



7449 Montrose Road

Environmental Noise Assessment Niagara Falls, ON

SLR Project No: 241.30010.00000

February 2021



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ENVIRONMENTAL NOISE ASSESSMENT
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Niagara Falls, Ontario
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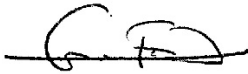
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This document has been prepared by SLR Canada. The material and data in this report were prepared under the supervision and direction of the undersigned.

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TABLE OF CONTENTS

1.	Introduction.....	1
1.1	Focus of Report.....	1
1.2	Nature of the Subject Lands	1
1.3	Nature of the Surroundings.....	1
	PART 1: IMPACTS OF THE ENVIRONMENT ON THE DEVELOPMENT.....	2
2.	Transportation Noise Impacts	2
2.1	Transportation Noise Sources	2
2.2	Surface Transportation Noise Criteria	2
2.2.1	Ministry of Environment Publication NPC-300.....	2
2.2.2	Niagara Region Noise Guideline	4
2.3	Traffic Data and Future Projections	4
2.3.1	Roadway Traffic Data	4
2.4	Projected Sound levels	5
2.4.1	Façade Sound Levels	5
2.4.2	Outdoor Living Areas.....	7
2.5	Façade Assessment.....	8
2.5.1	Glazing Assumptions and Calculation Inputs.....	8
2.5.2	Glazing Requirements	8
2.6	Ventilation and Warning Clause Requirements	9
2.6.1	Residential Units	9
2.6.2	Outdoor Amenity Areas	10
3.	Stationary Source Noise Impacts.....	10
3.1	Stationary Noise Modelling	10
3.2	Stationary Noise Criteria.....	11
3.2.1	MECP NPC-300 Guidelines for Stationary Noise Sources.....	11
3.2.2	Predicted Façade Levels.....	12
3.2.3	Noise Mitigation Measures Included.....	14
	PART 2: IMPACTS OF THE DEVELOPMENT ON ITSELF	15
4.	Stationary Source Noise Impacts on the Development Itself	15
	PART 3: IMPACTS OF THE DEVELOPMENT ON THE SURROUNDING AREA	15
5.	Stationary Source Noise Impacts on Surrounding Area.....	15

6.	Conclusion and Recommendations	16
6.1	Transportation Noise	16
6.2	Stationary Noise.....	16
6.3	Overall Assessment.....	16
7.	References.....	17
	Statement Of Limitations	18

TABLES

Table 1:	MECP Publication NPC-300 Sound Level Criteria for Road and Rail Noise	3
Table 2:	MECP Publication NPC-300 Outdoor Living Area Mitigation Requirements	3
Table 3:	MECP Publication NPC-300 Ventilation & Warning Clause Requirements	4
Table 4:	MECP Publication NPC-300 Building Component Requirements.....	4
Table 5:	Summary of Road Traffic Data Used in the Transportation Analysis	5
Table 6:	Summary of Transportation Facade Sound Levels	6
Table 7:	Summary of Transportation Noise Impacts - OLAs	7
Table 8:	Façade Sound Transmission Class (STC) Requirements	8
Table 9:	NPC-300 Class 1 Continuous Sound Noise Requirements.....	11
Table 10:	Summary of Road Traffic Data Used in the Transportation Analysis	12
Table 11:	Summary of Stationary Façade Sound Levels.....	12

FIGURES

Figure 1: Context Plan

Figure 2: Façade Sound Levels – Daytime Road Impacts

Figure 3: Façade Sound Levels – Night-time Road Impacts

Figure 4: Outdoor Living Areas – Roadway Impacts

Figure 5: Stationary Source Location

Figure 6: Modelled Stationary Noise Impacts – Daytime/Evening

Figure 7: Modelled Stationary Noise Impacts – Nighttime

Figure 8: Modelled Excess of the Guideline Limits Stationary Noise – Daytime/Evening

Figure 9: Modelled Excess of the Guideline Limits Stationary Noise – Nighttime

Figure 10: Outdoor Living Area Sound Levels – Surrounding Stationary

Figure 11: Modelled Stationary Noise Impacts – Daytime/Evening (Mitigated)

Figure 12: Modelled Stationary Noise Impacts – Nighttime (Mitigated)

Figure 13: Modelled Excess of the Guideline Limits Stationary Noise – Daytime/Evening (Mitigated)

Figure 14: Modelled Excess of the Guideline Limits Stationary Noise – Nighttime (Mitigated)

APPENDICES

Appendix A: Development Drawings

Appendix B: Traffic Data and Calculations

Appendix C: STAMSON Output Files

Appendix D: BPN-56 Façade Calculations

Appendix E: Required Warning Clauses

Appendix F: Stationary Source Sound Level Data

1. INTRODUCTION

SLR Consulting (SLR) was retained by 2683421 Ontario Limited to conduct an environmental noise assessment for the proposed development at 7449 Montrose Road in Niagara Falls, Ontario. This report is in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for the development.

1.1 FOCUS OF REPORT

In keeping with City of Niagara Falls, the Regional Municipality of Niagara and Ministry of the Environment, Conservation and Parks requirements, this report examines the potential for:

- Impacts of the environment on the proposed development;
- Impacts of the proposed development on the environment; and
- Impacts of the proposed development on itself.

1.2 NATURE OF THE SUBJECT LANDS

The proposed development is located at 7449 Montrose Road, on the west side of the road. The site is encompassed by Pine Oak Drive to the west, McLeod Road to the north, Montrose Road to the east, and the Niagara Square Mall parking lot to the south. The site is currently an empty lot with vegetation.

The proposed development includes a high-rise residential building (Building A), a mid-rise residential building (Building B), and five townhouse buildings (Buildings C1 to C5).

- The L-shaped Building A is located at the northeast corner of the site, and includes two 13-storey towers (north and south tower), with mechanical penthouse, atop a three storey podium. The total height of each tower is approximately 45 m.
- The L-shaped Building B is located at the northwest corner of the site and is eight storeys tall, plus a mechanical penthouse, for a total height of approximately 29 m.
- The five townhouse buildings (Buildings C1 through C5) are located on the south half of the site and are each three storeys in height (approximately 9 m).

Outdoor amenity spaces within the development includes a parkette located north of Buildings C2 and C3 and a green space on the roof of the podium of Building A, between the towers, on Level 4.

A copy of the site plan and floor plans are included in **Appendix A**.

1.3 NATURE OF THE SURROUNDINGS

Immediately surrounding the site are low-rise commercial developments to the southwest and west, parking lots and low-rise commercial buildings to the north and northeast, an empty lot to the east, and the old Niagara Square Mall to the southeast and south. Beyond the immediate surroundings there are low-rise residential buildings to the northwest through northeast to southeast, with farmland, woodlots and some residential to the south through west.

The topography of the immediate surrounding area is considered to be essentially flat with no significant variations.

A context plan is shown in **Figure 1**.

PART 1: IMPACTS OF THE ENVIRONMENT ON THE DEVELOPMENT

In assessing potential impacts of the environment on the proposed development, the focus of this report is to assess the potential for:

- Roadway noise impacts on the development;
- Stationary noise impacts from the surrounding commercial and industries lands; and
- Stationary noise impacts from the proposed development mechanical equipment on the proposed development itself and surrounding sensitive receptors.

The nearest railway line is located more than 500 m from the proposed development, therefore, there are no concerns related to railway noise or vibration, and further assessments of these sources are not required.

There are no airports in the immediate vicinity of the proposed development, and an assessment of aircraft noise impacts is not required.

2. TRANSPORTATION NOISE IMPACTS

2.1 TRANSPORTATION NOISE SOURCES

Transportation sources of interest with the potential to produce noise at the proposed development are roadway noise from Queen Elizabeth Way (QEW), McLeod Road, Montrose Road and Pine Oak Drive.

The level of noise from these sources has been predicted, and this information has been used to identify façade, ventilation, and warning clause requirements.

2.2 SURFACE TRANSPORTATION NOISE CRITERIA

2.2.1 MINISTRY OF ENVIRONMENT PUBLICATION NPC-300

Noise Sensitive Developments

Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300 provides sound level criteria for noise sensitive developments. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background. **Tables 1 to 4** below summarizes the applicable surface transportation (road and rail) criteria limits.

Location Specific Criteria

Table 1 summarizes criteria in terms of energy equivalent sound exposure (L_{eq}) levels for specific noise-sensitive locations. Both outdoor and indoor locations are identified, with the focus of outdoor areas being amenity spaces. Indoor criteria vary with sensitivity of the space. As a result, sleep areas have more stringent criteria than Living / Dining room space.

Outdoor Amenity Areas

Table 2 summarizes the noise mitigation requirements for communal outdoor amenity areas (“Outdoor Living Areas” or “OLAs”).

For the assessment of outdoor sound levels, the surface transportation noise impact is determined by combining road and rail traffic sound levels. Whistle noise due to railway trains is not included in the determination of levels.

Ventilation and Warning Clauses

Table 3 summarizes requirements for ventilation where windows potentially would have to remain closed as a means of noise control. Despite implementation of ventilation measures where required, if sound exposure levels exceed the guideline limits in **Tables 1**, warning clauses advising future occupants of the potential excesses are required. Warning clauses also apply to OLAs.

Building Shell Requirements

Table 4 provides sound level thresholds which if exceeded, require the building shell and components (i.e., wall, windows) to be designed and selected accordingly to ensure that the **Table 3 and 4** indoor sound criteria are met.

Table 1: MECP Publication NPC-300 Sound Level Criteria for Road and Rail Noise

Type of Space	Time Period	Equivalent Sound Exposure Level - Leq (dBA)		Assessment Location
		Road	Rail ^[1]	
Outdoor Living Area (OLA)	Daytime (0700-2300h)	55	55	Outdoors ^[2]
Living / Dining Room	Daytime (0700-2300h)	45	40	Indoors ^[4]
	Night-time (2300-0700h)	45	40	Indoors ^[4]
Sleeping Quarters	Daytime (0700-2300h)	45	40	Indoors ^[4]
	Night-time (2300-0700h)	40	35	Indoors ^[4]

Notes: [1] Whistle noise is excluded for OLA noise assessments, and included for Living / Dining Room and Sleeping Quarter assessments.
[2] Road and Rail noise impacts are to be combined for assessment of OLA impacts.
[3] An assessment of indoor noise levels is required only if the criteria in **Table 4** are exceeded.

Table 2: MECP Publication NPC-300 Outdoor Living Area Mitigation Requirements

Time Period	Equivalent Sound Level in Outdoor Living Area (dBA)	Ventilation Requirements
Daytime (0700-2300h)	≤ 55	• None
	55 to 60 incl.	• Noise barrier OR Warning Clause A
	> 60	• Noise barrier to reduce noise to 55 dBA OR • Noise barrier to reduce noise to 60 dBA and Warning Clause B

Table 3: MECP Publication NPC-300 Ventilation & Warning Clause Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level - L_{eq} (dBA)		Ventilation and Warning Clause Requirements ^[2]
		Road	Rail ^[1]	
Outdoor Living Area	Daytime (0700-2300h)	56 to 60 incl.		Type A Warning Clause
Plane of Window	Daytime (0700-2300h)	≤ 55		None
		56 to 65 incl.		Forced Air Heating /provision to add air conditioning + Type C Warning Clause
		> 65		Central Air Conditioning + Type D Warning Clause
	Night-time (2300-0700h)	51 to 60 incl.		Forced Air Heating/ provision to add air conditioning + Type C Warning Clause
		> 60		Central Air Conditioning + Type D Warning Clause

Notes: [1] Rail whistle noise is excluded.

[2] Road and Rail noise is combined for determining Ventilation and Warning Clause requirements.

Table 4: MECP Publication NPC-300 Building Component Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level - L_{eq} (dBA)		Component Requirements
		Road	Rail ^[1]	
Plane of Window	Daytime (0700-2300h)	> 65	> 60	Designed/ Selected to Meet Indoor Requirements ^[2]
	Night-time (2300-0700h)	> 60	> 55	

Notes: [1] Including whistle noise.

[2] Building component requirements are assessed separately for Road and Railway noise. The resultant sound isolation parameter is required to be combined to determine an overall acoustic parameter.

2.2.2 NIAGARA REGION NOISE GUIDELINE

The Niagara Region noise guidelines are contained in a Public Works Department Policy Manual, Region Road Traffic Noise Control, dated November 9, 2006.

The noise requirements for new developments are consistent with the MECP requirements described above. Note that Niagara Region requires traffic volumes to be projected to a condition 20 years in the future.

2.3 TRAFFIC DATA AND FUTURE PROJECTIONS

2.3.1 ROADWAY TRAFFIC DATA

Road traffic data for McLeod Road, Montrose Road and Pin Oak Road was obtained from Turning Movement Counts (TMCs) provided by the project Traffic Consultant, R.V. Anderson Associates Limited. As per traffic consultant, the traffic data was grown using a 2.0% annual growth rate. The traffic was grown from 2020 to the 20 year future 2042 as per the Niagara Region guideline.

Road traffic volumes from Queen Elizabeth Way was obtained from the MTO iCorridor website, based on 2016 data. Traffic data was grown using a 2.0% annual growth rate applied from 2016 to 2042.

Copies of all traffic data used and calculations can be found in **Appendix B**. The following table summarizes the road traffic volumes used in the analysis.

Table 5: Summary of Road Traffic Data Used in the Transportation Analysis

Roadway Link	2042 Traffic Volumes (AADT)	% Day/ Night Volume Split ^[3]		Commercial Traffic Breakdown		Vehicle Speed (km/h)
		Daytime	Night-time	% Medium Trucks	% Heavy Trucks	
Queen Elizabeth Way	61,414 ^[1]	66	34	3.8	11.3	100
McLeod Road	33,777 ^[2]	90	10	2.3	2.0	50
Montrose Road	14,186 ^[2]	90	10	2.3	2.0	50
Pin Oak Road	7,254 ^[2]	90	10	2.3	2.0	50

Notes: [1] Calculated from MTO iCorridor Data.
 [2] Calculated from TMCs provided by traffic consultant R.V. Anderson Associates Limited.
 [3] The Day/Night split was determined from historic data at SLR for urban areas.

2.4 PROJECTED SOUND LEVELS

Future road traffic sound levels at the proposed development were predicted using Cadna/A, a commercially available noise propagation modelling software. Roadways were modelled as line sources of sound, with sound emission rates calculated using the ORNAMENT algorithms, the road traffic noise model of the MECF. These predictions were validated and are equivalent to those made using the MECF's ORNAMENT or STAMSON v5.04 road traffic noise models. STAMSON validation files are included in **Appendix C**.

Sound levels were predicted along the facades of the proposed development using the "building evaluation" feature of Cadna/A. This feature allows for noise levels to be predicted across the entire façade of a structure.

2.4.1 FAÇADE SOUND LEVELS

Sound levels were predicted along the facades of the residential portions of the towers using the "building evaluation" feature of Cadna/A. This feature allows for noise levels to be predicted across the entire façade of a structure. Predicted worst-case façade sound levels are presented in **Table 6**. The transportation façade sound levels of the development, showing the ranges of predicted daytime and night-time sound levels are shown in **Figures 2 and 3**.

Table 6: Summary of Transportation Facade Sound Levels

Building	Façade ^[1]	Roadway Sound Levels ^[2]	
		L _{eq} Day (dBA)	L _{eq} Night (dBA)
Building A - 3 storey Section	North	68	63
	East	68	65
	South	63	61
	West	64	57
Building A – North Tower	North	67	63
	East	65	62
	South	58	57
	West	61	55
Building A – South Tower	North	64	61
	East	67	65
	South	62	61
	West	54	49
Building B	North	67	62
	East	64	60
	South	60	58
	West	64	58
Building C1	North	62	61
	East	65	64
	South	61	60
	West	50	48
Building C2	North	56	55
	East	62	61
	South	60	60
	West	49	48
Building C3	North	56	54
	East	56	56
	South	59	59
	West	50	47
Building C4	North	56	54
	East	58	58
	South	59	58
	West	55	49
Building C5	North	60	55
	East	55	55
	South	59	56
	West	62	55

Notes: [1] Façade locations are shown in **Figures 2 and 3**.

[2] The sound levels presented are for the worst-case exposed façade, in which totals may not correspond to the same location.

The façade roadway sound levels are predicted to be above 65 dBA and 60 dBA at some facades, during the daytime and nighttime periods, respectively. Therefore, an assessment of building components is required for these facades of the development.

2.4.2 OUTDOOR LIVING AREAS

The Outdoor Living Areas (OLA) of the proposed development include a parkette located north of Buildings C2 and C3 and a green space on of the podium rooftop of Building A, between the towers, on Level 4. The locations of the OLAs are shown in **Figure 4**.

The development includes a parapet with a minimum height of 1.25 m on the Building A podium. Parapet location is shown in **Figure 4**. The parapet must be continuous with no gaps or cracks, and a must have a minimum surface density (mass per unit area) of 20 kg/m² (4 lbs per sq.ft.). A number of different products can be used which meet these specifications, including wood, metal, glass or plexiglass structures.

The predicted noise impacts from the surrounding roadways are shown in **Figure 4** and summarized in the following table:

Table 7: Summary of Transportation Noise Impacts - OLAs

ID	Location	Transportation Impacts Leq Day (dBA) ^[1]
OLA 1	Building A – Level 4	60
OLA 2	Parkette	58

Notes: [1] Sound levels up to 60 dBA are allowed with the use of a **Type A** Warning Clause.

2.5 FAÇADE ASSESSMENT

Based on the roadway levels shown in **Table 6**, façade sound levels were predicted to exceed the above criteria at multiple locations throughout the development. Therefore, an assessment of glazing requirements is necessary for meeting the indoor sound level requirements outlined in **Table 1**.

Indoor sound levels and required facade Sound Transmission Classes (STCs) were estimated using the procedures outlined in National Research Council Building Practice Note BPN-56.

2.5.1 GLAZING ASSUMPTIONS AND CALCULATION INPUTS

The following assumptions were considered for the Buildings A and B, as detailed floor plans were not available at the time of the assessment:

- 50% glazing for bedroom facades;
- 70% glazing for living room facades;
- sleeping quarters were assumed to have a façade-to-floor area ratio of 100%;
- living/dining rooms were assumed to have a façade-to-floor area ratio of 50%;
- non-glazing portion of wall was assumed to have a rating of STC 45 for all locations.

The following assumptions were considered for the Buildings C1 to C5, as detailed floor plans were not available at the time of the assessment:

- 20% glazing for bedroom facades;
- 50% glazing for living room facades;
- sleeping quarters were assumed to have a façade-to-floor area ratio of 100%;
- living/dining rooms were assumed to have a façade-to-floor area ratio of 50%;
- non-glazing portion of wall was assumed to have a rating of STC 45 for all locations.

2.5.2 GLAZING REQUIREMENTS

The acoustical requirements are provided below in **Table 8**, which is the STC rating taking into consideration roadway noise and the assumptions listed in the previous section. Detailed Façade Calculations are included in **Appendix D**.

The combined glazing and frame assembly must be designed to ensure the overall sound isolation performance for the entire window unit meets the sound isolation requirements. It is recommended window manufacturers test data be reviewed to confirm acoustical performance is met.

Table 8: Façade Sound Transmission Class (STC) Requirements

Building	Façade	Non-Glazing Component	Glazing Requirements	
			Living Room	Bedroom
Building A - 3 storey Section	North	45	OBC	OBC
	North – Corner Units	45	OBC	OBC
	East	45	OBC	OBC
	East – Corner Units	45	OBC	31 ^[1]
	South	45	OBC	OBC
	South – Corner Units	45	OBC	OBC
	North	45	OBC	OBC

Building	Façade	Non-Glazing Component	Glazing Requirements	
			Living Room	Bedroom
Building A – North Tower	North – Corner Units	45	OBC	OBC
	East	45	OBC	OBC
	East – Corner Units	45	OBC	OBC
Building A – South Tower	North	45	OBC	OBC
	North – Corner Units	45	OBC	OBC
	East	45	OBC	OBC
	East – Corner Units	45	OBC	OBC
	South	45	OBC	OBC
	South – Corner Units	45	OBC	OBC
Building B	North	45	OBC	OBC
	North – Corner Units	45	OBC	OBC
	East	45	OBC	OBC
	East – Corner Units	45	OBC	OBC
Building C1	North	45	OBC	OBC
	North – Corner Units	45	OBC	OBC
	East	45	OBC	OBC
	East – Corner Units	45	OBC	OBC
Building C2	East	45	OBC	OBC
	East – Corner Units	45	OBC	OBC

Notes: OBC = Ontario Building Code, meeting a rating of STC 29.

[1] Corner units can add up to 3 additional STC points.

2.6 VENTILATION AND WARNING CLAUSE REQUIREMENTS

2.6.1 RESIDENTIAL UNITS

The requirements regarding warning clauses are summarized in **Table 2**. Where required, the Warning Clauses should be included in agreements registered on Title for the residential units, and included in all agreements of purchase and sale or lease, and all rental agreements. Warning Clauses are summarized in **Appendix E**.

Based on the predicted façade noise levels, forced air heating with provisions for future installation of central air conditioning, and an MECP **Type C** warning clause, is recommended for all affected units with façade sound levels from road traffic that are between 56 and 65 dBA during the daytime, or between 51 and 60 dBA during night-time hours. This affects:

- Building C3;
- Building C4; and
- Building C5.

Central air conditioning, and an MECP **Type D** warning clause, is recommended for all affected units with façade sound levels from road and rail traffic that exceed 65 dBA during the daytime, or exceed 60 dBA during night-time hours. This affects:

- Building A;
- Building B;
- Building C1; and
- Building C2.

2.6.2 OUTDOOR AMENITY AREAS

As the predicted outdoor amenity area sound levels are between 55 dBA and 60 dBA, a MECP **Type A** Warning Clause is recommended for all units. The **Type A** warning clause text is included in **Appendix E**.

3. STATIONARY SOURCE NOISE IMPACTS

A site visit was complete by SLR personnel on December 12, 2020. The site was found to be primarily surrounded by commercial and residential lands. No significant industry is located within a 1000m radius of the development. A context plan is shown in **Figure 1**.

As the surrounding area is primarily commercial/retail lands, the inclusion of stationary noise sources was determined based on the MECP Guideline D-6 Potential Influence Areas. Commercial/retail lands are considered to be Class I Industries, in which a 70 m influence area was applied for the inclusion of stationary noise sources. The 70 m influence area from the development property line is shown in **Figure 5**.

3.1 STATIONARY NOISE MODELLING

Based on the information obtained from the local industries and from our site visit, the significant sources of noise in the area of the project have been identified. Modelled noise sources include:

- HVAC mechanical equipment from existing Starbucks;
- Drive Thru idling cars and speaker box from existing Starbucks;
- HVAC mechanical equipment from existing Commercial Building;
- HVAC mechanical equipment from existing Hoops Sports Bar and Grill;
- Open bay doors from Existing Auto Body Shop;
- Paint booth exhaust fans from Existing Auto Body Shop;
- HVAC mechanical equipment from existing Tim Hortons;
- Drive Thru idling cars and speaker box from existing Tim Hortons;
- HVAC mechanical equipment from existing Carwash;
- Dryer fan from existing Carwash; and
- Vacuum units from existing Carwash.

Noise impacts from stationary sources were modelled using Cadna/A, a software implementation of the internationally recognized ISO-9613-2 environmental noise propagation algorithms. Cadna/A / ISO-9613 is the preferred noise model of the MECP. The ISO 9613 equations account for:

- Source to receiver geometry;
- Distance attenuation;

- Atmospheric absorption;
- Reflections off of the ground and ground absorption;
- Reflections off of vertical walls; and
- Screening effects of buildings, terrain, and purpose-built noise barriers (noise walls, berms, etc.).

The following additional parameters were used in the modelling, which are consistent with providing a conservative (worst-case assessment of noise levels):

- Temperature: 10°C;
- Relative Humidity: 70%;
- Ground Absorption G: G=0.2 (mostly reflective) as default global parameter;
- Reflection: An order of reflection of 1 was used (accounts for noise reflecting from walls);
- Wall Absorption Coefficients: Set to 0.21 (21 % of energy is absorbed, 79% reflected); and
- Terrain: Relatively flat near the Project site.

Sound level data from site visit measurements and generic SLR historical sound level data was applied in the stationary noise modelling. A summary of the sound levels used in the analysis and equipment operating conditions is included in **Appendix F**. All stationary sources modelled are shown in **Figure 5**.

3.2 STATIONARY NOISE CRITERIA

3.2.1 MECP NPC-300 GUIDELINES FOR STATIONARY NOISE SOURCES

MECP noise guidelines for stationary source noise impacting residential developments are given in MECP publication NPC-300. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A Background.

The acoustic environment surrounding the proposed development is dominated by the roadway noise. Therefore, the proposed development is considered to be located in a Class 1 area.

The sound level limit for steady sound sources are expressed as a 1-hr equivalent sound level (L_{eq} (1 hr) values, in dBA) and is the higher of the NPC-300 exclusionary limits and the existing background sound level. The NPC-300 stationary source noise requirements in a Class 1 Area are summarized in **Table 9** steady sound sources.

Table 9: NPC-300 Class 1 Continuous Sound Noise Requirements

Receiver Category	Time Period	Exclusionary Sound Level Limits, L_{eq} (1 hr), dBA ^[1]
Outdoor	0700 – 1900h	50
	1900 – 2300h	50
	2300 – 0700h	-
Plane of Window ^[2]	0700 – 1900h	50
	1900 – 2300h	50
	2300 – 0700h	45

Notes: [1] or minimum hourly L_{eq} of background noise, whichever is higher.

[2] Applicable for “Noise Sensitive Spaces”, as defined in NPC-300.

Since the ambient sound levels were anticipated to exceed the NPC-300 exclusionary limits, sound exposures from roadway noise were assessed and the corresponding applicable guideline

limits were determined.

Table 10: Summary of Road Traffic Data Used in the Transportation Analysis

Roadway Link	Traffic Volumes ^[1] (AADT)	% of Worst-Case Hour for Day / Eve / Night			Commercial Traffic Breakdown ^[2]		Vehicle Speed (km/h)
		Day	Evening	Night	% Medium Trucks	% Heavy Trucks	
Queen Elizabeth Way	36,700 ^[1]	4.7	2.9	0.7	3.8	11.3	100
McLeod Road	21,000 ^[2]	4.3	3.1	0.4	2.2	1.8	50
Montrose Road	8,820 ^[2]	4.3	3.1	0.4	2.2	1.8	50
Pin Oak Road	4,510 ^[2]	4.3	3.1	0.4	2.2	1.8	50

Notes: [1] Calculated from MTO iCorridor Data.

[2] Calculated from TMCs provided by traffic consultant R.V. Anderson Associates Limited.

As with the Transportation assessment, ambient roadway noise was modelled as line sources of sound using the Cadna/A computer model. The minimum hourly L_{eq} for the ambient sound levels were found to exceed the NPC-300 default guideline limits during all periods of the day.

As a conservative assessment of stationary impacts, the daytime/evening operations were considered to be the same and were assessed against the stricter evening criteria.

Surrounding facility noise impacts were assessed against the higher of the modelled ambient noise levels and the exclusionary limits in **Table 9**.

3.2.2 PREDICTED FAÇADE LEVELS

The “building evaluation” feature of the Cadna/A was used to assess noise impacts on the residential portions of the towers, podium and townhouse blocks. This feature allows for noise levels to be predicted across the entire façade of a structure.

A summary of the predicted noise impacts on each façade are shown in **Table 11**, and **Figures 6 and 7** for the daytime/evening and night-time periods, respectively. The difference between the existing ambient sound levels and the surrounding stationary noise impacts are shown in **Figures 8 and 9** for daytime/evening and night-time periods, respectively.

Table 11: Summary of Stationary Façade Sound Levels

Building	Façade ^[1]	Stationary Sound Levels ^[2]		Applicable Guideline Limit ^[3]	
		Day and Evening	Night	Day and Evening	Night
Building A - 3 storey Section	North	44	41	≤ 64	≤ 53
	East	36	32	≤ 64	≤ 55
	South	45	39	≤ 61	≤ 52
	West	45	41	≤ 59	≤ 49
Building A – North Tower	North	44	41	≤ 63	≤ 53
	East	43	40	≤ 62	≤ 53
	South	48	43	≤ 56	≤ 48

Building	Façade ^[1]	Stationary Sound Levels ^[2]		Applicable Guideline Limit ^[3]	
		Day and Evening	Night	Day and Evening	Night
	West	48	43	≤ 58	≤ 48
Building A – South Tower	North	41	37	≤ 62	≤ 53
	East	35	32	≤ 63	≤ 54
	South	48	43	≤ 60	≤ 51
	West	48	43	≤ 52	≤ 45
Building B	North	48	42	≤ 63	≤ 53
	East	44	40	≤ 60	≤ 51
	South	53	46	≤ 58	≤ 50
	West	56	47	≤ 60	≤ 50
Building C1	North	41	37	≤ 60	≤ 51
	East	41	37	≤ 62	≤ 53
	South	49	45	≤ 60	≤ 51
	West	46	42	≤ 55	≤ 47
Building C2	North	43	37	≤ 55	≤ 46
	East	49	45	≤ 60	≤ 52
	South	50	46	≤ 58	≤ 50
	West	46	42	≤ 53	≤ 45
Building C3	North	43	37	≤ 55	≤ 47
	East	43	40	≤ 54	≤ 46
	South	50	45	≤ 57	≤ 49
	West	49	46	≤ 53	≤ 45
Building C4	North	50	44	≤ 54	≤ 45
	East	46	41	≤ 56	≤ 48
	South	52	46	≤ 57	≤ 48
	West	52	42	≤ 53	≤ 45
Building C5	North	53	46	≤ 57	≤ 47
	East	50	45	≤ 54	≤ 45
	South	54	45	≤ 56	≤ 47
	West	56	46	≤ 58	≤ 47

- Notes:**
- All values are L_{eq} (1 hr) sound levels, in dBA.
 - [1] Façade locations are identified on **Figure 6 and 7**.
 - [2] Sound levels shown represent the worst-case impact along the identified facade.
 - [3] Guideline limit is the higher of the ambient sound levels and the exclusion limit.

The predicted worst-case noise impacts at the OLAs from the stationary sources are shown in **Figure 10**. All OLA levels are predicted to be at or below the default Class 1 criteria of 50 dBA for outdoor amenity spaces. Therefore, additional noise mitigation is not required.

Based on a preliminary assessment of stationary noise impacts, excesses of the guideline limits are predicted for the west facade of the Building B.

3.2.3 NOISE MITIGATION MEASURES INCLUDED

The excess is due to the operation of the Car Wash Dryer, which is located approximately 70 m to the west and it is in direct line of sight with the façade. It is suggested that the dryer fan be replaced with a low noise unit. The new fan should have a maximum Sound Power Level (PWL) rating of 101 dBA. Mitigated sound levels are shown in **Figures 11 and 12** for daytime/evening and night-time periods, respectively. The difference between the existing ambient sound levels and the mitigated surrounding stationary noise impacts are shown in **Figures 13 and 14** for daytime/evening and night-time periods, respectively.

The guideline limits are met with the inclusion of the above mitigation.

PART 2: IMPACTS OF THE DEVELOPMENT ON ITSELF

4. STATIONARY SOURCE NOISE IMPACTS ON THE DEVELOPMENT ITSELF

At the time of this assessment, the proposed development's mechanical systems have not been sufficiently designed.

If common mechanical systems will be implemented as part of the proposed development, the impacts from all equipment should comply with the MECP Publication NPC-300 guideline limits. The mechanical equipment is to be included with proposed development, the potential impacts should be assessed as part of the final building design. The criteria can be met at all surrounding and on-site receptors by the appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers) into the design. This can be confirmed at either the site plan approval or building permit approval stages.

If individual air conditioning systems are to be implemented for each residential unit for the proposed site, the sound levels from each unit should meet MECP Publication NPC-216.

PART 3: IMPACTS OF THE DEVELOPMENT ON THE SURROUNDING AREA

5. STATIONARY SOURCE NOISE IMPACTS ON SURROUNDING AREA

In terms of the noise environment of the area, it is expected that the project will have a negligible effect on the neighbouring properties.

The traffic related to the proposed development will be small relative to the existing traffic volumes within the area and is not of concern with respect to noise impact.

Other possible development noise sources with possible adverse impacts on the surrounding neighbourhood are the potential mechanical equipment (make up air units, cooling units, and parking garage vents). This equipment is required to meet MECP Publication NPC-300 requirements at the worst-case off-site noise sensitive receptors.

Off-site impacts are not anticipated given the high ambient sound levels in the area, and the fact that the systems will be designed to ensure that the applicable noise guidelines are met at on-site receptors.

Regardless, potential impacts will be assessed as part of the final building design to ensure compliance. The criteria can be met at all surrounding and on-site receptors through the use of routine mitigation measures, including the appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers) into the design.

It is recommended that the mechanical systems be reviewed by an Acoustical Consultant prior to final selection of equipment.

6. CONCLUSION AND RECOMMENDATIONS

The potential for noise impacts on and from the proposed development have been assessed. Impacts of the environment on the development, the development on itself, and the development on the surrounding area have been considered. Based on the results of our studies, the following conclusions have been reached:

6.1 TRANSPORTATION NOISE

- An assessment of transportation noise impacts from surrounding roadways has been completed.
- Based on transportation façade sound levels upgraded glazing is required within the development, as outlined in outlined in **Section 2.5.2**.
- Noise impacts within the common outdoor amenity areas are predicted to be within acceptable levels and a parapet height of 1.25 m is required, as outlined in **Section 2.4.2**.
- As required by MECP Publication NPC-300, the **Type A**, **Type C** and **Type D** Warning Clauses (outlined in **Section 2.6**) should be included in agreements registered on Title for the residential units, and included in agreements of purchase and sale. Warning Clauses are summarized in **Appendix E**.

6.2 STATIONARY NOISE

- “Stationary” noise from the surrounding commercial and industrial facilities were assessed on the proposed development, as outlined in **Section 3**.
- Stationary noise impacts from the surrounding commercial noise are predicted to meet NPC-300 Class 1 guideline limits on all façades, and outdoor living areas with the inclusion of recommended mitigation measures as outlined in **Section 3.2.3**.

6.3 OVERALL ASSESSMENT

- Impacts of the environment on the proposed development can be adequately controlled with proper glazing, the installation of a parapet, the replacement of the car wash dryer fan by a lower noise unit and the inclusion of ventilation and warning clause requirements, detailed in Part 1 of this report.
- Impacts of the proposed development on itself are not anticipated and can be adequately controlled by following the design guidance outlined in Part 2 of this report.
- Impacts of the proposed development on the surroundings are expected to meet the applicable guideline limits, and can be adequately controlled by following the design guidance outlined Part 3 of this report.
- As the mechanical systems for the proposed development have not been designed at the time of this assessment, the acoustical design should be reviewed by an Acoustical Consultant as part of the final building design.

7. REFERENCES

International Organization for Standardization, ISO 9613-2: *Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation*, Geneva, Switzerland, 1996.

National Research Council, Building Practice Note 56: *Controlling Sound Transmission into Buildings*, Canada 1985.

Ontario Ministry of the Environment, Conservation and Parks, 1989, Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT).

Ontario Ministry of the Environment, Conservation and Parks, Publication NPC-300: *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, 2013.

Ontario Ministry of the Environment, Conservation and Parks, 1996, STAMSON v5.03: Road, Rail and Rapid Transit Noise Prediction.

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Figures

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2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

CONTEXT PLAN

True North



Scale:

1:9,000

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

1

Project No. 241.30010.00000





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

FAÇADE SOUND LEVELS – DAYTIME ROAD IMPACTS

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

Project No. 241.30010.00000

2





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

FAÇADE SOUND LEVELS – NIGHTTIME ROAD IMPACTS

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

Project No. 241.30010.00000

3





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

OUTDOOR LIVING AREAS – ROADWAY IMPACTS

True North



Scale: 1:900

Date: Dec 22, 2020

Rev 1.0

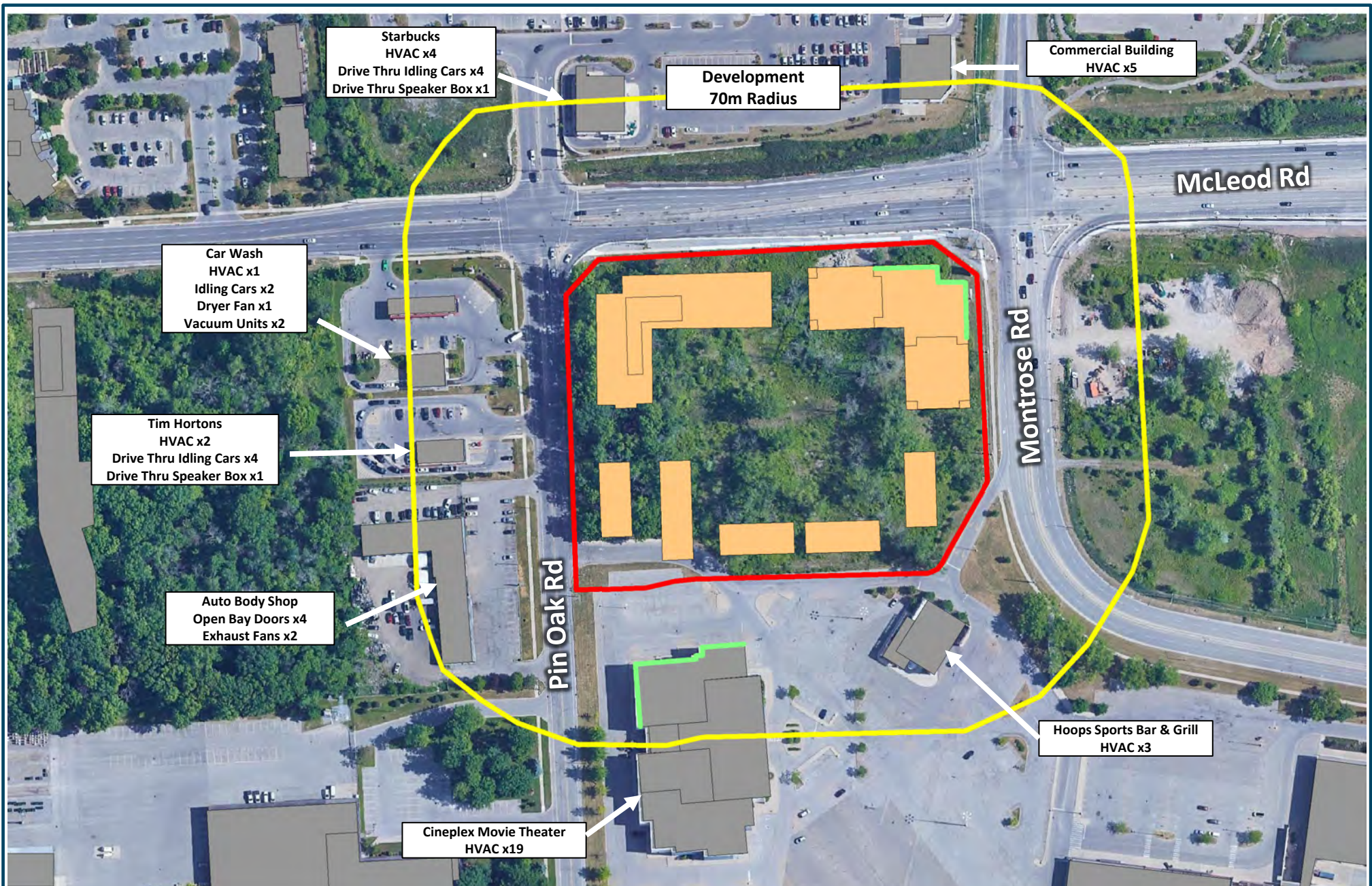
Project No. 241.30010.00000

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Figure No.

4



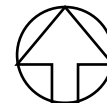


2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

STATIONARY SOURCE LOCATION

True North



Scale:

1:2,200

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

Project No. 241.30010.00000

5





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

MODELLED STATIONARY NOISE IMPACTS – DAYTIME/EVENING

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

6

Project No. 241.30010.00000





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

MODELLED STATIONARY NOISE IMPACTS – NIGHTTIME

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

Project No. 241.30010.00000

7





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

MODELLED EXCESS OF THE GUIDELINE LIMITS STATIONARY NOISE – DAYTIME/EVENING

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

Project No. 241.30010.00000

8





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

MODELLED EXCESS OF THE GUIDELINE LIMITS STATIONARY NOISE – NIGHTTIME

True North



Scale:

1:900

METRES

Date: Dec 22, 2020

Rev 1.0

Figure No.

9

Project No. 241.30010.00000





2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

OUTDOOR LIVING AREA SOUND LEVELS – SURROUNDING STATIONARY

True North



Scale: 1:900

Date: Dec 22, 2020

Rev 1.0

Project No. 241.30010.00000

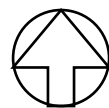

METRES

Figure No.




10



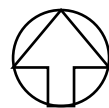



2683421 ONTARIO LIMITED	<div>True North</div> 	Scale: 1:900		METRES	<div></div>
7449 MONTROSE ROAD		Date: Dec 22, 2020	Rev 1.0	Figure No. 11	
MODELLED STATIONARY NOISE IMPACTS – DAYTIME/EVENING (MITIGATED)		Project No. 241.30010.00000			



2683421 ONTARIO LIMITED	<div>True North</div> 	Scale: 1:900		METRES	<div> ENVIRONMENTAL NOW PART OF  SLR</div>
7449 MONTROSE ROAD		Date: Dec 22, 2020	Rev 1.0	Figure No. 12	
MODELLED STATIONARY NOISE IMPACTS – NIGHTTIME (MITIGATED)		Project No. 241.30010.00000			



2683421 ONTARIO LIMITED	<div>True North</div> 	Scale: 1:900		METRES	<div></div>
7449 MONTROSE ROAD		Date: Dec 22, 2020	Rev 1.0	Figure No. 13	
MODELLED EXCESS OF THE GUIDELINE LIMITS STATIONARY NOISE – DAYTIME/EVENING (MITIGATED)		Project No. 241.30010.00000			



2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

MODELLED EXCESS OF THE GUIDELINE LIMITS STATIONARY NOISE – NIGHTTIME
(MITIGATED)

True North



Scale: 1:900

Date: Dec 22, 2020

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Project No. 241.30010.00000

METRES

Figure No.

14





Appendix A

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Appendix B

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ORNAMENT - Sound Power Emissions & Source Heights

Ontario Road Noise Analysis Method for Environment and Transportation

Road Segment ID	Roadway Name	Link Description	Speed (kph)	Period (h)	Total Traffic Volumes	Auto %	Med %	Hvy %	Auto	Med	Heavy	Road Gradient (%)	Cadna/A Ground Absorption G	PWL (dBA)	Source Height, s (m)
QEW_E	Queen Elizabeth Way Northbound	Daytime Impacts	100	16	20267	85.0%	3.8%	11.3%	17227	760	2280	0	0.00	92.7	1.8
		Nighttime Impacts	100	8	10440	85.0%	3.8%	11.3%	8874	392	1175	0	0.00	92.8	1.8
QEW_W	Queen Elizabeth Way Southbound	Daytime Impacts	100	16	20267	85.0%	3.8%	11.3%	17227	760	2280	0	0.00	92.7	1.8
		Nighttime Impacts	100	8	10440	85.0%	3.8%	11.3%	8874	392	1175	0	0.00	92.8	1.8
McLeod_Rd	McLeod Road	Daytime Impacts	50	16	30399	95.8%	2.3%	2.0%	29113	688	598	0	0.00	84.0	1.2
		Nighttime Impacts	50	8	3378	95.8%	2.3%	2.0%	3235	76	66	0	0.00	77.4	1.2
Montrose_Rd	Montrose Road	Daytime Impacts	50	16	12768	95.8%	2.3%	2.0%	12228	289	251	0	0.00	80.2	1.2
		Nighttime Impacts	50	8	1419	95.8%	2.3%	2.0%	1359	32	28	0	0.00	73.7	1.2
Pin_Oak_Rd	Pin Oak Road	Daytime Impacts	50	16	6529	95.8%	2.3%	2.0%	6252	148	128	0	0.00	77.3	1.2
		Nighttime Impacts	50	8	725	95.8%	2.3%	2.0%	695	16	14	0	0.00	70.8	1.2

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McLeod Rd @ Pin Oak Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Niagara Falls

Site #: 0000000006

Intersection: McLeod Rd & Pin Oak Dr

TFR File #: 6

Count date: 28-Nov-2018

Weather conditions:

Cloudy/Wet, Snow

Person(s) who counted:

Cam

** Signalized Intersection **

Major Road: McLeod Rd runs W/E

North Leg Total: 362

North Entering: 198

North Peds: 4

Peds Cross: \times

Cyclists	0	0	0	0
Trucks	0	0	1	1
Cars	56	35	106	197
Totals	56	35	107	



Cyclists 0

Trucks 0

Cars 164

Totals 164

East Leg Total: 1565

East Entering: 775

East Peds: 2

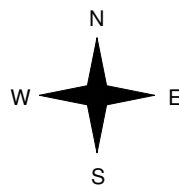
Peds Cross: \times

Cyclists	Trucks	Cars	Totals
0	21	735	756



McLeod Rd

Cyclists	Trucks	Cars	Totals
0	0	36	36
0	21	497	518
0	3	61	64
0	24	594	



Pin Oak Dr

Cars	Trucks	Cyclists	Totals
109	0	0	109
578	21	0	599
65	2	0	67
752	23	0	

McLeod Rd



Cars	Trucks	Cyclists	Totals
755	35	0	790

Peds Cross: \times

West Peds: 4

West Entering: 618

West Leg Total: 1374

Cars	161
Trucks	5
Cyclists	0
Totals	166



Cars	101	19	152	272
Trucks	0	0	13	13
Cyclists	0	0	0	0
Totals	101	19	165	

Peds Cross: \times

South Peds: 1

South Entering: 285

South Leg Total: 451

Comments

McLeod Rd @ Montrose Rd

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Niagara Falls

Site #: 0000000005

Intersection: McLeod Rd & Montrose Rd

TFR File #: 5

Count date: 28-Nov-2018

Weather conditions:

Cloudy/Wet, Snow

Person(s) who counted:

Cam

** Signalized Intersection **

Major Road: McLeod Rd runs W/E

North Leg Total: 883

North Entering: 411

North Peds: 2

Peds Cross: \times

Cyclists	0	0	0	0
Trucks	6	9	3	18
Cars	73	97	223	393
Totals	79	106	226	



Cyclists 1

Trucks 33

Cars 438

Totals 472

East Leg Total: 2100

East Entering: 983

East Peds: 0

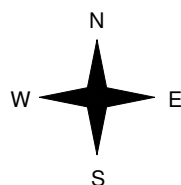
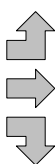
Peds Cross: \times

Cyclists	Trucks	Cars	Totals
0	23	748	771



McLeod Rd

Cyclists	Trucks	Cars	Totals
0	10	76	86
0	22	663	685
0	2	22	24
0	34	761	



Montrose Rd

Cars	Trucks	Cyclists	Totals
272	16	0	288
629	16	0	645
45	5	0	50
946	37	0	

McLeod Rd



Cars	Trucks	Cyclists	Totals
1085	32	0	1117

Peds Cross: \times

West Peds: 2

West Entering: 795

West Leg Total: 1566

Cars	164	Cars	46	90	199	335
Trucks	16	Trucks	1	7	7	15
Cyclists	0	Cyclists	0	1	0	1
Totals	180	Totals	47	98	206	



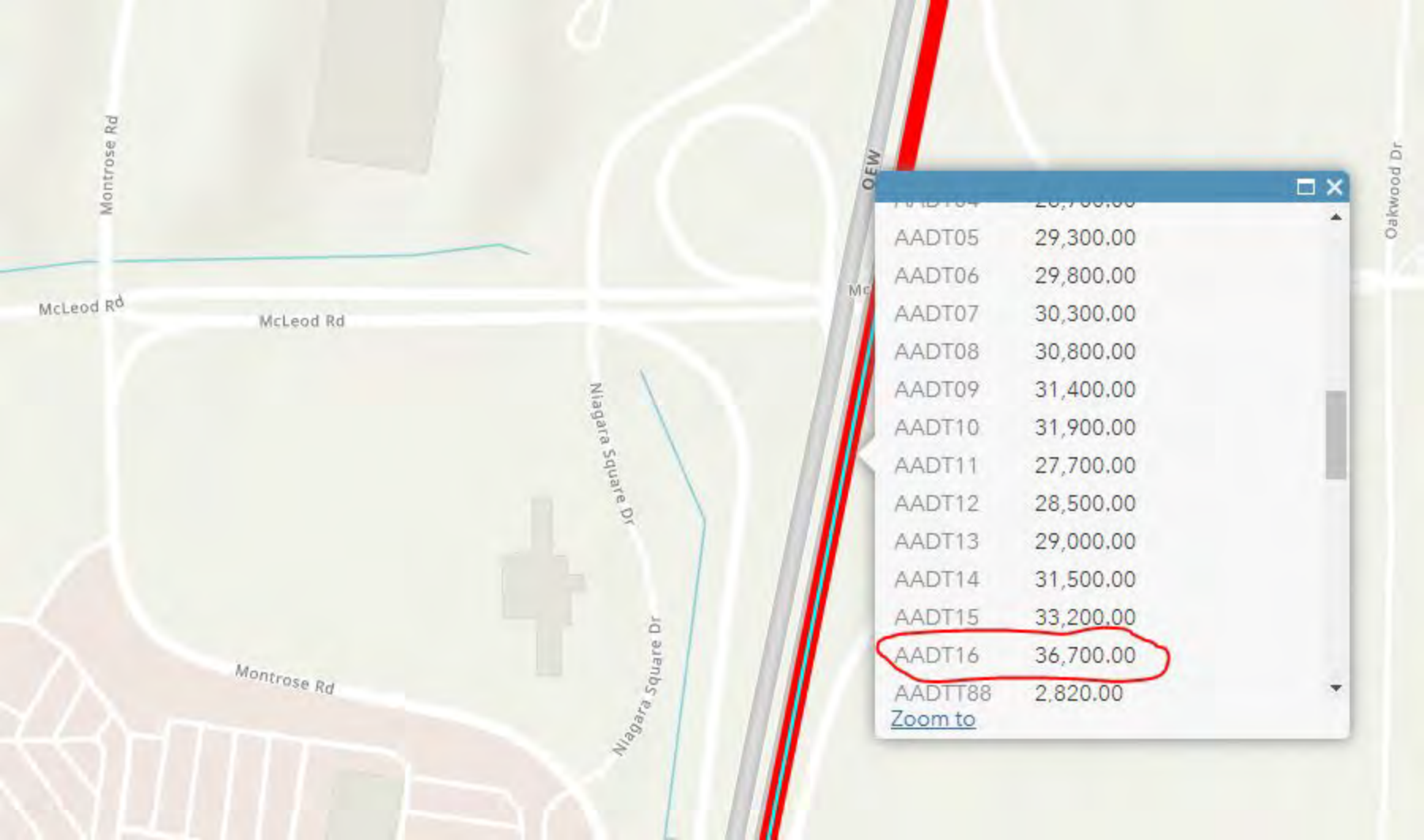
Peds Cross: \times

South Peds: 3

South Entering: 351

South Leg Total: 531

Comments





AADTT05	4,395.00
AADTT06	4,470.00
AADTT07	4,545.00
AADTT08	4,620.00
AADTT09	4,710.00
AADTT10	4,785.00
AADTT11	4,155.00
AADTT12	4,275.00
AADTT13	4,350.00
AADTT14	4,725.00
AADTT15	4,980.00
AADTT16	5,505.00

[Zoom to](#)



Appendix C

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2683421 ONTARIO LIMITED

7449 MONTROSE ROAD

COMPARISON OF CADNAA AND STAMSON

True North



Scale: 1:900

Date: Dec 22, 2020 Rev 1.0

Project No. 241-30010-0000

METRES

Figure No.

C.1



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Filename: montrose.te Time Period: 16 hours
Description:

Road data, segment # 1: QEW E

Car traffic volume : 17227 veh/TimePeriod
Medium truck volume : 760 veh/TimePeriod
Heavy truck volume : 2280 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: QEW E

Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 500.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: QEW S

Car traffic volume : 17227 veh/TimePeriod
Medium truck volume : 760 veh/TimePeriod
Heavy truck volume : 2280 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: QEW S

Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 490.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 3: McLeod

```

-----
Car traffic volume : 29113 veh/TimePeriod
Medium truck volume : 688 veh/TimePeriod
Heavy truck volume : 598 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

```

Data for Segment # 3: McLeod

```

-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 26.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```

↑

Road data, segment # 4: Montrose

```

-----
Car traffic volume : 12228 veh/TimePeriod
Medium truck volume : 289 veh/TimePeriod
Heavy truck volume : 251 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

```

Data for Segment # 4: Montrose

```

-----
Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 83.50 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```

↑

Results segment # 1: QEW E

Source height = 1.83 m

ROAD (0.00 + 56.38 + 0.00) = 56.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	0	0.00	77.63	0.00	-15.23	-6.02	0.00	0.00	0.00	56.38

Segment Leq : 56.38 dBA

↑
Results segment # 2: QEW S

Source height = 1.83 m

ROAD (0.00 + 56.47 + 0.00) = 56.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	0	0.00	77.63	0.00	-15.14	-6.02	0.00	0.00	0.00	56.47

Segment Leq : 56.47 dBA

↑
Results segment # 3: McLeod

Source height = 1.18 m

ROAD (0.00 + 66.52 + 0.00) = 66.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.90	0.00	-2.39	0.00	0.00	0.00	0.00	66.52

Segment Leq : 66.52 dBA

↑
Results segment # 4: Montrose

Source height = 1.18 m

ROAD (0.00 + 58.38 + 0.00) = 58.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	0	0.00	71.86	0.00	-7.46	-6.02	0.00	0.00	0.00	58.38

Segment Leq : 58.38 dBA

Total Leq All Segments: 67.82 dBA

↑

TOTAL Leq FROM ALL SOURCES: 67.82





Appendix D

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BPN 56 Calculation Procedure - Required Glazing STC Rating (Fixed Veneer)

ROADWAY

Receptor ID	Source Description	Sound Levels				Room / Façade Inputs					Source Inputs			Veneer - Component 1		Glazing - Component 2	
		Façade Sound Level:	Free - field Correction:	Required Indoor Sound Level:	Required Noise Reduction:	Glazing as % of Wall Area	Exposed Wall Height (m)	Exposed Wall Length (m)	Room Depth (m)	Room Absorption:	Incident Sound Angle:	Angle Correction Factor:	Spectrum type:	Assumed Veneer STC	Component Category:	Component Category:	Required Glazing STC
		(dBA)	(dBA)	(dBA)	(dBA)						(deg)			(STC)			(STC)
BA_G3_N_BR	Building A - Ground to Level 3 - North Façade - Bedroom	68	3	45	26	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_G3_N_LR	Building A - Ground to Level 3 - North Façade - Living Room	68	3	45	26	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_G3_E_BR	Building A - Ground to Level 3 - East Façade - Bedroom	68	3	45	26	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_G3_E_LR	Building A - Ground to Level 3 - East Façade - Living Room	68	3	45	26	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_G3_S_BR	Building A - Ground to Level 3 - South Façade - Bedroom	63	3	45	21	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	21
BA_G3_S_LR	Building A - Ground to Level 3 - South Façade - Living Room	63	3	45	21	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	21
BA_NT_N_BR	Building A - North Tower - North Façade - Bedroom	67	3	45	25	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BA_NT_N_LR	Building A - North Tower - North Façade - Living Room	67	3	45	25	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BA_NT_E_BR	Building A - North Tower - East Façade - Bedroom	65	3	45	23	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	23
BA_NT_E_LR	Building A - North Tower - East Façade - Living Room	65	3	45	23	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	23
BA_ST_N_BR	Building A - South Tower - North Façade - Bedroom	64	3	45	22	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	22
BA_ST_N_LR	Building A - South Tower - North Façade - Living Room	64	3	45	22	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	22
BA_ST_E_BR	Building A - South Tower - East Façade - Bedroom	67	3	45	25	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BA_ST_E_LR	Building A - South Tower - East Façade - Living Room	67	3	45	25	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BA_ST_S_BR	Building A - South Tower - South Façade - Bedroom	62	3	45	20	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	20
BA_ST_S_LR	Building A - South Tower - South Façade - Living Room	62	3	45	20	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	20
BB_N_BR	Building B - North Façade - Bedroom	67	3	45	25	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BB_N_LR	Building B - North Façade - Living Room	67	3	45	25	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BC1_N_BR	Building C1 - North Façade - Bedroom	62	3	45	20	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	16
BC1_N_LR	Building C1 - North Façade - Living Room	62	3	45	20	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BC1_E_BR	Building C1 - East Façade - Bedroom	65	3	45	23	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BC1_E_LR	Building C1 - East Façade - Living Room	65	3	45	23	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	22
BC2_E_BR	Building C2 - East Façade - Bedroom	62	3	45	20	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	16
BC2_E_LR	Building C2 - East Façade - Living Room	62	3	45	20	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19

Receptor ID	Source Description	Sound Levels				Room / Façade Inputs					Source Inputs			Veneer - Component 1		Glazing - Component 2	
		Façade Sound Level:	Free - field Correction:	Required Indoor Sound Level:	Required Noise Reduction:	Glazing as % of Wall Area	Exposed Wall Height (m)	Exposed Wall Length (m)	Room Depth (m)	Room Absorption:	Incident Sound Angle:	Angle Correction Factor:	Spectrum type:	Assumed Veneer STC	Component Category:	Component Category:	Required Glazing STC
		(dBA)	(dBA)	(dBA)	(dBA)						(deg)			(STC)			(STC)
NIGHT-TIME																	
BA_G3_N_BR	Building A - Ground to Level 3 - North Façade - Bedroom	63	3	40	26	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_G3_N_LR	Building A - Ground to Level 3 - North Façade - Living Room	63	3	45	21	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	21
BA_G3_E_BR	Building A - Ground to Level 3 - East Façade - Bedroom	65	3	40	28	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	28
BA_G3_E_LR	Building A - Ground to Level 3 - East Façade - Living Room	65	3	45	23	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	23
BA_G3_S_BR	Building A - Ground to Level 3 - South Façade - Bedroom	61	3	40	24	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	24
BA_G3_S_LR	Building A - Ground to Level 3 - South Façade - Living Room	61	3	45	19	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BA_NT_N_BR	Building A - North Tower - North Façade - Bedroom	63	3	40	26	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	26
BA_NT_N_LR	Building A - North Tower - North Façade - Living Room	63	3	45	21	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	21
BA_NT_E_BR	Building A - North Tower - East Façade - Bedroom	62	3	40	25	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BA_NT_E_LR	Building A - North Tower - East Façade - Living Room	62	3	45	20	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	20
BA_ST_N_BR	Building A - South Tower - North Façade - Bedroom	61	3	45	19	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BA_ST_N_LR	Building A - South Tower - North Façade - Living Room	61	3	45	19	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BA_ST_E_BR	Building A - South Tower - East Façade - Bedroom	65	3	45	23	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	23
BA_ST_E_LR	Building A - South Tower - East Façade - Living Room	65	3	45	23	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	23
BA_ST_S_BR	Building A - South Tower - South Façade - Bedroom	61	3	45	19	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BA_ST_S_LR	Building A - South Tower - South Façade - Living Room	61	3	45	19	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	19
BB_N_BR	Building B - North Façade - Bedroom	62	3	40	25	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	25
BB_N_LR	Building B - North Façade - Living Room	62	3	45	20	70%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	20
BC1_N_BR	Building C1 - North Façade - Bedroom	61	3	45	19	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	15
BC1_N_LR	Building C1 - North Façade - Living Room	61	3	45	19	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	18
BC1_E_BR	Building C1 - East Façade - Bedroom	64	3	45	22	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	18
BC1_E_LR	Building C1 - East Façade - Living Room	64	3	45	22	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	21
BC2_E_BR	Building C2 - East Façade - Bedroom	61	3	40	24	20%	3.0	3.0	3.0	Very Absorptive	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	20
BC2_E_LR	Building C2 - East Façade - Living Room	61	3	45	19	50%	3.0	3.0	6.0	Intermediate	0 - 90	0	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or	C. sealed thin window, or openable thick	18



Appendix E

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Warning Clauses

The following Warning Clauses are suggestion of what should be registered on Title and/or included in the Agreement of Purchase and Sale or Lease and in the relevant Development Agreement:

MECP Type A – all units

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

MECP Type C

- Building C3;
- Building C4; and
- Building C5.

"Purchasers are advised that the dwelling unit has been or will be fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment's noise criteria."

MECP Type D

- Building A;
- Building B;
- Building C1; and
- Building C2

"Purchasers are advised that the dwelling unit has been or will be fitted with a central air conditioning system which will enable occupants to keep windows closed if road traffic noise interferes with the indoor activities."

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Appendix F

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Modelling Information Summary

Source Description	Maximum Sound Power Levels (1/1 Octave Band Levels)									Modelled Sound Power Level (dBA)	Notes
	32	63	125	250	500	1000	2000	4000	8000		
Starbucks											
Rooftop 5 Ton HVAC	77	80	81	81	80	78	74	70	64	83.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Drive-Thru Idling Car Queue	--	91	86	81	78	76	75	71	61	82.0	- Based on average idling vehicle sound level. - 60 min/car conservatively applied for 4 cars/hour during daytime/evening. - Not in operation during nighttime.
Drive Thru Speakers	--	75	70	67	81	78	76	63	48	83.0	- Based on historical SLR field measurements. - Not in operation during nighttime.
Commercial Building											
Rooftop 5 Ton HVAC	77	80	81	81	80	78	74	70	64	83.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Hoops Sports Bar and Grill											
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Cineplex Theater											
Rooftop 5 Ton HVAC	77	80	81	81	80	78	74	70	64	83.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Rooftop 20 Ton HVAC	89	92	93	93	92	90	86	82	76	95.0	- No duty cycling applied during daytime/evening. - 30 min duty cycling applied for the night.

Source Description	Maximum Sound Power Levels (1/1 Octave Band Levels)									Modelled Sound Power Level (dBA)	Notes
	32	63	125	250	500	1000	2000	4000	8000		
Auto Body Shop											
Open Bay Door Compressed Air	101	101	96	89	86	86	84	85	81	92.0	- Based on historical SLR data. - +5dB correction applied for tonality. - Assumed 10 min of operation/ hour during daytime.
Open Bay Door Impact Wrench	83	78	82	76	79	78	86	85	85	91.0	- Based on historical SLR data. - +5dB correction applied for tonality. - Assumed 10 min of operation/ hour during daytime.
Paint Booth Exhaust Fan	95	91	95	95	88	83	72	64	63	90.0	- Based on historical SLR field measurements. - Not in operation during nighttime.
Tim Hortons											
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Drive-Thru Idling Car Queue	--	91	86	81	78	76	75	71	61	82.0	- Based on average idling vehicle sound level. - 60 min/car conservatively applied for 4 cars during daytime/evening. - No queue during nighttime.
Drive Thru Speakers	--	75	70	67	81	78	76	63	48	83.0	- Based on historical SLR field measurements. - No queue during nighttime.
Gas Station											
Rooftop 10 Ton HVAC	80	83	84	84	83	81	77	73	67	86.0	- Based on historical SLR data. - 30 min duty cycling applied for the night.
Car Wash Idling Car Queue	--	91	86	81	78	76	75	71	61	82.0	- Based on average idling vehicle sound level. - 60 min/car conservatively applied for 3 cars/ hour during daytime/evening. - No queue during nighttime.
Dryer Fan	102	107	102	99	105	99	100	94	87	106.0	- Based on site visit field measurements. - Assumed 10 min/hour of operation during daytime/evening and 2 min/hour during nighttime.
Vacuum Unit	80	84	81	90	78	81	85	87	84	92.0	- Based on historical SLR data. - Assumed 30 min of operation during daytime/evening and 5 min during nighttime.