

**STATIONARY NOISE
ASSESSMENT**

398, 402, 406 Roosevelt Avenue
Ottawa, Ontario

REPORT: GW17-179 – Stationary Noise



August 24, 2022

PREPARED FOR

ML Westboro Inc.

651 Churchill Avenue North
Ottawa, ON K1Z 5G2

PREPARED BY

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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for a proposed mixed-used condominium development located at 398, 402, and 406 Roosevelt Avenue in Ottawa, Ontario. The development will be 6-storieys high, with commercial space on the first floor and part of the second floor, and residential use from the second to the sixth floor. The major sources of stationary noise are a rooftop unit (RTU), six condensing units, and a generator. Figure 1 illustrates a site plan with the surrounding context.

The focus of this study is the exterior noise levels generated by the major mechanical equipment, which consists of a rooftop unit, a generator, and six condensing units. 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); (iii) architectural drawings prepared by RLA Architecture, dated April 7th 2022; and (iv) mechanical drawings and data provided by Goodkey, Weedmark & Associates Ltd.

The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria provided that the assumptions outlined in Section 2.1 and the notes in Section 6 are followed. Additionally, the sound power levels of the condensers, rooftop unit, and generator should not exceed the levels shown in Table 3. As such, the proposed development is expected to be compatible with the existing noise-sensitive land uses. 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 1

2. TERMS OF REFERENCE 1

2.1 Assumptions 2

3. OBJECTIVES 3

4. METHODOLOGY..... 3

4.1 Perception of Noise..... 4

4.2 Stationary Noise Criteria 4

4.3 Determination of Noise Source Power Levels 6

4.4 Stationary Source Noise Predictions..... 6

5. RESULTS AND DISCUSSION 8

6. CONCLUSIONS AND RECOMMENDATIONS..... 12

FIGURES



1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by ML Westboro Inc. to undertake a stationary noise assessment for the proposed mixed-used condominium development located at 398, 402, and 406 Roosevelt Avenue 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 the rooftop unit, condenser units, and generator. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa¹ and Ministry of the Environment, Conservation and Parks (MECP) NPC-300² guidelines, architectural drawings (RLA Architecture, dated April 7th, 2022), and mechanical drawings and information provided by Goodkey, Weedmark & Associates Ltd.

2. TERMS OF REFERENCE

The focus of this stationary noise assessment is a proposed mixed-use condominium building on the property encompassing 398, 402 and 406 Roosevelt Avenue in Ottawa, Ontario. The proposed development is a six-storey building, with commercial space on the first floor and part of the second floor, and residential use from the second to the sixth floor. There is a basement level dedicated to storage spaces, parking spaces, mechanical and electrical rooms. Parking spaces are also available at grade on the west side of the building. The building rises with a uniform floor plan from Level 2 to Level 4, at which point the floor plan steps back on the north and east elevations to create space for private balconies. At Level six, the floor plan steps back on the north, west and south elevations to create space for private balconies. Figure 1 illustrates the site plan and surrounding context.

The major sources of stationary noise are the rooftop unit, condensing units, and generator that are in the mechanical penthouse and the outdoor mechanical area. Figure 2 illustrates the location of noise sources included in this study.

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 sound power levels of the condensing units, generator, and rooftop unit manufacturer data are provided by Goodkey, Weedmark & Associates Ltd. 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) The sound power levels of the condensing units, generator, and rooftop unit are based on manufacturer data provided by Goodkey, Weedmark & Associates Ltd.
- (ii) The rooftop unit (RTU-1) is assumed to operate continuously at 100% over a 1-hour period during the daytime and evening periods and at 50% over a 1-hour period during the nighttime period.
- (iii) The condensing units are assumed to operate continuously at 100% over a 1-hour period during the daytime, evening, and nighttime periods, respectively.
- (iv) The generator is assumed to be running continuously at 100% over a 1-hour period during the daytime period for testing and maintenance purposes. It is assumed to have a Level 3 sound attenuating enclosure which has a sound pressure rating of 70 dBA at 7 m.
- (v) Where applicable, the sound attenuation from ductwork and end reflections from louvres are applied to the sound power levels of the rooftop and condensing units.
- (vi) The rooftop unit and generator were represented as point sources while noise from the condensing units was represented as an emitting façade and an emitting roof in the analysis.
- (vii) A total of eighteen (18) receptors were strategically placed on the closest buildings and outdoor points of reception around the study site. The location noise sources and receptors can be seen in Figure 2 and Figure 3, respectively.
- (viii) The ground region was modelled as reflective ground due to the presence of pavement (hard ground).



- (ix) The condenser air intake is assumed to have either an acoustical louver or silencer bank. The required insertion loss of the acoustic louvre/ silencer can be seen in Table 1 below.

TABLE 1: ACOUSTIC LOUVRE TRANSMISSION LOSS

Louvre Depth (mm)	Open Area (%)	Octave Band Transmission Loss (dB)							
		63	125	250	500	1000	2000	4000	8000
200	28	6	7	8	10	17	18	17	17

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the neighbouring noise-sensitive buildings 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 noise-sensitive 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.

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.

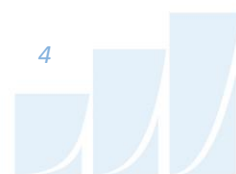
4.2 Stationary Noise Criteria

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, campgrounds, and noise-sensitive buildings such as schools and daycares. Because noise is dominated by manmade sources,

³ City of Ottawa Environmental Noise Control Guidelines, page 10

⁴ City of Ottawa Environmental Noise Guidelines, page 9



the site is considered to be in a Class 1 area. The recommended maximum noise levels at a POR for a Class 1 area in an urban environment adjacent to arterial roadways are outlined in Table 2.

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 2: 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

4.3 Determination of Noise Source Power Levels

The sound power levels of the condensing units, generator, and rooftop unit are based on manufacturer data provided by Goodkey, Weedmark & Associates Ltd. Table 3 summarizes the sound power levels of each source used in the analysis.

TABLE 3: EQUIPMENT SOUND POWER LEVELS (DBA)

Source	Description	Height Above Roof (m)	Correction Applied	Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	Total
S1	CU-Intaker	1*	Unmitigated	-	-	-	-	90	-	-	-	90
			Maximum Permissible	-	-	-	-	85	-	-	-	85
S2	CU-Discharge	1x1	Unmitigated	-	-	-	-	86	-	-	-	86
S3	Generator	1.8	Level 3 Enclosure	-	-	-	-	95	-	-	-	95
S4	RTU-1	1.5	Unmitigated	54	68	69	76	80	74	68	62	83

*Height above the roof of the center point of the louver. CU-Louver dimensions are 5500x1920.

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 18 receptor locations were chosen on the surrounding buildings to measure the noise impact at plane of window (POW) and OPOR receptors during the daytime/evening period (07:00 – 23:00), as well as during the nighttime period (23:00 – 07:00). Receptor locations are described in

Table 5 and illustrated in Figure 3. The rooftop unit and generator unit were represented as point sources while noise from the condensing units were modelled as emitting façades and an emitting roof in the analysis. The source locations can be seen in Figure 2. 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 is available upon request.

TABLE 4: CALCULATION SETTINGS

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

TABLE 5: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	Study Site- Level 5 Roof	19.5
R2	395 Berkley Ave	1.5/4.5
R3	397 Berkley Ave	1.5/4.5
R4	403 Berkley Ave	1.5/4.5
R5	420 Berkley Ave	29.5
R6	398-410 Berkley Ave	1.5/4.5
R7	398-410 Berkley Ave	1.5/4.5
R8	410 Richmond Road	26.5
R9	410 Richmond Road	26.5
R10	403 Richmond Road	1.5/4.5
R11	403 Richmond Road	1.5/4.5
R12	396 Winston Ave	1.5/4.5
R13	375 Roosevelt Ave	1.5/4.5
R14	386 Roosevelt Ave	1.5/4.5
R15	390 Roosevelt Ave	1.5/4.5
R16	396 Roosevelt Ave	1.5/4.5
R17	381-385 Berkley Ave	1.5/4.5
R18	391 Berkley Ave	1.5/4.5

5. RESULTS AND DISCUSSION

Noise levels at nearby sensitive receptors are below ENCG criteria for stationary noise, as summarized in Table 6 below. The sound levels listed in Table 6 and Table 7 are based on the assumptions outlined in Section 2.1. With consideration of Gradient Wind’s recommendations and assumptions, the proposed development is expected to be compatible with the existing land uses.

TABLE 6: HVAC NOISE LEVELS

Receptor Number / Type	Location	Height Above Grade (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day	Night	Day	Night	Day	Night
R1	Study Site – Level 5 Roof	19.5	38	N/A*	50	N/A*	Yes	N/A*
R2	395 Berkley Ave – East Façade	1.5	39	39	50	45	Yes	Yes
		4.5	40	40	50	45	Yes	Yes
R3	397 Berkley Ave– East Façade	1.5	38	37	50	45	Yes	Yes
		4.5	39	39	50	45	Yes	Yes
R4	403 Berkley Ave – East Façade	1.5	40	39	50	45	Yes	Yes
		4.5	42	42	50	45	Yes	Yes
R5	420 Berkley Ave – East Façade	29.5	46	45	50	45	Yes	Yes
R6	398-410 Berkley Ave – East Façade	1.5	44	44	50	45	Yes	Yes
		4.5	45	45	50	45	Yes	Yes
R7	398-410 Berkley Ave – East Façade	1.5	45	45	50	45	Yes	Yes
		4.5	45	45	50	45	Yes	Yes
R8	410 Richmond Road – North Façade	26.5	45	43	50	45	Yes	Yes
R9	410 Richmond Road – East Façade	26.5	36	34	50	45	Yes	Yes

*OPOR noise levels during the nighttime are not considered as per the ENCG.

TABLE 6 (CONTINUED): HVAC NOISE LEVELS

Receptor Number / Type	Location	Height Above Grade (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day	Night	Day	Night	Day	Night
R10	403 Richmond Road – West Façade	1.5	30	28	50	45	Yes	Yes
		4.5	31	30	50	45	Yes	Yes
R11	403 Richmond Road– West Façade	1.5	27	26	50	45	Yes	Yes
		4.5	28	27	50	45	Yes	Yes
R12	396 Winston Ave – West Façade	1.5	31	30	50	45	Yes	Yes
		4.5	33	32	50	45	Yes	Yes
R13	375 Roosevelt Ave– West Façade	1.5	28	28	50	45	Yes	Yes
		4.5	30	29	50	45	Yes	Yes
R14	386 Roosevelt Ave – South Façade	1.5	23	23	50	45	Yes	Yes
		4.5	24	23	50	45	Yes	Yes
R15	390 Roosevelt Ave Ave – South Façade	1.5	28	27	50	45	Yes	Yes
		4.5	30	30	50	45	Yes	Yes
R16	396 Roosevelt Ave Ave – South Façade	1.5	28	28	50	45	Yes	Yes
		4.5	28	27	50	45	Yes	Yes
R17	381-385 Berkley Ave – South Façade	1.5	39	39	50	45	Yes	Yes
		4.5	37	37	50	45	Yes	Yes
R18	391 Berkley– East Façade	1.5	37	37	50	45	Yes	Yes
		4.5	39	39	50	45	Yes	Yes

TABLE 7: GENERATOR NOISE LEVELS

Receptor Number / Type	Location	Height Above Grade (m)	Noise Level (dBA)	Sound Level Limits	Meets ENCG Class 1 Criteria
			Day	Day	Day
R1	Study Site - Level 5 Roof	19.5	55	55	Yes
R2	395 Berkley Ave– East Façade	1.5	41	55	Yes
		4.5	42	55	Yes
R3	397 Berkley Ave– East Façade	1.5	39	55	Yes
		4.5	40	55	Yes
R4	403 Berkley Ave– East Façade	1.5	39	55	Yes
		4.5	41	55	Yes
R5	420 Berkley Ave– East Façade	29.5	49	55	Yes
R6	398-410 Berkley Ave– East Façade	1.5	44	55	Yes
		4.5	45	55	Yes
R7	398-410 Berkley Ave– East Façade	1.5	44	55	Yes
		4.5	45	55	Yes
R8	410 Richmond Road	26.5	40	55	Yes
R9	410 Richmond Road– East Façade	26.5	33	55	Yes

TABLE 7 (CONTINUED): GENERATOR NOISE LEVELS

Receptor Number / Type	Location	Height Above Grade (m)	Sound Level Limits	Sound Level Limits	Meets ENCG Class 1 Criteria
			Day	Day	Day
R10	403 Richmond Road	1.5	28	55	Yes
		4.5	29	55	Yes
R11	403 Richmond Road	1.5	35	55	Yes
		4.5	35	55	Yes
R12	396 Winston Ave	1.5	40	55	Yes
		4.5	41	55	Yes
R13	375 Roosevelt Ave	1.5	46	55	Yes
		4.5	48	55	Yes
R14	386 Roosevelt Ave	1.5	38	55	Yes
		4.5	39	55	Yes
R15	390 Roosevelt Ave	1.5	38	55	Yes
		4.5	47	55	Yes
R16	396 Roosevelt Ave	1.5	37	55	Yes
		4.5	38	55	Yes
R17	381-385 Berkley	1.5	48	55	Yes
		4.5	48	55	Yes
R18	391 Berkley – East Façade	1.5	42	55	Yes
		4.5	44	55	Yes

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 ENCG noise criteria provided that the assumptions outlined in Section 2.1 are followed, and the sound power levels of the condenser units, rooftop unit, and generator do not exceed the levels shown in Table 3. As such, the proposed development is expected to be compatible with the existing noise-sensitive land uses. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to the installation of the equipment.



To ensure compliance with the ENCG, the following noise control measures are recorded:

- The sound power levels of the condenser units, rooftop unit, and generator, should not exceed the levels shown in Table 3.
- An acoustic louver or silencer bank will be provided for the condenser air intake. The acoustic louvre or silencer will have minimum insertion losses as presented in Table 1.
- The emergency generator will have a sound rated enclosure with a sound pressure rating of 70 dBA at 7 m.

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.

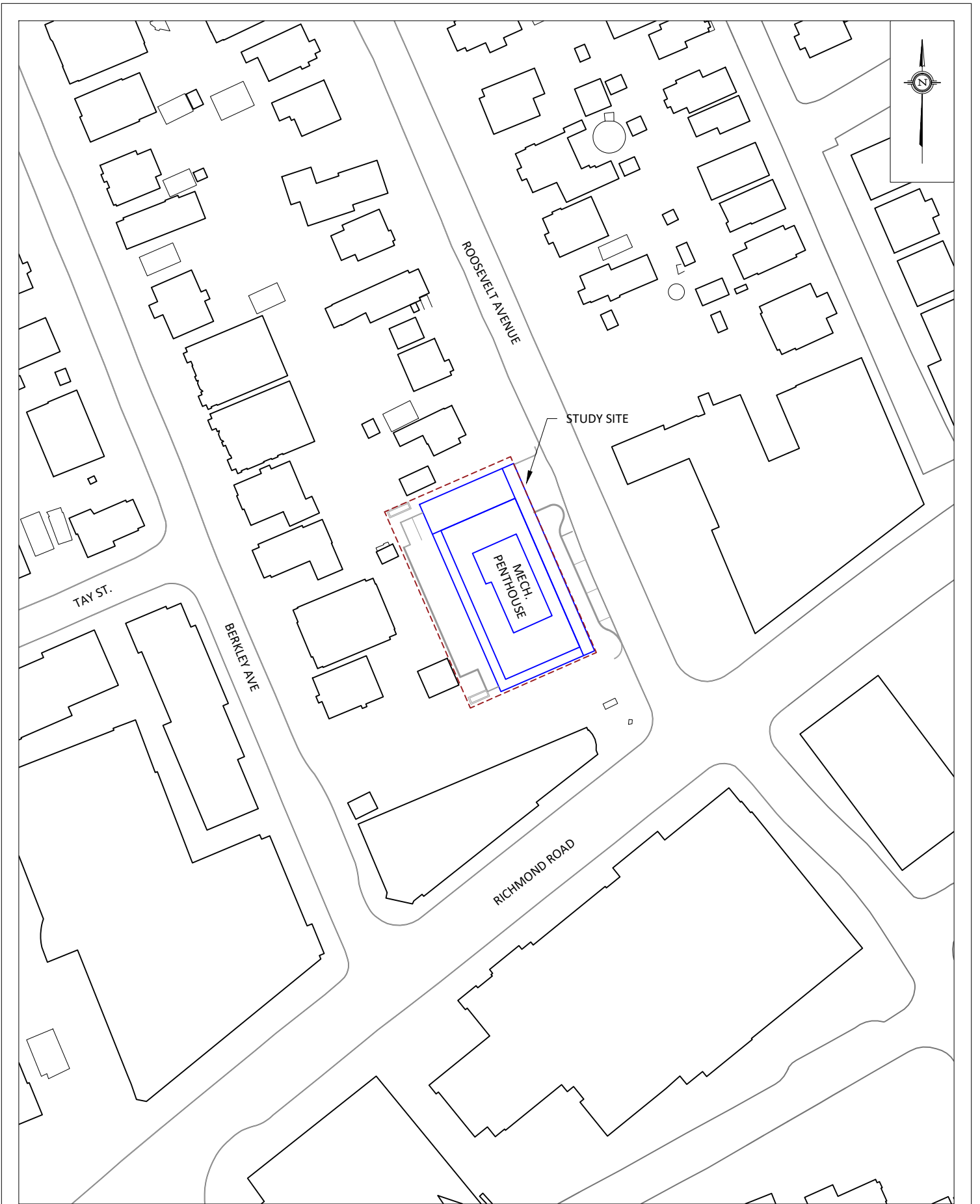


Essraa Alqassab, B.A.Sc.
Junior Environmental Scientist

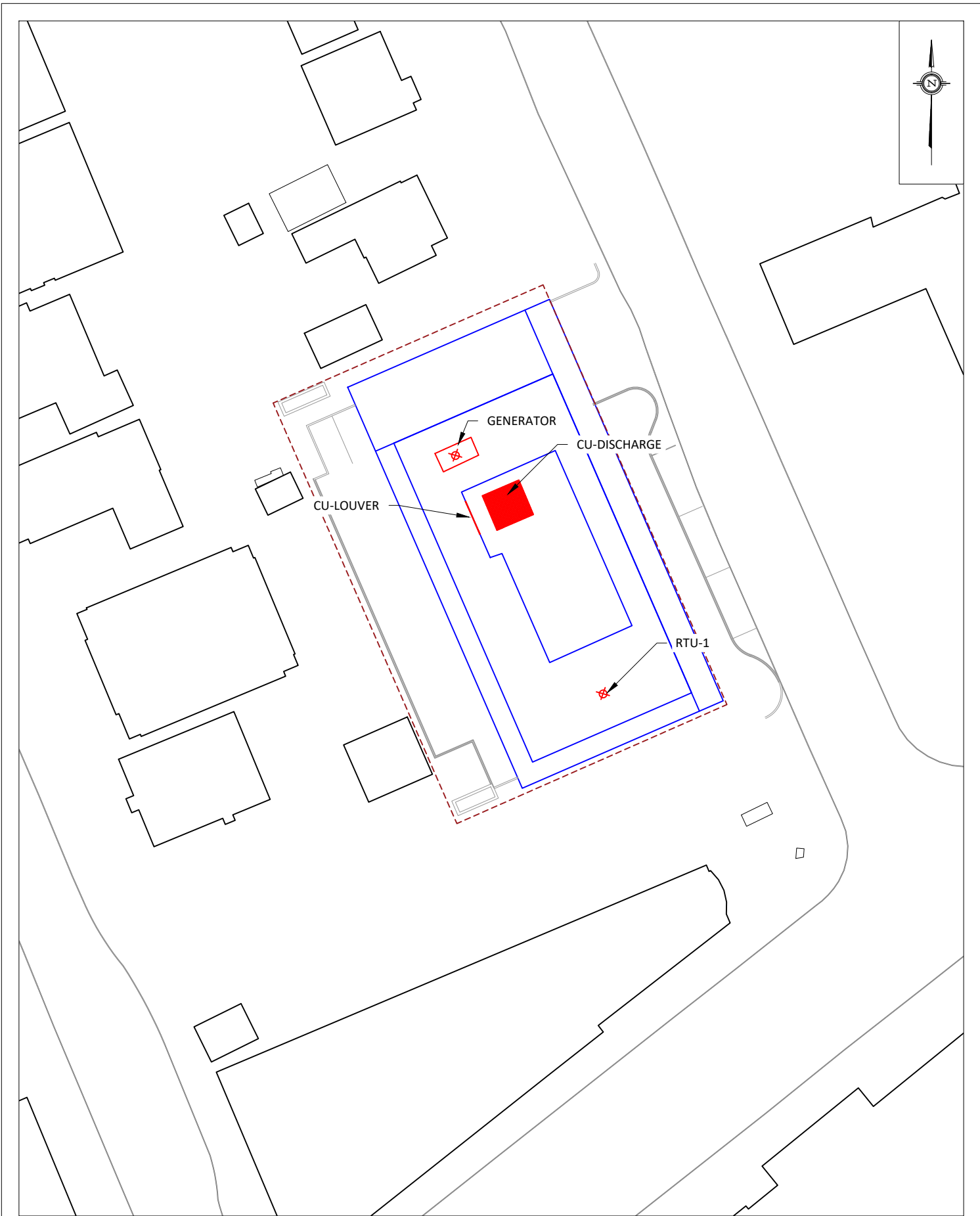


Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #17-179 – Stationary Noise



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	398, 402, 406 ROOSEVELT AVENUE, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	SCALE	1:1000 (APPROX.)	DRAWING NO. GW17-179-1	
	DATE	JULY 29, 2022	DRAWN BY E.A.	

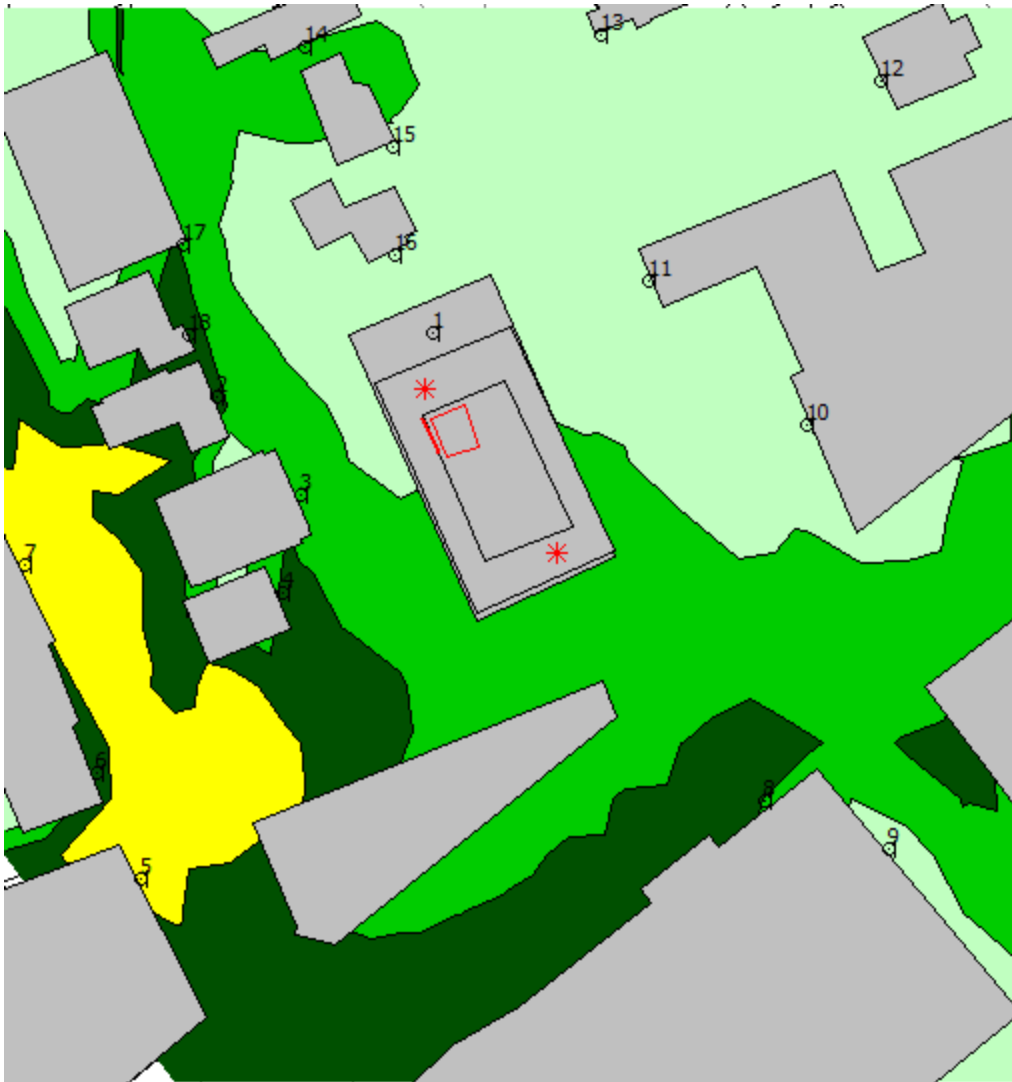


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DATE	JULY 29, 2022	DRAWN BY E.A.

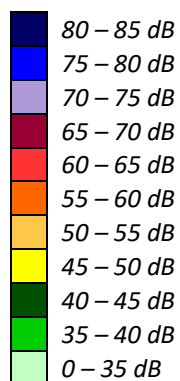


- 1 OPOR RECEPTOR
- 1 POW RECEPTOR

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	398, 402, 406 ROOSEVELT AVENUE, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION FIGURE 3: RECEPTOR LOCATIONS
	SCALE	1:1000 (APPROX.)	DRAWING NO. GW17-179-3	
	DATE	JULY 29, 2022	DRAWN BY E.A.	

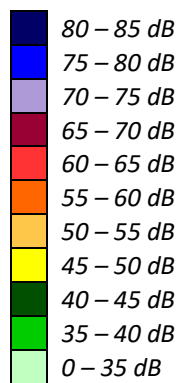


**FIGURE 5: HVAC DAYTIME NOISE CONTOURS
(4 M ABOVE GRADE, WITH 3.5 M NOISE SCREEN)**





**FIGURE 6: HVAC NIGHTTIME NOISE CONTOURS
(4 M ABOVE GRADE, WITH 3.5 M NOISE SCREEN)**





**FIGURE 7: GENERATOR NOISE CONTOURS
(4 M ABOVE GRADE)**

