2655 North Sheridan Way, Suite 300
Mississauga, ON Canada L5K 2P8
t: 905.823.8500
f: 905.823.8503
www.mmmgrouplimited.com

MEMO

RE:	Halton Region Trafalgar Road Transportation Improvements (from Steeles Avenue to Highway 7) Class Environmental Assessment Study
FROM:	Rhonda George-Hiebert, M.Eng., P.Eng.
DATE:	May 26, 2016
COPIES:	Katherine Jim, M.Eng., P.Eng., MMM Group Limited
OUR FILE:	W.O. 3214006
SUBJECT:	Trafalgar Road Class EA - Noise Assessment

1. Introduction

Halton Region is undertaking a Class Environmental Assessment (Class EA) Study for road improvements along 13 km of the Trafalgar Road corridor from Steeles Avenue to Highway 7. The proposed road improvements include widening Trafalgar Road between Steeles Avenue and Highway 7 from 2 lanes to 4 lanes with turning lanes at the intersections. Two grade separations are proposed – an underpass with CN railway north of 17 Side Road and an underpass with Metrolinx railway north of 20 Side Road. The existing Black Creek structure north of 15 Side Road will also be raised and replaced with a 4-lane structure.

The posted speed limit on Trafalgar Road, within the study limits, varies from 60 km/h to 80 km/h; the current speed limit along the corridor will largely be maintained for the future configuration.

As part of the Class EA Study, a noise assessment was conducted to assess the potential increase in noise level to noise sensitive areas as a result of the proposed improvements to Trafalgar Road from Steeles Avenue to Highway 7. Existing land uses within the study area change from rural (e.g. agriculture and farming operations) in the south to semi-urban in the north, towards Stewarttown and Georgetown.

Noise sensitive areas within the study area include residential properties located adjacent to Trafalgar Road; some are rural residential properties and some are residential properties within a subdivision. The noise assessment was undertaken based on a selection of several of these private residential homes within the Study Area., which represent the potential noise impact to noise sensitive areas in proximity to Trafalgar Road.

It should be noted that a developer will be responsible to complete a Noise Impact Assessment (NIA) as part of development application for future residential developments along Trafalgar Road within the study limits. Should noise mitigation measures be identified in the NIA, they are to be provided by the developer as part of future land development. As such, any future residential developments were not taken into consideration as part of the Trafalgar Road EA noise analysis.

This memorandum summarizes the findings of the noise assessment.

2. Methodology

Noise levels are predicted in decibels in the A-weighted dBA scale, which best approximates the human perception of sound over a specified time period. An increase of 2 – 3 decibels in noise levels is considered to be just perceivable to the average person. It should be noted that a 3 dBA increase in noise equates to a doubling of traffic volumes.

Ministry of the Environment Guidelines

Since roadway sound levels vary over time, the noise descriptor used in Ontario to assess noise is the "equivalent sound level" - L_{eq}. L_{eq} is identified as the continuous sound level, which has the same energy as a time varying sound level over a specified time period. For the purposes of assessing municipal roadway noise, L_{eq} is calculated on the basis of the 16 hour daytime period, 7:00 a.m. to 11:00 p.m. For new residential development adjacent to existing roads, the provincial objective is 55 dBA in the outdoor living area (OLA) for the daytime period.

Based on the Ontario Ministry of Transportation (MTO)/Ministry of the Environment and Climate Change (MOECC) Noise Protocol, where an existing roadway is proposed to be modified / widened adjacent to a Noise Sensitive Area (NSA), MOECC requires that the future noise levels without the proposed improvements be compared to the future noise level with the proposed improvements. The assessment is done at the outdoor living area (typically backyards) of each NSA. The provision of noise mitigation is to be investigated should the future noise level with the proposed improvements result in a greater than 5 dBA increase over the future noise level without the proposed improvements. If noise mitigation is provided, the objective is a minimum 5 dBA reduction. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically and administratively feasible.

The STAMSON 5.0 computer modelling program, which is approved for use in Ontario by the MOECC, was used to assess existing and future noise levels on Trafalgar Road. This program is used to predict noise levels generated from the road at the outdoor living areas (typically backyards) of NSA's.

Halton Region Noise Abatement Policy

Halton Region has its own Noise Abatement Policy which was "developed based on the principle that existing Noise Sensitive Areas (NSA's) that are exposed to high noise levels due to their proximity to a Regional noise source, such as a Regional Road, should receive consideration for retrofitting of noise attenuation measures."

The Region Noise Abatement Policy is divided into three sections – A) Existing Residential Development (Retrofit Situations) Policy, B) Regional Road Projects, and C) New Development Policy.

Under the Existing Residential Development Policy section, 60 dBA is the threshold where noise mitigation may be considered. Per the Policy, "Retrofitting noise mitigation barriers may be installed in existing residential areas, which meet the warrants, established in this Policy. Their purpose is to reduce traffic noise in outdoor living areas as much as is technically, economically, and administratively practical toward the Region's established sound level objectives for retrofit cases."

In addition, "if a noise barrier is to be constructed as part of the retrofitting Policy, subject to the criteria and warrants in this Policy, it must provide a minimum sound Insertion Loss (IL) of 5 dBA when averaged over the first rows of the points of reception."

3. Analysis

Two scenarios were calculated:

i) future noise levels without improvements to Trafalgar Road (Year 2031)* - see below

ii) future noise levels with 4 lanes (+turning lanes) on Trafalgar Road (Year 2031)

The following table summarizes the main assumptions and factors used in the analysis.

** It should be noted that existing (2015) traffic volumes on Trafalgar Road were used to represent the future (2031) "without widening of Trafalgar Road" scenario. This approach is acceptable and it would yield a more conservative comparison between the future "with" and "without" improvements conditions.*

Table 3-1 - Factors Used In Noise Analysis

Factor	Assumptions
Noise Descriptor	L_{eq} (16 hr)
Posted Speed	Trafalgar Road between Steeles Avenue and just north of Hornby Road - 70 km/h (existing & future) Trafalgar Road between just north of Hornby Road and just south of 15 Sideroad - 80 km/h (existing & future)

Factor	Assumptions
	Trafalgar Road between just south of 15 Sideroad and just north of Princess Anne Drive - 60 km/h (existing & future) Trafalgar Road between just north of Princess Anne Drive to Highway 7 - 70 km/h (existing & future)
Traffic Volumes AADT	Trafalgar Road, Steeles Avenue to 5 Sideroad: - Existing (2015) / Future without improvements – 13,707 - Future with improvements (2031) – 20,348 Trafalgar Road, 5 Sideroad to 10 Sideroad: - Existing (2015) / Future without improvements – 18,458 - Future with improvements (2031) – 27,401 Trafalgar Road, 10 Sideroad to 15 Sideroad: - Existing (2015) / Future without improvements – 16,599 - Future with improvements (2031) – 21,739 Trafalgar Road, 15 Sideroad to 17 Sideroad: - Existing (2015) / Future without improvements – 17,668 - Future with improvements (2031) – 23,138 Trafalgar Road, 17 Sideroad to Highway 7: - Existing (2015) / Future without improvements – 11,102 - Future with improvements (2031) – 14,541
Truck Percentages (Medium / Heavy)	Trafalgar Road, Steeles Avenue to 5 Sideroad: - Medium Trucks – 3.7 % - Heavy Trucks – 2.7 % Trafalgar Road, 5 Sideroad to 10 Sideroad: - Medium Trucks – 2.1 % - Heavy Trucks – 2.2 % Trafalgar Road, 10 Sideroad to 15 Sideroad: - Medium Trucks – 2.0% - Heavy Trucks – 1.8 % Trafalgar Road, 15 Sideroad to 17 Sideroad: - Medium Trucks – 1.5 % - Heavy Trucks – 2.3 % Trafalgar Road, 17 Sideroad to Highway 7: - Medium Trucks – 2.5 % - Heavy Trucks – 2.9 %
Receptor Height	1.5 m above the ground
Noise Barrier	Existing developer barriers were taken into consideration in noise calculations

4. Noise Sensitive Areas

There are existing residential houses abutting Trafalgar Road within the study limits on both sides of the roadway; some are rural residential properties, some are within a subdivision. Several of the residential properties were selected to be included in the noise calculations as representatives to these residential houses along Trafalgar Road. The selected receiver locations are summarized in Table 4-1.

Table 4-1 – Receiver Locations

Receiver #	Location	Characteristic of Property in Relation to Trafalgar Road
Receiver 1	8430 Hornby Road	Frontage
Receiver 2	8584 Trafalgar Road	Frontage
Receiver 3	8615 Trafalgar Road	Frontage
Receiver 4	8779 Trafalgar Road	Frontage
Receiver 5	9158 Trafalgar Road	Frontage
Receiver 6	9303 Trafalgar Road	Frontage
Receiver 7	9368 Trafalgar Road	Frontage
Receiver 8	9595 Trafalgar Road	Frontage
Receiver 9	9810 Trafalgar Road	Frontage
Receiver 10	9871 Trafalgar Road	Frontage
Receiver 11	9990 Trafalgar Road	Frontage
Receiver 12	10039 Trafalgar Road	Sidelot
Receiver 13	10229 Trafalgar Road	Frontage
Receiver 14	10552 Trafalgar Road	Frontage
Receiver 15	10677 Trafalgar Road	Frontage
Receiver 16	10704 Trafalgar Road	Frontage
Receiver 17	11026 Trafalgar Road	Frontage
Receiver 18	11100 Trafalgar Road	Frontage
Receiver 19	37 Stewarttown Road South	Reverse Frontage
Receiver 20	11177 Trafalgar Road	Frontage
Receiver 21	11174 Trafalgar Road	Frontage
Receiver 22	9 Stewarttown Road North	Reverse Frontage
Receiver 23	11290 Trafalgar Road	Frontage
Receiver 24	11382 Trafalgar Road	Frontage
Receiver 25	11509 Trafalgar Road	Frontage
Receiver 26	11583 Trafalgar Road	Frontage
Receiver 27*	44 Grey Owl Run	Reverse Frontage
Receiver 28	198 Princess Anne Drive	Sidelot
Receiver 29	11804 Trafalgar Road	Frontage

Receiver #	Location	Characteristic of Property in Relation to Trafalgar Road
Receiver 30*	26 Callaghan Crescent	Reverse Frontage
Receiver 31*	38 Johnson Crescent	Reverse Frontage
Receiver 32*	28 Johnson Crescent	Reverse Frontage
Receiver 33	12944 20 Sideroad Road	Sidelot
Receiver 34	4 Lindsay Court	Sidelot

*Note: * Properties with existing noise barrier by developer / noise wall.*

5. Results

Noise levels were calculated at the selected receiver locations (Table 4-1) for the future with and without improvements scenarios. Table 5-1 and Exhibits 1a to 1c summarize the predicted daytime noise levels at Receivers 1 to 34, as well as the potential changes in future noise levels.

STAMSON output sheets for existing and future noise levels for Receivers 1 to 34 for the alternatives are on file with MMM Group Limited.

Table 5-1: Trafalgar Road Class EA – Summary of Calculated Noise Levels

Receiver Location (see Exhibit 1a to 1c)	Distance from Receiver Location to Noise Source (m)		Projected Noise Level dBA Leq (16)		
	Existing or Future without Improvements (2 Lanes)	Future with Improvements (4 Lanes) (NB/SB)	Existing (2015) / Future without Improvements	Future With Improvements Lanes (2031)	Difference in Noise Level without and with improvements
Receiver 1 8430 Hornby Road	131	136/126	52.2	54.0	***+1.8***
Receiver 2 8584 Trafalgar Road	99	102/91	55.4	57.4	***+2.0***
Receiver 3 8615 Trafalgar Road	40	34/44	**62.7**	**64.7**	***+2.0***
Receiver 4 8779 Trafalgar Road	66	62/72	58.6	**60.2**	***+1.6***
Receiver 5 9158 Trafalgar Road	40	45/34	**62.6**	**64.6**	***+2.0***
Receiver 6 9303 Trafalgar Road	71	76/66	58.6	**60.9**	***+2.3***
Receiver 7 9368 Trafalgar Road	53	50/60	**60.9**	**62.4**	***+1.5***
Receiver 8 9595 Trafalgar Road	53	48/58	**60.7**	**62.5**	***+1.8***
Receiver 9 9810 Trafalgar Road	29	37/26	**65.1**	**66.6**	***+1.5***
Receiver 10 9859 Trafalgar Road	41	36/46	**62.9**	**64.7**	***+1.8***
Receiver 11 9866 Trafalgar Road	83	88/78	58.8	**60.5**	***+1.7***
Receiver 12 10037 Trafalgar Road	38	35/49	**62.0**	**62.7**	***+0.7***
Receiver 13 10229 Trafalgar Road	34	27/40	**63.0**	**64.5**	***+1.5***
Receiver 14 10552 Trafalgar Road	21	24/11	**66.2**	**68.6**	***+2.4***
Receiver 15 10677 Trafalgar Road	35	28/40	**62.6**	**64.2**	***+1.6***
Receiver 16 10704 Trafalgar Road	82	87/74	56.4	57.8	***+1.4***
Receiver 17 11026 Trafalgar Road	40	52/39	59.3	59.8	***+0.5***

Receiver Location (see Exhibit 1a to 1c)	Distance from Receiver Location to Noise Source (m)		Projected Noise Level dBA Leq (16)		
	Existing or Future without Improvements (2 Lanes)	Future with Improvements (4 Lanes) (NB/SB)	Existing (2015) / Future without Improvements	Future With Improvements Lanes (2031)	Difference in Noise Level without and with improvements
Receiver 18 11100 Trafalgar Road	31	41/32	**62.3**	**62.4**	***+0.1***
Receiver 19 37 Stewarttown Road S.	17	26/18	**66.7**	**66.6**	***-0.1***
Receiver 20 11177 Trafalgar Road	51	41/51	58.1	**60.6**	***+2.5***
Receiver 21 11174 Trafalgar Road	45	53/42	59.0	**60.6**	***+1.6***
Receiver 22 9 Stewarttown Rd. N.	33	44/30	**62.5**	**62.8**	***+0.3***
Receiver 23 11290 Trafalgar Road	39	50/39	59.5	59.8	***+0.3***
Receiver 24 11382 Trafalgar Road	47	86/74	57.4	55.5	***-1.9***
Receiver 25 11509 Trafalgar Road	51	37/51	57.2	59.5	***+2.3***
Receiver 26 11583 Trafalgar Road	36	36/49	59.0	59.2	***+0.2***
Receiver 27* 44 Grey Owl Run	26	28/41	55.3	52.5	***-2.8***
Receiver 28 198 Princess Anne Dr.	42	42/56	57.9	58.1	***+0.2***
Receiver 29 11804 Trafalgar Road	64	64/76	56.7	57.1	***+0.4***
Receiver 30* 26 Callaghan Crescent	23	22/35	54.8	53.9	***-0.9***
Receiver 31* 38 Johnson Crescent	20	36/49	58.7	55.1	***-3.6***
Receiver 32* 28 Johnson Crescent	28	54/66	57.2	51.8	***-5.4***
Receiver 33 12944 20 Sideroad Road	60	38/25	57.5	**62.9**	***+5.4***
Receiver 34 4 Lindsay Court	42	70/84	**60.5**	56.5	***-4.0***

* *Properties with existing noise barrier by developer / noise wall*

6. Findings

The findings of the noise assessment are as follows:

Consideration of Noise Mitigation Not Warranted per MTO/MOECC Noise Protocol

- The projected noise levels at Receivers 1 to 34 under existing / future (2031) without improvements to Trafalgar Road scenario are calculated to range from 47.9 to 66.7 dBA.
- The projected noise levels at Receivers 1 to 34 under future (2031) with the improvements to Trafalgar Road scenario are calculated to range from 51.8 dBA to 68.6 dBA.
- The maximum potential increase in noise level between the future 2031 without improvements and the future 2031 with improvements at 33 of the 34 receiver locations was calculated to be less than 5 dBA. Since the potential increases in the projected noise levels are less than 5 dBA, the consideration of noise mitigation based on MTO/MOECC Noise Protocol is not warranted at these 33 locations.

Consideration of Noise Mitigation Warranted per MTO/MOECC Noise Protocol or Halton Region Noise Abatement Policy

- The consideration of noise mitigations are warranted at the following receiver locations per MTO / MOECC Noise Protocol (i.e. noise increase greater than 5 dBA under the future "with" and "without" improvements to Trafalgar Road scenarios), or per Halton Region Noise Abatement Policy (i.e. absolute noise level at or over 60 dBA).
- At Receiver 33 (12944 20 Sideroad Road) the increase in noise level between the existing / future 2031 without and with improvements scenarios was calculated to be at 5.4 dBA (i.e. greater than 5 dBA).
- The absolute noise level at Receivers 3, 5, 7, 8, 9, 10, 12, 13, 14, 15, 18, 19 and 22 were calculated to be greater than 60 dBA under existing / future (2031) without improvements to Trafalgar Road scenario and future (2031) with improvements to Trafalgar Road scenario.
- The absolute noise level at Receivers 4, 6, 11, 20, 21 and 33 were calculated to be greater than 60 dBA under future (2031) with improvements to Trafalgar Road scenario.
- The absolute noise level at Receiver 34 was calculated to be greater than 60 dBA under existing / future (2031) without improvements to Trafalgar Road scenario. However, it was calculated to decrease to 56.5 dBA under future (2031) without improvements to Trafalgar Road scenario, as the road will be shifted away (to the west) from this receiver location.

7. Conclusions

The conclusions of the noise assessment for the Trafalgar Road improvements are as follows:

- The difference between the projected noise levels with and without the proposed improvements to Trafalgar Road for the future (2031) conditions were determined to be less than 5 dBA at 33 of the 34 receiver locations. Therefore, the consideration of noise mitigation is not warranted based on MTO/MOECC Noise Protocol at these 33 locations.
- At receiver 33 the projected increase in noise levels from with and without the proposed improvements to Trafalgar Road for the future (2031) conditions is 5.4 dBA. Receiver 33 is a single house with one house adjacent to it (this adjacent house would be considered to be a second row receiver) and it is situated in an open area. In order to achieve a noise attenuation of 5 dBA under the future with improvements to Trafalgar Road scenario, a 3 m high by approximately 80 m long noise wall would be required (assuming the noise barrier would be constructed along the future Trafalgar Road right-of-way). The provision of an 80 m noise wall for a single receiver location would not be considered economically feasible.
- Noise levels at Receivers 3 to 15, 18 to 22 and 33 have predicted noise levels of greater than 60 dBA under future (2031) conditions with improvements to Trafalgar Road. These receiver locations have been reviewed in light of the Halton Region's "Noise Abatement Policy for Regional Roads" to confirm whether they would qualify for mitigation under the retrofit policy. Noise sensitive areas that qualify under the Region's retrofit policy must meet the following criteria:
    - The residential area must be adjacent to a Regional Road.
    - The residential areas must have reversed frontage lots or blocks including flanking units where their outdoor living areas are directly exposed to traffic noise. No barriers are considered under the policy for dwelling units that are of the direct frontage type.
    - In addition, the minimum number of residences to be considered under this policy is 5 dwelling units and 50 linear meters of noise barrier.
- Give the above, Receivers 3 to 11, 13 to 15, 18, 20 and 21 would not qualify for noise mitigation under the Region's policy as these Receiver locations are frontage to Trafalgar Road (i.e. direct driveway access to Trafalgar Road). These Receivers, as well as Receivers 12, 14, 19 and 33 are rural dwellings with less than 5 dwelling units and thus would not qualify for noise mitigation under the Region's Retrofit policy.
- Only Receiver 22 (9 Stewarttown Road North) would warrant the consideration for noise mitigation under the Region's retrofit policy; i.e. it is adjacent to Trafalgar Road (reversed frontage) and there are at least 5 dwelling units in a row and the length of property adjacent to Trafalgar Road is greater than 50 m at this location. The provision of a 3 m high, 92 m

long noise wall constructed along the right-of-way of Trafalgar Road would reduce the noise levels for the future configuration, by 4.7 dBA (i.e. from 62.8 dBA to 58.1 dBA under the future with improvements to Trafalgar Road scenario). Given that it would yield a noise reduction close to 5 dBA, a noise barrier of 3 to 3.5 m will be considered during detailed design. The approximate extents of the potential noise wall is shown in Exhibit1c.

- Based on the foregoing, noise mitigation is proposed for receiver 22 as part of the Trafalgar Road Improvements Class EA Study.

RESULTS OF NOISE EVALUATION
(Hornby Road to 10 Side Road)

Exhibit
1a


TRAFALGAR ROAD
NORTH
R12
62.0 dBA
62.7 dBA
R5 - 10037 Trafalgar Road
10 SIDEROAD
TRAFALGAR RD
R13
63.0 dBA
64.5 dBA
R13 - 10229 Trafalgar Road
R14 - 10552 Trafalgar Road
66.2 dBA
68.6 dBA
R14
R16
R16 - 10704 Trafalgar Road
56.4 dBA
57.8 dBA
R17 - 11026 Trafalgar Road
59.3 dBA
59.8 dBA
R17
NORTH
R15
62.6 dBA
64.2 dBA
R15 - 10677 Trafalgar Road
15 SIDE RD
Scale 1:2500
LEGEND
Rx - Receiver Location
xx.x dBA - Projected Future Noise Levels without Widening of Trafalgar Road
xx.x dBA - Projected Future (2031) Noise Levels with Widening of Trafalgar Road
- Existing Noise Wall
RESULTS OF NOISE EVALUATION
(10 Side Road to 15 Side Road)
Exhibit
1b

LEGEND

- Rx ● - Receiver Location
- xx.x dBA - Projected Future Noise Levels without Widening of Trafalgar Road
- xx.x dBA - Projected Future (2031) Noise Levels with Widening of Trafalgar Road
- ——— - Existing Noise Wall
- — — — - Proposed Noise Wall

RESULTS OF NOISE EVALUATION
(15 Side Road to Highway 7)

Exhibit 1c