Canadian National

Luanne Patterson
Senior System Manager –
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March 22, 2019

Lesley Griffiths
Review Panel Chair
160 Elgin St.
Ottawa, ON K1A 0H3

By email
Dear Ms. Griffiths,

CN is pleased to submit the remaining responses to Information Request package 8 (IR 8) received from the Review Panel on September 25, 2018 (CEAR #685). More specifically, this response addresses the following:

1) IR 8.2 (b)
2) IR 8.4 (e)
3) IR 8.5 (a) to (g)
4) IR 8.9 (a) & (b)

This concludes the submission of IR 8 responses.

Sincerely,

<Original signed by>

Luanne Patterson
Senior System Manager – Environmental Assessment

cc:

William G. McMurray, Review Panel Member
Isobel Heathcote, Review Panel Member
Joseph Ronzio, Review Panel Manager
Darren Reynolds, CN Project Director

CN Milton Logistics Hub ("Project")
CEAR File No. 80100

CN Response to the Review Panel's Information Request 8
Received September 25, 2018

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The following information is provided in response to Information Request (IR) 8 received from the Review Panel on September 25, 2018 (CEAR #685) to address portions of IRs 8.2 and 8.4, and IRs 8.5 and 8.9 as requested by the Review Panel on February 21, 2019 (CEAR #718). Additional information pertaining to IRs 8.1, 8.6 - 8.8, 8.10 – 8.16, 8.18, and 8.19 was provided under separate cover on December 19, 2018 (CEAR #705), while information pertaining to IRs 8.3, 8.17, and 8.20 was provided under separate cover on February 15, 2019 (CEAR #714), and information pertaining to IRs 8.2 and 8.4 was provided under separate cover on March 1, 2019 (CEAR #722).

AIR QUALITY

IR8.2 Project site ambient air quality monitoring results

Rationale: *In its response to the Review Panel's information request #3.1 (CEAR #613), CN provided the results of its ambient air quality monitoring study to establish whether differences between this monitoring data and the data used for the air quality assessment in the EIS might affect the effects CN predicted in its air quality and human health risk assessments. Based on the monitoring data, when combined with the predicted values from the Project, CN predicted that the Project could result in exceedances of ambient air quality criteria for some contaminants, including $PM_{2.5}$ and PM_{10}. CN provided additional analysis on these exceedances in Attachment IR3.1-2: HHRA Update and some of the updated exposure ratios exceeded 1.0. Despite these exceedances, CN concluded that it did not expect unacceptable health risks to the public from exposure to these air quality contaminants of potential concern associated with the Project because exceedances would be limited in frequency and magnitude and because CN had used conservative modelling assumptions. CN did not discuss potential health effects that might result from substances that would not exceed exposure ratios of 1.0.*

In its comments on CN's response to the Review Panel's Package 3 information requests, Health Canada (CEAR #666) indicated that $PM_{2.5}$ is a human carcinogen and therefore unacceptable human health risks may arise in the current PM2.5 exposure scenarios. Health Canada stated that health effects, including cardiovascular and respiratory effects, can occur at levels below the Canadian Ambient Air Quality Standards (CAAQS). Health Canada recommended that CN establish mitigation measures to reduce emissions, given that there are no recognized thresholds for the health effects of PM_{10} and $PM_{2.5}$.

Health Canada also noted that new CAAQS for NO_2 were announced in December 2017 and will be effective in 2020. These new standards use a different statistical form of the numerical standard than the one presented by CN and for that reason the values in the EIS cannot be compared against the new standards.

Additionally, in the cumulative effects assessment summary table (Table IR3.16-3), results for the cumulative effect assessment scenario for NO_2 and CO are different from the results presented in Tables 1 and 2 of Attachment IR4.29. For instance, the results for 1hr NO_2 in 2021 in Tables 1 and 2 are respectively 110 µg/m^3 and 114 µg/m^3. CN did not provide a clear rationale to explain these differences.

Information Request:

b) Provide an updated assessment, including cumulative effects, using the 2020 Canadian Ambient Air Quality Standards for 1-hour NO_2 and annual NO_2. Identify whether there would be exceedances and discuss the implications of the new standards.

CN Response:

b) Provide an updated assessment, including cumulative effects, using the 2020 Canadian Ambient Air Quality Standards for 1-hour NO_2 and annual NO_2. Identify whether there would be exceedances and discuss the implications of the new standards.

In the HHRA (EIS Appendix E7) and in CN's responses to IR3.1 and IR4.29, the maximum predicted NO_2 ground level concentrations were compared to the Canadian National Ambient Air Quality Objective (NAAQO) maximum acceptable levels for 1-hour, 24-hour, and annual averaging periods (CCME 1999). Since submission of the EIS in 2015, new Canadian Ambient Air Quality Standards (CAAQS) for NO_2 were published on November 3, 2017 that will come into effect in 2020 and 2025. The CAAQS for 2025 are lower than those for 2020, and both are much lower than the current NAAQOs used in the EIS (**Table IR8.2-1**).

Table IR8.2-1 Comparison of NAAQO Maximum Acceptable Levels with CAAQS (2020 and 2025) for NO_2

Pollutant	Averaging Time	NAAQO[a] (µg/m³)	Statistical Form for NAAQO	CAAQS (µg/m³)[b]		Statistical Form for CAAQS
		2015		2020	2025	
NO_2	1-hour	400	Maximum 1-hour average	113	79	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
	24-hour	200	Maximum 24-hour average	-	-	N/A[c]
	Annual	100	The average over a calendar year of all 1-hour average concentrations	32	23	The average over a single calendar year of all 1-hour average concentrations

a) NAAQO maximum acceptable level (CCME 1999).

b) CCME has reported CAAQS for NO_2 in ppb. For comparison to predicted ground level concentrations of NO_2 from the Project, these have been converted to µg/m³ by multiplying by 1.88 based on the molecular weight of NO_2 and assuming an atmospheric pressure of 1 atm, 25 degrees Celsius.

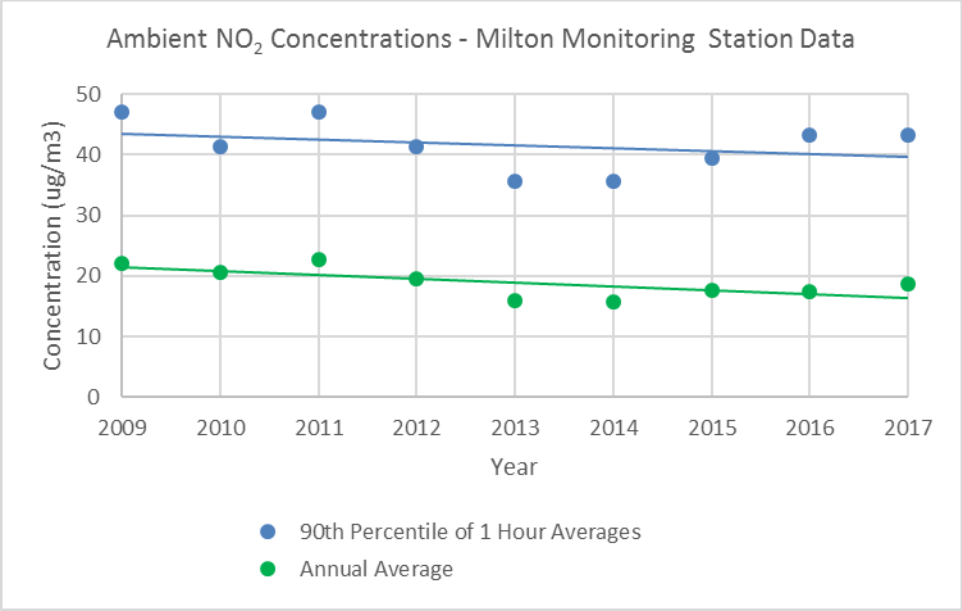
c) No 24-hour value was developed as Health Canada (2016) determined that health risk associated with daily 1-h max and 24-h average NO_2 exposures were so highly correlated that separate guidelines were not required.

Given the considerably lower criteria for the new NO_2 CAAQS, a review of assumptions in the background concentrations used in the HHRA and CN's responses to IR3.1 and IR4.29 was conducted, and refined background levels were developed for use in assessing cumulative air quality levels with respect to the CAAQS. This refinement to future expected background, along

with original estimated backgrounds, provides an expected range of most probable values to better anticipate what future background concentrations may actually be. For the Year 2021 assessment in the responses to IR3.1 and IR4.29, background levels were developed using the on-site data collected during the 2015-2016 monitoring. This data is expected to provide representative background levels in 2021 given the development in the study area that has occurred, and is expected to occur, by 2021. For the Year 2031 assessment, the responses to IR3.1 and IR4.29 utilized the maximum background concentrations over 5 years of data from the nearest NAPs station to the terminal (Mississauga), which is expected to be a very conservative approach. This approach was considered very conservative as the values were predicted to essentially double from the values currently observed, which is counter to a) the recent monitored Milton downward data trends (**Figure IR8.2-1**) and b) the accelerated future reduction expected with the newly announced reduced target. To better define a background NO_2 concentration representative of 2031, the following factors were considered:

- According to the Town of Milton Official Plan (Figure 6 in the Technical Data Report - Socio-Economic Baseline (EIS Appendix E.12)), a portion of the study area to the north and northeast of the PDA, which is currently undeveloped, is zoned for residential development while the zoning for other areas in the study area is consistent with their current land uses (agricultural and green belt, with some industrial). Thus, there is expected to be some development that may affect background levels within the study area in the future.
- A review of Halton Region ambient NO_2 monitoring in the Town of Milton was conducted for the 2009 – 2017 period. A plot of measured 90th percentile hourly and annual average NO_2 concentrations for each year is presented in **Figure IR8.2-1**. From 2006 to 2011, the population of the Town of Milton increased by 54.9% and was projected to increase another 21.1% between 2011 to 2016 (Table IR7.10-1, CEAR #680), with an overall increase of 87.5% in the period 2006 – 2016. As can be seen in **Figure IR8.2-1**, while the population (and associated development) was increasing, measured ambient NO_2 concentrations in Milton showed a slightly decreasing trend.
- Given the anticipated changes in land use around the Project (based on the Town of Milton's Official Plan, which does not anticipate development to the east or south of the Terminal by 2031), background NO_2 levels in the study area would not be expected to reach the levels currently measured in Milton (with developed areas surrounding the existing monitoring station), but the Milton data would provide a conservative upper limit for future background levels.

Figure IR8.2-1 Measured Ambient NO_2 Concentrations for 2009-2017 at the Milton Monitoring Station



Based on these considerations, a range for the background NO_2 levels in 2031 was assessed for comparison to the CAAQS. The lower end of the background concentration range was taken to be consistent with that used for 2019 (assuming negligible development affecting background air quality in the study area), while the Milton data for 2017 was used to represent a conservative upper end of the range (assuming significant development in the study area around the Project). Actual background levels in 2031 are likely to fall somewhere between these two values.

As the hourly metric used by the CAAQS is not simply the maximum hourly NO_2 prediction (as previously presented in the EIS and IR responses), additional analysis of the model predictions was carried out. This analysis was conducted for the 98 special receptors (also called points of reception [PORs]) assessed in CN's responses to IR3.16 (40 Human Health Risk Assessment Receptors and 58 Traffic Receptors). Predictions for Project Operation for 2021 were compared with the 2020 CAAQS and Project Operation predictions for 2031 were compared with the 2025 CAAQS. Project Construction was not compared to the CAAQS, as construction is expected to be completed prior to the NO_2 CAAQS coming into effect.

The maximum predicted ground level NO_2 concentrations over the 98 PORs for 2021 and 2031with comparison to the CAAQS is presented in **Table IR8.2-2**.

Table IR8.2-2 Comparison of Maximum Predicted NO_2 Concentrations (µg/m³) with the CAAQS for 2021 and 2031 (over the 98 Special Receptors included in the Air Quality Assessment)

Substance	Year	Averaging Period	CAAQS (µg/m³)	Project Alone		Cumulative (CN + Future Non-CN Traffic + Background)			
				Project + CN Offsite Traffic (µg/m³)[1]	% of Criteria	Background (µg/m³) [3]	CN + CN Offsite and Future Non-CN Traffic + Baseline (µg/m³) [1]	% of Criteria	Number of Receptors Above CAAQS [4]
NO_2	2021	1-hour	113	84 [2]	74%	21	104 [2]	92%	0
		Annual	32	13	41%	11	24	72%	0
	2031	1-hour	79	67 [2]	85%	21- 43	84 -116 [2]	106% - 147%	21-54
		Annual	23	6.6	29%	11 - 19	18 - 25.6	78% - 111%	0 - 34

Notes:

1 - Results presented are the maximum predicted concentrations out of the 98 modeled receptors.

2 – the presented model predictions are the three-year average of the 98th percentile of the daily maximum 1-hour concentrations for the Project plus the maximum predicted hourly average traffic concentration(s) at the receptor and therefore provide a conservative estimate of the maximum hourly concentration for comparison to the NO_2 CAAQS.

3 - Background values for 2021 are based on measured concentrations from the on-site monitoring program. The range of background values presented for 2031 bracket the expected background levels at this time – between the current 2021 levels and a level representative of the study area being developed to a level similar to Milton currently.

4 – Number out of the 98 receptors modelled.

The following results were determined from the NO_2 CAAQS comparisons:

- Maximum predicted NO_2 concentrations for short-term and long-term exposures for the year 2021 for both the Project Alone and Cumulative cases are below the 2020 CAAQS;
- For the year 2031 scenario, the maximum predicted NO_2 concentrations for the Project Alone are below the 2025 CAAQS;
- For the 2031 Cumulative case, the maximum predicted concentrations are above the 2025 hourly average CAAQS by 6% - 47% over the range of background concentrations anticipated to bracket study area background levels in 2031;
- For the 2031 Cumulative case, the maximum predicted annual average NO_2 concentrations ranged from 22% below to 11% above the CAAQS (based on the minimum and maximum background concentrations anticipated to bracket the study area background levels in 2031); and,
- For the 2031 Cumulative case, exceedances of the CAAQS are only predicted for receptors in close proximity to the Project.

As described in CN's response to IR3.13, the Project dispersion modelling (in the EIS and as part of CN's response to IR3.16) employed conservative emissions estimates that are expected to over-predict ambient concentrations. For example, all onsite equipment units (locomotives during movement; locomotives idling; non-road equipment (e.g., hostlers, reach stackers); trucks; and stationary equipment (e.g., generators) were assumed to be operating simultaneously onsite at

60% to 80% loads, with all operations occurring 24 hours per day – an over-estimate of the actual anticipated loading and operational hours for the equipment. Therefore, the predicted NO_2 concentrations for the Project reported in **Table IR8.2-2** are based on conservative maximum emissions estimates from an operating scenario that is not expected to occur. To assist the Review Panel in understanding the potential effects of the Project, we developed a more refined consideration of the NO_2 emissions expected from Project operations.

Utilizing operational data provided by CN from other CN intermodal facilities, refined NO_2 emissions estimates were developed, and NO_2 predictions based on the refined emissions were compared to the CAAQS. Refinements to the NO_2 emissions inventory included:

- Adjusting operating times of equipment to reflect typical operating hours per day (e.g., hostlers, reach stackers, and reefers operate 12-16 hours per day rather than 24 hours).
- Adjusting equipment load factors to reflect typical rather than maximum operating levels (e.g., passing locomotives are expected to typically operate at about 40% load rather than 80% and on-site equipment typically operate at 10-30% load rather than 60%). The refined load factors account for not all equipment operating simultaneously, idling times, operating while unloaded, re-fuelling, etc.

Based on these considerations, the refined NO_2 emissions for the Project were estimated to be approximately 74% lower than the maximum emissions scenario utilized in the response to IR3.16. We used this same operational rationale to develop expected potential future transboundary reportable emissions in discussions with Environment Canada and Climate Change (as referenced in response to IR3.7). Refined NO_2 dispersion modelling predictions were then derived by applying a 74% reduction to the NO_2 concentrations predicted for the maximum emissions scenario shown in Table 2. The resulting maximum NO_2 ground level concentrations predicted for the refined emissions estimates are summarized in **Table IR8.2-3**.

Utilizing the refined emissions inventory, the predicted ground level NO_2 concentrations for both the Project Alone and the Cumulative case are below the CAAQS for 2021 and 2031.

Table IR8.2-3 Comparison of Maximum Predicted NO_2 Concentrations (µg/m³) for the Refined Emissions Inventory with the CAAQS for 2021 and 2031

Substance	Year	Averaging Period	CAAQS (µg/m³)	Project Alone		Cumulative (CN + Future Non-CN Traffic + Background)			
				Project + CN Offsite Traffic (µg/m³)[1]	% of Criteria	Background (µg/m³) [3]	CN + CN Offsite and Future Non-CN Traffic + Baseline (µg/m³) [1]	% of Criteria	Number of Receptors Above CAAQS [4]
NO_2	2021	1-hour	113	22 [2]	19%	21	43 [2]	38%	0
		Annual	32	3.4	11%	11	14.4	45%	0
	2031	1-hour	79	17 [2]	22%	21- 43	37 -62 [2]	47% - 78%	0
		Annual	23	1.7	7%	11 - 19	13 - 21	57% - 91%	0

Notes:

1 – Results presented are the maximum predicted concentrations out of the 98 modeled receptors.

2 – The presented model predictions are the three-year average of the 98th percentile of the daily maximum 1-hour concentrations for the Project plus the maximum predicted hourly average traffic concentration(s) at the receptor

and therefore provide a conservative estimate of the maximum hourly concentration for comparison to the NO_2 CAAQS.

3 – Background values for 2021 are based on measured concentrations from the on-site monitoring program. The range of background values presented for 2031 bracket the expected background levels at this time – between the current 2021 levels and a level representative of the study area being developed to a level similar to Milton currently.

4 – Number out of the 98 receptors modelled.

Considering the identified range of potential future NO_2 concentration values developed in the discussion presented, CN expects that the refined background and emissions inventory is the most probable scenario to occur in future.

TRUCK TRAFFIC

IR8.4 Transportation impact studies

Rationale: *In order to address the effects of truck traffic generated by the development of the proposed terminal, CN provided in Appendix E.17 of the EIS a study of terminal-generated truck traffic conducted by the BA Consulting Group. As part of its response to information request #2.33, CN also filed four additional studies: Terminal Road Access Study, Safety Assessment of Site Accesses at the Proposed CN Logistics Hub and Safety Assessment of the Proposed CN Logistics Hub and Draft CN Milton Logistics Hub Transportation Considerations, (CEAR #592). CN noted that these studies were meant to assess the safety of proposed access points to the Milton Logistics Hub and to examine terminal-generated truck traffic beyond the Project.*

In its comments on CN's responses to the Review Panel's information request #2.33 (CEAR #667), Halton Municipalities asserted that the results provided by these reports were insufficient because the analysis and assumptions were inconsistent with typical engineering approaches and therefore produced results that minimized environmental effects. Halton Municipalities claimed that several assumptions, projections, factors, safety performance functions, risk assessment, and approaches differed from industry standards.

As part of its submission, Halton Municipalities filed two reviews prepared on its behalf by CIMA+: CN Milton Logistics Hub Terminal Road Access Study Report and Transportation Considerations Report Peer Review, July 16, 2018 and Milton Logistics Hub Route Study Peer Review of Safety Assessments, July 16, 2018. Based on these, Halton Municipalities suggested that CN's work produced results that minimize environmental effects. It cited the following examples:

- *CN did not double heavy truck volumes for the analysis of the entire roadway system beyond the facility entrance. A doubling of truck volumes would be consistent with typical engineering approaches, and could have a substantial impact at key intersections near the proposed facility an on the predicted environmental effects.*

- *CN did not discuss remediation options for situations when queue lengths for some of the left turns would extend beyond the existing storage lanes (for example, Britannia and Trafalgar Roads 2021 p.m. peak).*

- *Figure 4 of IR2.33-2 did not match Figure 7 of IR2.33-1 in terms of intersection design. It did not show the dedicated right turn eastbound for trucks which crosses a bike lane and CN did not appear to consider this particular vehicle/cyclist interaction and whether additional mitigation would be required given the proposed truck volumes.*

Additionally, in its submission to the Review Panel on CN's responses to information request Package 4 (CEAR #672), Halton Municipalities noted that CN's operational analysis of the Terminal Road Access Study multiplied the truck volumes by two, which with Synchro's internal truck factor of two means that one truck was considered to be equivalent to four passenger cars. However, it was not clear from CN's response that it used a truck equivalency of 4.0 Passenger Car Units for its Region-wide capacity calculations.

Information Request:

e) Provide a traffic model to predict how traffic on local and regional roads between the Project site and 400-series highways would be affected by Project-generated truck movement in 2031.

CN Response:

e) Provide a traffic model to predict how traffic on local and regional roads between the Project site and 400-series highways would be affected by Project-generated truck movement in 2031.

In order to respond to this IR, BA Group has considered several different potential sources of traffic volume projections for the 2031 horizon year on the regional arterial road network in the Town of Milton as discussed below.

1. Preliminary Traffic Volumes Prepared for Air Quality Impact Analysis (February-April 2016)

Early in 2016, BA Group prepared a preliminary set of future traffic volume estimates to be used in support of work relating to an assessment of the air quality impacts of the Project. This information was submitted to the Review Panel in response to CEAA IR13-2 (Attachment A of Attachment 13-2) (CEAA #375).

As noted in Attachment IR2.33-3 "*CN Milton Logistics Hub Transportation Considerations*", dated August 17, 2017 (page 3), these estimates were developed initially by adding traffic growth volumes provided by the Halton Region[1] (reportedly from the Region's 2011 Transportation Master Plan Model) to a set of then-existing actual traffic volumes acquired through a comprehensive set of roadway traffic counts undertaken by BA Group in 2015. The actual traffic volumes measured in 2015 are considered more reflective of the actual base existing traffic volumes than the modeled traffic volumes from 2011 that are used in other forecasts (described further below). In a manner consistent with best traffic planning practice, certain of the resulting future forecast traffic volumes were balanced across screenlines[2] to respect planned corridor capacity. The growth factors provided to CN by Halton Region are included in **Attachment IR8.4-1: Halton Modelling Support 2015 - PM Peak Hour Link Level Growth Rates**. The projection of 2031 future background traffic volumes (dated April 21, 2016) is referred to herein as the "**2016 forecast**".

[1] Guidance on traffic volume growth projections was initially provided by Halton Region during a meeting on October 19, 2015; further data on growth factors was provided in subsequent emails dated November 2, 1015, November 11, 2015 and February 3, 2016.

[2] A 'screenline' is an imaginary line that crosses a set of parallel roads on a road network. The total traffic volume crossing this imaginary line on the set of parallel roads represents the total traffic flow across the screenline. This screenline traffic volume is one of the outputs from a Regional transportation planning model. The balancing of traffic volumes across the screenline, i.e. the more even distribution of traffic volumes across the parallel roads in order to better accommodate overall travel demand, is a common practice that reflects the actual traffic carrying capacity of the parallel roads.

2. Traffic Volume Projections Using Methodology Contained in Attachment IR2.33-3 "*CN Milton Logistics Hub Transportation Considerations*", August 17, 2017

In 2017, in response to community feedback, BA Group was requested by CN to undertake an assessment of the implications of Terminal-generated traffic on road infrastructure requirements and traffic operating conditions on the Halton Region arterial road network in the Town of Milton in the 2021 horizon year. BA Group completed a study, Attachment IR2.33-3 "*CN Milton Logistics Hub Transportation Considerations*", dated August 17, 2017, which summarized the results of BA Group's work.

As a necessary step in that study, BA Group developed a set of future peak hour background traffic volume estimates for the 2021 horizon based on transportation studies previously completed by others, namely: traffic volume growth factors provided by Halton Region (from the Region's 2011 Transportation Master Plan Model), the Britannia Road Class Environmental Assessment Study dated April 2014[3], the Boyne Survey Secondary Plan dated 2010-2012[4], and the 2017-2031 Halton Region Capital Projects Plan.

For the purpose of the current analysis of the 2031 horizon year, the same methodology has been used to develop a set of forecasts of future background corridor traffic volumes on key arterial road segments in the Town of Milton in the 2031 horizon. Resulting forecasts for corridor traffic volumes based on this methodology are referred to herein as the "**2017 forecast**" and are summarized in **Table IR8.4-2**.

3. Town of Milton "*Transportation Master Plan (TMP) Final Report*", April 2018

The Town of Milton published its "*Transportation Master Plan (TMP) Final Report*" in April 2018[5] (herein referred to as the "**2018 Milton TMP**"). The TMP sets out a plan for a multi-modal transportation network to serve existing and forecast new population and employment to the year 2031 and beyond.

The **2018 Milton TMP** reportedly used the Halton Region travel demand model in order to develop corridor volume forecasts for the 2031 horizon. It is our understanding that the Region's travel demand model was last comprehensively updated in 2011 in support of the Region's 2011 Transportation Master Plan[6]; revisions were subsequently made to the model to reflect some updated information including updated Transportation Tomorrow Survey (TTS) travel data, updated road configuration assumptions for some Town of Milton roads in the 2031 horizon, and modified population estimates for three zones in the Town of Milton where Town staff anticipate a

[3] "*Environmental Study Report Britannia Road (Regional Road 6) Transportation Corridor Improvements*". April 2014. Prepared by Delcan for the Regional Municipality of Halton.
[4] "*Boyne Survey Secondary Plan and Milton Education Village – Transportation Options Assessment Final Draft*". December 2010. ENTRA Consultants.
"*Boyne Survey Secondary Plan and Milton Education Village – Traffic Operations Assessment Addendum*". April 2012. GENIVAR.
[5] "*Milton Transportation Master Plan (T.M.P.) Final Report*". April 2018. Prepared by WSP on behalf of the Town of Milton.
[6] "*The Road to Change – Halton Region Transportation Master Plan 2031*". September 2011. Regional Municipality of Halton.

higher amount of population growth than originally assumed in the Region's model[7]. The 2018 Milton TMP report does not publish the resulting traffic volume projections for the 2031 horizon.

4. Region of Halton 2031 EMME[8] plots, received January 2019

In November 2018, CN made a request to Halton Region for regional traffic volume forecast information as may be available to assist CN in responding to IR8.4. Consequently, Halton Region provided CN with traffic volume outputs from its EMME traffic model (for the weekday afternoon peak hour in the horizon year 2031). It should be noted that Halton Region advised that output provided from the EMME model is based on the population and employment projections contained in the 2011 Halton Region *Best Planning Estimate (BPE) v3.032[9] approved by Council in July 2011*, as well as the future road network contained in the 2031 Halton Region Roads Capital Projects Plan from the 2011 Halton Region *Transportation Master Plan[10]*. The model was reportedly calibrated and validated through use of 2011 Transportation Tomorrow Survey data. In other words, the information provide to CN by Halton Region does not reflect new analysis, but rather is the work undertaken by Halton Region in preparation for the publication of the 2011 Transportation Master Plan.

The Halton Region EMME model is a macroscopic travel demand model that provides forecasts of future corridor traffic volumes on the road network based on projected future population, employment, land use and road network assumptions. Model output is in the form of estimated future traffic volumes on segments of the road network (i.e., 'link' traffic volumes on individual road segments). EMME models are used by the Region to assess, at a high level, the availability of sufficient capacity on key road corridors and the need for additional road network capacity.

Note that the model does not forecast, or assess, traffic volumes at road intersections (i.e., 'turning movement' traffic volumes), nor does it provide an assessment of individual road intersection capacities within the network, which in practice represent the 'limiting factor' to road network capacity. This may result in an over-estimation of vehicular traffic volumes on certain routes.

BA Group has carefully reviewed the EMME model output in relation to the forecasts previously prepared by BA Group based on the corridor segment traffic volume growth factors provided to CN by Halton Region in 2015. The EMME model output is valid at the screenline level, and not directly applicable to forecasts of traffic on individual corridor segments. Based on BA Group's review, it is concluded that the corridor segment growth factors provided by Halton Region in 2015, several years after the publication of the 2011 TMP, must have been duly considered and reflective of the Region's more current advice on suitable growth factors for specific corridor traffic forecasting. BA Group thus concludes that the EMME modelling undertaken for the 2011 TMP (for which outputs were provided to CN in January 2019) has been superseded by the more current direction reflected in the corridor segment specific growth rates provided by Halton Region in 2015. Based on the foregoing, the traffic planning forecasts prepared in 2016 and 2017

[7] Discussed in the Section 3.1 (*The Process*) of the 2018 Milton TMP, and in the *Methodology* section of Appendix E to the 2018 Milton TMP.
[8] EMME ("Equilibre Multimodal/Multimodal Equilibrium") is a travel demand modelling software used by the Region of Halton.
[9] *"Best Planning Estimates of Population, Occupied Dwelling Units and Employment 2011-2031"*. Halton Region. June 2011 (approved by Regional Council in July 2011).
[10] *"The Road to Change: Halton Region Transportation Master Plan 2031"*. Halton Region. September 2011.

remain well suited to their intended purposes and there is no reason to apply a different set of forecasts to any of the analyses related to assessment of the impacts of the Project.

Assessment of the Impact of Terminal-Generated Traffic on 2031 Arterial Road Corridors

Table IR8.4-2 summarizes forecast traffic volumes in the 2031 horizon (based on information from the 2017 forecast, consistent with the traffic volume impact assessments previously undertaken by BA Group), with and without the addition of Terminal generated traffic volumes.

Table IR8.4-2 Project-Related Traffic Impact on 2031 Corridor Traffic Volume Forecasts

Road Segment / Direction			Road Capacity [1]	2031 Volume Without Terminal [2]		2031 Volume Without Terminal - V/C		Terminal Truck Traffic		Terminal Employee Traffic		Total Terminal Traffic (PCU [3])		2031 Volume With Terminal – V/ C		Terminal Traffic Impact	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Tremaine Road	North of Britannia	NB	2850	1493	1828	0.52	0.64	18	23	5	5	77	97	0.55	0.68	3%	4%
		SB	2850	1733	1474	0.61	0.52	13	14	5	5	57	61	0.63	0.54	2%	2%
	North of Derry	NB	2850	1818	1752	0.64	0.61	18	22	5	5	77	93	0.66	0.65	2%	4%
		SB	2850	1823	2009	0.64	0.7	13	14	5	5	57	61	0.66	0.73	2%	3%
Regional Road 25 [4]	North of Britannia	NB	2400	989	1194	0.41	0.5	4	4	0	0	16	16	0.42	0.5	1%	0%
		SB	2400	1218	1053	0.51	0.44	3	3	0	0	12	12	0.51	0.44	0%	0%
	North of Derry	NB	2400	1447	667	0.6	0.28	2	2	0	0	8	8	0.61	0.28	1%	0%
		SB	2400	792	1042	0.33	0.43	2	2	0	0	8	8	0.33	0.44	0%	1%
James Snow Parkway	North of Britannia	NB	2850	1648	1593	0.58	0.56	3	3	0	0	12	12	0.58	0.56	0%	0%
		SB	2850	1580	1910	0.55	0.67	5	5	0	0	20	20	0.56	0.68	1%	1%
	North of Derry	NB	2850	1788	1448	0.63	0.51	3	3	0	0	12	12	0.63	0.51	0%	0%
		SB	2850	2005	2105	0.7	0.74	5	5	0	0	20	20	0.71	0.75	1%	1%
Trafalgar Road [4]	North of Britannia	NB	2400	1488	1343	0.62	0.56	3	3	0	0	12	12	0.63	0.56	1%	0%
		SB	2400	1457	1324	0.61	0.55	7	9	0	0	28	36	0.62	0.57	1%	2%
	North of Derry	NB	2400	2053	1728	0.86	0.72	3	3	0	0	12	12	0.86	0.73	0%	1%
		SB	2400	932	1649	0.39	0.69	7	9	0	0	28	36	0.4	0.7	1%	1%
Britannia Road [4]	East of Tremaine	EB	2400	1028	949	0.43	0.4	13	14	5	5	57	61	0.45	0.42	2%	2%
		WB	2400	853	1143	0.36	0.48	18	23	0	0	72	92	0.39	0.51	3%	3%
	East of RR25	EB	2400	1169	1560	0.49	0.65	14	15	5	5	61	65	0.51	0.68	2%	3%
		WB	2400	1213	1532	0.51	0.64	18	22	0	0	72	88	0.54	0.68	3%	4%
	East of JSP	EB	2400	1341	1432	0.56	0.6	11	12	5	5	49	53	0.58	0.62	2%	2%
		WB	2400	1353	1427	0.56	0.59	13	17	0	0	52	68	0.59	0.62	3%	3%

Road Segment / Direction			Road Capa-city [1]	2031 Volume Without Terminal [2]		2031 Volume Without Terminal - V/C		Terminal Truck Traffic		Terminal Empl-oyee Traffic		Total Terminal Traffic (PCU [3])		2031 Volume With Terminal – V/ C		Terminal Traffic Impact	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	East of Trafalgar	EB	2400	923	894	0.38	0.37	8	9	5	5	37	41	0.4	0.39	2%	2%
		WB	2400	1106	1123	0.46	0.47	6	8	0	0	24	32	0.47	0.48	1%	1%
Derry Road	East of Tremaine	EB	2850	1005	895	0.35	0.31	0	0	0	0	0	0	0.35	0.31	0%	0%
		WB	2850	695	665	0.24	0.23	0	0	0	0	0	0	0.24	0.23	0%	0%
	East of RR25	EB	2850	1422	1447	0.5	0.51	2	2	0	0	8	8	0.5	0.51	0%	0%
		WB	2850	1046	1926	0.37	0.68	1	1	0	0	4	4	0.37	0.68	0%	0%
	East of JSP	EB	2850	2607	952	0.91	0.33	2	2	0	0	8	8	0.92	0.34	1%	1%
		WB	2850	911	2426	0.32	0.85	1	1	0	0	4	4	0.32	0.85	0%	0%
	East of Trafalgar	EB	2850	2272	1042	0.8	0.37	2	2	0	0	8	8	0.8	0.37	0%	0%
		WB	2850	986	2221	0.35	0.78	1	1	0	0	4	4	0.35	0.78	0%	0%
Steeles Avenue	East of Tremaine	EB	1900	701	372	0.37	0.2	1	2	0	0	4	8	0.37	0.2	0%	0%
		WB	1900	408	368	0.21	0.19	3	3	0	0	12	12	0.22	0.2	1%	1%
	East of RR25	EB	2850	1605	1040	0.56	0.36	0	0	0	0	0	0	0.56	0.36	0%	0%
		WB	2850	810	1270	0.28	0.45	0	0	0	0	0	0	0.28	0.45	0%	0%

Notes:

1. Assumed road capacity: 950 vehicles/hour/lane for general purpose lanes and 500 vehicles/hour/lane for HOV lanes.
2. 2031 traffic volumes based on 2017 forecast.
3. A passenger car unit (PCU) factor of 4.0 has been used for Terminal-generated trucks.
4. HOV lanes are assumed to be present on Britannia Road, Trafalgar Road and Regional Road 25 in the 2031 horizon.

Summary of Key Findings

- The regional arterial road network capacity in the Town of Milton in the year 2031 will be greater than it will be in the year 2021, as the Region is expected to have executed its planned road improvements, including the widening of Britannia Road, Tremaine Road, Regional Road 25, Derry Road, Trafalgar Road, James Snow Parkway and Steeles Avenue.
- As a result of the projected growth in population and employment in the Town of Milton, forecasts show significantly increased background traffic volumes on the road network in 2031 that are supported by the increase in road network capacity planned by Halton Region and the Town of Milton.
- Terminal-generated traffic volumes would utilize a small percentage of the planned 2031 regional arterial road network capacity in the Town of Milton, generally in the order of 1%-4% on Britannia Road and Tremaine Road, and in the order of 0%-2% on the wider regional arterial

road network in the Town of Milton. These forecasts are consistent with previous forecasts for 2031 traffic volumes provided in response to IR2.33[11].

- The regional arterial road network is planned to have the capacity required to accommodate the anticipated future traffic volumes to 2031, and sufficient residual capacity to accommodate the relatively small volume of Project-associated traffic.

IR8.5 Traffic safety studies

Rationale: *In response to the Review Panel's information request #2.33, CN filed 30 Forensic Engineering's reports Safety Assessment of Site Accesses at the Proposed CN Logistics Hub and Safety Assessment of the Proposed CN Logistics Hub (CEAR #592).*

In its comments on CN's responses to the Review Panel's information request #2.33 (CEAR #667), Halton Municipalities suggested that several assumptions, projections, factors, safety performance functions, risk assessment, and approaches differed from industry standards. Halton Municipalities filed a review prepared by CIMA+: Milton Logistics Hub Route Study Peer Review of Safety Assessments, July 16, 2018. Halton Municipalities suggested there were information deficiencies concerning traffic safety including safety performance functions (SPF), traffic volume assumptions, intersection safety analysis, and mid-block collisions.

Specifically, Halton Municipalities noted that Section 2.0 of Attachment IR2.33-2 indicated CN had conducted a safety assessment of facility access, which included a quantitative analysis of truck and employee accesses to evaluate the future safety effects of increased heavy vehicle volumes. However, CN later stated in Section 3.1 that it had not undertaken a quantitative assessment of the employee access on Tremaine Road as it anticipated limited traffic in this location. Halton Municipalities recommended that CN should nevertheless include a quantitative assessment of the safety impacts of the Tremaine Road access and address how the introduction of the access will impact the safety of the roadway segment of Tremaine Road between Britannia Road and Lower Base Line.

Halton Municipalities also commented that the conversion of the main entrance intersections from three legs to four should intuitively result in more collisions. However, the models used by CN in Attachment IR2.33-1 predict fewer collisions. While CN recognized this inconsistency in information request 2.33-2, it did not propose an alternate technique to better estimate the future collision history for the intersection.

Halton Municipalities noted that CN did not provide an analysis of potential collisions on Britannia Road adjacent to the main truck entrance. Halton Municipalities suggested that there may be collision patterns such as rear-end collisions due to extended queuing on Britannia or sight distance issues that would require mitigation.

Halton Municipalities additionally indicated that Section 4.2.4[12] of Attachment 2.33-4 provided the results of CN's Safety Performance Analysis for three high frequency intersections, based on Peel Region safety performance functions and considering total collisions. Halton Municipalities recommended that CN also analyse severity of accidents, including all intersections, by

[11] CN Intermodal - Terminal Road Access Study, May 4, 2017, BA Group (Attachment IR2.33-1, CEAR #592).
[12] In CEAR #667 Halton Municipalities included an incorrect reference to section 4.4 of that document. Section 4.4 does not exist and, based on the context of the comment, the Review Panel has inserted the correct reference.

considering property damage only, severe, and total collisions separately based on safety performance factors used by Halton Region.

With respect to collision rates at roundabouts, Halton Municipalities noted that CN used the Region of Waterloo as having conditions comparable to the Region of Halton. Halton Municipalities noted that while the Waterloo experience was similar to CN's conclusion of <1% truck collisions expected at the roundabouts on Tremaine Road, the response did not consider the truck volumes that are expected to result from the Project, either as an absolute frequency or as a percentage of traffic volumes. Halton Municipalities suggested that CN calculate the actual expected frequency (number) of truck collisions expected at roundabouts, based on projected Halton/Milton truck volumes on the various corridors.

Halton Municipalities further suggested that CN's calculations in response to information requests #2.33-4 (CEAR #592) and #4.62 a) (CEAR #652) used Region of Peel safety performance functions, rather than those used by the Region of Halton. Halton Municipalities recommended that CN perform a detailed but relatively straightforward computation of the predicted effects on each intersection and road segment that the trucks would travel on, rather than CN's method, which involved extrapolating three intersections to represent all intersections and road segments to be used by MIT truck traffic.

Halton Municipalities was also critical of CN's use of three-year linear extrapolation to predict future accidents to 2021, and recommended basing projections on expected traffic increases to at least 2031 to cover the phase when the Project is fully operational.

Information Request:

a) *Provide a safety analysis for the Tremaine employee and service entrance, including how it will impact the safety of the roadway segment of Tremaine Road between Britannia Road and Lower Base Line.*

b) *Explain how the effect of converting the main entrance intersection from three legs to four could reduce accident risks.*

c) *Provide an analysis of the accident potential along Britannia road adjacent to the main entrance and identify any required mitigation to address identified impacts.*

d) *Provide a revised risk analysis that addresses accident severity.*

e) *Provide a revised roundabout risk assessment that accounts for the expected frequency of truck collisions expected at roundabouts, based on projected Halton/Milton truck volumes on the various corridors in the risk calculation.*

f) *Submit a road safety analysis that calculates the predicted collision outcomes for each intersection and road segment that the trucks would travel on to reach 400-series highways.*

g) *Provide a quantitative accident rate estimate for the year 2031, including project generated truck and staff traffic, and accounting for traffic increases due to the projected 2031 population.*

CN Response:

a) *Provide a safety analysis for the Tremaine employee and service entrance, including how it will impact the safety of the roadway segment of Tremaine Road between Britannia Road and Lower Base Line.*

To evaluate the collision risk associated with an increase in traffic along Tremaine Road, at and adjacent to the employee access, a quantitative assessment using the predictive method[13] was conducted.

For the predicted number of collisions to be estimated, the Tremaine Road corridor (Britannia Road to Lower Base Line) was subdivided into distinct site assessment types (e.g., intersections and road segments). The Tremaine Road corridor was divided into the following sites:

- 1.980 km of rural two-lane roadway from Britannia Road to the employee access;
- An unsignalized three-legged intersection at Tremaine Road and the employee access; and
- 1.145 km of rural two-lane roadway from the employee access to Lower Base Line.

Specific Safety Performance Functions (SPFs) for road segments are used when predicting the expected average number of collisions on a road corridor. In this case, the Halton Region SPFs for rural road segments were used. These SPFs were developed for specific collision severities, including severe and property damage only (PDO) collisions. The SPFs for rural road segments and unsignalized three-legged intersections are provided in **Attachment IR8.5-1: Halton Region Midblock and Intersection SPFs.**

The 2021 Annual Average Daily Traffic (AADT) for the background and total scenarios (background plus employee traffic) at the above sites, including the northbound and southbound peak hour volumes, are summarized in **Table IR8.5-1** for the road segments and in **Table IR8.5-2** for the intersection of Tremaine Road and the employee access.

Table IR8.5-1 2021 Future AADTs – Road Segments

Segment	*Background*			Total (Background plus employee traffic)		
	PM Peak		AADT	PM Peak		AADT
	V_{NB}	V_{SB}		V_{NB}	V_{SB}	
Tremaine Road from Britannia Road to the employee access	985	675	18652	995	680	18821
Tremaine Road from the employee access to Lower Base Line	985	675	18652	985	680	18708

[13] For more details regarding the methodology, consult the April 5, 2017 *Safety Assessment of Site Accesses at the Proposed CN Logistics Hub* report provided as Attachment IR2.33-2, CEAR #592).

Table IR8.5-2 2021 Future AADTs – Intersection

Intersection	Total			
	PM Peak		AADT $_{maj}$	AADT $_{min}$
	V_{maj}	V_{min}		
Tremaine Road and Employee Access	1665	15	18709	169

Note that $AADT_{maj}$ corresponds to the annual average daily traffic on the major roadway (i.e., Tremaine Road) and that $AADT_{min}$ corresponds to the annual average daily traffic on the minor roadway (i.e., the employee access road).

The predicted number of collisions per year evaluated using the Halton Region SPFs along the Tremaine Road corridor are shown in **Table IR8.5-3**.

Table IR8.5-3 Future predicted number of collisions

Segment	Scenario	Number of PDO Collisions	Number of Severe Collisions	Total Number of Collisions
Tremaine Road from Britannia Road to the employee access	2021 Background	2.582	0.856	3.438
	2021 Total (Background plus employee traffic)	2.595	0.861	3.456
Tremaine Road from employee access to Lower Base Line	2021 Background	1.606	0.495	2.101
	2021 Total (Background plus employee traffic)	1.609	0.496	2.105
Tremaine Road and Employee Access Intersection	2021 Background[14]	n/a	n/a	n/a
	2021 Total (Background plus employee traffic)	0.162	0.048	0.201
Total	2021 Background	4.188	1.351	5.539
	2021 Total (Background plus employee traffic)	4.366	1.405	5.762
	Difference	0.178	0.054	0.223

The above indicates that the increase in traffic volumes along Tremaine Road including at the intersection of Tremaine Road with the employee access under the 2021 future scenario is expected to result in an increase of 0.223 collisions per year. An increase of 0.223 collisions on the two road segments and the proposed access intersection is low compared to the annual average number of collisions of 13.2 recorded at the adjacent intersection of Tremaine Road and Britannia Road for the 2013 to 2018 analysis period. The majority of the expected collision increase (88%) is due to having a new unsignalized intersection on Tremaine Road for the employee access. This increase would be expected with any new intersection in a network and is not a result of the nature or volume of traffic using the employee access. Relatively low volumes will be using the

[14] Under the background scenario, there will be no intersection at this location.

employee access compared to a typical public road T-intersection. The collision risk will be minimized, as it is recommended that the proposed access design[15] have a dedicated left turn lane and available sight lines that exceed current guidelines.

b) *Explain how the effect of converting the main entrance intersection from three legs to four could reduce accident risks.*

The effect of converting the main entrance intersection from three legs to four was re-assessed using Halton SPFs for signalized intersections (three-legged and four-legged intersections). For this analysis, a three-leg signalized intersection was considered for the 2021 background scenario and a four-leg signalized intersection was considered for the 2021 total volumes scenario. The results of the safety performance analysis at the truck access indicated that the predicted number of collisions is no longer expected to be lower under the total scenario (four-leg intersection) than under the background scenario (three-leg intersection).

The 2021 Annual Average Daily Traffic (AADT) for the background and total scenarios (background plus access traffic) at the main entrance intersection are summarized in **Table IR8.5-4**.

Table IR8.5-4 2021 Future AADTs – Main Entrance Intersection

Intersection	Background				Total	
	PM Peak		AADT $_{maj}$	AADT $_{min}$	AADT $_{maj}$	AADT $_{min}$
	V_{maj}	V_{min}				
Britannia Road and Main Entrance	1070	40	12023	450	12540	1250

Note that AADT at an intersection is calculated using entering traffic volume at an intersection per direction. However, while the daily traffic volume exiting the main entrance (northbound approach) is known to be 800, only the afternoon hourly peak volume for the southbound approach is available. As a result, we used the following methodology to calculate the AADT on the minor roadway:

$AADT\ min = [entering\ AADT]_{NB} + [entering\ AADT]_{SB}$

Where,

$[entering\ AADT]_{NB}$ *is 800*

$[entering\ AADT]_{SB}$ *is* V_{SB}*/Conversion Factor*

V_{SB} is the afternoon peak hour volume on the southbound approach

Conversion Factor is factor used to convert pm peak hour volume to AADT

Based on the above equation, the AADT on the minor roadway is equal to 1250.

[15] CN Intermodal - Terminal Road Access Study, May 4, 2017, BA Group (Attachment IR2.33-1, CEAR #592)

The predicted number of collisions per year evaluated using the Halton Region SPFs at the Main Entrance intersection are shown in **Table IR8.5-5**.

Table IR8.5-5 Future predicted number of collisions at the Main Entrance Intersection

Scenario	Number of PDO Collisions	Number of Severe Collisions	Total Number of Collisions
2021 Background	0.50	0.13	0.63
2021 Total (Background plus truck traffic)	0.81	0.24	1.05
Difference	0.31	0.11	0.42

An expected number of collisions of 1.05 per year at the Main Entrance intersection is low compared to most signalized intersections across the Region. One collision per year at an intersection is representative of a stop-controlled intersection with a low volume side road. Therefore, it is reasonable to conclude that the safety performance of the Main Entrance intersection will be comparable or better than the vast majority of signalized intersections in the Region.

c) *Provide an analysis of the accident potential along Britannia road adjacent to the main entrance and identify any required mitigation to address identified impacts.*

Collision Risk along Britannia Road

To evaluate the collision risk associated with an increase in truck traffic along Britannia Road adjacent to the truck access, a quantitative assessment using the predictive method[16] was conducted. For the predicted number of collisions to be evaluated, the Britannia Road corridor (Britannia Road from Tremaine Road to First Line) was subdivided into different site types. Specifically, the Britannia Road corridor consists of the following sites:

- 1.206 km multi-lane roadway from Tremaine Road to the truck access; and,
- 0.251 km multi-lane roadway from truck access to First Line.

Note that the expected number of collisions at the intersection of Britannia Road and the truck access are not provided as part of this analysis as they were previously predicted in the July 25, 2017 TNS report, which has been updated as part of subsection (f) of this response to **IR8.5**.

The 2021 AADTs on the above road segments used for estimating the predicted number of collisions, including the eastbound and westbound peak hour volumes, are summarized in **Table IR8.5-6.**

[16] For more details about the methodology, consult the July 25, 2017 *Safety Assessment of the Proposed CN Logistics Hub* report (Attachment IR2.33-4 (CEAR #592).

Table IR8.5-6 Future Horizon AADTs

Road Segment	Background			Total		
	PM Peak		AADT	PM Peak		AADT
	VEB	VWB		VEB	VWB	
Britannia Road from Tremaine Road to Truck Access	693	388	12147	716	402	12562
Britannia Road from Truck Access to First Line	733	348	12147	762	371	12731

The predicted number of collisions per year evaluated using the Halton Region SPFs (see **Attachment IR8.5-1**) and the above traffic volumes for the road segments immediately adjacent to the truck access are shown in **Table IR8.5-7**.

Table IR8.5-7 Future predicted number of collisions

Segment	Scenario	Number of PDO Collisions	Number of Severe Collisions	Total Number of Collisions
Britannia Road from Tremaine Road to Truck Access	2021 Background	1.312	0.390	1.702
	2021 Total	1.338	0.399	1.737
Britannia Road from Truck Access to First Line	2021 Background	0.334	0.081	0.415
	2021 Total	0.343	0.084	0.427

The above indicates that increase in traffic volumes on the road segments immediately adjacent to the truck access are expected to result in an annual average increase of 0.035 collisions per year on the segment of Britannia Road from Tremaine Road to the truck access and of 0.012 collisions per year on the segment of Britannia Road from the truck access to First Line.

Queues Analysis

An analysis of the visibility of the expected queues along Britannia Road at the truck access was conducted based on the predicted queue lengths included in the May 4, 2017 BA Group report titled *Terminal Road Access Study*[17]. An adequate stopping sight distance (SSD) to the expected back of a queue minimizes the risk of rear-end collisions at intersections.

Based on the functional design drawing of the CN facility site access provided by BA Group, the SSDs on the eastbound and westbound approaches were measured to be in excess of 240 metres. Considering that the queue lengths during the peak hours are not expected to exceed 55 metres and that the minimum required SSD varies between 130 and 190 metres (under wet weather conditions and at the posted speed), motorists approaching the subject intersection will have sufficient visibility of the back of queue. **Table IR8.5-8** summarizes the results of the visibility

[17] CN Intermodal - Terminal Road Access Study, May 4, 2017, BA Group (Attachment IR2.33-1, CEAR #592)

assessment of the expected queues along Britannia Road at the truck access. The available visibility will minimize the risk of rear-end collisions at intersections due to the expected queue reach.

Table IR8.5-8 Visibility assessment of the queues on Britannia Road at the truck access

Approach	Required SSD without Queue	95th percentile Queue Length	Required SSD with Queue	Available SSD
Eastbound	150 to 190 m[18]	53 m	203 to 243 m	240 m
Westbound	130 to 170 m	18 m	148 to 188 m	240 m

Mitigation Measures

The queue length at the subject intersection is estimated to be less than 55 m in part due to the proposed presence of turning lanes (eastbound right-turn and westbound left-turn lanes)[19]. The installation of these turning lanes is recommended as it is expected to minimize the risk of conflicts between through vehicles and turning vehicles, and of conflicts with the end of queue.

d) Provide a revised risk analysis that addresses accident severity.

Our analysis of the most recent historical collisions (2013 to mid-2018) for both intersections and midblock segments provided by the Region on the subject road network indicated that the severity[20] of collisions that involved trucks is slightly lower than the severity of collisions that considers all vehicle types. Specifically, it was calculated that the proportion of fatal and injury collisions that involved heavy vehicles represented 12.7% compared to 15.1% for all vehicle types. Disaggregating by collision type, the historical data show that there are certain collision types for which greater variation in collision severity was observed between all vehicle types and heavy vehicles. **Table IR8.5-9** shows the frequency and proportion of severe collisions recorded at intersections per collision types for all vehicle types, as compared to heavy vehicles only.

Table IR8.5-9 Proportion of severe collision per collision types recorded at intersections

Collision Type	All Vehicle Types		Heavy Vehicles Only		Difference (%)
	Frequency	Proportion	Frequency	Proportion	
Angle	105	22.3%	8	25.8%	3.0%
Head-on	23	4.9%	2	6.5%	1.6%
Other	3	0.6%	0	0.0%	-0.6%
Rear-end	172	36.5%	9	29.0%	-7.5%
Sideswipe	19	4.0%	4	12.9%	8.9%

[18] Longer SSDs are required on the eastbound approach due to the downgrade in the eastbound direction towards the site access.
[19] CN Intermodal - Terminal Road Access Study, May 4, 2017, BA Group (Attachment IR2.33-1, CEAR #592)
[20] Two collision severity levels were considered including property damage only and severe, which combines fatal and injury collisions.

Collision Type	All Vehicle Types		Heavy Vehicles Only		Difference (%)
	Frequency	Proportion	Frequency	Proportion	
Single Motor Vehicle (SMV)	48	10.2%	3	9.7%	-0.5%
Turning Movement	101	21.4%	5	16.1%	-5.3%

The above table indicates the following:

- Heavy vehicles tend to be involved in higher proportions of severe collisions than the overall average when they are involved in angle, head-on, and sideswipe collisions.
- Heavy vehicles tend to be involved in lower proportions of severe collisions than the overall average when they are involved in rear-end, SMV, and turning movement collisions.

Note that the risk of angle collisions is almost completely eliminated at roundabouts given that all traffic flow is in the same direction and in a counterclockwise circular manner.

A detailed analysis of collision severity under future conditions disaggregated by corridor and individual sites is provided below in subsection (f) to this response to **IR8.5**.

e) *Provide a revised roundabout risk assessment that accounts for the expected frequency of truck collisions expected at roundabouts, based on projected Halton/Milton truck volumes on the various corridors in the risk calculation.*

To complete a safety performance analysis to assess the collision risk specifically at roundabouts along the Tremaine Road corridor (Tremaine Road from Britannia Road to Steeles Ave), the Halton SPFs for roundabouts would typically be applied. However, Halton-specific roundabout SPFs are not available[21], and the Tremaine Road roundabouts were in service for a relatively short period of time, so a suitable collision performance could not be established on that basis. Alternatively, our collision risk analysis included in the response to IR4.63 - *Truck safety at roundabouts* relied on the safety experience of the roundabouts located in the Region of Waterloo. The Region of Waterloo is a comparable jurisdiction to the Region of Halton on many important aspects including size, road environment, and weather conditions. However, our initial analysis did not consider traffic composition, specifically truck percentages, so that the likelihood of trucks being involved in collisions could not be explicitly compared. To address this, traffic counts at seven existing roundabouts located along two major road corridors were obtained from the Region of Waterloo. The two corridors for which traffic counts were received included the following:

- Franklin Boulevard from Pinebush Road to Bishop Street: this corridor includes a total of three roundabouts; and
- Ira Needles Road from Highview drive from Erb Street: this corridor includes a total of four roundabouts.

The turning movement counts were collected for an eight-hour period for a typical day between March and November 2017. A summary of these traffic counts which includes truck volumes and

[21] The Region has not developed SPFs specifically for roundabouts.

percentages are provided in **Table IR8.5-10** for the morning peak hour and in **Table IR8.5-11** for the afternoon peak hour.

Table IR8.5-10 Truck volumes for the morning peak hour in Waterloo

Intersections	Total Volumes Entering the Intersections	Total Trucks Entering the Intersection	Percentage of Trucks
Franklin Blvd at:			
Pinebush Road	2,365	211	9%
Sheldon Drive	3,748	366	10%
Bishop Street	2,845	167	6%
Ira Needles Blvd at:			
Highview Drive	2,915	131	4%
Victoria Street	2,942	108	4%
University Avenue	2,643	119	5%
Erb Street	2,871	87	3%

Table IR8.5-11 Truck volumes for the afternoon peak hour in Waterloo

Intersections	Total Volumes Entering the Intersections	Total Trucks Entering the Intersection	Percentage of Trucks
Franklin Blvd at:			
Pinebush Road	2,296	180	8%
Sheldon Drive	3,865	137	4%
Bishop Street	3,399	104	3%
Ira Needles Blvd at:			
Highview Drive	3,423	105	3%
Victoria Street	3,594	87	2%
University Avenue	5,199	135	3%
Erb Street	4,001	67	2%

The above data indicate that relatively high truck traffic is travelling through the surrogate roundabouts in the Region of Waterloo, especially at those located on Franklin Boulevard. During the morning peak hour, the truck volumes on Franklin Boulevard range from 167 to 366 trucks in one hour, which is the equivalent of 6% to 10% of the total traffic. During the afternoon peak hours, the truck volumes on Franklin Boulevard range from 104 to 184 trucks in one hour, which is the equivalent of 3% to 8% of the total traffic.

Along Ira Needles Road, the truck volumes during the morning peak hour range from 87 to 131 trucks, which is the equivalent of 3% to 5% of the total traffic. During the afternoon peak hour, the truck volumes range from 67 to 135 trucks, which is the equivalent of 2% to 3% of the total traffic.

In comparison, a summary of the truck volumes and percentages forecasted under the 2021 total scenario (background plus Project truck volumes) along the Tremaine corridor are provided in **Table IR8.5-12** for the morning peak hour and in **Table IR8.5-13** for the afternoon peak hour.

Table IR8.5-12 Truck volumes for the morning peak hour along the Tremaine Road corridor – 2021 Total (background traffic plus intermodal truck traffic)

Tremaine Rd at	Total Volumes Entering the Intersections	Total Trucks Entering the Intersection	Percentage of Trucks
Britannia Road	2276	145	6%
Derry Road	3761	138	4%
Main Street	2766	115	4%
Steeles Avenue	4129	146	4%

Table IR8.5-13 Truck volumes for the afternoon peak hour along the Tremaine Road corridor – 2021 Total (background traffic plus intermodal truck traffic)

Tremaine Rd at	Total Volumes Entering the Intersections	Total Trucks Entering the Intersection	Percentage of Trucks
Britannia Road	2482	125	5%
Derry Road	3712	119	3%
Main Street	2741	105	4%
Steeles Avenue	3456	146	4%

The above data indicate that the truck volume forecasts at the Tremaine Road roundabouts will be in the range of 3 to 6% of the total traffic in the morning and afternoon peak hours. The truck volumes during the morning and afternoon peak hours are expected to range from 105 to 145 trucks.

In general, the truck volumes and percentages along the Tremaine Road corridor are expected to be lower than the truck volumes and percentages experienced on the two surrogate Waterloo corridors used in our assessment. Based on these truck volumes and considering that the roundabouts in Waterloo and Halton were adequately designed to accommodate truck traffic, it is reasonable to conclude the collision risk at the roundabouts in Halton will perform at comparable or better levels to those in Waterloo.

f) Submit a road safety analysis that calculates the predicted collision outcomes for each intersection and road segment that the trucks would travel on to reach 400-series highways.

The quantitative safety assessment was updated with additional traffic data recently provided by the Region of Halton. Specifically:

- Halton Safety Performance Functions (SPFs): The Region most recently developed SPFs for intersections and midblock segments. The SPFs were developed in 2017[22];
- AADTs: midblock AADT collected by 24-hour Automatic Traffic Recorder (ATR) counts at 38 sites on the Regional road network; and
- Halton Travel Demand (EMME) Model Volumes: the 2021 and 2031 link volumes for Regional road network.

Safety Performance Functions

The Halton Region provided the SPFs for intersections and midblock segments, calibrated for different collision types (e.g., all collisions, severe, PDO[23]), roadway geometry (e.g., two-lane vs. multi-lane segments), and land-use characteristics (e.g., rural, suburban, urban). Readers are referred to **Attachment IR8.5-1** for the adopted intersection and midblock Halton SPFs.

In addition to the intersections and roadway segments, a few roundabouts are located along the potential travel routes for the 2021 future conditions. No SPFs for roundabouts have been developed by the Region, and to our knowledge there are no jurisdictions in Canada that have made their SPFs publicly available. However, many research studies in the United States have focused on the evaluation of the performance and safety effectiveness of roundabouts. Based on the statistically rigorous Empirical Bayes (EB) method, the Michigan Department of Transportation (MDOT) developed the following SPF for different types of collision and roundabout configuration, which we utilized in our analyses:

$$E(Y) = exp^{\alpha}(AADT)^{\beta_1} exp^{(\beta_2 \times Type + IC \times \beta_3)}$$[24]

Where:

$AADT$ is the Annual Average Daily Traffic (entering traffic)

$Type$ is 1 if one circulating lane; 0 otherwise

IC is 1 if the roundabout is located at interchange; 0 otherwise

α, β_1, β_2, and β_3 are the model parameters (see **Table IR8.5-14**)

[22] Safety Performance Function Update, The Regional Municipality of Halton, March 2017.
[23] Property Damage Only
[24] McIntosh, K., Redinger, C., & Bagdade, J. (2011). Evaluating the performance and safety effectiveness of roundabouts (No. RC-1566). Opus International Consultants.

Table IR8.5-14 Roundabout SPF Model Parameters

Type	Number of Circulating Lane	α (SE)	β_1 (SE)	β_1 (SE)	β_1 (SE)	k (SE)
All Collisions	One	-4.5958 (0.1274)	0.5253 (0.1274)	-0.7884 (0.2423)	0.6988 (0.3710)	0.4839 (0.1266)
	Two	-3.8074 (1.2621)				
Injury	One	-6.4109 (1.8322)	0.4788 (0.1795)	-0.6822 (0.3051)	0.7850 (0.5733)	0.2460 (0.1933)
	Two	-5.7287 (1.8066)				

Future Traffic Volume Estimates

AADT volumes are required for the analysis of future safety performance. Hourly peak traffic volumes (morning and afternoon peak hour volumes) at key intersections for the 2021 study horizon were acquired from the Traffic Impact Study completed by the BA Group (Attachment IR2.33-3, CEAR #592). These volumes were developed for the 2021 study horizon scenarios including "future background without terminal traffic volumes" (background scenario) and "future total with terminal traffic volumes" (total scenario).

While the Traffic Impact Analysis focused on major intersections, this detailed safety analysis requires the modelling of every intersection and midblock segment. Given that a total of 92 intersections are located along the potential truck routes and that the hourly peak traffic volumes were available for 14 intersections, the traffic volumes, primarily on the minor streets that connect to the truck routes, had to be estimated for the 2021 background and total scenarios. In order to do so, the EMME model was utilized for the road segments with missing volumes. In cases where the EMME models did not provide any traffic information, road segments and intersections with similar characteristics were used as a reference.

The next step was to convert the peak hour volumes to AADT using the multiplicative factor, calculated from Automatic Traffic Recording (ATR) counts for 24-hour time periods. The preliminary analysis revealed that the multiplicative factor converting the afternoon peak hour volume to AADT generated less variation among counting stations and was the most reliable. Based on the 38 ATR counts analyzed, it was found that the afternoon peak hour typically represents 8.9% of the daily traffic. The analysis has been carried out assuming this conversion factor.

Results of the Safety Performance Analysis

Table IR8.5-15 and **Table IR8.5-16** summarize the predicted number of collisions per year per corridor for severe and PDO collisions, respectively. For comparison, separate values were reported for the 2021 background and total scenarios, as well as the differences between the two scenarios. Note that an intersection that is part of two corridors was accounted for only once.

The predicted number of collisions per year for each site using the Halton Region SPFs is provided in **Attachment IR8.5-2: Safety Performance Analysis (2021 Scenario)**.

Table IR8.5-15 Predicted Number of Severe Collisions per Year for Each Corridor

Corridor	2021 Background Scenario			2021 Total Scenario			Net Change in Collision Frequency (All Sites)
	Midblock	Intersection	All Sites	Midblock	Intersection	All Sites	
Britannia	5.85	11.06	16.90	5.91	11.27	17.18	0.28
Derry	7.82	14.68	22.50	7.82	14.69	22.52	0.01
JSP	2.87	6.09	8.96	2.87	6.10	8.97	0.02
Martin	0.99	3.02	4.02	1.00	3.03	4.02	0.00
Ontario	2.32	6.82	9.14	2.32	6.83	9.15	0.01
RR25	7.01	9.07	16.08	7.03	9.08	16.11	0.02
Steeles	1.32	3.96	5.28	1.32	3.97	5.29	0.01
Trafalgar	2.92	3.39	6.31	2.93	3.40	6.33	0.02
Tremaine	3.22	3.07	6.29	3.26	3.08	6.34	0.05
Total	34.32	61.17	95.49	34.46	61.41	95.88	0.42
Net Change in Collision Frequency (All Sites)				**0.15**	**0.28**	**0.42**	

Table IR8.5-16 Predicted Number of PDO Collisions per Year for Each Corridor

Corridor	2021 Background Scenario			2021 Total Scenario			Net Change in Collision Frequency (All Sites)
	Midblock	Intersections	All Sites	Midblock	Intersections	All Sites	
Britannia	19.88	58.72	78.60	20.10	59.63	79.73	1.13
Derry	47.52	79.13	126.65	47.56	79.22	126.77	0.12
JSP	20.62	30.25	50.88	20.68	30.33	51.01	0.14
Martin	7.04	13.25	20.29	7.06	13.27	20.33	0.04
Ontario	16.12	34.07	50.20	16.15	34.09	50.24	0.04
RR25	40.00	53.33	93.33	40.08	53.44	93.51	0.18
Steeles	8.21	18.90	27.11	8.24	18.95	27.19	0.08
Trafalgar	14.60	16.86	31.46	14.67	16.94	31.61	0.15
Tremaine	16.57	18.15	34.72	16.78	18.26	35.03	0.31
Total	190.57	322.67	513.24	191.30	323.97	515.27	**2.19**
Net Change in Collision Frequency (All Sites)				**0.73**	**1.46**	**2.19**	

Overall, the increase in heavy vehicle volume is expected to result in an increase of 2.42 collisions per year for all intersections and roadway segments within the study area, including 0.39 severe collisions and 2.03 PDO collisions. The expected collision increase per year would be distributed over 92 intersections and 91 midblock road segments. While the increase in collisions would not be distributed equally at each site, the annual average collision increase per site is 0.013. The site at which the greatest collision increase is expected is at Britannia Road and Regional Road 25 intersection with 0.29 collisions. This overall collision risk increase represents less than 0.5% of the existing collision experience.

g) *Provide a quantitative accident rate estimate for the year 2031, including project generated truck and staff traffic, and accounting for traffic increases due to the projected 2031 population.*

In contrast with the background traffic volume which is expected to consistently increase from the year 2021 to 2031, the number of trucks generated by the Project is expected to remain relatively constant. This means that from the year 2021 to the year 2031, the Project-generated trucks will proportionally decrease relative to background traffic. Since collision risk is a function of traffic volumes, it is reasonable to conclude that proportionally the collision risk involving Project-associated truck traffic will be lower under the 2031 scenario than the 2021 scenario.

Another reason supporting proportionally lower collision risk in the year 2031 is that the relationship between the traffic volume and the predicted number of collision is not linear, meaning that the number of collisions does not infinitely increase as traffic volume grows. Rather, SPFs typically flatten out at the top of curve, which is when relatively high traffic volumes are experienced for the characteristics of a specific SPF. When road facilities are near capacity, high speed operations and lane changing opportunities decrease, which tend to result in lower collision risk.

A comparative safety performance analysis that examines the predicted number of collisions under the 2031 background scenario to the 2031 total scenario (background plus Project generated volumes) was conducted for one intersection (Derry and Trafalgar) to illustrate the expected proportional decrease of the number of collisions involving Project-associated truck traffic.

The 2031 traffic volumes for the background and total scenarios used for estimating the predicted number of collisions, including the peak hour volumes for the major and minor approaches (V_{maj} and V_{min}) and the AADTs, are summarized in **Table IR8.5-17**.

Table IR8.5-17 Future 2031 AADTs for the intersection of Derry Road and Trafalgar Road

Background				Total (Background plus Project related traffic)			
V_{maj}	V_{min}	$AADT_{maj}$	$AADT_{min}$	V_{maj}	V_{min}	$AADT_{maj}$	$AADT_{min}$
3173	2992	35,652	33,618	3176	3004	35,686	33,753

The predicted number of collisions per year for the intersection of Derry Road and Trafalgar Road evaluated for the 2031 scenario is shown in **Table IR8.5-18**.

Table IR8.5-18 Future 2031 predicted number of collisions for the intersection of Derry Road and Trafalgar Road

2031 Background	2031 Total	Net change in collisions	Net change percentage in collisions
21.07	21.15	0.08	0.4%

The net change percentage in collisions at the intersection of Derry Road and Trafalgar Road evaluated for the 2031 scenario is 0.4%, which is less than the net change percentage in collisions evaluated for the 2021 scenario (0.6%). This result supports the conclusion that net collision risk will be lower under the 2031 scenario than the 2021 scenario.

NOISE AND VIBRATION

IR8.9 Additional noise sources

Rationale: *In its response to the Review Panel's information request #4.66 (CEAR #652), CN assessed the Britannia Road route and indicated that the associated off-site truck traffic on these road segments would result in an increase in future Britannia Road traffic noise levels of 1.5 dB or less, which CN considers to be imperceptible.*

However, in its submission on the sufficiency of CN's Package 4 responses (CEAR #672), Halton Municipalities indicated the two main haul routes from the Project would be Britannia Road east towards Highway 407 and Tremaine Road north to Highway 401, but only an assessment of the Britannia Road route had been completed by CN.

Halton Municipalities stated that the traffic volumes used in CN's assessment of the Britannia Road route are for the year 2031 and predictive of higher traffic volumes. As the CN facility may be in operation prior to 2031, using higher traffic volumes for the 2031 timeframe may underestimate the effects of truck noise along potential haul routes during the initial operating years of the Project (i.e. adding the Terminal truck traffic to higher forecasted traffic volumes could reduce the apparent impact of the truck noise in lower traffic numbers).

In addition, Halton Municipalities indicated that the second major haul route, along Tremaine Road, would require the completion of the Tremaine Road realignment and completion of the planned interchange at Highway 401. The traffic volumes used in CN's haul route analysis along Britannia Road assume this realignment and interchange will be in place. If the CN facility is in operation prior to these road network improvements taking place, Halton Municipalities suggested that truck traffic would also need to travel along Britannia Road or other local roads, increasing the potential for noise effects in those locations. Halton Municipalities stated that CN should complete the assessment of the Tremaine Road leg of the haul route.

Responding to information request #4.66 (CEAR #652), CN indicated that the largest increase in project sound levels would be 1.4 dB at Tremaine Road. Tables 5.1.to 5.4 in Appendix E.10 show that some of the highest noise levels occur near Tremaine Road.

In its submission to the Review Panel on CN's Package 4 information request responses (CEAR #666), Health Canada stated that there can be a substantial increase in the percent highly annoyed (%HA) with relatively small changes in the noise environment in situations where the initial baseline noise level is high. This is due to the non-linear nature of the relationship between noise and %HA. In its response to the information request #4.66, CN provided a revised noise assessment noting increased sound levels due to the project in decibels (dB) but did not included an assessment of the change in %HA. Health Canada states that health effects resulting from project-generated noise should be evaluated using criteria based on the change in %HA rather than using the increase in sound pressure level as presented in Table 4.66-1.

In addition, Health Canada stated that CN's response to information request #4.78 indicated that measured baseline noise levels were in excess of 40dBA Ln at the noise monitoring stations. Given that reported baseline noise levels exceed the World Health Organization criteria, Health Canada suggested that an assessment of potential human health effects using change in %HA would be more appropriate.

Health Canada further recommended that CN should not categorize audible noise sources as imperceptible because such statements can be misleading given that noise perception is individual and subjective.

Information Request:

a) *Provide an assessment of haul route noise impacts along Tremaine Road as well as Britannia Road, using the change in %HA methodology as per Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise, Healthy Environments and Consumer Safety Branch, 2017. The calculations should take into consideration the traffic volumes at the time of full Terminal operation. In the Tremaine Road analysis, discuss the effect of timing of road network improvements such as the planned Tremaine Road realignment and interchange construction on predicted haul route noise levels. Provide supporting calculations.*

b) *Verify that the revised analysis would not change the expected requirements for mitigation identified in Appendix E.10.*

CN Response:

a) *Provide an assessment of haul route noise impacts along Tremaine Road as well as Britannia Road, using the change in %HA methodology as per Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise, Healthy Environments and Consumer Safety Branch, 2017. The calculations should take into consideration the traffic volumes at the time of full Terminal operation. In the Tremaine Road analysis, discuss the effect of timing of road network improvements such as the planned Tremaine Road realignment and interchange construction on predicted haul route noise levels. Provide supporting calculations.*

CN has completed an assessment of the haul route noise impacts along Tremaine Road and Britannia Road, which are the two routes with the highest proportion of CN-related truck traffic (i.e., segments closest to the proposed Terminal). The haul route assessment has been completed for both 2021 and 2031, as provided in Attachment IR2.33-3 (CEAR #592). In this way, the haul

route impact would capture the pre- and post- road network improvements (i.e., the planned Tremaine Road realignment and 401 interchange are anticipated to be operational post-2021).

For determining the expected impact, as a change in %HA, each road segment along Tremaine Road and Britannia Road was evaluated. Traffic volumes in 2021 and 2031 were based on the 2017 Forecast provided by BA Group in their report "CN Milton Logistics Hub Transportation Considerations", dated August 17, 2017 (provided as Attachment IR2.33-3 (CEAR #592)), and described in part (e) of the response to **IR8.4** above. Supporting calculations are provided in **Attachment IR8.9-1: Road Traffic Noise Predictions**.

For the Britannia Road haul route (east of First Line and east of Tremaine Road) and the Tremaine Route (north of Britannia), project-related trucks will increase the traffic noise level at the start of operations. The predicted changes in %HA in both 2021 and 2031 are less than 6.5%, which meets the Health Canada (2017) criterion. The results of this assessment are presented in **Tables IR8.9-1** and **IR8.9-2**.

Table IR8.9-1 Summary Haul Route Noise Impact, 2021

Road Segment	Road Speed (km/hr)	Setback Distance to nearest Building (m)	Predicted L_{dn} Sound Level			Predicted %HA		
			Without Project Trucks (dBA)	With Project Trucks (dBA)	Sound Level Difference (dB)	Without Project Trucks (%HA)	With Project Trucks (%HA)	%Change in %HA
Britannia East of First Line	80	40	65	68	3	14.7	20.2	5.5
Britannia East of Tremaine Road	80	40	64	67	3	12.4	17.1	4.7
Tremaine North of Britannia Road	70	30	66	68	2	14.8	19.9	5.1

Table IR8.9-2 Summary Haul Route Noise Impact, 2031

Road Segment	Road Speed (km/hr)	Setback Distance to nearest Building (m)	Predicted L_{dn} Sound Level			Predicted %HA		
			Without Project Trucks (dBA)	With Project Trucks (dBA)	Sound Level Difference (dB)	Without Project Trucks (%HA)	With Project Trucks (%HA)	%Change in %HA
Britannia East of First Line	80	40	66	69	3	15.3	20.5	5.2
Britannia East of Tremaine Road	80	40	65	67	2	13.2	17.7	4.5
Tremaine North of Britannia Road	70	30	67	69	2	16.8	21.2	4.4

On January 29, 2019, Halton Region provided CN with updated traffic data. Based on the traffic volumes provided, the traffic noise modeling for the years 2021 and 2031 was revised, and the results are presented in **Table IR8.9-3** and **Table IR8.9-4**. Supporting calculations are provided in **Attachment IR8.9-1.** As indicated in these tables, the predicted changes in %HA in both 2021 and 2031 are less than 6.5%, which meets the Health Canada (2017) criterion.

Table IR8.9-3 Summary Haul Route Noise Impact, 2021 (2019 Updated Data)

Road Segment	Road Speed (km/hr)	Setback Distance to nearest Building (m)	Predicted L_{dn} Sound Level			Predicted %HA		
			Without Project Trucks (dBA)	With Project Trucks (dBA)	Sound Level Difference (dB)	Without Project Trucks (%HA)	With Project Trucks (%HA)	%Change in %HA
Britannia East of First Line	80	40	NA	NA	NA	NA	NA	NA
Britannia East of Tremaine Road	80	40	62	66	4	10.1	15.7	5.6
Tremaine North of Britannia Road	70	30	66	68	3	15.1	20.1	5.0

NA – updated traffic data not provided by Halton Region.

Table IR8.9-4 Summary Haul Route Noise Impact, 2031 (2019 Updated Data)

Road Segment	Road Speed (km/hr)	Setback Distance to nearest Building (m)	Predicted Ldn Sound Level			Predicted %HA		
			Without Project Trucks (dBA)	With Project Trucks (dBA)	Sound Level Difference (dB)	Without Project Trucks (%HA)	With Project Trucks (%HA)	%Change in %HA
Britannia East of First Line	80	40	NA	NA	NA	NA	NA	NA
Britannia East of Tremaine Road	80	40	64	67	3	13.1	17.6	4.5
Tremaine North of Britannia Road	70	30	66	69	2	16.1	20.7	4.6

NA – updated traffic data not provided by Halton Region.

b) *Verify that the revised analysis would not change the expected requirements for mitigation identified in Appendix E.10.*

Based on the revised haul route analysis provided, no change to the mitigation measures identified in the Noise Effects TDR (EIS Appendix E.10) is warranted.

REFERENCES

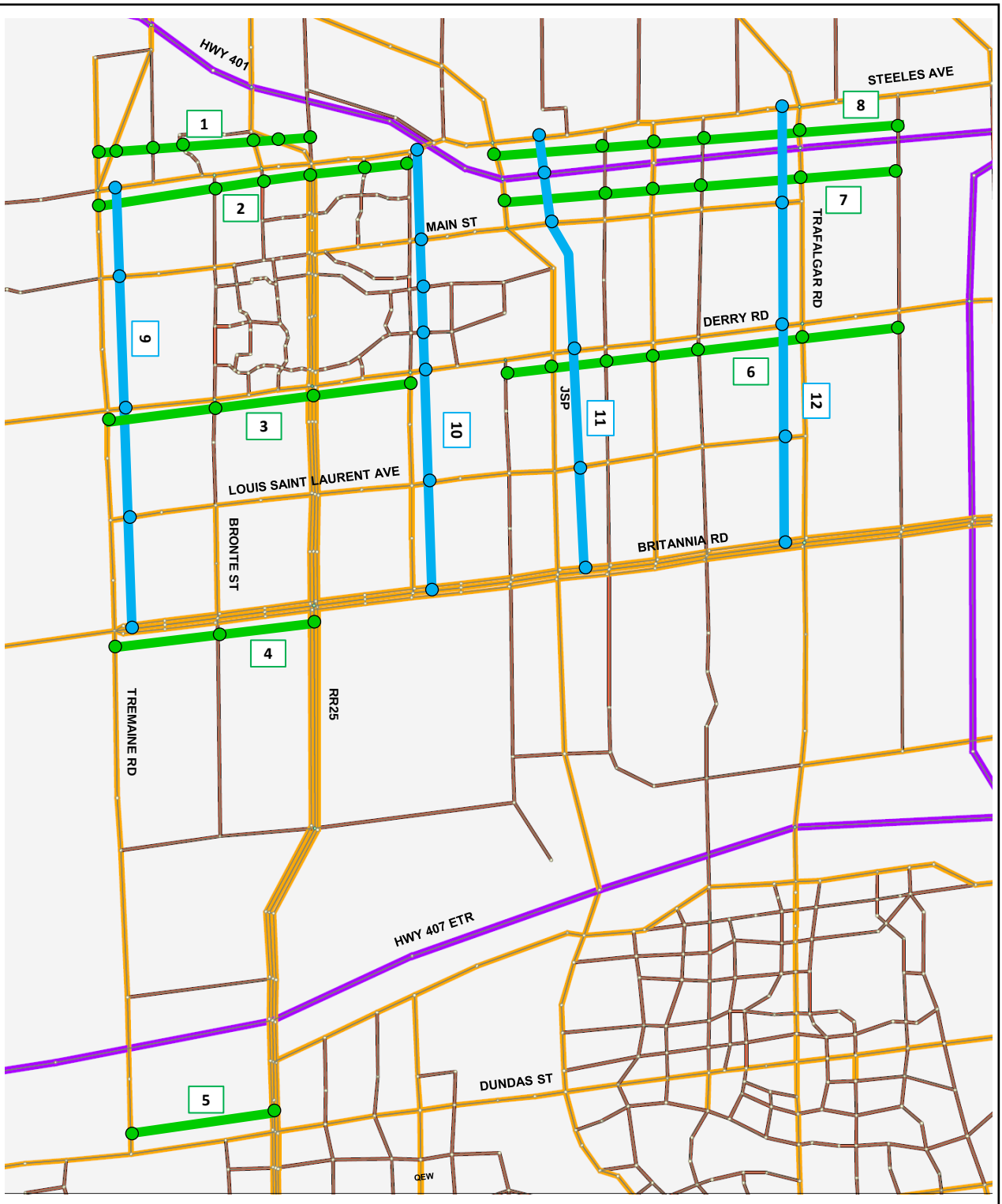
Delcan. 2014. Environmental Study Report – April 2014. Britannia Road (Regional Road 5) Transportation Corridor Improvements. Environmental Study Report. Prepared for the Regional Municipality of Halton.

Health Canada. 2016. Human Health Risk Assessment for Ambient Nitrogen Dioxide. Available online: http://publications.gc.ca/collections/collection_2016/sc-hc/H114-31-2016-eng.pdf

Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise, Healthy Environments and Consumer Safety Branch. Available here: http://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-3-2017-eng.pdf

March 22, 2019

ATTACHMENT IR8.4-1
HALTON MODELLING SUPPORT 2015 - PM PEAK HOUR LINK LEVEL GROWTH RATES



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CLIENT
Halton REGION

PROJECT
Halton Modelling Support:
Milton Growth Rates Request

PLOT
2031 Halton TMP Recommended Network
Screenline Definition Map

LEGEND
N/S Screenlines
E/W Screenlines

PROJECT No.
60330407

MAP
1

Halton Modelling Support 2015
Milton Regional Road Growth Rates Request

Pm Peak Hour Link Level Growth Rates (Milton East-West Roads)

Street	From	To	2011 Volume Eastbound	2011 Volume Westbound
Steeles Ave	Tremaine Rd	RR 25	557	846
	RR 25	James Snow Pkwy	1,071	1,538
	James Snow Pkwy	Trafalgar Rd	388	790
Derry Rd	Tremaine Rd	RR 25	710	1,049
	RR 25	James Snow Pkwy	298	1,271
	James Snow Pkwy	Trafalgar Rd	610	1,672
Britannia Rd	Tremaine Rd	RR 25	704	672
	RR 25	James Snow Pkwy	585	665
	James Snow Pkwy	Trafalgar Rd	677	974

Screenline Growth Rates (Milton East-West Roads)

Representative Screenline	2011-2021 Growth Rate Eastbound	2011-2021 Growth Rate Westbound	2021-2031 Growth Rate Eastbound	2021-2031 Growth Rate Westbound
9	3.1%	1.5%	1.5%	0.8%
10	4.0%	3.9%	2.0%	1.1%
11, 12	4.4%	4.5%	2.8%	0.7%
9	3.1%	1.5%	1.5%	0.8%
10	4.0%	3.9%	2.0%	1.1%
11, 12	4.4%	4.5%	2.8%	0.7%
9	3.1%	1.5%	1.5%	0.8%
10	4.0%	3.9%	2.0%	1.1%
11, 12	4.4%	4.5%	2.8%	0.7%

PM Peak Hour Link Level Growth Rates (Milton North-South Roads)

Street	From	To	2011 Volume Northbound	2011 Volume Southbound
Tremaine Rd	Dundas St	Britannia Rd	566	485
	Britannia Rd	Derry Rd	800	938
	Derry Rd	Steeles Ave	818	1,209
	Steeles Ave	Hwy 401	402	582
James Snow Pkwy	Britannia Rd	Derry Rd	568	775
	Derry Rd	Steeles Ave	1,033	1,619
Trafalgar Rd	Britannia Rd	Derry Rd	1,380	1,413
	Derry Rd	Steeles Ave	1,204	1,387
RR 25	Dundas St	Britannia Rd	852	742
	Britannia Rd	Derry Rd	648	996
	Steeles Ave	Hwy 401	1,327	1,329

Screenline Growth Rates (Milton North-South Roads)

Representative Screenline	2011-2021 Growth Rate Northbound	2011-2021 Growth Rate Southbound	2021-2031 Growth Rate Northbound	2021-2031 Growth Rate Southbound
4, 5	5.4%	3.1%	3.1%	2.0%
3	4.8%	6.3%	2.5%	1.0%
2	5.5%	4.3%	1.8%	0.6%
1	7.3%	6.8%	2.8%	1.5%
6	2.7%	5.4%	4.3%	4.4%
7, 8	4.0%	3.2%	3.4%	3.6%
6	2.7%	5.4%	4.3%	4.4%
7, 8	4.0%	3.2%	3.4%	3.6%
4, 5	5.4%	3.1%	3.1%	2.0%
3	4.8%	6.3%	2.5%	1.0%
1	7.3%	6.8%	2.8%	1.5%

Notes:
- Halton Transportation Master Plan Model - The Road to Change (approved in 2011) used for all forecasts
- Population and employment figures consistent with BPE v3032
- 2021 and 2031 network and transit mode splits consistent with TMP recommendations
- Screenline growth rates between each segment taken from indicated representative screenline (see Screenline Definition Map)

March 22, 2019

ATTACHMENT IR8.5-1
HALTON REGION MIDBLOCK AND INTERSECITON SPFS

Halton SPFs for Midblock Roadway Segments

Table A-1: Urban/CBD Two-Lane Segments

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT^b \times Length$	-12.443	0.6911		0.7407
Severe	$E(Y) = \alpha \times AADT^b \times Length$	-17.2455	1.0070		1.0293
PDO	$E(Y) = \alpha \times AADT^b \times Length$	-12.0916	0.6285		0.7189
Angle	$E(Y) = \alpha \times AADT^b \times Length$	-13.9663	0.6286		3.4462
Rear-End	$E(Y) = \alpha \times AADT^b \times Length^c$	-22.4864	1.6867	0.9574	1.0137
SMV	$E(Y) = \alpha \times AADT^b \times Length$	-9.4778	0.2078		0.9392

Table A-2: Urban/CBD Multi-Lane Segments

Type	Equation	$Ln(\alpha)$	b	k
All Collisions	$E(Y) = \alpha \times AADT^b \times Length$	-14.4944	0.9115	1.0181
Severe	$E(Y) = \alpha \times AADT^b \times Length$	-14.5750	0.7165	1.1325
PDO	$E(Y) = \alpha \times AADT^b \times Length$	-14.7531	0.9151	1.0149
Angle	$E(Y) = \alpha \times AADT^b \times Length$	-11.3893	0.4191	3.0532
Rear-End	$E(Y) = \alpha \times AADT^b \times Length$	-19.3123	1.3068	1.0737
SMV	$E(Y) = \alpha \times AADT^b \times Length$	-10.8217	0.3065	0.6845

Table A-3: Suburban Two-Lane Segments

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT^b \times Length^c$	-12.3393	0.5865	1.1227	1.6305
Severe	$E(Y) = \alpha \times AADT^b \times Length^c$	-16.1056	0.6192	1.3204	0.9328
PDO	$E(Y) = \alpha \times AADT^b \times Length^c$	-12.9804	0.6528	1.1088	1.9052
Angle	$E(Y) = \alpha \times AADT^b \times Length$	-15.2055	0.7891		7.1537
Rear-End	$E(Y) = \alpha \times AADT^b \times Length$	-17.0955	1.0430		2.6714
SMV	$E(Y) = \alpha \times AADT^b \times Length$	-9.1960	0.1434		0.8624

Table A-4: Rural Two-Lane Segments

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT^b \times Length^c$	-11.4827	0.5993	0.8990	0.5358
Severe	$E(Y) = \alpha \times AADT^b \times Length$	-14.3765	0.6742		0.4615
PDO	$E(Y) = \alpha \times AADT^b \times Length^c$	-11.4242	0.5693	0.8842	0.4787
Angle	$E(Y) = \alpha \times AADT^b \times Length^c$	-14.1104	0.8196	0.4972	1.0314
Rear-End	$E(Y) = \alpha \times AADT^b \times Length^c$	-18.7585	1.4561	0.6417	1.1863
SMV	$E(Y) = \alpha \times AADT^b \times Length$	-11.2008	0.4138		0.4583

Table A-5: Suburban and Rural Multi-Lane Segments

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT^b \times Length^c$	-13.1870	0.7510	0.9740	0.7988
Severe	$E(Y) = \alpha \times AADT^b \times Length$	-14.5561	0.6896		0.2757
PDO	$E(Y) = \alpha \times AADT^b \times Length^c$	-12.5498	0.6986	0.9033	0.7747
Angle	$E(Y) = \alpha \times AADT^b \times Length^c$				
Rear-End	$E(Y) = \alpha \times AADT^b \times Length^c$	-26.0179	1.9228		0.4933
SMV	$E(Y) = \alpha \times AADT^b \times Length$				

Halton SPFs for Intersections

Table A-6: Signalized 4-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-8.5448	0.2915	0.8191	0.8667
Severe	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-8.4128	0.2591	0.6393	0.7724
PDO	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-8.2706	0.1944	0.8588	0.8322
Angle	$E(Y) = \alpha \times AADT_{tot}^b \times \left(\frac{AADT_{min}}{AADT_{tot}}\right)^c$	-3.7551	0.4471	0.8408	0.8461
Rear-End	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-11.7314	0.5263	0.8441	0.9534
SMV	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-8.3669	0.3879	0.3626	0.6693
Turning Movement	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-11.5375	0.2951	0.9303	1.1433

Table A-7: Signalized 3-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-6.4328	0.3525	0.4349	0.9588
Severe	$E(Y) = \alpha \times AADT_{tot}^b \times \left(\frac{AADT_{min}}{AADT_{tot}}\right)^c$	-6.6653	0.6611	0.4845	0.9344
PDO	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-5.8817	0.3117	0.3699	0.9191
Angle	$E(Y) = \alpha \times AADT_{tot}^b$	-6.7399	0.5359		1.0462
Rear-End	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-8.3066	0.4960	0.4121	1.0987
SMV	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$				
Turning Movement	$E(Y) = \alpha \times AADT_{tot}^b \times \left(\frac{AADT_{min}}{AADT_{tot}}\right)^c$	-10.3807	1.0411	0.6981	1.9412

Table A-8: Two-Way Stop Controlled 4-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-6.9670	0.2183	0.6383	0.9747
Severe	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-9.9009	0.3725	0.6627	1.4790
PDO	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-6.8724	0.1883	0.6131	0.9853
Angle	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-5.5766	-0.0740	0.7007	1.6491
Rear-End	$E(Y) = \alpha \times AADT_{maj}^b \times AADT_{min}^c$	-13.9402	0.7900	0.7352	1.2344
SMV	$E(Y) = \alpha \times AADT_{tot}^b \times \left(\frac{AADT_{min}}{AADT_{tot}}\right)^c$	-8.9505	0.7711	0.5177	0.1991

Type	Equation	$Ln(\alpha)$	b	c	k
Turning Movement	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-15.9916	0.8366	0.7342	1.1426

Table A-9: Two-Way Stop Controlled 3-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-10.5973	0.6174	0.5776	1.3896
Severe	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-12.7558	1.2953	0.7304	2.3855
PDO	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-10.7182	0.6040	0.5761	1.1337
Angle	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-11.8507	0.5009	0.7603	1.5315
Rear-End	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-14.7678	1.0138	0.5006	2.1580
SMV	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-8.3647	0.0726	0.6758	3.7114
Turning Movement	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-15.8915	0.7941	0.7702	3.6408

Table A-10: All-Way Stop Controlled 4-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				
Severe	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				
PDO	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-11.5334	0.9756	0.2803	0.4678
Angle	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-14.9402	0.6361	1.0366	0.8365
Rear-End	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-13.8781	1.4034	-0.0165	0.1380
SMV	$E(Y) = \alpha \times AADT_{tot}^{b} \times \left(\frac{AADT_{min}}{AADT_{tot}}\right)^{c}$				
Turning Movement	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				

Table A-11: All-Way Stop Controlled 3-Legged Intersections

Type	Equation	$Ln(\alpha)$	b	c	k
All Collisions	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				
Severe	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				
PDO	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-13.1241	1.1281	0.2882	0.4705
Angle	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-12.1604	0.3961	0.8250	0.4904
Rear-End	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-14.6545	1.2774	0.2337	0.6417
SMV	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$	-11.8140	0.8501	0.2400	1.5579
Turning Movement	$E(Y) = \alpha \times AADT_{maj}^{b} \times AADT_{min}^{c}$				

March 22, 2019

ATTACHMENT IR8.5-2
SAFETY PERFORMANCE ANALYSIS
(2021 SCENARIO)

Attachment IR8.5-2 Safety Performance Analysis (2021 Scenario)

Table B1 - Safety Performance Analysis (2021 Scenario) - Intersections

Site Characteristics			Annual Average Daily Traffic				Predicted Number of Collisions						Difference		
			Background		Total		Background			Total					
Intersection	Configuration	Control Type	$AADT_{Maj}$	$AADT_{Min}$	$AADT_{Maj}$	$AADT_{Min}$	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Britannia Corridor															
BRITANNIA ROAD @ TREMAINE ROAD	Roundabout		15956	11517	16113	11776	4.77	0.43	4.33	4.80	0.44	4.37	0.04	0.00	0.03
BRITANNIA ROAD @ TRUCK ACCESS	3 Background/4 Total	Signalized	12023	450	12540	1250	0.63	0.13	0.50	1.05	0.24	0.80	0.42	0.12	0.30
BRITANNIA ROAD @ FIRST LINE	4-Legged	Signalized	15506	12135	16090	12135	7.17	1.10	6.07	7.25	1.11	6.14	0.08	0.01	0.07
Britannia Road @ Chretien Street	4-Legged	Unsignalized	19607	1529	20192	1529	0.88	0.26	0.62	0.88	0.26	0.63	0.01	0.00	0.00
Britannia Road @ Leger Way	4-Legged	Unsignalized	21416	1529	22057	1529	0.90	0.27	0.63	0.90	0.27	0.63	0.01	0.00	0.00
Britannia Road @ Clitherow Street	4-Legged	Unsignalized	21517	1529	22169	1529	0.90	0.27	0.63	0.90	0.27	0.63	0.01	0.00	0.00
Britannia Road @ Farmstead Dr	4-Legged	Unsignalized	21765	1529	22259	1529	0.90	0.27	0.63	0.90	0.27	0.63	0.00	0.00	0.00
BRITANNIA ROAD @ REGIONAL ROAD 25	4-Legged	Signalized	35394	21854	35472	22360	14.78	1.99	12.78	15.07	2.02	13.04	0.29	0.03	0.26
BRITANNIA ROAD @ Thompson Road	4-Legged	Signalized	24574	3663	25000	3663	3.08	0.58	2.50	3.09	0.58	2.51	0.02	0.00	0.01
BRITANNIA ROAD @ FOURTH LINE	4-Legged	Signalized	23461	2023	23854	2023	1.87	0.39	1.48	1.88	0.39	1.48	0.01	0.00	0.01
BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUTH	4-Legged	Signalized	26236	6686	26596	6742	5.13	0.86	4.27	5.19	0.87	4.32	0.06	0.01	0.05
BRITANNIA ROAD @ Fifth Line	4-Legged	Signalized	27405	10697	27922	10697	7.64	1.18	6.46	7.68	1.19	6.49	0.04	0.01	0.04
BRITANNIA ROAD @ SIXTH LINE	4-Legged	Signalized	22911	3439	23326	3439	2.86	0.55	2.32	2.88	0.55	2.33	0.02	0.00	0.01
BRITANNIA ROAD @ TRAFALGAR ROAD	4-Legged	Signalized	30956	23540	31057	23765	15.10	2.02	13.08	15.23	2.03	13.20	0.13	0.01	0.12
Britannia Road @ Eight Line	4-Legged	Unsignalized	23708	2248	23899	2248	1.17	0.36	0.82	1.17	0.36	0.82	0.00	0.00	0.00
BRITANNIA ROAD @ EXIT BRITANNIA ROAD OFF RAMP HIGHWAY 407	4-Legged	Signalized	22529	2248	22720	2248	2.01	0.41	1.60	2.02	0.41	1.60	0.00	0.00	0.00
Derry Road Corridor															
DERRY ROAD @ SAVOLINE BOULEVARD	4-Legged	Signalized	12270	1158	12270	1158	0.98	0.23	0.75	0.98	0.23	0.75	0.00	0.00	0.00
DERRY ROAD @ SCOTT BOULEVARD	4-Legged	Signalized	16158	4967	16158	4967	3.49	0.63	2.86	3.49	0.63	2.86	0.00	0.00	0.00
DERRY ROAD @ FIRST LINE/BRONTE	4-Legged	Signalized	18248	10562	18248	10562	6.71	1.05	5.66	6.71	1.05	5.66	0.00	0.00	0.00
DERRY ROAD @ FARMSTEAD DRIVE	4-Legged	Signalized	18944	3214	18944	3214	2.56	0.50	2.06	2.56	0.50	2.06	0.00	0.00	0.00
DERRY ROAD @ COMMERCIAL STREET	4-Legged	Signalized	19944	3540	19944	3540	2.81	0.54	2.28	2.81	0.54	2.28	0.00	0.00	0.00
DERRY ROAD @ ONTARIO STREET SOUTH	4-Legged	Signalized	28821	25899	28832	25967	15.99	2.11	13.89	16.03	2.11	13.92	0.04	0.00	0.03
DERRY ROAD @ HOLLY AVENUE	4-Legged	Signalized	25281	4967	25281	4967	3.98	0.71	3.27	3.98	0.71	3.27	0.00	0.00	0.00
DERRY ROAD @ THOMPSON ROAD SOUTH	4-Legged	Signalized	28843	17708	28843	17708	11.72	1.65	10.07	11.72	1.65	10.07	0.00	0.00	0.00
DERRY ROAD @ MILLER WAY	4-Legged	Signalized	27956	4967	27956	4967	4.10	0.73	3.37	4.10	0.73	3.37	0.00	0.00	0.00
DERRY ROAD @ SAUVE STREET	3-Legged	Signalized	23697	2663	23697	2663	1.73	0.35	1.38	1.73	0.35	1.38	0.00	0.00	0.00
DERRY ROAD @ FOURTH LINE	3-Legged	Unsignalized	30495	2922	30495	2922	1.47	0.35	1.12	1.47	0.35	1.12	0.00	0.00	0.00
DERRY ROAD @ TRUDEAU DRIVE	4-Legged	Signalized	32596	4967	32596	4967	4.29	0.76	3.53	4.29	0.76	3.53	0.00	0.00	0.00
DERRY ROAD @ JAMES SNOW PARKWAY	4-Legged	Signalized	34720	19439	34753	19529	13.35	1.84	11.51	13.40	1.84	11.56	0.05	0.01	0.05
DERRY ROAD @ FIFTH LINE	4-Legged	Signalized	35967	18416	36000	18416	12.90	1.79	11.11	12.91	1.79	11.11	0.00	0.00	0.00
DERRY ROAD @ SIXTH LINE	4-Legged	Signalized	37135	5742	37169	5742	5.01	0.86	4.16	5.02	0.86	4.16	0.00	0.00	0.00
DERRY ROAD @ Eight Line	4-Legged	Unsignalized	33147	675	33180	675	0.58	0.18	0.40	0.58	0.18	0.40	0.00	0.00	0.00
DERRY ROAD @ EXIT DERRY ROAD OFF RAMP HIGHWAY 407	3-Legged	Signalized	31495	3371	31529	3371	2.12	0.41	1.71	2.12	0.41	1.71	0.00	0.00	0.00
JSP Corridor															
JAMES SNOW PARKWAY @ LOUIS ST LAURENT AVENUE	3-Legged	Signalized	25899	24169	26068	24169	4.66	1.15	3.51	4.67	1.15	3.52	0.01	0.00	0.01
JAMES SNOW PARKWAY @ CLARK BOULEVARD	3-Legged	Signalized	19236	2663	19326	2663	1.61	0.34	1.27	1.61	0.34	1.27	0.00	0.00	0.00
JAMES SNOW PARKWAY @ WALDIE AVENUE	3-Legged	Signalized	27888	2663	28000	2663	1.83	0.36	1.47	1.83	0.36	1.47	0.00	0.00	0.00
James Snow Parkway @ Trudeau Dr	3-Legged	Signalized	26349	2663	26450	2663	1.80	0.36	1.44	1.80	0.36	1.44	0.00	0.00	0.00
JAMES SNOW PARKWAY @ MAIN STREET EAST	4-Legged	Signalized	34720	30708	34720	30821	19.41	2.46	16.95	19.47	2.47	17.00	0.06	0.01	0.05
JAMES SNOW PARKWAY @ EXIT 324 OFF RAMP HIGHWAY 401	3-Legged	Signalized	39135	5618	39281	5618	2.86	0.55	2.30	2.86	0.55	2.31	0.00	0.00	0.00
JAMES SNOW PARKWAY @ EXIT 324 OFF RAMP HIGHWAY 401	3-Legged	Signalized	39135	13484	39281	13484	4.18	0.87	3.31	4.19	0.87	3.31	0.01	0.00	0.01

Table B1 - Safety Performance Analysis (2021 Scenario) - Intersections

Site Characteristics			Annual Average Daily Traffic				Predicted Number of Collisions						Difference		
			Background		Total		Background			Total					
Intersection	Configuration	Control Type	$AADT_{Maj}$	$AADT_{Min}$	$AADT_{Maj}$	$AADT_{Min}$	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Martin St Corridor															
MARTIN STREET @ MARKET DRIVE	3-Legged	Signalized	27304	8989	27416	8989	3.09	0.67	2.42	3.09	0.67	2.42	0.00	0.00	0.00
MARTIN STREET @ CHISHOLM DRIVE	4-Legged	Signalized	27304	3394	27416	3394	2.98	0.57	2.41	2.98	0.57	2.42	0.00	0.00	0.00
MARTIN STREET @ EXIT 320 OFF RAMP HIGHWAY 401 EB	4-Legged	Signalized	27304	9832	27416	9832	7.12	1.12	6.00	7.13	1.12	6.01	0.01	0.00	0.01
MARTIN STREET @ EXIT 320 ON RAMP HIGHWAY 401	3-Legged	Signalized	27304	8989	27416	8989	3.09	0.67	2.42	3.09	0.67	2.42	0.00	0.00	0.00
Regional Road 25 Corridor															
DERRY ROAD @ ONTARIO STREET SOUTH	4-Legged	Signalized	28821	25899	28832	25967	15.99	2.11	13.89	16.03	2.11	13.92	0.04	0.00	0.03
REGIONAL ROAD 25 @ LOUIS ST LAURENT AVENUE	4-Legged	Signalized	19259	7012	19326	7012	4.88	0.82	4.05	4.88	0.82	4.06	0.00	0.00	0.00
Regional Road 25 @ Whitlock Ave	3-Legged	Unsignalized	14641	574	14697	574	0.37	0.08	0.28	0.37	0.08	0.28	0.00	0.00	0.00
Regional Road 25 @ Etheridge	3-Legged	Unsignalized	22798	574	22866	574	0.48	0.11	0.37	0.48	0.11	0.37	0.00	0.00	0.00
REGIONAL ROAD 25 @ LOWER BASE LINE	4-Legged	Signalized	39180	3439	39281	3439	3.35	0.63	2.72	3.35	0.63	2.72	0.00	0.00	0.00
REGIONAL ROAD 25 @ HENDERSON ROAD	3-Legged	Unsignalized	40023	697	40135	697	0.76	0.18	0.58	0.76	0.18	0.58	0.00	0.00	0.00
BURNHAMTHORPE ROAD WEST @ REGIONAL ROAD 25	4-Legged	Unsignalized	40113	3439	40225	3439	1.72	0.57	1.15	1.72	0.57	1.15	0.00	0.00	0.00
REGIONAL ROAD 25 @ EXIT BRONTE ROAD - HWY 407 OFF RAMP	3-Legged	Signalized	40113	4495	40225	4495	2.62	0.50	2.12	2.62	0.50	2.12	0.00	0.00	0.00
REGIONAL ROAD 25 @ EXIT BRONTE ROAD - HWY 407 OFF RAMP	3-Legged	Signalized	40113	5618	40225	5618	2.88	0.56	2.33	2.88	0.56	2.33	0.00	0.00	0.00
REGIONAL ROAD 25 @ OLD BRONTE ROAD	3-Legged	Unsignalized	40113	338	40225	338	0.50	0.12	0.38	0.50	0.12	0.38	0.00	0.00	0.00
DUNDAS STREET WEST @ REGIONAL ROAD 25	4-Legged	Signalized	48618	44192	48618	44304	28.86	3.39	25.46	28.92	3.40	25.52	0.06	0.01	0.05
Steeles Corridor															
STEELES AVENUE WEST @ TREMAINE ROAD	Roundabout		32978	5450	33349	5484	1.17	0.13	1.04	1.18	0.13	1.05	0.01	0.00	0.01
STEELES AVENUE WEST @ PERU ROAD	3-Legged	Unsignalized	9484	3394	9540	3394	0.78	0.18	0.60	0.78	0.18	0.61	0.00	0.00	0.00
STEELES AVENUE WEST @ INDUSTRIAL DRIVE	3-Legged	Unsignalized	9787	3394	9843	3394	0.80	0.18	0.62	0.80	0.18	0.62	0.00	0.00	0.00
STEELES AVENUE WEST @ BRONTE STREET NORTH	3-Legged	Signalized	13697	3394	13798	3394	1.58	0.37	1.22	1.59	0.37	1.22	0.00	0.00	0.00
STEELES AVENUE EAST @ MOROBEL DRIVE	3-Legged	Unsignalized	25090	506	25270	506	0.47	0.11	0.36	0.48	0.11	0.36	0.00	0.00	0.00
STEELES AVENUE EAST @ CHRIS HADFIELD WAY	3-Legged	Unsignalized	32574	506	32787	506	0.56	0.13	0.43	0.56	0.13	0.43	0.00	0.00	0.00
STEELES AVENUE EAST @ MARTIN STREET	4-Legged	Signalized	23540	20618	23585	20675	12.51	1.73	10.78	12.54	1.73	10.81	0.04	0.00	0.03
STEELES AVENUE EAST @ GLENN CRESCENT	3-Legged	Unsignalized	25000	574	25045	574	0.51	0.12	0.39	0.51	0.12	0.39	0.00	0.00	0.00
STEELES AVENUE EAST @ WHEELABRATOR WAY	3-Legged	Unsignalized	24776	3394	24809	3394	1.41	0.33	1.08	1.41	0.33	1.08	0.00	0.00	0.00
STEELES AVENUE EAST @ ONTARIO STREET NORTH	3-Legged	Signalized	24551	9607	24574	9630	3.06	0.68	2.38	3.06	0.69	2.38	0.00	0.00	0.00
Trafalgar Corridor															
DERRY ROAD @ TRAFALGAR ROAD	4-Legged	Signalized	33147	20899	33180	21034	13.98	1.90	12.07	14.05	1.91	12.14	0.08	0.01	0.07
TRAFALGAR ROAD @ AUBURN ROAD	3-Legged	Unsignalized	19236	843	19371	843	0.54	0.13	0.42	0.54	0.13	0.42	0.00	0.00	0.00
TRAFALGAR ROAD @ EXIT 328 OFF RAMP HIGHWAY 401	3-Legged	Signalized	19236	8989	19371	8989	2.73	0.64	2.09	2.74	0.64	2.09	0.01	0.00	0.01
TRAFALGAR ROAD @ EXIT 328 OFF RAMP HIGHWAY 401	3-Legged	Signalized	19236	11236	19371	11236	3.01	0.72	2.28	3.01	0.72	2.29	0.01	0.00	0.01
Tremaine Corridor															
Tremain Road @ Employee Access	Not part of proposed truck routes.	3-Legged	Unsignalized	0	0	18708	169	0.00	0.00	0.00	0.210	0.048	0.162	0.21	0.05	0.16
Tremaine Road @ Louis Saint-Laurent		Roundabout		21270	3843	21686	3843	4.55	0.42	4.13	4.59	0.42	4.17	0.04	0.00	0.04
TREMAINE ROAD @ DYMOTT AVENUE		3-Legged	Signalized	23686	787	24102	787	1.02	0.19	0.83	1.02	0.19	0.83	0.01	0.00	0.01
DERRY ROAD @ TREMAINE ROAD		4-Legged	Signalized	28315	12978	28731	12978	9.04	1.35	7.69	9.07	1.35	7.72	0.04	0.01	0.03
TREMAINE ROAD @ LANDSBOROUGH AVENUE		3-Legged	Signalized	28854	2663	29259	2663	1.85	0.36	1.49	1.86	0.36	1.50	0.01	0.00	0.01
Tremaine Road @ Pringle Ave		3-Legged	Signalized	28854	1090	29259	1090	1.26	0.23	1.02	1.26	0.23	1.03	0.01	0.00	0.01
TREMAINE ROAD @ MAIN STREET WEST		Roundabout		28989	1405	29394	1405	2.28	0.23	2.05	2.30	0.23	2.07	0.02	0.00	0.01
TREMAINE ROAD @ NO 14 SIDE ROAD		3-Legged	Unsignalized	28843	2248	29012	2248	1.22	0.29	0.93	1.23	0.29	0.94	0.00	0.00	0.00

Table B1 - Safety Performance Analysis (2021 Scenario) - Intersections

Site Characteristics			Annual Average Daily Traffic				Predicted Number of Collisions						Difference		
			Background		Total		Background			Total					
Intersection	Configuration	Control Type	$AADT_{Maj}$	$AADT_{Min}$	$AADT_{Maj}$	$AADT_{Min}$	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Ontario Street Corridor															
Ontario Street and Laurier Avenue	4-Legged	Signalized	27304	10562	27349	10562	7.55	1.17	6.38	7.56	1.17	6.38	0.00	0.00	0.00
Ontario Street and Parkway Drive/Centennial Forest Drive	4-Legged	Unsignalized	27304	911	27349	911	0.68	0.21	0.47	0.68	0.21	0.47	0.00	0.00	0.00
Ontario Street and Campbell Avenue	3-Legged	Signalized	27349	1124	27394	1124	1.25	0.23	1.02	1.25	0.23	1.02	0.00	0.00	0.00
Ontario Street and Wakefield Road S	3-Legged	Unsignalized	27731	338	27776	338	0.40	0.09	0.31	0.40	0.09	0.31	0.00	0.00	0.00
Ontario Street and Wakefield Road N	3-Legged	Unsignalized	28450	338	28495	338	0.41	0.10	0.31	0.41	0.10	0.31	0.00	0.00	0.00
Ontario Street and Childs Drive/Oak	4-Legged	Signalized	29551	4989	29596	4989	4.18	0.74	3.44	4.18	0.74	3.44	0.00	0.00	0.00
Ontario Street and Pine Street	3-Legged	Signalized	31090	4989	31135	4989	2.50	0.50	2.00	2.50	0.50	2.00	0.00	0.00	0.00
Ontario Street and Pearl Street	3-Legged	Unsignalized	33158	1529	33214	1529	1.07	0.25	0.81	1.07	0.25	0.81	0.00	0.00	0.00
Ontario Street and Main Street	4-Legged	Signalized	35899	22765	35956	22765	15.34	2.05	13.29	15.35	2.05	13.30	0.01	0.00	0.01
Ontario Street and George Street	3-Legged	Unsignalized	38180	574	38236	574	0.66	0.16	0.50	0.66	0.16	0.50	0.00	0.00	0.00
Ontario Street and Broadway Avenue	3-Legged	Unsignalized	35180	574	35236	574	0.63	0.15	0.48	0.63	0.15	0.48	0.00	0.00	0.00
Ontario Street and Woodward Avenue	4-Legged	Signalized	30517	4967	30574	4967	4.20	0.74	3.46	4.21	0.74	3.46	0.00	0.00	0.00
Ontario Street and Mountainview Drive	3-Legged	Unsignalized	27854	574	27911	574	0.54	0.13	0.42	0.54	0.13	0.42	0.00	0.00	0.00
Ontario Street and Pitfield Road	3-Legged	Unsignalized	29057	574	29113	574	0.56	0.13	0.43	0.56	0.13	0.43	0.00	0.00	0.00
Ontario Street and Ridge Drive	3-Legged	Signalized	26686	574	26854	574	0.93	0.17	0.76	0.93	0.17	0.76	0.00	0.00	0.00
Total							***383.84***	***61.17***	***322.67***	***385.58***	***61.45***	***324.13***	***1.74***	***0.28***	***1.46***

Table B2 - Safety Performance Analysis (2021 Scenario) - Midblock Segments

Site Characteristics				AADT		Predicted Number of Collisions						Difference		
						Background			Total					
Location	Road Type	Number of lanes	Length (m)	Background	Total	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Britannia Corridor														
BRITANNIA ROAD btwn TREMAINE ROAD & Truck Access	Rural	Multi-lane	1206	12147	12562	1.702	0.390	1.312	1.737	0.399	1.338	0.035	0.01	0.03
BRITANNIA ROAD btwn Truck Access & First Line	Rural	Multi-lane	251	12147	12731	0.415	0.081	0.334	0.427	0.084	0.343	0.012	0.00	0.01
BRITANNIA ROAD btwn FIRST LINE & Chretien Street	Urban/Suburban	Multi-lane	178	19607	20192	0.49	0.08	0.41	0.50	0.08	0.42	0.01	0.00	0.01
BRITANNIA ROAD btwn Chretien Street & Leger Way	Suburban	Multi-lane	288	19607	20192	0.78	0.13	0.65	0.80	0.13	0.67	0.02	0.00	0.01
BRITANNIA ROAD btwn Leger Way & Clitherow Street	Suburban	Multi-lane	334	21989	22574	0.98	0.16	0.82	1.00	0.16	0.84	0.02	0.00	0.02
BRITANNIA ROAD btwn Clitherow Street & Farmstead Drive	Suburban	Multi-lane	178	20742	21326	0.51	0.08	0.43	0.52	0.08	0.44	0.01	0.00	0.01
BRITANNIA ROAD btwn Farmstead Drive & Regional Road 25	Suburban	Multi-lane	398	22023	22607	1.17	0.19	0.98	1.19	0.19	1.00	0.02	0.00	0.02
BRITANNIA ROAD btwn REGIONAL ROAD 25 & THOMPSON ROAD SOUTH	Rural	Multi-lane	1400	24326	24742	2.95	0.72	2.23	2.98	0.73	2.25	0.03	0.01	0.02
BRITANNIA ROAD btwn THOMPSON ROAD SOUTH & FOURTH LINE	Rural	Multi-lane	1380	23427	23843	2.85	0.70	2.15	2.88	0.70	2.18	0.03	0.01	0.02
BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY	Rural	Multi-lane	678	21854	22270	1.44	0.33	1.12	1.46	0.33	1.13	0.02	0.00	0.01
BRITANNIA ROAD btwn James Snow Parkway & FIFTH LINE	Rural	Multi-lane	722	28147	28472	1.78	0.41	1.36	1.79	0.42	1.37	0.01	0.00	0.01
BRITANNIA ROAD btwn FIFTH LINE & SIXTH LINE	Rural	Multi-lane	1390	25405	25731	3.01	0.74	2.27	3.03	0.75	2.29	0.02	0.01	0.02
BRITANNIA ROAD btwn SIXTH LINE & TRAFALGAR ROAD	Rural	Multi-lane	1384	24720	25045	2.95	0.72	2.23	2.97	0.73	2.24	0.02	0.01	0.02
BRITANNIA ROAD btwn TRAFALGAR ROAD & Eight Line	Rural	Multi-lane	1370	23708	23899	2.85	0.70	2.15	2.86	0.70	2.16	0.01	0.00	0.01
BRITANNIA ROAD btwn Eight Line & Exit Britannia Road Off Ramp Highway 407	Rural	Multi-lane	848	23708	23899	1.85	0.43	1.42	1.86	0.43	1.43	0.01	0.00	0.01
Derry Road Corridor														
DERRY ROAD btwn TREMAINE ROAD & SAVOLINE BOULEVARD	Urban	Multi-lane	350	12248	12248	0.95	0.14	0.81	0.95	0.14	0.81	0.00	0.00	0.00
DERRY ROAD btwn SAVOLINE BOULEVARD & Scott Boulevard	Urban	Multi-lane	516	10630	10630	1.22	0.19	1.04	1.22	0.19	1.04	0.00	0.00	0.00
DERRY ROAD btwn SCOTT BOULEVARD & Bronte St	Urban	Multi-lane	376	19304	19304	1.54	0.21	1.33	1.54	0.21	1.33	0.00	0.00	0.00
DERRY ROAD btwn BRONTE STREET SOUTH & FARMSTEAD DRIVE	Urban	Multi-lane	489	17371	17371	1.82	0.25	1.57	1.82	0.25	1.57	0.00	0.00	0.00
DERRY ROAD btwn FARMSTEAD DRIVE & COMMERCIAL STREET	Urban	Multi-lane	407	19944	19944	1.71	0.23	1.48	1.71	0.23	1.48	0.00	0.00	0.00
DERRY ROAD btwn COMMERCIAL STREET & REGIONAL ROAD 25	Urban	Multi-lane	490	30899	30899	3.08	0.38	2.70	3.08	0.38	2.70	0.00	0.00	0.00
DERRY ROAD btwn REGIONAL ROAD 25 & HOLLY AVENUE	Urban	Multi-lane	706	29888	29922	4.30	0.53	3.77	4.30	0.53	3.77	0.00	0.00	0.00
DERRY ROAD btwn HOLLY AVENUE & THOMPSON ROAD SOUTH	Urban	Multi-lane	678	26529	26562	3.70	0.47	3.23	3.71	0.47	3.24	0.00	0.00	0.00
DERRY ROAD btwn THOMPSON ROAD SOUTH & MILLER WAY	Urban	Multi-lane	678	30304	30338	4.18	0.52	3.67	4.19	0.52	3.67	0.00	0.00	0.00
DERRY ROAD btwn MILLER WAY & FOURTH LINE	Urban	Multi-lane	698	29090	29124	4.15	0.52	3.63	4.15	0.52	3.64	0.00	0.00	0.00
DERRY ROAD btwn SAUVE STREET & Fourth Line	Urban	Multi-lane	241	25079	25113	1.25	0.16	1.09	1.25	0.16	1.09	0.00	0.00	0.00
DERRY ROAD btwn FOURTH LINE & TRUDEAU DRIVE	Urban	Multi-lane	303	30967	31000	1.91	0.23	1.67	1.91	0.23	1.67	0.00	0.00	0.00
DERRY ROAD btwn TRUDEAU DRIVE & JAMES SNOW PARKWAY	Urban	Multi-lane	379	34102	34135	2.60	0.31	2.29	2.61	0.31	2.29	0.00	0.00	0.00
DERRY ROAD btwn JAMES SNOW PARKWAY & FIFTH LINE	Rural	Multi-lane	701	34720	34753	2.85	0.45	2.40	2.85	0.45	2.40	0.00	0.00	0.00
DERRY ROAD btwn FIFTH LINE & SIXTH LINE	Rural	Multi-lane	1277	38495	38529	5.52	0.88	4.64	5.52	0.88	4.64	0.00	0.00	0.00
DERRY ROAD btwn SIXTH LINE & TRAFALGAR ROAD	Rural	Multi-lane	1507	35394	35427	6.09	0.98	5.11	6.10	0.99	5.11	0.00	0.00	0.00
DERRY ROAD btwn TRAFALGAR ROAD & Eight Line	Rural	Multi-lane	1373	32472	32506	5.21	0.85	4.37	5.22	0.85	4.37	0.00	0.00	0.00
Derry ROAD btwn Eight Line & Exit Derry Road Off Ramp Highway 407	Rural	Multi-lane	848	32506	32506	3.26	0.52	2.74	3.26	0.52	2.74	0.00	0.00	0.00
JSP Corridor														
JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE	Rural	2	1530	15843	15933	2.47	0.59	1.88	2.48	0.59	1.89	0.01	0.00	0.01
JAMES SNOW PARKWAY SOUTH btwn LOUIS ST LAURENT AVENUE & CLARK BOULEVARD	Suburban	2	686	15742	15832	3.83	0.22	3.60	3.84	0.22	3.62	0.01	0.00	0.01
JAMES SNOW PARKWAY SOUTH btwn CLARK BOULEVARD & DERRY ROAD	Suburban	2	872	15618	15708	5.11	0.31	4.81	5.13	0.31	4.82	0.02	0.00	0.02
JAMES SNOW PARKWAY SOUTH btwn DERRY ROAD & WALDIE AVENUE	Urban	Multi-lane	442	23877	23967	2.19	0.28	1.91	2.20	0.28	1.92	0.01	0.00	0.01
JAMES SNOW PARKWAY SOUTH btwn WALDIE AVENUE & Trudeau Drive	Urban	Multi-lane	542	28596	28686	3.17	0.40	2.77	3.18	0.40	2.78	0.01	0.00	0.01
JAMES SNOW PARKWAY SOUTH btwn Trudeau Drive & MAIN STREET EAST	Suburban	Multi-lane	1010	29472	29562	3.59	0.58	3.01	3.60	0.58	3.02	0.01	0.00	0.01
JAMES SNOW PARKWAY NORTH btwn MAIN STREET EAST & EXIT 324 ON RAMP HIGHWAY 401 (1148360)	Suburban	Multi-lane	508	39135	39225	2.28	0.36	1.92	2.28	0.36	1.93	0.00	0.00	0.00
JAMES SNOW PARKWAY NORTH btwn EXIT 324 ON RAMP HIGHWAY 401 & EXIT 324 OFF RAMP HIGHWAY 401 (1069210)	Suburban	Multi-lane	182	39135	39225	0.84	0.13	0.71	0.84	0.13	0.71	0.00	0.00	0.00

Table B2 - Safety Performance Analysis (2021 Scenario) - Midblock Segments

Site Characteristics				AADT		Predicted Number of Collisions						Difference		
						Background			Total					
Location	Road Type	Number of lanes	Length (m)	Background	Total	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Martin St Corridor														
MARTIN STREET btwn STEELES AVENUE & MARKET DRIVE	Urban	Multi-lane	553	29832	29933	3.36	0.42	2.95	3.37	0.42	2.96	0.01	0.00	0.01
MARTIN STREET btwn MARKET DRIVE & CHISHOLM DRIVE	Urban	Multi-lane	247	29832	29933	1.50	0.19	1.32	1.51	0.19	1.32	0.00	0.00	0.00
MARTIN STREET btwn CHISHOLM DRIVE & EXIT 320 ON RAMP HIGHWAY 401	Urban	Multi-lane	202	29832	29933	1.23	0.15	1.08	1.23	0.15	1.08	0.00	0.00	0.00
MARTIN STREET btwn EXIT 320 OFF RAMP HIGHWAY 401 & EXIT 320 ON RAMP HIGHWAY 401	Urban	Multi-lane	320	29832	29933	1.95	0.24	1.70	1.95	0.24	1.71	0.01	0.00	0.01
Regional Road 25 Corridor														
REGIONAL ROAD 25 btwn LOUIS ST LAURENT AVENUE & DERRY ROAD	Suburban	Multi-lane	1540	21349	21427	4.26	0.71	3.55	4.27	0.71	3.56	0.01	0.00	0.01
REGIONAL ROAD 25 btwn LOUIS ST LAURENT AVENUE & Whitlock Ave	Suburban	Multi-lane	511	21349	21427	1.45	0.24	1.22	1.46	0.24	1.22	0.00	0.00	0.00
REGIONAL ROAD 25 btwn Whitlock Ave & Etheridge Avenue	Suburban	Multi-lane	711	32529	32607	2.75	0.44	2.31	2.76	0.44	2.32	0.00	0.00	0.00
REGIONAL ROAD 25 btwn BRITANNIA ROAD & Etherridge	Rural	Multi-lane	305	32529	32607	1.21	0.19	1.02	1.21	0.19	1.02	0.00	0.00	0.00
REGIONAL ROAD 25 btwn LOWER BASE LINE & BRITANNIA ROAD	Rural	Multi-lane	3094	35618	35708	12.33	2.03	10.30	12.36	2.03	10.32	0.02	0.00	0.02
REGIONAL ROAD 25 btwn HENDERSON ROAD & LOWER BASE LINE	Rural	Multi-lane	1381	39765	39854	6.11	0.98	5.13	6.12	0.98	5.14	0.01	0.00	0.01
REGIONAL ROAD 25 btwn BURNHAMTHORPE ROAD WEST & HENDERSON ROAD	Rural	Multi-lane	875	40113	40203	3.94	0.62	3.32	3.95	0.62	3.32	0.01	0.00	0.01
REGIONAL ROAD 25 btwn EXIT BRONTE ROAD OFF RAMP HIGHWAY 407 & BURNHAMTHORPE ROAD WEST	Rural	Multi-lane	409	40113	40203	1.88	0.29	1.59	1.88	0.29	1.59	0.00	0.00	0.00
REGIONAL ROAD 25 btwn EXIT BRONTE ROAD ON RAMP HIGHWAY 407 & EXIT BRONTE ROAD ON RAMP HIGHWAY 407	Urban	Multi-lane	65	40113	40203	0.52	0.06	0.46	0.52	0.06	0.46	0.00	0.00	0.00
REGIONAL ROAD 25 btwn EXIT BRONTE ROAD OFF RAMP HIGHWAY 407 & EXIT BRONTE ROAD ON RAMP HIGHWAY 407	Urban	Multi-lane	164	40113	40203	1.31	0.15	1.15	1.31	0.15	1.16	0.00	0.00	0.00
REGIONAL ROAD 25 btwn EXIT BRONTE ROAD ON RAMP HIGHWAY 407 & EXIT BRONTE ROAD OFF RAMP HIGHWAY 407	Urban	Multi-lane	175	40113	40203	1.39	0.16	1.23	1.40	0.16	1.23	0.00	0.00	0.00
REGIONAL ROAD 25 btwn OLD BRONTE ROAD & EXIT BRONTE ROAD ON RAMP HIGHWAY 407	Urban	Multi-lane	591	40113	40203	4.71	0.55	4.16	4.72	0.55	4.17	0.01	0.00	0.01
REGIONAL ROAD 25 btwn DUNDAS STREET WEST & OLD BRONTE ROAD	Urban	Multi-lane	594	44192	44281	5.17	0.59	4.57	5.18	0.59	4.58	0.01	0.00	0.01
Steeles Corridor														
STEELES AVENUE WEST btwn Termaine Road & PERU ROAD	Rural	Multi-lane	580	9326	9383	0.88	0.15	0.73	0.89	0.15	0.73	0.00	0.00	0.00
STEELES AVENUE WEST btwn PERU ROAD & INDUSTRIAL DRIVE	Urban	Multi-lane	682	11304	11360	1.71	0.26	1.46	1.72	0.26	1.46	0.01	0.00	0.01
STEELES AVENUE WEST btwn INDUSTRIAL DRIVE & BRONTE STREET NORTH	Urban	Multi-lane	175	11304	11360	0.44	0.07	0.37	0.44	0.07	0.38	0.00	0.00	0.00
STEELES AVENUE EAST btwn BRONTE STREET NORTH & MOROBEL DRIVE	Urban	Multi-lane	276	16495	16551	0.98	0.14	0.84	0.98	0.14	0.84	0.00	0.00	0.00
STEELES AVENUE EAST btwn MOROBEL DRIVE & CHRIS HADFIELD WAY	Urban	Multi-lane	247	21686	21742	1.12	0.15	0.97	1.13	0.15	0.98	0.00	0.00	0.00
STEELES AVENUE EAST btwn CHRIS HADFIELD WAY & MARTIN STREET	Urban	Multi-lane	147	21686	21742	0.67	0.09	0.58	0.67	0.09	0.58	0.00	0.00	0.00
STEELES AVENUE EAST btwn MARTIN STREET & GLENN CRESCENT	Urban	Multi-lane	205	25000	25045	1.06	0.14	0.92	1.06	0.14	0.93	0.00	0.00	0.00
STEELES AVENUE EAST btwn GLENN CRESCENT & WHEELABRATOR WAY	Urban	Multi-lane	176	25450	25495	0.93	0.12	0.81	0.93	0.12	0.81	0.00	0.00	0.00
STEELES AVENUE EAST btwn WHEELABRATOR WAY & ONTARIO STREET NORTH	Urban	Multi-lane	326	25899	25944	1.74	0.22	1.52	1.74	0.22	1.52	0.00	0.00	0.00
TRAFALGAR ROAD btwn BRITANNIA ROAD & DERRY ROAD	Rural	Multi-lane	3088	27922	28057	10.25	1.71	8.54	10.29	1.72	8.57	0.04	0.01	0.03
TRAFALGAR ROAD btwn DERRY ROAD & Auburn	Rural	Multi-lane	1876	19102	19236	4.74	0.80	3.94	4.77	0.81	3.96	0.02	0.00	0.02
TRAFALGAR ROAD btwn AUBURN ROAD & EXIT 328 OFF RAMP HIGHWAY 401	Rural	Multi-lane	324	19259	19394	0.86	0.14	0.72	0.87	0.14	0.73	0.00	0.00	0.00
TRAFALGAR ROAD btwn EXIT 328 ON RAMP HIGHWAY 401 & EXIT 328 ON RAMP HIGHWAY 401	Rural	Multi-lane	123	19259	19394	0.34	0.05	0.28	0.34	0.05	0.28	0.00	0.00	0.00
TRAFALGAR ROAD btwn EXIT 328 ON RAMP HIGHWAY 401 & EXIT 328 ON RAMP HIGHWAY 401	Rural	Multi-lane	140	19259	19394	0.38	0.06	0.32	0.38	0.06	0.32	0.00	0.00	0.00
TRAFALGAR ROAD btwn EXIT 328 OFF RAMP HIGHWAY 401 & STEELES AVENUE	Rural	Multi-lane	356	19259	19394	0.95	0.15	0.79	0.95	0.15	0.80	0.00	0.00	0.00

Table B2 - Safety Performance Analysis (2021 Scenario) - Midblock Segments

Site Characteristics				AADT		Predicted Number of Collisions						Difference		
						Background			Total					
Location	Road Type	Number of lanes	Length (m)	Background	Total	All	Severe	PDO	All	Severe	PDO	All	Severe	PDO
Tremaine Corridor														
TREMAINE ROAD btwn BRITANNIA ROAD & Louis Saint-Laurent	Rural	Multi-lane	1510	19551	19967	3.91	0.66	3.25	3.97	0.67	3.31	0.06	0.01	0.05
TREMAINE ROAD btwn Louis Saint-Laurent & DYMOTT AVENUE	Suburban	Multi-lane	430	21978	22394	1.26	0.20	1.05	1.27	0.20	1.07	0.02	0.00	0.02
TREMAINE ROAD btwn DYMOTT AVENUE & DERRY ROAD	Suburban	Multi-lane	1140	24383	24798	3.51	0.58	2.93	3.55	0.58	2.97	0.04	0.01	0.04
TREMAINE ROAD btwn DERRY ROAD & LANDSBOROUGH AVENUE	Suburban	Multi-lane	432	29045	29450	1.55	0.25	1.31	1.57	0.25	1.32	0.02	0.00	0.01
TREMAINE ROAD btwn LANDSBOROUGH AVENUE & Pringle Avenue	Suburban	Multi-lane	431	29057	29461	1.55	0.25	1.31	1.57	0.25	1.32	0.02	0.00	0.01
TREMAINE ROAD btwn PRINGLE AVENUE & MAIN STREET WEST	Suburban	Multi-lane	973	29045	29450	3.43	0.55	2.87	3.46	0.56	2.90	0.04	0.01	0.03
TREMAINE ROAD btwn MAIN STREET WEST & NO 14 SIDE ROAD	Rural	Multi-lane	26	28203	28607	0.10	0.01	0.08	0.10	0.01	0.08	0.00	0.00	0.00
TREMAINE ROAD btwn NO 14 SIDE ROAD & Steeles Avenue	Rural	Multi-lane	1226	30843	31248	4.49	0.73	3.76	4.54	0.74	3.80	0.04	0.01	0.04
Tremaine Rd from Britannia Rd to Employee Access Not part of proposed truck routes.	Rural	2	1980	18652	18821	3.438	0.856	2.582	3.456	0.861	2.595	0.02	0.01	0.01
Tremaine Rd from Site Access to Lower Base Line	Rural	2	1145	18652	18708	2.101	0.495	1.606	2.105	0.496	1.609	0.00	0.00	0.00
Ontario Street														
ONTARIO STREET SOUTH btwn DERRY ROAD & LAURIER AVENUE	Urban	Multi-lane	216	27304	27349	1.21	0.15	1.06	1.21	0.15	1.06	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn LAURIER AVENUE & CENTENNIAL FOREST DRIVE	Urban	Multi-lane	610	27304	27349	3.42	0.43	2.99	3.43	0.43	2.99	0.01	0.00	0.00
ONTARIO STREET SOUTH btwn CENTENNIAL FOREST DRIVE & Donald Campbell Avenue	Urban	Multi-lane	210	27304	27349	1.18	0.15	1.03	1.18	0.15	1.03	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn DONALD CAMPBELL AVENUE & WAKEFIELD ROAD	Urban	Multi-lane	241	27641	27686	1.37	0.17	1.20	1.37	0.17	1.20	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn WAKEFIELD ROAD & WAKEFIELD ROAD	Urban	Multi-lane	220	27978	28023	1.26	0.16	1.10	1.26	0.16	1.11	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn WAKEFIELD ROAD & CHILDS DRIVE/Oak Street	Urban	Multi-lane	241	28293	28338	1.40	0.17	1.22	1.40	0.17	1.22	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn OAK STREET & PINE STREET	Urban	Multi-lane	68	28630	28675	0.40	0.05	0.35	0.40	0.05	0.35	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn PINE STREET & Pearl Street	Urban	Multi-lane	93	28956	29000	0.55	0.07	0.48	0.55	0.07	0.48	0.00	0.00	0.00
ONTARIO STREET SOUTH btwn PEARL STREET & MAIN STREET EAST	Urban	Multi-lane	98	29281	29326	0.59	0.07	0.51	0.59	0.07	0.51	0.00	0.00	0.00
ONTARIO STREET NORTH btwn MAIN STREET EAST & GEORGE STREET	Urban	Multi-lane	348	29607	29652	2.10	0.26	1.84	2.10	0.26	1.84	0.00	0.00	0.00
ONTARIO STREET NORTH btwn GEORGE STREET & Broadway Avenue	Urban	Multi-lane	104	27967	28012	0.60	0.07	0.52	0.60	0.07	0.52	0.00	0.00	0.00
ONTARIO STREET NORTH btwn Broadway Avenue & Woodward	Urban	Multi-lane	103	26315	26360	0.56	0.07	0.49	0.56	0.07	0.49	0.00	0.00	0.00
ONTARIO STREET NORTH btwn Woodward Avenue & Mountainview Drive	Urban	Multi-lane	90	24663	24708	0.46	0.06	0.40	0.46	0.06	0.40	0.00	0.00	0.00
ONTARIO STREET NORTH btwn Mountainview Drive & Pitfield Road	Urban	Multi-lane	283	25675	25720	1.50	0.19	1.31	1.50	0.19	1.31	0.00	0.00	0.00
ONTARIO STREET NORTH btwn Pitfield Road & Ridge Drive	Urban	Multi-lane	80	25675	25720	0.42	0.05	0.37	0.42	0.05	0.37	0.00	0.00	0.00
ONTARIO STREET NORTH btwn RIDGE DRIVE & STEELES AVENUE	Urban	Multi-lane	252	27675	27720	1.43	0.18	1.25	1.43	0.18	1.25	0.00	0.00	0.00
Total						***224.89***	***34.32***	***190.57***	***225.77***	***34.46***	***191.30***	***0.88***	***0.15***	***0.73***

March 22, 2019

ATTACHMENT IR8.9-1
ROAD TRAFFIC NOISE PREDICTIONS

STAMSON CALCULATIONS

2016 Traffic Predictions (Year 2021 and 2031)

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:37:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1_b.te Time Period: Day/Night 16/8 hours
Description: Britannia East of First Line (2021-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 15372/1708 veh/TimePeriod
Medium truck volume : 297/33 veh/TimePeriod
Heavy truck volume : 504/56 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.33 m

ROAD (0.00 + 62.79 + 0.00) = 62.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.32	0.00	-7.07	-1.46	0.00	0.00	0.00	62.79

Segment Leq : 62.79 dBA

Total Leq All Segments: 62.79 dBA

Results segment # 1: Segment I (night)

Source height = 1.33 m

ROAD (0.00 + 56.26 + 0.00) = 56.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	64.79	0.00	-7.07	-1.46	0.00	0.00	0.00	56.26

Segment Leq : 56.26 dBA

Total Leq All Segments: 56.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.79
(NIGHT): 56.26

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:39:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1_t.te Time Period: Day/Night 16/8 hours
Description: Britannia East of First Line (2021-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 15372/1708 veh/TimePeriod
Medium truck volume : 297/33 veh/TimePeriod
Heavy truck volume : 1232/262 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.64 m

ROAD (0.00 + 65.06 + 0.00) = 65.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.57	0.00	-7.05	-1.45	0.00	0.00	0.00	65.06

Segment Leq : 65.06 dBA

Total Leq All Segments: 65.06 dBA

Results segment # 1: Segment I (night)

Source height = 1.90 m

ROAD (0.00 + 60.68 + 0.00) = 60.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	69.14	0.00	-7.02	-1.44	0.00	0.00	0.00	60.68

Segment Leq : 60.68 dBA

Total Leq All Segments: 60.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.06
(NIGHT): 60.68

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:40:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s2_b.te Time Period: Day/Night 16/8 hours
Description: Britannia East of Tremaine Road (2021-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 9842/1093 veh/TimePeriod
Medium truck volume : 248/28 veh/TimePeriod
Heavy truck volume : 368/41 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.37 m

ROAD (0.00 + 61.25 + 0.00) = 61.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.78	0.00	-7.07	-1.46	0.00	0.00	0.00	61.25

Segment Leq : 61.25 dBA

Total Leq All Segments: 61.25 dBA

Results segment # 1: Segment II (night)

Source height = 1.37 m

ROAD (0.00 + 54.74 + 0.00) = 54.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.26	0.00	-7.07	-1.46	0.00	0.00	0.00	54.74

Segment Leq : 54.74 dBA

Total Leq All Segments: 54.74 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.25
(NIGHT): 54.74

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:41:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s2_t.te Time Period: Day/Night 16/8 hours
Description: Britannia East of Tremaine Road (2021-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 9842/1093 veh/TimePeriod
Medium truck volume : 248/28 veh/TimePeriod
Heavy truck volume : 893/184 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.69 m

ROAD (0.00 + 63.58 + 0.00) = 63.58 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.65 72.08 0.00 -7.05 -1.45 0.00 0.00 0.00 63.58

Segment Leq : 63.58 dBA

Total Leq All Segments: 63.58 dBA

Results segment # 1: Segment II (night)

Source height = 1.94 m

ROAD (0.00 + 59.13 + 0.00) = 59.13 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.65 67.58 0.00 -7.02 -1.43 0.00 0.00 0.00 59.13

Segment Leq : 59.13 dBA

Total Leq All Segments: 59.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.58
(NIGHT): 59.13

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:42:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s3_b.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Britannia Road (2021-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 15157/1684 veh/TimePeriod
Medium truck volume : 396/44 veh/TimePeriod
Heavy truck volume : 440/49 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.29 m

ROAD (0.00 + 63.47 + 0.00) = 63.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.93	0.00	-5.00	-1.46	0.00	0.00	0.00	63.47

Segment Leq : 63.47 dBA

Total Leq All Segments: 63.47 dBA

Results segment # 1: Segment III (night)

Source height = 1.29 m

ROAD (0.00 + 56.95 + 0.00) = 56.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.40	0.00	-5.00	-1.46	0.00	0.00	0.00	56.95

Segment Leq : 56.95 dBA

Total Leq All Segments: 56.95 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.47
(NIGHT): 56.95

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:43:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s3_t.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Britannia Road (2021-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 15157/1684 veh/TimePeriod
Medium truck volume : 396/44 veh/TimePeriod
Heavy truck volume : 965/192 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.55 m

ROAD (0.00 + 65.40 + 0.00) = 65.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.84	0.00	-4.99	-1.45	0.00	0.00	0.00	65.40

Segment Leq : 65.40 dBA

Total Leq All Segments: 65.40 dBA

Results segment # 1: Segment III (night)

Source height = 1.78 m

ROAD (0.00 + 60.71 + 0.00) = 60.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	67.12	0.00	-4.97	-1.44	0.00	0.00	0.00	60.71

Segment Leq : 60.71 dBA

Total Leq All Segments: 60.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.40
(NIGHT): 60.71

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:54:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s11_b.te Time Period: Day/Night 16/8 hours
Description: Britannia East of First Line (2031-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 17785/1975 veh/TimePeriod
Medium truck volume : 345/39 veh/TimePeriod
Heavy truck volume : 518/58 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.29 m

ROAD (0.00 + 63.19 + 0.00) = 63.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.72	0.00	-7.07	-1.46	0.00	0.00	0.00	63.19

Segment Leq : 63.19 dBA

Total Leq All Segments: 63.19 dBA

Results segment # 1: Segment I (night)

Source height = 1.29 m

ROAD (0.00 + 56.68 + 0.00) = 56.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.21	0.00	-7.07	-1.46	0.00	0.00	0.00	56.68

Segment Leq : 56.68 dBA

Total Leq All Segments: 56.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.19
(NIGHT): 56.68

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:57:01 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s11_t.te Time Period: Day/Night 16/8 hours
Description: Britannia East of First Line (2031-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment I (day/night) ----------
Car traffic volume : 17785/1975 veh/TimePeriod
Medium truck volume : 345/39 veh/TimePeriod
Heavy truck volume : 1246/264 veh/TimePeriod

Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.59 m

ROAD (0.00 + 65.30 + 0.00) = 65.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.81	0.00	-7.06	-1.45	0.00	0.00	0.00	65.30

Segment Leq : 65.30 dBA

Total Leq All Segments: 65.30 dBA

Results segment # 1: Segment I (night)

Source height = 1.85 m

ROAD (0.00 + 60.83 + 0.00) = 60.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	69.30	0.00	-7.03	-1.44	0.00	0.00	0.00	60.83

Segment Leq : 60.83 dBA

Total Leq All Segments: 60.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.30
(NIGHT): 60.83

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:59:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s22_b.te Time Period: Day/Night 16/8 hours
Description: Britannia East of Tremaine Road (2031-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 12131/1347 veh/TimePeriod
Medium truck volume : 301/34 veh/TimePeriod
Heavy truck volume : 366/41 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.30 m

ROAD (0.00 + 61.72 + 0.00) = 61.72 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 70.25 0.00 -7.07 -1.46 0.00 0.00 0.00 61.72

Segment Leq : 61.72 dBA

Total Leq All Segments: 61.72 dBA

Results segment # 1: Segment II (night)

Source height = 1.30 m

ROAD (0.00 + 55.22 + 0.00) = 55.22 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90	90	0.66	63.74	0.00	-7.07	-1.46	0.00	0.00	0.00	55.22

Segment Leq : 55.22 dBA

Total Leq All Segments: 55.22 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.72
(NIGHT): 55.22

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:59:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s22_t.te Time Period: Day/Night 16/8 hours
Description: Britannia East of Tremaine Road (2031-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 12131/1347 veh/TimePeriod
Medium truck volume : 301/34 veh/TimePeriod
Heavy truck volume : 891/184 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.61 m

ROAD (0.00 + 63.85 + 0.00) = 63.85 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.36 0.00 -7.06 -1.45 0.00 0.00 0.00 63.85

Segment Leq : 63.85 dBA

Total Leq All Segments: 63.85 dBA

Results segment # 1: Segment II (night)

Source height = 1.85 m

ROAD (0.00 + 59.30 + 0.00) = 59.30 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90	90	0.65	67.76	0.00	-7.03	-1.44	0.00	0.00	0.00	59.30

Segment Leq : 59.30 dBA

Total Leq All Segments: 59.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.85
(NIGHT): 59.30

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:01:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s33_b.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Britannia Road (2031-2016 Prediction) - Without Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 19484/2164 veh/TimePeriod
Medium truck volume : 490/55 veh/TimePeriod
Heavy truck volume : 429/48 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.20 m

ROAD (0.00 + 64.02 + 0.00) = 64.02 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 70.48 0.00 -5.00 -1.46 0.00 0.00 0.00 64.02

Segment Leq : 64.02 dBA

Total Leq All Segments: 64.02 dBA

Results segment # 1: Segment III (night)

Source height = 1.21 m

ROAD (0.00 + 57.51 + 0.00) = 57.51 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -5.00 -1.46 0.00 0.00 0.00 57.51

Segment Leq : 57.51 dBA

Total Leq All Segments: 57.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.02
(NIGHT): 57.51

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:01:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s33_t.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Britannia Road (2031-2016 Prediction) - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 19484/2164 veh/TimePeriod
Medium truck volume : 490/55 veh/TimePeriod
Heavy truck volume : 954/191 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.46 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.20	0.00	-5.00	-1.46	0.00	0.00	0.00	65.75

Segment Leq : 65.75 dBA

Total Leq All Segments: 65.75 dBA

Results segment # 1: Segment III (night)

Source height = 1.68 m

ROAD (0.00 + 60.94 + 0.00) = 60.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	67.37	0.00	-4.98	-1.45	0.00	0.00	0.00	60.94

Segment Leq : 60.94 dBA

Total Leq All Segments: 60.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.75
(NIGHT): 60.94

STAMSON CALCULATIONS

2017 Traffic Predictions (Year 2021 and 2031)

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:47:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s111_b.te Time Period: Day/Night 16/8 hours
Description: Britannia East of First Line (2021-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 18573/2063 veh/TimePeriod
Medium truck volume : 557/62 veh/TimePeriod
Heavy truck volume : 643/72 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.34 m

ROAD (0.00 + 63.95 + 0.00) = 63.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.48	0.00	-7.07	-1.46	0.00	0.00	0.00	63.95

Segment Leq : 63.95 dBA

Total Leq All Segments: 63.95 dBA

Results segment # 1: Segment I (night)

Source height = 1.35 m

ROAD (0.00 + 57.44 + 0.00) = 57.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.97	0.00	-7.07	-1.46	0.00	0.00	0.00	57.44

Segment Leq : 57.44 dBA

Total Leq All Segments: 57.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.95
(NIGHT): 57.44

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:48:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s111_t.te Time Period: Day/Night 16/8 hours
Description: Brittania East of First Line (2021-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 18573/2063 veh/TimePeriod
Medium truck volume : 557/62 veh/TimePeriod
Heavy truck volume : 1371/279 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.61 m

ROAD (0.00 + 65.79 + 0.00) = 65.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	74.29	0.00	-7.06	-1.45	0.00	0.00	0.00	65.79

Segment Leq : 65.79 dBA

Total Leq All Segments: 65.79 dBA

Results segment # 1: Segment I (night)

Source height = 1.85 m

ROAD (0.00 + 61.16 + 0.00) = 61.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	69.62	0.00	-7.03	-1.44	0.00	0.00	0.00	61.16

Segment Leq : 61.16 dBA

Total Leq All Segments: 61.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.79
(NIGHT): 61.16

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:49:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s222_b.te Time Period: Day/Night 16/8 hours
Description: Brittania East of Tremaine Road (2021-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 13336/1480 veh/TimePeriod
Medium truck volume : 415/47 veh/TimePeriod
Heavy truck volume : 442/50 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.33 m

ROAD (0.00 + 62.45 + 0.00) = 62.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.98	0.00	-7.07	-1.46	0.00	0.00	0.00	62.45

Segment Leq : 62.45 dBA

Total Leq All Segments: 62.45 dBA

Results segment # 1: Segment II (night)

Source height = 1.33 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	64.49	0.00	-7.07	-1.46	0.00	0.00	0.00	55.97

Segment Leq : 55.97 dBA

Total Leq All Segments: 55.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.45
(NIGHT): 55.97

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:50:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s222_t.te Time Period: Day/Night 16/8 hours
Description: Brittania East of Tremaine Road (2021-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 13336/1480 veh/TimePeriod
Medium truck volume : 415/47 veh/TimePeriod
Heavy truck volume : 967/193 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.60 m

ROAD (0.00 + 64.31 + 0.00) = 64.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.82	0.00	-7.06	-1.45	0.00	0.00	0.00	64.31

Segment Leq : 64.31 dBA

Total Leq All Segments: 64.31 dBA

Results segment # 1: Segment II (night)

Source height = 1.83 m

ROAD (0.00 + 59.61 + 0.00) = 59.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	68.07	0.00	-7.03	-1.44	0.00	0.00	0.00	59.61

Segment Leq : 59.61 dBA

Total Leq All Segments: 59.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.31
(NIGHT): 59.61

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:51:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s333_b.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Brittania Road (2021-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 18175/2019 veh/TimePeriod
Medium truck volume : 557/62 veh/TimePeriod
Heavy truck volume : 447/50 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.24 m

ROAD (0.00 + 64.05 + 0.00) = 64.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.50	0.00	-5.00	-1.46	0.00	0.00	0.00	64.05

Segment Leq : 64.05 dBA

Total Leq All Segments: 64.05 dBA

Results segment # 1: Segment III (night)

Source height = 1.24 m

ROAD (0.00 + 57.53 + 0.00) = 57.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.99	0.00	-5.00	-1.46	0.00	0.00	0.00	57.53

Segment Leq : 57.53 dBA

Total Leq All Segments: 57.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.05
(NIGHT): 57.53

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 12:51:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s333_t.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Brittania Road (2021-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 18175/2019 veh/TimePeriod
Medium truck volume : 557/62 veh/TimePeriod
Heavy truck volume : 972/193 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.49 m

ROAD (0.00 + 65.77 + 0.00) = 65.77 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.22 0.00 -5.00 -1.46 0.00 0.00 0.00 65.77

Segment Leq : 65.77 dBA

Total Leq All Segments: 65.77 dBA

Results segment # 1: Segment III (night)

Source height = 1.71 m

ROAD (0.00 + 60.95 + 0.00) = 60.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.65 67.38 0.00 -4.98 -1.45 0.00 0.00 0.00 60.95

Segment Leq : 60.95 dBA

Total Leq All Segments: 60.95 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.77
(NIGHT): 60.95

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:04:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1111_b.te Time Period: Day/Night 16/8 hours
Description: Brittania East of First Line (2031-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 22893/2542 veh/TimePeriod
Medium truck volume : 632/71 veh/TimePeriod
Heavy truck volume : 613/69 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.26 m

ROAD (0.00 + 64.33 + 0.00) = 64.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.86	0.00	-7.07	-1.46	0.00	0.00	0.00	64.33

Segment Leq : 64.33 dBA

Total Leq All Segments: 64.33 dBA

Results segment # 1: Segment I (night)

Source height = 1.27 m

ROAD (0.00 + 57.83 + 0.00) = 57.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	66.36	0.00	-7.07	-1.46	0.00	0.00	0.00	57.83

Segment Leq : 57.83 dBA

Total Leq All Segments: 57.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.33
(NIGHT): 57.83

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:05:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1111_t.te Time Period: Day/Night 16/8 hours
Description:Brittania East of First Line (2031-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment I (day/night)

Car traffic volume : 22893/2542 veh/TimePeriod
Medium truck volume : 632/71 veh/TimePeriod
Heavy truck volume : 1341/275 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment I (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment I (day)

Source height = 1.52 m

ROAD (0.00 + 66.02 + 0.00) = 66.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	74.55	0.00	-7.07	-1.46	0.00	0.00	0.00	66.02

Segment Leq : 66.02 dBA

Total Leq All Segments: 66.02 dBA

Results segment # 1: Segment I (night)

Source height = 1.76 m

ROAD (0.00 + 61.30 + 0.00) = 61.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	69.78	0.00	-7.04	-1.44	0.00	0.00	0.00	61.30

Segment Leq : 61.30 dBA

Total Leq All Segments: 61.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.02
(NIGHT): 61.30

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:06:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s2222_b.te Time Period: Day/Night 16/8 hours
Description: Brittania East of Tremaine Road (2031-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 17907/1989 veh/TimePeriod
Medium truck volume : 508/57 veh/TimePeriod
Heavy truck volume : 413/46 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.22 m

ROAD (0.00 + 63.04 + 0.00) = 63.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.56	0.00	-7.07	-1.46	0.00	0.00	0.00	63.04

Segment Leq : 63.04 dBA

Total Leq All Segments: 63.04 dBA

Results segment # 1: Segment II (night)

Source height = 1.22 m

ROAD (0.00 + 56.51 + 0.00) = 56.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.04	0.00	-7.07	-1.46	0.00	0.00	0.00	56.51

Segment Leq : 56.51 dBA

Total Leq All Segments: 56.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.04
(NIGHT): 56.51

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:07:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s2222_t.te Time Period: Day/Night 16/8 hours
Description: Brittania East of Tremaine Road (2031-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 17907/1989 veh/TimePeriod
Medium truck volume : 508/57 veh/TimePeriod
Heavy truck volume : 938/189 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.48 m

ROAD (0.00 + 64.68 + 0.00) = 64.68 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 73.21 0.00 -7.07 -1.46 0.00 0.00 0.00 64.68

Segment Leq : 64.68 dBA

Total Leq All Segments: 64.68 dBA

Results segment # 1: Segment II (night)

Source height = 1.71 m

ROAD (0.00 + 59.83 + 0.00) = 59.83 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.65 68.32 0.00 -7.04 -1.45 0.00 0.00 0.00 59.83

Segment Leq : 59.83 dBA

Total Leq All Segments: 59.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.68
(NIGHT): 59.83

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:08:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s3333_b.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Brittania Road (2031-2017 Prediction) - Without Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 28520/3168 veh/TimePeriod
Medium truck volume : 765/85 veh/TimePeriod
Heavy truck volume : 433/49 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.10 m

ROAD (0.00 + 65.15 + 0.00) = 65.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.61	0.00	-5.00	-1.46	0.00	0.00	0.00	65.15

Segment Leq : 65.15 dBA

Total Leq All Segments: 65.15 dBA

Results segment # 1: Segment III (night)

Source height = 1.10 m

ROAD (0.00 + 58.65 + 0.00) = 58.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.10	0.00	-5.00	-1.46	0.00	0.00	0.00	58.65

Segment Leq : 58.65 dBA

Total Leq All Segments: 58.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.15
(NIGHT): 58.65

STAMSON 5.0 NORMAL REPORT Date: 09-11-2018 13:08:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s3333_t.te Time Period: Day/Night 16/8 hours
Description: Tremaine North of Brittania Road (2031-2017 Prediction) - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 28520/3168 veh/TimePeriod
Medium truck volume : 765/85 veh/TimePeriod
Heavy truck volume : 958/192 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.33 m

ROAD (0.00 + 66.54 + 0.00) = 66.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.99	0.00	-5.00	-1.46	0.00	0.00	0.00	66.54

Segment Leq : 66.54 dBA

Total Leq All Segments: 66.54 dBA

Results segment # 1: Segment III (night)

Source height = 1.54 m

ROAD (0.00 + 61.48 + 0.00) = 61.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	67.92	0.00	-4.99	-1.45	0.00	0.00	0.00	61.48

Segment Leq : 61.48 dBA

Total Leq All Segments: 61.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.54
(NIGHT): 61.48

STAMSON CALCULATIONS

2019 Traffic Predictions (Year 2021 and 2031)

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:47:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s192_b.te Time Period: Day/Night 16/8 hours
Description: Segment II (Britannia East of First Line)
Year 2021 - Using 2019 EMME Data - No Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 9288/1032 veh/TimePeriod
Medium truck volume : 234/26 veh/TimePeriod
Heavy truck volume : 306/34 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.33 m

ROAD (0.00 + 60.74 + 0.00) = 60.74 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 69.27 0.00 -7.07 -1.46 0.00 0.00 0.00 60.74

Segment Leq : 60.74 dBA

Total Leq All Segments: 60.74 dBA

Results segment # 1: Segment II (night)

Source height = 1.33 m

ROAD (0.00 + 54.21 + 0.00) = 54.21 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90	90	0.66	62.74	0.00	-7.07	-1.46	0.00	0.00	0.00	54.21

Segment Leq : 54.21 dBA

Total Leq All Segments: 54.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.74
(NIGHT): 54.21

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:47:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s192_t.te Time Period: Day/Night 16/8 hours
Description: Segment II (Britannia East of First Line)
Year 2021 - Using 2019 EMME Data - with Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 9288/1032 veh/TimePeriod
Medium truck volume : 234/26 veh/TimePeriod
Heavy truck volume : 831/177 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.68 m

ROAD (0.00 + 63.29 + 0.00) = 63.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	71.78	0.00	-7.05	-1.45	0.00	0.00	0.00	63.29

Segment Leq : 63.29 dBA

Total Leq All Segments: 63.29 dBA

Results segment # 1: Segment II (night)

Source height = 1.95 m

ROAD (0.00 + 58.94 + 0.00) = 58.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

-90	90	0.65	67.39	0.00	-7.01	-1.43	0.00	0.00	0.00	58.94

Segment Leq : 58.94 dBA

Total Leq All Segments: 58.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.29
(NIGHT): 58.94

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:47:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s193_b.te Time Period: Day/Night 16/8 hours
Description: Segment III (Britannia East of Tremaine)
Year 2021 - Using 2019 EMME Data - No Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 19397/2154 veh/TimePeriod
Medium truck volume : 505/57 veh/TimePeriod
Heavy truck volume : 474/53 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.23 m

ROAD (0.00 + 64.21 + 0.00) = 64.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-5.00	-1.46	0.00	0.00	0.00	64.21

Segment Leq : 64.21 dBA

Total Leq All Segments: 64.21 dBA

Results segment # 1: Segment III (night)

Source height = 1.24 m

ROAD (0.00 + 57.70 + 0.00) = 57.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

-90	90	0.66	64.15	0.00	-5.00	-1.46	0.00	0.00	0.00	57.70

Segment Leq : 57.70 dBA

Total Leq All Segments: 57.70 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.21
(NIGHT): 57.70

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:47:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s193_t.te Time Period: Day/Night 16/8 hours
Description: Segment III (Britannia East of Tremaine)
Year 2021 - Using 2019 EMME Data - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 19397/2154 veh/TimePeriod
Medium truck volume : 505/57 veh/TimePeriod
Heavy truck volume : 999/196 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.48 m

ROAD (0.00 + 65.88 + 0.00) = 65.88 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.33 0.00 -5.00 -1.46 0.00 0.00 0.00 65.88

Segment Leq : 65.88 dBA

Total Leq All Segments: 65.88 dBA

Results segment # 1: Segment III (night)

Source height = 1.69 m

ROAD (0.00 + 61.03 + 0.00) = 61.03 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90	90	0.65	67.46	0.00	-4.98	-1.45	0.00	0.00	0.00	61.03

Segment Leq : 61.03 dBA

Total Leq All Segments: 61.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.88
(NIGHT): 61.03

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:48:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1922_b.te Time Period: Day/Night 16/8 hours
Description: Segment II (Britannia East of First Line)
Year 2031 - Using 2019 EMME Data - No Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 17990/1998 veh/TimePeriod
Medium truck volume : 443/50 veh/TimePeriod
Heavy truck volume : 413/46 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.22 m

ROAD (0.00 + 62.95 + 0.00) = 62.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 71.48 0.00 -7.07 -1.46 0.00 0.00 0.00 62.95

Segment Leq : 62.95 dBA

Total Leq All Segments: 62.95 dBA

Results segment # 1: Segment II (night)

Source height = 1.22 m

ROAD (0.00 + 56.43 + 0.00) = 56.43 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90	90	0.66	64.96	0.00	-7.07	-1.46	0.00	0.00	0.00	56.43

Segment Leq : 56.43 dBA

Total Leq All Segments: 56.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.95
(NIGHT): 56.43

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:48:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1922_t.te Time Period: Day/Night 16/8 hours
Description: Segment II (Britannia East of First Line)
Year 2031 - Using 2019 EMME Data - With Project Trucks

Road data, segment # 1: Segment II (day/night)

Car traffic volume : 17990/1998 veh/TimePeriod
Medium truck volume : 443/50 veh/TimePeriod
Heavy truck volume : 938/189 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment II (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment II (day)

Source height = 1.48 m

ROAD (0.00 + 64.63 + 0.00) = 64.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.16	0.00	-7.07	-1.46	0.00	0.00	0.00	64.63

Segment Leq : 64.63 dBA

Total Leq All Segments: 64.63 dBA

Results segment # 1: Segment II (night)

Source height = 1.70 m

ROAD (0.00 + 59.80 + 0.00) = 59.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

-90	90	0.65	68.29	0.00	-7.04	-1.45	0.00	0.00	0.00	59.80

Segment Leq : 59.80 dBA

Total Leq All Segments: 59.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.63
(NIGHT): 59.80

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:48:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1933_b.te Time Period: Day/Night 16/8 hours
Description: Segment III (Britannia East of Tremaine)
Year 2031 - Using 2019 EMME Data - No Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 26728/2969 veh/TimePeriod
Medium truck volume : 668/75 veh/TimePeriod
Heavy truck volume : 405/45 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.10 m

ROAD (0.00 + 64.82 + 0.00) = 64.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.27	0.00	-5.00	-1.46	0.00	0.00	0.00	64.82

Segment Leq : 64.82 dBA

Total Leq All Segments: 64.82 dBA

Results segment # 1: Segment III (night)

Source height = 1.10 m

ROAD (0.00 + 58.29 + 0.00) = 58.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

-90	90	0.66	64.75	0.00	-5.00	-1.46	0.00	0.00	0.00	58.29

Segment Leq : 58.29 dBA

Total Leq All Segments: 58.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.82
(NIGHT): 58.29

STAMSON 5.0 NORMAL REPORT Date: 12-03-2019 15:49:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s1933_t.te Time Period: Day/Night 16/8 hours
Description: Segment III (Britannia East of Tremaine)
Year 2031 - Using 2019 EMME Data - With Project Trucks

Road data, segment # 1: Segment III (day/night)

Car traffic volume : 26728/2969 veh/TimePeriod
Medium truck volume : 668/75 veh/TimePeriod
Heavy truck volume : 903/188 veh/TimePeriod
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Segment III (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Segment III (day)

Source height = 1.34 m

ROAD (0.00 + 66.23 + 0.00) = 66.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.69	0.00	-5.00	-1.46	0.00	0.00	0.00	66.23

Segment Leq : 66.23 dBA

Total Leq All Segments: 66.23 dBA

Results segment # 1: Segment III (night)

Source height = 1.55 m

ROAD (0.00 + 61.30 + 0.00) = 61.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

-90	90	0.66	67.74	0.00	-4.99	-1.45	0.00	0.00	0.00	61.30

Segment Leq : 61.30 dBA

Total Leq All Segments: 61.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.23
(NIGHT): 61.30