

Environmental Study Report

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Halton Region
CE904000 | S3519A

Mid-Halton Wastewater Treatment Plant Expansion Municipal Class
Environmental Assessment
March 2, 2026





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Executive Summary

The Regional Municipality of Halton (the Region) owns and operates six wastewater treatment plants (WWTPs) that treat wastewater and safely return the water back to the environment. The Mid-Halton Wastewater Treatment Plant (WWTP) is currently the second largest WWTP in the Region and provides wastewater treatment for communities and businesses in North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills. The plant is rated to treat an average daily flow (ADF) of 125 million litres per day (ML/d) and is located at 2195 North Service Road West, in Oakville, Ontario.

The Region developed the Joint Best Planning Estimates (JBPEs) with the participation of its local municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills) in 2023 to determine where growth will be distributed in the Region. This exercise identified significant population and employment growth within the Mid-Halton WWTP serviced area. Additionally, the Region's Water, Wastewater and Transportation Integrated Master Plan (IMP) is being completed. The IMP established that the Mid-Halton WWTP will require capacity expansion in the short and long term to support population growth.

The Region is committed to a capacity expansion from 125 ML/d to 195 ML/d at the Mid-Halton WWTP by 2031, in accordance with the Province of Ontario's Bill 23 (More Homes Built Faster Act). The Region currently has a residential population of approximately 650,000 and is expected to have a population of approximately 1,100,000 people by 2051. Employment in the Region is expected to increase from approximately 350,000 to 500,000 employees by 2051.

This Environmental Study Report (ESR) documents the findings of a Schedule C Municipal Class Environmental Assessment (MCEA) to identify a preferred capacity expansion concept to increase the plant to 195 ML/d ADF within the existing site constraints. The expansion is needed to maintain environmental protection, ensure continued compliance with regulatory requirements, and accommodate planned growth to 2051.

Existing Conditions

Current Wastewater Flows

The Mid-Halton WWTP's drainage area includes North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills, which together comprise the plant's primary service area. Wastewater from these communities is conveyed to the facility through the North Pumping Station and the Third Line Pumping Station. These service areas represent the vast majority of current influent flow to the plant and form the baseline against which additional contributions are assessed.

The Mid-Halton WWTP receives wastewater flows from several sources, including supernatant and centrate generated at the Biosolids Management Centre (BMC) and septage from the Boyne Hauled Sewage Receiving Station (HSRS). The BMC handles liquid biosolids from several smaller treatment plants and stores them during winter before land application in warmer months, occasionally using onsite dewatering when required. Although these flows enter the Mid-Halton system, they represent approximately 0.3% of the plant's ADF, and septage contributions are similarly negligible; therefore, both were included within the total plant flows for analysis.

Historical data from 2019 to 2024 shows an increase in flows to the Mid-Halton WWTP, with the ADF rising by approximately 20 ML/d over the six-year period. In 2024, the plant's ADF reached 84.5 ML/d,

about 68% of its rated capacity of 125 ML/d, while the maximum observed daily flow was 228 ML/d. Flow variations occur seasonally, weekly, and hourly due to infiltration and usage patterns, underscoring the importance of characterizing these trends for planning future capacity. Per-capita flow rates remained within typical municipal ranges, between 261 and 301 L/c/d.

Current Wastewater Quality and Loadings

Influent wastewater characterization at the Mid-Halton WWTP is assessed through weekly measurements of 5-day biochemical oxygen demand (BOD₅), total suspended solids (TSS), total phosphorous (TP), total Kjeldahl nitrogen (TKN), and ammonia nitrogen (NH₃-N) to understand organic and nutrient loading and to support capacity planning. While flows from the BMC and HSRs make up only about 0.3% of total influent, these streams carry disproportionately high nitrogen concentrations due to their origin in liquid biosolids storage and intermittent dewatering processes. Despite these unique characteristics, raw wastewater concentrations at the plant remained generally stable from 2019 to 2024, as shown in historical data.

Per capita load contributions for 2022–2024 indicate that most parameters fall within or slightly below typical municipal ranges, with the exception of TKN and NH₃-N, which reflect higher nitrogen inputs, including 5–10% contributions from BMC supernatant and centrate. Although minor for BOD₅, TSS, and TP, these elevated nitrogen loads will be important to account for in future planning, particularly as the Region moves toward biosolids composting. Table ES-1-1 summarizes historical per-capita load contributions for the Mid-Halton WWTP catchment area population equivalent.

Table ES-1-1. Per Capita Load Contributions for the Mid-Halton WWTP Catchment Area Population Equivalent – 2022 to 2024

Parameter	2022	2023	2024	Maximum	Typical Value ^[a]
Population	281,501	289,602	289,602 ^[b]	-	-
Per Capita BOD ₅ Load, g/c/d	54	50	60	60	60-110
Per Capita TSS Load, g/c/d	59	59	67	67	60-115
Per Capita TP Load, g/c/d	1.4	1.4	1.5	1.5	3-5
Per Capita TKN Load, g/c/d	12.9	12.5	14.0	14.0	9-14
Per Capita NH ₃ -N Load, g/c/d	8.1	7.6	8.1	8.1	5-12

^[a] Adapted from Metcalf and Eddy (Metcalf and Eddy, 2014).

^[b] The 2024 Mid-Halton WWTP annual report was not available. However, the Region indicated that the service population did not change from 2023 to 2024.

Current Sludge and Biosolids Generation

Current sludge and biosolids generation at the Mid-Halton WWTP are characterized by average 2024 cake production of 62 m³/d, supported by two 100 m³ storage bins that provide roughly 3–4 days of capacity. Raw sludge production averages 173 m³/d in Trains A/B and 138 m³/d in Train C, with solids content around 3.6–3.7%, aligning with typical design values. The digestion process operates with an average flow of 447 m³/d, a hydraulic retention time of 40 days, and a volatile solid loading rate of 0.64 kg/m³/d, all well within guideline ranges, while volatile solids reduction averages 52%, consistent with expected performance. Dewatering produces a cake at 21.8% total solids, falling within the standard 15–30% range.

Current Energy Usage and Greenhouse Gas Emissions

Energy use and greenhouse gas (GHG) emissions are key considerations for the Mid-Halton WWTP as the Region continues progressing toward its 2045 net-zero corporate target. The plant already incorporates several forms of onsite energy recovery. A 750 kW micro-hydro turbine installed at the outfall generated approximately 2.07 million kWh between 2019 and 2024, and anaerobic digestion produced an average of 10,610 m³/day of biogas, with roughly 30% beneficially used for heating. While these renewable sources currently offset a modest portion of the plant’s total energy demand (average daily electricity use is approximately 46,090 kWh), the Region continues to explore opportunities to increase onsite energy generation and resource recovery.

From 2019 to 2023, total GHG emissions ranged from 13,883 to 18,047 tonnes CO₂e per year. Consistent with typical wastewater treatment facilities, the majority originated from Scope 1 sources (direct process emissions such as nitrous oxide from secondary treatment and methane from digestion and flaring) Scope 2 emissions (purchased electricity) and Scope 3 emissions (indirect emissions from chemicals used onsite) were comparatively minor. These trends highlight the need for further energy efficiency improvements and biogas optimization, and the Region is currently pursuing studies on renewable natural gas, combined heat and power, and strategies to reduce nitrous oxide emissions as Halton Region works toward its 2045 net-zero target.

Future Conditions

Population and Flow Projection

The JBPEs forecast substantial growth within the Mid-Halton WWTP service area, with the residential population expected to increase by 134% and the employment/industrial, commercial, and institutional (ICI) population by 192% between 2026 and 2051. The demographic balance is projected to remain relatively stable, shifting slightly toward a greater share of employment/ICI users. Population served will also increase due to two major planned flow transfers: the South Georgetown Diversion in 2026 and the Oakville Southwest WWTP transfer in 2041. Combined, these factors will drive total service population growth from roughly 471,000 (2026) to over 1.16 million (2051).

Flow projections based on historical trends and per-capita flow criteria show that the Mid-Halton WWTP’s current rated ADF capacity of 125 ML/d will be exceeded by 2029. With population growth and incoming diversions, the ADF is expected to rise to 141 ML/d by 2031 and continue increasing, reaching 195 ML/d, the future expanded capacity, by 2040 and approximately 257 ML/d by 2051. Table ES-1-2 presents Mid-Halton WWTP projections through 2051.

Table ES-1-2. Mid-Halton WWTP Flow Projection through 2051

Parameter	2026	2031	2036	2041	2046	2051
Mid-Halton Catchment Area ADF, ML/d	101.3	131.9	160.7	195.8	217.1	243.2
South Georgetown Diversion ADF, ML/d	8.4	9.2	9.4	9.7	9.9	10.1
Oakville Southwest WWTP Transfer ADF, ML/d	-	-	-	2.7	3.2	3.7
Total Mid-Halton WWTP ADF, ML/d	109.8	141.1	170.1	208.2	230.2	257.1
Mid-Halton WWTP PDF, ML/d	219.6	282.2	340.2	416.5	460.4	514.1

Parameter	2026	2031	2036	2041	2046	2051
Mid-Halton WWTP PHF, ML/d	285.5	366.9	442.3	541.4	598.5	668.4
Mid-Halton WWTP PIF, ML/d	329.4	423.3	510.3	624.7	690.6	771.2

ADF = average day flow

PDF = peak day flow

PHF = peak hour flow

PIF = peak instantaneous flow

Projected Sludge and Biosolids Generation

Sludge and biosolids projections to 2051 were developed using forecasted wastewater flows and loads, along with historical plant performance and assuming an 8-day solids retention time, typical chemical dosing, and current thickening, digestion, and dewatering efficiency. As flows increase with population growth and service area expansion, solids production is expected to rise proportionally. As flows increase to 195 ML/d, sludge and biosolids production will rise proportionally from current levels. To accommodate this growth, the plant will require additional solids handling capacity, including two new anaerobic digesters, a fourth rotary drum thickener, and a third centrifuge. These upgrades ensure the facility can reliably process projected solids quantities.

Process Capacity Assessment

A comprehensive process capacity assessment was completed to compare each major treatment unit against both the existing 125 ML/d rated capacity and the proposed expansion to 195 ML/d. This evaluation identified where upgrades, expansion, or new facilities are required in order to reliably achieve the future treatment capacity. The findings of the capacity assessment for existing processes, tanks, and equipment are summarized in Figure ES-1-1. Although most process units require expansion to meet the 195 ML/d target, the existing outfall is designed for 400 ML/d and can fully accommodate future flows without modification.

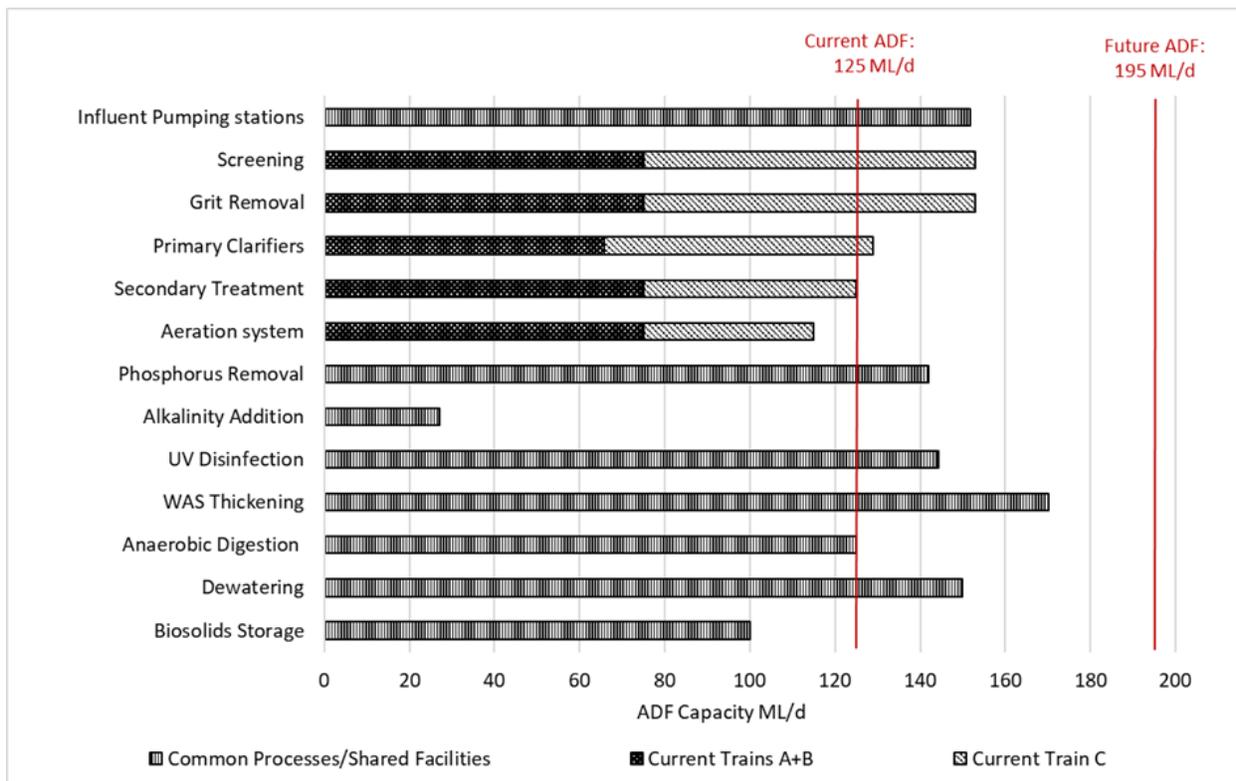


Figure ES-1-1. Capacity Assessment Summary

Problem and Opportunity Statement

The Mid-Halton WWTP is the Region’s second largest plant and currently serves approximately 290,000 people, including both residents and employees across North Oakville, South Milton, and the Highway 401 Corridor. With Halton Region’s population expected to grow from 650,000 today to 1.1 million by 2051, and employment increasing from 350,000 to 500,000, a significant portion of this growth will occur within the Mid-Halton service area. The plant will also begin receiving flows from Georgetown in 2026. Given these increases, the current rated ADF of 125 ML/d will not be sufficient, and the Region plans to expand capacity to 195 ML/d by 2031 to meet servicing needs, consistent with the JBPEs and the Region’s IMP. The MCEA study was initiated to identify the preferred expansion concept following the Municipal Engineers Association’s (MEA’s) Schedule C process. Halton WWTP is the Region’s second-largest plant and currently serves approximately 290,000 population equivalents across North Oakville, South Milton, and the Highway-Halton service area.

Implementation of the MCEA recommendations will enable the Region to achieve the following:

- Plant capacity expansion from 125 ML/d to 195 ML/d by 2031, which will provide capacity to service growth through 2040.
- Support of the Region’s Corporate Climate Action Plan, prioritizing energy efficiency, renewable energy, and GHG mitigation.
- Expanded treatment capabilities that will meet future Environmental Compliance Approvals (ECA) requirements.

- Development of an expansion concept aligned with climate commitments, supporting a resilient, low-carbon WWTP.
- Treatment capacity for future flow diversions, including South Georgetown.
- Integration of the 195 ML/d expansion into a long-term plan enabling an ultimate site capacity of 400 ML/d.
- Support for implementation of required plant upgrades.
- Capital expenditure efficiencies for expansion infrastructure.
- Mitigation of future operations and maintenance (O&M) cost impacts.
- Improved resilience to climate impacts.
- Continued protection of receiving water quality.
- Mitigation of impacts on surrounding landowners.
- Enhanced system resiliency and environmental protection.
- Support for future implementation of the biosolids composting facility.

Wastewater Treatment Alternatives and Evaluation

To support the planned expansion of the Mid-Halton-Halton WWTP to 195 ML/d, this MCEA Study evaluated alternatives for the major process areas where future capacity and performance depend on technology selection. While earlier expansion phases incorporated space for future growth, achieving the new capacity requires a combination of constructing new infrastructure, installing equipment in existing infrastructure, and re-rating the existing Train C within its current footprint. Alternatives were developed for primary treatment, secondary treatment, solids handling (including thickening, pretreatment, and digestion), and sidestream management. A full technology scan was completed covering both conventional and emerging options, and a set of “must-treatment, and digestion), and sidestream management. A full technology scan was completed covering both conventional and emerging options, and a set of “must-have” screening criteria was used to shortlist only those technologies suitable for the -have” screening criteria was used to shortlist only those technologies suitable for the Mid-Halton-Halton site. Table ES-1-3 summarizes the short list of technologies based on the screening process.

Table ES-1-3. Short List of Technologies

Unit Process	Technologies
Primary Treatment	<ul style="list-style-type: none"> ▪ Conventional Sedimentation (base case) ▪ Chemically Enhanced Primary Treatment (CEPT) ▪ Lamella Primary Treatment
Secondary Treatment	<ul style="list-style-type: none"> ▪ Conventional Nitrifying/Denitrifying Activated Sludge with Chemical Phosphorus Removal (base case) ▪ Enhanced Biological Phosphorus Removal (EBPR) ▪ Aerobic Granular Sludge (AGS) ▪ Sludge Densification via Physical Selection ▪ Membrane Aerated Biofilm Reactor (MABR)

Unit Process	Technologies
Solids Handling	<ul style="list-style-type: none"> ▪ Sludge Thickening and Pretreatment <ul style="list-style-type: none"> - Rotary Drum Thickener (RDT) WAS Thickening (base case) - Primary Sludge Thickening - Thermal Hydrolysis Pretreatment (THP) ▪ Digestion <ul style="list-style-type: none"> - Anaerobic Digesters (base case)
Sidestream Management	<ul style="list-style-type: none"> ▪ Sidestream Equalization (base case) ▪ Sidestream Treatment (Partial Nitritation/Deammonification) ▪ Post-Aerobic Digestion

These were assessed through a multi-criteria evaluation considering technical reliability, environmental performance, social and cultural factors, and both capital and lifecycle costs.

The preferred design concept for the Mid-Halton WWTP expansion to 195 ML/d includes a combination of upgrades to existing infrastructure, installing equipment in existing infrastructure, and construction of new facilities. Key elements and the preferred solutions are summarized in Table ES-1-4.

Table ES-1-4. Summary of Preferred Design Concept for the Mid-Halton Wastewater Treatment Plant Expansion to 195 ML/d

Unit Process	Preferred Solution
North Pumping Station	Replace existing Stage 1 (2002) sewage pumps SLP01-04 with larger pumps
Headworks	Add third screen in existing spare channel in the headworks building Add third vortex grit tank adjacent to existing ones in the headworks building area
Primary and Secondary Treatment	Build new treatment Train D with conventional primary clarifiers, CAS aeration tanks with chemical phosphorous removal Provisional – Process intensification with MABR and hydrocyclone retrofit for EBPR Re-rate Train C to 60 ML/d
UV Disinfection	Add UV equipment in existing fifth channel of the UV Disinfection building
Sludge Thickening	Add fourth RDT in the existing Biosolids Building
Anaerobic Digestion	Build two new anaerobic digesters and a control building
Dewatering	Add third centrifuge in the existing Biosolids Building Provisional: Construct a new Biosolids Building
Sidestream Management	Equalization tank expansion Provisional – Sidestream deammonification

CAS = conventional activated sludge

The recommended solutions collectively balance performance, constructability, operability, and cost, providing a clear and flexible path to achieving 195 ML/d of reliable treatment capacity.

Engagement

Stakeholders in the MCEA process include the general public, government agencies, Council members, local municipalities and services, utilities, and special interest groups. Indigenous communities with treaty rights or traditional territories affected by the project were also engaged in the project. At the start of the study, the Region identified these groups and implemented a comprehensive consultation program to

gather input throughout the process. All feedback received was reviewed, responded to, and considered into the development of the expansion plan and mitigation measures.

Engagement Plan and Approach

The Engagement Plan for the Mid-Halton WWTP MCEA was designed to ensure meaningful, transparent, and inclusive consultation with the public, government agencies, utilities, Indigenous Communities, First Nations and Métis Communities, throughout the study. The engagement approach aimed to provide accessible opportunities for input, address questions and concerns, build understanding and support for the project. Key objectives included providing early notice, clearly communicating alternatives and their impacts, presenting opportunities for sustainable solutions, and demonstrating that all feedback was carefully reviewed and considered in the decision-making process.

To guide this work, the Region developed Stakeholder and Indigenous Community Consultation Plans outlining engagement methods such as notices, meetings, email correspondence, virtual comment forms, and public information centres. A stakeholder contact list was established early in the study and updated as interest grew. Approximately 1,400 nearby property owners within an approximate 500 m radius of the plant were also notified via mail. Government agencies, including Conservation Halton, Ontario Ministry of the Environment, Conservation and Parks (MECP), Ministry of Citizenship and Multiculturalism (MCM), and Ontario Ministry of Natural Resources (MNR), were consulted to ensure alignment with regulatory requirements. Indigenous engagement included consultation with the Mississaugas of the Credit First Nation and Six Nations of the Grand River (Elected Council), while the Haudenosaunee Development Institute, Wendat Nation, and Métis communities were informed about the project. Input received through all engagement activities informed the development of the preferred design concept and mitigation measures.

Engagement Activities

Meaningful engagement is a core element of the MCEA process because it ensures transparency, incorporates community and Indigenous knowledge, and helps refine project decisions. For the Mid-Halton WWTP Expansion, the Region undertook a broad, multi-layered engagement program involving the public, Indigenous Communities, First Nations and Métis Communities, government agencies, local municipalities and services, and utilities, which are presented in the following subsections.

Public Notices & Communication:

Three notices, Study Commencement/Public Information Centres (PICs) 1, PIC 2, and Study Completion, were issued to approximately 120 stakeholders and mailed to 1,400 nearby residents. Personalized letters were provided to Indigenous Communities, First Nations and Métis Communities.

Website & Digital Outreach:

A dedicated project webpage was regularly updated, supported by digital ads in other websites (Metroland, Toronto Star, Inside Halton, Google Search) to increase visibility.

Virtual PICs:

- **PIC 1 (June–July 2025):** Presented study background and evaluation criteria; included a video, information panels, and a survey. The website received 2,730+ views and 31 written comments.
- **PIC 2 (Nov–Dec 2025):** Shared evaluation results and the recommended concept; included a public survey. The website received 2,130+ views and 13 written comments.

Government Agency Consultation:

MECP, MCM, Conservation Halton, and MNR were engaged through meetings, technical exchanges, and submission of supporting studies to ensure regulatory alignment and discuss permitting needs.

Other Stakeholders:

Ongoing communication occurred with Halton Region departments, Town of Oakville staff, councillors, utilities, school boards, and police services to support coordination and identify potential impacts.

Indigenous Engagement:

Letters and notices were issued to Mississaugas of the Credit First Nation (MCFN), Six Nations of the Grand River (SNGR), Haudenosaunee Development Institute (HDI), Wendat, and Métis communities, who were given opportunities to review key studies, namely the Stage 1 Archaeological Assessment (AA), Natural Environment Report (NER), and Environmental Impact Assessment (EIA) and participate in all engagement activities.

Integrating Feedback into the Decision-Making Process

Feedback from the public, Indigenous Communities, First Nations and Métis Communities, government agencies, and stakeholders played a central role in shaping the evaluation of alternatives and the development of the preferred design concept for the Mid-Halton WWTP Expansion. All comments were logged, reviewed, and addressed through the MCEA process, with detailed responses documented in Appendix B.

Recommendations

Table ES-1-5 presents a summary of the recommended design concept to expand the Mid-Halton WWTP to 195 ML/d. Of note, the capital costs presented also include costs for the unit process upgrades that did not require an analysis of alternatives (North Pumping Station [PS], headworks, UV disinfection, alkalinity addition), for completeness. These are high-level cost estimates (Class 5) that will be further refined through design.

Table ES-1-5. Summary of MCEA Study Preferred Solution for Expansion to 195 ML/d

Unit Process	Preferred Solution	Capital Cost (excluding escalation and HST)
North Pump Station	Upgrade four existing pumps	\$67,538,000
Headworks	Add third screen in the existing spare channel Add third grit tank adjacent to existing ones	\$11,737,000
Primary Treatment	Conventional primary clarifiers	\$53,123,000
Secondary Treatment	CAS secondary treatment with chemical phosphorous removal and secondary clarifiers Train C re-rating	\$149,884,000 \$11,469,000
UV Disinfection	Add UV equipment in the existing fifth channel	\$3,738,000
Solids Handling	WAS thickening expansion, dewatering expansion Anaerobic digester expansion (2x digesters)	\$7,080,000 \$77,566,000
Sidestream Treatment	Equalization tank expansion	\$1,640,000
Chemical Building	To be defined during design	\$16,851,000
Total		\$400,626,000

Unit Process	Preferred Solution	Capital Cost (excluding escalation and HST)
Secondary Treatment	Provisional – MABR and hydrocyclone retrofit	\$25,527,000
Solids Handling	Provisional – New Biosolids Building	\$130,689,000
Sidestream Treatment	Provisional – Sidestream deammonification	\$19,515,000
Total Provisional		\$175,731,000
Grand Total Including Provisional Items		\$576,356,000

Recommendations arising from technical evaluation, staff input, and stakeholder and Indigenous engagement include:

- Define the long-term biogas utilization strategy for Mid-Halton in alignment with the Region's corporate biogas strategy once finalized.
- Continue monitoring ferric pricing and sludge characteristics to determine the feasibility and timing of process intensification technologies (MABR, hydrocyclones, EBPR), supported by a sewage characterization study.
- Monitor influent ammonia loads to confirm the need for sidestream ammonia treatment solutions.
- Maintain ongoing engagement with stakeholders and Indigenous Communities, First Nations and Métis Communities throughout design and construction to ensure transparency, responsiveness, and incorporation of local knowledge.

Implementation Plan

The Mid-Halton WWTP expansion to 195 ML/d will be delivered through a phased, adaptable program that maintains full plant operation and regulatory compliance throughout construction. The implementation focuses on constructability, integration with existing assets, and flexibility for a future build-out to 400 ML/d. Core scope elements include new primary clarifiers, secondary treatment upgrades with the addition of Train D and re-rating of Train C to 60 ML/d, solids handling expansion (WAS thickening, two new digesters, an additional centrifuge), increased centrate equalization capacity, and on-site layout optimization within the existing footprint. Environmental mitigation measures identified through the EIA, such as erosion and sediment controls, vegetation management, and wildlife protection, will be incorporated into design and construction.

Implementation proceeds through key phases:

1. **Approvals and Stakeholder Engagement** – Secure required provincial, federal, regional, and municipal permits (including ECA for sewage, air, and noise) and integrate feedback from the ESR review process.
2. **Design Development** – Complete preliminary and detailed design; confirm unit process sizing; undertake additional wastewater characterization to support future EBPR retrofit feasibility; and prepare erosion, sedimentation, and environmental mitigation plans.
3. **Construction and Commissioning** – Build primary and secondary treatment facilities, solids handling systems, and sidestream management upgrades; commission Train D; integrate new systems with ongoing operations; and implement mitigation measures identified in the EIA.

4. **Operational Optimization** – Monitor Train D performance, track ferric cost trends, evaluate timing for MABR/hydrocyclone retrofits, assess biogas utilization strategy, and keep track of influent conditions to identify sidestream treatment requirements.
5. **Future Upgrades** – Monitor influent conditions and regulatory requirements to determine the need for sidestream deammonification and plan the long-term expansion toward the 400 ML/d ultimate capacity.

This staged approach ensures the plant remains resilient, cost-effective, and aligned with projected growth, regulatory timelines, and sustainability objectives.

The anticipated project implementation schedule for the Environmental Assessment, Preliminary Design, Detailed Design, Procurement and Tender, and Construction phases is presented in Figure ES-1-2.

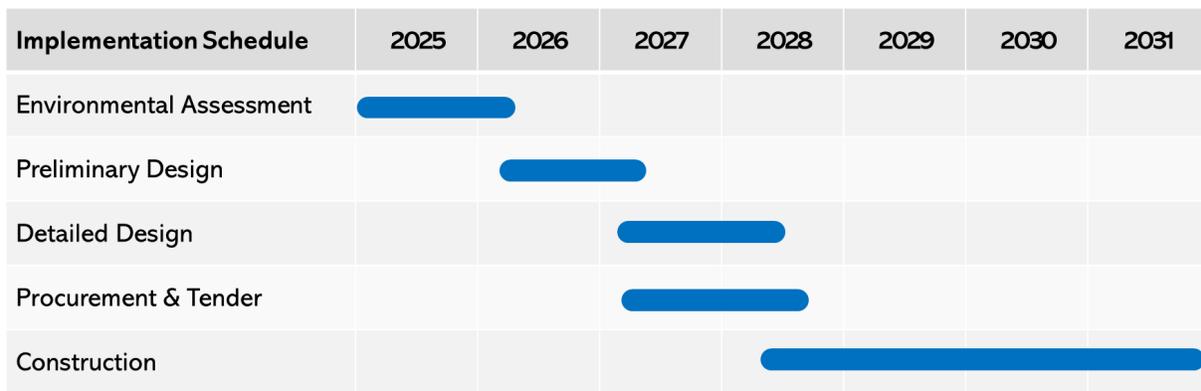


Figure ES-1-2. Anticipated Project Implementation Schedule.

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Acronyms and Abbreviations

Acronym	Description
AA	Archaeological Assessment
ADF	Average Daily Flow
AD	Anaerobic Digestion
AGS	Aerobic Granular Sludge
AHA	Aquatic Habitat Assessment
ANSI	areas of natural and scientific interest
ARA	Aquatic Resource Area
BBS	Breeding Bird Surveys
BMC	Biosolids Management Centre
BMP	best management practice
BOD	biochemical oxygen demand
BOD ₅	5-day biochemical oxygen demand
CAS	conventional activated sludge
cBOD ₅	carbonaceous biochemical oxygen demand
CEPT	chemically enhanced primary treatment
CH	Conservation Halton
CH ₄	methane
CHER	Cultural Heritage Evaluation Report
CHP	combined heat and power
CIA	Connection Impact Assessment
CO ₂ e	carbon dioxide equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DBH	Diameter at breast height

Environmental Study Report

Acronym	Description
DFO	Fisheries and Oceans Canada
EA	environmental assessment
EASR	Environmental Activity and Sector Registry
EBPR	Enhanced Biological Phosphorus Removal
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
EI	Environmental Inspector
EIA	Environmental Impact Assessment
ELC	Ecological Land Classification
ENR	Engineering News Record
EPA	Environmental Protection Act
ESA	Environmentally Significant Area
ESC	Erosion and Sedimentation Control
ESDM	Emission Summary and Dispersion Modelling
ESR	Environmental Study Report
FIPPA	Freedom of Information and Protection of Privacy Act
FWCA	Fish and Wildlife Conservation Act
GHG	greenhouse gas
GLWQA	Great Lakes Water Quality Agreement
GTA	Greater Toronto Area
GWP	global warming potential
H&S	Health and Safety
HCCC	Haudenosaunee Confederacy Chiefs Council
HDI	Haudenosaunee Development Institute

Acronym	Description
HIA	Heritage Impact Assessment
HRT	hydraulic retention time
HSRS	Hauled Sewage Receiving Station
ICI	Industrial, commercial, and institutional
IFAS	Integrated Fixed-film Activated Sludge
IMP	Halton Region Water, Wastewater and Transportation Integrated Master Plan
IPCC	Intergovernmental Panel on Climate Change
IPZ	intake protection zones
JBPE	Joint Best Planning Estimate
kg	kilograms
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour
L	litres
LCC	lifecycle cost
LIO	Lands Information Ontario
LP/Hi	low pressure/high intensity
LTSTOS	Long-term Stable Top of Slope
m ³	cubic metres
m ³ /d	cubic metres per day
MABR	membrane aerated biofilm reactor
MBCA	Migratory Birds Convention Act
MCEA	Municipal Class Environmental Assessment
MCFN	Mississaugas of the Credit First Nation

Acronym	Description
MCM	Ministry of Citizenship and Multiculturalism
MEA	Municipal Engineers Association
MECP	Ministry of the Environment Conservation and Parks
ML/d	megalitres per day
MLITSD	Ministry of Labour, Immigration, Training and Skills Development
MNR	Ministry of Natural Resources
MTSA	Major Transit Station Area
N ₂ O	nitrous oxide
NER	Natural Environment Report
NH ₃ -N	ammonia nitrogen
NHF	Natural Heritage Features
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
NIR	National Inventory Report
O&M	operations and maintenance
OBBA	Ontario Breeding Bird Atlas
OESC	Ontario Electrical Safety Code
OP	Official Plan
OWRA	Ontario Water Resources Act
OWWA	Ontario Water Works Association
PAD	Post-Aerobic Digestion
PIC	Public Information Centre
PIF	Project Information Form
PPS	Provincial Planning Statement

Acronym	Description
PS	pumping station
PTTW	Permits to Take Water
PWQO	Provincial Water Quality Objectives
PWQOs	Provincial Water Quality Objectives
QEW	Queen Elizabeth Way
R.S.O.	Revised Statutes of Ontario
RDT	rotary drum thickeners
RNG	renewable natural gas
RWIA	Receiving Water Impact Assessment
SAC	Ontario Spills Action Centre
SAR	Species at Risk
SARA	Species at Risk Act
SLG	Solid-liquid-gas
SNGR	Six Nations of the Grand River
SPA	Source Protection Area
SPP	Source Protection Plans
SRT	Solids retention time
SUE	Subsurface Utility Engineering
SWH	Significant Wildlife Habitat
SWM	Stormwater Management
TAN	total ammonia nitrogen
THP	thermal hydrolysis pretreatment
TKN	total Kjeldahl nitrogen
TMP	Traffic Management Plan

Acronym	Description
TN	total nitrogen
TP	total phosphorous
TSS	total suspended solids
TSSA	Technical Standards and Safety Authority
TWAS	thickened waste activated sludge
UIA	Un-ionized Ammonia
UV	CHECK TEXT / EXISTING GLOSSARY FOR DEFINITION
VS	volatile solids
VSR	Volatile Solids Reduction
WAS	waste activated sludge
WEAO	Water Environment Association of Ontario
WEF	Water Environment Federation
WRF	Water Research Foundation
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1. Introduction and Background

The Regional Municipality of Halton (the Region) owns and operates six wastewater treatment plants (WWTPs) that treat wastewater and safely return the water back to the environment. The Mid-Halton Wastewater Treatment Plant (WWTP) is currently the second largest WWTP in the Region and provides wastewater treatment for communities and businesses in North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills. The plant is rated to treat an average daily flow (ADF) of 125 million litres per day (ML/d) and is located at 2195 North Service Road West, in Oakville, Ontario.

The Region developed the Joint Best Planning Estimate (JBPE) with the participation of its local municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills) in 2023 to determine where growth will be distributed in the Region. This exercise identified significant population and employment growth within the Mid-Halton WWTP serviced area. Additionally, the Region's Water, Wastewater and Transportation Integrated Master Plan (IMP) is being completed. The IMP established that the Mid-Halton WWTP will require capacity expansion in the short and long term to support population growth.

The Region is committed to a capacity expansion from 125 ML/d to 195 ML/d at the Mid-Halton WWTP by 2031, in accordance with the Province of Ontario's Bill 23 (More Homes Built Faster Act). The Region currently has a residential population of approximately 650,000 and is expected to have a population of approximately 1,100,000 people by 2051. Employment in the Region is expected to increase from approximately 350,000 to 500,000 employees by 2051.

1.1 Study Purpose and Approach

As part of the Region's overall strategy for meeting existing and future wastewater servicing needs for a growing population, the Mid-Halton WWTP must be expanded by 2031. This Municipal Class Environmental Assessment (MCEA) study was initiated by the Region to develop a preferred capacity expansion concept that will increase the rated ADF capacity of the Mid-Halton WWTP to 195 ML/d by 2031. The Region's original strategy included a plan to increase the plant capacity from 125 ML/d ADF to 175 ML/d ADF by 2031. However, based on optimization opportunities identified in the early stages of the study, it was determined that 195 ML/d could be achieved within a similar footprint to a 175 ML/d expansion. This increased capacity will better support local municipal growth priorities within the Region and will provide cost and operational efficiencies. Therefore, the purpose of this Municipal Class Environmental Assessment is to develop a solution for increasing the capacity of the plant to 195 ML/d.

The study is being conducted in accordance with the planning and design process for municipal projects outlined in the Municipal Engineers Association's (MEA's) Municipal Class Environmental Assessment process for Schedule C municipal infrastructure projects (Municipal Engineers Association MCEA, October 2000, as amended in 2024).

This MCEA Study will complete Phases 1 to 4 of the MCEA process, as follows:

- **Phase 1 – Problem and Opportunity:** Review existing natural, social and cultural, and technical environments related to the Mid-Halton WWTP current condition, establish future needs, and develop a Problem and Opportunity Statement.
- **Phase 2 – Development of Alternative Solutions:** Identification and evaluation of alternative treatment technologies considering the benefits and impacts to the existing community, technical requirements, natural environment, social and cultural context, and economic environment, as well as input from

project stakeholders and Indigenous Communities, First Nations and Métis Communities, to identify a preferred design concept for plant expansion.

- **Phase 3 – Development of Alternative Design Concepts:** In this phase, alternative design concepts were developed and assessed based on detailed evaluation criteria. A preferred design concept was recommended and shared with the public, along with potential impacts and mitigation measures.
- **Phase 4 – Environmental Study Report (ESR):** The study methodology and rationale to recommend the preferred design concept, as well as stakeholders and Indigenous Communities, First Nations and Métis Communities' participation and feedback, are documented in this ESR.

1.2 Report Structure

This ESR is structured as follows:

- **Section 1: Introduction and Background** provides an overview of the project background and approach.
- **Section 2: Ontario Environmental Assessment Process** describes how the environmental assessment process has informed the development of this MCEA study.
- **Section 3: Project Context** reviews the Study Area and plant background, and presents the regulations and policies that inform and shape this MCEA study.
- **Section 4: Methods and Approach** presents the approach to public engagement and the decision-making process.
- **Section 5: Study Area Existing Conditions** provides an overview of the existing conditions in terms of Natural Heritage Features, Cultural Heritage Resources, WWTP treatment processes, and establishes a foundation for understanding Halton Region's existing and future needs at the Mid-Halton WWTP.
- **Section 6: Future Requirements for Plant Expansion** presents the anticipated future requirements and capacity needs within the planning horizon, forming the basis for the study problem and opportunity statement.
- **Section 7: Problem and Opportunity Statement** defines the problems and opportunities identified through the documentation of the existing conditions and future needs in accordance with the MCEA process.
- **Section 8: Wastewater Treatment Technologies Screening** presents the long list of treatment technologies and provides the rationale for screening the long list into a short list of treatment technologies.
- **Section 9: Evaluation of Shortlisted Treatment Technologies** goes over the non-economic and economic detailed evaluation of the short list of treatment technologies to recommend a preferred design concept.
- **Section 10: Public, Agency, and Indigenous Communities, First Nations and Métis Communities Consultation and Engagement** details the engagement activities conducted throughout the study and how the feedback received through engagement activities informed the MCEA.
- **Section 11: Recommendations** presents the recommended design concept and associated potential impacts and mitigation measures.
- **Section 12: Implementation Plan** proposes an implementation schedule, triggers for provisional design concepts, and capital cost forecast for implementing the MCEA recommendations.

1.3 Project Contact

Primary contacts for the project are as follows:

Halton Region

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Tom Mahood, P.Eng.

Project Manager
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tom.mahood@jacobs.com

You may provide written comments to our project team by March 20, 2026. All comments and concerns should be sent directly to Erica Wilson from Halton Region at Erica.Wilson@halton.ca.

Halton Region will work with the public, Indigenous Communities, First Nations and Métis Communities and government agencies to determine the preferred means of addressing a problem or opportunity. Project consultation is intended to address all comments received during the consultation period and resolve any outstanding concerns with the project team. In the event there are outstanding concerns that relate to the potential adverse impacts to constitutionally protected Indigenous and treaty rights, a Section 16 request on those matters (only), should be addressed in writing to:

Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Avenue, 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

Requests should specify what conditions, if any, the requestor is seeking or that a comprehensive Environmental Assessment (EA) is being sought, how the requested order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any other information in support of the request.

All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of Section 30 of the Environmental Assessment Act and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential.

2. Ontario Environmental Assessment Process

This section describes the Ontario EA process.

2.1 Environmental Assessment Act

The objective of the Ontario Environmental Assessment Act Revised Statutes of Ontario 1990, c. E. 18 (last amended in 2025) is to consider the possible effects of projects early in the planning process when concerns may be most easily resolved, and to select a preferred solution with the fewest identified impacts.

The *EA Act* requires the study, documentation, and examination of the environmental effects that could result from projects or activities.

The *EA Act* defines “environment” very broadly as follows:

1. Air, land, or water
2. Plant and animal life, including human life
3. Social, economic, and cultural conditions that influence the life of humans or a community
4. Any building, structure machine, or other device or thing made by humans
5. Any solid, liquid, gas, odour, heat, sound, vibration, or radiation resulting directly or indirectly from human activities
6. Any part or combination of the foregoing, and the interrelationships between any two or more of them, in or of Ontario

In applying the requirements of the *EA Act* to projects, two types of EA planning and approval processes are identified:

- Individual EAs (Part II of the *EA Act*): Projects have terms of reference and individual EAs, which are carried out and submitted to the Ontario Ministry of the Environment, Conservation and Parks (MECP) for review and approval.
- Class EAs: Projects are approved subject to compliance with an approved Class EA process; provided that the appropriate Class EA approval process is followed, a proponent will comply with the requirements of the *EA Act*.

2.2 Environmental Assessment Process

The MCEA process is a decision-making framework that effectively meets the requirements of the *EA Act* and is comprised of the following five phases. These phases are illustrated in Figure 2-1.

1. Identify the problem and opportunity.
2. Identify alternative solutions and establish a preferred solution.
3. Examine alternative methods of implementing the preferred solution that will minimize negative effects and maximize positive effects.
4. Prepare the ESR.
5. Implement the preferred solution.

The MCEA schedules are defined as follows:

- **Exempt Projects** (formerly Schedule A and A+ projects) include municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal adverse effects on the environment. These projects are exempt from the requirements of the *EA Act*.
- **Eligible for Screening to Exempt** are projects that may be exempt from the requirements of the *EA Act*, based on the results of the archaeological screening process included in Appendix 1 of the MEA MCEA (MEA, October 2000, as amended in 2024). Completing the screening process is voluntary and proponents may choose to proceed with the Schedule B or C process instead.
- **Schedule B** projects must proceed through the first two phases of the process. Proponents must identify and assess alternative solutions to the problem, inventory impacts, and select a preferred solution. A Project File must be prepared and made available for review by any interested person or party. The proponent must also contact relevant agencies and affected members of the public. Provided there are no outstanding concerns, the proponent may proceed to implementation once the regulatory process has been completed.
- **Schedule C** projects require more detailed study, public consultation, and documentation, as they may have potential for more significant environmental effects. Projects categorized as Schedule C must proceed through all five phases of an assessment. An ESR must be completed and available for a 30-day public review period. If there are no outstanding concerns, the proponent may proceed to implementation once the regulatory process has been completed.

This project was completed as a Schedule C MCEA study, including Phases 1 through 4 of the MEA MCEA Process, as shown in Figure 2-1.

A Section 16 Order is the legal mechanism in which the status of an undertaking can be elevated before the project can progress. The study's planning and design process allows for concerns to be identified and resolved throughout the course of the project; however, a Section 16 Order request can be submitted to MECP on the grounds that the order may prevent, mitigate or remedy adverse impacts on the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada, as recognized and affirmed in Section 35 of the Constitution Act, 1982.

The *EA Act* as amended through the COVID-19 Economic Recovery Act, 2020, also provides the Minister with the authority to make two types of orders with respect to an undertaking proceeding in accordance with a MCEA. The Minister may, on their own initiative, within a time-limited period, require a proponent to undertake an individual EA, referred to as a Section 16(1) order, in which case the proponent cannot proceed with the project without first seeking and obtaining approval under Part II of the Act (conduct an individual EA). The Minister may also impose conditions on an undertaking, referred to as a Section 16(3) order, where the proponent must meet the conditions outlined in the order.

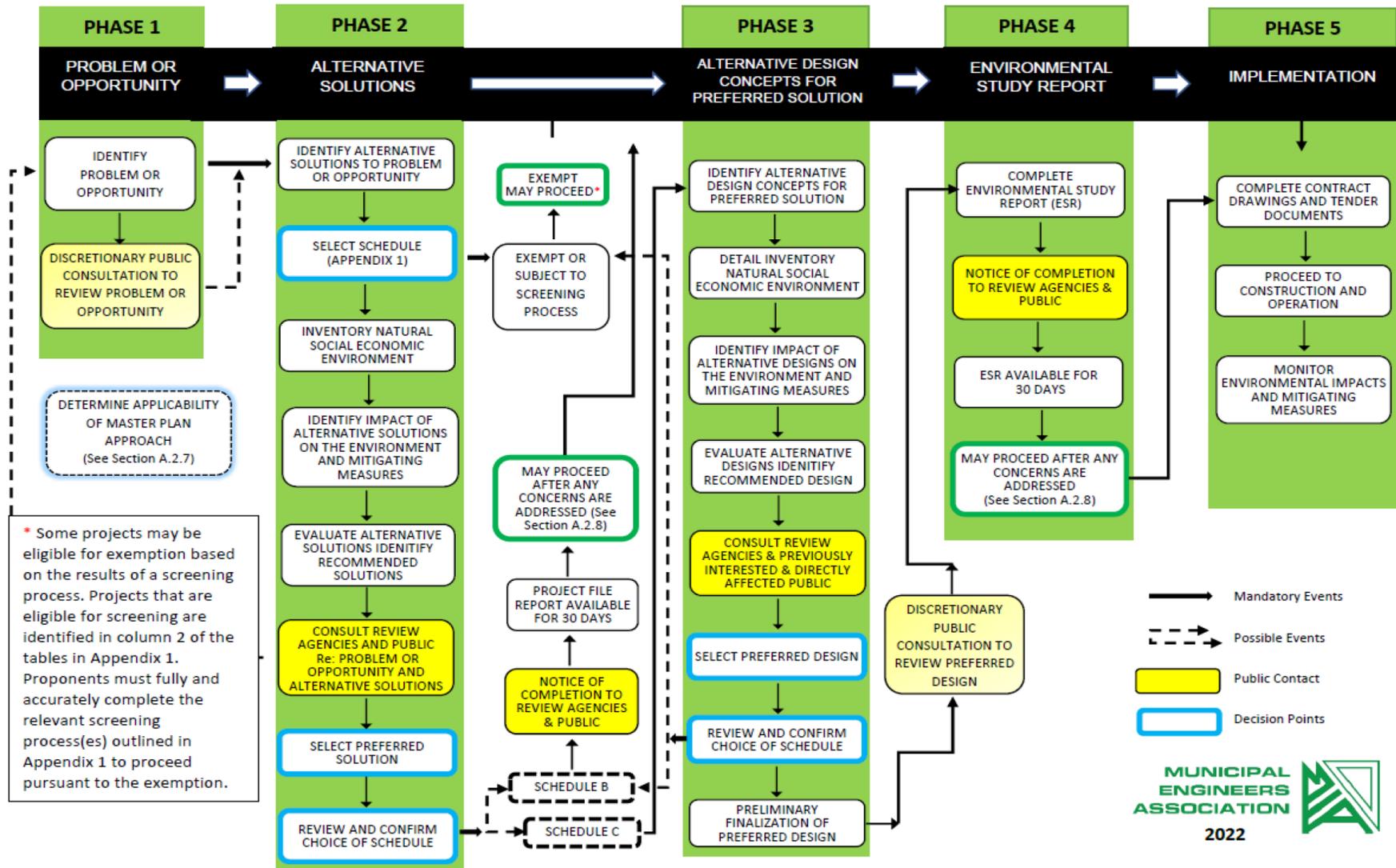


Figure 2-1. Municipal Class EA Planning and Design Process, retrieved from

3. Project Context

This section presents an overview of the Study Area, the Mid-Halton WWTP, and relevant regulatory frameworks and documents that informed the study.

3.1 Study Area

The Study Area boundaries for the purposes of this Schedule C MCEA study include the Mid-Halton WWTP site and the Third Line Pumping Station (PS) site. Figure 3-1 presents the project Study Area, located on the North Service Road between Third Line and Bronte Road, north of the Queen Elizabeth Way (QEW) highway in the town of Oakville. It borders the Deerfield Golf Course on the west, Langtry Park on the northeast, and the Fourteen Mile Creek Lands to the north.



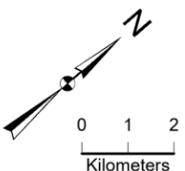
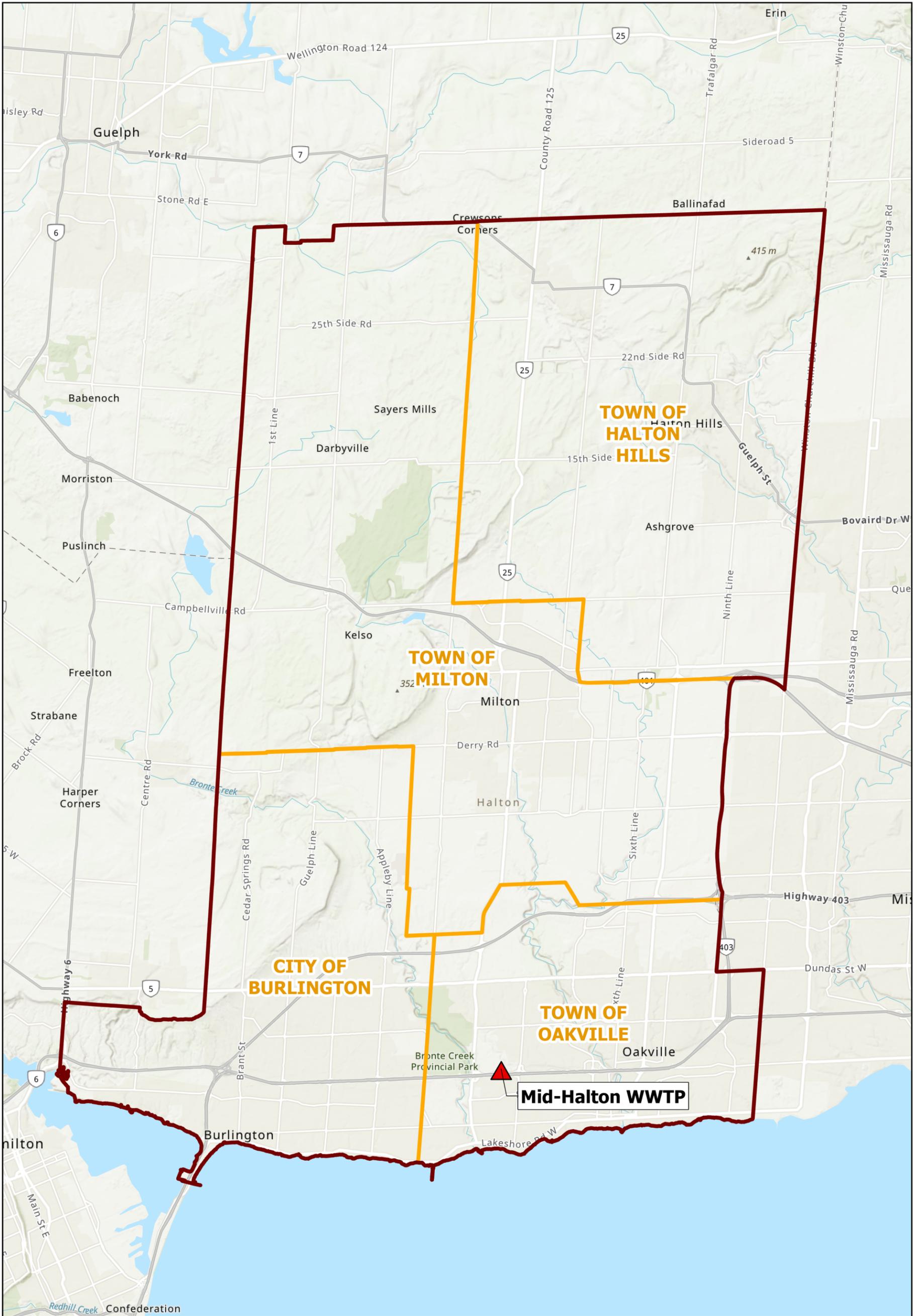
Figure 3-1. Mid-Halton WWTP Site Overview and Boundary

3.2 Mid-Halton WWTP

The Mid-Halton WWTP receives domestic, institutional, commercial, and industrial wastewater from North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills, providing wastewater treatment for approximately 290,000 population equivalents.

The Mid-Halton WWTP provides capacity to treat an average daily wastewater flow of 125 ML/d and discharges treated and seasonally disinfected effluent to Lake Ontario. The treated effluent and biosolids have energy and nutrient value, which are recovered by current practices.

Figure 3-2 provides the Mid-Halton WWTP location in Halton Region.



- ▲ Study Area
- Municipal Boundary
- Regional Municipality of Halton

Notes:
 1. Basemaps Source: Esri, NASA, NGA, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Figure 3-2
 Mid-Halton WWTP Location in the Region
 Environmental Study Report
 Mid-Halton Wastewater Treatment Plant (WWTP) Expansion
 Environmental Assessment (EA)
 Regional Municipality of Halton
 Oakville, Ontario

The plant is a conventional activated sludge (CAS) treatment plant that provides screening, grit removal, primary clarification, secondary treatment, chemical phosphorus removal with ferric chloride, and seasonal UV disinfection. Residual solids generated during the wastewater treatment process are managed through waste activated sludge (WAS) thickening, anaerobic digestion (AD), and dewatering. Dewatered biosolids are conveyed to storage bins prior to trucking offsite for end use. Figure 3-3 provides an aerial view of the existing plant facilities layout.



Figure 3-3. Aerial view of the Mid-Halton WWTW

Influent wastewater is pumped to the Mid-Halton WWTW through the North PS and Third Line PS. Flows are conveyed to a flow distribution chamber, which splits flows between two headworks facilities – a Train A and B facility and a Train C facility. There are three parallel primary and secondary treatment trains (referred to as Trains A, B, and C) at the Mid-Halton WWTW. Secondary effluent from each train flows into a combined channel and receives seasonal UV disinfection (May 1 to October 31) prior to final discharge. Effluent is discharged through a dedicated outfall into Lake Ontario.

Two solids streams are generated as a result of the treatment process: primary sludge and WAS. WAS is thickened prior to being blended with primary sludge and anaerobically digested. Digested biosolids are dewatered and hauled offsite for beneficial use.

Figure 3-4 illustrates the Mid-Halton WWTW process units flow chart.

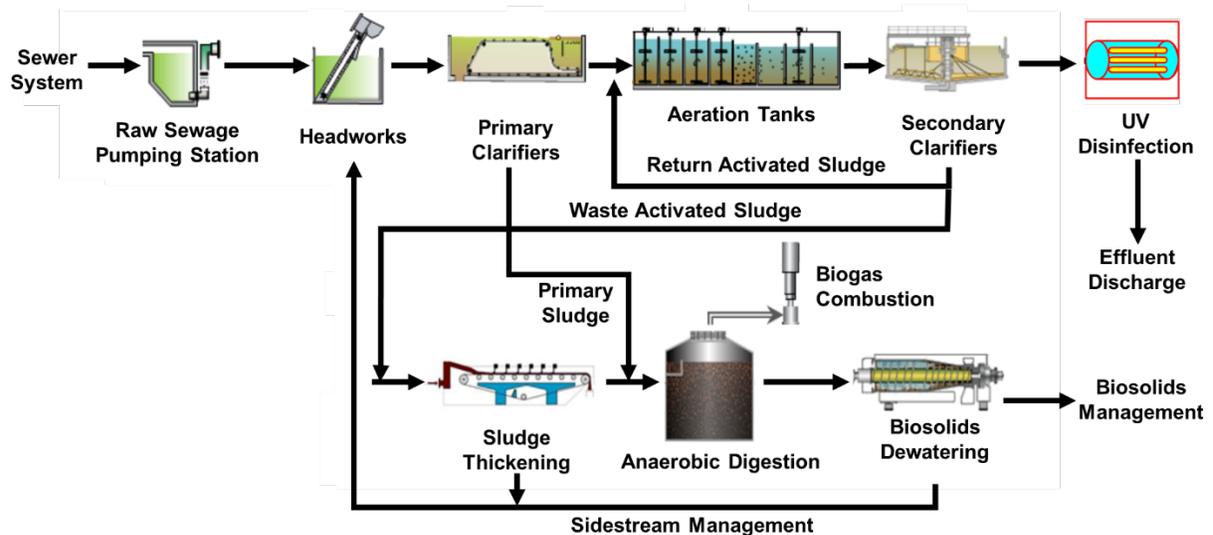


Figure 3-4. Mid-Halton WWTP Process Units Flow Chart

Details of each process unit include:

- **North PS and Third Line PS:** Wastewater is collected from the service areas through a network of trunk and local sewers, wastewater PSs, and forcemains. These flows converge at the North PS and the Third Line PS before being conveyed to the Mid-Halton WWTP for treatment. As illustrated in Figure 3-3, the North PS is located on the Mid-Halton WWTP site, and the Third Line PS to the east of the site. The need to expand both of these PSs was considered in this EA.
- **Headworks (or preliminary treatment):** Two dedicated headwork facilities, one for Trains A and B and another for Train C, provide preliminary treatment through screening and grit removal. Mechanical screens remove material such as rags, paper, and branches and other large debris from the wastewater. Heavier inorganic particles, such as sand and grit, are removed through the detritors (grit removal via sedimentation) at the Train A and B facility, and vortex separators grit removal (via centrifugal force) at the Train C facility. Screenings and grit material removed from the wastewater stream are collected and trucked to landfill for disposal.
- **Primary Treatment:** There are eight rectangular primary clarifiers tanks at the Plant, four servicing Trains A and B, and four servicing Train C. Suspended solids settle out in the primary clarifiers while light materials (oil and grease) rise to the surface of the tanks and are removed by skimming mechanisms. The settled solids, referred to as primary sludge, are pumped to the anaerobic digesters and the effluent moves on to secondary treatment.
- **Secondary Treatment:** This process unit has two main components. The aeration tanks are where aerobic microorganisms break down the organic contaminants in the wastewater to reduce the organic load, measured as biochemical oxygen demand (BOD). Microorganisms also convert ammonia to nitrate, since the un-ionized ammonia form is toxic to aquatic life. Nitrogen is measured as ammonia nitrogen ($\text{NH}_3\text{-N}$). Oxygen is added to the aeration tanks to promote microorganisms' growth. The biologically treated wastewater and the microorganisms (called activated sludge) are separated by gravity in the secondary clarifiers, with a portion being recirculated to the aeration tanks and the remaining activated sludge or WAS being sent to solids treatment for thickening. The Mid-Halton WWTP operates three parallel CAS treatment processes, Trains A, B, and C. Train A consists of six rectangular aeration tanks and one circular aeration tank. Train B consists of two rectangular aeration tanks and one circular aeration tank. Train C consists of two rectangular aeration tanks. Each treatment

train has four rectangular secondary clarifiers (12 clarifiers in total), where ferric chloride is added for chemical phosphorous removal.

- **UV Disinfection:** Seasonal UV disinfection (from May 1 to October 31) is used to remove pathogens and microorganisms like bacteria, viruses, and parasites. The UV building has five UV channels, from which four are equipped with low pressure/high intensity (LP/HI) UV lamps (two banks per channel). Up to three of these channels are operational at a time with the fourth available as standby. The fifth channel is available for future capacity expansion.
- **Outfall:** The outfall is designed with a hydraulic capacity capable of servicing a peak instantaneous flow of up to 1200 ML/d. Treated effluent from the plant is discharged to Lake Ontario through an outfall pipe and multiport diffuser system. The pipe extends 1790 m offshore to a multiport staged diffuser that is 300 m in length. The average water depth over the length of the diffuser is 27 m.
- **Sludge Thickening:** WAS from secondary treatment is combined in the WAS blend tank and then thickened to increase solids concentration before going to AD. This optimizes the digestion process and reduces digester volume. Three rotary drum thickeners (RDTs) are located in the Biosolids Building, with space reserved for the installation of a fourth RDT for capacity expansion.
- **AD:** Thickened WAS (TWAS) and primary sludge from primary clarifiers are conveyed to three anaerobic digesters for sludge stabilization. Stabilized sludge is referred to as biosolids. The biogas generated in the process is captured and used as fuel for hot water boilers to recover energy and meet digester and building heating demands. Excess biogas is flared. Digested biosolids are stored in one secondary digester before dewatering.
- **Dewatering:** Biosolids are dewatered to further concentrate solids and reduce volume for transportation through two centrifuges located in the Biosolids Building. There is space reserved for the installation of a third centrifuge for capacity expansion.
- **Sidestream Management:** The main recycle streams generated by sludge treatment are thickening filtrate and dewatering centrate. The current sidestream management strategy is to equalize flows in two separate storage tanks for filtrate and centrate and pump them back to a recycled flow chamber for treatment in the liquid trains.

3.3 Legislative Framework

This section provides an overview of the relevant federal, provincial, and local legislation relating to the treatment of wastewater and the protection of the environment that were considered for this expansion project.

3.3.1 Planning Act

The *Planning Act, 1990*, (Ontario, Planning Act, 1990) is a provincial law that regulates how land is used and developed in Ontario. It sets out the framework, principles, policies and procedures for planning decisions and appeals. The Act aims to integrate community input, environmental health, and economic growth in the planning process, and describes how land uses may be controlled, and who may control them. The purpose of the Act is to:

- Provide for planning processes that are fair by making them open, accessible, timely and efficient
- Promote sustainable economic development in a healthy natural environment within a provincial policy framework
- Provide for a land use planning system led by provincial policy

- Integrate matters of provincial interest into provincial and municipal planning decisions by requiring that all decisions be consistent with the Provincial Policy Statement and conform/not conflict with provincial plans
- Encourage co-operation and coordination among various interests
- Recognize the decision-making authority and accountability of municipal councils in planning

The roles and responsibilities of the Province include:

- Issuing provincial policy statements under the *Planning Act*
- Promoting provincial interests, such as: protecting farmland, natural resources and the environment; and, promoting development that is designed to be sustainable, supportive of public transit and designed for the needs of pedestrians
- Preparing provincial plans (for example, A Place to Grow: Growth Plan for the Greater Golden Horseshoe)
- Providing advice to municipalities and the public on land use planning issues
- Administering local planning controls and giving approval where required

The roles and responsibilities of municipalities include:

- Making local planning decisions that will determine the future of communities
- Preparing planning documents, such as official plans, which set out the municipality's general planning goals and policies that will guide future land use, and zoning bylaws, which set the rules and regulations that control development as it occurs
- Ensuring planning decisions and planning documents are consistent with the Provincial Policy Statement and conform or do not conflict with provincial plans

3.3.1.1 Bill 23 - More Homes Built Faster Act (2022)

On November 28, 2022, the Government of Ontario passed the More Homes Built Faster Act, 2022 (Bill 23) (Ontario, Bill 23, More Homes Built Faster Act, 2022), a bill that significantly amends and creates new legislation affecting planning and land development across the province of Ontario. Bill 23 supports long-term strategies to increase housing supply, with a goal of building 1.5 million homes in 10 years.

Bill 23 introduced changes to the *Planning Act* and *Development Charges Act* to create expanded “as of right” development rights for small scale residential development, regulate the use of inclusionary zoning, require municipalities to be more flexible with parkland dedications, limit the application of site plan control, and change how planning authority is exercised in regional and local municipalities, giving communities more influence over decisions that impact them directly. Changes to the *Planning Act* also require municipalities to adopt zoning by-law amendments that ensure that development meets minimum density targets near major transit station areas within one year of identifying such major transit station areas in an Official Plan (OP). Amendments to the *Development Charges Act* include several new discounts and exemptions to the rates that municipalities can charge for new development, including affordable and inclusionary zoning units, select attainable housing units, non-profit housing developments, as well as rental construction and development.

Schedule 9 of the Act makes various amendments to the *Planning Act, 1990*, including changes to the third-party appeal process of OPs and amendments, zoning bylaws and amendments, consents, and minor variances. *The Act* now requires that only persons from a specified person list be allowed to appeal a

decision. Appeal rights are maintained for key participants, except where appeals have been restricted elsewhere (such as a minister's decision on a new OP).

Amendments to the *Conservation Authorities Act* have the potential to permit development in areas that were previously prohibited through regulation, freeze certain fees payable to the conservation authority and impose new limits on a conservation authority's programs or services, if related to reviewing development applications. Further, conservation authority appeals under the *Planning Act* will be limited to matters that affect land owned by them, or where the conservation authority is the applicant. In the future, a conservation authority may only act as a public body in specific appeals, to be listed in the revised statute, where the appeal is made under a provision relating to natural hazard policies in the Provincial Planning Statement (2024).

3.3.1.2 Bill 185 - Cutting Red Tape to Build More Homes Act (2024)

The Cutting Red Tape to Build More Homes Act, 2024 (Bill 185), (Ontario, Bill 185, Cutting Red Tape to Build More Homes Act, 2024) received royal assent from the Government of Ontario on June 6, 2024, and aims to accelerate the development of new housing by removing perceived barriers.

The Act makes various amendments to the *Planning Act* that impact the Mid-Halton WWTP Expansion Project including defining Halton Region as a "regional municipality" without planning authority as of July 1, 2024, with the responsibility for municipal planning resting solely with the local area municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills). Therefore, the responsibility for interpretation and implementation of the Halton Regional Plan (2024) (Halton Region, 2024), further described in Section 3.3.4 now rests with area municipalities.

3.3.2 Provincial Planning Statement, 2024

The Provincial Planning Statement, 2024 (PPS) (Ontario, Provincial Planning Statement, 2024) is a key document that provides direction on matters of provincial interest related to land use planning and development and sets the foundation for policies regarding the regulation of development and use of land. The PPS came into effect in October 2024 and replaces both the Provincial Policy Statement 2020 and a Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2019, while building upon housing -supportive policies from both documents.

The PPS 2024 provides municipalities with the tools and flexibility they need to build more homes. It enables municipalities to:

- Plan for and support development and increase the housing supply across the province.
- Align development with infrastructure to build a strong and competitive economy that is investment -ready.
- Foster the long-term viability of rural areas.
- Protect agricultural lands, the environment, public health and safety.

Municipal official plans, such as the Halton Regional Plan (Halton Region, 2024) are considered the most important "vehicle" for implementation of the PPS.

Policies that may be applicable to the study are listed as follows:

- Vision Statement: Healthy, livable, and safe communities are sustained by promoting development and land use patterns that conserve biodiversity and prepare for regional and local impacts of climate change.

- Policy 2.9.1: Planning authorities shall plan to reduce greenhouse gas emissions and prepare for the impacts of a changing climate through approaches that incorporate climate change considerations in planning for the development of infrastructure, including stormwater management systems, and public service facilities; support energy conservation and efficiency; and take into consideration any additional approaches that help reduce greenhouse gas emissions and build community resilience to the impacts of a changing climate
- Policy 3.6.1: Planning for sewage and water services shall: accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing municipal sewage services; ensure that these systems can be sustained by water resources, is feasible and financially viable over their life cycle, protects human health and safety, and the natural environment, including the quality and quantity of water, promote water conservation and water use efficiency and considers opportunities to allocate, and re-allocate if necessary, the unused system capacity of municipal water services and municipal sewage services to support efficient use of these services to meet current and projected needs for increased housing supply.
- Policy 3.6.8: Planning for stormwater management shall: be integrated with planning for sewage and water services and ensure that systems are optimized, retrofitted as appropriate, feasible and financially viable over their full life cycle; minimize or prevent or reduce increases in stormwater volumes and contaminant loads; minimize erosion or changes in water balance including through the use of green infrastructure; mitigate risks to human health, safety, property and the environment; maximize the extent and function of vegetative and pervious surfaces; and promote best practices, including stormwater attenuation and reuse, water conservation and efficiency, and low impact development.
- Policy 4.1.1: Natural features and areas shall be protected for the long term.
- Policy 4.1.2: The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.
- Policy 4.1.3: Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.
- Policy 4.1.5: Development and site alteration shall not be permitted in significant woodlands in Ecoregions 6E and 7E, significant wildlife habitat, and significant areas of natural and scientific interest (ANSI) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
- Policy 4.1.7: Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.
- Policy 4.6.2: Planning authorities shall not permit development and site alteration on lands containing archaeological resources or areas of archaeological potential unless the significant archaeological resources have been conserved.
- Policy 4.6.3: Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property unless the heritage attributes of the protected heritage property will be conserved.
- Policy 4.6.5: Planning authorities shall engage early with Indigenous Communities, First Nations and Métis Communities and ensure their interests are considered when identifying, protecting and managing archaeological resources, built heritage resources and cultural heritage landscapes.

- Policy 5.2.4: Planning authorities shall prepare for the impacts of a changing climate that may increase the risk associated with natural hazards.
- Policy 6.2.1: A coordinated, integrated, and comprehensive approach should be used when dealing with planning matters within municipalities, including managing natural heritage, water, agricultural, mineral, cultural heritage, and archaeological resources.
- Policy 6.2.2: Planning authorities shall undertake early engagement with Indigenous Communities, First Nations and Métis Communities and coordinate on land use planning matters to facilitate knowledge-sharing, support consideration of Indigenous interests in land use decision-making and support the identification of potential impacts of decisions on the exercise of Indigenous or treaty rights.

3.3.3 Greenbelt Plan

The Greenbelt is considered to be a cornerstone of the Growth Plan for the Greater Golden Horseshoe; therefore, it identifies where development should not occur in order to protect the agricultural land base, and the ecological and hydrological features occurring on this landscape (MMAH, 2017). The Greenbelt extends about 325 km from the Oak Ridges Moraine (Rice Lake) in the east, to the Niagara River in the west and includes the Niagara Peninsula and the river valleys running through southern Ontario to Lake Ontario. The Greenbelt Plan builds on the PPS to establish a land use planning framework to support sustainable development. While Bill 23, the "More Homes Built Faster Act", aims to increase housing supply, it did not directly update the Greenbelt Plan. However, the province did propose amendments to the Greenbelt Plan concurrently with Bill 23, including removing lands from the Greenbelt, which were later restored by the Greenbelt Statute Law Amendment Act, 2023.

The Study Area for the Mid-Halton WWTP expansion is not within the main area of the Greenbelt which is located further north of the WWTP. However, the Fourteen Mile Creek Valley lands are located directly to the north and east of the plant site. These valley lands must be protected under designated Greenbelt Plan land.

3.3.4 Halton Regional Plan

In October 2022, the Province tabled Bill 23, More Homes Built Faster Act, 2022. This legislation identified Halton Region as an "regional municipality without planning responsibilities". In April 2024, through Bill 185, Cutting Red Tape to Build More Homes Act, 2024, the effective date of this change to Halton Region's role in land use planning was identified as July 1, 2024. As a result, the Regional Plan that came into effect on July 1, 2024, is no longer considered an OP for the Regional Municipality of Halton. Instead, it is a consolidated plan that includes the OP of the Local Municipalities in Halton (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills).

The Halton Regional Plan (Halton Region, 2024) applies to the Halton Planning Area and provides direction regarding ongoing and future physical development intended to meet the current and future needs of its population.

Part III, Land Stewardship Policies, outlines development criteria applicable to the Study Area as follows:

- Section 57: Development is directed to environmentally suitable areas within the appropriate land use designation in accordance with the goals, objectives and policies of this Plan.
- Section 58: Uses are permitted as specified for each land use designation provided that the site is not considered hazardous to life or property, adequate treatment of wastewater for the proposed use has been secured, and all applicable statutory requirements have been met.

Part III, Land Stewardship Policies, outlines criteria for water supply and wastewater treatment services:

- Section 87: The goal for urban services is to ensure the adequate provision of urban services to achieve regional development objectives while being conscious of the need to protect the environment.
- Section 88: The objectives for urban services are to provide satisfactory levels of urban services to meet existing and future requirements, and to provide a staged program of improvements or extensions of urban services, within the financial capabilities of the Region, that meet or exceed provincial environmental standards and based on the Joint Infrastructure Staging Plan (that is, Joint plan with municipalities and the province).
- Section 89 (9): Explore, and implement, if deemed cost-effective, technological innovations and best operating and management practices to continuously improve performance of the servicing infrastructure to protect the environment.
- Section 89 (23): Minimize the number of disturbances to the Regional Natural Heritage System affected by the provision of urban services, by integrating, if possible, construction plans for both water supply and wastewater treatment services, and by designing the urban services at those locations to take into account any possible future system expansion.

Part III, Land Stewardship Policies, includes objectives for preserving and enhancing the Natural Heritage System, as follows:

- Section 114.1: Objectives of the Natural Heritage System including to direct development to locations outside hazard lands; to protect or enhance the diversity of flora and fauna, ecosystems, plant communities, and significant landforms; and, to preserve or enhance air quality.

Part IV, Healthy Communities Policies, includes objectives for environmental quality, as follows:

- Section 142, Air and the Ambience: improving air quality, addressing the impact of climate change, and reducing overall GHG emissions generated by the Region's own activities and functions.
- Section 146, Land: protecting unique landforms such as the Niagara Escarpment permanently, preserving certain landscapes as part of Halton's Cultural Heritage Resources, and implementing the environmental goals and objectives of this Plan through strategic land acquisitions.
- Section 159: promoting public awareness of Regional affairs and services and providing opportunities for all sectors of the community to participate in municipal decision-making.
- Section 165: protecting the material, cultural and built heritage of Halton for present and future generations.

3.3.5 Town of Oakville Official Plan

Per Bill 23 and Bill 185, as of July 1, 2024, the Halton Regional Plan remains in effect as an OP for Oakville and the other Halton Region area municipalities until it is revoked or amended by the respective municipality. This means there are now three OPs which apply to the Town of Oakville:

- The Livable Oakville Plan which applies to all lands within the Town, except for the North Oakville East and West Secondary Areas (including the Mid-Halton WWTP Study Area).
- North Oakville Secondary Plans which apply to lands north of Dundas Street and South of Highway 407 between Ninth Line and Tremaine Road.
- Halton Regional Plans, as described in Section 3.3.4.

The Livable Oakville Plan was unanimously adopted by Council on June 22, 2009, approved with modifications by the Region on November 30, 2009, and ultimately approved by the Ontario Municipal Board on May 10, 2011. The Livable Oakville Plan applies to all lands in the town of Oakville south of Dundas Street and north of Highway 407.

The Planning Act requires that an OP “contain goals, objectives and policies established primarily to manage and direct physical change and the effects on the social, economic and natural environment of the municipality.” The following policies are relevant to the Mid-Halton WWTP Expansion Project:

- Section 5.3.1: The Town shall encourage the conservation of cultural heritage resources identified on the register and their integration into new development proposals through the approval process and other appropriate mechanisms.
- Section 5.3.2: A cultural heritage resource should be evaluated to determine its cultural heritage values and heritage attributes prior to the preparation of a heritage impact assessment of a proposed development on the cultural heritage resource.
- Section 5.3.6: The Town should require a heritage impact assessment where development or redevelopment is proposed on, adjacent to, or in the immediate vicinity of, an individually designated heritage property.
- Section 5.4.2: Where a development may have an impact to archaeological resources or areas of archaeological potential, an assessment by a qualified professional will be required in accordance with provincial standards and guidelines. Archaeological resources that are located on a proposed development site will be conserved in accordance with the recommendations of the approved assessment.
- Section 5.4.3: Where significant archaeological resources must be preserved onsite, only development and site alteration which maintain the heritage integrity of the site may be permitted.
- Section 10.2.1: The Town recognizes that a key initiative to mitigate the impacts of climate change is the reduction of greenhouse gas emissions. The Town will work to mitigate and adapt to climate change by initiatives that include but are not limited to encouraging energy generation from renewable sources as well as district energy, establishing targets for reducing greenhouse gas emissions and improving air quality.
- Section 10.9.4: Where there is no existing subwatershed study, and a study is not required under Section 10.9.3, an environmental impact statement may be required to be prepared by the proponent of a planning application for lands adjacent to watercourses, natural features, and related physiographic or topographic formations that contribute to groundwater recharge or discharge.

3.4 Legislative Approvals

This section provides an overview of the federal, provincial, and local legislation and associated permits and approvals that are relevant for the Mid-Halton WWTP expansion and provide guidance for protecting the natural heritage, cultural heritage, and archaeological features.

3.4.1 Federal Legislation and Policy

3.4.1.1 Fisheries and Oceans Canada - Fisheries Act

The Fisheries Act (1985) is a federal legislation mandated by Fisheries and Oceans Canada (DFO), in conjunction with various other agencies (Environment and Climate Change Canada (ECCC), Ontario

Ministry of Natural Resources (MNR), MECP), that provides a framework for the proper management and control of fisheries, and the conservation and protection of fish and fish habitat, including by preventing pollution.

The following sections of the Act are relevant to this Class EA regarding fish and fish habitat protection and pollution prevention:

- **Section 34.4(1):** No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish
- **Section 35(1):** No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat
- **Section 36(3):** No person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

3.4.1.2 Environment and Climate Change Canada - Migratory Bird Convention Act

The Migratory Birds Convention Act (MBCA) (1917, amended 1944, 2005), is to protect migratory birds, their eggs, and their nests. The MBCA was created to implement the Migratory Birds Convention between Canada and the United States. The Act, administered by ECCC, lists protected families and subfamilies of migratory birds and lays out legislation surrounding activities that may impact migratory birds or nests, including when and where activities may occur.

3.4.1.3 Environment and Climate Change Canada - Species at Risk Act

The Species at Risk Act (SARA) focuses on preventing wildlife species in Canada from disappearing, providing for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity, and managing species of special concern to prevent them from becoming endangered or threatened.

Species are designated at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) by using biological information on a species deemed to be in danger. The COSEWIC reviews the best available scientific, community and Indigenous knowledge and applies assessment criteria based on international standards to evaluate risk of extinction.

While SARA applies to species on federal land, it also applies to species at risk migratory birds under the MBCA and fish anywhere they occur. Therefore, SARA may apply to any fish species that are deemed a federal species at risk as a result of the project.

3.4.2 Provincial Legislation and Policy

3.4.2.1 Ministry of Citizenship and Multiculturalism - Ontario Heritage Act

The Ontario Heritage Act, mandated by the Ministry of Citizenship and Multiculturalism (MCM), allows municipalities and the provincial government to designate individual properties and districts as being of cultural heritage value or interest. The Act requires that cultural heritage resources, including buildings, sites and archaeological (land and marine) resources be protected and that any potential impacts to these features must be avoided or mitigated.

As part of the Class EA, a Stage 1 Archaeological Assessment (AA) (Archaeological Services Inc, 2025) was completed under Project Information Form (PIF) number P094-0456-2025. The full report is included in Appendix A. Should previously undocumented archaeological resources be discovered during construction, the Region of Halton will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented.

The Merton Mount Pleasant Cemetery located across the road from the Mid-Halton WWTP was identified as a recognized heritage property. A Cultural Heritage Evaluation Report and a Heritage Impact Assessment was completed to update the Statement of Heritage Value and ensure that the property is not impacted during construction.

3.4.2.2 Ministry of Environment, Conservation and Parks - Endangered Species Act

The Endangered Species Act (2007), similar to the SARA, aims to identify species at risk based on the best available scientific information, including information obtained from community knowledge and Indigenous traditional knowledge, to protect species that are at risk and their habitats, and to promote the recovery of species that are at risk, as well as stewardship activities to assist in the protection and recovery of species that are at risk.

The Endangered Species Act provides guidance on determining whether anthropogenic activities, such as construction, could impact regulated species and considers biology and behaviour of the species, details of the activity, and how the activity may affect the species' ability to carry out its life processes.

3.4.2.3 Ministry of Environment, Conservation and Parks - Environmental Protection Act and Ontario Water Resources Act

The Environmental Protection Act (EPA) is the primary pollution control legislation in Ontario and is used with the Ontario Water Resources Act (OWRA) to protect air and water quality in Ontario. The EPA prohibits the discharge of contaminants into the environment that are likely to cause adverse effects, by establishing limits for air emissions and wastewater effluent that must not be exceeded. Environmental Compliance Approvals (ECAs) are issued under the Act. In addition, the Act controls the removal, transport, and disposal of excess soils; if they are deemed to be contaminated. Management of excavated soils must be in accordance with Ontario Regulation (O. Reg.) 406/19 (amended October 2025): On-site and Excess Soil Management.

The OWRA focuses on the protection of groundwater and surface water in Ontario. The Act regulates the approval, construction, and operation of wastewater treatment facilities, including ensuring that effluent discharges to receiving waters meet Provincial Water Quality Objectives (PWQOs). Permits to Take Water (PTTW) from the ground or surface water sources are also regulated under the Water Resources Act.

The EPA and OWRA are key legislation applicable to this project. The recommended design concept identified through the Class EA process must incorporate mitigation measures to reduce risks to the community and the environment to receive subsequent approvals under these Acts.

3.4.2.3.1 Water Management – Policies, Guidelines, Provincial Water Quality Objectives

To support municipalities in meeting the EPA and OWRA, the MECP has developed water management guidelines. The two (2) most relevant guidelines to this Class EA are described here:

1. MECP Procedure F-5-1

Procedure F-5-1 outlines treatment requirements for municipal and private sewage treatment works discharging to surface waters. Effluent requirements are established on a case-by-case basis considering the characteristics of the receiving water body. All sewage treatment works shall provide secondary treatment or equivalent as the “normal” level of treatment unless individual receiving water assessment studies indicate the need for higher levels of treatment. Existing works not complying with the guidelines are required to be upgraded as soon as possible.

The procedure stipulates effluent design objectives for BOD, suspended solids, total phosphorus and ammonia, and provides guidelines for BOD and suspended solids. Sewage treatment works designed according to the guidelines should be able to meet the objectives on an average annual basis and not exceed the guidelines.

Procedure F-5-1, Section 3.3 states that bypassing of raw sewage and primary effluent from nominally separated sewerage systems will not be allowed except in emergency conditions. However, Section 3.5 allows the use of “excess primary treatment” to handle extraneous wet weather peak flows where secondary treatment for these flows is “impractical or uneconomical”. Effluent criteria and compliance assessment programs are not necessary for excess primary treatment. This policy supports the development of appropriate levels of primary and secondary treatment capacity, particularly with respect to subjecting peak flows to a minimum of primary treatment and the determination of secondary treatment peak capacity.

2. MECP Procedure B-1-5

Procedure B-1-5 describes the procedures to establish receiving-water-based effluent requirements for point source discharges, such as wastewater treatment plant outfalls. The procedures aim to ensure that point-discharges to surface water bodies do not negatively impact receiving water quality relative to PWQOs. Procedure B-1-5 states that effluent limits are the legally enforceable effluent requirements, and that these limits are based on either achievable treatment technology or scientifically sound data on receiving water quality requirements. Further it states that effluent objectives are used where the available data on the parameters to be controlled are insufficient to form the basis for a legally enforceable limit. Violations of an effluent objective can require the discharger to report on the causes and impacts of the violations as per their ECA and MECP policy.

Surface waters in Ontario are subject to requirements of the five (5) Policies, as applicable to an undertaking:

- **Policy 1** applies to water bodies with quality that is better than PWQO and specifies that water quality must be maintained at or above the Objective.
- **Policy 2** applies to water bodies with quality that does not currently meet PWQO and shall not be further degraded. Policy 2 reinforces the fact that measures should be taken to improve water quality to meet Objectives.
- **Policies 3 and 4** prohibit the release of banned hazardous substances and minimize the release of non-hazardous substances, respectively.

- **Policy 5** addresses mixing zone effects; the mixing zone is defined as an area where the receiving water quality is degraded at the point of discharge and may hinder beneficial use of the water body. Policy 5 prescribes that mixing zones should be as small as possible to limit effects on beneficial use and shall not be used in lieu of reasonable and practical treatment.

For this Class EA, Policies 1 and 5 will apply. The procedure also stipulates methods for developing effluent criteria and assessing receiving waters. In compliance with this procedure, a receiving water impact assessment and assimilative capacity study was completed to ensure that the plant continues to meet guidelines set forth by the MECP.

3.4.2.3.2 Permits to Take Water

PTTW are required if temporary or permanent dewatering is required. For temporary dewatering on land, the volume of water entering the excavation will be based on both groundwater infiltration and precipitation events. Based on O. Reg. 63/16, the following dewatering limits and requirements are as follows:

- Construction Dewatering less than 50,000 litres per day (L/day): The takings of both groundwater and stormwater do not require a hydrogeological report and does not require a PTTW from the MECP.
- Construction Dewatering greater than 50,000 L/day and less than 400,000 L/day: The taking of groundwater and/or stormwater requires a hydrogeological report and registration on the Environmental Activity and Sector Registry (EASR) but does not require a PTTW from the MECP.
- Construction Dewatering greater than 400,000 L/day: The taking of groundwater and/or stormwater requires a hydrogeological report and a PTTW from the MECP.

For permanent dewatering, based on Section 34 of O. Reg. 387/04, the dewatering limits and requirements are as follows:

- Water Taking less than 50,000 L/day: A PTTW is not required from the MECP.
- Water Taking greater than 50,000 L/day: A PTTW is required from the MECP (likely Category 3).

3.4.2.3.3 Ontario Regulation 406/19: On-Site and Excess Soil Management

The management and reuse of excess soil generated from construction at the Mid-Halton WWTP is governed by Ontario Regulation 406/19 (as amended October 2025). The goal of the regulation is to beneficially reuse excess soil for purposes such as backfilling and landscaping, provided it meets provincial environmental quality standards. This soil must be tested by a qualified professional and must be tracked and documented from its source to its new location. Landfills will no longer accept reusable soil starting as of January 2025, and restrictions are in place to prevent inappropriate dumping.

3.4.2.4 Ministry of Public and Business Service Delivery and Procurement -Electrical Safety Code (Ontario Regulation 164/99)

Electrical power system upgrades are required as part of the upgrade and expansion work at the Mid-Halton WWTP and will require notification of work (also known as a permit) from the Electrical Safety Authority. This notification creates a permanent record of the work and triggers an inspection by the Electrical Safety Authority to ensure compliance with the Ontario Electrical Safety Code (OESC).

3.4.2.5 Ministry of Public and Business Service and Delivery Procurement - Technical Standards and Safety Authority

The Technical Standards and Safety Authority (TSSA) is Ontario's public safety regulator for devices and equipment such as boilers, pressure vessels, and fuels across Ontario. TSSA's work includes design reviews, inspections, investigations, and public education to enhance safety. Any new biosolids treatment facilities (for example, digesters) must meet all standards for use of biogas and solids operation.

3.4.2.6 Ministry of Natural Resources - Fish and Wildlife Conservation Act

The MNR issues permit under the Fish and Wildlife Conservation Act for activities such as collecting, transporting, or releasing scheduled wildlife or fish species. If sensitive natural habitats are impacted by construction, then the species within the habitats may have to be relocated. If so, a Scientific Collecting Permit (or Wildlife Scientific Collector's Authorization) from MNR may be necessary.

3.4.2.7 Conservation Authority Regulation and Policy

The Conservation Authorities Act (1990) provides for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.

The legislative mandate of a conservation authority, as set out in Section 21 of the Conservation Authorities Act, is to establish and undertake programs designed to further the conservation, restoration, development, and management of natural resources. Conservation Authorities are local agencies that protect and manage water and other natural resources at the watershed level. Conservation Halton (CH) has jurisdiction of the Mid-Halton WWTP Study Area.

Given that Mid-Halton WWTP is within the jurisdiction of CH, consultation with the conservation authority is required throughout the study to ensure that appropriate approvals and mitigation measures are considered.

3.4.3 Regional Municipality of Halton

Halton Water and Wastewater Services must coordinate with other Halton service areas, such as legal, financial, planning, transportation, and environmental services, to ensure the expansion meets all internal guidelines and regulations.

In addition, an independent Service Permit must be obtained under the Ontario Municipal Act from Halton Region's Services Permit Group since an additional potable water connection is required to supply water from Halton's water supply system for the expanded plant operations.

3.4.4 Town of Oakville

3.4.4.1 Heritage Act Approval

The Merton Mount Pleasant Cemetery is located on the North Service Road across the road from the Mid-Halton WWTP and has been designated as a heritage property in 1993 by the Town of Oakville as a heritage property through By-law 1993-20 under Part IV of the Ontario Heritage Act. The designation recognizes the cemetery's cultural heritage value, as it is associated with early settlers and is the last remaining part of the former hamlet of Merton, established in 1880. A Cultural Heritage Evaluation Report

(CHER) and a Heritage Impact Assessment (HIA) were completed in consultation with the Town of Oakville Heritage Planning staff to update the Statement of Heritage Value of the cemetery and confirm that the plant expansion will not impact the cemetery. The MCM is the provincial agency that approves the CHER and the HIA and files them in the public record.

3.4.4.2 Site Plan Approval

Site plan approval in Ontario falls under Section 41 of the *Planning Act*. This section allows municipalities to designate areas as being subject to site plan control, which then requires developers to submit site plans for review and approval before proceeding with development. The Town of Oakville and CH are both involved in reviewing site plans.

3.4.4.3 Building Permits & Approvals

Prior to the start of any construction projects, building permits must be obtained from the Town of Oakville that follow the requirements set forth in the Ontario Building Code, and the Town of Oakville Zoning By-law 2014-014.

The zoning by-law implements the community vision and policies for future growth and development expressed in the Town's OP, the Livable Oakville Plan. The zoning by-law puts the Livable Oakville Plan vision and policies into terms, permissions, and numbers that can be measured.

3.4.4.4 Noise By-law Compliance

The Town of Oakville's noise and nuisance bylaws aim to minimize disturbances and regulate or prohibit activities that may reasonably prevent the community from enjoying their properties.

Under the Town of Oakville's Noise By-law, construction noise is prohibited from 7 p.m. to 7 a.m. (Monday to Saturday) and on Sundays and statutory holidays.

Noise exemption permits can be obtained from the Municipal Enforcement Services department. Permits may be considered for construction, community or life events. The application form must be submitted at least 30 days before the scheduled event or activity takes place. Applications for Construction permits must be submitted at least 45 days prior to commencement of any work.

3.4.4.5 Tree Protection Compliance

3.4.4.5.1 Tree Protection By-law 2009-025

The Town Tree Protection By-law aims to promote tree conservation, the increase, renewal and proliferation of trees and the tree canopy, and the protection of existing trees by providing reasonable minimum standards regarding the preservation, planting, protection and maintenance of town trees.

The Town Tree Protection By-law:

- Authorizes and regulates the planting, care, maintenance and removal of trees on town property and ensures the sustainability of the urban forest
- Authorizes the Town to prohibit and regulate the destruction or injury of trees
- Authorizes the Town to access land along any of its highways to inspect trees, conduct tests on trees, and to remove decayed, damaged or dangerous trees or branches if the Town believes the trees or branches pose a danger to the health and safety of any person using the highway

3.4.4.5.2 Tree Protection During Construction Procedure

The purpose of this procedure is to outline the required action by the property owner and/or contractor to protect trees during construction. This procedure shall represent the standard specifications for tree protection whenever tree protection measures are required by the Town. Higher standards of tree protection may be imposed where warranted in the opinion of the Town having regard to the size, variety, location and health of the tree, and any circumstances surrounding the construction which require additional tree protection measures. This procedure applies to Town trees covered under any municipal permit process or agreement relating to construction.

Town trees required to be removed due to construction activities must receive approval by the Director of Parks and Open Space or designate. If approval is granted for removal of Town owned trees, the applicant will assume all costs involved. Where tree relocation is approved, the applicant will assume all relocation and establishment costs. For trees covered under this procedure, written authorization from the Town is required in the form of either a Tree Protection Agreement, or a Tree Protection Zone Encroachment Permit or a Tree Permit

3.4.4.6 Road Occupancy Permits

The Municipal Right of Way By-Law 2024-002 regulates the use of a municipal right of way which refers to land owned by the Town including opened or unopened road allowances, public walkways, municipal services, or public utilities, but excludes Town lands owned or operated as parkland, creeks and watercourse, and related public trail systems. The following sections from the by-law may be relevant to the Mid-Halton WWTP Expansion Project.

- **2.1.** No person shall obstruct any municipal right of way by any means whatsoever, unless authorized by the provisions of this By-law or by any other By-law of the Town or by a permit issued by the Town.
- **2.2.** No person shall, unless specifically authorized by this By-law or by a permit issued by the Town: place equipment or materials of any kind upon or within a municipal right of way; close a municipal right of way in whole or in part; undertake any activity that negatively impacts the use and function of a municipal right of way; cut into or excavate any portion of a municipal right of way for the purpose of, but not limited to, installing service and utility connections, boreholes, monitoring wells, or test pits.
- **5.1.** Permits for municipal right of way activities, signs and encroachments may be issued by the Director of Transportation and Engineering or the Director of Municipal Enforcement Services.
- **5.2.** Any such Permits issued under Section 5.1 for activities, signs and encroachments covered by the following Town Procedures shall be issued in accordance with the following Town Procedures, as amended from time to time: Excavation and Temporary Street Occupation Permit Procedure; Any other Town Procedures that may be added from time to time under the Municipal Right of Ways By-law and the Use of Municipal Right of Ways and Municipal Parking Lot Policy

3.5 Climate Change Strategy and Energy Initiatives

Halton Region declared a climate emergency in 2019 and committed to achieving net-zero corporate greenhouse gas (GHG) emissions by 2045. The Region followed this declaration by developing its Corporate Climate Action Plan (Halton Region, 2023), which identified key actions for the Region over a 20-year period:

- Measure, track, monitor, and mitigate the Region's GHG emissions.
- Complete a renewable energy generation study.
- Electrify the Region's fleet vehicles.

- Explore the advancement of a carbon budget.
- Advance partnerships that align with the Region's climate change initiatives.

A Region-wide corporate GHG emissions inventory was developed based on 2019 baseline data, identifying the water and wastewater sector as a significant contributor to corporate emissions. The Region has since completed its renewable energy generation study and initiated a nitrous oxide monitoring study at the Mid-Halton and Skyway WWTPs.

As one of the Region's largest infrastructure assets, the Mid-Halton WWTP plays a critical role in meeting this target. The Region's Corporate Climate Action Plan prioritizes energy efficiency, renewable energy generation, and GHG mitigation in future infrastructure planning.

The Region also completed a Renewable Energy Technology Feasibility Report (GHD, J.L. Richards, and OCWA, 2025), which evaluated three biogas utilization technologies: combined heat and power (CHP), renewable natural gas (RNG), and fuel cells. While fuel cells were initially recommended, a subsequent review identified RNG as having higher GHG reduction potential and lower carbon abatement cost. Although selection and implementation of a biogas strategy is outside the scope of this EA, the expansion will be designed to accommodate future integration of biogas utilization infrastructure.

Climate-responsive design considerations have been integrated into the technology screening and evaluation process. Technologies were assessed based on their potential to mitigate GHG emissions, improve energy efficiency, enable resource recovery, and optimize process performance. Strategies include prioritizing technologies that reduce nitrous oxide and methane emissions. Sidestream treatment options that reduce mainstream oxygen demand and chemical use were also considered.

This MCEA Study evaluated alternative solutions and design concepts not only for their technical and environmental performance but also for their GHG impact relative to the established baseline. This integrated approach ensures that the preferred expansion concept aligns with Halton Region's climate commitments and supports a resilient, low-carbon future for the Mid-Halton WWTP.

3.6 Related Studies and Master Plans

This section provides an overview of background studies that are relevant to Mid-Halton WWTP expansion and the ESR.

3.6.1 2011 Sustainable Halton Water and Wastewater Master Plan

The Region completed the Sustainable Halton Water and Wastewater Master Plan in 2011 to identify sustainable growth and servicing strategies to meet population and employment needs through 2031 (AECOM, 2011). The 2011 Master Plan recommended several projects related to the Mid-Halton WWTP to service future growth, which are summarized in the following bullets with their status:

- Divert flows from the Milton WWTP to the Mid-Halton WWTP (complete).
- Mid-Halton WWTP Phase IV/V expansion from 75 ML/d to 125 ML/d, including North PS expansion (complete).
- New Mid-Halton WWTP outfall (complete).

The 2011 Master Plan also recommended an expansion from 125 ML/d to 175 ML/d, which would provide capacity for flow diversion from the Georgetown WWTP.

This MCEA Study will develop a preferred capacity expansion concept that will increase the rated capacity of the WWTP to 195 ML/d by 2031, according to the latest population projections from the IMP (Section 3.6.2).

3.6.2 Halton Water, Wastewater and Transportation Integrated Master Plan

The IMP is an ongoing, long-term planning initiative by Halton Region aimed at ensuring the Region's water, wastewater, and transportation infrastructure can support projected growth to the year 2051. The IMP is being conducted in accordance with Phases 1 and 2 of the MCEA process.

The purpose and scope of this project are as follows:

- The IMP integrates planning for water, wastewater, and transportation systems to maximize infrastructure capacity, flexibility, and lifespan.
- It supports Local Municipal growth priorities, with population forecasts reaching 1.1 million residents and 500,000 jobs by 2051.
- The Study Area includes Burlington, Halton Hills, Milton, and Oakville, covering both existing and future urban servicing needs.

Key Components of the Master Plan includes:

- **Water:** Focuses on delivering safe, clean drinking water and maintaining sustainable water intakes from groundwater and lake-based systems.
- **Wastewater:** Addresses collection and treatment of sewage, emphasizing system resiliency and environmental protection.
- **Transportation:** Plans for a multimodal network accommodating all users, including transit, pedestrians, cyclists, and vehicles.

The preliminary strategies for each focus area are as follows:

- **Water/Wastewater:**
 - Enhance system resiliency and operational flexibility.
 - Adapt infrastructure strategies to changing population and growth areas.
 - Balance demands between groundwater and lake-based sources.
- **Transportation:**
 - Optimize existing networks and plan for corridor improvements.
 - Prioritize active transportation and transit-supportive infrastructure.

Updated population projections from the IMP have been used to inform the Mid-Halton WWTP expansion capacity review, supporting the increase from 175 ML/d to 195 ML/d.

Additional optimization opportunities identified in the early stages of the study also support the expansion to 195 ML/d. It was determined that 195 ML/d could be achieved within a similar footprint to the original scope of expansion to 175 ML/d. This increased capacity will better support local municipal growth priorities within the Region and will provide cost and operational efficiencies.

The IMP was presented to Regional Council for approval in fall 2025. It evaluated infrastructure strategies and identified preferred solutions for Water, Wastewater and Transportation facilities.

3.6.3 Mid-Halton WWTP Facility Plan

The Region completed a facility plan for the Mid-Halton WWTP in 2020 to identify future needs through 2041, and to develop a detailed implementation plan for a capacity expansion to 175 ML/d (CH2M, 2020). The facility plan projected a future ADF of 157 ML/d in 2041, and recommended the following strategy for a capacity expansion to 175 ML/d:

- **Pumping Stations:** Expand the North PS.
- **Headworks:** Expand the Train C headworks by adding one new vortex grit removal tank and an additional mechanical screen.
- **Primary Treatment:** Twin the Train C primary clarifiers and consider implementing chemically enhanced primary treatment (CEPT).
- **Secondary Treatment:** Re-rate and twin the Train C aeration tanks and secondary clarifiers.
- **UV Disinfection:** Expand the UV disinfection system by adding new UV lamp banks in an existing channel.
- **WAS Thickening:** Install one new RDT in the existing Biosolids Building.
- **AD:** Construct a new primary sludge thickening facility to avoid the need for additional digester capacity. Thermal hydrolysis pretreatment (THP) can also be considered for sludge pretreatment.
- **Biosolids Dewatering:** Install one new centrifuge in the Biosolids Building or increase the operating hours of the existing centrifuges.
- **Biosolids Storage and Truck Loading Facility:** Expand the truck loading facilities with a new storage hopper and truck loading bay.
- **Biogas Utilization:** Implement energy recovery from biogas using CHP generation.

This MCEA Study examines alternative technologies and concepts for meeting the updated flow projection needs of 195 ML/d by 2031.

3.6.4 Halton Region Corporate Climate Action Plan

The Region declared a climate emergency in 2019, with a commitment to achieving net-zero corporate GHG emissions by 2045. The Region followed this declaration by developing its Corporate Climate Action Plan (Halton Region, 2023), which identified key actions for the Region over a 20-year period:

- Measure, track, monitor, and mitigate the Region's GHG emissions.
- Complete a renewable energy generation study.
- Electrify the Region's fleet vehicles.
- Explore the advancement of a carbon budget.
- Advance partnerships that align with the Region's climate change initiatives.

A Region-wide corporate GHG emissions inventory was developed based on 2019 baseline data as part of the Region's Corporate Climate Action Plan, which identified the water and wastewater industry as a significant contributor to the Region's total GHG emissions. The Region has since completed its renewable energy generation study (described further in Section 3.6.5) and initiated a nitrous oxide monitoring study at the Mid-Halton WWTP and Skyway WWTP. This MCEA included the evaluation of alternatives based on GHG emissions criteria.

3.6.5 Renewable Energy Technology Feasibility Report

The Region completed a Renewable Energy Technology Feasibility Report for the Mid-Halton WWTP as part of its Halton WWTPs Renewable Energy Initiative project. The purpose of the report was to identify feasible renewable energy technologies that could be implemented at the Mid-Halton WWTP, with a focus on biogas utilization technologies and membrane aerated biofilm reactor (MABR) implementation (GHD, J.L. Richards and OCWA, 2025).

Three biogas utilization technologies were evaluated as part of this study:

- CHP
- RNG generation
- Fuel cells

Fuel cells were recommended for further consideration at the Mid-Halton WWTP based on the preliminary evaluation results. However, a subsequent study review determined that there are risks associated with fuel cell implementation, as there are no fuel cell installations in Canada to date. The review also determined that RNG generation has a higher GHG emission reduction potential and a lower carbon abatement cost than fuel cells. To date, the Region has not decided on the preferred biogas utilization strategy at the Mid-Halton WWTP. Selecting and implementing the preferred biogas utilization strategy is not within the scope of this project.

The study also recommended that MABR implementation be considered as part of the overall plant expansion strategy. Consideration of MABR technology was part of the development and evaluation of alternatives in this MCEA.

3.6.6 Biogas Utilization Strategy

The Region completed a biogas utilization strategy feasibility study in 2022 for four of its wastewater treatment plants, including the Mid-Halton WWTP (AECOM, 2022). The study shortlisted four biogas utilization technologies for further review that are feasible for implementation at the Mid-Halton WWTP:

- CHP
- Microturbines
- RNG generation
- Vehicle fuel generation

These technologies were further reviewed for GHG emission potential and lifecycle cost requirements as part of the Mid-Halton WWTP Renewable Energy Technology Feasibility Report (GHD, J.L. Richards and OCWA, 2025).

Biogas utilization was not considered in the MCEA evaluation, as the preferred future biogas strategy is not yet determined by the Region.

3.6.7 Development Charges Update Water Wastewater Technical Report

The Region completed development charges update study for water, wastewater and transportation projects in 2022 to confirm the funding sources for various planned capital projects (Halton Region, 2022).

As discussed in Section 3.6.1, the 2011 Sustainable Halton Water and Wastewater Master Plan indicated the need to transfer South Georgetown flows to the Mid-Halton WWTP. This transfer is anticipated to occur in 2026 and will cause a non-growth-related flow increase at the Mid-Halton WWTP. Therefore, the

development charges update determined that a portion of the Mid-Halton WWTP expansion cost will be funded from non-growth reserves to account for the capacity allocated to this flow transfer.

3.6.8 Halton Region Biosolids Composting MCEA Study

The Region completed the Halton Region Biosolids Composting MCEA Study in 2025, which identified the preferred location for a Region-owned biosolids composting facility that will provide capacity to meet the Region's biosolids management needs through 2051 (Jacobs, 2025). The preferred location for the facility is at the Biosolids Management Centre (BMC) site, adjacent to the existing storage tanks. Once the facility is constructed, the Region will begin to transition its biosolids management program from land application to biosolids composting. The facility is expected to be constructed in phases, and the program transition is expected to occur over time, rather than all at once. Biosolids composting implementation will have the following impacts on the Mid-Halton WWTP:

- Dewatered biosolids generated at the Mid-Halton WWTP are currently hauled for land application but will be hauled to the BMC for composting once the composting facility is constructed; providing full digestion (that is, less than 15-day hydraulic retention time for sludge stabilization) is less critical for biosolids composting compared with the current land application.
- The Mid-Halton WWTP currently receives supernatant from the BMC, which is generated when liquid biosolids settle in the storage tank. Liquid biosolids will be dewatered and composted in the future and dewatering centrate from this process will be conveyed to the Mid-Halton WWTP. The flows and loads from dewatering will be significantly higher than those currently generated from supernatant. These impacts were considered for future projections, as well as those from facility implementation timing.

4. Methods and Approach

This section provides an overview of the methods and approach for this study.

4.1 Overview of Study Approach

This study is being completed as a Schedule C Municipal Class EA, following Phases 1 through 4 of the Class EA process. The activities completed for each phase include:

- **Phase 1 – Problem and Opportunity:** Review existing natural, social and cultural, and technical environments related to the Mid-Halton WWTP current condition, establish future needs, and develop a Problem and Opportunity Statement.
- **Phase 2 – Development of Alternative Solutions:** Identification and evaluation of alternative treatment technologies considering the benefits and impacts to the existing community, technical requirements, natural environment, social and cultural context, and economic environment, as well as input from project stakeholders and Indigenous Communities, First Nations and Métis Communities, to identify a preferred design concept for plant expansion.
- **Phase 3 - Development of Alternative Design Concepts:** In this phase, alternative design concepts were developed and assessed based on detailed evaluation criteria. A preferred design concept was recommended and shared with the public, along with potential impacts and mitigation measures
- **Phase 4 - ESR:** The study methodology and rationale to recommend the preferred design concept, as well as stakeholders and Indigenous Communities, First Nations and Métis Communities' participation and feedback, are documented in this ESR.

Sections 4.2 to 4.6 provide additional details on the approach to each phase. Community Engagement is a vital component of the Class EA process and occurred throughout the study. The approach to community engagement is described in Section 4.2.

4.2 Consultation and Engagement Plan

Upon study initiation, a Stakeholder Communication and Consultation Plan and an Indigenous Community Communication and Consultation Plan were developed to guide the engagement approach throughout this study. Both Communication Plans are provided in Appendix B.

The goals for engagement in this study include:

- Meet the consultation and engagement requirements of the Municipal Class EA process.
- Raise awareness for the project planning activities.
- Incorporate community priorities and values in the study's decision-making process.

The Engagement Plan prioritized reaching out broadly to stakeholders and Indigenous Communities, First Nations and Métis Communities and providing opportunities for input to the Class EA. The Engagement Plan focused on engagement with the following groups:

- First Nations, Indigenous, and Métis Communities'.
- Community residents and general public.
- Regulatory review agencies, such as the MECP, MCM and CH.
- Municipal staff and elected officials.
- Utilities Companies.
- Local Municipalities and Services.

Community engagement prioritized broad outreach and flexibility, with public information centres being held virtually and project notices being distributed via mail, email, social media and news outlets.

The Region's approach to First Nations, Indigenous, and Métis Communities' engagement was guided by the stated wishes of each of the individual groups and based on foundational principles of long-term relationship building. The Region coordinated the engagement activities across all of its projects and respected the different levels of desired involvement of Indigenous Communities, First Nations and Métis Communities.

Details on the engagement activities, feedback, and outcomes are provided in Section 10 of this Class EA.

4.3 Alternatives Evaluation Process

Alternatives evaluation was required to identify the preferred design concept for the Mid-Halton WWTP. A fundamental goal of the alternative's evaluation process is to be transparent, defensible and reproducible. The evaluation process for this MCEA Study incorporated feedback received during public information centres and other engagement activities.

A multi-step evaluation approach was used to identify the preferred design concept. The alternatives evaluation process included the following steps:

1. **Long-lists** of wastewater and solids treatment technologies were identified for each process area to address deficiencies (that is, capacity, condition, and so on) or provide other benefits (that is, improve energy efficiency, enhance treatment) for each process area.
2. Technologies on the long list for each process area were subject to **screening** against a set of "-must-meet" criteria (Table 4-1) to identify a short list of alternatives.
3. A two-stage **detailed evaluation** was completed on the shortlisted alternatives using the detailed evaluation criteria presented in Table 4-2.
 - a. **Stage 1:** A non-economic evaluation was completed for the shortlisted alternatives based on natural environment, social and cultural, and technical criteria. The highest rated alternatives for each process area were carried forward to the next stage.
 - b. **Stage 2:** Alternatives that passed Stage 1 of the evaluation were advanced for detailed concept development and costing, which were used to develop the economic score for each design concept. This provided an overall detailed evaluation score for each concept. The design concept that received the highest detailed evaluation score was selected in each process area.

4.3.1 Screening Criteria

Technologies in the long list were screened based on a set of "must-meet" criteria and provided with a pass or fail score. Technologies had to meet every single criterion; otherwise, they were removed from future consideration. The objective of this screening exercise was to identify feasible solutions with demonstrated performance that would help the Region to achieve its goals for the plant. Table 4-1 presents the screening criteria to identify a short list of alternatives for plant expansion.

Table 4-1. Screening Criteria to Identify Short List of Alternatives

Screening Criterion	Description
Minimize risks associated with technology experience	Is it a demonstrated, proven technology at similar facilities?
Maximize flexibility for future capacity expansion and upgrading	Is it able to provide opportunities for future expansion to a buildout capacity of 400 ML/d?
Minimize GHG Emissions	Does it present opportunities to reduce GHG emissions compared to base case (that is, expansion based on use of existing technologies)?
Implementable by 2031	Can it be constructed and operational by 2031 (that is, no major constraints to implementation – technical, regulatory, environmental, social)?
Compatible with existing plant and regulatory requirements	Is it compatible with existing infrastructure/processes at the plant and can it reliably maintain or improve upon current/future performance requirements?

4.3.2 Detailed Evaluation Framework

The short list of alternatives was evaluated using a set of criteria intended to be consistent with the MCEA process and reflect the Region’s and stakeholders’ goals and priorities. Criteria were identified for the following four categories:

- Natural Environment.
- Social and Cultural.
- Technical.
- Economic.

The detailed evaluation criteria were developed in collaboration with the Region and reflect feedback received from Public Information Centre #1. Table 4-2 describes detailed evaluation criteria and scoring measures. The associated criterion weightings were developed during a facilitated workshop with Region staff. The category weight represents the relative importance of that category compared to the other categories and the criterion weight represents the relative importance of the criteria within each category. Table 4-3 presents the categories and criterion weights. The evaluation criteria and their relative weightings were established through a workshop held with the Region. During this workshop, project staff and Regional representatives collaboratively reviewed and discussed the criteria, resulting in the final weighting approach applied for the assessment.

Table 4-2. Detailed Evaluation Criteria Definition and Scoring Scale

Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Natural Environment	Significant terrestrial habitats	Based on potential impacts to terrestrial habitats at or around the WWTP site that would result from the construction and/or operation of the alternative, and mitigation required to minimize impacts.	5 – Terrestrial habitat quality or quantity may be enhanced or experience no impact as a result of alternative. 3 – Terrestrial habitat quality or quantity will be moderately affected as a result of the alternative and some mitigation measures to protect existing habitats will be required. 1 – Terrestrial habitat quality or quantity will be severely affected as a result of the alternative and substantial mitigation measures to protect existing habitats will be required.
	Significant aquatic habitats	Based on potential impacts to aquatic habitats at or around the WWTP site that would result from the construction and/or operation of the alternative, and mitigation required to minimize impacts.	5 – Aquatic habitat quality or quantity may be enhanced or experience no impact as a result of alternative. 3 – Aquatic habitat quality or quantity will be moderately affected as a result of the alternative and some mitigation measures to protect existing habitats will be required. 1 – Aquatic habitat quality or quantity will be severely affected as a result of the alternative and substantial mitigation measures to protect existing habitats will be required.
	Species at Risk (SAR) (terrestrial/aquatic species)	Based on potential impacts to Species at Risk at or around the WWTP site that would result from the construction and/or operation of the alternative, and mitigation required to minimize impacts.	5 – SAR will not be impacted as a result of alternative. 3 – SAR may be moderately affected as a result of the alternative and some mitigation measures to protect existing habitats will be required. 1 – SAR may be severely affected as a result of the alternative and substantial mitigation measures to protect existing habitats will be required.

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Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Natural Environment	Groundwater quantity and quality	Based on potential effects of the alternative on groundwater quality or quantity at or around the WWTP site, and the mitigation required to minimize impacts.	<p>5 – The construction and/or operation of the alternative will not impact groundwater resources with the implementation of routine mitigation measures.</p> <p>3 – The construction and/or operation of the alternative will pose moderate risks to the quality or quantity of groundwater resources and implementation of additional mitigation measures above routine may be required.</p> <p>1 – The construction and/or operation of the alternative site may pose severe risks to groundwater resources and substantial mitigation measures above routine will be required.</p>
	Surface water quality (Lake Ontario)	Based on potential effects of the alternative on surface water quality or quantity at or near the WWTP, including effects on IPZ near the existing outfall.	<p>5 – The construction and/or operation of the alternative will not impact surface water resources with the implementation of routine mitigation measures.</p> <p>3 – The construction and/or operation of the alternative will pose moderate risks to the quality or quantity of surface water resources and implementation of routine mitigation measures may be required.</p> <p>1 – The construction and/or operation of the alternative may pose severe risks to the quality or quantity of surface water resources and substantial mitigation measures will be required.</p>
	Greenhouse Gas Emissions (GHG)	Based on the predicted Scope 1, 2, and 3 GHG emissions associated with construction and operation of the alternative.	<p>5 – The alternative creates the lowest GHG emissions during operation.</p> <p>Other alternatives will be scored proportionally in relation to the lowest GHG emission (for example, if the GHG emission is 20% higher than the lowest GHG emission alternative, the score would be 20% lower than the highest score).</p>

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Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Social and Cultural	Visual/aesthetic	Potential visual impact that new and expanded infrastructure will have on the surrounding community.	<p>5 – The alternative will not impact, or may positively impact, the existing visual/aesthetics of the plant from the perspective of the surrounding community.</p> <p>3 – The alternative may moderately impact the existing visual/aesthetics of the plant from the perspective of the surrounding community.</p> <p>1 – The alternative may severely impact the existing visual/aesthetics of the plant from the perspective of the surrounding community.</p>
	Odour during operations	Potential for operation of the alternative to increase odours to receptors near the WWTP during normal operations and maintenance (while still meeting odour control regulations).	<p>5 – The operation of the alternative will reduce or not increase odour levels for receptors near the WWTP with routine odour control measures in place.</p> <p>3 – The operation of the alternative will moderately increase potential odour frequency or concentration for receptors near the WWTP with routine odour control measures in place.</p> <p>1 – The construction and/or operation of the alternative will cause a substantial increase in frequency or intensity of nuisance odours to receptors near the WWTP with routine odour control measures in place.</p>
	Noise during operations	Potential for operation of the alternative to increase noise to receptors near the WWTP during normal operations and maintenance (while still meeting noise control regulations).	<p>5 – The operation of the alternative will reduce or not increase noise levels for receptors near the WWTP.</p> <p>3 – The operation of the alternative will moderately increase noise levels for receptors near the WWTP; routine mitigation measures such as construction within normal work hours, may be required.</p> <p>1 – The operation of the alternative will substantially increase noise levels for receptors near the WWTP.</p>
	Local traffic impacts during operations	Potential for an increase in truck traffic to and from the WWTP during operation for normal operations (for example, chemical delivery, haulage of biosolids offsite), to cause impacts to local traffic.	<p>5 – No or minimal increase in truck traffic during operations which will not affect local traffic.</p> <p>3 – Moderate increase in truck traffic during operations that could impact local traffic.</p> <p>1 – Substantial increase in truck traffic during operations that will impact local traffic.</p>

Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Social and Cultural	Impacts during construction	Potential for alternatives to impact the surrounding community during construction (for example, increased truck traffic, odour, air quality, noise and vibrations, and so on) considering the magnitude of the impacts and the duration of construction.	<p>5 – Construction of the alternative will be shortest in duration and will have minimal impacts to the surrounding community.</p> <p>3 – Construction of the alternative will be longer in duration and moderately impact the surrounding community.</p> <p>1 – Construction of the alternative will be longest in duration and cause a significant impact to the surrounding community.</p>
	Property impacts	The alternative requires an expansion of the WWTP beyond the existing plant boundary (that is, acquisition of new land).	<p>5 – The alternative is within the existing plant boundary and does not require the acquisition of new land.</p> <p>3 – Land acquisition is required for the alternative; however, purchase and title transfer are anticipated to be simple.</p> <p>1 – Land acquisition is required for the alternative and purchase and title transfer are anticipated to require substantial planning and process requirements.</p>
	Archaeological resources	Based on the potential for the alternative to impact known and potential archaeological resources identified at or near the WWTP site.	<p>5 – The alternative does not impact known or potential archaeological resources at or near the WWTP.</p> <p>3 – The alternative may impact known or potential archaeological resources at or near the WWTP. Mitigation measures will likely be required.</p> <p>1 – The alternative will severely impact known or potential archaeological resources at or near the WWTP. Substantial mitigation measures will be required.</p>
	Built heritage resources and Cultural heritage landscapes	Based on the potential for the alternative to impact known and potential built heritage resources and cultural heritage landscapes at or around the WWTP site.	<p>5 – The alternative will not impact known or potential built heritage resources and cultural heritage landscapes during construction and/or operation.</p> <p>3 – The alternative may impact known or potential built heritage resources and cultural heritage landscapes in proximity to the WWTP during construction and/or operation. Mitigation measures will likely be required.</p> <p>1 – The alternative will impact known or potential built heritage resources and cultural heritage landscapes in proximity to the WWTP during construction and/or operation. Substantial mitigation measures will be required.</p>

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Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Technical	Treatment performance, reliability and robustness	The ability of the alternative to reliably meet or improve upon treatment performance requirements (that is, current final effluent and biosolids quality requirements), provide robust treatment under flow/load variations and adverse conditions, and be resilient to process upsets.	<p>5 – The alternative has been demonstrated to reliably meet or improve upon treatment performance requirements under all operating conditions, is very robust for flow/load variations, and/or has the lowest risk of non-compliance.</p> <p>3 – The alternative has been demonstrated to reliably meet treatment performance requirements under all operating conditions, is somewhat robust for flow/load variations, and/or has an acceptable/typical risk of non-compliance.</p> <p>1 – The alternative has been demonstrated to meet treatment performance requirements under most operating conditions, is less robust for flow/load variations, and/or has the highest risk of non-compliance.</p>
	Flexibility for future WWTP expansion	The ability for the alternative to accommodate future WWTP capacity expansions beyond 195 ML/d and provide flexibility for capacity increase by having the lowest footprint or greatest capacity for the alternative expansion footprint.	<p>5 – The alternative can be easily designed with provisions to accommodate future capacity expansions.</p> <p>3 – The alternative can be designed with provisions to accommodate future capacity expansions.</p> <p>1 – The alternative has limited flexibility to accommodate future capacity expansions.</p>
	Ease of implementation	The ability to implement the alternative within required timeline for construction and commissioning, in terms of receiving approvals and minimizing construction challenges (for example, site constraints, construction sequencing/staging).	<p>5 – The alternative can be readily approved, requiring routine permits and approvals, and readily constructed and commissioned within required timeline of 2031.</p> <p>3 – The alternative can be approved with minimal conditions and constructed and commissioned with minimal challenges within required timeline of 2031.</p> <p>1 – The alternative can be approved with substantial or onerous conditions and constructed and commissioned with substantial challenges within required timeline of 2031.</p>

Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Technical	Compatibility with existing processes and operations, on a plant and regional asset basis	The ability and suitability of the alternative to integrate with existing processes and operations, and the ability to maximize investment in existing infrastructure (considering plant and Region-wide assets).	<p>5 – The alternative is very compatible with, and compliments current plant and Regional operations; it can be integrated into current infrastructure with minimal impacts.</p> <p>3 – The alternative is somewhat compatible with, and complimentary to current plant and Regional processes; it can be integrated; but will have some impacts to plant operations.</p> <p>1 – The alternative is not compatible with, or complimentary to current plant and Regional processes and will be difficult to integrate within existing plant processes.</p>
	Flexibility for future regulatory requirements and market conditions	The ability for the alternative to adapt to changing regulatory requirements (for example, final effluent/biosolids quality) and market conditions.	<p>5 – The alternative is very flexible/adaptable for future regulatory requirements and market conditions.</p> <p>3 – The alternative is somewhat flexible/adaptable for future regulatory requirements and market conditions.</p> <p>1 – The alternative is not very flexible/adaptable for future regulatory requirements and market conditions.</p>
	Ease of operation	Complexity and flexibility of operation of the alternative including level of operational knowledge required, staff training and health and safety requirements.	<p>5 – The alternative results in the same, or less, operational complexity as existing plant processes.</p> <p>3 – The alternative involves operation that results in moderate operational complexity compared to existing plant processes.</p> <p>1 – The alternative involves operation that results in significantly more operational complexity compared to existing plant processes.</p>
	Ease of maintenance	Complexity and flexibility of maintenance of the alternative including level of staff requirements, health and safety requirements, and frequency of maintenance events.	<p>5 – The alternative results in the same, or less, maintenance complexity as existing plant processes.</p> <p>3 – The alternative involves maintenance that results in moderate maintenance complexity compared to existing plant processes.</p> <p>1 – The alternative involves maintenance that results in significantly more maintenance complexity compared to existing plant processes.</p>

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Category	Criterion	How will this Criterion be Measured?	Scoring Scale
Economic	Capital costs	Estimated capital costs of the alternative. The measure will be evaluated with a score assigned proportionally on capital cost estimates associated with the alternative.	5 – The alternative has the lowest capital cost. Other alternatives will be scored proportionally in relation to the lowest capital cost (for example, if the capital cost is 20% higher than the lowest cost alternative, the score would be 20% lower than the highest score).
	Operations and Maintenance Costs	Estimated O&M costs of the alternative. The measure will be evaluated with a score assigned proportionally on O&M cost estimates associated with the alternative.	5 – The alternative has the lowest O&M cost. Other alternatives will be scored proportionally in relation to the lowest O&M cost (for example, if the O&M cost is 20% higher than the lowest cost alternative, the score would be 20% lower than the highest score).
	Lifecycle costs	Estimated lifecycle costs of the alternative. The measure will be evaluated with a score assigned proportionally on lifecycle cost estimates associated with the alternative.	5 – The alternative has a low relative lifecycle cost. Other alternatives will be scored proportionally in relation to the lowest lifecycle cost (for example, if the total lifecycle cost is 20% higher than the lowest cost alternative, the score would be 20% lower than the highest score).

IPZ = intake protection zone

O&M = operations and maintenance

Table 4-3. Detailed Evaluation Criteria Weights

Category	Category Weight (percent)	Criterion	Criterion Weight
Natural Environment	30	Significant terrestrial habitats	3.8
	30	Significant aquatic habitats	5.0
	30	SAR (terrestrial/aquatic species)	5.0
	30	Groundwater quantity and quality	5.0
	30	Surface water quality (Lake Ontario)	6.3
	30	Greenhouse Gas (GHG) Emissions	5.0
Social and Cultural	15	Visual/aesthetic	1.1
	15	Odour during operations	2.7
	15	Noise during operations	2.1
	15	Local traffic impacts during operations	1.6
	15	Impacts during construction	2.1
	15	Property Impacts	2.1
	15	Archaeological Resources	1.6
	15	Built heritage resources and Cultural heritage landscapes	1.6
Technical	30	Treatment performance, reliability and robustness	4.7
	30	Flexibility for future WWTP expansion	3.8
	30	Ease of implementation	3.8
	30	Compatibility with existing processes and operations, on a plant and regional asset basis	4.7
	30	Flexibility for future regulatory requirements and market conditions	3.8
	30	Ease of operation	4.7
	30	Ease of maintenance	4.7
Economic	25	Capital Costs	7.1
	25	Operation and Maintenance Costs	8.9
	25	Lifecycle Costs	8.9
Total	100		100

4.4 Cost Estimate Basis

This section describes the methodology used to develop cost estimates for the selected design concept alternatives evaluated as part of this MCEA study. Cost estimates were developed to support the comparative detailed evaluation of alternatives and include capital, O&M, and lifecycle cost estimates. Planning-level estimates were developed using industry-standard unit rates, recent project benchmarks, and engineering judgment.

4.4.1 Capital Cost Estimate

Capital cost estimates for the design concept alternatives were developed based on a projected ADF of 195 ML/d, which represents the required treatment capacity for the planning horizon of the Mid-Halton WWTP expansion.

Where applicable, capital cost estimates were informed by vendor quotations for specific equipment and technologies, as well as reference projects of similar scope to provide high-level benchmarks.

Additional costing was developed using Jacobs' Replica Parametric Design (Replica PD) tool. Replica PD is a conceptual estimating platform that utilizes a robust database of historical project data, based on actual construction costs from Jacobs' projects and are supplemented by RSMeans cost data. The Jacobs database of material and equipment costs is adjusted using Engineering News Record (ENR) indices to reflect current market conditions, including monthly updates and regional labour adjustments. For this project, unit costs were specifically calibrated to reflect construction market conditions in Halton Region and the Greater Toronto Area.

The generated cost estimates include allowances to account for risks and uncertainties associated with forecasting future costs. The construction capital costs developed using Replica PD are considered Class 5 estimates, with an expected accuracy range of -30% to +50%, and include the following mark-ups and adjustment factors:

- 13 percent for contractor profit, mobilization/demobilization, bonds and insurance.
- 12 percent for contractor overhead.
- 15 percent for design contingency.
- 15 percent for construction contingency.

4.4.2 Operations and Maintenance Cost Estimates

The O&M requirements and associated costs were developed based on the annual average day load and sludge generation rates for the planning period, considering the following market conditions:

- Electricity: The average electricity cost at Mid-Halton WWTP in \$ per kilowatt hour (\$/kWh) for 2023 was used when developing annual operating costs, based on the most recent information available.
- Natural Gas: The natural gas cost at Mid-Halton WWTP in \$ per cubic metres (\$/m³) for 2023 was used when developing annual operating costs, based on the most recent information available.
- Chemicals: Chemical costs can be affected by macroeconomics and by local supply and demand; therefore, it is difficult to project the chemical cost in the long-term future. For this study, chemical costs were based on recent bills provided by the Region in \$ per kilograms (\$/kg) where available, though the trend through the years is showing considerable annual increases.
- Biosolids cake hauling: The biosolids cake hauling cost at Mid-Halton WWTP in \$ per tonne (\$/tonne) for 2024 was used when developing annual operating costs, based on the most recent information available.
- Labour: Labour costs related to operating and maintaining the processes were estimated for each alternative. A typical local market labour rate of \$75 per hour was used for the purposes of this study.

The basis of various components of the annual O&M cost estimate is presented in Table 4-4.

Table 4-4. O&M Cost Basis for Evaluation of Design Concept Alternatives

Item	Unit Cost	Source/Basis
Electricity	0.1 \$/kWh	2023 Cost
Natural Gas	0.63 \$/m ³	2023 Cost
Ferric Chloride	4.98 \$/kg Fe	Unit cost for 2024, Active Chemical (Fe ³⁺)
Magnesium Hydroxide	1.4 \$/kg	Unit cost for 2024, 60% concentration
Sodium Hydroxide	3.38 \$/kg	Unit cost for 2024, 25% concentration
Polymer (liquids)	5.53 \$/kg	2024 cost at a large wastewater facility in Greater Toronto Area (currently not in use at Mid-Halton WWTP)
Polymer (solids)	10.22 \$/kg	Unit cost for 2024
Biosolids Cake Hauling	105 \$/tonne	Unit cost for 2024
Labour	75 \$/hour	Typical for local labour market
Maintenance	2% of equipment	Typical range of allowances for annual equipment maintenance, unless otherwise specified

4.4.3 Lifecycle Cost Estimates

Lifecycle costs (20-year) estimates include capital cost and annual O&M costs, if not specified otherwise. Lifecycle costs were developed using the annual flow, loading, and sludge generation projections between 2031 (commissioning of the expansion) and 2050.

Buildings and process equipment have different useful life spans (for example, typically more than 50 years for buildings and 15 to 25 years for equipment depending on technology and operating model). Equipment or material replacement costs were included in the lifecycle O&M cost depending on the shortlisted technologies. If major equipment replacement, such as diffusers, membranes, or media replacement, is expected within the planning period, those costs were included. Table 4-5 summarizes the basis for lifecycle cost estimate for this study.

Table 4-5. Lifecycle Cost Basis for Mid-Halton WWTP

Item	Value	Source or Basis
Lifecycle Duration	20 years	2031 (expected commissioning) to 2050
Discount Rate	5%	An assumed discount rate of 5% was selected with Region input to reflect risk factors and opportunity costs separate from the inflation rate
Inflation Rate	2%	Inflation rate of 2% selected based on Bank of Canada long-term objectives; used to escalate operating costs over the 20-year period

4.5 GHG Calculation Basis

This section presents the GHG emission baseline development methodology for this MCEA study, incorporating the best science in quantifying wastewater GHG emissions in recent years. The historical GHG emissions for Mid-Halton WWTP operations were estimated on an annual basis from 2019 to 2024, providing an update to the Region's 2019 baseline.

GHG emissions are typically quantified and reported by scope. The most accepted definitions of emission Scopes 1, 2, and 3 were introduced by the GHG Protocol (World Business Council for Sustainable Development, 2015) to categorize emissions by ownership levels, that is, direct (Scope 1) and indirect (Scopes 2 and 3) emissions.

The following GHG emission sources and sinks were quantified to develop a GHG emission baseline for the Mid-Halton WWTP, based on 2019 to 2024 plant data:

- **Scope 1 Emissions** - Direct GHG emissions from sources owned or controlled by the corporation from stationary combustion, process fugitive emissions, and mobile combustion. Direct carbon dioxide emissions from the treatment process as a result of biomass conversion are considered biogenic and excluded from GHG reporting requirements. Scope 1 emissions for Mid-Halton WWTP include:
 - Process emissions generated during the wastewater treatment process, including methane and nitrous oxide emissions from wastewater treatment, methane and nitrous oxide emissions from effluent discharge, and fugitive methane emissions from sludge treatment, particularly AD.
 - Biogas combustion in the boilers and flare.
 - Natural gas consumption.
- **Scope 2 Emissions** - Indirect GHG emissions from the generation of purchased electricity, heat, or steam that is consumed in its owned or controlled equipment or operations. Quantification of Scope 2 emissions for the plant includes:
 - Electricity consumption based on the net electricity purchased from the grid (that is, subtracting the outfall microturbine electricity output).
- **Scope 3 Emissions** - Indirect GHG emissions that are not owned or controlled by the corporation. Scope 3 emissions for Mid-Halton WWTP include:
 - Chemical consumption (phosphorus removal, pH adjustment, WAS thickening and biosolids dewatering polymers).

Figure 4-1 presents an overview of typical Scope 1, 2, and 3 GHG emission sources at water resource recovery facilities.

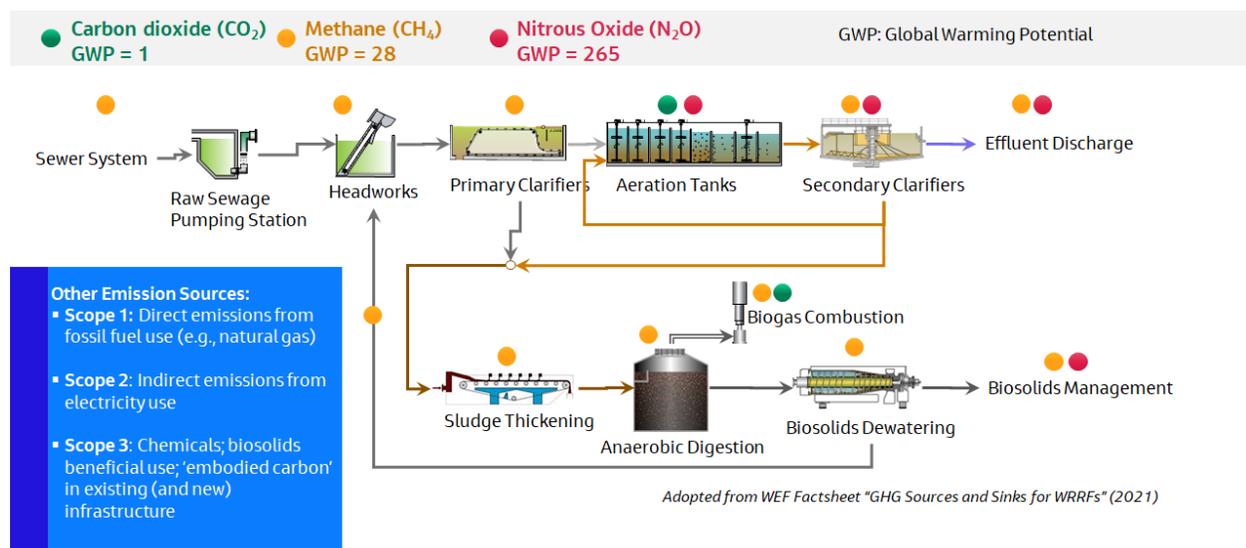


Figure 4-1. Typical GHG Sources at Water Resource Recovery Facilities

Biosolids management emissions, that is, fuel use to spread biosolids on land, emissions (methane or nitrous oxide) when biosolids are land applied, and biosolids management offsets (carbon sequestration and commercial fertilizer offset from beneficial use of biosolids or biosolids products) are accounted for separately. These emissions are included as part of the Region-wide biosolids management emissions, which were quantified as part of the Halton Region Biosolids Composting Schedule B MCEA Study (Jacobs, 2025).

Table 4-6 summarizes the GHG emissions calculation basis used in this MCEA study. GHG emissions were quantified for each process area based on sources directly affected by the proposed technology alternatives. These targeted estimates enabled comparison of alternatives based on their GHG impact and supported informed decision-making aligned with the Region’s net-zero goals.

Table 4-6. GHG Emission Calculation Basis

Scope	Parameter	Value	Source/Notes
Scope 1 Emissions	N ₂ O – Secondary Treatment	0.016 kg N ₂ O-N/kg TN-influent	Intergovernmental Panel on Climate Change (IPCC) 2019
	N ₂ O – Effluent	0.005 kg N ₂ O-N/kg TN-effluent	IPCC 2019
	CH ₄ – Wastewater Treatment	Factor for amount of BOD removed: <ul style="list-style-type: none"> ▪ Primary treatment: 1 sludge BOD/wastewater BOD ▪ Secondary treatment: 0.46 sludge BOD/wastewater BOD CH ₄ emission factors: <ul style="list-style-type: none"> ▪ Primary & secondary treatment: 0.0036 kg CH₄/kg BOD 	Ontario Water Works Association (OWWA) / Water Environment Association of Ontario (WEAO) GHG Inventory Tool (v4) Primary and secondary treatment performance (BOD removal%) based on plant data
	CH ₄ – Effluent	0.114 kg CH ₄ /kg BOD-effluent	IPCC 2019
	CH ₄ – Anaerobic Digestion	5% of Biogas (CH ₄) generated	IPCC 2006
	Biogas Combustion (boilers)	233 g CO _{2e} /m ³ biogas	IPCC 2006. Based on boiler combustion efficiency of 98%
	Biogas Flaring	586 g CO _{2e} /m ³ biogas	IPCC 2006. Based on flare combustion efficiency of 95% for open candlestick type
	Natural Gas Consumption	1,932 g CO _{2e} /m ³	National Inventory Report (NIR) 2025
Scope 2 Emissions	Electricity Consumption	59 g CO _{2e} /kWh	NIR 2025
Scope 3 Emissions	FeCl ₃	0.4 kg CO _{2e} /kg Fe	OWWA/WEAO GHG Inventory Tool (v4)
	Mg(OH) ₂	0.15 kg CO _{2e} /kg Mg(OH) ₂	OWWA/WEAO GHG Inventory Tool (v4)
	Polymer	4.6 kg CO _{2e} /kg polymer	OWWA/WEAO GHG Inventory Tool (v4)

4.6 Supporting Studies

Supporting studies were developed to inform this MCEA Study and provide a rationale to score the design concepts in the detailed evaluation stage. This section briefly describes the methodology for the following supporting studies:

- **Receiving Water Impact Assessment (RWIA):** The goal was to assess whether the existing outfall and future effluent conditions for the expanded capacity will meet regulatory requirements for surface water discharges. Current ambient conditions for Lake Ontario and the ECA effluent limits were used to calculate target dilutions. The CORMIX model was used to determine near-field conditions (mixing zone) and the MIKE3 model was used to estimate far-field conditions. Results from these models helped to define mixing zones and verify if there were any impacts on key locations, such as beaches and water intakes.
- **Stage 1 AA:** A desktop assessment to review the development, historical, and archaeological contexts was carried out (Archaeological Services Inc, 2025) under PIF number P094-0456-2025, followed by a systematic visual property inspection to verify the geography, topography, and current conditions, as well as to evaluate and map archaeological potential in the Study Area. Fieldwork was conducted using a Samsung Galaxy A7 tablet paired with a sub-metre Trimble Catalyst Global Navigation Satellite System and ESRI Field Maps in conjunction with project mapping.
- **Natural Environment Features and Environmental Impact Assessment:** A Natural Environment Report (NER) consisting of a desktop assessment from agency databases and field surveys was developed to identify natural features occurring in and around the Study Area. Jacobs staff utilized the results of the desktop assessment, coupled with air photo interpretation and agency spatial data to scope and plan site-specific field surveys to retrieve information on terrestrial and aquatic resources, and natural features. Breeding Bird Surveys (BBS), SAR, Ecological Land Classification (ELC), Aquatic Habitat Assessment (AHA), and Amphibian/Nightjar Survey were carried out during three non-consecutive days. The Environmental Impact Assessment (EIA) Report utilizes the results of the NER and provides an impact assessment, mitigation and recommendations to avoid and/or reduce potential impacts to the natural environment, based on the recommended design concept, to aid in planning for the detailed design stage.
- **CHER and HIA:** The Merton Mount Pleasant Cemetery, located across the road from the Mid-Halton WWTP at 2222 North Service Road West, was identified as a recognized heritage property. The property is designated under Part IV of the Ontario Heritage Act under By-law No. 1993-020. A CHER (Archaeological Services Inc., 2025) was necessary because the subject property was designated prior to 2006 and therefore has not previously been evaluated using Ontario Regulation 9/06. The scope of the CHER is determined by the Ontario Heritage Tool Kit (MCM 2025) and includes review of history, property ownership and development; site visit to capture site and architectural details; cultural heritage evaluation; and development of a Draft Statement of Cultural Heritage Value and List of Heritage Attributes. A HIA (Archaeological Services Inc, 2025) report was also developed to determine if there are any impacts to the heritage attributes associated with the cemetery as a result of this project, and provide appropriate avoidance or mitigation measures, if required. The cemetery was assessed in accordance with the Town of Oakville's *Development Application Guidelines: Heritage Impact Assessment* Terms of Reference (Town of Oakville, 2025).

5. Study Area Existing Conditions

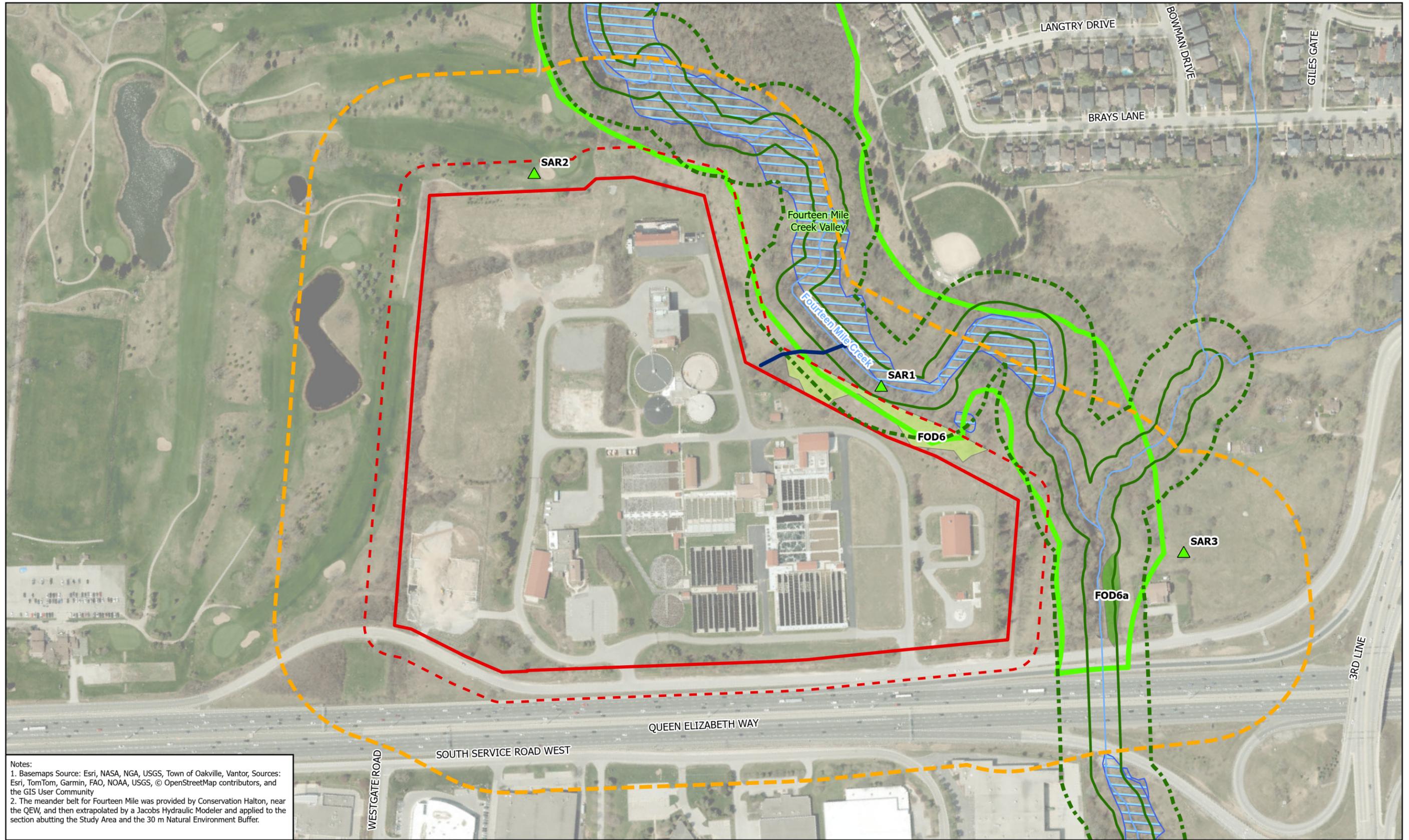
Existing natural environment, cultural heritage resources, and technical conditions are described in this section to provide a baseline for plant expansion. Available information from existing literature, government databases, online resources, field surveys, and feedback collected during community engagement were used to establish the Study Area existing conditions.

5.1 Natural Environment

5.1.1 Natural Heritage Features

Natural Heritage Features (NHF) include water, agricultural and mineral resources, wetlands, woodlands, wildlife habitat and ANSI. The PPS defines “adjacent lands” as lands within 120 m of a NHF; therefore, NHFs within the Study Area and 120 m adjacent lands were investigated by referencing available mapping from CH, Natural Heritage Information Centre (NHIC), Regional OP (Halton 2024) and DFO. Spatial datasets were also downloaded from MNR, and Lands Information Ontario (LIO) (MNR 2025a). Open-source data summaries were developed and field surveys conducted to identify habitats and species on and surrounding the site. Appendix C provides the NER, with key findings summarized in this section.

Figure 5-1 shows the NHFs identified for the Mid-Halton WWTP and surrounding area.



Notes:
 1. Basemaps Source: Esri, NASA, NGA, USGS, Town of Oakville, Vantor, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
 2. The meander belt for Fourteen Mile was provided by Conservation Halton, near the QEW, and then extrapolated by a Jacobs Hydraulic Modeler and applied to the section abutting the Study Area and the 30 m Natural Environment Buffer.

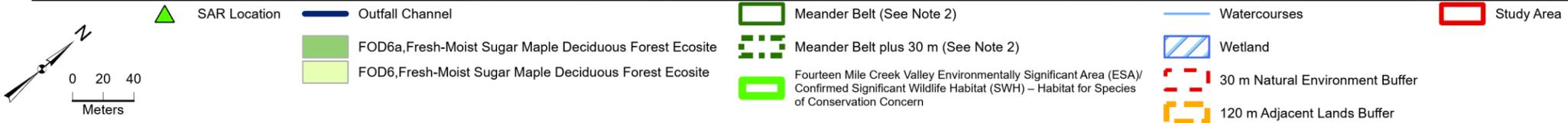


Figure 5-1
 Natural Heritage Features (NHFs)
 Environmental Study Report
 Mid-Halton Wastewater Treatment Plant (WWTP) Expansion Environmental Assessment (EA)
 Regional Municipality of Halton
 Oakville, Ontario

5.1.1.1 Woodlands and Wetlands

According to MNR mapping (MNR, 2025a and 2025b), woodlands occur throughout the northeastern outer boundary and marginally encroach the Study Area. A woodland is also mapped within the northwestern and central area of the Study Area; however, this feature is considered cultural (that is, anthropogenically disturbed) and not part of a contiguous woodland.

The CUW1 (Mineral Cultural Woodland Ecosite) community was located along the western limits of the Study Area, separating the WWTP from Deerfield Golf Club. This disturbed woodland community also extended into the WWTP abutting the Industrial and CUM1a communities. The CUW1 community within the Study Area was not connected in contiguous form to adjacent and intact woodlands off property. The canopy was dominated by Northern Red Oak while European Buckthorn heavily dominated the subcanopy. Both Canada Goldenrod and Field Thistle dominated the groundcover.

CH mapping includes wetlands within the 120 m adjacent lands, mainly in the area northeast of the plant, around Fourteen Mile Creek.

5.1.1.2 Wildlife and Aquatic Habitat

Background data obtained for wildlife included a review of the Ontario Breeding Bird Atlas (OBBA) data, which provides information on avifauna occurrences. The summary data is available in Appendix C1 (NER). BBS identified several species at the surveyed areas, that is, the Deerfield Golf Club, the Mid-Halton WWTP and the Third Line Pump Station. A list of the identified species is also available in Appendix C1 (NER).

The NER and EIA reports indicated that the local Study Area has the potential to support migratory and nesting birds, including the Fourteen Mile Creek Lands Park, Glen Abbey Trail hiking area, and the Deerfield Golf Club. The project must comply with the requirements of the MBCA, particularly with respect to vegetation clearing and tree removal activities.

The Make a Natural Heritage Map (MNR, 2025b) identified that a Wildlife Concentration Area (that is, a Mixed Wader Nesting Colony) occurred within a 1-kilometre square at the Study Area. However, this occurrence is likely associated with the Fourteen Mile Creek watercourse, Natural Heritage System (NHS) and Environmentally Significant Areas (ESA) outside of the Study Area.

Background investigation identified that special concern avifauna species may occur in the Study Area and adjacent lands. Eastern Wood-Pewee and Barn Swallow are species of special concern that were identified during field surveys outside of the Study Area but within 120 m adjacent lands and the 30 m Natural Environment Buffer, respectively.

Regarding significant wildlife habitat (SWH), the Study Area primarily contains anthropogenically disturbed areas, with dominance of non-native and successional flora species resulting in generally poor wildlife habitat quality. However, ecotones of potential suitable wildlife habitat and important ecological functions occur within the 30 m Natural Environment Buffer, and 120 m adjacent lands, mainly including Fourteen Mile Creek.

Based on DFO's *Aquatic SAR Map* (DFO, 2025), Fourteen Mile Creek and surrounding areas are classified as Critical Habitat for Redside Dace (*Clinostomus elongatus*), an endangered species. The Critical Habitat for Redside Dace includes the Meander Belt and Meander Belt plus 30 m. Redside Dace is vulnerable species at risk that is controlled under the Fisheries Act but also receives additional protection through Canada's SARA and Ontario's SAR regulations. The DFO therefore must be notified if the project impacts Redside Dace and if so, measures to protect the species must be implemented and appropriate approvals received. No other SAR fish species were identified in the background screening. However, non-SAR fish species were identified in the MNR LIO's Aquatic Resource Area (ARA).

5.1.1.3 Areas of Natural and Scientific Interest

According to the online Make a Natural Heritage Map (MNR, 2025b), ANSIs do not occur within the Study Area or 120 m adjacent lands.

5.1.2 Source Water Protection

Drinking water sources are offered protection under the Ontario Clean Water Act (2006) which mandates development and maintenance of drinking water Source Protection Plans (SPP). The Mid-Halton WWTP is located within the Halton-Hamilton Source Protection Area (SPA) and responsible for source water protection. The Halton-Hamilton SPP documents drinking water sources, IPZ, and potential risks. An IPZ is the area around the intakes, with the most vulnerable area being within a 1 km radius of the intake, referred to as IPZ 1).

The Oakville and Burloak Water Treatment Plants (WTPs) IPZs are of relevance to this project, as they are within 10 km of the Mid-Halton WWTP outfall, as illustrated on Figure 5-2. The Mid-Halton WWTP has been designed and operated to protect IPZ, shoreline uses and Lake Ontario water quality. A RWIA was completed as part of this MCEA Study to analyze if this remains the case for once the plant is expanded to an ADF capacity of 195 ML/d. The results of the analyses show that the Mid-Halton WWTP effluent quality will be much better than the PWQOs developed to protect Lake Ontario, and that IPZs and shoreline uses will continue to be protected.

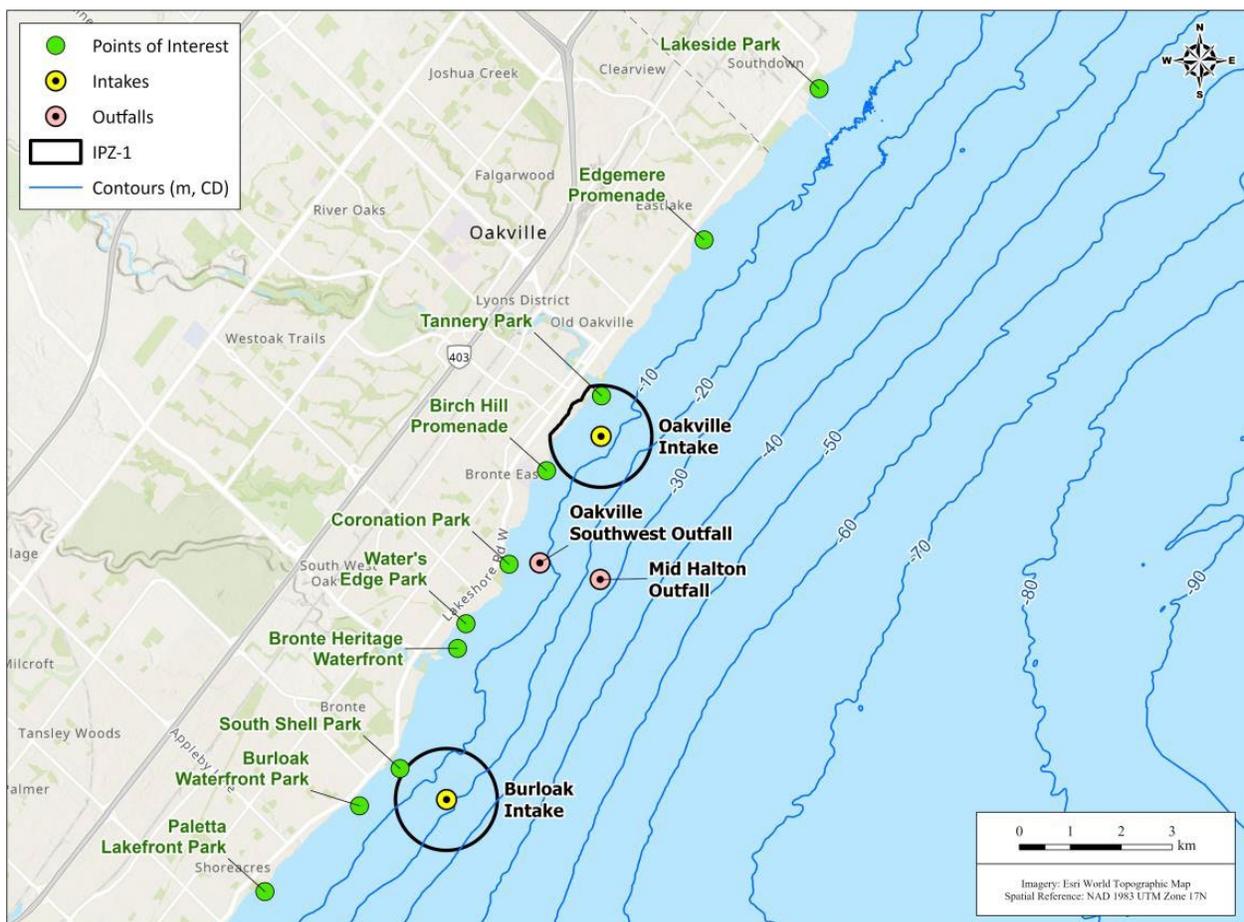


Figure 5-2. IPZ near the Mid-Halton WWTP Outfall

5.1.3 Surface Water

The Study Area is in proximity to two bodies of water, Fourteen Mile Creek and Lake Ontario.

Fourteen Mile Creek is located to the northeast of the Study Area and meanders southwards along the eastern side of the WWTP and the western side of the Third Line PS, before flowing under the QEW, and eventually draining into Lake Ontario. Fourteen Mile Creek does not occur within the Study Area nor within the 30 m Natural Environment Buffer, however, it is a Redside Dace Critical Habitat occurring in proximity to the Study Area. The flow velocity of Fourteen Mile Creek ranged from 0.06 - 0.77 m/s, with riffle, run, and pool type flows. The depth of the creek varied from 0.01 – 0.52 metres while the wetted width ranged from 3.6 – 10.2 metres. Crayfish, a Green Frog and forage fish were observed in the creek AHA surveys.

Lake Ontario is the receiving body of water for the treated effluent of the Mid-Halton WWTP, and a RWIA (Baird, 2025) was completed to verify whether future quality and quantity for the treated effluent would affect lake conditions or negatively impact sensitive receptors such as recreational areas and drinking water intakes. Detailed information on the RWIA for Lake Ontario is available in Appendix D and Section 6.6.2.

5.2 Cultural Heritage Resources

Cultural heritage resources include archaeological resources, built heritage resources, and cultural heritage landscapes. Heritage resources include artifacts, buildings or structures (for example, bridges, monuments), landscapes (for example, parks, trails), and archaeological sites. There are no known buildings, structures, landscapes or archaeological sites located within the project footprint. To date, consultation with Indigenous Communities, First Nations and Métis Communities does not indicate that there are any traditional use sites within the project Study Area.

5.2.1 Archaeological Resources

A Stage 1 AA (Archaeological Services Inc, 2025), under PIF number P094-0456-2025, was completed for the project Study Area, which includes the Mid-Halton WWTP and Third Line PS sites. Its purpose is to identify areas of archaeological potential and further archaeological assessment (for example, Stage 2-4) as necessary.

The assessment determined that the main Mid-Halton WWTP area does not retain archaeological potential, based on deep and extensive land disturbance or low and wet conditions, or because the area was previously accessed. The main Mid-Halton WWTP area does not require further archaeological assessment.

The Stage 1 AA identified that parts of the area around Third Line PS exhibit archaeological potential. These lands would require a Stage 2 AA, which would include a test pit survey at 5-m intervals, before ground-disturbing activities took place in the area. A Stage 2 AA will not take place as part of this Class EA because no work is anticipated at Third Line PS as part of the Mid-Halton WWTP expansion.

The Stage 1 AA has been filed with the MCM and is under review. When the review is complete, and provided there are no outstanding archaeological concerns, the Stage 1 AA will be entered into the Ontario Public Register of Archaeological Reports ('the Register'), and a letter of confirmation sent to the Halton Region. The results of the Stage 1 AA are considered preliminary until this time.

The detailed findings of the Stage 1 AA can be found in Appendix A. Any recommendations stated in the Stage 1 AA report were added to Section 12.1 Recommended Implementation Plan.

5.2.2 Built Heritage Resources and Cultural Heritage Landscapes

The screening checklist, Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, developed by the Ministry of Tourism, Culture and Sport (now MCM), was completed as part of this MCEA Study and is available in Appendix E1. The Merton Mount Pleasant Cemetery is located across the road from the Mid-Halton WWTP and was identified as a recognized heritage property.

A CHER (Archaeological Services Inc., 2025) was completed to update the cemetery's Statement of Cultural Heritage Value and identify heritage attributes, as shown in Appendix E2. The CHER determined that the property has design and physical value, historical and associative value, and contextual value. Based on the results of research, analysis and heritage evaluation activities, this property meets four criteria presented in Ontario Regulation 9/06 of the Ontario Heritage Act and therefore has cultural heritage value or interest.

A HIA (Archaeological Services Inc, 2025) (Appendix E3) was also completed for the Merton Mount Pleasant Cemetery to assess the project's potential direct and indirect impacts on identified heritage attributes. It acknowledges that all construction work will occur within the existing WWTP property line, at 2195 North Service Road West, and that direct adverse impacts to the cemetery are not expected.

Nevertheless, it recognizes that the expansion work may result in limited and temporary indirect impacts in the form of vibration, as the cemetery sits approximately 30 metres from the WWTP property. The following recommendations and mitigation measures have been developed:

- Construction crews should be advised of the heritage status and heritage attributes of the property at 2222 North Service Road West before going onsite.
- Staging and construction should be suitably planned and executed to maintain the heritage attributes of the property at 2222 North Service Road West.
- To address the potential for indirect impacts due to construction-related vibration, a baseline vibration assessment during detail design should be undertaken to determine the potential vibration impacts. If required, a vibration assessment and monitoring plan could be prepared by a qualified engineer and implemented by the contractor to mitigate construction-related vibration impacts.

These recommendations were added to Section 12.1 Recommended Implementation Plan.

5.3 Technical

This section provides baseline information on the existing Mid-Halton WWTP historical flows, loadings, and effluent quality limits.

5.3.1 Mid-Halton WWTP Current Flows

The Mid-Halton WWTP's drainage area includes North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills, which together comprise the plant's primary service area. Wastewater from these communities is conveyed to the facility through the North Pumping Station and the Third Line Pumping Station. These service areas represent the vast majority of current influent flow to the plant and form the baseline against which additional contributions are assessed.

The Mid-Halton WWTP currently receives supernatant from the BMC, which is generated when liquid biosolids settle in the storage tank. The BMC receives and stores liquid biosolids from the Region's smaller wastewater treatment facilities that do not have onsite biosolids dewatering processes (Acton WWTP, Georgetown WWTP, Oakville Southeast WWTP, and Oakville Southwest WWTP). Liquid biosolids are stored

onsite during the winter period and trucked offsite for land application during the land application season (typically between April and mid-November). The BMC also has a small onsite dewatering facility, which is used on an as-needed basis when liquid biosolids cannot be applied within the Region and longer haulage distances are required. Supernatant from the liquid biosolids storage tanks and centrate from the dewatering process at the BMC are conveyed to the onsite PS, which is located adjacent to the storage tanks. Flows are pumped to the Boyne trunk sewer that crosses the BMC property, which ultimately leads to the Mid-Halton WWTP. The Mid-Halton WWTP also receives septage from the Boyne Hauled Sewage Receiving Station (HSRS), which is located on the BMC property. The flows from the BMC represent approximately 0.3% of the Mid-Halton WWTP ADF and therefore, were not separated from the total plant flows for analysis. Similar to the BMC flows, average septage flows are negligible and were not separated from the total plant flows for analysis.

Wastewater flows often vary by season, day of the week, and hour of the day, and depend on the water infiltration into collection pipes. The characterization of these variations is important to understand flow patterns and determine future treatment capacity requirements.

Average and maximum daily flows to the Mid-Halton WWTP from 2019 to 2024 are presented in Table 5-1. The historical flow data indicates that there has been a significant increase in flows to the Plant in the past 6 years, with the ADF increasing by about 20 ML/d since 2019. The ADF at the Mid-Halton WWTP in 2024 was approximately 84.5 ML/d, representing 68% of the plant's current rated ADF capacity of 125 ML/d. The maximum observed daily flow was 228 ML/d.

Table 5-1. Mid-Halton WWTP Daily Flows from 2019 to 2024

Year	ADF, m ³ /d	Percent of Rated ADF Capacity	Maximum Daily Flow, m ³ /d
2019	64,826	52%	138,406
2020	71,602	57%	208,422
2021	74,194	59%	152,655
2022	73,367	59%	153,632
2023	82,694	66%	185,507
2024	84,551	68%	228,147
Design	125,000	-	250,000 ^[a]

^[a] Per capita flow rates for the Mid-Halton WWTP service area ranged from 261 to 301 L/c/d over the review period, aligning with typical values for municipal wastewater systems.

5.3.2 Current Wastewater Quality and Loadings

Concentrations and loading of key parameters in wastewater are used to determine future capacity required to achieve performance objectives. These parameters include total suspended solids (TSS) and nutrients (phosphorous and nitrogen compounds). The BOD is also an important parameter that indirectly measures biodegradable organics by quantifying the amount of oxygen needed to biodegrade the organics in an aerobic environment.

Influent characterization is understood through the 5-day biochemical oxygen demand (BOD₅), TSS, total phosphorous (TP), total Kjeldahl nitrogen (TKN), and ammonia (NH₃-N) concentrations in the wastewater. These parameters are measured and reported weekly at the Mid-Halton WWTP.

Although flows received from the BMC and HSRS are negligible compared to the overall Mid-Halton WWTP influent (approximately 0.3% of ADF), their concentration and load characteristics differ significantly from typical plant influent.

The BMC supernatant and centrate streams originate from liquid biosolids storage and intermittent dewatering processes. These streams typically exhibit very high concentrations of TKN and NH₃-N, even though their volumetric contribution is small. The BMC loads depend on biosolids management practices, haulage patterns, and operational strategies at other regional facilities.

Table 5-2 presents the average influent concentrations from 2019 to 2024. Raw wastewater characteristics were generally consistent throughout the period.

Table 5-2. Historical Influent Wastewater Concentrations- 2019 to 2024

Year	BOD ₅ , mg/L	TSS, mg/L	TP, mg/L	TKN, mg/L	NH ₃ -N, mg/L	Alkalinity, mg/L as CaCO ₃
2019	191	213	4.7	47.9	29.8	328
2020	221	224	5.4	51.2	31.7	319
2021	213	225	5.3	51.0	30.5	330
2022	210	229	5.6	52.6	33.7	368
2023	185	215	5.0	47.4	29.5	309
2024	209	229	5.2	51.6	30.9	319
Average	205	223	5.2	50.3	31.0	329

Table 5-3 presents the per capita load contributions from the Mid-Halton WWTP catchment area population equivalent in 2022 to 2024. Analysis was completed for 2022 to 2024, as BMC supernatant and centrate flow data was not available from 2019 to 2021. BMC supernatant and centrate accounted for 5–10% of total influent TKN and NH₃-N loads, and were minor for BOD₅, TSS, and TP. These contributions will be considered in future projections, especially as the Region transitions to biosolids composting.

Table 5-3. Per Capita Load Contributions for the Mid-Halton WWTP Catchment Area Population Equivalent - 2022 to 2024

Parameter	2022	2023	2024	Maximum	Typical Value ^[a]
Population	281,501	289,602	289,602 ^[b]	-	-
Per Capita BOD ₅ Load, g/c/d	54	50	60	60	60-110
Per Capita TSS Load, g/c/d	59	59	67	67	60-115
Per Capita TP Load, g/c/d	1.4	1.4	1.5	1.5	3-5
Per Capita TKN Load, g/c/d	12.9	12.5	14.0	14.0	9-14
Per Capita NH ₃ -N Load, g/c/d	8.1	7.6	8.1	8.1	5-12

^[a] Adapted from Metcalf and Eddy (Metcalf and Eddy, 2014).

^[b] The 2024 Mid-Halton WWTP annual report was not available. However, the Region indicated that the service population did not change from 2023 to 2024.

5.3.3 Current Effluent Quality Requirements and Performance

To ensure that wastewater treatment plants in Ontario are designed and operated to protect human health and the environment, the MECP issues ECAs. The purpose of an ECA is to specify the effluent limits and objectives, monitoring requirements, and operational conditions that a WWTP must meet in order to comply with provincial regulations and standards. Effluent limits and objectives vary between wastewater

treatment plants and are specific to the receiving water body. The Mid-Halton WWTP operates in accordance with Amended ECA NUMBER 7714-DBKUA6 (Issue Date: December 13, 2024).

Effluent quality is monitored for carbonaceous biochemical oxygen demand (cBOD₅), TSS, TP, ammonia nitrogen (NH₃-N), pH, and Escherichia coli (E. coli). Table 5-4 presents the Mid-Halton WWTP effluent limits and objectives.

Table 5-4. Mid-Halton WWTP Effluent Limits and Objectives

Effluent Parameter	Monthly Average Limit	Monthly Average Objective
cBOD ₅	25.0 mg/L	15.0 mg/L
TSS	25.0 mg/L	15.0 mg/L
TP	0.8 mg/L	0.6 mg/L
NH ₃ -N	10.0 mg/L (May 1 to November 30) 20.0 mg/L (December 1 to April 30)	6.0 mg/L (May 1 to November 30) 10.0 mg/L (December 1 to April 30)
pH	6.0-9.5	6.5-9.0
E. Coli	200 organisms per 100 mL monthly geometric mean density (May 1 to October 31)	150 organisms per 100 mL monthly geometric mean density (May 1 to October 31)

The plant consistently met its effluent limits and objectives from 2019 to 2024, with only minor objective exceedances observed during specific operational events. Monthly average concentrations for cBOD₅, TSS, and NH₃-N were consistently below both the limits and objectives. TP concentrations were generally compliant, with five effluent objective exceedances out of 60 data points (8%), primarily during operational tests in early 2022. No effluent limit exceedances occurred during this period.

Effluent pH remained within the regulatory limits throughout the review period, although occasional dips below the lower objective range of 6.5 were observed. These were likely due to insufficient alkalinity and were mitigated through supplemental chemical addition. E. coli levels were consistently below the objective, indicating effective seasonal UV disinfection performance.

5.3.4 Current Sludge and Biosolids Generation

Current Sludge and Biosolids generation are summarized in Table 5-5, Table 5-6, Table 5-7. Cake production for 2024 averaged 62 m³/d. Biosolids are stored in two 100 m³ bins, providing approximately 3 to 4 days of storage capacity based on recent production rates.

Table 5-5. Current Primary Sludge Generation

Primary Sludge Parameter	Train A+B	Train C	Design Guideline/ Typical Value
Average Raw Sludge Volume, m ³ /d	173	138	-
Average Raw Sludge Production, kg/d	6,436	4,985	-
Average Raw Sludge %TS	3.6	3.7	3 [a]

[a] Per MOE Design Guidelines for Sewage Works (Ministry of the Environment, 2008)

Table 5-6. Current Digestion Values

Digestion Parameter	Value	Design Guideline/ Typical Value
Average Digester Flow, m ³ /d	447	-
Average Hydraulic Retention Time (HRT), days	40	>15 ^[a]
Volatile Solids (VS) Loading Rate, kg/m ³ /d	0.64	<2.4 ^[b]
Volatile Solids Reduction (VSR), %	52	45-65 ^[c]

^[a] Per MOE Design Guidelines for Sewage Works (Ministry of the Environment, 2008)

^[b] Per Water Environment Federation (WEF) MOP 8 (WEF, 2018)

^[c] Per Metcalf and Eddy (Metcalf and Eddy, 2014)

Table 5-7. Current Dewatering Values

Dewatering Parameter	Value	Design Guideline/ Typical Value
Average Cake Concentration, %TS	21.8	15-30 ^[a]

^[a] Per MOE Design Guidelines for Sewage Works (Ministry of the Environment, 2008)

5.3.5 Current Energy Usage and Greenhouse Gas Emissions

Energy consumption and GHG emissions are key considerations for the Mid-Halton WWTP, especially considering Halton Region’s commitment to achieving net-zero corporate GHG emissions by 2045. The Region has developed a comprehensive GHG emissions inventory and climate action plan, identifying wastewater treatment as a significant contributor to its overall emissions profile.

Electricity is supplied to the Mid-Halton WWTP by Oakville Hydro through two 27.6 kV incoming feeds, with redundancy built into the system to ensure uninterrupted service. Power is distributed across the plant via multiple switchgears, supplemented by onsite generation from a 750 kW micro-hydro turbine located at the outfall. When operating, the turbine feeds power to the switchgear serving Train C. Between 2019 and 2024, it ran for 757 days, generating approximately 2.07 million kWh, with an average of 2,595 kWh/day and 1.5 kWh/ML treated. For comparison, from 2019 to 2023, the plant consumed an average of 46,090 kWh/day, with an electricity intensity of 630 kWh/ML treated.

Natural gas is supplied by Enbridge through multiple service connections. The annual average consumption is approximately 180,000 m³/y from 2019 to 2023. Natural gas is primarily used for heating via hot water boilers, which are supplemented by biogas generated onsite.

Biogas is produced through AD of sludge and is used to meet heating demands in the Energy Centre. From 2019 to 2024, the plant generated an average of 10,610 m³/day of biogas, with approximately 30% used in boilers and the remainder flared. Seasonal variations in heating demand influence biogas utilization, with higher consumption during winter months.

GHG emissions were quantified using the latest methodologies and global warming potential (GWP) values from the IPCC’s Sixth Assessment Report (IPCC, 2019). As discussed in Section 3.5 and shown in Table 5-8, emissions were categorized into Scope 1 (direct emissions), Scope 2 (indirect emissions from electricity), and Scope 3 (indirect emissions from chemical use). From 2019 to 2023, total annual emissions ranged from 13,883 to 18,047 tonnes CO₂e. Scope 1 emissions, primarily from nitrous oxide in secondary treatment and methane from digestion, accounted for over 95% of total emissions. Scope 2 emissions from electricity use were relatively minor, while Scope 3 emissions from chemical consumption

(for example, ferric chloride, polymers, alkalinity agents) contributed less than 2% of the total GHG emissions.

The single largest source of GHG emissions is nitrous oxide from secondary treatment, followed by fugitive methane emissions from AD and biogas flaring.

Table 5-8. Mid-Halton WWTP Baseline GHG Emissions Inventory 2019 - 2024

Scope	GHG Emissions, tonnes CO _{2e} /y	2019	2020	2021	2022	2023	2024
Scope 1 Emissions	N ₂ O – Secondary Treatment	7,780	9,185	9,480	9,668	9,820	10,931
	N ₂ O – Effluent	1,359	1,690	1,732	2,029	2,041	2,056
	CH ₄ – Wastewater Treatment	751	966	985	1,093	756	1,326
	CH ₄ – Effluent	53	65	103	164	136	102
	CH ₄ – AD	1,829	2,215	2,241	2,231	2,268	2,286
	Biogas Combustion (Boilers)	4.8	4.2	4.4	4.6	4.9	4.8
	Biogas Flaring	1,086	1,533	1,529	1,495	1,485	1,521
	Natural Gas Consumption	351	372	387	294	332	N/A
	Total Scope 1 Emissions	13,213	16,030	16,461	16,980	16,843	N/A
Scope 2 Emissions	Electricity	445	504	599	701	701	N/A
	Total Scope 2 Emissions	445	504	599	701	701	N/A
	Total Scope 1 and Scope 2 Emissions	13,657	16,534	17,060	17,681	17,544	N/A
Scope 3 Emissions	FeCl ₃	130	126	136	152	139	165
	Mg(OH) ₂	0	29	56	97	121	83
	NaOH	10	3	12	13	38	38
	Polymers	86	98	94	103	92	115
	Total Scope 3 Emissions	225	257	299	366	390	402
Scopes 1, 2, and 3 Total	Total Emissions	13,883	16,761	17,359	18,047	17,934	N/A

^[a] Natural gas and electricity data for 2024 are not available.

N/A = Not Applicable

These findings underscore the importance of implementing energy-efficient technologies and optimizing process operations to reduce emissions. The Region is actively exploring (in a separate project) biogas utilization strategies, including RNG generation and combined heat and power (CHP) systems. A study is underway to assess opportunities and make recommendations to support mitigation of nitrous oxide emissions at the Region’s wastewater treatment plants. The data from this project will help refine Halton Region’s greenhouse emissions inventory and support future emission reduction strategies.

5.3.6 Existing and Planned Condition-based Upgrades

The Region completed a capital needs assessment for the Third Line PS, North PS, and Mid-Halton WWTP to identify condition-based capital and maintenance investments required in each facility over a 20-year planning horizon (GM BluePlan, 2023). While not part of this MCEA study, the works identified in the assessment are either underway or planned and will be considered during the expansion design to identify potential overlaps or synergies in scope. Key recommendations include upgrades to pumping facilities, digester complex, energy systems, aeration blowers, grit removal systems, and structural repairs to tanks and clarifiers.

6. Future Requirements for Plant Expansion

This section presents the future requirements and design basis for the Mid-Halton WWTP capacity expansion from 125 ML/d to 195 ML/d ADF. The design basis follows the growth projections, the wastewater flow and load characterization, and the planned diversions to the Mid-Halton WWTP.

6.1 Population Projections

The JBPEs, developed in collaboration with local municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills), forecast significant growth within the Mid-Halton WWTP service area. The residential population is projected to increase by 134% between 2026 and 2051, while the equivalent employment/industrial, commercial, and institutional (ICI) service population is expected to grow by 192%. The demographic split is anticipated to remain relatively stable, shifting slightly from 76% residential / 24% employment/ICI in 2026 to 72% residential / 28% employment/ICI in 2051.

In addition to population growth, two major flow transfers to Mid-Halton WWTP are planned:

- Georgetown WWTP Diversion (2026): Residential-dominated flows from South Georgetown.
- Oakville Southwest WWTP Transfer (2041): Employment/ICI-dominated flows from the Bronte GO Major Transit Station Area.

These transfers will contribute to the overall service population and influent load at Mid-Halton WWTP. Table 6-1 shows the population projections from 2026 to 2051 for the service area. JBPE population forecasts from the beginning of 2025 were used for this study.

Table 6-1. Mid-Halton WWTP Service Area Population Projections

Year	Existing Catchment Area Population	Existing Catchment Area-Employment	South Georgetown Diversion-Population	South Georgetown Diversion-Employment	Oakville Southwest WWTP Diversion-Population	Oakville Southwest WWTP Diversion-Employment	Total-Population	Total-Employment
2026	336,738	111,357	21,499	1,268	-	-	358,237	112,625
2031	438,335	153,249	23,319	1,432	-	-	461,654	154,681
2036	533,937	191,888	23,983	1,620	-	-	557,920	193,508
2041	650,541	239,145	24,793	1,846	1,743	8,209	677,077	249,200
2046	721,450	273,352	25,232	2,193	2,336	9,248	749,018	284,793
2051	808,102	315,912	25,767	2,615	3,061	10,517	836,930	329,044

6.2 Flow Projection

The flow projection criteria were developed based on a detailed analysis of historical flow data for each contributing catchment area. The flow projections incorporate contributions from:

- The existing Mid-Halton WWTP catchment area.
- South Georgetown Diversion.
- Oakville Southwest WWTP transfer.

Table 6-2 presents a summary of the flow projection criteria for each contributing area. Table 6-3 presents Mid-Halton WWTP projections through 2051, and Figure 6-1 presents flow projections with a comparison to the existing rated ADF capacity of 125 ML/d, and the future design ADF capacity of 195 ML/d (South Georgetown flow diversion was originally planned for 2025, however the anticipated timing has shifted to 2026). Key conclusions and considerations related to the flow projections are as follows:

- The current rated ADF capacity of 125 ML/d is projected to be reached by 2029.
- The ADF is projected to reach 85% of the expanded ADF capacity (195 ML/d) by 2035.
- The expanded ADF capacity of 195 ML/d is projected to be reached by 2040.

Table 6-2. Flow Projection Design Criteria Summary

Parameter	Mid-Halton Catchment Area	South Georgetown Diversion	Oakville Southwest WWTP Transfer
Per Capita Flow, L/c/d	301	392	N/A
PDF	2.0	2.0	2.0
PHF	2.6	2.6	2.6
PIF	3.0	3.0	3.0

Table 6-3. Mid-Halton WWTP Flow Projection through 2051

Parameter	2026	2031	2036	2041	2046	2051
Mid-Halton Catchment Area ADF, ML/d	101.3	131.9	160.7	195.8	217.1	243.2
South Georgetown Diversion ADF, ML/d	8.4	9.2	9.4	9.7	9.9	10.1
Oakville Southwest WWTP Transfer ADF, ML/d	-	-	-	2.7	3.2	3.7
Total Mid-Halton WWTP ADF, ML/d	109.8	141.1	170.1	208.2	230.2	257.1
Mid-Halton WWTP PDF, ML/d	219.6	282.2	340.2	416.5	460.4	514.1
Mid-Halton WWTP PHF, ML/d	285.5	366.9	442.3	541.4	598.5	668.4
Mid-Halton WWTP PIF, ML/d	329.4	423.3	510.3	624.7	690.6	771.2

The Region will continue to monitor flows at the Mid-Halton WWTP to confirm that the timing of future upgrades aligns to current flows and projected growth, since flow projections are typically based on conservative numbers.

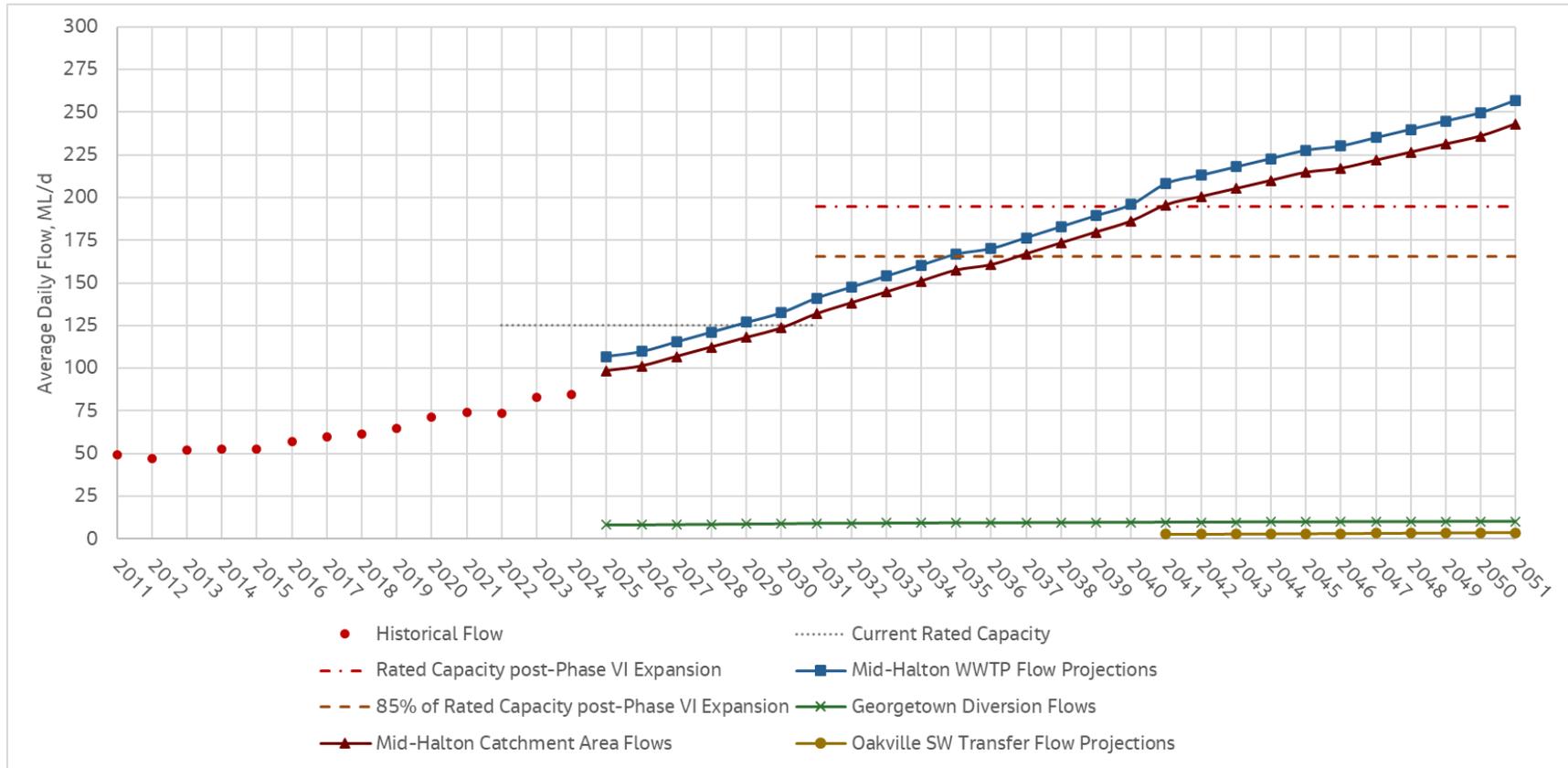


Figure 6-1. Mid-Halton WWTP Total Flow Projections through 2051

6.3 Load Projection

Table 6-4 presents a summary of the load projection design criteria for the existing Mid-Halton catchment area, South Georgetown diversion, and Oakville WWTP transfer. Table 6-5 presents a summary of the Mid-Halton WWTP load projections.

Table 6-4. Raw Wastewater Load Projection Criteria

Parameter	Mid-Halton Catchment Area	South Georgetown Diversion	Oakville Southwest WWTP Transfer	Maximum Month Load Factor
BOD ₅	60 g/c/d	80 g/c/d	199 mg/L	1.2
TSS	70 g/c/d	110 g/c/d	233 mg/L	1.3
TP	1.5 g/c/d	2.5 g/c/d	47 mg/L	1.2
TKN	14.0 g/c/d	15.0 g/c/d	27 mg/L	1.2
NH ₃ -N	8.1 g/c/d	6.5 g/c/d	5 mg/L	1.2

Table 6-5. Mid-Halton WWTP Average Daily Load Projection

Year	BOD ₅ , kg/d	TSS, kg/d	TP, kg/d	TKN, kg/d	NH ₃ -N, kg/d
2026	21,920	25,940	560	5,220	3,020
2031	28,170	33,250	715	6,840	4,000
2036	33,950	40,010	860	8,210	4,810
2041	41,550	48,890	1,050	10,020	5,860
2046	45,930	54,010	1,160	11,060	6,470
2051	51,290	60,270	1,295	12,340	7,220

6.3.1 Biosolids Management Centre Load Projections

The BMC has historically contributed 5 to 10% of the TKN and NH₃-N loads at Mid-Halton WWTP, while flows, BOD₅ loads, TSS loads, and TP loads from the BMC are negligible.

Liquid biosolids are received at the BMC for thickening to 4% TS in the storage domes via settling. Supernatant from the thickening process is conveyed to the Mid-Halton WWTP for treatment.

The Region plans to construct a biosolids composting facility at the BMC, which will allow for the liquid biosolids land application program to be phased out over time if desired. The composting facility is assumed to be commissioned in 2031. BMC load projections were developed through 2051 based on current operation practices to 2030 and implementation of biosolids composting in 2031. BMC load projections were developed through 2051 based on the following and are presented in Table 6-6.

Table 6-6. BMC Load Projection

Year	Liquid Biosolids Generation, m ³ /d	Centrate Generation, m ³ /d	Centrate TKN Load, kg/d	Centrate TAN Load, kg/d
2026	380	200	180	155
2031	420	390	350	300
2036	450	420	380	325
2041	490	460	410	350

Year	Liquid Biosolids Generation, m ³ /d	Centrate Generation, m ³ /d	Centrate TKN Load, kg/d	Centrate TAN Load, kg/d
2046	520	490	440	380
2051	560	520	470	400

6.4 Summary of Design Basis

Table 6-7 presents a summary of the design basis for a capacity expansion to 195 ML/d, which is forecast to be reached around 2040.

Table 6-7. Design Basis for Capacity Expansion to 195 ML/d

Parameter	Value	Basis
ADF, ML/d	195	-
Equivalent Service Population	647,840	301 L/c/d
PDF, ML/d	390	PDF factor = 2.0
PHF, ML/d	500	PHF factor = 2.6
PIF, ML/d	585	PIF factor = 3.0
BOD ₅ -Average Daily Load, kg/d	38,920	
BOD ₅ -Maximum Month Load, kg/d	46,700	Maximum Month Load Factor = 1.2
BOD ₅ -Average Concentration, mg/L	200	-
TSS-Average Daily Load, kg/d	45,820	
TSS-Maximum Month Load, kg/d	59,570	Maximum Month Load Factor = 1.3
TSS-Average Concentration, mg/L	235	-
TP-Average Daily Load, kg/d	985	
TP-Maximum Month Load, kg/d	1,185	Maximum Month Load Factor = 1.2
TP-Average Concentration, mg/L	5.1	-
TKN-Average Daily Load, kg/d	9,400	
TKN-Maximum Month Load, kg/d	11,280	Maximum Month Load Factor = 1.2
TKN-Average Concentration, mg/L	48	-
NH ₃ -N -Average Daily Load, kg/d	5,500	
NH ₃ -N -Maximum Month Load, kg/d	6,600	Maximum Month Load Factor = 1.2
NH ₃ -N -Average Concentration, mg/L	28.2	-

6.5 Projected Sludge and Biosolids Generation

Sludge and biosolids generation projections were developed using the raw wastewater flow and load forecasts outlined in the design basis, along with historical plant operating data. These projections assume:

- An average solids retention time (SRT) of 8 days.
- Typical chemical dosing rates.
- Historical performance of thickening, digestion, and dewatering processes.

The projections support capacity planning for solids handling infrastructure and are used in the unit process capacity assessment. Table 6-8 summarizes the sludge, biosolids, and biogas projections to 2051. 2040 is the anticipated year for Mid-Halton WWTP to reach 195 ML/d capacity.

Table 6-8. Sludge, Biosolids, and Biogas Projections

Parameter	2031	2040	2041	2051
ADF, ML/d	141	195	208	257
Raw Sludge, kg/d (Average)	25,800	35,700	38,000	47,000
Raw Sludge, kg/d (Max Month)	33,300	45,900	49,000	60,600
WAS, kg/d (Average)	12,600	17,400	18,600	22,500
WAS, kg/d (Max Month)	15,300	21,100	22,500	27,900
Digested Biosolids, kg/d (Average)	18,300	26,000	28,000	34,400
Digested Biosolids, kg/d (Max Month)	23,400	33,600	36,200	46,100
Dewatered Cake, kg/d (Average)	16,000	23,000	24,700	30,300
Dewatered Cake, kg/d (Max Month)	20,600	29,600	31,900	40,500
Biogas, m ³ /d (Average)	13,200	17,800	18,800	21,700
Biogas, m ³ /d (Max Month)	15,400	20,500	21,700	27,000

6.6 Considerations for Future Requirements

6.6.1 Flow Split to North and Third Line Pump Station

Flow projections for each PS were estimated based on the recommended design per capita flow rate (301 L/cap/d) and the Region's estimate of population growth upstream of each PS from GIS data. Flow diversions from South Georgetown are assumed to enter the North PS sewershed (starting in 2026) and flows from the Oakville Southwest WWTP transfer are assumed to enter the Third Line PS (starting in 2041). The resulting ADF projections for the North PS and Third Line PS are summarized in Table 6-9.

Table 6-9. ADF Flow Projections for North and Third Line Pumping Stations

Year	North PS ADF, ML/d	Third Line PS ADF, ML/d	Total ADF, ML/d
2031	117	24	141
2041	180	28	208
2051	226	31	257

6.6.2 Receiving Water Impact Assessment

A RWIA was undertaken to evaluate the potential effects of increased effluent discharge on the receiving waters of Lake Ontario. The RWIA supports the Schedule C Class EA and identifies the effluent criteria required under future flow conditions to allow for continued compliance with the MECP regulatory requirements for surface water discharges.

Lake Ontario is classified as a Policy 1 receiver under MECP's *Policies for Surface Water Quality Management*. This means the lake currently meets or exceeds PWQO, and water quality must be maintained at or better than PWQO. Any increase in effluent discharge cannot degrade water quality below these objectives.

The RWIA evaluated whether the existing outfall and diffuser system can achieve required dilutions under future flows without compromising water quality. Both near-field (CORMIX) and far-field (MIKE3) modelling were undertaken using conservative assumptions:

- Effluent concentrations: Compliance limits for TP and TAN were used (TP = 0.8 mg/L; TAN = 10–20 mg/L depending on season).
- Background conditions: Lake Ontario ambient concentrations (for example, TP = 0.009 mg/L) based on recent monitoring.
- Worst-case conditions: Low lake currents and high effluent concentrations.

And the key parameters are:

- TP: Governing parameter for dilution; PWQO = 0.02 mg/L.
- Un-ionized Ammonia (UIA): PWQO = 0.02 mg/L; negligible dilution required.
- E. coli: Indicator of fecal contamination; negligible dilution required.

Table 6-10 summarizes the modelled scenarios.

Table 6-10. Modelled Flow Scenarios.

Scenario	Flow (MLD)	TP (mg/L)	TAN (mg/L)	Governing PWQO	Required Dilution (TP)	Mixing Zone Area
Existing	125	0.8	10–20	TP = 0.02 mg/L	68:1 – 73:1	0.163 km ²
Future	195	0.8	10–20	TP = 0.02 mg/L	68:1 – 73:1	0.257 km ²

The findings based on the models are:

- PWQO Compliance: TP, TAN, and UIA meet PWQO at the edge of the near-field mixing zone for both flow scenarios.
- TP is the governing parameter, requiring the highest dilution; UIA and E. coli require negligible dilution (<1:1).
- Drinking Water Intakes: TAN concentrations remain well below the Great Lakes Water Quality Agreement objective of 0.5 mg/L.
- Mixing Zones: Remain small and localized (≤ 0.26 km²), extending only a few hundred metres from the diffuser and not interfering with other water uses.
- Shoreline Impacts: Predicted TP concentrations at shoreline locations remain below PWQO based on 24-hour averages; minor instantaneous exceedances (<0.3% of time) occur under conservative assumptions.

The RWIA confirms that the proposed expansion of the Mid-Halton WWTP to 195 ML/d will not adversely affect the receiving waters of Lake Ontario. The existing outfall and diffuser system can achieve the required dilutions to meet PWQO for TP, TAN, and UIA. Impacts on recreational areas and drinking water intakes are not significant, and the mixing zones remain small and well-contained. The assessment supports the conclusion that the Mid-Halton WWTP can accommodate future growth while maintaining compliance with MECP surface water discharge requirements. Furthermore, the effluent objectives and criteria specified in the ECA will remain unchanged (Refer to section 5.3.3).

6.6.3 Scalability and Resilience Planning

The recent Capacity Demonstration Study confirmed that Train C can be re-rated from 50 ML/d to 60 ML/d with targeted upgrades such as foam suppression, step-feed automation, blower capacity expansion, alkalinity addition, and dual-point ferric dosing. Hydraulic modelling validated its ability to handle a peak instantaneous flow of 180 ML/d, ensuring short-term flexibility. However, this re-rating does not enable full plant capacity increase to 135 ML/d due to solids handling limitations, highlighting the need for integrated planning across liquids and solids streams.

Future expansion provisions aim to achieve 195 ML/d by 2031 and ultimately 400 ML/d, with design strategies that prioritize adaptability and operational resilience. These include space for additional digesters and thickening/dewatering units, chemical systems sized for future demand, electrical and hydraulic upgrades, and automation for flow distribution. The design also anticipates regulatory compliance, process intensification options, and sustainability measures such as renewable energy integration. Aligning these provisions with State of Good Repair projects will mitigate risks and ensure cost-effective implementation.

6.7 Process Capacity Assessment

The process capacity assessment for the Mid-Halton WWTP evaluated each treatment unit against the current rated ADF of 125 ML/d and the proposed expansion to 195 ML/d. The analysis incorporated design criteria from MECP and WEF guidelines, historical performance data, and calibrated process modelling. While several systems are adequately sized for current operations and capable of supporting future capacity targets, many require upgrades or expansions to support the future capacity target. Although most process units require expansion to meet the 195 ML/d target, the existing outfall is designed for 400 ML/d and can fully accommodate future flows without modification.

The findings of the capacity assessment for existing processes, tanks, and equipment are summarized in Table 6-11 and illustrated in Figure 6-2. Several processes have buildout provisions to increase capacity by installing more equipment in existing facilities:

- Headworks Building: provision to install screen in existing 3rd channel and 3rd vortex grit removal unit adjacent to existing units.
- UV disinfection: provision to install UV equipment in existing 5th UV channel.
- WAS thickening: provision to install a 4th RDT.
- Dewatering: provision to install a 3rd centrifuge.

Table 6-11. Summary of Capacity Assessment and Expansion Needs

Treatment Process	Current ADF Capacity	Expansion Needs for 195 ML/d
Influent pumping stations	North PS: 108 ML/d Third Line PS: 44 ML/d Total: 152 ML/d	North PS expansion to 170 ML/d (ADF)
Screening and grit removal	Trains A+B: 72 ML/d Train C: 78 ML/d Total: 150 ML/d	Buildout Headworks Building (install 4th screen and 3rd vortex grit unit) Total with buildout: 195 ML/d
Primary clarifiers	Trains A+B: 66 ML/d Train C: 63 ML/d Total: 129 ML/d	60 ML/d ADF primary treatment expansion

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Treatment Process	Current ADF Capacity	Expansion Needs for 195 ML/d
Bioreactors and secondary clarifiers	Trains A+B: 75 ML/d Train C: 50 ML/d Total: 125 ML/d	60 ML/d ADF secondary treatment expansion Train C re-rate to 60 ML/d is possible with upgrades
Aeration system	Trains A+B: 75 ML/d Train C: 40 ML/d (upgrades are required to accommodate a Train C re-rating) Total: 115 ML/d	Aeration capacity for 60 ML/d ADF secondary treatment expansion
Chemical phosphorus removal	142 ML/d	Chemical storage capacity expansion
Supplemental alkalinity addition	27 ML/d	Chemical storage and metering pump capacity expansion
UV disinfection	Current: 144 ML/d	Buildout UV Building (install UV equipment in 5th channel) With buildout: 195 ML/d
Outfall	400 ML/d	N/A
WAS thickening	Current: 170 ML/d	Buildout thickening facility (install 4th RDT) With buildout: Beyond 195 ML/d
Anaerobic digestion	125 ML/d	AD expansion
Biosolids dewatering	Current: 150 ML/d	Buildout dewatering facility (install 3rd centrifuge) With buildout: Beyond 195 ML/d
Biosolids cake storage	100 ML/d (3 days of storage), or 125 ML/d (2 days of storage)	Storage capacity expansion (or hauling contract revision)

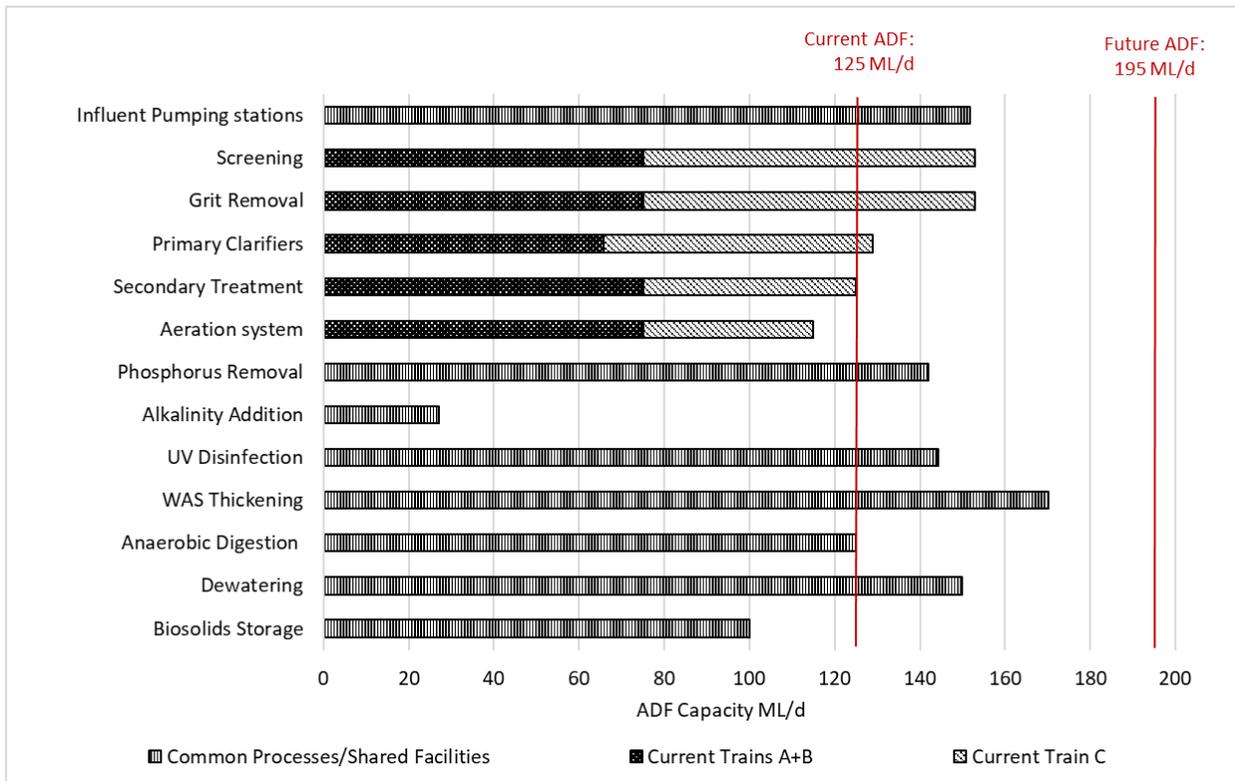


Figure 6-2. Capacity Assessment Summary

7. Problem and Opportunity Statement

The Region owns and operates six WWTPs. The Mid-Halton WWTP is currently the second largest WWTP in the Region and provides wastewater treatment for communities and businesses in North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills.

Overall, the Region currently has a residential population of approximately 650,000 and is expected to have a population of approximately 1,100,000 people by 2051. Employment in the Region is also expected to increase from approximately 350,000 to 500,000 employees by 2051. The Mid-Halton WWTP currently provides wastewater treatment for approximately 290,000 people, including both residents and employees. In addition, the plant will begin receiving flows from a portion of Georgetown in 2026. The JBPE study completed with the participation of the Regions' local municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills), identified that a significant percentage of the forecasted population and employment growth will occur within the Mid-Halton WWTP serviced area.

Currently, the Mid-Halton WWTP is rated to treat an ADF of 125 ML/d and will require capacity expansions in both the short and long term based on the JBPE study population forecasts and the results of the Region's IMP. To meet the forecasted servicing requirements, the Region is committed to expanding the Mid-Halton WWTP capacity from 125 ML/d to 195 ML/d by 2031.

The ability to expand the WWTP to service the short-term forecasted population and employment growth within the Mid-Halton WWTP service area represents challenges facing the Region in the areas of:

- Maintaining the required level of plant capacity to meet the demands of a growing population and employment base.
- Meeting the Region-wide corporate GHG emissions reduction targets.
- Increasing capital costs of infrastructure upgrades.
- Increasing maintenance and operation costs due to inflation rates and market conditions.
- Resilience to changing climate impacts.
- Providing the servicing levels in the Region that will support the Province of Ontario's Bill 23 (More Homes Built Faster Act).

This MCEA study was initiated by the Region to develop a preferred capacity expansion concept that will increase the rated ADF capacity of the Mid-Halton WWTP to 195 ML/d by 2031. The study is being conducted in accordance with the planning and design process for municipal projects outlined in the MEA's MCEA process for Schedule C municipal infrastructure projects (MEA, October 2000, as amended in 2024).

Through implementation of the recommendations made through the MCEA study, the Region can realize the following potential opportunities that provide for:

- Plant capacity expansion from 125 ML/d to 195 ML/d by 2031, which will provide capacity to service growth through 2040.
- The support of the Region's Corporate Climate Action Plan, which prioritizes energy efficiency, renewable energy generation, and GHG mitigation in future infrastructure planning.
- Expanded treatment capabilities that will meet future ECA requirements.

- The support of the development of a preferred expansion concept that aligns with Halton Region's climate commitments and supports a resilient, low-carbon future for the Mid-Halton WWTP.
- Treatment requirements based on future flow diversions, including flows from the South Georgetown Diversion.
- The support of the integration of the expansion to 195 ML/d into a long-term facility plan that will allow the Mid-Halton WWTP to reach the ultimate site capacity of 400 ML/d.
- The support of the implementation of plant upgrades that are required to meet expansion requirements.
- Efficiencies in the expenditure of required capital for expansion.
- Mitigation of the impact of future O&M costs.
- Mitigation of the impacts of future climate impacts.
- Continued protection of water quality in receiving environments.
- Continued mitigation of impacts on surrounding landowners.
- Treatment of sewage that emphasizes system resiliency and environmental protection.
- The support of the future implementation of the planned biosolids composting facility.

8. Wastewater Treatment Technologies Screening

This section presents an industry scan of technologies that were considered at the Mid-Halton WWTP to address operational constraints and capacity deficiencies, followed by must-have criteria screening to short list the technologies.

8.1 Considerations for Capacity Expansion Alternatives

The last capacity expansion project at Mid-Halton WWTP considered buildout provisions for process unit expansion. New infrastructure was implemented with space allocated for future equipment installation. Auxiliary systems that support operations but depend on the selection of primary and secondary treatment technologies, such as blowers and chemical systems, will be developed during design. The planned increase to 195 ML/d will be accomplished through a combination of constructing new process infrastructure, installing equipment in existing infrastructure, and re-rating the existing Train C to optimize its capacity within the current footprint.

Therefore, the key process units that require alternatives development and evaluation under this MCEA Study are:

- Primary Treatment.
- Secondary Treatment.
- Solids Handling (includes AD and other treatment technologies).
- Sidestream Management.

The current strategy for sidestream management dewatering centrate is to equalize flows in an equalization tank prior to pumping back to the head of the plant for treatment. Sidestream management flows depend on the selected solids handling approach and alternatives evaluation will consider keeping the current approach for sidestream management versus implementing a sidestream treatment process.

8.2 Long List of Technologies

A comprehensive scan of technologies has been completed to support the development of technology alternatives for the Mid-Halton WWTP expansion. The long list includes a range of conventional and emerging technologies.

The technology scan was informed by multiple sources, including literature reviews, conference proceedings, and publications from the Water Research Foundation, WEF, and U.S. Environmental Protection Agency, as well as Jacobs' experience from recent projects.

Table 8-1 presents a summary of the long list of technologies. The technologies evaluated during the MCEA Study are presented in Section 8.3 and shortlisted in Section 8.4.

Table 8-1. Technology Scan Summary

Unit Process	Technologies
Primary Treatment	<ul style="list-style-type: none"> ▪ Conventional Sedimentation (base case) ▪ CEPT ▪ Lamella Primary Treatment ▪ Ballasted Flocculation ▪ A-stage Primary Treatment ▪ Dissolved Air Flotation ▪ Primary Filtration
Secondary Treatment	<ul style="list-style-type: none"> ▪ Conventional Nitrifying/Denitrifying Activated Sludge with Chemical Phosphorus Removal (base case) ▪ Enhanced Biological Phosphorous Removal ▪ Integrated Fixed-Film Activated Sludge ▪ Moving Bed Biofilm Reactor ▪ Biological Aerated Filter ▪ Membrane Bioreactor ▪ Aerobic Granular Sludge ▪ Sludge Densification: <ul style="list-style-type: none"> - Sludge Densification via Physical Selection - Sludge Ballasting - Mobile Biofilm Carriers ▪ MABR
Solids Handling	<p>Sludge Thickening and Pretreatment</p> <ul style="list-style-type: none"> ▪ Rotating Drum Thickeners for WAS Thickening (base case) ▪ Primary Sludge Thickening ▪ Recuperative Digested Sludge Thickening ▪ Sludge Hydrolysis Pretreatment: <ul style="list-style-type: none"> - THP - Thermo-Chemical Hydrolysis Pretreatment - Biological Hydrolysis - Microbial Hydrolysis Process <p>Digestion</p> <ul style="list-style-type: none"> ▪ Conventional Anaerobic Digesters (base case) <p>Dewatering</p> <ul style="list-style-type: none"> ▪ Centrifuge (base case)
Sidestream Management	<ul style="list-style-type: none"> ▪ Sidestream Equalization (base case) ▪ Sidestream Treatment (Partial Nitritation/Deammonification) ▪ Post-Aerobic Digestion

8.3 Screening of Long List of Technologies

To refine the long list, a set of screening criteria, referred to as “must-have” criteria, was established. These criteria were used to assess the suitability of each technology for shortlisting. The criteria are summarized in Section 4.3.1. Technologies that met all screening criteria were advanced to the short list. These shortlisted technologies formed the basis for developing liquid and solids treatment process alternatives.

8.3.1 Primary Treatment

The base case for primary treatment at Mid-Halton WWTP is conventional sedimentation through eight rectangular primary clarifiers tanks, four servicing Trains A and B, and four servicing Train C.

The long list of Primary Treatment technologies was assessed against the five must-have screening criteria. The results of the screening are summarized in Table 8-2.

Based on the screening results, the following technologies were carried forward for further evaluation:

- Conventional Sedimentation (base case)
- CEPT
- Lamella Primary Treatment

These technologies were considered viable for integration into the plant-wide expansion concepts.

Table 8-2. Primary Treatment Technology Screening

Technology	Minimize Risks Associated with Technology Experience	Maximize Flexibility for Future Capacity Expansion and Upgrading	Minimize GHG Emissions	Implementable by 2031	Compatible with Existing Infrastructure and Regulatory Requirements	Carried Forward to Short List of Technologies?
Conventional Sedimentation (base case)	Pass	Pass	Pass	Pass	Pass	Yes
Chemically Enhanced Primary Treatment	Pass	Pass	Pass	Pass	Pass	Yes
Lamella Primary Treatment	Pass	Pass	Pass	Pass	Pass	Yes
Ballasted Flocculation	Pass	Pass	Pass	Pass	Fail – increases hydraulic headloss, may not be achievable within existing hydraulic profile without intermediate pumping.	No
A-stage Primary Treatment	Pass	Pass	Pass	Pass	Fail – increases hydraulic headloss, may not be achievable within existing hydraulic profile without intermediate pumping.	No
Dissolved Air Flotation	Fail – limited full-scale applications.	Pass	Pass	Pass	Pass	No
Primary Filtration	Fail – limited full-scale applications.	Pass	Pass	Fail – pilot testing would be required to confirm applicability.	Pass	No

8.3.2 Secondary Treatment

Secondary treatment at Mid-Halton WWTP is currently provided by CAS aeration tanks and secondary clarifiers. The aeration tanks achieve full nitrification and partial denitrification, with chemical phosphorus removal. To support the planned expansion to 195 ML/d, a range of technologies were considered to enhance or replace the existing secondary treatment process.

Each technology was evaluated against the five screening criteria. Technologies with significant hydraulic limitations, limited full-scale experience, or compatibility issues were screened out as shown in Table 8-3.

The following technologies were carried forward for further evaluation:

- CAS with Chemical Phosphorus Removal (base case)
- Enhanced Biological Phosphorus Removal (EBPR)
- Aerobic Granular Sludge (AGS)
- Sludge Densification via Physical Selection (hydrocyclones)
- Membrane Aerated Biofilm Reactor (MABR)

These technologies were considered viable for integration into the plant-wide expansion concepts.

Table 8-3. Secondary Treatment Technology Screening

Technology	Minimize Risks Associated with Technology Experience	Maximize Flexibility for Future Capacity Expansion and Upgrading	Minimize GHG Emissions	Implementable by 2031	Compatible with Existing Infrastructure and Regulatory Requirements	Carried Forward to Short List of Technologies?
Conventional Nitrifying/Denitrifying Activated Sludge with Chemical Phosphorus Removal (base case)	Pass	Pass	Pass	Pass	Pass	Yes
Enhanced Biological Phosphorous Removal	Pass	Pass	Pass	Pass	Pass	Yes
Integrated Fixed-Film Activated Sludge	Pass	Pass	Fail – intermediate pumping would increase Scope 2 GHG.	Pass	Fail – increases hydraulic head, may not be achievable within existing hydraulic profile without intermediate pumping.	No
Moving Bed Biofilm Reactor	Pass	Pass	Fail – intermediate pumping would increase Scope 2 GHG.	Pass	Fail – increases hydraulic head, may not be achievable within existing hydraulic profile without intermediate pumping.	No
Biological Aerated Filter	Pass	Pass	Fail – intermediate pumping would increase Scope 2 GHG.	Pass	Fail – increases hydraulic head, may not be achievable within existing hydraulic profile without intermediate pumping.	No
Membrane Bioreactor	Pass	Pass	Fail – intermediate pumping would increase Scope 2 GHG.	Pass	Fail – increases hydraulic head, may not be achievable within existing hydraulic profile without intermediate pumping.	No
AGS	Pass	Pass	Pass	Pass	Pass	Yes

Technology	Minimize Risks Associated with Technology Experience	Maximize Flexibility for Future Capacity Expansion and Upgrading	Minimize GHG Emissions	Implementable by 2031	Compatible with Existing Infrastructure and Regulatory Requirements	Carried Forward to Short List of Technologies?
Sludge Densification via Physical Selection (hydrocyclones)	Pass	Pass	Pass	Pass	Pass	Yes
Sludge Ballasting	Pass	Pass	Fail – intermediate pumping would increase Scope 2 GHG.	Pass	Fail – increases hydraulic head, may not be achievable within existing hydraulic profile without intermediate pumping.	No
Mobile Biofilm Carriers	Fail – limited full-scale applications.	Pass	Pass	Fail – MECP would likely require a demonstration prior to implementation.	Pass	No
Membrane Aerated Biofilm Reactor	Pass	Pass	Pass	Pass	Pass	Yes

8.3.3 Solids Handling

Solids handling at the Mid-Halton WWTP includes thickening, digestion, and dewatering of primary and WAS. As part of the technology scan, several pre-treatments, thickening, dewatering, and digestion technologies were reviewed to improve process efficiency, increase capacity, and enhance biogas production. Preliminary evaluation and vendor discussions indicated that accommodating larger centrifuge units within the existing Biosolids Building to maintain the same operating hours would require significant layout modifications, reduced maintenance access, and complex constructability sequencing. To maintain the Region's preferred operating schedule (5 days/week, 8–10 hours/day), four centrifuges are required, which cannot be achieved within the current building footprint without major compromises. Therefore, construction of a new Biosolids Building is proposed as a provisional item under this ESR to support future dewatering capacity needs in case an increase in the operating hours required for smaller capacity centrifuges cannot be accommodated.

The Mid-Halton WWTP currently uses three RDTs for WAS thickening, with space for a fourth to meet future capacity needs (195 ML/d). A range of sludge management technologies were considered to optimize digester performance and biosolids handling that are additional to the base case. Technologies include thickening (RDT, primary sludge, recuperative) and pretreatment (THP, thermo-chemical hydrolysis). Biological hydrolysis and microbial hydrolysis are excluded due to limited full-scale applications. Currently, primary sludge and thickened WAS are anaerobically digested using three primary and one secondary conventional anaerobic digester. To support the planned expansion to 195 ML/d, digestion capacity may be increased through additional conventional anaerobic digesters (base case). Solids Handling technologies were evaluated against the screening criteria as shown in Table 8-4.

Technologies that were carried forward are:

- RDT WAS Thickening (base case)
- Primary Sludge Thickening
- Recuperative Thickening
- Thermal Hydrolysis Process (THP)
- Thermo-Chemical Hydrolysis Pretreatment
- Conventional Anaerobic Digesters (base case)

Final selections were based on holistic evaluation of solids handling strategy and integration between technologies.

Table 8-4. Solids Handling Technology Screening

Technology	Minimize Risks Associated with Technology Experience	Maximize Flexibility for Future Capacity Expansion and Upgrading	Minimize GHG Emission	Implementable by 2031	Compatible with Existing Infrastructure and Regulatory Requirements	Carried Forward to Short List of Technologies?
RDT WAS Thickening (base case)	Pass	Pass	Pass	Pass	Pass	Yes
Primary Sludge Thickening	Pass	Pass	Pass	Pass	Pass	Yes
Recuperative Thickening	Pass	Pass	Pass	Pass	Pass	Yes
Thermal Hydrolysis Process	Pass	Pass	Pass	Pass	Pass	Yes
Thermo-Chemical Hydrolysis Pretreatment	Pass	Pass	Pass	Pass	Pass	Yes
Biological Hydrolysis	Fail – limited full-scale applications.	Pass	Pass	Fail – MECP would likely require a demonstration prior to implementation.	Pass	No
Microbial Hydrolysis Process	Fail – limited full-scale applications.	Pass	Pass	Fail – MECP would likely require a demonstration prior to implementation.	Pass	No
Conventional Anaerobic Digesters (base case)	Pass	Pass	Pass	Pass	Pass	Yes

8.3.4 Sidestream Management

Sidestreams from thickening and dewatering processes contribute significant nutrient loads to the liquid treatment train. Dewatering centrate contains elevated concentrations of ammonia, contributing between 12–23% of the total influent ammonia load. Sidestream management through equalization is the base case at Mid-Halton WWTP. These sidestreams are currently returned to the headworks and could exacerbate alkalinity deficiency in the plant, negatively affecting the biological performance in the aeration tanks. To support the planned expansion to 195 ML/d, sidestream treatment technologies were considered to reduce nitrogen loading on the liquid stream, improve process stability, and enhance overall plant performance. These technologies would be additional to sidestream equalization. The long list of technology screening for sidestream management is provided in Table 8-5. All three technologies were carried forward for further evaluation.

Table 8-5. Sidestream Management Technology Screening

Technology	Minimize Risks Associated with Technology Experience	Maximize Flexibility for Future Capacity Expansion and Upgrading	Minimize GHG Emissions	Implementable by 2031	Compatible with Existing Infrastructure and Regulatory Requirements	Carried Forward to Short List of Technologies?
Sidestream Equalization (base case)	Pass	Pass	Pass	Pass	Pass	Yes
Sidestream Treatment (Partial Nitritation/Anammox or Deammonification)	Pass	Pass	Pass	Pass	Pass	Yes
Post-Aerobic Digestion	Pass	Pass	Pass	Pass	Pass	Yes

8.4 Short List of Technologies

Table 8-6 summarizes the short list of technologies based on the screening process.

Table 8-6. Short List of Technologies

Unit Process	Technologies
Primary Treatment	<ul style="list-style-type: none"> ▪ Conventional Sedimentation (base case) ▪ CEPT ▪ Lamella Primary Treatment
Secondary Treatment	<ul style="list-style-type: none"> ▪ Conventional Nitrifying/Denitrifying Activated Sludge with Chemical Phosphorus Removal (base case) ▪ EBPR ▪ AGS ▪ Sludge Densification via Physical Selection (hydrocyclones) ▪ MABR
Solids Handling	<ul style="list-style-type: none"> ▪ Sludge Thickening and Pretreatment <ul style="list-style-type: none"> - RDT WAS Thickening (base case) - Primary Sludge Thickening - THP ▪ Digestion <ul style="list-style-type: none"> - Anaerobic Digesters (base case)
Sidestream Management	<ul style="list-style-type: none"> ▪ Sidestream Equalization (base case) ▪ Sidestream Treatment (Partial Nitritation/Deammonification) ▪ Post-Aerobic Digestion

9. Evaluation of Shortlisted Treatment Technologies

This section summarizes the evaluation of shortlisted technologies for primary treatment, secondary treatment, solids handling, and sidestream management, based on multi-criteria analysis (technical, environmental, social/cultural, and economic). The methodology and criteria for the evaluation framework are presented in Section 4. Appendix F shows detailed evaluation scoring and rationales.

Figure 9-1 presents the treatment process units where upgrades are anticipated by installing new equipment to existing infrastructure and the areas reserved for new construction for capacity expansion at the Mid-Halton WWTP.



Figure 9-1. Areas Reserved for New Construction and Process Units that will be Upgraded to Implement Expansion Capacity at Mid-Halton WWTP

9.1 Primary Treatment

Primary treatment plays a critical role in reducing the load on downstream processes by removing suspended solids and organic matter. It reduces the load on secondary treatment processes, especially aeration, which is energy intensive. Enhanced primary removal not only improves downstream biological performance but also enables energy savings and supports operational optimization.

9.1.1 Non-Economic Evaluation of Shortlisted Alternatives

Three alternatives were evaluated:

- Alternative 1: Conventional Primary Clarifiers (Base Case)
- Alternative 2: CEPT
- Alternative 3: Lamella Clarifiers

The non-economic evaluation of primary treatment alternatives was conducted using a multi-criteria framework.

Table 9-1 summarizes the non-economic evaluation results for the shortlisted primary treatment technologies. Alternative 3 (lamella clarifiers) was scored the lowest due to being the least proven technology in North America, being unique to the site and the Region, increased operational complexity and maintenance, and increased risk of odour. This alternative did not move forward for design concept development and cost estimate.

Table 9-1. Primary Treatment Alternatives - Non-Economic Evaluation Results

Category	Alternative 1 (Primary Clarifiers)	Alternative 2 (CEPT)	Alternative 3 (Lamella Clarifiers)
Natural Environment	30.0	29.8	30.0
Social/Cultural	14.4	13.7	13.3
Technical	25.1	24.8	16.5
Total Non-economic Score	69.5	68.3	59.8
Carry forward for cost development	Yes	Yes	No

9.1.2 Details Development for the Shortlisted Alternatives

The two primary treatment alternatives carried forward for detailed development are:

- Alternative 1 – Conventional Primary Clarifiers: base case expansion scenario, based on providing four rectangular primary clarifiers similar to Train C.
- Alternative 2 – CEPT: primary clarifiers with the same configuration as Alternative 1, with continuous ferric chloride and polymer addition to improve primary treatment performance.

Table 9-2 presents the design sizing for the conventional primary clarifiers (same for both alternatives). The tank sizing is based on Train C primary clarifiers and can be refined during the design phase of this project.

Table 9-2. Design Sizing for Conventional Primary Clarifiers

Parameter	Value
Number of Trains	4
Length, m	35.8
Width, m	11.0
Side Water Depth, m	4.0
Area, m ²	394 (each); 1,575 (total)

Figure 9-2 presents the primary site layout showing the approximate location and footprint for the primary clarifiers and polymer building for CEPT.

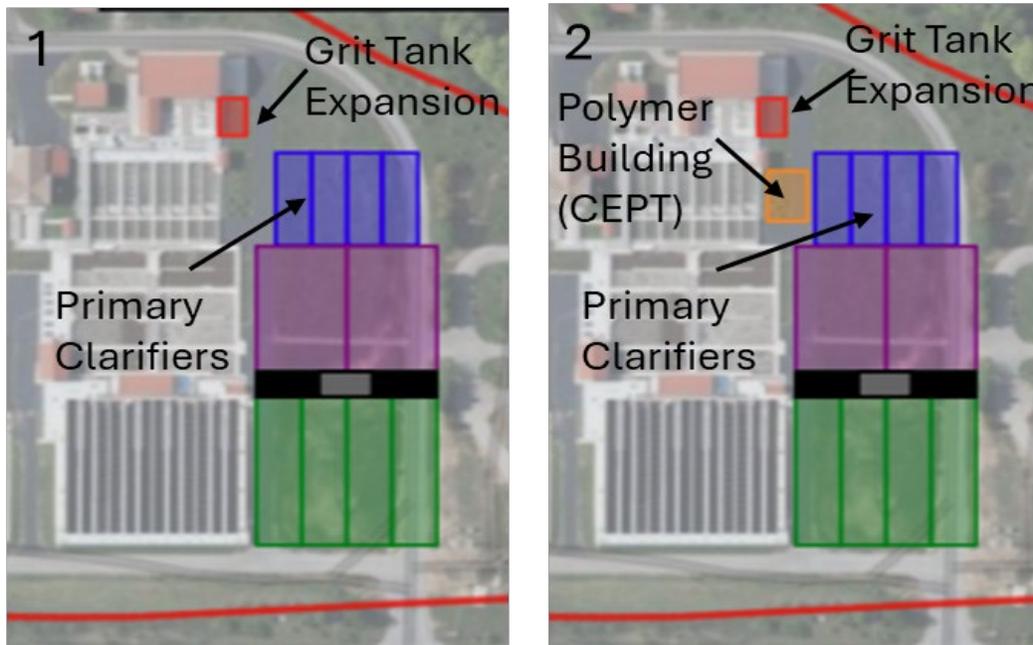


Figure 9-2. Preliminary Site Layout for 1) Primary Clarifier and 2) CEPT Polymer Building

The GHG emissions associated with the primary treatment alternatives are compared in Figure 9-3, and only include the GHG sources at the Mid-Halton WWTP that are affected by Train D CEPT operation. Biosolids management emissions (offsite) are not evaluated in this project, though the emissions will be comparable given the similar biosolids production. The GHG emissions are comparable between the two primary treatment alternatives. Biogas utilization is excluded from the GHG assessment, as the future biogas utilization strategy for excess biogas is undetermined. Biogas generated in each alternative would be sufficient to meet process heating demands (used as fuel in the hot water boilers).

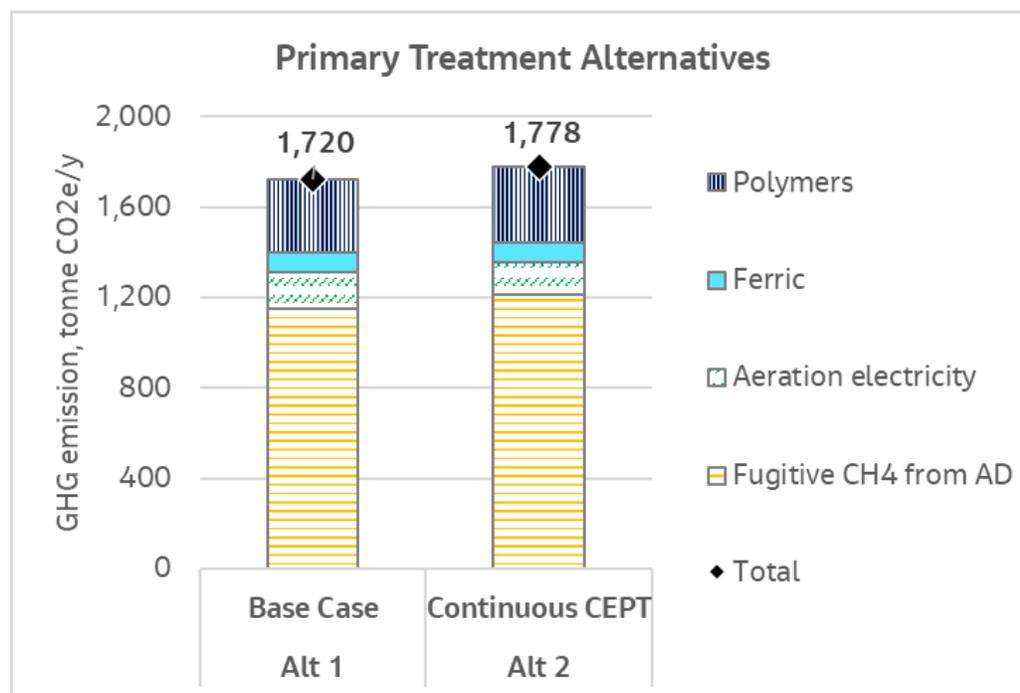


Figure 9-3. Emissions for Primary Treatment Alternatives

Table 9-3 presents the Lifecycle Cost (LCC) estimate for the primary treatment alternatives. Details are provided in Appendix F. CEPT adds \$5.4 million capital cost for a new polymer building.

Table 9-3. Lifecycle Cost Estimate for Primary Treatment Alternatives

Item (\$ million)	Alternative 1 (Primary Clarifiers)	Alternative 2 (CEPT)
Capital Cost	\$39	\$44
20-y O&M NPV Cost	\$45	\$45
20-y Total LCC	\$84	\$89

9.1.3 Comprehensive Evaluation of Shortlisted Alternatives

The cost information was used to determine the scores for the economic criteria and combined with the technical evaluation to represent the comprehensive results, as summarized in Table 9-4.

Table 9-4. Multi-Criteria Evaluation Results for Primary Treatment Alternatives

Category	Alternative 1 (Primary Clarifiers)	Alternative 2 (CEPT)
Natural Environment	30.0	29.8
Social/Cultural	14.4	13.7
Technical	25.1	24.8
Total Non-Economic Score	69.5	68.3
Economic	25.0	23.6
Total Score	94.5	91.9

Based on the evaluation results, Alternative 1 (conventional primary clarifiers) is recommended for implementation in the new 60 ML/d Train D at the Mid-Halton WWTP.

9.2 Secondary Treatment

Secondary treatment alternatives focused on maximizing capacity and nutrient removal within the available footprint. Alternatives were developed such that the available footprint reserved for Train D was fully utilized (that is, based on achieving the maximum capacity feasible within the available footprint), with a target minimum capacity of 60 ML/d.

9.2.1 Non-Economic Evaluation of Shortlisted Alternatives

The evaluation considered various approaches for secondary treatment and phosphorus removal at Mid-Halton WWTP by combining shortlisted technologies:

- Secondary Treatment Approaches:
 - CAS – Proven technology, widely used in Ontario.
 - Process Intensification – Advanced technologies to increase capacity within the existing footprint using MABR and hydrocyclones.
 - AGS – Compact, high-rate process offering the highest capacity potential but least proven in Ontario.
- Phosphorus Removal Approaches:
 - Chemical Phosphorus Removal (Chem-P) – Base case approach.
 - EBPR – Sustainable approach requiring footprint optimization.
- Shortlisted Alternatives:
 - **Alternative 1a.** CAS + Chem-P (Base Case)
 - **Alternative 1b.** CAS + EBPR (Not feasible within available footprint without intensification)
 - **Alternative 2a.** Process Intensification + Chem-P - Combines CAS with MABR and hydrocyclones.
 - **Alternative 2b.** Process Intensification + EBPR (Enables EBPR within footprint using MABR and hydrocyclones)
 - **Alternative 3.** AGS (Least favourable due to limited full-scale applications in North America, proprietary controls, and higher maintenance requirements)

Intensification was introduced to address footprint constraints and future capacity needs. The approach combines:

- MABR: Biofilm-based process installed in the anoxic zone; improves energy efficiency and nitrogen removal through passive oxygen transfer.
- Hydrocyclones: Installed on WAS line; enhance sludge settleability and allow higher clarifier loading.

This configuration supports higher capacity and enables EBPR within the available footprint for Train D.

The non-economic evaluation of secondary treatment alternatives was conducted using a multi-criteria framework. Table 9-5 presents the non-economic evaluation of shortlisted secondary treatment technologies. AGS is least favourable alternative technology and was not carried forward for detailed development and cost estimate due to it being the least proven technology in North America and unique to the site and Region, having proprietary controls and higher maintenance requirements.

Table 9-5. Secondary Treatment Alternatives - Non-Economic Evaluation Results

Category	Alternative 1a. CAS with Chem-P (Base Case)	Alternative 1b. CAS with EBPR- (insufficient footprint)	Alternative 2a. Intensification with Chem-P	Alternative 2b. Intensification with EBPR	Alternative 3. AGS
Natural Environment	28.0	Eliminated	28.7	29.2	30.0
Social/Cultural	14.4	Eliminated	14.4	14.7	14.7
Technical	24.4	Eliminated	20.4	21.2	14.4
Total non-economic	66.8	Eliminated	63.5	65.0	59.1
Carry forward for cost development	Yes	Eliminated	Yes	Yes	No

9.2.2 Details Development for the Shortlisted Alternatives

Three secondary treatment alternatives were further developed and evaluated:

- **Alternative 1a.** CAS with Chemical -P (base case) – Aeration tanks include a pre-anoxic zone (15% of total volume) for denitrification and alkalinity recovery. Secondary clarifiers are the capacity-limiting process due to the available footprint for Train D. Sizing and configurations are based on existing Train C.
- **Alternative 2a.** Intensification with Chemical Phosphorus Removal – MABR cassettes are installed in the pre-anoxic zone (15% of total bioreactor volume) to promote process intensification. Aeration tanks downstream of the MABR are sized based on a 6-day SRT, with additional CAS-equivalent SRT provided by the fixed film.
- **Alternative 2b.** Intensification with EBPR – Conceptual design follows an A2O configuration for EBPR operation: anaerobic zone (30%), anoxic zone (15% with MABR cassettes), and remaining volume aerobic. Hydrocyclones (same as Alternative 2a) are expected to improve EBPR performance by selectively retaining granules where phosphorus-accumulating organisms grow.

All three alternatives were designed to provide the maximum capacity allowable within the available footprint. Alternatives 2a and 2b incorporate MABR and hydrocyclone technologies that offer process intensification potential. The maximum Train D ADF capacity for the three secondary treatment alternatives within the available footprint is compared in Table 9-6. Alternative 2a can accommodate up to 67 ML/d ADF capacity (12 percent increase from Alternative 1 base case), while Alternative 2b enables EBPR operation (which typically requires larger footprint than CAS) while meeting the 60 ML/d capacity expansion need.

Table 9-6. Maximum ADF Capacity for Secondary Treatment Alternatives Within Available Footprint

Parameter	Alternative 1a (CAS with Chem-P)	Alternative 2a (Intensification with Chem-P)	Alternative 2b (Intensification with EBPR)
Maximum ADF capacity, m3/d	60,000	67,000	60,000
Aerobic SRT, d	7	6	6
Bioreactors, m3	18,544	16,291	18,544
Non-aerated volume, %	15%	15%	30%- Anaerobic 15%- Anoxic

Parameter	Alternative 1a (CAS with Chem-P)	Alternative 2a (Intensification with Chem-P)	Alternative 2b (Intensification with EBPR)
Secondary clarifiers, m ²	3,276	3,620	3,276
MLSS – AAL, mg/L	2,900	3,200	3,400
MLSS – MML (12 C), mg/L	3,800	4,200	4,500
SOR at PHF, m ³ /m ² /d	48	48	48
SLR at PDF - AAL, kg/m ² /d	146	163	156
SLR at PDF - MML, kg/m ² /d	191	214	205

AAL = annual average load
 ADF = average day flow
 MML = maximum month load
 PDF = peak day flow
 PHF = peak hour flow
 SLR = solids loading rate
 SOR = surface overflow rate

Given that the three alternatives are designed with approximately the same footprint, a representative layout for primary and secondary treatments is shown in Figure 9-4. This layout is based on an integrated RAS/WAS PS and blower room for Train D in the gallery between aeration tanks and secondary clarifiers. For Alternatives 2a and 2b, the hydrocyclones can fit within the RAS/WAS, blower gallery.

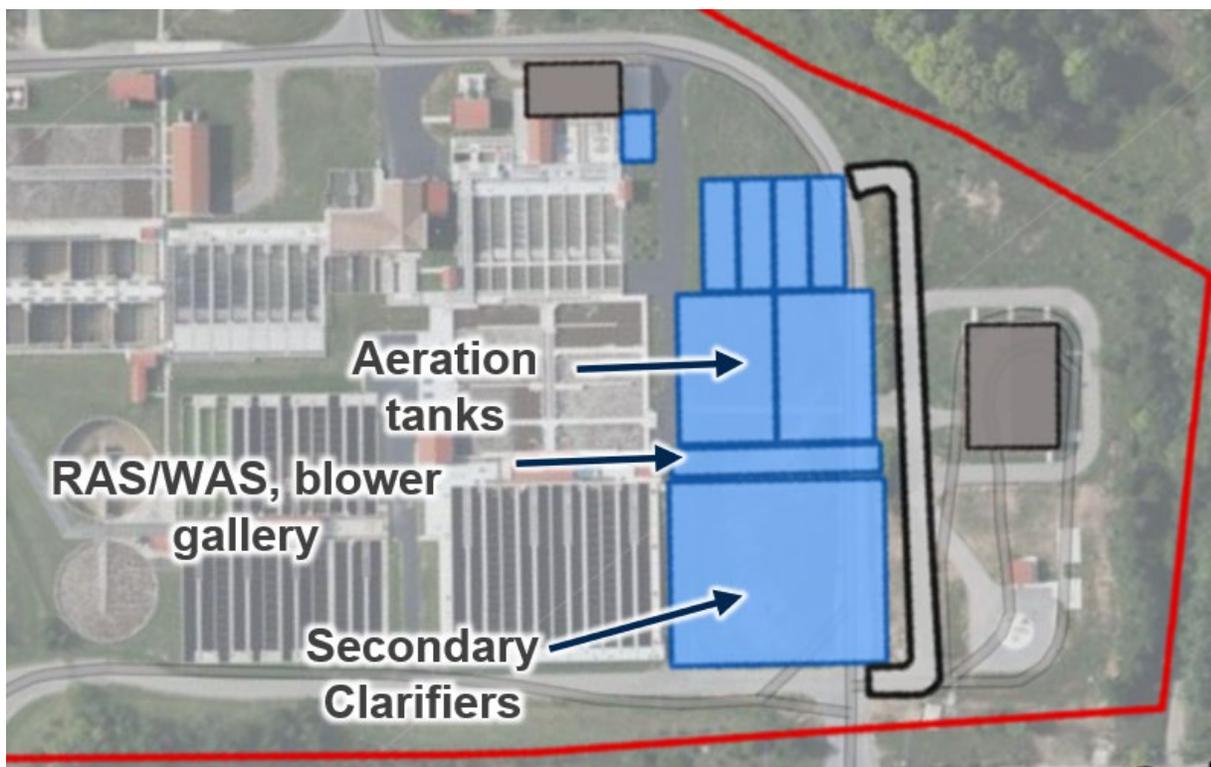


Figure 9-4. Preliminary Layout for Train D Secondary Treatment

The GHG emissions associated with the secondary treatment alternatives are compared in Figure 9-5, and only include GHG sources that are affected by different treatment technologies and that can be quantified

with the current methodology. Alternatives with MABR (Alternatives 2a/2b) result in improved total nitrogen removal, therefore reducing the effluent N₂O discharge to the environment. Alternative 2b has further reduction related to chemical GHG emissions. In practice, the MABR alternatives offer some opportunities to reduce the process N₂O emissions, however, this impact can only be quantified through direct measurements (that is, cannot be differentiated by current inventory method). Overall, Alternative 2b has the lowest GHG emission.

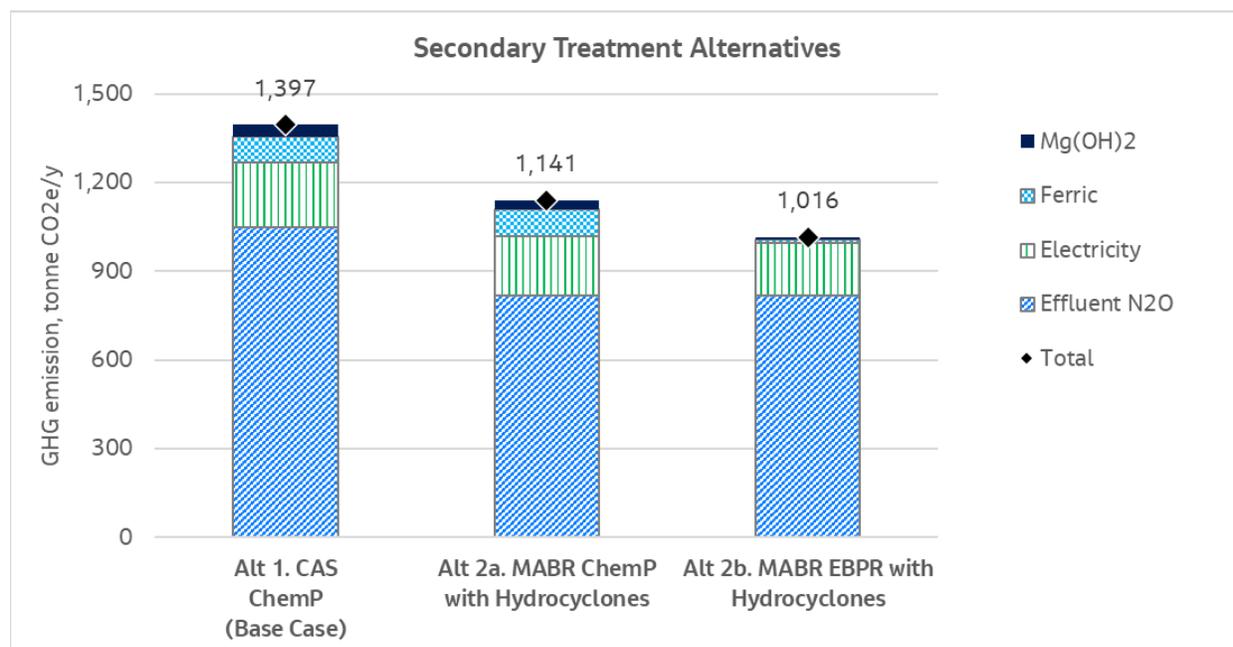


Figure 9-5. GHG Emissions for Secondary Treatment Alternatives

MABR adds \$22.5 million to the capital cost, with another \$1.9 million for hydrocyclones (total \$24.4 million for process intensification). In terms of O&M costs, MABR alternatives (Alternatives 2a/2b) will result in 10 to 15 percent reduction in aeration energy use when compared to Alternative 1. For Alternatives 2a/2b, hydrocyclones would result in a more dilute WAS stream (0.5% TS), which in turn increases the electricity use for WAS thickening. Alternative 2b will minimize the need for ferric and Mg(OH)₂ addition during normal operation for Train D, which is a great advantage given the highly volatile market price for ferric. Additional labour requirements were included for the MABR system and hydrocyclones. Table 9-7 presents the LCC estimate for the secondary treatment alternatives. Details are provided in Appendix F.

Table 9-7. Lifecycle Cost Estimate for Secondary Treatment Alternatives

Item (\$ Million)	Alternative 1 (CAS with Chem-P)	Alternative 2a (Intensification with Chem-P)	Alternative 2b (Intensification with EBPR)
Capital Cost	\$129	\$154	\$153
20-y O&M NPV Cost	\$25	\$28	\$15
20-y Total LCC	\$153	\$182	\$168

9.2.3 Comprehensive Evaluation of Shortlisted Alternatives

Table 9-8 summarizes the comprehensive multi-criteria evaluation results for secondary treatment alternatives. Alternative 2a is least favourable and therefore not recommended. Alternatives 1 and 2b are comparable; Alternative 1 has slightly higher non-economic score but lower economic score.

Table 9-8. Multi-Criteria Evaluation Results for Secondary Treatment Alternatives

Category	Alternative 1 (CAS with Chem-P)	Alternative 2a (Intensification with Chem-P)	Alternative 2b (Intensification with EBPR)
Natural Environment	28.0	28.7	29.2
Social/Cultural	14.4	14.4	14.7
Technical	24.4	20.4	21.2
Total Non-Economic Score	66.8	63.5	65.0
Economic	21.2	18.0	23.1
Total Score	88.0	81.5	88.1

The key advantages of Alternative 1 (base case) over Alternative 2b (intensification with EBPR) include:

- Easy implementation and Regional synergies
- Simple operation and maintenance
- Lower capital cost

The key advantages of Alternative 2b (intensification with EBPR) over Alternative 1 (base case) include:

- Improved process stability with the hybrid MABR + CAS system
- Reduced risk of alkalinity deficiency
- Lower chemical reliance and improved total nitrogen removal, resulting in more sustainable operation (lower GHG emissions)
- Significant saving on chemical cost

While Alternatives 1 and 2b differ in approach, the overall evaluation indicates no substantial difference in performance. Importantly, these alternatives are not mutually exclusive and can be implemented in phases.

The proposed tank sizing for bioreactors and secondary clarifiers is identical for both Alternatives 1 and 2b. This allows for future integration of MABR and hydrocyclones without requiring major structural changes. A key factor influencing the timing of MABR and hydrocyclone implementation is the rising cost of ferric chemicals. Given the potential for reduced chemical usage and lower GHG emissions, EBPR with process intensification remains a viable option.

Ultimately, CAS-based secondary treatment (Alternative 1) was selected as the preferred approach, with design provisions for future retrofit with MABR and hydrocyclones to enable EBPR operation (provisional). Timing for implementation of process intensification with EBPR will be based on ferric chloride prices and will be defined during design.

9.3 Solids Handling

Solids handling entails concentrating solids to reduce volume and stabilizing the primary sludge and WAS. Additional processes can optimize digestion and improve dewaterability.

9.3.1 Non-Economic Evaluation of Shortlisted Alternatives

Solids handling shortlisted alternatives are interdependent, for example, implementing sludge pretreatment would impact AD needs. Therefore, integrated solids handling alternatives were developed considering process needs for each unit process and are presented in Table 9-9.

Table 9-9. Solids Handling Alternatives Overview

Alternative	Alternative 1 Digester Expansion (Base Case)	Alternative 2 Primary Sludge Thickening	Alternative 3 THP
Sludge Treatment	WAS Thickening	Primary Sludge Thickening WAS Thickening	WAS Thickening Sludge Screening and Pre-dewatering Thermal Hydrolysis Pre-treatment
Sludge Stabilization	Anaerobic Digestion	Anaerobic Digestion	Anaerobic Digestion
Dewatering	Dewatering Centrifuges	Dewatering Centrifuges	Dewatering Centrifuges

The existing Biosolids Facility includes provisions for expansion of the existing WAS thickening and dewatering processes by installing an additional WAS thickening RDT and an additional dewatering centrifuge. These upgrades are compatible with all shortlisted solids handling technologies and were carried forward as common elements for each alternative. The non-economic evaluation of solids handling alternatives was conducted using a multi-criteria framework described in Section 4.

Table 9-10 summarizes the non-economic evaluation results for the solids handling alternatives. Alternative 1 (digester expansion) and Alternative 2 (primary sludge thickening) received similar scores, reflecting their operational familiarity, proven reliability, and compatibility with regional practices. Alternative 3 (THP) received the lowest score and was not carried forward for further concept development and costing, primarily due to its increased O&M complexity, and the requirement for specialized staff to operate the system. The detailed evaluation including the scores and rationales are provided in Appendix F.

Table 9-10. Solids Handling Alternatives - Non-Economic Evaluation Results

Category	Alternative 1 Digester Expansion	Alternative 2 Primary Sludge Thickening	Alternative 3 THP
Natural Environment	29.5	30.0	29.3
Social/Cultural	12.6	13.1	14.6
Technical	27.0	26.6	16.3
Total Non-economic Score	69.1	69.7	60.2
Carry Forward for Cost Development?	Yes	Yes	No

9.3.2 Details Development for the Shortlisted Alternatives

The two solids handling alternatives carried forward for detailed development are available in Table 9-11.

Table 9-11. Solids Handling Alternatives Details

Feature	Alternative 1 Digester Expansion (Base Case)	Alternative 2 Primary Sludge Thickening
New Primary Digesters	2 digesters (7,419 m ³ each)	1 digester (7,419 m ³)
Total Primary Digester Volume	29,623 m ³	22,204 m ³
Design Capacity Supported	195 ML/d (maximum month load)	195 ML/d (maximum month load)
HRT	15 days (normal), 12 days (firm capacity)	15 days (normal), 12 days (firm capacity)
VS Loading & Reduction	Consistent with historical performance	Consistent with historical performance
Secondary Digester Capacity	Confirmed adequate for operational flexibility	Confirmed adequate for operational flexibility
Additional Building	New digester control building with heat exchangers, pumps, mixing systems	New digester control building with heat exchangers, pumps, mixing systems
Integration	Tunnel extensions and new piping for sludge feed, digested biosolids transfer, overflow	Tunnel extension; piping for thickened sludge and TWAS to new digester
Primary Sludge Thickening	Not included	New thickening building with 2 GBTs

Preliminary footprint requirements for Alternative 1 are presented in Figure 9-6, while Figure 9-7 presents the layout of Alternative 2.

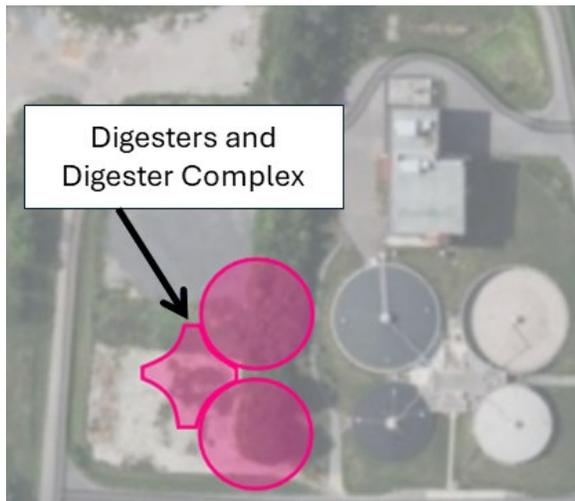


Figure 9-6. Alternative 1- Digester Footprint Requirements

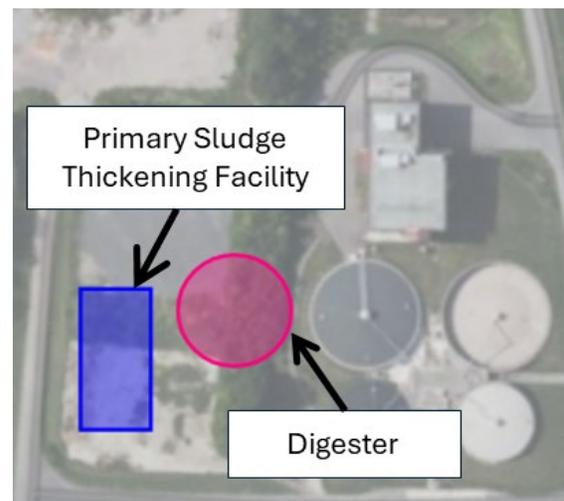


Figure 9-7. Alternative 2- Footprint Requirements

GHG emissions for the solids handling alternatives are presented in Figure 9-8. Alternative 1 (digester expansion) is projected to have higher GHG emissions than Alternative 2, primarily due to the increased process heating demand and associated emissions from biogas combustion in the boilers.

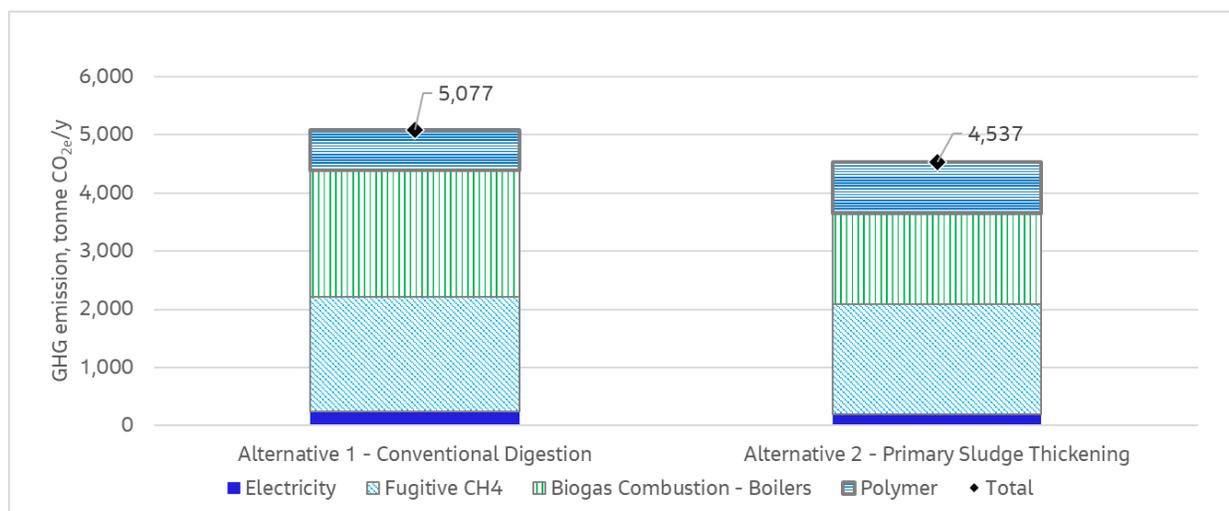


Figure 9-8. Solids Handling Alternatives GHG Emissions

The O&M costs do not consider the additional benefits provided through potential energy recovery from excess biogas (that is, via CHP or RNG generation), as the future biogas utilization strategy is currently being reviewed. Alternative 2 (primary sludge thickening) has higher O&M cost requirements than Alternative 1, primarily due to the additional polymer consumption and labour required for primary sludge thickening. Table 9-12 presents the solids handling alternatives LCC estimate. Alternative 1 has the lowest LCC, given that it has the lowest capital and O&M costs.

Table 9-12. Solids Handling Alternatives LCC Estimate

Parameter	Alternative 1 Digester Expansion	Alternative 2 Primary Sludge Thickening
Capital Cost, \$ million	\$70.9	\$96.5
20-y O&M NPV Cost, \$ million	\$25.5	\$32.4
20-y LCC, \$ million	\$96.4	\$128.9

9.3.3 Comprehensive Evaluation for the Shortlisted Alternatives

Based on the comprehensive multi-criteria evaluation results for solids handling alternatives shown in Table 9-13, Alternative 1 (Digester Expansion) was selected as the preferred solids handling solution, which maintains operational continuity and provides flexibility for future upgrades.

Table 9-13. Solids Handling Alternatives Multi-Criteria Evaluation Results

Category	Alternative 1 Digester Expansion	Alternative 2 Primary Sludge Thickening
Natural Environment	29.5	30.0
Social/Cultural	12.6	13.1
Technical	27.0	26.6
Total Non-Economic Score	69.1	69.7
Economic	25.0	19.0
Total Score	94.1	88.7

9.4 Sidestream Management

9.4.1 Non-Economic Evaluation of Shortlisted Alternatives

The existing and future Mid-Halton WWTP solids handling processes generate internal recycle streams—commonly referred to as sidestreams. These sidestreams, particularly the centrate from anaerobically digested biosolids dewatering, typically contain high ammonia loads and can significantly impact the mainstream biological treatment process and increase alkalinity demands and aeration requirements. Sidestream management addresses high-strength ammonia loads from biosolids dewatering. The design basis for sidestream management is affected by the preferred solids handling alternative, which determines the quantity and quality of sidestream generation.

Based on the preferred solids handling alternative from Section 9.3, three sidestream management alternatives were shortlisted for evaluation:

- **Alternative 1.** Sidestream Equalization (Base Case) - Involves expanding the existing centrate storage capacity to buffer the intermittent centrate flows from dewatering operations. This approach maintains continuous centrate return to the mainstream process and requires constructing a third underground centrate tank, increasing total equalization volume to 2,568 m³. It is a low-cost, low-complexity solution that aligns with current operations and infrastructure. It does not actively treat ammonia but stabilizes its return, minimizing peak load impacts on the mainstream process.
- **Alternative 2.** Sidestream Deammonification – This alternative proposes a dedicated treatment system using the integrated fixed-film activated sludge process, which biologically removes ammonia. This alternative significantly reduces ammonia load to the mainstream process (up to 90% removal), lowers operational costs and greenhouse gas (GHG) emissions, and improves process stability. However, it requires a substantial capital investment, specialized equipment, and additional operational complexity.
- **Alternative 3.** Post-Aerobic Digestion (PAD) - Was eliminated early in the evaluation due to insufficient available footprint and inability to meet HRT requirements. Although PAD could reduce ammonia before dewatering and improve biosolids quality, it was deemed infeasible within the site constraints and future expansion plans.

With Alternative 3 being eliminated due to insufficient available footprint, Alternatives 1 and 2 proceeded to the economic evaluation.

9.4.2 Details Development for the Shortlisted Alternatives

The design sizing for sidestream equalization is provided in Table 9-14, and the preliminary layout is presented in Figure 9-9.

Table 9-14. Design Sizing for Alternative 1- Sidestream Equalization (Base Case)

Parameter	Value	Notes
Sidestream design flow, m ³ /d	1,100	Centrate flow at 195 ML/d, AAL
Centrate generation rate – weekdays, m ³ /d	1,540	Based on 5 d/week dewatering operation
Centrate return rate, m ³ /d	1,100	Based on continuous centrate return
Total equalization volume required, m ³	2,200	Based on 5 d/week dewatering operation
Existing centrate tank 1 volume, m ³	944	17.4 m bx 11.3 m x 4.8 m, inside the existing Biosolids Facility

Parameter	Value	Notes
Existing centrate tank 2 volume, m ³	812	28.2 m x 6.0 m x 4.8 m, underground storage along the east side of the Biosolids Facility (outside)
New centrate tank 3 volume, m ³	812	Twin Centrate Tank 2, underground toward the east side of the Biosolids Facility; provision allocated in last expansion
Expanded centrate equalization volume, m ³	2,568	



Figure 9-9. Preliminary Layout for Alternative 1 (Sidestream Equalization)

Key design information for sidestream deammonification is provided in Table 9-15, based on Veolia's proposal. The system is sized to remove 85 to 90 percent of the ammonia load from the dewatering centrate according to the design. The preliminary site layout for Alternative 2 (sidestream deammonification) is presented in Figure 9-10.

Table 9-15. Design Sizing and Operating Parameters for Alternative 2 - Sidestream Deammonification

Process Unit	Parameter	Value	Notes
Dewatering Centrate	Average centrate flow, m ³ /d	1,100	Based on continuous feed
MBBR Reactor	Number of Tank	1	
	Length, m	12	
	Width, m	12	
	Side Water Depth, m	7.0	
	Area, m ²	144	

Process Unit	Parameter	Value	Notes
MBBR Reactor	Volume, m ³	1,000	
	SRT, d	2.5	Typical 2.5 – 4 d
	MLSS, mg/L	3,600	Typical 1,800 – 4,000
	WAS, kg/d	1,065	
	TAN Removal, %	90%	
IFAS Clarifier	Number of Tank	1	
	Length, m	12	
	Width, m	3	
	Area, m ²	36	
	RAS rate, %	100%	Range 50-150%
	Effluent TSS, mg/L	200	Typical 100 – 300
	Combined effluent TSS, mg/L	1,140	If WAS is mixed with clarifier effluent and sent back to Headworks

MBBR = moving bed biofilm reactor



Figure 9-10. Preliminary Layout for Alternative 2 (Sidestream Deammonification)

The GHG emissions associated with the sidestream management alternatives are compared in Figure 9-11, only including GHG sources that are affected by different alternatives and that can be quantified with the current methodology. For the sources that can be quantified, sidestream treatment could result in approximately 20 percent reduction in GHG emissions. The current method cannot differentiate the process N₂O emissions between the two alternatives, though sidestream treatment will

likely result in higher N₂O emissions than managing in the mainstream bioreactor. However, although full-scale data is still limited, there is general consensus that single-stage biofilm-based sidestream treatment systems offer more flexibility to reduce N₂O emissions through operational optimization, and the compact nature of sidestream treatment offers the possibility of covering the tanks and collecting the offgas for treatment in the future (if required by regulation), while it is not practical to cover the much larger mainstream bioreactors to collect N₂O for treatment. Given these considerations, the two alternatives were scored equal for GHG emissions for the evaluation.

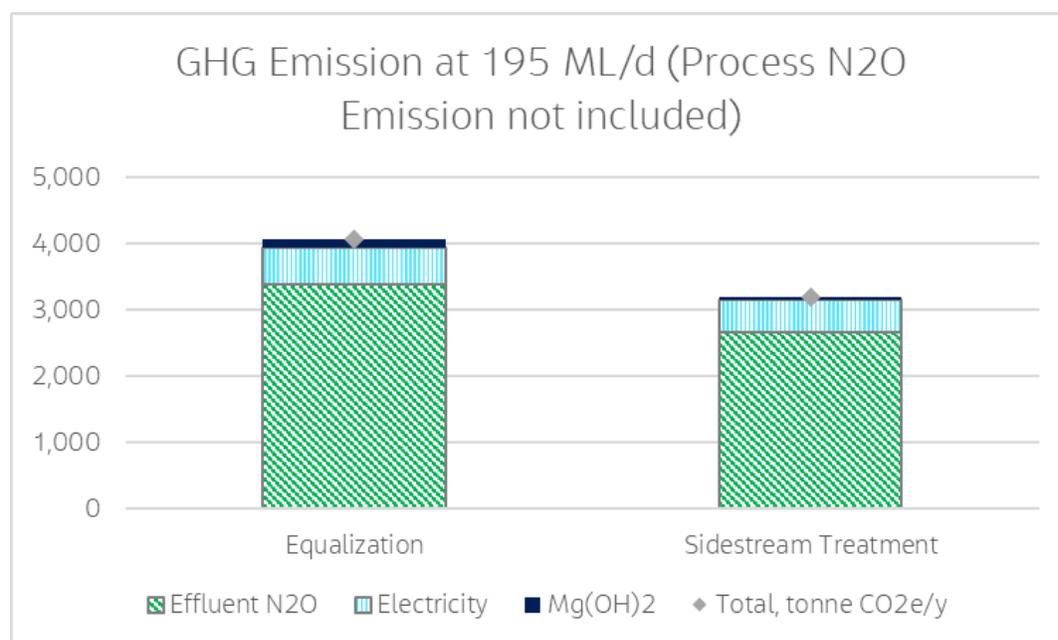


Figure 9-11. GHG Emissions for Sidestream Management Alternatives

Alternative 2 is estimated to reduce the overall electricity use by 5 percent and Mg(OH)₂ use by 75 percent, compared with the base case (Alternative 1). Table 9-16 presents the LCC estimate for the sidestream management alternatives. Details are provided in Appendix F. Sidestream treatment adds another \$17 million capital cost, while resulting in \$10 million saving in O&M cost over the 20-y period.

Table 9-16. Lifecycle Cost Estimate for Sidestream Management Alternatives

Item (\$ million)	Alternative 1 (Equalization)	Alternative 2 (Sidestream Deammonification)
Capital Cost	\$1.6	\$18.6
20-y O&M NPV Cost	\$27.9	\$17.8
20-y Total LCC	\$29.4	\$36.4

9.4.3 Comprehensive Evaluation for the Shortlisted Alternatives

The multi-criteria evaluation results for sidestream management alternatives are summarized in Table 9-17. The non-economic scores are comparable, with Alternative 1 slightly higher. However, the economic score for Alternative 2 is significantly lower (due to the additional capital cost and higher LCC).

Table 9-17. Multi-Criteria Evaluation Results for Sidestream Management Alternatives

Category	Alternative 1 (Equalization)	Alternative 2 (Sidestream Deammonification)
Natural Environment	28.0	28.0
Social/Cultural	15.0	14.1
Technical	23.6	21.9
Total Non-Economic Score	66.6	64.1
Economic	21.8	16.9
Total Score	88.4	81.0

Alternative 1 (Equalization) was selected as the preferred sidestream management strategy due to its cost-effectiveness, compatibility with existing infrastructure, and sufficient performance for the current expansion needs. The site layout accommodates future implementation of sidestream treatment without disrupting current operations, given centrate equalization is needed before sidestream deammonification.

9.5 Summary of Recommended Design Concept to Provide 195 ML/d

Table 9-18 presents a summary of the recommended design concept to expand the Mid-Halton WWTP to 195 ML/d. Of note, the capital costs presented also include costs for the unit process upgrades that did not require an analysis of alternatives (North PS, headworks, UV disinfection, chemical building), for completeness. These are high-level cost estimates (Class 5) that will be further refined through design. Figure 9-12 shows the recommended design concept for Mid-Halton WWTP.

Table 9-18. Summary of Preferred Solution for Expansion to 195 ML/d

Unit Process	Preferred Solution	Capital Cost (excluding escalation and HST)
North Pump Station	Upgrade four existing pumps	\$67,538,000
Headworks	Add 3 rd screen in the existing spare channel Add 3 rd grit tank adjacent to existing ones	\$11,737,000
Primary Treatment	Conventional primary clarifiers	\$53,123,000
Secondary Treatment	CAS secondary treatment with chemical phosphorous removal and secondary clarifiers Train C re-rating	\$149,884,000 \$11,469,000
UV Disinfection	Add UV equipment in the existing 5 th channel	\$3,738,000
Solids Handling	WAS thickening expansion, dewatering expansion Anaerobic digester expansion (2x digesters)	\$7,080,000 \$77,566,000
Sidestream Treatment	Equalization tank expansion	\$1,640,000
Chemical Building	To be defined during design	\$16,851,000
Total		\$400,626,000
Secondary Treatment	Provisional – MABR and hydrocyclone retrofit	\$25,527,000
Solids Handling	Provisional – New Biosolids Building	\$130,689,000
Sidestream Treatment	Provisional – Sidestream deammonification	\$19,515,000
Total Provisional		\$175,731,000
Grand Total Including Provisional Items		\$576,356,000

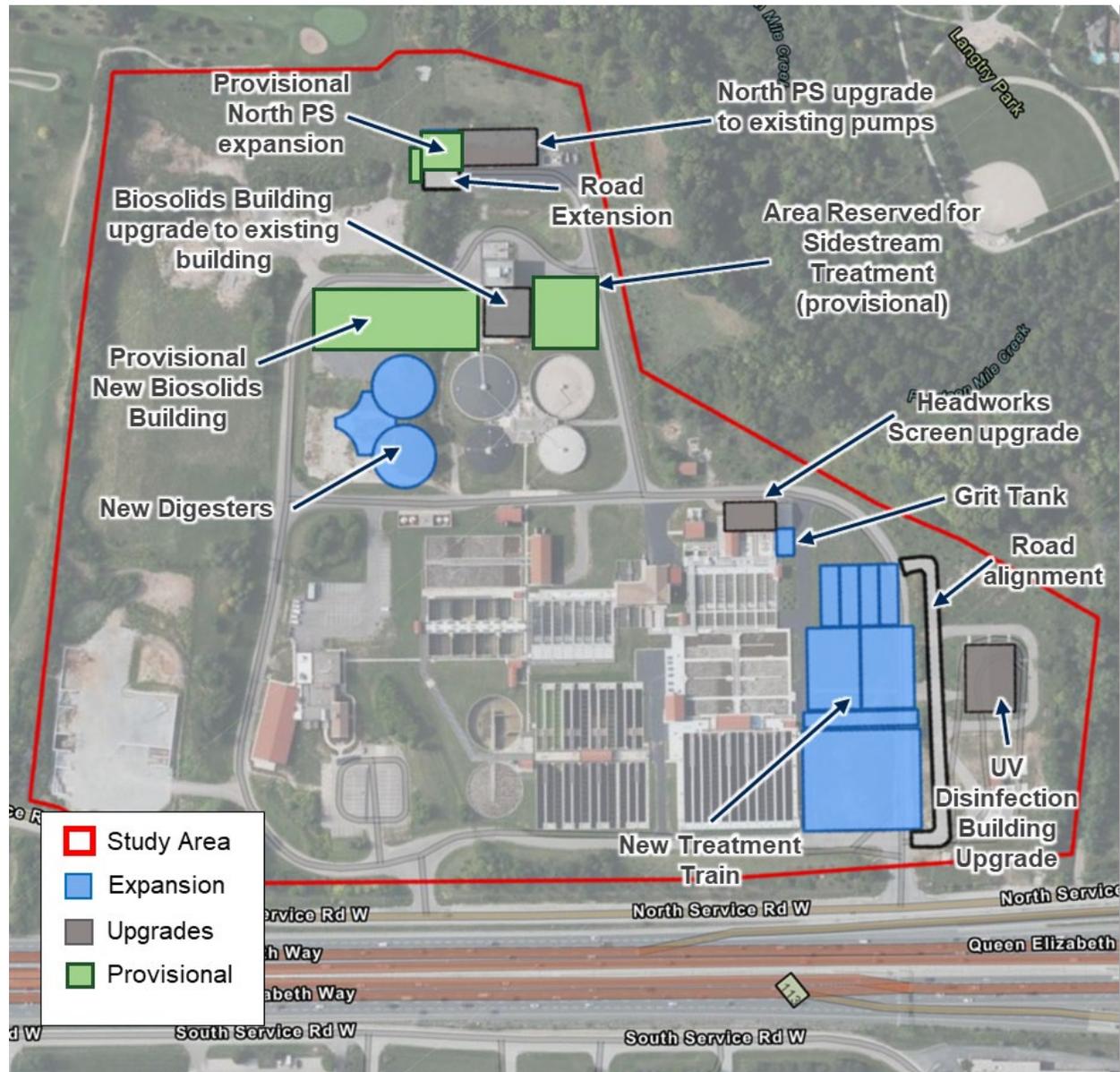


Figure 9-12. Mid-Halton WWTP Recommended Design Concept

10. Public, Agency, and Indigenous Communities, First Nations and Métis Communities Consultation and Engagement

Stakeholders in the MCEA process are any individual or party who can be affected by or have an interest in a project, including the general public, government agencies and other stakeholders such as special interest groups or utilities. All interested stakeholders must be consulted through the MCEA process. Indigenous Communities, First Nations and Métis Communities who have treaty rights or the lands are within their traditional territory must also be consulted as part of the MCEA.

At the onset of the MCEA, the Region identified stakeholders and Indigenous Communities, First Nations and Métis Communities to be consulted with through the process and implemented an extensive program to consult with these audiences and receive their input. Input was reviewed, responded to, and considered in the development of the expansion plan and mitigation measures.

This section provides a review of the goals of the consultation program, the stakeholders and Indigenous Communities, First Nations and Métis Communities consulted with, consultation activities, input received, and how input influenced the MCEA process and the selection and development of the preferred design concept. Related consultation materials are provided in Appendix B.

10.1 Goals of the Consultation and Engagement Program

Consultation is an integral component of the MCEA process, enabling the Region to inform the public, agencies, other stakeholders and Indigenous Communities, First Nations and Métis Communities about the study while eliciting their input throughout the study process. The overall aim of the program is to build understanding and receive support for the project. Specific goals included:

- Providing accessible methods and opportunities for consultation and engagement.
- Addressing comments, questions, and concerns so they can be considered within the Study process.
- Garnering support for the Study from members of the public, agencies, other stakeholders and Indigenous Communities, First Nations and Métis Communities through a process that is fair, transparent, and honest.

To achieve these goals, the following specific objectives were defined for the communications and consultation program:

- Provide adequate notice at the start of this Study to actively encourage inclusive and equitable participation.
- Clearly and effectively communicate information on each alternative the Study will consider, including:
 - Benefits and negative effects of each alternative.
 - Rationale for the recommended alternative.
 - Opportunities for sustainable solutions, particularly relating to energy efficiency and GHG emissions.
 - Recommendations to minimize adverse effects and maximize benefits.

- Foster public trust and confidence by:
 - Demonstrating the Region is following a comprehensive process, with a team of specialists who have the experience and qualifications to complete a fair, transparent, and educated evaluation of all alternatives.
 - Providing consistent messaging to all interested and affected parties.
 - Engaging all affected and interested parties in a manner that provides balanced and understandable information and elicits meaningful input.
 - Demonstrating that input received is respected, responded to, and considered during the process to arrive at an informed decision about the Study.

Stakeholder and Indigenous Community Communications and Consultation Plans were developed at the MCEA Study outset to guide consultation and communications and are available in Appendices B1 and B2, respectively. These plans outlined the broad range of consultation and engagement methods that were employed through the MCEA, including meetings and discussions, notices, comment forms at virtual consultation opportunities including by email, web page, or virtual public information centres (PICs). The method of communication used depended on the Stakeholder or Indigenous Community consulted based on their interest and knowledge.

10.2 Stakeholder and Indigenous Community Identification

A stakeholders contact list was established in Phase 1 of the MCEA based on past Halton Region projects, information provided by the MECP Environmental Assessment Branch and project team's knowledge of the Study Area. The list includes members of the general public, government agencies, local and Regional Council members, utilities, and local services. Indigenous Community members were also included and discussed in detail in Section 10.6. The list was updated through the MCEA Study depending on interest and comments received.

To reach the local public that is potentially most affected by the project, the Region identified an approximate 500 m boundary around the plant site as shown in and mailed all notices to approximately 1,400 property owners within this boundary.

Stakeholders and Indigenous Communities, First Nations and Métis Communities were kept informed through notices, the Halton project website and PICs at key milestones in the MCEA Study. Additional communications were also held with major approval agencies to receive early input and streamline the approval process through the project design stage. The following agencies were contacted:

- CH
- MECP
- MCM
- MNR

As identified by the MECP at the initiation of the study, Mississaugas of the Credit First Nation (MCFN) and the Six Nations of the Grand River (SNGR), including Elected Council, were consulted during the study. The Haudenosaunee Development Institute (HDI), who represent the Haudenosaunee Confederacy Chiefs Council (HCCC), were informed of the study. The Region also informed Wendat Nation and Métis Communities of the study. Further details are provided in Section 10.6.

10.3 Public Consultation and Engagement Activities

This section focuses on public consultation and engagement activities through project notices, website, social media, and PICs.

10.3.1 Notices

Three notices were issued through the course of this study:

- Notice of Study Commencement and PIC #1, on June 26, 2025.
- Notice of PIC #2, on November 6, 2025.
- Notice of Study Completion, on February 19, 2026.

The notices were issued to the stakeholders and Indigenous Communities, First Nations and Métis Communities on the project's mailing list, email list, and posted on the project webpage and online through social media platforms, as shown in Appendix B3. Personalized emails or letters to accompany these notices were prepared for the government agencies, identified Indigenous Communities, First Nations and Métis Communities, and community members who had expressed interest in being on the mailing list. Contact information for the Region Project Manager and Jacobs Project Manager were provided in the notices to allow interested parties to obtain additional information or request that they be added to the Stakeholder email list.

The notices were issued by email to approximately 120 contacts, including government agencies, local and Regional Council members, utilities and local services. Copies of notices were also provided by mail to approximately 1,400 residents within an approximate 500 m radius of the Mid-Halton WWTP, as shown in Figure 10-1. The MCFN, SNGR (including Elected Council and HDI), Wendat Nation and Métis Communities also received the notice and personalized emails or letters.

The MECP was notified directly through filing the notice to elicit important project information such as the identification of key Indigenous Communities, First Nations and Métis Communities in the Study Area as well as MECP legislative considerations.

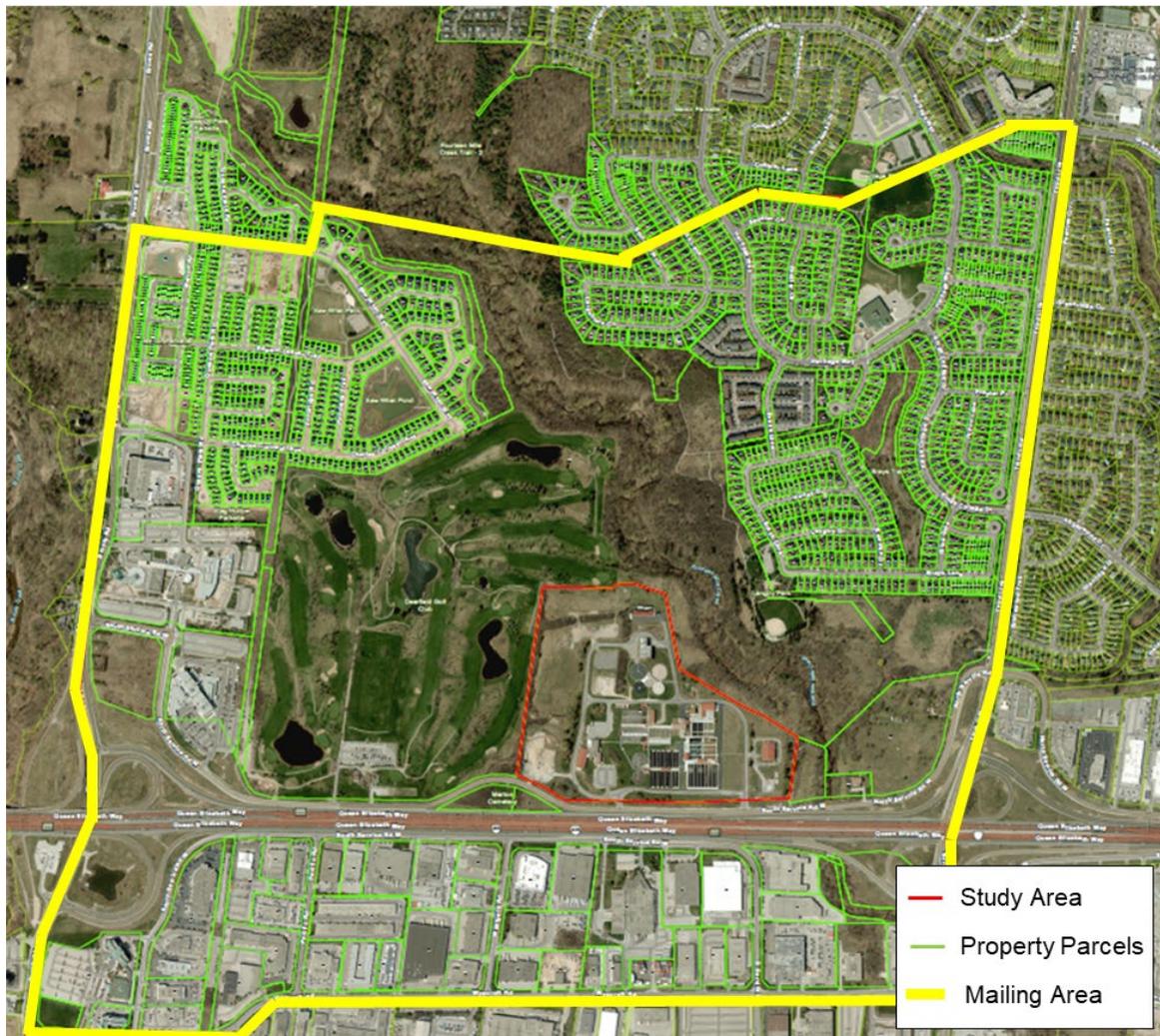


Figure 10-1. Property Owner 500 m Mailing List Boundary

10.3.2 Website and Social Media

A website for the Mid-Halton WWTP Expansion MCEA Study was established early in the process and can be accessed through www.halton.ca (Municipal Class Environmental Assessment Studies -Mid-Halton Wastewater Treatment Plant). The website has been continually updated with notices, PIC display panels and presentations, surveys, and other important information.

In addition to the website, Digital Metroland Driver Ads, LinkedIn, Facebook and Instagram ads were used to publish notices online, and in local digital papers including the Toronto Star and Inside Halton. Google Search Ads were also employed for easy access to study information. Oakville news also published a short article about the project and PIC#2.

10.3.3 Virtual Public Information Centre #1

The notice of the PIC #1 event was issued in conjunction with the Notice of Commencement to the stakeholders and Indigenous Communities, First Nations and Métis Communities on the email list on June 26, 2025, and to residences within approximately 500 m of the Mid-Halton WTPP.

Virtual PIC#1 was held between June 26 to July 25, 2025, and included panels and a short video presentation. The purpose of this PIC was to:

- Share information about how the study is being conducted.
- Share early considerations for capacity expansion at the Mid-Halton WWTP.
- Share the preliminary evaluation criteria for alternatives.
- Gather input and share the next steps in the study.

The PIC #1 information was presented in one video. It introduced the study background, Study Area, MCEA process, need for the study, the Mid-Halton WWTP processes and facility layout, key considerations for expanding the WWTP, as well as the next steps in the evaluation, including presenting draft criteria for screening the long list of technologies, and the proposed detailed evaluation criteria for assessing alternative design concepts for public input.

The event also provided an engagement opportunity through a survey for interested parties to provide comments, submit questions, and identify areas of importance regarding the Mid-Halton WWTP Expansion MCEA Study within the 4-week window (June 26 to July 25, 2025) of PIC #1. During the 4-week PIC #1 event, the project website was accessed over 2,730 times (unique views), with 443 people accessing the survey. Of these 443 people, approximately 100 individuals answered one or more questions on the survey. Thirty-one of those responded to the survey and provided written comments or questions. The survey questions and a summary of the number of responses to the questions are provided in Table 10-1 and Appendix B3, while Section 10.7 provides details on the responses to written comments received.

Table 10-1. PIC #1 Survey Questions Respondents

Question	Number of Respondents
Please indicate your familiarity with the area. <input type="checkbox"/> I live in the area. <input type="checkbox"/> I work or own a business in the area. <input type="checkbox"/> I commute through the area. <input type="checkbox"/> Other, please specify.	Of the 104 individuals who responded to this question, 91% of them indicated that they lived in the area.
The Public Information Centre video summarizes the existing infrastructure of the Mid-Halton WWTP and identifies the problem, opportunities and key considerations for the project. Do you have any additional considerations for the project team?	Of the 61 respondents to this question, 17 (or 28%) had additional considerations for the project team. The remainder (44 individuals) indicated that they did not have additional considerations.
The video provides an overview of the evaluation criteria for assessing alternative treatment technologies and expansion concepts for the Mid-Halton Wastewater Treatment Plant. The project team will use these criteria to evaluate the impacts of each alternative and select a preferred concept. Is there anything else you would like the project team to consider as we develop and evaluate alternatives?	Of the 43 respondents to this question, 13 (or 30%) had additional considerations for the project team, with 12 individuals providing written comments. The remainder 30 individuals (or 70%) indicated that they had no additional considerations.
Please share any other questions or comments you may have related to this study.	Nineteen individuals provided additional written comments.

Respondents were provided with email responses and added to the mailing list if requested. All comments received, including those not requesting a response, were addressed through the MCEA process. Details on comments received, responses to comments, and how they influence the MCEA process and preferred alternative are described in Section 10.7, with details provided in Appendix B3.

10.3.4 Virtual Public Information Centre #2

Virtual PIC#2 was held between November 6 to December 5, 2025. Notices for PIC #2 were distributed to the stakeholders and Indigenous Communities, First Nations and Métis Communities on the email list on November 6, 2025, and mailed to residences within approximately 500 m of the Mid-Halton WWTP.

The purpose of PIC #2 was to:

- Share considerations for capacity expansion at the Mid-Halton WWTP.
- Share information on the evaluation process and recommended design concept for expansion.
- Gather input and share the next steps in the study.

The PIC#2 event provided information on the study background and input received during PIC #1, the key findings of supporting natural environment and social/cultural studies, alternatives and their evaluation, and the recommended design concept. The event also offered an engagement opportunity through a survey for interested parties to provide comments, submit questions, and identify areas of importance regarding the Mid-Halton WWTP Expansion MCEA Study within the 4-week window of the PIC. During the 4-week PIC #1 event, the project website was accessed over 2,130 times (unique views), with 459 people accessing the survey. Of these 459 people, approximately 45 individuals answered one or more questions on the survey. Thirteen of those responded to the survey and provided written comments or questions. The survey questions and a summary of the number of responses to the questions are provided in Table 10-1 and Appendix B3, while Section 10.7 provides details on the responses to written comments received.

Table 10-2. PIC #2 Survey Questions Respondents

Question	Number of Respondents
Please indicate your familiarity with the area. <input type="checkbox"/> I live in the area. <input type="checkbox"/> I work or own a business in the area. <input type="checkbox"/> I commute through the area. <input type="checkbox"/> Other, please specify.	Of the 48 individuals who responded to this question, 90% of them indicated that they lived in the area.
The Public Information Centre video explained how the project team analyzed and evaluated the alternatives. Do you think there is anything else we should have included in our assessment?	Of the 28 respondents to this question, 22 (or 79%) did not think anything else should have been included in the assessment. Six respondents provided comments.
What do you think about the recommended design concept? Do you have any comments you would like to share?	Of the 22 respondents to this question, eight had additional considerations for the project team.
Please share any other questions or comments you may have related to this study.	Eleven individuals provided additional written comments.

Thirteen individuals provided comments on the PIC #2 information, with nine of these individuals providing contact information. Respondents who provide contact information were provided with email responses and added to the mailing list if requested. All comments received, including those not requesting a response, were addressed through the MCEA process. Details on comments received, responses to comments, and how they influence the MCEA process and preferred alternative are described in Section 10.7, with details provided in Appendix B3.

10.4 Government Approval Agencies

The MECP requires that all potentially affected federal, provincial, and local government agencies be contacted, with particular focus on approval agencies. The Region notified several agencies through the process with the following approval agencies expressing interest and further involvement in the project. Consultation with these agencies will continue through design to receive appropriate permits and approvals.

10.4.1 Ministry of Citizenship and Multiculturalism

The Ontario Heritage Act, mandated by the MCM requires that cultural heritage resources, including buildings, sites and archaeological (land and marine) resources be protected and that any potential impacts to these features must be avoided or mitigated.

The MCM was notified early of the study and provided with the Stage 1 AA (PIF number P094-0456-2025, Appendix A) on July 30, 2025. The Stage 1 AA indicated that the Mid-Halton WWTP site has been previously disturbed and does not retain archaeological potential. The Stage 1 AA has been filed with the MCM and is under review. When the review is complete, and provided there are no outstanding archaeological concerns, the Stage 1 AA will be entered into the Ontario Public Register of Archaeological Reports ('the Register'), and a letter of confirmation sent to the Halton Region. The results of the Stage 1 AA are considered preliminary until this time.

The Region completed the MCM's Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes checklist (Appendix E1) to determine if cultural heritage buildings or properties are within the Study Area. The Merton Mount Pleasant Cemetery is located on the North Service Road across the road from the Mid-Halton WWTP and has been designated as a heritage property in 1993 by the Town of Oakville through By-law 1993-20 under Part IV of the Ontario Heritage Act. The designation recognizes the cemetery's cultural heritage value, as it is associated with early settlers and is the last remaining part of the former hamlet of Merton, established in 1880. While plant expansion will likely not impact on the Merton Mount Pleasant Cemetery, a CHER (Appendix E2) and a HIA (Appendix E3) have been completed in consultation with the Town of Oakville to update the Statement of Heritage Value of the cemetery. The MCM has been contacted to provide input into these reports, and drafts were submitted to the MCM for review.

Indigenous Communities, First Nations and Métis Communities were also consulted with regarding the Stage 1 AA, the CHER and HIA to receive comments and input. Information of Indigenous Community engagement is provided in Section 10.6.

10.4.2 Conservation Halton

Conservation Authorities are local agencies that protect and manage water and other natural resources at the watershed level. CH has jurisdiction over the Mid-Halton WWTP Study Area as it is within the Fourteen Mile Creek watershed. Therefore, CH was consulted early in the process to obtain information necessary to ensure that appropriate mitigation measures are considered in the development of the preferred design concept.

Information requested early in the MCEA process from CH was Fourteen Mile Creek Flood Plain mapping, including the Regulated Area, Floodplain and Meander Belt. In addition, CH's Guidelines for Ecological Studies (Conservation Halton, 2017), *Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document* (Conservation Halton, 2020), and Planning and Permitting Document (2025) were considered in the preparation of the NER (Appendix C1) and the

EIA Report (Appendix C2). These reports identified natural features that may potentially be impacted by the expansion and measures to mitigate impacts on these features.

A consultation meeting was also held on October 16, 2025 with CH to present information on the recommended design concept, discuss potential impacts to the Fourteen Mile Creek watershed, and proposed mitigation measures. Discussions at the meeting focused on identifying potential impacts and mitigation measures to protect Fourteen Mile Creek and its valley lands from construction dewatering activities, stormwater discharge, runoff, erosion and sedimentation. Halton Region will continue to consult with CH through design to receive approvals, including preparing Dewatering, Stormwater Management (SWM) and Erosion and Sedimentation Control (ESC) Plans to ensure the development activities do not affect adjacent watercourses and valley lands.

10.4.3 Ministry of Environment, Conservation and Parks

The MECP is the key approval agency for wastewater treatment facilities as it is responsible for administering Ontario's EA, Environmental Protection and Water Resources Acts. In addition to meeting Ontario's EA Act requirements through this MCEA Study, numerous approvals from MECP will be required prior to construction including an ECA Sewage, ECA Amendment Air and Noise, PPTW and meeting Excess Soil Management requirements. Although these approvals will not be received until the design stage, the Region has consulted with the MECP during the EA process to describe the Study, receive relevant information, and set the stage for receiving future approvals. Major consultation activities undertaken with the MECP were:

- **Filing the Notice of Commencement (with the Notice of PIC #1) and PIF:** The MECP was notified directly through filing the Notice of Commencement and PIF to elicit important project information such as the identification of key Indigenous Communities, First Nations and Métis Communities in the Study Area as well as MECP legislative considerations.
- **Email updates with the MECP EA Coordinator:** Provided background information on the project, including details on the RWIA to the MECP EA coordinator during the MCEA process.
- **Consultation Meeting:** A consultation meeting was held with MECP on September 11, 2025, to present information on the project background and preliminary results on the RWIA. Discussions at the meeting focused on the RWIA findings and future approvals required by the MECP. Summary notes were prepared and sent to all participants.

Halton Region will continue to meet with the MECP through design, and complete necessary studies to receive approvals, such as an Air Quality Impact Assessment and an Acoustic Assessment. Additional natural heritage investigations during design are also proposed to ensure that the MECP's SAR and the Conservation Authority Acts are met.

10.4.4 Ministry of Natural Resources

The MNR provides the *MNR Southern Region Information Package – For External Proponent Environmental Assessments* (October 2024) in response to the Notice of Commencement. The Information Package outlines the regulatory requirements of the MNR, including requirements under the *Planning Act*, *Lakes and Rivers Improvement Act*, such as under the *Fish and Wildlife Conservation Act*, the *Lakes and Rivers Improvement Act*, and the *Public Lands Act*. MNR also provided natural heritage information of the area via email for development of the NER and EIA reports. During the design, the Region will be completing additional natural heritage investigations and will continue to consult with MNR to receive approvals, if necessary.

10.5 Other Stakeholders

Along with the general public and government approval agencies, other stakeholders were consulted during the MCEA process. These included other divisions in the Region of Halton, Regional and local Council members, and utilities and local services.

- **Halton Region other Departments:** Representatives from other relevant departments were updated of the Study and participated in project meetings, as required. These include staff representatives from the Commissioner's Office, Capital and Engineering, Planning and Development, O&M, Health and Safety and Corporate Real Estate. This is to ensure that other departments are aware of the project, such that the expansion meets all internal guidelines and regulations. The Halton Region District School Boards and Halton Regional Police Service were also notified and included in the Study's communications.
- **Town of Oakville:** The Mid-Halton WWTP is located in the Town of Oakville. As such, the Town has unique interest in the project as to how it will impact the community and how impacts will be mitigated. The Town is also an approval agency, responsible for issuing permits, such as building, site plans, and tree preservation permits. The Region has continued to notify staff from Oakville's Building Services, Parks and Recreation, Planning, Fire and Traffic Services of the project, and will continue to work with them through the design and construction phases of the project to ensure their requirements are met. Town staff were also engaged in the CHER and HIA studies that were developed to update the Statement of Heritage Value of the Merton Mount Pleasant Cemetery.
- **Region of Halton and Town of Oakville Councillors:** Regional and local councillors' support and understanding is vital to the success of the project. The Region has and will continue to provide Study notifications to keep councillors up-to-date on the project and its implications for the community.
- **Utilities and Other Services:** Relevant utility companies (for example, Oakville Hydro, Hydro One, and Enbridge) were notified throughout the Study to identify potential conflicts with existing or planned future infrastructure. They will continue to be consulted with as design progresses to get appropriate permits, approvals and clearances prior to construction.

10.6 Indigenous Communities, First Nations and Métis Communities Engagement

The Region recognizes the importance of building and fostering reciprocal relationships with Indigenous Communities, First Nations, and Métis Communities around Halton and are committed to learning from Indigenous values and traditional knowledge and building opportunities for collaboration. For this study, the Region engaged the MCFN, who are primary rights holders of the Study Area and surrounding lands, and the following other Nations with stewardship over the lands:

- SNGR
- HDI (of the HCCC)
- Wendat (Wendaque)
- Métis Communities'

Personalized letters were sent to these Indigenous Communities, First Nations and Métis Communities, along with the Notice of Commencement and PIC #1, at study initiation, with all responding with interest in receiving further notifications. As such, all Indigenous Communities, First Nations and Métis Communities were given the same opportunities to participate in the engagement process as described for the public, government approval agencies and other stakeholders. These opportunities include circulating public notices, holding virtual PICs, and publicly posting the ESR for a minimum 30-day public comment period.

Given their unique position as land stewards and right holders, they were also provided with the opportunity to review and provide input into the following studies:

- Stage 1 AA: at the time of writing, no comments have been received.
- NER and EIA Report: at the time of writing, no comments have been received.

All comments received have been responded to and considered in the MCEA process, as discussed in Section 10.7.

10.7 Integrating Feedback into the Decision-Making Process

During Phase 1, a Communications Log was developed for the MCEA so that all comments, consultation, and communications could be directly linked and stored easily and efficiently. All comments received from the public, stakeholders and Indigenous Communities, First Nations and Métis Communities during the MCEA were documented, addressed and considered in the assessment of alternatives and the development of the preferred design concept for the Mid-Halton WWTP expansion. Detailed comments and responses are provided in Appendix B6, while descriptions of how feedback has influenced the decision process are described in the following subsections.

10.7.1 Public Input

Input from the local community has helped the Region to understand local concerns and issues. Feedback received during the MCEA Study influenced the decision-making process by supporting the:

- Development of the detailed evaluation criteria and their importance weighting.
- Identification of measures necessary to mitigate impacts and the extent to which these measures must be implemented.

Detailed comments and responses are provided in Appendix B, while Table 10-3 provides a summary of the comment themes, and project team responses.

Table 10-3. General Public Comments and Responses

Comment Theme	Project Team Response
Need for the Mid-Halton WWTP expansion	Expansion of the Mid-Halton WWTP was identified in the 2011 Sustainable Halton Water and Wastewater Master Plan as well as the currently underway IMP. The expansion is required to meet future demands and support growth in 2031 and beyond. More information on the Integrated Master Plan can be found at https://www.halton.ca/For-Residents/Opportunities-to-Participate/Water-Wastewater-Transportation-IMP
Odour Control during operations	<p>Odour control at the Mid-Halton WWTP has evolved through facility upgrades and expansions, with a number of improvements being implemented over the years to manage odour during plant operations. Our approach to odour management is multi-pronged, involving capturing and treating odorous air from key areas such as the Headworks and Biosolids buildings, regularly maintaining facilities and equipment and effectively operating the WWTP. If odours are reported, staff operating the plant actively work to solve the issue.</p> <p>Currently, the plant is equipped with numerous odour control measures, including enclosed headworks, carbon absorption and biofilters/biological systems. These measures are considered current best practice for odour control at wastewater treatment plants. The recommended expansion concept also includes additional odour control for the headworks and raw wastewater pumping, solids handling processes (that is, thickening, dewatering, and storage/truck loading), and ancillary processes such as standby power generation.</p>

Comment Theme	Project Team Response
	<p>Details on the types and extend of odour controls for the expanded Mid-Halon WWTP will be established during design through air emission modelling and must be compliant with Ontario Regulation 419/05 (Air Pollution – Local Air Quality) for air emissions standards. Since its inception in 2005, Ontario Regulation 419/05 has been made stricter through the continuous introduction of more rigorous health-based standards, the modernization of air dispersion modelling, and the addition of specific risk management thresholds. The goal is to prevent existing sources from making air pollution, including odours, worse with plant expansion, by requiring assessments and controls to protect local communities.</p>
Noise control during operation	<p>The existing Mid-Halton implements a range of noise control measures as part of its operations and facility design, including enclosed headworks facilities, acoustic barriers and regular maintenance. The recommended expansion concept will include the use of acoustic control measures to mitigate the impacts of noise at nearby receptors. The level of mitigation and control measures required will be determined through an Acoustic Assessment which will be completed during design. The Acoustic Assessment will evaluate the cumulative impact of additional noise sources due to the expansion against the applicable MECP NPC-300 limits.</p>
Noise from the North PS	<p>The capacity of the North PS on the Mid-Halton WWTP site will be expanded by replacing the existing sewage pumps with larger pumps. An expansion to the existing building may also be required to house the replacement pumps. The details on the design and installation of new sewage pumps, including noise control measures, will be established through the design process.</p> <p>Currently, noise control at the North PS involves a combination of physical barriers (for example, walls); equipment muffling (with blowers and fans, regular equipment maintenance, and operational limits. The recommended expansion concept includes additional noise measures for the plant expansion, including the North PS so that nearby sensitive areas are protected. Details on the types and extend of noise controls will be established during design through an Acoustic Assessment that will evaluate the cumulative impact of the additional noise sources due to the expansion against the applicable MECP NPC-300 limits.</p>
Traffic Control	<p>During construction there will be an increase in the type and volume of traffic on surrounding roadways (for example, construction vehicles and equipment). Additional traffic may also cause hazards to the environment (for example, material spills). To avoid or mitigate these impacts, vehicles and equipment used during construction will follow traffic laws; multi-passenger vehicles will be used, when possible, to reduce traffic associated with construction activities. Construction vehicle routes will avoid residential areas, as will vehicles that support operations (chemical deliveries and biosolids transportation). Best Management Practices (BMPs) will be used by the contractor to control dirt and spills from construction traffic. These BMPs may include stabilizing the construction exits and regular truck wheel washing. Construction and operational traffic will enter the plant via the North Service Road, which the Town of Oakville maintains. During the detailed design phase, a detailed Traffic Management Plan (TMP) will be completed to identify the required measures to mitigate temporary construction impacts. The Region will coordinate with the Town of Oakville.</p> <p>During operations, truck traffic for biosolids, chemical deliveries, and maintenance and supply needs will continue, with slightly more truck traffic expected. However, similar avoidance or mitigation measures as for construction traffic will apply. In addition, future implementation of MABR and hydrocyclone technologies for EBPR, will significantly reduce the chemical use and the associated traffic for chemical deliveries to the plant.</p>

Comment Theme	Project Team Response
Potential impacts on health and quality of life	Sewage treatment is critical in protecting human health and the environment, as it removes harmful pollutants and pathogens. To ensure that the WWTPs are designed to protect human health and the environment, Ontario has a comprehensive framework of legislation, the key ones being the EPA, and the OWRA. The Mid-Halton WWTP meets or betters all legislation, producing clean effluent, managing air emissions, odour and noise, while protecting natural and cultural heritage features.
Who Benefits from the Mid-Halton WWTP.	<p>Wastewater treatment benefits communities by protecting public health and safeguarding the environment by preventing pollution of rivers and lakes. The Mid-Halton WWTP expansion will benefit existing and future protected residents and employees in the communities of North Oakville, South Milton, the Highway 401 Corridor in Halton Hills, South Georgetown, and the planned Bronte GO Major Transit Station Area (year 2041).</p> <p>Biosolids produced through the treatment processes at the six Regional wastewater treatment plants, including the Mid-Halton WWTP, are nutrient-rich byproducts that are primarily used as a fertilizer and soil conditioner for agricultural land. Consequently, local farmland will also continue to benefit as a result of the Mid-Halton WWTP expansion.</p>
Potential impacts during construction on natural features, including Fourteen Mile Creek, groundwater, and trees	<p>Natural heritage studies have been completed as part of this MCEA Study to identify natural heritage species and features, and to develop measures to mitigate impacts on these features. Although no significant features were found on site, the Mid-Halton WWTP is adjacent to Fourteen Mile Creek and its valleylands. Numerous mitigation measures will be implemented to protect these and other surrounding lands, including setbacks and erosion, sedimentation, and runoff controls. The WWTP site will also be restored following construction.</p> <p>The Region will continue to consult with CH and the Town of Oakville and receive all environmental protection approvals and permits prior to construction to ensure natural features are protected.</p>
Considerations on energy recovery or nutrient recycling for local farms	<p>The Mid-Halton WWTP currently uses natural gas and biogas generated during the AD process to meet digester and building heating requirements. The Region is also exploring biogas utilization for energy recovery. The biogas utilization strategy will be determined through a future study, in support of the Region's (2025) Renewable Energy Strategy. The Region also has a unique hydro turbine system installed in the outfall that converts energy to electricity to support plant operations.</p> <p>Dewatered biosolids generated at the Mid-Halton WWTP are currently used for beneficial land application, primarily for agricultural use. The Region is planning on constructing a Biosolids Composting Centre in the future to compost the biosolids produced from all Halton WWTPs to further treat and manage biosolids. The end product will be a nutrient-rich fertilizer that can be used for beneficial land uses.</p>
Financing the project	Any work necessary to expand the Mid-Halton WWTP to meet future growth needs will be financed through development charges.
Adapting to extreme weather and climate change.	Extreme weather events due to climate change are becoming more frequent and can impact the operations of wastewater treatment facilities. The Region has considered, in the Environmental Assessment stage of the expansion project, the need to adapt to potential climate changes by including design criteria for the expansion that will allow the plant to be more adaptable to climate impacts and accommodate peak flows that are associated with more extreme wet weather events. In addition, the design will incorporate features aimed at reducing Greenhouse Gase (GHG) emissions and energy usage. The Region is also exploring opportunities for biogas energy recovery beyond the current practice of using the boilers to recover energy and meet digester and building heating demands.

Comment Theme	Project Team Response
<p>Controlling contaminants of emerging concern (CECs), which include endocrine-disrupting chemicals (EDCs) (such as microplastics) and pharmaceuticals/personal care products (PPCPs)</p>	<p>CECs present a potential threat to aquatic habitats, as well as human health. Consequently, The Government of Canada, the Province of Ontario, and local governments, including Halton Region are taking actions to reduce the risks of CECs to human health and the environment. Actions include:</p> <p>Source control regulations aimed at proper disposal of pharmaceuticals and other hazardous wastes to prevent them from entering wastewater streams.</p> <p>Monitoring and surveillance of certain chemicals in the environment, including in wastewater effluent. Halton Region is involved in ongoing efforts and studies to monitor and track contaminants of CECs in surface waters and the broader Great Lakes watershed.</p> <p>Source Water Protection: Halton Region is part of the Halton-Hamilton Source Protection Region, which developed a Source Protection Plan under Ontario's <i>Clean Water Act</i>. This plan aims to identify, assess, and manage potential threats to municipal drinking water sources. As part of this EA, a Receiving Water Impact Assessment Study (RWIA) was completed, that indicated that the treated effluent from the Mid-Halton WWTP better meets regulations aimed at protecting recreational areas, drinking water intakes, human health and the environment.</p> <p>The federal and provincial governments are responsible for setting regulations aimed at controlling CECs and wastewater treatment. Our staff continue to keep up-to-date on research regarding controlling CECs, and potential changes to regulations that may be implemented in the future.</p>
<p>Technologies Considered</p>	<p>In general, the expansion will use technologies similar to those currently used at the Mid-Halton WWTP. However, more advanced technologies were also reviewed and considered in the assessment of alternatives and included as part of the long term to ensure regulatory compliance, process stability, and long-term adaptability. These technologies are described here.</p> <p>While CAS with Chemical Phosphorus Removal is the current secondary treatment process and the basis for the expansion, the system is being developed with provisions to enable future implementation of MABR and hydrocyclone technologies for EBPR, which will significantly reduce the chemical use (and the associated traffic for chemical deliveries) at the plant.</p> <p>The preferred solids handling strategy for the Mid-Halton WWTP expansion includes AD and dewatering, which will generate high-strength, ammonia-rich centrate. To manage this internal recycle stream, expanding the sidestream equalization capacity is currently proposed as the base case, with provisions for future sidestream deammonification using technologies such as ANITA™ Mox or DEMON®. (ANITA™ Mox uses a MBBR with carriers, while uses physical separation and settling techniques to retain granular biomass).</p> <p>Biogas from the expanded digestion system is projected to exceed process heating requirements, meaning there is potential for energy recovery. The Region is considering the future implementation of RNG or CHP systems. (RNG is a low-carbon fuel from organic waste that can be used for heating or vehicle fuel, while CHP or cogeneration systems generate both electricity and heat from a single fuel source). Space is reserved onsite to accommodate such technologies.</p>

To keep the public apprised of the Mid-Halton WWTP Expansion Project, the Region will continue to notify the public through its website and social media of major project updates throughout design and construction.

10.7.2 Agency Input

The MCM, CH and MECP played a critical role in the MCEA Study by providing:

- Information on government approvals, permits and standards the project must meet.
- Technical, regulatory, environmental and planning advice that helped identify impacts and mitigation measures.

Communications with key agencies also helped establish the basis for further consultation through the design and construction phases of the project. The major comments received and the project team's responses are provided in Table 10-4.

Table 10-4. Government Agency Comments and Responses

General Theme and Mandate	Response
<p>MCM – responsible for protecting cultural heritage resources and properties. MCM provided input on the need to prepare a CHER and a HIA for the Merton Mount Pleasant Cemetery as it has been designated as a heritage property in 1993 by the Town of Oakville through By-law 1993-20 under Part IV of the Ontario Heritage Act.</p>	<p>MCM has been provided with the Stage 1 AA, the CHER, and HIA. The Region will continue to communicate with the MCM as required.</p> <p>In addition, should previously undocumented archaeological resources be discovered during construction, the Region of Halton will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented.</p>
<p>CH - concerns are related to its mandate to manage the local Fourteen Mile Creek watershed by focusing on flood management, and protection of natural areas.</p>	<p>Natural heritage studies were undertaken as part of the MCEA Study to define the natural heritage environment, identify potential impacts and establish mitigation measures to protect Fourteen Mile Creek and surrounding areas from indirect impacts due to construction dewatering activities, stormwater discharge, runoff, erosion and sedimentation. Halton Region will continue to consult with CH through design to receive approvals, including preparing Dewatering, Stormwater Management (SWM) and ESC Plans to ensure the development activities do not affect adjacent watercourses and valley lands.</p>
<p>MECP – Provided input into the RWIA to confirm future effluent treatment requirements.</p>	<p>The Region finalized the RWIA based on MECP input. Additional air emission/odour and noise assessments, as well as geotechnical and hydrogeological investigations will be undertaken during design to receive ECA Sewage, ECA Amendment Air and Noise, PTTW and to meet Excess Soil Management requirements. MECP will continue to be consulted through design.</p>
<p>Ministry of Natural Resources provided the <i>MNR Southern Region Information Package – For External Proponent Environmental Assessments</i> (October 2024) in response to the Notice of Commencement. The Information Package outlines the regulatory requirements of the MNR, including requirements under the <i>Planning Act</i>, <i>Lakes and Rivers Improvement Act</i>, such as under the <i>Fish and Wildlife Conservation Act</i>, the <i>Lakes and Rivers Improvement Act</i>, and the <i>Public Lands Act</i>. MNR also provided natural heritage information of the area via email for development of the NER and EIA reports.</p>	<p>The natural features studies indicated that no natural habitats or species were found in the Study Area. Indirect impacts, however, may occur in the natural areas surrounding the Study Area (for example, Fourteen Mile Creek).</p> <p>During the design stage, the Region will confirm if additional natural heritage investigations are necessary to further characterize the environment and will continue to consult with MNR to receive approvals if necessary.</p>

10.7.3 Indigenous Community Input

The Region provided the SNGR, MCFN, HDI, Wendat/Wendaque, and Métis Communities with copies of the Stage 1 AA for review on August 12, 2025. MCFN has reviewed the report and is satisfied with the assessment. No other comments were received as of the filing of this ESR document. However, should additional comments be received on the Stage 1 AA, they will be addressed through the design stage of the process. The Stage 1 AA will be updated according to input, and the MCM contacted if there are changes to the report.

The Region also shared the draft Environmental Impact Assessment and Natural Environment Reports with the SNGR, MCFN, HDI, Wendat/Wendaque, and Métis Communities on November 19, 2025, for comments. As of filing this ESR, only the MCFN's comments were received, and can be reviewed in Appendix B5.

On November 24, 2025, the Region received an email comment from SNGR indicated that they were concerned regarding the planned developments in the Town of Milton, Town of Oakville and Halton Hills. Although planning for growth is now the responsibility of the area municipalities and not the Region of Halton, the Region is committed to continue to consult with SNGR on the Mid-Halton WWTP expansion through the design process.

11. Recommendations

This section provides recommendations on the preferred design concept and mitigation measures for potential impacts.

11.1 Preferred Design Concept

A summary of the preferred design concept for wastewater treatment and solids treatment for the Mid-Halton WWTP expansion is presented in Table 11-1. It includes expansion of existing infrastructure by adding equipment to existing buildings to reach the 195 ML/d capacity and the construction of new infrastructure for primary and secondary treatment, AD, and sidestream management. Figure 11-1 presents an overview of the expansion scope and site layout for the 195 ML/d expansion.

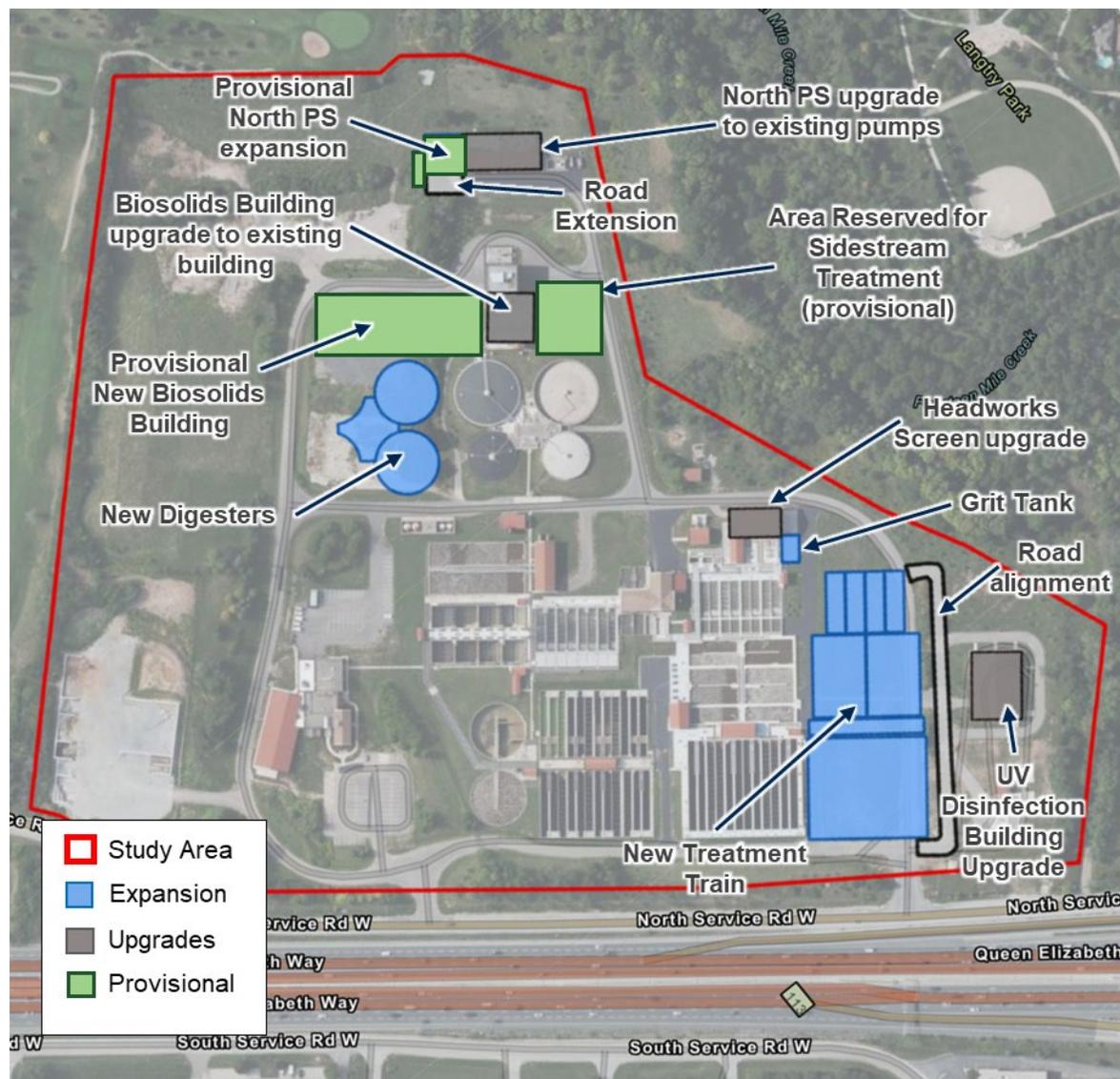


Figure 11-1. Recommended Design Concept for the Mid-Halton WWTP.

Table 11-1. Summary of Preferred Design Concept for the Mid-Halton Wastewater Treatment Plant Expansion to 195 ML/d

Unit Process	Preferred Solution
North Pumping Station	Replace existing Stage 1 (2002) sewage pumps SLP01-04 with larger pumps
Headworks	Add third screen in existing spare channel in the headworks building Add third vortex grit tank adjacent to existing ones in the headworks building area
Primary and Secondary Treatment	Build new treatment Train D with conventional primary clarifiers, CAS aeration tanks with chemical phosphorous removal Provisional – Process intensification with MABR and hydrocyclone retrofit for EBPR Re-rate Train C to 60 ML/d
UV Disinfection	Add UV equipment in existing fifth channel of the UV Disinfection building
Sludge Thickening	Add fourth rotary drum thickener in the existing Biosolids Building
Anaerobic Digestion	Build two new anaerobic digesters and a control building
Dewatering	Add third centrifuge in the existing Biosolids Building Provisional: Construct a new Biosolids Building
Sidestream Management	Equalization tank expansion Provisional – Sidestream deammonification

General recommendations for this project result from conversations with Region staff and input from agencies, stakeholders and Indigenous Communities, First Nations and Métis Communities through engagement activities. Recommendations are as follows:

- Define the biogas utilization strategy for the Mid-Halton WWTP in alignment with the Region's biogas utilization strategy once finalized.
- Continue to monitor ferric prices to determine whether to implement process intensification (MABR and hydrocyclones) with EBPR. A sewage characterization study is also recommended to assess the characteristics of the raw sewage and effluent from primary treatment to support decision-making and design.
- Continue to monitor ammonia loads in the influent to determine whether sidestream treatment should be implemented.
- Continue to engage with interested parties and Indigenous Communities, First Nations and Métis Communities throughout the project, particularly during construction.

11.2 Impacts and Mitigations

The following section provides a description of the potential impacts of the preferred design concept, and the associated mitigation and monitoring measures required during detailed design and construction.

11.2.1 Natural Environment

11.2.1.1 Natural Heritage Features

An EIA was completed to identify potential direct and indirect impacts resulting from the implementation of the preferred design concept and to provide mitigation measures for these impacts. Direct impacts are typically associated with the physical removal or alteration of natural features that could occur during construction (that is, tree and vegetation removals). Indirect impacts include changes or effects that relate

to hydrological, noise and disturbance occurring due to activities being completed as part of the future construction scope. While not physically altering or removing habitat, these indirect impacts can introduce some level of disturbance or degradation to natural features and function.

Potential impacts were determined based on the recommended integrated expansion concept to 195 ML/d, taking into consideration that details on access roads, staging, laydown areas, and building demolition have not yet been defined at this stage in the project. Updated natural environment field surveys and EIA will be developed during detailed design, if needed, to confirm natural features and refine impacts and mitigation measures.

Direct impacts on natural features or SAR are not anticipated as these features were not identified within the Study Area. However, tree removals/injuries and vegetation removals will occur within the Study Area. Although the trees and vegetation within the Study Area are not part of a natural feature (such as the FOD6 woodland), removal would be considered a direct impact onto the natural environment and could impact migratory birds.

Potential indirect impacts due to the preferred design concept include sedimentation and erosion occurring outside of the Study Area. This is particularly a concern where works are proposed adjacent to the offsite natural features at the eastern and northern limits of the Study Area. Erosion and sedimentation could also transport concentrated flows of runoff and discharge to the adjacent natural features, especially during rain events.

Table 11-2 identifies mitigation strategies that should be implemented to address potential impacts to natural features, SAR and wildlife within the Study Area and 120 m adjacent lands.

Table 11-2. Potential Impacts to Natural Features and Recommended Mitigation Strategies

Potential Impacts to Natural Features	Mitigation Strategies
Erosion and sedimentation/runoff	<ul style="list-style-type: none"> ▪ At the detailed design stage, an ESC plan shall be developed by a qualified person and be Site-specific. ▪ Multibarrier ESC measures (that is, Filter Socks and heavy-duty silt fencing) should be erected directly adjacent to the proposed works which abut Outfall Channel and FOD6 valleylands. ▪ Vegetation removal, grading, and heavy equipment use shall only occur within the Study Area where these areas have been previously demarcated and approved to allow construction works. Silt fencing should be erected along the extremities of the excavation limits. These measures and structures should be maintained and enhanced, as needed, until construction has been completed and the site has stabilized. ▪ Concrete washout pads should be installed to contain potential leachate as necessary and be setback a minimum 30 m from any water features. ▪ Stockpiled material shall be covered to prevent erosion and potential sedimentation from entering natural features. ▪ Staging and access areas should be planned to be located primarily within existing, open, and disturbed areas. ▪ If feasible, grading activities should be scheduled to avoid times of high runoff volumes (spring and fall) to prevent erosion and potential sedimentation.

Potential Impacts to Natural Features	Mitigation Strategies
<p>Accidental spills from heavy equipment and site vehicles</p>	<ul style="list-style-type: none"> ▪ A designated and lined refuelling area with appropriate spill containment shall be established a minimum of 30 m from any watercourse/water feature. A spill response team member will be designated as a point of contact in the case of an accident or spill to verify the proper and timely implementation of site response controls. Contractor shall provide a spill control plan. ▪ Absorbent materials and equipment required to control and clean up spills of deleterious substances shall be available onsite. Spills and leaks of deleterious substances shall be immediately contained and cleaned up in accordance with regulatory requirements and reported immediately to the Ontario Spills Action Centre (SAC) at 1.800.268.6060.
<p>Accidental introduction of invasive species</p>	<ul style="list-style-type: none"> ▪ Access and movement of vehicles and equipment must be controlled to limit the introduction and spread of invasive species. Vehicles and equipment shall be inspected prior to entering and leaving the project location to verify the equipment is clean and free of invasive species. Equipment shall be inspected and used only if in good working order. The contractor is to follow and implement the <i>Clean Equipment Protocol for Industry: Inspecting and cleaning equipment for the purposes of invasive species prevention</i> (Ontario Invasive Plant Council, 2013). This document should be added to the Projects Contract Specifications.
<p>Vegetation and tree removals</p>	<ul style="list-style-type: none"> ▪ Limit the amount of tree, shrub and groundcover vegetation removals to the extent possible. ▪ Submit an Arborist Report – Tree Preservation Plan and Landscape Architectural drawings at the detailed design stage. Provide compensation for tree removals and injury as required, preferably within or directly adjacent to the Study Area. ▪ If feasible, vegetation removal should be scheduled to avoid times of high runoff volumes (that is, spring) to prevent erosion and potential sedimentation. ▪ The Study Area shall be revegetated (with native species) as soon as possible following disturbance. Plantings should include native trees which will benefit valleyland, woodland, and open cultural areas, where applicable. Riparian zones shall contain the appropriate trees and shrubs for the site conditions and consideration for overhanging species is recommended.
<p>Noise disturbances and impacts to SAR avifauna, general wildlife (including herptiles) and migratory birds' habitats</p>	<ul style="list-style-type: none"> ▪ Avoid in-water and near water works at the Outfall Channel which directly abuts the Study Area. ▪ Do not work within the Redside Dace Critical Habitat adjacent to the Study Area. ▪ Tree and shrub removal, and vegetation clearing should be avoided from April 1 to August 31, conforming to the project location's general nesting period, corresponding to the <i>MBCA</i> (Government of Canada, 2025) or unless otherwise stated by the agencies.

Potential Impacts to Natural Features	Mitigation Strategies
	<ul style="list-style-type: none"> ▪ If the April 1 to August 31 vegetation clearing timing window cannot be adhered to, the following shall be implemented: <ul style="list-style-type: none"> - Have a qualified avifauna biologist sweep areas of proposed construction and flag any nests observed. Nest sweeps are valid for 1 week from the date of survey. - Implement appropriate buffers and timing windows based on type of nests observed per the MBCA. - If general construction occurs within the April 1 to August 31 timing window, an environmental inspector (EI) shall perform daily audits to ensure birds are not nesting during construction and that birds are not harassed from the work. If any of these observations are made, work is to halt, and a qualified avifauna biologist is to be retained to survey the site. ▪ If nests are observed onsite, before, during or after construction, retain a qualified avifauna biologist to investigate if these nests are considered a hindrance and cannot be protected due to Site operations or construction. ▪ An EI in conjunction with a qualified biologist shall inspect the adjacent natural features for evidence of SAR birds and herptiles during construction and within the Study Area. Stop work procedures may need to be executed, and wildlife relocation permits could be required if these species occur within the Study Area or harassment of the species is identified. ▪ If building demolition is required, complete bat exit/entry surveys at the detailed design stage as close to the demolition as possible while still abiding by the seasonal timeline for such studies (that is, June and July). ▪ If building demolition is required, review the potential for SAR/migratory birds to occur within said buildings. Carry out exit/entry and nesting confirmation surveys as required at the detailed design stage. ▪ Site personnel shall be trained on the identification of SAR avifauna and herptiles. If these species are identified during or prior to construction, they should be allowed to move from the area freely and all work activities must be halted. If a SAR is identified within the work areas, contact the MECP. SAR herptiles are not to be relocated without direct permission from the MECP/MNR. Non-SAR herptiles would also require a collection permit as per the <i>Fish and Wildlife Conservation Act (FWCA)</i>. ▪ Site personnel shall also monitor for amphibians, if species are observed within the work areas, stop work and procure a qualified biologist for next steps. If these species are identified during or prior to construction, they should be allowed to move from the area. Relocation efforts would require a permit.

11.2.1.2 Groundwater and Surface Water Quality

Groundwater and surface waters will be protected through construction and operation. Mitigation measures include:

- Effluent quality compliance limits and objectives have been established through a RWIA and supported by the MECP. These defined limits and objectives mean that effluent quality that is and will continue to be produced at the Mid-Halton WWTP meets PWQOs defined by the MECP to protect public health and the environment, thus protecting the Lake Ontario water quality.
- Measures to control runoff, sedimentation and erosion will be implemented to protect Fourteen Mile Creek.
- Geotechnical and hydrogeological studies will be undertaken during design to define impacts to groundwater quality and quantity and establish dewatering plans that meet regulatory requirements.

11.2.1.3 Greenhouse Gas Emissions

The preferred expansion concept incorporates features aimed at reducing GHG emissions, such as:

- Process intensification (MABR and hydrocyclones) to enable EBPR, which has the potential for more energy-efficient biological nitrogen removal, chemical savings, and possibly lower nitrous oxide (N₂O) emissions.
- Additional biogas energy recovery beyond the current practice of using the boilers to recover energy and meet digester and building heating demands.

During the design phase, the Region will incorporate best practices and provisions to provide adequate flexibility to further reduce GHG emissions through operational adjustments and/or adopting other innovative technologies.

11.2.2 Social and Cultural

11.2.2.1 Air Emissions and Odour Control

The existing Mid-Halton WWTP is equipped with odour control measures, including enclosed headworks, carbon absorption and biological system. Facilities and equipment are also regularly maintained to reduce odours during operation. The recommended expansion concept also allows for odour control units to be included in the design of the facility. During design, the impacts of expansion on nearby sensitive receptors will be estimated using emission modelling. Based on the modelling, appropriate odour measures will be implemented as part of the expansion to ensure all applicable MECP O. Reg. 419/05 air quality standards are met or bettered. Further odour control measures will be aimed at reducing the risks of offsite odours.

The Mid-Halton WWTP is governed by ECA Air number 5280-9V5SK9, dated May 25, 2015. Per the ECA Air, the plant is required to maintain an up-to-date manual outlining the operating procedures and a maintenance program for the boilers, waste gas burner, diesel generators, other gas-fired units/exhausts, and odour control units at the plant, as well as to monitor and record the operating parameters of the biofilter. The noise, air emissions, and odour limits in the ECA Air were established based on the supporting Emission Summary and Dispersion Modelling (ESDM) report prepared in accordance with Ontario EPA Local Air Quality Regulation (O. Reg. 419/05), Schedule 2 (Ministry of Environment, 2005). Noise and odour complaints must be recorded and reported to the MECP.

Accordingly, the Mid-Halton WWTP will be required to complete an ESDM for air emissions and odours as part of the future expansion. These studies will be conducted during project design. It is expected that active odour control will be required for headworks and raw wastewater pumping, solids handling processes such as thickening, dewatering, and storage/truck loading, and ancillary processes such as standby power generation. Odour modelling will be used to inform whether additional odour control is required (for example, tank covers for liquid processes).

11.2.2.2 Noise and Vibration Control

The existing Mid-Halton implements a range of noise control measures as part of its operations and facility design, including enclosed headworks facilities, acoustic barriers and regular maintenance. The recommended expansion concept also includes use of acoustic control measures to mitigate the impacts of noise at nearby receptors. Areas subject to elevated noise levels will receive acoustical treatment as required, and warning signs and ear plugs at area entrances will be provided if necessary. The level of attention required will be determined through an Acoustic Assessment which will be completed during design. The Acoustic Assessment will evaluate the cumulative impact of the additional noise sources due to the expansion against the applicable MECP NPC-300 limits.

As part of detailed design and construction, the resonance of pumps, generators, and similar vibration producing equipment will be checked against the natural frequency of the supporting concrete slabs. The natural frequency of suspended concrete slabs subjected to vibration will be designed to meet applicable requirements. Vibration studies of critical equipment will be completed during detailed design to confirm slab design.

11.2.2.3 Visual and Aesthetics

The visual and aesthetic impact of the proposed facility expansion will be mitigated by designing proposed buildings to compliment the architectural design of existing facilities. In addition, no building will be taller than the existing Biosolids Building (the tallest building onsite). Finally, the site will be landscaped following construction to adhere to the natural surrounding areas. Overall, permanent infrastructure changes within the existing site are expected to present a negligible change to the existing viewshed.

11.2.2.4 Community Health and Safety

Sewage treatment is critical in protecting human health and the environment, as it removes harmful pollutants and pathogens. To ensure that the wastewater treatment plants are designed to protect human health and the environment, Ontario has a comprehensive framework of legislation, the key ones being the EPA, and the OWRA. The Mid-Halton WWTP meets or betters all legislation, producing clean effluent, managing air emissions, odour and noise, while protecting natural and cultural heritage features.

Community health and safety will be protected during construction and operation through the following measures:

- **Traffic Control:** During construction there will be an increase in the type and volume of traffic on surrounding roadways (for example, construction vehicles and equipment) or introduce additional hazards to the environment (for example, material spills). To mitigate these impacts, vehicles and equipment used during construction will follow traffic laws; multi-passenger vehicles will be used, when possible, to reduce traffic associated with construction activities. Construction vehicle routes will avoid residential areas, as will vehicles that support operations (chemical deliveries and biosolids transportation). BMPs will be used by the contractor to control dirt and spills from construction traffic. These BMPs may include stabilizing the construction exits and regular truck wheel washing.

Construction and operation traffic will enter the plant via the North Service Road, which the Town of Oakville maintains. During the detailed design phase, a detailed TMP will be completed to identify the required measures to mitigate temporary construction impacts. The Region will coordinate with the Town of Oakville.

- Noise: Construction noise will be temporary and short-term in nature. The Region will consult with the Town of Oakville with respect to their Noise by-law, and if permitting is required. Noise is not expected to increase significantly during normal plant operations as a result of expansion.
- Odour: Throughout the MCEA Study, the community around the WWTP has expressed its concerns regarding odour and air emissions. As previously mentioned, the plant expansion will include odour control for some process units (for example, Biosolids Building, Headworks), which will collect and treat odorous air before it is released. Odour dispersion modelling will be completed to design the odour treatment process, to minimize the frequency and level of odours on nearby residents and businesses and will be subject to MECP approval. Odour as a result of construction activities will be minimal and controlled through BMPs.

11.2.2.5 Archaeological and Cultural Heritage Resources

The Stage 1 AA (Archaeological Services Inc, 2025), included in Appendix A and under the PIF number P094-0456-2025, indicated that the area of expansion has been disturbed and little to no potential for archaeological resources remain. Should previously undocumented archaeological resources be discovered during construction, the Region of Halton will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented.

The following recommendations have been made in the Stage 1 AA report:

- Parts of the Project Area around the Third Line Pumping Station exhibit archaeological potential. These lands would require Stage 2 archaeological assessment by test pit survey at five-metre intervals prior to conducting any ground-disturbing activities in that area. At the time of this report, it is understood that work at Third Line Pumping Station is unlikely to be required. This will be confirmed during the design stage of the project.
- Sites AiGw-57 and AiGw-58, located within the limits of the Project Area, represent isolated findspots that have already been destroyed by the construction of the existing WWTP facilities; therefore, no further assessments are required.
- Site AiGw-989 is located within 50 metres of the larger component of the Project Area, but the Stage 3 excavations determined the limits of the site were 15 metres east of the Project Area, with no risk of overlapping; the site has further cultural heritage value or interest and Stage 4 mitigation is recommended if to be impacted by future developments.
- The remainder of the Project Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, or being previously assessed. These lands do not require further archaeological assessment.
- Merton Mount Pleasant Pioneer Cemetery is located approximately 20 metres south of the Project Area, across North Service Road West, and it must be protected and avoided in case of eventual changes to the development plans that may impact it. A ten-metre buffer around the limits of the cemetery was recommended for Stage 3 investigation by a previous Stantec assessment; and,
- Should the proposed work extend beyond the current Project Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

The Merton Mount Pleasant Cemetery located across the road from the Mid-Halton WWTP was identified as a recognized heritage property. A CHER (Archaeological Services Inc., 2025), included in Appendix E2, and a HIA (Archaeological Services Inc, 2025), included in Appendix E3, were completed to update the Statement of Heritage Value and ensure that the property is not impacted during construction.

The following recommendations have been proposed in the CHER:

- Based on the results of research, analysis and heritage evaluation activities, this property meets four criteria presented in Ontario Regulation 9/06 of the Ontario Heritage Act and therefore has cultural heritage value or interest.
- The proponent should submit this report for review and comment to the planning staff at the Town of Oakville, the MCM and to any other relevant stakeholder that has an interest in the heritage of the subject property. Any feedback will be incorporated into this report prior to finalization.

The CHER was submitted to the Town of Oakville planning department and the MCM and updated according to their input.

The HIA indicates that expansion of the Mid-Halton WWTP is not expected to result in any direct adverse impacts to the Merton Mount Pleasant Cemetery. The HIA further indicated that proposed work may result in indirect impacts in the form of vibration, as the cemetery sits approximately 30 metres from the WWTP. The following recommendations and mitigation measures have been developed in the HIA and should be implemented:

- Construction crews should be advised of the heritage status and heritage attributes of the property at 2222 North Service Road West before going on site.
- Staging and construction should be suitably planned and executed to ensure that unintended negative impacts to the heritage attributes of the property at 2222 North Service Road West are avoided.
- To address the potential for indirect impacts due to construction-related vibration, a baseline vibration assessment during detail design should be undertaken to determine potential vibration impacts. Where impacts due to vibration are anticipated, the following mitigation measure should be undertaken: A vibration assessment and monitoring plan should be prepared by a qualified engineer and implemented by the contractor to lessen vibration impacts related to construction.
- This HIA report should be submitted to staff at the Town of Oakville and the Ministry of Citizenship and Multiculturalism and any additional interested stakeholders for review and comment. Following review, stakeholders should determine if they are aware of additional information that should be taken into account in the assessment of impacts, identification of mitigation measures, or implementation. Any feedback will be considered and incorporated into the report, where appropriate. The final report should be submitted to the mentioned agencies as well as the Oakville Public Library for archival purposes.
- This report should be updated with a final Statement of Cultural Heritage Value once heritage staff at the Town of Oakville have reviewed the CHER and confirmed the Draft Statement of Cultural Heritage Value and List of Heritage Attributes.

The HIA was submitted to the Town of Oakville planning department and the MCM and updated according to their input.

11.2.3 Technical and Economic Considerations

The Mid-Halton WWTP expansion is being designed to meet or surpass all legislative requirements, ensuring the facility operates effectively, reliably, and maintains high performance standards. The expansion works are compatible with existing processes, allowing opportunities to streamline implementation, operation and maintenance in a cost-efficient manner. The preferred design concept also allows the Region flexibility to meet future regulations and adapt to potential changes in economic and climate conditions by allowing for provisional technologies such as EBPR and sidestream treatment to be implemented in the future.

11.2.4 Overall Net Effects

Net effects refer to the negative impacts that may remain after all planned mitigation measures have been implemented. Net effects were considered in the assessment of alternatives and the development of the preferred expansion concept.

Several assessments were completed during the MCEA Study to better understand the potential impacts of the proposed facility expansion, and to identify measures to mitigate these impacts. These included natural heritage studies and inventories, a RWIA, and archaeological and cultural heritage assessments. Further investigations are also planned during design such as geotechnical and hydrogeological studies, an Air Quality Assessment, an Acoustic Assessment, Environmental Site Assessments, Vibration Assessment of equipment and Subsurface Utility Engineering (SUE). Based on extensive studies and discussions with approval agencies and the public, mitigation measures have been established to protect the community and the environment.

Overall, the project will have negligible to no adverse environmental or social consequences (that is, net effects). Expansion of the Mid-Halton WWTP will allow Halton to continue to meet the needs of its growing population, while protecting the environment and community.

12. Implementation Plan

The implementation of the preferred expansion concept for the Mid-Halton WWTP to a rated capacity of 195 ML/d will be executed in a phased manner, aligned with the Region's growth projections, regulatory timelines, and operational priorities. The plan emphasizes constructability, integration with existing infrastructure, and flexibility for future upgrades to the ultimate buildout capacity of 400 ML/d. Throughout all construction phases, the plant will maintain continuous operation and regulatory compliance.

The following components are included in the implementation scope:

- **Primary Treatment:** Construction of conventional primary clarifiers consistent with existing infrastructure.
- **Secondary Treatment:** Installation of Train D configured for CAS with chemical phosphorus removal. The design will incorporate provisions for future retrofit with MABRs and hydrocyclones to enable EBPR, should operational or economic conditions warrant. Increase in ferric costs, need for improved total nitrogen removal and lower GHG emissions are some of the factors that could trigger implementation of process intensification with EBPR. In addition, Train C will be re-rated to 60 ML/d to optimize existing assets and support the overall 195 ML/d capacity target.
- **Solids Handling:** Expansion of WAS thickening (one additional rotary drum thickener), construction of two new anaerobic digesters, and installation of one additional dewatering centrifuge. These upgrades are designed to meet the 195 ML/d capacity and maintain operational reliability. Provisions for the construction of a new Biosolids Building will be made to allow the implementation of larger capacity centrifuges to maintain current dewatering operation hours (5 days/week, 8–10 hours/day), in case an increase in the operation hours is not possible.
- **Sidestream Management:** Expansion of centrate equalization capacity through construction of a third underground centrate tank. Provisions will be made for future sidestream deammonification treatment, which may be implemented if influent ammonia loads increase or if sustainability goals prioritize nitrogen removal.
- **Site Integration:** The expansion will be accommodated within the existing plant footprint, preserving space for future liquid train additions and solids handling upgrades. Preliminary layouts have been developed to ensure compatibility with current operations and regional asset strategies.
- **Environmental Mitigation:** A comprehensive EIA has been completed. Mitigation measures for erosion, sedimentation, vegetation removals, and wildlife protection will be implemented during construction, with further refinement during detailed design.

12.1 Recommended Implementation Plan

The recommended implementation plan includes the following key phases:

- Approvals and Stakeholder Engagement
 - Secure ECA and other regulatory permits.
 - Incorporate feedback from ESR public review.
- Design Development
 - Finalize preliminary and detailed design of the preferred design concept.
 - Conduct additional wastewater characterization to support EBPR feasibility.

- Confirm sizing and layout of all unit processes.
- Develop site-specific ESC and mitigation plans.
- Construction and Commissioning
 - Construct primary and secondary treatment facilities, solids handling upgrades, and sidestream management system.
 - Commission Train D and integrate with existing operations.
 - Implement mitigation measures during construction as outlined in the EIA.
- Operational Optimization
 - Monitor performance of Train D.
 - Evaluate ferric cost trends and determine timing for MABR/hydrocyclone retrofit.
 - Confirm biogas utilization strategy and assess sidestream treatment feasibility.
- Future Upgrades
 - Monitor influent characteristics and regulatory changes.
 - Implement sidestream deammonification if required.
 - Plan for expansion to 400 ML/d based on growth and outcomes of the IMP.

This phased and adaptive implementation strategy ensures that the Mid-Halton WWTP remains resilient, cost-effective, and aligns long-term regional growth and sustainability objectives.

The anticipated project implementation schedule for the Environmental Assessment, Preliminary Design, Detailed Design, Procurement and Tender, and Construction phases is presented in Figure 12-1.

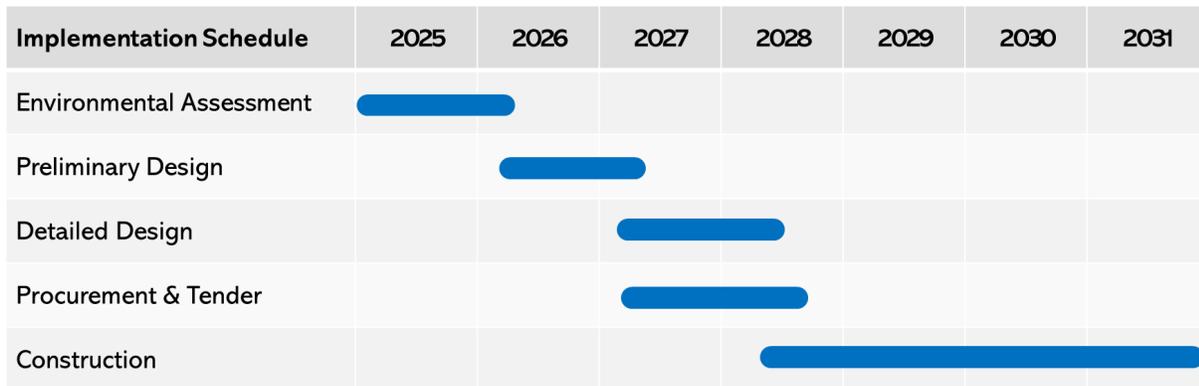


Figure 12-1. Anticipated Project Implementation Schedule.

12.2 Permits and Approvals

To implement the preferred design concept, several permits and approvals will be required. These approvals will be received during the design phase of the project and are described in Table 12-1, Table 12-2, Table 12-3, Table 12-4. Other approvals may be identified as the design progresses.

Table 12-1. Preliminary Approvals and Permitting Requirements for the Mid-Halton WWTP Expansion-Federal

Agency/Act-Federal	Permit/Approval Required	Design Studies/Considerations
Fisheries and Oceans Canada – Fisheries Act	Notification - There are no fish species on site that will be affected by the project. Redside Dace Critical Habitat in Fourteen Mile Creek	Work with MECP and CH during design to ensure impacts to Fourteen Mile Creek mitigated.
ECCC - Migratory Bird Act	Compliance (Letter of Authorization)	Prior to construction an EI in conjunction with a qualified biologist should inspect the adjacent natural features for evidence of migratory and SAR birds that may be impacted by construction. If there is potential for nesting in trees requiring removal, tree and scrub removal (and vegetation clearing) should occur outside the Migratory Bird window (early April to end of August).
ECCC – SAR	Notification - No federally significant species on the plant site. Redside Dace Critical Habitat in Fourteen Mile Creek	Work with MECP and CH during design to ensure impacts to Fourteen Mile Creek mitigated.

Table 12-2. Preliminary Approvals and Permitting Requirements for the Mid-Halton WWTP Expansion-Provincial

Agency/Act-Provincial	Permit/Approval Required	Design Studies/Considerations
MCM - Ontario Heritage Act	No further approvals for archaeological resources. Cultural heritage studies are underway to confirm compliance with the Act.	The Region completed Stage 1 AA with the results indicating that the area of expansion has been previously disturbed with little potential for undiscovered archaeological resources. Should previously undocumented archaeological resources be discovered during construction, the Region of Halton will cease construction until the MCM is contacted, and appropriate mitigation or resource recovery is implemented. The Merton Mount Pleasant Cemetery located across the road from the Mid-Halton WWTP was identified as a recognized heritage property. A CHER and a HIA were completed to update the Statement of Heritage Value and ensure that the property is not impacted during construction.

Agency/Act-Provincial	Permit/Approval Required	Design Studies/Considerations
MECP – Endangered Species Act	Prove Compliance (that is, construction will not cause harm to species and their habitat; mitigation techniques must be identified and approved by MECP and CH).	No impacts to Fourteen Mile Creek and Redside Dace Critical Habitat are expected provided 10 m setback buffer provided. If during design it is determined that construction of the preferred alternative encroaches into the setback area, any potential impacts will need to be determined and preferred mitigation or avoidance measures developed through consultation with MECP and CH. Additional hydrology and geotechnical studies could be required at the detailed design stage, such as confirmation of the Long-term Stable Top of Slope (LTSTOS).
MECP – OWRA	ECA Sewage	The design and operating requirements for the expanded Mid-Halton WWTP will be confirmed through the detailed design and form the basis for receiving ECA approval. As part of application, require confirmation of designs, odour, air, noise control measures, and effluent limits and objectives. Monitoring requirements will also be specified.
MECP – EPA	ECA Amendment Air and Noise	To amend the Air and Noise ECA, confirmation of designs, odour, air, noise control measures will be confirmed, and comply with: O. Reg. 419/05 applicable standards and criteria and will meet the air quality requirements for obtaining a provincial ECAs for air. MECP NPC - 300 limits for noise. Air Quality and Noise Modelling Assessments will be prepared during design for approval with the MECP.
MECP – Ontario Water Resources Act	Check dewatering requirements and mitigation measures during design to confirm if a Permit to Take Water is required	During construction of the proposed works, dewatering operations will be necessary to facilitate dry working conditions. During design, site-specific geotechnical and hydrogeological investigations will be undertaken to confirm dewatering requirements and mitigation measures, and if a Permit to Take Water is required.
MECP – EPA Specifically, the requirements are outlined in Ontario Regulation 406/19: On-Site and Excess Soil Management.	Excess Soil Management requirements	An Excess Soil Management Plan that meets MECP's Excess Soil Regulation (O. Reg. 406/19) under the EPA will be prepared during design. The Plan will outline how excess soil will be managed as a resource, focusing on beneficial reuse. The Plan will be filed and approved through the Excess Soil Registry, by the Resource Productivity and Recovery Authority of MECP.

Agency/Act-Provincial	Permit/Approval Required	Design Studies/Considerations
Ministry of Public and Business Service Delivery and Procurement - Electrical Safety Authority	Electrical Permits	To receive permits from Electrical Safety Authority, a Voltage Report must be completed as part of detailed design to ensure design and construction meet all requirements prior to connection.
Ministry of Public and Business Service and Delivery Procurement - TSSA	Digester Gas Handling and Biosolids Management Modifications Permit	Detailed designs to meet all standards for use of biogas and solids operations.
The Ministry of Labour, Immigration, Training and Skills Development - Occupational Health and Safety Act.	Notice and Compliance	Notice to be received prior to construction. Construction and operational staff must be trained to meet all occupational health and safety requirements.
CH – Conservation Authority Act	Permit to undertake any work in or next to regulated areas	<p>Studies during design will include:</p> <ol style="list-style-type: none"> 1. A Stormwater Management (SWM) Plan, with an Erosion and Sedimentation (ESC) Plan will be developed during design stage of the project to ensure the development activities do not affect adjacent watercourses and valley lands. The Region develop SWM and ESC plans for the site that addresses CH's stormwater management criteria including that the site meet the following: <ol style="list-style-type: none"> a. Quality Control (Enhanced Level of Protection; 80% TSS Removal) b. Quantity Control (100-year Post to 2-year Pre-control of peak flows) c. Erosion Control (Retention of the first 5 mm of any given rainfall event) d. Consideration should be given for incorporating LIDs into the proposed SWM strategy. 2. Tree Preservation Plan 3. Site Plan 4. Additional hydrology and geotechnical studies could be required at the detailed design stage, such as confirmation of the LTSTOS if it is determined that construction of the preferred alternative encroaches into the setback area required to protect Fourteen Mile Creek. – Need for these studies to be determined.

Table 12-3. Preliminary Approvals and Permitting Requirements for the Mid-Halton WWTP Expansion-Regional Municipality of Halton

Agency/Act-Regional Municipality of Halton	Permit/Approval Required	Design Studies/Considerations
Regional Municipality of Halton – Ontario Municipal Act	Halton Region Service Permit (water)	An additional potable water connection is required for the expansion for plant operations. An independent service permits for connecting to Halton’s water supply system is required by Halton Region’s Services Permit Group.

Table 12-4. Preliminary Approvals and Permitting Requirements for the Mid-Halton WWTP Expansion-Town of Oakville and Local Utilities

Agency/Act-Town of Oakville and Local Utilities	Permit/Approval Required	Design Studies/Considerations
Town of Oakville – Ontario Heritage Act	Coordinate to ensure Approval A Cultural Heritage Evaluation Report (CHER) and a HIA are being completed in consultation with the Town of Oakville Heritage Planning staff to update the Statement of Heritage Value of the cemetery and confirm that the plant expansion will not impact the cemetery.	N/A – compliance is being obtained through EA.
Town of Oakville –Ontario Building Code Act	Building Permit	Required to comply with Ontario Building Code Requirements and Town of Oakville Zoning By-law; obtained during detailed design, prior to construction.
Town of Oakville – Ontario Municipal Act	An Arborist Report, including a Tree Preservation Plan and complete tree inventory, is required for approvals. A tree removal permit must be obtained for any trees with a diameter at breast height (DBH) greater than 15 cm that are identified and scheduled for removal.	An Arborist Report, including a Tree Preservation Plan and complete tree inventory, is required for approvals. A tree removal permit must be obtained for any trees with a DBH greater than 15 cm that are identified and scheduled for removal.
	Site Plan Approval	Required to meet policies in Town of Oakville OP; obtained during detailed design, prior to construction. Key requirements of the site plan will include facility layout and design, landscaping, and stormwater management.

Agency/Act-Town of Oakville and Local Utilities	Permit/Approval Required	Design Studies/Considerations
Town of Oakville – Ontario Municipal Act	Road occupancy Permit	<p>Construction traffic will enter the plant via the North Service Road, which is maintained by the Town of Oakville.</p> <p>The Municipal Right of Way By-Law 2024-002 required a permit from the Town of Oakville for additional construction traffic using the North Service Road.</p>
	Noise By-law Adherence	<p>The Town of Oakville restricts construction noise to between 7 am 7 a.m. and 7 p.m. Monday to Saturday, with all-day prohibition on Sundays and statutory holidays.</p> <p>Deviations from the by-law require a permit.</p>
Oakville Hydro (Local electric company responsible for electrical compliance)	Installation Inspection Compliance	<p>Connection Impact Assessment as part of detailed design phase to ensure design and construction meet all requirements prior to upgrades to the existing 27.6kV connection.</p>
Underground Utilities (Gas, Telecommunications, Electric)	Clearance	<p>SUE investigation will identify the nature, depth, location, orientation, and dimensions of buried utilities will be conducted.</p> <p>Clearances will be received where required.</p>

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