



Regional Municipality of Halton

# **New North Oakville Transportation Corridor and Crossing of Sixteen Mile Creek**

## **Appendix K: Noise Assessment**



**THE REGIONAL MUNICIPALITY OF HALTON**

**NEW NORTH OAKVILLE TRANSPORTATION CORRIDOR AND  
CROSSING OF SIXTEEN MILE CREEK CLASS EA STUDY**

**NOISE ANALYSIS**

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## TABLE OF CONTENTS

<b>GLOSSARY OF TERMS</b> .....	<b>i</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>2. STUDY AREA</b> .....	<b>1</b>
<b>3. BACKGROUND</b> .....	<b>1</b>
<b>4. METHODOLOGY</b> .....	<b>1</b>
<b>5. NOISE SENSITIVE AREAS</b> .....	<b>2</b>
<b>6. TRAFFIC FORECASTS</b> .....	<b>3</b>
<b>7. NOISE ANALYSIS</b> .....	<b>6</b>
7.1 7.1 Analysis.....	6
7.2 7.2 Sound Levels and Impacts.....	6
<b>8. NOISE MITIGATION REQUIREMENTS</b> .....	<b>7</b>
<b>9. CONSTRUCTION NOISE</b> .....	<b>9</b>
<b>10. CONCLUSIONS</b> .....	<b>9</b>

### LIST OF FIGURES

**Figures 1 & 2**      **Location of Receiver Sites**

### LIST OF TABLES

<b>Table 1</b>	<b>Location of Receiver Sites</b>
<b>Table 2</b>	<b>Road Characteristics</b>
<b>Table 3</b>	<b>Sound Levels for Horizon Year 2021</b>
<b>Table 4</b>	<b>Required Mitigation Effort</b>

## GLOSSARY OF TERMS

**AADT** Annual Average Daily Traffic - the average 24 hour, two-way traffic volume, for the period from January 1st to December 31st.

**SADT** Summer Average Daily Traffic - the average 24 hour, two-way traffic volume, for the period from July 1st to August 31st.

**Decibel (dB)** A logarithmic unit of measure used to express the level of sound.

**Decibel (dBA)** A logarithmic unit of measure used for expressing sound but weighted to give a higher weight to those frequencies that can be heard by the human ear. The human ear cannot hear the very high and low frequencies as well as the mid range frequencies of sound. Therefore the predicted sound levels expressed in the "A" weighted scale (expressed as dBA) are a more reasonable approximation of sound levels heard by the human ear.

### **Equivalent Sound Level (Leq)**

The level of a continuous sound that would have the same energy, for a given time period, as the fluctuating sound. This measure provides greater weight to the higher sound levels within the time period.

**16 Leq** An equivalent sound level measured over a 16 hour daytime period (7:00-23:00)

**24 Leq** An equivalent sound level measured over a 24 hour time period.

### **Noise Sensitive Area (NSA)**

A noise sensitive area is a land use that has an outdoor living area associated with the residential unit.

**Receiver** A location where sound levels are predicted. The location is selected to reflect an outdoor living space (patio) 3 m from the rear face of the house and 1.5 m above the ground. The location is to represent the human ear sitting at an outdoor patio.

# 1. INTRODUCTION

TSH (now AECOM) has been retained by the Regional Municipality of Halton to carry out the preliminary design and Class Environmental Assessment for the New North Oakville Transportation Corridor (NNOTC). The acoustical modeling assessment conducted for this project was undertaken to determine the magnitude of the noise impact that the preferred alternative would have on twenty-three (23) noise sensitive areas (NSA) within the study area. The year 2021 was selected as the future horizon year for analysis. The modeling was used to predict the sound levels both without the undertaking, the “Do Nothing” alternative, and with the undertaking, in the 2021 traffic year for the 16 hour daytime period using the Stamson Version 5.03 Software Program.

The report has been prepared on behalf of the Regional Municipality of Halton. It has been prepared following the methodology of the MTO Noise Manual, MOE/MTO Noise Protocol, and MTO Directive A1.

# 2. STUDY AREA

The limits of the Study Area are shown on **Figures 1 & 2**.

# 3. BACKGROUND

The noise sources considered were vehicular traffic noise on Bronte Road (Regional Road 25), Burnhamthorpe Road (Regional Road 27 - existing and proposed construction), Neyagawa Boulevard (Regional Road 4), 4<sup>th</sup> Line, 6<sup>th</sup> Line, 9<sup>th</sup> Line (Regional Road 13), Highway 403 and Highway 407. No other noise sources, such as rail and aircraft, were considered appropriate for receiver locations in the study area.

# 4. METHODOLOGY

The STAMSON 5.03 computer modeling program, which is approved for use in Ontario by the MOE, was used to assess potential noise impacts resulting from the preferred alternative. This program is used to simulate and predict noise levels generated from the road at the selected receiver locations.

The noise levels are predicted in decibels in the A-weighted scale (dBA), which approximates the human

perception of sound. An increase of approximately 3 decibels in noise levels is considered to be just perceptible to the average person. A 3 dBA increase in noise equates to a doubling of traffic volumes.

The MOE/MTO Noise Protocol outlines the objectives for predicted noise levels and the required mitigation measures. Roadway noise is highly variable over time and for ease of comparison it is quantified as equivalent sound level, Leq, which represents the continuous sound level in dBA, which has the same energy as a variable sound level over a period of time. The time period used for assessing municipal roads is the 16-hour daytime period spanning from 7:00 am to 11:00 pm.

According to the MOE/MTO Noise Protocol, where an existing roadway is proposed to be modified / widened adjacent to a Noise Sensitive Area (NSA), the future noise levels without the proposed improvements are to be compared to the future noise level with the proposed improvements. The assessment is done at the outdoor living area of the identified noise sensitive area.

## 5. NOISE SENSITIVE AREAS

A Noise Sensitive Area (NSA) is defined as a building that has an outdoor recreational/living area associated with a residential unit. It does not include such buildings as vacant residential buildings, institutional or commercial establishments. For this study, twenty-three (23) receiver sites were examined. All receivers are assumed to be at a height of 1.5 m above the ground and 3.0 m from the rear face of the building. The location of the receiver sites representing these twenty-three NSA's are shown in **Figures 1 & 2**.

The receiver labels and description of locations are presented in **Table 1**.

**Table 1 - Location of Receiver Sites**

Receiver Label(s)	Number of Receivers	Description of Location
R1, R2, R3	3	Individual properties fronting onto existing Bronte Road in vicinity of the New North Oakville Transportation corridor connection at Bronte Road (Regional Road 25).
R4, R5, R6, R7, R8, R10, R11, R13	8	Individual properties fronting onto existing Burnhamthorpe Road west of Neyagawa Boulevard
R9	1	Receiver representing 4 similar properties fronting onto existing Burnhamthorpe Road west of Neyagawa Boulevard
R12	1	Property fronting onto 4 <sup>th</sup> Line north of existing Burnhamthorpe Road
R14, R15, R16, R17, R18	5	Individual properties fronting onto existing Burnhamthorpe Road east of Neyagawa Boulevard
R19, R20	2	Individual properties fronting onto 6 <sup>th</sup> Line north of existing Burnhamthorpe Road
R21, R22, R23	3	Individual properties fronting onto existing Burnhamthorpe Road west of 9 <sup>th</sup> Line
<b>Total</b>	<b>23</b>	

## 6. TRAFFIC FORECASTS

The Region of Halton EMME/2 model was used to generate the road traffic volumes and traffic breakdown used in the analysis for Burnhamthorpe Road and the surrounding roads. The traffic data is summarized in **Table 2**. It should be noted that the traffic volumes are estimates of future traffic within the Study Area.

The noise analysis is based on projected hourly traffic volumes for the 16-hour daytime period for all roadways except for freeways which are based on volumes for the 24-hour period. The 16-hour volumes were calculated from the projected Annual Average Daily Traffic (AADT) volumes on roadways by applying the daytime percentage factor.

The traffic volumes for existing Burnhamthorpe Road west of Neyagawa, and along 4th Line were



adjusted up to 960 vehicles per day (vpd), the minimum required by the acoustic model.

The posted speeds, presented in **Table 2**, were used as input into the model for the vehicular speed variable.

The commercial vehicle percentages are also noted in **Table 2**.

**Table 2 - Road Characteristics**

Roadway Section	Posted Speed Limit (km/h)	% Day (16h)	2021 "Do Nothing" Without Undertaking			2021 With Undertaking		
			AADT (24 hour) (year)	% Commercial		AADT (24 hour)	% Commercial	
				Medium Trucks (MT)	Heavy Trucks (HT)		Medium Trucks (MT)	Heavy Trucks (HT)
<b>Existing Burnhamthorpe Rd.</b>						<b>NNOTC</b>		
Bronte Rd. to 3rd Line	60	90	-	-	-	22,000	8	2
3rd Line to Neyagawa Blvd	60	90	960	8	2	25,100	8	2
Neyagawa Blvd to 6th Line	60	90	12,300	8	2	19,500	8	2
6th Line to Trafalgar Rd.	60	90	12,000	8	2	17,000	8	2
Trafalgar Rd. to 8th Line	60	90	17,000	8	2	25,100	8	2
8th Line to 9th Line	60	90	24,200	8	2	34,700	8	2
9th Line to Highway 403	60	90	34,300	8	2	38,500	8	2
						<b>Old Burnhamthorpe Rd.</b>		
New Burnhamthorpe Rd. to 6th Line	-	-	-	-	-	800	8	2
6th Line to Trafalgar Rd.	-	-	-	-	-	300	8	2
Trafalgar Rd. to 8th Line	-	-	-	-	-	1,300	8	2
8th Line to New Burnhamthorpe Rd.	-	-	-	-	-	5,900	8	2
<b>Bronte Road (Regional Road 25)</b>								
Dundas St. to New Burnhamthorpe Rd.	60	91	38,900	8	2	37,000	8	2
New Burnhamthorpe Rd. to Highway 407	60	91	38,900	8	2	34,700	8	2
<b>4th Line</b>								
Neyagawa Blvd to Highway 407	60	92	960	4	1	960	4	1
<b>Neyagawa Boulevard (Regional Road 4)</b>								
Dundas St. to New Burnhamthorpe Rd.	60	94	23,800	4	1	21,000	4	1

Table 2 - Road Characteristics

Roadway Section	Posted Speed Limit (km/h)	% Day (16h)	2021 "Do Nothing" Without Undertaking			2021 With Undertaking		
			AADT (24 hour) (year)	% Commercial		AADT (24 hour)	% Commercial	
				Medium Trucks (MT)	Heavy Trucks (HT)		Medium Trucks (MT)	Heavy Trucks (HT)
New Burnhamthorpe Rd. to Highway 407	60	92	15,000	4	1	15,700	4	1
<b>6th Line</b>								
Dundas St. to Old Burnhamthorpe Rd.	60	92	7,500	4	1	9,100	4	1
Old Burn Rd. to New Burnhamthorpe Rd.	60	92	9,500	4	1	7,500	4	1
New Burnhamthorpe Rd. to Highway 407	60	92	9,500	4	1	9,700	4	1
<b>9th Line</b>								
Dundas St. to New Burnhamthorpe Rd.	60	91	21,700	4	1	19,900	4	1
New Burnhamthorpe Rd. to Highway 407	60	91	24,500	4	1	24,700	4	1
<b>Highway 407 ETR</b>								
Bronte Rd. to Neyagawa Blvd	100	-	71,300	8	2	51,600	8	2
Neyagawa Blvd to Trafalgar Rd.	100	-	106,900	8	2	98,600	8	2
Trafalgar Rd. to Highway 403	100	-	92,000	8	2	86,300	8	2
<b>Highway 403</b>								
Dundas St. to Highway 407	100	-	110,000	8	2	106,400	8	2

## 7. NOISE ANALYSIS

### 7.1 7.1 Analysis

A noise evaluation was carried out for the following roadway conditions:

- i. Without the Undertaking - "Do Nothing"- 2021
- ii. With the Undertaking (New North Oakville Transportation Corridor) - 2021

### 7.2 7.2 Sound Levels and Impacts

**Table 3** lists the sound levels in Leq (equivalent sound level measured in dBA and calibrated to the human ear) from the existing roadways and the changes in sound levels due to the proposed undertaking. The "Do Nothing" alternative, which represents the ambient noise, is used as a basis for comparison to determine the noise impact on each NSA. Decimals have been included in presenting the final calculations for comparative purposes only.

**Table 3 –Sound Levels for horizon Year 2021**

Receiver Site Number	L <sub>eq16</sub> and Change in L <sub>eq16</sub> (dBA)		
	"Do Nothing" Without Undertaking	With Undertaking	Change in Leq
R1	62.8	58.2	-4.6
R2	62.1	62.1	0
R3	65.2	59.1	-6.1
* R4	45.1	56.9	11.8
R5	39.7	52.8	13.1
R6	47.5	59.7	12.2
R7	41.7	55.5	13.8
R8	41.0	56.5	15.5
R9	45.6	62.9	17.3
R10	42.4	56.9	14.5
R11	46.8	61.1	14.3
R12	56.7	56.2	-0.5
R13	59.6	64.3	4.7

**Table 3 –Sound Levels for horizon Year 2021**

Receiver Site Number	<b>L<sub>eq16</sub> and Change in L<sub>eq16</sub> (dBA)</b>		
	<b>“Do Nothing” Without Undertaking</b>	<b>With Undertaking</b>	<b>Change in Leq</b>
R14	55.5	57.4	1.9
R15	50.6	54.3	3.7
R16	56.3	50.4	-5.9
R17	56.8	55.5	-1.3
R18	51.9	54.3	2.4
* R19	58.2	61.2	3.0
R20	63.5	63.4	-0.1
R21	55.0	52.2	-2.8
R22	58.4	55.9	-2.5
R23	66.9	67.3	0.4

\* Receiver locations R4 and R19 were identified as displaced properties to accommodate the new right-of-way.

The 2021 “Do Nothing” (without the undertaking) predicted noise levels range from 39.7 dBA to 66.9 dBA. The wide variance of “Do Nothing” noise levels is due to the proximity of receivers to existing roads with significant traffic volumes. The predicted noise levels for 2021 with the undertaking range from 50.4 dBA to 67.3 dBA. The change in noise level ranges from -6.1 dBA to +17.3 dBA. Eight (8) receivers registered very significant increases (>10dBA increase), zero (0) receivers registered significant increases (6-9 dBA increase), six (6) receivers registered increases (<5dBA increase) and eight (8) receivers registered decreases in sound levels for the 2021 with the proposed undertaking.

Seven of the receivers were predicted to have an absolute noise level greater than 60 dBA of which 2 receivers were predicted to have a noise level increase of greater than 5 dBA.

## 8. NOISE MITIGATION REQUIREMENTS

The assessment of the impact of the predicted sound levels utilized the MTO/MOE Noise Protocol. As noted above the significance of the noise impact is calculated by comparing the future noise levels with and without New North Oakville Transportation Corridor. The provision of noise mitigation is investigated

should the future noise levels with the proposed improvements result in a greater than 5dBA increase over the future noise levels without the proposed improvements. Where increases in levels are predicted the MTO/MOE Noise protocol requires the following level of effort.

**Table 4 - Required Mitigation Effort**

Change in Noise Level above ambient	Mitigation Effort Required
0-5 dBA	<ul style="list-style-type: none"> <li>• none</li> </ul>
>5 dBA	<ul style="list-style-type: none"> <li>• Investigate noise control measure on R.O.W.</li> <li>• If project cost is not significantly affected, introduce noise control measure within right-of-way.</li> <li>• Noise control measures, where introduced, should achieve a minimum of 5dBA attenuation, averaged over first row of receivers.</li> <li>• Mitigate to ambient, as economically and technically feasible.</li> </ul>

If noise mitigation is to be provided, noise control measures will be designed to achieve levels as close to, or lower than, the objective of 55 dBA or pre-construction ambient noise levels as is technically, economically or administratively feasible. Noise controls measures, where applied, should be cost effective and achieve a minimum attenuation of 5 dBA for the first row of receivers.

There are a total of eight (8) receiver locations for which a greater than 5 dBA increase is predicted by the acoustic model: R4, R5, R6, R7, R8 R9, R10 and R11. It should be noted that Receiver 4 will be displaced by the corridor and no further mitigation consideration is required. The remaining receivers are located along existing Burnhamthorpe Road immediately to the West of Neyagawa Boulevard. Based on the predicted increase, noise mitigation measures should be considered at these receiver locations.

Receivers R5, R6, R7 R9, R10 and R11 have direct frontage to existing Burnhamthorpe Road / New North Oakville Transportation. For sound barriers to be effective they must create a continuous barrier between the noise source and the receiver (i.e. reversed frontage lots). Constructing noise barriers along the frontage of the properties is not desirable for aesthetics, safety reasons and breaks in the noise barrier for driveway access render the barriers ineffective. Therefore, the provision of a continuous noise barrier at the Regional ROW is not considered to be feasible or practical at these locations. However, it is recognized that the increased noise levels are significant, therefore, the Region, during detailed design, will work with the individual property owners on a site-specific basis to establish appropriate noise mitigation measures such as noise barriers at or surrounding the outdoor living area.

## 9. CONSTRUCTION NOISE

Construction noise constraints should be incorporated into the contract documents. This is consistent with the requirements of the MTO/MOE Noise Protocol.

Any construction activities throughout the project should conform to current local municipal noise by-laws giving due consideration to such factors as the time of day, proximity and size of equipment and type of operation. Contractors should be required to keep idling of construction equipment to a minimum and maintain equipment in good working order to reduce noise from the construction activities.

## 10. CONCLUSIONS

The predicted noise levels for 2021 with the undertaking range from 50.4 dBA to 67.3 dBA. The change in noise level ranges from -6.1 dBA to +17.3 dBA. Eight (8) receivers registered very significant increases (> 10dBA increase), zero (0) receivers registered significant increases (<10dBA - >5dBA increase), six (6) receivers registered increases (<5dBA increase) and eight (8) receivers registered decreases in sound levels for the 2021 undertaking. Under the provisions of the MTO/MOE Noise Protocol, mitigation should be considered for the receiver locations with a greater than 5 dBA increase. However, due to the location and orientation of the noise sensitive areas, noise mitigation was not considered to be technically, economically and administratively feasible at the Regional ROW. However, it is recognized that the increased noise levels are significant, therefore, the Region, during detailed design, will work with the individual property owners on a site-specific basis to establish appropriate noise mitigation measures such as noise barriers at or surrounding the outdoor living area.



