Region of Peel working with you

Clarkson Wastewater Treatment Plant
Schedule C Class Environmental Assessment

Welcome to Virtual Public Information Centre No. 3

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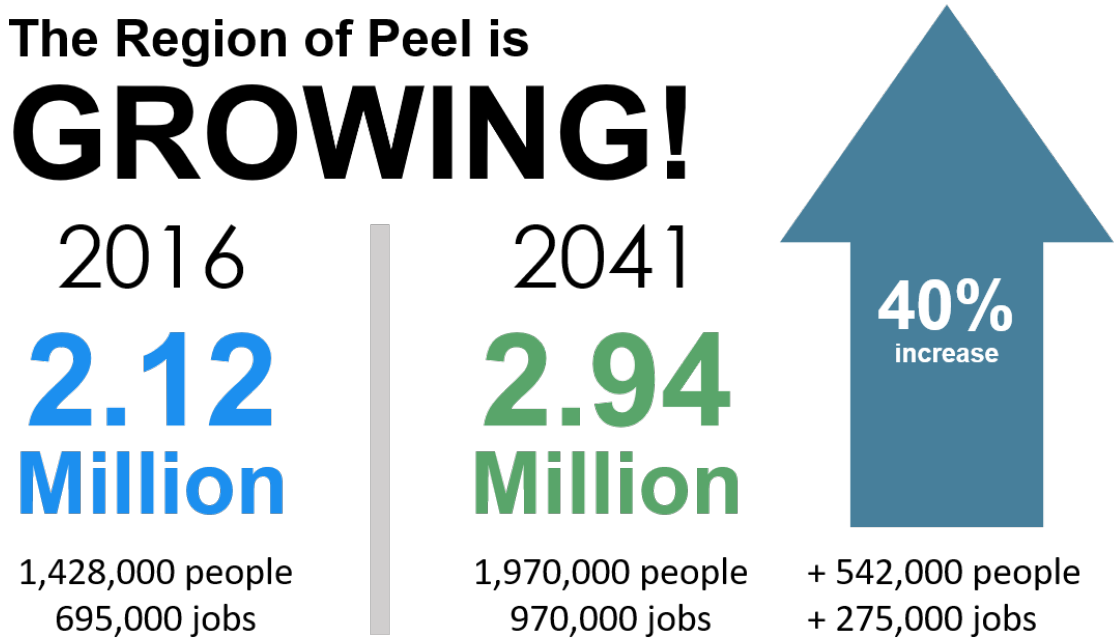
Project Background

Wastewater from residential, commercial, institutional, and industrial users in the Region of Peel is collected through a network of sewers and pumping stations and treated at either the G.E. Booth wastewater treatment plant (WWTP) or the Clarkson WWTP.

As population grows in Peel, there is insufficient capacity to meet future wastewater treatment needs at the WWTPs.



Problem and Opportunity Statement

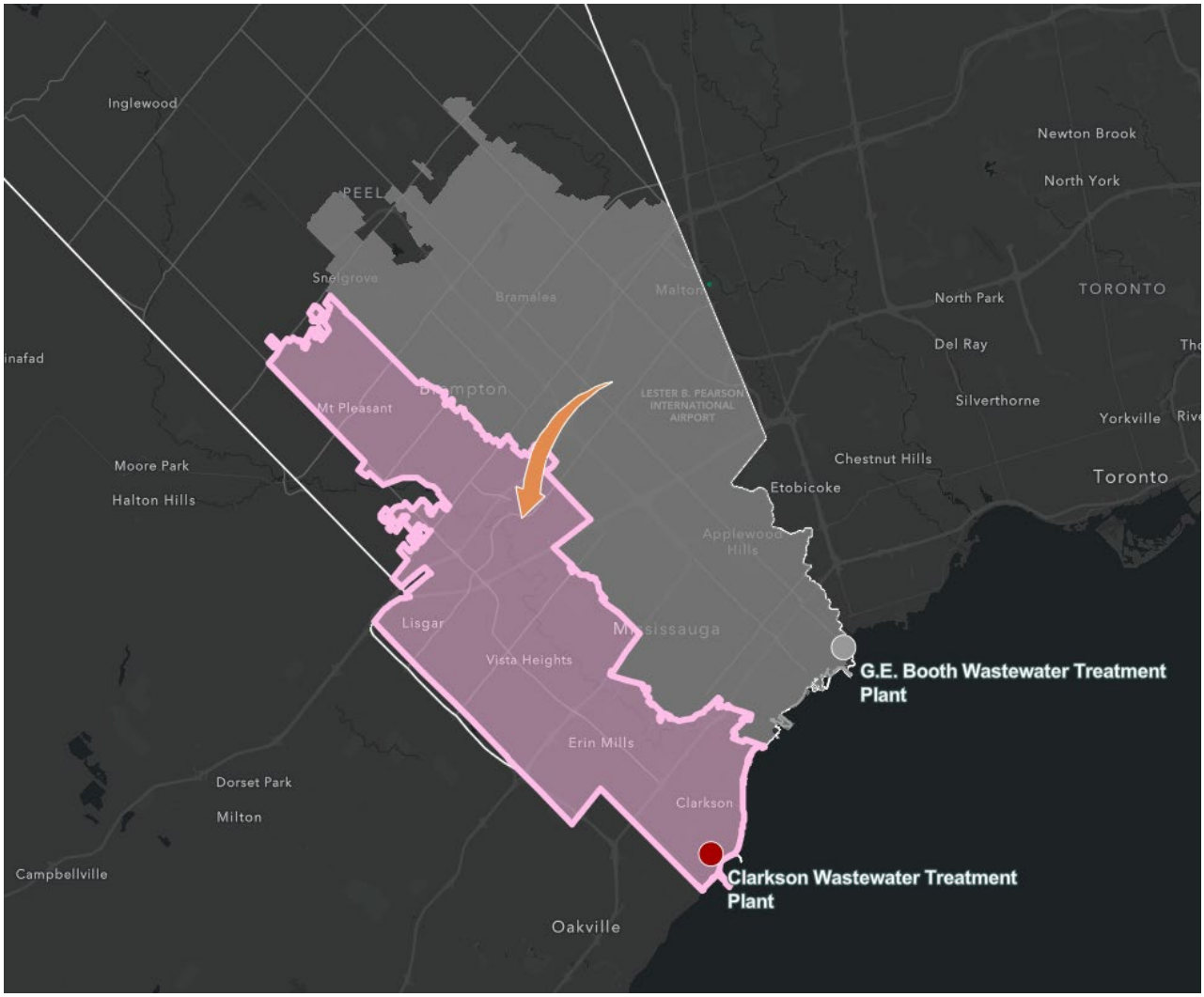
The Region is undertaking two Schedule C Class EAs to develop preferred solutions at the G.E Booth WWTP and the Clarkson WWTP that will:

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

This Public Information Centre focuses on the Schedule C Class EA for the Clarkson WWTP.

Peel's Wastewater Treatment System

The East-West Diversion is a deep gravity trunk sewer of 2400 mm diameter currently being constructed along Derry Road. It is expected to be completed and operational by 2026. It allows Peel to divert flows from the G.E. Booth WWTP catchment area where there are capacity limitations, to the Clarkson WWTP catchment area which currently has surplus capacity.



Goals and Objectives of the Class C Environmental Assessment

Meeting the demands of a growing population through an environmentally responsible process involving active public engagement.

Biosolids Management

- Region Wide Biosolids Management with Operational Flexibility
- Diversified Outlets with Reliable Biosolids Treatment and End Uses at Each Facility
- Advanced Technologies with Energy and Resource Recovery
- Community Compatible and Acceptable

Energy Efficiency

- Reduce Greenhouse Gas (GHG) Emissions
- Energy Reduction and Reuse

Wet Weather Management

- Real-Time Control
- Diverting Flows

Receiving Water Quality

- Assimilative Capacity Studies
- Define Effluent Quality Limits
- Protecting Pressure Zones and Shoreline Users/Uses

Odour and Air Quality

- Multi-Barrier Approaches

Visual Aesthetics

- Landscaping
- Best Use of Sites
- Eliminate Ash Lagoons

Compatibility with Ongoing Initiatives

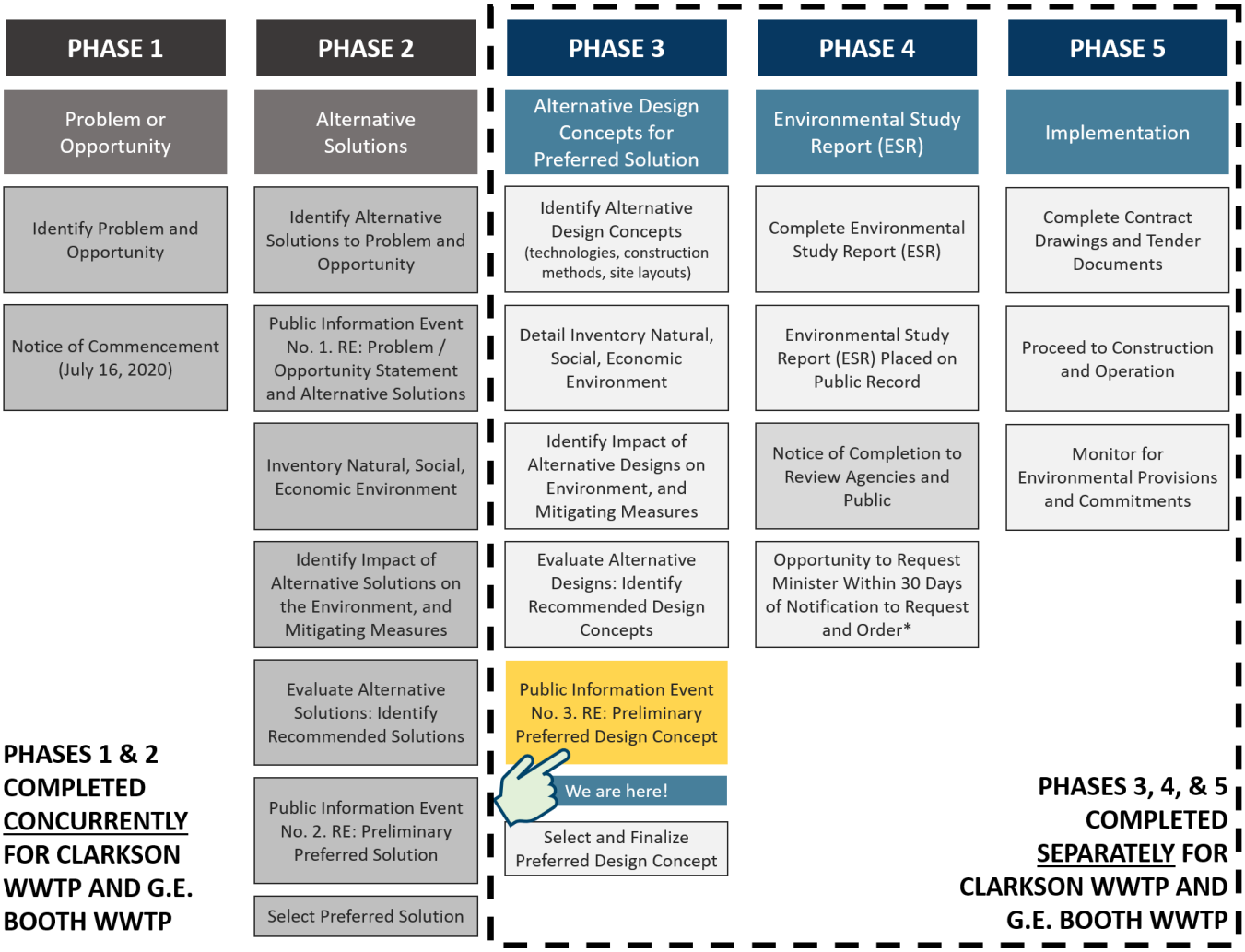
- Real-Time Control
- Existing Plant Upgrades
- Energy Efficiency Initiatives

Treatment Redundancy

- Firm Capacity with One Train Out of Service

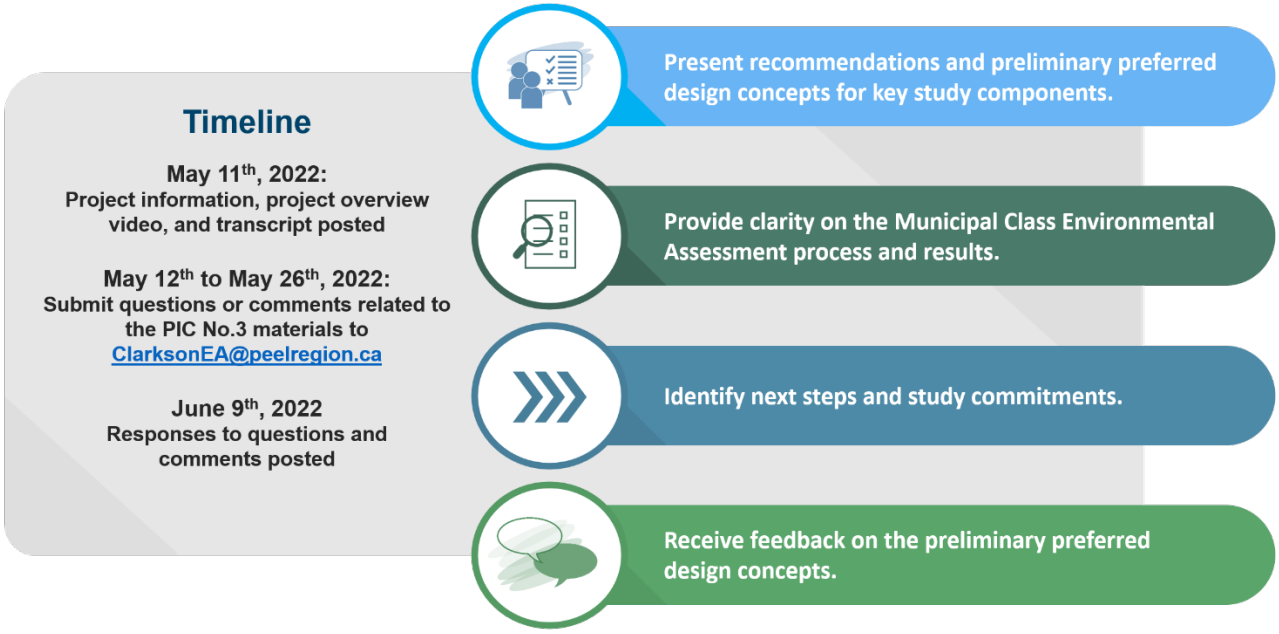
Class Environmental Process

Design of the Clarkson Wastewater Treatment Plant (WWTP) follows the Municipal Class Environmental Assessment (EA) process. Phase 1 and Phase 2 were completed concurrently for Clarkson WWTP and G.E. Booth WWTP. Phase 3, Phase 4, and Phase 5 will be completed separately for both WWTPs.



MEA Mandated Requirements: https://municipalclassea.ca/manual/page10.htm

Public Information Centre No.3 Objectives



- Present recommendations and preliminary preferred design concepts for the key study components;
- Provide clarity on the Municipal Class Environmental Assessment process and results;
- Identify next steps and study commitments;
- Receive feedback on the preliminary preferred design concepts.

Note: this is the third and final PIC for this study.

Phase 3 Key Questions

- What technologies should we use to treat our wastewater
- (liquid and solids components)?
- Where should our treated biosolids go and be used?
- Do we require additional outfall capacity? How will it be provided?
- How should the wastewater plant site be laid out and look?
- How do we mitigate environmental and social impacts?

Summary of Phase 2 Solution

Existing Wastewater Treatment

- The existing treatment processes include screening, grit removal, primary clarification, aeration, secondary clarification and chlorine disinfection and de-chlorination prior to discharge to Lake Ontario through the plant outfall.
- The existing plant capacity is 350 megalitres per day (MLD).
- The plant currently receives about 220 MLD flow, and therefore has excess capacity.
- The outfall has sufficient capacity to meet future requirements. No expansion to outfall capacity is required.

Recommended Wastewater Treatment Solution

- Divert flows from the G.E. Booth WWTP catchment to Clarkson WWTP through the East-to-West Diversion Trunk Sewer to take advantage of excess capacity at the Clarkson WWTP in the short-term.
- Expand the Clarkson WWTP from 350 MLD to 500 MLD by providing additional wastewater treatment capacity within the site boundaries.
- Expansion facilities to be located on the east part of the site.

Existing Biosolids Management

- The solids in the wastewater are collected for digestion and dewatering.
- The digested and dewatered biosolids is trucked to the G.E. Booth WWTP for incineration along with the G.E. Booth WWTP solids.

Recommended Biosolids Management Solution

- Stop trucking Clarkson WWTP biosolids to the G.E. Booth WWTP for incineration.
- Provide additional solids treatment capacity at the Clarkson WWTP to effectively treat the solids and produce high-quality biosolids end-products.

Beneficial reuse of biosolids such as:

- Land applications including agricultural lands or silviculture (tree farming).
- As soil amendments with fertilizers.

Phase 3 Design Parameters

Wastewater Treatment and Disinfection

A Receiving Water Impact Assessment (RWIA) was completed to confirm the wastewater plant's expansion's compliance with the Ministry of Environment, Conservation, and Park's (MECP) water quality guidelines. Wastewater treatment design must include the following parameters and basis as outlined below.

Design Parameters in reference to Design Flows:

- Average Day Flow = 500 Megalitres per Day (MLD)
- Peak Daily Flow = 850 MLD
- Peak Hourly Flow = 1,200 MLD
- Peak Instantaneous Flow = 1,500 MLD

Design Parameters in reference to Wastewater Characteristics:

- Carbonaceous Biochemical Oxygen Demand (cBOD) = 230 Milligrams per Litre (mg/l)
- Total Suspended Solids (TSS) = 305 mg/L
- Total Kjeldahl Nitrogen (TKN) = 30 mg/L
- Total Phosphorous = 4.6 mg/L
- Minimum Monthly Temperature = 10.8 °C
- Alkalinity = 233 mg/L

Design Basis for Effluent Quality Limits

- cBOD and TSS = 25 mg/l
- Total Ammonia Nitrogen (TAN) = 13.0 mg/L between May 1 and May 31 and October 1 to October 31; 10.0 mg/L between June 1 to September 30; 24.0 mg/L between November 1 and April 30
- Total Phosphorous = 0.70 mg/L
- Escherichia Coli (E.Coli) = 200 organisms per 100 millilitres (mL)

Design Basis for Effluent Quality Objectives

- cBOD and TSS = 15 mg/l
- Total Ammonia Nitrogen (TAN) = 5.0 mg/L between May 1 to October 31; 12.0 mg/L between November 1 to April 30
- E.Coli = 150 organisms per 100 mL

Design Parameters	
Parameter	**Design Value**
Design Flows	
Average Day Flow	500 Megaliters per Day (MLD)
Peak Daily Flow	850 MLD
Peak Hourly Flow	1,200 MLD
Peak Instantaneous Flow	1,500 MLD
Wastewater Characteristics	
Carbonaceous Biochemical Oxygen Demand (cBOD)	230 mg/L
Total Suspended Solids (TSS)	305 mg/L
Total Kjeldahl Nitrogen (TKN)	30 mg/L
Total Phosphorus (TP)	4.6 mg/L
Minimum Monthly Temperature	10.8^{o}C
Alkalinity	233 mg/L

Design Basis	
Parameter	**Design Value**
Effluent Quality Limits	
Carbonaceous Biochemical Oxygen Demand (cBOD)	25 mg/L
Total Suspended Solids (TSS)	25 mg/L
Total Ammonia Nitrogen (TAN)	13.0 mg/L (May 1 - May 31) 10.0 mg/L (Jun 1 – Sep 30) 13.0 mg/L (Oct 1 – Oct 31) 24.0 mg/L (Nov 1 - Apr 30)
Total Phosphorous (TP)	0.70 mg/L
E. Coli	200 organisms per 100 mL
Effluent Quality Objectives	
Carbonaceous Biochemical Oxygen Demand (cBOD)	15 mg/L
Total Suspended Solids (TSS)	15 mg/L
Total Ammonia Nitrogen (TAN)	5.0 mg/L (May 1 - Oct 31) 12.0 mg/L (Nov 1 - Apr 30)
Total Phosphorous (TP)	0.60 mg/L
E.Coli	150 organisms per 100 mL

Biosolids Management

Biosolids loading at Clarkson Wastewater Treatment Plant (WWTP):

- 12,300 dry tonnes per year (dt/year) of digested, dewatered biosolids produced in 2020.
- 28,600 dt/year of digested, dewatered biosolids anticipated by 2041.

Biosolids currently produced at the Clarkson WWTP meet Canadian Food Inspection Agency (CFIA), Non-Agricultural Source Material (NASM) Category 3 metal category 1 based on metal content (CM1), and Category A & B feedstock metal limits. With anaerobic digestion, the Clarkson WWTP biosolids meets NASM pathogen category 2 based on pathogen limit (CP2) limits for faecal coliform and could meet the NASM pathogen category 1 based on pathogen limit (CP1) and CFIA limits with further processing.

Biosolids Market Assessment was completed to identify the demand and compliance limits of treated biosolids to be sent to beneficial end-use markets. Four (4) biosolid management options were assessed:

1) Beneficial Use

Beneficial use management of biosolid products and processes include digested biosolids (liquid, dewatered cake), manufactured soil material, thermal-dried biosolids, alkaline stabilized and thermal-alkaline hydrolysis biosolids, and composted biosolids products.

Market end uses for these byproducts include but are not limited to agriculture, horticultural market, landscaping of recreational lands and land rehabilitation.

2) Thermal Reduction

Thermal reduction of biosolids will result in incinerator residual ash disposal and use. These may be applied within municipal waste landfills, incorporated into cement or other ash reuse options markets.

3) Landfilling

Landfilling as an option for biosolid management results in unstabilized and stabilized dewatered cake, compost products, and thermally dried products. These byproducts can be used as landfill cover or deposited in a municipal landfill or a dedicated landfill (monofil).

4) Co-management with municipal solid waste

Compost products and dewatered biosolid cake produced would be managed with source-separated organics.

BIOSOLIDS MANAGEMENT OPTIONS	BIOSOLID PROCESS AND PRODUCTS	MARKET END USERS
Beneficial Use	▪ Digested biosolids (liquid) ▪ Digested biosolids (dewatered cake) ▪ Manufactured soil material ▪ Advanced digested biosolids; liquid or cake ▪ Thermal-dried biosolids ▪ Alkaline stabilized biosolids ▪ Thermal-alkaline hydrolysis biosolids ▪ Composted biosolids products	▪ Agricultural land application ▪ Silviculture (tree farming) ▪ Horticultural market ▪ Golf courses, parks and recreation ▪ Landscaping ▪ Land rehabilitation
Thermal Reduction	▪ Incinerator residual ash disposal ▪ Incinerator residual ash use	▪ Municipal waste landfill ▪ Incorporation into cement ▪ Other ash reuse options
Landfilling	▪ Unstabilized dewatered cake ▪ Stabilized dewatered cake ▪ Compost products ▪ Thermally dried product	▪ Municipal landfill and landfill cover ▪ Monofill (dedicated landfill)
Co-management with municipal solid waste	▪ Compost products ▪ Biosolids cake (dewatered)	▪ Management with source separated organics

Biosolids Market Demand

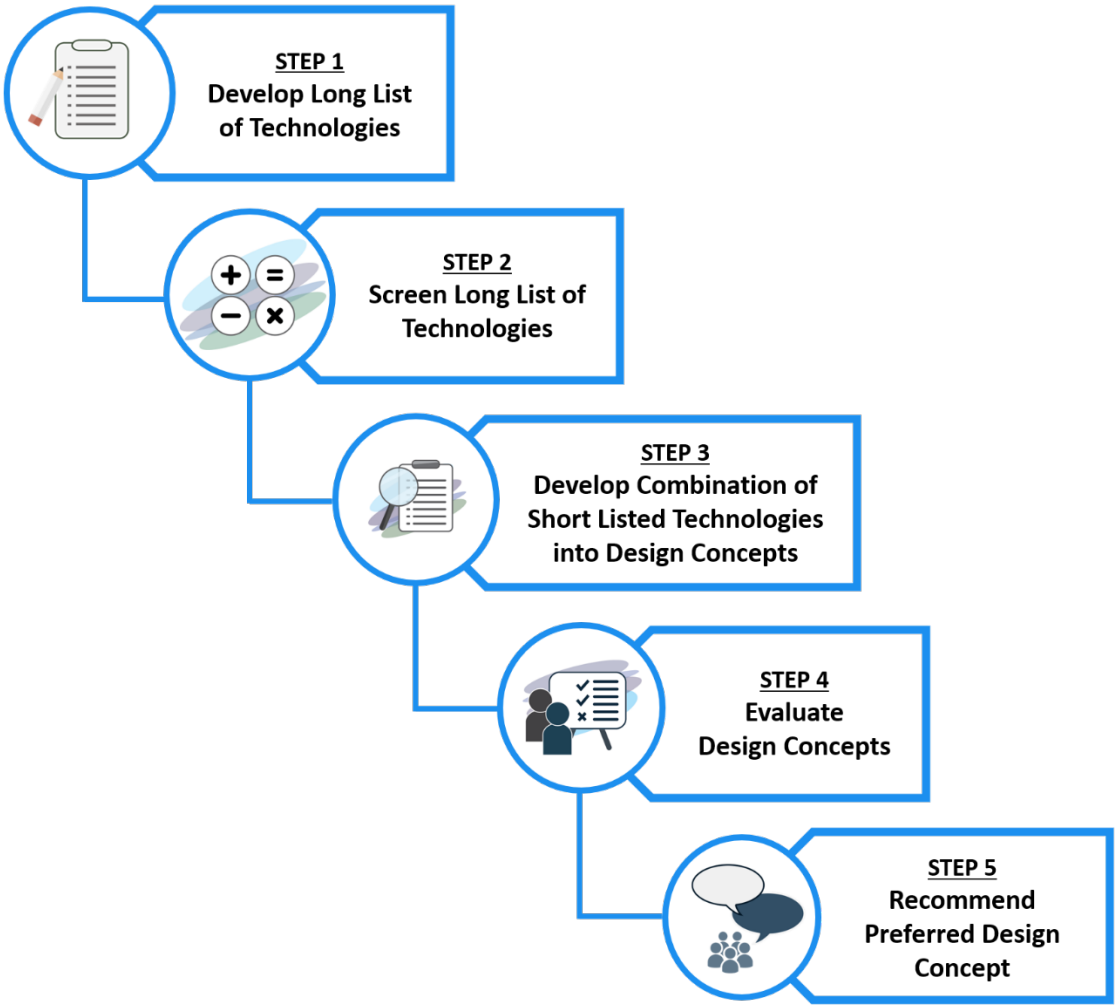
The greatest market availability was found for agricultural cropland. It was found that there are 27,000 hectares (ha) and 296,000 ha of agricultural land within the Peel Region and Greater Golden Horseshoe respectively. The annual maximum potential demand of treated biosolids for Peel Region agricultural land is 108,000 dry tonnes per year (DT/year) and 1,184,000 DT/year for Greater Golden Horseshoe agricultural lands.

Market demand exceeds the current biosolid quantities from the Clarkson WWTP and G.E. Booth WWTP. It is anticipated that the market will be able to absorb a significant portion of biosolids generated by both plants to 2041.

OUTLET	PEEL REGION		GREATER GOLDEN HORSESHOE	
	LAND AREA (HECTARES)	ANNUAL MAXIMUM POTENTIAL DEMAND (DT/YR)	LAND AREA (HECTARES)	ANNUAL MAXIMUM POTENTIAL DEMAND (DT/YR)
Agriculture	27,000	108,000	296,000	1,184,000
Parks & Rec. Dept.	2,600	10,400		
Golf Courses	570	2,300		
TOTAL	**30,170**	**120,700**	**296,000**	**1,184,000**

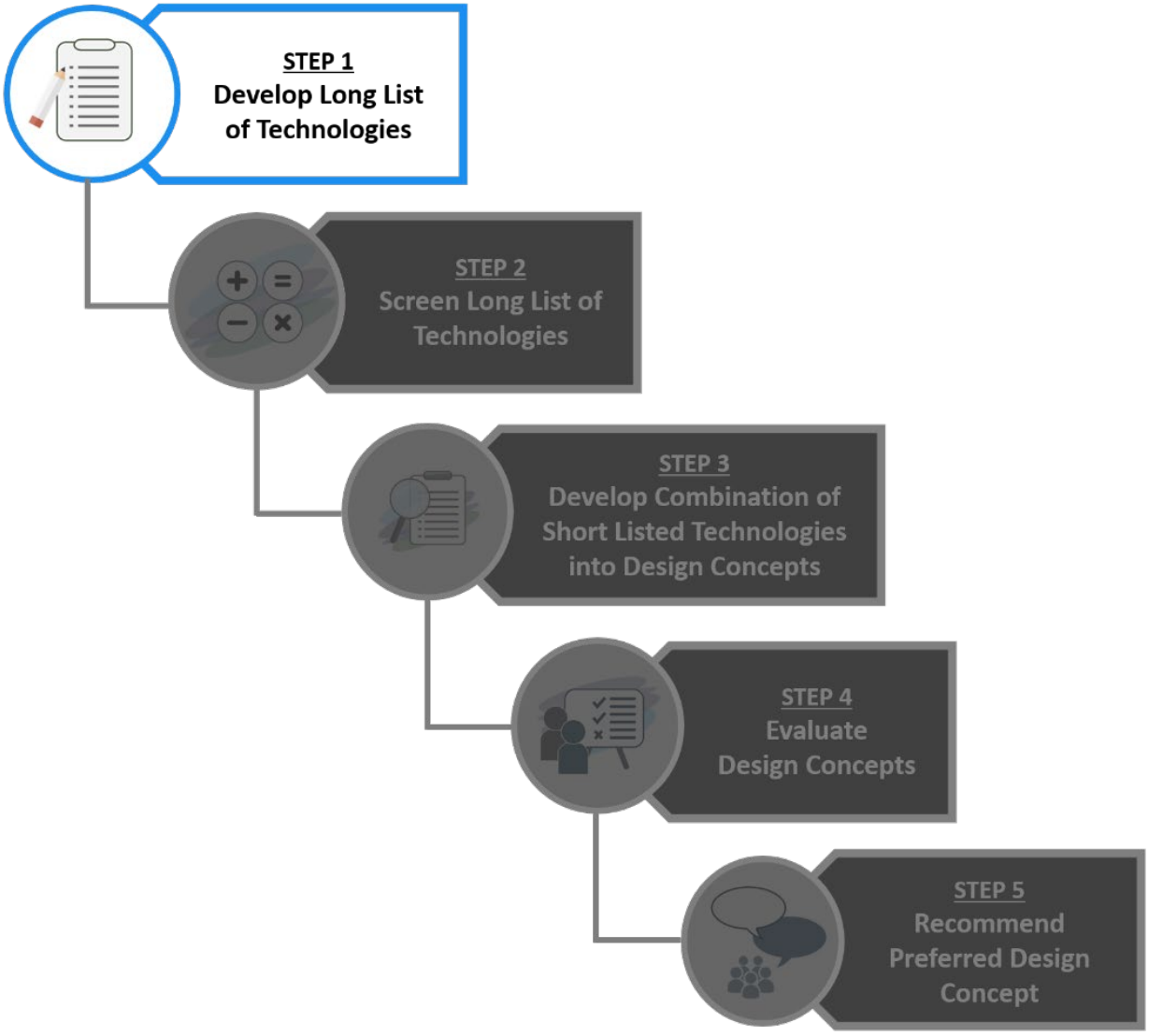
Phase 3 Approach

A five-step evaluation approach was taken to find the appropriate solution. This methodology was applied to select both wastewater treatment and disinfection technologies, and biosolid management solutions.



- Step 1: Develop Long List of Technologies
- Step 2: Screen Long List of Technologies
- Step 3: Develop Combination of Short Listed Technologies into Design Concepts
- Step 4: Evaluate Design Concepts
- Step 5: Recommend Preferred Design Concept

Develop Long List of Technologies



Wastewater Treatment Technologies

Eleven (11) wastewater treatment technologies were considered:

1. Conventional Activated Sludge (CAS)
2. CAS with Chemically Enhanced Primary Treatment (CEPT)
3. CAS with Wet Weather Flow (WWF) Treatment
4. Ballasted Activated Sludge (BAS)
5. Biological Nutrient Removal (BNR)
6. Membrane Bioreactor
7. Membrane Aerated Biofilm Reactor
8. Integrated Fixed-Film Activated Sludge / Moving Bed Bioreactor
9. Sequencing Batch Reactor
10. Aerobic Granular Sludge
11. Biological Aerated Filter

Wastewater Disinfection Technologies

Four (4) technologies were considered for wastewater disinfection:

1. Chlorination/ dechlorination
2. Ultraviolet (UV) Disinfection
3. Ozonation
4. Peracetic Acid

Biosolids Management Technologies

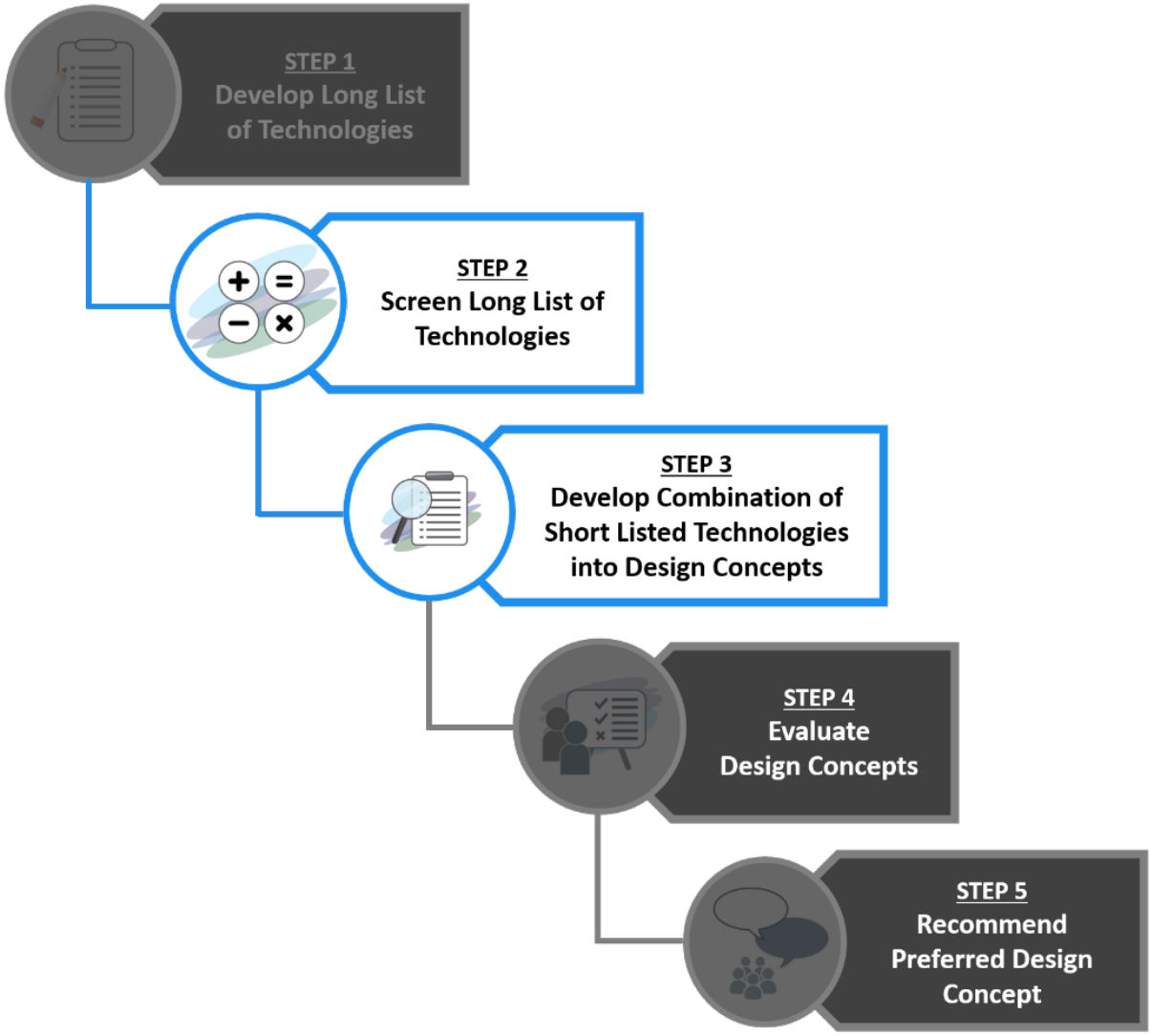
Nineteen (19) biosolid management technologies were considered:

1. Conventional Mesophilic Anaerobic Digestion
2. Temperature-Phased Anaerobic Digestion (TPAD)
3. Acid/Gas Phased Anaerobic Digestion
4. Thermal Hydrolysis Pre-treatment (THP)
5. Thermo / Alkaline Hydrolysis Pre-treatment
6. Conventional Aerobic Digestion
7. Autothermal Thermophilic Aerobic Digestion (ATAD)
8. Direct Thermal Dryer (Drum Dryer, Belt Dryer, Fluidized Bed Dryer)
9. Indirect Thermal Dryer (Paddle Dryer, Disc Dryer)
10. Solar Dryer
11. Alkaline Stabilization
12. Alkaline Stabilization with Supplemental Heat or Acid
13. Alkaline Stabilization with Supplemental Heat and High-Speed Mixing
14. Composting (Open Technologies Aerated Static Pile and Windrow Composting) or co-composting with Region of Halton
15. Incineration
16. Gasification
17. Pyrolysis
18. Wet Oxidation
19. Hydrothermal Liquification

Screening the Long List Options

The long list options for wastewater and biosolids management technologies were screened based on "Must Have" Criteria:

- Maturity of Technology
- Proven Application at Large WWTP
- Compatibility with Existing Processes and End-Use Markets
- Compatible with Region's Energy Management and Greenhouse Gas (GHG) Reduction Goals
- Able to be Implemented within Required Schedule (2029)



Wastewater Treatment Technologies

Three (3) long list options of the 11 potential technologies satisfied the "Must-Have" criteria:

1. Conventional Activated Sludge (CAS)
2. CAS with Chemically Enhanced Primary Treatment (CEPT)
3. Biological Nutrient Removal (BNR)

Wastewater Disinfection Technologies

Two (2) long list options of the 4 potential technologies satisfied the "Must-Have" criteria:

1. Chlorination / Dechlorination
2. Ultraviolet (UV) Disinfection

Biosolids Management Technologies

Five (5) long list options of the 19 potential technologies satisfied the "Must-Have" criteria:

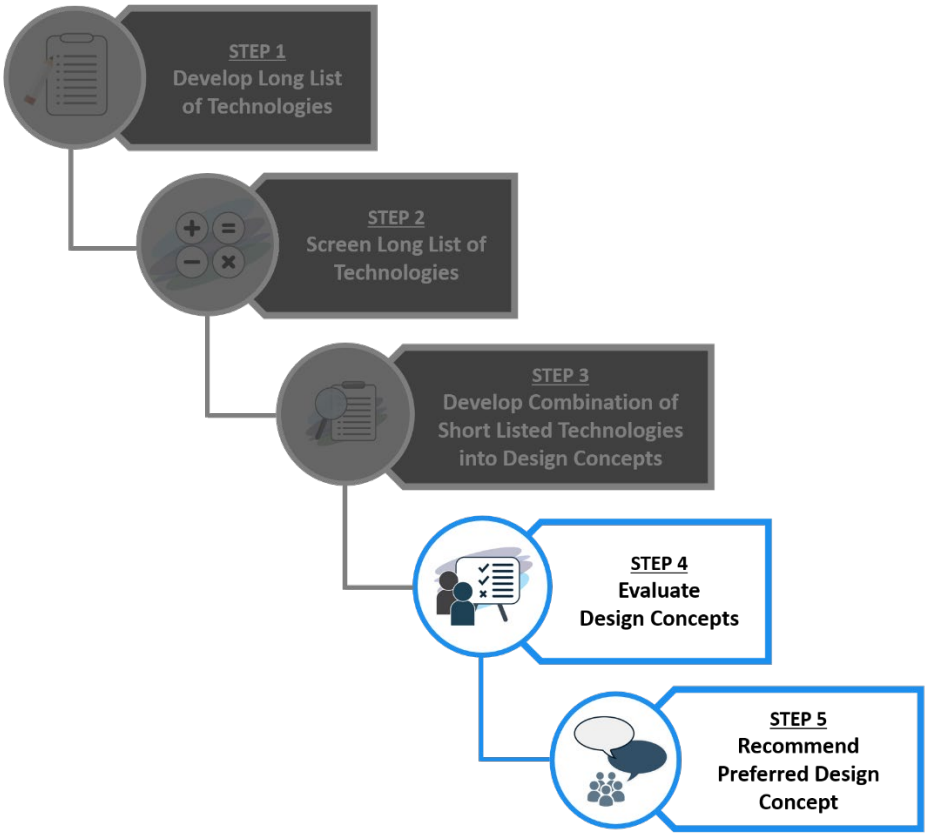
1. Conventional Mesophilic Anaerobic Digestion
2. Thermal Hydrolysis Pre-treatment (THP)
3. Direct Thermal Dryer (Drum Dryer, Belt Dryer, Fluidized Bed Dryer)
4. Alkaline Stabilization with Supplemental Heat or Acid
5. Alkaline Stabilization with Supplemental Heat and High-Speed Mixing

Detailed Evaluation of the Design Concepts

The shortlist options were further evaluated based on the Environmental Assessment Categories to select the final recommended preferred design.

Environmental Assessment Categories:

- Natural Environment (25%)
- Social/Cultural Environment (25%)
- Technical Considerations (25%)
- Economic Considerations (25%)



Wastewater Treatment and Disinfection Technologies

Of the alternative wastewater treatment design concepts developed using the short-listed technologies, the following wastewater treatment design concepts scored the highest under the environmental assessment categories:

- Expansion of the Clarkson WWTP using Biological Nutrient Removal Process
- Chlorination / Dechlorination System

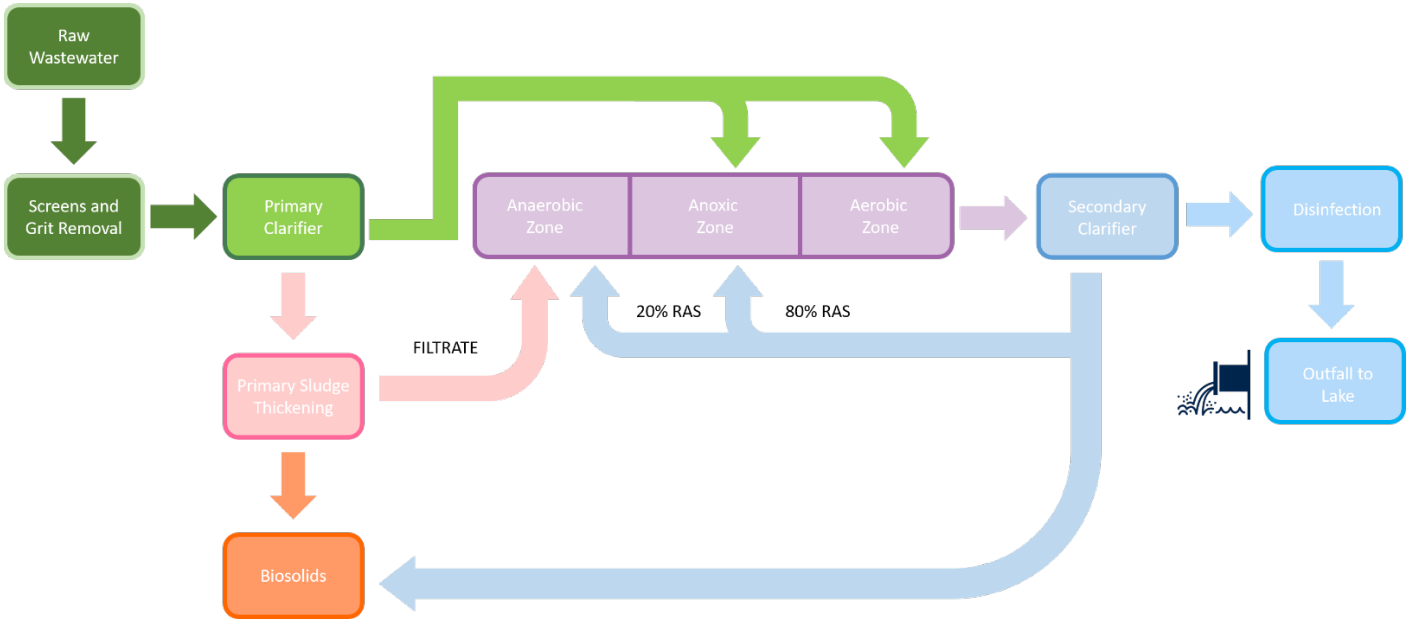
Biosolids Management Technologies

Of the alternative biosolids management design concepts developed using the short-listed technologies, the expansion of the anaerobic digestion system, thermal drying, and third-party beneficial use is recommended as this scored the highest under the environmental assessment categories.

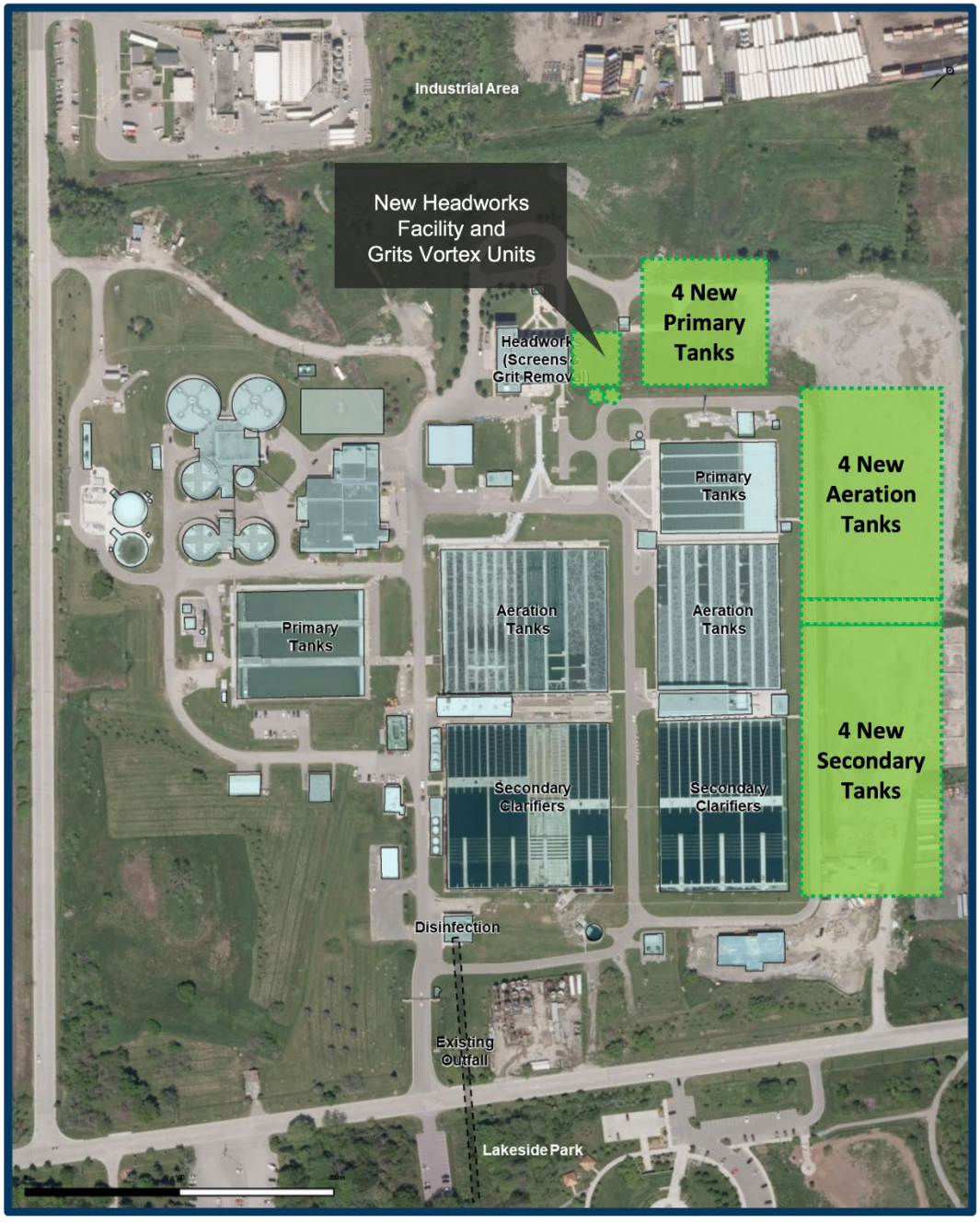
Preferred Wastewater Treatment Plant Design Concepts

Wastewater Treatment

Biological Nutrient Removal (BNR) is recommended to be used for wastewater treatment. The current site layout is presented with wastewater treatment facilities shown.



A new headworks facility and new grits vortex are recommended. Four (4) new secondary tanks are proposed to be sized for Conventional Activated Sludge (CAS) operation. Four (4) new aeration tanks and four (4) new primary tanks in addition are required. A Sidestream Enhanced Phosphorus Removal Process (S2EBPR) will be incorporated for wet weather resiliency and operational flexibility.

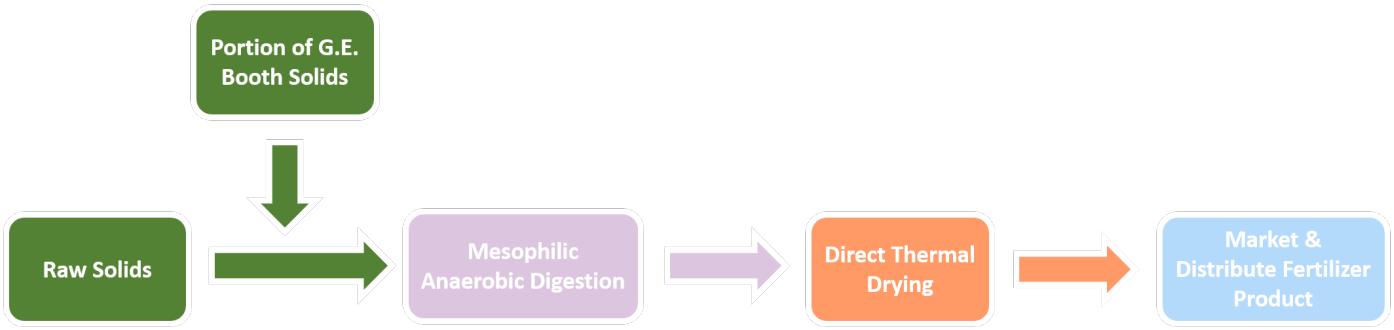


Wastewater Disinfection

- Existing outfall to be maintained; includes a chlorination / dechlorination disinfection system.
- Recommended design concept involves maintaining existing chlorination and dechlorination disinfection facilities with required chemical dosage increases equivalent to increased flows.
- Sodium hypochlorite injected at outfall chamber and sodium bisulphite injected before effluent discharge to Lake Ontario. Outfall provides the require chlorine contact time for disinfection.
- The conceptual site layout presented uses the existing disinfection building adjacent to existing outfall chamber.

Preferred Biosolids Management Design Concept

The recommended biosolids management design concept is the direct thermal drying of anaerobically digested biosolids and third-party distribution. The current site layout is presented with biosolids management facilities shown.



- Digesters to be sized to process all solids generated at Clarkson WWTP, along with 20 DT/day from G.E. Booth WWTP during high-capacity months to provide regional wide resilience and flexibility in biosolids management.
- Biogas produced from digestion to be used for boiler, Combined Heat and Power (CHP) Engines, and dryer operation to recover energy and reduce greenhouse gas (GHG) emissions.
- Direct thermal drying to increase total solids concentration from 26% to 92%, resulting in reduction of biosolids product hauling and GHG emissions.
- Four (4) days of onsite storage to be provided in elevated silos to minimize operational complexity.
- Biosolids product to be certified as a fertilizer and marketed/distributed by 3rd party biosolids management firm to appropriate outlets (agricultural, etc.), resulting in carbon credits and GHG emissions reduction.

Conceptual Biosolids Management Site Layout

- Construct four (4) new digesters adjacent to existing Digesters 4 & 5.
- De-commission existing Digesters 1 & 2.
- Construct new thermal drying facility.
- Construct short-term storage (two product silos) along a widened portion of the access road.

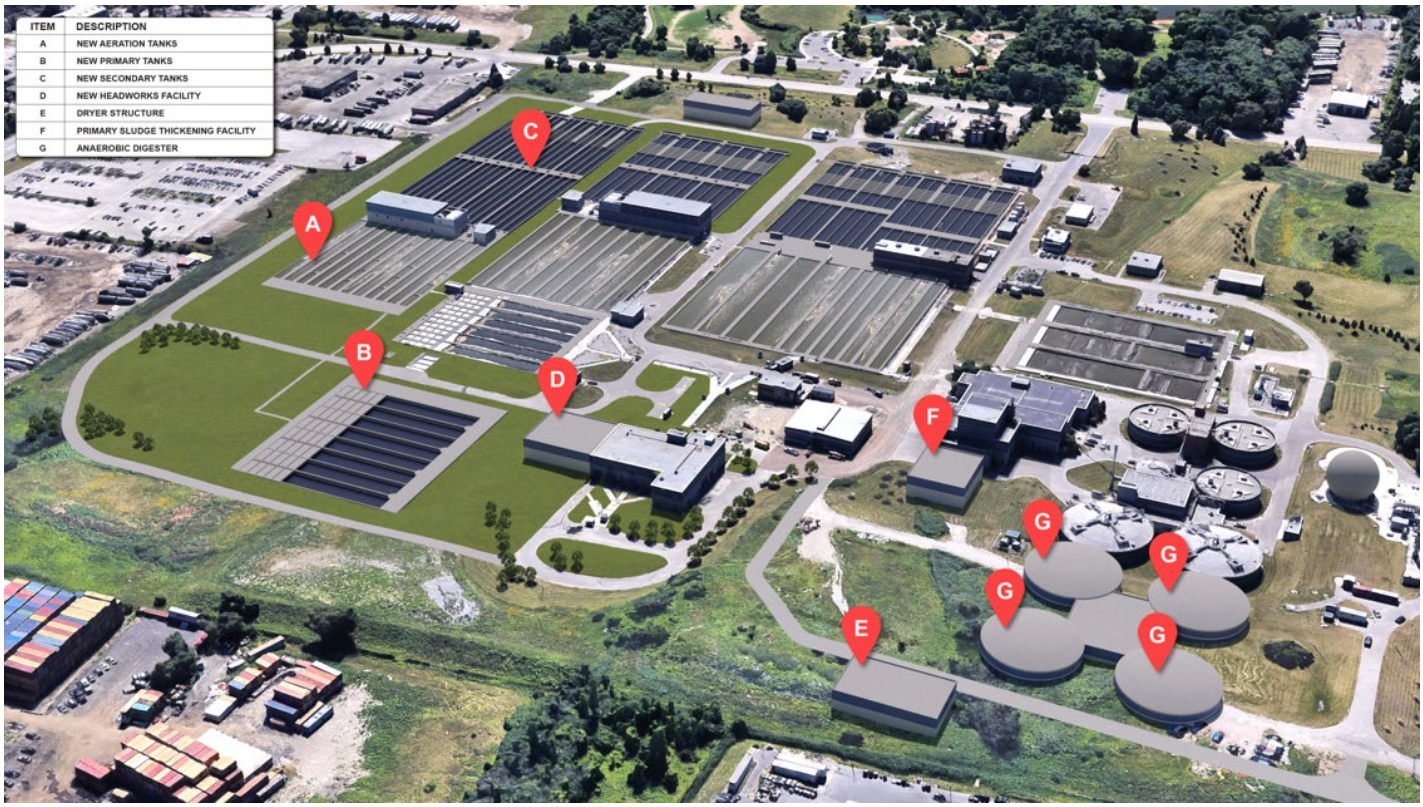
Implementation Strategy

Outlet One: Distribute and market dried biosolids as a fertilizer for land application. Can be done through a third-party vendor.

Outlet Two: Establish contracts with third-party vendors to transport dewatered biosolids offsite for either land application or further processing to produce fertilizer for beneficial use. Allows diversified end-users based on market conditions.

Clarkson Wastewater Treatment Plant (Today)

Clarkson Wastewater Treatment Plant Design Concept



Impacts, Mitigation, and Approvals

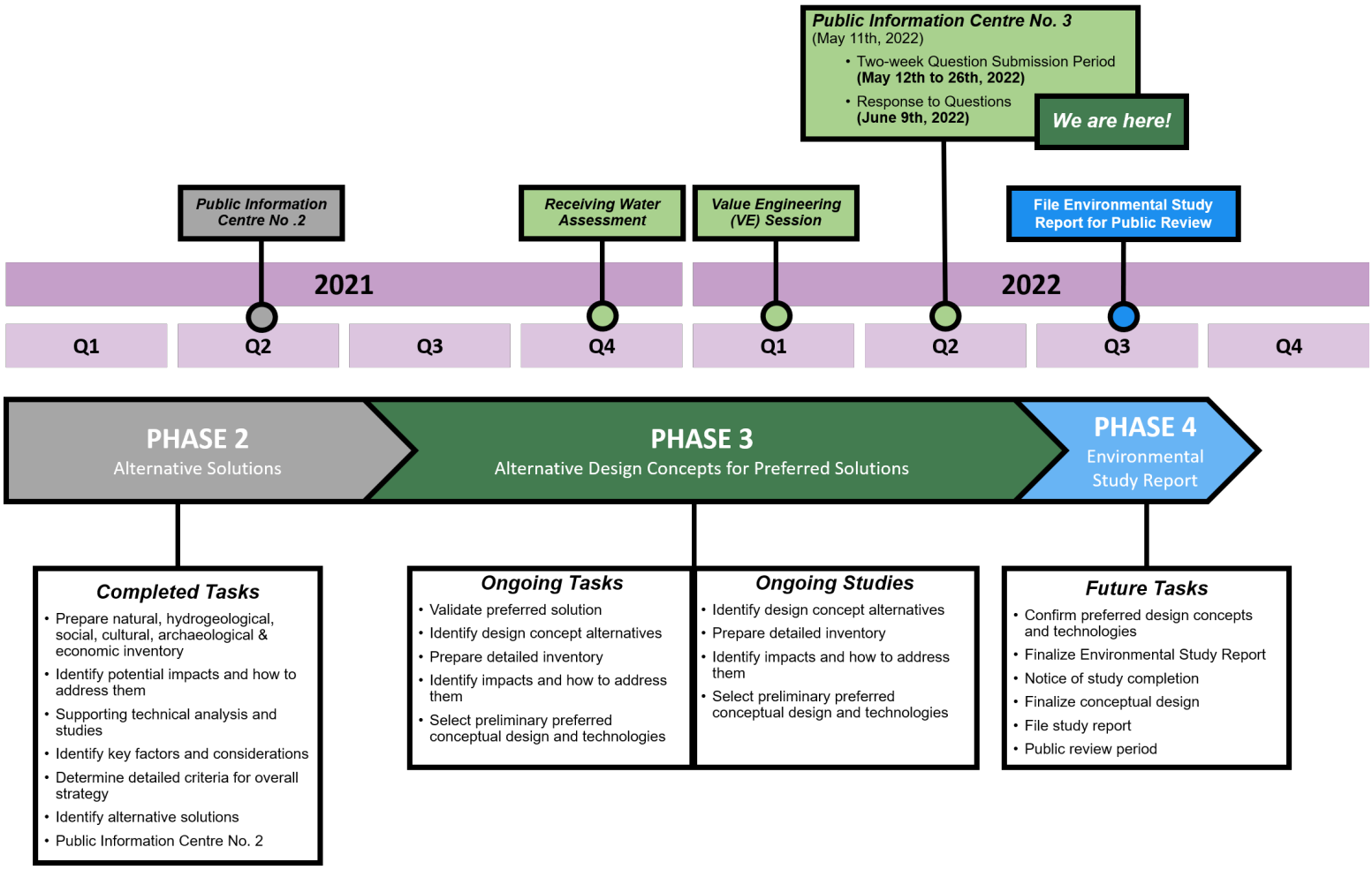
The Clarkson WWTP Environmental Assessment provides recommendations that will:

- Minimize impacts to environmental and archeological features
- Maximize buffer from existing and future neighbouring properties
- Meet MECP setback requirements
- Optimize the existing plant with flexibility for future treatment technologies, expansions, and changing environment
- Provide energy recovery and GHG emissions reduction through the proposed expansion strategy. The biosolids management approach produces biogas to be used on-site for energy reuse, along with a biosolids product which can be certified as a fertilizer, thereby resulting in carbon credits and further GHG emissions reduction.

Key Investigations required for detailed design:

- Stage 2 Archeological Assessment (AA) for portions of the existing Clarkson WWTP site
- Natural Environment Study for removal and replication of one wetland community (MAM2)
- Air/Odour/Noise Modelling to establish levels and mitigation measures to meet MECP requirements
- Receiving Water Assessment (Assimilative Capacity Study) to ensure no impacts to sensitive shoreline users or Intake Protection Zones (IPZ)
- Stormwater Management Plan

Timeline



Next Steps

- **May 2022**
  - Public Information Centre No. 3 to present design elements for the expansion of the Clarkson WWTP (We are here!)
- **June/July 2022**
  - Validate design concepts and finalize all study reporting for public review.
- **August 2022**
  - Issue Notice of Completion and initiate 30-day public review for the Environmental Study Report
- **End of 2022**
  - Post Environmental Assessment
  - Design and Construction of the Wastewater Treatment Plant

We Want to hear from you!

- Visit our website: www.peelregion.ca/Clarkson
- Provide PIC No. 3 feedback on the website from May 12, 2022 to May 26, 2022
- Sign-up to receive study notifications on the website, including notice of study completion when the final report is available for public review.

For any Class EA questions, please contact the Project Manager:

Cindy Kambeitz, PMP, PMI-RMP

10 Peel Centre Drive, Brampton, ON, L6T 4B9 | 905-791-7800 ext. 5040
ClarksonEA@peelregion.ca

Visit the Project Website

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Please note that information related to this study will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. All comments related will become part of the public record and may be included in the study documentation prepared for public review.