WRRF is located in southwest Mississauga, south of Lakeshore Road between Southdown Road and Winston Churchill Boulevard. The site has an area of approximately 32 hectares (ha) (79 acres).

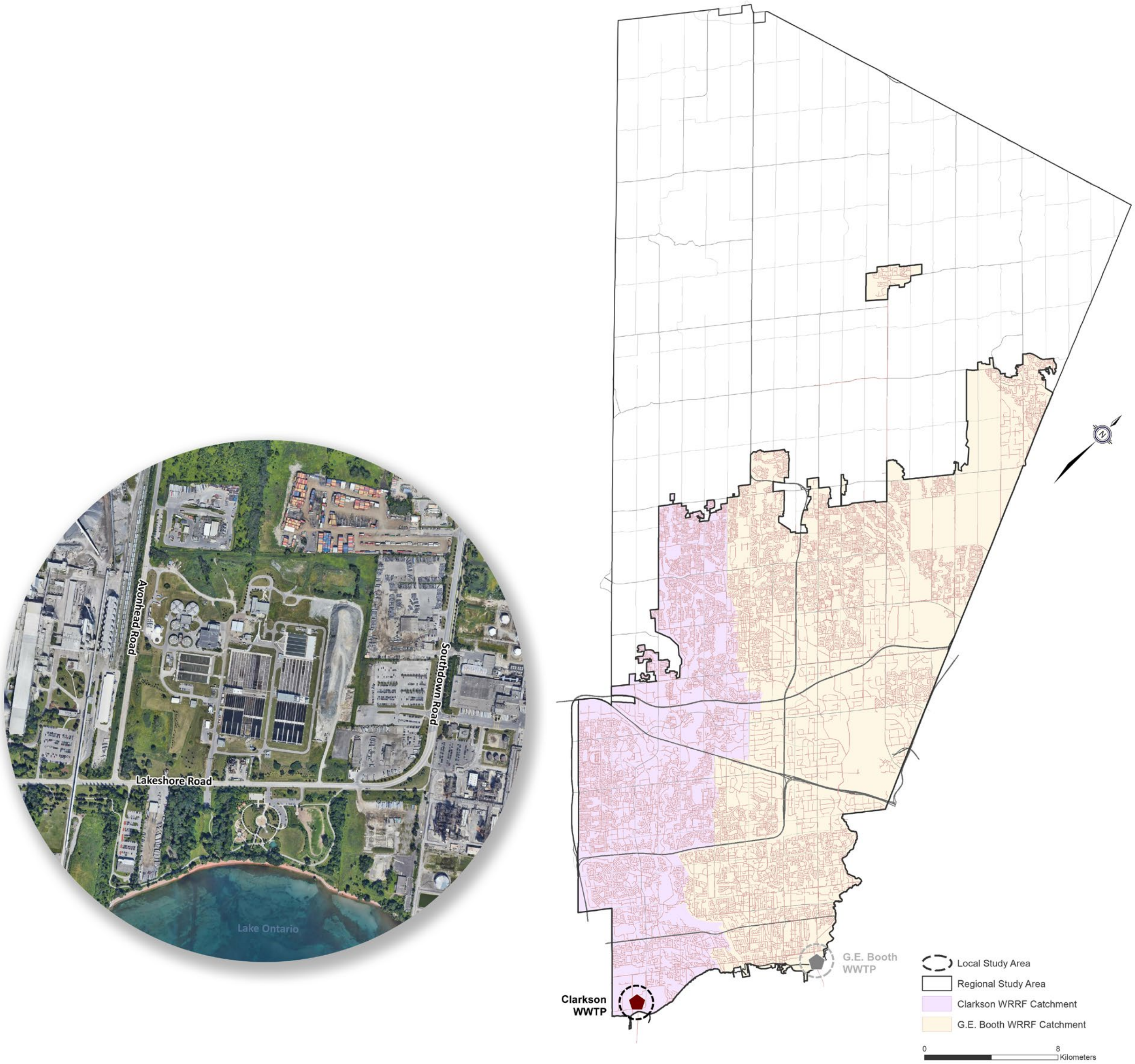


Figure E-1: Regional and Local Study Areas

E.1.4 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 **Figure E-2**, additional wastewater treatment capacity is needed within 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.

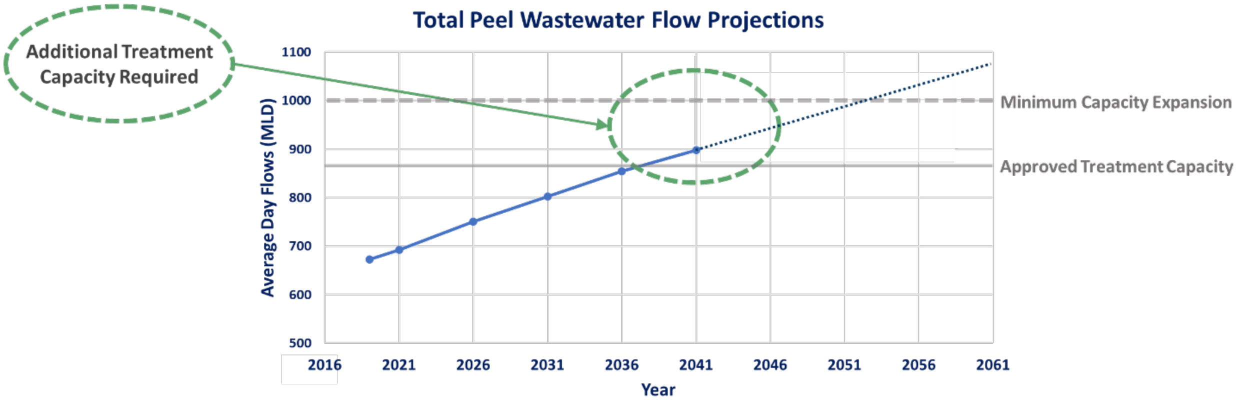


Figure E-2: Peel Wastewater Flow Projections

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

Study Opportunity Statement

The Clarkson WRRF Class EA, in conjunction with the G.E. Booth WRRF Class EA, presents the opportunity to develop a preferred 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; and
- Provide greater flexibility and reliability in wastewater and biosolids management.

The Clarkson WRRF Class EA meets the Study Opportunity Statement by defining a preferred solution and design concept which aligns with the key objectives presented in **Table E-1**.

Table E-1: Class EA Objectives

KEY OBJECTIVE	DESCRIPTION
Long term sustainability	• Regional wastewater and biosolids management programs with operational flexibility • Multiple biosolids product marketing opportunities • Resource recovery through beneficial use
Resiliency	• Managing wet weather flows • Adapting to changing conditions • Built in redundancy in treatment processes
Environmental Protection	• Mitigating risks to natural environments • Meeting 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 Greenhouse Gas (GHG) reduction goals • Energy reduction and reuse opportunities
Fiscal Responsibility	• Reducing lifecycle costs, while protecting the environment and communities

E.3 Alternative Regional 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, 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 Clarkson WRRF and G.E. Booth 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 (solids) be managed?

E.3.1 Long list of Alternative Solutions

As a first step in Phase 2, a long list of wastewater treatment, biosolids management, and outfall alternatives were developed and reviewed based on the following screening criteria:

Phase 2: Screening (Must Have) Criteria

1. Can the solution meet 2041 treatment requirements?
2. Will the solution provide greater flexibility and reliability in wastewater treatment and biosolids management?
3. Can the solution be implemented without facing major constraints or time delays?

An alternative was carried forward for further consideration only if it met all three (3) of the above criteria. Any alternative that failed one (1) or more screening criteria was screened out from further evaluation.

E.3.1.1 Wastewater Management Concepts

Alternative concepts for meeting future wastewater treatment needs in Peel were reviewed for their ability to address the Study Opportunity Statement. The alternative concepts are:

i. Do Nothing;

ii. Limit Community Growth;

iii. Reduce Flows through Water Conservation or Infiltration/Inflow (I/I) Control;

iv. Manage Peak Flows through Real Time Control (RTC) in the collection system;

v. Construct New WRRF or WRRFs; or,

vi. Expand One or Both of the Existing WRRFs (i.e., Clarkson WRRF and G.E. Booth WRRF).

Specifically, the “Do Nothing” concept would not achieve future capacity requirements, while “Limit Community Growth” would be inconsistent with Regional and Provincial Growth Policies. Constructing one (1) or more new facilities would face time delays and is inconsistent with Peel’s long-term vision as it does not take advantage of the investments made in the existing infrastructure across Peel over many years.

A review of the measured and projected reductions in flows from water conservation and I/I reduction programs have shown that they will not eliminate the need for the WRRF expansions. They will, however, provide benefit to the ultimate solution and will continue to be part of Peel’s overall wastewater management strategy.

Real Time Control (RTC) uses automation and control systems to optimize the performance of wastewater collection and treatment systems. Peak flows are stored in trunk sewers or tanks within the collection system and released back into the system after the wet weather event has occurred to help reduce overflows in the system and maintain the performance of wastewater treatment plants. Recognizing the benefits of RTC, the Region of Peel is undertaking a feasibility study to identify opportunities for use in the East-to-West Trunk sewer and other areas within its system. Similar to I/I reduction, RTC is also a component of Peel’s overall wastewater management strategy and will support meeting peak flow capacity needs in the lake-based wastewater system.

Based on the review of alternative concepts, **Expand One (1) or Both of the Existing WRRFs**, was carried forward as the preferred concept for detailed evaluation.

E.3.1.2 Biosolids Management

Currently, digested sludge generated at the Clarkson WRRF is dewatered and hauled by truck approximately 18 km to the G.E. Booth WRRF for incineration. On average, approximately three (3) trucks (40 cubic meter (m^3) capacity) per day transfer the digested and dewatered sludge.

There are four (4) operating incinerators at the G.E. Booth WRRF that treat all sludge from both the Clarkson WRRF and the G.E. Booth WRRF. The existing operating capacity of each incinerator is between 60 dry tonnes per day (dT/d) to 80 dT/d. With three (3) units in operation, the actual operating peak capacity of the incineration facility at the G.E. Booth WRRF is estimated to be 180 dT/d to 240 dT/d. In 2019, the average daily sludge feed in the peak month was 155 dT/d. The incinerators do not have the capacity to meet all sludge treatment needs to the year 2041. The long list of alternatives for providing additional capacity to meet future needs are:

i. Continue with the status quo of trucking sludge from the Clarkson WRRF to the G.E. Booth WRRF for incineration.
ii. Independently treat sludge and manage biosolids at each WRRF separately.

Continuing with the status quo will require four (4) additional incinerators at the G.E. Booth WRRF to meet solids treatment needs in the Region until 2041. The major challenge with continuing the existing management strategy is that it relies on one (1) process (i.e., incineration) for management of the sludge from both WRRFs, thereby increasing risk to Peel. Therefore, the strategy does not meet the screening criterion of providing greater flexibility and reliability in biosolids management. Other challenges with the strategy are that it increases truck traffic to G.E. Booth WRRF, which is inconsistent with Peel's objective of community acceptability, and it is not compatible with the Region's Energy Management and GHG reduction goals.

Independently treating sludge and managing biosolids at each WRRF separately allows for the implementation of different alternative sludge treatment methods at both the G.E. Booth WRRF and the Clarkson WRRF. Treatment methods may include digestion, dewatering, thermal-drying, alkaline stabilization, or composting, while end-use options for biosolids include beneficial land application such as farming, parks or golf courses, landfill, or ash reuse options. As determined through a biosolids product market assessment, there are third-party management firms and adequate markets to support the implementation of this strategy. The benefits of this strategy include:

- Eliminates trucking of digested and dewatered sludge from Clarkson WRRF to the G.E. Booth WRRF for incineration;
- Provides additional incineration capacity to manage G.E. Booth WRRF biosolids in the future;
- Allows the Region of Peel to diversify their biosolids management program in the future; and
- Maximizes existing infrastructure investments (i.e., incinerators).

Independently treating sludge and managing biosolids at each WRRF meets the project objectives and screening criteria and was therefore carried forward for more detailed assessment.

E.3.1.3 Outfall Capacity

The final treated effluent from the Clarkson WRRF and the G.E. Booth WRRF is discharged to Lake Ontario through large diameter outfall pipes, with diffusers along the end portion of the outfalls. The diffusers are important elements of the outfalls because they are used to improve mixing by distributing effluent over a larger area and slowly integrate flows into the receiving water. The outfalls are sized to meet peak instantaneous flows, which are average daily flows multiplied by a peaking factor of 3 (as developed for both WRRFs).

The Clarkson WRRF outfall is a three (3) meter (m) diameter and 2,200 m long outfall with 18 discharge diffusers along the last 500 m of the outfall pipe. The outfall has a peak approved capacity of 1,400 MLD. The final effluent from the G.E. Booth WRRF is discharged to Lake Ontario through a 3.65 m diameter and 1,400 m long outfall with 35 discharge diffusers in the last 200 m section. The G.E. Booth outfall has a peak approved capacity of 1,523 MLD.

Hydraulic capacity analyses were undertaken to confirm the existing capacities of the outfalls at the Clarkson WRRF and the G.E. Booth WRRF. Lake levels are projected to increase in the future due to potential impacts related to climate change, which was considered in the hydraulic capacity analyses. Results of the hydraulic analysis indicate that:

- The Clarkson WRRF outfall capacity is higher than the peak approved capacity of the outfall and is approximately 1,600 MLD. The outfall has the capacity to meet future wastewater needs at the Clarkson WRRF and potentially has surplus capacity to handle some peak flows from the G.E. Booth WRRF.
- The G.E. Booth WRRF outfall capacity is somewhat lower than the peak approved capacity of the outfall and is approximately 1,500 MLD. It does not have sufficient capacity to meet future needs at the G.E. Booth WRRF. Furthermore, there are existing challenges with in-plant surcharging (i.e., flooding of the secondary clarifier weirs) during extreme peak flow events.

The long list of alternatives for providing this additional outfall capacity at the G.E. Booth WRRF are:

i. Status Quo (allow in-plant surcharging);
ii. Construct an effluent pumping station to increase flow through the outfall pipe;
iii. Construct a new, larger outfall into Lake Ontario;
iv. Upgrade the existing outfall by opening more or revising the diffuser ports; or,
v. Divert peak flows to the Clarkson WRRF via an effluent pumping station at the G.E. Booth WRRF and supported by RTC in the system.

Allowing the G.E. Booth WRRF outfall to continue to surcharge during peak flow conditions (i.e., Status Quo) is not a reliable alternative. Upgrading the existing outfall by providing more capacity is also not feasible, as the existing outfall does not have any spare diffuser ports and the diffusers are already at their maximum size. Based on the outcome of the screening, the feasible outfall/peak flow management alternatives carried forward for further evaluation for the G.E. Booth WRRF are:

- **Construct a new effluent pumping station to restore the existing outfall to its rated flow capacity;**
- **Construct a new, larger outfall into Lake Ontario; and,**

- **Construct a new effluent pumping station to increase flow through the existing outfall and divert excess peak flows from the G.E. Booth WRRF to the Clarkson WRRF.**

E.3.2 Short List of Alternative Solutions

Based on the screening of the wastewater, biosolids, and outfall/peak flow management alternatives presented above, alternative solutions to meet future treatment requirements within the Region of Peel were developed on a region-wide basis for both WRRFs concurrently. 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 to eliminate in-plant surcharging and RTC in 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 to eliminate in-plant surcharging 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 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.3.3 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, because it:

- Provides the greatest flexibility and reliability in wastewater and biosolids management;
- Reduces the risks of nearshore water quality impacts, and associated impacts on aquatic and recreational users, by constructing an outfall deeper into Lake Ontario at the G.E. Booth WRRF;
- Minimizes risks to natural areas on and surrounding the WRRFs;
- Offers opportunities for improving odour control, noise management, visual aesthetics, and climate change adaptivity;
- Offers opportunities to improve energy recovery and reuse at both WRRFs;
- Allows for beneficial land use of biosolids, as well as new markets for incinerator ash; and,
- Allows phasing of construction at both the G.E. Booth WRRF and the Clarkson WRRF to minimize cash flow implications.

The Region's preferred overall solution involves flow diversion, expansions at both WRRFs, treatment of biosolids at each plant independently, and a new outfall at the G.E. Booth WRRF. With respect to the Clarkson WRRF, the solution includes:

- Flow diversion of average day flows of 80 MLD when the East-to-West Diversion Trunk Sewer becomes operational in 2026, and an additional 70 MLD by the year 2031; for a total of 150 MLD of flow diversion from the G.E Booth catchment to the Clarkson WRRF, as shown on **Figure E-3**.
- Expand the Clarkson WRRF from a rated flow capacity of 350 MLD to 500 MLD by the year 2029.
- Stop trucking digested and dewatered biosolids from the Clarkson WRRF to the G.E. Booth WRRF for incineration and develop long-term plans for treating and managing biosolids at the Clarkson WRRF.

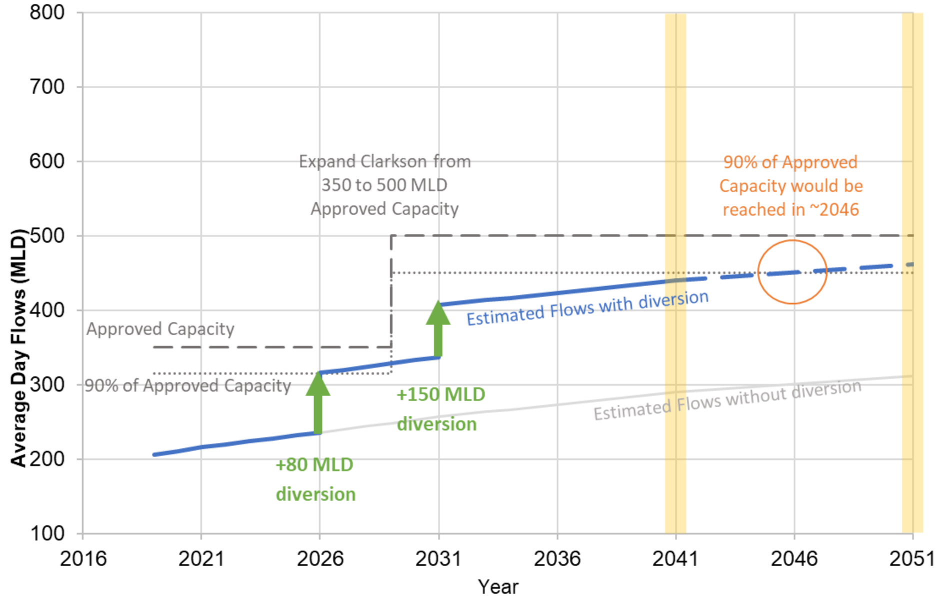


Figure E-3: Preferred Solution: Diversion and Expansion Approach for the Clarkson WRRF

The overall preferred solution is illustrated on **Figure E-4. Section E-4** describes the treatment technologies and design concepts for expanding the Clarkson WRRF from 350 MLD to 500 MLD, including the requirements for solids treatment and management of biosolids. A separate Class EA is being undertaken to assess treatment technologies and design concepts for expanding the G.E. Booth WRRF from 518 MLD to 550 MLD, as well as the design concepts and construction techniques for constructing a new outfall.

Alternative Solution 3

Region of Peel
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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-4: Preferred Regional Solution

E.4 Alternative Treatment and Design Concepts for the Clarkson WRRF

Phase 3 of this Class EA process examined alternative treatment technologies and design concepts for the Clarkson WRRF. The wastewater (liquid) treatment, sludge treatment, and biosolids management were assessed separately, and an overall preferred conceptual design for the Clarkson 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 Clarkson 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?

The process for evaluating treatment and design concepts was similar to the evaluation approach used in Phase 2 with the first step being the screening of a long list of treatment technologies based on "must have" criteria. These screening criteria are identified in **Table E-2.** Alternative design concepts were then developed based on the short list of technologies and assessed using a multi-criteria evaluation approach. Evaluation criteria are similar to those used in Phase 2 but revised to reflect the more detailed evaluation required for Phase 3. Site specific environmental investigations, including a natural feature assessment, archaeological assessment, receiving water impact analysis, land use review, and greenhouse gas (GHG) emission analysis were undertaken to support the evaluation. VE input was also instrumental in assessing the alternatives and establishing the preferred design concept. Alternative design concepts were also reviewed against the key objectives developed earlier in the study (refer to **Table E-1**) to ensure alignment with the Region's priorities. Finally, a preferred overall conceptual design to expand the Clarkson WRRF from 350 MLD to 500 MLD was developed, complete with a description of costs, schedule, measures to mitigate impacts and reduce risks, and permit and approval requirements.

Table E-2: Phase 3 Screening Criteria

Screening Criteria	Description
Maturity of Technology	The technology must have been in use for long enough that most of its initial operational issues and inherent problems have been removed or reduced by further development. The technology must be robust, reliable, and have a successful track record.
Proven Application at Large WRRFs	The technology must be able to serve facilities the size of the Clarkson WRRF. The technology must have a successful operating history at facilities of similar size or larger.
Compatibility with Existing and Future Processes	The technology must be compatible with the existing treatment processes at the WRRF, consider existing infrastructure investments, and be constructible given existing site conditions. For biosolids, it must also complement the end use alternatives and markets that have been identified for the Region of Peel.
Compatibility with Region Energy Management and GHG Reduction Goals	The technology must offer opportunities for energy efficiency, GHG emission mitigation, reduction in chemical inputs, or potential for resource recovery to help support the Region's Energy Management and GHG Reduction Goals.

Screening Criteria	Description
Ability to Implement within Required Schedule	Capacity expansion of the Clarkson WRRF is required by 2029 to accommodate projected wastewater flows. This criterion assesses the ability of a technology to be implemented within this schedule.

E.4.1 Wastewater Treatment

A Receiving Water Impact Assessment (RWIA) was undertaken to define the effluent limits and treatment objectives for the Clarkson WRRF when its' capacity is expanded to 500 MLD. Based on the results of the RWIA and discussions with the MECP, proposed effluent limits and objectives were established, and are presented in **Table E-3**.

Table E-3: Summary of Proposed Effluent Limits and Objectives for the Clarkson WRRF Expansion

Parameter	Existing ECA	Proposed Future Conditions
Effluent Limits		
$cBOD_5$ (Carbonaceous biochemical oxygen demand)	25 mg/L	25 mg/L
TSS (total suspended solids)	25 mg/L	25 mg/L
TAN (total ammonia nitrogen)	13.2 mg/L (May 1 - June 15) 10.5 mg/L (Jun 16 - Sep 15) 13.2 mg/L (Sept 16 - Oct 31) 24.7 mg/L (Nov 1 - Apr 30)	13.2 mg/L (May 1 - June 15) 10.5 mg/L (Jun 16 - Sep 15) 13.2 mg/L (Sept 16 - Oct 31) 24.7 mg/L (Nov 1 - Apr 30)
TP (total phosphorus)	1.0 mg/L	0.70 mg/L
E. Coli	200 organisms per 100 mL	200 organisms per 100 mL
TCR (total chlorine residual)	0.01 mg/L	0.01 mg/L
pH	6.0 to 9.5, inclusive, at all times	6.0 to 9.5, inclusive, at all times
Effluent Objectives		
$cBOD_5$	15 mg/L	15 mg/L
TSS	15 mg/L	15 mg/L
TAN	6.6 mg/L (May 1 - Oct 31) 13.2 mg/L (Nov 1 - Apr 30)	6.6 mg/L (May 1 - Oct 31) 13.2 mg/L (Nov 1 - Apr 30)
TP	0.80 mg/L	0.60 mg/L
E. Coli	150 organisms per 100 mL	150 organisms per 100 mL
TCR	0 mg/L	0 mg/L
pH	6.0 to 9.5, inclusive, at all times	6.0 to 9.5, inclusive, at all times

The proposed effluent limits and objectives were used to define alternative treatment technologies and design concepts, and the development of the preferred design concept.

E.4.1.1 Long List of Wastewater Treatment Technologies

Long lists of alternative wastewater treatment technologies for secondary treatment and disinfection processes at the Clarkson WRRF were identified and reviewed against the Phase 3 screening criteria described in **Table E-2**. Preliminary and primary treatment processes were assumed to be common elements for all alternatives.

Based on the screening process, the following disinfection technologies were short listed:

1. **Chlorination/Dechlorination:** This technology involves expanding the disinfection facilities at the Clarkson WRRF using chlorination and dechlorination. This disinfection approach is already integrated into the existing outfall which will continue to service the 500 MLD Clarkson WRRF.
2. **Ultraviolet (UV):** This technology involves expanding the disinfection facilities at the Clarkson WRRF to include a new facility to house UV channels and power equipment for UV disinfection. The secondary effluent would be diverted to the new UV facility before discharging to the outfall.

Based on the screening process, the following secondary treatment technologies were short-listed:

1. **Conventional Activated Sludge (CAS) Process:** This is the existing process used at the Clarkson WRRF.
2. **CAS Process Optimized with Chemically Enhanced Primary Treatment (CEPT):** The CAS process with CEPT includes the same processes as those described for CAS but with the addition of metal salts and polymer upstream of primary treatment. The CEPT process can achieve higher removal rates of Total Suspended Solids (TSS) and BOD_5 than CAS alone.
3. **Biological Nutrient Removal (BNR) Process:** BNR processes are modifications of the existing activated sludge process that incorporate anoxic and/or anaerobic zones to provide enhanced nitrogen and phosphorus removal. Many BNR variants have been developed, representing a wide range of nutrient removal capabilities. The BNR process has the ability to reduce chemical usage, energy use, and sludge production (i.e., smaller biosolids management facilities).

The proposed effluent limits and objectives can be reliably met through secondary treatment, so consideration of tertiary filtration technologies was not necessary.

E.4.1.2 Short List of Wastewater Design Concepts

Based on the detailed evaluation of the short listed disinfection technologies, the preferred approach is to continue operating with chlorination/dechlorination. Since chlorination/dechlorination is already integrated into the existing outfall, little modification to the facility is expected other than increasing the dose proportionally to the flow capacity. Changing to a UV system would require the construction of a UV facility at significantly higher capital costs.

Three (3) wastewater design concepts were developed based on the short listed secondary treatment technologies with preliminary treatment, primary treatment, and disinfection using chlorination/dechlorination common to all design concepts.

When assessed in detail, there were minimal differences in the scoring among all three (3) design concepts. All alternatives would be effective at treating wastewater to meet effluent quality objectives and wet weather management needs while also protecting human health and the environment, with no significant difference in impacts to natural, social/cultural, and technical environments. Lifecycle costs are also similar. A review of the design concepts based on their ability to meet the Region's objectives was therefore undertaken. Based on this review, **Expansion of Existing Facility Using the BNR Process** was selected as preferred, as it best aligned with the following Region objectives:

- **Long term Sustainability**: BNR reduces chemical addition and also offers the flexibility to operate as a CAS facility. BNR has the potential for greater nitrogen removal through integrated nitrification and denitrification.
- **Community Acceptability**: As a result of reduced chemical use and corresponding reductions in chemical sludge, BNR will result in less truck traffic related to chemical deliveries and reduced biosolids production for off-site disposal.
- **Energy Efficiency and Reduce GHG Emissions**: BNR uses less energy and reduces the amount of chemicals hauled to the site. BNR also results in the lowest GHG emissions.
- **Fiscal Responsibility**: While all alternatives have similar lifecycle costs, BNR results in the lowest operating cost.

E.4.2 Biosolids Management

E.4.2.1 Biosolids Market Assessment

To support the screening of solids treatment alternatives, a biosolids market assessment was completed. The assessment summarized Ontario's regulatory framework for biosolids management, identified treatment processes and the associated products, and identified target markets and demand. The assessment indicated that there are markets for beneficial land use, residual ash use, landfilling, and co-management with municipal solid waste. However, the greatest market potential for the Region is the agricultural market. The treatment/products and end users formed the basis for the screening of the long list of solids treatment technologies.

E.4.2.2 Long List of Solids Treatment Technologies

Solids treatment technologies were grouped into seven (7) categories based on the products they produced for beneficial land use. These categories are anaerobic digestion, anaerobic digestion with thermal hydrolysis (THP) pretreatment, aerobic digestion, thermal drying, chemical stabilization, composting, and thermal conversion (incineration). Based on screening using the criteria in **Table E-2**, the following five (5) technologies were short listed for further evaluation:

- Conventional Mesophilic Anaerobic Digestion
- Thermal Hydrolysis Process (THP) followed by Mesophilic Anaerobic Digestion
- Direct Thermal Drying
- Advanced Alkaline Stabilization with Supplemental Heat or Acid
- Advanced Alkaline Stabilization with Supplemental Heat and High-Speed Mixing

E.4.2.3 Short List of Biosolids Management Design Concepts

Based on the selected treatment technologies, the biosolids end users and market assessment, the following three design concepts were developed for the Clarkson WRRF, including:

1. **Anaerobic Digestion and Dewatering Prior to Beneficial Use by Third-Party Management Firms (Digestion/Dewatering Concept)**

2. **Thermal Hydrolysis Process (THP), Anaerobic Digestion, and Dewatering, Prior to Beneficial Use by Third-Party Management Firms (THP Concept)**

3. **Direct Thermal Drying of Anaerobically Digested Biosolids, Prior to Third-Party Product Distribution (Drying Concept)**

Each alternative includes beneficial use of the biosolid products by third-party biosolids management firms. The third-party firms would either land apply the product as part of an agricultural practice, beneficially use the product for land reclamation, and/or market and distribute an end product that meets the Canadian Food Inspection Agency (CFIA) registration requirements for fertilizer products. Third-party management firms may also further treat the biosolids at a remote facility to produce a fertilizer product, using the short-listed advanced alkaline stabilization techniques.

There are minimal differences in the scoring among all three (3) biosolids design concepts, as all are acceptable and viable. However, **Design Concept 3 (Direct Thermal Drying of Anaerobically Digested Biosolids and Third-Party Distribution**) and **Design Concept 1 (Anaerobic Digestion and Dewatering and Third-Party Distribution)** best align with the Region’s following objectives:

- **Long term Sustainability**: These concepts would allow a diversified biosolid management program thereby increasing flexibility and resiliency to market change, fluctuations in utility costs, and new regulations. Third-party vendors are well established in Ontario to manage the biosolids produced.
- **Ease of Operations**: Both concepts are well proven and easier to operate than the THP Concept. The THP Concept has increased operational complexity associated with working with high pressure steam.
- **Community Acceptability**: The Drying Concept has the advantage in that it significantly reduces the volume of biosolids to be managed, thereby reducing the number of trucks required to transport the biosolids.
- **Fiscal Responsibility**: These concepts have lower overall lifecycle costs than the THP Concept.

E-5 Preferred Design Concept

E.5.1 Facility Expansion Plan

Figure E-5 provides a site plan showing all of the WRRF design components to expand the Clarkson WRRF to 500 MLD average rated flow capacity. The preferred design concept is based on optimizing the site area and providing flexibility for future improvements to the facility. In addition, the expansion facilities were located on site to ensure compatibility with existing plant processes, and to minimize community and natural environment impacts. The key components of the site plan are described in the following sub-sections.

E.5.1.1 Wastewater (Liquid) Treatment

The components of the wastewater (liquid) treatment processes are described as follows:

- **Preliminary Treatment:** The preferred design components for preliminary treatment at the Clarkson WRRF includes demolishing the existing headworks facility and constructing a new headworks facility, sized to accommodate peak flows for the whole plant. The new headworks facility will include new screening and grit removal systems.
- **Primary Treatment:** The preferred design components for primary treatment at the Clarkson WRRF includes constructing four (4) rectangular primary clarifier tanks. Three (3) primary clarifiers will provide the required capacity with the fourth tank providing redundancy. The conceptual design also includes provision for metal salt addition to the primary influent for phosphorus removal and to enhance sludge settling.
- **Secondary Treatment:** BNR is the preferred secondary treatment technology. In order to expand the facilities with BNR, four (4) new three (3)-pass rectangular aeration tanks are proposed with fine bubble diffusers along the tank floor. Three (3) of the tanks will provide the required firm capacity with the fourth tank providing redundancy. The aeration tanks will be designed with the flexibility to operate as conventional plug-flow activated sludge process with wet weather step-feed flexibility, or as a Sidestream Enhanced Biological Phosphorus Removal (S2EBPR) process.
- **Effluent Disinfection:** The Clarkson WRRF expansion will continue to be serviced by the existing chlorination and dechlorination system. The existing chlorination/dechlorination system is integrated into the existing outfall with sodium hypochlorite injected upstream of the outfall chamber and sodium bisulphite injected before the effluent discharges into Lake Ontario. Additional sodium hypochlorite dosing points will be added to the new Plant 3 secondary effluent channel.
- **Odour Control:** Odour treatment at the Clarkson WRRF expansion will include the collection and treatment of air from the headworks, preliminary treatment, and primary treatment facilities. Air from the Plant 1 primary inlet channels and effluent launders will continue to be treated in the existing biofilter while the existing Plant 2 odour control system will be demolished and consolidated with the new odour control system for Plant 3. Channels and effluent launders will be covered to minimize the odorous air released into the environment.

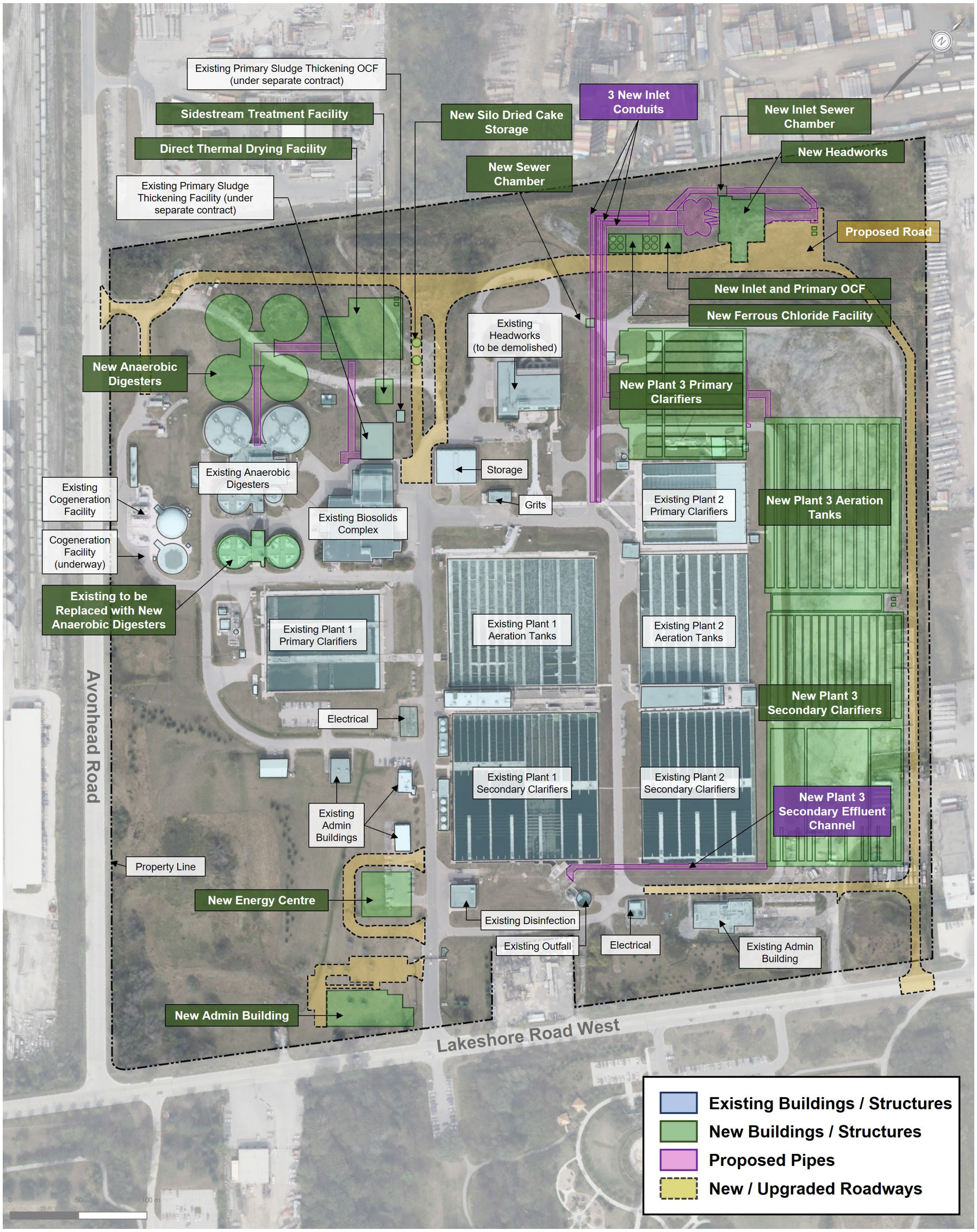

Figure E-5: Preferred WWRF Design Components

E.5.1.2 Solids Treatment and Biosolids Management

Components of the solids treatment and biosolids management design concept are:

- **Anaerobic Digestion:** Currently, the Clarkson WRRF has a waste activated sludge (WAS) thickening facility and a primary sludge thickening facility is being constructed. The facility has five (5) existing digesters; the recommended design concept involves replacing the old Digesters 1 and 2 that are approaching the end of their useful life with two (2) new digesters of equivalent capacity. To meet the firm capacity with one (1) of the largest digesters off-line, four (4) new digesters will be required. Overall, the upgraded facility will have eight (8) primary digesters, which includes two (2) replacement digesters, two (2) existing digesters, and four (4) new digesters while the remaining smallest existing digester will be used as a secondary digester.
- **Drying Facility:** The direct thermal dryers will be used to increase the total solids concentration of the digested and dewatered biosolids. The off-gas from the thermal drying process will be directed to an odour control system.
- **Beneficial Land Use of Biosolids:** Two (2) biosolids products will be produced at the Clarkson WRRF; a digested/dewatered cake product and a dried product, which provides the Region a variety of beneficial end use options. The digested/dewatered cake can be applied to agricultural lands or further treated through alkaline stabilization by a third-party firm and marketed as a fertilizer. The dried product can be marketed as a fertilizer as well. This diversified biosolids management program provides operational flexibility and redundancy.

E.5.1.3 Energy Reuse and Recovery

Biogas is generated during the anaerobic digestion process. The biogas generated at the Clarkson WRRF is stored within a biogas dome on site. The biogas is used in a combined heat and power process (CHP) to recover heat energy and generate electricity. The Region intends to expand the dome gas storage and install additional CHP units as part of a separate on-going project.

Biogas use on-site will reduce the demand for natural gas. Biogas can be used to fuel a number of appliances on-site, such as the boilers and the dryers. Biogas can also be used to generate electricity and heat for process operations using the CHP engines. Both options will support the Region’s goals of reducing their carbon footprint and overall GHG emissions.

E.5.1.4 Energy Centre

The electrical upgrades will involve power distribution modifications to service the expansion as well as support the Region’s plans to provide a standby power system to Clarkson WRRF. During the development of the Peel Energy Strategy, the Region evaluated different options related to site wide power distribution and emergency generation. The preferred approach to power distribution in support of the growth at the Clarkson WRRF includes a new underground 27.6 kilovolt (kV) power distribution loop to provide power to plant processes, and the use of a centrally located power generation facility (i.e., Energy Centre).

The Energy Center will manage the supply of normal and emergency power to the plant. It will be equipped with new standby generator units that will provide emergency power to all buildings and processes systems at the site via the common 27.6 kV underground distribution system. Generator noise and combustion exhaust emissions will be controlled in accordance with MECP NPC-300 limits and O.Reg. 419/05 requirements.

5.5.1.5 New Administration Building

The new administration building will be a two (2)-story above-grade structure located near the site entrance off Lakeshore Road West. It will include an open lobby area designated for visitors with informative displays aimed at public engagement in wastewater treatment. The first floor will also include a large laboratory and change facilities. The second floor will consist of office space, a SCADA room, a library/records room, a control room, and a lunchroom. The new building is required to support the additional staff that will be required to operate the expanded plant.

E.5.2 Conceptual Rendering

Architectural features will be incorporated into the above-grade buildings and will be designed to have a long service life with minimal maintenance requirements. As part of the design process, contextual consideration will be taken for the proposed buildings, ensuring they complement the aesthetics of the existing built environment with light precast concrete panels and metal siding. Additionally, sustainable building materials will be considered for this project as they can potentially help save on utility and maintenance costs, while contributing to the sustainability of the Region’s infrastructure facilities. New and upgraded roads are also part of the design to allow for easy access to new facilities. Facilities were located on site to ensure compatibility with existing plant process, and to minimize community and natural environment impacts.

Figure E-6 and **Figure E-7** provide conceptual renderings of the existing facility and preferred facility expansion, respectively, for comparison purposes. Any additional concepts and/or renders developed during the detailed design stage will adhere to the Region’s design standards.

Figure E-6: Existing Clarkson WRRF

Figure E-7: Preferred Expansion of the Clarkson WRRF

E.5.3 Project Costs Estimates and Schedule

The capital cost estimate for the Clarkson WRRF expansion scope of work is estimated to be in the magnitude of $800 million. Given the magnitude and complexity of the expansion, it is recommended that the work be completed as a program consisting of several projects/contracts. Conceptually, the works program could be divided into five (5) separate engineering assignments as follows:

- Engineering Assignment 1: Liquids Processing Expansion
- Engineering Assignment 2: New Digesters and Beneficial Gas Reuse
- Engineering Assignment 3: Operations Building
- Engineering Assignment 4: Existing Digester Replacement
- Engineering Assignment 5: Drying Facility

This program will be refined further during detailed design. A high-level conceptual construction schedule is presented below in **Figure E-8**. It demonstrates the suggested timing of the engineering assignments to complete the required works in order to provide additional treatment capacity by 2029. The engineering assignments will need to occur in parallel with staggered start dates to avoid tendering contracts at the same time.

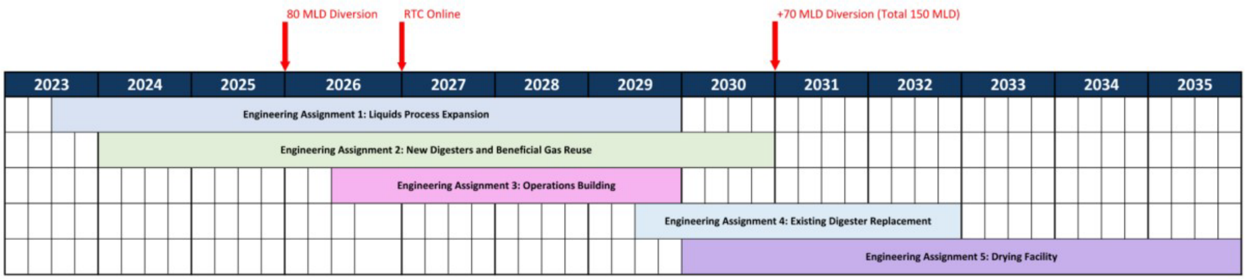

Figure E-8: Conceptual Construction Schedule

E.5.3 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 to identify measures to mitigate these impacts. A summary of the impacts, mitigation measures, and net effects of the preferred alternative are presented in **Table E-4**.

Overall, the preferred alternative will have neutral to positive net effects on the environment and community. Total phosphorus concentrations in the updated effluent will be reduced such that the total phosphorus loading to Lake Ontario will not increase as flows increase. The RWIA demonstrated that Provincial Water Quality Objectives (PWQOs) in Lake Ontario will continue to be met. The Natural Heritage Characterization and Impact Assessments have shown that there are limited natural habitats and species at risk on and surrounding the site. Furthermore, the design concept has been planned to avoid and protect these areas. There will be some encroachment on a non-provincially significant wetland on site and some tree removals will be required. However, expansion plans will include relocating the wetland on-site to preserve the feature, as well as tree replanting along the southern frontage of the Clarkson WRRF to maintain a buffer between the plant and the parklands south of Lakeshore Blvd. Stage 1 and 2 archaeological assessments were undertaken as part of the Class EA and have cleared the expansion areas of archaeological potential.

The design will include measures to control air emissions, odour, and noise. The Air Quality Impact Assessment (AQIA) and Acoustic Impact

Assessment (AIA) indicate that with the proposed control measures, the expanded WRRF will comply with all applicable standards and criteria. The expansion facilities will complement the aesthetics of the existing buildings on site, 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.

Energy recovery and GHG emissions reduction are important goals of the Region of Peel, and the preferred alternative aligns with these goals. Treatment of solids at the Clarkson WRRF means less reliance on incineration resulting in lower GHG emissions on a regional basis. Beneficial land use of dried product also provides carbon credits from the replacement of commercial fertilizer. The new BNR treatment process will reduce chemical usage and lower aeration requirements, resulting in lower energy use and GHG emissions. Finally, biogas recovery from anaerobic digesters will be used to reduce natural gas consumption and/or to generate electricity for use in process operations.

Table E-4: Summary of Impacts and Mitigation Measures from Clarkson WRRF Expansion

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Natural Environment				
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 PWQOs will continue to be met.	RWIA, including an 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 Clarkson WRRF. Adequate chlorination/ dechlorination 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.
Expansion facilities are located to avoid sensitive natural areas on site to the greatest extent possible. However, the biosolids facilities will encroach on the non-provincially significant wetland categorized as MAM2 (Mineral Meadow Marsh).	Relocation and restoration of Mineral Meadow Marsh on site (southwest area). This created wetland will be re-constructed as a MAM2 vegetation community and meet the Credit Valley Conservation Authority's (CVC's) land-based offsetting requirements, as land will be replicated at a 1:1 ratio. A 10-metre buffer will be provided surrounding the constructed wetland in accordance with CVC guidelines.	The exact location, orientation, and shape of the constructed wetland will be determined at the detailed design stage.	Monitoring during construction by qualified personnel.	Relocation and restoration of Mineral Meadow Marsh on site (southwest area) will preserve the meadow marsh flora and fauna within the broader site area.
Non-provincially significant wetland in northwest corner of site (SWD2-2 - Green Ash Mineral Deciduous Swamp) has candidate SWH for Bat Maternity Colonies, including Species at Risk (SAR) (Little Brown Myotis).	Construction will avoid the area categorized as SWD2-2. Adequate buffer between construction working area and SWD2-2.	Opportunities to plant buffer area adjacent to SWD2-2 will be explored during detailed design as part of the overall landscaping plan.	N/A	No negative impacts are expected to the candidate SWH and candidate SAR (Little Brown Myotis) as a result of the proposed facility expansion.
Expansion could potentially increase runoff, impact water quality, and decrease infiltration.	The stormwater impact of the additional impermeable areas will likely be balanced by the addition of the new open tank areas. Site grading to be designed to drain to local swales, culverts, and catch basins that convey drainage to the existing storm sewer discharging to Lake Ontario. Site drainage structures will be designed in accordance with Region of Peel and/or City of Mississauga Standards. Plans to be consistent with City of Mississauga Southdown District Master Plan. Runoff, erosion and sedimentation, and spills will be controlled throughout construction.	Prepare a Stormwater Management Plan. Develop and implement a site-specific spill management plan. Maintain all necessary mitigation measures on site in event of a spill.	Additional monitoring requirements to be identified during detailed design.	Potential impacts of increased runoff will be controlled to protect water quality.

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Climate Change: New treatment processes have the potential to increase Greenhouse Gas (GHG) emissions.	BNR treatment process selected to reduce chemical usage and to lower aeration requirements, resulting in lower energy use and GHG emissions. Less reliance on incineration to manage biosolids results in lower GHG emissions on a Region-wide basis. Beneficial land use of dried product provides carbon credit from replacement of commercial fertilizer. Biogas recovery from anaerobic digesters used to reduce natural gas consumption or to generate electricity and heat for process operations. To maximize the use of biogas the Region will continue to operate the existing CHP engine, and the planned second CHP engineer, to be commissioned by 2026.	Energy Recovery and Reuse details to be established during detailed design.	Additional monitoring requirements to be identified during detailed design and identified in the Amended ECA (Air and Noise).	Emission impacts will be controlled and meet applicable regulations.
Social/Cultural Environment				
New treatment processes have the potential to increase odour and air emissions.	Air dispersion modelling was completed to compare the effects of the expanded plant against existing Ontario ambient air quality criteria. The analysis indicates that the odour impacts at identified sensitive receptors proximate to the plant are not expected to change appreciably as a result of the planned expansion and that for all air pollutants assessed, the predicted cumulative concentrations were less than the respective criteria at all sensitive receptor locations. Odour mitigation measures planned at the expanded plant include 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).	The expansion is expected to comply with O. Reg. 419/05 applicable standards and criteria and will meet the air quality requirements for obtaining a provincial Environmental Compliance Approval for air quality.
New treatment processes have the potential to increase noise impacts at nearby sensitive receptors.	The Acoustic Assessment Report (AAR) assessed the compliance of the existing condition of the Clarkson WRRF and the cumulative impact from existing noise sources with the source additions envisioned from the proposed capacity expansion against the applicable MECP NPC - 300 limits. Seven (7) representative Points of Reception (PORs) were identified and considered for this assessment which included three (3) accessible vacant lot receptors. Under the predicted worst-case noise emission scenarios, the Clarkson WRRF is expected to be compliant with the MECP NPC-300 limits both in its existing condition and also after the proposed capacity expansion (which includes noise attenuation measures).	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).	The expansion is expected to comply with MECP NPC-300 applicable standards and criteria and will meet the noise control requirements for obtaining a provincial Environmental Compliance Approval for noise.
Increased truck traffic during construction. Increased truck traffic during operations to transport biosolids for beneficial use; partial offset as digested/dewatered sludge will no longer be trucked to G.E. Booth WRRF for incineration.	Drying technology selected to reduce the volume of biosolids and trucks required to transport off-site for beneficial use. Truck traffic and truck loading for construction and operations to meet by-law requirements. Third-party biosolids management firm responsible for haulage of biosolids product to provide Traffic Management Plans such that routes are selected to minimize local traffic impact with appropriate mitigation measures.	Traffic management plan (construction) Traffic management plan (transport of biosolids by third-party management firms)	N/A	Traffic management plans to meet Peel and City of Mississauga requirements.

Potential Impacts	Mitigation Measures	Additional Studies During Detailed Design	Monitoring Requirement	Net Effects
Expansion of facilities may change the visual character of the area.	Clarkson WRRF is located in an industrial area, and expansion facilities are primarily at the northern and eastern portion of the property adjacent to other industrial users. Buffer remains between the WRRF and Lakeside Park. The proposed buildings will be designed to have a long service life and minimum maintenance. Proposed buildings will complement the aesthetics of the existing buildings on site with light precast concrete panels and pre-finished metal cladding. Landscaping of facility expansion will be completed including the additional wetland feature and other plantings.	Architectural features will be confirmed through detailed design.	N/A	No change in the visual character of the facilities at the plant site; further landscaping during construction to retain natural features on site.
Potential impacts to undiscovered archaeological resources	Stage 1 and 2 Archaeological Assessments (AAs) were completed. No archaeological sites were identified during the Stage 2 AA. The study area is considered free of further archaeological concern. Confirmation from the Ministry of Heritage, Sports, Tourism and Cultural Industries (MHSTCI) is being sought on the Stage 2 AA (approval of Stage 2 AA required before construction).	No additional studies needed.	Should previously undocumented archaeological resources be discovered during construction, the Region of Peel will cease construction until the MHSTCI is contacted, and appropriate mitigation or resource recovery is implemented.	Risks of discovering archaeological resources during construction considered low given AA findings.
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 (Permit to Take Water).	N/A	No net effects expected.
Areas of Potential Environmental Concern (APEC)	Phase 1 Environmental Site Assessment (ESA) indicated that there are 8 APECs on site with the potential for designated substances such as asbestos and lead.	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	Real Time Control (RTC) in collection system helps manage peak flow events. Clarkson WRRF is located outside of the Regional Floodplain. Facilities designed with redundancy. Hydraulic analysis indicates that at the higher lake levels predicted as a result of climate change, the outfall has the capacity to meet needs under design flows (hydraulic analysis indicated that the outfall has a peak flow capacity of 1500 MLD; slightly higher than the ECA's peak flow capacity of1400 MLD).	Process designs to be confirmed through detailed design.	N/A	No net effects expected.

E.5.4 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, identified risks will be monitored and managed throughout the detailed design and construction phases. These risks are outlined in **Table E-5**.

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

Risk Description	Risk Strategy Implementation Plan
Construction	• Detailed geotechnical, hydrogeological, and ESA investigations to be completed during detailed design • Separate contracts and staging of works
Operational	• Additional operator training for BNR; but design retains flexibility to operate as CAS similar to existing for maximize resiliency. • For drying facility, opportunity to consider Qualified Third-party for any combination of design, build, finance, operate, maintain, and market dried fertilizer product.
Long-Term Sustainability	• Continue to monitor long-term wastewater treatment needs to ensure adequate space is available at the Clarkson WRRF to meet long-term needs. If additional space is required, consider purchase of additional land adjacent to the Clarkson WRRF. • Continue negotiations with third-party management firms for biosolids products (both digested/dewatered cake and dried product) during design to develop reliable, cost-efficient contracts • During design consider opportunities for intensification within existing facilities leveraging developing technologies (aerobic sludge granulation, MABR, etc.)
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 two separate engineering assignments (liquids and biosolids) for coordinated delivery of multiple contracts within a tight schedule • Multiple parallel design-bid-build (DBB) contracts with time-space separation • Drying facility and new digesters are in close proximity introducing risk of completing as separate construction contracts. With careful delineation and sequence planning, it should be possible to deliver as separate contracts opening up opportunity to have drying facility as DBOM, DBFOM, or similar including product marketing.

Risk Description	Risk Strategy Implementation Plan
Third-Party Management Firm	• Several discussions with Third-party management firms; all have indicated interest in managing Peel's biosolids either through an on-site facility at Clarkson or through their own off-site facilities. Some indicated they will expand their operations to service Peel with a long-term contract (10-year or similar) commitment. This has been demonstrated already with Clarkson currently managing approximately 50% of biosolids cake through third-party management firms. • Engage Third-party management firms early in design.
Biosolids Market Availability	• Discussions with third-party management firms indicated interest in receiving some or all of Clarkson biosolids. • Market review indicates the presence of market availability, particularly on agricultural land. • Recommend diversified approach with multiple management firms and multiple outlets for the Clarkson WRRF to mitigate risks of a single management firm or outlet. • Long-term regulations are unknown and add some uncertainty in terms of contaminants of emerging concern (i.e., PFAS, etc.); however, anticipate this to be well into the future for Canada.
Schedule (Need to have expansion in place by 2029)	• Schedule is achievable. However, there is minimal float in overall schedule to issue RFP to retain consultants for engineering assignments, complete design, tendering, and construction of this large capital program. Will require careful monitoring and mitigation plans to reduce schedule risk. • Recommend multiple parallel contracts with time-space separation to reduce risk of one contract delaying others. • Pre-purchase equipment. • Capital phasing plan; multiple contracts.
Community Concerns	• Continue to communicate with local public regarding schedule for construction. • Traffic Management Plan to be developed for construction. • Ensure third-party management firms have Traffic Management Plans in place for transporting biosolids that minimize impacts to communities.

E-6 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 during 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), MECP, and the Ministry of Heritage, Sports, Tourism and Cultural Industries (MHSTCI). In addition, the Mississaugas of the Credit First Nation (MCFN) and the Huron-Wendat First Nations expressed their interest and were engaged throughout the study, including review and input into archaeological assessments.

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 managing biosolids, and design concepts for expanding the Clarkson WRRF. 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 Clarkson WRRF expansion 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 Clarkson WRRF. In particular, input received helped to define the control, mitigation, avoidance, and restoration measures required to protect the environment and community.

E-7 Summary and Conclusions

The Clarkson 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 Clarkson WRRF to meet future wastewater treatment needs to the year 2041. The preferred design concept will help the Region respond to changing regulations and needs well into the future.

The preferred alternative includes:

- Diversion of flows through the East-to-West Trunk sewer to alleviate current capacity challenges at the G.E. Booth WRRF, while taking advantage of surplus capacity at the Clarkson WRRF.
- Expanding the existing Clarkson WRRF from a rated capacity of 350 MLD to 500 MLD by the year 2029. The expansion includes additional preliminary treatment, primary treatment, and disinfection capacity by using the same technologies as the existing and providing additional secondary treatment capacity through the implementation of a BNR facility.
- Digested/dewatered sludge produced at the Clarkson WRRF will no longer be trucked to the G.E. Booth WRRF for incineration. Additional solids treatment capacity will be provided at the Clarkson WRRF through the construction of additional digesters and a drying facility.
- Biosolids produced through the new solids treatment processes include a digested/dewatered cake product and a dried product for collection and distribution for beneficial land use by third-party firms.
    - The digested/dewatered cake can be applied directly on agricultural lands, or further treated off-site by third-party vendors for use as a fertilizer.
    - The dried product can be used directly as a fertilizer.

Consultation with the public, government agencies, Indigenous Communities, and other stakeholders was undertaken throughout the course of the Class EA study and to date, there were no comments received that have not already been addressed or cannot be addressed as the project proceeds through detailed design.

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, hydrogeological, environmental site assessments (ESAs), and subsurface utility investigations (SUE).
- Develop plans to manage stormwater, construction dewatering, truck traffic, and excess soils during detailed design.
- Implement the approved mitigation and monitoring measures during design and construction.
- Establish contracts with third-party vendors to transport, store, use, or distribute the biosolids products produced at the Clarkson WRRF.
- Continue to monitor environmental, regulatory and market trends to effectively plan for meeting wastewater treatment and biosolids management needs beyond the year 2041.

The Region of Peel is planning to begin design on the Clarkson WRRF expansion project upon approval of this Schedule C Class EA, and to complete construction of this project by the year 2029.