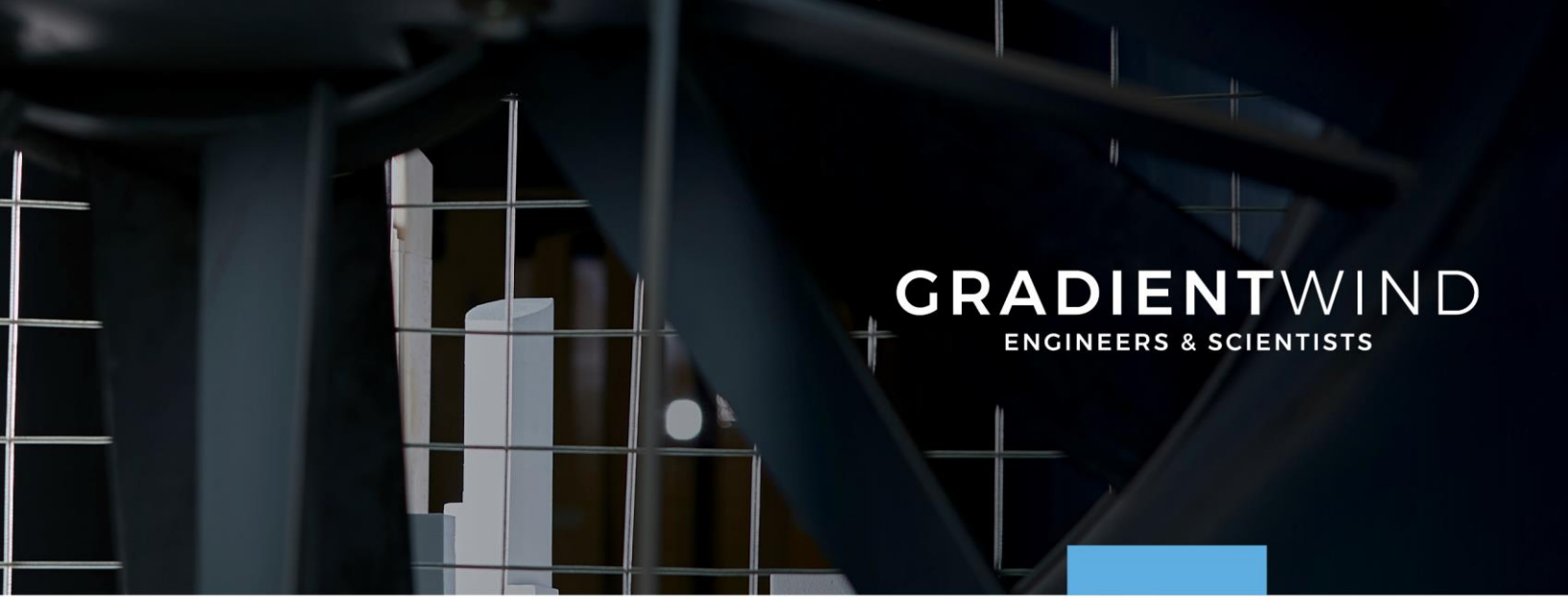

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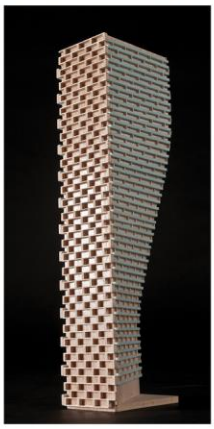
TRANSPORTATION NOISE FEASIBILITY ASSESSMENT

214 Somerset St E
Ottawa, Ontario

Report: 24-112-Transportation Noise Assessment



January 03, 2024

PREPARED FOR

CSV Architects
190 OConnor Street, Suite 100, Ottawa,
ON, K2P 2R3

PREPARED BY

Sergio Nunez Andres, B.A.Sc., Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a transportation noise assessment performed for a proposed redevelopment located at 214 Somerset St East in Ottawa, Ontario (hereinafter referred to as the "subject site", "study site", or "proposed development"). The main transportation noise sources impacting the site are King Edward and Somerset.

The proposed redevelopment comprises a four-storey rectangular building on a sloped parcel of land. At grade the building comprises amenities, multi-purpose spaces, offices, and suites. Levels two to four comprise additional suites. This proposal is based on architectural drawings prepared by CSV Architects, dated 2023-02-03.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300, and City of Ottawa Environmental Noise Control Guidelines (ENCG) guidelines; (ii) future vehicular traffic volumes corresponding to roadway classification obtained from the City of Ottawa and architectural drawings prepared by CSV Architects, dated February 3, 2023.

The results of the current analysis indicate that noise levels will range between 30 and 64 dBA during the daytime period (07:00-23:00) and between 23 and 56 dBA during the nighttime period (23:00-07:00) at POW receptors. The highest noise level (64 dBA) occurs at the north façade of the study building which is nearest and most exposed to the Somerset St East Road.

A Type D warning clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Due to the size of the development the mechanical equipment for the building is expected to consist of small rooftop air handling units and small condensers. Stationary noise impacts from the development are therefore expected to be minimal. and can be controlled to the surroundings by judicious placement of mechanical equipment The building will be designed to comply with the stationary sound level limits outlined in the ENCG. A review of the equipment and their location sis recommended by a qualified acoustic consultant during the design review phases.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by CSV Architects to undertake a transportation noise assessment for the proposed redevelopment located at 214 Somerset St East in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local transportation.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300, Ministry of Transportation Ontario (MTO), and City of Ottawa Environmental Noise Control Guidelines (ENCG) guidelines. Noise calculations were based on architectural drawings prepared by CSV Architects, dated February 3, 2023.

2. TERMS OF REFERENCE

The focus of this transportation noise assessment is a proposed redevelopment located at 214 Somerset Street East in Ottawa, Ontario. The study site is bordered by Somerset St East to the North and Nelson St to the East.

The proposed redevelopment comprises a four-storey rectangular building on a sloped parcel of land. At grade the building comprises amenities, multi-purpose spaces, offices, and suites. Levels two to four comprise additional suites.

Level 0 is containing a garbage room, recycling room, a mechanic room and an electric room, Level 1 compromise a multi-Purpose Room, a laundry room, an Office, a Quiet Room and two suites. The typical tower floorplate rises uniformly through its full height, upon which a mechanical penthouse completes the development.

NPC-300 considers balconies and elevated terraces (e.g., rooftops), with a minimum depth of 4 metres, as outdoor living areas (OLA). Therefore, terraces only with a depth greater than 4 metres are included as OLAs in this study.

The roadway noise sources impacting the site are King Edward and Somerset St E.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.1 of this report.

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 Transportation Noise

4.2.1 Criteria for Transportation Traffic Noise

For vehicular traffic, 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. The NPC-300 guidelines specify the recommended indoor noise limits, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA

Type of Space	Time Period	Road	Rail
		L_{eq} (dBA)	L_{eq} (dBA)
General offices, reception areas, **retail** stores, etc.	07:00 – 23:00	50	45
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	40
Sleeping quarters of hotels/motels	23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40	35

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[1]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[2]. 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 normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation[3].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA but are less than 60 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Where noise levels exceed 60 dBA noise mitigation is required. If these measures are not

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

provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

4.2.2 Theoretical Transportation 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. The TNM model is also being accepted in the updated Environmental Guide for Noise of Ontario, 2022 by the Ministry of Transportation (MTO)4. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing.

The *Predictor-Lima* computer program can represent three-dimensional surfaces and the first reflection of sound waves over a suitable spectrum for human hearing. Calculations were performed for receptors around the study site to determine the noise impact from roadway sources.

Traffic noise calculations were performed by treating roadway as a line source of noise, and by using existing 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 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- Noise receptors were strategically placed at 5 locations (4 POW and 1 OLA) around the study area (see Figure 2).
- The ground surface was modelled as reflective due to the presence of pavement and concrete in the proximity of the study site.
- The day/night split was taken to be 92% / 8% respectively for all roadways.

4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[5] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes

are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway/Transit Class	Speed Limit (km/h)	Traffic Volume
King Edward	Arterial	50	15,000
Somerset St E	Urban Collector	40	12,000

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

As per Section 4.2, when daytime noise levels from road sources at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

Based on published research, exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels + safety factor).

5. TRANSPORTATION NOISE RESULTS

5.1 Transportation Noise Levels

The results of the transportation noise calculations are summarized in Table 4.

TABLE 4: EXTERIOR NOISE LEVELS DUE TO TRANSPORTATION SOURCES

Receptor Number / Type	Receptor Location	Receptor Height Above Grade (m)	Roadway Noise Levels (dBA)	
			Day	Night
R01 / POW	East Facade	4	58	50
		10	58	50
R02 / POW	North Facade	4	64	57
		10	64	56
R03 / POW	West Facade	4	55	47
		10	55	48
R04 / POW	South Facade	4	30	23
		10	32	25
R05 / OLA	Patio South	4	30	N/A

* OLA noise levels during the nighttime are not considered, as per NPC-300.

The results of the current analysis indicate that noise levels will range between 30 and 64 dBA during the daytime period (07:00-23:00) and between 23 and 56 dBA during the nighttime period (23:00-07:00) at POW receptors. The highest noise level (64 dBA) occurs at the north façade of the study building which is nearest and most exposed to the Somerset St East Road.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 30 and 64 dBA during the daytime period (07:00-23:00) and between 23 and 56 dBA during the nighttime period (23:00-07:00) at POW receptors. The highest noise level (64 dBA) occurs at the north façade of the study building which is nearest and most exposed to the Somerset St East Road.

The noise level at the Level 1 terrace does not exceeds the NPC-300 criterion. A noise barrier study will not be necessary. A Type D warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized below:

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."

Stationary noise impacts from the development are therefore expected to be minimal. and can be controlled to the surroundings.

This concludes our roadway noise 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.

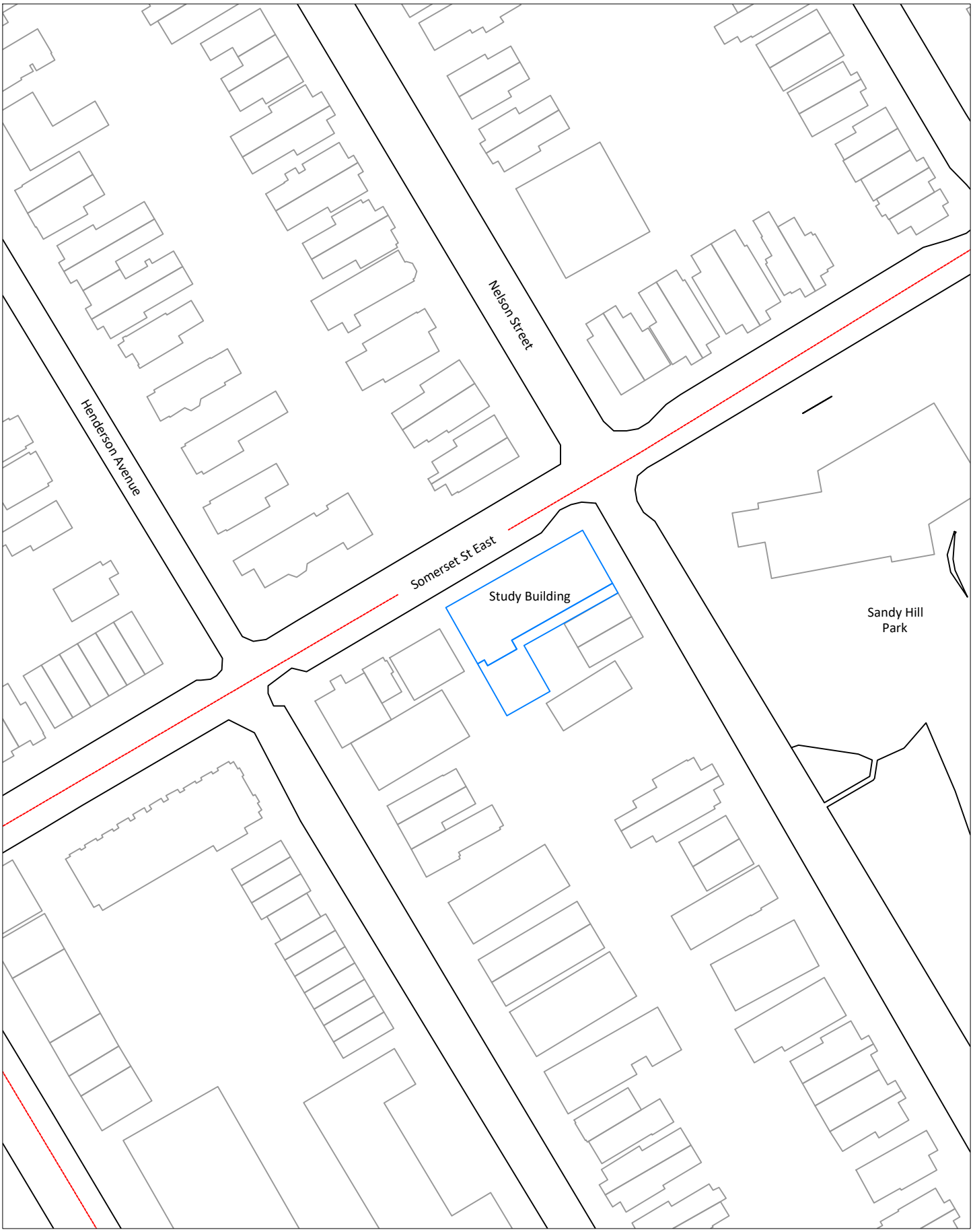
Sincerely,

Gradient Wind Engineering Inc.

Sergio Nunez Andres, B.A.Sc
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 24-112-Transportation Noise



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PROJECT	214 SOMERSET ST EAST, OTTAWA, ONTARIO ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW24-112 - 1
DATE	OCTOBER 22, 2024	DRAWN BY	S.N

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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PROJECT	214 SOMERSET STREET EAST, OTTAWA , ONTARIO ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	2:1000 (APPROX.)	DRAWING NO.	GW24-112 - 2
DATE	OCTOBER 22, 2024	DRAWN BY	S.N.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

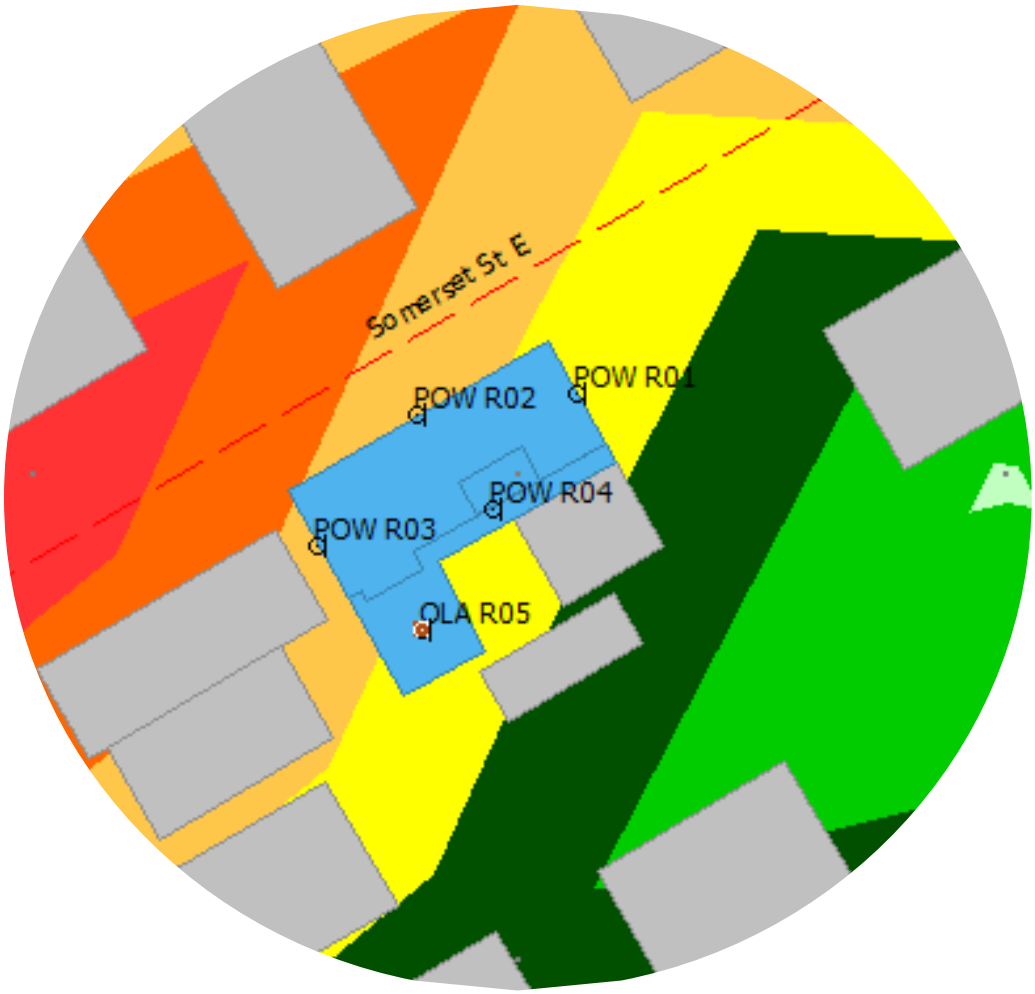

FIGURE 3: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)

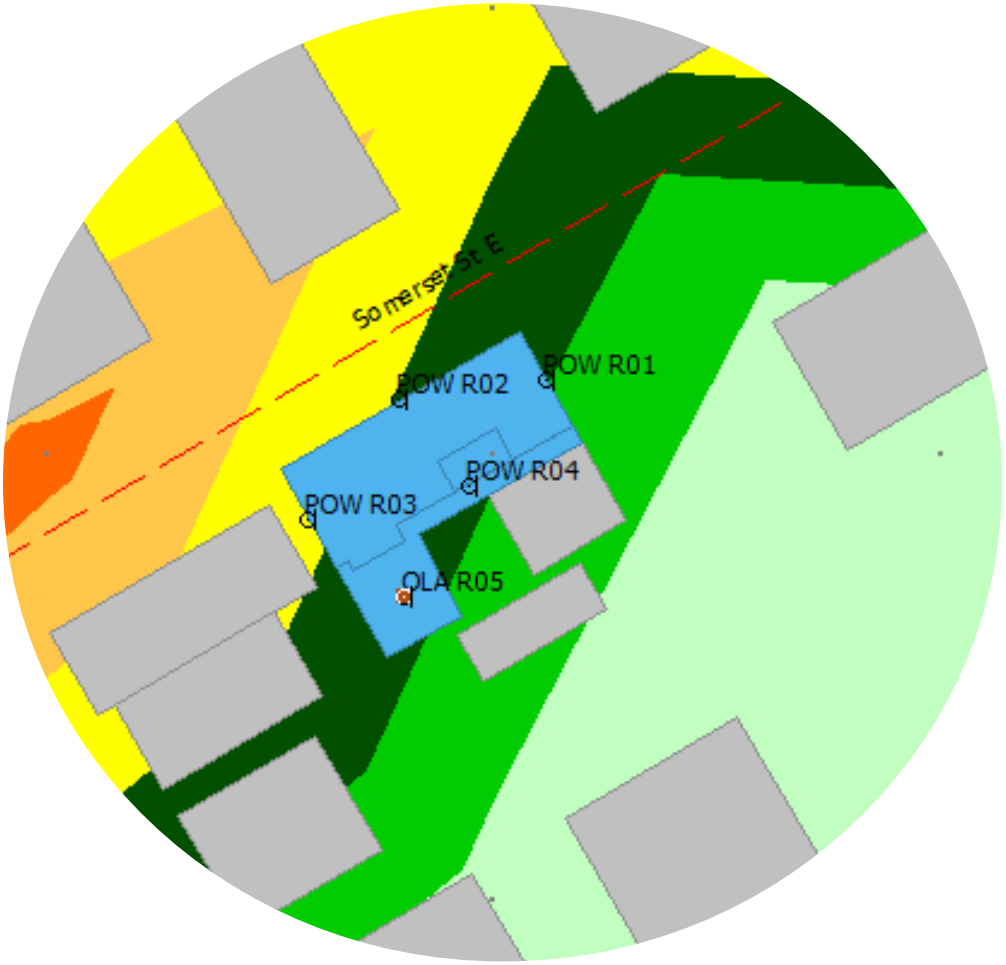

FIGURE 4: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)