Appendix D.2 Air Quality Assessment

Environmental Review Report

East Windsor Generation Facility Expansion

Capital Power Corporation

SLR Project No.: 241.030524.00024

July 2024

Air Quality Assessment

East Windsor Generation Facility Expansion Project

Capital Power Corporation

1200-10423, 101 St. N.W. Edmonton AB T5H 0E9

Prepared by:

SLR Consulting (Canada) Ltd.

100 Stone Road West, Suite 201, Guelph, ON N1G 5L3

SLR Project No.: 241.030524.00024

July 2024

Revision: 1

Revision Record

Revision	Date	Revision Description
0	April 11, 2024	Draft report issued for external review
1	July 2024	Report issued for public review

Statement of Limitations

This report has been prepared by SLR Consulting (Canada) Ltd. (SLR) for Capital Power Corporation (Client) in accordance with the scope of work and all other terms and conditions of the agreement between such parties. SLR acknowledges and agrees that the Client may provide this report to government agencies, stakeholders and/or Indigenous communities as part of project planning or regulatory approval processes. Copying or distribution of this report, in whole or in part, for any other purpose other than as aforementioned is not permitted without the prior written consent of SLR.

Any findings, conclusions, or recommendations in this report are based on conditions that existed at the time work was completed, and the assumptions, conditions, and qualifications set forth herein.

This report may contain data or information provided by third party sources on which SLR is entitled to rely without verification and SLR does not warranty the accuracy of any such data or information.

Nothing in this report constitutes a legal opinion or compliance determination with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies, other than as specifically set forth in this report. Revisions to the regulatory standards referred to in this report may be expected over time and, as a result, modifications to the findings, conclusions and recommendations may be necessary.

Executive Summary

Capital Power Corporation (Capital Power), through its affiliate East Windsor (Expansion) L.P., is proposing the East Windsor Generation Facility Expansion (the Project) in the City of Windsor, Ontario. The Project is in response to the Independent Electricity System Operator's (IESO's) call for additional natural gas generation capacity and will provide up to approximately 107 megawatts (MW) of additional gross generation capacity to the Windsor-Essex area and provincial electricity grid. The proposed Project is being designed to provide dependable capacity at peak times when Ontario's other generation sources are not capable of meeting demand.

The objective of this Air Quality Assessment is to predict concentrations of selected air quality contaminants associated with the Project to demonstrate compliance with applicable regulatory limits. This report has been prepared in support of the Environmental Review Report (ERR) to meet the requirements of the Environmental Screening Process for Electricity Projects (ESP).

The Project will be associated with increases to local and regional air quality emissions, however, emissions of identified Contaminants of Concern (COCs) at Points of Impingement (POIs) are predicted to remain below their respective Ontario Regulation 419/05 limits for the selected operating scenarios, where O. Reg. 419/05 is the air quality regulation in the Province of Ontario.

In conducting a combined effects assessment by including emissions from the existing East Windsor Cogeneration Centre (EWCC) facility and ambient air quality conditions, it is predicted that despite high background concentrations for two COCs, concentrations at selected sensitive receptors are below their respective provincial Ambient Air Quality Criteria (AAQC) and the federal Canadian Air Ambient Quality Standards (CAAQS) for the normal operating scenario.

In the case of annual fine particulate matter, 2.5 µg ($PM_{2.5}$), the predicted combined concentrations are 96% of the 8.8 (µg/m^3) threshold recognized in both the AAQC and CAAQS. However, the total combined emissions from the Project and existing EWCC contribute less than 1% to the combined concentration with the high background concentrations contributing to the air quality condition. Similarly, in the case of the CAAQS for nitrogen dioxide (NO_2), a species of NO_X, ambient conditions contribute the most to the combined concentration. Specifically, the Project and existing EWCC contributes less than 1% (0.16 µg/m^3) of the combined concentration of 21.77 µg/m^3 which is 97% of the CAAQS.

As noted above, these modelling predictions are based on highly conservative operating scenarios. However, even with the conservative considerations in the assessment, the Project, in combination with the existing EWCC and local background conditions, is anticipated to be within the AAQCs and CAAQS.

Table of Contents

Statement of Limitations ..... **ii**
Executive Summary ..... **iii**
Table of Contents ..... **iv**
Acronyms and Abbreviations ..... **viii**
1.0 Introduction **1**
1.1 Project Overview 1
1.2 Objective 3
2.0 Project and Site Context **3**
2.1 Site Context 3
2.2 EWCC Context 3
2.3 Project Context 4
3.0 Regulatory Framework **6**
3.1 Ontario Regulation 419/05 6
3.1.1 Air Contaminant Benchmark List 6
3.1.2 Ambient Air Quality Criteria 6
3.1.3 Guideline A-5 Requirements 6
3.2 Canadian Ambient Air Quality Standards 6
3.3 Canada-United States Air Quality Agreement 7
4.0 Existing Environmental Conditions **7**
4.1 Regional Climate 7
4.2 Local Meteorology and Ambient Air Quality Context 8
4.2.1 Temperature 8
4.2.2 Precipitation 9
4.2.3 Wind Speed and Direction 10
4.3 Ambient (Background) Air Quality 12
5.0 Air Contaminants and Air Quality Criteria **13**
5.1 Project Air Contaminants 13
5.2 Air Quality Assessment Criteria 13
6.0 Methods **14**
6.1 Existing Emission Sources 14
6.2 Project Emission Sources 16
6.3 Assessment Boundaries 16

6.4 Points of Impingement (POI) 17
6.5 Modelling Scenarios 19
6.5.1 Scenario A - 100% Load Normal Operating Scenario (Cold Temperature) 19
6.5.2 Scenario B - Peak Load (Cold Temperature) 19
6.5.3 Scenario C - 100% Load (Average Temperature) 19
6.5.4 Scenario D - Peak Load (Summer Extreme Temperature) 19
6.5.5 Scenario E - Start-Up Condition 20
6.5.6 Dispersion Modelling Parameters 20
7.0 Modelling Results 23
7.1 Scenario A - 100% Load Normal Operating Scenario (Cold Temperature) 23
7.2 Scenario B - Peak Load (Cold Temperatures) 23
7.3 Scenario C - 100% Load (Average Temperature) 23
7.4 Scenario D - Peak Load (Summer Extreme Temperature) 23
7.5 Scenario E - Start-Up Condition 23
8.0 Combined Concentration Results 28
8.1 Start-Up Scenario 28
8.2 Normal Operating Scenario 30
9.0 Summary of Findings 34
10.0 Closure 35
11.0 References 36

Tables in Text

Table 4-1: Monthly Average and Extreme Temperatures at Windsor A Station, 1981 – 2010 9
Table 4-2: Average Monthly and Extreme Precipitation at Windsor A Station, 1981 – 2010 9
Table 4-3: Background Ambient Air Quality Concentrations (2018-2022) 12
Table 5-1: COC Assessment Criteria 14
Table 6-1: Stack Parameters and Emission Data – Existing EWCC 15
Table 6-2: Sensitive Receptor Locations 17
Table 6-3: Stack Parameters and Emission Data – Scenario A – 100% Load Normal Operating Scenario (Cold Temperature) 21
Table 6-4: Stack Parameters and Emission Data – Scenario B – Peak Load (Cold Temperature) 21
Table 6-5: Stack Parameters and Emission Data – Scenario C – 100% Load (Average Temperature) 21

Table 6-6: Stack Parameters and Emission Data – Scenario D – Peak Load (Summer Extreme Temperature) 22
Table 6-7: Stack Parameters and Emission Data – Scenario E –Start-Up Condition 22
Table 7-1: Maximum POI Concentrations for Scenario A - 100% Load Normal Operation Scenario (Cold Temperature) – Project Only 24
Table 7-2: COC Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operation Scenario (Cold Temperature) – Project Only 24
Table 7-3: VOC & PAH Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operations Scenario (Cold Temperature) 25
Table 7-4: Metals Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operations Scenario (Cold Temperature) during Operating Conditions 25
Table 7-5: COC Concentrations at POI Compared to Scenario B Criteria for Peak Load (Cold Temperature) – Project Only 26
Table 7-6: COC Concentrations at POI Compared to Scenario C Criteria for 100% Load (Average Temperature) – Project Only 26
Table 7-7: COC Concentrations at POI Compared to Scenario D Criteria for Peak Load (Summer Extreme Temperature) – Project Only 26
Table 7-8: COC Concentrations at POI Compared to Scenario E Criteria for Start-Up Condition – Project Only 27
Table 8-1: Combined Maximum Concentration Results for Scenario E (Start-Up Scenario) Compared to O. Reg. 419/05 29
Table 8-2: Combined Maximum Concentration Results for Scenario A 100% Load (Normal Operating Scenario) Compared to O. Reg. 419/05 31
Table 8-3: Combined Concentration Results for Scenario A 100% Load (Normal Operating Scenario) Compared to AAQC 31
Table 8-4: Combined Concentration Results (Project + Existing EWCC) for Scenario A 100% Load (Normal Operating Scenario) Compared to CAAQS 32
Table 8-5: COC Combined Concentrations Compared to AAQC/CAAQs Limits at Sensitive Receptors during Normal Operations Scenario A Operating Conditions 33

Figures in Text

Figure 1-1: Project Location 2
Figure 2-1: Site Layout 5
Figure 4-1: Wind Rose (2018 – 2022) – NAV Canada’s Windsor Airport Station 11
Figure 6-1: Selected Sensitive Receptor Locations 18

Appendices

Appendix A Emission Factor and Calculation Tables

A.1 Gas Turbine, GEN:

Appendix B Guideline A-5 Requirements

B.1 Guideline A-5 Requirements (Simple Cycle – 100% Load Normal Operating Scenario)

Acronyms and Abbreviations

AAQC	Ambient Air Quality Criteria
AQMS	air quality management system
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CO	carbon monoxide
COC	contaminant of concern
ECA	Environmental Compliance Approval
ECCC	Ministry of Environment and Climate Change
EPA	*Environmental Protection Ac*
ERR	Environmental Review Report
ESDM	Emission Summary and Dispersion Modelling
ESP	Environmental Screening Process for Electricity Projects
EWCC	East Windsor Cogeneration Centre
GE	General Electric
GLC	ground level concentration
GSU	Generator Step-Up
GTG	gas turbine generator
ha	hectare
IESO’s	Independent Electricity System Operator’s
km	kilometre
m	metre
MECP	Ministry of the Environment, Conservation and Parks
MW	megawatt
NAPS	National Air Pollution Surveillance
NO_X	nitrogen oxide
PAH	polycyclic aromatic hydrocarbon
PM	particulate matter
POI	Point of Impingement
SO_2	sulphur dioxide
SWM	stormwater management system
TSP	total suspended particulate
US	United States
US EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WRF-ARW	Weather Research and Forecasting

1.0 Introduction

1.1 Project Overview

Capital Power Corporation (Capital Power), through its affiliate East Windsor (Expansion) L.P., is proposing the East Windsor Generation Facility Expansion (the Project) in the City of Windsor, Ontario. The Project is in response to the Independent Electricity System Operator's (IESO's) call for additional natural gas generation capacity and will provide up to approximately 107 megawatts (MW) of additional gross generation capacity to the Windsor-Essex area and provincial electricity grid. The proposed Project is being designed to provide dependable capacity at peak times when Ontario's other generation sources are not capable of meeting demand.

The Project consists of the construction and operation of a new simple cycle natural gas generation facility located adjacent to the existing East Windsor Cogeneration Centre (EWCC)[1] The Project will make use of some existing infrastructure, including tying into the existing EWCC high-voltage interconnection line to avoid the need for a new connection to the provincial electricity grid. Ancillary project components include an equipment building, storage building, stormwater management system and site servicing. Additional areas for temporary staging and laydown will be required during the construction phase.

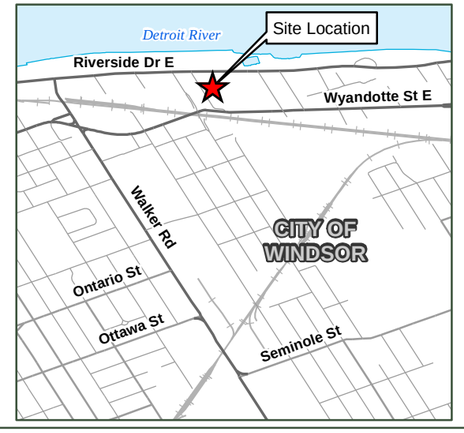
The Project will be located within the existing EWCC fenceline, primarily on lands owned by Capital Power. These lands represent a series of parcels, municipally known as 228 to 276 Cadillac Street (hereby referred to as the Project Site). These parcels, along with others on the west side of Cadillac Street, were formerly residential properties that were acquired, and residences removed, as part of the original development of the EWCC. The Project Site is approximately 0.61 hectares (ha; 1.49 acres) in size and is currently used for site access, parking, mowed and landscaped areas, and formerly storage (removed at the City's request) (**Figure 1-1**).

[1] The EWCC is located on the land leased from Ford Motor Company of Canada Ltd. In addition to generating electricity, the facility used to provide steam to the neighbouring Ford Motor company for their Ford Windsor engine plant. Since the closure of the engine plant in 2018, Ford has terminated the Steam Supply Agreement with EWCC, and EWCC now operates in simple cycle mode as a peaking plant.

LEGEND:

- Capital Power Lands - Owned
- Capital Power Lands - Leased
- Project Site
- Parcel Fabric (City of Windsor)
- Railway

NOTES:
PARCEL FABRIC, CITY OF WINDSOR OPEN DATA CATALOGUE, ACCESSED NOVEMBER, 2022.
IMAGERY: COUNTY OF ESSEX; 2023



0 25 50 100 150 m

SCALE 1:2,750
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 17N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

EAST WINDSOR GENERATION FACILITY EXPANSION

AIR QUALITY ASSESSMENT

PROJECT LOCATION

SLR

FIGURE NO:
1-1

DATE: July 2024

PROJECT NO: 241.30524.00024

1.2 Objective

The objective of this Air Quality Assessment Report is to predict concentrations of selected air quality contaminants associated with the Project to demonstrate compliance with applicable regulatory limits.

This report has been prepared in support of the Environmental Review Report (ERR) to meet the requirements of the Environmental Screening Process for Electricity Projects (ESP).

2.0 Project and Site Context

2.1 Site Context

The Project Site is located adjacent to the existing EWCC, on a series of parcels municipally known as 228 to 276 Cadillac Street. The Project will be located within the existing EWCC fenceline, primarily on lands owned by Capital Power. The existing EWCC is located on the Ford Powerhouse property, on land leased from the Ford Motor Company of Canada Ltd. The current EWCC facility fenceline encompasses the Project Site lands, which are currently used for site access, parking, landscaped areas, and formerly storage (removed at the City's request).

Both the Project and existing EWCC are located on lands designated as "Business Park" and "Mixed Use Node" which allow for business and industrial uses subject to the City of Windsor's site plan control process. Both the Project Site and EWCC are also zoned as "Commercial District" which allows public utilities and accessory uses as per the City of Windsor Zoning By-law 8600.

Immediately surrounding the property, within 500 metres (m), residential, commercial, and industrial uses make up the primary land uses and these existing developments have been in existence for over two decades. Directly north of the Project Site, across from Riverside Drive East, are lands designated as "Waterfront Port" and "Industrial" and zoned as "Manufacturing District", and to the northeast there is a small area designated "Waterfront Residential" and zoned "Residential District" (Low Density and Medium Density Housing). To the east of the Project Site, there are lands designated as "Mixed Use Corridor" and "Residential" and zoned as "Institutional District" and "Residential District" (Medium Density Housing). To the south is Wyandotte Street East and the CN railway, with areas zoned "Manufacturing District" as well as pockets zoned "Residential District" (Medium Density Housing). To the west, there are lands zoned "Institutional District" (Church, School, Day Nursery), "Commercial District" (Parking Area, Public Parking Area and Highway Commercial), "Green District" (Public Park), and "Manufacturing District" (Heavy Industrial). In addition, Specific Zoning Exemptions occur on lands throughout the area.

2.2 EWCC Context

The existing EWCC commenced commercial operations in 2009. As a result of the conversion of the EWCC from a cogeneration to a simple cycle operation, the EWCC noise was assessed in May 2021 as part of the amendment of the Environmental Compliance Approval (ECA) – Air and Noise. The amended ECA – Air and Noise was issued by the Ministry of the Environment, Conservation and Parks (MECP) on April 2022, and the EWCC currently operates in accordance with the ECA A-500-4130410774.

The existing EWCC is a peaking power plant that operates its existing generators in simple cycle mode to produce electricity using two gas turbine generators (GTGs). Electricity is generated and directed to the provincial grid when dispatched by the IESO.

2.3 Project Context

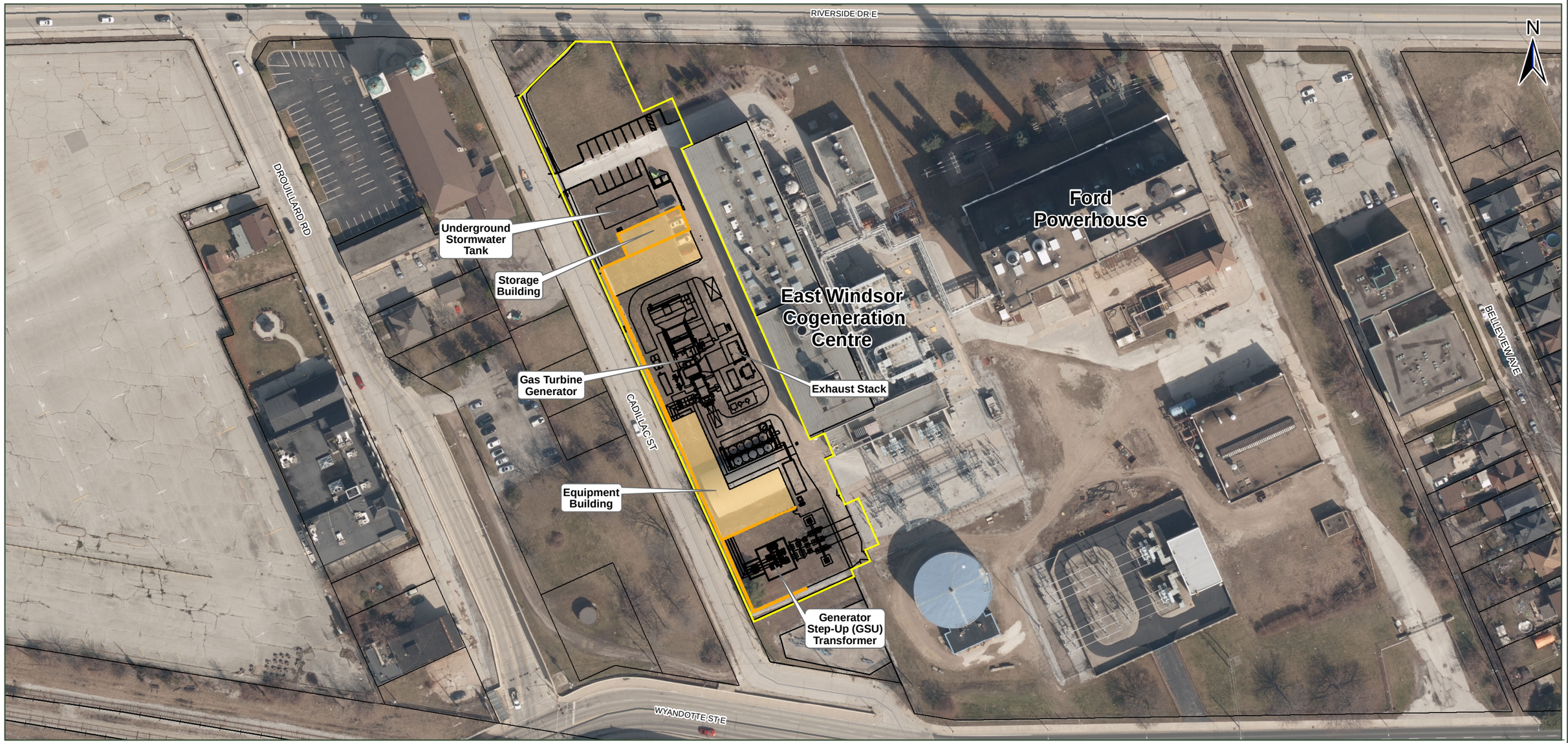
The Project is a simple cycle natural gas fired peaking power plant which would provide the provincial electricity grid and IESO with reliable and responsive peaking power supply. The Project will be located within the EWCC fenceline and will share some existing infrastructure and services but will be owned and operated by a separate Capital Power entity. The Project is IESO-contracted, metered, and dispatched independently of the existing EWCC.

Key project components of the Project include one General Electric (GE) 7E.03 simple cycle gas turbine generator with the capacity to produce up to 107 MW of gross peaking electricity, and all associated infrastructure including an inlet air filter, exhaust stack, fuel gas compressor, natural gas handling system, instrumentation and control systems, and a Generator Step-Up (GSU) transformer. Natural gas will be supplied to the Project from a high-pressure fuel gas pipeline originating from the existing Enbridge operated EWCC gas yard. Ancillary project components include an equipment building, storage building, stormwater management system (SWM) and site servicing.

The gas turbine will include a dedicated exhaust stack for the dispersion of the associated emissions. This exhaust stack will be approximately 3.4 m by 6.1 m and 22.5 metres above grade. The modular system has a relatively small footprint, allows for timely installation and Commissioning, and has an approximate 10-20-minute start-up time. **Figure 2-1** illustrates site layout.

Similar to the existing EWCC, the Project is expected to run infrequently; as a peaking facility it must operate for less than 1,500 hours, annually. Dispatch forecasting suggests that the unit may run less than 150 hours annually, with an average run time of approximately 2 to 4 hours. While the expansion is co-located adjacent to the existing EWCC, the two facilities will operate and be dispatched by the IESO independently. Both facilities are classified and operate as peaking plants and would be available for dispatch by the IESO to fulfil system demands.

Although both facilities could be dispatched concurrently by the IESO, this scenario is anticipated to occur infrequently. Regardless, the assessment has considered this scenario and conservatively includes the combined effect of both the existing and proposed facilities operating simultaneously for the normal operating scenario. The combined facility with the expansion included will have a gross nameplate capacity of 172.6 MW and a gross maximum potential output of 195 MW.



LEGEND:

- Project Site
- New Building
- New Building
- Equipment Layout
- Parcel Fabric (City of Windsor)
- Railway

NOTES:
PARCEL FABRIC, CITY OF WINDSOR OPEN DATA CATALOGUE, ACCESSED NOVEMBER, 2022.
IMAGERY: COUNTY OF ESSEX; 2023

0 10 20 40 60 m

SCALE 1:1,250
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 17N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

EAST WINDSOR GENERATION
FACILITY EXPANSION
224 CADILLAC DRIVE, WINDSOR ONTARIO

AIR QUALITY ASSESSMENT

PROJECT SITE LAYOUT

SLR

FIGURE NO:
2-1

DATE: July 2024

PROJECT NO: 241.30524.00024

Last Saved: March 22, 2024 8:26:47 AM by tgraham

GIS PATH: G:_Projects\241_30524_CapitalPower\1_Maps\RPT\RPT_AirQuality_Assessment\241_30524_2-1_AirQuality_EWC_Layout_revJ.mxd

3.0 Regulatory Framework

The following sections provides an overview of provincial and federal regulatory frameworks relevant to the Air Quality Assessment.

3.1 Ontario Regulation 419/05

The Project is considered an emitter subject to O. Reg. 419/05 – Air Pollution – Local Air Quality, with statutory authority under the provincial *Environmental Protection Act* (EPA). Within this regulatory framework, the Project will require an Environmental Compliance Approval – Air and Noise, to meet the provincially regulated emission limits.

3.1.1 Air Contaminant Benchmark List

The air contaminant benchmark list is intended for use primarily by an emitter who is required to prepare an Emission Summary and Dispersion Modelling (ESDM) report under O. Reg. 419/05. The applicable criteria from the benchmark list were used to compare to the Project specific dispersion modelling results to determine the Project's compliance with O. Reg 419/05.

3.1.2 Ambient Air Quality Criteria

Ambient Air Quality Criteria (AAQC) are set by the Ontario MECP, within the air contaminant benchmark list. They are provincially based, non-regulatory, ambient air quality values developed to protect against potentially adverse effects on human health and/or the environment. AAQCs are used to assess air quality from all emission sources and are most commonly used in environmental assessments.

3.1.3 Guideline A-5 Requirements

Guideline A-5, under O. Reg. 419/05, specifies emission limits for stationary combustion sources, including limits for natural gas fired turbines. For a natural gas fired turbine facility, these limits are calculated based on the power rating on the turbine as well as heat recovery units, where applicable. The A-5 guideline specifies equipment emission limits, at the source, for nitrogen oxides (NO_X), carbon monoxide (CO) and sulphur dioxide (SO_2) under normal operating conditions; unlike the AAQC, the emission limits are not predicted concentrations at a Point of Impingement (POI) but rather a limit on concentrations of contaminants exiting the exhaust stack. Under the A-5 Guideline, a >70 MW peaking turbine has an allowable emission rate of 140 g/GJ NO_X with a capped operating time of 1,500 hours per year.

3.2 Canadian Ambient Air Quality Standards

The Canadian Ambient Air Quality Standards (CAAQS) are federally based, non-regulatory, ambient air quality values. These standards are based on factors including health and environmental effects, current air quality levels in other jurisdictions, projected trends, and elements of achievability. CAAQS are intended to be used as indicators to help manage regional air quality and drive the improvement of air quality across the country. CAAQS are established to work with regional air quality management systems (AQMS) to control and monitor air quality at the regional level but not intended to be directly applied to individual facilities (CCME 2020) or the compliance of individual facilities.

For the purposes of this report, predicted ground level concentrations (GLC) at a POI beyond the fenceline of the EWCC and at selected sensitive receptors were compared to identified provincial and federal regulatory frameworks and standards, where applicable.

3.3 Canada-United States Air Quality Agreement

Airsheds are not bound by jurisdictional borders and, therefore, depending on factors such as meteorological conditions, compounds in the air originating in one jurisdiction can disperse to another jurisdiction. This process can be referred to as the transboundary effect.
The transboundary dispersion of air quality compounds between the United States (U.S.) and Canada can have an effect on the background air quality levels in Southern Ontario and subsequently at the Project Site.

The Canada-United States Air Quality Agreement, signed in 1991, addresses these transboundary effects (GOC 1991). Both countries agreed to reduce emissions of SO_2 and NO_X, the primary precursors to acid rain. The Ozone Annex was added to the agreement in December 2000 to address transboundary air pollution leading to high ambient levels of ground-level ozone, a major component of smog. The Annex commits both countries to reduce their emissions of nitrogen oxides and volatile organic compounds, the precursor pollutants to ground-level ozone.

Significant progress has been made in reducing emissions of these pollutants. Between 2000 and 2020, emissions of nitrogen dioxide in Canada and the U.S. decreased by 65% and 72%, respectively, in the transboundary ozone area. This area includes central and southern Ontario, southern Québec, 18 U.S. states, and the U.S. District of Columbia. These reductions have been achieved through regulations and non-regulatory programs designed to meet emission reduction commitments in the Ozone Annex.

Under Article V of the agreement, Canada is obligated to notify the U.S., with the use of the Transboundary Notification Form, of any new air pollution source located within 100 kilometres (km) of the Canada-U.S. border that is expected to emit greater than 90 tonnes per year of any one of the common air pollutants; sulphur dioxide, nitrogen oxides, carbon monoxide, total suspended particulates, and volatile organic compounds.

The applicability of this legislation is considered in this assessment.

4.0 Existing Environmental Conditions

The following sections provide the regional and local meteorology and air quality context relevant to the Project. Regional and local (East Windsor area) historical climate data were sourced from the Government of Canada Past Weather and Climate Historical Data set (Government of Canda 2023).

4.1 Regional Climate

The Project is located in southern Ontario near the mouth of the Detroit River in the East Windsor area. Regionally, the City of Detroit, Michigan is directly across the Detroit River spanning from west to north to east of the proposed Project with Lake St. Clair to the east, and Lake Erie to the south. **Figure 1-1** provides a regional view of the proposed Project.

As part of southern Ontario, Windsor experiences a warmer, more humid climate than the subarctic northern region of the province of Ontario. Windsor is the most humid city in the region and sees four distinct seasons marked by warm, humid summers and cold, wet winters. It is situated at a similar latitude as Northern California and the mean annual temperature is recorded as 10°C.

Temperatures are moderated by delayed cooling of lakes in the north and the south that lessen summer and winter climate extremes, delay autumn frosts, and reduce day and night temperature differences. On average, January is the coldest month of the year, and July the warmest. Precipitation is relatively evenly distributed seasonally, though more precipitation is typically observed during the summer months. Proximity to the Great Lakes produces abundant winter snow cover in some areas of the region, as well as floods, ice storms, heavy fog, hail, and blizzards.

4.2 Local Meteorology and Ambient Air Quality Context

Understanding local climate and meteorological conditions, and ambient air quality composition, is important in determining any potential effects a project may have on the local environment. The Project is in an industrial area 135 m south of the Detroit River, approximately 1,500 m south of the city of Detroit, 4,700 m west from Lake St. Clair, and 32,000 m (32 km) north of Lake Erie.

In this assessment, historical meteorological data from Windsor Airport (Windsor A) station[2] were used to identify climate normals and means of temperature, precipitation, and wind speed and wind direction for the purposes of characterizing local meteorological conditions.

Meteorological data collected from 1981–2010, monthly averages of temperature, precipitation, and wind speed and direction from the Windsor A station are summarized below. The chosen timeframe for the meteorological data (1981 – 2010) reflects the accessibility of official statistics from Canada's Ministry of Environment and Climate Change (ECCC). For dispersion modelling purposes, data sets made available by the MECP were used, as described the following sections.

4.2.1 Temperature

Daily average, maximum, and minimum temperatures for each month are presented in **Table 4-1**. The extreme maximum temperature recorded was 40.2°C in June, while the extreme minimum temperature recorded was -29.1°C in January.

[2] Windsor A station is operated by NAV Canada, located at Latitude:42°16'34.000" N, Longitude:82°57'19.000" W, which is approximately 7 kilometers east from Windsor centre. Its elevation is 189.60 m, climate ID: 6139530, WMO ID:71538 and TC ID:YQG.

Table 4-1: Monthly Average and Extreme Temperatures at Windsor A Station, 1981 – 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily Average (°C)	-3.8	-2.6	2.3	8.9	15	20.5	23	22	17.9	11.3	5.1	-1.2
Standard Deviation	2.9	2.3	1.8	1.5	2	1.3	1.3	1.4	1.4	1.6	1.7	2.8
Daily Maximum (°C)	-0.3	1.1	6.7	14.1	20.4	25.8	28.1	26.9	22.9	15.8	8.8	2
Daily Minimum (°C)	-7.3	-6.3	-2.2	3.7	9.5	15.3	17.9	17.1	12.8	6.7	1.4	-4.3
Extreme Maximum (°C)	17.8	20.4	26.6	31.1	34	40.2	38.3	37.7	37.2	32.2	26.1	19.6
Extreme Minimum (°C)	-29.1	-23.4	-19.7	-9.5	-2.8	2.8	5.6	5.2	-1.1	-5	-15.6	-23.4

Note: Data collected from Government of Canada's (2023) online repository for Past Weather and Climate: Historical Data

4.2.2 Precipitation

Table 4-2 provides monthly average precipitation, divided into rainfall and snowfall. The month with the highest average rainfall recorded was September with the lowest average rainfall being recorded in the month of January. The highest average snowfall over the recorded period was January, with the lowest average snowfall being in October from fall to Spring. The extreme daily rainfall is 94.6 mm occurring in April, and extreme daily snowfall is 36.8 cm occurring in February.

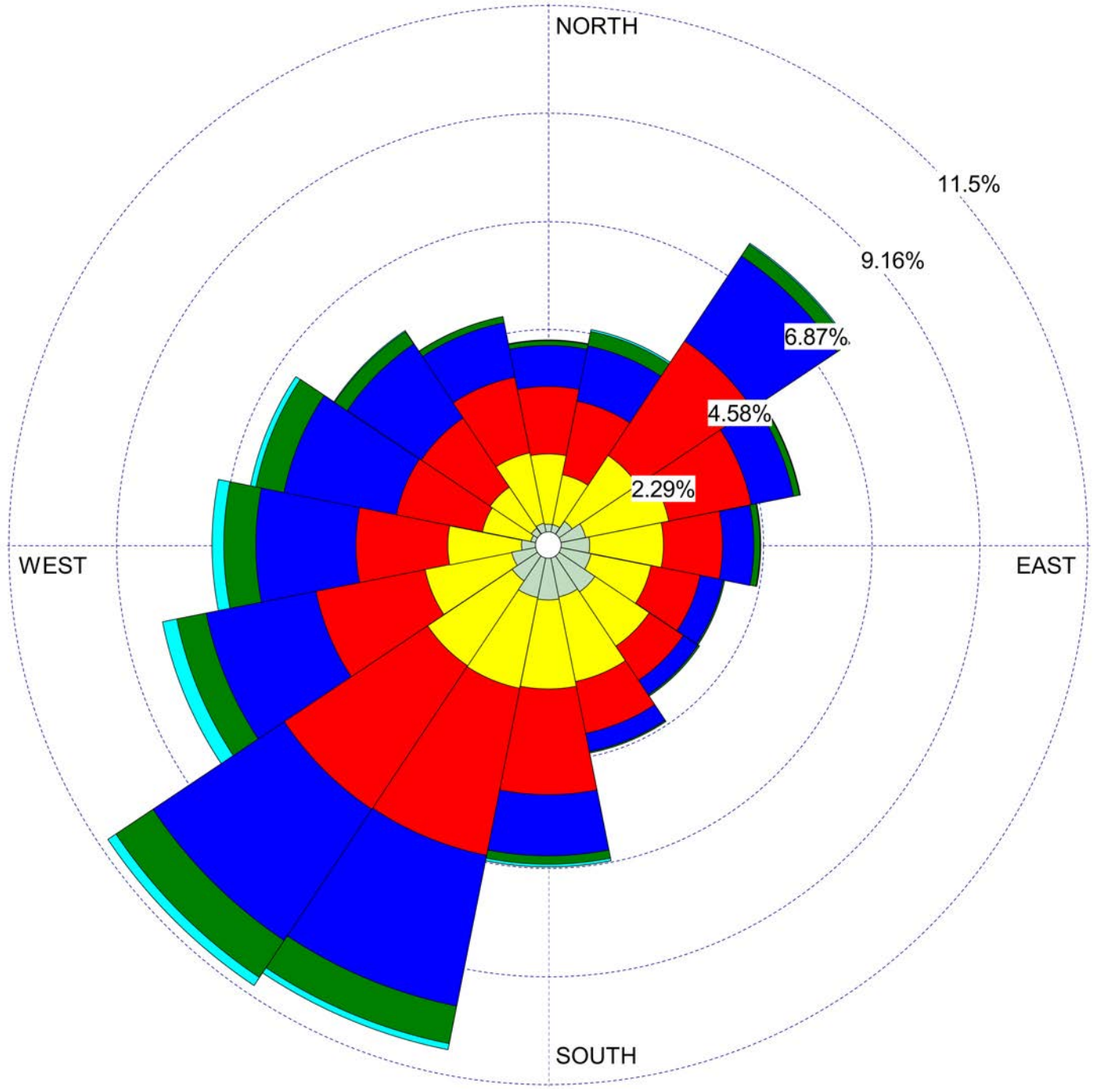
Table 4-2: Average Monthly and Extreme Precipitation at Windsor A Station, 1981 – 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	32.4	35.6	50.9	77.7	89.3	86.1	89.2	72.6	93.9	72	74.5	48.3
Snowfall (cm)	37.2	30.5	20.9	5.8	0	0	0	0	0	0.6	5.5	28.8
Precipitation (mm)	62.1	62.2	70	83	89.3	86.1	89.2	72.6	93.9	72.6	79.6	74.1
Extreme Daily Rainfall (mm)	43	70.6	46.4	94.6	54.9	78	82	79.4	89	71.6	48.4	72.6
Extreme Daily Snowfall (cm)	28.2	36.8	22.4	16	0.5	0	0	0	0	13.8	34.8	32.3

Note: Data collected from Government of Canada's (2023) online repository for Past Weather and Climate: Historical Data

4.2.3 Wind Speed and Direction

In June 2023, SLR submitted a request to the MECP to use site-specific data for the Project air dispersion modeling. Site-specific meteorological data referenced the Windsor Airport data as a reasonable reflection of the meteorological conditions for the assessment. A 5-year (2018-2022) dataset was prepared by the MECP with wind sector dependent land use specific to the Project Site. Surface wind data was sourced from NAV Canada's Windsor Airport station, with gaps filled with those of the MECP prognostic dataset for the Windsor airport station from the advanced research version of the Weather Research and Forecasting (WRF-ARW) model. Surface data, as obtained from MECP was used to generate a wind rose for the years between 2018-2022. **Figure 4-1** presents the wind rose data, with predominant winds from the southwest and northeast quadrants. The average wind speed is approximately 4.48 m/s.



LEGEND:

WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.00%

NOTES:
STATION #61395
WIND SPEED DIRECTION (BLOWING FROM)
START DATE: 1/1/2018 - 00:00
END DATE: 12/31/2022 - 23:59
TOTAL COUNT: 43824 HRS
CALM WINDS: 0.00%
AVG. WIND SPEED: 4.48 M/S

PAGE SIZE 11 x 17

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY
AND SHOULD NOT BE USED FOR NAVIGATION

EAST WINDSOR GENERATION
FACILITY EXPANSION

AIR QUALITY ASSESSMENT

WIND ROSE

SLR

FIGURE NO:
4-1

DATE: July 2024

PROJECT NO: 241.30524.00024

4.3 Ambient (Background) Air Quality

A review of the MECP and National Air Pollution Surveillance (NAPS) ambient monitoring stations in the Windsor area, was undertaken to identify monitoring stations that are near the Project and representative of background air quality concentrations. The ambient monitoring station used for this assessment includes:

- Windsor Downtown (ID: 12008), Address: 467 University Avenue W. Years: 2018-2022, COCs: $PM_{2.5}$, NO_X, CO, SO_2

PM_{10} is not measured in Ontario; therefore, background concentrations were estimated by applying a $PM_{2.5}/PM_{10}$ ratio of 0.54 (Lall et al. 2004). The 90th percentile ambient concentrations are provided in **Table 4-3**. In cumulative assessments, the 90th percentile of available monitoring data is commonly used as a conservative estimate of background air quality, as recommended by the Canadian Environmental Assessment (CEA) (CEA Agency and CNSC, 2012). Consequently, the 90th percentile of measured concentrations is utilized to represent background air quality for parameters with shorter averaging periods (i.e., 1-hour, 8-hour, and 24-hour). The annual background concentrations are calculated based on the mean of the available data. The 90th percentile monitoring data is applicable as the background ambient air quality for both AAQC and CAAQS.

Table 4-3: Background Ambient Air Quality Concentrations (2018-2022)

COC	Averaging Period	90th Percentile Ambient Concentration (µg/m^3)	Monitoring Station
CO	1-hr	385	Windsor Downtown (12008)
	8-hr	379	Windsor Downtown (12008)
NO_X	1-hr	46	Windsor Downtown (12008)
	24-hr	42	Windsor Downtown (12008)
PM_{10}	24-hr	25	Windsor Downtown (12008)
$PM_{2.5}$	24-hr	13	Windsor Downtown (12008)
	Annual	9	Windsor Downtown (12008)
SO_2	10-min	5	Windsor Downtown (12008)
	1-hr	3	Windsor Downtown (12008)
	Annual	2	Windsor Downtown (12008)

These ambient concentrations were added to maximum modelled Project concentrations to estimate combined air quality concentrations at sensitive receptors and POIs locations in the air quality assessment spatial boundary as defined in Section 6.3.

The existing EWCC has been operating since 2009 and therefore contributes to historical and current baseline air quality conditions. The existing EWCC specific emissions are discussed further in **Section 6.0**.

5.0 Air Contaminants and Air Quality Criteria

5.1 Project Air Contaminants

The combustion of natural gas associated with the generation of electricity from a gas turbine generation facility results in emissions of contaminants of concern (COCs) to the atmosphere. COCs identified for natural gas fueled turbines include:

- Nitrogen oxides (NO_X) (in the form of Nitrogen Dioxide or NO_2);
- Carbon monoxide (CO);
- PM; where total particulate matter and fine particulate matter are assessed for the Project, with fine particulate matter defined as particulate sizes 2.5 microns in diameter and less ($PM_{2.5}$), and 10 microns in diameter and less (PM_{10}); and
- Sulphur dioxide (SO_2).

Volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and to a lesser extent, metals, can be detected in the exhaust stream as a result of the combustion process. Emission quantifications were completed for the normal operating conditions (Simple Cycle – 100% Load) for the above-mentioned compounds and predicted to be released in trace amounts. Due to the low emissions modeled, these compounds (VOCs, PAH, and metals) have not been included in the combined effects analysis.

5.2 Air Quality Assessment Criteria

Table 5-1 presents the COC assessment criteria used. Regulatory frameworks described in Section 3.0 of this report, are compared to modelled predictions for the following purposes:

- **Provincial O. Reg. 419/05 Limit** – required to meet compliance as this is the provincial standard for the ECA process.
- **Provincial AAQC Limit** – sets out provincial target concentrations for acceptable ambient air quality in a local airshed. These are not compliance standards but are used for guidance purposes.
- **Federal CAAQS Targets** – these are federal targets to determine appropriate air quality management actions within an air zone. These are not compliance standards but are used for guidance purposes.

Averaging periods are researched and developed by the Canadian Council of Ministers of the Environment (CCME) and provincial environmental agencies. Averaging periods differ depending on the COC, since each COC has a unique effect on human health and the environment.

Table 5-1: COC Assessment Criteria

COC	Averaging Period	O. Reg. 419/05 Limit (µg/m^3)	AAQC Limit (µg/m^3)	CAAQS (ppb)
NO_X	1-hour	400	400	42
	24-hour	200	200[3]	-
	Annual	-	-	12
CO	1/2 hour	6,000		-
	1-hour	-	36,200	-
	8-hour	-	15,700	-
PM_{10}	24-hour	120[4]	50	-
$PM_{2.5}$	24-hour	-	27	27 (µg/m^3)[5]
	Annual	-	8.8	8.8 (µg/m^3)[6]
SO_2	10-minute	-	67 ppb	-
	1-hour	100	40 ppb	65
	Annual	10	4 ppb	4

6.0 Methods

6.1 Existing Emission Sources

The proposed Project is located adjacent to the existing EWCC. To be conservative, air quality data from both the EWCC and Windsor Downtown ambient air monitoring station were incorporated into the baseline assessment. The emission sources associated with the existing EWCC are the two simple cycle natural gas fired turbine generator exhaust stacks. The stacks' physical parameters and emissions data used for the combined dispersion modeling from the existing EWCC were taken from the 2021 ESDM report (Dillon Consulting 2007) and can be found in **Table 6-1**.

The 2021 ESDM report showed that the existing facility demonstrates regulatory compliance, since the predicted ground-level concentrations of COCs from the existing EWCC are below the O. Reg. 419/05 thresholds. A combined effects analysis was completed to compare the combined COC concentrations at the property line and closest sensitive receptor to the AAQC and CAAQS limits**.** Results of this analysis can be found in **Section 8.0.**

[3] Limit is for Nitrogen Dioxide (NO_2). NO_X concentrations were conservatively compared against this limit for this assessment.

[4] O. Reg. 419/05 limit for particulate matter is for total particulate matter.

[5] The 24-hr $PM_{2.5}$ CAAQS is based on the 3-year average of the annual 98th percentile of the 24-hr average concentrations.

[6] The annual $PM_{2.5}$ CAAQS is based on the average of the three highest annual average values over the study period.

Table 6-1: Stack Parameters and Emission Data – Existing EWCC

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique (1)	Emissions Data Quality	% of Overall Emissions
GTG1	Point	NG-fired Turbine	191.6	461.7	3.22	23.5	27.4	13.4	335137	4687865	Nitrogen Oxides	10102-44-0	5.05	1, 24	EC	Average	50
											Carbon Monoxide	630-08-0	3.10	0.5	EC	Average	50
											Sulphur Dioxide	7446-09-5	0.172	1, annual	EC	Average	50
											Particulate Matter	N/A	0.505	24	EC	Average	50
GTG2	Point	NG-fired Turbine	191.6	461.7	3.22	23.5	27.4	13.4	335145	4687846	Nitrogen Oxides	10102-44-0	5.05	1, 24	EC	Average	50
											Carbon Monoxide	630-08-0	3.10	0.5	EC	Average	50
											Sulphur Dioxide	7446-09-5	0.172	1, annual	EC	Average	50
											Particulate Matter	N/A	0.505	24	EC	Average	50

Note: EC refers to Engineering Calculation.

6.2 Project Emission Sources

The primary air emission source from the Project is the dedicated exhaust stack associated with the proposed new natural gas fired GE 7E.03 turbine. The United States Environmental Protection Agency (US EPA) publishes emission factors for stationary gas turbines. For the Project, NO_X turbine emission rates were based on manufacturer's specifications, whereas the emission factors for total suspended particulate (TSP) and SO_2 used were from the US EPA AP-42 Chapter 3.1: Stationary Gas Turbines (US EPA 1996) (**Appendix A**).

VOCs, PAHs, and metals emissions were calculated based on US EPA AP-42 Chapter 1.4: Natural Gas Combustion (US EPA 1996). VOCs, PAHs, and metals emission rates were only included for the Normal Operating Scenario. Maximum emission rates per averaging period were calculated in accordance with requirements outlined in Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling Report (MECP 2018).

Section 6.5 summarizes stack parameters and emissions data used for five operating scenarios modelled (Modelling Scenarios).

Assuming a highly conservative case of the Project operating at peak load for the maximum of 1,500 hours for a peaking facility, the maximum annual NO_X emissions are estimated to be 68.6 tonnes per year, which is lower than the 90-tonne threshold for notification under the Canada-United States Air Quality Agreement. However, Capital Power will track annual emissions and provide the appropriate notification, if required in the future.

6.3 Assessment Boundaries

The air quality assessment spatial boundary used a 16 x 16 km receptor grid for conducting the dispersion modelling. The dispersion modelling grid selected was based on the requirements described in Guideline A-11: Air Dispersion Modelling Guideline for Ontario (ADMGO 2017).

A receptor grid was placed over the Project following the ADMGO (2017) methods. Receptors were selected based on guidance provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. Specifically, the nested receptor grid used for modelling centered on the Project turbine stack and used the following spacing which provides for more receptors spread over a larger area compared to the guidance documentation:

a) 20 m spacing between receptor points, within an area of 300 m by 300 m centred around the Project

b) 50 m spacing, within an area surrounding the area described in (a) with a boundary at 600 m by 600 m outside the boundary of the area described in (a)

c) 100 m spacing, within an area surrounding the area described in (b) with a boundary at 1,100 m by 1,100 m outside the boundary of the area described in (b)

d) 200 m spacing, within an area surrounding the area described in (c) with a boundary at 2,100 m by 2,100 m outside the boundary of the area described in (c)

e) 500 m spacing, within an area surrounding the area described in (d) with a boundary at 5,100 m by 5,100 m outside the boundary of the area described in (d)

f) 1,000 m spacing, within an area surrounding the area described in (e) with a boundary at 8,000 m by 8,000 m outside the boundary of the area described in (e)

In addition to using the nested receptor grid, POIs were also placed every 10 metres along the Project Site property line.

6.4 Points of Impingement (POI)

The dispersion model predicts concentrations of selected COCs at ground level or POI. POIs are maximum concentrations located at and beyond the property line of a Project Site. Two types of POI were included in the model: a general POI grid or nested grid covering the surrounding area, and 15 sensitive receptors. Sensitive receptors were chosen to represent locations where extended human occupancy is experienced, such as residences and hotels. Heights of these receptors are determined based on potential exposure to humans. **Table 6-2** and **Figure 6-1** present the locations of the 15 sensitive receptors identified for modelling. Dispersion modelling was used to select sensitive receptors R1 through R4 to represent worst case predicted concentrations and sensitive features surrounding the Project site.

Table 6-2: Sensitive Receptor Locations

ID	Description	Coordinates (UTM Zone 17 – NAD83)	
		X (m)	Y (m)
R1	Residential House	334765.00	4687695.00
R2	Residential House	335359.00	4687792.00
R3	Residential House	335109.00	4687624.00
R4	Rivershore Tower Apartments - Skyline Living	335490.89	4687839.58
R5	Shoreview at Riverside	334988.71	4687844.71
R6	Water's Edge Event Centre	335041.28	4687907.93
R7	Arcadian Apartments	335310.30	4687881.81
R8	Residential House	335400.57	4687998.64
R9	Lifetimes on Riverside	335475.76	4687927.51
R10	Club Lofts Condominium	334420.45	4687599.33
R11	Drouillard Place Terrace	334961.38	4687388.33
R12	Palazzo Apartments	335926.23	4687862.22
R13	Summit House	335672.65	4687932.82
R14	Alexander Park - Hazelview Properties	335517.03	4687929.85
R15	Lions Manor Apartment	335627.38	4687915.19

LEGEND:

- Project Site
- Sensitive Receptor Locations
- Railway

NOTES:
PARCEL FABRIC, CITY OF WINDSOR OPEN DATA CATALOGUE, ACCESSED NOVEMBER, 2022.
IMAGERY: COUNTY OF ESSEX; 2023

0 50 100 200 300 m

SCALE 1:5,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 17N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

EAST WINDSOR GENERATION
FACILITY EXPANSION
224 CADILLAC DRIVE, WINDSOR ONTARIO

AIR QUALITY ASSESSMENT

SELECTED RECEPTOR LOCATIONS

SLR

FIGURE NO:
6-1

DATE: July 2024

PROJECT NO: 241.30524.00024

6.5 Modelling Scenarios

The following modelling scenarios were chosen for the assessment. These scenarios were chosen to represent conservative worst-case emissions (100% load or peak load) under different operating and environmental conditions (ambient temperatures). These scenarios do not occur all of the time; however, of the scenarios assessed, Scenarios A and C (100% load at cold and average temperatures, respectively) would occur most often, followed by peak load Scenarios B (cold temperatures) and D (extreme summer temperatures). Scenario E is the Cold Start scenario which is a start-up condition where the turbines are starting from ambient temperature, all equipment is “cold”. Once equipment reaches required heat rates, emissions return to lower levels. Five operating conditions were assessed, and details of each scenario condition are provided below. Annual average predicted concentrations were scaled based on maximum operating time per year by prorating the predicted annual average concentration result by the operating versus modelling time ratio (1,500 operating hours per year/8,760 hours per year modelled).

6.5.1 Scenario A - 100% Load Normal Operating Scenario (Cold Temperature)

This is intended to be the normal simple cycle operating configuration for the Project. This scenario is indicative of the simple cycle facility operating in response to a high system demand where power is provided to the provincial electricity grid. As an additional conservative measure, the emissions anticipated during cold weather events have been considered and were chosen to represent the 100% Load (Normal Operating) Scenario.

The Guideline A-5 limits and calculations for this scenario have been included in **Appendix B**.

6.5.2 Scenario B - Peak Load (Cold Temperature)

This scenario represents a peak load operating scenario. When periods of high system demand (as requested by the IESO) are required during extreme weather conditions, in this case during winter, peak load captures the emissions profile under this scenario. Peak generation leads to increased equipment maintenance given the increased firing temperature and wear on system components. As a result, this scenario is only intended to be used when required and for a limited period of time to meet system demands.

6.5.3 Scenario C - 100% Load (Average Temperature)

This scenario is similar to Scenario A. The difference with this scenario is the average temperature and relative humidity are closer to the annual average experienced at the Project Site. The emissions (lb/hr) anticipated under this average temperature scenario are lower than those during cold temperatures (Scenario A).

6.5.4 Scenario D - Peak Load (Summer Extreme Temperature)

Similar to Scenario B, this scenario captures periods of high system demand during extreme summer weather conditions. Similarly, peak generation during these conditions leads to increased equipment maintenance given the increased firing temperature and wear on system components. As a result, this scenario is only intended to be used when required and for a limited period of time to meet system demands.

6.5.5 Scenario E - Start-Up Condition

As a peaking power plant, the GE 7E.03 turbine is capable of generating electrical output within 10 to 20 minutes of start-up. During a cold start the turbine uses existing site or grid electricity to initiate the rotation. Once adequate rotational speeds are achieved, the natural gas flow to the unit is turned on, at which time the gas turbine starts to operate under its own combustion power. Gas flow is increased to the gas turbine to increase power.

6.5.6 Dispersion Modelling Parameters

Dispersion modelling was completed using AERMOD version 22112 following the steps outlined in Guideline A-11 (ADMGO 2017). AERMOD combines stack parameter input data, emission rates, terrain, and meteorological data to model a Gaussian plume to simulate the dispersion of COCs into the atmosphere. Stack parameters and emission rates used for modelling are provided in **Table 6-3** through **Table 6-7.** Terrain (TIF) files for Windsor/Detroit region were used from MECP's website and WebGIS.

The AERMOD model includes a module to simulate the building downwash effects from point sources. The US EPA BPIP model with the Prime algorithm has been used to compute building and structure heights and apparent widths and to create the building downwash parameters for AERMOD input. Five years of hourly, site-specific, meteorological data was obtained from the MECP from 2018 to 2022. Each scenario was modelled for NO_X, SO_2, PM, and CO. Modelled scenarios assumed all equipment would run 24 hours per day, 7 days per week, 365 days per year, which would represent the worst case for each of the scenarios presented below and is a highly conservative assumption.

Table 6-3: Stack Parameters and Emission Data – Scenario A – 100% Load Normal Operating Scenario (Cold Temperature)

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM Zone 17 NAD83, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
GEN	Point	NG-Fired Turbine	743	527	4.78	41.4	21.3	-	335113.34	4687861.12	Nitrogen Oxides	10102-44-0	4.95	1, 24	EC	Average	100
											Carbon Monoxide	630-08-0	7.80	0.5	EC	Average	100
											Sulphur Dioxide	7446-09-5	0.44	1, annual	EC	Average	100
											Particulate Matter	N/A	0.63	24	EC	Average	100
Note: EC refers to Engineering Calculation.																	

Table 6-4: Stack Parameters and Emission Data – Scenario B – Peak Load (Cold Temperature)

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM Zone 17 NAD83, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
GEN	Point	NG-Fired Turbine	764	565	4.78	42.56	21.3	-	335113.34	4687861.12	Nitrogen Oxides	10102-44-0	12.70	1-hour, 24-hour	EC	Average	100
											Carbon Monoxide	630-08-0	7.63	½-hour	EC	Average	100
											Sulphur Dioxide	7446-09-5	0.46	1-hour, annual	EC	Average	100
											Particulate Matter	N/A	0.63	24-hour	EC	Average	100
Note: EC refers to Engineering Calculation.																	

Table 6-5: Stack Parameters and Emission Data – Scenario C – 100% Load (Average Temperature)

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM Zone 17 NAD83, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging. Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
GE	Point	NG-Fired Turbine	689	547	4.78	38.36	21.3	-	335113.34	4687861.12	Nitrogen Oxides	10102-44-0	4.37	1, 24	EC	Average	100
											Carbon Monoxide	630-08-0	6.99	0.5	EC	Average	100
											Sulphur Dioxide	7446-09-5	0.39	1, annual	EC	Average	100
											Particulate Matter	N/A	0.63	24	EC	Average	100
Note: EC refers to Engineering Calculation.																	

Table 6-6: Stack Parameters and Emission Data – Scenario D – Peak Load (Summer Extreme Temperature)

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM Zone 17 NAD83, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
GE	Point	NG-Fired Turbine	687	593	4.78	38.25	21.3	-	335113.34	4687861.12	Nitrogen Oxides	10102-44-0	9.19	1, 24	EC	Average	100
											Carbon Monoxide	630-08-0	6.40	0.5	EC	Average	100
											Sulphur Dioxide	7446-09-5	0.39	1, annual	EC	Average	100
											Particulate Matter	N/A	0.63	24	EC	Average	100
Note: EC refers to Engineering Calculation.																	

Table 6-7: Stack Parameters and Emission Data – Scenario E –Start-Up Condition

Source ID	Source Type	Source Description	Stack Parameters								Emission Data						
			Volumetric Flow Rate (m^3/s)	Exit Gas Temperature (°C)	Inner Diameter/ Initial Vertical Dispersion (m)	Exit Velocity (m/s)	Height Above Grade / Release Height (m)	Height Above Roof (m)	Source Coordinates (UTM Zone 17 NAD83, m)		Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
GE	Point	NG-Fired Turbine	609	549	4.78	33.88	21.3	-	335113.34	4687861.12	Nitrogen Oxides	10102-44-0	6.45	1, 24	EC	Average	100
											Carbon Monoxide	630-08-0	13.14	0.5	EC	Average	100
											Sulphur Dioxide	7446-09-5	0.35	1, annual	EC	Average	100
											Particulate Matter	N/A	0.61	24	EC	Average	100
Note: EC refers to Engineering Calculation.																	

7.0 Modelling Results

Results for the dispersion modelling for NO_X, CO, SO_2, and PM arising from Scenario A, the 100% Load Normal Operating Scenario, are provided in **Table 7-1** and **Table 7-2**. As the normal operating scenario is the 100% Load, these results are discussed in more detail within this section. Results are compared against the MECP O. Reg. 419/05 limits, as only the MECP emission limit is required for compliance purposes as discussed in Section 3.0.

7.1 Scenario A - 100% Load Normal Operating Scenario (Cold Temperature)

Modelling results predict that all COCs at POIs and sensitive receptors are below their respective O. Reg. 419/05 limits. An emission summary table including maximum results at each sensitive receptor and the maximum POI is included in **Section 8.0.** The emission summary table for this scenario is provided in **Table 7-1** and **Table 7-2**.

Results for VOCs, PAHs, and metals are included in **Table 7-3** and **Table 7-4.** All modelled results for VOCs, PAHs, and metals that have limits are within the O. Reg. 419/05 and AAQC standards. Natural gas turbine emissions typically have only trace amounts of these compounds, and the modelling results confirmed this is predicted to be the case for the Project.

7.2 Scenario B - Peak Load (Cold Temperatures)

Modelling results predict that all COCs at POIs and sensitive receptors are below their respective O. Reg. 419/05 limits. The emission summary table for this scenario is provided in **Table 7-5**.

7.3 Scenario C - 100% Load (Average Temperature)

Modelling results predict that all COCs at POIs and sensitive receptors are below their respective O. Reg. 419/05 limits**.** The emission summary table for this scenario is provided in **Table 7-6**.

7.4 Scenario D - Peak Load (Summer Extreme Temperature)

Modelling results predict that all COCs at POIs and sensitive receptors are below their respective O. Reg. 419/05 limits**.** The emission summary table for this scenario is provided in **Table 7-7**.

7.5 Scenario E - Start-Up Condition

Modelling results predict that all COCs at POIs and sensitive receptors are below their respective O. Reg. 419/05 limits**.** The emission summary table for this scenario is provided in **Table 7-8.**

Table 7-1: Maximum POI Concentrations for Scenario A - 100% Load Normal Operation Scenario (Cold Temperature) – Project Only

Contaminant	Total Emission Rate (g/s)	Averaging Period	Maximum POI Concentration (µ/m^3)	Maximum Concentration at a Sensitive Receptor (µg/m^3)	MECP POI Limit (µg/m^3)	Percentage of MECP POI Limit (%)	Sensitive Receptor Percentage of MECP POI Limit (%)
Nitrogen Oxides	4.95	24-hour	2.131	1.699	200	1.07	0.85
		1-hour	39.858	14.467	400	9.96	3.62
Carbon Monoxide	7.80	½-hour	75.360	29.820	6,000	1.26	0.50
Sulphur Dioxide	0.44	1-hour	1.385	1.053	100	1.39	1.05
		annual	0.001	0.001	10	0.01	0.01
Particulate Matter	0.63	24-hour	0.271	0.216	120	0.23	0.18
Note: Averaging periods are taken from O. Reg. 419/05 Schedule 3: Standards with Variable Average Hours.							

Table 7-2: COC Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operation Scenario (Cold Temperature) – Project Only

Contaminant	CAS #	Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µ/m^3)	Averaging Period (hours)	MECP POI Limit (µ/m^3)	Limiting Effect	Source Benchmark	Regulation Schedule #	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	4.95	AERMOD	2.131	24	200	Health	Standard	B1	1.07
			AERMOD	39.858	1	400	Health	Standard	B1	9.96
Carbon Monoxide	630-08-0	7.80	AERMOD	75.360	0.5	6000	Health	Standard	B1	1.26
Sulphur Dioxide	7446-09-5	0.44	AERMOD	1.385	1	100	Health & Vegetation	Standard	B1	1.39
			AERMOD	0.001	annual	10	Health & Vegetation	Standard	B1	0.01
Particulate Matter	N/A	0.63	AERMOD	0.271	24	120	Particulate	Standard	B1	0.23

Table 7-3: VOC & PAH Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operations Scenario (Cold Temperature)

CAS#	COC	Emission Factor (lb/MMbtu)	Emission Rate (g/s)	24-hour POI (µg/m^3)	Annual POI (ug/m^3)	MECP Limit (ug/m^3)	AAQC Limit (µg/m^3)	Percentage of MECP Limit (%)	Percentage of AAQC Limit (%)
91-57-6	2-Methylnaphthalene	2.35E-08	3.06E-06	1.17E-06	5.13E-09	35.5	-	0.000	1.000
71-43-2	Benzene	2.06E-06	2.67E-04	1.02E-04	4.49E-07	0.45 annual	0.45 annual	0.0005	0.0005
50-32-8	Benzo(a)pyrene	1.18E-09	1.53E-07	5.85E-08	2.57E-10	0.000001 annual	0.000001 annual	0.025	0.025
106-97-8	Butane	2.06E-03	2.67E-01	1.02E-01	4.49E-04	3550	-	0.003	-
25321-22-6	Dichlorobenzene	1.18E-06	1.53E-04	5.85E-05	2.57E-07	80	-	0.000	-
74-84-0	Ethane	3.04E-03	3.95E-01	1.51E-01	6.63E-04	14500	-	0.001	-
50-00-0	Formaldehyde	7.35E-05	9.55E-03	3.65E-03	1.60E-05	65	65	0.006	0.006
110-54-3	Hexane	1.76E-03	2.29E-01	8.77E-02	3.84E-04	7500	7500	0.001	0.001
91-20-3	Naphthalene	5.98E-07	7.77E-05	2.97E-05	1.31E-07	22.5	22.5	0.000	0.000
109-66-0	Pentane	2.55E-03	3.31E-01	1.27E-01	5.56E-04	35500	-	0.000	-
74-98-6	Propane	1.57E-03	2.04E-01	7.79E-02	3.42E-04	215000	-	0.000	-
108-88-3	Toluene	3.33E-06	4.33E-04	1.66E-04	7.28E-07	2000	2000	0.000	0.000

Table 7-4: Metals Concentrations at POI Compared to Scenario A Criteria for 100% Load Normal Operations Scenario (Cold Temperature) during Operating Conditions

CAS#	COC	Emission Factor (lb/MMbtu)	Emission Rate (g/s)	24-hour POI (µg/m^3)	Annual POI (µg/m^3)	MECP Limit (µg/m^3)	AAQC Limit (µg/m^3)	Percentage of MECP O. Reg 419/05 Limit (%)	Percentage of AAQC Limit (%)
7440-38-2	Arsenic	1.96E-07	2.55E-05	9.74E-06	4.28E-08	0.3	0.3	0.003	0.003
7440-39-3	Barium	4.31E-06	5.60E-04	2.14E-04	9.42E-07	10	10	0.002	0.002
7440-41-7	Beryllium	1.18E-08	1.53E-06	5.85E-07	2.57E-09	0.01	0.01	0.006	0.006
7440-43-9	Cadmium	1.08E-06	1.40E-04	5.36E-05	2.35E-07	0.025	0.025	0.214	0.214
7440-43-9	Cadmium	1.08E-06	1.40E-04	5.36E-05	2.35E-07	-	0.005 annual	-	0.005
7440-47-3	Chromium	1.37E-06	1.78E-04	6.82E-05	2.99E-07	0.5	0.5	0.014	0.014
7440-48-4	Cobalt	8.24E-08	1.07E-05	4.09E-06	1.80E-08	0.1	0.1	0.004	0.004
7440-50-8	Copper	8.33E-07	1.08E-04	4.14E-05	1.82E-07	50	50	0.000	0.000
7439-96-5	Manganese	3.73E-07	4.84E-05	1.85E-05	8.13E-08	0.4	50	0.005	0.000
7439-97-6	Mercury	2.55E-07	3.31E-05	1.27E-05	5.56E-08	2	2	0.001	0.001
7439-98-7	Molybdenum	1.08E-06	1.40E-04	5.36E-05	2.35E-07	120	120	0.000	0.000
7440-02-0	Nickel	2.06E-06	2.67E-04	1.02E-04	4.49E-07	0.04 annual	0.04 annual	0.001	0.001
7440-02-0	Nickel	2.06E-06	2.67E-04	1.02E-04	4.49E-07	-	0.1	-	0.102
7782-49-2	Selenium	2.35E-08	3.06E-06	1.17E-06	5.13E-09	10	10	0.000	0.000
7440-62-2	Vanadium	2.30E-06	2.98E-04	1.14E-04	5.02E-07	2	2	0.006	0.006
7440-66-6	Zinc	2.84E-05	3.69E-03	1.41E-03	6.21E-06	120	120	0.001	0.001

Table 7-5: COC Concentrations at POI Compared to Scenario B Criteria for Peak Load (Cold Temperature) – Project Only

Contaminant	CAS #	Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µ/m^3)	Averaging Period (hours)	MECP POI Limit (µ/m^3)	Limiting Effect	Source Benchmark	Regulation Schedule #	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	12.70	AERMOD	5.311	24	200	Health	Standard	B1	2.66
			AERMOD	98.677	1	400	Health	Standard	B1	24.67
Carbon Monoxide	630-08-0	7.63	AERMOD	71.688	0.5	6,000	Health	Standard	B1	1.19
Sulphur Dioxide	7446-09-5	0.46	AERMOD	1.419	1	100	Health & Vegetation	Standard	B1	1.42
			AERMOD	0.001	annual	10	Health & Vegetation	Standard	B1	0.01
Particulate Matter	N/A	0.63	AERMOD	0.263	24	120	Particulate	Standard	B1	0.22

Table 7-6: COC Concentrations at POI Compared to Scenario C Criteria for 100% Load (Average Temperature) – Project Only

Contaminant	CAS #	Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µ/m^3)	Averaging Period (hours)	MECP POI Limit (µ/m^3)	Limiting Effect	Source Benchmark	Regulation Schedule #	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	4.37	AERMOD	3.500	24	200	Health	Standard	B1	1.75
			AERMOD	64.290	1	400	Health	Standard	B1	16.07
Carbon Monoxide	630-08-0	6.99	AERMOD	126.492	0.5	6000	Health	Standard	B1	2.11
Sulphur Dioxide	7446-09-5	0.39	AERMOD	3.440	1	100	Health & Vegetation	Standard	B1	3.44
			AERMOD	0.001	annual	10	Health & Vegetation	Standard	B1	0.01
Particulate Matter	N/A	0.63	AERMOD	0.500	24	120	Particulate	Standard	B1	0.42

Table 7-7: COC Concentrations at POI Compared to Scenario D Criteria for Peak Load (Summer Extreme Temperature) – Project Only

Contaminant	CAS #	Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µ/m^3)	Averaging Period (hours)	MECP POI Limit (µ/m^3)	Limiting Effect	Source Benchmark	Regulation Schedule #	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	9.19	AERMOD	7.860	24	200	Health	Standard	B1	3.93
			AERMOD	137.370	1	400	Health	Standard	B1	34.34
Carbon Monoxide	630-08-0	6.40	AERMOD	116.136	0.5	6000	Health	Standard	B1	1.94
Sulphur Dioxide	7446-09-5	0.39	AERMOD	3.540	1	100	Health & Vegetation	Standard	B1	3.54
			AERMOD	0.001	annual	10	Health & Vegetation	Standard	B1	0.01
Particulate Matter	N/A	0.63	AERMOD	0.530	24	120	Particulate	Standard	B1	0.44

Table 7-8: COC Concentrations at POI Compared to Scenario E Criteria for Start-Up Condition – Project Only

Contaminant	CAS #	Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µ/m^3)	Averaging Period (hours)	MECP POI Limit (µ/m^3)	Limiting Effect	Source Benchmark	Regulation Schedule #	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	6.45	AERMOD	4.01	24	200	Health	Standard	B1	2.0
			AERMOD	59.23	1	400	Health	Standard	B1	14.8
Carbon Monoxide	630-08-0	13.14	AERMOD	144.82	0.5	6000	Health	Standard	B1	2.4
Sulphur Dioxide	7446-09-5	0.35	AERMOD	1.56	1	100	Health & Vegetation	Standard	B1	1.6
			AERMOD	0.01	annual	10	Health & Vegetation	Standard	B1	0.1
Particulate Matter	N/A	0.61	AERMOD	0.38	24	120	Particulate	Standard	B1	0.3

8.0 Combined Concentration Results

Analysis was completed for the combined scenario which considers simultaneous operation of the Project and existing EWCC based on predicted results from dispersion modelling.

8.1 Start-Up Scenario

An analysis was completed of the start-up condition for the Project (Scenario E) combined with the existing EWCC operations. This scenario is expected to occur infrequently and is considered a temporary operating condition as both the existing EWCC and the Project reach load quickly; between 10 to 20 minutes.

The start-up condition for the Project is considered the worst-case scenario in terms of NO_x emissions, which are limiting in considering regulatory air quality standards associated with natural gas combustion. The results of this scenario were therefore compared to O. Reg. 419/05 criteria. Results of these analyses demonstrate that the COC concentrations at POIs are within O. Reg. 419/05 thresholds (**Table 8-1)**.

Table 8-1: Combined Maximum Concentration Results for Scenario E (Start-Up Scenario) Compared to O. Reg. 419/05

Contaminant	Averaging Period	Combined Maximum at POI (µg/m^3)	Combined Maximum at Sensitive Receptor (µg/m^3)	O. Reg. 419/05 Limits (µg/m^3)	Combined Maximum at POI Percentage of Limit	Combined Maximum at Sensitive Receptor Percentage of Limit
NO_X	1-Hour	105.08	98.86	400	26.3%	24.7%
	24-Hour	27.78	27.78	200	13.9%	13.9%
CO	1/2-Hour	2.77	2.77	6000	2.3%	2.3%
SO_2	1-Hour	136.56	110.21	100	2.3%	1.8%
	annual	3.94	3.70	10	3.9%	3.7%
PM	24-Hour	0.03	0.03	120	0.3%	0.3%

Note:
Predicted results from dispersion modelling for the combined scenario includes emissions from both the Project and existing EWCC facility.

8.2 Normal Operating Scenario

Predicted results from dispersion modelling for the combined scenario includes emissions from both the Project and existing EWCC under 100% load conditions. This assessment represents a conservative scenario, as the two facilities are anticipated to infrequently operate simultaneously. The assessment also assumes all equipment would run 24 hours per day, 7 days per week, which is a highly conservative assumption. Modelling results were added with the local, historical, ambient air quality data, adding further conservatism to the assessment, since the current EWCC emissions would have also contributed to ambient conditions.

This analysis was conducted for Scenario A, which represents the 100% Load (Normal Operating Scenario), at the 15 selected sensitive receptors. Results of these analyses demonstrate that despite high background concentrations, the COC concentrations at sensitive receptors are within the AAQC and CAAQS thresholds. For instance, predicted concentrations for annual $PM_{2.5}$ are close to the AAQC's; however, the background comprises most of the concentration as the facility operates for a maximum of 1,500 hours per year based on the requirements of Guideline A-5. Modelling results are presented in **Table 8-2** through **Table 8-5**.

Table 8-2: Combined Maximum Concentration Results for Scenario A 100% Load (Normal Operating Scenario) Compared to O. Reg. 419/05

Contaminant	Averaging Period	Combined Maximum at POI (µg/m³)	Combined Maximum at Sensitive Receptor (µg/m³)	O. Reg. 419/05 Limits (µg/m³)	Combined Maximum at POI Percentage of Limit	Combined Maximum at Sensitive Receptor Percentage of Limit
NO_X	1-Hour	93.8	88.73	400	23.5%	22.2%
	24-Hour	26.57	26.57	200	13.3%	13.3%
CO	1/2-Hour	77.6	76.86	6000	1.3%	1.3%
SO_2	1-Hour	3.60	3.57	100	3.6%	3.6%
	annual	0.01	0.01	10	0.1%	0.1%
PM	24-Hour	2.67	2.67	120	2.2%	2.2%

Note:
Predicted results from dispersion modelling for the combined scenario includes emissions from both the Project and existing EWCC facility.

Table 8-3: Combined Concentration Results for Scenario A 100% Load (Normal Operating Scenario) Compared to AAQC

Contaminant	Averaging Period	90th Percentile of Ambient Background Concentration (µg/m³)	Highest Concentration (Project + existing EWCC) at Sensitive Receptor (µg/m³)	Combined Maximum at Sensitive Receptor (µg/m³)	AAQC Limits (µg/m³)	Sensitive Receptor Percentage of Limit
NO_X	1-Hour	46.1	88.73	134.8	400	34%
	24-Hour	42.3	26.57	68.8	200	34%
CO	1-Hour	385	64.05	449	36,200	1%
	8-Hour	379	35.78	415	15,700	3%
SO_2	10-min	4.5	5.88	10.4	67 ppb (178.2 µg/m³)	6%
	1-Hour	2.75	3.57	6.32	40 ppb (106.4 µg/m³)	6%
	annual	1.68	0.01	1.71	4 ppb (10.6 µg/m³)	16%
PM_{10}	24-Hour	24.9	2.67	27.6	50	55%
$PM_{2.5}$	24-Hour	13.4	2.67	16.0	27	59%
	annual	8.48	0.01	8.49	8.8	96%

Note:
[1] The AAQC limits for SO_2 and NO_2 are in the unit of Part Per Billion (ppb). The (ppb) unit converted to (µg/m³) by using following factors:
SO_2: (µg/m³) = (ppb) * 2.66
NO_2: (µg/m³) = (ppb) * 1.88
[2] Predicted results from dispersion modelling for the combined scenario includes emissions from both the Project and existing EWCC facility.

Table 8-4: Combined Concentration Results (Project + Existing EWCC) for Scenario A 100% Load (Normal Operating Scenario) Compared to CAAQS

Contaminant	Averaging Period	90th Percentile of Ambient Background Concentration (µg/m³)	Combined Concentration at Sensitive Receptor (µg/m³) *	Cumulative Concentration at Sensitive Receptor (µg/m³)	CAAQS Targets (ppb)	Sensitive Receptor Percentage of Targets
NO_2	1-Hour	38.17	11.78	49.95	42 (78.9 µg/m³)	63%
	annual	21.61	0.16	21.77	12 (22.5 µg/m³)	97%
SO_2	1-Hour	2.75	0.79	3.54	65 (172.9 µg/m³)	2%
	annual	1.68	0.01	1.69	4 (10.6 µg/m³)	16%
$PM_{2.5}$	24-Hour	13.45	0.74	14.19	27 (µg/m³)	53%
	Annual	8.48	0.01	8.49	8.8 (µg/m³)	96%

Note:
[1] The CAAQS limits for SO_2 and NO_2 are in the unit of Part Per Billion (ppb). The (ppb) unit converted to (µg/m³) by using following factors:
SO_2: (µg/m³) = (ppb) * 2.66
NO_2: (µg/m³) = (ppb) * 1.88
[2] Predicted results from dispersion modelling for the combined scenario includes emissions from both the Project and existing EWCC facility.
***CAAQS Statistical Form:**
The 1-hour NO_2 CAAQS is based on the 3-year average of the annual 98th percentile of the NO_2 daily maximum 1-hour average concentrations.
The annual NO_2 CAAQS is based on the average over a single calendar year of all the 1-hour average NO_2 concentrations.
The 24-hr $PM_{2.5}$ CAAQS is based on the 3-year average of the annual 98th percentile of the 24-hr average concentrations.
The annual $PM_{2.5}$ CAAQS is based on the average of the three highest annual average values over the study period.
The 1-hour SO_2 CAAQS is based on the 3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations.
The annual SO_2 CAAQS is based on the average over a single calendar year of all the 1-hour average SO_2 concentrations.

Table 8-5: COC Combined Concentrations Compared to AAQC/CAAQs Limits at Sensitive Receptors during Normal Operations Scenario A Operating Conditions

Receptor	COC Specific Combined Concentrations at Sensitive Receptors for Normal Operations																											
	NO_X 24-Hour			NO_X 1-Hour			PM_{10} 24-Hour			$PM_{2.5}$ 24-hour			$PM_{2.5}$ annual			CO 1-Hour			CO 8-Hour			SO_2 10-minute			SO_2 1-Hour			SO_2 annual		
	Combined Concentration (ug/m^3)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of CAAQs Target	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of CAAQs Target	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ug/m^3)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ppb)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ppb)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution	Combined Concentration (ppb)	Percentage of AAQC Limit	Percentage of Ambient Background Contribution
R1	45	22%	21%	61	15%	12%	25	51%	50%	14	50%	50%	8.50	97%	96%	396	1%	1%	385	2%	2%	3.2	5%	3%	1.3	3%	3%	0.64	16%	16%
R2	52	26%	21%	135	34%	12%	26	52%	50%	14	50%	50%	8.50	97%	96%	446	1%	1%	413	3%	2%	5.0	7%	3%	2.3	6%	3%	0.64	16%	16%
R3	46	23%	21%	115	29%	12%	25	50%	50%	14	50%	50%	8.49	96%	96%	435	1%	1%	407	3%	2%	4.6	7%	3%	2.1	5%	3%	0.64	16%	16%
R4	62	31%	21%	127	32%	12%	27	54%	50%	14	52%	50%	8.55	97%	96%	449	1%	1%	415	3%	2%	5.1	8%	3%	2.4	6%	3%	0.65	16%	16%
R5	44	22%	21%	55	14%	12%	25	50%	50%	14	50%	50%	8.49	97%	96%	391	1%	1%	383	2%	2%	3.1	5%	3%	1.2	3%	3%	0.64	16%	16%
R6	43	22%	21%	66	17%	12%	25	50%	50%	13	50%	50%	8.48	96%	96%	398	1%	1%	386	2%	2%	3.3	5%	3%	1.3	3%	3%	0.64	16%	16%
R7	54	27%	21%	110	27%	12%	26	52%	50%	14	50%	50%	8.50	97%	96%	428	1%	1%	403	3%	2%	4.4	7%	3%	2.0	5%	3%	0.64	16%	16%
R8	56	28%	21%	87	22%	12%	26	53%	50%	14	51%	50%	8.52	97%	96%	417	1%	1%	397	3%	2%	4.0	6%	3%	1.7	4%	3%	0.65	16%	16%
R9	66	33%	21%	112	28%	12%	27	55%	50%	14	52%	50%	8.55	97%	96%	441	1%	1%	410	3%	2%	4.8	7%	3%	2.2	6%	3%	0.65	16%	16%
R10	46	23%	21%	60	15%	12%	25	51%	50%	14	50%	50%	8.50	97%	96%	396	1%	1%	385	2%	2%	3.2	5%	3%	1.3	3%	3%	0.64	16%	16%
R11	52	26%	21%	75	19%	12%	26	52%	50%	14	50%	50%	8.50	97%	96%	407	1%	1%	391	2%	2%	3.6	5%	3%	1.5	4%	3%	0.64	16%	16%
R12	50	25%	21%	73	18%	12%	26	51%	50%	14	51%	50%	8.51	97%	96%	404	1%	1%	390	2%	2%	3.5	5%	3%	1.5	4%	3%	0.65	16%	16%
R13	64	32%	21%	93	23%	12%	27	54%	50%	14	52%	50%	8.55	97%	96%	422	1%	1%	400	3%	2%	4.1	6%	3%	1.8	5%	3%	0.65	16%	16%
R14	69	34%	21%	111	28%	12%	28	55%	50%	14	52%	50%	8.56	97%	96%	439	1%	1%	409	3%	2%	4.7	7%	3%	2.2	5%	3%	0.65	16%	16%
R15	64	32%	21%	95	24%	12%	27	54%	50%	14	52%	50%	8.55	97%	96%	423	1%	1%	400	3%	2%	4.2	6%	3%	1.8	5%	3%	0.65	16%	16%

9.0 Summary of Findings

Modelling results for the selected operating scenarios show that the Project will be associated with increases to local and regional air quality emissions, however, emissions of identified COCs at POIs are predicted to remain below their respective O. Reg. 419/05 limits.

The air quality assessment also considered combined modeling scenarios whereby both the existing EWCC and the Project would run simultaneously, which is anticipated to occur infrequently. Both the existing EWCC and the Project were modelled as operating simultaneously and continuously, 24 hours a day, 7 days a week which is a highly conservative assumption. During Project start-up conditions, the results demonstrated compliance with regulatory thresholds. For the normal operating conditions, historical ambient data were added to the combined modelling results. The assessment can further be considered conservative since it is expected that the existing EWCC emissions will also contribute to ambient conditions. Modelling results for the combined assessment predict that despite high background concentrations for two COCs, concentrations at sensitive receptors will be below their respective AAQC and CAAQS thresholds for the normal operating scenario.

In the case of annual $PM_{2.5}$, the predicted combined concentrations are 96% of the 8.8 ($\mu g/m^3$) threshold recognized in both the AAQC and CAAQS. However, the total emissions from the Project and existing EWCC contribute less than 1% to the combined concentration with the high background concentrations contributing to the air quality condition.

Similarly, in the case of the CAAQS for nitrogen dioxide (NO_2), a species of NO_X, ambient conditions contribute the most to the combined concentration. Specifically, the Project and existing EWCC contributes less than 1% (0.16 $\mu g/m^3$) of the combined concentration of 21.77 $\mu g/m^3$ which is 97% of the CAAQS.

As noted above, these modelling predictions are based on highly conservative operating scenarios, however, even with the conservative considerations in the assessment, the Project, in combination with the existing EWCC and local background conditions, is anticipated to be within the AAQCs and CAAQS.

10.0 Closure

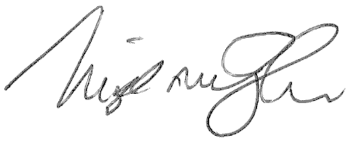
Should you have questions on the above report, please contact the undersigned.

Regards,

SLR Consulting (Canada) Ltd.

Mina Ghorbani, M.Eng., E.I.T.
Air Quality Scientist

Shawn Roberts, M.A.Sc., EP
GHG & Air Quality Senior Specialist



Nigel Taylor, M.A.Sc., EP
Principal

11.0 References

Canadian Council of Ministers of the Environment (CCME). 2020 Canadian Ambient Air Quality Standards (https://ccme.ca/en/air-quality-report).

Dillon Consulting. 2021. East Windsor Cogeneration Inc. Emission Summary and Dispersion Modeling Report. Windsor, Ontario N8W 5K8.

GOC. 1991. Agreement between the Government of Canada and the Government of the United States of America on Air Quality. canadausairqualityagreement.pdf. Government of Canada

GOC. 2023. Past Weather and Climate: Historical Data. Accessed online: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html. Government of Canada Last accessed: January 2023.

Lall, R., Kendall, M., Ito, K., Thurston, G., 2004. Estimation of historical annual $PM_{2.5}$ exposures for health effects assessment. Atmospheric Environment 38(2004) 5217-5226.

MacNaughton Hermsen Britton Clarkson Planning Limited MHBC. 2024. Expansion Project: New 107 MW Simple Cycle Natural Gas Power Plant Planning Justification Screening Response Memo. 204-442 Brant Street, Burlington, ON, L7R 2G4.

MECP. 2018. [Guideline A-10] Procedure for Preparing an Emission Summary and Dispersion Modelling Report. Available online: https://files.ontario.ca/books/20180309_moecc_65_emission_aoda_en-aoda.pdf. Ministry of the Environment, Conservation and Parks. Last accessed: March 2024.

MECP. 2017. [Guideline A-11] Air Dispersion Modelling Guideline for Ontario. Available online: https://files.ontario.ca/admgo-id50_aoda_v2b.pdf. Ministry of the Environment, Conservation and Parks. Last accessed: March 2024.

US EPA. 1996. US EPA AP-42 Chapter 3.1: Stationary Gas Turbines. Available online: U.S. Environmental Protection Agency | US EPA. Last accessed: March 2024

Appendix A Emission Factor and Calculation Tables

Air Quality Assessment

East Windsor Generation Facility Expansion Project

Capital Power Corporation

SLR Project No.: 241.030524.00024

July 2024

A.1 Gas Turbine, GEN:

Peak Load, 100% Load (Normal Operation), Cold Start Simple Cycle Scenarios

Methodology: Manufacturer's Data

Emissions from the gas turbine (LM6000) was provided by General Electric (GE) for both normal and peak load scenarios. Data was provided for NO_X, CO, and PM based on the updated parameters from the turbines. Data for NO_X, CO and PM was provided in lb/hr. The following equation is an example of how this lb/hr value is converted to a g/s emission rate for NO_X.

$$Emission\ Rate\ \left(\frac{g}{s}\right) = Emission\ \left(\frac{lb}{hr}\right) * \frac{1(kg)}{2.2(lb)} * \frac{1000(gr)}{1(kg)}\ * \frac{1(hr)}{3600(s)}$$

$$Emission\ Rate\ \left(\frac{g}{s}\right) = 39.2\ \left(\frac{lb}{hr}\right) * \frac{1(kg)}{2.2(lb)} * \frac{1000(gr)}{1(kg)}\ * \frac{1(hr)}{3600(s)}$$

$$NOx\ Emission\ Rate\ = 4.94\ \left(\frac{g}{s}\right)$$

Methodology: Emission Factors

SO_2 data was not provided by the manufacturer, therefore US EPA AP-42 Chapter 3.1: Stationary Gas Turbines emission factors were used to calculate SO_2 emissions.

SO_2 Emission Factor = 0.0034 lb/MMbtu

$$SO2\ Emissions = Emission\ facotr\ *\ Energy\ Value\ (LHV)$$

$$SO2\ Emissions = 0.0034\left(\frac{lb}{MMbtu}\right) * 1031\ \left(\frac{MMbtu}{hr}\right)$$

$$SO2\ Emissions = 3.5\left(\frac{lb}{hr}\right) * \frac{1(kg)}{2.2(lb)} * \frac{1000(gr)}{1(kg)}\ * \frac{1(hr)}{3600(s)}$$

$$SO2\ Emission\ Rate = 0.44\ \left(\frac{g}{s}\right)$$

Appendix B Guideline A-5 Requirements

Air Quality Assessment

East Windsor Generation Facility Expansion Project

Capital Power Corporation

SLR Project No.: 241.030524.00024

July 2024

B.1 Guideline A-5 Requirements (Simple Cycle – 100% Load Normal Operating Scenario)

Guideline A-5, under O. Reg. 419/05 specifies operating conditions which must be met for gas turbines, among other sources, in order to improve provincial air quality. For a gas turbine facility, these limits are calculated based on the power rating on the turbine as well as heat recovery units, where applicable. The limits and calculations have been included, the A-5 guideline specifies limits for NO_X, CO and SO_2 under normal operating conditions.

The emission limits for the pollutants of concern are determined based on the turbine operation and expressed as parts per million volume concentrations in the stack (ppmv) at Reference Conditions (i.e., 15% O_2 on a dry volume basis, 60% relative humidity, 15ºC ambient temperature, 101.3 kPa barometric pressure).

As the unit is expected to operate less than 1,500 hours per year, the 140 g/GJ output-based NO_X emission limit was used to calculate the applicable concentration-based NO_X limit. There is no direct recovery of thermal energy for heating purposes; hence, it will have no useful external heat output.

Under the turbine condition, the net thermal efficiency for this configuration is estimated to be 30.9%, based on the heating value of natural gas fuel.

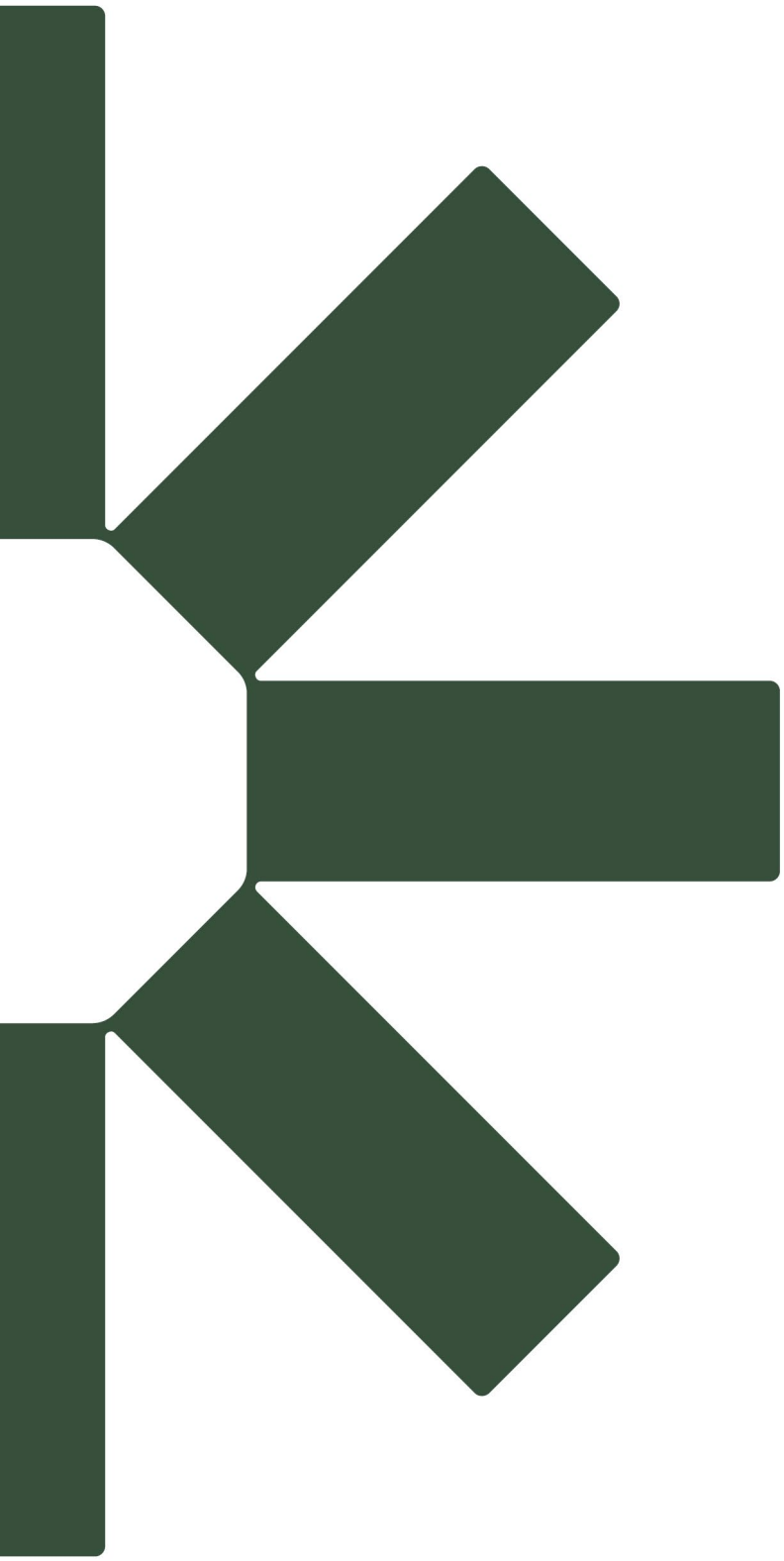
Table B.1-1 below calculates the simple cycle NO_X limit based on equations from A-5. In this configuration the NO_X limit for the stack would be 27.1 ppmv and would be under the limit.

The carbon monoxide (CO) emission limit for combustion turbine systems of all sizes and fuel types is 50 ppmv, corrected to 15% O_2 at reference conditions. For the normal operating conditions, the expected CO concentration in the exhaust is predicted to be 25 ppmv based on the manufacturing data provided and this meets the limit.

For SO_2, the A-5 Guideline does not have an emission limit. Instead, the natural gas used on-site has to contain <120 milligrams per cubic metre of sulphur. This is regulated under Part 3 of the *Canadian Energy Regulator Act*. If the natural gas being used does not meet this requirement, then source testing will be expected for SO_2.

Table B.1-1: Simple Cycle A-5 Calculation

Parameter	Units	EWX
Heat input to combustion turbine	GJ/hr	1199.5
Heat input to combustion turbine	MW	333.18
Heat input to auxiliary burner(s)	GJ/hr	0.0
Heat input to auxiliary burner(s)	MW	0.0
Cycle configuration	-	simple
Power output, combustion turbine	MW	102.95
Power output, Rankine cycle turbine	MW	0.0
Total power generation/output	**MW**	**102.95**
Thermal efficiency (Equation 10)	**%**	**30.9%**
F-factor for natural gas on a dry basis	DSm^3/GJ	240
Output-based NO_X emission limit (Table 1)	g/GJ	140
Calculated maximum NO_X emission rate (Equation 5)	g/hr	51886
Calculated maximum concentration-based NO_X emission limit (Equation 2)	ppmv	27.1
Proposed applicable concentration-based NO_X emission limit (Table 2 or Equation 8)	**ppmv**	**27.1**
95% of NO_X as NO	ppmv	16.8
5% of NO_X as NO_2	ppmv	1.4



Making Sustainability Happen