REPORT

AIRPORT ROAD – KING STREET TO HUNTSMILL DRIVE

CALEDON, ONTARIO

ROAD TRAFFIC NOISE ASSESSMENT
RWDI # 1702763
September 17, 2021

SUBMITTED TO

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EXECUTIVE SUMMARY

IBI Group retained RWDI AIR Inc. to conduct a noise impact assessment of proposed improvements to Airport Road between King Street and Huntsmill Drive in Caledon, Ontario within the Region of Peel. This assessment has been completed in support of a Schedule C Municipal Class Environmental Assessment.

The Airport Road study area is approximately 7.5 km in length and extends from King Street (Regional Road 9) northerly to 300 m north of Huntsmill Drive. Planned improvements proposed through development applications include adding and extending access roads and signalizing or adding roundabouts to five major intersections. The project also includes sidewalks, bike lanes and on-street parking but are not significant contributors to future sound levels.

The potential for environmental noise impacts of the proposed Airport Road improvements has been assessed. Both operational and construction sound levels have been considered. Changes in future sound levels resulting from the Project is expected to be small. However, the overall future sound levels are predicted to exceed 60 dBA at some receptors. Noise mitigation measures at these locations have been investigated, in accordance with the Region of Peel and the Town of Caledon guidelines. Noise mitigation measures in the form of noise barriers were investigated for seven representative receptors, five of which were deemed technically feasible. Noise barrier heights, location, extents, and aesthetic features should be further reviewed during the Detailed Design by the Region.

Construction activities are temporary in nature with sound levels noticeable at times. Methods to minimize construction noise impacts should be included in the Construction Code of Practice, as outlined in this report.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

IBI Group retained RWDI AIR Inc. to conduct a road traffic noise impact assessment of Airport Road between King Street (Regional Road 9) and Huntsmill Drive in Caledon, Ontario. The Town of Caledon is within the Region of Peel. This assessment has been completed in support of a Schedule C Municipal Class Environmental Assessment. The objectives of the study are:

- to assess the "Future Build" and "Future No-Build" sound levels (i.e., sound levels with and without the proposed project taking place);
- to determine the potential for sound level effects as a result of the project;
- to specify mitigation measures where required; and,
- to assess the potential for construction noise and provide a Code of Practice to minimize potential effects.

A plain language description of terminology and relationships between everyday sounds to aid the non-technical reader is provided in Appendix A.

2 PROJECT DESCRIPTION

Airport Road is a two-lane arterial road that runs north-south through the Town of Caledon. The Airport Road study corridor is approximately 7.5 km in length and extends from King Street northerly to 300 m north of Huntsmill Drive (Figure 1).

Along the subject length, Airport Road has a number of signalized intersections and side-streets typically have stop signs. Through the Environmental Assessment, intersection improvements that were considered include signalizing and adding roundabouts to five intersections along Airport Road. Adding and extending access roads was also considered in select locations along the corridor through the study and development applications. The promotion of healthy living through infrastructure improvements for walking and cycling was also examined. The addition and modification of sidewalks and cycling facilities are not significant contributors to future sound levels.

Access improvements include adding two access roads on the southwest side of Airport Road between Leamster Trail and Walker Road and adding one access road on the southwest side of Airport Road between Boston Mills Road and King Street. Road extensions include extending Caledon East Public-School access and Cranston Drive northeast of Airport Road. These changes are planned to be implemented between 2018 and 2022 and are minor improvements to existing road configuration. These minor changes are considered as the Future No-Build scenario. The preferred alternative includes adding roundabouts to two intersections: Boston Mills Road/Castlederg Side Road and Cranston Drive, and intersection improvements to Old Church Road, Walker Road, and Old Base Line. Roundabouts create larger intersections bringing traffic closer to sensitive areas. Roundabouts have been considered as part of the Future Build scenario. A sample drawing of one of the roundabouts is provided in Appendix B.

Based on information provided by IBI Group, traffic volumes are projected to be the same for the Future No-Build and Future Build scenarios. This is anticipated to result in little to no change in future sound levels. An evaluation of effects from operational (road traffic) and construction sound level resulting from the undertaking are provided herein.

3 ROAD TRAFFIC SOUND LEVEL ASSESSMENT

3.1 Applicable Guidelines

A number of guidelines and documents related to assessing road traffic noise impacts have been reviewed. The document which applies to Ontario municipal roadway construction and reconstruction projects is:

- Ontario Ministry of the Environment (MOE)/ Ministry of Transportation (MTO), "Joint Protocol", A Protocol for Dealing with Noise concerns during the Preparation, Review and Evaluation of Provincial Highway's Environmental Assessments, 1986; and
- The MTO Environmental Guide for Noise, 2006, supersedes the Joint Protocol. It is our understanding that the updated Guide has not been adopted by the MOE for municipal projects at the time of publication.

The Joint Protocol applies to provincial highways and are not highly applicable for a regional road. The MTO Environmental Guide for Noise applies to major road construction and not highly applicable to minor road improvements in this case.

The approach used for this assessment adhered to the aforementioned guidelines and considered the following documents:

- Town of Caledon, Development Standards, Policies and Guidelines Version 5, January 2019;
- Region of Peel, General Guidelines for the Preparation of Acoustical Reports in the Region of Peel, November 2012; and,
- Region of Peel, Corporate Policy Manual – Noise Attenuation Barriers, W30-04, 2016.

While the provincial documents outline the methodology of how to model road traffic noise, identify receptor locations and determine the feasibility of the mitigation, these additional documents indicate the applicable local criteria and any limitations related to mitigation as outlined in the remainder of this section:

- The criterion for road traffic noise in outdoor living areas is 55 dBA (16-hour daytime average);
- The criterion for outside a bedroom window is 50 dBA (8-hour nighttime average); and,
- Noise barriers are considered for road traffic noise when noise level exceeds 60 dBA (average over a 16-hour daytime period) at 1.5 m above ground, 3 m away from rear wall of a dwelling that has reverse frontage.

The project in the present case consists of improvements to a regional road. The main question for the noise impact assessment is whether there are any locations where it would be appropriate to incorporate noise barriers into the roadway improvements. Therefore, the study focuses on identifying residential areas with reverse frontage (or side frontage) and noise levels in excess of 60 dBA (16-hour daytime, L_{EQ-16h}).

The maximum barrier height considered is 2.4 m. The aim is for a barrier to achieve the 55 dBA criterion at the target outdoor living area of a residence, or at least a readily noticeable reduction in the noise level (i.e., at least a 5 dB reduction). When this cannot be achieved with a barrier height of 2.4 m or less, then it is deemed infeasible to implement a barrier at the target location.

The applicable noise criteria are summarized in Table 1.

Table 1: Summary of Applicable Noise Criteria

Daytime Outdoor L_{EQ-16h} Criterion for Barriers	Applicable Noise Criteria
60 dBA or higher	Outdoor living area at 1.5 m above ground, 3 m from the rear face of a dwelling. Criterion for a barrier to be considered technically feasible, the barrier achieves the desired sound level of 55 dBA (16-hour daytime level) or achieves at least a 5 dB reduction in sound level at the target residences.

3.2 Traffic Data

Projected 2041 traffic volumes, posted speeds and vehicle distribution percentages were provided by IBI Group. Note that Future No-Build and Future Build traffic volumes are projected to be the same. The 2041 peak hour data were used to model future conditions, thus representing the worst-case. Day-night split of 90/10 was used for regional roads per the Ontario Road Noise Analysis Method for Environmental Transportation (ORNAMENT) (MOE 1989). Table 2 provides a summary of the modelled traffic volume and speed data. More detailed data are summarized in Appendix C.

In order to assign the vehicle distribution percentages to appropriate vehicle classes, the Federal Highway Administration vehicle classification system was used. Vehicle distribution percentages were supplied by IBI Group for light vehicles, buses, single unit trucks and articulated trucks at all existing intersections within the study area.

The distribution of vehicle types for northbound traffic on Airport Road is relatively homogeneous throughout the study area, during the mid-day and PM-peak periods. The same is true for the distribution of vehicle types for southbound traffic, during the mid-day and AM-peak periods. Therefore, for each of these periods, an average vehicle distribution was adopted for the entire length of Airport Road within the study area. For northbound traffic during the AM-peak and southbound traffic during the PM-peak, the distribution of vehicle types north of Old Church Road differed from that to the south. In those cases, therefore, separate average vehicle distributions were adopted for these two sections of Airport Road.

Table 2: 2041 Future Traffic Volumes and Speeds for the Study Area

Road	Portion of Road	Direction	2041 AADT [1]	Posted Speed Limit [2] (km/h)
Airport Road	Old School Road to King Street	NB	7,500	80
		SB	9,560	
	King Street to King Street Access	NB	9,010	80
		SB	9,300	
	King Street Access to Castlederg Side Road	NB	9,580	60
		SB	11,250	
	Castlederg Side Road to Olde Base Line Road	NB	9,920	60
		SB	9,950	
	Olde Base Line Road to Cranston Drive	NB	13,550	60
		SB	10,880	
	Cranston Drive to Caledon P.S. Driveway	NB	10,970	50
		SB	10,700	
	Caledon P.S. Driveway to Foodland Plaza	NB	12,270	50
		SB	10,010	
	Foodland Plaza to Hilltop Drive	NB	12,820	50
		SB	10,450	
	Hilltop Drive to Marion Street	NB	12,120	50
		SB	11,070	
	Marion Street to Larry Street	NB	12,260	50
		SB	10,480	
	Larry Street to Mountcrest Road	NB	12,390	50
		SB	10,870	
	Mountcrest Road to Caledon Trailway	NB	12,270	50
		SB	10,740	
	Caledon Trailway to Emma Street	NB	12,130	50
		SB	10,790	
	Emma Street to Parsons Avenue	NB	11,710	50
		SB	10,670	
	Parsons Avenue to Old Church Road	NB	12,520	50
		SB	10,060	

Road	Portion of Road	Direction	2041 AADT [1]	Posted Speed Limit [2] (km/h)
Airport Road	Old Church Road to Walker Road	NB	9,440	50
		SB	7,240	
	Walker Road to Airport Road Access (S)	NB	8,730	50
		SB	7,250	
	Airport Road Access (S) to Airport Road Access (N)	NB	8,620	50
		SB	7,560	
	Airport Road Access (N) to Leamster Trail	NB	8,610	50
		SB	7,420	
	Leamster Trail to Huntsmill Drive	NB	8,460	50
		SB	7,410	
	Huntsmill Drive to Patterson	NB	8,440	80
		SB	7,110	
King Street	Torbram Road to Airport Road	EB	6,260	70
		WB	7,400	
	Innis Lake Road to Airport Road	EB	6,860	70
		WB	8,440	
Olde Base Line Road	Mountainview Road to Airport Road	EB	4,420	50
		WB	3,560	
Old Church Road	Greer Street to Airport Road	EB	5,760	50
		WB	4,550	

Notes: [1] Future traffic volumes are projected to be the same for No-Build and Build scenarios.

3.3 Noise-Sensitive Land Uses

3.3.1 Future Residential Lots

Lands that have been zoned for future residential uses and which have a Plan of Subdivision in place are considered. A review of several Plans of Subdivision as provided by IBI Group has been conducted and included in Appendix D. Three planned subdivisions along Airport Road have current development applications with the Town of Caledon but are not yet approved. The locations of these subdivisions are shown in Figures 5 through 7. Only a portion of each lot is planned for homes and considered. Portions that are not planned for homes are excluded.

3.3.2 Existing Residential Lots

Several existing residential land uses have been identified. Only representative receptor locations have been identified and modelled to demonstrate the worst-case sound level. The representative receptor may be situated on any side of the receptor but is generally taken to be the back yard. The location is to be 3 m from the wall and 1.5 m above the ground. Where the actual position of the backyard is not known, the side closest to the proposed roadway has been assumed. The location of the representative receptors are shown in Figures 2 through 7. Table 3 summarized the modelled representative receptors.

Table 3: Modelled Representative Receptors

Representative Receptor ID	Receptor Description
NR1	Side Facing Residential home on King Street
NR2	Side Facing Residential home on Airport Road
NR3	Side Facing Residential home on Airport Road (at Roundabout)
NR4	Side Facing Residential home on Olde Base Line Road
NR5	Side Facing Residential home on Olde Base Line Road
NR6	Side Facing Residential home on Cranston Drive (at Roundabout)
NR7	Rear Facing Residential home on Brandiff Court
NR8	Side Facing Residential home on Hilltop Drive
NR9	Side Facing Residential home on Marion Street/ Larry St/ Hilltop Drive/ Mountcrest Road
NR10	Side Facing Residential home on Larry Street
NR11	Side Facing Residential home on Emma Street/ Parsons Avenue/ Ivan Avenue/ Walker Road West
NR12	Side Facing Residential home on Old Church Road/ John Street South/ Robert Carson Drive
NR13	Side Facing Residential home on Walker Road East
NR14	Rear Facing Residential home on Munsey Court
NR15	Rear Facing Residential home on Fleetham Court
NR16	Side Facing Residential home on McKinley Crescent/ Leamster Trail
NR17	Rear Facing Residential home on Huntsmill Drive
F1	Potential Future Residential Subdivision (at Roundabout)
F2	Potential Future Residential Subdivision
F3	Potential Future Residential Subdivision

3.4 Road Traffic Model

Road traffic sound levels were modelled using a spreadsheet implementation of the ORNAMENT algorithms. The algorithms in this spreadsheet form the basis of the STAMSON v5.03 computer program produced by the MOE (MOE 1996). Results from the ORNAMENT spreadsheet calculations and STAMSON are approximately equivalent.

The following factors were taken into account in the analysis:

- Horizontal and vertical road-receiver geometry;
- Road gradients;
- Intervening terrain types (ground absorption);
- Traffic volumes and percentage of trucks;
- Vehicle speeds; and,
- Screening provided by terrain, houses and existing sound barriers.

Distances and receptor locations were obtained from online aerial photographs. Existing barriers along Airport Road considered are those made of wood and appear to have no large visible gaps and are shown in Figures 2 through 7. Barrier locations and heights were obtained from Google Street View.

3.5 Determination of Potential Impacts

The Future Build scenario with roundabouts which locate road traffic slightly closer to the homes has been modelled and presented in detail. Since traffic between the Future Build and No-Build are projected to be the same, the Future No-Build sound level would be similar.

Where existing wooden fences and earthen berm exist, these have been included in the modelling if no large gaps are visible. These wooden fences and earthen berm range approximately between 1.8 m to 2.0 m combined height. Location of existing wooden fences are shown in Figures 5 through 7.

Table 4 summarized the predicted Future Build sound levels. The ORNAMENT calculations can be found in Appendix E.

Table 4: Predicted Future Sound Levels – Unmitigated

Representative Receptor ID	Future Sound Level $L_{EQ\text{-}16h}$ (dBA) [1]	>60 dBA?
NR1	**62**	Yes
NR2	58	No
NR3	52	No
NR4	**62**	Yes
NR5	**63**	Yes
NR6	**62**	Yes
NR7	55	No

Representative Receptor ID	Future Sound Level L_{EQ-16h} (dBA) [1]	>60 dBA?
NR8	**61**	Yes
NR9	55	No
NR10	**64**	Yes
NR11	58	No
NR12	**61**	Yes
NR13	**63**	Yes
NR14	57	No
NR15	56	No
NR16	58	No
NR17	53	No
F1	**65**	Yes
F2	**63**	Yes
F3	53 [2]	No

Notes: [1] Predictions include only existing wooden fence with no visible gaps.
[2] Proposed future residential subdivision is similar to receptor NR17 based on setback and sound level shown is based on prediction at NR17.

The results show that existing representative receptors NR1, NR4 through NR6, NR8, NR10, NR12, and NR13 are predicted to exceed 60 dBA future sound level. Receptors NR1, NR4 and NR12 are not located next to the right-of-way and therefore, any barriers installed at the right-of-way would be ineffective (not technically feasible) in reducing sound at these locations. Therefore, investigation of noise mitigation is completed for NR5, NR6, NR8, NR10, and NR13 as these are adjacent to the road right-of-way.

Potential future receptors F1 and F2 are also predicted to exceed 60 dBA and were investigated for noise mitigation. Mitigation measures are to be finalized through the Land Use Planning process. Sound levels at potential future receptor F3 is not expected to exceed 60 dBA based on similar setback as existing receptor NR17.

3.6 Investigation of Noise Mitigation

Based on the projected future sound levels resulting from the project, an investigation of noise mitigation measures is required.

3.6.1 **Barrier Requirements**

Noise barriers reduce noise levels at the receptors through blocking the path of sound waves emanating from the source towards the receiver, and by absorbing or reflecting the incident sound energy away. Therefore, a noise barrier must at least break the line-of-sight between the source (the roadway) and the receptor. Such a barrier must provide at least 5 dB of attenuation.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 4:1 should be used for drainage and erosion control and right-of-way maintenance. Noise barriers should be free of large gaps and cracks and have a minimum surface density (mass per unit of face area) of 20 kg/m^2.

3.6.2 Investigated Barriers

Noise barriers have been modelled for seven representative receptors. The average reductions for investigated barriers are summarized in Table 5.

Table 5: Predicted Future Sound Levels – Mitigated

Representative Receptor ID	Future Sound Level L_{EQ-16h} (dBA) [1]	Average Reduction (dB)	Barrier ID
NR5	57	5	BAR1
NR6	59	3	BAR2a-b
NR8	59	2	BAR3
NR10	58	6	BAR4
NR13	58	5	BAR5
F1	59	6	BAR6a-c
F2	59	4	BAR7

Receptor NR5 appears to be side facing with the majority of its outdoor amenity space facing Airport Road. Because of this, consideration was given and a barrier with a return was investigated to protect the space as per Peel's guidelines for corner lots.

Receptor NR10 appears to be currently a home-based business, however, it is located within a residential zone. Because of the zoning, the fact that the outdoor amenity space may be used for residential purposes, and the potential for this residence to be sold to a new owner with the purpose of personal occupancy, this receptor was also included on the list for potential barrier investigations.

Only four of seven barriers achieved the 5 dB reduction criteria. Although F2 does not provide the full 5 dB reduction, barriers installed here will provide a noticeable reduction in noise level. It is recommended that noise barriers be installed for NR5, NR10, NR13, F1, and F2 which are deemed technically feasible. Investigated barriers near Walker Road and Cranston Drive (Bar5a/5b and Bar4a/b/c) are to be reviewed through the development approval process. These barriers were investigated assuming side and rear facing lots. Proposed noise barrier locations are shown in Figures 5 through 7 and details on barrier dimensions are provided in Table 6.

Table 6: Proposed Barrier Dimensions

Representative Receptor ID	Barrier ID	Barrier Height [1] (m)	Barrier Length (m)
NR5	BAR1	1.8	80
NR10	BAR2	1.8	40
NR13	BAR3	2.0	40
F1	BAR4a	2.1	270
	BAR4b		240
	BAR4c		50
F2	BAR5a	2.0	75
	BAR5b		30

Notes: [1] Physical barrier height of the noise wall above local grade to break line-of-sight to representative receptor.

4 CONSTRUCTION SOUND LEVEL ASSESSMENT

Construction activities are temporary in nature, and largely unavoidable. With adequate controls, impacts can be minimized. However, for some periods of time and types of work, construction sound levels will be noticeable. This section of the report provides an evaluation of sound levels from construction equipment resulting from the undertaking and discusses applicable by-laws and Code of Practice requirements to minimize impacts.

4.1 Construction Noise Guidelines

4.1.1 Local Noise Control By-laws

The proposed project lies within the following local jurisdictions of the Town of Caledon and the Region of Peel. By-laws restricting noise from construction activities exist only in the Town of Caledon. The Town of Caledon noise by-law 86-110 prohibits the operation of any equipment in connection with construction between the hours of 11:00 pm on one day to 6:00 am the next day. A copy of the by-law can be found in Appendix F.

4.1.2 Maximum Construction Equipment Sound Level

The MOE stipulate limits on sound level 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 in MOE Publication NPC-115 “Construction Equipment”, as follows (MOE 1977b):

Table 7: NPC-115 Maximum Sound Levels for Typical Construction Equipment

Type of Unit	Maximum Sound Pressure Level [1] (dBA)	Distance from Equipment (m)	Power Rating (kW)
Excavation Equipment[2]	83	15	Less than 75 kW
	85	15	75 kW or Greater
Pneumatic Equipment[3]	85	7	-
Portable Compressors	76	7	-

Notes: [1] Maximum permissible sound pressure level 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.

4.2 Anticipated Construction Noise Levels

Construction activities will vary temporally and spatially as the project progresses. Sound levels from construction at a given receptor location will also vary over time as different activities take place, and as those activities change location within the right-of-way.

At this time, detailed construction noise plans are not available. An analysis of potential worst-case construction sound levels has been conducted based on generic data (equipment types and activities). The analysis, including anticipated construction sound levels, is described in Appendix F.

4.3 Construction Code of Practice Requirements

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:

- Construction should be limited to the time periods (0600h to 1900h Monday to Saturday and 1000h to 1700h Sundays);
- There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors;
- 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;
- The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect;
- In the presence of persistent noise complaints, all construction equipment should be verified to comply with MOE NPC-115 guidelines; and,
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical and administrative feasibility of the various alternatives.

5 CONCLUSIONS

The potential for environmental noise impacts of the proposed Airport Road between King Street and Huntsmill Drive improvements has been assessed. Both operational and construction sound levels have been considered. The following conclusions and recommendations result:

Changes in future sound levels resulting from the Project are expected to be small. However, future sound levels are predicted to exceed 60 dBA at some receptors. Noise mitigation measures at these locations have been investigated, in accordance with the Region of Peel and the Town of Caledon guidelines. Noise mitigation measures in the form of noise barriers were investigated for seven representative receptors, five of which were deemed technically feasible. Noise barrier heights, location, extents, and aesthetic features should be further reviewed during the Detailed Design by the Region. Investigated barriers near Walker Road and Cranston Drive are to be reviewed through the development approval process as these are specific to future potential developments.

Construction activities are temporary in nature with sound levels noticeable at times. Methods to minimize construction noise impacts should be included in the Construction Code of Practice, as outlined in this report.

6 REFERENCES

Region of Peel, *General Guidelines for the Preparation of Acoustical Reports in the Region of Peel*, December 2002

Region of Peel, *Corporate Policy Manual – Noise Attenuation Barriers*, W30-04, June 2016

Town of Caledon, *Development Standards, Policies and Guidelines* Version 4, January 2009

Town of Caledon, A by-law to control noise, By-law No. 86-110.

FIGURES

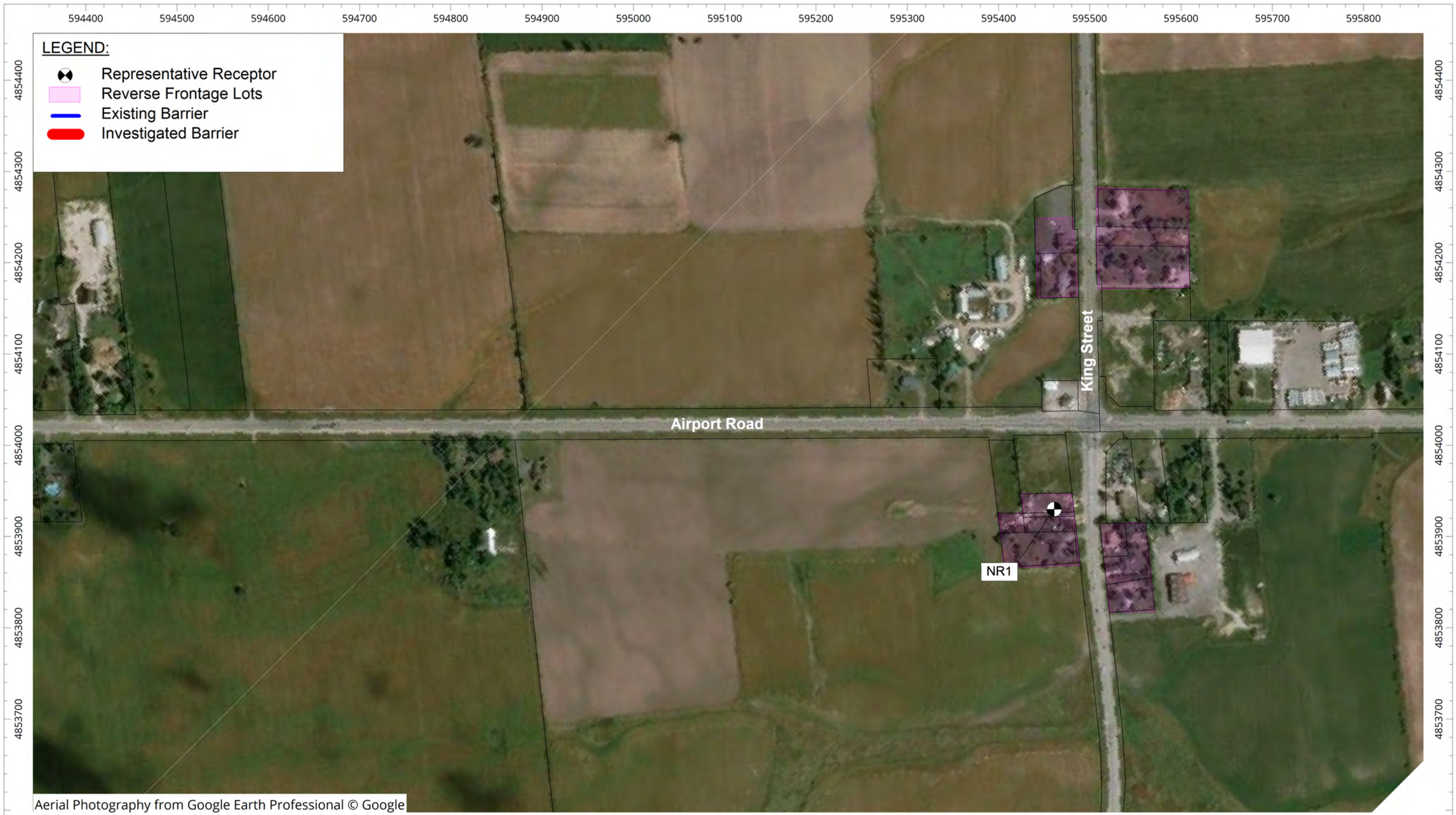
Study Area

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 1
Scale:	1:22000
Date:	Feb. 18, 2021



Representative Receptors and Investigated Barriers

Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 2
Scale:	1:4000
Date:	Feb. 18, 2021

Representative Receptors and Investigated Barriers

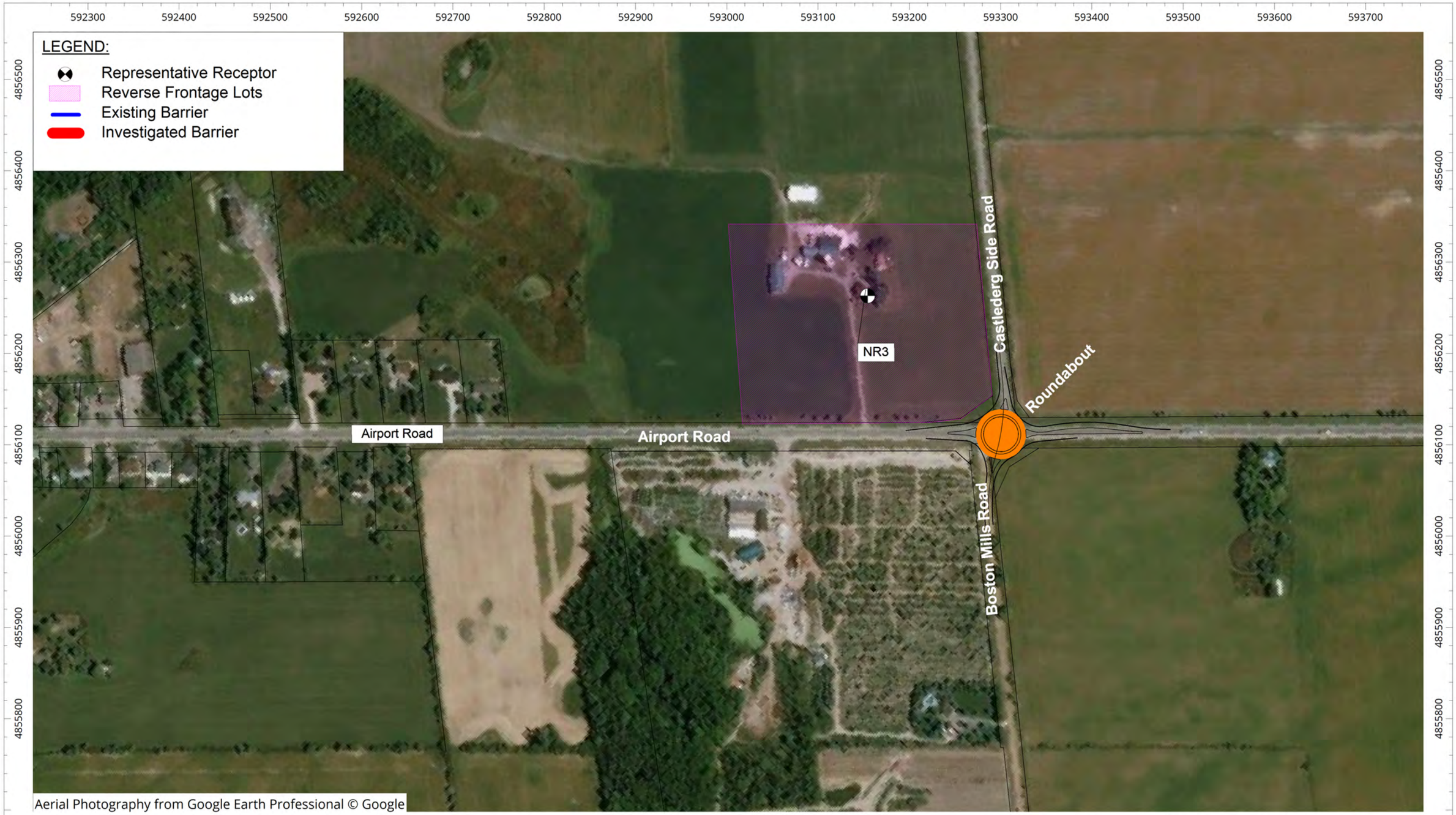
Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 3
Scale:	1:4000
Date:	Feb. 18, 2021



Representative Receptors and Investigated Barriers

Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 4
Scale:	1:4000
Date:	Feb. 18, 2021

LEGEND:

- Representative Receptor
- Reverse Frontage Lots
- Existing Barrier
- Investigated Barrier

Note:
BAR4a - BAR4c - identified based on assumption that the potential future residential development will have side or rear facing lots.

Potential Future

F1

Roundabout

BAR4c

BAR4b

BAR4a

Airport Road

BAR1

NR8

NR7

NR6

Cranston Drive

NR5

NR4

Olde Base Line Road

Aerial Photography from Google Earth Professional © Google

591300 591400 591500 591600 591700 591800 591900 592000 592100 592200 592300 592400 592500 592600

4857500 4857400 4857300 4857200 4857100 4857000 4856900 4856800

Representative Receptors and Investigated Barriers

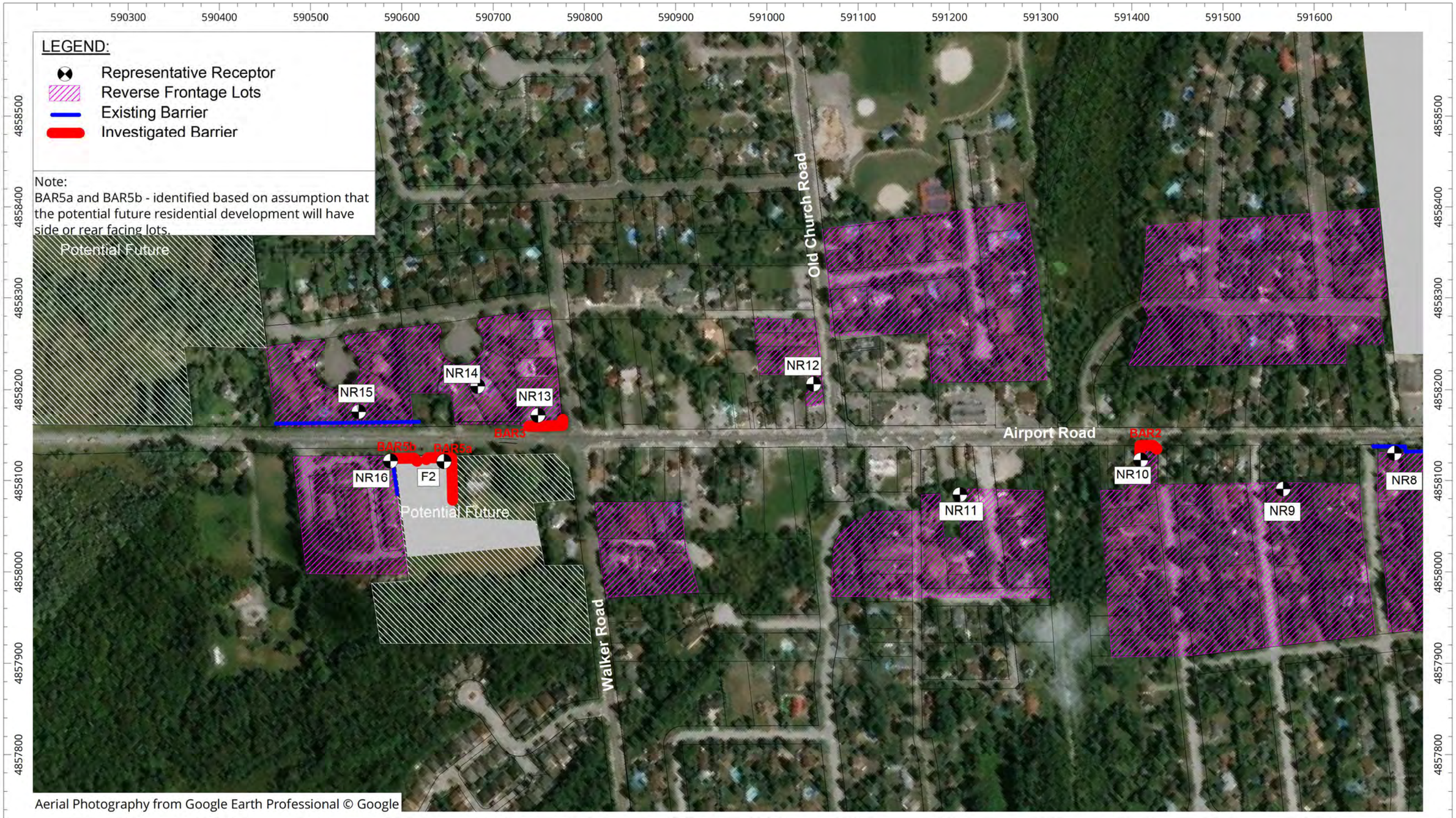
Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 5
Scale:	1:4000
Date:	Mar. 4, 2021



Representative Receptors and Investigated Barriers

Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 6
Scale:	1:4000
Date:	Mar. 4, 2021

LEGEND:

- Representative Receptor
- Reverse Frontage Lots
- Existing Barrier
- Investigated Barrier

Note:
F3 - Proposed future residential subdivision is similar to receptor NR17 based on setback and sound level shown is based on prediction at NR17.

Huntsmill Drive
Potential Future
F3
NR17
Airport Road
NR15
NR14
NR13
BAR3
BAR5b
BAR5a
NR16
F2
Potential Future
Old Church Road
NR12
Walker Road

589800 589900 590000 590100 590200 590300 590400 590500 590600 590700 590800 590900 591000 591100 591200

4859000 4858900 4858800 4858700 4858600 4858500 4858400 4858300

Aerial Photography from Google Earth Professional © Google

Representative Receptors and Investigated Barriers

Future Build

Airport Road, King Street to Huntsmill Drive - Caledon, Ontario

True North

Project #1702763

Drawn by: MPP	Figure: 7
Scale:	1:4000
Date:	Mar. 4, 2021

APPENDIX A

TRANSPORTATION SOUND BASICS

Sound Levels

Sound is, in its simplest form, a dynamic, fluctuating pressure, in a fluid medium. That medium can be air, other gases, or liquids such as water. These fluctuations are transmitted by pressure waves through the medium from the source to the receiver. For the majority of transportation engineering purposes, the primary interest is with sound waves in air, with human beings as the receptor. Noise is defined as unwanted sound. The standard practice within the acoustical industry is to use these two terms interchangeably.

Decibels

A decibel (dB) is a logarithmic ratio of a value to a reference level. The general mathematical format is:

$$\text{Level in dB} = 10 \log (\text{Value} / \text{Reference})$$

Any value can be expressed in decibels. Decibels are very useful in performing comparisons where there are huge ranges in levels. For example, an acoustical engineer can expect to deal with acoustical energy values ranging from 0.00001 W to 100 W (sound power), and pressures ranging from 0.002 Pa to 200 Pa (sound pressure).[1] For completeness, decibels should always be stated with their reference level (e.g., 20 dB re: 20 µPa). However, in practice the reference level is often left out.

Sound Pressure Level

Sound pressure level is what humans experience as sound. Sound waves create small fluctuations around the normal atmospheric pressure. These pressure fluctuations come into contact with eardrums and create the sensation of sound. Sound pressure is measured in decibels, according to the following equation:

$$\text{Sound Pressure Level, dB} = 10 \log (p^2 / p_o^2)$$

Where: p = root mean square (r.m.s.) sound pressure, in Pa
p_o = reference sound pressure, 20 µPa

The reference pressure represents the faintest sound that a "typical" human being can hear. The typical abbreviation for sound pressure level is SPL, although L_p is also often used in equations. "Sound level" or "noise level" are also sometimes used.

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[1] Equivalent to Sound Power Levels ranging from 70 to 140 dB and Sound Pressure Levels ranging from 20 dB to 140 dB

Octave Bands

Sounds are composed of varying frequencies or pitches. Human sensitivity to noise varies by frequency, with a greater sensitivity to higher frequency sounds. The propagation of sound also varies by frequency. The unit of frequency is Hertz (Hz), which refers the number of cycles per second (number of wave peaks per second of the propagating sound wave). The typical human hearing response runs from 20 Hz to 20,000 Hz. Frequencies below 20 Hz are generally inaudible, although response is variable, and some individuals may be able to hear or perceive them.

Sound is typically analysed in octave bands or 1/3-octave bands. An octave band is defined as a band or range of sound frequencies where the frequency range doubles for succeeding octave (alternately, the highest frequency in the range is twice the value of the lowest frequency). Octave band and 1/3-octave band frequencies of interest frequencies of interest are shown in the table on the following page. Road and rail transportation noise sources tend to be broadband in nature, having roughly equal sound energy in many octave bands. Heavy rail traffic and heavy truck traffic may produce significant noise in lower frequencies < 200 Hz.

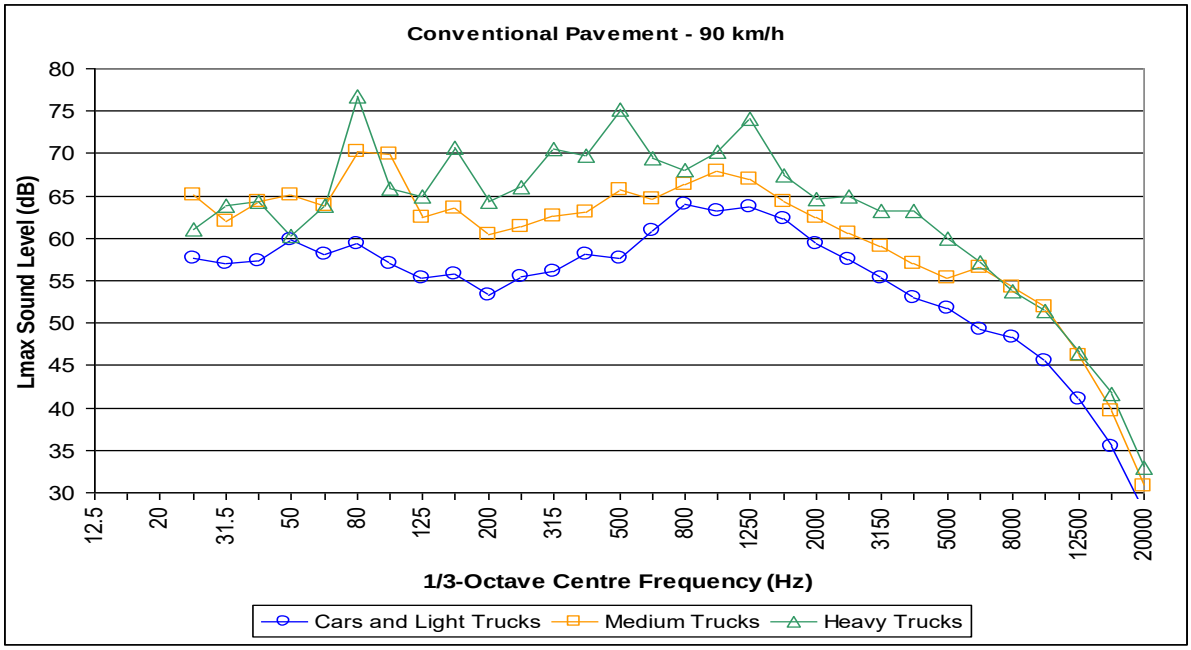
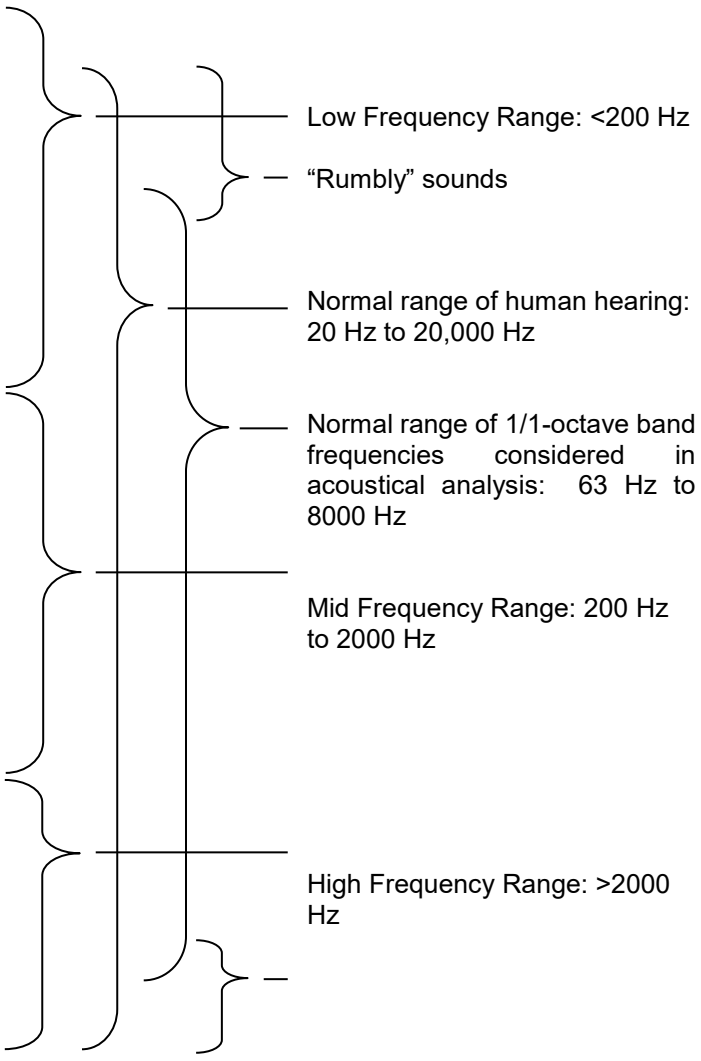


Figure 1: Typical Frequency Spectra of Traffic Noise - Vehicle Pass-bys at 90 km/h

Table 1: Octave Band Frequencies of Interest

Centre-Frequency (Hz)		Band No.	Frequency Range (Hz)
1/3-Octave	1/1-Octave		
12.5	16	N/A	11 to 22
16			
20			
25	31.5	0	22 to 45
31.5			
40			
50	63	1	45 to 89
63			
80			
100	125	2	89 to 177
125			
160			
200	250	3	177 to 345
250			
315			
400	500	4	345 to 707
500			
630			
800	1,000	5	707 to 1,414
1,000			
1,250			
1,600	2,000	6	1,414 to 2,828
2,000			
2,500			
3,150	4,000	7	2,828 to 5,657
4,000			
5,000			
6,300	8,000	8	5,657 to 11,314
8,000			
10,000			
12,500	16,000	N/A	11,314 to 22,627
16,000			
20,000			



Note: Per ISO 266-1975

A-Weighting

When the overall sound pressure level is expressed as a single value (i.e., not expressed in frequency band levels) the variation in human frequency response must be accounted for. People do not hear low frequency noise as well as noise in mid or high frequencies. To account for this, frequency-weighting networks have been developed to better account for human hearing response. The most frequently used networks are the A-Weighting and C-Weighting.

The A-Weighting network was developed to correspond to how humans hear low to medium levels of noise. The A-Weighting is the most frequently used scheme, and the majority of noise guidelines are expressed in A-Weighted decibel values, denoted as "dBA" levels. C-Weighted "dBC" values are sometimes used in assessing low-frequency noise impacts, which are generally not of concern in transportation noise impact assessment. The A-Weighting and C-Weighting values are shown in the following table and figure.

Table 2: A- and C-Weighting Values

1/1-Octave Frequency (Hz)	A-Weighting Value (dB)	C-Weighting Value (dB)
31.5	-39.4	-3.0
63	-26.2	-0.8
125	-16.1	-0.2
250	-8.6	0
500	-3.2	0
1,000	0	0
2,000	1.2	-0.2
4,000	1.0	-0.8
8,000	-1.1	-3.0

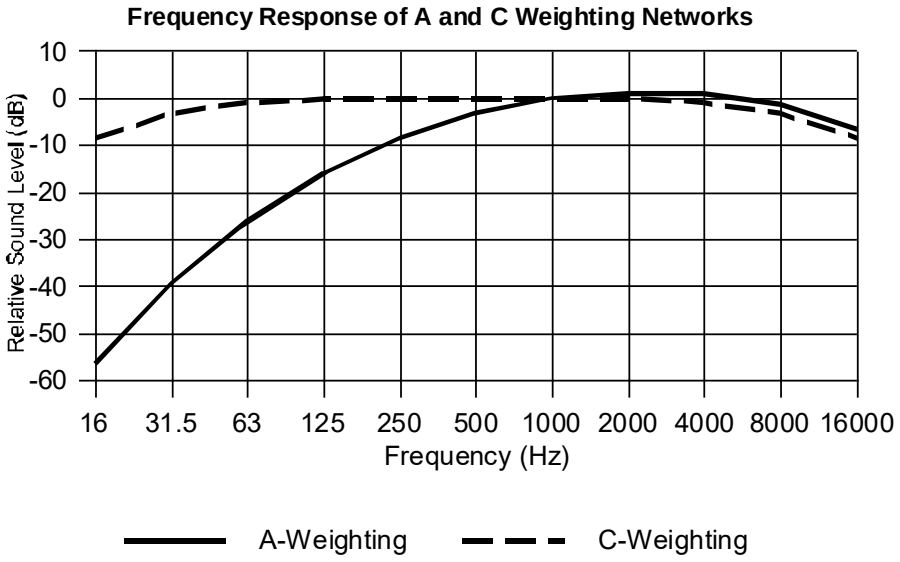


Figure 2: A-Weighting and C-Weighting Networks

Ranges of Sound Levels

People experience a wide range of sound levels in their daily activities. The table below presents a graphical comparison of "typical" noise levels which might be encountered, and the general human perception of the level.

Table 3: Ranges of Sound Levels

Sound Levels		Sources of Noise
Human Perception	**SPL, in dBA**	
Deafening	125	Sonic booms
	120	Threshold of Feeling / Pain
	115	Maximum level, hard rock band concert
	110	Accelerating Motorcycle at a few feet away
Very Loud	105	Loud auto horn at 3 m (10 ft) away
	100	Dance club / maximum human vocal output at 1 m (3 ft) distance
	95	Jack hammer at 15 m (50 ft) distance
	90	Indoors in a noisy factory
Loud	85	Heavy truck pass-by at 15 m (50 ft) distance
	80	School cafeteria / noisy bar; Vacuum Cleaner at 1.5 m (5 ft)
	75	Near edge of major Highway
	70	Inside automobile at 60 km/h
	65	Normal human speech (unraised voice) at 1 m (3 ft) distance
Moderate	60	Typical background noise levels in a large department store
	55	General objective for outdoor sound levels; typical urban sound level
	50	Typical suburban / semi-rural sound level (24h)
	45	Typical noise levels in an office due to HVAC; typical rural levels (24h)
Faint	40	Typical background noise levels in a library
	35	
	30	Broadcast Studio
	25	Average whisper
Very Faint	20	Deep woods on a very calm day
	15	
	10	
	5	Human breathing
	0	Quietest sound that can be heard

Sound levels from 40 to 65 dBA are in the faint to moderate range. The vast majority of the outdoor noise environment, even within the busiest city cores, will lie within this area. Sound levels from 65 to 90 are perceived as loud. This area includes very noisy commercial and industrial spaces. Sound levels greater than 90 dB are very loud to deafening, and may result in hearing damage.

Transportation noise events, which vary with time, can also be considered in terms of their maximum noise level (L_{max}) during a vehicle pass-by, as shown in the following table:

Table 4: Typical Pass-By Noise Levels at 15 m from Noise Source

Event	Range of Noise Levels (dBA) at 15 m
Semi-Trailer Trucks	75 - 85
Aircraft	69 – 85 [1]
Conventional Light Rapid Transit (Streetcars)	72 – 80 [2]
Large Trucks	71 - 78
Street Motorcycle	76
Diesel or Natural Gas Bus	70 - 78
Trolley Bus	69 - 73
Small Motorcycle	67
General Busy Auto Traffic	66 - 70
Individual Automobiles	63 - 69

Notes: Source: BKL Consultants Ltd.

[1] Aircraft flyover not at 15 m distance

[2] Based on data provided for the Calgary, Edmonton and Portland LRT systems.

Noise Descriptors – Leq Values

At this time, the best available research indicates that long-term human responses to noise are best evaluated using energy equivalent sound exposure levels (L_{eq} values), in A-Weighted decibels (L_{eq} values in dBA)[2, 3] including adjustments to account for particularly annoying characteristics of the sounds being analyzed.

Sound levels in the ambient environment vary each instant. In a downtown urban environment, the background noise is formed by an "urban hum", composed of noise from distant road traffic and from commercial sources. As traffic passes near a noise receptor, the instantaneous sound level may increase as a vehicle approaches, and then decrease as it passes and travels farther away. The energy equivalent sound exposure level L_{eq} is the average sound level over the same period of time with same acoustical energy as the actual environment (i.e., it is the average of the sound energy measured over a time period T). As a time-average, all L_{eq} values must have a time period associated with them. This is typically placed in brackets beside the L_{eq} tag. For example, a thirty-minute L_{eq} measurement would be reported as an L_{eq} (30 min) value.

The L_{eq} concept is illustrated in Figure 3, showing noise levels beside a small roadway, over a 100 second time period, with two vehicle pass-bys:

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2 Berglund and Lindvall, Community Noise, 1995.

3 ISO 1996:2003(E), *Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures*.

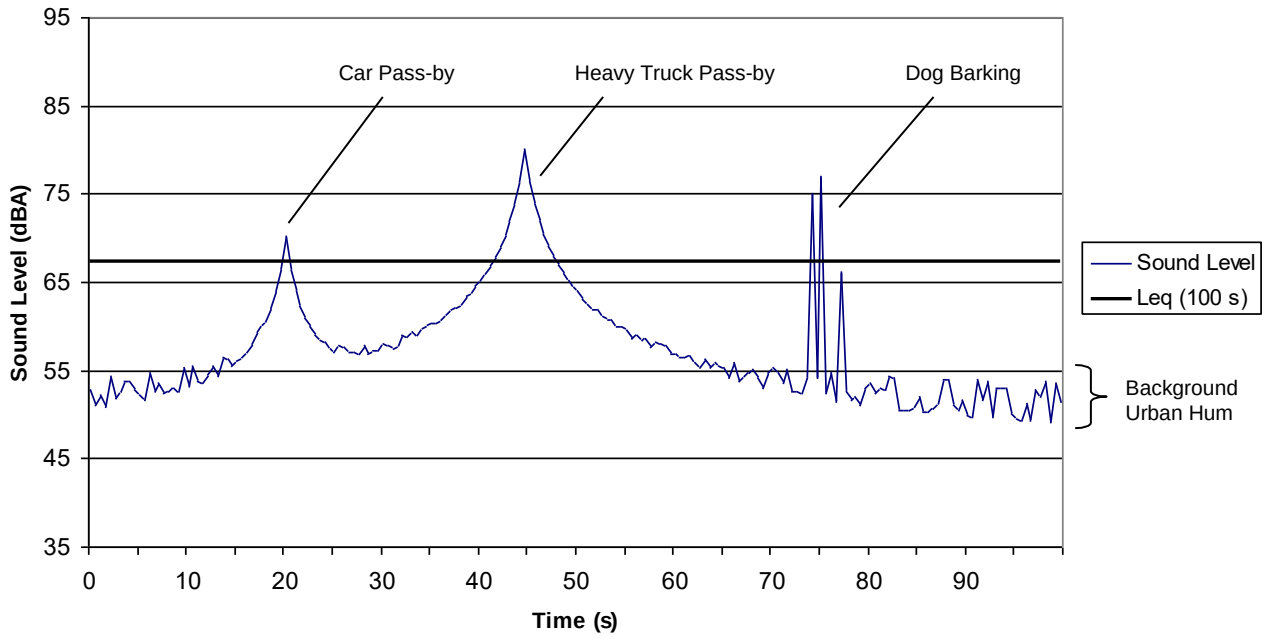

Figure 3: Example of the L_{eq} Concept

In this example, the background "urban hum" is between 47 and 53 dBA. A car passes by at 20 seconds. As it approaches, the noise level increases to a maximum, and then decreases as it speeds away. At 45 seconds, a heavy truck passes by. Near 75 seconds, a dog barks three times. The maximum sound level (L_{max}) over the period is 80 dBA and the minimum is 47 dBA. For almost 50% of the time, the sound level is lower than 55 dBA.

The L_{eq} (100s) for the above example is 67 dBA, which is much higher than the statistical mean sound level of 55 dBA. This illustrates that the L_{eq} value is very sensitive to loud noise events, which contain much more sound energy (as sound is ranked on a logarithmic scale) than the normal background. It is also sensitive to the number of events during the time period, and the duration of those events. If only the truck had passed by during the measurement (no car and no dog barks), the L_{eq} (100s) would be 66 dBA. If only the car and dog barks had occurred, the L_{eq} (100s) would have been 61 dBA. This shows that the truck pass-by is the dominant event in our example, due to its level and duration.

The ability of the L_{eq} metric to account for the three factors of level, duration and frequency of events makes it a robust predictor of human response to noise. It is for this reason that the vast majority of noise standards are based on L_{eq} values.

Typical Durations for Leq Analyses

For transportation noise impact analyses, the following durations are typically used:

L_{eq} (24h) – The sound exposure level over then entire 24-hour day

L_{eq} Day – Either: L_{eq} (15h), from 7am to 10 pm; or
L_{eq} (16h), from 7am to 11 am

L_{eq} Night – Either: L_{eq} (9h), from 10 pm to 7 am; or
L_{eq} (8h), from 11 pm to 7 am

L_{dn} – A special L_{eq} (24h) value with a 10 dB night-time penalty applied to overnight sound levels (10pm to 7am)

L_{eq} (1-h) – The sound exposure over a 1-hour time period

L_{eq} (24h) values are appropriate for examining impacts of transportation noise sources with small changes in sound exposure levels over the 24-hour day. For example, freeway noise levels are generally consistent over the 24-hour day. Therefore, for freeways, there is little difference between L_{eq} (24h) values and the corresponding L_{eq} Day and L_{eq} Night values.

L_{eq} Day values, covering off the AM-peak and PM-peak travel periods, are generally appropriate for examining the impacts of non-freeway highways and municipal arterial roadways. The vast majority of noise associated with these sources is concentrated in the daytime hours, where typically, 85% to 90% of the daily road traffic will occur.[4] Thus, if reasonable sound levels occur during the daytime (and appropriate guideline limits are met), they will also occur (and be met) at night.

To account for increased annoyance with noise overnight in a single value, the U.S. Environmental Protection Agency (U.S. EPA) developed the L_{dn} metric. It is a special form of the L_{eq} (24h) with a +10 dB night-time penalty. L_{dn} values and a related metric, the day-evening-night level (L_{den}) are also used in some European guidelines. L_{dn} values are not used in Canadian Provincial jurisdictions in evaluating transportation noise. Instead, guideline limits for separate L_{eq} Day and L_{eq} Night periods are generally used.

L_{eq} (1-h) values are the average sound levels over a one-hour time period. These tend to fluctuate more over the day, as traffic levels can fluctuate significantly hour to hour. L_{eq} (1-h) values are useful in assessing the impact of transportation sources which also vary hourly, and which may vary in a different manner than the background traffic. These values are often used to assess haul route noise impacts, for example.

[4] Based on research conducted by Ontario Ministry of Transportation, and provided in the *MTO Environmental Office Manual Technical Areas – Noise*. Daytime refers to a 16 hour day from 7am to 11 pm.

Some transportation noise sources may have significant traffic levels occurring over-night. For example, freight rail traffic in heavily used corridors can be shifted to over-night periods, with daytime track use being reserved for freight switcher traffic and passenger traffic. In situations such as this, an assessment of both daytime and night-time noise impacts may be appropriate.

Decibel Addition

Decibels are logarithmic numbers, and therefore have special properties of addition. Decibel values must be added logarithmically. If two sources, each emitting the same amount of sound energy, are placed side-by-side, then the total increase in sound level will only be 3 dB. If the difference in sound energy emitted is greater than 10 dB, then effectively the sound level will be the same as for the loudest unit (i.e., the increase in noise will be less than a decibel). This is shown in Table 5.

Table 5: Decibel Addition Chart

dB Difference Of	dB Value to Add to Highest Number
0	3.0
1	2.5
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
9	0.5
10	0.4

This affects transportation noise from projects, as noise emission is logarithmically related to traffic volume. Doubling the traffic volume (essentially the same as adding a source with the same sound emission) will only result in a 3 dB increase over the original levels. The decibel increase in noise due to the increase in traffic volume, assuming all other factors remain the same, can be estimated by:

$$\text{dB increase} = 10 \log (\text{new volume} / \text{original volume}).$$

Human Response to Changes in Sound Levels

The human ear does not interpret changes in sound level in a linear manner. The general subjective human perception of changes in sound level is shown in the following table.

Table 6: Subjective Human Perception of Changes in Sound Level [5,6]

Change in Broadband Sound Level (dB)	Human Perception of Change
< 3	Imperceptible change
3	Just-perceptible change
4 to 5	Cleary noticeable change
6 to 9	Substantial change
> 10 and more	Very substantial change (half or twice as loud)
> 20 and more	Very substantial change (much quieter or louder)

Notes: Adapted from Bies and Hansen, p53, and MOE Noise Guidelines for Landfill Sites, 1998. Applies to changes in broadband noise sources only (i.e., increases or decreases in the same noise or same type of noise only). Changes in frequency content or the addition of tonal or temporal changes would affect the perception of the change.

The above table is directly applicable to changes in sound level where the noise sources are of the same general character. For example, existing road traffic noise levels can be directly compared to future road traffic noise levels, using the above relationships. In comparing road traffic noise to road plus rail traffic noise, the different frequency and temporal nature of the noise means that the rail noise may be more noticeable. Adjustments for the nature of the new sound can be applied to better account for temporal and frequency differences.

For transportation noise sources, research conducted by the U.S. Environmental Protection Agency indicates that a 5 dB change in sound levels is required to trigger a change in large-scale community response to noise. This correlates to a clearly noticeable increase in noise levels.

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5 Bies, D.A., and C.H. Hansen 1988. *Engineering Noise Control – Theory and Practice, 2nd Ed.* E & FN Spon, London, p 53.

6 Ontario Ministry of the Environment 1998. Noise Guidelines for Landfill Sites. Queen's Printer for Ontario.

Decay of Noise with Distance

Noise levels decrease with increasing distance from a source of noise. The rate of decay is partially dependent on the nature of the ground between the source: whether it is hard (acoustically reflective) or soft (acoustically absorptive). Transportation noise sources in general act as *line sources* of sound. For line sources, the rate of decay is approximately:

- Hard ground: 3 dB for each doubling of distance from the source
- Soft ground: 5 dB for each doubling of distance from the source

This is shown graphically in Figure 6, based on a reference distance of 15 m from the source:

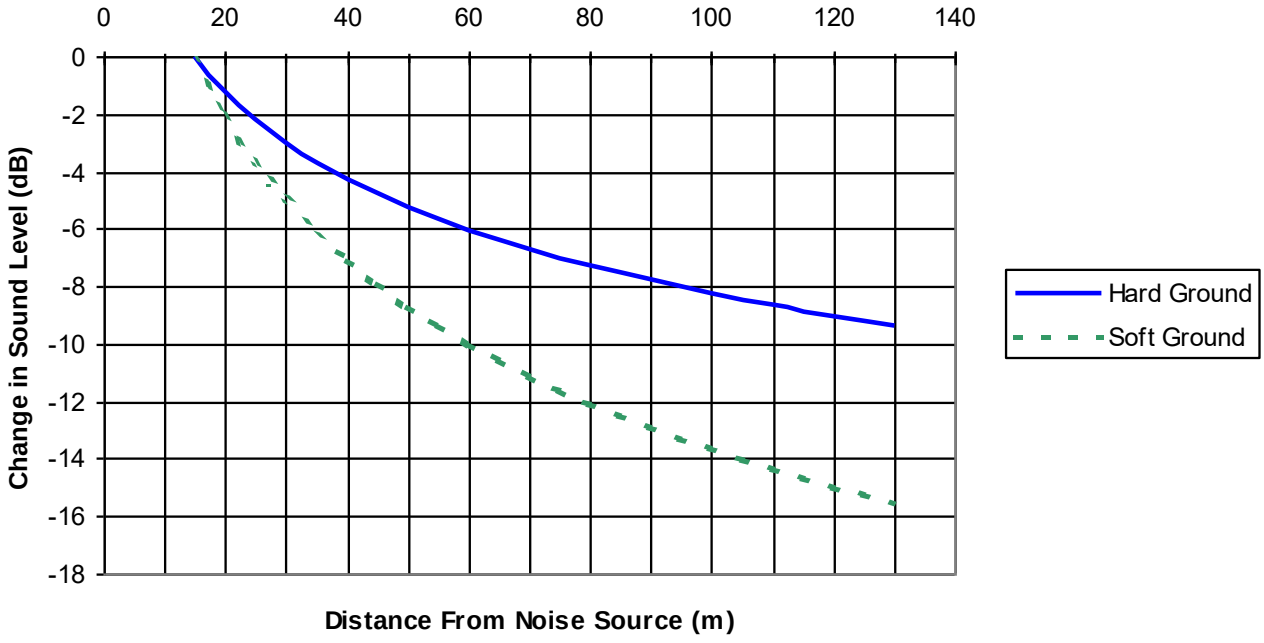
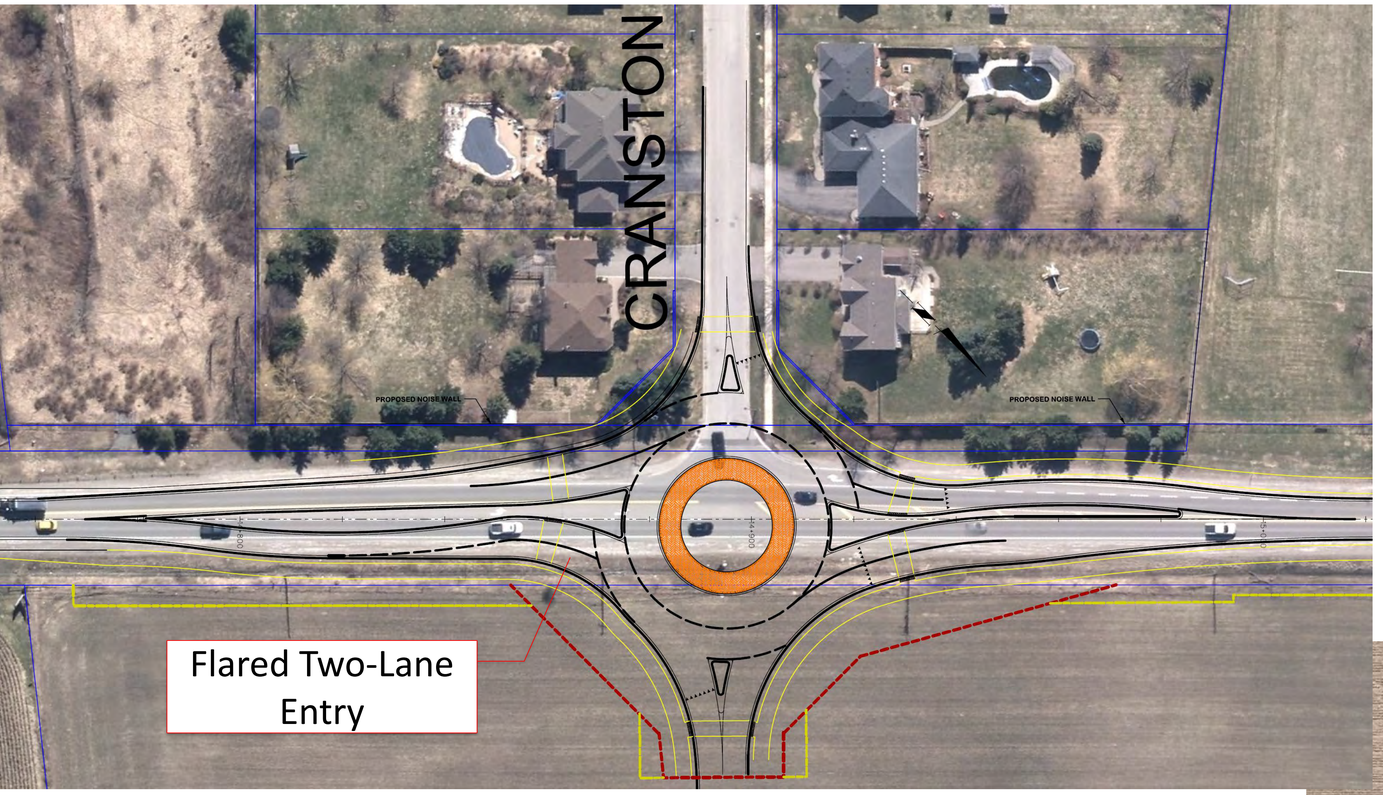


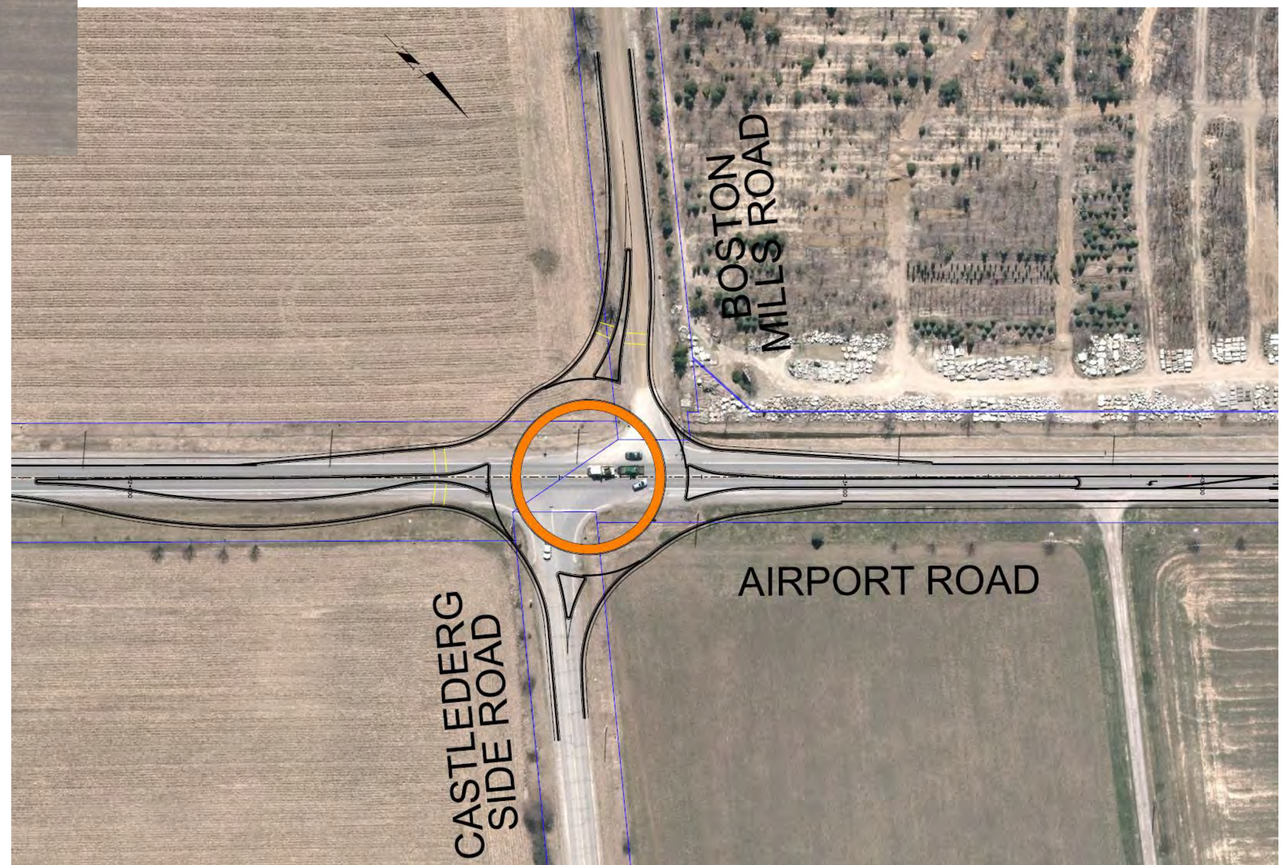
Figure 4: Decay of Noise Versus Distance for Line Sources

APPENDIX B

Roundabouts



- Opportunity for gateway feature at Cranston Drive
- Combined with pedestrian crossing to the north of Cranston Drive
- Eliminates offset intersection at Castlederg / Boston Mills Side Road



- Encourages slower traffic speeds
- Reduces severity of collisions, although may increase non-fatal collisions
- May require roundabout driver education

APPENDIX C

Year 2041 Traffic Data for Airport Road **RWDI Project#: 1702763**

Traffic Volumes used in theAssessment

												90%	Day (16 hr)			sum		
Road	**Portion of Road**	**Link Studio Link #**	**Link Type**	**Direction**	**Peak Hour Volume**	**AADT**	**Total AADT**	**% Cars**	**%Medium**	**% HT**	**Free Flow Speed Limit (km/hour)**	**Day (16 hr)**	**Car**	**Medium**	**Heavy**	**Car**	**Medium**	**Heavy**
Airport Road	Old School Road to King Street	F01	Freeflow	NB	750	7,500	17,060	98.1%	0.0%	1.9%	80	6,750	6625	0	125			
		F58	Freeflow															
		F44	Freeflow	SB	956	9,560		94.5%	0.0%	5.5%	80	8,604	8133	0	471	14758	0	596
			Freeflow															
	King Street to King Street Access	F02	Freeflow	NB	901	9,010	18,310	95.8%	2.3%	1.9%	80	8,109	7768	187	154			
			Freeflow															
		F43	Freeflow	SB	930	9,300		94.5%	0.0%	5.5%	80	8,370	7912	0	458	15680	187	612
			Freeflow															
	King Street Access to Castlederg Side Road	F03	Freeflow	NB	958	9,580	20,830	95.8%	2.3%	1.9%	60	8,622	8260	198	164			
			Freeflow															
		F42	Freeflow	SB	1,125	11,250		93.8%	3.5%	2.8%	60	10,125	9487	354	284	17747	553	447
			Freeflow															
	Castlederg Side Road to Olde Base Line Road	F04	Freeflow	NB	992	9,920	19,870	96.0%	1.9%	2.2%	60	8,928	8562	170	196			
			Freeflow															
		F41	Freeflow	SB	995	9,950		93.8%	3.5%	2.8%	60	8,955	8391	313	251	16953	483	447
			Freeflow															
	Olde Base Line Road to Cranston Drive	F05	Freeflow	NB	1,355	13,550	24,430	96.6%	1.7%	1.6%	60	12,195	11793	207	195			
		F06	Freeflow															
		F40	Freeflow	SB	1,088	10,880		95.0%	2.7%	2.3%	60	9,792	9302	264	225	21095	472	420
			Freeflow															
	Cranston Drive to Caledon P.S. Driveway	F07	Freeflow	NB	1,097	10,970	21,670	96.7%	1.6%	1.7%	50	9,873	9547	158	168			
			Freeflow															
		F39	Freeflow	SB	1,070	10,700		95.1%	2.3%	2.6%	50	9,630	9158	221	250	18705	379	418
		F59	Freeflow															
	Caledon P.S. Driveway to Foodland Plaza	F08	Freeflow	NB	1,227	12,270	22,280	96.7%	1.5%	1.8%	50	11,043	10679	166	199			
			Freeflow															
		F38	Freeflow	SB	1,001	10,010		94.9%	2.4%	2.7%	50	9,009	8550	216	243	19228	382	442
			Freeflow															
	Foodland Plaza to Hilltop Drive	F09	Freeflow	NB	1,282	12,820	23,270	96.9%	1.5%	1.6%	50	11,538	11180	173	185			
		F10	Freeflow															
		F37	Freeflow	SB	1,045	10,450		94.7%	2.5%	2.8%	50	9,405	8907	235	263	20087	408	448
			Freeflow															
	Hilltop Drive to Marion Street	F11	Freeflow	NB	1,212	12,120	23,190	96.8%	1.5%	1.7%	50	10,908	10559	164	185			
			Freeflow															
		F36	Freeflow	SB	1,107	11,070		95.0%	2.4%	2.6%	50	9,963	9465	239	259	20024	403	444
			Freeflow															
	Marion Street to Larry Street	F12	Freeflow	NB	1,226	12,260	22,740	96.7%	1.7%	1.5%	50	11,034	10681	188	166			
			Freeflow															
		F35	Freeflow	SB	1,048	10,480		94.8%	2.5%	2.7%	50	9,432	8942	236	255	19622	423	420
			Freeflow															
	Larry Street to Mountcrest Road	F13	Freeflow	NB	1,239	12,390	23,260	96.8%	1.5%	1.7%	50	11,151	10794	167	190			
			Freeflow															
		F34	Freeflow	SB	1,087	10,870		94.8%	2.5%	2.7%	50	9,783	9274	245	264	20068	412	454
			Freeflow															
	Mountcrest Road to Caledon Trailway	F14	Freeflow	NB	1,227	12,270	23,010	96.7%	1.6%	1.6%	50	11,043	10690	177	177			
			Freeflow															
		F33	Freeflow	SB	1,074	10,740		94.3%	3.1%	2.6%	50	9,666	9115	300	251	19805	476	428
			Freeflow															
	Caledon Trailway to Emma Street	F15	Freeflow	NB	1,213	12,130	22,920	96.7%	1.5%	1.8%	50	10,917	10557	164	197			
			Freeflow															
		F32	Freeflow	SB	1,079	10,790		94.8%	2.4%	2.7%	50	9,711	9216	233	262	19772	397	459
			Freeflow															
	Emma Street to Parsons Avenue	F16	Freeflow	NB	1,171	11,710	22,380	96.7%	1.7%	1.6%	50	10,539	10191	179	169			
			Freeflow															
		F31	Freeflow	SB	1,067	10,670		94.5%	2.8%	2.7%	50	9,603	9075	269	259	19266	448	428
			Freeflow															
	Parsons Avenue to Old Church Road	F17	Freeflow	NB	1,252	12,520	22,580	97.5%	1.8%	0.6%	50	11,268	10998	203	68			
			Freeflow															
		F30	Freeflow	SB	1,006	10,060		94.5%	2.6%	2.9%	50	9,054	8556	235	263	19554	438	330
			Freeflow															
	Old Church Road to Walker Road	F18	Freeflow	NB	944	9,440	16,680	96.7%	2.5%	0.8%	50	8,496	8216	212	68			
			Freeflow															
		F29	Freeflow	SB	724	7,240		90.4%	6.4%	3.2%	50	6,516	5890	417	209	14106	629	276
			Freeflow															
	Walker Road to Airport Road Access (S)	F19	Freeflow	NB	873	8,730	15,980	96.5%	2.7%	0.8%	50	7,857	7582	215	60			
			Freeflow															
		F28	Freeflow	SB	725	7,250		89.8%	5.7%	4.5%	50	6,525	5859	372	294	13441	587	354
			Freeflow															
	Airport Road Access (S) to Airport Road Access (N)	F20	Freeflow	NB	862	8,620	16,180	96.3%	3.0%	0.7%	50	7,758	7471	230	57			
			Freeflow															
		F27	Freeflow	SB	756	7,560		90.1%	5.7%	4.2%	50	6,804	6130	390	284	13601	620	340
			Freeflow															
	Airport Road Access (N) to Leamster Trail	F21	Freeflow	NB	861	8,610	16,030	96.1%	3.2%	0.7%	50	7,749	7447	248	54			
			Freeflow															
		F26	Freeflow	SB	742	7,420		90.3%	5.8%	3.8%	50	6,678	6037	385	256	13484	633	310
			Freeflow															
	Leamster Trail to Huntsmill Drive	F22	Freeflow	NB	846	8,460	15,870	96.4%	2.8%	0.9%	50	7,614	7332	213	69			
			Freeflow															
		F25	Freeflow	SB	741	7,410		90.6%	5.8%	3.5%	50	6,669	6049	387	233	13381	600	302
			Freeflow															
	Huntsmill Drive to Patterson	F23	Freeflow	NB	844	8,440	15,550	96.4%	2.8%	0.9%	80	7,596	7315	213	68			
			Freeflow															
		F24	Freeflow	SB	711	7,110		90.0%	5.2%	4.8%	80	6,399	5759	333	307	13074	545	376
			Freeflow															
King Street	Torbram Road to Airport Road	F55	Freeflow	EB	626	6,260	13,660	93.9%	0.0%	6.1%	70	5,634	5289	0	345			
		F46	Freeflow															
		F45	Freeflow															
		F50	Freeflow	WB	740	7,400		95.8%	0.0%	4.2%	70	6,660	6382	0	278	11671	0	623
		F51	Freeflow															
		F54	Freeflow															
	Innis Lake Road to Airport Road	F47	Freeflow	EB	686	6,860	15,300	93.9%	0.0%	6.1%	70	6,174	5796	0	378			
			Freeflow															
		F49	Freeflow	WB	844	8,440		95.8%	0.0%	4.2%	70	7,596	7279	0	317	13075	0	695
		F48	Freeflow															
Olde Base Line Road	Mountainview Road to Airport Road	F52	Freeflow	EB	442	4,420	7,980	93.3%	6.7%	0.0%	50	3,978	3711	267	0			
		F61	Freeflow															
		F53	Freeflow	WB	356	3,560		93.3%	6.7%	0.0%	50	3,204	2989	215	0	6701	481	0
			Freeflow															
Old Church Road	Greer Street to Airport Road	F57	Freeflow	EB	576	5,760	10,310	93.0%	5.4%	1.7%	50	5,184	4816	280	88			
			Freeflow															
		F56	Freeflow	WB	455	4,550		93.0%	5.4%	1.7%	50	4,095	3804	221	70	8620	501	158
		F60	Freeflow															

APPENDIX D

APPENDIX E

ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation

version 2.09

Job No. 1702763
Job Name Airport Rd King to Huntsmill, Peel Region

Scenario 2041 Future Build - Unmitigated
Existing Barriers Modelled

ROAD CHARACTERISTICS | **SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS**

ID	Description	Time Period	Number of Vehicles			Speed (km/h)	Road Gradient (%)	Two Way? (y/n)	Pavement Type	Road Viewable Angle		Source-Receiver Distance (m)	Ground Type (Hard/Soft)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Ground Elevation Change (m)			Barrier Height (m)	Barrier Elevation (m asl)	Barrier-Reciever Distance (m)	Barrier Viewable Angle		No. of Rows of Houses	Density of Houses (% Houses)	Depth of Woods	Adjustment (dB)	Reason For Adjustment	**Total Segment L_{eq} (dBA)**
			Autos	Medium	Heavy					θ_1	θ_2								Elevation Change e (m)	Hor. Dist a (m)	Hor. Dist b (m)				θ_1	θ_2						
NR1 (King St)	Airport Road Old School Rd. to King Street	16	14758	0	596	90	0	y	1	15	45	95.0	Soft	A	1.4	0.0	1.5	0.0													51.0
	Airport Rd King Street to King Street Access	16	15680	187	612	90	0	y	1	-90	15	95.0	Soft	A	1.4	0.0	1.5	0.0													55.9
	King St Torbram Road to Airport Road	16	11671	0	623	80	0	y	1	-90	0	35.0	Soft	A	1.5	0.0	1.5	0.0													60.4
																														SUM	**62**
NR2 (14628 Airport Rd)	Airport Rd King Street to King Street Access	16	15680	187	612	90	0	y	1	-90	90	100.0	Soft	A	1.4	0.0	1.5	0.0													**58**
NR3 (15049 Airport Rd)	Airport Road, King Street Access to Castlederg Side Road	16	17747	553	447	70	0	y	1	-90	-45	150.0	Soft	A	1.2	0.0	1.5	0.0													45.0
	Airport Road, Castlederg Side Road to Olde Baseline Road	16	16953	483	447	70	0	y	1	-45	90	150.0	Soft	A	1.3	0.0	1.5	0.0													51.4
																														SUM	**52**
NR4 - (5985 Old Base Line Rd)	Airport Road, Castlederg Side Road to Olde Baseline Road	16	16953	483	447	70	0	y	1	-20	90	70.0	Soft	A	1.3	0.0	1.5	0.0													55.9
	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-90	-20	70.0	Soft	A	1.2	0.0	1.5	0.0													53.5
	Olde Baseline Road, Mountainview Road to Airport Road	16	6701	481	0	60	0	y	1	-90	70	18.0	Soft	A	0.1	0.0	1.5	0.0													60.5
																														SUM	**62**
NR5 - (5992 Old Base Line Rd)	Airport Road, Castlederg Side Road to Olde Baseline Road	16	16953	483	447	70	0	y	1	40	90	45.0	Soft	A	1.3	0.0	1.5	0.0													54.2
	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-90	40	45.0	Soft	A	1.2	0.0	1.5	0.0													60.2
	Olde Baseline Road, Mountainview Road to Airport Road	16	6701	481	0	60	0	y	1	-70	90	26.0	Soft	A	0.1	0.0	1.5	0.0													57.9
																														SUM	**63**
NR6 - roundabout (Cranston Dr)	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-50	90	28.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	13.0	-50	90					58.9
	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-20	10	35.0	Soft	A	1.2	0.0	1.5	0.0													57.0
	Airport Road, Cranston Drive to Caledon PS Driveway	16	18705	379	418	60	0	y	1	-90	-65	28.0	Soft	A	1.2	0.0	1.5	0.0													51.4
																														SUM	**62**
NR7 (Brandiff Ct)	Airport Road, Foodland Plaza to Hilltop Drive	16	20087	408	448	60	0	y	1	-90	90	47.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	33.0	-90	90					**55**
NR8 (Hilltop Dr)	Airport Road, Foodland Plaza to Marion Street	16	20024	403	444	60	0	y	1	-90	90	17.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	7.0	-90	90					**61**
NR9 (Marion St)	Airport Road, Hilltop Drive to Marion Street	16	20024	403	444	60	0	y	1	-90	90	58.0	Soft	A	1.2	0.0	1.5	0.0									1	50			**55**
NR10 (Larry St)	Airport Road, Marion Street to Larry Street	16	19622	423	420	60	0	y	1	30	90	25.0	Soft	A	1.2	0.0	1.5	0.0													58.3
	Airport Road, Larry Street to Mountcrest Road	16	20068	412	454	60	0	y	1	-90	30	25.0	Soft	A	1.2	0.0	1.5	0.0													62.6
																														SUM	**64**
NR11 (Emma St)	Airport Road, Mountcrest Road to Old Church Road	16	19772	397	459	60	0	y	1	-90	90	60.0	Soft	A	1.2	0.0	1.5	0.0													**58**
NR12 (Old Church Rd)	Airport Road, Mountcrest Road to Old Church Road	16	19772	397	459	60	0	y	1	-90	90	60.0	Soft	A	1.2	0.0	1.5	0.0													57.6
	Old Church Road, Greer Street to Airport Road	16	8620	501	158	60	0	y	1	0	60	19.0	Soft	A	1.1	0.0	1.5	0.0													59.1
																														SUM	**61**
NR13 - (Walker Rd E)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-55	90	25.0	Soft	A	1.3	0.0	1.5	0.0													62.5
	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	-55	25.0	Soft	A	1.3	0.0	1.5	0.0													53.9
																														SUM	**63**
NR14 (Munsey Ct)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	55	58.0	Soft	A	1.3	0.0	1.5	0.0													56.5
	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	55	90	58.0	Soft	A	1.3	0.0	1.5	0.0													47.8
																														SUM	**57**
NR15 (Fleetham Ct)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	90	30.0	Soft	A	1.3	0.0	1.5	0.0				2.0	0.0	11.0	-90	90					**56**
NR16 (McKinley Cr)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	90	24.0	Soft	A	1.3	0.0	1.5	0.0				1.8	0.0	2.5	-90	90					**58**
NR17 (Huntsmill Dr)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	30	127.0	Soft	A	1.3	0.0	1.5	0.0													50.0
	Airport Road, Huntsmill Drive to Patterson	16	13074	545	376	90	0	y	1	30	90	127.0	Soft	A	1.3	0.0	1.5	0.0													49.6
																														SUM	**53**
FUTURE RESIDENTIAL DEVELOPMENTS																																
F1 - roundabout (Future)	Airport Road, Olde Baseline Road & Cranston Drive	16	21095	472	420	70	0	y	1	-50	90	28.0	Soft	A	1.2	0.0	1.5	0.0													64.0
	Airport Road, Olde Baseline Road & Cranston Drive	16	21095	472	420	70	0	y	1	-20	10	35.0	Soft	A	1.2	0.0	1.5	0.0													57.0
	Airport Road, Cranston Drive & Caledon PS Driveway	16	18705	379	418	60	0	y	1	-90	-65	28.0	Soft	A	1.2	0.0	1.5	0.0													51.4
																														SUM	**65**
F2 (Future)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	90	24.0	Soft	A	1.3	0.0	1.5	0.0													**63**

ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation

version 2.09

Job No. 1702763 Scenario 2041 Future Build - Mitigated

Job Name Airport Rd King to Huntsmill, Peel Region Barriers Investigated

ROAD CHARACTERISTICS | **SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS**

ID	Description	Time Period	Number of Vehicles			Speed (km/h)	Road Gradient (%)	Two Way? (y/n)	Pavement Type	Road Viewable Angle		Source-Receiver Distance (m)	Ground Type (Hard/Soft)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Ground Elevation Change (m)			Barrier Height (m)	Barrier Elevation (m asl)	Barrier-Reciever Distance (m)	Barrier Viewable Angle		No. of Rows of Houses	Density of Houses (% Houses)	Depth of Woods	Adjustment (dB)	Reason For Adjustment	**Total Segment L_{eq} (dBA)**
			Autos	Medium	Heavy					θ_1	θ_2								Elevation Change e (m)	Hor. Dist a (m)	Hor. Dist b (m)				θ_1	θ_2						
NR5 - roundabout (5992 Old Base Line Rd)	Airport Road, Castlederg Side Road to Olde Baseline Road	16	16953	483	447	70	0	y	1	40	90	45.0	Soft	A	1.3	0.0	1.5	0.0				1.8	0.0	16.0	40	90						50.1
	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-90	40	45.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	35.0	-90	40						55.1
	Olde Baseline Road, Mountainview Road to Airport Road	16	6701	481	0	60	0	y	1	-70	90	26.0	Soft	A	0.1	0.0	1.5	0.0				1.8	0.0	14.0	-70	90						50.8
																															SUM	**57**
NR6 - roundabout (Cranston Dr)	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-50	90	28.0	Soft	A	1.2	0.0	1.5	0.0				2.4	0.0	13.0	-50	90						57.3
	Airport Road, Olde Baseline Road to Cranston Drive	16	21095	472	420	70	0	y	1	-20	10	35.0	Soft	A	1.2	0.0	1.5	0.0				2.4	0.0	19.0	-20	10						50.1
	Airport Road, Cranston Drive to Caledon PS Driveway	16	18705	379	418	60	0	y	1	-90	-65	28.0	Soft	A	1.2	0.0	1.5	0.0														51.4
																															SUM	**59**
NR8 (Hilltop Dr)	Airport Road, Foodland Plaza to Marion Street	16	20024	403	444	60	0	y	1	-90	90	17.0	Soft	A	1.2	0.0	1.5	0.0				2.4	0.0	7.0	-90	90						**59**
NR10 (Larry St)	Airport Road, Marion Street to Larry Street	16	19622	423	420	60	0	y	1	30	90	25.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	16.0	30	90						53.5
	Airport Road, Larry Street to Mountcrest Road	16	20068	412	454	60	0	y	1	-90	30	25.0	Soft	A	1.2	0.0	1.5	0.0				1.8	0.0	1.5	-90	30						56.8
																															SUM	**58**
NR13 - roundabout (Walker Rd E)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	0	90	25.0	Soft	A	1.3	0.0	1.5	0.0				2.0	0.0	13.0	0	45						57.4
	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	-55	25.0	Soft	A	1.3	0.0	1.5	0.0				2.0	0.0	14.0	-90	-55						49.2
																															SUM	**58**
FUTURE RESIDENTIAL DEVELOPMENTS																																
F1 - roundabout (Future)	Airport Road, Olde Baseline Road & Cranston Drive	16	21095	472	420	70	0	y	1	-50	90	28.0	Soft	A	1.2	0.0	1.5	0.0				2.1	0.0	13.0	-50	90						58.2
	Airport Road, Olde Baseline Road & Cranston Drive	16	21095	472	420	70	0	y	1	-20	10	35.0	Soft	A	1.2	0.0	1.5	0.0				2.1	0.0	13.0	-20	10						51.3
	Airport Road, Cranston Drive & Caledon PS Driveway	16	18705	379	418	60	0	y	1	-90	-65	28.0	Soft	A	1.2	0.0	1.5	0.0				2.1	0.0	13.0	-90	-65						47.0
																															SUM	**59**
F2 (Future)	Airport Road, Old Church Road to Huntsmill Drive	16	13441	587	354	60	0	y	1	-90	90	24.0	Soft	A	1.3	0.0	1.5	0.0				2.0	0.0	13.0	-90	45						**59**

APPENDIX F

OFFICE CONSOLIDATION

This is a consolidation of the Town's by-law to control noise being By-law 86-110 as amended by By-law 95-66, 2010-117 and 2012-016. This is prepared for reference and information purposes only. The following consolidation is an electronic reproduction made available for information only. It is not an official version of the by-law. Official versions of all by-laws can be obtained from the Legislative Services section by calling (905) 584-2272. If there are any discrepancies between this consolidation and By-laws 86-110, 95-66, 2010-117 and 2012-016 the By-laws shall prevail.

THE CORPORATION OF THE TOWN OF CALEDON

BY-LAW NO. 86-110

A by-law to control noise

WHEREAS it is expedient to exercise the power conferred upon the Council by the *Environmental Protection Act* and other statutory authority; and

WHEREAS a recognized body of scientific and technological knowledge exists by which sound and vibration may be substantially reduced; and

WHEREAS the people have a right to and should be ensured an environment free from unusual, unnecessary or excessive sound or vibration which may degrade the quality and tranquility of their life or cause nuisance; and

WHEREAS it is the policy of the Council to reduce and control such sound or vibration;

NOW THEREFORE**,** the council of The Corporation of the Town of Caledon enacts as follows:

1. Interpretation

(1) In this by-law,

(a) Construction

"construction" includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earth moving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith;

(b) Construction Equipment

"construction equipment" means any equipment or device designed and intended for use in construction or material handling, including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

(c) Conveyance

"conveyance" includes a vehicle and any other device employed to transport a person or persons

or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

(d) Council

"Council" means the Council of The Corporation of the Town of Caledon;

[By-law 2012-016 effective Feb 14/12]

(dd) dB(A)

"dB(A)" means the sound pressure measured in decibels using "A" weighted scale of a sound level meter set to slow response;

[By-law 2012-016 effective Feb 14/12]

(ddd) Decibel

"Decibel" means a unit for expressing the relative intensity of sounds on a scale from zero for the average least perceptible sound to approximately 130 for the average pain level;

(e) Highway

"highway" includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle designed and intended for, or used by, the general public for the passage of vehicles;

(f) Motor Vehicle

"motor vehicle" includes an automobile, motorcycle and any other vehicle propelled or driven otherwise than by muscular power, but does not include the cars of electric or steam railways or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of the *Highway Traffic Act*;

(g) Motorized Conveyance

"motorized conveyance" means a conveyance propelled or driven otherwise than by muscular, gravitational or wind power;

(h) Municipality

"municipality" means the land within the geographic limit of the Town of Caledon;

[By-law 2012-016 effective Feb 14/12]

(i) Noise

"noise" means unwanted sound;

[By-law 2012-016 effective Feb 14/12]

(ii) Officer

"Officer" means a person appointed by The Corporation of the Town of Caledon for the enforcement of its by-laws and also includes a member of the Ontario Provincial Police Force;

(j) Point of Reception

"point of reception" means any point on the premises of a person where sound or vibration

originating from other than those premises is received and

[By-law 2012-016 effective Feb 14/12]

(k) RPM

"RPM" means revolutions per minute;

[By-law 2012-016 effective Feb 14/12]

(l) Sound Level Meter

"Sound Level Meter" means a device used to measure sound pressure which meets the American National Standards Institute S1.4-1983(R2006), or the International Electro-Technical Council Standard No. 123, or the British Standard no. 3539 Part 1, or the U.S.A. Standard S1.4-196, as amended.

(2) Residential Area

In this by-law "Residential Area" means those areas of the municipality designated in the Official Plan of the Town of Caledon Planning Area as "Settlement Area".

2. General Prohibitions

No person shall emit or cause or permit the emission of sound resulting from an act listed herein, and which sound is clearly audible at a point of reception:

1. Racing of any motorized conveyance other than in a racing event regulated by law.

2. The operation of a motor vehicle in such a way that the tires squeal.

3. The operation of any combustion engine or pneumatic device without an effective exhaust or intake muffling device in good working order and in constant operation.

4. The operation of a vehicle or a vehicle with a trailer resulting in banging, clanking, squealing or other like sounds due to improperly secured load or equipment, or inadequate maintenance.

5. The operation of an engine or motor in, or on, any motor vehicle or item of attached auxiliary equipment for a continuous period exceeding five minutes, while such vehicle is stationary in a Residential Area unless:

   (i) the original equipment manufacturer specifically recommends a longer idling period for normal and efficient operation of the motor vehicle in which case such recommended period shall not be exceeded; or,

   (ii) operation of such engine or motor is essential to a basic function of the vehicle or equipment, including but not limited to, operation of ready-mixed concrete trucks, lift platforms and refuse compactors; or,

   (iii) weather conditions justify the use of heating or refrigerating systems powered by the motor or engine for the safety and welfare of the operator, passengers or animals, or the preservation of perishable cargo, and the vehicle is stationary for purposes of delivery or loading; or,

(iv) prevailing low temperatures make longer idling periods necessary immediately after starting the motor or engine; or,

(v) the idling is for the purpose of cleaning and flushing the radiator and associated circulation system for seasonal change of antifreeze, cleaning of the fuel system, carburetor or the like, when such work is performed other than for profit.

6. The operation of a motor vehicle horn or other warning device except where required or authorized by law or in accordance with good safety practices.

7. The operation of any item of construction equipment in a Residential Area without effective muffling devices in good working order and in constant operation.

[By-law 2012-016 effective Feb 14/12]

2A. (1) No person shall operate a motorcycle on any highway if the motorcycle:

1. emits any sound exceeding 92 dB(A) from the exhaust outlet as measure at 50 centimeters by means of a Sound Level Meter set to slow response while the engine of the motorcycle is at idel; or

2. is a one, two, five or six cylinder motocycle and emits any sound exceeding 96 dB(A) from the exhaust outlet as measured at 50 centimetres by means of a Sound Level Meter set to slow response when the engine is at 2000 RPM; or

3. is a three or four cyclinder motorcycle and emits any sound exceeding 100 dB(A) from the exhaust outlet as measured at 50 centimetres by means of a Sound Level Meter set to slow response when the engine is at 5000 RPM.

(2) No person shall hinder or obstruct the Sound Level Meter testing procedure carried out by an Officer pursuant to the provisions of this by-law.

3. Prohibitions by Time and Place

No person shall emit or cause or permit the emission of sound resulting from any act listed in Table 3-1 if clearly audible at a point of reception located in a Residential Area within a prohibited time shown in Table 3-1.

TABLE 3-1

PROHIBITIONS BY TIME AND PLACE

Act	Prohibited Period of Time
1. The detonation of fireworks or explosive devices not used in construction	At all times
2. The discharge of firearms	At all times
3. The operation of a combustion engine which, (i) is, or (ii) is used in, or (iii) is intended for use in a toy, or a model or replica of any device, which model or replica has no function other than amusement and which is not a conveyance.	At all times

4. The operation of any electronic device or group of connected electronic devices incorporating one or more loudspeakers or other electro-mechanical transducers, and intended for the production, reproduction or amplification of sound.	11:00 p.m. one day to 7:00 a.m. the next day
5. The operation of any auditory signaling device, including but not limited to the ringing of bells or gongs and the blowing of horns or sirens or whistles, or the production, reproduction or amplification of any similar sounds by electronic means, except where required or authorized by law or in accordance with good safety practices.	11:00 p.m. one day to 7:00 a.m. the next day
6. The operation of any powered rail car, including but not limited to refrigeration cars, locomotives or self-propelled passenger cars, while stationary on property not owned or controlled by a railway governed by the *Canada Railway Act.*	11:00 p.m. one day to 7:00 a.m. the next day
7. The operation of any motorized conveyance other than on a highway or other place intended for its operation.	11:00 p.m. one day to 7:00 a.m. the next day
8. The venting, release or pressure relief of air, steam or other gaseous material, product or compound from any autoclave, boiler, pressure vessel, pipe, valve, machine, device or system.	11:00 p.m. one day to 7:00 a.m. the next day
9. Persistent barking, calling or whining or other similar persistent noise making by any domestic pet or any other animal kept or used for any purpose other than agriculture.	11:00 p.m. one day to 7:00 a.m. the next day
10. The operation of a commercial car wash with air drying equipment.	11:00 p.m. one day to 7:00 a.m. the next day
11. Yelling, shouting, hooting, whistling or singing	11:00 p.m. one day to 7:00 a.m. the next day
12. The operation of a power assisted hand glider or parafoil.	11:00 p.m. one day to 7:00 a.m. the next day
13. All selling or advertising by shouting or outcry or amplified sound.	11:00 p.m. one day to 7:00 a.m. the next day
14. Loading, unloading, delivering, packing, unpacking, or otherwise handling any containers, products, materials, or refuse, whatsoever, unless necessary for the maintenance of essential services or the moving of private household effects.	11:00 p.m. one day to 7:00 a.m. the next day
15. The operation of any equipment in connection with construction	11:00 p.m. one day to 6:00 a.m. the next day
16. The operation or use of any tool for domestic purposes other than snow removal.	11:00 p.m. one day to 7:00 a.m. the next day
17. The operation of solid waste bulk lift or refuse compacting equipment.	11:00 p.m. one day to 7:00 a.m. the next day
18. The operation of a commercial car wash of a type other than mentioned in item 10.	11:00 p.m. one day to 7:00 a.m. the next day

4. Exemption for Public Safety

Notwithstanding any other provision of this by-law, it shall be lawful to emit or cause or permit the emission of sound or vibration in connection with emergency measures undertaken:

(a) for the immediate health, safety or welfare of the inhabitants or any of them; or,

(b) for the preservation or restoration of property;

unless such sound or vibration is clearly of a longer duration, or nature more disturbing, than is reasonably necessary for the accomplishment of such emergency purpose.

[By-law 2012-016 effective Feb 14/12] 4A This by-law may be enforced by the Officers of the Ontario Provincial Police and Town of Caledon By-law Enforcement Officers.

5. Severability

If a court of competent jurisdiction should declare any section or part of a section of this by-law to be invalid, such section or part of a section shall not be construed as having persuaded or influenced Council to pass the remainder of the by-law and it is hereby declared that the remainder of the by-law shall be valid and shall remain in force.

[By-law 95-66 effective Jun 26/95] 6. Penalty

Every person who contravenes any of the provisions of this by-law is guilty of an offence.

[By-law 95-66 effective Jun 26/95] 7. Exemptions

The Council, upon application of any person who proposes to emit, or cause or permit the emission of sound not in conformity with the provisions of this by-law, may authorize an exemption from the provisions of this by-law provided that, in the opinion of the Council, the general intent and purpose of this by-law are maintained.

[By-law 95-66 effective Jun 26/95] 8. A person seeking an exemption shall

(1) submit an application to the chief by-law enforcement officer who shall prepare a report in respect of the application,

(2) pay a non-refundable application fee of $50.00, at the time of submitting the application, and

(3) be heard by the Council, or such committee of Council as designated by Council, which committee shall recommend to Council whether or not to grant the exemption requested.

9. Effective Date

This by-law shall come into force and take effect from the date it is approved by the Minister of the Environment.

By-law read a first time
This 23rd day of June 1986

_____
Mayor

_____
Clerk

By-law read a second and third time and
finally Passed in Open Council
This 7th day of July 1986

_____
Mayor

_____
Clerk

This By-law is approved pursuant to the
Provisions of the Environmental Protection
Act at Toronto, This 19th day of
August, 1986.

"Jim Bradley"

MINISTER OF THE ENVIRONMENT

Highway Construction Noise Assessment - Roadway Construction

Job No: 1702763
Job Name: Airport Rd King to Huntsmill, Peel Region

1. Removal of Overburden

Type	Amt	Act. PWL[1]	Max. SPL[2]	Equipment
2	1	109	81	Excavators
14	3	108	76	Haul truck (Typical 3-axle)
3	1	110	82	Bulldozers
4	1	112	84	Scrapers
		0	0	
		0	0	
		0	0	
		0	0	
TOTAL	**6**	**116**		

2. Compaction of Subgrade

Type	Amt	Act. PWL[1]	Max. SPL[2]	Equipment
5	2	111	83	Compactor
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
TOTAL	**2**	**111**		

3. Base Course

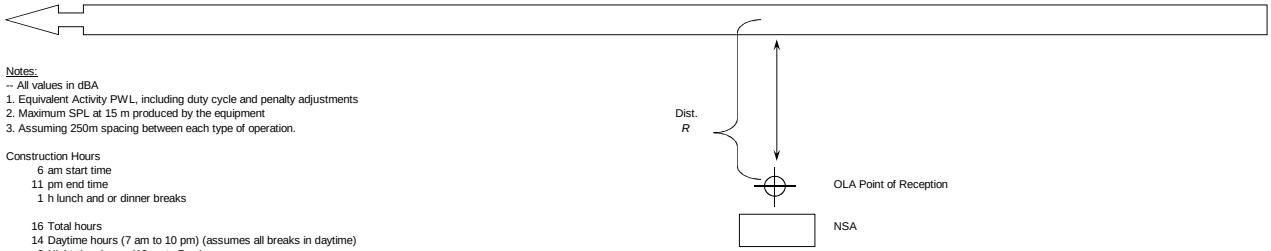
Type	Amt	Act. PWL[1]	Max. SPL[2]	Equipment
1	2	110	79	Backhoes / Wheeled Loaders
3	1	110	82	Bulldozers
14	4	110	76	Haul truck (Typical 3-axle)
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
TOTAL	**7**	**114**		

4. Compaction of Base Course

Type	Amt	Act. PWL[1]	Max. SPL[2]	Equipment
5	10	118	83	Compactor
11	1	108	80	Graders
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
		0	0	
TOTAL	**11**	**118**		

5. Surface Course

Type	Amt	Act. PWL[1]	Max. SPL[2]	Equipment
1	2	110	79	Backhoes / Wheeled Loaders
14	3	108	76	Haul truck (Typical 3-axle)
12	1	105	77	Asphalt Spreader
6	1	98	73	Road Roller
		0	0	
		0	0	
		0	0	
		0	0	
TOTAL	**7**	**113**		



Notes:
-- All values in dBA
1. Equivalent Activity PWL, including duty cycle and penalty adjustments
2. Maximum SPL at 15 m produced by the equipment
3. Assuming 250m spacing between each type of operation.

Construction Hours
6 am start time
11 pm end time
1 h lunch and or dinner breaks

16 Total hours
14 Daytime hours (7 am to 10 pm) (assumes all breaks in daytime)
2 Night-time hours (10pm to 7am)

Predicted Construction Noise Levels

Receptor No.	Description	Distance to Centre-line *R* (m)	Approximate Screening (dBA)	L_{eq} (1h) [1.]	L_{max} [2.]	L_{10} [3.]	L_{dn} [4.]
NR1	Side Facing Residential home on King Street	95	0	68	68	71	70
NR2	Side Facing Residential home on Airport Road	100	0	68	68	71	69
NR3	Side Facing Residential home on Airport Road (at Rounda	150	0	66	66	69	67
NR4	Side Facing Residential home on Olde Base Line Road (a	70	0	70	70	73	72
NR5	Side Facing Residential home on Olde Base Line Road (a	45	0	74	74	77	75
NR6	Side Facing Residential home on Cranston Drive (at Rour	28	0	78	78	81	79
NR7	Rear Facing Residential home on Brandiff Court	47	0	73	73	76	75
NR8	Side Facing Residential home on Hilltop Drive	17	0	82	82	85	83
NR9	Side Facing Residential home on Marion Street/ Larry St/	58	0	72	72	75	73
NR10	Side Facing Residential home on Larry Street	25	0	79	79	82	80
NR11	Side Facing Residential home on Emma Street/ Parsons	60	0	71	71	74	73
NR12	Side Facing Residential home on Old Church Road/ John	60	0	71	71	74	73
NR13	Side Facing Residential home on Walker Road East (at R	25	0	79	79	82	80
NR14	Rear Facing Residential home on Munsey Court	58	0	72	72	75	73
NR15	Rear Facing Residential home on Fleetham Court	30	0	77	77	80	78
NR16	Side Facing Residential home on McKinley Crescent/ Lea	24	0	79	79	82	80
NR17	Rear Facing Residential home on Huntsmill Drive (at Rou	127	0	67	67	70	68

Notes:
- All values are in dBA unless otherwise noted
1. Equivalent Activty PWL for the group (includes duty cycle, penalties and no of vehicle adjustments) + 10 log (2 / (4*3.14* S-R dist^2))
2. Higher of L_{eq} (1 h) or (Max of (Max SPL for each group + 20 log (15 / SR- dist))
3. L_{eq} (1 h) + 3 dB, based on typical construction sites, per RCNM
4. Based on L_{eq} (1 h) values and construction hours, includes a 10 dB penalty for night-time operations (10 pm to 7 am)