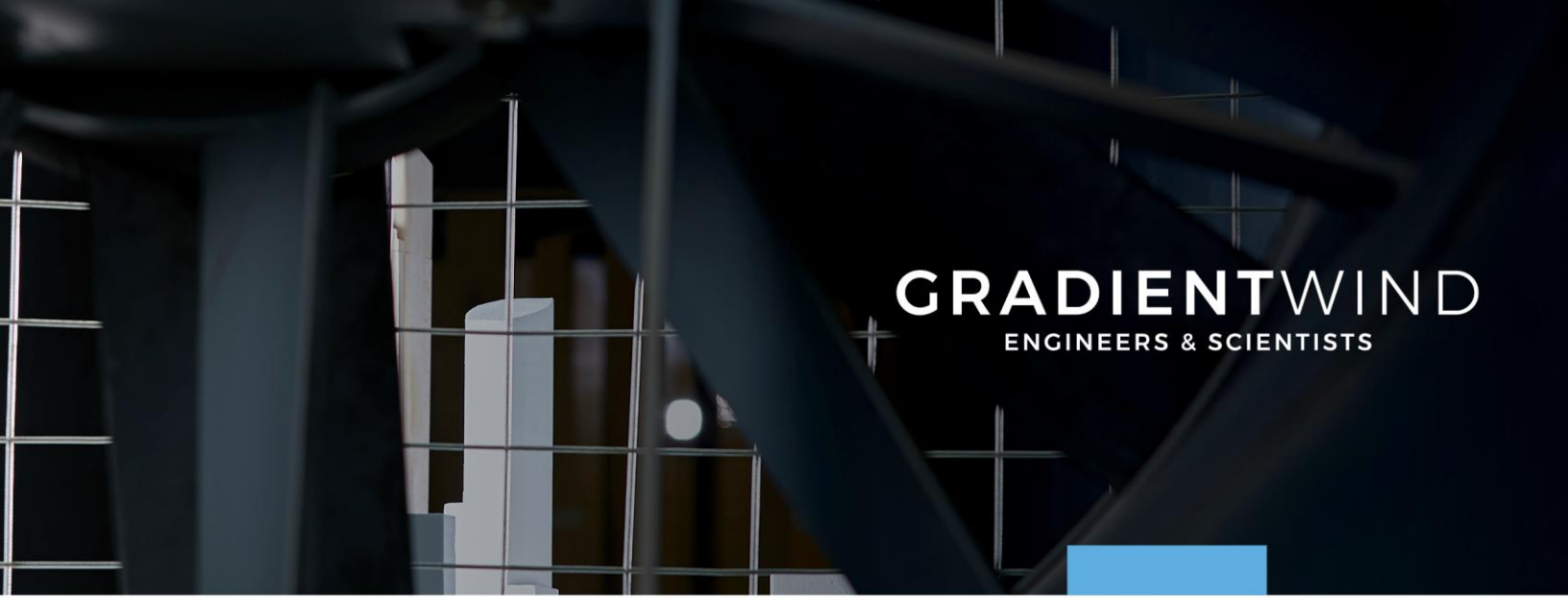

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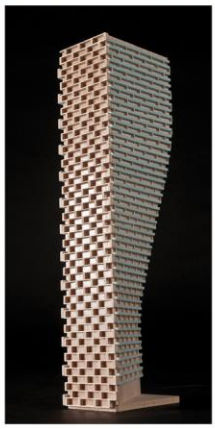
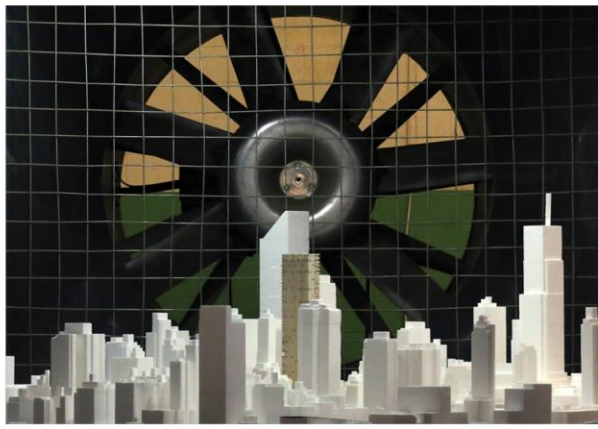
STATIONARY NOISE FEASIBILITY ASSESSMENT

3493, 3497 & 3499 Innes Road
Ottawa, Ontario

REPORT: GW21-171-Stationary Noise





November 29, 2022

PREPARED FOR

Lapensée Mattresses
c/o Novatech Engineers,
Planners & Landscape Architects
1085 boul. de la Carrière
Gatineau, QC J8Y 6V4

PREPARED BY

Essraa Alqassan, BASc., Jr. Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a stationary noise feasibility assessment performed for a proposed commercial development at 3493, 3497, and 3499 Innes Road in Ottawa, Ontario. The proposed development comprises two single-storey retail buildings, one containing a showroom and retail store to the west (821 m^2), and the other to be leased as retail space for another user to the east (810 m^2), both overlooking Innes Road to the south. The site is surrounded by 2-storey noise-sensitive residential dwellings to the north on Thornecrest Street, a retirement residence at 2305 Pagé Road, and commercial buildings on Innes Road. Sources of stationary noise include rooftop air handling equipment, and delivery truck movements to the loading areas on the north side of each building. Figure 1 illustrates a site plan with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG), and; (iii) concept plan drawings and additional information provided by Novatech Engineers, Planners & Landscape Architects dated May 2022.

The results of the current assessment indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are adhered to during the detailed design process. As such, the proposed development is expected to be compatible with the existing noise-sensitive land uses. As a general recommendation, the rooftop air handling equipment should be located towards the center of the roof, or toward the south away from the noise-sensitive residential dwellings on Thornecrest Street. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Novatech Engineers, Planners & Landscape Architects, on behalf of Lapensée Mattresses to undertake a stationary noise feasibility assessment in support of Zoning By-law Amendment (ZBA) and Site Plan Control (SPC) applications for the proposed development at 3493, 3497, and 3499 Innes Road in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a stationary noise feasibility assessment.

The present scope of work involves assessing the impact of stationary noise sources associated with the development on the adjacent residential neighbourhood. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP) NPC-300[2] guidelines, concept plan drawings and additional information provided by Novatech Engineers, Planners & Landscape Architects, dated May 2022, mechanical information assumed by Gradient Wind based on experience with similar projects, surrounding street layouts obtained from the City of Ottawa, and recent site imagery.

2. TERMS OF REFERENCE

The focus of this stationary noise feasibility assessment is the proposed commercial development located at 3493, 3497, and 3499 Innes Road in Ottawa, Ontario. The proposed development comprises two single-storey retail buildings, one containing a showroom and retail store on the west, and the other to be leased as retail space for another user on the east, both overlooking Innes Road on the south. Both buildings are of nearly rectangular planform with an inset on the northwest corner (west building) and northeast corner (east building) to provide space for the garbage storage and loading areas. The development includes surface parking spaces adjacent to and between buildings, as well as a planned road widening.

The site is surrounded by 2-storey noise-sensitive residential dwellings to the north on Thornecrest Street, a retirement residence at 2305 Pagé Road, and commercial buildings on Innes Road. Figure 1 illustrates the site plan and surrounding context.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline – Publication NPC-300, August 2013

The air handling equipment is expected to operate 24 hours a day with reduced operation during the nighttime period between 23:00 and 07:00. Sources of stationary noise include rooftop air handling equipment, and delivery truck movement to the loading areas on the north side of each building. Figure 2 illustrates the location of all noise sources included in this study.

2.1 Assumptions

Gradient Wind has assumed the preliminary mechanical information of the development based on experience with similar developments. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to the installation of the equipment. The following assumptions have been made in the analysis:

(i) Delivery trucks arrive/depart from each respective loading dock once during the daytime period (07:00 – 23:00). No deliveries occur during the nighttime period (23:00 – 07:00). The City of Ottawa Noise By-law No.2017-255 prohibits deliveries during the nighttime period.

(ii) The locations, quantity and tonnage of rooftop units have been assumed based on Gradient Wind's experience with similar developments.

(iii) Sound data for rooftop mechanical units and delivery truck movements are based on Gradient Wind's experience with similar developments.

(iv) The rooftop mechanical units are assumed to operate continuously at 100% over a 1-hour period during the daytime and at 50% operation during the nighttime period.

(v) Screening effects of 50cm parapets surrounding each proposed buildings' rooftops have been included in the modelling.

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the surrounding dwellings produced by stationary sources and (ii) ensure that exterior noise levels do not exceed the allowable limits specified by the ENCG, as outlined in Section 4 of this report.

4. METHODOLOGY

The impact of the external stationary noise sources on the nearby residential areas was determined by computer modelling. Stationary noise source modelling is based on the software program *Predictor-Lima* developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program simulates three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. This methodology has been used on numerous assignments and has been accepted by the MECP as part of Environmental Compliance Approvals applications. Fifteen receptor locations were selected for the study site, as illustrated in Figure 2.

4.1 Perception of Noise

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 source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Its measurement 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 represents the noise perceived by the human ear. With this scale, a doubling of sound power at the source results in a 3 dBA increase in measured noise levels at the receiver and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

Stationary sources are defined in the ENCG as "all sources of sound and vibration, whether fixed or mobile, that exist or operate on a premises, property or facility, the combined sound and vibration levels of which are emitted beyond the property boundary of the premises, property or facility, unless the source(s) is (are) due to construction" [3].

[3] City of Ottawa Environmental Noise Control Guidelines, page 10

4.2 Stationary Noise Criteria

The equivalent sound energy level, L_{eq}, provides a weighted 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 selected period of time. For stationary sources, the L_{eq} is commonly calculated on an hourly interval, while for roadways, the L_{eq} is calculated on the basis of a 16-hour daytime/8-hour nighttime split.

Noise criteria taken from the ENCG and NPC-300 apply to points of reception (POR). A POR is defined under the ENCG as "any location on a noise-sensitive land use where noise from a stationary source is received"[4]. A POR can be located on an existing or zoned for future use premises of permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise-sensitive buildings such as schools and places of worship. The recommended maximum noise levels for a Class 1 area in a suburban environment adjacent to arterial roadways at a POR are outlined in Table 1 below. The study site is considered to be in a Class 1 area because it is located next to an arterial roadway in a commercially developed area, indicating that the sound field is dominated by manmade sources.

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

Time of Day	Outdoor Points of Reception	Plane of Window
07:00 – 19:00	50	50
19:00 – 23:00	50	50
23:00 – 07:00	N/A	45

[4] City of Ottawa Environmental Noise Guidelines, page 9

4.3 Determination of Noise Source Power Levels

Preliminary mechanical information for the development has been based on Gradient Wind's experience with similar developments. Table 2 summarizes the sound power of each source used in the analysis.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Height Above Grade (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1 - S8	RTU	6.5	47	57	72	83	84	79	74	66	88
S9, S10	Truck Movement	1.5	39	56	67	82	90	90	84	73	94

4.4 Stationary Source Noise Predictions

The impact of stationary noise sources on nearby residential areas was determined by computer modelling using the software program Predictor-Lima. This program was developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2 and is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments and has been accepted by the Ministry of the Environment, Conservation and Parks (MECP) as part of Environmental Compliance Approval applications.

A total of fifteen (15) receptor locations were chosen around the site to measure the noise impact at points of reception (POR) during the daytime/evening period (07:00 – 23:00), as well as during the nighttime period (23:00 – 07:00). POR locations include outdoor points of reception (OPOR) and the plane of windows (POW) of the adjacent residential properties. Sensor locations are described in Table 3 and illustrated in Figure 2. All units were represented as point sources in the Predictor model. Table 4 below contains Predictor-Lima calculation settings. These are typical settings that have been based on ISO 9613 standards and guidance from the MECP.

Ground absorption over the study area was determined based on topographical features (such as water, concrete, grassland, etc.). An absorption value of 0 is representative of hard ground, while a value of 1 represents grass and similar soft surface conditions. Existing and proposed buildings were added to the

model to account for screening and reflection effects from building façades. A Predictor-Lima sample output and further modelling data is available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	POW – 1822 Thornecrest Street	4.5
R2	POW – 1824 Thornecrest Street	4.5
R3	POW – 1826 Thornecrest Street	4.5
R4	POW – 1828 Thornecrest Street	4.5
R5	POW – 1830 Thornecrest Street	4.5
R6	POW – 1832 Thornecrest Street	4.5
R7	POW – 1834 Thornecrest Street	4.5
R8	OPOR – 1822 Thornecrest Street	1.5
R9	OPOR – 1824 Thornecrest Street	1.5
R10	OPOR – 1826 Thornecrest Street	1.5
R11	OPOR – 1828 Thornecrest Street	1.5
R12	OPOR – 1830 Thornecrest Street	1.5
R13	OPOR – 1832 Thornecrest Street	1.5
R14	OPOR – 1834 Thornecrest Street	1.5
R15	POW - 2305 Pagé Road	10.5

TABLE 4: CALCULATION SETTINGS

Parameter	Setting
Meteorological correction method	Single value for C0
Value C0	2.0
Default ground attenuation factor	0
Ground attenuation factor for lawns	1
Temperature (K)	283.15
Pressure (kPa)	101.33
Air humidity (%)	70

5. RESULTS AND DISCUSSION

5.1 Stationary Noise Levels

Noise levels at nearby points of reception fall below the ENCG criteria for a class 1 area, as summarized in Table 5 below. The noise levels listed in Table 5 are based on the assumptions outlined in Section 2.1.

TABLE 5: NOISE LEVELS FROM STATIONARY SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
		Day	Night	Day	Night	Day	Night
R1	POW – 1822 Thornecrest Street	49	45	50	45	YES	YES
R2	POW – 1824 Thornecrest Street	48	45	50	45	YES	YES
R3	POW – 1826 Thornecrest Street	48	45	50	45	YES	YES
R4	POW – 1828 Thornecrest Street	48	44	50	45	YES	YES
R5	POW – 1830 Thornecrest Street	48	45	50	45	YES	YES
R6	POW – 1832 Thornecrest Street	47	44	50	45	YES	YES
R7	POW – 1834 Thornecrest Street	47	44	50	45	YES	YES
R8	OPOR – 1822 Thornecrest Street	47	N/A*	50	N/A*	YES	N/A*
R9	OPOR – 1824 Thornecrest Street	46	N/A*	50	N/A*	YES	N/A*
R10	OPOR – 1826 Thornecrest Street	47	N/A*	50	N/A*	YES	N/A*
R11	OPOR – 1828 Thornecrest Street	46	N/A*	50	N/A*	YES	N/A*
R12	OPOR – 1830 Thornecrest Street	47	N/A*	50	N/A*	YES	N/A*
R13	OPOR – 1832 Thornecrest Street	46	N/A*	50	N/A*	YES	N/A*
R14	OPOR – 1834 Thornecrest Street	45	N/A*	50	N/A*	YES	N/A*
R15	POW - 2305 Pagé Road	49	45	50	45	YES	YES

*Nighttime noise levels at OPOR receptors are not considered, as per ENCG

As Table 5 summarizes, noise levels are expected to fall below the ENCG criteria for all points of reception. Noise contours at 1.5 meters above grade can be seen in Figures 3 and 4 for daytime and nighttime conditions, respectively.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current assessment indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are adhered to during the detailed design process. As such, the proposed development is expected to be compatible with the existing noise sensitive land uses. As a general recommendation, the rooftop air handling equipment should be located towards the center of the roof, or toward the south away from the noise-sensitive residential dwellings on Thornecrest Street. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

This concludes our 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.

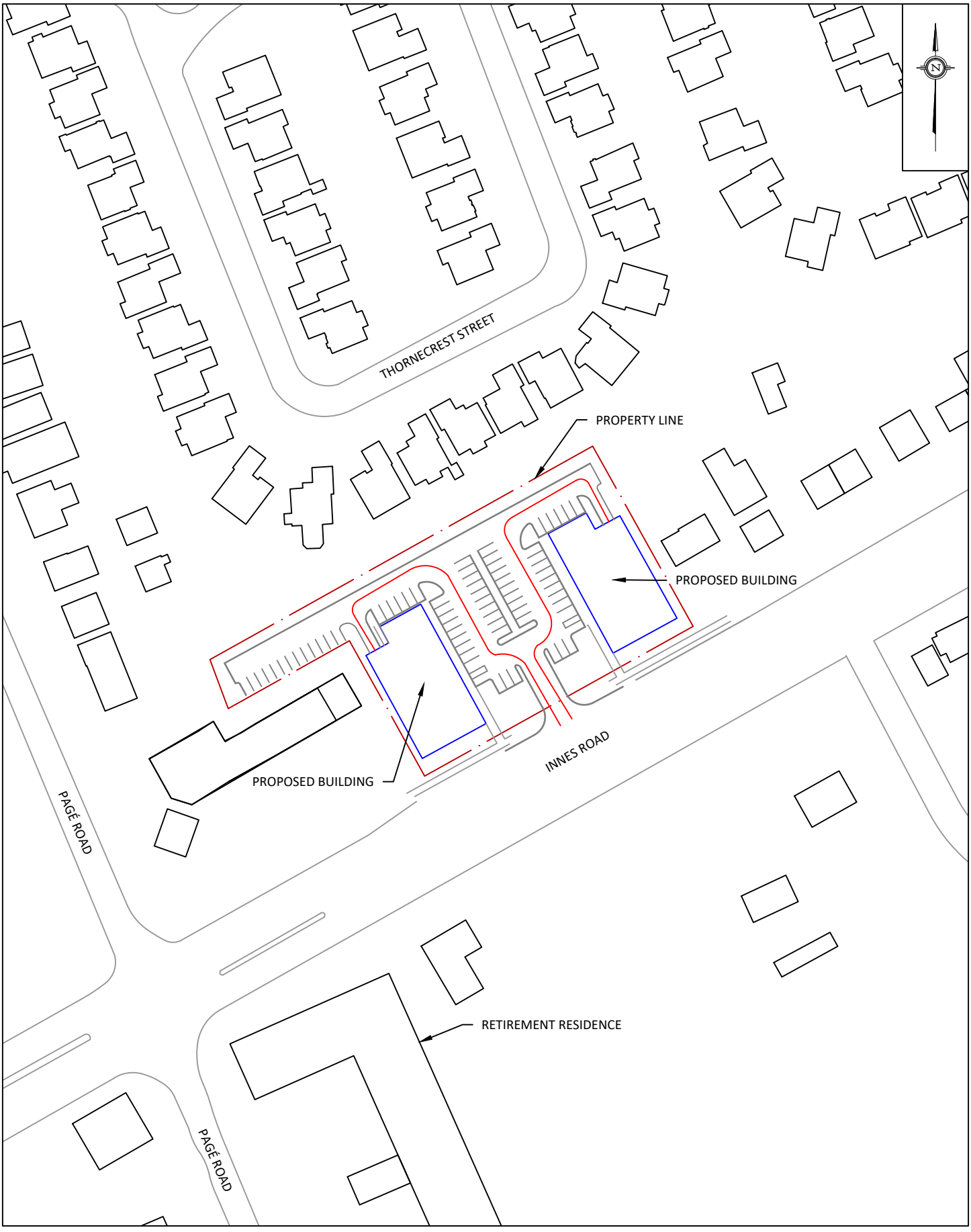
Sincerely,

Gradient Wind Engineering Inc.

Essraa Alqassab, BASc
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #21-171



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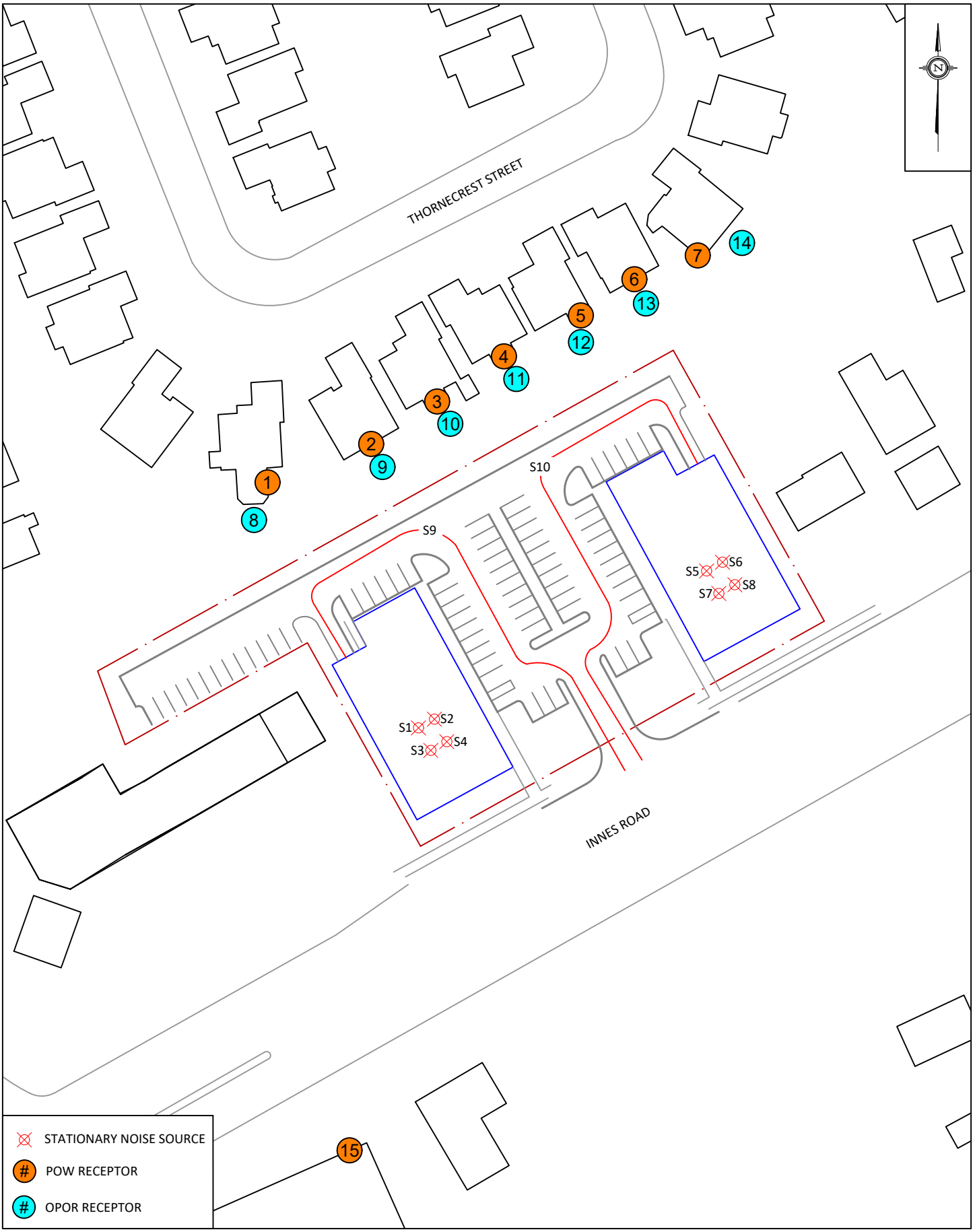
PROJECT	3493, 3497, & 3499 INNES ROAD, OTTAWA STATIONARY NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	21-171-1
DATE	NOVEMBER 28, 2022	DRAWN BY	E.A.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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PROJECT	3493, 3497, & 3499 INNES ROAD, OTTAWA STATIONARY NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. 21-171-2	FIGURE 2: STATIONARY NOISE SOURCE/RECEPTOR LOCATIONS
DATE	NOVEMBER 28, 2022	DRAWN BY E.A.	

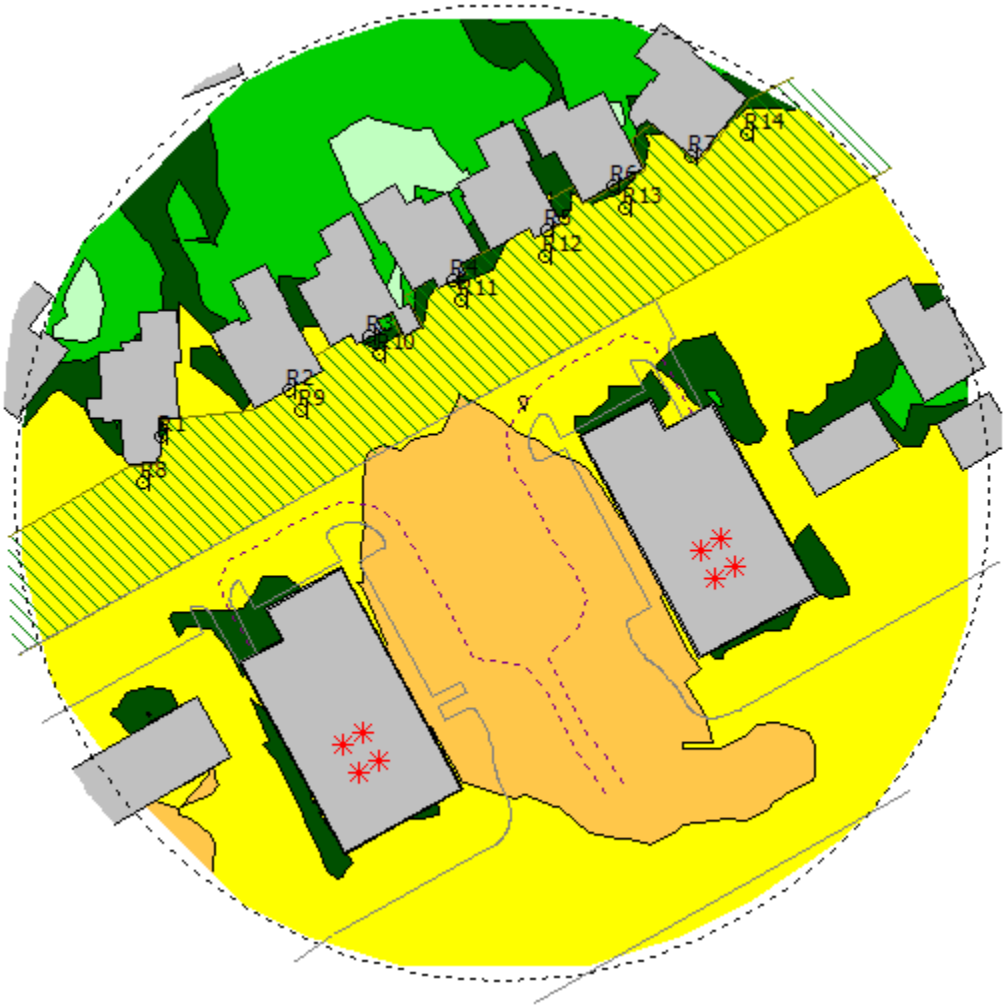

FIGURE 3: DAYTIME NOISE CONTOURS (1.5M ABOVE GRADE)

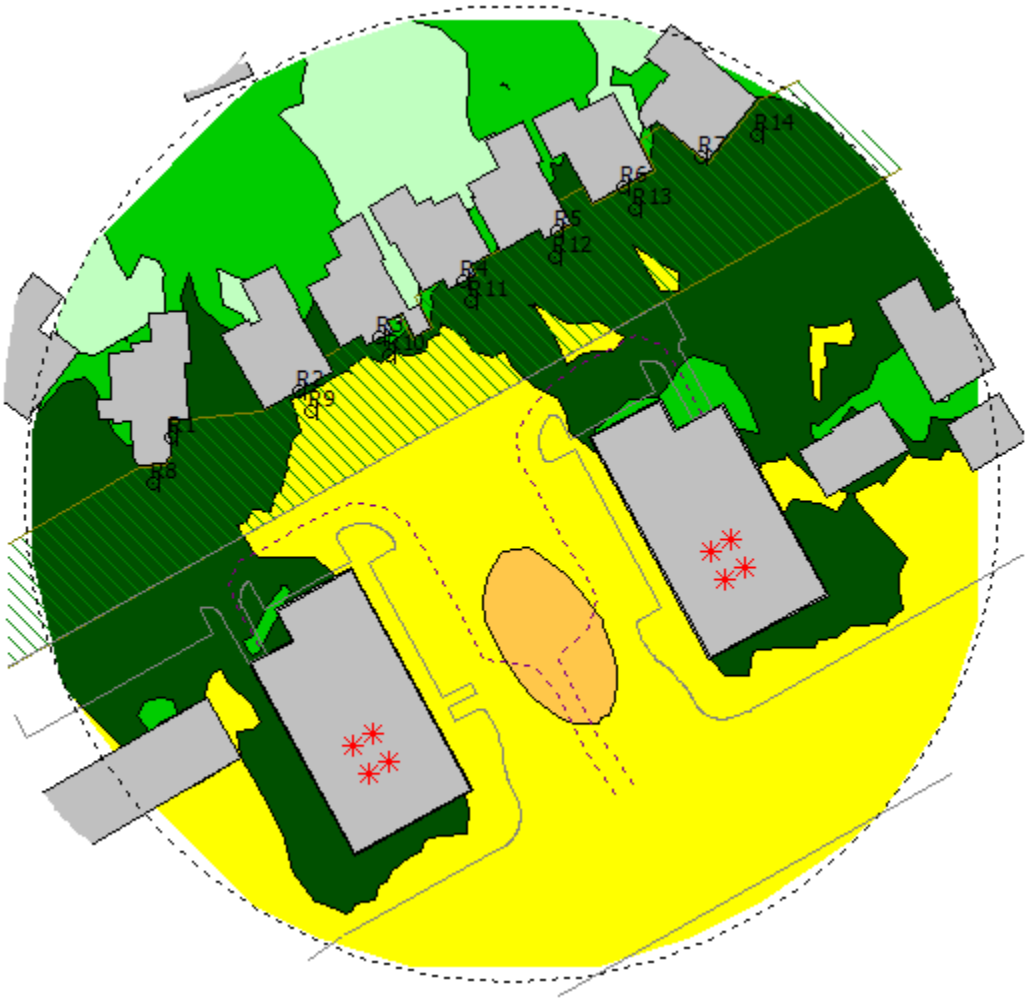

FIGURE 4: NIGHTTIME NOISE CONTOURS (1.5M ABOVE GRADE)