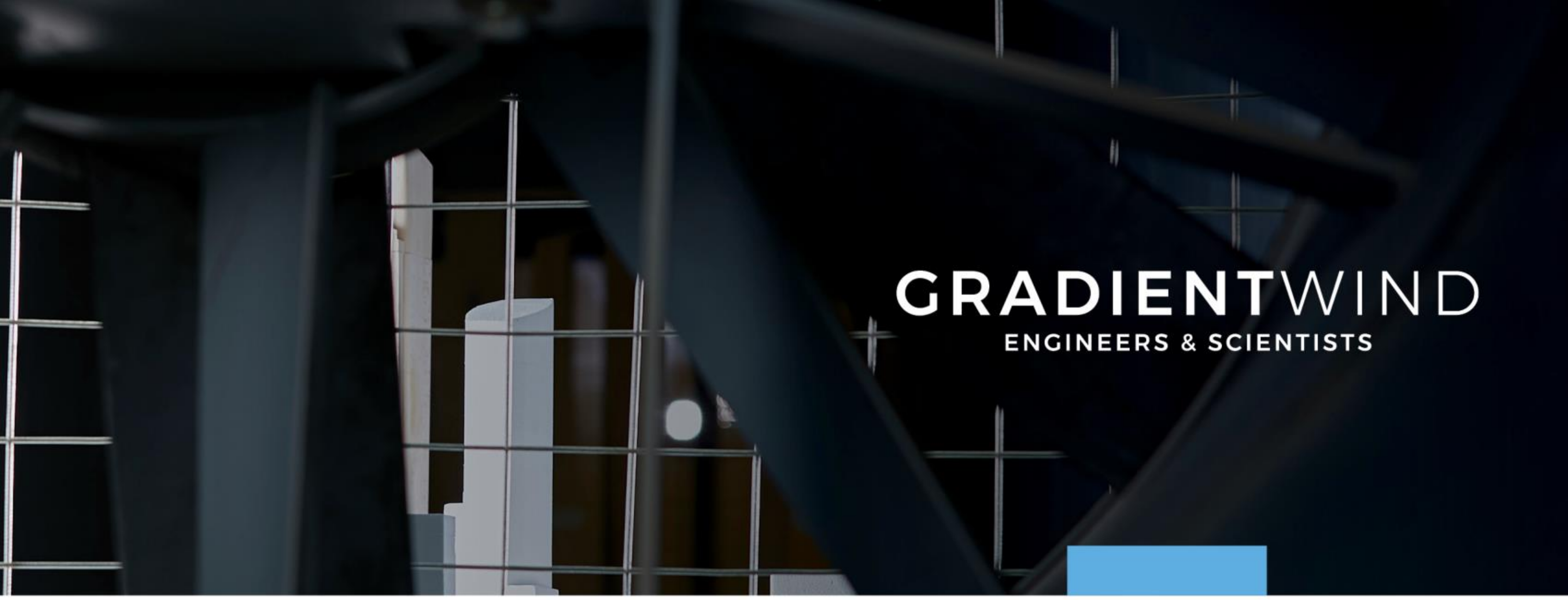
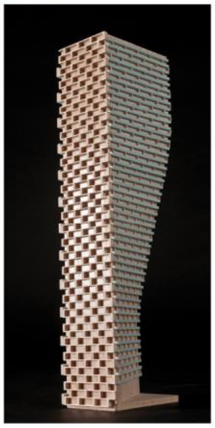
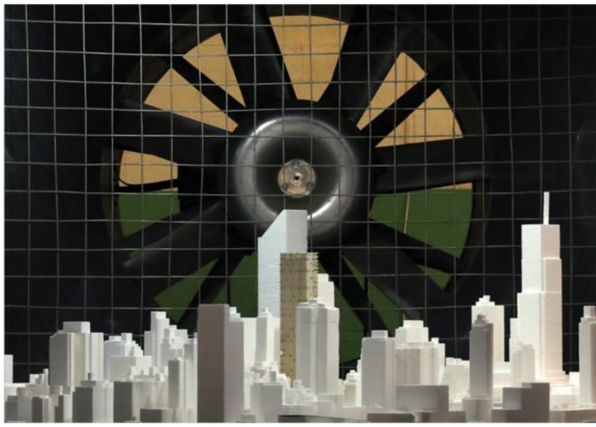


STATIONARY NOISE ASSESSMENT

200 Elgin Street
Ottawa, Ontario

REPORT: 24-098-Stationary Noise





May 29th, 2024

DRAFT

PREPARED FOR
JBPA Developments Inc.
107 Pretoria Avenue
Ottawa, ON K1S 1W8

PREPARED BY
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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for a proposed development located at 200 Elgin Street in Ottawa, Ontario. The development comprises an 11-storey residential building. Sources of stationary noise include make-up air units (MUAs) , energy-recovery ventillators (ERVs), a cooling tower, and a generator. 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 (iv) mechanical engineering drawings and data provided by Smith+Andersen in April and May 2024.

The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the NPC-300 and ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are followed and the suggested maximum permissible noise levels and noise screen are included during the detailed design process. As such, the proposed development is expected to be compatible with the existing and proposed noise-sensitive land uses and will satisfy all site plan conditions. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to the installation of the equipment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by JBPA Developments Inc. to undertake a stationary noise assessment for the proposed development located at 200 Elgin Street in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a stationary noise assessment.

The present scope of work involves assessing exterior noise levels generated by make-up air units, energy recover ventillators, a cooling tower, and an emergency generator. 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, mechanical engineering drawings and data provided by Smith+Andersen in , surrounding street layouts obtained from the City of Ottawa, and recent site imagery.

2. TERMS OF REFERENCE

The focus of this stationary noise assessment is the proposed residential development located at 200 Elgin Street in Ottawa, Ontario. The subject site is situated on an "L"-shaped parcel of land bounded by Beech Street to the east, Lisgar Street to the south, an office building to the north, Preston Street to the east, and connected to a mixed use / residential building to the west. The development aims to convert the existing 11-storey office building to a residential tower. Figure 1 illustrates the site plan and surroundings.

As a conservative approach, the building equipment is assumed to operate at all hours of the day, however, certain sources are likely to have reduced operation during the nighttime period between 23:00 and 07:00. Sources of stationary noise include make-up air units, energy recover ventillators, a cooling tower, and an emergency generator. Figure 2 illustrates the location of all noise sources included in this study.

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[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

2.1 Assumptions

The following assumptions have been made in the analysis:

(i) The locations of the mechanical equipment have been based on mechanical drawings provided. The generator location has been assumed as this information has not yet been finalized.

(ii) Sound data for all HVAC noise sources for the development have been based on information obtained from Smith+Andersen in May 2024. Sound data for the generator has been given as a maximum permissible value, as information has not yet been finalized.

(iii) Attenuation from ductwork has been considered for the ERV exhaust and MUA intake (indoor units).

(iv) All mechanical units, with the exclusion the emergency generator, were assumed to operate continuously over a 1-hour period during the daytime and at 50% operation during the nighttime period.

(v) The emergency generator was assumed to operate continuosusly over a 1-hour period in the daytime, for testing and maintenance purposes.

(vi) A 4.5 m high noise screen around the cooling tower is included in the model.

(vii) The ground region was conservatively modelled as reflective due to the presence of hard ground (pavement).

3. OBJECTIVES

The main goals of this work are to (i) calculate the future on-site and off-site noise levels 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. Twenty receptor locations were selected for the study site, as illustrated in Figure 3.

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 NPC-300 as "a source of sound or combination of sources of sound that are included and normally operated within the property lines of a facility and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction"[3].

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 outdoor points of reception (POR). A POR is defined under NPC-300 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,

[3] NPC – 300, page 16
[4] NPC – 300, page 14

campgrounds, and noise-sensitive buildings such as schools and places of worship. The recommended maximum noise levels for a Class 1 area in an urban environment adjacent to arterial roadways at a POR are outlined in Table 1 below. The study site is considered to be Class 1 as it is located within the "Urban Area" boundary as defined in Schedule A and B of the City of Ottawa Official Plan[5]. These conditions indicate that the sound field is dominated by manmade sources.

Additionally, when analysing standby power equipment such as emergency generators, NPC-300 specifies a noise level limit of 55 dBA for daytime testing. Generators are also investigated separately, without the combined effect of other equipment.

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

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

4.3 Determination of Noise Source Power Levels

Mechanical information for the development was provided by Smith+Andersen in May 2024. Table 2 summarizes the sound power of each source used in the analysis. The table summarizes the unmitigated noise levels based on the data provided, as well as the maximum permissible noise levels to ensure on-site and off-site noise levels do not exceed NPC-300 and ENCG criteria. The indoor ERV exhaust and MUA intake are ducted, therefore, attenuation from the ductwork has been considered in the model. Please also note that generator information has been assumed, as location has not been yet finalized. A maximum permissible sound power level is provided in Table 2, in order to meet NPC-300 / ENCG criteria at receptors.

[5] City of Ottawa Official Plan Vol 1: Section 6

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source	Description	Height Above Grade/Roof (m)	Correction Applied	Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	Total
S1	Indoor ERV Exhaust	34.5	Without attenuation from ductwork	51	54	70	71	76	73	67	61	**80**
			With attenuation from ductwork	44	44	57	62	68	65	59	53	**71**
S2	Indoor ERV Intake	34.5	None	50	57	70	72	77	75	69	63	**81**
S3	Indoor Make up air unit Intake	34.5	Without attenuation from ductwork	46	52	69	72	76	75	68	62	**80**
			With attenuation from ductwork	42	46	63	64	72	72	65	59	**76**
S4, S5	Indoor Make-up air Unit Radiated Sound	34.5	None	39	47	59	58	57	62	34	26	**66**
S6	ERV Outdoor Unit	2.5	None	-	-	-	-	69	-	-	-	**69**
S7	MUA Outdoor Unit	2.5	None	-	-	-	-	73	-	-	-	**73**
S8	Cooling Tower	4.1	Unmitigated	73	84	89	92	91	90	87	75	**97**
			Maximum Permissible	66	77	82	85	84	83	80	68	**90**
GEN	Generator	2.5	Maximum Permissible	-	-	-	-	92	-	-	-	**92**

4.4 Stationary Source Noise Predictions

The impact of stationary noise sources on nearby noise-sensitive 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 thirteen 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 4 and illustrated in Figure 3. The units were represented as point sources and emitting facade objects in the Predictor model. Table 3 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. Predictor-Lima modelling data is available upon request.

TABLE 3: CALCULATION SETTINGS

Parameter	Setting
Meteorological correction method	Single value for C0
Value C0	2.0
Ground attenuation factor for lawn areas	1
Ground attenuation factor for roadways and paved areas	0
Temperature (K)	283.15
Pressure (kPa)	101.33
Air humidity (%)	70

TABLE 4: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade/Roof (m)
R1	200 Elgin Street – East Façade	31.5
R2	18 Nepean Street – East Façade	37.5
R3	18 Nepean Street – South Façade	37.5
R4	180 Lisgar Road – North Façade	7.5
R5	231 Cooper Street – North Façade	10.5
R6	40 Nepean Street – East Façade	83.5
		50
R7	26 Nepean Street – South Façade	29.5
R8	40 Nepean Street – South Façade	83.5
		50
R9	140 Laurier Avenue West – South Façade	83.5
		50
R10	184 Lisgar Street – North Façade	7.5
R11	210 Copper Street – North Façade	10.5
R12	205-215 Somerset Street West – North Façade	13.5
R13	120 Lisgar Street – North Façade	4.5
R14	120 Lisgar Street – West Façade	4.5
R15	108 Lisgar Street – West Façade	69.5
		50
R16	225 Lisgar Street – East Façade	35.5
R17	200 Elgin Street – South Façade	31.5
R18	200 Elgin Street – West Façade	31.5
R19	200 Elgin Street (Study Site) – South Façade	31.5
R20	200 Elgin Street (Study Site) – East Façade	31.5
R21	200 Elgin Street (Study Site) – Level 2 Outdoor Amenity Area	4.5

5. RESULTS AND DISCUSSION

Noise levels on the surroundings produced by the mechanical equipment and the emergency generator associated with the proposed development are presented in Tables 5 and 6, respectively. The sound levels are based on the assumptions outlined in Section 2.1 and adjusted / maximum permissible sound power levels listed in Table 2.

TABLE 5: NOISE LEVELS FROM HVAC STATIONARY SOURCES

Receptor Number	Receptor Location	Height Above Grade/Roof (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day	Night	Day	Night	Day	Night
R1	200 Elgin Street – East Façade	31.5	47	44	50	45	Yes	Yes
R2	18 Nepean Street – East Façade	37.5	49	45	50	45	Yes	Yes
R3	18 Nepean Street – South Façade	37.5	49	45	50	45	Yes	Yes
R4	180 Lisgar Road – North Façade	7.5	31	28	50	45	Yes	Yes
R5	231 Cooper Street – North Façade	10.5	35	32	50	45	Yes	Yes
R6	40 Nepean Street – East Façade	83.5	45	42	50	45	Yes	Yes
		50	48	45	50	45	Yes	Yes
R7	26 Nepean Street – South Façade	29.5	44	41	50	45	Yes	Yes
R8	40 Nepean Street – South Façade	83.5	45	42	50	45	Yes	Yes
		50	48	45	50	45	Yes	Yes
R9	140 Laurier Avenue West – South Façade	83.5	17	14	50	45	Yes	Yes
		50	15	12	50	45	Yes	Yes
R10	184 Lisgar Street – North Façade	7.5	30	27	50	45	Yes	Yes
R11	210 Copper Street – North Façade	10.5	35	32	50	45	Yes	Yes
R12	205-215 Somerset Street West – North Façade	13.5	34	31	50	45	Yes	Yes

R13	120 Lisgar Street – North Façade	4.5	35	32	50	45	Yes	Yes
R14	120 Lisgar Street – West Façade	4.5	35	32	50	45	Yes	Yes
R15	108 Lisgar Street – West Façade	69.5	39	36	50	45	Yes	Yes
		50	35	32	50	45	Yes	Yes
R16	225 Lisgar Street – East Façade	35.5	37	34	50	45	Yes	Yes
R17	200 Elgin Street – South Façade	31.5	38	35	50	45	Yes	Yes
R18	200 Elgin Street – West Façade	31.5	35	32	50	45	Yes	Yes
R19	200 Elgin Street (Study Site) – South Façade	31.5	41	38	50	45	Yes	Yes
R20	200 Elgin Street (Study Site) – East Façade	31.5	49	45	50	45	Yes	Yes
R21	200 Elgin Street (Study Site) – Level 2 Outdoor Amenity Area	4.5	34	N/a	50	N/a	Yes	N/a

TABLE 6: NOISE LEVELS FROM EMERGENCY STATIONARY SOURCES

Receptor Number	Receptor Location	Height Above Grade/Roof (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day	Night	Day	Night	Day	Night
R1	200 Elgin Street – East Façade	31.5	53	-	55	-	Yes	N/a
R2	18 Nepean Street – East Façade	37.5	55	-	55	-	Yes	N/a
R3	18 Nepean Street – South Façade	37.5	55	-	55	-	Yes	N/a
R4	180 Lisgar Road – North Façade	7.5	32	-	55	-	Yes	N/a
R5	231 Cooper Street – North Façade	10.5	36	-	55	-	Yes	N/a
R6	40 Nepean Street – East Façade	83.5	48	-	55	-	Yes	N/a
		50	50	-	55	-	Yes	N/a
R7	26 Nepean Street – South Façade	29.5	47	-	55	-	Yes	N/a
R8	40 Nepean Street – South Façade	83.5	47	-	55	-	Yes	N/a
		50	49	-	55	-	Yes	N/a
R9	140 Laurier Avenue West – South Façade	83.5	13	-	55	-	Yes	N/a
		50	14	-	55	-	Yes	N/a
R10	184 Lisgar Street – North Façade	7.5	33	-	55	-	Yes	N/a
R11	210 Copper Street – North Façade	10.5	37	-	55	-	Yes	N/a
R12	205-215 Somerset Street West – North Façade	13.5	40	-	55	-	Yes	N/a
R13	120 Lisgar Street – North Façade	4.5	24	-	55	-	Yes	N/a
R14	120 Lisgar Street – West Façade	4.5	27	-	55	-	Yes	N/a

R15	108 Lisgar Street – West Façade	69.5	34	-	55	-	Yes	N/a
		50	32	-	55	-	Yes	N/a
R16	225 Lisgar Street – East Façade	35.5	42	-	55	-	Yes	N/a
R17	200 Elgin Street – South Façade	31.5	44	-	55	-	Yes	N/a
R18	200 Elgin Street – West Façade	31.5	40	-	55	-	Yes	N/a
R19	200 Elgin Street (Study Site) – South Façade	31.5	39	-	55	-	Yes	N/a
R20	200 Elgin Street (Study Site) – East Façade	31.5	32	-	55	-	Yes	N/a
R21	200 Elgin Street (Study Site) – Level 2 Outdoor Amenity Area	4.5	40	-	55	-	Yes	N/a

As Tables 5 and 6 summarize, noise levels fall below ENCG criteria at all receptors. Noise contours 20 meters above grade for HVAC and emergency equipment sources can be seen in Figures 4-6 for daytime and nighttime conditions. It is recommended that the maximum permissible noise levels be used within the design, where noted, to ensure noise levels meet the criteria outlined in NPC-300 and ENCG. This can be achieved by incorporating quieter units and installing the noise barrier around the cooling tower.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the NPC-300 and ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are followed, and the suggested maximum permissible noise levels and noise barrier are included during the detailed design process.

As such, the proposed development is expected to be compatible with the existing and proposed noise-sensitive land uses and will satisfy all site plan conditions. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to the installation of the equipment.

This concludes our stationary 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.

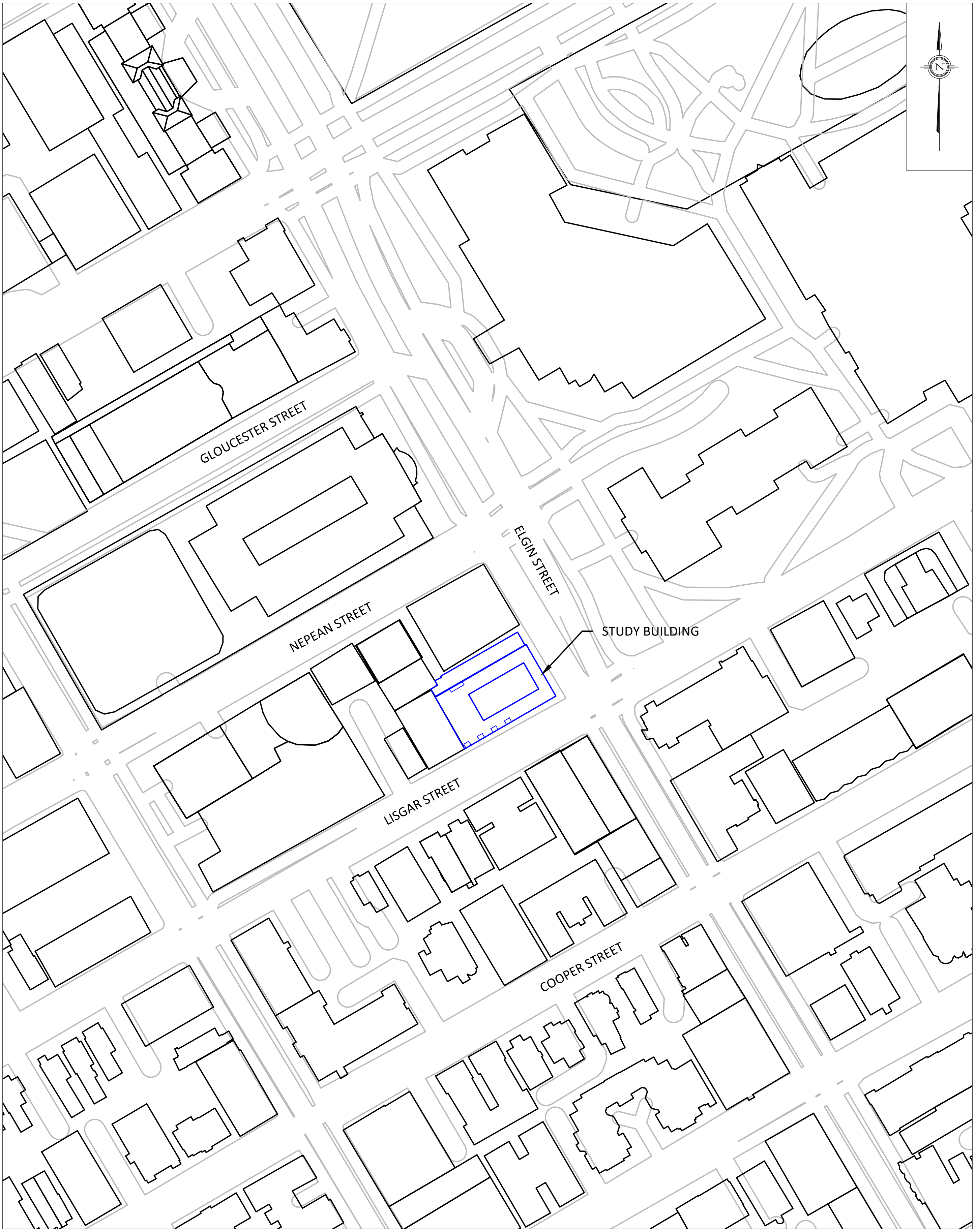
Sincerely,

Gradient Wind Engineering Inc.

Essraa Alqassab, BASc.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #24-098 – Stationary Noise



GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	200 ELGIN STREET STATIONARY NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW24-098-1
DATE	MAY 30, 2024	DRAWN BY	E.A.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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PROJECT		DESCRIPTION
200 ELGIN STREET STATIONARY NOISE ASSESSMENT		FIGURE 2: STATIONARY NOISE SOURCES
SCALE: 1:200 (APPROX.)	DRAWING NO.: GW24-098-2	
DATE: MAY 30, 2024	DRAWN BY: E.A.	

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PROJECT	200 ELGIN STREET STATIONARY NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW24-098-3
DATE	MAY 30, 2024
DRAWN BY	E.A.
DESCRIPTION	FIGURE 3: RECEPTOR LOCATIONS

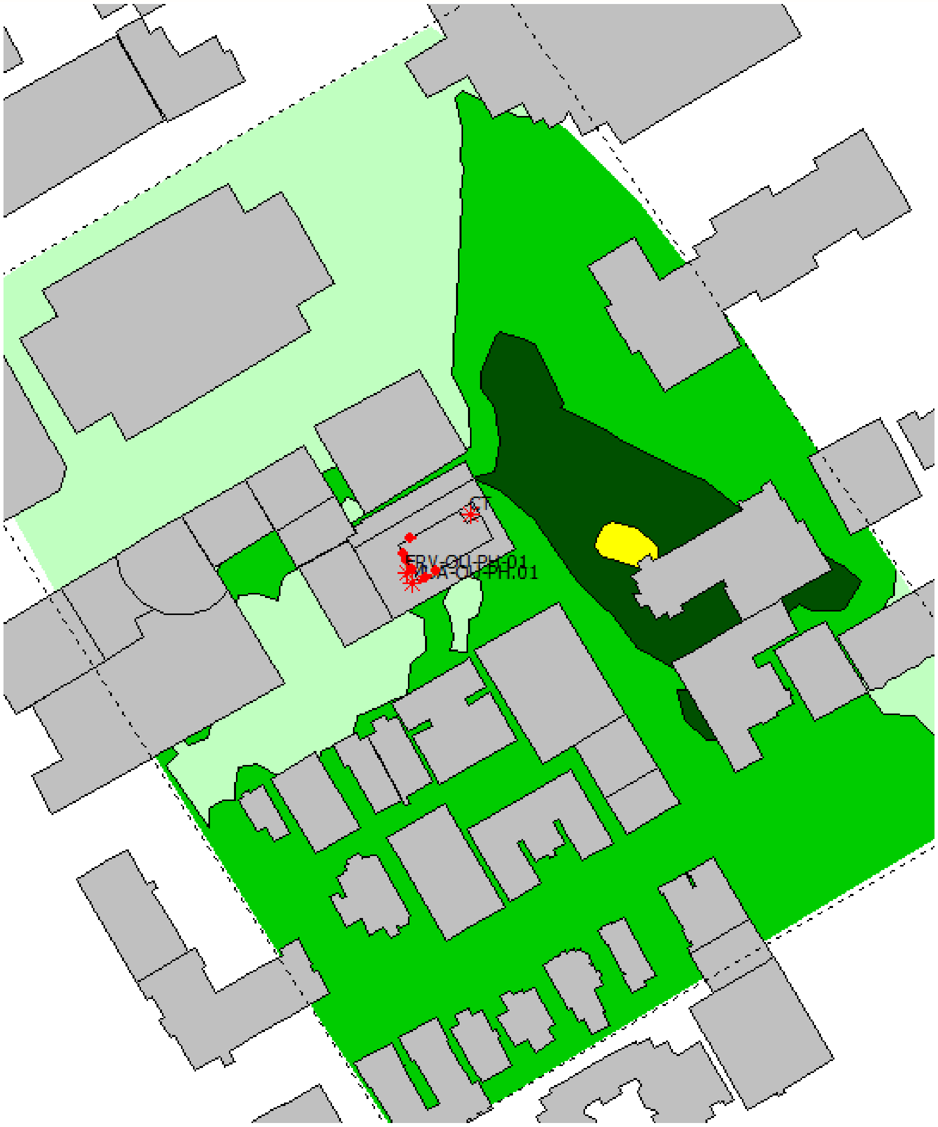

FIGURE 4: DAYTIME STATIONARY NOISE CONTOURS – HVAC EQUIPMENT (20 METERS ABOVE GRADE)

80 – 85 dB
75 – 80 dB
70 – 75 dB
65 – 70 dB
60 – 65 dB
55 – 60 dB
50 – 55 dB
45 – 50 dB
40 – 45 dB
35 – 40 dB
0 – 35 dB

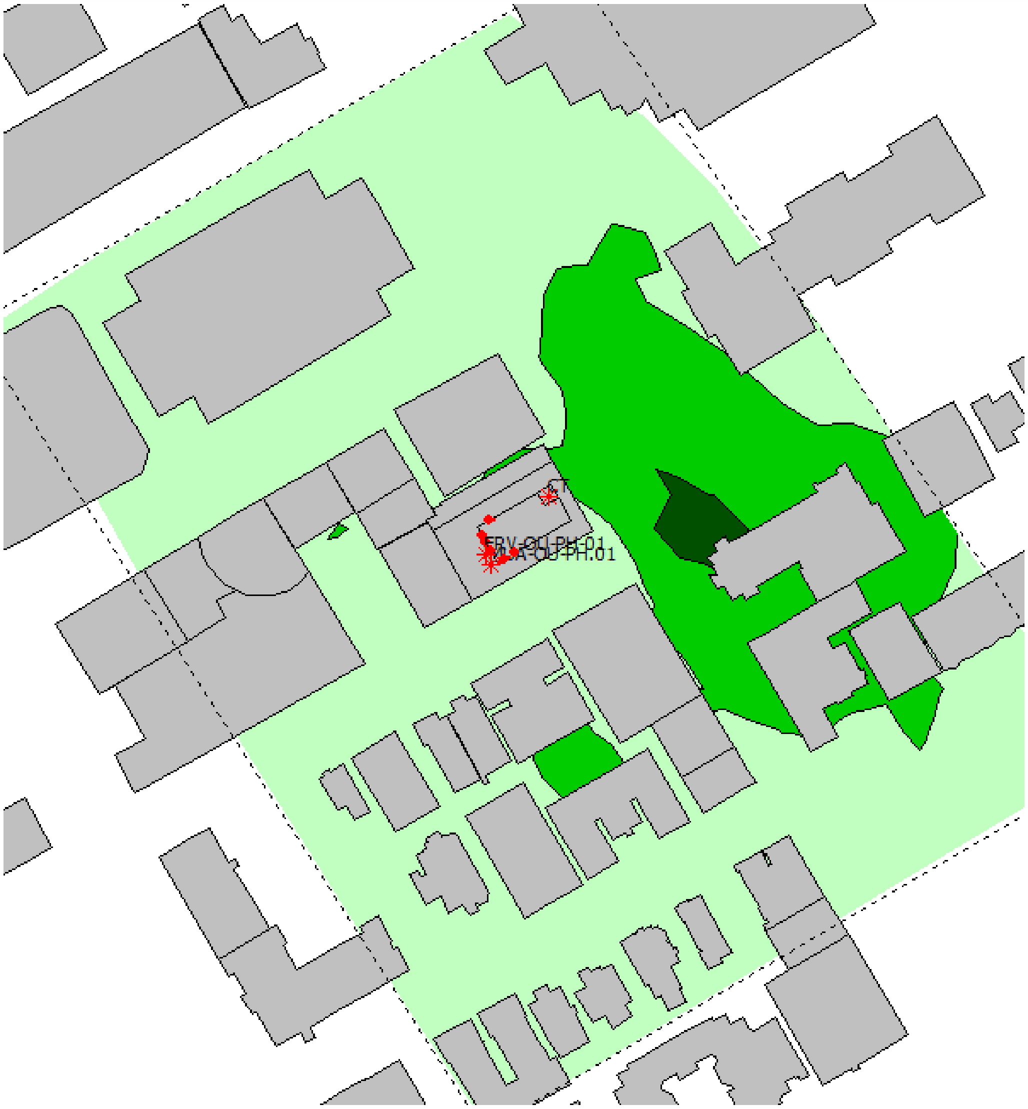

FIGURE 5: NIGHTTIME STATIONARY NOISE CONTOURS – HVAC EQUIPMENT (20 METERS ABOVE GRADE)

80 – 85 dB
75 – 80 dB
70 – 75 dB
65 – 70 dB
60 – 65 dB
55 – 60 dB
50 – 55 dB
45 – 50 dB
40 – 45 dB
35 – 40 dB
0 – 35 dB

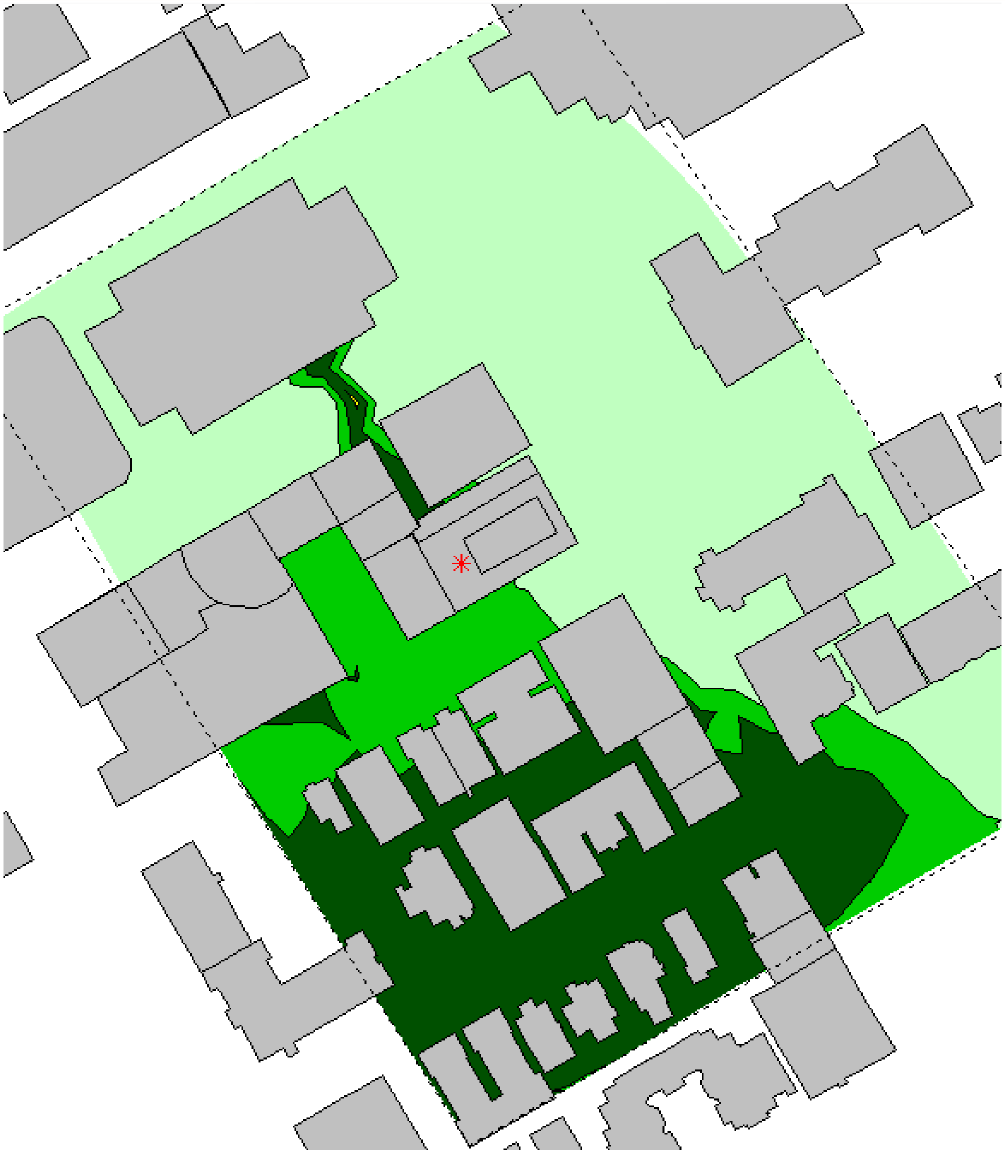

FIGURE 6: DAYTIME STATIONARY NOISE CONTOURS – EMERGENCY EQUIPMENT (20 METERS ABOVE GRADE)