SLATE ASSET MANAGEMENT L.P.

CLARKSON TRANSIT STATION AREA AIR QUALITY STUDY

MONITORING AND DISPERSION MODELLING REPORT

February 16, 2022

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SLATE ASSET MANAGEMENT L.P.

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WSP
UNIT 2
126 DON HILLOCK DRIVE
AURORA, ON, CANADA L4G 0G9

T: +1 905 750-3080
F: +1 905 727-0463

Signatures

Prepared By

Stephanie Clarke, B.A.
Environmental Consultant

Katelyn Sysiuk, B. Eng., E.I.T.
Environmental Consultant

Reviewed By

Camille Taylor, P. Eng.
Director and Sr. Air Quality Engineer

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EXECUTIVE SUMMARY

The purpose of this study is to assess the air quality impacts from surrounding land uses, including industrial operations and transportation sources in the Clarkson Transit Station Area (TSA). WSP Canada Inc. (WSP) was retained by Slate Asset Management (Slate) to complete an Air Quality Study including six months of ambient monitoring and an air dispersion modelling assessment for the proposed development located at 2077, 2087, 2097, and 2105 Royal Windsor Drive in Mississauga, Ontario. The City of Mississauga (the City) requires an updated study to determine the compatibility of additional sensitive land uses within the area and will also use this report to inform their Master Plan. The City will have this final report peer reviewed. The City and their peer reviewer have been following the process since the beginning and have provided feedback on this study.

The six months of ambient air monitoring and dispersion modelling assessment were completed in accordance with the Terms of Reference provided by the City of Mississauga on June 23, 2020 (TOR). The ambient air quality monitoring was conducted at the Slate lands located at 2105 Royal Windsor Drive in Mississauga, Ontario from July 2020 to January 2021.

For baseline, the Ministry of the Environment, Conservation, and Parks (MECP) conducted an air quality study in 2007 which found elevated concentrations of various contaminants; benzene, dichloromethane (methylene chloride) and acrolein were identified as air contaminants that were greater than their respective Ambient Air Quality Criteria (AAQC). The AAQC values are not enforceable through regulatory actions, they are concentrations of individual contaminants in air that are determined to be protective against adverse effects on health and/or the environment. AAQC values are used to assess ambient air quality resulting from all sources of a contaminant to air and are commonly used to determine impacts from projects on the ambient air quality. It was expected that there was general improvement of the air quality in the area since 2007 due to improvements in vehicle emissions and industrial practices.

The COVID-19 pandemic resulted in a reduction of traffic in the area, and a reduced train frequency along the Lakeshore West corridor during the monitoring period; therefore, this report assumes that vehicular emissions from nearby parking lots and major roadways were reduced. The ambient air quality monitoring results are used in conjunction with dispersion modelling to conservatively assess the air quality impacts on the proposed development. Dispersion modelling was completed using data from prior to the COVID-19 pandemic. Historical data, including monitoring data from the Clarkson Airshed Industrial Association (CASIA) from 2012 to 2018 was also incorporated into this study for comparative purposes, where applicable. Despite the uncertainties of the effects of COVID-19 on the ambient

monitoring data WSP has confidence in the report and its findings. The following report outlines all timelines, methodologies, and relevant guidelines.

Based on the results of the ambient air quality monitoring and the dispersion modelling assessment there is no reason to exclude high density residential land use and other sensitive land uses in the study area.

Relevant results are summarized here:

- All significant contaminants included in this assessment, except for acrolein, benzene, benzo(a)pyrene, NO_X, $PM_{2.5}$, and PM_{10} were predicted to be below their respective AAQC;
- Acrolein concentrations recorded at the monitoring station had a 90th percentile concentration that was elevated compared to the 24-hour AAQC. The 90th percentile acrolein concentrations recorded during the six months of monitoring were 67 % lower than the 90th percentile recorded during the 2007 MECP study showing a downward general trend;
- The ambient baseline concentration of acrolein is significantly contributing to the AAQC exceedance for acrolein, with the modelled concentration being only 1% of the cumulative concentration. The background concentration is comparable to reported acrolein concentrations in Ontario;
- Benzo(a)pyrene was not part of the ambient monitoring program; the modelling results show concentrations elevated compared to the AAQC for both 24-hour and annual concentrations. This analysis is based on cumulative concentrations using the NAPS station located near Highway 401, which has higher concentrations given the close proximity to high volumes of vehicular traffic than in the vicinity of the Clarkson TSA;
- The ambient baseline concentration of benzo(a)pyrene is significantly contributing to the AAQC exceedance, with modelled concentration being only 1% of the cumulative concentration for the 24-hour average and 0% for the annual average. The baseline concentration is comparable to reported benzo(a)pyrene concentrations in Ontario and Canada;
- Based on the NPRI data both acrolein and benzo(a)pyrene are not emitted from the surrounding industrial facilities. The main source of anthropogenic acrolein and benzo(a)pyrene in the area is expected to be traffic and locomotive sources. Emissions are expected to decrease as older vehicles are removed from service and vehicle emission controls become more efficient as well as through eventual electrification of the Lakeshore West GO corridor; Both acrolein and benzo(a)pyrene are listed as Traffic Related Air Pollutants and are often elevated compared to the AAQC in urban areas and near highways and roadways;

- Benzene concentrations recorded at the monitoring station had a 90th percentile concentration that was elevated compared to the 24-hour AAQC. The modelled concentration of benzene only contributed 2% to the cumulative concentration. The ambient baseline concentration recorded is within the range reported in Ontario and in Canada.
- The 90th percentile 24-hour concentration of NO_2 recorded at the monitoring station was below the AAQC threshold. The cumulative concentration calculated from the dispersion modelling was above the annual Canadian Ambient Air Quality Standard (CAAQS) of 12 ppb which may be attributable to the addition of sources to the baseline ambient data which already includes the nearby sources. It should also be noted that the CAAQS is based on the average over a single calendar year of all 1-hour average concentrations, not 90th percentiles. The average of all one hour NO_2 concentrations collected at the monitoring station was 6.9 ppb.
- The modelled concentration of NO_2 and baseline concentration have similar contribution to the cumulative concentrations. The NO_2 annual cumulative concentration for the Clarkson TSA is within the range reported in Toronto and in urban areas of Canada.
- Concentrations of $PM_{2.5}$ and PM_{10} at the Site property boundary were reported as elevated compared to the annual air quality threshold and 24-hour air quality threshold respectively; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured $PM_{2.5}$ and PM_{10} concentrations in ambient air and the resulting cumulative concentration was not significantly altered. The cumulative impacts at the proposed development showed a minor increase from existing conditions likely as a result of expected traffic growth in the study area. The $PM_{2.5}$ annual cumulative concentrations and PM_{10} 24-hour cumulative concentration for the Clarkson TSA are within the range reported in Canadian urban cities.
- By examining receptors at various heights at the property boundary and adding the modelled concentration and the ambient concentration it was determined that for the contaminants of concern ($PM_{2.5}$, PM_{10}, NO_X, acrolein, and benzene) there are no concentrations elevated compared to the AAQC above 30.1 m except for benzo(a)pyrene.
- Background concentrations of acrolein and benzo(a)pyrene are elevated compared to the AAQC values; however, B(a)P is elevated anywhere a development were to proceed in an urban area.
- Air quality mitigation is not required at the proposed development; however, mitigation recommendations have been included to improve indoor air quality.
- If air intakes are designed to be located in each suite, then for any suites below the fourth floor (estimated at 12.9 m) filters to control particulate matter ($PM_{2.5}$ and PM_{10}) impregnated with

carbon to control benzene could be utilized to improve indoor air quality. Percent reductions required can be calculated from Table 3 attached to the memorandum located in Appendix L. Since Table 3 represents a very conservative approach then it is recommended that a method of ambient monitoring be incorporated to ensure the controls of a local air intake design are working, or even required. An alternative to filtering local air intakes and monitoring could be to have a centralized air intake system ducted from above 12.9 m for any suites located below this level.

- Based on the air quality study, air quality in the study area is not expected to adversely impact high density residential development nor the existing local industrial sites level of compliance to existing standards. Elevated concentrations of contaminants reported (i.e., above health-based thresholds) which could lead to health risks are not unique to the Clarkson TSA and are expected throughout urban areas in Ontario (i.e., Greater Toronto Area and Hamilton) and Canada. Transit-oriented development within the Clarkson TSA is expected to reduce reliance on passenger vehicle trips as the community shifts to alternative modes of transportation such as public transit and active transportation. This transition is expected to reduce emissions of TRAP contaminants within the Clarkson TSA and likely will result in improved air quality in the community.

Tables

Figures

Appendices

1 Introduction

WSP Canada Inc. (WSP) was retained by Slate Asset Management (Slate) to complete an Air Quality Study including six months of ambient monitoring and an air dispersion modelling assessment for the proposed development located at 2077, 2087, 2097, and 2105 Royal Windsor Drive in Mississauga, Ontario (the Site). The ambient air quality monitoring was conducted at the Slate lands located at 2105 Royal Windsor Drive in Mississauga, Ontario.

The six months of ambient air monitoring and dispersion modelling assessment were completed in accordance with the Terms of Reference provided by the City of Mississauga (the City) on June 23, 2020 (TOR) and completed in accordance with the Ontario Ministry of the Environment, Conservation and Parks (MECP) Operations Manual for Air Quality Monitoring in Ontario, 2018 (the Operations Manual). The monitoring was carried out to identify any potential ambient air quality effects on the proposed development area from nearby industrial sources, transit, and vehicular traffic. The parameters outlined in the TOR for monitoring were:

— Total suspended particulate (TSP);

— Volatile organic compounds (benzene, dichloromethane, and acrolein);

— Nitrogen oxides (NO_X); and

— Sulphur dioxide (SO_2).

PM_{10} and $PM_{2.5}$ were later added to the list of monitored parameters at the request of the MECP. The monitoring took place from July 8, 2020 to January 10, 2021. This report outlines the results of the monitoring program.

This report outlines the specific modelling approach and input data used to complete the air dispersion modelling for the proposed development and assesses the predicted cumulative impacts from the nearby activities on the Site.

The proposed development is located within the Clarkson Transit Station Area (TSA) and would introduce sensitive land uses. As a result, the City requires an Air Quality Assessment to be completed to assess air quality impacts on the proposed development from surrounding land uses, including industrial operations and transportation sources. The results of the dispersion modelling were combined with ambient air monitoring results to assess the predicted cumulative concentrations of each contaminant.

The Site is located on the west side of the Royal Windsor Drive and Southdown Road intersection in Mississauga, Ontario. The Site is currently zoned as employment (E2-108) and

is surrounded by residential, commercial, and employment zones. In the City of Mississauga's Official Plan, the lands are designated as Mixed Use within the Southdown Employment Area and currently do not permit residential uses. A rail corridor is located to the northwest of the Site and includes the Clarkson GO Station located at 1110 Southdown Road. Lands to the north, east, and northwest consist of predominately residential developments while lands to the west through southeast are predominately commercial and industrial developments. The location of the Slate proposed development is shown in **Figure 1-1**. The location of the proposed development, Clarkson TSA monitoring station, and Study Area are shown in **Figure 1-2**. The development is proposed to include four 25-storey residential buildings.

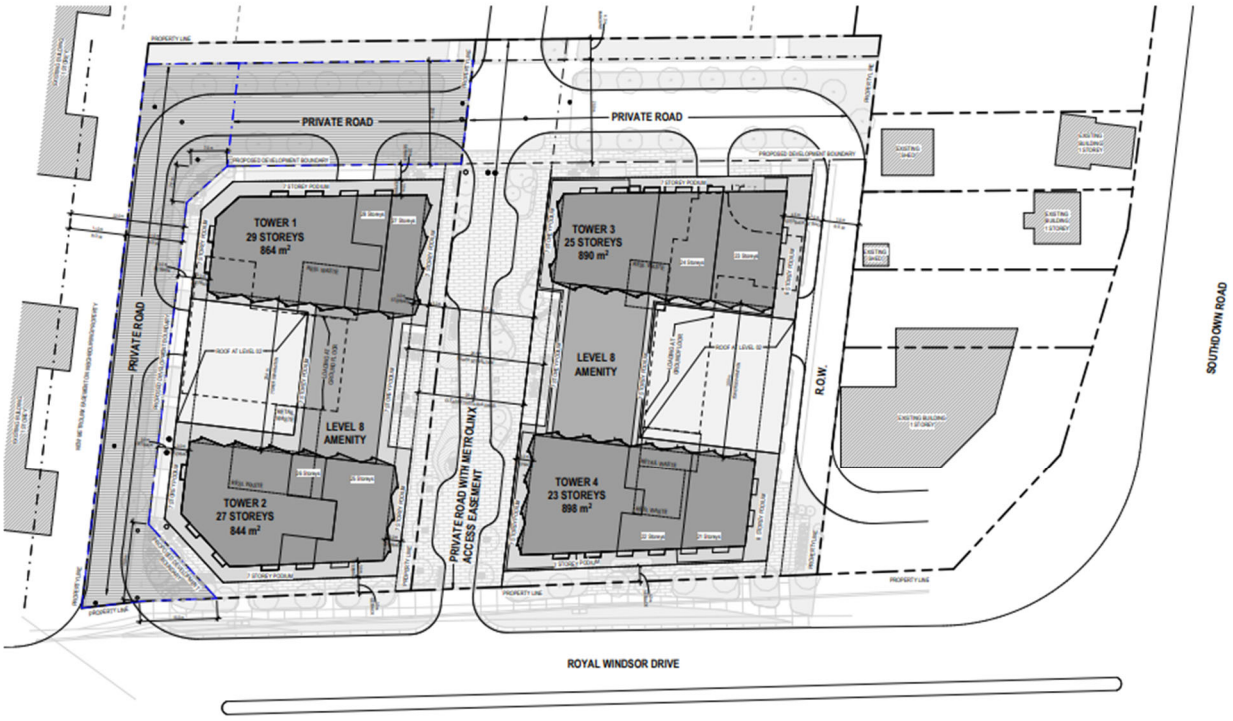

Figure 1-1 Slate Proposed Development

The location of the proposed development, Clarkson TSA monitoring station, and Study Area are shown in **Figure 1-2**.

Figure 1-2 Air Quality Assessment Study Area

1.1 COVID-19 Influences

The current COVID-19 situation has resulted in the reduction of roadway traffic and a change to train operating schedules along the GO corridor. Nearby industrial activities that may have an impact on air quality may also have altered emission rates during the COVID-19 pandemic. Vehicular emissions from the nearby parking lots and major roadways are expected to be reduced during this time period. As such, the results presented from the ambient air quality monitoring may represent atypical conditions. Monitoring data from the Clarkson Airshed Industrial Association (CASIA) was provided by the participating industries to be incorporated into the Air Quality Study for comparative purposes, where applicable. Despite the uncertainties of the effects of COVID-19 on the ambient monitoring data, WSP has confidence in the report and its finding. While there are still unknown possible effects of COVID-19 on the ambient monitoring data, several data set comparisons have been undertaken and included in this report to ensure the dependability of the information. The possible effects of COVID-19 on the ambient monitoring study are further discussed in **Section 5** of this report.

2 Monitoring Summary

2.1 Methodology

After receiving approval from the City, the ambient air quality monitoring station was installed on July 8, 2020 at the Site in order to ensure the summer months were captured in the monitoring program. The continuous analyzers were operating since the installation on July 8, 2020. The first round of discrete sampling was completed on July 14, 2020, aligning with the North American schedule. Monitoring was carried through to completion on January 10, 2021, to fulfill the requirements of the City's Terms of Reference.

Following the MECP Operations Manual for Air Quality Monitoring in Ontario (the Operations Manual) and the Terms of Reference provided by the City, the following instruments and sampling methods were used:

— Total Suspended Particulate (TSP): TSP filter media and TSP gravimetric analysis using a Tisch TE-5170 Mass Flow Controlled TSP Sampler (Hi-Vol). Sampling was conducted on a one-in-six-day schedule and ran for 24 hours (00:00 – 23:59) per sample. An exhaust hose was used to direct sampled air away from the intake.

— Particulate Matter <10 µm (PM_{10}) and <2.5 µm ($PM_{2.5}$) in diameter: PQ200 discrete samplers. Sampling was conducted on a one-in-six-day schedule and ran for 24 hours (00:00 – 23:59) per sample.

— VOCs (Benzene, dichloromethane (methylene chloride), and acrolein): US EPA Compendium Method TO-15 using vacuum canisters (concurrent sample collection). Sampling was conducted on a one-in-six-day schedule and with samples collected for 24 hours (00:00 – 23:59). A programmable timer/regulator was used on the canisters to trigger sampling. Since acrolein is highly reactive, the VOC samples were delivered to the laboratory for analysis as soon as reasonably possible.

— Sulphur dioxide (SO_2): Thermo Scientific 43i SO_2 analyzer housed in a temperature-controlled weatherproof enclosure. Sampling was continuous with a resolution of five minutes.

— Nitrogen Oxides (NO_X): Thermo Scientific 42i $NO/NO_2/NO_X$ analyzer housed in a temperature-controlled weatherproof enclosure. Sampling was continuous with a resolution of five minutes.

Sample probe siting for all sampling equipment was completed in accordance with the

Operations Manual. All monitoring equipment was distanced from walls or structures at least twice the height of the wall or structure. The SO_2 and NO_X continuous analyzers were installed to have an inlet height of at least three meters. The TSP, PM_{10}, and $PM_{2.5}$ inlets were installed to be a minimum of two meters above the ground and more than 20 m from any trees. The VOC inlet was installed to be a minimum of three meters above the ground. All other requirements of the Operations Manual related to probe siting were followed, including Table 3: Sample Probe Siting Criteria.

Monitoring results have been summarized for sampling data collected between July 8, 2020 and January 10, 2021 (the monitoring period). The location of the monitoring station is shown in **Table 2-1** and **Figure 1-1.**

Table 2-1 Monitoring Station Location

Location/Address	Zone	UTM-X Coordinates	UTM-Y Coordinates
2105 Royal Windsor Dr., Mississauga, ON	17T	610529	4818409

2.2 Equipment Calibration and Record Keeping

A site logbook was maintained and a record of each site visit including the purpose of visit, work performed on each instrument, and observations while on site were recorded. Any equipment malfunctions, repairs, and maintenance were properly logged per the Operations Manual. The logbook was kept up to date for each site visit. All site logs were reviewed monthly by the Senior Air Quality Engineer.

Calibrations of sampling equipment completed during the monitoring period were conducted in accordance with the Operations Manual, the Terms of Reference provided by the City and manufacturer recommendations. The following equipment calibrations were completed during the monitoring period:

— The Tisch TE-5170 was calibrated upon installation, and after three months of sampling;

— The PQ200 discrete samplers were calibrated bimonthly;

— VOC sampling unit leak test calibration was completed bimonthly;

— The Thermo Scientific 43i SO_2 analyzer was calibrated monthly; and

— The Thermo Scientific 42i $NO/NO_2/NO_X$ analyzer was calibrated monthly.

All equipment Calibration Certificates that were completed during the monitoring period are presented in **Appendix A**.

The SO_2 and NO_X analyzers were equipped with a data logger and remote communication to ensure data was recorded and that field staff were alerted to equipment downtime in a timely manner. The analyzers were remotely checked for normal operations a minimum of once per day.

Power to the monitoring station was hardwired (via extension cords to the adjacent building on Site) for the duration of the monitoring period to ensure consistent monitoring with no electrical background noise impacting data measurements or communication. Power draw for all sampling equipment was metered and recorded regularly in the Site's logbook during site visits.

2.3 Laboratory Analysis and Data Validation

The discrete samples that required laboratory analyses included TSP, VOCs, PM_{10}, and $PM_{2.5}$. Laboratory analysis for all discrete samples collected was completed by ALS Environmental, a laboratory whose analytical methods, as required by the monitoring program, have Canadian Association for Laboratory Accreditation (CALA) accreditation. Sample media for the discrete samplers was sampled, collected, transported and stored in accordance with the Operations Manual, Reference Methods, and laboratory requirements.

The procedure for data validation for continuous and discrete data has been completed in accordance with the Operations Manual. The discrete sampling followed a one day of every six days frequency, per the North American schedule. All laboratory analysis and continuous NO_X and SO_2 data have gone through internal review by the Senior Air Quality Engineer to ensure sampling was conducted per the Operations Manual and all data presented within this report is valid.

2.4 Uncertainties of Air Quality Monitoring

WSP followed the Operations Manual for Air Quality Monitoring in Ontario and industry best practice to ensure that uncertainties were minimized. There is some uncertainty when sampling acrolein, considering factors such as how canisters are cleaned in preparation for sample collection and the gas standards used to calibrate analytical equipment. Historically, the method typically used for sampling acrolein in ambient air was by collection on a DNPH-coated silica gel cartridge, followed by high performance liquid chromatography (HPLC) analysis, per the United States Environmental Protection Agency (USEPA) Method TO-11A. This changed in 2000 when the USEPA amended the "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition", which removed

acrolein due to significant data quality concerns. Air samples collected in canisters and analyzed by gas chromatography/mass spectrometry (GC/MS) per USEPA method TO-15 later became the industry standard for sampling acrolein in ambient air. As this approach was being tested, it became a concern that there may be formation of acrolein in the canisters, resulting in a reading higher than actual (i.e., high bias). In 2010, the Office of Air Quality Planning and Standards (OAQPS) conducted a study to assess how the canister cleaning process might result in increased acrolein concentration during analysis. The study showed that acrolein could be elevated even in clean canisters. The study also showed that there were variables when it came to the acrolein gas standards used to calibrate the analytical systems for different laboratories. To reduce the likelihood of uncertainties, the USEPA recommended that collection canisters be heated to a minimum of 80 °C while being cleaned. ALS Environmental follows this USEPA recommended practice of heating canisters while cleaning.

The USEPA also recommended analyzing the cleaned canisters for acrolein by GC/MS immediately after cleaning and once a week for two to three weeks to determine whether acrolein was likely to form in the canister over time. The canisters from ALS are proofed after sitting for 24 hours under pressure with humidified nitrogen. ALS also conducts method blanks to confirm the limit of reporting (LOR) is lower than 0.2 ppbv.

The calibration gas standards that laboratories use to calibrate their GC/MS analytical system can also cause variation in analysis. The 2010 study completed by OAQPS indicated that laboratories using higher concentration acrolein standards and diluting to target range provided more consistent analytical results. The gas standards that ALS Environmental uses have an analytical accuracy of ±10 %. ALS Environmental also uses a stock standard that is 1 000 ppbv and diluted to 1 ppbv. The USEPA also recommended analyzing the canister as soon as reasonably possible after collection. WSP submitted the canisters to the laboratory the following workday after each 24-hour sample.

The uncertainties for benzene and methylene chloride analysis are not as significant as acrolein. The analysis provided by ALS Environmental would be reasonably accurate based on Reference Methodology. Further, the uncertainties in particulate sampling (TSP, PM_{10}, and $PM_{2.5}$) are also minimal; however, there were some noted issues with the 47 mm PM_{10} and $PM_{2.5}$ filters at the start of the sampling program, which were later resolved by switching to more durable polytetrafluoroethylene (PTFE) filters. Uncertainties relating to NOx and SO_2 analysis are minimized as WSP maintained calibrations on the analyzers per the Operations Manual.

3 Summary of Monitoring Results

3.1 Discrete Sampling Results

Discrete sampling events were completed on a one-in-six-day schedule and ran for 24 hours (00:00 – 23:59) per sample. All discrete sampling results have been compared to the 24-hour and annual Ambient Air Quality Criteria (AAQC) guidelines for each respective sample parameter. The comparison to annual AAQC guidelines is for informational purposes only; six months of data should not be held to the annual guidelines, which account for seasonal variations. Since acrolein and PM_{10} do not have annual AAQC guidelines, only the 24-hour guidelines were used for these parameters.

$PM_{2.5}$ and PM_{10} were added to the monitoring parameters at a later date as requested by the MECP, as a result, WSP was unable to obtain the 47 mm filters in time for the July 14, 2020 sample event. At the onset of the monitoring program, there were issues with the $PM_{2.5}$ and PM_{10} sampling that occurred due to visually unobservable damage to sampling media during the sampling events. WSP was not aware of this issue until laboratory results were made available weeks after the sampling events occurred. The 47 mm filters used for $PM_{2.5}$ and PM_{10} were reported by the laboratory as showing signs of damage sustained during the sampling event. This was noted on $PM_{2.5}$ samples from July 20, August 1, August 13, and August 19, 2020. This was noted on PM_{10} samples from July 26, August 13 and August 19, 2020. Data from these sample events were not included in any average calculations as they would underestimate the levels of $PM_{2.5}$ and PM_{10} due to the damage. Despite WSP's best effort to keep the 47 mm filters intact, the issue remained. WSP investigated alternative types of 47 mm filters and decided to use the 47 mm PTFE-filters. After receiving better results on the August 25, 2020 sample event more PTFE-filters were ordered; however, they did not arrive in time for the September 6, 2020 sample event. The PTFE-filters were used for every sampling event following and did not show any signs of damage for the remainder of the ambient sampling program. All other samples were collected without any observable issues. There was an error with the flow controller on November 17, 2020 that resulted in the VOC canister's final pressure being positive. For this reason, these results were not included in the report.

A summary of the individual discrete sampling results compared to the AAQC 24-hour threshold guidelines is presented in **Table 3-1.** The Certificates of Analysis from each sampling event are located in Appendix B.

Table 3-1 Summary of 24-Hour Discrete Sampling Results

MEASURED CONTAMINANT (µg/m³)	ACROLEIN	BENZENE	METHYLENE CHLORIDE	TSP	$PM_{2.5}$	PM_{10}
24-HOUR AAQC (µg/m³)	**0.4**	**2.3**	**220**	**120**	**27**	**50**
SAMPLE DATE						
14-Jul	0.5	0.69	1.27	30.2	--	--
20-Jul	0.63	<0.32	<0.69	35.7	<0.62 [A]	<0.62
26-Jul	0.68	0.47	<0.69	51.4	1.37	<0.63 [A]
01-Aug	0.53	<0.32	<0.69	<15	<0.62 [A]	<0.63
07-Aug	0.4	0.5	0.75	45.6	2.25 [C]	0.63 [C]
13-Aug	0.63	0.45	1.22	44.9	<0.62 [A]	<0.63 [A]
19-Aug	0.45	0.69	4.42	26.1	<0.62 [A]	<0.63 [A]
25-Aug	0.53	0.49	<0.69	32.4	8.58	16.8
31-Aug	0.67	0.68	<0.69	25.3	4.7	11.1
06-Sep	0.26	<0.32	1.33	16.5	NA [B]	NA [B]
12-Sep	0.58	0.75	1.27	20.7	2.17 [C]	1 [C]
18-Sep	<0.23	<0.32	<0.69	30.1	2.5	10.1
24-Sep	0.28	0.94	1.67	96.3	22.4	58.2
30-Sep	<0.23	0.37	<0.69	27.2 [D]	10.3	22.8
06-Oct	<0.23	0.37	<0.69	89.3	4.5	37.7

MEASURED CONTAMINANT (µg/m³)	ACROLEIN	BENZENE	METHYLENE CHLORIDE	TSP	$PM_{2.5}$	PM_{10}
24-HOUR AAQC (µg/m³)	**0.4**	**2.3**	**220**	**120**	**27**	**50**
SAMPLE DATE						
12-Oct	<0.23	0.32	<0.69	14.2	2.12	3.46
18-Oct	<0.23	0.39	<0.69	25.8	5.75	14.30
24-Oct	<0.23	0.32	<0.69	14.7	0.79	4.09
30-Oct	<0.23	0.34	<0.69	19.5	4.09	10.10
05-Nov	<0.23	0.44	<0.69	10.9 [C]	7.90	47.10 [C]
11-Nov	<0.23	0.35	<0.69	34.8	6.71	14.50
17-Nov	NA	NA	NA	22.2	4.33	8.50
23-Nov	<0.23	0.49	<0.69	32.5	5.29	8.17
29-Nov	<0.23	0.48	<0.69	31.7	5.79	16.20
05-Dec	<0.23	0.34	<0.69	16.4 [C]	3.58	20.70 [C]
11-Dec	<0.23	1.79	1.91	120	28.20	84.90
17-Dec	<0.23	0.67	<0.69	94	9.37	27.20
23-Dec	<0.23	0.47	<0.69	25.3	5.75	21.50
29-Dec	<0.23	0.39	<0.69	20.9	6.66	8.75
04-Jan	<0.23	0.51	<0.69	20.2	<0.62	14.80
10-Jan	<0.23	0.58	<0.69	24.5	9.37	12.9

Note: A Filter samples in this submission show obvious signs of damage, sustained during the sampling event. Data is expected to be biased low as a result of matrix loss. Data from these samples is not included in the average calculations.

B Sample media was not available from the laboratory for Sep 6, 2020.

C Discrepancies in concentrations (TSP<PM_{10}, or PM_{10}<$PM_{2.5}$)

D Power was lost due to the extension cord being disconnected by a pedestrian, sampled October 2, 2020 instead.

'--' Requirement for PM_{10} and $PM_{2.5}$ discrete sampling was introduced after the sampling event occurred. PQ200 discrete samplers were not yet installed and ready to sample.

'<' Indicates that the sampling result was below the laboratory detection limit.

'NA' Indicates missing data.

Red text indicates measurement is above the respective 24-hour AAQC guideline.

When comparing individual sampling events to the AAQC, a total of nine acrolein samples collected during the monitoring period were elevated compared to the 24-hour AAQC guideline of 0.4 µg/m^3.

When comparing individual sampling events to the AAQC, there were no benzene, methylene chloride, or TSP samples collected during the monitoring period that were elevated compared to their respective 24-hour AAQC guidelines.

When comparing individual sampling events to the AAQC, there was one $PM_{2.5}$ measurement collected on December 11, 2020 that was elevated compared to the AAQC guideline of 27 µg/m^3. There were two PM_{10} measurements collected during the monitoring period that were elevated compared to the 24-hour AAQC guideline of 50 µg/m^3. The PM_{10} elevated levels occurred on September 24, 2020 and December 11, 2020. On December 11, 2020, PM_{10}, $PM_{2.5}$, TSP and benzene concentrations were all greater than the typical ranges seen during the monitoring period; the reason for these elevated concentrations is currently unknown. Wind direction on this day was blowing from the north northeast, so it is likely not due to the industry activities located to the south of the Site.

There were four days when discrepancies in measured TSP and PM fractions were identified where the smaller $PM_{2.5}$ size fraction was larger than the PM_{10} fraction, or TSP was less than PM_{10}. On these days no errors in sampling methodology were identified and samples were deemed valid by ALS Environmental. As a result, TSP and PM fraction results were included in the analysis.

When the benzene concentration from all sampling events is averaged over the six-month program it is elevated compared to the AAQC annual threshold limit of 0.45 µg/m^3. The average six-month concentrations for all other sample parameters with annual AAQC guidelines were below their respective AAQC guidelines. A summary of the contaminants' average concentrations compared to the AAQC annual guidelines is presented in **Table 3-2**, a reminder that this comparison is for informational purposes only and that six months of data is not a valid data set to compare to annual guidelines due to seasonal variations. The Certificates of Analysis from each sampling event can be found in **Appendix B**. The collected data represents six months of monitoring and meets the City's requirements set forth in the Project's Terms of Reference.

Table 3-2 Summary of the Discrete Monitoring Results

Contaminant	Annual AAQC Threshold ($\mu g/m^3$)[1]	Average Concentration ($\mu g/m^3$)	90th Percentile Concentrations
Acrolein	**--**	0.27	0.63
Benzene	**0.45**	0.49	0.70
Methylene Chloride	**44**	0.71	1.36
TSP	**60**	35.7	89.3
PM_{10}	**--**	18.3	42.4
$PM_{2.5}$	**8.8**	6.6	9.93

Note: Average concentrations for each contaminant were calculated by calculating the mean value across all sampling events that occurred in the monitoring period. Mean calculations presented above excluded missing or invalid sampling events.

Red text indicates a contaminant six-month average is above the Annual AAQC guideline.

Missing data or invalid data was not included in the average concentrations.

Non-detectable concentrations were assumed to be half the detection limit.

[1] Annual AAQC Threshold included for reference, average concentration from WSP sampling is not annualized, so seasonal variations have not been accounted for.

3.2 Continuous Monitoring Results

Continuous monitoring for SO_2 and NO_X was completed for the duration of the monitoring period, with a five-minute resolution in accordance with the Operations Manual. Results of continuous monitoring were compared to the corresponding AAQC guidelines. The AAQC for SO_2 was compared to the unpublished MECP changes; the old 24-hour average was removed and the new 10-minute and one-hour averages were included. As a result, SO_2 data collected was evaluated on a running average for both one-hour and 10-minute averages over the monitoring period. The one-hour and 24-hour AAQCs for NO_2 were used to compare monitoring data, per the Operations Manual. As a result, NO_2 data collected was evaluated on a running average for both one-hour and 24-hour averages over the monitoring period.

For one-hour and 10-minute running averages of SO_2 data, there were no elevated levels during the monitoring period when compared to the AAQC. For one-hour and 24-hour running averages of NO_2 data there were no elevated levels compared to the AAQC during the

monitoring period. A summary of all SO_2 and NO_X data collected over the monitoring period is presented in **Appendix C**. The maximum concentrations of NO_2 and SO_2 measured during the six-month monitoring period relative to each AAQC averaging period are presented in **Table 3-3**.

Table 3-3 Summary of the Continuous Monitoring Results – Maximum Concentrations

Contaminant	Averaging Period	Applicable AAQC Threshold (ppb)	Maximum Concentration (ppb)
Nitrogen Dioxide	1-hour	200	50
	24-hour	100	29
Sulphur Dioxide	10-minute	67	43
	1-hour	40	27
	Annual [1]	4	0.47

Note: [1] Annual AAQC Threshold included for reference, maximum concentration from WSP sampling is not annualized, so seasonal variations have not been accounted for.

4 Ambient Data Comparison

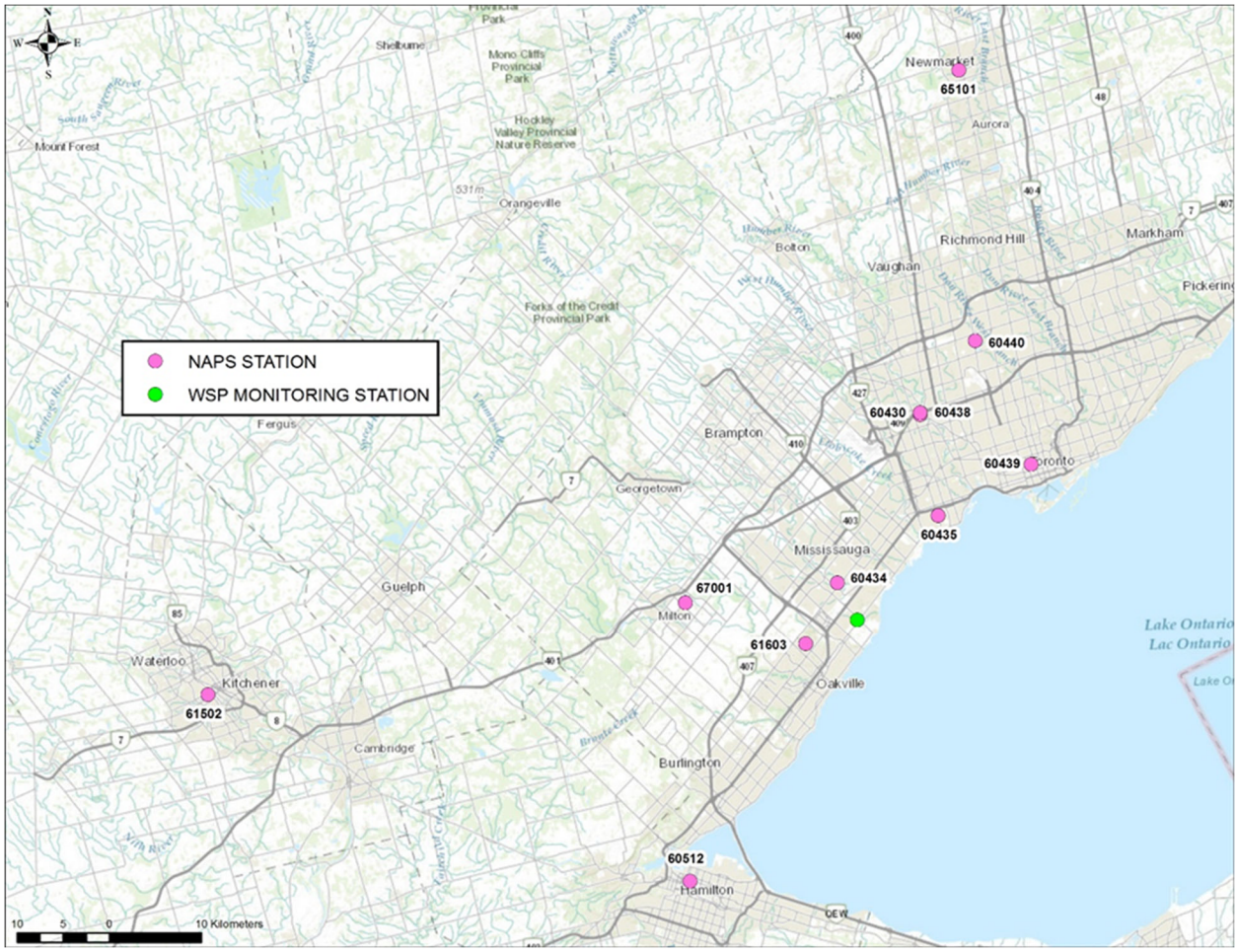

Figure 4-1 National Air Pollution Surveillance Station Location

Data comparisons were completed using the most recent validated data available from the nearest government-operated ambient air quality monitoring stations. Data from the closest National Air Pollution Surveillance (NAPS) stations were used and calculations were made based on data from July to December for each year. The location of each NAPS station used in this report can be found in **Figure 4-1**.

4.1 Discrete Monitoring

Monitoring was conducted following the North American six-day schedule to allow for comparison to local ambient air quality stations upwind and downwind of the Site. At this point

in time, current data across all sample parameters are not available from nearby MECP stations. As a result, data collected at the Site were compared to data collected from local Environment and Climate Change Canada (ECCC) monitoring stations governed by the NAPS Air Toxics Program. The NAPS stations used for data comparison had available data and were representative of the study area. Data comparisons were made with the most recent published data for the NAPS stations (past five years), which was used to compare pollutant trends to the monitoring results.

4.1.1 Acrolein Data Comparison

The ambient acrolein data was not compared to any NAPS stations due to the difference in methodology. The NAPS stations use a model 926 Two Channel Carbonyl Sampler to obtain their acrolein sample. The samples are collected on a DNPH cartridge and analyzed via high performance liquid chromatography (HPLC). The NAPS stations used 24-hour samples with a flow rate of 1 L/min resulting in a volume of approximately 1.44 m^3 over the sampling duration. The lab would need a detection limit of 0.0043 µg for acrolein per sample with a 1.44 m^3 sample to obtain the NAPS reported detection limit of 0.003 $µg/m^3$. Based on discussions with commercial laboratories the lowest detection limit for acrolein is on the order of 1 µg, over 300 times higher than what was calculated from the NAPS results. Commercial laboratories also warned of the potential risk of the high flow rate associated with the NAPS methodology and acrolein not having enough contact time with the DNPH tube to be effectively captured, resulting in the breakthrough of acrolein.

Commercial laboratories instead use evacuated canisters to get acrolein data in ambient air. This analysis is performed using procedures adapted from USEPA Method TO-15, as previously discussed in Section 2.4. Commercial laboratories do not use the ECCC high-volume DNPH methodology as it is not a published Reference Method. Due to the difference in methodology, it is not possible to compare the ambient acrolein data to the NAPS station data.

In the summer of 2007, the MECP completed an Air Quality Monitoring Program for the Clarkson and Oakville area (Report #PIBS 7074e). The monitoring program was completed to determine acrolein, acrylonitrile, and dichloromethane (methylene chloride) concentrations and the potential sources in the area. Since this data was collected from the same area using the same methodology, it was used for comparison purposes. For the MECP study, sampling was completed at three locations to attempt to triangulate a likely source. The MECP study spatially occurred within three kilometers of the WSP ambient monitoring station. MECP sampling in 2007 was completed following USEPA TO-15 methodology. MECP sampling was completed on June 14, June 26, August 28, and September 20 of 2007. Due to the variation in wind direction, the MECP could not identify a point source of elevated acrolein concentrations. The

MECP Air Quality Monitoring Report is attached in **Appendix D**. A comparison of Site data and MECP 2007 data is included in

Table 4-1.

Table 4-1 Acrolein Monitoring Results Comparison with Clarkson Airshed Study

	WSP Sample Results (2020) - µg/m³	MECP Clarkson Airshed Study (2007) - µg/m³	Percent Change
90th Percentile	0.696	2.12	-67 %

The results obtained in 2020 are lower than the baseline data collected by the MECP in 2007 as part of the Clarkson Airshed Study. The 90th percentile concentrations decreased 67 % when compared to the results collected in the 2007 Clarkson Airshed Study. It should be noted that this comparison is done with limited data and taken during different conditions (both spatially and temporally). It is also noted that 2020 data may have been reduced due to COVID-19 impacted operations or traffic. It can be assumed that the proposed development will not further degrade the air quality with respect to acrolein, as will be discussed further in the air dispersion modelling assessment.

4.1.2 Benzene Data Comparisons

Benzene data collected was compared to the closest NAPS stations with benzene data available. The following table shows the NAPS stations used and their location.

Table 4-2 NAPS Station Locations - Benzene

	NAPS Station 60435	NAPS Station 60438	NAPS Station 60440	NAPS Station 60512	NAPS Station 61502	NAPS Station 65101
Location	Etobicoke South, 461 Kipling Ave.	Etobicoke, 401W – 125 Resource Rd.	Toronto North - Downsview, 4905 Dufferin St	Hamilton, Elgin St. & Kelly St. - Beasley Park	Kitchener, West Ave. and Homewood	Newmarket, Eagle St. and McCaffrey Rd.
Distance from WSP's Station	14 km northeast	23 km northeast	33 km north east	34 km southwest	70 km west	60 km northeast

The most recent NAPS data available (2015-2019) was summarized over the same six-month sampling period (July – December) for comparison. When comparing benzene sampling

results to historical data collected at nearby NAPS stations benzene concentrations were comparable. The average benzene concentration from the monitoring program was lower than the average benzene concentrations collected at NAPS stations 60512, 60440, and 60438. The results of this comparison are shown in **Table 4-3.**

Table 4-3 Benzene Monitoring Results Comparison (July – December)

	WSP Sample Result Average	NAPS Station 60435 (2015-2016)	NAPS Station 60438 (2017-2019)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)	NAPS Station 61502 (2015-2019)	NAPS Station 65101 (2017-2019)	Annual AAQC[1]
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
Six Month Mean	0.49	0.45	0.56	0.55	0.67	0.39	0.33	0.45
Six Month 90th Percentile	0.7	0.63	0.78	0.98	1.26	0.63	0.52	0.45

Note: [1] Annual AAQC Threshold included for reference, other concentrations from WSP and NAPS sampling are not annualized, so seasonal variations have not been accounted for.

The NAPS stations were also assessed for the number of 24-hour concentrations with elevated levels compared to the annual AAQC for benzene, the following table shows the summary.

Table 4-4 Benzene Monitoring Results Comparison – Percentage of Daily Concentrations Greater Than The Annual AAQC For Benzene (July – December)

WSP	NAPS Station 60435 (2015-2016)	NAPS Station 60438 (2017-2019)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)	NAPS Station 61502 (2015-2019)	NAPS Station 65101 (2017-2019)
50 %	48 %	70 %	58 %	54 %	29 %	22 %

The tables above indicate that it is already historically common for benzene to have elevated levels compared to the annual AAQC in similarly developed areas. The NAPS stations 60438 (Etobicoke 401W), 60440 (Toronto North), and 60512 (Hamilton) all have greater concentrations than WSP's monitoring station and NAPS station 60435 (Etobicoke South) had similar concentrations. NAPS station 61502 (Kitchener) and 65101 (Newmarket) have lower concentrations as expected since these areas are less developed and more rural.

The available data collected by NAPS for VOCs is limited, for this reason, the Stations in Kitchener and Newmarket were added for additional comparison, although these locations are a significant distance from the Site. It is difficult to determine the proportion of decrease related to COVID-19 restrictions on benzene concentrations; however, it can be demonstrated that the Site is within typical ranges seen historically throughout Ontario.

It can be assumed that the proposed development will not further degrade ambient air quality within the Clarkson airshed with respect to benzene, as will be discussed further in the air dispersion modelling assessment.

4.1.3 Methylene Chloride (Dichloromethane) Data Comparisons

Methylene chloride data collected was compared to the closest NAPS stations with methylene chloride data available. The following table shows the NAPS stations used and their location.

Table 4-5 NAPS Station Locations – Methylene Chloride

	NAPS Station 60435	NAPS Station 60438	NAPS Station 60440	NAPS Station 60512	NAPS Station 61502	NAPS Station 65101
Location	Etobicoke South, 461 Kipling Ave.	Etobicoke, 401W – 125 Resource Rd.	Toronto North - Downsview, 4905 Dufferin St	Hamilton, Elgin St. & Kelly St. - Beasley Park	Kitchener, West Ave. and Homewood	Newmarket, Eagle St. and McCaffrey Rd.
Distance from WSP's Station	14 km northeast	23 km northeast	33 km north east	34 km southwest	70 km west	60 km northeast

The most recent NAPS data available (2015-2019) was summarized over the same six-month sampling period for comparison (July – December).

When comparing methylene chloride sampling results to historical data collected at nearby NAPS stations methylene chloride concentrations were comparable. The average methylene chloride concentration from the monitoring program was within the typical range of concentrations collected at the NAPS stations. The results of this comparison are shown in **Table 4-6.**

Table 4-6 Methylene Chloride Monitoring Results Comparison

	WSP Sample Results	NAPS Station 60435 (2015-2016)	NAPS Station 60438 (2017-2019)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)	NAPS Station 61502 (2015-2019)	NAPS Station 65101 (2017-2019)	Annual AAQC[1]
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
Six Month Mean	0.71	0.62	0.61	1.15	0.39	0.46	0.35	44
Six Month 90th Percentile	1.36	0.87	1.06	2.29	0.58	0.63	0.50	44

Note: [1] Annual AAQC Threshold included for reference, other concentrations from WSP and NAPS sampling are not annualized, so seasonal variations have not been accounted for.

Methylene chloride concentrations are within the typical ranges seen at the surrounding NAPS stations. Methylene chloride samples were mostly non-detectable in the laboratory reports and were below the annual AAQC of 44 µg/m³.

4.1.4 PM Data Comparison

PM_{10} and $PM_{2.5}$ data collected was compared to the closest NAPS stations with data available. The following table shows the NAPS stations used for PM_{10} and $PM_{2.5}$ data.

Table 4-7 NAPS Station Locations – PM_{10} and $PM_{2.5}$

	NAPS Station 60435	NAPS Station 60438	NAPS Station 60439	NAPS Station 60440	NAPS Station 60512
Location	Etobicoke South, 461 Kipling Ave.	Etobicoke, 401W – 125 Resource Rd.	Toronto, 200 College St.	Toronto North - Downsview, 4905 Dufferin St	Hamilton, Elgin St. & Kelly St. - Beasley Park
Distance from WSP's Station	14 km northeast	23 km northeast	25 km north east	33 km north east	34 km southwest

The most recent NAPS data available (2015-2019) was summarized over the same six-month sampling period for comparison (July – December).

Overall, PM_{10} concentrations recorded during the monitoring period were greater than the historical PM_{10} concentrations recorded at the nearby NAPS stations; however, there is no

annual AAQC guideline for PM_{10} and the six-month average concentration was below the 24-hour AAQC. The results of this comparison are shown in

Table 4-8.

Table 4-8 PM_{10} Monitoring Results Comparison

	WSP Sample Result	NAPS Station 60435 (2015)	NAPS Station 60438 (2017-2019)	NAPS Station 60439 (2015-2016)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
Six Month Average	18.3	19.3	18.2	13.5	11.8	12.4
Six Month 90th Percentile	42.4	30.9	29.2	25.0	20.3	20.6

Overall, $PM_{2.5}$ concentrations recorded during the monitoring period were generally lower than $PM_{2.5}$ historical concentrations recorded at the nearby NAPS stations. The six-month average was lower than the Annual AAQC. The results of this comparison are shown in **Table 4-9.**

Table 4-9 $PM_{2.5}$ Monitoring Results Comparison

	WSP Sample Result	NAPS Station 60435 (2015)	NAPS Station 60438 (2017-2019)	NAPS Station 60439 (2015-2016)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)	Annual AAQC[1]
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
Six Month Average	6.6	8.9	8.6	6.9	6.5	7.5	8.8
Six Month 90th Percentile	9.9	19.0	14.5	12.6	12.0	13.1	8.8

Note: [1] Annual AAQC Threshold included for reference, other concentrations from WSP and NAPS sampling are not annualized, so seasonal variations have not been accounted for.

4.1.5 TSP Data Comparison

At this time, no representative MECP or NAPS Station data was available to compare TSP monitoring results.

4.2 Continuous Monitoring

Comparable ambient data for SO_2 and NO_X was not yet validated from nearby MECP stations; as a result, data collected at the Site were compared to data collected from local ECCC monitoring stations governed by the NAPS Air Toxics Program. NAPS stations used for data comparison were stations that had available data and were representative of the study area. The most recent NAPS data available (2015-2019) was summarized over the same six-month sampling period and compared to the WSP sampling data.

4.2.1 SO_2 Data Comparison

Continuous SO_2 data collected from the ambient program was compared to the closest NAPS stations with SO_2 data available. The following table shows the NAPS stations used and their location.

Table 4-10 Naps Station Locations - SO_2

	NAPS Station 60430	NAPS Station 60434	NAPS Station 60438	NAPS Station 60440	NAPS Station 60512	NAPS Station 67001
Location	Etobicoke, 401 W and Resources Rd.	Mississauga, 3359 Mississauga Rd. N. - UofT Campus	Etobicoke, 401W – 125 Resource Rd.	North York, 4905 Dufferin St,	Hamilton, Elgin St. & Kelly St. - Beasley Park	Milton, Main St. E. and Harris Blvd.
Distance to WSP's Station	23 km northeast	4.5 km northwest	23 km northeast	33 km north east	34 km southwest	19 km west

Continuous SO_2 data collected during the monitoring period was below the AAQC for SO_2. Overall, SO_2 concentrations recorded during the monitoring period were comparable to SO_2 concentrations recorded at the nearby NAPS stations over the past five years. It should be noted that NAPS station 60512 (Hamilton) had much higher levels of SO_2 compared to other stations as it measures the impacts of the heavily industrialized areas of Hamilton on the hospital/downtown core. The results of this comparison are shown below in **Table 4-11**.

Table 4-11 SO2 Monitoring Results Comparison – Six Month 90th Percentile

	WSP Sample Result	NAPS Station 60430 (2015-2019)	NAPS Station 60434 (2019)	NAPS Station 60438 (2017-2019)	NAPS Station 60440 (2017-2019)	NAPS Station 60512 (2015-2019)	NAPS Station 67001 (2019)
	ppb	ppb	ppb	ppb	ppb	ppb	ppb
Six Month Mean	0.47	0.47	0.42	0.21	0.16	3.30	0.90
Six Month 90th Percentile	1.0	0.70	1.0	0.63	0.27	9.4	1.9

4.2.2 NO_X DATA Comparison

Continuous NO_X data collected as part of the ambient program was compared to the closest NAPS stations with NO_X data available. The following table shows the NAPS stations used and their location.

Table 4-12 NAPS Station Locations - NO_x

	NAPS Station 60434	NAPS Station 60435	NAPS Station 60438	NAPS Station 60512	NAPS Station 61603	NAPS Station 67001
Location	Mississauga, 3359 Mississauga Rd. N. - UofT Campus	Etobicoke, 461 Kipling Ave.	Etobicoke, 401W – 125 Resource Rd.	Hamilton, Elgin St. & Kelly St. - Beasley Park	Oakville, 8th Line & Glenashton Dr.	Milton, Main St. E. and Harris Blvd.
Distance to WSP's Station	4.5 km northwest	14 km northeast	23 km northeast	34 km southwest	6 km southwest	19 km west

Continuous NO_X data collected during the monitoring period was below the AAQC for NO_2. Overall, NO_X concentrations recorded during the monitoring period were less than NO_X concentrations recorded at the nearby NAPS stations over the past five years. The results of this comparison are shown below in **Table 4-13**.

Table 4-13 NO_x Monitoring Results Comparison

	WSP Sample Result	NAPS Station 60434 (2015 – 2019)	NAPS Station 60435 (2015 – 2019)	NAPS Station 60438 (2017-2019)	NAPS Station 60512 (2015-2019)	NAPS Station 61603 (2015 – 2019)	NAPS Station 67001 (2019)
	ppb	ppb	ppb	ppb	ppb	ppb	ppb
Six Month Mean	10.5	10.9	21.3	39.8	15.2	9.8	12.8
Six Month 90th Percentile	23.6	23.6	44.4	86.3	31.0	21.2	28.0

5 Baseline Concentrations

Ambient air monitoring data collected as part of the Clarkson TSA ambient air quality monitoring program (Clarkson monitoring program) was used in combination with air dispersion modelling results to predict cumulative impacts of air contaminants at the Site for benzene, acrolein, $PM_{2.5}$, PM_{10}, TSP, NO_X, SO_2, and methylene chloride. In order to assess the cumulative impact on the Site, the 90th percentile of ambient concentrations of each contaminant monitored as part of the Clarkson monitoring program was calculated for 10-min, 1-hour, and 24-hour averaging periods. The 90th percentile of the available monitoring data is typically considered a conservative estimate of baseline air quality (CEA Agency and CNSC, 2009).

Ambient air monitoring data collected as part of the Clarkson Air Shed Industrial Association (CASIA) ambient air quality monitoring program (CASIA monitoring program) was used in combination with air dispersion modelling results to predict cumulative impacts of air contaminants at the Site for carbon monoxide. In order to assess the cumulative impact on the Site, the 90th percentile of ambient concentrations of carbon monoxide was calculated for 1-hour and 8-hour averaging periods. NAPS monitoring data collected in 2019 was used to supplement Clarkson monitoring data collected by WSP to allow for a full year of data to be used to calculate ambient NO_2 and $PM_{2.5}$ concentrations. There was only NO_x data available from CASIA so NAPS data with NO_2 was used instead. The $PM_{2.5}$ data from CASIA was collected continuously using a different methodology so NAPS data was used instead since the methodology was similar to WSP's ambient program.

Ambient air monitoring data collected as part of the NAPS ambient air quality monitoring program (NAPS monitoring program) and Ontario Ministry of Environment, Conservation, and Parks (MECP) ambient air quality monitoring program (MECP monitoring program) was used to obtain ambient concentrations of contaminants which are not part of the Clarkson or CASIA monitoring program. NAPS data was also used to supplement Clarkson monitoring data collected by WSP to allow for a full year of data to be used to calculate ambient contaminant concentrations. The NAPS monitoring station closest to the study area with the most recent data available was used to supplement Clarkson monitoring data. These contaminants include benzene, benzo(a)pyrene, 1,3-butadiene, formaldehyde, acetaldehyde, SO_2, NO_2, $PM_{2.5}$, xylene, and methylene chloride. In order to assess the cumulative impact on the Site, the 90th percentile of ambient concentrations of these contaminants was calculated for 10-min, ½-hour, 1-hour and 24-hour. For contaminants with annual averaging periods, the annual mean was calculated.

A summary of ambient air monitoring data and sources is shown in **Table 5-1** . Impacts from contaminants which have not been retained for the monitoring and modelling assessment will be discussed; however, these impacts will only include existing conditions.

Table 5-1 Summary of Ambient Baseline Concentrations

Contaminant	Averaging Period	Baseline Concentration (µg/m³)	Air Quality Threshold (µg/m³)	% of Threshold	Data Source
PM_{10} [A]	24 h	47	50	94%	Clarkson Air Monitoring and NAPS #60438 (Toronto)
$PM_{2.5}$ [A]	24 h	15	27	54%	Clarkson Air Monitoring and NAPS #60438 (Toronto)
	Annual	8.2	8.8	93%	
TSP [B]	24 h	89	120	74%	Clarkson Air Monitoring
	Annual	36	60	60%	
NO_x (expressed as NO_2) [A]	1 h	36	79	46%	Clarkson Air Monitoring and NAPS #60434 (Mississauga)
	24 h	30	200	15%	
	Annual	16	22.6	68%	
CO	1 h	298	36200	1%	CASIA
	8 h	279	15700	2%	
SO_2 [A]	10 min	3	175.6	2%	Clarkson Air Monitoring
	1 h	2	104.8	2%	Clarkson Air Monitoring and NAPS #60438 (Toronto)
	Annual	0.98	10.5	9%	
Acrolein [B]	1 h	1.6 [C]	4.5	36%	

Contaminant	Averaging Period	Baseline Concentration (µg/m³)	Air Quality Threshold (µg/m³)	% of Threshold	Data Source
	24 h	0.6	0.4	158%	Clarkson Air Monitoring
Benzene [A]	24 h	0.69	2.3	30%	Clarkson Air Monitoring and NAPS #60438 (Toronto)
	Annual	0.49	0.45	109%	
1,3-Butadiene	24 h	0.1	10	1%	NAPS #60435 (Etobicoke)
	Annual	0.01 [C]	2	0.5%	
Acetaldehyde	30 min	5 [C]	500	1%	NAPS #60211 (Windsor West)
	24 h	2	500	0.3%	
Formaldehyde	24 h	3	65	5%	NAPS #60211 (Windsor West)
Benzo(a)pyrene	24 h	0.0001	5.00E-05	213%	NAPS #60430 (Toronto West) NAPS # 60438 (Toronto) NAPS #60439 (Toronto Downtown)
	Annual	0.00001 [C]	1.00E-05	115%	
Methylene Chloride [A]	24 h	1.3	220	1%	Clarkson Air Monitoring and NAPS #60438 (Toronto)
	Annual	0.6	44	1.4%	
Total Reduced Sulphur (as H_2S)	10 min	1.4 [D]	13	11%	MECP #29000 (Hamilton)
	24 h	0.3	7	5%	

Contaminant	Averaging Period	Baseline Concentration (µg/m³)	Air Quality Threshold (µg/m³)	% of Threshold	Data Source
Xylenes	10 min	6.2 [D]	3000	0.2%	NAPS #60435 (Etobicoke)
	24 h	1.5	730	0.2%	

Notes:

[A] Clarkson air monitoring data supplemented with NAPS or CASIA data

[B] Ambient concentration calculated based on 6-months of Clarkson monitoring data

[C] Concentration was converted from the 24-hour concentration. Reference: Ontario Ministry of the Environment, Conservation, and Parks, 2018 ("Procedure for Preparing an Emission Summary and Dispersion Modelling Report")

[D] The 10-minute concentration was converted from the 24-hour concentration. Reference: Ontario Ministry of the Environment, Conservation, and Parks, 2018 ("Procedure for Preparing an Emission Summary and Dispersion Modelling Report")

As shown in **Table 5-1,** ambient concentrations of benzo(a)pyrene are greater than the 24-hour and annual air quality thresholds. Benzo(a)pyrene was not monitored by WSP, the nearest monitoring station that was used for baseline concentrations is situated next to Highway 401 as there are not many monitoring stations that monitor benzo(a)pyrene in the surrounding area. Using this location for the baseline concentration is conservative as it likely has higher concentrations of benzo(a)pyrene than at the Clarkson TSA due to the higher volume of traffic experienced on Highway 401.

Benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAHs) are widespread environmental contaminants formed during incomplete combustion or pyrolysis of organic material. These substances are found in air, water, soils and sediments, generally at trace levels except near their sources. Benzo(a)pyrene is released to the atmosphere from a wide variety of anthropogenic and natural sources including wildfires (ACGIH, 2019). Biomass burning is the most important category of PAH emissions in Canada given that wildfires and residential wood combustion are the largest reported natural and anthropogenic sources, respectively (Tevlin et al, 2020). Residential wood combustion (RWC) is also used for recreational purposes in winter (wood-burning fireplaces) and summer (fire pits, chimineas, and outdoor ovens and smokers) (Tevlin et al, 2020).

National anthropogenic PAH emissions reported through Canada's Air Pollutant Emissions Inventory have declined by a factor of three since 1990 and are now dominated by residential wood combustion (Tevlin et al, 2020). The most recent contributions from motor vehicle exhaust are comparatively small at 8 % of the anthropogenic total when accounting is conducted at the national scale. When assessed at the local scale, vehicles contribute more to PAH burdens in ambient air (Tevlin et al, 2020). Air in the Greater Toronto Area has vehicle contributions up to 50 %, and smaller municipalities that are near major highways but otherwise have few PAH sources can have vehicle contributions up to 90 % (Tevlin et al, 2020). The benzo(a)pyrene concentrations reported at the Site fall within the ranges reported in Ontario and Canada and are to be expected in urban areas.

The figure provided below illustrates ambient concentrations of benzo(a)pyrene in comparison with guidelines (Tevlin et al, 2020). Annual average ambient air guidelines from the provinces of Ontario (ON), Alberta (AB) and Quebec (QC) are depicted as horizontal blue lines.

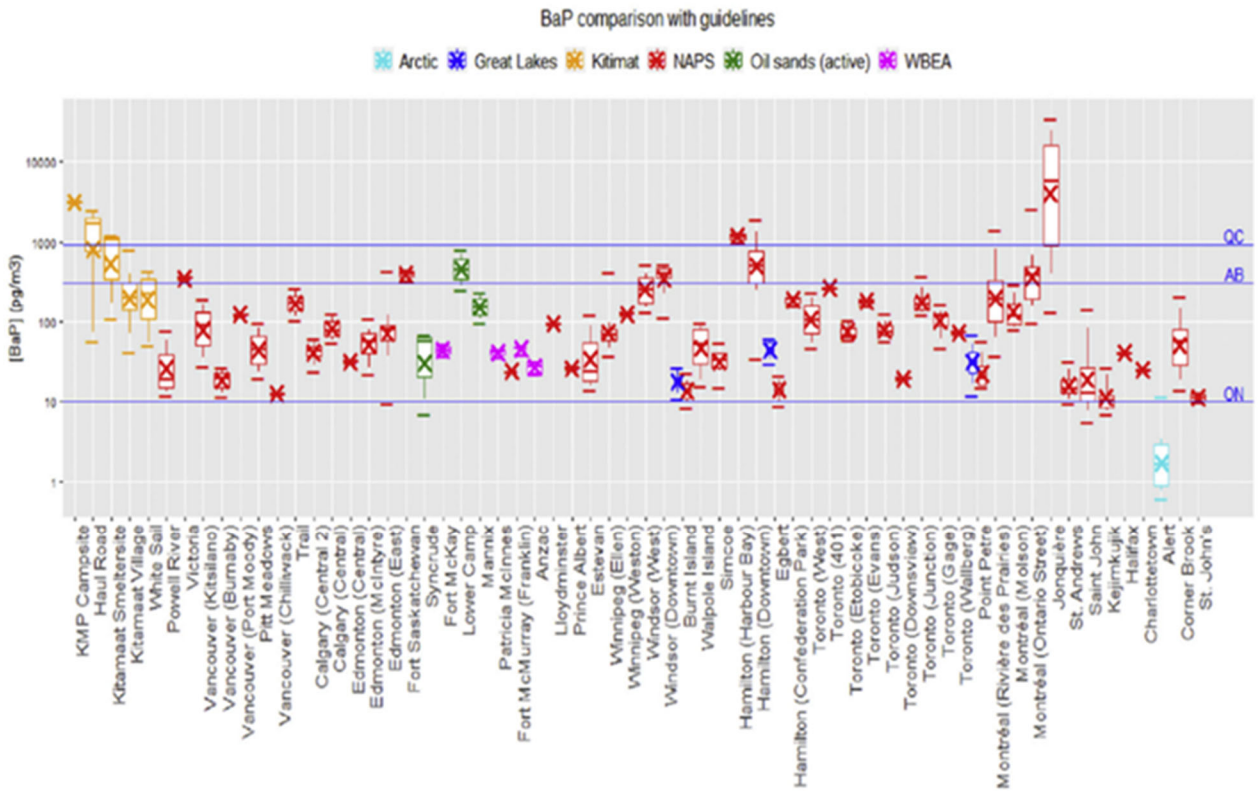

Figure 5-1 Measured Range of Annual Average Benzo(A)Pyrene Concentrations (pg/m^3)

Ambient concentrations of acrolein are also greater than the 24-hour air quality threshold. Acrolein is released to the atmosphere from a wide variety of anthropogenic and natural sources including forest, crop and grassland fires (MOE, 2009). Man-made sources of acrolein

include industrial emissions from manufacturing facilities that make or use acrolein, fossil fuel combustion, motor vehicle exhaust, tobacco smoke, burning of animal and vegetable fats, heating of lubrication oils, burning of wood and plastics and aquatic and terrestrial pesticide uses (MOE, 2009). Forest product manufacturing processes that release VOCs are also known to emit significant amounts of acrolein to the air (MOE, 2009).

From 1996 to 1998, acrolein concentrations in three urban locations in Ontario ranged from 0.14 to 0.25 µg/m^3 with a range of maximum concentrations from 0.56 to 0.71 µg/m^3 (MOE, 2009). From 1989 to 1996, the ECCC NAPS program reported acrolein levels in major urban areas across Canada ranging from 0.05 µg/m^3 to 2.47 µg/m3 with a mean of 0.18 µg/m^3. The highest level in a suburban area was 1.85 µg/m^3 and in a rural area was 0.33 µg/m^3. The acrolein concentrations reported at the Site fall within the ranges reported in Ontario and across Canada and are to be expected in urban areas.

As shown in **Table 5-1**, ambient concentrations of benzene are greater than the annual air quality threshold. Benzene was monitored by WSP for six months; therefore, WSP monitoring data was supplemented with NAPS monitoring data to provide a more representative annual baseline concentration. The nearest monitoring station that was used for baseline concentrations is situated next to Highway 401 as there are not many monitoring stations that monitor benzene in the surrounding area. Using this location for the baseline concentration is conservative as it likely has higher concentrations of benzene than at the Clarkson TSA due to the higher volume of traffic experienced on Highway 401.

All other contaminants of concern are below ambient air quality thresholds.

5.1 Impacts of COVID-19 on Ambient Air Quality

5.1.1 Metrolinx Train Data

Metrolinx has reported ridership on GO Trains being down to less than 10 % of the pre-pandemic levels from April to September 2020. Due to the decreased ridership, Metrolinx reduced the number of trains. WSP evaluated the train schedules as changes were made and determined the actual decrease in train activity for the GO Trains that stop at the Clarkson GO Station. Based on the schedule updates provided to the public by Metrolinx, the following changes were made to the Lakeshore West line since the start of the pandemic. On March 30, 2020 the express rush-hour trips were no longer running. There were further reductions on April 14, 2020 and again on April 27, 2020. On June 9 most of the trains on the Lakeshore West line were reduced from twelve to six coaches. There were still select rush hour trains which had twelve coaches. There were further reductions in the number of coaches per train that began on June 22, 2020. Sampling began on July 8, 2020, when train activity had already been reduced. On September 5, 2020, as the lockdown restrictions were being removed, the

rush hour service was resumed, providing trains every 15 to 30 minutes during rush hours and hourly or better in the midday, evenings and weekends. Most of the trains were still reduced to six cars per train. There were no further updates provided by Metrolinx until after the monitoring was completed in January 2021. Based on the available historic train schedules for the Lakeshore West line, there was a significant decrease in train activity. The following table, **Table 5-2** shows the number of train stops at the Clarkson GO Station.

Table 5-2 Number of Train Stops at Clarkson GO Station

	WEEKDAY		WEEKEND		
Schedule Date	**Eastbound**	**westbound**	**eastbound**	**westbound**	**Weekly total**
05-Jan-19	56	51	35	37	**893**
12-Apr-20	21	21	18	19	**368**
05-Sep-20	34	34	19	19	**552**
Percent Reduction in April 2020	63 %	59 %	49 %	49 %	**59 %**
Percent Reduction in September 2020	39 %	33 %	46 %	49 %	**38 %**

The total weekly stops at the Clarkson GO Station saw a percent decrease of 59 % when comparing the 2019 schedule with the April 2020 schedule. On September 5, 2020, when the schedule was increased there was still 38 % fewer train stops than during pre-COVID conditions. The reduction in train activity in the area likely contributed to reductions in nitrogen oxides, sulfur dioxide, and particulate matter that were being monitored by WSP.

5.1.2 Roadway Traffic

Official traffic data was unavailable to WSP at the time of preparing this report. There was some data available through TomTom's satellite navigation devices that show a decrease in rush hour traffic, between 33 % and 62 %, as shown in **Table 5-3**.

Table 5-3 Percent Reduction in Traffic Due to Covid-19

Month	AM Rush Hour Congestion (% Reduction)	PM Rush Hour Congestion (% Reduction)
July	62 %	43 %
August	51 %	33 %
September	59 %	37 %
October	53 %	43 %
November	61 %	46 %
December	58 %	45 %
Average	**57 %**	**41 %**

Without valid traffic data specific to the area (Royal Windsor Drive and Southdown Road), it is impossible to know the exact reduction in traffic around the Site; however, it can be assumed that it was reduced by approximately 50 %.

5.1.3 Ambient Data Comparison

In order to assess the potential impacts of the COVID-19 pandemic and associated provincial shut-downs on local air quality, the CASIA data over five years (2014 – 2018) during the same six-month period (July – December) was compared to the data collected at WSP's ambient air monitoring station for $PM_{2.5}$ and NO_X. A comparison of monitoring data is presented in **Table 5-4 and Table 5-5.**

Table 5-4 SP and Historical CASIA Data Comparison – $PM_{2.5}$

	Station ID	24-Hour 90th Percentile (µg/m³)	Six Month Mean (µg/m³)
CASIA 2014	STN46118	18.3	10.2
	STN44086	17.0	9.8
CASIA 2015	STN46118	18.5	9.5
	STN44086	19.0	9.8
CASIA 2016	STN46118	15.4	9.3
	STN44086	14.4	8.9
CASIA 2017	STN46118	15.3	10.2
	STN44086	15.4	10.3
CASIA 2018	STN46118	15.8	9.7
	STN44086	17.1	10.9
CASIA Average		16.6	9.9
WSP		15.1	6.6
Percent Change		**-9.0 %**	**-33.3 %**

Table 5-5 WSP and Historical CASIA Data Comparison – NO_X

	Station ID	24-Hr 90th Percentile (ppb)	24 Hr 98th Percentile (ppb)	1 Hr 90th Percentile (ppb)	1 Hr 98th Percentile (ppb)	Six Month Mean (ppb)
CASIA 2014	STN46118	15.3	28.9	20.7	42.0	9.4
	STN44086	20.3	34.9	24.0	52.0	11.1
CASIA 2015	STN46118	19.6	30.3	21.0	47.0	9.6
	STN44086	24.1	48.7	28.0	64.0	12.2
CASIA 2016	STN46118	20.1	38.7	23.0	48.0	10.7
	STN44086	21.4	53.9	23.0	71.0	11.4
CASIA 2017	STN46118	21.3	42.1	27.0	56.0	12.6

	Station ID	24-Hr 90th Percentile (ppb)	24 Hr 98th Percentile (ppb)	1 Hr 90th Percentile (ppb)	1 Hr 98th Percentile (ppb)	Six Month Mean (ppb)
	STN44086	23.8	46.1	28.0	65.9	12.2
CASIA 2018	STN46118	13.2	29.6	16.0	38.0	7.5
	STN44086	18.4	36.6	20.0	51.0	10.0
CASIA Average		19.7	39.0	23.1	53.5	10.7
WSP		24.7	36.1	23.6	55.4	10.5
Percent Change		**25.2 %**	**-7.4 %**	**2.1 %**	**3.5 %**	**-1.3 %**

Based on the six-month mean data comparisons presented in **Table 5-4** and **Table 5-5**, there was a 1.3 % decrease in NO_x concentrations and a 33.3 % decrease in $PM_{2.5}$ concentrations which may have been due to reduced vehicle traffic in the area, or could also be attributed to the difference in station locations or methodology. It should be noted that there is a difference in location and direct comparison between the two data sets has unknown variables. This data comparison demonstrates the reduction in $PM_{2.5}$ being 33.3 % less than the 6-month mean from the CASIA data. The 6-month mean for NOx was only reduced by 1.3 %; however, the 90th percentile increased by 25.2 %. In order to better quantify potential bias adjustment factors for COVID-related impacts on air quality recent data from MECP monitoring stations were assessed. The results are presented in the following section of the report.

Dispersion modelling was completed using supplemented data from January to July to account for the first half of the year when ambient concentrations were not monitored. The baseline concentrations for $PM_{2.5}$, NO_X, PM_{10}, SO_2, benzene and methylene chloride were supplemented with NAPS data from January - July 2019 which helps to adjust to pre-COVID-19 conditions.

5.1.4 MECP Bias Adjustment Factors

MECP air quality data was used to determine bias adjustment factors for WSP's data collected in 2020. MECP air quality data was selected for comparison and development of a bias factor over CASIA data because the MECP monitoring program uses the same sampling methodology and type of equipment. The CASIA should not be compared directly as the sampling methodology and the type of equipment which was used to conduct the sampling are not equivalent to the ones used by the MECP and WSP. MECP data for NO_2, $PM_{2.5}$, and SO_2 were analyzed to determine the percent change from 2019 to 2020. Since the majority of

WSP's sampling took place from July – December 2020, the same period was used when calculating the percent change in the MECP data.
The following table includes a list of MECP monitoring stations used to determine the bias adjustment factors.

Table 5-6 MECP Monitoring Stations Used for Bias Adjustment Factor

Station Name	Contaminants
Mississauga	NO2, PM2.5
Toronto West	NO2, PM2.5, SO2
Toronto North	NO2, PM2.5, SO2
Hamilton Downtown	SO2
Hamilton Mountain	SO2

The following tables include the percent change from 2019 (July-December) to 2020 (July-December).

Table 5-7 NO_2 Bias Adjustment Factor

	Percent Change 2019 – 2020	Average Percent Change per Year (5 Year Average)
Mississauga	-24%	3%
Toronto West	-18%	-1%
Toronto North	-24%	-6%
Average	-22%	-1%

Based on the table above it can be concluded that an approximate percent change for NO_2 concentrations from July – December (monitoring period) due to COVID-19 influences would be -21%. WSP's data set was multiplied by the bias adjustment factor of 1.266 to account for the 21% decrease from 2019. This data was then incorporated into supplementary data to obtain a baseline concentration.

Table 5-8 $PM_{2.5}$ Bias Adjustment Factor

	Percent Change 2019 – 2020	Average Percent Change (5 Year Average)
Mississauga	-2%	-4%
Toronto West	1%	-2%
Toronto North	-11%	-7%
Average	-4%	-4%

The table above demonstrates that $PM_{2.5}$ has been decreasing by approximately 4% each year since 2015. The average decrease as a result of COVID-19 lockdowns is also 4%, so it can be concluded that no bias adjustment factor is required. Further to this, $PM_{2.5}$ decreased less in 2020 when compared to the average percent change over the previous five years at the Mississauga MECP monitoring station.

Table 5-9 SO_2 Bias Adjustment Factor

	Percent Change 2019 – 2020	Percent Change 2018 - 2020	Percent Change 2018 - 2019
Toronto West	-25%	1%	34%
Toronto North	7%	-39%	-43%
Hamilton Downtown	-22%	-13%	11%
Hamilton Mountain	-6%	21%	29%
Average	-12%	-8%	8%

The data quality for SO_2 from MECP is not ideal for these purposes. The data collected from 2015 – 2018 does not include a decimal place, resulting in rounding errors when calculating the mean. There is also no station located in Mississauga that records SO_2 so two stations in

Hamilton were included. Since there does not appear to be any clear trend in the dataset, the average percent change from 2019-2020 and 2018-2020 was used. The average percent change is -10% in 2020, due to the impact of COVID-19 lockdowns. WSP's data set was multiplied by the bias adjustment factor of 1.111 to account for the 10% decrease as a result of COVID-19 lockdowns. This is a conservative approach considering that the average percent change from 2018-2019 (no COVID-19 impact) was an 8% increase, meaning the average decrease is only -2%. This data was then combined with supplementary data from NAPS to obtain a baseline concentration.

5.1.5 COVID-19 Correction Recommendations

Assuming a worst-case scenario based on the MECP data comparison, where NO_2 concentrations were reduced by 22 % due to the reduction in traffic and train activity, the NO_2 concentrations may have been as high as 13.5 ppb, which is still below the 24-hour AAQC for nitrogen dioxide of 100 ppb. Based on the MECP data comparisons for 2019 and 2020 there was no significant change in $PM_{2.5}$ concentrations as a result of COVID-19. The average for the three (3) MECP monitoring stations was a 4% decrease, which is the same as the average decrease per year over the past 5 years. As an absolute worst-case scenario, $PM_{2.5}$ can be assumed to have been reduced by 4 % and the actual concentration may have been 6.9 µg/m³, which is below the annual AAQC and below the 24-hour AAQC threshold.

When assessing the reduction in nearby industrial activity, WSP has concluded that the WWTP most likely would have seen no impact, since the stay-at-home orders and business closures would not have impacted throughput. Petro Canada Lubricants confirmed verbally that their boilers did not slow down throughout 2020 when compared to 2019. Since their boilers are the primary source of the contaminants of concern evaluated in this study, it can be assumed that there were no significant changes due to the pandemic. There was likely some reduction in production at CRH; however, the data required to quantify the reduction was not available at the time this report was prepared. The emission factors used for the dispersion modelling for CRH are based on public NPRI data and working hours.

WSP determined the baseline concentrations using WSP's monitoring data from approximately July – December 2020 combined with supplementary data from the most appropriate source (CASIA, NAPS or MECP). The bias adjustment factors determined from the MECP data were applied to WSP's monitoring data (NO_2, $PM_{2.5}$ and SO_2) to account for the effects of COVID-19 lockdowns on the surrounding air quality.

At the time of this report submission, there are no full datasets for 2020 for the other contaminants monitored as part of this study (benzene, acrolein, methylene chloride, PM_{10}, TSP).

6 Ambient Air Monitoring Conclusions

Based on the ambient monitoring completed over the six-month monitoring period, the following conclusions have been made:

— Data collected since 2015 from NAPS ambient air quality monitoring stations were used to compare with monitoring results. Only data available from NAPS stations closest to the study area and generally similar in surroundings were used to allow for a representative comparison;

— Acrolein concentrations during the monitoring period were higher when compared to representative NAPS stations (2015 - 2019); however, the difference in analytical methodologies does not allow for a reasonable comparison, as such the 2007 data from the MECP Clarkson Airshed Study was used;

— Acrolein concentrations during the monitoring period were lower than the 2007 MECP air quality study. Sources of elevated acrolein concentrations could not be identified in the MECP study due to the variation in wind direction during sampling events, the same is true based on an examination of wind patterns over the six-month study just completed. No wind direction aligned with a single producer/traffic source when acrolein levels were recorded elevated compared to the AAQC;

— More than half of the acrolein samples analyzed in the six-month study were below the laboratory detection limit of 0.23 µg/m^3;

— There were no benzene samples analyzed that were greater than the 24-hour AAQC of 2.3 µg/m^3;

— $PM_{2.5}$ concentrations collected during the monitoring period were comparable or less than $PM_{2.5}$ concentrations of historic nearby NAPS stations. There was one sample that had an elevated concentration compared to the 24-hour AAQC limit for $PM_{2.5}$;

— PM_{10} concentrations collected during the monitoring period were comparable to PM_{10} concentrations of historic nearby NAPS stations. There were two sample days that had measured levels elevated compared to the 24-hour AAQC for PM_{10} of 50 µg/m^3;

— No representative TSP data was available to compare TSP sampling results; there were no 24-hour concentrations elevated compared to the 24-hour AAQC;

- Continuous SO_2 and NO_X data collected during the monitoring period were below the respective AAQC guidelines;
- The 90th percentile concentration of NO_2 was greater than the CAAQS annual concentration (2025). This standard is meant to be based on the average over a single calendar year of all 1-hour average concentrations, not 90th percentiles. The 6-month mean for NO_2 was 18.1 µg/m^3, assuming there was a 21% decrease due to COVID-19 lockdowns this becomes 22.9 µg/m^3, within the conservative 2025 CAAQS. The cumulative concentrations meet the 2020 CAAQS limits and the AAQC limits.
- Meteorological data from Petro Canada Lubricants was received and ambient data analysis for trends was completed as part of air quality dispersion modelling assessment; and
- Although monitoring data shows elevated concentrations compared to the annual AAQC for benzene, it should be noted that an AAQC guideline is a concentration of a contaminant in the air that is protective against adverse effects on health and/or the environment. Benzene exceedances are common across Ontario near sensitive receptors containing high-density residential areas; the magnitude and potential source contribution of elevated benzene will be examined as part of the air quality dispersion modelling assessment.

7 Prevailing Wind Directions

Figure 7-1 illustrates the expected prevailing wind directions at the proposed development. Wind data was obtained from the Clarkson Air Shed Monthly Columnar Data Set (Station ID# 44666) provided by Petro Canada Lubricants Inc. The data from this station was selected to best represent meteorological conditions at the proposed development due to its proximity to the proposed development, data availability over five years, and similar surrounding land uses. Data from January 1, 2016 to December 31, 2020 was used to determine prevailing winds at the Site. Based on the data, prevailing winds are expected to be blowing from the west-southwest and east-northeast. A wind rose diagram with data covering the monitoring period and each sample day can be found in **Appendix E**. When comparing the wind speed and direction for each sample date there was no clear trend indicating where sources of the sampling parameters may have been located.

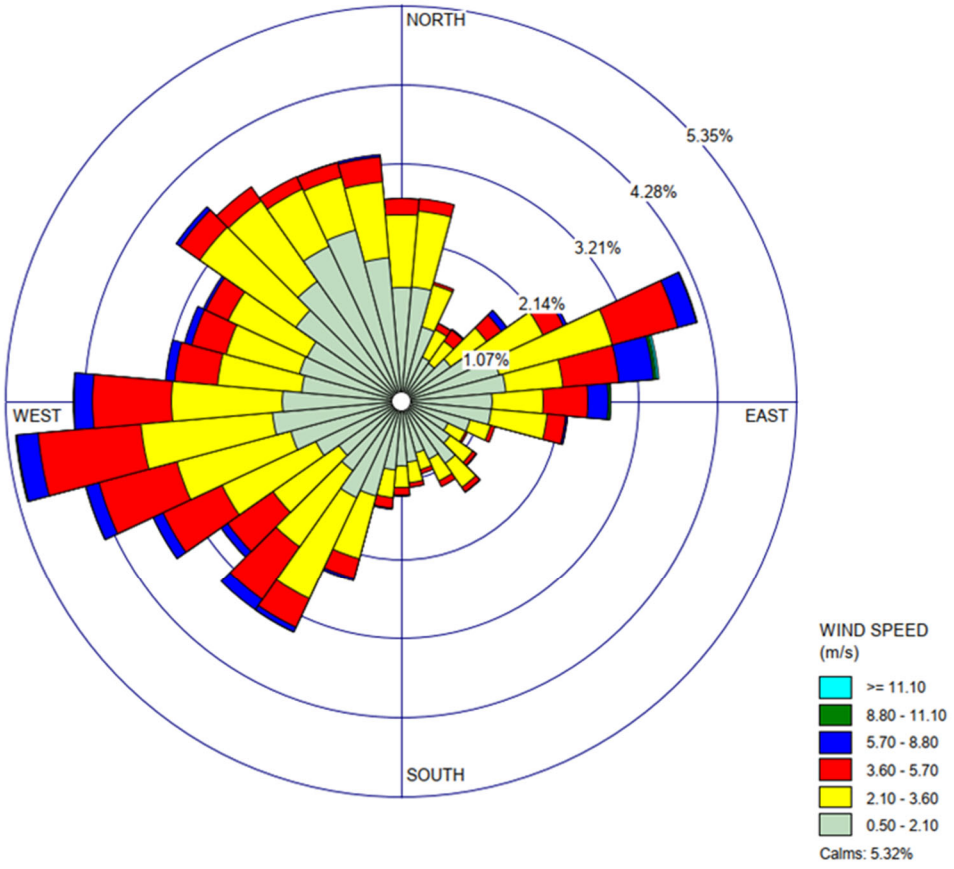

Figure 7-1 Clarkson Prevailing Wind Directions

8 Evaluation of Surrounding Land Uses

Based on the D-6 Guideline, a study area of 1 000 m around the Site was established. The D-6 Guideline outlines a recommended minimum separation distance and potential influence area between industrial facilities and sensitive land uses for three classes of industrial use. The recommended minimum separation distance is the distance (property line to property line) between the incompatible land uses, where industrial use has the potential to cause an adverse effect. The potential influence area is a greater distance in which the industrial operations may have the potential to cause an adverse effect, depending on site operations and meteorological conditions. Additionally, the facilities that are outside of their respective recommended minimum separation distance and potential influence area are expected to have no potential for creating nuisance issues that would give rise to complaints.

In this assessment, facilities of potential concern were assessed based on facility provided emission data, the National Pollutant Release Inventory (NPRI), the Environmental Activity and Sector Registry (EASR) or the Environmental Compliance Approval (ECA) data published online in the Environment Registry of Ontario, aerial photography, and other publicly available data.

8.1 D-6 Guideline

The objective of the D-6 Guideline is to prevent or minimize the encroachment of sensitive land uses upon industrial land uses and vice versa. These two land uses are normally incompatible due to possible adverse effects on sensitive land uses created by industrial operations. For the purpose of this study, a commercial or employment land use is considered an industrial operation in terms of the potential to adversely impact a sensitive land use. The D-6 Guideline categorizes industrial facilities into three classes according to their size, the volume of operations, and nature of their emissions and defines what a sensitive land use is.

The D-6 Guideline provides definitions and examples to illustrate the three industrial classes, provided in **Appendix F**. Facilities that do not meet the definition of any one of the three industrial classes have little to no potential for creating nuisance issues that would give rise to complaints. The definitions and examples in the D-6 Guideline relevant to air quality concerns were used to characterize the nearby facilities. The D-6 Guideline defines a recommended minimum separation distance and potential influence area between industrial facilities and sensitive land uses for each industrial classification, presented in **Table 8-1**.

Table 8-1 Guideline D-6 Recommended Minimum Separation Distance And Potential Influence Areas For Industrial Land Uses

Industrial Classification	Recommended Minimum Separation Distance (m)	Potential Influence Area (m)
Class I – Light Industrial	20	70
Class II – Medium Industrial	70	300
Class III – Heavy Industrial	300	1,000

8.2 Facilities Within Potential Influence Area

A total of 55 industrial facilities surrounding the proposed development were qualitatively assessed for the potential for adverse air quality impacts at the proposed development, as shown in **Table F-1** of **Appendix F**. The locations of industrial facilities identified surrounding the proposed development are shown in **Figure 8-1**. A summary of facilities located within the potential influence area or recommended minimum separation distance is shown in **Table 8-2**. There are 16 facilities located within the potential influence area and six facilities located within the recommended minimum separation as shown. The remaining facilities identified are located outside the potential influence area and are shown in **Table 8-3**.

Figure 8-1 Surrounding Industrial Facilities

Table 8-2 Summary of Industrial Facilities Within the Recommended Minimum Separation Distance or Potential Influence Area

Facility ID	Facility	Address	Industrial Classification	Approximate Distance From Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility Within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A2	H.L. Blachford Limited [A]	2323 Royal Windsor Drive	III	620	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A4	All Tank (1342131 Ontario Limited) [A]	2460 Royal Windsor Drive	III	988	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A10	Greater Toronto Transit Authority (Clarkson Go Station) [A]	1110 Southdown Road	I	7	No	Yes	Yes	No	Located within the minimum separation distance, however, the Clarkson GO Station has an ECA for a standby diesel generator to be used during emergency situations and periodic testing. Is it expected, given its purpose, that the diesel generator will be located near a building. The nearest building to the Site is the parking garage approximately 118 m northwest of the Site. The diesel generator will be used infrequently and is expected to be located outside the recommended minimum separation distance and potential area of influence. Any additional emissions from the facility would have been captured in ambient data.
A11	ICS Universal Drum Reconditioning Limited [A]	2460 Royal Windsor Drive	III	988	Yes	No	Yes	Yes	See All Tank (Facility ID A4)
A12	IPEX Inc. [A]	2441 Royal Windsor Drive	III	882	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A14	Petro Canada Lubricants Inc [A]	385 Southdown Road	III	887	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A15	CRH Canada Group [A]	2391 Lakeshore Rd West	III	990	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A16	Stackpole International Powder Metal [A]	2430 Royal Windsor Drive	III	796	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A17	Stackpole Powertrain International [A]	2400 Royal Windsor Drive	III	884	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A18	Trans-Northern Pipelines Inc [A]	385 Southdown Road	III	887	Yes	No	Yes	Yes	Located within potential influence area, public air emission data available
A22	Musket Transportation Ltd	2215 Royal Windsor Drive	II	223	No	No	Yes	No	Located within the potential influence area, however expected emissions associated with the facility (road dust) would be captured in ambient data

Facility ID	Facility	Address	Industrial Classification	Approximate Distance From Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility Within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A27	Ritcey Custom Cabinetry	2133 Royal Windsor Drive	I	0	No	Yes	Yes	No	Located within the minimum separation distance; however, expected emissions associated with the facility (dust) would be captured in ambient data.
A29	WaySide Auto Service	2133 Royal Windsor Drive	I	0	No	Yes	Yes	No	Located within the minimum separation distance; however, expected emissions associated with the facility would be captured in ambient data.
A30	Audi Repair Mississauga - Lorne Park Car Centre	2133 Royal Windsor Drive	I	0	No	Yes	Yes	No	Located within the minimum separation distance; however, expected emissions associated with the facility would be captured in ambient data.
A48	Caruso's Service Centre Inc.	2133 Royal Windsor Drive	I	0	No	Yes	Yes	No	Located within the minimum separation distance; however, expected emissions associated with the facility would be captured in ambient data.
A55	Mississauga BMW Repair	2133 Royal Windsor Drive	I	0	No	Yes	Yes	No	Located within the minimum separation distance; however, expected emissions associated with the facility would be captured in ambient data.

Notes: [A] Facility operates under Section 9 approval (ECA/EASR).

Table 8-3 Summary of Industrial Facilities Outside the Potential Influence Area

Facility ID	Facility	Address	Industrial Classification	Approximate Distance from Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A1	Longlac Wood Industries Inc. [A]	2311 Royal Windsor Drive	II	420	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A3	1375 Southdown Road Ltd [A]	1375 Southdown Road	I	995	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A5	Autobody shop [A]	8-2355 Royal Windsor Drive	I	705	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A6	Bruckmann Manufacturing Inc. [A]	2265 Royal Windsor Drive	II	408	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A7	Corporation of the City of Mississauga - Fire Station #103 [A]	2035 Lushes Lane	I	140	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)

Facility ID	Facility	Address	Industrial Classification	Approximate Distance from Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A8	Clarkson Wastewater Treatment Plan [A]	2307 Lakeshore Road West	III	1600	Yes	No	No	Yes	Located outside potential influence area for applicable facility Class (1000 m); however, the facility has the potential for significant air emissions and public air emission data is available
A9	FMK Holdings Inc. [A]	2355 Royal Windsor Drive	II	705	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A13	The Peel District School Board [A]	1290 Kelly Drive	I	937	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A19	Trimac Transportation Services [A]	474 Southdown Road	II	1450	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A20	Wawel Villa Incorporated [A]	880 Clarkson Road South	I	690	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A21	Bernardi Building Supply	2235 Royal Windsor Drive	II	330	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A23	Car Pride Auto Spa	2380 Royal Windsor Drive	I	645	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A24	Canada Fruit	885 Avonhead Rd	II	653	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A25	Praxair Canada Inc. - CO2 Plan	566 Southdown Road	II	1300	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A26	Cleanharbors Canada [A]	551 Avonhead Road	III	1200	Yes	No	No	Yes	Located outside potential influence area (1000 m); however, the facility has the potential for significant air emissions and public air emission data is available
A28	AGT Products Inc.	2311 Royal Windsor Drive	II	420	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A31	Midas	2175 Royal Windsor Drive	I	226	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A32	City of Mississauga - Clarkson Yard	2167 Royal Windsor Drive	I	132	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A33	ShipShape Marine LTD	2265 Royal Windsor Drive	II	408	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A34	Victoria Strong	2463 Royal Windsor Drive	II	1015	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A35	Cam Tech Automotive Services	2355 Royal Windsor Drive	I	705	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A36	Nestle Purina Petcare [A]	2500 Royal Windsor Drive	III	1160	Yes	No	No	Yes	Located outside potential influence area for applicable facility Class (1000 m); however, the facility has the potential for significant air emissions and public air emission data is available

Facility ID	Facility	Address	Industrial Classification	Approximate Distance from Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A37	UBA Inc.	2605 Royal Windsor Drive	III	1410	Yes	No	No	Yes	Located outside potential influence area for applicable facility Class (1000 m); however, the facility has the potential for significant air emissions and public air emission data is available
A38	Total Ready Mix Limited (2159978 Ontario Limited) [A]	1040 Winston Churchill Boulevard	II	1850	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A39	Mancor Canada Inc. [A]	2481 Royal Windsor Drive	II	1860	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A40	Ashland Canada Corp. [A]	2620 Royal Windsor Drive	III	1600	No	No	No	No	Located outside potential influence area for applicable facility Class (1000 m)
A41	Nexeo Solutions [A]	2620 Royal Windsor Drive	III	1600	No	No	No	No	Located outside potential influence area for applicable facility Class (1000 m), public air emission data available however the facility operates with an environmental permit and there are no tall stacks or sources of emissions greater than 50 m in height, so it is assumed that emissions are compliant at the property boundary. Fugitive emissions would have been captured in ambient data.
A42	Tri-Phase Environmental Inc. [A]	446 Hazelhurst Rd	II	2190	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A43	The Corporation of the Regional Municipality of Peel	1201 Walden Circle	I	178	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A44	Interim Place	735 Southdown Road	I	750	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A45	ORTECH Consulting Inc.	804 Southdown Road	I	510	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A46	Bosch Service	1806 Lakeshore Rd West	I	770	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A47	Mississauga Auto Centre	1800 Lakeshore Rd West	I	770	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A49	Canadian Tire Auto Parts & Service	900 Southdown Road	I	80	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A50	Davey Tree Expert Co. of Canada, Limited	2265 Royal Windsor Drive	II	408	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)

Facility ID	Facility	Address	Industrial Classification	Approximate Distance from Site (m)	Public Reporting	Facility Within Recommended Minimum Separation Distance	Facility within Potential Influence Area	Quantitative Air Quality Assessment Required	Comments/Rationale
A51	Canadian Home Granite & Tiles	2265 Royal Windsor Drive	I	408	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A52	Tech Reset	2301 Royal Windsor Drive	I	520	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)
A53	PPG Automotive Refinish Canada Inc.	2301 Royal Windsor Drive	II	520	No	No	No	No	Located outside potential influence area for applicable facility Class (300 m)
A54	Canadian Automotive Refinish	2355 Royal Windsor Drive	I	705	No	No	No	No	Located outside potential influence area for applicable facility Class (70 m)

9 Sources and Contaminants

9.1 Stationary Sources

Industrial facilities within the Study Area were assessed per the MECP's D-Series of Guidelines, specifically the D-6 Guideline "Compatibility Between Industrial Facilities" (D-6 Guideline). A total of 9 facilities were identified as requiring further assessment based on their expected or known operations, proximity to the Site, publicly available air emission data, and ECAs. An additional four facilities were identified to require further assessment due to known operations, emissions reporting, and the presence of tall stacks greater than 50 m in height.

9.2 Facility Provided Emission Data

Facility air emission data was provided by H.L. Blachford, Stackpole International Powder Metal (Stackpole), and Clarkson Wastewater Treatment Plant (WWTP) in the form of the Emission Summary and Dispersion Modelling (ESDM) tables, which outline the facility emission rates for contaminants emitted to air from the facility as part of the ECA application process. Contaminants included in the facility ESDM reports which are also emitted by other facilities or which were included in ambient air monitoring were further assessed. A summary of shared contaminants emitted from these facilities is provided in **Table 9-1** and was quantitatively assessed for their potential to impact air quality at the proposed development. It should be noted that all contaminants included in H.L Blachford, Stackpole International Powder Metal, and Clarkson WWTP ESDM tables were below applicable air quality criteria at the facility's property boundary.

Table 9-1 Facility ESDM Contaminant Summary

Facility ID	Facility	Contaminants Reported in ESDM Report
A2	H.L. Blachford Limited	Diethanolamine, NO_X, TSP
A8	Clarkson Wastewater Treatment Plant	Ammonia, NO_X, SO_2, TRS, TSP,
A16	Stackpole International Powder Metal	Benzene, benzo(a)pyrene, cadmium, carbon monoxide, cobalt, manganese, nickel, nitrogen oxide, particulate matter, zinc

9.3 Facilities Reporting Emissions to NPRI

Facilities surrounding the Site were also qualitatively assessed for their potential to impact air quality through a review of the National Pollutant Release Inventory (NPRI) databases from 2016 to 2018 which correspond to the most recent publicly available data. A total of 13 facilities listed in **Table 8-2** and **Table 8-3** reported emissions to air in the NPRI from 2016 to 2018. A summary of NPRI reporting facilities is presented in **Table 9-2**.

Table 9-2 NPRI Reporting Facilities Within the Study Area

FACILITY ID	FACILITY	CONTAMINANTS REPORTED [A]	STACKS > 50 M
A2	H.L. Blachford Limited	Chlorinated alkanes, diethanolamine, zinc	No
A4	All Tank (1342131 Ontario Limited)	$PM_{2.5}$, PM_{10}, methyl ethyl ketone, isopropyl alcohol, toluene, xylene, hydrotreated light distillate, heptane, naphthalene, ethyl acetate, methyl isobutyl ketone, hydrochloric acid	No
A8	Clarkson Wastewater Treatment Plan	Ammonia, phenanthrene, carbon monoxide, sulphur dioxide, total particulates, hexane, toluene, NOx (as NO_2), TRS (as H_2S), hydrogen sulphide, fluorene, acenaphthylene, benzene, naphthalene, anthracene, formaldehyde, fluoranthene, benz(a)anthracene, benzo(j)fluoranthene, acenaphthene, dibenz(a,h)anthracene, 7,12-dimethylbenz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene, benzo(g,h,i)perylene, 3-methylchloranthrene, pyrene, mercury, lead, cobalt, arsenic, vanadium, manganese, copper, cadmium, chromium, selenium, nickel, zinc	No

FACILITY ID	FACILITY	CONTAMINANTS REPORTED [A]	STACKS > 50 M
A11	ICS Universal Drum Reconditioning Limited	See All Tank	No
A12	IPEX Inc. [A]	$PM_{2.5}$, PM_{10}	No
A14	Petro Canada Lubricants Inc	Pentane, butane, propane, propylene, carbon monoxide, methanol, TSP, sulphur dioxide, $PM_{2.5}$, PM_{10}, methyl ethyl ketone, hexane, isopropyl alcohol, sulphuric acid, toluene, NO_x (as NO_2), total reduced sulphur (as H_2S)	Yes
A15	CRH (CRH Canada Group)	Ammonia, phenanthrene, hexachlorobenzene, carbon monoxide, sulphur dioxide, $PM_{2.5}$, PM_{10}, total PM, methyl ethyl ketone, hexane, toluene, NO_X (as NO_2), xylene, heptane, fluorene, acenaphylene, benzene, 1,2,4-trimethylbenzene, mercury, selenium, hydrochloric acid	Yes
A16	Stackpole International Powder Metal	$PM_{2.5}$, PM_{10}, nickel	No
A17	Stackpole Powertrain International	See Stackpole International Powder Metal	No
A18	Trans-Northern Pipelines Inc (TNPI)	Naphthalene, MTBE, ethyl alcohol, benzene, cumene (isopropyl benzene), cyclohexane, ethyl benzene, hexane, toluene, xylenes [B]	No

FACILITY ID	FACILITY	CONTAMINANTS REPORTED [A]	STACKS > 50 M
A26	Cleanharbors Canada	Carbon monoxide, methanol, isopropyl alcohol, toluene, NO_X (as NO_2), xylene, methyl isobutyl ketone, dichloromethane, formaldehyde, tetrachloroethylene, ethylene glycol	No
A36	Nestle Purina Petcare	$PM_{2.5}$, PM_{10}	No
A37	UBA Inc.	Sulphuric acid, nitric acid, hydrochloric acid	No

Notes: [A] Based on National Pollutant Release Inventory data from 2016 to 2018.
[B] Emission data provided in the TNPI Facility EASR

9.4 Stationary Sources Contaminant Emission Rates

Contaminant emission rates for stationary sources were conservatively estimated using facility ESDM emission data and NPRI reported data from 2016 to 2018 when facility data was not provided. The maximum reported concentration for each contaminant was used to allow for a conservative estimate of emissions from the facility. Facility operating hours reported to NPRI were also used to determine emission rates. If a facility did not report operating hours to NPRI, it was assumed that the facility operates 5 days a week and 12 hours per day, unless otherwise communicated by the facility. Facilities which noted significant shutdown periods in the NPRI reported data were corrected to represent the total working hours of the facility per year. This includes CRH who reported shutdown periods of up to 50 days. Facility operating hours used to determine emission rates are summarized in **Table 9-3**.

Table 9-3 Facility Operating Hours

Facility	Hours Per Day	Days Per Week
H.L. Blachford Limited [B]	-	-
All Tank (1342131 Ontario Limited)	8	5
Clarkson Wastewater Treatment Plan [B]	-	-
Petro Canada Lubricants Inc	24	7

Facility	Hours Per Day	Days Per Week
CRH (CRH Canada Group)	24	6 [A]
Stackpole International Powder Metal/Powertrain [B]	-	-
Cleanharbors Canada	12	5
Nestle Purina Petcare	24	5
UBA Inc.	12	5
TransNorthern Pipeline [B]	-	-
IPEX Inc.	12	5

Notes: [A] Accounts for annual shut down periods up to 50 days
[B] Emission rates provided in ESDM table

Emissions reported to NPRI are generally in tonnes per year. Based on the facility operating hours, these rates were converted to a grams per second emission rate to be used in the air dispersion model, as shown in **Table G-1** of **Appendix G**. Contaminant emission rates for Trans-Northern Pipelines Inc. were estimated based on emission data provided in the facility's EASR. Contaminant emission rates for H.L Blachford, Stackpole, and Clarkson WWTP were estimated based on emission data provided in facility ESDM data. An example emission rate calculation is provided below.

$$\textbf{Petro Canada TSP Emission Rate } \left(\frac{\mathbf{g}}{\mathbf{s}}\right) = \left(\textbf{Maximum Reported NPRI Concentration } \left(\frac{\textbf{tonnes}}{\textbf{year}}\right) \times \mathbf{1\,000\,000} \frac{\mathbf{g}}{\textbf{tonne}}\right) \times \frac{\textbf{year}}{\textbf{364 days}} \times \frac{\textbf{day}}{\textbf{86400}} \textbf{seconds}$$

$$\textbf{Petro Canada TSP Emission Rate } \left(\frac{\mathbf{g}}{\mathbf{s}}\right) = \left(\mathbf{41.6219} \left(\frac{\textbf{tonnes}}{\textbf{year}}\right) \times \mathbf{1\,000\,000} \frac{\mathbf{g}}{\textbf{tonne}}\right) \times \frac{\textbf{year}}{\textbf{364 days}} \times \frac{\textbf{day}}{\textbf{86400}} \textbf{seconds}$$

$$\textbf{Petro Canada TSP Emission Rate } \left(\frac{\mathbf{g}}{\mathbf{s}}\right) = \mathbf{1.32}$$

9.5 Contaminant Negligibility Assessment

A contaminant negligibility assessment was completed to determine which contaminants were to be included in the air dispersion modelling assessment. The negligibility assessment was

based on the procedures outlined in the Air Dispersion Modelling Guideline for Ontario (ADMGO). The negligibility assessment was completed for each facility of concern outlined in **Table 9-4** to determine which contaminants required air dispersion modelling. All contaminants associated with each facility which have the potential to impact the proposed development were screened for negligibility, as shown in **Appendix G**. Contaminants deemed negligible were not incorporated into the modelling assessment; however, their impacts at the Site would have been captured in ambient air monitoring and baseline conditions. Dispersion factors were determined based on the distance of the facility property line to the nearest property boundary of the proposed development. If a contaminant was deemed negligible from a single facility, it was not included in the air dispersion modelling assessment. If a contaminant was deemed negligible from all facilities which emit that contaminant, the combined emissions of that contaminant was assessed for negligibility based on the emission threshold for the nearest facility. Contaminants and facilities included in the negligibility assessment are presented in **Table G-1** of **Appendix G**. Based on the negligibility assessment, a total of 13 contaminants were determined to be significant, as shown below:

— Sulphur dioxide (SO_2);

— Particulate matter less than 2.5 µm in diameter ($PM_{2.5}$);

— Particulate matter less than 10 µm in diameter (PM_{10});

— Nitrogen oxides (as NO_2);

— Sulphuric acid;

— Total reduced sulphur (as H_2S);

— Carbon monoxide (CO);

— Total suspended particulate (TSP);

— Benzene;

— Ammonia;

— Phenanthrene (as benzo(a)pyrene);

— Hydrochloric acid; and,

— Xylene.

It should be noted that phenanthrene which is emitted from the Clarkson WWTP and CRH was not deemed negligible but was not retained for the assessment as it does not have a threshold

value to use for the assessment. Benzo(a)pyrene is the polycyclic aromatic hydrocarbon (PAH) with the most stringent limit, benzo(a)pyrene was used as a surrogate for all PAHs.

9.6 Transportation Sources

Based on the "Ministry of Transportation Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects" (MTO Guide), dated May 2020, and the MECP "Mitigation Strategies and Municipal Road Class Environmental Assessment Air Quality Impact Protocol", dated July 25, 2017, roadway and railway sources within 500 m of the proposed development were assessed for their potential to impact air quality at the Site. **Table 9-4** lists the road and rail sources that have been identified within 500 m of the Site which were included in the air quality assessment.

Table 9-4 Transportation Sources Identified Within the Study Area

Source	Source Type	Approximate Length of Segment Within Study Area (m)	Expected Contaminants
Clarkson GO Station Rail Corridor (travel and idling)	Rail (GO, CN, VIA)	1000	Products of diesel combustion: CO, NO_2, $PM_{2.5}$, PM_{10}, TSP, formaldehyde, benzo(a)pyrene, acetaldehyde, acrolein, benzene
Royal Windsor Drive	Road	703	Products of fuel combustion: CO, NO_2, TSP, PM_{10}, $PM_{2.5}$, and VOCs and common air toxics from mobile-sources: benzene, benzo(a)pyrene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein
Lakeshore Road West	Road	425	Products of fuel combustion: CO, NO_2, TSP, PM_{10}, $PM_{2.5}$, and VOCs and common air toxics from mobile-sources: benzene, benzo(a)pyrene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein

Source	Source Type	Approximate Length of Segment Within Study Area (m)	Expected Contaminants
Southdown Road (North of Royal Windsor/Lakeshore)	Road	588	Products of fuel combustion: CO, NO_2, TSP, PM_{10}, $PM_{2.5}$, and VOCs and common air toxics from mobile-sources: benzene, benzo(a)pyrene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein
Southdown Road (South of Royal Windsor/Lakeshore)	Road	488	Products of fuel combustion: CO, NO_2, TSP, PM_{10}, $PM_{2.5}$, and VOCs and common air toxics from mobile-sources: benzene, benzo(a)pyrene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein
Notes: Limited published information is available for 1,3-butadiene emission factors for trains, therefore emissions of 1,3-butadiene from trains were not included in the assessment.			

9.7 Transportation Contaminant Emission Rates

9.7.1 Passenger Vehicles and Trucks

Vehicle emission rates for the future conditions (2024) were estimated using the USEPA Motor Vehicle Emission Simulator (MOVES), version MOVES3, released November 10, 2020, which is the latest motor vehicle emission estimate model, and which has replaced the Canadian version of MOBILE6.2C and is approved and recommended for use by the MTO and the MECP. The MOVES model allows for coverage of multiple geographic scales and can generate emission estimates for various time periods (hour, day, month, and year). Emission rates for the assessment were estimated using Annual Average Daily Traffic (AADT) data provided by the City of Mississauga and default highway vehicle fleet (age and vehicles type distribution), emissions inspection and maintenance, and fuel properties were adjusted to reflect the geographic area of the Project (Ontario). AADT values were projected to 2024 using an annual growth rate of 1 %, as outlined in the City of Mississauga Transportation Master Plan dated May 2019. Emission rates for particulate matter included resuspension emissions. MOVES option selections are presented in **Table H-1** in **Appendix H**.

WSP did not include buses as a separate vehicle category as no traffic data was provided for buses. Traffic volume data for buses was assumed to be included in medium/heavy truck volumes. Freight emissions are included in emissions from trucks (single unit short haul and combination long haul).

9.7.2 Trains

Emission rates from trains, including GO, VIA, and CN were estimated using USEPA exhaust emission standards for Tier 2 line-haul and switch locomotives for TSP, PM_{10}, $PM_{2.5}$, NOx, and CO. Line-haul emission factors were used to estimate emission rates during travel while switch emission factors were used to estimate emission rates during idling. Emission rates for benzene, formaldehyde, acetaldehyde, acrolein, and benzo(a)pyrene were estimated using USEPA Large Uncontrolled Stationary Diesel Engines emission standards for both travel and idling. The emission rates for trains were estimated using diesel train frequency (maximum trips per day) projected to 2024 without GO electrification, average train speed, and average engine power data for the Lakeshore West rail corridor on the Port Credit to Clarkson Station segment found in the GO Rail Network Electrification TPAP Air Quality Impact Assessment Report (August 2017), as well as VIA and CN train schedules with train volumes prior to the COVID-19 pandemic. An example emission rate calculation is provided below. Emission calculation tables can be found in **Appendix I**.

$$\boldsymbol{NOx\ Emission\ Rate} = [(\boldsymbol{Travel\ Length} \div \boldsymbol{Average\ Train\ Speed}) \times \boldsymbol{Trips\ Per\ Day}] \times \boldsymbol{Average\ Engine\ Power} \times \boldsymbol{Emission\ Factor} \times \boldsymbol{Conversion}$$

$$\boldsymbol{NOx\ Emission\ Rate} = \left[\left(1\ km \div 63\frac{km}{hr}\right) \times 10\frac{Trips}{hr}\right] \times 2526\ bhp-h \times 5.5\frac{g}{bhp-hr} \times \frac{1hr}{3600s}$$

$$\boldsymbol{NOx\ Emission\ Rate} = 0.613\frac{g}{s}$$

9.8 Assessment of Contaminants

Contaminants outlined in Section 8.5 were assessed for the potential cumulative impact of air contaminants at the Site using ambient monitoring and air dispersion modelling data. Predicted cumulative concentrations of each contaminant were compared to the AAQC guideline, Canadian Ambient Air Quality Standards (CAAQS), or Ontario's Air Contaminants Benchmarks (ACB) lists for each contaminant of concern. Cumulative impacts for contaminants for which there are no existing baseline concentrations will not be presented; however, the predicted concentrations from the modelling assessment were provided. **Table 9-5** outlines the applicable air quality limit for each contaminant of concern in this assessment. The project

threshold will be selected based on the most stringent AAQC or CAAQS guideline for each contaminant. For contaminants which do not have an AAQC or CAAQS, predicted concentrations will be compared to the limit found in Ontario's ACB list.

Table 9-5 Air Quality Limits for Contaminants of Concern

Contaminant	Averaging Period	AAQC (µg/m³)	CAAQS [A] (µg/m³ or ppb)	Project Threshold (µg/m³ Unless Otherwise Stated)
Benzene	Annual	0.45	-	0.45
	24-hr	2.3	-	2.3
Acrolein	1-hr	4.5	-	4.5
	24-hr	0.4	-	0.4
Particulate Matter less than 2.5 µm ($PM_{2.5}$)	24-hr	27	27 µg/m³ [B]	27
	Annual	8.8	8.8 µg/m³ [C]	8.8
Particulate Matter less than 10 µm (PM_{10})	24-hr	50	-	50
Total Suspended Particulates (TSP)	Annual	60	-	60
	24-hr	120	-	120
Nitrogen oxides (NO_x)	1-hr	400	2020: 60 ppb [D] 2025: 42 ppb [D] (79 µg/m³)	79
	24-hr	200	-	200
	Annual	-	2020: 17 ppb [E] 2025: 12 ppb [E] (23 µg/m³)	23
CO	1-hr	36200	-	36200
	8-hr	15700	-	15700
Benzo(a)pyrene	24-hr	0.00005	-	0.00005
	Annual	0.00001	-	0.00001
1,3-Butadiene	24-hr	10	-	10
	Annual	2	-	2
Formaldehyde	24-hr	65	-	65
Acetaldehyde	0.5-hr	500	-	500

Contaminant	Averaging Period	AAQC (µg/m³)	CAAQS [A] (µg/m³ or ppb)	Project Threshold (µg/m³ Unless Otherwise Stated)
	24-hr	500	-	500
Sulphur dioxide (SO_2)	10-min	178 (67 ppb)	-	178
	1-hr	106 (40 ppb)	2020: 70 ppb [F] 2025: 65 ppb [F]	106
	Annual	11 (4 ppb)	2020: 5 ppb [G] 2025: 4 ppb [G]	11
Sulphuric Acid	24-hr	5	-	5
TRS (as H_2S)	10-min	13	-	13
	24-hr	7	-	7
Ammonia	24-hr	100	-	100
Hydrochloric Acid	0.5-hr	-	-	60[H]
	24-hr	20	-	20
Xylene	10-min	3000	-	3000
	24-hr	730	-	730
Methylene chloride	Annual	44	-	44
	24-hour	220	-	220

Notes: [A] CAAQS as ppb should assume 10°C and 760 mmHg when converting to µg/m³ consistent with the approach for converting AAQCs

[B] The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations

[C] The 3-year average of the annual average concentrations

[D] The 3-year average of the annual 98th percentile daily maximum 1-hour average concentrations

[E] The average over a single calendar year of all the 1-hour average concentrations

[F] The 3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations

[G] The average over a single calendar year of all the 1-hour average SO_2 concentrations

[H] Air Contaminants Benchmarks (ACB) List

10 Dispersion Modelling

The dispersion modelling was conducted in accordance with MECP's Guideline A11: "Air Dispersion Modelling Guideline for Ontario" (ADMGO), the Ministry of Transportation Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (MTO Guide), dated May 2020, and best practices from the Air Quality Practitioners Group in Ontario, where applicable to each source.

10.1 Dispersion Modelling Input Summary

As per Section 4.5 of the ADMGO, stationary sources were characterized as point or volume sources. Volume sources were sized to cover the main emission sources at a facility and heights were estimated based on average building height. The height of the material piles at CRH was conservatively estimated at 50 m. Where stack data was available, emissions from tall stacks (> 50 m) from CRH and Petro Canada Lubricants Inc. were modelled as point sources. Stack parameters for CRH and Petro Canada Lubricants Inc. were obtained from the NPRI reported data.

Emission data for each point source was not provided within NPRI data; therefore, WSP assigned emissions to point sources based on the maximum estimated facility emission rate, the percent of stack versus fugitive emissions reported to NPRI, and the percentage of the total flow rate for each stack.

For conservatism, when publicly available data was not available to parameterize the emissions sources, WSP conducted the modelling using volume sources to provide conservative results. As a result, emissions from all other facilities were modelled as volume sources as their emissions were assumed to be fugitive in nature.

Transportation sources were characterized as line volume sources and sized to correspond to the width of the road or rail corridor and the expected average height of the vehicles that may be travelling along the roads or rail corridor. The source data required for each road source was calculated using the road type, width of the road and height of the vehicle according to the procedures provided in the ADMGO. Train idling at Clarkson GO Station was characterized as a volume source and sized to correspond to train length, height, and the approximate location at the station.

A detailed summary of dispersion modelling inputs is provided in **Appendix I**.

10.1.1 Dispersion Model Used

The AERMOD dispersion model, version 19191, predicts concentrations at points of impingement (POI) along the property line and beyond. The MECP identified AERMOD as an approved dispersion model under O. Reg. 419/05 which includes the Plume Rise Model Enhancements (PRIME) algorithms for assessing the effects of buildings on air dispersion. AERMOD is applicable for assessing dispersion accommodating rural and urban areas, flat and complex terrain, surface and elevated releases as well as multiple source types (including point, area, and volume sources). The AERMOD modelling system consists of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor.

An assessment of the applicability and potential impacts of shoreline fumigation for the proposed development was also conducted. The initial assessment was completed using the SCREEN3 dispersion modelling for the point sources greater than 50 m in height with available stack information to assess the impact on the project. SCREEN3 is a highly conservative model to assess fumigation as it uses the stability class F (which is an infrequent meteorological stability class) and also a thermal inversion boundary layer factor of six (6) which is conservative. The SCREEN3 results indicate that there is potential for shoreline fumigation effects associated with the Petro Canada Lubricants Inc. sources identified as PCLI2, PCLI3, PCLI4 and the CRH Canada Group source identified as CRH5, to impact predicted concentrations at the proposed development. WSP conducted additional modelling using the Shoreline Dispersion Model (SDM) to identify the hours when fumigation could occur and to confirm whether further assessment is required for those hours. Of the 5 years of hourly meteorological data assessed for sources PCLI2, PCLI3 and CRH5, only 0.06% (approximately 26 hours) were identified where fumigation could occur; and for source PCLI4 0.11% (approximately 49 hours) were identified where fumigation could occur. The potential increase in concentration presented with fumigation would range from a factor of 1.09 to 2.84; however, the contribution to the maximum from these sources is small for all sources and contaminants except for SO_2 on an hourly basis from CRH5 (50% contribution to maximum). To estimate the potential concentration with fumigation for the worst-case hour, assuming fumigation could occur on this hour which is highly unlikely, we can apply the respective applicable factors of 1.09 to 2.84 to each of the sources (PCLI2, PCLI3, PCLI4 and CRH5). By adding this impact to the existing results we can estimate a concentration of 73 ug/m^3 for SO_2 on an hourly basis (with background) which will remain below the 106 ug/m^3 SO_2 AAQC threshold. This estimate would be highly conservative (and unrealistic) as fumigation occurs for so few hours and does not occur for all sources during the same hours, nor at the same time as maximum concentrations were predicted at the Proposed Development. Given this very

small frequency of hours when fumigation impacts could occur at the Proposed Development, and the level of conservatism already included in the assessment methodology, the emission rates, and the modelling, it was identified that no additional assessment of potential fumigation impacts was required as it would not alter the outcome of the assessment. Therefore, an assessment of predicted concentrations resulting from fumigation impacts for hours with the potential for fumigation to occur is not presented as part of this assessment.

10.1.2 Meteorological Conditions and Land Use Data

The site-specific meteorological data file was developed based on guidance in the ADMGO and USEPA AERMET User's Guide.

WSP received a five-year meteorological dataset from Petro Canada Lubricants Inc. containing data from January 2016 to December 2020. Parameters included in the dataset were wind speed, wind direction, temperature, relative humidity, solar radiation, and precipitation. Additional meteorological parameters were required to develop the meteorological dataset for AERMOD, including pressure and cloud cover. Pressure data for January 2016 to December 2020 was obtained from the Toronto City Centre station (Station ID# 48549) located at Billy Bishop Airport and operated by NAV Canada, located approximately 23 km northeast of the Site. The data from this station was selected to best represent meteorological conditions at the proposed development due to its proximity to Lake Ontario, data availability over five years, and similar surrounding land uses. Land use within three kilometres of the meteorological station was set to "Urban" and "Fresh Water" to determine albedo, Bowen ratio, and surface roughness. Cloud cover data was not available; therefore 5/10 (50 %) assumed cloud cover was used to account for the missing data as outlined in the AERMET User's Guide for AERMOD 19191. Upper air data was obtained from the Buffalo, NY upper air station located at the Greater Buffalo International Airport.

The meteorological data required to execute the MOVES emissions model consists of the temperature and pressure for the month of January and July which are considered the worst-case months. The temperature data required to run the model was obtained from Petro Canada Lubricants Inc. while pressure data were obtained from Billy Bishop Airport.

The meteorological input data was processed using AERMET to develop a site-specific data file for the Site. Only one site-specific data site was created as the project area is not large enough to warrant the development of multiple datasets.

10.1.3 Receptors and Area of Modelling Coverage

The area of modelling coverage was centered around the Site and covered a 5 km square area (25 km²). Receptors were placed along the proposed development boundary at a

minimum of 10 m intervals. Discrete receptors were placed at various heights up to 25 storeys at the property boundary to account for balconies, outdoor spaces, and operable windows. The location of discrete receptors for each model was determined based on the location of the maximum POI concentration for each contaminant. The placement of discrete receptors at various heights is considered conservative as these were placed along the property boundary and did not account for building setback distances. The modelling area and boundary receptor placement are shown in **Figure 10-1** and **Figure 10-2**, respectively.

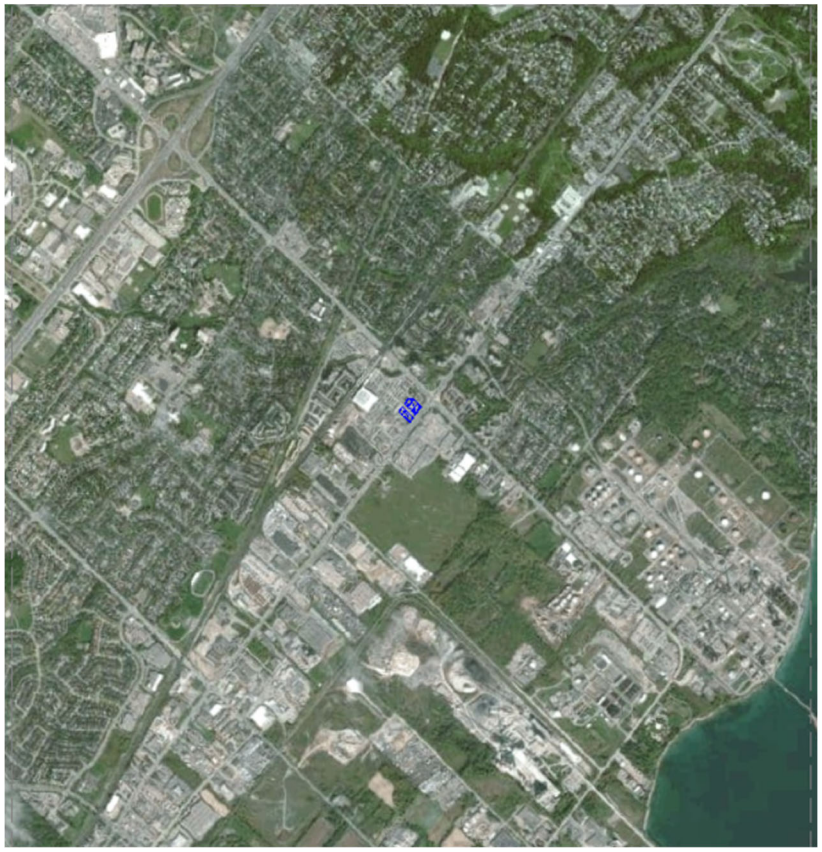

Figure 10-1 Modelling Area Receptors

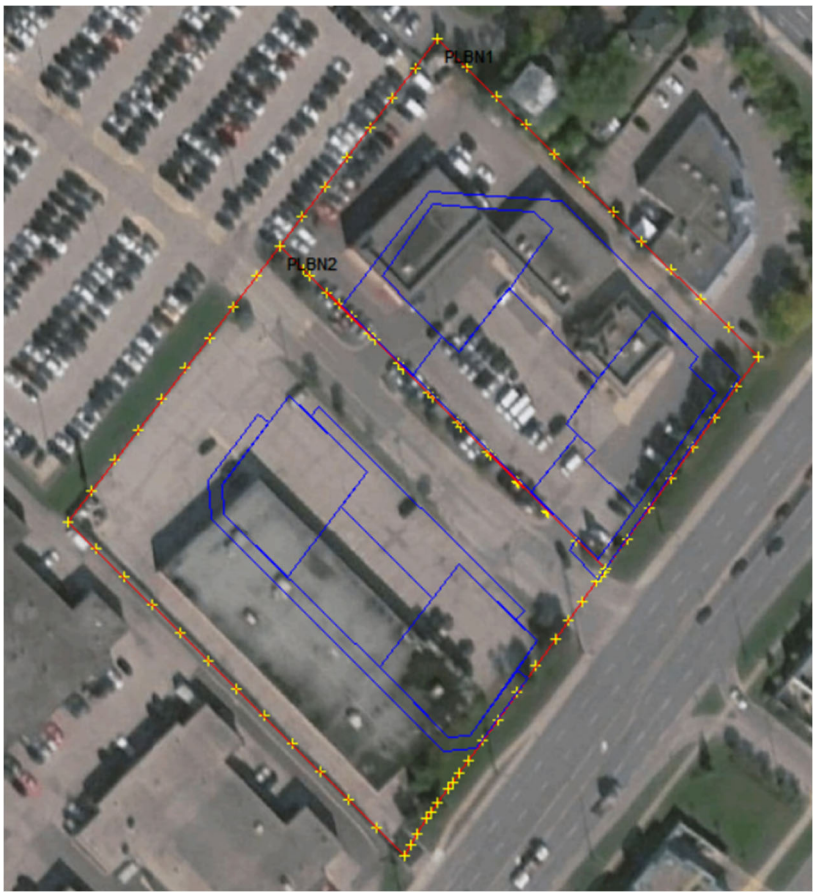

Figure 10-2 Modelling Area and Terrain

10.1.4 Building Downwash

Building wake effects are considered using the USEPA's Building Profile Input Program (BPIP-PRIME), a pre-processor to AERMOD. The inputs into this pre-processor include the coordinates and heights of the relevant buildings and stacks. The output data from BPIP-PRIME is used in the AERMOD building wake effect calculations. For the assessment, no sources of emissions were included on the proposed buildings; therefore, building downwash effects do not apply to the Proposed Development. A preliminary assessment of building downwash effects was completed for industrial sources; however, there were no building downwash effects from the industrial sources on the proposed development modelling area and therefore as a result, building downwash effects were not included in the modelling assessment.

10.1.5 Terrain Data

Terrain information for the area surrounding the Site was obtained from the MECP Ontario Digital Elevation Model data website. The terrain data is based on the North American Datum

1983 (NAD83) horizontal reference datum, cdem_dem_030M.tif, Mississauga, UTM Zone 17. This data was run through the AERMAP terrain pre-processor to estimate base elevations for the buildings, sources and receptors in order to help the model account for changes in the elevations of the surrounding terrain. The modelling area as well as terrain contours are shown in **Figure 10-3**.

Figure 10-3 Modelling Area and Terrain Contours

10.1.6 Averaging Periods Used

Many of the contaminant standards and guidelines are based on 1-hour and 24-hour averaging times, which are averaging times that are provided by AERMOD. In cases where a standard and/or guideline has an averaging period that AERMOD is not designed to predict (e.g. ½-hr or 30-day), a conversion to the appropriate averaging period was completed using the Ministry recommended conversion factors, as documented in the ADMGO and the Ministry Technical Bulletin Methodology for Modelling Assessments with 10-Minute Average Standards and Guidelines under O. Reg. 419/05, dated September 2016.

10.1.7 Dispersion Model Options

A summary of AERMOD dispersion model options is provided in **Table 10-1**.

Table 10-1 AERMOD Model Options

Model Option	Input Selected
Regulatory Options	Default
Dispersion Factor	Urban
Pollutant Models	1,3-butadiene, benzo(a)pyrene, benzene, acrolein, Base model, methylene chloride, NOx, NO_2, TSP, PM_{10}, $PM_{2.5}$, SO_2
Averaging Times	1-hour, 8-hour, 24-hour, annual
Terrain	Elevated
Emission Rate Output Units	$\mu g/m^3$
Source Operating Hours	24 hours/day and 52 weeks/year

10.1.8 Dispersion Modelling Method

Sources were modelled as point sources, volume sources, or line volume sources. All sources were set to be operating 24 hours/day, 7 days/week, 52 weeks/year in the modelling assessment.

Due to the number of sources and contaminant emissions, WSP prepared a simplified modelling approach in a “Base” model. A base emission rate of 1 g/s was entered into each AERMOD source which were then modelled as source groups. The resulting maximum POI concentration from all sources was evaluated and the contribution from each source to the maximum POI concentration was extracted to provide a dispersion factor. The dispersion factor was then used for each applicable source, and the emission rate of each contaminant was multiplied by its corresponding dispersion factor. This allows for a very conservative approach, as the maximum POI concentration from each source will not realistically occur at the same time and place along the property boundary.

Variable emissions were used for train travel and idling to account for hours which do not experience train traffic. Variable emissions were assigned based on GO, VIA and CN train schedules and data. For hours which GO, VIA, and CN are expected to operate, an emission factor of 1 was assigned.

Variable emissions were used for road sources to account for hourly traffic patterns. Midblock hourly traffic counts were provided by the City of Mississauga and used to calculate an emission factor for each hour of the day to account for peak hours.

Contaminant specific models were run for benzo(a)pyrene, benzene, acrolein, TSP, PM_{10}, $PM_{2.5}$, NO_X and NO_2, 1,3-butadiene, SO_2, and methylene chloride given that most of these contaminants are associated with road and rail sources which are expected to have the most impact at the Site. Some of these contaminants also have low air quality thresholds and the existing conditions are above the air quality threshold. This allowed for an assessment of the impact of the proposed project and cumulative impacts.

11 Modelling Results

The air dispersion modelling results for the contaminants of concern are reported in this section. The most impacted property boundary receptor for the Base model was located at the west corner of the site. Air dispersion model results for contaminants included in the modelling assessment are presented for the most impacted receptor. The cumulative impacts at the Site were calculated by aggregating the modelling results with the baseline ambient concentrations. The cumulative impacts at the most impacted receptor were compared to air quality thresholds and are presented in **Table 11-1**.

Table 11-1 Summary of Cumulative Impacts at the Site Property Boundary

Contaminant	Baseline Concentration (µg/m^3)	Model Concentration (µg/m^3)[1]	Cumulative Concentration (µg/m^3)	Averaging Period	Air Quality Threshold (µg/m^3)	Percent of Limit From Baseline (%)	Percent of Limit From Model (%)	Percent of Threshold (%)
Benzene	0.69	0.03	0.72	24-hr	2.3	30%	2%	31%
	0.49	0.009	**0.50**	Annual	0.45	**109%**	2%	**111%**
Acrolein	1.6	0.010	1.6	1-hr	4.5	36%	0.2%	36%
	0.63	0.004	**0.63**	24-hr	0.4	**158%**	1%	**158%**
$PM_{2.5}$	15	4.5	19	24-hr	27	54%	17%	71%
	8.2	1.8	**10**	Annual	8.8	93%	21%	**114%**
PM_{10}	47	6.8	**54**	24-hr	50	94%	14%	**108%**
TSP	89	15	104	24-hr	120	74%	12%	87%
	36	6	42	Annual	60	60%	10%	70%
NOx (as NO_2)	36	54	**90**	1-hr	79	46%	68%	**114%**
	30	32	62	24-hr	200	15%	16%	31%
	16	14	**30**	Annual	23	68%	63%	**131%**
CO	298	183	481	1-hr	36200	0.8%	1%	1%
	279	125	404	8-hr	15700	2%	1%	3%
Benzo(a)pyrene	**0.00011**	7.48E-07	**0.00011**	24-hr	0.00005	**213%**	1%	**215%**
	0.000012	N/A[2]	**0.000012**	Annual	0.00001	**115%**	0.0%	**115%**
1,3-Butadiene	0.06	0.001	0.06	24-hr	10	1%	0.01%	1%
	0.01	0.001	0.01	Annual	2	0.5%	0.03%	1%
Formaldehyde	3.1	0.05	3.1	24-hr	65	5%	0.08%	5%
Acetaldehyde	5.0	0.09	5.1	0.5-hr	500	1%	0.02%	1%
	1.7	0.03	1.7	24-hr	500	0.3%	0.01%	0.3%
SO_2	3	88	91	10-min	178	2%	50%	52%
	2	53	55	1-hr	106	2%	50%	52%

Contaminant	Baseline Concentration (µg/m^3)	Model Concentration (µg/m^3)[1]	Cumulative Concentration (µg/m^3)	Averaging Period	Air Quality Threshold (µg/m^3)	Percent of Limit From Baseline (%)	Percent of Limit From Model (%)	Percent of Threshold (%)
	1	1.6	2.6	Annual	11	9%	14%	23%
Sulphuric Acid	-	0.06	0.06	24-hr	5	-	1.3%	1.3%
TRS (as H_2S)	1.4	0.1	1.5	10-min	13	11%	1%	12%
	0.3	0.02	0.3	24-hr	7	5%	0.2%	5%
Ammonia	-	0.02	0.02	24-hr	100	-	0.02%	0.02%
Hydrochloric Acid	-	0.02	0.02	0.5-hr	60	-	0.03%	0.03%
	-	0.01	0.01	24-hr	20	-	0.05%	0.05%
Xylene	6	58	64	10-min	3000	0.2%	1.9%	2.1%
	1.5	11	12.5	24-hr	730	0.2%	1.5%	1.7%
Methylene Chloride	1.3	0.3	1.6	24-hr	220	0.6%	0.1%	0.7%
	0.6	0.07	0.67	Annual	44	1.4%	0.2%	1.6%

Notes: Red text indicates concentrations that are elevated compared to the air quality threshold value.

[1] Some modelling results were rounded up for ease of presentation.

[2] Not available – the concentration value is too small to be extracted from the results.

Contaminant concentrations were assessed at various heights where the most impacted property boundary receptor was located to determine where the worst-case contaminant concentrations would be expected along the expected façade of the proposed buildings. A summary of the location of maximum POI concentrations for each contaminant is presented in **Table 11-2**.

Table 11-2 Summary of Maximum POI Concentrations and Location

Contaminant	UTM-E	UTM-N	Model Conc. (µg/m³) [1]	Air Quality Threshold (µg/m³)	Avg. Period	Receptor Height (m)
Benzene	610676.36	4818432.78	0.03	2.3	24-hr	107.5
	610676.36	4818432.78	0.009	0.45	Annual	0
Acrolein	610676.36	4818432.78	0.010	4.5	1-hr	0
	610676.36	4818432.48	0.004	0.4	24-hr	0
$PM_{2.5}$	610520.39	4818401.39	4.5	27	24-hr	21.5
	610676.36	4818432.78	1.8	8.8	Annual	0
PM_{10}	610676.36	4818432.78	6.8	50	24-hr	0
TSP	610598.77	4818323.52	15	120	24-hr	21.5
	610676.36	4818432.78	6	60	Annual	0
NOx (as NO_2)	610585.53	4818486.42	54	79	1-hr	21.5
	610606.67	4818514.03	32	200	24-hr	0
	610606.67	4818514.03	14	23	Annual	0
CO [A]	610676.36	4818432.78	183	36200	1-hr	0
	610676.36	4818432.78	125	15700	8-hr	0
Benzo(a)pyrene	610596.10	4818500.22	7.48E-07	0.00005	24-hr	0
	610676.36	4818432.78	N/A[2]	0.00001	Annual	4.3
1,3-Butadiene	610676.36	4818432.78	0.001	10	24-hr	0
	610676.36	4818432.78	0.001	2	Annual	0
Formaldehyde [A]	610676.36	4818432.78	0.05	65	24-hr	0

Contaminant	UTM-E	UTM-N	Model Conc. ($\mu g/m^3$) [1]	Air Quality Threshold ($\mu g/m^3$)	Avg. Period	Receptor Height (m)
Acetaldehyde [A]	610676.36	4818432.78	0.09	500	0.5-hr	0
	610676.36	4818432.78	0.03	500	24-hr	0
SO_2	610681.47	4818439.89	88	178	10-min	60.2
	610681.47	4818439.89	53	106	1-hr	60.2
	610598.77	4818323.52	1.6	11	Annual	107.5
Sulphuric Acid [A]	610606.67	4818514.03	0.06	5	24-hr	4.3
TRS (as H_2S) [A]	610606.67	4818514.03	0.1	13	10-min	4.3
	610606.67	4818514.03	0.02	7	24-hr	4.3
Ammonia [A]	610606.67	4818514.03	0.02	100	24-hr	4.3
Hydrochloric Acid [A]	610606.67	4818514.03	0.02	60	0.5-hr	4.3
	610606.67	4818514.03	0.01	20	24-hr	4.3
Xylene [A]	610606.67	4818514.03	58	3000	10-min	4.3
	610606.67	4818514.03	11	730	24-hr	4.3
Methylene Chloride	610598.77	4818323.52	0.3	220	24-hr	25.8
	610598.77	4818323.52	0.07	44	Annual	0

Notes: [A] Maximum POI location retrieved from Base model

[1] Some modelling results were rounded up for ease of presentation.[2] N/A - Not available as the concentration is too small to be extracted from the results.

12 Dispersion Modelling Discussion

Emission rates for roadways were predicted using the USEPA's MOVES model. Emission rates for trains on the Clarkson GO rail corridor were predicted using emission standards for Tier 2 diesel locomotives and large diesel engines. Emission rates for facilities of concern were calculated using publicly available facility emission data. Cumulative concentration impacts from the baseline concentrations and the predicted modelled concentration from the stationary and transportation sources within the Clarkson study area were assessed at the Site property boundary and various heights using the AERMOD air dispersion model.

The results presented in **Table 11-1** indicate that the cumulative concentration of acrolein at the most impacted receptor is elevated compared to the 24-hour air quality threshold. It should be noted that ambient concentrations of acrolein collected during the Clarkson Air Monitoring Program are already elevated compared to the 24-hour air quality threshold. Modelled concentrations were combined with ambient data to determine the cumulative impacts; however, this approach is considered conservative as acrolein concentrations from surrounding sources would have already been captured in the Clarkson Air Monitoring Program. The predominant source of acrolein in the study area is transportation sources. As a reminder, baseline concentrations already account for some of the sources modelled for the predicted model concentration; therefore, results are conservative as they include some double counting (i.e., sources captured in the Clarkson Air Monitoring Program are then modelled and added to the results of the Clarkson Air Monitoring Program again). Acrolein has also been identified as a Transportation Related Air Pollutant (TRAP) which is generally elevated near highways and busy roads, often elevated compared to MECP guidelines. Although acrolein was shown to be elevated for the 24-hour air quality threshold in the area, emission rates for acrolein from vehicles are expected to decrease as vehicles become more efficient. To illustrate this, WSP calculated the emissions rates from MOVES for acrolein for a fleet in 2007 (MECP ambient study year) and compared the value to the 2021 and 2024 modelled emission rates. The results are presented in **Table 12-1**.

Table 12-1 Acrolein Emission Rates 2007, 2021, and 2024

Contaminant	Vehicle Type	2007 Emission Rate (g/VMT)	2021 Emission Rate (g/VMT)	2024 Emission Rate (g/VMT)	2007-2021 Change (%)	2021-2024 Change (%)
Acrolein	Passenger Car	3.77E-04	2.15E-05	1.52E-05	-94%	-29%
	Passenger Truck	4.67E-04	5.67E-05	2.95E-05	-88%	-48%

Contaminant	Vehicle Type	2007 Emission Rate (g/VMT)	2021 Emission Rate (g/VMT)	2024 Emission Rate (g/VMT)	2007-2021 Change (%)	2021-2024 Change (%)
	Medium Truck	5.79E-03	7.22E-04	3.91E-04	-88%	-46%
	Heavy Truck	4.40E-03	1.45E-03	9.97E-04	-67%	-31%

Notes: Vehicle Mile Travelled (VMT)

The results presented in **Table 11-1** indicate that cumulative concentrations of benzo(a)pyrene at the most impacted receptor are elevated compared to the 24-hour and annual air quality thresholds. It should be noted that ambient concentrations of benzo(a)pyrene collected as part of the NAPS Air Monitoring Program were already elevated compared to the 24-hour and annual air quality thresholds. Modelled concentrations were combined with ambient data to determine cumulative impacts; however, this approach is considered conservative as benzo(a)pyrene concentrations from surrounding sources would have already been captured in the ambient data, as discussed in the previous paragraph with acrolein. The predominant source of benzo(a)pyrene in the study area is transportation sources. Benzo(a)pyrene has also been identified as a TRAP which is generally elevated near highways and busy roads, often elevated compared to MECP guidelines. Emission rates of benzo(a)pyrene are expected to decrease over time as vehicles become more efficient, similar to acrolein.

The results presented in **Table 11-1** indicate that cumulative concentrations of NO_X at the most impacted receptor are elevated compared to the 1-hour and annual air quality thresholds. Modelled concentrations were combined with ambient data to determine cumulative impacts; however, this approach is considered conservative as NO_X concentrations from surrounding sources would have already been captured in the ambient data, as previously discussed. NOx has also been identified as a TRAP which is generally elevated near highways and busy roads, often elevated compared to MECP guidelines. The predominant source of NOx impacts at the Site is transportation sources; however, emission rates of NOx are also expected to decrease over time as vehicles become more efficient.

The results presented in **Table 11-1** indicate that cumulative concentrations of benzene at the most impacted receptor are elevated compared to the annual air quality thresholds. Modelled concentrations were combined with ambient data to determine cumulative impacts; however, this approach is considered conservative as benzene concentrations from surrounding sources would have already been captured in the ambient data, as previously discussed. Benzene has also been identified as a TRAP which is generally elevated near highways and busy roads, often elevated compared to MECP guidelines. The predominant source of benzene in the

study area is transportation sources; however, emission rates of benzene are also expected to decrease over time as vehicles become more efficient.

The results presented in **Table 11-1** indicate that cumulative concentrations of $PM_{2.5}$ and PM_{10} at the most impacted receptor are elevated compared to the annual air quality thresholds and the 24-hour air quality thresholds respectively. Modelled concentrations were combined with ambient data to determine cumulative impacts; however, this approach is considered conservative as $PM_{2.5}$ and PM_{10} concentrations from surrounding sources would have already been captured in the ambient data, as previously discussed. $PM_{2.5}$ and PM_{10} have also been identified as TRAP which are generally elevated near highways and busy roads, often elevated compared to MECP guidelines. The predominant source of $PM_{2.5}$ and PM_{10} impacts at the Site is transportation sources.

All other significant contaminants included in this assessment were predicted to be below air quality thresholds. The results presented in **Table 11-2** indicate that the maximum contaminant concentration is expected at various heights, depending on the contaminant. When assessing the maximum concentration at the Site from all sources in the Base model, the model indicated that the west corner of the property would experience the highest impact at approximately 0 m for 24-hr, 1-hr and 8-hr averaging periods. Contaminant specific models indicated that the maximum concentrations could occur at various heights depending on the location of sources. For example, the most impacted receptor for 24-hr NOx concentrations is located at the northwest property boundary at a height of approximately 0 m as a result of this location being near train and road sources. In comparison, the most impacted receptor for 1-hr SO_2 concentrations is located at the south property boundary at a height of approximately 60.2 m as a result of this location being near industrial sources of SO_2.

12.1 Nuisance Dust and Odour Impacts

The potential for nuisance dust and odour impacts on the proposed development has been assessed as part of this study. Dust was assessed as part of the dispersion modelling, where emission data was available, and ambient air monitoring. The predominant source or dust impacts on the proposed development are related to traffic and not industrial emissions. PM_{10} and TSP are expected to be below the AAQC thresholds and are not expected to be an issue with respect to nuisance impacts. Facilities within the minimum separation distance and potential influence area are not expected to produce nuisance dust that would impact the proposed development.

Odour may be present from the surrounding facilitates, including the following:

- Clarkson Wastewater Treatment Plant;
- Petro Canada Lubricants Inc; and,
- Ritcey Custom Cabinetry.

The Clarkson Wastewater Treatment Plant (CWWTP) is located approximately 1,600 m from the proposed development and emits some odorous contaminants such as TRS; however, the facility is outside the potential influence area for a Class III facility. The facility uses odour control systems to manage odour from operations to ensure that existing and future operations do not adversely impact offsite receptors. As a result, CWWTP is not expected to cause odour nuisance at the Site.

Petro Canada Lubricants Inc. emits some odorous contaminants such as TRS and is approximately 887 m from the proposed development which is within the potential influence area. The modelled concentrations of contaminants from Petro Canada Lubricants Inc. are low and do not indicate that nuisance odour would be perceivable at the proposed development.

Ritcey Custom Cabinetry is a cabinet manufacturer, the facility building is located approximately 60 m from the proposed development, within the 70 m potential area of influence, but outside the 20 m minimum separation distance for a Class I facility. This facility is small in scale and there are no visible stacks or other emission sources. All products associated with the manufacturing process are expected to be contained inside the facility with minimal potential for fugitive emissions and nuisance. There were no dust and odours were observed onsite during over thirty site visits to install and/or collect sample media. Any potential nuisance dust would have been captured by the air monitoring station on site, which was located approximately 85 m to the northeast of the facility. As a result, Ritcey Custom Cabinetry is not expected to produce any significant odours or dust that would impact the proposed development.

There are 12 auto repair shop facilities within the study area including:

- Mississauga BMW Repair
- WaySide Auto Service;
- Audi Repair Mississauga - Lorne Park Car Centre;
- Caruso's Service Centre Inc.;
- Autobody shop;
- Midas;
- Car Pride Auto Spa;
- Cam Tech Automotive Service;
- Mississauga Auto Centre;
- Canadian Tire Auto Parts & Service;
- PPG Automotive Refinish Canada Inc.; and,
- Canadian Automotive Refinish.

When the distance from the Site is adjusted to account for the distance to the facility building, most of the auto repair shops are located outside potential influence area for applicable facility Class, 70 m for Class I and 300 m for Class II. There are four automotive repair facilities on the property adjacent to the proposed development. Mississauga BMW Repair is within the 20 m

minimum separation distance. WaySide Auto Service is within the 70 m potential area of influence, but outside the 20 m minimum separation distance. Audi Repair Mississauga - Lorne Park Car Centre is within the 70 m potential area of influence but outside the 20 m minimum separation distance. Caruso's Service Centre Inc. is outside the 70 m potential area of influence. These four facilities only conduct repairs and maintenance of vehicles and there is no evidence of paint booths as no environmental permits were found. Any odour generated from operations is expected to be contained within the facility; therefore, there is little potential for nuisance odour. It should also be noted that again no dust or odours were observed in the vicinity of these facilities during over thirty site visits to install and/or collect sample media. All other automotive facilities are well outside the potential influence area and would not be expected to have any odour impacts on the proposed development.

12.2 Summary of Cumulative Human Health Assessment

The Cumulative Human Health Risk Assessment Report (HHRA) can be found in **Appendix K**. Results for each contaminant with a cumulative concentration that exceeded the AAQC and/or CAAQS were provided to the WSP human-health risk assessment team in order to determine appropriate implications and consideration of any mitigation measures for the Proposed Development. Analysis of the frequency and magnitude of exceedances was considered; however, the concentrations presented were primarily a result of existing ambient baseline concentrations due to transportation sources within the study area. As a result, a qualitative assessment of human-health risks was completed.

It was determined that the exceedances of AAQCs are related to significant contribution from ambient baseline sources, with minimal contribution from modelled concentrations. Modelled concentrations for acrolein, benzene, and benzo(a)pyrene contribute ≤2% to cumulative concentrations. The ambient background levels of acrolein, benzene and benzo(a)pyrene are comparable to reported concentrations in Ontario and Canada. Modelled concentrations for $PM_{2.5}$ and PM_{10} concentrations contribute 21% and 14%, respectively. The cumulative concentration of $PM_{2.5}$ is within the range reported in Canadian urban cities. For nitrogen oxides, modelled concentrations and baseline concentrations have similar contributions at approximately 50% to the cumulative concentrations. The NO_2 annual cumulative concentrations for the Clarkson TSA (27 µg/m3 or 15 ppb) are within the range reported in Toronto and Canadian urban areas.

A toxicological review was completed of available jurisdictional ambient air quality objectives (AAQOs) for acrolein, benzene, benzo(a)pyrene, NO_2, PM_{10} and $PM_{2.5}$. Additionally, a comprehensive review of the available short-term (acute) and long-term (chronic) numerical limits was conducted in the HHRA.

Given the ongoing sources of identified chemicals of concern from mobile vehicular and industrial sources, mitigation measures could be developed for implementation in land use planning to improve indoor air quality.

12.3 Mitigation Measures

Air quality mitigation is not required at the proposed development; however, mitigation recommendations have been included to improve indoor air quality. A memorandum with discussion of the recommended mitigation measures to improve indoor air quality can be found in Appendix L. The recommended mitigation measures were determined based on the cumulative concentrations (baseline and modelling) at various heights for each of the COCs that exceeded their respective AAQC threshold value. The cumulative impacts show that except for B(a)P and acrolein, there are no concentrations elevated compared to the AAQC at 30.1 m and above. The Mitigation Recommendations Memorandum presented that background concentrations of acrolein and B(a)P are elevated when compared to the AAQC values; however, B(a)P is elevated anywhere a development were to proceed in an urban area.

For all other COCs, excluding acrolein and B(a)P, based on the data assessed in this memo, the following recommendations are presented:

- Local Air Intakes: If air intakes are designed to be located in each suite, then for any suites below the fourth floor (12.9 m) filters to control $PM_{2.5}$ and PM_{10} impregnated with carbon to control benzene could be utilized. Percent reductions required can be calculated from Table 3. Filters require ongoing maintenance and monitoring per manufacturer specifications, which generally require replacement after a specified duration of time.
- Monitoring: Since Table 3 represents a very conservative approach then it is recommended that a method of ambient monitoring be incorporated to ensure the controls of a local air intake design are working, or even required.
- Ducted Air Intakes: An alternative to filtering local air intakes and monitoring could be to have a centralized air intake system ducted from above 43 m for any suites located below this level.
- Since NO_X is being compared to the CAAQS Annual threshold for NO_2 (12 ppb), it should be based on the same criteria which is the average over a single calendar year of all 1-hour average concentrations. The 6-month average of NO_2 measured by WSP was 6.9 ppb, when adjusted based on the bias adjustment factor (21% decrease due to COVID-19 lockdowns) it becomes 8.7 ppb. At 8.7 ppb the NO_2 concentration for the area is well within the CAAQS annual threshold. The cumulative concentrations include both measured and modelled concentrations for NO_X which is very conservative when assessing the need for mitigation.

With the recommendations presented above and detailed design of mitigation to be conducted by the proponent as part of the Design Process, WSP does not see any further requirements to fulfil a development application at this time.

13 Conclusions

Based on the air dispersion modelling assessment, the following conclusions can be made:

— Benzene, acrolein, PM_{10}, $PM_{2.5}$, NOx, and benzo(a)pyrene were predicted to be above air quality thresholds. All other significant contaminants included in this assessment were predicted to be below air quality thresholds;

— Prevailing wind direction is blowing from the west southwest and east northeast, and not from significant stationary sources of air emissions such as large facilities and tall stacks. As a result, the most significant sources of air impacts at the Site are expected to be transportation sources (road and rail);

— It should be noted that impacts from the Clarkson GO Rail Corridor are expected to decrease over time as Metrolinx electrifies their transportation network, though not included in this assessment as diesel GO trains would continue to operate and pass by until the entirety of the corridor was electrified;

— Modelled maximum air quality impacts were predicted at the most impacted receptor (property boundary or flagpole receptor);

— Concentrations of acrolein at the Site were reported as elevated compared to the 24-hour air quality threshold; however, the proposed development and the cumulative concentration from the nearby sources will not contribute to increasing the existing concentration (i.e., the development is not a source of acrolein);

— Concentrations of benzo(a)pyrene at the Site property boundary were reported as elevated compared to the 24-hour and annual air quality thresholds; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured benzo(a)pyrene concentrations in ambient air and the resulting cumulative concentration was not altered - the cumulative impacts at the proposed development remain unchanged from existing conditions;

— Concentrations of $PM_{2.5}$ and PM_{10} at the Site property boundary were reported as elevated compared to the annual air quality threshold; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured $PM_{2.5}$ concentrations in ambient air and the resulting cumulative concentration was not significantly altered. The cumulative impacts at the proposed development showed a minor increase from existing conditions likely as a result of expected traffic growth in the study area;

- Concentrations of PM_{10} at the Site property boundary were reported as elevated compared to the 24-hour air quality threshold; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured PM_{10} concentrations in ambient air and the resulting cumulative concentration was not significantly altered. The cumulative impacts at the proposed development showed a minor increase from existing conditions likely as a result of expected traffic growth in the study area;
- Concentrations of NOx at the Site property boundary were reported as elevated compared to the 1-hour and annual air quality thresholds; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured NOx concentrations in ambient air. The cumulative impacts at the proposed development showed an increase from existing conditions likely as a result of expected traffic growth in the study area;
- The 90th percentile 24-hour concentration of NO_2 recorded at the monitoring station was below the AAQC threshold. The cumulative concentration calculated from the dispersion modelling was above the annual Canadian Ambient Air Quality Standard (CAAQS) of 12 ppb which may be attributable to the addition of sources to the baseline ambient data which already includes the nearby sources. It should also be noted that the CAAQS is based on the average over a single calendar year of all 1-hour average concentrations, not 90th percentiles. The average of all 1-hour NO_2 concentration collected at the monitoring station was 6.9 ppb.
- Acrolein, PM_{10}, $PM_{2.5}$, benzene, NOx, and benzo(a)pyrene have been identified as Traffic Related Air Pollutants and are identified as often elevated compared to the air quality thresholds in urban areas and near highways and roadways. Elevated concentrations of these contaminants are not unique to the Clarkson TSA and are expected throughout urban areas in Ontario (i.e., Greater Toronto Area and Hamilton) and Canada;
- Based on publicly available data, acrolein and benzo(a)pyrene are not emitted by surrounding industrial facilities in significant amounts; therefore, it is expected that air quality impacts from these contaminants at the proposed development are predominantly associated with transportation emissions;
- Ambient concentrations of acrolein, benzene, NOx, and benzo(a)pyrene are expected to decrease as older vehicles are removed from service and vehicle emission controls become more efficient;

- The proposed development is expected to introduce stationary sources of air emissions associated with comfort heating equipment. These sources would emit contaminants from the stationary combustion and would not alter the results presented as these sources will be very small compared to the transportation emissions. It is unlikely that the introduction of the stationary sources would alter the outcome of the assessment which is dominated by transportation emissions and is conservative;
- Based on the air dispersion assessment, the potential for nuisance odour impacts at the proposed development is not expected based on modelled and cumulative ammonia and TRS concentrations. Ammonia concentrations are well below the 24-hour air quality threshold. Cumulative TRS concentrations are below the 10-minute and 24-hour air quality thresholds, and the majority of TRS concentrations are attributable to baseline conditions which were obtained from Hamilton, Ontario. Based on the model concentrations, there are no significant impacts from surrounding facilities to the proposed development;
- Based on the air dispersion assessment, the potential for nuisance dust impacts at the proposed development is not expected based on cumulative PM_{10} and TSP concentrations. The concentration of TSP is below the air quality threshold. The maximum 24-hour PM_{10} concentration is elevated compared to the air quality threshold; however, reported concentrations have been conservatively combined with ambient air monitoring data which would have already captured PM_{10} and TSP concentrations in ambient air. $PM_{2.5}$ concentrations were elevated compared to the annual air quality threshold; however, $PM_{2.5}$ impacts are predominately from transportation sources that would not give rise to nuisance complaints;
- The Health Assessment, located in Appendix K, determined that the exceedances of AAQCs are related to a significant contribution from ambient baseline sources, with minimal contribution from modelled concentrations. Modelled concentrations for acrolein, benzene and benzo(a)pyrene contribute ≤2% to cumulative concentrations. The ambient background levels of acrolein, benzene and benzo(a)pyrene are comparable to reported concentrations in Ontario and Canada. Modelled concentrations for $PM_{2.5}$ and PM_{10} concentrations contribute 21% and 14%, respectively. The cumulative concentration of $PM_{2.5}$ is within the range reported in Canadian urban cities. For nitrogen oxides, modelled concentrations and baseline concentrations have similar contribution at approximately 50% to the cumulative concentrations. The NO_2 annual cumulative concentrations for the Clarkson TSA (29 $\mu g/m^3$) are within the range reported in Toronto and in Canadian urban areas.
- Air quality mitigation is not required at the proposed development; however, mitigation recommendations have been included to improve indoor air quality.

- The Mitigation Recommendations Memorandum, located in Appendix L, determined that background concentrations of acrolein and B(a)P are elevated when compared to the AAQC values; however, B(a)P is elevated anywhere a development were to proceed in an urban area.

- If air intakes are designed to in each suite, then for any suites below the fourth floor (12.9 m) filters to control PM_{10} and $PM_{2.5}$ impregnated with carbon to control benzene could be utilized to improve indoor air quality. It is recommended that a method of ambient monitoring be incorporated to ensure the controls of a local air intake design are working, or even required. An alternative to filtering local air intakes and monitoring could be to have a centralized air intake system ducted from above 12.9 m for any suites located below this level. A detailed design of mitigation will be conducted by the proponent as part of the Design Process;

– Based on the air quality study, air quality in the study area is not expected to adversely impact high density residential development nor the existing local industrial sites level of compliance to existing standards. Elevated concentrations of contaminants reported (i.e., above health-based thresholds) which could lead to health risks are not unique to the Clarkson TSA and are expected throughout urban areas in Ontario (i.e., Greater Toronto Area and Hamilton) and Canada. Transit-oriented development within the Clarkson TSA is expected to reduce reliance on passenger vehicle trips as the community shifts to alternative modes of transportation such as public transit and active transportation. This transition is expected to reduce emissions of TRAP contaminants within the Clarkson TSA and likely will result in improved air quality in the community.

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H.L. Blachford. Table 4: Emission Summary Table

APPENDIX

L MITIGATION OPTIONS

MEMO

TO: Slate Asset Management L.P.

FROM: WSP Canada Inc.

SUBJECT: **Mitigation Recommendations, Clarkson Transit Station Area**

DATE: **August 26, 2022, revised February 15, 2023**

Based on the WSP Air Study, mitigation is not required at the proposed development; however, mitigation recommendations have been included to improve indoor air quality. This memorandum outlines mitigation recommendations to improve indoor air quality based on the results of two WSP Canada Inc. (WSP) reports:

- Clarkson Transit Station Area Air Quality Study, Monitoring and Dispersion Modelling Report, January 23, 2023 (WSP Air Study); and,

- Human Health Assessment, Clarkson Transit Station Area (TSA) Study, December 9, 2022 (WSP Health Assessment)

The focus of this mitigation memo is to examine the potential for future building construction with appropriate HVAC and air filtration systems to reduce ingress of chemicals of concern into indoor air. Mitigation could be accomplished by adjusting where intake air is drawn into the suites. The modelling completed as part of the WSP Air Quality Study examined concentrations at receptors at various heights at the property boundary. Predicting the concentrations at receptors at the property line at various heights is conservative since the contaminants of concern (COCs) are traffic-related air pollution (TRAP):

- Particulate matter less than 10 µm (PM_{10});
- Particulate matter less than 2.5 µm ($PM_{2.5}$);
- Oxides of Nitrogen (NO_X);
- Acrolein;
- Benzene; and,
- Benzo(a)pyrene [B(a)P].

Table 1 attached displays the model results for the primary contaminants of concern (COCs) listed above and the equivalent time-weighted average Ambient Air Quality Criteria (AAQC). None of the predicted model concentrations result in a value that is elevated compared to the respective AAQC.

Table 2 uses the percentage change of the modelled concentrations in **Table 1** with height and modifies the baseline ambient monitoring concentrations to show their equivalent change with height. This was performed as a direct percentage change since the ambient conditions would change in a similar proportion to the modelled fractions. Correcting the ambient concentrations for

82 Lancaster Street West
Kitchener, ON
Canada N2K 1M3

F: +1 519 743-8778
wsp.com

height was performed assuming that ambient data is collected from an equivalent height as the modelled 4.3 m receptor height, following best practices. **Table 2** demonstrates the background ambient concentration variability with height, and that for all COCs except B(a)P, impacts are not elevated compared to the AAQC at 17.2 m and above.
Table 3 conservatively adds together values from **Table 1** (modelled concentration) and **Table 2** (ambient concentrations). Adding together the modelled results and ambient results is extremely conservative and usually only conducted for Environmental Assessments (EAs) and Transit Project Assessment Process (TPAP) work. In EAs and TPAPs, a future scenario is often examined to show the project; such as highway expansion or rail improvements, has a net positive impact compared to alternatives. By examining cumulative impacts, **Table 3** effectively takes the known sources modelled (**Table 1**) and adds them to all known and unknown sources (**Table 2**). In this case the cumulative impacts show that except for acrolein and B(a)P, there are no concentrations elevated compared to the AAQC at 30.1 m and above. Background concentrations of acrolein and benzo(a)pyrene are elevated compared to the AAQC values; however, B(a)P is elevated anywhere a development were to proceed in an urban area.

Based on the data assessed in this memo, the following recommendations are presented:

- **Local Air Intakes**: If air intakes are designed to be located in each suite, then for any suites below the fourth floor (12.9 m) filters to control particulates ($PM_{2.5}$ and PM_{10}) impregnated with carbon to control benzene could be utilized to improve indoor air quality. Percent reductions required can be calculated from **Table 3**. Filters require ongoing maintenance and monitoring per manufacturer specifications, which generally require replacement after a specified duration of time. It should be noted that mitigation for particulate will also incidentally reduce the concentration of B(a)P since B(a)P binds to particulate and may be partially mitigated through filtration.

- **Monitoring**: Since **Table 3** represents a very conservative approach then it is recommended that a method of ambient monitoring be incorporated to ensure the controls of a local air intake design are working, or even required.

Ducted Air Intakes: An alternative to filtering local air intakes and monitoring could be to have a centralized air intake system ducted from above 30.1 m for any suites located below this level.

- **NO_x**: No additional controls are recommended for NOx given the level of conservatism in the Air Quality Study and as the measured values (baseline) are well below for ambient air quality criteria for NOx as NO_2. The baseline already includes both industry, rail, and roadways emissions. Railway emissions dominated the predicted modelling concentration and are conservative as no reductions have been included for the electrification of the GO Stations. Therefore, baseline combined with modelling is an overpredicting of the concentrations at the Proposed Development and the potential need for mitigation.

- It is recommended that the proponent conduct a detailed design of mitigation as part of the Design Process.

In addition to the recommendations, WSP identifies the following improvements noted for the Clarkson airshed:

- Ongoing MECP compliance for Industry; and,

- Metrolinx Regional Express Rail Lakeshore West line is expected to be electrified in the coming years (some trains will remain diesel, but the majority will be electrified).

Further improvements of air quality are expected based on the City of Mississauga's local initiatives that are ongoing to improve air quality and reduce greenhouse gases.