Air Quality Impact Assessment

Revision: Final

Halton Region
Proposal P-1256-24 |
PO# 4500072635 | S3519A

Mid-Halton WWTP Expansion
July 29, 2026

Air Quality Impact Assessment

Client Name:	Halton Region		
Project Name:	Mid-Halton WWTP Expansion		
Client Reference:	Proposal P-1256-24 | PO# 4500072635 | S3519A	**Project No:**	CE904000
Document No:	S3519A	**Project Manager:**	J. M. Pouliot
Revision:	Final	**Prepared By:**	C. Shen
Date:	July 29, 2026	**File Name:**	CE904000_MidHaltonWWTP_ESR_AirQualityImpactAssessment_Final_20260805

Document History and Status

Revision	Date	Description	Author	Reviewed	Approved
0	2026-05-15	Draft	C. Shen	D. Chartrand M. Lee A. Schmidt	J. M. Pouliot
1	2026-07-29	Final	C. Shen	P. Burrowes D. Chartrand A. Schmidt	J. M. Pouliot

Jacobs Consultancy Canada Inc.

121 King Street West
Suite 2100
Toronto, ON M5H 3T9
Canada

T 1.416.499.9000
www.jacobs.com

Executive Summary

This Air Quality Impact Assessment Report presents the assessment of potential air and odour emission impacts during construction and operations of the expanded Mid-Halton Wastewater Treatment Plant (WWTP) and compares effects to the Ontario Ministry of the Environment, Conservation, and Parks (MECP) Air Contaminants Benchmarks (ACB) List. It applies ACB standards, guidelines, and screening levels for assessing point of impingement (POI) concentrations of air contaminants (version 3.0, April 2023). The report also applies the MECP screening criterion of 1 Odour Unit (OU) at the 99.5th percentile, as determined at sensitive receptors. For this study, a quantitative assessment of project-related air emissions during operations were based on current conventional treatment technologies employed at the Mid-Halton WWTP.

The Mid-Halton WWTP is being expanded to increase its rated capacity from 125 to 195 megalitres per day by 2031 (the Project). The preferred expansion concept, includes the following components that will impact air quality:

- Addition of a new Train D Liquid Treatment module
- Increased biogas generation rate due the expansion
- Replacement of an existing 360-kilowatt standby diesel generator with a new 2,500-kilowatt standby diesel generator.

The proposed Project will discharge air contaminants into the atmosphere including products of combustion, reduced sulphur compounds, and odour (as OU). Combustion source emissions were estimated using emission factors and mass balance techniques. Total reduced sulphur (TRS) and odour emissions from the existing wastewater treatment process were estimated based on the results of the onsite odour sampling program with engineering justification. New train D emissions were estimated using sampling results from Train C.

An air quality impact assessment was conducted for both construction and operation phases. During the construction phase of the proposed Project, air contaminants that arise from diesel engine combustion will be highly localized to the work area due to short emission-discharge heights and mobility of the sources. Construction equipment varies in different construction phases for short durations and is not likely to have a long-term ecological effect beyond the plant site. The fugitive particles created by construction activities will be of larger aerodynamic diameters that tend to settle rapidly. Anticipated potential impacts are dust nuisance in the immediate vicinity of the site. Odour emissions during construction are not expected to be significant. There may be some short-term emissions when tie-ins are required to the existing facility infrastructure. These emissions can be suitably managed using operational controls.

Operational air quality impacts were assessed through air dispersion modelling (AERMOD v.24142) using site-specific meteorological data processed by the MECP using AERMET v.24142 in accordance with the MECP air dispersion modelling guidelines. Three scenarios were modelled to provide context of the relative contributions of new Project component emissions compared to existing sources:

- **Scenario 1: Baseline (Existing)** – includes existing sources from Trains A&B, Train C, and associated infrastructure only.
- **Scenario 2: Project Only** – includes Expansion Project components only.
- **Scenario 3: Cumulative** – Includes both baseline and Expansion Project components.

Model results indicate that baseline and cumulative POI concentrations for 1-hour nitrogen oxide (NO_x), 24-hour nitrogen oxide, 24-hour particulate matter (PM), and annual sulphur dioxide (SO_2) are less than the applicable standards in the MECP ACB List. The baseline 1-hour SO_2 concentration is also less than the

applicable MECP POI limit. For the cumulative scenario, compliance with the 1-hour SO_2 criterion can be achieved by increasing the WGB1 stack height to 10 metres above grade. This stack height adjustment is not a design recommendation but is presented solely to demonstrate that the WWTP can comply with applicable air quality criteria if additional stack height is provided. It should also be noted that the Region is planning to upgrade the flare as part of a separate project scope.

Predicted NO_x concentrations associated with emergency generator maintenance testing are less than the MECP screening level for emergency generators for both the baseline and cumulative scenarios. The predicted 1-hour concentration at sensitive receptors is also less than the applicable air guidelines.

The maximum predicted 24-hour ammonia POI concentration in all three scenarios is less than 2 percent of the applicable MECP POI limit of 100 micrograms per cubic metre.

The proposed project is expected to result in a slight increase in TRS (H_2S) concentrations. However, for both the baseline and cumulative scenarios, the maximum predicted 24-hour TRS concentrations remain less than the MECP 24-hour standard of 7 micrograms per cubic metre. Odour-based 10-minute average TRS concentrations were evaluated at 22 sensitive receptors, and the highest predicted concentrations at these locations are less than the applicable MECP POI limit of 13 micrograms per cubic metre for both scenarios.

The nearest sensitive receptor, a private language learning centre located approximately 180 metres west of the WWTP, is predicted to experience the highest 10-minute odour concentration. However, an exceedance frequency analysis that accounts for the language learning centre's hours of operation indicates, odour concentrations are expected to exceed the MECP 10-minute OU screening level of 1 OU per cubic metre for 0.57 percent of the time.

Because the language learning centre receptor was evaluated based on its operating hours, a separate assessment was conducted for the remaining sensitive receptors that are assumed to be occupied 24 hours per day. The odour assessment indicates the potential for a modest increase in odour emissions, comparable to those associated with the existing Train C facilities, which may result in slightly higher odour concentrations at nearby receptors. Excluding the language centre receptor, the highest predicted 10-minute odour concentration (99.5th percentile) is 1.91 OU per cubic metre at 2220 Brays Lane under the baseline scenario and 2.52 OU per cubic metre at 2158 Brays Lane under the cumulative scenario. Frequency analysis indicates that, under the cumulative scenario, the most affected receptor is predicted to experience odour concentrations exceeding 5 OU per cubic metre for only 0.125 percent of the time and exceeding 1 OU per cubic metre for 2.16 percent of the time.

The following mitigation measures resulted from this Air Quality Impact Assessment study:

- Increase the height of the existing biogas flare stack to 10 metres above grade, would ensure the compliance of SO_2 in the cumulative scenario
- Operate and maintain the carbon units in accordance with the manufacturer's manual and replace the activated carbon media based on supplier recommendations or odour sampling results.
- Operate and maintain the biofilter units in accordance with the manufacturer's manual and replace the media based by supplier recommendations or odour sampling results.

The plant already has a robust process for receiving, addressing and reporting odour complaints. The Region works closely with community members to clarify questions and respond to their concerns and will continue to do so.

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

Acronym	Abbreviation
AAQC	Ambient Air Quality Criteria
AAV	Annual Assessment Value
ACB	Air Contaminants Benchmarks
ADMGO	Air Dispersion Modelling Guideline for Ontario
AHUs	air-handling units
AQIA	Air Quality Impact Assessment
AQOC	Air Quality Objective Criteria
BPIP	Building Profile Input Program
CAAQS	Canadian Ambient Air Quality Standards
COC	contaminants of concern
DAV	Daily Assessment Value
ECA	Environmental Compliance Approval
H_2S	hydrogen sulphide
m^3	cubic metres
m^3/h	cubic metres per hour
m^3/s	cubic metres per second
MECP	Ministry of the Environment, Conservation and Parks
NO_2	nitrogen dioxide
O. Reg.	Ontario Regulation
OU	odour unit
PB1	Parkway Belt Public Use
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns

Acronym	Abbreviation
POI	point of impingement
PS	pump station
SO_2	sulphur dioxide
TRS	Total Reduced Sulphur
UTM	Universal Transverse Mercator
UV	ultraviolet
WGB	Waste Gas Burner
WWTP	Wastewater Treatment Plant

1. Introduction

The Mid-Halton Wastewater Treatment Plant (WWTP), owned and operated by the Regional Municipality of Halton (the Region), is rated to treat an average daily flow of 125 megalitres per day. It provides wastewater treatment for a catchment area that includes North Oakville, South Milton, and the Highway 401 Corridor in Halton Hills. A portion of the flows from the Georgetown WWTP are being directed to the Mid-Halton WWTP since the beginning of 2026. The plant is located on the North Service Road between Third Line and Bronte Road, north of the Queen Elizabeth Way 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 1-1 presents an aerial view of the plant site and an outline of the site boundary.

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

The Mid-Halton WWTP is a conventional activated sludge treatment plant that provides screening and grit removal, and primary and secondary treatment through three parallel process trains (Trains A, B, and C) and ultraviolet (UV) disinfection. Influent flows are conveyed to the Mid-Halton WWTP through the North Pumping Station (PS) and the Third Line PS. Effluent is discharged into Lake Ontario. Two solids streams are generated from the treatment process, primary sludge and waste activated sludge. Waste activated sludge is thickened prior to being blended with primary sludge and anaerobically digested. Digested biosolids are dewatered prior to off-site disposal by beneficial reuse.

The Region is committed to a capacity expansion at the Mid-Halton WWTP by 2031, in line with the Province of Ontario's (the Province) Bill 23 (More Homes Built Faster Act) and the 2011 Halton Sustainable Water and Wastewater Master Plan. The Province set 2051 growth targets for the Region including residential population growth to approximately 1,100,000 and employment population growth to approximately 500,000.

The Region and its local municipalities (Town of Oakville, Town of Milton, City of Burlington, and Town of Halton Hills) recently completed a Joint Best Planning Estimate to determine where growth will be distributed in the Region. This exercise identified significant population and employment growth within the Mid-Halton WWTP catchment area. The Region has also recently completed its Water, Wastewater and Transportation Integrated Master Plan, which identified the potential to divert flows from other plants in the Region to the Mid-Halton WWTP in the future. The plant will require significant capacity expansions in the short-and long-term as a result.

The Region initiated this Municipal Class Environmental Assessment (MCEA) study to develop a preferred capacity expansion concept that will increase the rated capacity of the WWTP from 125 to 195 megalitres per day by 2031 (the Project).This MCEA is being conducted in accordance with the planning and design process for municipal projects outlined in the Municipal Engineers Association's MCEA process for Schedule C municipal infrastructure projects (MEA, October 2000, as amended in 2007, 2011, 2015, 2023).

1.1 Purpose and Scope

This Air Quality Impact Assessment (AQIA) is prepared as part of the Environmental Study Report for the MCEA to assess potential air quality impacts and identify proposed mitigation measures, if applicable.

The purpose of this AQIA is as follows:

- Assess the baseline air quality impact of the existing plant operation.
- Assess the potential impacts on air quality associated with the Project.
- Identify mitigation measures for any negative impacts to air quality caused by the Project, if applicable.

Since the Project is in the conceptual design phase, only preliminary information was available. The Project air quality impact was conducted quantitatively using air dispersion modelling with assumptions of source locations and emission rates similar to existing sources at the WWTP.

2. Methodology

This study is based on the Project design information available at the time of the assessment. Guidance from the MECP was followed as appropriate for the various study components listed in the following subsections.

2.1 Step 1 – Project Footprint and Study Area

- Identifying the project footprint.
- Reviewing the available conceptual design of the Project.
- Establishing a study area for the Project.

2.2 Step 2 – Air Contaminants of Concern and Regulatory Framework

- Identifying contaminants of concern associated with the Project.
- Reviewing applicable air quality regulatory requirements and objectives.

2.3 Step 3 – Existing Conditions

- Obtaining ambient background air quality concentrations from the representative National Air Pollution Surveillance Network or MECP air quality monitoring stations for the Project study area.
- Obtaining climate/weather conditions in the study area.
- Reviewing zoning maps and aero photos to identify sensitive/critical receptors in the study area.

2.4 Step 4 – Emission Sources, Potential Impacts and Mitigation Measures

- Identifying existing air emission sources in the Mid-Halton WWTP.
- Identifying air emissions associated with the Project.
- Conducting air quality assessment using air dispersion modelling (AERMOD v. 24142) based on site-specific meteorological data processed by the MECP using AERMET v.24142 for the Project for three scenarios, as follows:
  - **Scenario 1:** determining the existing (without the Project) WWTP air quality impacts along and beyond the property line.
  - **Scenario 2:** determining the air quality impacts for the proposed Project at and beyond the property line.
  - **Scenario 3:** determining the cumulative facility-wide (existing and Project) air quality impact at and beyond the property line.
- Comparing the modelling results of the scenarios.
- Providing recommendations for mitigation measures to be implemented to avoid, reduce, and manage air emissions associated with the Project.

3. Project Footprint and Study Area

This section describes the Project footprint and the Project study area.

3.1 Project Footprint

The Mid-Halton WWTP is located at 2195 North Service Road in Oakville, Ontario. The Facility is a conventional activated sludge plant that provides treatment for wastewater from the Regional Municipalities of Halton. The existing plant consists of three parallel liquid process treatment modules: Trains A, B and C. The wastewater treatment plant flow schematic is shown on Figure 3-1.

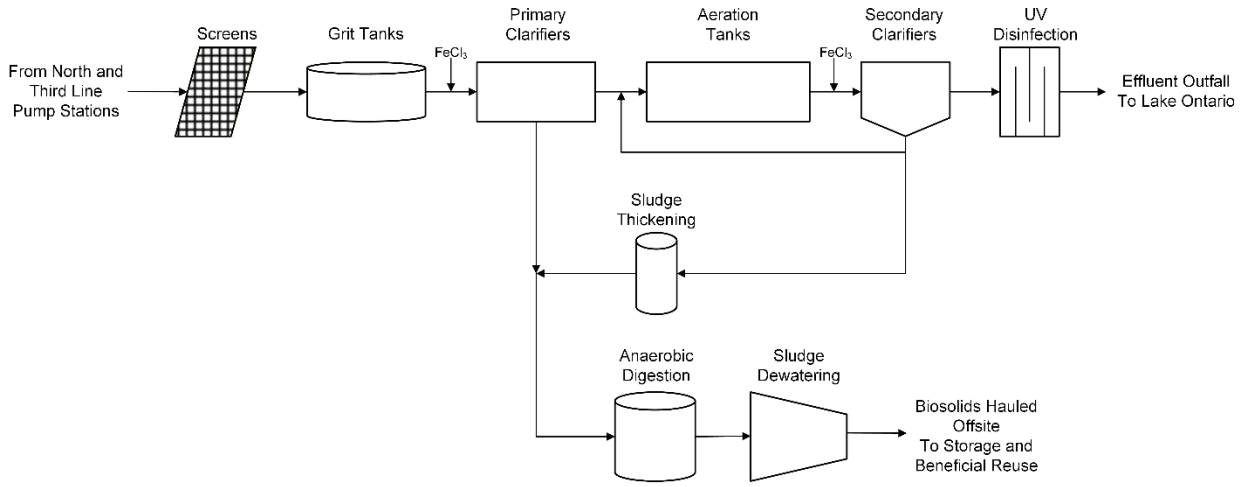

Figure 3-1. Mid-Halton Wastewater Treatment Plant Flow Schematic

The proposed expansion includes adding a new liquid process treatment module, Train D, and new digesters to serve the increased population growth and urbanization in the Halton area. The following major components will be part of the proposed expansion Project at Mid-Halton WWTP:

- Pumping Station Expansion
  - Upgrade the existing North PS, including the replacement of one 360-kilowatt emergency diesel generator with a new 2,500-kilowatt standby diesel generator.
- Liquid Treatment Expansion:
  - Install an additional screening and grit removal equipment in the Train C Headworks in the existing channel and build the third vortex grit tank adjacent to the existing ones.
  - Construct a new Train D Liquid Treatment module. Availability of data at the current design stage is limited, therefore, for this assessment, it was assumed that Train D will have similar components and size as the Train C liquid train.
  - Add UV banks to the existing fifth channel at the UV Disinfection Building.
- Solids Treatment Expansion
  - Install additional thickening (rotary drum thickener) and dewatering (centrifuge) equipment in the existing Biosolids Building.
  - Construct two new digesters to provide additional capacity required to accommodate the expansion.

The project footprint was established based on the current available design information for the proposed expansion, which will be refined and updated as the project planning progresses through preliminary design. Figure 3-2 shows the proposed Mid-Halton WWTP expansion project footprint with a conceptual layout of the new Project components in red, including Train D to the northeast of the plant.

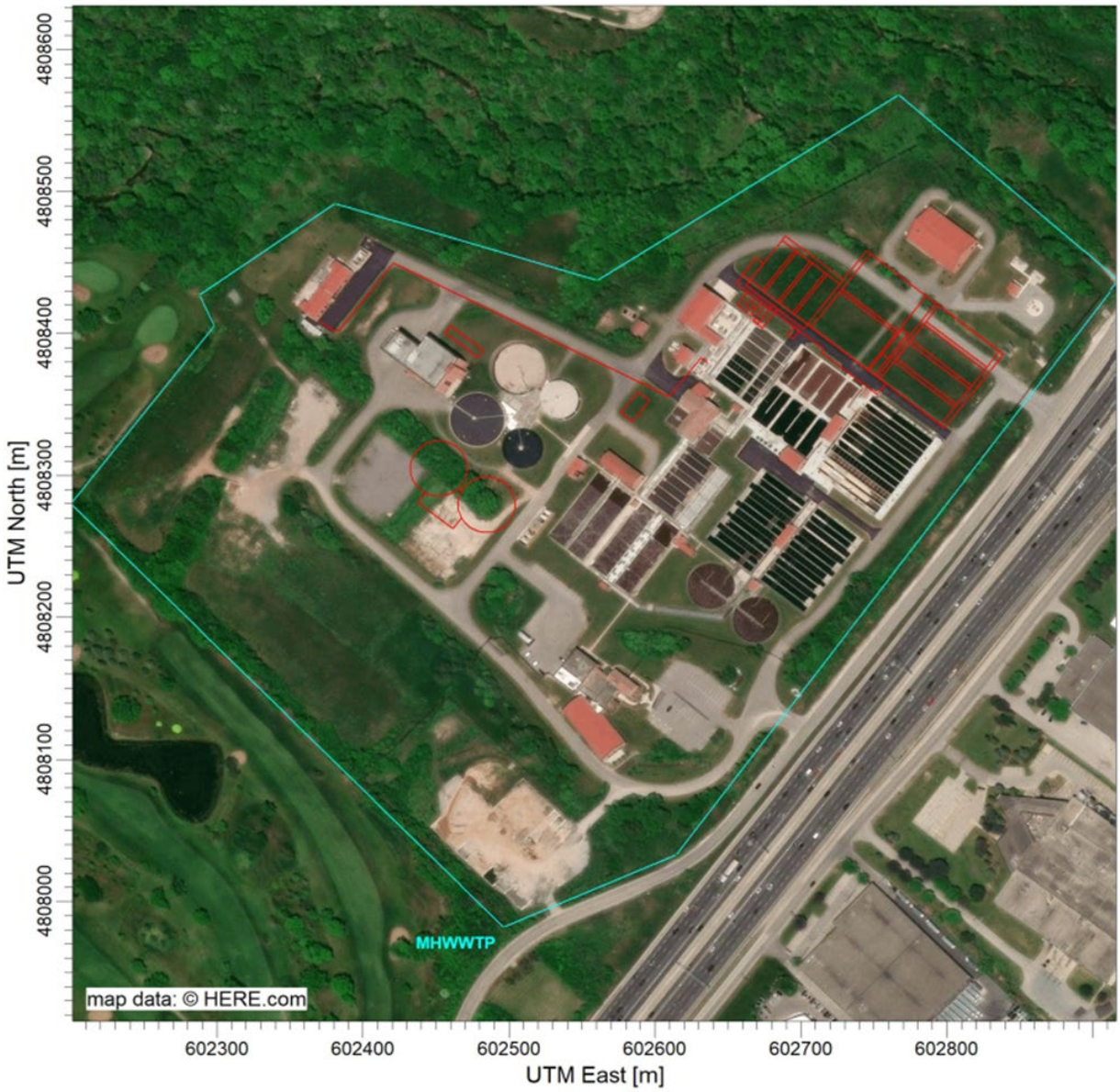

Figure 3-2. Project Footprint – Proposed Expansion at Mid-Halton WWTP

3.2 Study Area

A study area has been identified based on the Project footprint and an assessment of lands potentially impacted by the air emission. An area of 10 kilometres by 10 kilometres approximately centered on the WWTP air emissions sources was selected to be the study area, based on the nature of the air emissions sources and historical air quality studies. This area is shown on Figure 3-3.

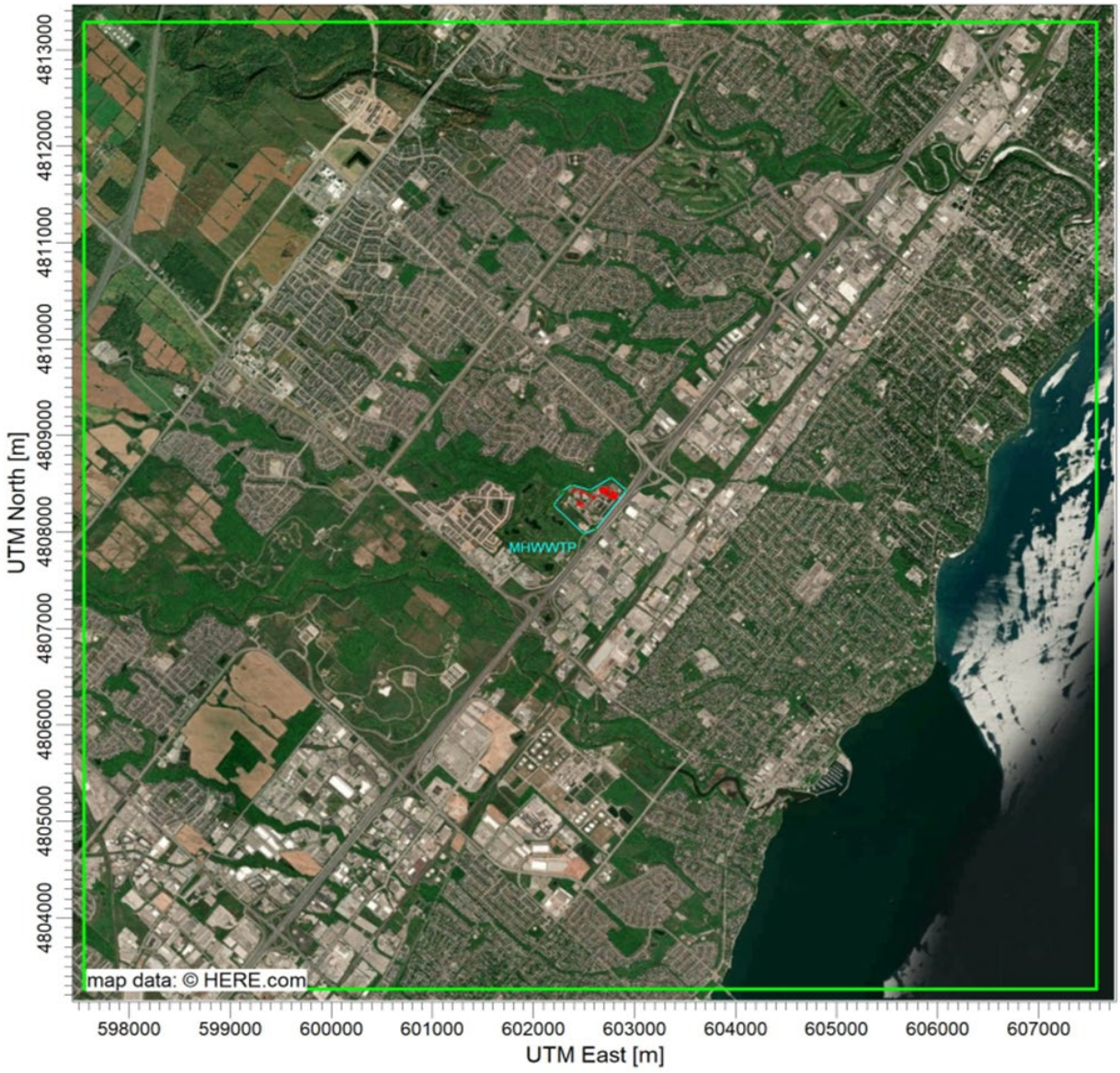

Figure 3-3. Air Quality Impact Assessment Study Area

4. Air Contaminants of Concern and Regulatory Framework

This section contains information on air contaminants of concern, regulatory framework that guide the assessment, ambient air quality standards, and points of impingement limits set by the province.

4.1 Air Contaminants of Concern

Ambient air quality in the Project study area is influenced by emissions from local commercial/industrial sources and vehicular traffic. The contaminants of concern (COC) for the Project include odorous contaminants from wastewater processing and combustion products from dual-fuel boilers, digester gas burner and the standby power system. Typical odour contaminants from a municipal wastewater treatment plant are the total reduced sulphur compounds (TRS) and mixed odour emissions and impacts are typically assessed using Odour Units (OU). According to Ontario Regulation (O. Reg.) 419/05, TRS consists of hydrogen sulphide (H_2S), methyl mercaptans (MM), dimethyl sulphide, and dimethyl disulphide. For Municipal wastewater treatment plants, H_2S represents the majority of the TRS.

For this assessment, these are the COCs:

- Nitrogen dioxide (NO_2)
- Sulphur dioxide (SO_2)
- Particulate matter less than 2.5 microns ($PM_{2.5}$)
- Total Reduced Sulphur Compounds (TRS)
- Hydrogen Sulfide (H_2S)
- Odour (OU)

4.2 Ambient Air Quality Standards and Objectives

A summary of the pertinent air quality objectives and standards for the COCs is presented in Table 4-1 according to the following applicable air contaminant guidelines from relevant agencies and organizations in Canada:

- Ontario Ambient Air Quality Criteria (AAQC) (MECP, 2019a)
- Canadian Ambient Air Quality Standards (CAAQS) (CCME 2025)

The Ontario AAQC and 2025 CAAQS are listed in Table 4-1 for Criteria Air Contaminants, H_2S and TRS.

Table 4-1. Applicable Ambient Air Quality Objectives

Air Contaminant	Averaging Time	AAQC (µg/m³)	2025 CAAQS (µg/m³)
NO_x	1-hour	400 (0.20 ppm)	84 (42 ppb[a])
	24-hour	200 (0.10 ppm)	-
	Annual	-	24 (12 ppb[b])
$PM_{2.5}$	24-hour	27[c]	27[d]
	Annual	8.8[c]	8.8[e]
SO_2	1-hour	100 (40 ppb)	162.5 (65 ppb[f])
	Annual	10 (4 ppb)	10 (4 ppb[g])
TRS	10-minute	13	-
	24-hour	7	-

Air Contaminant	Averaging Time	AAQC (µg/m^3)	2025 CAAQS (µg/m^3)
H_2S	10-minute	13	-
	24-hour	7	-

Notes:

[a] The 1-hour CAAQS is referenced to the 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.

[b] The annual CAAQS is the average over a single calendar year of all 1-hour average concentrations.

[c] The AAQC target is based on the CAAQS.

[d] The 98th percentile daily average concentration averaged over 3 consecutive years.

[e] The 3-year average of the annual average concentrations.

[f] The 3-year average of the annual 99th percentile of the SO2 daily maximum 1-hour average concentrations.

[g] The average over a single calendar year of all 1-hour average concentrations.

µg/m^3 = micrograms per cubic metre
H_2S = hydrogen sulphide
NO_x = nitrogen oxide
$PM_{2.5}$ = particulate matter less than 2.5 microns
ppb = parts per billion
ppm = parts per million
SO_2 = sulphur dioxide
TRS = total reduced sulphur

4.3 MECP Point of Impingement Limits

In Ontario, the *ACB List: "Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants*" (version 3.0 - April 2023) was developed by the MECP to assess the POI concentrations predicted by air dispersion modelling. The ACB List lists approximately 5,000 contaminants with corresponding benchmarks (i.e., standards, guidelines and screening levels).
The standards and guidelines listed in the ACB List for COCs have the same levels as the levels listed in the AAQC.

5. Existing Conditions

This section describes the existing conditions at the study area, including details on ambient air quality background levels, climate and meteorology, and land use zoning.

5.1 Ambient Air Quality Background Levels

Background concentrations of COC in the study area are analyzed and presented in this section. The background concentrations represent the effect of existing emissions sources (i.e., both anthropogenic and biogenic) in the area.

Ambient air quality monitoring data were obtained from available Environment Canada and Climate Change's National Air Pollution Surveillance monitoring stations located closest to, or most representative of, the Project location. Where data from multiple stations were analyzed, levels from the most representative station were used as the background concentration, as presented in Table 5-1. The locations of these monitoring stations are presented in Figure 5-1.

Table 5-1. National Air Pollution Surveillance Locations and Data Considered in the Assessment

Contaminant	NAPS Station ID	Station Address	Years Reviewed for Background	Direction/Distance to WWTP
NO_x, $PM_{2.5}$	061603	Oakville Station 8th Line and Glenashton Dr., Halton Reservoir	2022 – 2024	7.5 km North-Northeast of the WWTP
SO_2	067001	Milton Station 1120 Main St East, Milton	2022 – 2024	15.5 km Northwest of the WWTP

ID = identification
km = kilometres
NAPS = National Air Pollution Surveillance
NO_x = nitrogen oxide
$PM_{2.5}$ = fine particulate matter
SO_2 = sulphur dioxide
WWTP = wastewater treatment plant

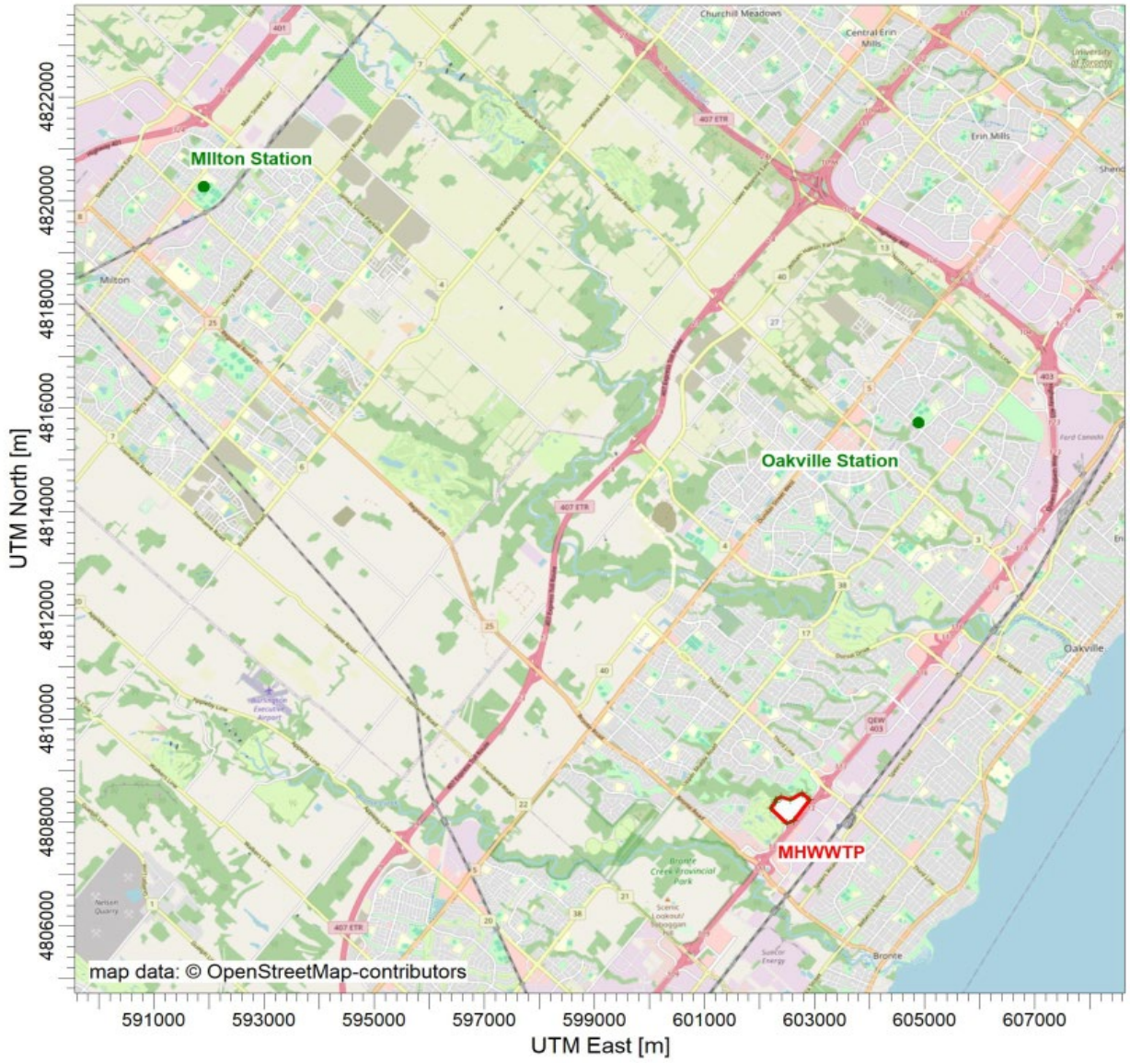

Figure 5-1. Location of National Air Pollution Surveillance Air Monitoring Stations

The background ambient air quality concentrations are compared with applicable air quality objectives in Table 5-2. Current criteria applicable to Ontario, as well as any more stringent federal criteria are shown in this Table for comparison. Detailed background concentration calculations can be found in Appendix B – Ambient Air Quality Concentration Calculations.

Table 5-2. Summary of Ambient Air Quality Background Concentrations

Contaminants	Averaging Period	Background Concentration (µg/m³)	Air Quality Objective (µg/m³)	% of Criteria	Note
NO_2	1-hour	77	400	19%	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
	24-hour	55	200	27%	Assuming the maximum of the Daily mean over 3 years
	Annual	15	24	62.5%	The average over a single calendar year of all 1-hour average concentrations
SO_2	10-minute	35	175	20%	Estimated from 1-hour concentration by times 1.65
	1-hour	21.1	100	21%	The 3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations
	Annual	1.6	10	16%	The average over a single calendar year of all 1-hour average SO_2 concentrations
$PM_{2.5}$	24-hour	22.7	27	84%	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	Annual	7.7	8.8	87%	The 3-year average of the annual average of the daily 24-hour average concentrations

µg/m³ = micrograms per cubic metre
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter less than 2.5 microns
SO_2 = sulphur dioxide

5.2 Climate and Meteorology

The location of the Mid-Halton WWTP is approximately 43° 25′ 9″ N and 79° 43′ 54″ W in the Town of Oakville on the north of the North Service Road between Third Line and Bronte Road. In Oakville, the summers are comfortable; the winters are cold, snowy, and windy; and it is partly cloudy year-round.

Over the course of the year, the temperature typically varies from -7 to 26 degrees Celsius and is rarely below -16 degrees Celsius or above 30 degrees Celsius. The warm season lasts for 3.5 months, from June 2 to September 18, with an average daily high temperature above 20 degrees Celsius. The hottest month of the year in Oakville is July, with an average high of 25 degrees Celsius and low of 18 degrees Celsius. The cold season lasts for 3.4 months, from December 3 to March 16, with an average daily high temperature below 4 degrees Celsius. The coldest month of the year in Oakville is January, with an average low of -7 degrees Celsius and high of -1 degrees Celsius.

The average hourly wind speed in Oakville experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 5.8 months, from October 26 to April 18, with average wind speeds of more than 18.4 kilometres per hour. The windiest month of the year in Oakville is January, with an average hourly wind speed of 22.9 kilometres per hour. The calmer time of year lasts for 6.2 months, from April 18 to October 26. The calmest month of the year in Oakville is August, with an average hourly wind speed of 13.9 kilometres per hour. The predominant average hourly wind direction in Oakville is from the west throughout the year. Figure 5-2 shows the wind rose based on 2020-2024 five-years surface meteorological data processed for the Mid-Halton WWTP.

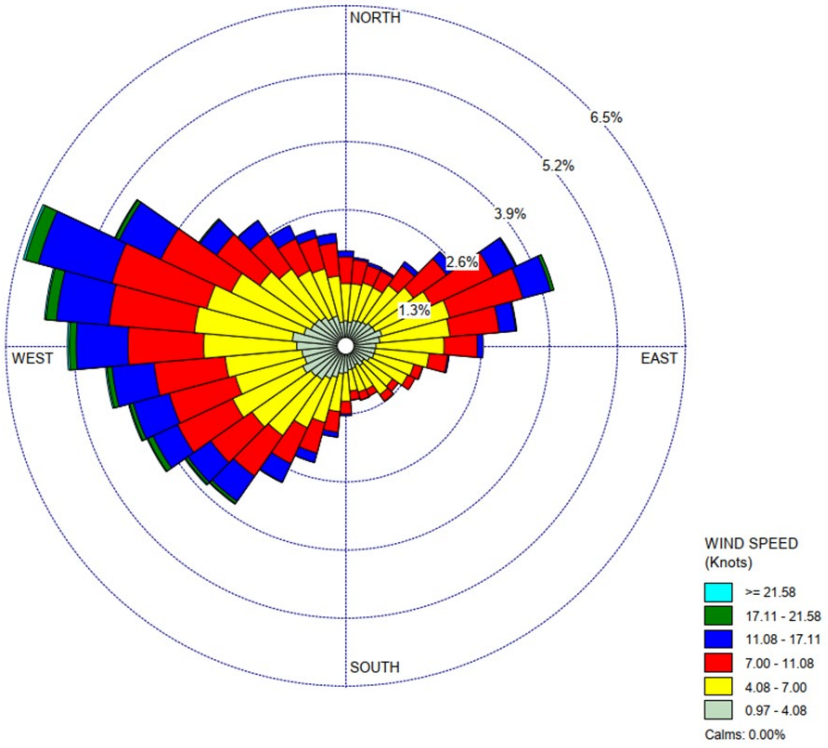

Figure 5-2. Wind Rose for the Mid-Halton WWTP

5.3 Land Use Zoning

According to the Town of Oakville Zoning By-law 2014-014, the Mid-Halton WWTP site is located within the environmental zone, namely Parkway Belt Public Use (PB1). PB1 zone permits a wide range of uses including stormwater management facility, agriculture, conservation use, public park, marina, and legal uses of land, buildings and structures existing on the lot as of the effective date of the By-law. Lands that immediately surround the Plant are PB1 in all direction except the Utility zone (U) to the south, where the Queen Elizabeth Way passes by. The nearest residential area is approximate 230 meters to the north, at Brays Lane in the Glen Abbey community. The Town of Oakville Zoning By-law Map is included in Appendix A – Town of Oakville Zoning Map.

6. Identification of Emission Sources

This section identifies emission sources, including emissions from construction and operation.

6.1 Construction Emissions Sources and Impacts

The air emissions associated with preconstruction and construction activities will be highly variable, as it is difficult to quantify the exact equipment required, timing, and so forth at this conceptual phase of the design. Consequently, predicting emission impacts from these sources and activities has a high degree of uncertainty, and impacts are discussed qualitatively. The construction will be typical of any large-scale infrastructure project and the potential environmental impacts will be managed accordingly.

Although the Expansion Project footprint is within the property line of the WWTP, the Project's construction phase has the potential to result in adverse air quality effects in the immediate vicinity of the plant. According to the land use zoning and the aero map investigation, there are no sensitive or critical air receptors, such as residential, hospital, school, etc., located within 200 meters from the WWTP property line. The nearest residential house is approximately 230 meters to the north at Brays Lane in the Glen Abbey community.

During construction, emission sources can include the following:

- Truck and construction equipment diesel engine exhausts. Criteria air contaminants are expected to be emitted from construction equipment because of fuel combustion, increased traffic in the area from workers, and delivery and maintenance vehicles. Examples of criteria air contaminants are nitrogen oxides, smaller diameter or fine particulate matter, volatile organic compounds, sulphur dioxides, and carbon monoxide.
- Construction activity fugitive dust emissions from earth work, such as removal of overburden, hauling, general material handling, grading, and wind erosion from uncovered surfaces.

The contaminants that arise from diesel engine combustion will be highly localized to the work area because of short emission discharge height and mobility of the sources. Construction equipment varies in different construction phases for relatively short durations and are not likely to have a long-term ecological effect beyond the plant site.

The fugitive dust/particulate matter created by construction activities will be of larger aerodynamic diameters that tend to settle out of the atmosphere rapidly. Potential impacts are likely to be nuisance dust in the immediate vicinity of the site.

Odour emissions during construction are not anticipated to be significant. There may be some short-term emissions when tie-ins are required to the existing facility infrastructure. These emissions can be suitably managed using operational controls.

Table 6-1 summarizes the projected air quality impacts during the construction phase.

Table 6-1. Air Quality Impacts During Construction

Impact Criteria	Earth Work	Structure/Building Construction	Piping/Equipment Installation
Potential Air Pollutants	Dust, particulate matter, combustion products	Particulate matter, combustion products	Combustion products
Spatial Extent	Local area	Local area	Local area
Duration	Short-term	Short-term	Short-term
Mitigation Measures	Fuel efficient vehicles, environmental awareness; proactive identification of emission sources, equipment maintenance program, reduced idling times, water application to roads during dry periods.	Fuel efficient vehicles, environmental awareness, proactive identification of emission sources, equipment maintenance program.	Fuel efficient vehicles, environmental awareness, proactive identification of emission sources, equipment maintenance program.

6.2 Operation Emission Sources

Section 6.2 provides a breakdown of existing operation emission sources and air emission sources related to the proposed Project.

6.2.1 Existing Sources

This section discusses the plant existing air emissions sources approved in the current Environmental Compliance Approval (ECA) #5280-9V5SK9, issued May 25, 2015.

6.2.1.1 Combustion Sources

- Waste Gas Burner
  - One waste gas burner (WGB) (Source: WGB1), to burn excess biogas originating from the digesters, with a maximum biogas burning capacity of 1,453 cubic metres per hour, discharging to the air at a maximum volumetric flow rate of 0.41 cubic metre per second and at a minimum temperature of 875 degrees Celsius, through a stack having an exit diameter of 0.15 metres, extending 4 metres above grade.
- Boilers
  - Two dual fuel boilers (Source: B1 and B2), firing natural gas and excess biogas originating from the digesters, each having a maximum heat input of 5.80 million kilojoules per hour, each discharging to the air at a maximum volumetric flow rate of 0.7 cubic metre per second and at a temperature of 20 degrees Celsius, through a common stack having an exit diameter of 0.4 metres, extending 1 meter above the roof and 8.1 metres above grade.
  - One dual fuel boiler (Source: B3), firing natural gas and excess biogas originating from the digesters, having a maximum heat input of 6.33 million kilojoules per hour discharging to the air at a maximum volumetric flow rate of 0.76 cubic metre per second and at a temperature of 150 degrees Celsius, through a stack having an exit diameter of 0.46 metre, extending 1 metre

above the roof and 8.1 metres above grade **(status – this source has been out of service and the Region has no plans to reuse it in the future).**

- Standby Diesel Generators - Sources exempted from s. 9 approval of the EPA per O. Reg. 524/98.
  - One standby diesel generator set (Source: EG2), located at the North Pumping Station in an acoustic enclosure, having a rating of 1,500 kilowatts, discharging to the air at a maximum volumetric flow rate of 5.16 cubic metres per second, through a stack having an exit diameter of 0.2 metres, extending 4.4 metres above grade.
  - One standby diesel generator set (Source: EG3), located inside the UV Building, having a rating of 750 kilowatts, discharging to the air at a maximum volumetric flow rate of 2.65 cubic metres per second, through a stack having an exit diameter of 0.3 metres, extending 12.7 metres above grade.
  - One standby diesel generator set (Source EG4), located at the North Pumping Station, having a rating of 360 kilowatts, discharging to the air at a maximum volumetric flow rate of 2.2 cubic metres per second, through a stack having an exit diameter of 0.3 metres, extending 11 meters above grade.
- Natural Gas-fired HVACs – Sources exempted from s. 9 approval of the EPA per O. Reg. 524/98.
  - Two natural gas fired air handling units (AHUs) (Source AHU1 and AHU2), located in the Biosolids Building, having a total maximum heat input of 3,692,000 kilojoules per hour, each discharging to the air.
  - One natural gas fired domestic water heater (Source: WH1), located at the Administration Building, having a maximum heat input of 210,895 kilojoules per hour, discharging to the air.

6.2.1.2 Process Emission Sources

- TRS and odour emission sources from the liquid treatment trains include the following point sources approved in the current ECA:
  - Two exhaust systems (Source: APC2a and APC2b) serving the following:
    - One two-cell aboveground biofilter, treating process emission air from the following components:
      - Biosolids Building
      - Centrate tank
      - Waste activate sludge filtrate tank
      - Waste activated sludge blend tank
      - Rotary drum tanks
      - Centrifuge
      - Raw sludge tank
      - Cake bins
    - Each cell has dimensions of 13.1 metres by 3.3 metres, a filter media depth of 1.7 metres, and a minimum retention time of 30 seconds. They are equipped with a total filter bed volume of 147 cubic metres of engineered coated media consisting of low-density aggregate and compost, and an irrigation and humidification system operating at 250 to 350 litres per minute for 10 minutes a day. Each cell discharges to the air at a maximum volumetric flow rate of 1.65 cubic metres per second and at a temperature of 40 degrees Celsius, through a stack having an exit diameter of 0.4 metre, extending 4.5 metres above grade.

- One activated carbon system (Source APC1), treating odorous emissions from Trains A and B Inlet Works Building, containing 9.6 cubic metres of activated carbon, and discharging to the air at a maximum volumetric flow rate of 3.07 cubic metres per second through a stack having exit dimensions of 1 metre by 1 metre, extending 6.05 metres above grade.
- One activated carbon system (Source APC3), treating odorous emissions from Train C Inlet Works Building, containing 7.1 cubic metres of activated carbon, and discharging to the air at a maximum volumetric flow rate of 2.92 cubic metres per second through a stack having exit dimensions of 1.2 metres by 1.2 metres, extending 3 metres above grade.
- One exhaust system, serving the Inlet Building, discharging to the air at a maximum volumetric flow rate of 0.72 cubic metre per second, through a sidewall vent having exit dimensions of 1.1 metres by 1.1 metres, located 6 metres above grade.

- Other point TRS and odour sources not listed in the current ECA include:
  - Four exhaust fans serving the North Pumping Station.
  - Two wall-mounted exhaust fans, serving Train C Headworks Building.
- TRS and odour emission sources also include the process area sources:
  - Trains A&B, and Train C primary clarifiers' scum trough, liquid surface
  - Train C effluent weirs
  - Trains A&B, and Train C aeration tanks liquid surface
  - Trains A&B, and Train C secondary clarifiers liquid surface
  - Trains A&B, and Train C scum pits and Train C stilling and side stream

6.2.2 Air Emission Sources Related to Proposed Project

This section discusses air emissions from combustion and processes related to the proposed project.

6.2.2.1 Combustion Sources

- Changes to Existing Boilers (B1 and B2) and Flare (WGB1)
  - The existing dual-fuel boilers and the waste gas burner are not currently included in the expansion Project scope. However, the digester gas production rate will increase because of the Project expansion. As such, emissions will increase from the existing boilers and the flare.
  - The existing WGB1 is an open flare installed years ago when the SO2 standard was less stringent. The Region is considering upgrading the dual-fuel boilers and flare under another project for the digester expansion, but no detailed information is available at this time. In this AQIA, the flare stack height is increased to demonstrate the flare operation can comply with the MECP air guidelines.
- Emergency Diesel Generator (EG4)
  - The existing 360-kilowatt standby diesel generator set (Source EG4), located at the North Pumping Station, will be replaced with a new 2,500-kilowatt standby diesel generator set, discharging to the air at a maximum volumetric flow rate of 10 cubic metres per second, through a stack having an exit diameter of 0.52 metres, extending 11 meters above grade.

6.2.2.2 Process Emission Sources

According to the basic information from conceptual design, a new Train D liquid treatment module will be added to increase the plant's capacity. This new Train D treatment module will have similar components as the Train C treatment module. Given that the project is at an early stage of the design, for this air impact assessment, it was assumed that air emission sources from Train D would be similar to Train C.

- New area sources of TRS and odour emissions include:
  - Train D primary clarifiers' scum trough, liquid surface, and effluent weirs;
  - Train D aeration tanks liquid surface; and
  - Train D secondary clarifiers liquid surface.

7. Emissions Estimation

This section provides details about the emissions estimates from combustion and process sources.

7.1 Operating Conditions Used for Emission Estimates

Equipment emission rates were developed based on the maximum operating capacity of the system or equipment, even though the process may not normally operate at that maximum rate. The maximum emission scenario will occur when all processes and/or equipment within the plant are operating simultaneously at their maximum capacity. As such, a "worst-case" emission scenario was developed for each of the contaminants to estimate the highest POI concentration.

7.2 Combustion Emission Rate Estimates

This section of the report presents the detailed approach to the estimation of emissions from each source group at the plant, including the methodology and calculation approaches used. Details and sample calculations are presented in Appendix C – Emission Estimate Calculation.

7.2.1 Dual-Fuel Boilers

The dual fuel boilers are equipped with dual-fuel burners capable of burning natural gas or digester gas. The emission rates for these sources were estimated based on the emission factors from the US EPA AP-42 publication for natural gas and digester gas, with the maximum emission rate from the two fuels depicted for combustion emissions.

Table C-1 in Appendix C presents the estimated emission rates and calculation details for each boiler.

7.2.2 Digester Waste Gas Burner

Digester gas is generated during anaerobic sludge digestion as part of the solids treatment process. Digester gas is normally used for process heating. However, waste gas burner is provided in the event that the digester gas will not be used. Digester gas flare was sized to be able to burn 1,453 cubic metres of digester gas per hour, which is of sufficient capacity to burn the additional digester gases after expansion. Emission factor and mass balance techniques are used for emission estimates.

The existing flare is an open flare. The flare was modeled in accordance with the MECP Technical Bulletin – modelling open flares under O. Reg. 419/05 (TM-flare). The open flare stack pseudo-parameters were calculated Accordingly. A destruction efficiency of 97 percent was assumed per the TM. SO_2 and TRS emissions were calculated based on the H_2S concentration in the digester gas using mass balance and engineering calculation; the data were considered above average data quality.

NO_x emission factor (average quality) was adopted from San Diego County Air Pollution Control District, Emission Calculation Procedure, F02-Flares, Digester Gas Fired, Enclosed. This emission factor was based on District flare tasting on digester gas flares having an average methane content of 60.5 percent and destruction efficiency of 99.9 percent, and was considered conservative for open flares.

Detailed emission estimates calculations from the new flares are provided in Appendix C, Table C-2. Detailed calculations of the flare pseudo-parameters are provided in Table C-2a.

7.2.3 Contaminants Emissions with Annual Air Standards

SO_2 emitted from the waste gas burner and boilers when firing on digester gas have an annual air standard. Compliance assessment was conducted in accordance with MECP Technical Bulletin: Using assessment values for contaminants with annual air standards, February 2017. Modelling assessment values and Upper Risk Thresholds for annual standards for SO_2 are listed in Table 7-1.

Table 7-1. Modelling Assessment Value for SO_2

Contaminants	Annual Standard ($\mu g/m^3$)	Annual Assessment Value ($\mu g/m^3$)	Daily Assessment Values ($\mu g/m^3$)	Upper Risk Threshold (24-hour) ($\mu g/m^3$)
Sulphur Dioxide	10	50	500	500

$\mu g/m^3$ = micrograms per cubic metre

For this project, SO_2 emissions were estimated for maximum 1-hour average emissions used for 1-hour POI, Annual Assessment Value (AAV) and Daily Assessment Value (DAV) assessment, and daily average emissions used for annual standard assessment.

7.2.4 Natural Gas Air Handling Units and Hot Water Heater

NO_x emissions from two natural gas-fired AHUs and the hot water heater were estimated based on the emission factors from the US EPA AP-42 publication for natural gas combustion. The two AHUs are each rated at 3.5 million British thermal units per hour, and the hot water heater is rated at 0.2 million British thermal units per hour. A sample calculation is provided for the NO_x emission estimation in Appendix C, Table C-3.

7.2.5 Standby Diesel Generators

NO_x emissions from the standby diesel generators were estimated using the manufacturer's emissions factors. Details of the calculation are provided in Appendix C, Table C-4.

7.3 Process Emissions Estimates

The COC from municipal wastewater treatment biofilters is the TRS compound, including H_2S, methyl mercaptans, dimethyl sulphide, and dimethyl disulphide, and odour mixture, assessed as OU. Ammonia emissions were also assessed.

7.3.1 Ammonia Emissions Estimates

Ammonia emissions were estimated for headworks, primary clarifiers, aeration tanks and biosolids facility using Jacobs's Odour Database generated based on testing from over one hundred wastewater treatment facilities. Detailed calculations are presented in Appendix C, Table C-7.

7.3.2 Onsite Sampling Program

Alliance Technical Group North, Inc. (Alliance), conducted an odour sampling program at the WWTP. The objective of this program was to assess odorous emissions including TRS and OU from various locations around the plant. Samples and measurements were collected between August 13 and August 27, 2025, and between March 31 and April 16, 2026. Duplicate samples for odour and TRS

compounds were collected at each source. Odour samples were analyzed in the evening of the day that they were collected and TRS samples were analyzed within 3-hours of collection. A summary of the sampling results is presented in Appendix C, Table C-5.

7.3.3 Emissions Equation and Calculation

The measured concentration of TRS was used to estimate the emission rate of the WWTP sources. For liquid treatment train area sources, OU concentrations were used, with engineering justification applied to secondary clarifiers.

The existing carbon units serving the headworks and the biofilter system serving the biosolids facilities were designed to meet specific performance criteria, including inlet odour concentrations, odour removal efficiencies, and outlet odour concentrations. The purpose of the on-site sampling program was to characterize uncontrolled emissions from area sources and exhaust fans, and to identify any performance issues associated with the odour control units (OCUs). The OCU sampling results collected in August 2025 and April 2026 showed significant discrepancies (i.e., 963 OU vs 61 OU for the Carbon units, and 1128 OU vs 524 OU for the biofilters). Therefore, an investigation of operating conditions during sampling, design airflow rates, and media condition is being conducted to identify any modifications required so the system is able to perform according to design. For the AQIA, typical outlet odour unit (OU) concentrations for carbon units (300 OU per cubic metre) and biofilters (350 OU per cubic metre) have been used in the assessment.

The sampled OU emissions (OU/s/m^2) for the Secondary Clarifier were considered questionable as it exhibited similar odour levels as the Primary Clarifiers. Thus, emissions from a comparable WWTP were used.

To determine the emission rate of the sources, velocity measurements were taken at the time of sampling. For sources having flow rate in the current ECA or fan design flow rates, these flow values were used in the emissions estimates. For those samples that were collected from a flux chamber, emission rates were calculated based on the flow rate of sweep gas used in the flux chamber, or for those samples from aeration tanks, the air injection rate of the tank.

Point Sources:

Equation 1: OU Emission Rate (OU per second) = OU Concentration (OU per cubic metre) x Flow Rate (cubic metre per second)

Equation 2: TRS Emission Rate (grams per second) = TRS Concentration (milligrams per cubic metre) x Flow Rate (cubic metre per second) / 1,000 (milligrams per gram)

The designed flow rates in the current ECA for APC1 (AERMOD Source ID: S1), APC2a and 2b (AERMOD Source ID: S2A & S2B), APC3 (AERMOD Source ID: S2) and wall mounted exhaust fan for Train A&B inlet building (Modelling Source: S31) were used for these sources. The fan capacity of wall mounted exhaust fans (Source ID: S2A and S2B) and the design capacity of the North Pumping Station wet well exhaust fans (S23, S24, S24 and S26) were used.

Area Sources:

Equation 3: *OU Emissions Rate (OU per second) = OU Emission Rate (OU per second per square metre) x Surface Area (square metres)*

Equation 4: TRS Emissions Rate (grams per second) =TRS Emission Rate (milligrams per second per square metre) x Surface Area (square metres) /1,000 (milligrams per gram)

Detailed calculations of OU and TRS emissions from each source are presented in Table C-6 in Appendix C.

7.4 Source Summary and Site Plan

The emission rates and source parameters for each source are documented in Table 7-2. The locations of the emission sources listed in Table 7-2 through Table 7-4 are presented in Figure 7-1. The location of each of the sources is specified with the source reference number. The location of the property line is indicated in Figure 7-2 with the end points of each section of the property-line clearly referenced to the Universal Transverse Mercator (UTM) coordinate system. The zoomed-in site plans showing the source ID are provided in Figure 7-2 to Figure 7-4. The location of each source is referenced to this UTM coordinate system under a column in Table 7-2.

Table 7-2. Combustion Sources Summary

Source Data					Stack Parameters					Emission Rate (g/s)			
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	Release Type	Release Height [m]	Gas Exit Flow Rate (m^3/s)	Gas Exit Temperature [°C]	Gas Exit Velocity [m/s]	Inside Diameter [m]	Contaminant	Time Period	Scenarios	Emission Rate (g/s)
B1	Existing Dual-Fuel Hot Water Boiler 1 (5.8 MM kj)	602552	4808297	Vertical	8.1	0.700	200	5.57	0.4	NOx	1-hr	Existing	5.86E-02
												Future	6.79E-02
											24-hr	Existing	1.78E-02
												Future	3.61E-02
										PM	24-hr	Existing	3.39E-04
												Future	6.86E-04
										SO_2	1-hr	Existing	7.74E-02
												Future	8.97E-02
											24-hr/Ann	Existing	2.36E-02
												Future	4.77E-02
B2	Existing Dual-Fuel Hot Water Boiler 2 (5.8 MM kj)	602552	4808299	Vertical	8.1	0.700	200	5.57	0.4	NOx	1-hr	Existing	5.86E-02
												Future	6.79E-02
											24-hr	Existing	1.78E-02
												Future	3.61E-02
										PM	24-hr	Existing	3.39E-04
												Future	6.86E-04
										SO_2	1-hr	Existing	7.74E-02
												Future	8.97E-02
											24-hr/Ann	Existing	2.36E-02
												Future	4.77E-02
WGB1 WGB1_F	Existing Digester Gas Flare (Faring Capacity:1453 m^3/hour)	602566	4808411	Vertical	4	0.41	875	23.201	0.15	NOx	1-hr	Existing	7.19E-02
					10							Future	1.48E-01
					4						24-hr	Existing	6.25E-02
					10							Future	1.29E-01
					4					PM	24-hr	Existing	1.56E-02
					10							Future	3.23E-02
					4					SO_2	1-hr	Existing	1.23E-01
					10							Future	2.52E-01
					4						24-hr/Ann	Existing	1.07E-01
					10							Future	2.20E-01
AHU1	Existing Biosolids Building roof AHU1	602434	4808387	Horizontal	18	0.131	200	4.17	0.2	NOx	1-hr	Existing/Future	2.16E-02

Source Data					Stack Parameters					Emission Rate (g/s)			
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	Release Type	Release Height [m]	Gas Exit Flow Rate (m^3/s)	Gas Exit Temperature [°C]	Gas Exit Velocity [m/s]	Inside Diameter [m]	Contaminant	Time Period	Scenarios	Emission Rate (g/s)
AHU2	Existing Biosolids Building roof AHU2	602445	4808378	Horizontal	18	0.131	200	4.17	0.2	NOx	1-hr	Existing/Future	2.16E-02
WH1	Existing Admin Building water heater stack	602560	4808161	Vertical	9	0.015	200	1.91	0.1	NOx	1-hr	Existing/Future	2.47E-03
EG2	Existing 1,500 kW Emergency Diesel Generator at NPS	602364	4808404	Vertical	11	5.160	403	47.99	0.37	NOx	1-hr	Existing/Future	3.06E+00
EG3	Existing 750 kW Emergency Diesel Generator in UV Building	602784	4808468	Vertical	12.7	2.650	509	37.49	0.3	NOx	1-hr	Existing/Future	1.47E+00
EG4	Existing 360 kW Diesel Emergency Generator in NPS, to be replaced by EG5	602375	4808431	Vertical	11	2.200	575.5	31.12	0.3	NOx	1-hr	Existing	7.24E-01
EG5	Future 2500 kW Emergency Diesel Generator at NPS	602346	4808421	Vertical	11	10.001	515	47.09	0.52	NOx	1-hr	Future	4.44E+00

°C = degrees Celsius
Ann = annual
g/s = grams per second
hr = hour
kW = kilowatts
m^3/hour = cubic metres per hour
m^3/s = cubic metres per second
MM kj = million kilojoules
NOx = nitrogen oxide
NPS = North Pumping Station
PM = particulate matter
SO_2 = sulphur dioxide
UV = ultraviolet

Table 7-3. Point Process Sources Summary

Source Data					Stack Parameters					Emission Rate		
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	Release Type	Release Height [m]	Gas Exit Flow Rate (m^3/s)	Gas Exit Temperature [°C]	Gas Exit Velocity [m/s]	Inside Diameter [m]	TRS (H_2S) (g/s)	OU [OU/s]	NH_3 (g/s)
S1	Existing (APC1) Train A&B Headworks Activated Carbon System Exhaust	602646	4808342	Horizontal	6.05	3.08	20	3.1	1.13	5.22E-04	921	1.07E-03
S2A	Existing (APC3) Train C Headworks Activated Carbon System Exhaust	602623	4808409	Horizontal	3	2.90	20	2.0	1.35	4.09E-04	876	1.02E-03
S2B	Existing Train C Headworks West Elevation Building Exhaust	602626	4808402	Horizontal	6.5	2.48	20	2.3	1.18	4.22E-04	553	1.73E-04
S2C	Existing Train C Headworks South Elevation Building Exhaust	602650	4808418	Horizontal	6.5	0.90	20	1.1	1	1.08E-04	200	6.24E-05
S5	Existing (APC2a) Biosolids Building Biofilter System	602426	4808393	Vertical	4.5	1.65	40	13.1	0.4	2.15E-04	578	1.53E-03
S6	Existing (APC2b) Biosolids Building Biofilter System	602422	4808397	Vertical	4.5	1.65	40	13.1	0.4	1.65E-04	578	1.53E-03
S23	Existing North PS Wet Well 1 Exhaust Fan	602381	4808451	Vertical	5	6.70	20	34.1	0.5	6.29E-03	2022	-
S24	Existing North PS Wet Well 2 Exhaust Fan	602372	4808435	Vertical	5				0.5			-
S25	Existing North PS Wet Well 3 Exhaust Fan	602369	4808434	Vertical	5	1.44	20	7.4	0.5	1.36E-03	779	-

Source Data					Stack Parameters					Emission Rate		
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	Release Type	Release Height [m]	Gas Exit Flow Rate (m^3/s)	Gas Exit Temperature [°C]	Gas Exit Velocity [m/s]	Inside Diameter [m]	TRS (H_2S) (g/s)	OU [OU/s]	NH_3 (g/s)
S26	Existing North PS Wet Well 4 Exhaust Fan	602358	4808420	Vertical	5	1.44	20	7.4	0.5	1.36E-03	779	-
S31	Existing Train A&B Headworks Exhaust	602620	4808330	Horizontal	6	0.72	20	0.5	1.354	1.04E-04	161	5.01E-05

°C = degrees Celsius
ID = identification
m = metres
m/s = metres per second
m^3/s = cubic metres per second
NH_3 = ammonia
OU/s = odour units per second
PS = pump station

Table 7-4. Area Process Sources Summary

Source Data				Stack Parameters				Emission Rate				
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	X Side Length [m]	Y Side Length [m]	Angle from North [deg]	Initial Vertical Dimension [m]	TRS/H_2S [g/s/m^2]	OU [OU/s/m^2]	TRS/H_2S (g/s)	OU (OU/s)	NH_3 (g/s)
7A1	Existing Trains A&B Primary Tank 1 Scum Trough	602626	4808276	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7A2	Existing Trains A&B Primary Tank 1 Scum Trough	602628	4808279	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7A3	Existing Trains A&B Primary Tank 1 Scum Trough	602631	4808282	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7B1	Existing Trains A&B Primary Tanks 2 Scum Troughs	602619	4808266	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7B2	Existing Trains A&B Primary Tanks 2 Scum Troughs	602621	4808269	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7B3	Existing Trains A&B Primary Tanks 2 Scum Troughs	602623	4808272	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7C1	Existing Trains A&B Primary Tank 3 Scum Trough	602641	4808295	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7C2	Existing Trains A&B Primary Tank 3 Scum Trough	602643	4808298	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7C3	Existing Trains A&B Primary Tank 3 Scum Trough	602645	4808301	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7D1	Existing Trains A&B Primary Tank 4 Scum Troughs	602633	4808285	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7D2	Existing Trains A&B Primary Tank 4 Scum Troughs	602635	4808288	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
7D3	Existing Trains A&B Primary Tank 4 Scum Troughs	602638	4808291	3.65	0.4	-52.5	0	4.90E-06	15.22	7.15E-06	22	1.33E-06
8A	Existing Train A&B Primary Clarifier No1 Liquid Surface	602626	4808276	11	24.6	-52.5	0	4.40E-07	0.77	1.19E-04	208	2.47E-04
8B	Existing Train A&B Primary Clarifier No2_Liquid Surface	602618	4808267	11	24.6	-52.5	0	4.40E-07	0.77	1.19E-04	208	2.47E-04
8C	Existing Train A&B Primary Clarifier No3 Liquid Surface	602640	4808296	11	24.6	-52.5	0	4.40E-07	0.77	1.19E-04	208	2.47E-04
8D	Existing Train A&B Primary Clarifier No4 Liquid Surface	602633	4808286	11	24.6	-52.5	0	4.40E-07	0.77	1.19E-04	208	2.47E-04
S10	Existing Aeration Tanks 1-4 Liquid Surface	602585	4808215	54.7	13.57	-52.5	0	5.50E-07	1.50	4.08E-04	1113	2.02E-04
S11&S12	Existing Aeration Tanks 5-6 Liquid Surface	602569	4808227	55.1	13.57	-52.5	0	2.10E-07	0.55	1.57E-04	411	2.04E-04
S14	Existing Aeration Tank 9 Liquid Surface	602551	4808239	45.9	12.14	-52.5	0	3.80E-07	1.35	2.12E-04	753	1.52E-04
S15	Existing Aeration Tank 10 Liquid Surface	602538	4808249	45.9	12.14	-52.5	0	3.80E-07	1.96	2.12E-04	1093	1.52E-04
S16A	Existing Secondary Clarifiers 1,3,5,7 Liquid Surface	602664	4808233	62.3	36.18	-52.5	0	1.20E-07	0.17	2.70E-04	383	-

Source Data				Stack Parameters				Emission Rate				
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	X Side Length [m]	Y Side Length [m]	Angle from North [deg]	Initial Vertical Dimension [m]	TRS/H_2S [g/s/m^2]	OU [OU/s/m^2]	TRS/H_2S (g/s)	OU (OU/s)	NH_3 (g/s)
S16B	Existing Secondary Clarifiers 4,5,6,8 Liquid Surface	602704	4808202	64.0	38.91	-52.5	0	1.20E-07	0.17	2.99E-04	423	-
17A1	Existing Train C Primary Tank 5 Scum Troughs	602661	4808354	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17A2	Existing Train C Primary Tank 5 Scum Troughs	602663	4808357	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17A3	Existing Train C Primary Tank 5 Scum Troughs	602665	4808360	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17A4	Existing Train C Primary Tank 5 Scum Troughs	602667	4808363	3.8	0.4	-52.5	0	7.50E-06	14.20	1.14E-05	22	1.39E-06
17A5	Existing Train C Primary Tank 5 Scum Troughs	602670	4808366	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17A6	Existing Train C Primary Tank 5 Scum Troughs	602672	4808369	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B1	Existing Train C Primary Tank 6 Scum Troughs	602675	4808373	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B2	Existing Train C Primary Tank 6 Scum Troughs	602677	4808376	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B3	Existing Train C Primary Tank 6 Scum Troughs	602680	4808379	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B4	Existing Train C Primary Tank 6 Scum Troughs	602682	4808382	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B5	Existing Train C Primary Tank 6 Scum Troughs	602684	4808385	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
17B6	Existing Train C Primary Tank 6 Scum Troughs	602686	4808388	3.6	0.4	-52.5	0	7.50E-06	14.20	1.08E-05	20	1.32E-06
18A	Existing Train C Primary Tank 5 Liquid Surface	602660	4808355	22	20.4	-52.5	0	6.50E-07	1.12	2.92E-04	503	4.10E-04
18B	Existing Train C Primary Tank 6 Liquid Surface	602675	4808373	22	20.4	-52.5	0	6.50E-07	1.12	2.92E-04	503	4.10E-04
S19	Existing Train C Primary Tanks Effluent Weirs	602667	4808349	46	7	-52.5	0	2.60E-06	1.31	8.37E-04	422	2.94E-04
S20&S21	Existing Train C aeration tanks 11-12 liquid Surface	602705	4808310	63.4	47.9	-52.5	0	1.80E-07	1.04	5.46E-04	3154	8.28E-04
S22	Existing Secondary Clarifiers 9-12 Liquid Surface	602755	4808272	63.9	52.2	-52.5	0	1.20E-07	0.17	4.01E-04	567	-
S27	Existing Trains A&B Scum Pit	602600	4808289	1.2	0.6	-52.5	0	5.30E-08	0.98	3.82E-08	1	-
S28	Existing Train C Scum Pit	602652	4808390	2.5	1.5	-51.5	0	5.70E-08	1.03	2.14E-07	4	-
S29_1	Existing Train C Still 1	602633	4808377	5.8	3.75	-51.5	0	2.40E-06	1.54	5.22E-05	33	-
S29_2	Existing Train C Still 2	602628	4808372	5.8	3.75	-51.5	0	2.40E-06	1.54	5.22E-05	33	-
S30	Existing Train C Side Stream	602637	4808382	4.5	3.6	-51.5	0	2.90E-07	0.77	4.70E-06	12	-
D_PRIM1	New Train D Primary Clarifier No1_Liquid Surface	602696	4808459	11	35.4	-142.2	0	6.50E-07	1.12	2.53E-04	436	3.56E-04
D_PRIM2	New Train D Primary Clarifier No2_Liquid Surface	602706	4808451	11	35.4	-142.2	0	6.50E-07	1.12	2.53E-04	436	3.56E-04
D_PRIM3	New Train D Primary Clarifier No3_Liquid Surface	602716	4808443	11	35.4	-142.2	0	6.50E-07	1.12	2.53E-04	436	3.56E-04
D_PRIM4	Mew Train D Primary Clarifier No4_Liquid Surface	602726	4808435	11	35.4	-142.2	0	6.50E-07	1.12	2.53E-04	436	3.56E-04
D_SCUM1A	New Train D Primary Tank 1 Scum Troughs	602690	4808463	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM1B	New Train D Primary Tank 1 Scum Troughs	602693	4808461	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM1C	New Train D Primary Tank 1 Scum Troughs	602696	4808459	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM2A	New Train D Primary Tank 2 Scum Troughs	602700	4808455	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM2B	New Train D Primary Tank 2 Scum Troughs	602703	4808453	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM2C	New Train D Primary Tank 2 Scum Troughs	602706	4808451	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06

Source Data				Stack Parameters				Emission Rate				
Source ID	Description	X Coordinates [m]	Y Coordinates [m]	X Side Length [m]	Y Side Length [m]	Angle from North [deg]	Initial Vertical Dimension [m]	TRS/H_2S [g/s/m^2]	OU [OU/s/m^2]	TRS/H_2S (g/s)	OU (OU/s)	NH_3 (g/s)
D_SCUM3A	New Train D Primary Tank 3 Scum Troughs	602711	4808447	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM3B	New Train D Primary Tank 3 Scum Troughs	602713	4808445	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM3C	New Train D Primary Tank 3 Scum Troughs	602716	4808443	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM4A	New Train D Primary Tank 4 Scum Troughs	602721	4808439	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM4B	New Train D Primary Tank 4 Scum Troughs	602724	4808437	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_SCUM4C	New Train D Primary Tank 4 Scum Troughs	602727	4808435	3.65	0.4	-142.2	0	7.50E-06	14.20	1.10E-05	21	1.33E-06
D_P_EFL1	New Train D Primary Tanks Effluent weir 1	602705	4808407	50	3.8	-142.2	0	2.60E-06	1.310	4.94E-04	249	1.74E-04
D_P_EFL2	New Train D Primary Tanks Effluent weir 2	602729	4808438	50	3.8	-142.2	0	2.60E-06	1.31	4.94E-04	249	1.74E-04
D_AER_1	New Train D aeration tank 1 liquid surface	602746	4808375	31.5	48.4	-52.2	0	1.80E-07	1.04	2.74E-04	1586	4.16E-04
D_AER_2	New Train D aeration tank 2 liquid surface	602766	4808402	31.5	48.4	-52.2	0	1.80E-07	1.04	2.74E-04	1586	4.16E-04
D_SEC_13	New Train D Secondary Clarifier 13 Liquid Surface	602799	4808334	14.5	56	-52.2	0	1.20E-07	0.17	9.74E-05	138	-
D_SEC_14	New Train D Secondary Clarifier 14 Liquid Surface	602809	4808347	14.5	56	-52.2	0	1.20E-07	0.17	9.74E-05	138	-
D_SEC_15	New Train D Secondary Clarifier 15 Liquid Surface	602820	4808361	14.5	56	-52.2	0	1.20E-07	0.17	9.74E-05	138	-
D_SEC_16	New Train D Secondary Clarifier 16 Liquid Surface	602830	4808374	14.5	56	-52.2	0	1.20E-07	0.17	9.74E-05	138	-

deg = degrees
g/s = grams per second
g/s/m^2 = grams per second per square metre
H_2S = hydrogen sulphide
m = metres
NH_3 = ammonia
OU/s = odour units per second
OU/s/m^2 = odour units per second per square metre
TRS = total reduced sulphur

Figure 7-1. Site Plan - Mid Halton Wastewater Treatment Plant

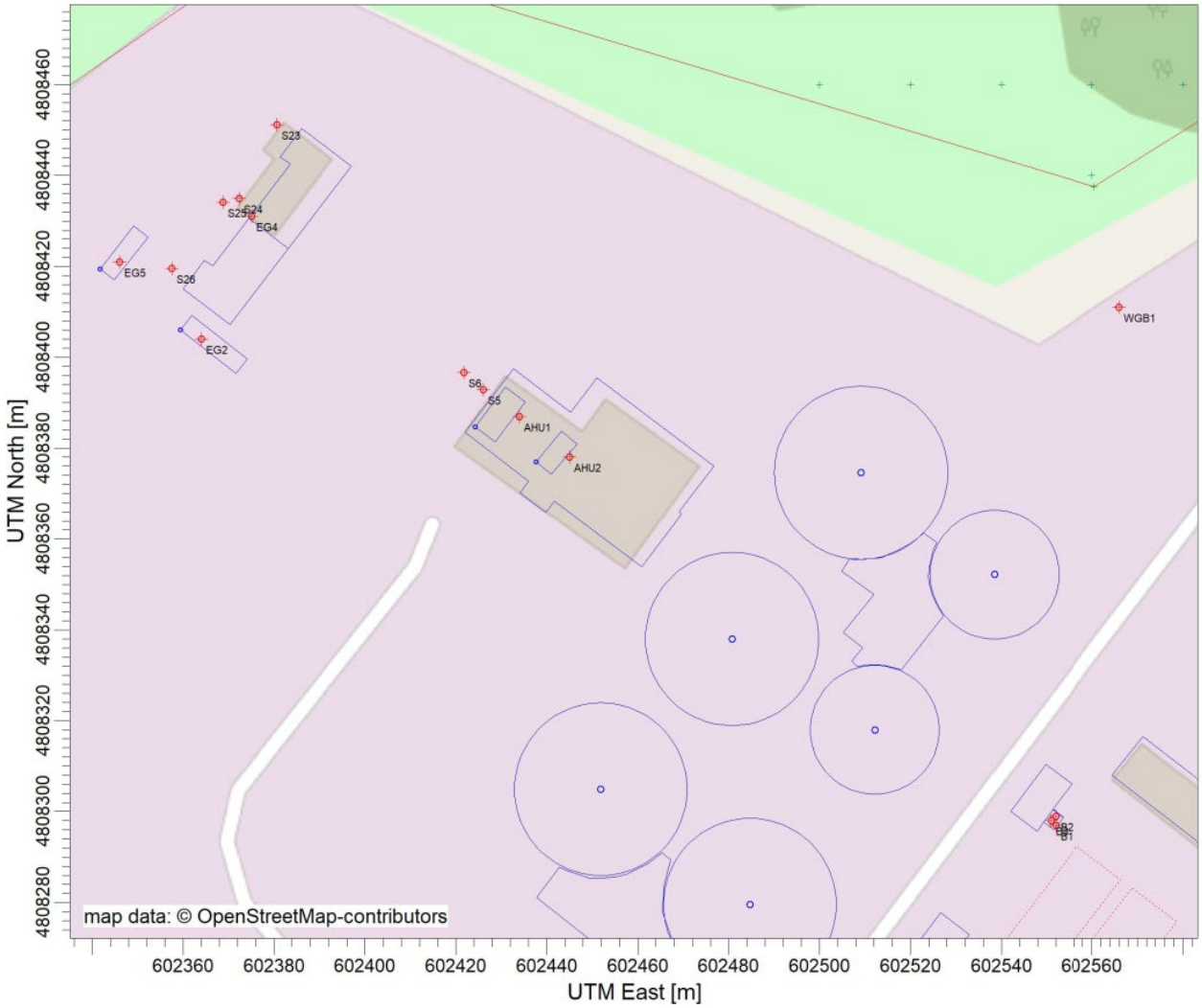

Figure 7-2. Zoomed-in Site Plan (Part 1) - Mid Halton Wastewater Treatment Plant

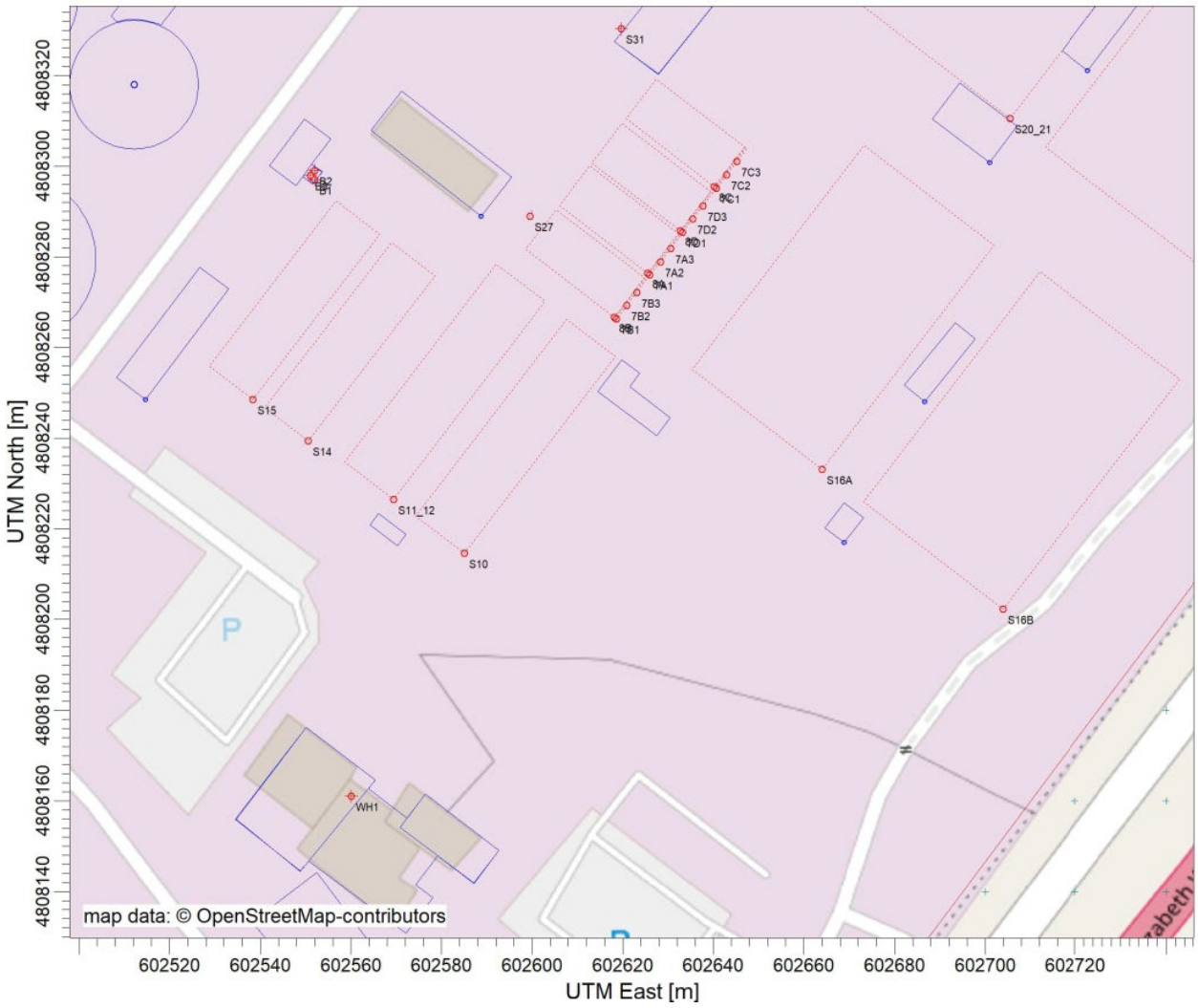

Figure 7-3. Zoomed-in Site Plan (Part 2) - Mid Halton Wastewater Treatment Plant

Figure 7-4. Zoomed-in Site Plan (Part 3) - Mid Halton Wastewater Treatment Plant

8. Dispersion Modelling

Dispersion modelling was completed in accordance with the following MECP documents:

- *Air Dispersion Modelling Guideline for Ontario, Version 3.0*, dated February 2017 (ADMGO)
- Technical Bulletin "Methodology for Modelling Assessments of Contaminants with 10-minute average standards and guidelines for odour under O. Reg. 419/05" (Technical Bulletin_10-min), dated September 2016
- Technical Bulletin "Modelling Open Flares under O. Reg. 419/05" (Technical Bulletin-Flare), dated April 18, 2017.

A general description of the input data used in the dispersion model is provided in the following subsections. The modelling was performed according to O. Reg. 419/05 requirements using the AERMOD model, version 24142. Site-specific meteorological data processed using AERMET version 24142 provided by the MECP were used.

8.1 Modelled Scenarios

Dispersion modelling was completed to estimate the existing (baseline) impacts, impacts from the proposed Project and the overall post Project impacts. This was done to determine the Project's contribution to the plant's overall impacts and whether the cumulative overall impacts will comply with the MECP ACB List criteria during normal operation.

The following operation scenarios were modelled:

- **Scenario 1:** Existing (baseline) emissions in normal operation.
- **Scenario 2:** Project Only (Train D expansion only) emissions in normal operation.
- **Scenario 3:** Cumulative facility-wide emissions in normal operation.

The MECP also set out a screening level of 1,880 micrograms per hour (half-hour) for NO_x for emergency generator testing only. Therefore, NO_x modelling was also conducted for emergency generator maintenance testing only under each of the three listed scenarios to compare against the MECP screening level.

8.2 Open Flare Modelling

In accordance with the MECP Technical Bulletin – Flare, the open flare (modelling source ID: WGB1 (baseline) and WGB1_F (cumulative)) was modelled as a point source with pseudo-stack parameters.

8.3 Meteorological Data

In accordance with the Technical Bulletin, contaminants with 10-minute odour-based POI limit need to be assessed using site-specific meteorological data. The Region requested Site-specific AERMOD-ready meteorological data set from the MECP in October 2025. The MECP provided the five-year (2020 – 2024) AERMOD-ready meteorological data processed using AERMET version 24142. The MECP approval letter is included in Appendix D.

8.4 Coordinate System

The UTM coordinate system was used to specify model object sources, buildings, and receptors. All coordinates were defined in the North American Datum of 1983.

8.5 Terrain

Terrain data used in this assessment were obtained from the Canadian Digital Elevation Model with horizontal accuracy between 1 and 5 metres and vertical accuracy between 1 and 34 metres. Terrain file (GeoTIFF) used in this assessment were as follows:

cdem_dem_030M.tif

Terrain elevation in the modelling domain is shown on Figure 8-1.

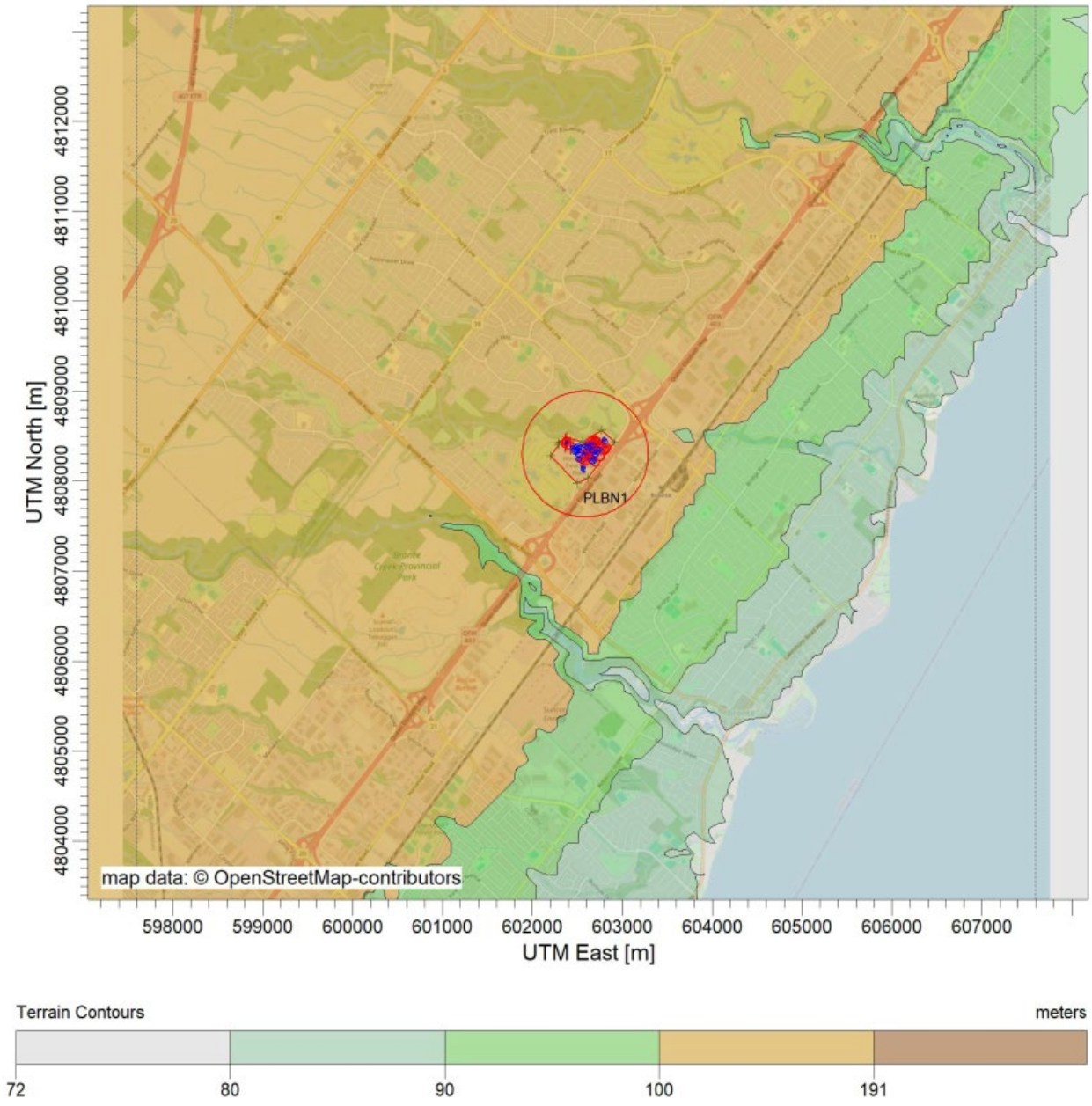

Figure 8-1. Terrain Elevation in Modelling Domain

8.6 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s. 14 of O. Reg. 419/05. Specifically, a nested receptor grid was placed as follows:

a. 20-metre spacing, within an area of 800 metres by 800 metres with centroid of the source polygon;

b. 50-metre spacing, within an area surrounding the area described in (a) with a boundary at 300 metres by 300 metres outside the boundary of the area described in (a);

c. 100-metre spacing, within an area surrounding the area described in (b) with a boundary at 500 metres by 500 metres outside the boundary of the area described in (a);

d. 250-metre spacing, within an area surrounding the area described in (c) with a boundary at 1,500 metres by 1,500 metres outside the boundary of the area described in (a); and,

e. 500-metre spacing, within an area surrounding the area described in (d) with a boundary at 2,300 metres by 2,300 metres outside the boundary of the area described in (a).

In addition to using the nested receptor grid, receptors were also placed every 10 metres along the property line. There are no childcare or educational facilities located in the buildings at the WWTP. As such, same structure contamination was not considered. The modelling receptor grid is shown in Figure 8-2.

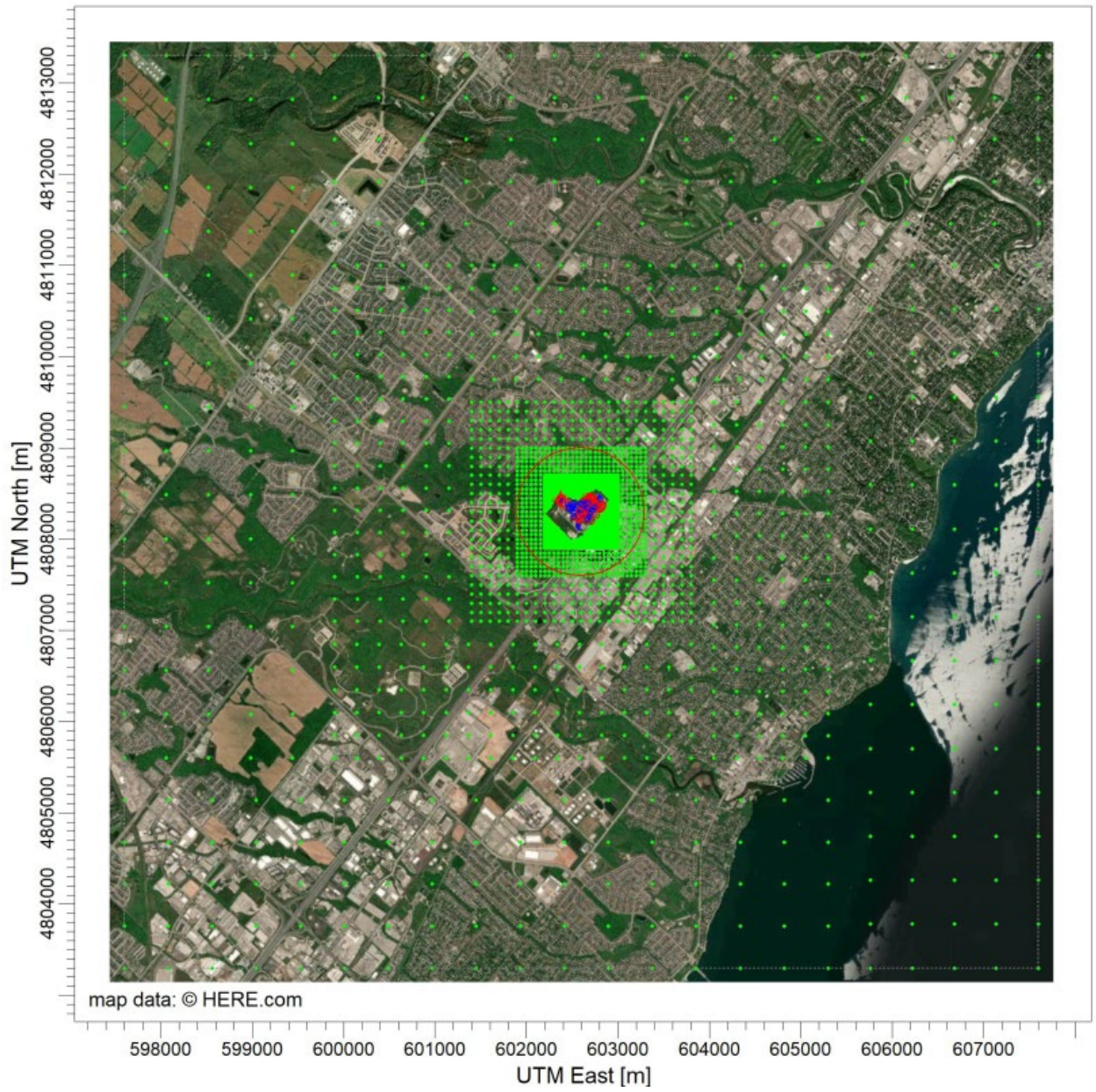

Figure 8-2. Receptor Grid in Modelling Domain

8.7 Sensitive Receptors

In accordance with the Technical Bulletin, contaminants with odour-based 10-minute MECP POI limits are assessed at locations where human activities regularly occur. In this study, a total of 22 odour sensitive receptors were identified, including 20 residential dwellings to the north and west, a private daytime language school to the east and the Halton Centre for Child Care to the southwest of WWTP. Figure 8-3 shows the location of the sensitive receptors.

Figure 8-3. Location of Sensitive Receptors

8.8 Building Downwash

Building wake effects were considered in this assessment using the USEPA's Building Profile Input Program (BPIP), another pre-processor to AERMOD. The inputs into this pre-processor include the coordinates and heights of the buildings and stacks.

The output data from BPIP were used in the AERMOD building wake effect calculations. The PRIME plume rise algorithms include vertical wind shear calculations (important for buoyant releases from short stacks [i.e., stacks at release heights within the recirculation zones of buildings]). The PRIME algorithm also allows for the wind speed deficit induced by the building to change with respect to the distance from the building. These factors improve the accuracy of predicted concentrations within building wake zones that form in the lee of buildings. Figure 8-4 shows the WWTP's BPIP plan.

Figure 8-4. Air Dispersion Modelling BPIP Plan

8.9 Deposition

The deposition algorithm was not used for a conservative estimate of POI concentrations.

8.10 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hour average. The MECP standards and guidelines listed in the ACB List apply to this Facility; many of these standards are based on 1-hour, 24 hour and annual averaging times, which are averaging times that are directly provided by AERMOD. In cases where a standard has an averaging period that the AERMOD does not include, a conversion to the appropriate averaging period was completed using the common conversion factors listed in Table 8-1. This is documented in the ADMGO, Section 4.4.

Table 8-1. Time Period Conversion Factor listed in ADMGO

Convert From	Convert To	Multiply By
1-hour	10-minute	1.65
1-hour	half-hour	1.2

The 10-minute TRS and OU modelling were conducted by applying a scaling factor of 1.65 to 1-hour emissions of each source and therefore the predicted 1-hour POI concentrations were effectively 10-minute average concentrations.

8.11 Dispersion Modelling Options

The options used in the AERMOD dispersion model are summarized in Table 8-2.

Table 8-2. AERMOD Dispersion Model Summary

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Horizontal discharge was used.	No
CONC	Specifies that concentration values will be calculated.	Yes
DDPLETE	Specifies that dry deposition will be calculated.	No
WDPLETE	Specifies that wet deposition will be calculated.	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used.	No, the model used elevated terrain data files as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack tip downwash will be used.	No
AVERTIME	Time averaging periods calculated.	1-hour, 24-hour, annual
URBANOPT	Allows the model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions.	No
URBANROUGHNESS	Specifies the urban roughness length (m).	No
FLAGPOLE	Specifies that receptor height above local ground level is allowed on the receptors.	No

8.12 Elimination of Meteorological Anomalies

Section 6.6 of the ADMGO Document provides guidance on elimination of meteorological anomalies. In accordance with this guidance, the 8 hours with the highest 1-hour average predicted concentrations in each single meteorological year may be discarded. The highest 24-hour average predicted concentration in each single meteorological year may be discarded.

For this study, elimination of meteorological anomalies was applied to get the highest POI concentrations in grid receptors for compliance assessment.

8.13 Dispersion Modelling Input and Output Files

The source parameters and emission rates that were input into AERMOD are summarized in Table 7-2 in Section 7.4.

The following modelling runs were conducted, and the modelling input/output files are available for review.

- **List of Run Names:**
  - NOx_1H_AQAI_new: Modelling run for 1-hour average NO_x
  - NOx_24Hr_AQAI_new: Modelling run for 24-hour average NO_x
  - SO2_1Hr_AQIA_new: Modelling run for 1-hour average SO_2
  - SO2_ANN_AQAI_new: Modelling run for annual average SO_2
  - PM_24Hr_AQIA_new: Modelling run for 24-hour average PM
  - NH3_24Hr: Modelling for 24-hour average ammonia
  - TRS_10min_AQIA: Modelling run for 10-minute average TRS
  - TRS_24Hr_AQIA: Modelling run for 24-hour average TRS
  - OU_10min_AQIA: Modelling run for 10-minute average OU
  - OU_2125Sout_AQIA: Modelling run for 10-minute OU frequency analysis at 2125 South Service Rd W
  - OU_2158B: Modelling run for 10-minute OU frequency analysis at 2158 Brays Ln
- **Modelling Files:**
  - Meteorological Data: MECP Site-Specific 5 years (2020 - 2024) meteorological data:
    - TheRegionalMunicipaliyOfHalton_MidHaltonWastewaterTreatmentPlant_Oakville_24142.sfc
    - TheRegionalMunicipaliyOfHalton_MidHaltonWastewaterTreatmentPlant_Oakville _24142.pfl
  - Terrain Data: Canadian Digital Elevation Model Terrain file (GeoTIFF): - cdem_dem_030M.tif
  - AERMAP output files: RunName.ROU and RunName.SOU
  - BPIP Input files: RunName.BPI
  - BPIP Output files: RunName.PRO (Primary); RunName.SUP (Summary)
  - AERMOD Input files: RunName.ADI
  - AERMOD Output files: RunNam.ADO
  - AERMOD Output summary files: RunName.SUM

Electronic AERMOD files are provided in Appendix E.

9. Dispersion Modelling Results

This section provides the results of the dispersion modelling. It contains emission summary tables and describes how analysts assessed combustion contaminants, ammonia, reduced sulphur compounds, and odours.

9.1 Emission Summary Tables

A POI concentration for each significant contaminant emitted from the Facility was calculated based on the emission rates listed in Table 7-2, 5-year site-specific meteorological data and the output from the dispersion model. The results are presented in emission summary Table 9-1, Table 9-2, and Table 9-3 for Scenarios 1 – Baseline (Existing), Scenario 2 – Project Only and Scenario 3 - Cumulative facility-wide sources, respectively. The POI concentrations in these tables were compared against the applicable MECP POI limits and screening level of NO_x for emergency generator testing.

Table 9-1. Emission Summary Table – Baseline

Contaminant		Facility Emissions (g/s)	Max. POI Concentra. (µg/m^3)	Averaging Period (hours)	MOE POI Limit (µg/m^3)	Limiting Effect	Category	% of POI Limit (%)	Note
Name	CAS Number								
NO_x	10102-44-0	0.235	33.98	1	400	Health	B1	8.5%	None
		0.162	10.76	24	200	Health	B1	5.4%	None
		5.253	279.1	1/2	1,880	NA	Screening	14.8%	EG2, EG3, and EG4 assumed tested simultaneously.
TSP	NA	0.017	2.48	24	120	Health	B1	2.1%	None
SO_2	7446-09-5	0.355	55.60	1	100	Health	B1	55.6%	None
		0.177	3.07	Annual	10	Health	B1	30.7%	None
NH_3	7664-41-7	9.11E-3	1.42	24	100	Health	B1	1.4%	None
TRS	NA	1.57E-02	7.06	10-min	13	Odour	B1	54.3%	Highest at 2240 Brays Ln
			3.89	24	7	Health	B1	55.6%	None

µg/m^3 = micrograms per cubic metre
CAS = Chemical Abstract Service
g/s = grams per second
NA = not available
NH_3 = ammonia
NO_x = nitrogen oxide
POI = point of impingement
SO_2 = sulphur dioxide
TRS = total reduced sulphur
TSP = total suspended particulate

Table 9-2. Emission Summary Table – Project Only

Contaminant		Facility Emissions (g/s)	Max. POI Concentra. (µg/m³)	Averaging Period (hours)	MOE POI Limit (µg/m³)	Limiting Effect	Category	% of POI Limit (%)	Note
Name	CAS Number								
NO_x	10102-44-0	N/A	N/A	1	400	Health	B1	N/A	None
		N/A	N/A	24	200	Health	B1	N/A	None
		4.44	342	1/2	1,880	NA	Screening	18.2%	EG5 Testing
PM	NA	N/A	N/A	24	120	Health	B1	N/A	None
SO_2	7446-09-5	N/A	N/A	1	100	Health	B1	N/A	None
		N/A	N/A	Annual	10	Health	B1	N/A	None
NH_3	7664-41-7	2.62E-3	1.21	24	100	Health	B1	1.2%	None
TRS	NA	3.07E-03	3.43	10-min	13	Odour	B1	26.4%	Highest, at 2125 South Service Rd W
		N/A	1.43	24	7	Health	B1	20.4%	None

µg/m³ = micrograms per cubic metre
CAS = Chemical Abstract Service
g/s = grams per second
NA = not available
N/A = not applicable
PM = particulate matter
POI = point of impingement
SO_2 = sulphur dioxide
TRS = total reduced sulphur

Table 9-3. Emission Summary Table – Cumulative

Contaminant		Facility Emissions (g/s)	Max. POI Concentra. (µg/m^3)	Averaging Period (hours)	MOE POI Limit (µg/m^3)	Limiting Effect	Category	% of POI Limit (%)	Note
Name	CAS Number								
NO_x	10102-44-0	0.329	55.25	1	400	Health	B1	13.8%	Combustion excluding EGs
		0.247	23.10	24	200	Health	B1	11.5%	Combustion excluding EGs
		8.97	478.8	0.5	1880	NA	Screening	25.5%	EG2, EG3, and EG5 assumed tested simultaneously.
PM	NA	0.034	4.99	24	120	Health	B1	4.2%	WGB1 Height: 10 m
SO_2	7446-09-5	0.521	90.82	1	100	Health	B1	90.8%	WGB1 Height: 10 m
		0.363	5.24	Annual	10	Health	B1	52.4%	WGB1 Height: 10 m
NH_3	7664-41-7	1.77E-2	2.01	24	100	Health	B1	2.0%	None
TRS	NA	1.88E-02	7.06	10-min	13	Odour	B1	54.3%	Highest at 2240 Brays Ln
		NA	3.94	24	7	Health	B1	56.3%	None

µg/m^3 = micrograms per cubic metre
CAS = Chemical Abstract Service
g/s = grams per second
m = metres
NH_3 = ammonia
PM = particulate matter
POI = point of impingement
SO_2 = sulphur dioxide
TRS = total reduced sulphur
WGB = waste gas burner

9.2 Assessment of Combustion Contaminants

The baseline modeling results (Table 9-1) indicate compliance with the applicable MECP POI limit for all identified combustion contaminants in all time periods. This includes NO_x (1-hour and 24-hour), PM (24-hour), and SO_2 (1-hour and annual). The cumulative modelling results (Table 9-3) based on future biogas projection show compliance with all identified combustion contaminants in all time periods except for 1-hour SO_2, which would be 160 percent of the MECP POI limit. The exceedance was primarily caused by the existing waste gas burner (WGB1) as it has a short stack (4 metres above grade) and is located close to the property line. An additional modelling run shows compliance with the 1-hour SO_2 standard when the WGB1 stack is increased from 4 metres to 6.5 metres above grade. However, the Region is planning to replace the existing biogas flare as it is 34 years old. The actual location and stack height of the new flare will be designed to meet air compliance requirements and would be at least 6.5 metres above grade.

9.2.1 Assessment of Sulphur Dioxide with Annual Standard

In addition to comparing the annual POI with the annual standards, assessment of modelling results against the AAV and DAV were also conducted following the MECP Technical Bulletin. The maximum 1-hour emissions were used to represent the maximum 24-hour emission rate in the modelling. Table 9-4 presents the assessment summary, which illustrates that the modelled SO_2 AAV and DAV concentrations were less than the related AAV and DAV values.

Table 9-4. Annual SO_2 Assessment Summary

Contaminant	Scenarios	Predicted Annual POI (µg/m³)	Annual Standard (µg/m³)	Predicted AAV (µg/m³)	AAV (µg/m³)	Predicted DAV (µg/m³)	DAV (µg/m³)
SO_2	Baseline	3.07	10.00	4.06	50	29.28	500
	Cumulative	5.24	10.00	5.35	50	45.39	500

µg/m³ = micrograms per cubic metre
AAV = Annual Assessment Value
DAV = Daily Assessment Value
POI = point of impingement

9.2.2 Assessment Including Ambient Background

Ambient air background concentrations were discussed in Section 5 and presented in Table 5-2 based on the available data from available monitoring stations. In this assessment, the total PM emissions from biogas combustion are also considered as $PM_{2.5}$ emissions (per AP-42 Table 1.4-2, Note c), and an overall cumulative concentration including the ambient background is presented in Table 9-5. The overall conservative cumulative concentration (28 micrograms per cubic metre) of $PM_{2.5}$ slightly exceeds the Air Quality Objective Criteria (AQOC) (27 micrograms per cubic metre) if the WGB1 stack is increased to 10 metres. Note that the ambient background is 84 percent of the AAQC for $PM_{2.5}$. The conservative cumulative 1-hour SO_2 also exceeded the AQOC with the WGB1 stack height of 10 metres. As the Region is considering upgrading the flare (currently not included in the expansion project scope), actual location and stack height will be determined and reported in the ECA application to ensure the plant's compliance with applicable air standards.

Table 9-5. Overall Concentration with Background

Contaminant		Time (hours)	Max. POI Concentration (µg/m³)			POI Increase Ratio	Ambient Background	Overall Concentrations (µg/m³)		AQOC
Name	CAS Number		Baseline	Cumulative	Increment			Background + Increment	Background + Cumulative	(µg/m³)
NO_x	10102-44-0	1	33.98	55.25	21.28	63%	77	98	132	400
		24	10.76	23.10	12.34	115%	55	67	78	200
$PM_{2.5}$ [a]	NA	24	2.48	4.99	2.51	101%	22.7	25	28	27
SO_2 [a]	7446-09-5	1	55.60	90.82	35.22	63%	21.1	56	112	100
		annual	3.07	5.24	2.17	71%	1.6	4	7	10

[a] $PM_{2.5}$ and SO_2 were based on WGB1 height of 10 metres in future.

µg/m³ = micrograms per cubic metre
AQOC = Air Quality Objective Criteria
CAS = Chemical Abstract Service
POI = point of impingement

9.2.3 Assessment of Emissions from Emergency Diesel Generators

Emissions from emergency generators are not included in the site-wide assessment. Instead, a separate assessment of nitrogen oxides was completed based on the MECP publication "Emergency Generator Checklist Supplement to Application for Approval, EPA s.9, August 26, 2008 (PIBs 4131e)" (EPG Checklist). In regular practice, the routine emergency generator maintenance testing is conducted on one unit per time. For the modelling purpose, the maximum predicted concentrations of emergency generators, assuming all emergency generators are running simultaneously for each scenario. The modelled half-hour NO_x concentrations shown in Table 9-1 to Table 9-3 for all scenarios are less than the MECP half-hour average screening level of 1,880 micrograms per cubic metre for NO_x.

9.3 Assessment of Ammonia

As shown in Table 9 1 and Table 9 3, the highest off-site 24-hour NH_3 POI concentrations account for 1.4 percent and 2.0 percent of the 24-hour NH_3 POI limit of 100 micrograms per cubic metre for baseline and cumulative scenarios, respectively. The new Project sources' impacts only account for 1.2 percent of the MECP POI imit.

9.4 Assessment of Reduced Sulphur Compounds

In accordance with the MECP Technical Bulletin for modelling the contaminants with 10-minute odour-based POI limits, the concentrations at sensitive receptors are assessed against the 10-minute MECP POI limits.

9.4.1 Assessment of 24-Hour TRS and H_2S

In municipal wastewater treatment plants, TRS are the major compounds of species that cause odours. In this study, H_2S is assumed to be the same as the sampled TRS.

The highest offsite 24-hour TRS POI concentrations account for 55.6 percent and 56.3 percent of the 24-hour TRS POI limit of 7 micrograms per cubic metre for Baseline and Cumulative scenarios, respectively. This is shown in Table 9-1 and Table 9-3. The new Project sources' impacts only account for 20.4 percent of the MECP POI limit.

9.4.2 Assessment of10-minute TRS and H_2S

Table 9-1 to Table 9-3 also include the highest 10-minute TRS POI concentrations at sensitive receptors for each scenario. The modelled results account for 54.3 percent of the 10-minute TRS POI limit of 13 micrograms per cubic metre for baseline and cumulative scenario. Predicted impacts from the Project sources only account for 18.8 percent of the MECP POI limit.

The modelling predicted maximum 10-minute TRS concentration isopleth in the modelling domain are illustrated in Figure 9-1, Figure 9-2 and Figure 9-3 for the three scenarios modelled. Locations of sensitive receptors are also shown in the figures. The complete summary of 10-minute TRS concentration at sensitive receptors is provided in Appendix F.

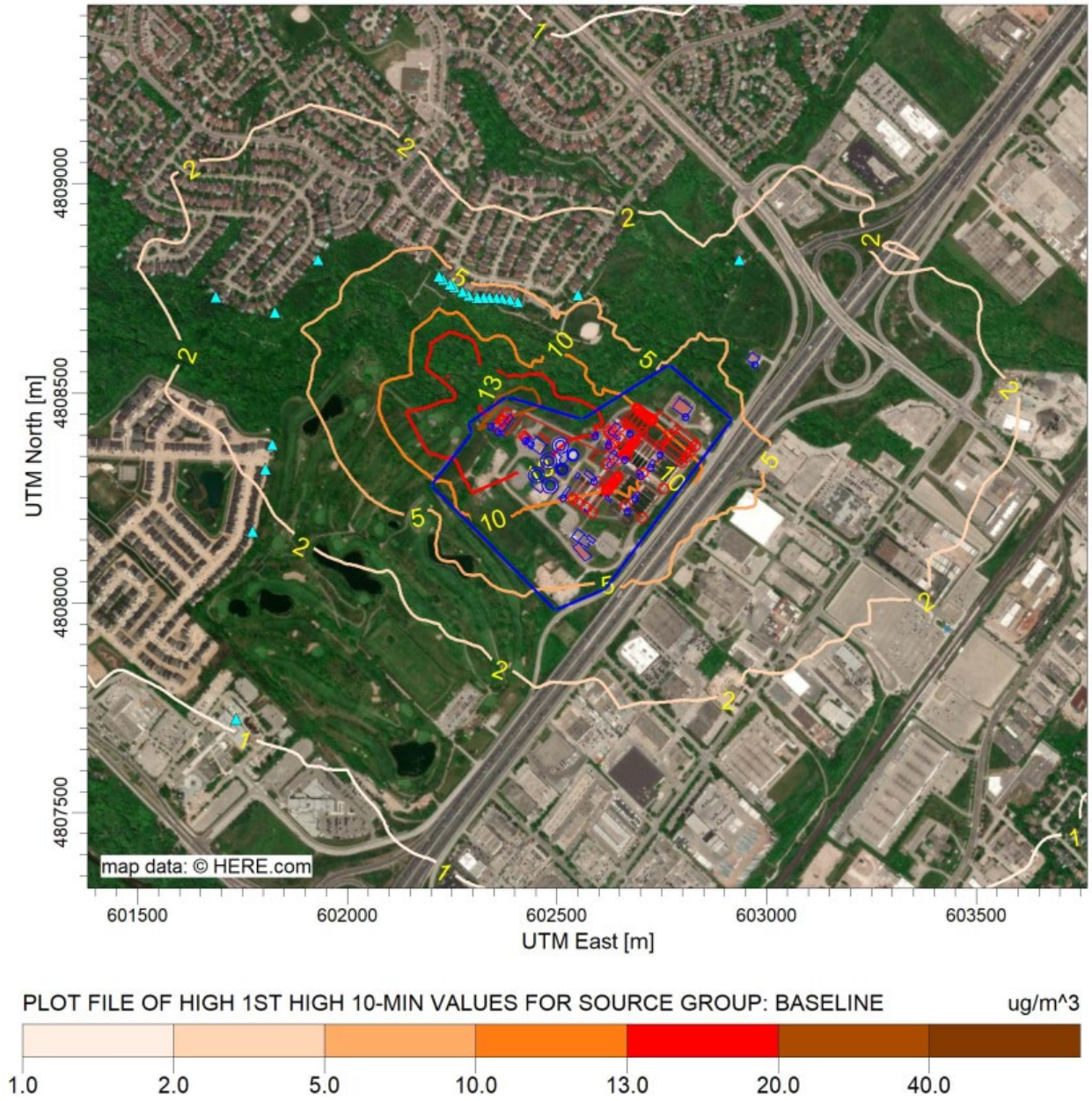

Figure 9-1. Highest 10-minute TRS Concentration Isopleth – Baseline

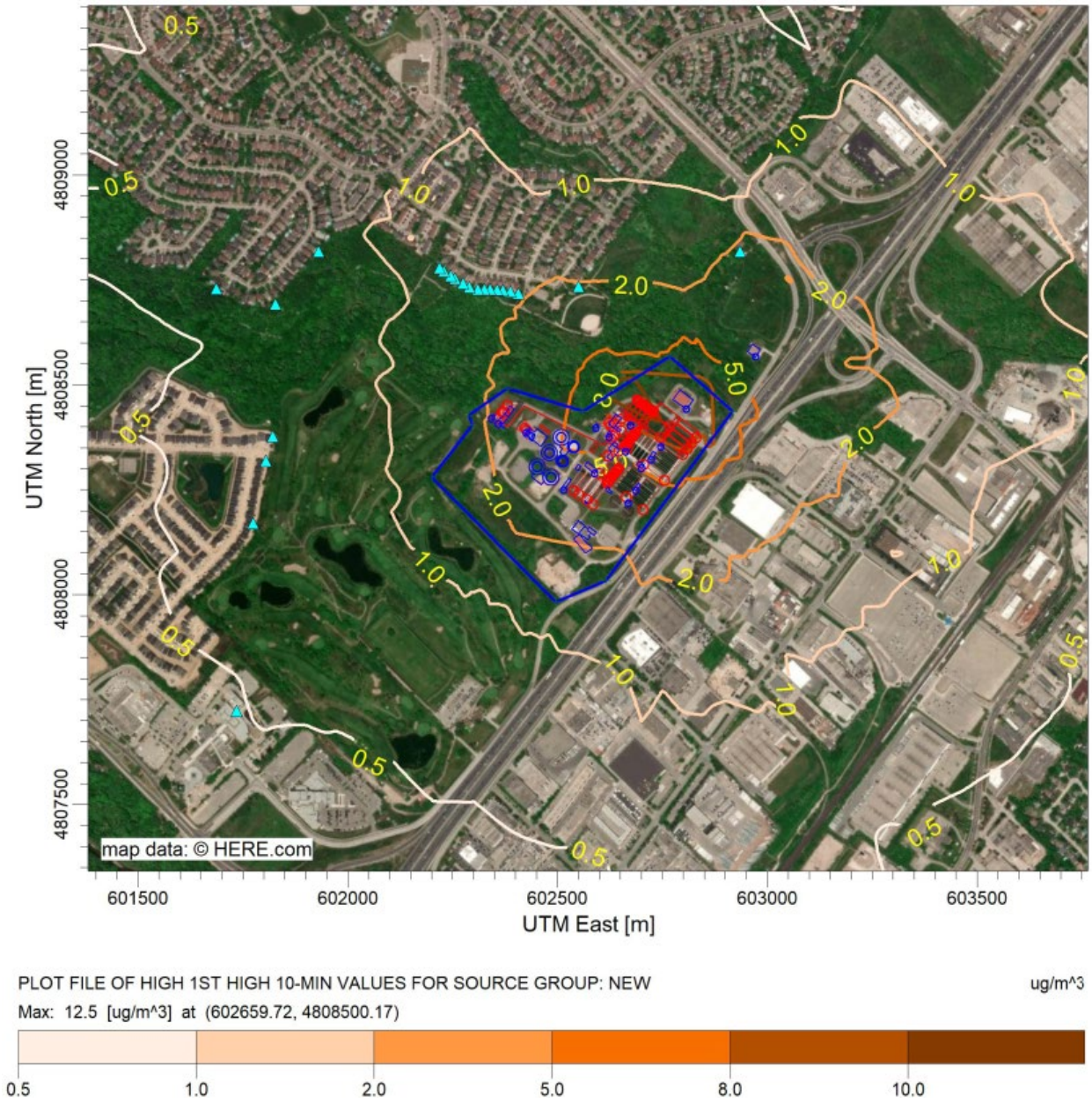

Figure 9-2. Highest 10-minute TRS Concentration Isopleth – Project Only

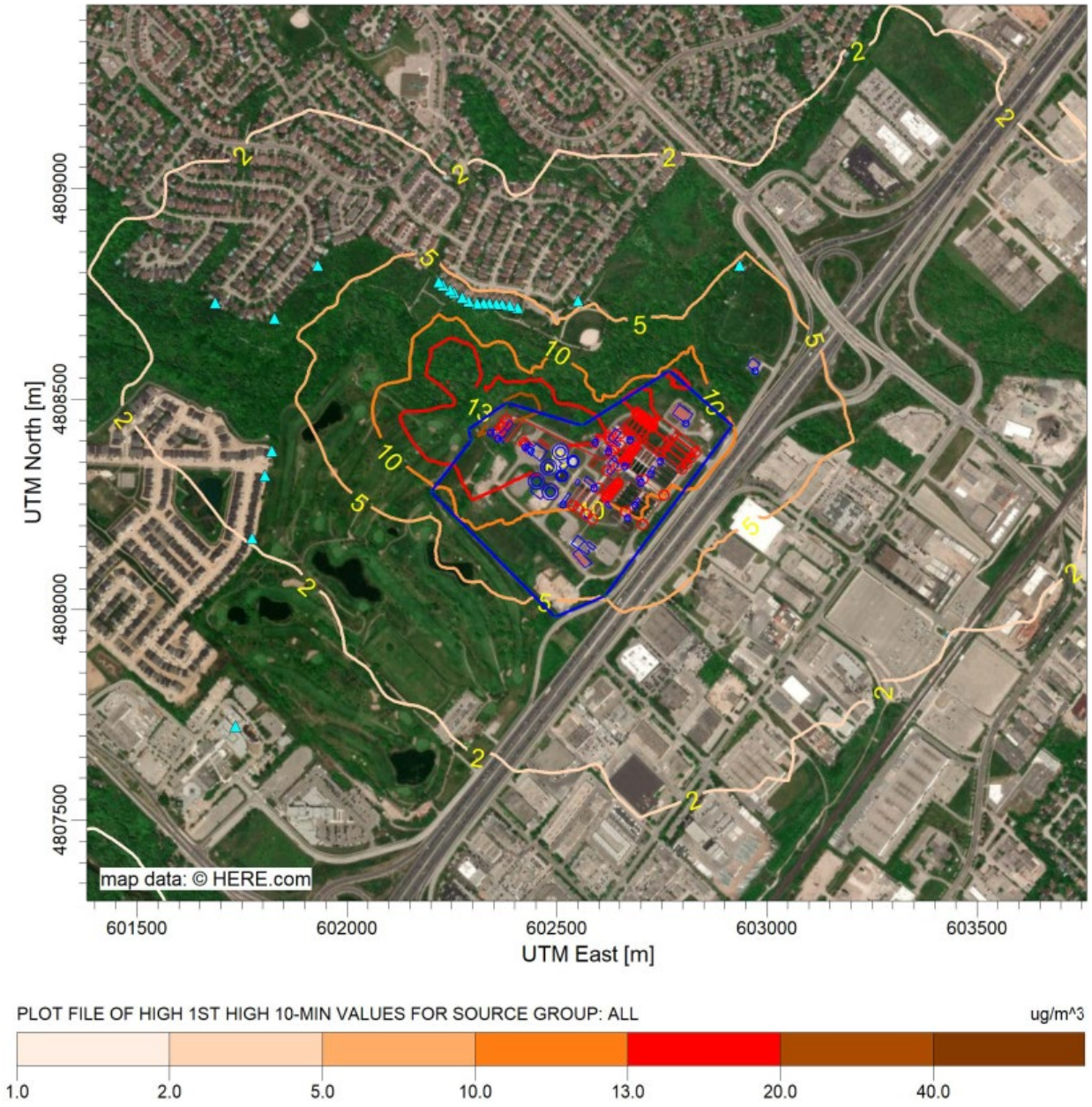

Figure 9-3. Highest 10-minute TRS Concentration Isopleth – Cumulative

9.5 Assessment of Odour [as OU]

The MECP uses a 10-minute odour screening level of 1 OU at the 99.5th percentile. However, MECP considers factors such as frequency, intensity, duration, offensiveness of the odours, and location (collectively known as FIDOL) of impacts at sensitive receptors in the overall decision-making process.

The 99.5th percentile odour concentration contours are provided on Figure 9-4, Figure 9-5, and Figure 9-6. These contours indicate that receptors at a certain concentration contour or within the area of that contour have OU concentration equal to or greater than that concentration for 0.5 percent of hours in a 5-year period. For example, the area within a contour labelled 5 OU per cubic metre, would have an

odour concentration of 5 OU or more for approximately 219 hours per 5-year period (0.5 percent of the time).

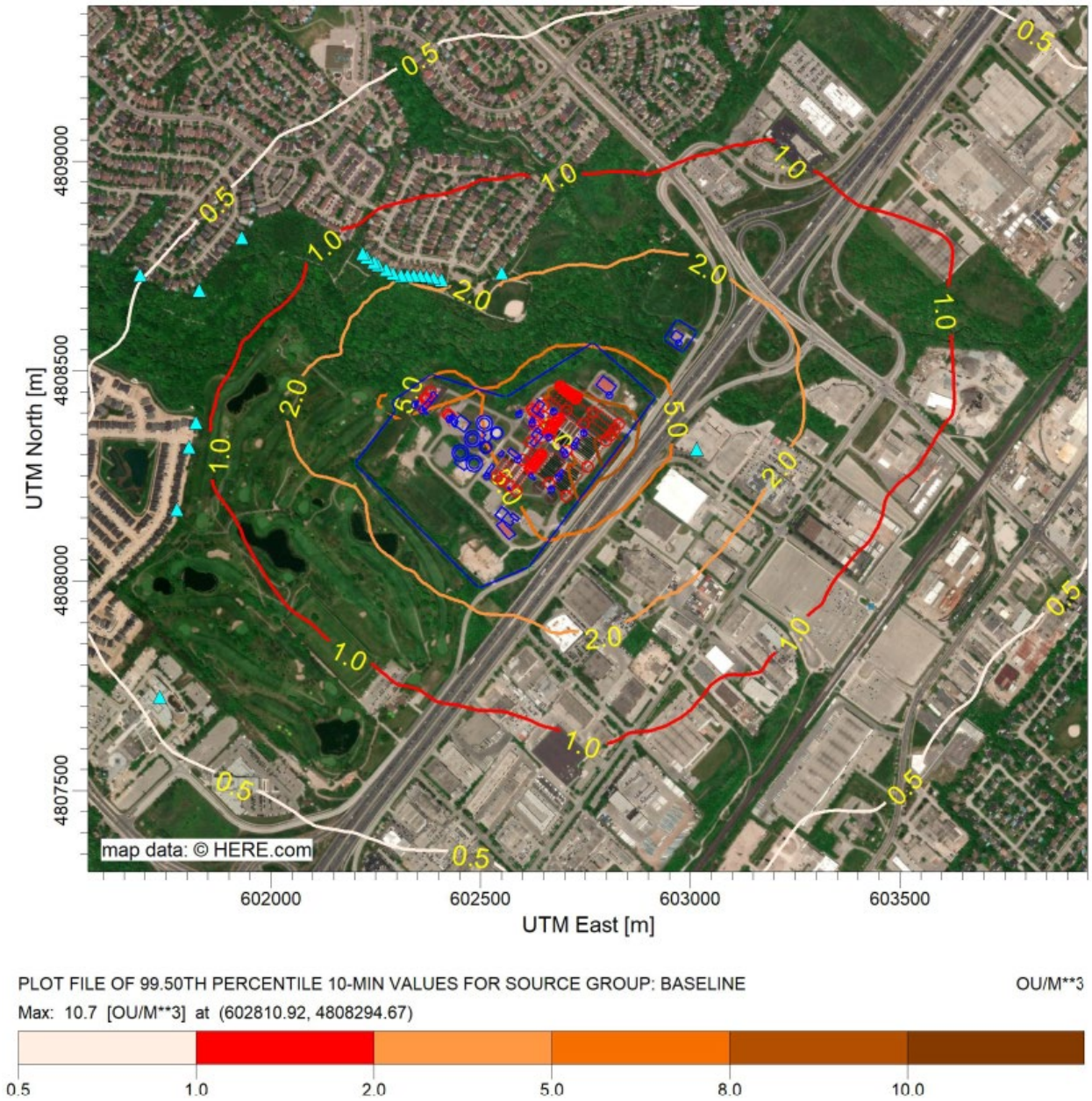

Figure 9-4. 99.5th Percentile 10-minute OU Concentration Isopleth – Baseline

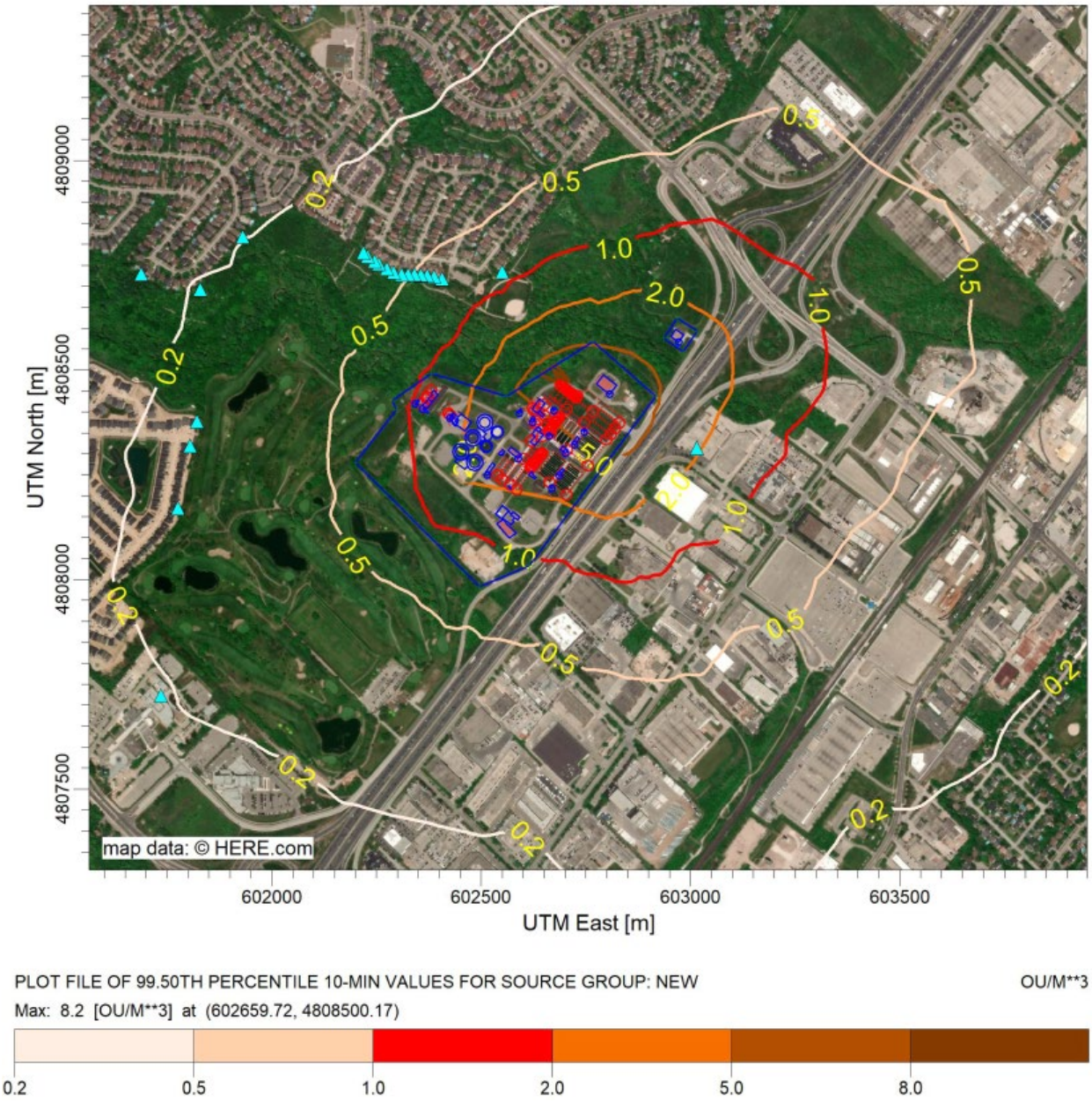

Figure 9-5. 99.5th Percentile 10-minute OU Concentration Isopleth – Project Only

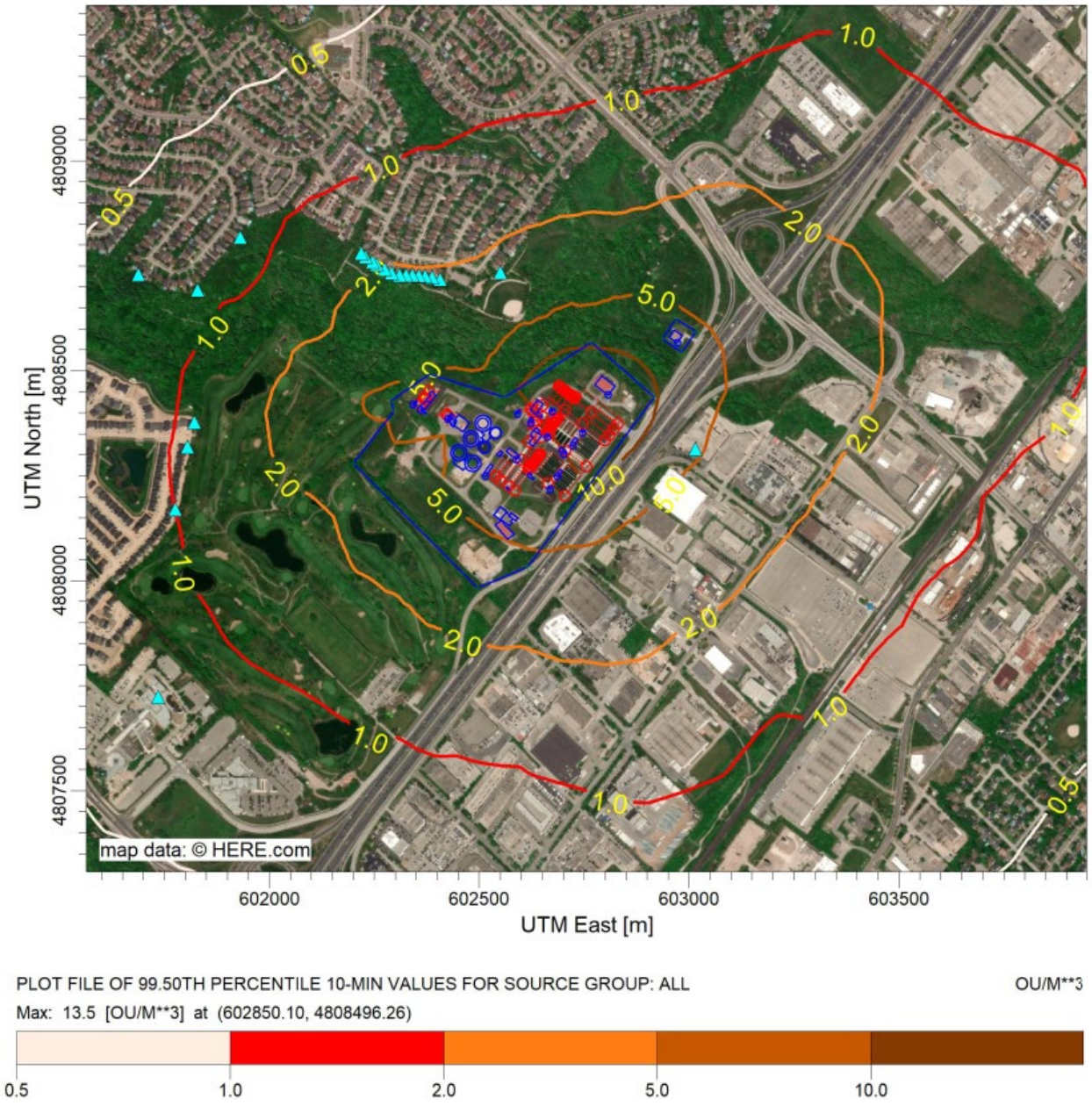

Figure 9-6. 99.5th Percentile 10-minute OU Concentration Isopleth – Cumulative

Table 9-6 summarize the 99.5th percentile 10-minute OU concentrations at sensitive receptors in Baseline, Project Only and Cumulative scenarios.

Table 9-6. Predicted 10-minute OU Concentration at Sensitive Receptors

Receptor ID	Description	Sensitive Receptor	UTM Coordinates (m)		99.5th Percentile Concentration (OU/m³)		
		Type	Easting	Northing	Baseline	Project Only	Cumulative
Facility-wide Odour Emissions (OU/s)					**18201**	**6214**	**24416**
2125Sout	2125 South Service Rd W	Language school	603015	4808313	3.923	2.099	5.423
2158	2158 Brays Ln	residential	602550	4808734	1.840	0.856	2.521
2200	2200 Brays Ln	residential	602407	4808718	1.831	0.628	2.211
2224	2224 Brays Ln	residential	602311	4808728	1.901	0.470	2.198
2220	2220 Brays Ln	residential	602326	4808728	1.911	0.488	2.169
2228	2228 Brays Ln	residential	602291	4808733	1.847	0.433	2.165
2216	2216 Brays Ln	residential	602340	4808727	1.864	0.508	2.145
2204	2204 Brays Ln	residential	602388	4808722	1.820	0.591	2.134
2212	2212 Brays Ln	residential	602357	4808727	1.819	0.536	2.124
2208	2208 Brays Ln	residential	602371	4808725	1.813	0.567	2.121
2232	2232 Brays Ln	residential	602275	4808741	1.695	0.408	2.099
2236	2236 Brays Ln	residential	602256	4808753	1.559	0.383	1.976
2240	2240 Brays Ln	residential	602246	4808760	1.533	0.370	1.892
2244	2244 Brays Ln	residential	602229	4808771	1.409	0.353	1.762
2248	2248 Brays Ln	residential	602219	4808779	1.344	0.341	1.691
2263Saw	2263 Saw Whet Blvd	residential	601822	4808378	0.888	0.249	1.162
2292Char	2292 Charlse Cornwall Ave	residential	601805	4808319	0.864	0.248	1.092
2340Char	2340 Charlse Cornwall Ave	residential	601775	4808170	0.765	0.237	0.998
2293C	2293 Carpenters Cir	residential	601828	4808693	0.611	0.212	0.847
2333C	2333 Carpenters Cir	residential	601931	4808818	0.635	0.199	0.838
1151Bron	1151 Bronte Rd	child care	601735	4807723	0.536	0.190	0.720
2269C	2269 Carpenters Cir	residential	601688	4808729	0.489	0.165	0.652

µg/m = micrograms per cubic metre
ID = identification
m = metres
OU/m^3 = odour unit per cubic metre
OU/s = odour unit per second
UTM = Universal Transverse Mercator

The Baseline scenario, that included existing sources, resulted in receptor impacts at the 99.5th percentile that ranged from 0.49 to 3.92 OU per cubic metre for the 22 sensitive receptors assessed. The Project

Only scenario included only the proposed Project odour emission sources and resulted in receptor impacts at the 99.5th percentile that ranged from 0.17 to 2.10 OU per cubic metre or the sensitive receptors. Finally, the Cumulative scenario that included all existing and Project sources had receptor impacts ranging from 0.65 to 5.42 OU per cubic metre at the sensitive receptors. The complete sensitive receptor summary including peak concentrations is provided in Appendix G.

It should be noted that the highest concentration of all three Scenarios occurred at the receptor with ID of 2125Sout. This receptor is Le Petit Écolier French Language Learning Centre, a private language school offering French classes to kids. It is located on the secondary floor of the commercial building at 2125 South Service Rd W,180 meters east of the WWTP property line across the Queen Elizabeth Way. It is open Monday to Friday and partially on Saturday and closed on Sunday. Thus, it is not a 24-hour receptor, and predicted highest OU concentration for all three scenarios based on a 5-year complete meteorological data set were considered conservative and is refined in a separate modelling run for school open hours only.

The remaining residential receptors and a childcare center were considered 24-hour receptors. The OU assessment results based on those 24-hour-a-day receptors show that there is potential for a modest increase in odour emissions similar to that from Train C and may result in slightly higher odour POI at residential receptors. The highest modelled 10-minute OU concentration (99.5th percentile) at 24-hour-a-day residential receptors is 1.91 OU per cubic metre (at 2220 Brays Ln) for baseline and 2.52 OU per cubic metre (at 2158 Brays Ln) for cumulative scenarios.

Exceedance frequency was analyzed for the language school receptor considering the opening hours and for the most impacted residential receptor (receptor ID: 2158) with the complete 5-year meteorological data.

9.5.1 Exceedance Frequency Analysis

According to the Technical Bulletin, exceedance frequency analyses were conducted at the two receptors having the first and second highest 99.5th percentile concentration from the cumulative scenario.

9.5.1.1 Daytime Language School

The receptor-specific exceedance frequency was analyzed for the language school with consideration of the opening hours listed in Table 9-7. The predicted results and exceedance frequency are shown in Table 9-8. The results indicate that the maximum odour concentration at the receptor is 9.98 OU per cubic metre. However, in 5 years, concentrations have only exceeded the 1 OU per cubic metre screening level 0.568 percent of the time during opening hours.

Table 9-7. Private Language School Opening Hours

Receptor ID	Receptor Description	Monday – Friday	Saturday	Sunday
2125Sout	Le Petit Écolier French Language Learning Centre	09:00 – 19:00	09:00 – 16:00	Closed

ID = identification

Table 9-8. 10-minute OU Exceedance Frequency at the Private Language School

Receptor ID	Address	Highest 10-min OU Concentration over 5 Years (OU/m³)	OU Exceedance Level (OU/m³)	Exceedance Counts over 5 Years	Exceedance Frequency over 5 Years
2125Sout	2125 South Service Road W	9.98	>9.0	4	0.009%
			>8.0	4	0.009%
			>7.0	7	0.016%
			>6.0	9	0.021%
			>5.0	12	0.027%
			>4.0	20	0.046%
			>3.0	35	0.080%
			>2.0	70	0.160%
			>1.9	77	0.176%
			>1.8	84	0.192%
			>1.7	95	0.217%
			>1.6	104	0.237%
			>1.5	113	0.258%
			>1.4	132	0.301%
			>1.3	143	0.326%
			>1.2	161	0.367%
			>1.1	201	0.458%
			>1.0	249	0.568%

> = greater than
ID = identification
OU/m³ = odour units per cubic metre

9.5.1.2 Most Impacted Residential Receptor

Exceedance frequency analysis for the most impacted residential receptor (Receptor ID:2158) is provided in Table 9-9. The results show that, in the cumulative scenario, the most impacted receptor is impacted more than 5 OU in 0.125 percent of time and more than 1 OU in 2.16 percent of time.

Table 9-9. 10-minute OU Exceedance Frequency at the Most Impacted Residential Receptor

Receptor ID	Address	Highest 10-min OU Concentration over 5 Years (OU/m^3)	OU Exceedance Level (OU/m^3)	Exceedance Counts over 5 Years	Exceedance Frequency over 5 Years
2158	2158 Brays Ln	7.40	>7.0	1	0.002%
			>6.0	32	0.073%
			>5.0	69	0.157%
			>4.0	100	0.228%
			>3.0	167	0.381%
			>2.0	301	0.686%
			>1.9	327	0.746%
			>1.8	340	0.775%
			>1.7	358	0.816%
			>1.6	384	0.876%
			>1.5	414	0.944%
			>1.4	458	1.045%
			>1.3	510	1.163%
			>1.2	577	1.316%
			>1.1	763	1.740%
			>1.0	948	2.162%

> = greater than
ID = identification
OU/m^3 = odour units per cubic meter

10. Mitigation Measures

This section outlines the mitigation measures to be used during the construction and operation phases of the Project.

10.1 Construction Phase

Standard mitigation practices for reducing air emissions during the construction period should be employed to control fugitive emissions and diesel exhaust. Mitigation measures consistent with Environment Canada's Best *Practices for the Reduction of Air Emissions from Construction and Demolition Activities* (Cheminfo Services Inc. 2005), and the MECP's *Technical Bulletin: Management Approaches for Industrial Fugitive Dust Sources* (2017b) will be followed.

The following mitigation measures should be included in the Air Quality Management Plan:

- Confirm that equipment complies with Canadian engine emissions standards.
- Visually inspect equipment before use and properly maintain equipment.
- Minimize drop height of materials onsite.
- Cover surface area of hauled bulk material.
- Implement a no idling policy onsite (unless necessary for equipment operation).
- Use electricity from the grid over diesel generators wherever possible.
- Remove accumulated mud, dirt, and debris deposits onsite daily, and wash trucks regularly.
- Clean paved and unpaved roadways through watering or by applying acceptable dust suppressants.
- Reduce activities during high-wind conditions.
- Schedule certain construction activities to periods of time when dust exposure is expected to be limited. In other words, avoid scheduling activities during dry, windy weather conditions. Examples of construction activities include site preparation and earthworks activities, demolition activities, unpaved surfaces with heavy equipment travel, and uncovered soil storage piles.
- Limit travel speeds onsite to a maximum of 20 kilometres per hour.
- Visually monitor for dust during construction.
- Portable odour control device as necessary such as a misting device or portable activated carbon control unit. Choice to be determined based on details of the potential odour emissions.
- Continue to implement Halton's communications protocol which includes timely resolution of complaints.

Additional mitigation measures will be developed as necessary during preconstruction, construction, and operational periods as sources of emissions are identified.

10.2 Operation Phase

The following mitigation measures resulted from this Air Quality Impact Assessment study:

- Increase the height of the existing biogas flare stack to at least 10 metres above grade, to ensure the compliance of SO_2 in the cumulative scenario.
- Operate and maintain the carbon units in accordance with the manufacturer's manual and replace the activated carbon media based on supplier recommendations or odour sampling results.
- Operate and maintain the biofilter units in accordance with the manufacturer's manual and replace the media based by supplier recommendations or odour sampling results.

Best practices for air emission and odour control will be considered during detailed design:

- Enclose odour sources whenever possible.
- Regularly maintain systems and facilities.
- Apply active odour control measures, where needed.
- If required, utilize air emission and odour control systems.

The plant already has a robust process for receiving, addressing and reporting odour complaints. The Region works closely with community members to clarify questions and respond to their concerns and will continue to do so.

11. Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are a key consideration for the Mid-Halton WWTP. Halton Region declared a climate emergency in 2019 and committed to achieving net-zero corporate GHG emissions by 2045. The Region followed this declaration by developing its Corporate Climate Action Plan (Halton Region, 2023). 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 Mid-Halton WWTP Expansion MCEA Study considered GHG impacts relative to an established baseline in its evaluation of alternative solutions and design concepts. This integrated approach was developed to ensure that the preferred expansion concept aligns with Halton Region's climate commitments and supports a resilient, low-carbon future for the Mid-Halton WWTP.

In the technology screening phase, one of the five must-meet criteria was "minimize GHG emissions". In the detailed evaluation phase, alternatives were scored for the GHG emission criterion dictated alternatives were scored proportional to the alternative with the lowest GHG emission. GHG emissions scores were calculated based on Scope 1 (direct emissions), Scope 2 (indirect emissions from electricity), and Scope 3 (indirect emissions from chemical use) emissions for construction and operation.

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

- Maximizing the utilization of existing infrastructure to avoid construction in new areas outside of the Mid-Halton WWTP site and minimizing the need for new buildings and other infrastructure at the site. For example, the North Pump Station, Train C Headworks, UV Building, and Biosolids Building are being upgraded to handle 195 megalitres per day average daily flow.
- Process intensification using Membrane Aerated Biofilm Reactor (MABR) and hydrocyclones to enable Enhanced Biological Phosphorous Removal (EBPR) have been included as recommended items pending confirmation in the design phase. These technologies have the potential for more energy-efficient biological nitrogen removal, chemical savings, and possibly lower nitrous oxide (N_2O) emissions. As design progresses, implementation timelines will be considered accordingly.

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.

12. Conclusions

The Project is to be constructed to service the anticipated wastewater needs of a growing population in Halton Region in the coming decades.

During the construction phase of the proposed expansion Project, air contaminants that arise from diesel engine combustion will be highly localized to the work area due to short emission-discharging heights and mobility of the sources. Construction equipment varies in different construction phases for relatively short durations and is not likely to have a long-term ecological effect beyond the plant site. The fugitive particles created by construction activities will be of larger aerodynamic diameters that tend to settle out of the atmosphere rapidly. The potential impacts are likely to be in relation to possible dust nuisance in the immediate vicinity of the site rather than ambient air quality concerns. Odour emissions during construction are not anticipated to be significant. There may be some short-term emissions when tie-ins are required to the existing facility infrastructure. These emissions can be suitably managed using operational controls.

Air Impacts during the operation phase were assessed under three scenarios: Baseline, Project Only, and Cumulative scenarios. Model results indicate that baseline and cumulative POI concentrations for 1-hour NO_x, 24-hour NO_x, 24-hour PM, and annual SO_2 are less than the applicable standards in the MECP ACB List. The baseline 1-hour SO_2 concentration is also less than the applicable MECP POI limit. For the cumulative scenario, compliance with the 1-hour SO_2 criterion can be achieved by increasing the WGB1 stack height to 10 metres above grade. This stack height adjustment is not a design recommendation but is presented solely to demonstrate that the WWTP can comply with applicable air quality criteria if additional stack height is provided. It should also be noted that the Region is planning to upgrade the flare as part of a separate project scope.

Predicted NO_x concentrations associated with emergency generator maintenance testing are less than the MECP screening level for emergency generators for both the baseline and cumulative scenarios. The predicted 1-hour concentration at sensitive receptors are also less than the applicable air guidelines.

The maximum predicted 24-hour ammonia POI concentration in all three scenarios is less than 2 percent of the applicable MECP POI limit of 100 micrograms per cubic metre.

The proposed project is expected to result in a slight increase in TRS (H_2S) concentrations. However, for both the Baseline and Cumulative scenarios, the maximum predicted 24-hour TRS concentrations remain less than the MECP 24-hour standard of 7 micrograms per cubic metre. Odour-based 10-minute average TRS concentrations were evaluated at 22 sensitive receptors, and the highest predicted concentrations at these locations are less than the applicable MECP POI limit of 13 micrograms per cubic metre under both scenarios.

The nearest sensitive receptor, a private language school located approximately 180 metres west of the WWTP, is predicted to experience the highest 10-minute odour concentration because of its close proximity to the facility. However, an exceedance frequency analysis that accounts for the language school's opening hours indicates that odour concentrations may exceed the MECP 10-minute OU screening level of 1 OU per cubic metre for up to 0.568 percent of the time.

Because the language learning centre receptor was evaluated based on its operating hours, a separate assessment was conducted for the remaining sensitive receptors that are assumed to be occupied 24 hours per day. For these receptors, the odour assessment results indicate the potential for a modest increase in odour emissions, comparable to those associated with the existing Train C facilities, which may

result in slightly higher odour concentrations at nearby receptors. Excluding the private language learning centre receptor, the highest predicted 10-minute odour concentration (99.5th percentile) is 1.91 OU/m^3 at 2220 Brays Lane under the Baseline scenario and 2.52 OU per cubic metre at 2158 Brays Lane under the Cumulative scenario. Under the Cumulative scenario, the most affected receptor is predicted to experience odour concentrations exceeding 5 OU/m^3 for only 0.125 percent of the time and 1 OU per cubic metre for 2.16 percent of the time.

13. References

Cheminfo Services Inc. 2005. *Best Practices for the Reduction of Air Emissions from Construction Activities and Demolition Activities.* March.

Government of Canada. (2025). *Canadian Ambient Air Quality Standards (CAAQs)*, February

MECP. (2025) *Ontario Ambient Air Quality Criteria (AAQC)*, dated June

MECP. (2023). *Air Contaminants Benchmarks (ACB) List: standards, guidelines, and screening levels for assessing point of impingement concentrations of air contaminants* (Version 3.0, April), Ontario

MECP. (2018). *Guideline A-10: Procedure for preparing an Emission Summary and Dispersion Modelling Reports under Ontario Regulation 419/05 Air Pollution – Local Air Quality*, version 4.1, dated March

MECP. (2016) *Guideline A11: Air Dispersion Modelling Guidelines for Ontario*, version 3.0, dated July

MECP Standards Development Branch. (2016) *Technical Bulletin, Methodology for Modelling Assessments of Contaminants with 10-minute Average Standards and Guidelines for Odour Units under O. Reg. 419/05,* September

MECP. (2017) *Technical Bulletin (O. Reg. 419/05) Methodology for Using "Assessment Values" for Contaminants with Annual Air Standards,* February

Alliance Technical Group. (2025). *Report: Regional Municipality of Halton Mid-Halton Wastewater Treatment Plant Odour Sampling Program 2026*. October

Alliance Technical Group. (2026). *Report: Regional Municipality of Halton Mid-Halton Wastewater Treatment Plant Odour Sampling Program 2026*. April

MECP. (2015). Amended Environmental Compliance Approval Number 5280-9V5SK9, issued May 25, 2015