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Appendix K: Air Quality Assessment Report

REGIONAL ROAD 25 FROM SPEERS ROAD TO DERRY ROAD MCEA

HALTON REGION ONTARIO

AIR QUALITY ASSESSMENT

RWDI # 2202891

April 21, 2026

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained by CIMA+ to conduct an air quality impact assessment for the proposed widening of Bronte Road (Regional Road 25) in Halton Region, Ontario. This air quality assessment was done in support of a Municipal Class Environmental Assessment (MCEA) for the improvements on Regional Road 25. The study area includes the section of Regional Road 25 from Speers Road to Derry Road, which is approximately 16 kilometres long.

The objective of the study is to predict air quality impacts as it relates to the project. The assessment was undertaken for two scenarios:

- Future No-Build scenario for the project year 2031; and
- Future Build scenario for the project year 2031.

The No-Build scenario represents the section of Regional Road 25 within the study area as it currently exists (two lanes in each direction) with no widening of the existing road for the project year 2031. The 2031 Build scenario includes the existing road being widened from four to six lanes including one HOV/transit-only lane proposed in each direction as identified in the Halton Region Integrated Master Plan. The road section from Speers Road to Wyecroft Road will remain the same in both the No-Build and Build scenarios, with no widening taking place (i.e. 4 lanes).

The emission modelling was based on the US EPA's roadway emissions model, MOVES4, and the dispersion modelling was based on the US EPA's dispersion model, AERMOD version 22112. The background concentrations were estimated using air quality monitoring data collected by the Ontario Ministry of Environment, Conservation and Parks (MECP) and Environment and Climate Change Canada (ECCC).

Representative discrete receptors within the study area were included with two thousand, five hundred and fifty-two (2,552) existing and potential future residential receptors in total. These were chosen using the latest publicly available aerial imagery and developer plans provided to RWDI by CIMA+.

Air contaminants assessed as part of the study included PM2.5, PM10, CO, NO2, acetaldehyde, acrolein, 1,3 butadiene, benzene, benzo(a)pyrene and formaldehyde.

Traffic composition was based on future traffic information provided by CIMA+, which was developed as part of the traffic analysis in the context of the Regional Road 25 MCEA Study. The distribution to MOVES4 vehicle types was based on current passenger vehicle registration data in Ontario (Statistics Canada, 2024a) and current

MOVES fleet data for commercial trucks (US EPA, 2024). MOVES4 default data were used to represent the percentages of electric vehicles in the future Ontario fleet.

The proposed project is expected to have minor impact on local air contaminant levels at the receptors, with the maximum predicted cumulative concentrations for most contaminants and averaging periods less than current respective thresholds. For the 2031 No-Build Scenario, annual and 24-hour average benzo(a)pyrene concentrations exceed their respective AAQC thresholds for both scenarios but are attributed to high ambient background concentrations. The average background benzo(a)pyrene concentrations for the 24-hour and annual averaging periods exceed the AAQC on their own.

The 2031 Future Build scenario is predicted to have minor air quality impacts and to be relatively comparable to the Future No-Build scenario; therefore, the project is not expected to have a significant impact on local air quality. Impacts from particulate matter (PM2.5 and PM10) are more significant than other contaminants due to re-entrained road dust dominating the particulate matter emission rates in comparison to tailpipe emissions. Emission calculations for particulate matter re-entrainment are based on calculated silt loading values along a road segment (US EPA, 2011). Public paved road silt loadings are dependent on a number of road and traffic characteristics, including average daily traffic volumes (ADT) and fraction of heavy vehicles. In the Future Build Scenario, the HOV/transit-only lanes (as identified in the Halton Region Integrated Master Plan) were modelled as separate road segments to account for lower anticipated traffic volumes in these lanes. These lower traffic volumes put the HOV lanes into a higher tier of baseline silt loading values which, in turn, increased their emission factors for re-entrained road dust. The combination of a higher re-entrained dust emission factor and closer proximity to nearby receptors resulted in increased modelled concentrations at the receptors closest to the modelled roadways.

When developing future residential areas, care taken to use reasonable setback distances from roadways would mitigate the potential impacts of re-entrained road dust. No additional mitigation measures are recommended beyond those which are already in place through phased-in federal regulations for on-road vehicle and engine emissions, which are expected to reduce NO_2 and other tailpipe emissions beyond the horizon year used for emission factors in the present study.

The increase in greenhouse gas emissions from the project compared to the regional provincial emissions of greenhouse gas CO_2e is very low and therefore the project is not expected to have a significant impact on the regional air quality. Traffic volumes and vehicle composition were assumed to be the same for Future No-Build and Future

Build, and with this assumption the difference in release of greenhouse gases between the scenarios is due to nominal differences in road length caused by realignment. Specifically, the increase from the 2031 No-Build to Build scenarios is less than 0.0005% of the total Ontario road transportation sector emissions.

Construction phase impacts were addressed qualitatively in Section 4.3 of the report. It is recommended that in order to minimize potential air quality impacts during construction, the construction tendering process should include requirements for implementation of an Air Quality Management Plan

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1 Introduction

RWDI was retained by CIMA+ to conduct an air quality impact assessment for the proposed widening of Bronte Road (Regional Road 25) in Halton Region, Ontario. This air quality assessment was done in support of a Municipal Class Environmental Assessment (MCEA) for the improvements on Regional Road 25. The study area includes the section of Regional Road 25 from Speers Road to Derry Road, which is approximately 16 kilometres long.

The scope of the study is itemized below:

- Use vehicle emissions modelling techniques to estimate tailpipe, brake wear, tire wear and road dust emissions associated with the traffic for horizon year 2031.
- Use a computer simulation of atmospheric dispersion to predict maximum contaminant concentrations at representative sensitive receptors due to vehicle emissions from the future conditions without the project (No-Build scenario for 2031), and future conditions with the project (Build scenario for 2031).
- Use representative historical monitoring data to establish background concentrations for each contaminant of interest, due to various other sources in the surrounding area other than those associated with the proposed project.
- Combine the dispersion model results with the background concentrations and compare to applicable air quality thresholds for all scenarios.
- Conduct a semi-quantitative assessment to determine the incremental impact of greenhouse gases within the context of provincial emissions.
- Conduct a qualitative assessment of construction activities.

2 Project Description

The project is described by the proposed widening of Regional Road 25 in Halton Region, Ontario. The study area includes the section of Regional Road 25 from Speers Road to Derry Road, which is approximately 16 kilometres long.

Figure 1 shows a key map of the study area and its surrounding land use, modelled roadways and sensitive receptors for the 2031 No-Build scenario. **Figures 1a to 1i** show individual section maps of the study area. **Figure 2** shows a key map of the study area and its surrounding land use, modelled roadways and sensitive receptors for the 2031 Build scenario. **Figures 2a to 2i** show individual section maps of the study area. The study area consists of residential, agricultural and forested land uses, and includes established residences.

Sensitive receptors representing established and future residences within 500 metres of the Regional Road 25 proposed widening were identified based on the latest publicly available satellite imagery and developer plans provided to RWDI by CIMA+. Local air quality impacts are expected to be greatest at receptors closest to the modelled roadways.

3 Assessment Methodology

This assessment generally followed the methodology described in the MTO "Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects" (May 2020) (the "MTO Air Quality Guide").

3.1 Modelled Scenarios

The assessment was undertaken for the following scenarios:

- **No-Build** of the proposed project for 2031; and
- **Build** of the proposed project for 2031

The assessment assumes that for the 2031 No-Build scenario, no major roadway improvements have occurred to the existing road alignments, with traffic volumes based on traffic volumes on existing roadways in the study area as provided by CIMA+. The Build scenario includes the proposed widening of Regional Road 25 for the horizon year 2031, with a third HOV/transit-only lane being added in each direction as identified in the Halton Region Integrated Master Plan. The road section from Speers Road to Wyecroft Road will remain the same in both the No-Build and Build scenarios, with no widening taking place. The traffic volumes used in both the No-Build and Build scenarios were based on PM peak hour traffic count values. The No-Build and Build scenarios used a roadway network speed of 60 km/hr.

3.2 Modelled Roadways

The modelling included all existing and proposed alignments of Regional Road 25 between Speers Road and Derry Road. The modelled roadway segments for the 2031 Future No-Build scenario are shown in **Figures 1 and 1a – 1i**, and the modelled segments for the 2031 Future Build scenario are shown in **Figures 2 and 2a – 2i**.

3.3 Traffic Data

Road traffic data based on peak PM traffic volumes were provided for all sections of Regional Road 25 within the study area by CIMA+. The same traffic data was used for both the No-Build and Build scenarios. The data were provided for the horizon year 2031.

In order to assign the vehicle distribution percentages to appropriate vehicle classes, the MOVES vehicle classification by source type was used. (See Section 3.7 for discussion of MOVES emissions modelling.) Truck percentage data for all road segments within the study area was either directly provided by or calculated based on data provided by CIMA+ for both the No-Build and Build scenarios. For the section of Regional Road 25 within the study area, a conservative heavy vehicle breakdown was adopted from MTO Noise guidelines for major roadways as 5% medium trucks and 8% heavy trucks (MTO, 2022).

The split of passenger vehicles as Passenger Car (MOVES Source Type 21) and Passenger Truck (MOVES Source Type 31) was based on 2023 vehicle registration for Ontario (Statistics Canada 2024b), with this spilt assumed for 2031. The split of Single-Unit and Combination trucks into Short-Haul and Long-Haul was based on MOVES technical guidance (US EPA, 2024).

Based on correspondence with CIMA+, transit buses were assumed to represent 3.5% of the total vehicles in the HOV/Transit Lane in the Build scenario. The same numbers of transit buses in each roadway segment were assumed for the No-Build scenario.

An hourly profile was used to determine diurnal variation of traffic volumes (Van Delden, et al., 2008). A summary of the hourly profile is provided in **Appendix A.1**. Traffic composition on each roadway segment is provided in **Appendix A.2**. Modelled traffic volumes for each scenario are provided in **Table 1a and 1b**, with additional detail in **Appendix A.3**.

3.4 Key Air Contaminants

Vehicular traffic produces a variety of air contaminants from fuel combustion inside the engine, evaporation of fuel from the tank, brake and tire wear, and re-suspension (also known as re-entrainment) of loose particles on the road surface (silt) as the vehicle travels over the road surface. The following key contaminants were assessed in accordance with the MTO Air Quality Guide:

- respirable particulate matter (PM2.5)

- inhalable particulate matter (PM10)
- carbon monoxide (CO)
- nitrogen dioxide (NO2)
- acetaldehyde
- acrolein
- benzene
- 1,3-butadiene
- benzo(a)pyrene
- formaldehyde

3.5 Air Quality Thresholds

The Ontario Ministry of Environment, Conservation and Parks (MECP) has Ontario Ambient Air Quality Criteria (AAQC) for airborne concentrations of PM10, CO, NO2, acetaldehyde, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, and formaldehyde. The Canadian Council of Ministers of the Environment (CCME) has established Canadian Ambient Air Quality Standards (CAAQS) for PM2.5 (CCME, 2022), and for 1-hour and annual concentrations of NO2 that came into effect on January 1, 2025. The AAQCs and CAAQS are collectively referred to as air quality thresholds in this report. The thresholds are summarized in **Table 2** (in micrograms per cubic metre, µg/m³).

The CAAQS were developed for use by provinces and territories to guide air zone management actions. They are not project-level regulatory standards; measures mandated to achieve the CAAQS should consider technical achievability, practicality, and implementation costs (CCME, 2019).

3.6 Background Air Quality Data

AERMOD was used to predict the contribution of the modelled roadways to concentrations of contaminants at nearby sensitive receptors. The predicted maximum concentrations were combined with estimated background concentrations that are due to other emission sources in the surrounding area, thus providing a prediction of maximum cumulative concentrations.

The ambient background data for each key contaminant were taken from representative air quality monitoring stations within the ECCC National Air Pollution Surveillance (NAPS) Program and MECP ambient air monitoring station network. Although current land use in the study area is predominantly rural, there are sections having low- to medium- density development with the expectation that development will increase within this corridor in future. Therefore, a review of stations representative of medium-density development with relevant data for the key contaminants was completed.

The Milton station (NAPS ID 67001) was used for background concentrations of PM2.5, PM10, and NO2 for 2019 to 2022. This station is closest to the study area and is reasonably representative of local conditions. Data for 2018 was not available for this station, therefore the Halton Reserve station (NAPS ID 61603) was used for 2018 data for PM2.5, PM10, and NO2 as it is the closest available station to the study area aside from the Milton station.

Toronto North – Downsview station (NAPS ID 60440) was used for carbon monoxide (CO). PM2.5, PM10, and NO2. Although it is not geographically the closest available station to the study area, it is the closest station that is also most representative of the land use of the study area.

Data for volatile organic compounds (VOCs) are only available at select monitoring stations. For benzene and 1,3-butadiene, the Kitchener (NAPS ID 61502) station is used. While it is not the closest available station to the study area, it is the closest available station that is also representative of the land use characteristics of the study area.

Recent data for benzo(a)pyrene are only available from a very limited number of monitoring stations. For benzo(a)pyrene, the Hamilton downtown station is geographically the closest available station to the study area, however it is not representative of the study area as it is located in an urban centre close to heavy industrial facilities which significantly impacts the background concentrations in the area. As this does not reflect the land use in the study area, the next closest available station was chosen. For 2018, both NAPS Station 60438 (Roadside 401W - Toronto) and NAPS Station 60430 (Toronto West) are available, however, NAPS Station 60430 is more representative of the study area as it is not situated in immediate proximity to Highway 401. For 2019 to 2022, NAPS Station 60438 is the only Toronto station available and is therefore chosen for these years.

Similar to benzo(a)pyrene, data for carbonyls are only available from a very limited number of monitoring stations. The nearest station to the study area for acrolein is Toronto Roadside – Wallberg (University of Toronto) (NAPS ID 60439) and this station is somewhat representative of the study area characteristics. For acetaldehyde and formaldehyde, Toronto stations are the closest available stations to the study area. Data was selected for the years 2015 to 2019. The Toronto station available for 2015 to 2017 is Roadside – Wallberg (University of Toronto) (NAPS ID 60439), and the Toronto station available for 2018 and 2019 is Roadside 401W – Toronto (NAPS ID 60438), therefore these stations were selected for acetaldehyde and formaldehyde.

The sources of background monitoring data used for this study are presented in **Table 3.**

In the case of NO2 and ozone (O3), hourly monitoring data were available for the local Milton monitoring station that allowed estimation of background concentration by hour of day. Project contribution of ozone was not assessed against air quality thresholds, but background ozone concentrations were used for converting nitrogen oxides (NOX) to NO2 using the Ozone Limiting Method (OLM). (See Section 3.8.2 for discussion of OLM.) As background concentrations vary widely from day to day, a 90th percentile concentration was calculated for each hour of the day using 5 years of hourly monitoring data from 2019 to 2023, as this represents the most recent data set available. The resulting background concentrations represented the highest background conditions likely to coincide with maximum predicted concentrations from the roadways. They were used when predicting maximum 1-hour and 24-hour cumulative concentrations of NO2. The hourly background concentrations for NO2 and O3 are presented in **Table 4**. For the annual averaging period the annual mean values were used.

PM10 monitoring data were not available; therefore, PM10 background concentrations were estimated from the PM2.5 values using a PM2.5/PM10 ratio of 0.54 (Lall et. Al., 2004).

For benzene and benzo(a)pyrene, the monitoring data consisted of 24-hour average concentrations. It was not possible to calculate background values by hour of the day, therefore, for these contaminants, the background concentrations for the 24-hour averaging period consisted of 90th percentile values. For 0.5-hour acetaldehyde and 1-hour acrolein, the background values were calculated from the corresponding 24-hour average background value following Section 4.4 of the Air Dispersion Modelling Guideline for Ontario. The summary of all background values used for the assessment is presented in **Table 5.**

3.7 Emissions Model

The standard approach for estimating vehicular emissions is to use computer simulation techniques that are based on extensive previous testing of a wide range of vehicles. Motor Vehicle Emission Simulator (MOVES4) is such a model that has been developed for this purpose by the U.S. Environmental Protection Agency (EPA). MOVES4 was used to generate vehicle emission factors for the horizon year 2031.

Exhaust emissions vary widely by vehicle type and speed, and MOVES4 was configured to generate emission factors based on the vehicle type and travel speed. These individual emission factors were aggregated to produce a composite emission factor for each key air contaminant, representing the average vehicle for each road segment assessed. MOVES emission factors by vehicle type and by roadway segment are provided in **Appendix A.4.**

For particulate matter, it is necessary to account for the re-suspension of dust as vehicles travel over a roadway surface, in addition to tailpipe emissions. The road dust emissions were calculated based on the revised version of U.S. EPA's AP-42, Chapter 13.2.1 (US EPA, 2011). The tailpipe emission factor for particulate matter, from MOVES4, was added to the road dust emission factor to account for both emission sources.

Tables 6a and 6b show the maximum predicted concentrations for the 2031 Future No-Build and Future Build scenarios, respectively.

MOVES4 default data were used to represent the percentages of electric vehicles in the future Ontario fleet.

3.8 Dispersion Model

Air contaminants emitted from vehicles on a roadway will drift downwind and disperse as they travel. The degree to which the contaminants disperse depends on the weather-related factors, such as wind speed and amount of turbulence. The typical approach to determine potential future downwind concentrations from a proposed project is to use a computer simulation that predicts the dispersal of air pollutants as they drift away from the roads. These simulations are referred to as dispersion models.

Dispersion modelling is a common approach for assessing local air quality near an emission source such as vehicular traffic. The dispersion model used in this study is the US EPA's AERMOD version 22112. This is a widely used dispersion model and is an approved model for regulatory purposes in Ontario. The model predicts how emissions from the vehicles travelling within each segment disperse and contribute to air pollutant concentrations within the study area. The dispersion model requires information on emission rates for the air pollutants of interest, the layout of the project corridor, terrain elevation data, and hourly meteorological data.

Site-specific meteorological data were processed for input to the AERMOD model. Two fully processed 5-year (2020-2024) site-specific meteorological data sets were processed by RWDI using the 22112 version of AERMET. In order to accommodate variations in land use characteristics across the length of the study area, one data set was prepared for the section of the study area closer to Speers Road, and the other data set was prepared for the section of the study area closer to Derry Road. Upper air and weather data were obtained from Buffalo International Airport; surface air weather data were obtained from Burlington Piers station primarily with Hamilton Internation Airport used to substitute for missing data.

Terrain information for the study area was obtained from the Regional Meteorological and Terrain Data for Air Dispersion Modelling website of the MECP. The terrain data are based on the North American Datum 1983 (NAD83) horizontal reference datum. The rural dispersion coefficient was used in the dispersion modelling analysis.

3.8.1 Selection of Receptors

Sensitive receptors were identified within the study area based on the latest publicly available satellite imagery and future developer plans provided to RWDI by CIMA+. The receptors were selected based on existing residences (receptor ID prefix of R) and potential future residences (receptor ID prefix of RF) within the defined study area along different compass directions from the modelled roadways. In total, 2,552 sensitive receptors were selected for this assessment. Local air quality impacts are expected to be greatest at receptors closest to the modelled roadways. **Figures 1, 1a – 1i** and **Figures 2, 2a – 2i** show the sensitive receptor locations within the study area

3.8.2 Conversion of NO_x to NO_2 Ozone Limiting Method

Any chemical reactions among pollutants are not considered in the assessment of local air quality impacts, except for the conversion of nitric oxide (NO) to NO2, through reaction with ambient ground-level ozone (O3). Vehicle exhausts initially consist mainly of NO. However, NO can convert to NO2 once in the outside air. The Ozone Limiting Method (OLM) was used to estimate this conversion for the credible worst-case NO concentration.

The OLM assumes that the conversion of NO to NO2 is limited only by the amount of ozone (O3) present in the outside air. If the concentration of available O3 (parts per million or ppm) is less than that of the NO contributed by the modelled roadway emissions, then the portion of NO that is converted to NO2 equals the available O3. On the other hand, if the concentration of available O3 exceeds that of the NO contributed by the modelled roadway, then all of the NO is converted to NO2. The OLM calculation is conditional dependent on the ambient concentration of ozone compared to the concentration of NOx from combustion. These are shown below as (a) and (b).

(a) $If\ ambient\ O_3 > [0.9 \times NOx], then\ NO_2 = NOx$

(b) $If\ ambient\ O_3 < [0.9 \times NOx], then\ NO_2 = [0.1 \times NOx] + O_3$

For example, the concentration of ambient ozone at 12 p.m. is 46 ppb as shown in **Table 4**. Assuming the concentration of NOx at 12 p.m. is 100 ppb, equation (b) would apply as shown below.

$$46\ ppb < [0.9 \times 100\ ppb], so\ NO_2 = [0.1 \times 100\ ppb] + 46\ ppb$$

$$= 10\ ppb + 46\ ppb = 56\ ppb$$

For the credible worst-case analysis, a fixed hourly concentration of ozone was used in the OLM, shown in **Table 4**, corresponding to the 90th percentile of measured values from historical monitoring data recorded at the Milton monitoring station operated by the MECP.

3.9 Climate Change Assessment

The potential for the project to impact climate change was assessed by calculating the total annual emissions for the No-Build and Build scenarios in 2031. This analysis focused on the emissions of greenhouse gases, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), in terms of CO_{2e} (CO_2 equivalent).

This analysis included the emissions from modelled roadways within the study area.

In order to assess the effect of the project on regional air quality, annual project-related emissions were compared with the annual total Ontario-wide emissions of the same pollutants from the road transportation sector.

4 Results

4.1 Assessment of Maximum Cumulative Concentrations

Tables 6a to 6b present a summary of the predicted maximum cumulative concentrations (maximum modelled project contribution plus the 90th percentile 1-hour or 24-hour background concentration) at the 2,552 modelled discrete receptors for the Future No-Build and Future Build scenarios. Two model runs were completed, one for each set of prepared met data. The maximum resultant concentrations from both models at each receptor for each contaminant were compared to the applicable thresholds.

The resultant concentrations for the 2031 Future Build scenario were similar to the concentrations for the 2031 Future No-Build scenario, excluding particulate matter concentrations (PM2.5 and PM10). This is because the same traffic volumes were used for both the No-Build and Build scenarios, with the only differences between the two scenarios being the road widening and the distribution of different vehicle types across the existing and proposed lanes. Therefore, changes in modelled concentrations from No-Build to Build for all contaminants except particulate matter are insignificant.

For the Future No-Build and Future Build scenarios, the cumulative maximum predicted concentrations for 24-hour and annual average benzo(a)pyrene exceeded the AAQC. However, this is attributed to high ambient background concentrations. As shown in **Table 5**, the background levels of benzo(a)pyrene are 345% and 891% of the AAQC for 24-hour and annual averaging periods, respectively.

The cumulative maximum predicted concentrations for all other contaminants in both the 2031 No-Build and Build Scenarios were below their respective criteria except annual PM2.5 (Build only), 24-hour PM10, and 1-hour NO_2. Most of these exceedances occur at modelled receptors that are closest in proximity to the modelled roadways. For the No-Build Scenario, the maximum concentration occurs at R64 for 24-hour PM10 and annual NO_2 (100% and 102% of the threshold, respectively), and RF518 for 1-hour NO_2 (143% of the threshold). For the Build Scenario, the maximum concentration occurs at R64 for annual PM2.5, 24-hour PM10, and 1-hour NO_2 (101%, 109% and 143% of the threshold, respectively).

Emission calculations for particulate matter re-entrainment are based on calculated silt loading values along a road segment (US EPA, 2011). Public paved road silt loadings are dependent on a number of road and traffic characteristics, including average daily traffic volumes (ADT) and fraction of heavy vehicles. In the Future Build Scenario, the new HOV/transit-only lanes were modelled as separate road segments to account for lower anticipated traffic volumes in these lanes. These lower traffic volumes put the HOV lanes into a higher tier of baseline silt loading values which, in turn, increased their emission factors for re-entrained road dust. The combination of a higher re-entrained dust emission factor and closer proximity to nearby receptors resulted in increased modelled concentrations at the receptors closest to the modelled roadways. When developing future residential areas, care taken to use reasonable setback distances from roadways would mitigate the potential impacts of re-entrained road dust.

Table 7 shows the relative changes in cumulative maximum predicated concentrations for each contaminant, with the percent change from the 2031 No-Build to Build scenario including background concentrations. The incremental change in predicted concentrations between the Future No-Build and Future Build scenarios for the 2031 horizon year is insignificant for all contaminants except PM2.5 and PM10. This is due to the same traffic volumes being used for both the No-Build and Build scenarios, with the only differences between the two scenarios being the road widening and the distribution of different vehicle types across the existing and proposed lanes. The increases in particulate matter concentrations are due to dust re-entrainment as discussed above. A large percentage change in **Table 7** must be considered in context with the absolute predicted concentrations in **Tables 6a and 6b**.

4.2 Assessment of Regional Air Quality and Greenhouse Gas Emissions

The impact of the project on greenhouse gas emissions was assessed by calculating the total annual emissions associated with the modelled roadways within the study area as shown in **Table 8**. The annual regional greenhouse gas emissions are projected to increase between the No-Build and Build scenarios due to the addition of one lane in each direction and the difference in vehicle distribution across existing and proposed lanes within the study area for the 2031 horizon year. Overall, the emissions from this roadway network are small in relation to provincial totals, and there is little change in the regional emissions between the No-Build and Build scenarios for the 2031 horizon year. Specifically, the increase is 0.0005% from the 2031 No-Build to Build scenario.

4.3 Emissions During the Construction Phase

Construction activities involve heavy equipment that generates air pollutants and dust; however, these impacts are temporary in nature. The emissions are highly variable, difficult to predict, and depend on the specific activities that are taking place and the effectiveness of the mitigation measures. The best manner to deal with these emissions is through diligent implementation of operating procedures such as application of dust suppressants, reduced travel speeds for heavy vehicles, efficient staging of activities and minimization of haul distances, covering up stockpiles, etc. It is recommended that in order to minimize potential air quality impacts during construction, the construction tendering process should include requirements for implementation of an Air Quality Management Plan. Such a Plan would set out established best management practices for dust and other emissions. Some of the best practices include the following:

- Use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fueled trucks to reduce emissions from construction equipment.
- Regular cleaning of construction sites and access roads to remove construction-caused debris and dust.
- Dust suppression on unpaved haul roads and other traffic areas susceptible to dust, subject to the area being free of sensitive plant, water or other ecosystems that may be affected by dust suppression chemicals.
- Covered loads when hauling fine-grained materials.
- Prompt cleaning of paved streets/roads where tracking of soil, mud or dust has occurred.
- Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads.
- Covered stockpiles of soil, sand, and aggregate, as necessary.
- Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces.

5 Conclusions

The proposed project is expected to have low impacts on local air contaminant levels at the most-impacted receptors, with the maximum predicted cumulative concentrations for all contaminants and averaging periods less than current respective AAQC and CAAQS thresholds except benzo(a)pyrene, PM10, and 1-hour NO2 for the No-Build and Build scenarios. PM2.5 exceeded its threshold for the Build Scenario only. Most of these exceedances occur at modelled receptors that are closest in proximity to the modelled roadways. When developing future residential areas, care taken to use reasonable setback distances from roadways would mitigate the potential impacts of re-entrained road dust. No additional mitigation measures are recommended, beyond those which are already in place through phased-in federal regulations for on-road vehicle and engine emissions, which are expected to reduce NO2 and other tailpipe emissions beyond the 2031 horizon year used for emission factors in this assessment.

The incremental emissions from the project compared to the regional provincial emissions of greenhouse gas CO2e are low (less than 0.0005%) for the 2031 horizon year, and therefore the project is not expected to have a significant impact on the regional air quality.

Construction phase impacts were addressed qualitatively. It is recommended that in order to minimize potential air quality impacts during construction, the construction tendering process should include requirements for implementation of an Air Quality Management Plan.

6 Statement of Limitations

This report entitled Air Quality Assessment – Bronte Road From Speers Road to Derry Road MCEA, was prepared by RWDI AIR Inc. (“RWDI”) for CIMA+ (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein (“Project”). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

7 References

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