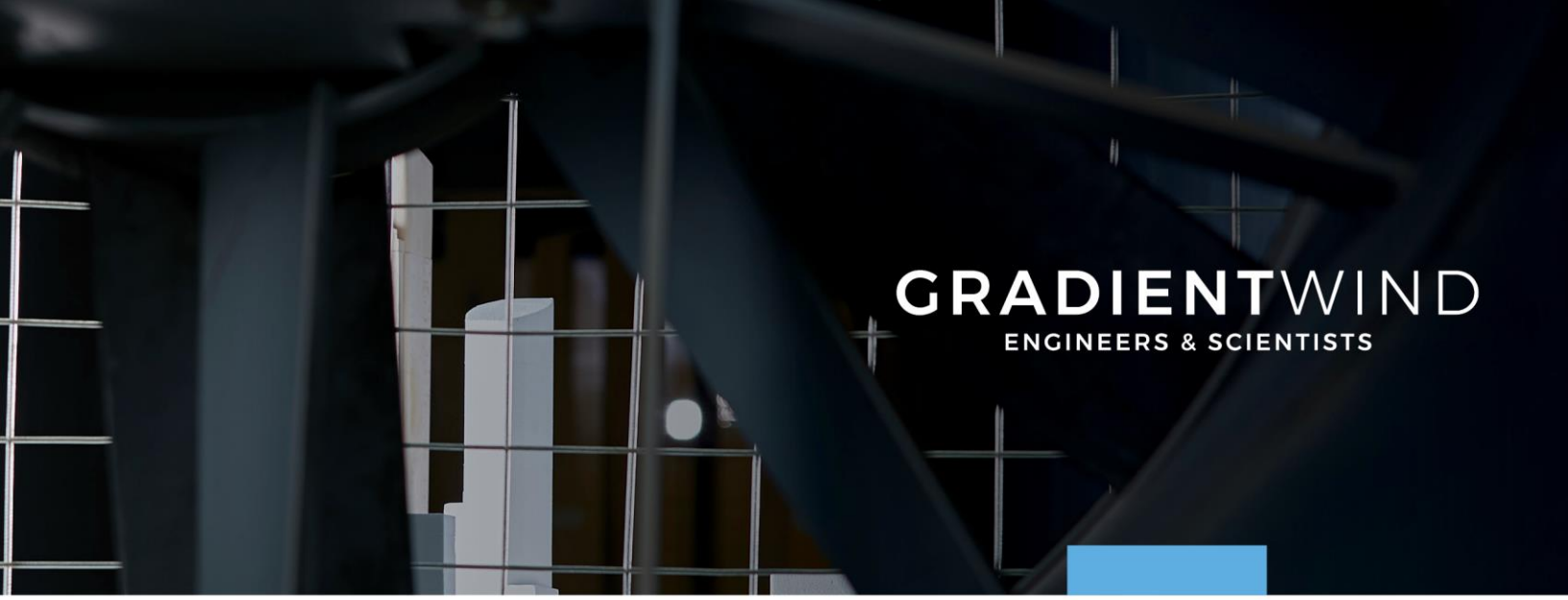

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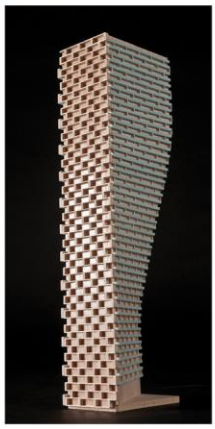
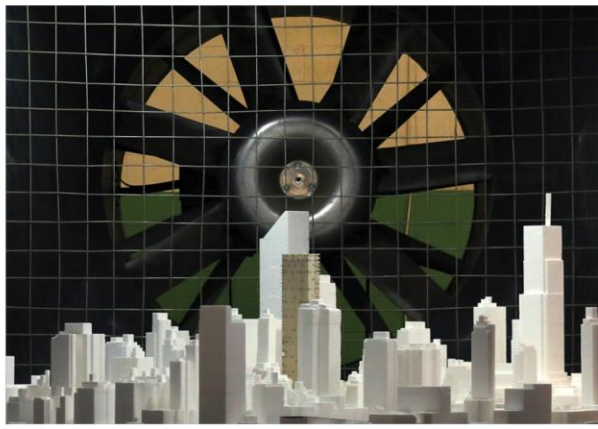
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

128 Lakeshore Road East
Mississauga, Ontario

Report: 21-350- Traffic Noise Feasibility





December 9, 2021

PREPARED FOR
BlackTusk Group
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PREPARED BY
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EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken to satisfy the requirements of a Zoning By-law Amendment (ZBA) application submission for a proposed mixed-use development located at 128 Lakeshore Road East in Mississauga, Ontario. The proposed development will rise 10-storeys plus mechanical penthouse with three levels of parking below grade. The primary sources of roadway traffic noise include Lakeshore Road East, Hurontario Street, Ann Street, and St. Lawrence Drive. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300 guidelines; (ii) future vehicular traffic volumes corresponding to roadway classification and theoretical capacities; and (iii) architectural drawings provided by IBI Group in November 2021.

The results of the current analysis indicate that noise levels will range between 55 and 68 dBA during the daytime period (07:00-23:00) and between 52 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the southeast façade, which is nearest and most exposed to Lakeshore Road East.

As such, upgraded building components will be required as noise levels predicted due to roadway traffic exceed the criteria listed in NPC-300 for building components. In addition, as noise levels exceed 65 dBA during the daytime period, the development will require central air conditioning. This will allow occupants to keep windows closed and maintain a comfortable living/working environment. A Type D Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6. Furthermore, noise levels at the Level 11 amenity terrace are expected to reach 55 dBA. As noise levels do not exceed 55 dBA, noise mitigation at the OLA is not required.

At the time of the Site Plan Application (SPA), an updated detailed traffic noise assessment would be conducted. Based on noise levels at the building façades, the update will include an evaluation of indoor noise levels for comparison against indoor noise criteria. This would be performed for a typical unit, assuming building wall details satisfy the minimum Ontario Building Code (OBC) requirements. For areas where the indoor noise criteria are not met, construction details such as the required sound transmission

class (STC) rating for windows would be specified to ensure comfort of indoor living areas. Furthermore, ventilation requirements and warning clauses will be provided.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below NPC-300 limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the NPC-300 criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

Furthermore, the stationary noise study would also assess impacts from existing stationary noise sources near the proposed development. The building located at 6-8 Ann Street was identified as the property with the nearest and most exposed mechanical equipment to the subject site (e.g., make-up air handling unit). As the mechanical equipment is positioned on a high roof, blockage from the building's edge will obstruct direct line of sight of the proposed development, which is several storeys shorter. With that notion, existing stationary noise impacts are not anticipated.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by BlackTusk Group to undertake a roadway traffic noise feasibility assessment to satisfy the requirements of a Zoning By-law Amendment (ZBA) application submission for a proposed mixed-use development located at 128 Lakeshore Road East in Mississauga, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local transportation traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP)[1] guidelines. Noise calculations were based on architectural drawings provided by IBI Group in November 2021, with future traffic volumes corresponding to roadway classification and theoretical roadway capacities.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise feasibility assessment is a proposed mixed-use development located at 128 Lakeshore Road East in Mississauga, Ontario. The study site is situated at the east corner of a parcel of land bounded by Helene Street North to the southwest, High Street East to the northwest, Ann Street to the northeast, and Lakeshore Road East to the southeast.

The proposed development comprises a 10-storey stepped rectangular building with the long axis aligned with Ann Street. Above three levels of below-grade parking, accessed from a covered driveway on the northeast side, the ground floor consists of retail space along the southeast side, and a residential lobby along the northeast side. Levels 2 and above are exclusively residential and at Level 2 the northeast and southwest sides extend to cantilever over the entrances below. Setbacks from all elevations of Level 4, the southeast side of Level 7, and the northwest, northeast, and southeast sides of Level 9 accommodate private terraces. At the mechanical penthouse level, all elevations set back to feature a wraparound outdoor amenity terrace on the building rooftop.

[1] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

The site is surrounded by low-rise and medium-rise mixed-use buildings in all directions, with Nola Port Credit (15-storeys) directly northwest of the site, Harbourview (20-storeys) to the northeast across Ann Street, and Northshore (22-storeys) further to the northeast on Hurontario Street. The primary sources of roadway traffic noise Lakeshore Road East, Hurontario Street, Ann Street, and St. Lawrence Drive. The Canadian National Railway corridor is located to the north beyond 300m from the subject site property line with several low-rise and medium-rise buildings situated in between. As such, the railway corridor was not identified as a significant source of transportation noise as noise levels from roadway vehicles are expected to dominate. Figure 1 illustrates a complete site plan with surrounding context.

At the time of the Site Plan Application (SPA), an updated detailed traffic noise assessment would be conducted, if necessary. Based on noise levels at the building façades, the update will include an evaluation of indoor noise levels for comparison against indoor noise criteria. This would be performed for a typical unit, assuming building wall details satisfy the minimum Ontario Building Code (OBC) requirements. For areas where the indoor noise criteria are not met, construction details such as the required sound transmission class (STC) rating for windows would be specified to ensure comfort of indoor living areas. Furthermore, ventilation requirements and warning clauses will be provided.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below NPC-300 limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the NPC-300 criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study building produced by local transportation sources, and (ii) explore potential noise mitigation where required.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. NPC-300 specifies that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for retail space, living rooms, and sleeping quarters, respectively, as listed in Table 1. However, to account for deficiencies in building construction and to control peak noise, these levels should be targeted toward 47, 42, and 37 dBA.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [2]

Type of Space	Time Period	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[3]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[4]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[5].

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Furthermore, balconies/terraces serving the residential units extending less than 4 metres from the façade do not require consideration as an OLA, as per NPC-300.

[2] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Table C-9
[3] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[4] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Roadway Traffic Volumes

NPC-300 dictates that noise calculations should consider future sound levels based on a roadway's mature state of development. As a conservative approach, traffic volumes have been considered for the mature state of development based on roadway classifications obtained from the City of Mississauga Transportation Master Plan and theoretical maximum capacities for each roadway type. Specific roadway traffic volumes for the roadways investigated can be assessed during a detailed traffic noise assessment at the time of the SPA application. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Lakeshore Road East	4-Lane Arterial (Undivided)	40	**30,000**
Hurontario Street	4-Lane Arterial (Undivided)	50	**30,000**
Ann Street	2-Lane Minor Collector	50	**8,000**
St. Lawrence Drive	2-Lane Minor Collector	40	**8,000**

4.2.3 Theoretical Roadway Traffic Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The TNM analysis model as been recognised by the Ministry of Transportation Ontario (MTO) as the recommend noise model for transportation projects (ref. Environmental Guide for Noise, dated August 2021[6]). A total of 9 receptor locations were identified around the site, as illustrated in Figure 2.

[6] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", August 2021, pg. 16

Roadway noise calculations were performed by treating each segment as separate line sources of noise, and by using existing and proposed building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise a conservative 5% heavy trucks and 7% medium trucks.
- The day/night split for all streets was taken to be 90%/10%, respectively.
- Default ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 9 locations around the study area (see Figure 2).

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	Roadway Noise Level (dBA)	
			Day	Night
R1	9.65	POW - Level 3 - Southeast Facade	68	61
R2	9.65	POW - Level 3 - Northeast Facade	66	59
R3	9.65	POW - Level 3 - Northwest Facade	60	53
R4	9.65	POW - Level 3 - Southwest Facade	65	58
R5	30.3	POW - Level 10 - Southeast Facade	64	57
R6	30.3	POW - Level 10 - Northeast Facade	64	58
R7	30.3	POW - Level 10 - Northwest Facade	59	52
R8	30.3	POW - Level 10 - Southwest Facade	62	56
R9	34	OLA - Level 11 Terrace	55	N/A*

*Noise levels during the nighttime are not considered for OLAs

The results of the current analysis indicate that noise levels will range between 55 and 68 dBA during the daytime period (07:00-23:00) and between 52 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the southeast façade, which is nearest and most exposed to Lakeshore Road East. Figure 3 and 4 illustrate daytime and nighttime noise contours of the site 15m above grade.

5.1.1 Noise Control Measures

The results indicate that upgraded building components along the southeast and northeast facades will be required as noise levels predicted due to roadway traffic exceed the criteria listed in NPC-300 for building components. This can be achieved using typical double pane glazing elements with STC 30 or above. In addition, as noise levels exceed 65 dBA during the daytime period, the development will require central air conditioning. This will allow occupants to keep windows closed and maintain a comfortable living/working environment. A Type D Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The results also indicate that noise levels at the Level 11 amenity terrace are expected to reach 55 dBA. As noise levels do not exceed 55 dBA, noise mitigation at the OLA is not required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 55 and 68 dBA during the daytime period (07:00-23:00) and between 52 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the southeast façade, which is nearest and most exposed to Lakeshore Road East.

As such, upgraded building components along the southeast and northeast facades will be required as noise levels predicted due to roadway traffic exceed the criteria listed in NPC-300 for building components. In addition, as noise levels exceed 65 dBA during the daytime period, the development will require central air conditioning. This will allow occupants to keep windows closed and maintain a comfortable living/working environment. A Type D Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below.

Furthermore, noise levels at the Level 11 amenity terrace are expected to reach 55 dBA. As noise levels do not exceed 55 dBA, noise mitigation at the OLA is not required.

Type D:

> *"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

At the time of the Site Plan Application (SPA), an updated detailed traffic noise assessment would be conducted. Based on noise levels at the building façades, the update will include an evaluation of indoor noise levels for comparison against indoor noise criteria. This would be performed for a typical unit, assuming building wall details satisfy the minimum Ontario Building Code (OBC) requirements. For areas where the indoor noise criteria are not met, construction details such as the required sound transmission class (STC) rating for windows would be specified to ensure comfort of indoor living areas. Furthermore, ventilation requirements and warning clauses will be provided.

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This concludes our roadway traffic noise feasibility assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

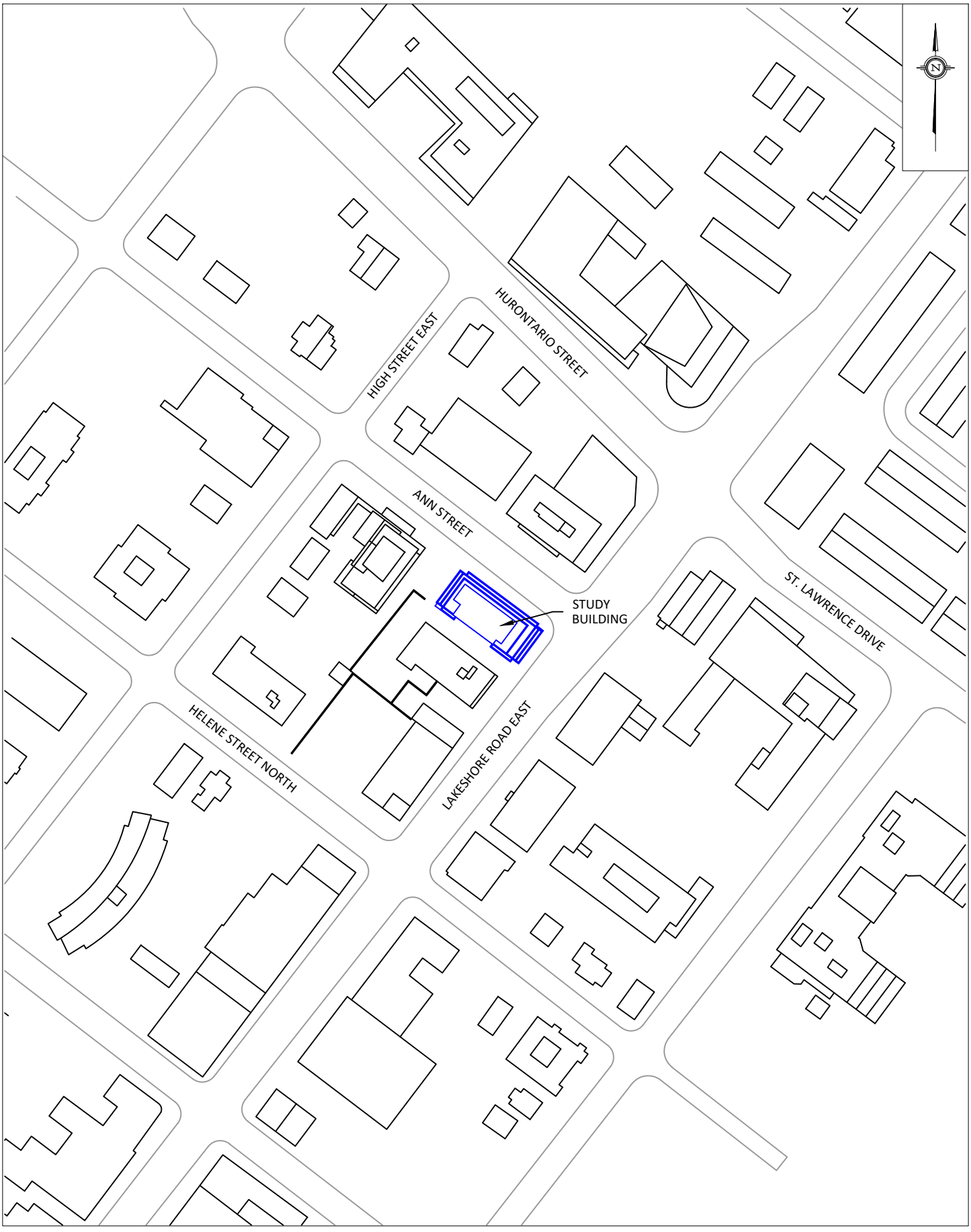
Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 21-350



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PROJECT	128 LAKESHORE ROAD EAST, MISSISSAUGA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW21-350-1
DATE	NOVEMBER 16, 2021	DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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SCALE	1:500 (APPROX.)	DRAWING NO.	GW21-350-2
DATE	NOVEMBER 16, 2021	DRAWN BY	G.G.

FIGURE 2:
RECEPTOR LOCATIONS

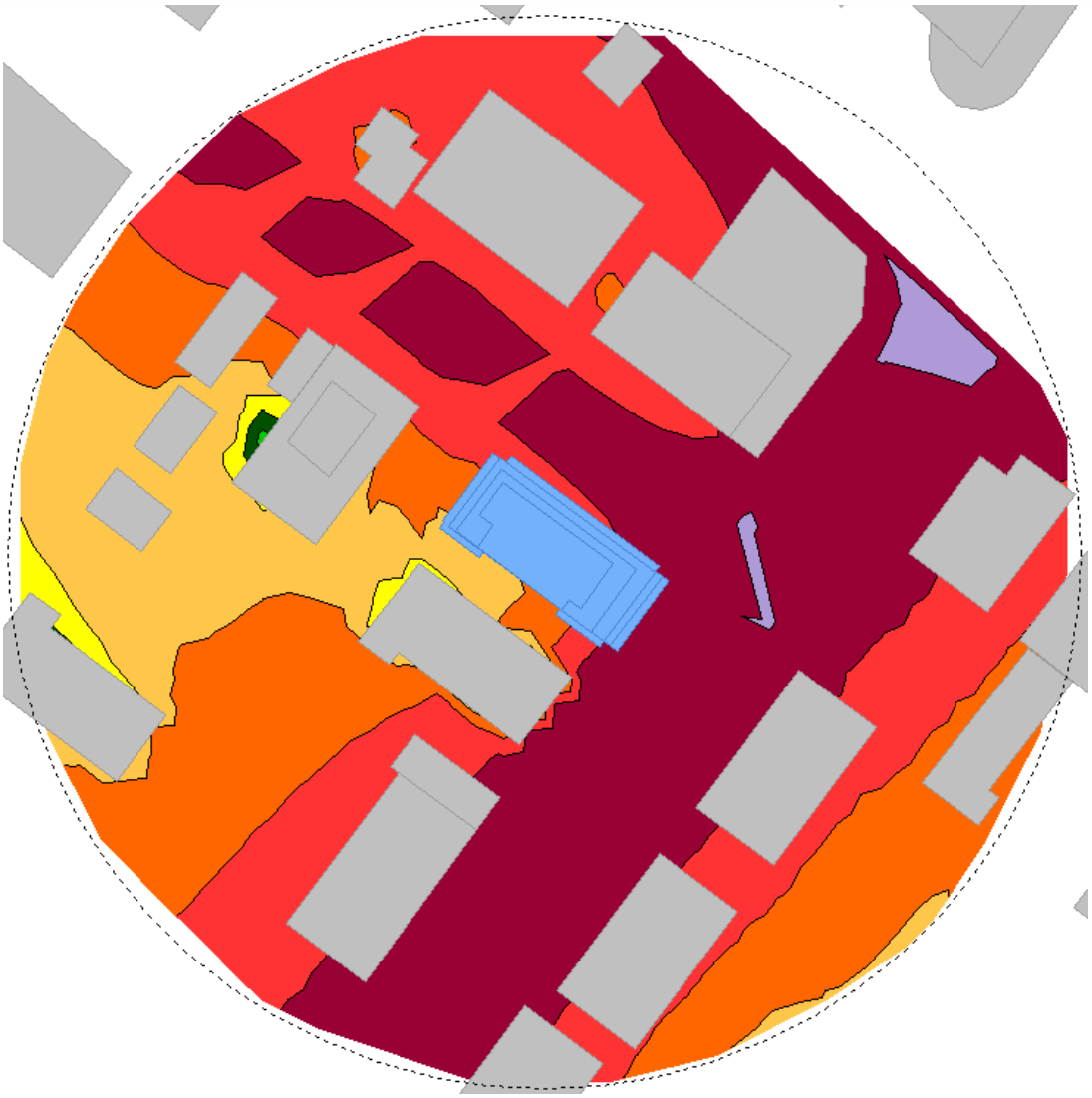

FIGURE 3: DAYTIME TRAFFIC NOISE CONTOURS (15 M ABOVE GRADE)

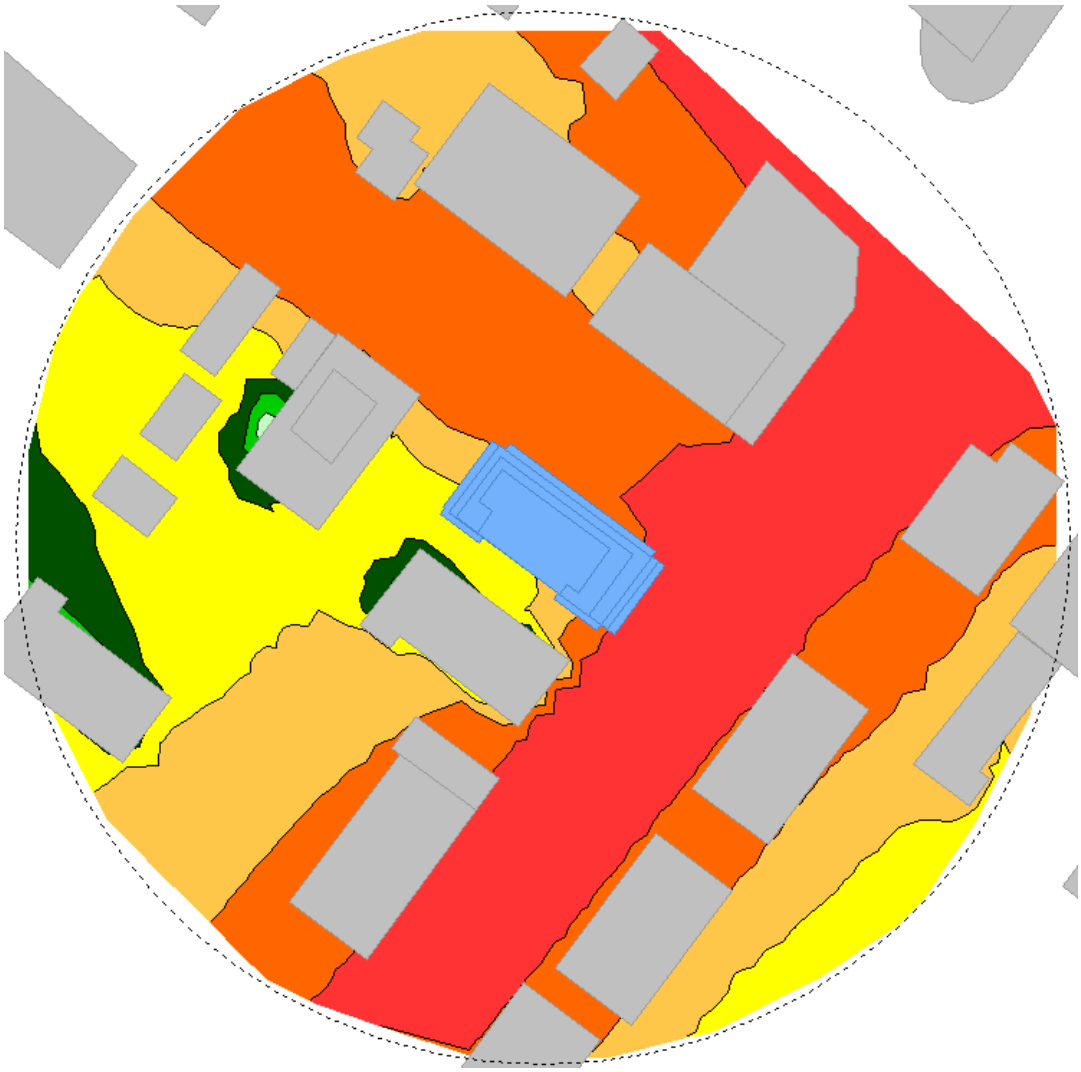

FIGURE 4: NIGHTTIME TRAFFIC NOISE CONTOURS (15 M ABOVE GRADE)