



Environmental Noise Assessment

Regional Road 25 Widening from 5 Side Road to 10 Side Road, Towns of Milton and Halton Hills, ON

HDR Inc.

100 York Blvd., Suite 300, Richmond Hill, ON L4B 1J8

Prepared by:

SLR Consulting (Canada) Ltd.

100 Stone Road West, Suite 201, Guelph, ON N1G 5L3

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0	April 17, 2025	Chris Blaney	Jason Dorssers	Scott Penton
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Executive Summary

SLR Consulting (Canada) Ltd. was retained by HDR Inc. on behalf of the Regional Municipality of Halton (Halton Region) to conduct an environmental noise assessment in the Town of Milton and the Town of Halton Hills, Ontario as part of the North Halton Coordinated Municipal Class Environmental Assessment (MCEA) Study. The purpose of the study is to address the proposed Regional Road 25 (RR 25) roadway improvements from 5 Side Road to 10 Side Road in the Town of Halton Hills. The project study area is shown in Figure 1. This encompasses approximately 3.0 km of improved roadway.

The objectives of this study are as follows:

- To assess future “build” and “no-build” sound levels from road traffic noise sources in the area (i.e., noise levels with and without the proposed project taking place);
- To use these predictions to assess potential impacts according to the applicable guidelines;
- To specify mitigation measures where required; and
- To assess the potential for construction noise and provide a Code of Practice to minimize potential impacts.

The predicted sound levels from the proposed undertaking have been assessed.

Both operational and construction noise impacts have been considered. The conclusions and recommendations are as follows:

- The results show that changes in sound levels resulting from the proposed project are expected to result in almost no change for the residences along Regional Road 25 within the project limits.
- Future noise impacts do not exceed the 5 dBA impact criteria in the Ministry of the Environment, Conservation and Parks/Ministry of Transportation (MECP/MTO) Joint Noise Protocol and the Halton Region Noise Abatement Guidelines. Therefore, the review of noise mitigation is not warranted based on both guidelines.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential Noise Sensitive Areas (NSAs). Methods to minimize construction noise impacts should be included in the Construction Code of Practice, as outlined in Sections 3.1.3 and Section 3.3.



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1.0 Introduction

SLR Consulting (Canada) Ltd. was retained by HDR Inc. on behalf of the Regional Municipality of Halton (Halton Region) to conduct an environmental noise assessment in the Town of Halton Hills, Ontario as part of the North Halton Coordinated Municipal Class Environmental Assessment (MCEA) Study. The purpose of the study is to address the proposed Regional Road 25 (RR 25) roadway improvements from 5 Side Road to 10 Side Road in the Town of Halton Hills. The project study area is shown in Figure 1. This encompasses approximately 3.0 km of improved roadway.

The objectives of this study are as follows:

- To assess future “build” and “no-build” sound levels from road traffic noise sources in the area (i.e., noise levels with and without the proposed project taking place);
- To use these predictions to assess potential impacts according to the applicable guidelines;
- To specify mitigation measures where required; and
- To assess the potential for construction noise and provide a Code of Practice to minimize potential impacts.

A glossary of transportation sound basics can be found in Appendix A.

1.1 Project Description

Halton Region is completing the “Municipal Class Environmental Assessment” (MCEA) for the proposed RR 25 roadway improvements from 5 Side Road to 10 Side Road. This work is being done as part of the MCEA process. This encompasses approximately 3.0 km of improved roadway including the intersections in accordance with the MCEA document from the Municipal Engineers Association (March 2023). An overview of the study area for the project is shown in Figure 1. Plans showing the technically preferred alternative are provided in Appendix B.

2.0 Road Traffic Noise Impacts (Operational Noise)

2.1 MECP/MTO Joint Protocol

Ontario has a number of guidelines and documents related to assessing road traffic noise impacts. The most applicable document applicable to municipal roadway projects under a Class EA project is the MECP/MTO Joint Protocol.

The Joint Protocol sets out an Outdoor Objective sound level of 55 dBA L_{eq} (Day), or the existing ambient, whichever is higher. The evaluation of noise impacts is related to the change in cumulative sound levels from existing conditions. Assessments are based on a minimum 10-year future horizon year (i.e., on traffic volumes 10 years after the completion of the project).

Noise mitigation is warranted when increases in sound level over the “no-build” ambient are greater than 5 dB. Mitigation measures can include changes in vertical profiles and horizontal alignments, noise barriers, and noise reducing asphalts. Noise mitigation, where applied, must be administratively, economically, and technically feasible, and must provide at least 5 dB of reduction averaged over the first row of noise-sensitive receivers. Mitigation measures are restricted to within the roadway right-of-way.



Off right-of-way noise mitigation, such as window upgrades and air conditioning, is not considered. Noise mitigation requirements are summarized in Table 1 below:

Table 1: Summary of Mitigation Efforts Under the MECP/MTO Joint Protocol

Future Sound Levels L_{eq} (16h)	Change in Noise Level Above “No-Build” Ambient (dBA)	Mitigation Effort Required
< 55 dBA	0 to 5 dBA	None
	> 5 dBA	
> 55 dBA	0 to 5 dBA	None
	> 5 dBA	Investigate noise control measures on right-of-way. If project cost is not significantly affected introduce noise control measure within right-of-way. Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation averaged over first row receivers. Mitigated to ambient, as administratively, economically, and technically feasible.
Notes: Values are overall daytime energy equivalent sound levels, L_{eq} (16h) in dBA, between 7 AM and 11 PM.		

2.2 Halton Region Noise Abatement Guidelines

For roadway projects, operational noise is of primary importance. This section of the report provides an analysis of operational noise impacts from road traffic noise related to this undertaking.

Following the Region of Halton Noise Abatement Guidelines (2014), for a Halton Regional Road reconstruction or expansion projects that are proposed adjacent to a Noise Sensitive Area (NSA), noise abatement features will be considered under the processes identified in the *Environmental Assessment Act* and/or *Planning Act*. The noise abatement features will be designed to attenuate noise generated from the projected future traffic to 2031.

2.2.1 Applicable Sound Level Criteria

Similar to the MECP/MTO Joint Noise Protocol, for the implementation of capital road projects, future noise levels with and without the capital project improvement will be assessed. Under the Region of Halton Noise Abatement Guidelines, where increase in noise levels are predicted, the Region will take the following actions:

- 0-5 dBA – no action required;
- Greater than 5 dBA – investigate noise control measures within right-of-way where a minimum attenuation of 5 dBA can be achieved.

When noise mitigation is not warranted on the basis of projected noise levels, an application may be made through a petition process under the Region of Halton’s retrofit guideline if existing noise levels are greater than 60 dBA.



2.2.2 Definition of Outdoor Living Area (OLA) and Noise Sensitive Areas (NSAs)

Noise impacts from transportation projects are evaluated at noise sensitive receptors commonly referred to as NSAs. The OLA is the part of an outdoor amenity area provided for the quiet enjoyment of the outdoor environment. The OLA is typically an area at ground level accommodating outdoor living activities. For sound level calculation purposes, the usual distance from the dwelling unit wall is 3 m where the actual OLA is not known. The vertical height is 1.5 metres (approximate head-height) above ground level. Where unknown, the side closest to the source of noise is assumed. Paved areas for multiple dwelling residential units are not defined as OLA. The OLA may include private areas used by individual dwelling occupants or “common” areas used by multi-tenant dwelling occupants.

Under the MECP (Ministry of the Environment, Conservation and Parks) Guidelines, NSAs include the following land uses, provided they have an OLA associated with them:

- Private homes (single family units and townhouses).
- Multiple unit buildings such as apartments, provided they have a communal OLA associated with them.
- Hospitals and nursing homes for the aged, provided they have an OLA for use by patients.
- Schools, educational facilities, and daycare centres where there are OLAs for students.
- Campgrounds that provide overnight accommodation.
- Hotels and motels with outdoor communal OLAs for visitors.
- Churches and places of worship.

The following land uses are generally not considered to qualify as NSAs:

- Apartment balconies
- Cemeteries
- Parks and picnic areas not part of a defined OLA
- All commercial
- All industrial

2.2.3 Representative NSAs for Analysis

Eleven (11) NSAs have been used in the analysis to represent worst-case potential noise impacts at all nearby noise sensitive land uses within the study area. NSAs were chosen to assess areas with similar overall noise levels and similar changes in noise (“build” versus “no-build”). These NSAs and modelled receptor locations are described in Table 2.

The locations of the representative noise receptors used in the analysis are shown in Figure 2 to Figure 4.



Table 2: Representative NSAs Considered in Analysis

Receptor Number	Description	Characteristic of Property in Relation to RR 25
Receptor 1	9056 RR 25	West
Receptor 2	9096 RR 25	West
Receptor 3	9274 RR 25	West
Receptor 4	9322 RR 25	West
Receptor 5	9273 RR 25	East
Receptor 6	9317 RR 25	East
Receptor 7	9422 RR 25	West
Receptor 8	9409 RR 25	East
Receptor 9	9449 RR 25	East
Receptor 10	9471 RR 25	East
Receptor 11	9495 RR 25	East

2.3 Study Horizons

Under the MECP/MTO Joint Noise Protocol and the Halton Noise Abatement Guidelines, a “noise impact” is defined as the difference in projected sound levels at the “no build” and the projected sound levels at the “build” year. Traffic volumes from the 2031 year were chosen as recommended in the guideline to assess possible noise impacts.

2.4 Study Scenarios

As mentioned above, the “noise impact” for the study area is defined as the difference in projected sound levels between the “no build” and “build” scenarios.

2.5 Road Traffic Data

Traffic information for the 2031 “no build” and “build” scenarios for Regional Road 25 and surrounding side roadways (5 and 10 Side Road) were provided by HDR Inc. and are found in Appendix C. The data is further summarized in Table 3. Traffic data was provided as Average Annual Daily Traffic (AADT), with percentage of commercial vehicles, day/night traffic split and posted speeds.



Table 3: 2031 “No-Build” and “Build” Traffic Information

Roadway	Section	Traffic Volumes (AADT)	Day% ^[1]	% Medium Trucks	% Heavy Trucks	Posted Speed (km/h)
Highway 401	West of RR 25	165,800	67	4.3	13.0	100
	RR 25 to James Snow Pkwy.	165,800	67	5.4	16.3	100
RR 25	South of 5 Side Rd.	14,790	90	4.4	9.9	70
	Between 5 Side Rd. and 10 Side Rd.	13,900	90	3.9	8.7	80
	North of 10 Side Rd.	13,200	90	4.4	9.7	80
10 Side Rd.	East of RR 25	900	90	0.9	2.0	50
5 Side Rd.	East of RR 25	3,600	90	5.2	11.7	60
	West of RR 25	2,900	90	1.4	3.2	60
Notes: [1] Percentage of vehicle traffic in the 16-hour daytime period.						

2.6 Noise Model Used

The roadway noise prediction model used is the ORNAMENT road noise prediction algorithms produced by the MECP. The MECP “STAMSON” highway noise prediction model is a computerized version of this method. Both methods are simplified versions of the United States Federal Highway Administration Method. A Cadna/A implementation of the STAMSON/ORNAMENT model was used for the noise analysis because of its ability to handle complex ground elevations, multiple barriers, and receptors. The Cadna/A software also considers screening from buildings that are located between the roadways and the NSAs. The sound power levels, and noise source heights used in Cadna/A are found in Appendix D. A comparison between the STAMSON output and the Cadna/A implementation of the ORNAMENT algorithms is provided in Appendix D.

The noise prediction model relies on the use of vehicle noise emission levels to generate a noise source that can then be assessed at the receptors based on the following factors:

- Speeds for the roadways in the area used in the noise analysis.
- Pavement surface used for construction of the roadway (hot mix asphaltic pavement for all roadways).
- Elevations, contours, and locations of all the NSA's near the right-of-way.
- Roadway grades.
- Intervening rows of homes and barriers.
- Type of ground cover, soft or hard ground.
- Percentage of commercial traffic.
- Distance from the roadway.



The model uses the following vehicle classifications:

Automobiles	Two axles and four wheels designed primarily for the transportation of nine or fewer passengers, or transportation of cargo (light trucks). This classification includes motorcycles. Generally, the gross vehicle weight is less than 4,500 kilograms.
Medium Trucks	Two axles and six wheels designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 4,500 kilograms but less than 12,000 kilograms.
Heavy Trucks	Three or more axles and designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 12,000 kilograms.

Distances, roadway heights, and receptor locations were obtained from plan drawings supplied by HDR Inc. in addition to aerial photography. Existing noise walls were included within the model.

As per industry standards, best practices, and MECP/MTO guidelines, the roadways were modelled along the centreline for each direction (i.e. one line for eastbound, and a second for westbound). Modelled line sources are shown in Figures 2 and 4 for both the “no-build” and “build” scenarios.

2.7 Detailed Modelling

Table 4 presents a comparison of predicted “no build” versus future “build” sound levels at receptors in the study area during the 16-hour daytime period.

Table 4: 2031 “No-Build” and “Build” Noise Levels

Receptor Location	Approximate Number of NSAs Represented	“No Build” L _{eq} (16h) ^[1]	“Build” L _{eq} (16h) ^[1]	Change (“Build” minus “No Build”) ^[2]	> 5 dBA (Yes/No)
Receptor 1	1	53.1	53.0	-0.1	No
Receptor 2	1	50.0	49.9	-0.1	No
Receptor 3	5	50.5	50.5	0.0	No
Receptor 4	2	58.6	58.4	-0.2	No
Receptor 5	6	47.6	47.5	-0.1	No
Receptor 6	1	51.2	51.1	-0.1	No
Receptor 7	2	51.4	51.2	-0.2	No
Receptor 8	3	53.8	53.7	-0.1	No
Receptor 9	3	48.2	48.2	0.0	No
Receptor 10	3	48.4	48.4	0.0	No
Receptor 11	1	50.8	50.7	-0.1	No

Notes:

[1] Where predicted sound levels are less and 50 dBA a sound level of 50 dBA is assumed.

[2] A negative “change in sound level” occurs in this case due to the lanes moving farther away from receptors compared to the existing condition.



2.8 Discussion of Noise Impacts

The location of the noise receptors are shown in Figure 2 to Figure 4. The results presented in the table above show that changes in sound levels resulting from the proposed project are expected to result in a slight noise reduction of approximately 0.2 dBA for most of the homes. This is considered an imperceptible change in sound level. It takes approximately a 3 dBA change in sound levels before most persons perceive a change, therefore slight increases or decreases in sound levels are expected to be imperceptible.

2.9 Discussion and Investigation of Noise Mitigation

There are no anticipated noise impacts for this project, and predicted sound levels are well under the noise impact criteria outlined in the Halton Noise Abatement Guidelines. As a result, additional noise mitigation is not recommended or required for this project.

3.0 Construction Noise Impacts

Construction noise impacts are temporary in nature, and largely unavoidable. Although for some periods and types of work, construction noise may be noticeable, with adequate controls, impacts can be minimized. This section of the report provides an overview of the local by-law and recommends a Code of Practice to minimize impacts.

3.1 Construction Noise and Vibration Assessment Guidelines

3.1.1 MECP Model Municipal Noise Control By-Law

The MECP stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. In the presence of persistent noise complaints, sound emission standards for the various types of construction equipment used on the project should be checked to ensure that they meet the specified limits contained within MECP Publication NPC-115 – “Construction Equipment”. These limits are provided in Table 5.

Table 5: NPC-115 Maximum Noise Emission Levels for Typical Construction Equipment

Type of Unit	Maximum Sound Level ^[1] (dBA)	Distance (m)	Power Rating (kW)
Excavation Equipment ^[2]	83	15	< 75
	85	15	> 75
Pneumatic Equipment ^[3]	85	7	-
Portable Compressors	76	7	-
Notes: [1] Maximum permissible sound levels presented here are for equipment manufactured after Jan.1, 1981. [2] Excavation equipment includes bulldozers, backhoes, front end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications. [3] Pneumatic equipment includes pavement breakers.			



3.1.2 Construction Vibration Guidelines

Blasting is not expected to occur as part of this project's construction process. Regardless, vibration from construction activities can affect surrounding structures. The vibration limits recommended under Ontario Provincial Standard Specification (OPSS) OPSS MUNI-120 – General Specification for the Use of Explosives should be adopted (OPSS 2014). These vibration limits are summarized in Table 6.

Table 6: Construction Vibration Limits – OPSS MUNI-120

Element	Frequency	Limit – Peak Particle Velocity (PPV), mm/s
Structures and Pipelines	< 40 Hz	20
	> 40 Hz	50
Concrete and Grout < 72 hours from placement	All	10

These limits would apply to vibration from construction activities such as hoe ramming, pile driving, dumping and excavation. The contractor should assess the potential for vibration impacts from their planned activities prior to the start of construction and mitigate accordingly.

In addition, the contractor should abide by the following MECP vibration document requirements when constructing this undertaking:

- Noise Pollution Control Publication 207 (NPC-207), Impulse Vibration in Residential Buildings, (November 1983); and,
- Vibration limits within MECP publication NPC-207 can be supplemented by more detailed construction vibration limits regarding building damage from Chapter 12 of United States Federal Transit Administration - Transit Noise and Vibration Impact Assessment (document FTA-VA-90-1003-06 – May 2006).

Where there are overlapping criteria, the more stringent criteria apply. Excerpts from NPC-207 are presented in Tables 7 and 8. Full details of the construction vibration limits are provided in their respective documents.

The scope of NPC-207 is defined as follows:

The purpose of this Publication is to provide a method for assessment of impulse vibration measured inside occupied residential buildings, caused by the operation of stationary sources of vibration including, but not limited to, stamping presses and forging hammers.

NPC-207 was drafted to address permanent, rather than temporary, vibration impacts and address perceived vibrations rather than the building damage criteria that are set out in OPSS MUNI-120.



Table 7: Table 207-2: Vibration Limits for Frequent Impulses (20 or More Impulses in Reported Observation Period)

Observation Period in Minutes	Limit on the Average Peak Vibration Velocity in mm/s	
20 minutes or less	0.30	0.30
Less or equal to 60 minutes but more than 20 minutes	0.60	0.30
Less or equal to 120 minutes but more than 60 minutes	1.00	0.30
Notes: Source: NPC-207 – Full details for vibration limits provided in NPC-207		

Table 8: Table 207-3: Vibration Limits for Infrequent Impulses (Less than 20 Impulses in Reported Observation Period)

Observation Period in Minutes	Limit on the Average Peak Vibration Velocity of Individual Impulses in mm/s	
120 minutes	10.00	0.30
Notes: Source: NPC-207 – Full details for vibration limits provided in NPC-207		

3.1.3 Local Noise Control By-Laws

The proposed project lies entirely within the Town of Halton Hills which has a bylaw restricting noise from construction activities. The Town of Halton Hills in Section 3.8 only limits noise in areas of the Town that they define as Residential Areas. The area of the proposed road construction is clearly well away from the residential areas shown in Schedule C of the Bylaw. Table 9 shows the relevant text from Bylaw 2010-0030. The town has a requirement that all construction equipment have effective noise muffling devices in good working order. Consolidated copies of the bylaws can be found in Appendix E.



Table 9: Town of Halton Hills Noise Control By-laws

Jurisdiction	Bylaw Numbers	Bylaw Provision																	
Town of Halton Hills	2010-0030 and 2023-0067	3.8 <u>LIMITATION ON EXTERIOR SOUND LEVELS DUE TO CONSTRUCTION EQUIPMENT</u> No Person shall emit or cause or permit the emission of any Sound from any item of Construction Equipment of a type referred to in or that exceeds the Sound Levels specified in Table 7 at a Construction site, any part of which, is located in or within 600 m of a Residential Area. TABLE 7 Limitation on Exterior Sound Levels Due to Construction Equipment <table border="1"> <tr> <th rowspan="2">Type of Equipment (manufactured after January 1, 1981)</th><th colspan="2">Maximum Sound Level (dBA)</th></tr> <tr> <th>Power Rating Less than 75 kW</th><th>Power Rating 75 kW and Larger</th></tr> <tr> <td>Excavation Equipment, Bulldozers, Loaders, Backhoes, or other equipment capable of being used for similar application.</td><td>83 dBA</td><td>85 dBA</td></tr> <tr> <td>Pneumatic Pavement Breakers</td><td colspan="2">85 dBA</td></tr> <tr> <td>Portable Air Compressors</td><td colspan="2">76 dBA</td></tr> <tr> <td>Tracked Drills</td><td colspan="2">100 dBA</td></tr> </table>	Type of Equipment (manufactured after January 1, 1981)	Maximum Sound Level (dBA)		Power Rating Less than 75 kW	Power Rating 75 kW and Larger	Excavation Equipment, Bulldozers, Loaders, Backhoes, or other equipment capable of being used for similar application.	83 dBA	85 dBA	Pneumatic Pavement Breakers	85 dBA		Portable Air Compressors	76 dBA		Tracked Drills	100 dBA	
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Pneumatic Pavement Breakers	85 dBA																		
Portable Air Compressors	76 dBA																		
Tracked Drills	100 dBA																		

3.2 Anticipated Construction Activities

The following construction activities are anticipated as part of this project:

- Removing some existing surface pavements.
- Construction of the roadway widening, including removal of overburden.
- Paving of new roadway surfaces.
- Repaving of some of the existing roadways.

3.3 Construction Code of Practice Requirements (Mitigation)

To minimize the potential for construction noise impacts, it is recommended that provisions be written into the contract documentation for the contractor, as outlined below:

- Where possible construction should be carried out during the normally allowed hours specified in the by-law found in Appendix E. If construction activities are required outside of these hours, the Contractor should minimize the amount of noise being generated to not be clearly audible in any noise sensitive areas.
- There should be explicit indication that the Contractor is expected to comply with all applicable requirements of the contract.

All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. This is also a requirement of the Vaughan noise control by-law.



4.0 Conclusions and Recommendations

The potential environmental noise impacts of the proposed undertaking have been assessed. Both operational and construction noise impacts have been considered. The conclusions and recommendations are as follows:

- The results show that changes in sound levels resulting from the proposed project are expected to result in almost no change for the residences along Regional Road 25 within the project limits.
- Future noise impacts do not exceed the 5 dBA impact criteria in the Ministry of the Environment, Conservation and Parks/Ministry of Transportation (MECP/MTO) Joint Noise Protocol and the Halton Region Noise Abatement Guidelines. Therefore, the review of noise mitigation is not warranted based on both guidelines.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential Noise Sensitive Areas (NSAs). Methods to minimize construction noise impacts should be included in the Construction Code of Practice, as outlined in Sections 3.1.3 and Section 3.3.

5.0 Closure

If you have any questions about the above, please don't hesitate to contact the undersigned.

Regards,

SLR Consulting (Canada) Ltd.



Jason Dorssers P.Eng.
Acoustics Engineer



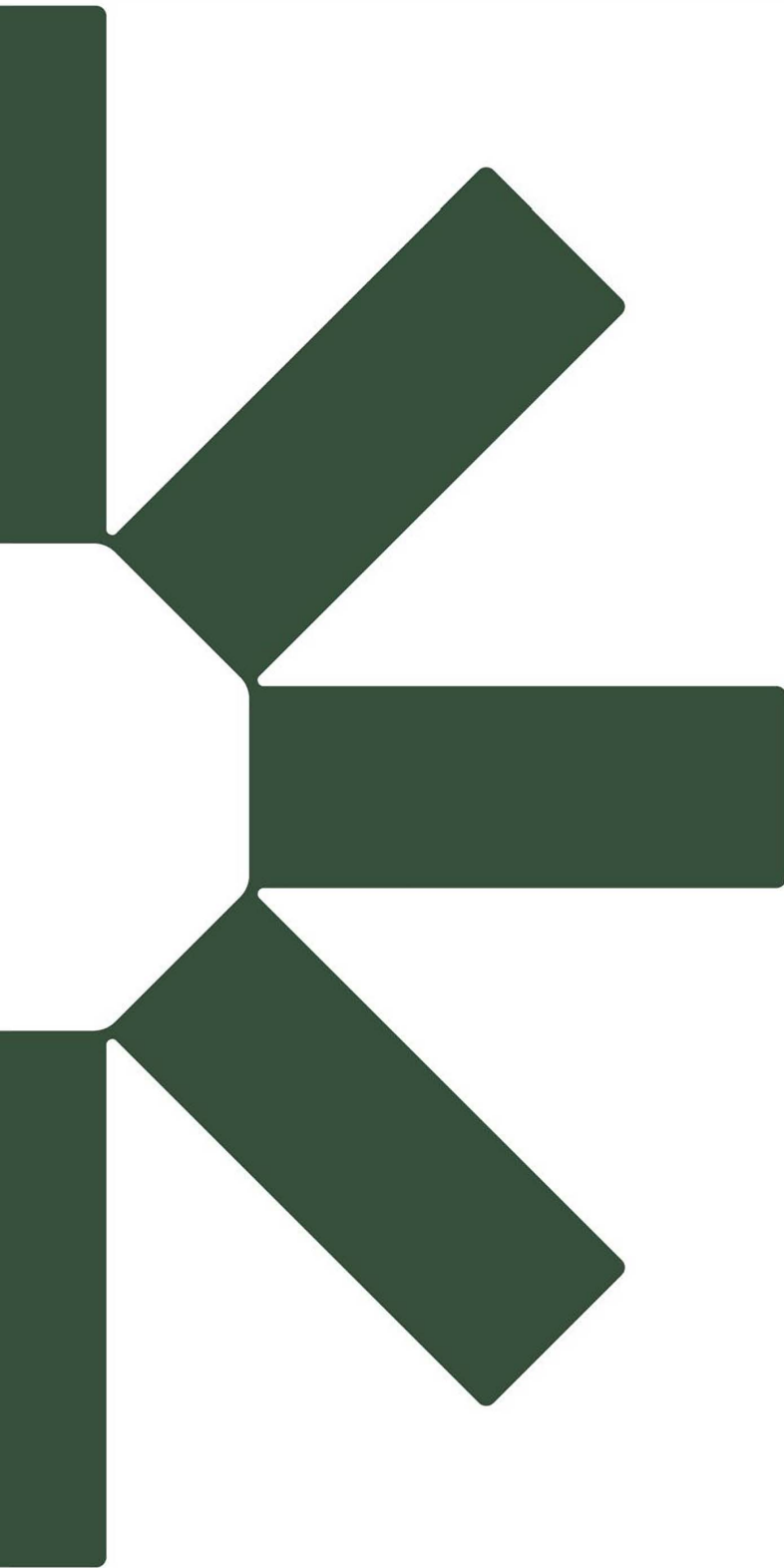
Scott Penton, P.Eng.
Principal Acoustics Engineer



6.0 References

- Ontario Ministry of the Environment, Conservation and Parks (MECP), 1989, Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT)
- Ontario Ministry of the Environment, Conservation and Parks (MECP), 2000, STAMSON v5.04: Road, Rail and Rapid Transit Noise Prediction Model
- Ontario Ministry of the Environment, Conservation and Parks (MECP), 1977b, Model Municipal Noise Control Bylaw, which includes Publication NPC-115 – Construction Equipment
- Ontario Ministry of the Environment, Conservation and Parks (MECP), 1977c, Model Municipal Noise Control Bylaw, which includes Publication NPC-119 – Noise from Blasting
- Ontario Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-207 - Impulse Vibration in Residential Buildings, Revised November 1983
- Ontario Provincial Standard Specification OPSS MUNI 120: General Specification for the Use of Explosives.
- Transit Noise and Vibration Impact Assessment, Federal Transit Administration, FTA-VA-90-1003-06, May 2006
- Ontario Ministry of the Environment, Conservation and Parks (MECP), 2013, Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning, Publication NPC-300
- Regional Municipality of Halton, Noise Abatement Guidelines
- Town of Milton, Noise By-Law Number 133-2012
- Town of Halton Hills, Noise Control Bylaws 2010-0030 and 2023-0067





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