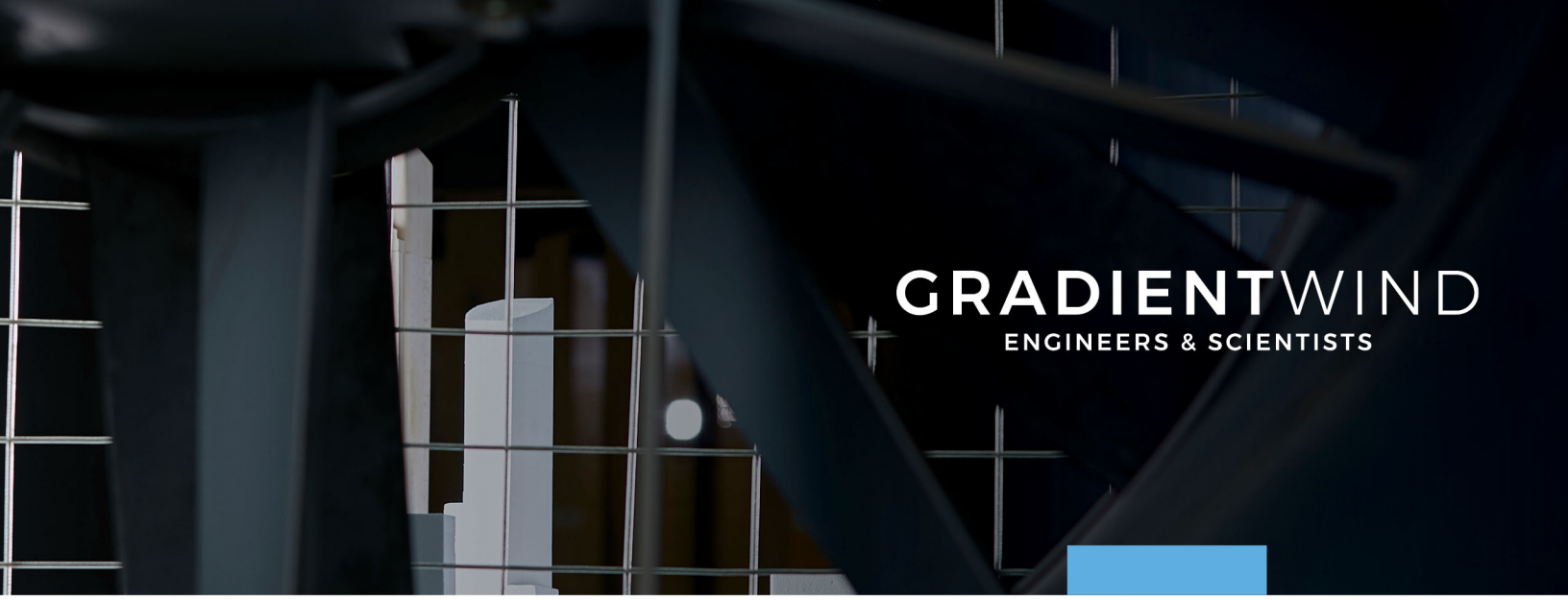

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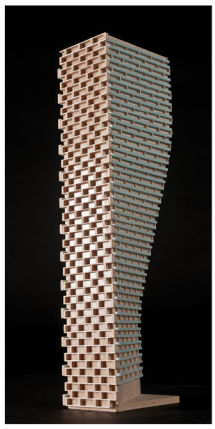
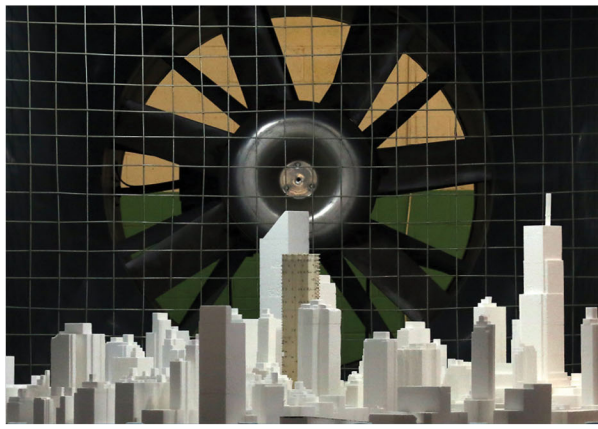
STATIONARY NOISE ASSESSMENT

77 Metcalfe Street
Ottawa, Ontario

REPORT: 24-254– Stationary Noise Study





July 11, 2025

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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for the proposed residential development located at 77 Metcalfe Street in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). The proposed development comprises a 23-storey mixed-use residential building topped with a mechanical penthouse (MPH). Sources of stationary noise include a make up air unit, two air sourced heat pumps, a generator, and two large exhaust fans. Figure 1 illustrates a site plan with the surrounding context.

The focus of this study are the exterior noise levels generated by the stationary noise sources. The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP); (ii) the site plan prepared by NEUF architect(e)s in December 2024; (iii) mechanical drawings and sound power data of the make-up air unit and air-sourced heat pumps provided by MEP Experts Conseils; and (iv) sound power data of the generator and fluid coolers based on Gradient Wind's past experience with similar projects.

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 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. Should changes be made to the design, where the sound power levels of the equipment exceed the values described in Table 2 or locations of the equipment differ from what is illustrated in Figure 2, a review by this office should be completed.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Édifice 77 Metcalfe Inc. to undertake a stationary noise assessment for the proposed residential development located at 77 Metcalfe 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 the impact of the stationary noise sources of the proposed development on the surrounding Mixed-Use Downtown Zone area. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa and Ministry of the Environment, Conservation and Parks (MECP) NPC-300[1] guidelines, based on the site plan prepared by NEUF architect(e)s in December 2024 and mechanical engineering drawings and data provided by MEP Experts Conseils, surrounding street layouts obtained from the City of Ottawa, and recent site imagery. Sound power data for the generator and Fluid Coolers are based on Gradient Wind's past experience with similar projects and for the other equipment based on the technical data provided.

2. TERMS OF REFERENCE

The focus of this stationary noise assessment is the proposed development located 77 Metcalfe Street, situated at the northwest corner of a city block bounded by Metcalfe Street to the west, Albert Street to the north, Elgin Street to the east, and Slater Street to the south. The proposed development comprises a 23-storey mixed-use residential building topped with a mechanical penthouse (MPH).

Above below-grade parking, the ground floor of the proposed development includes a residential lobby to the north along Albert Street, a loading zone at the northeast corner, a garbage room to the east, and commercial space along the south and west. Access to the below-grade parking is provided by 81 Metcalfe Street situated to the immediate south of the proposed development. Level 2 includes lockers to the east and south, a central leasing office, and residential units throughout the remainder of the level. Level 3 includes indoor amenities to the east, lockers to the south, and residential units to the north and west. The building steps back from the southeast elevation at this level, accommodating a common amenity

[1] Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline – Publication NPC-300, August 2013

terrace at the southeast corner. Levels 4-10 are reserved for residential use, while Level 11 includes an indoor amenity to the east and residential units throughout the remainder of the level. At Level 11, a common amenity terrace is provided within setbacks from the north and east elevations and private terraces are provided within a setback from the west elevation. Levels 12-23 are reserved for residential occupancy. The building steps back from the south elevation at Level 16, accommodating private terraces.

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 a make up air unit, two air sourced heat pumps, a generator, and two large exhaust fans. Figure 2 illustrates the location of all noise sources included in this study.

The site is surrounded by high-rise office and residential buildings. As noise sensitive buildings there is a Hotel to the East of the site, receptors have been added to the closest facades between the Hotel and the Study Building and a residential Building located at 75 Slater Street, this apartment building has the most exposed side without windows and does not have balconies or external areas that could be affected. Figure 1 illustrates the site plan and the surrounding context.

2.1 Parameters Considered

The following parameters have been considered in the analysis. Should changes be made to the design, where the sound power levels of the equipment exceed the values described in Table 2 or locations of the equipment differ from what is illustrated in Figure 2, a review by this office should be completed.

(i) The locations, quantity and tonnage of rooftop units have been based on architectural and mechanical drawings provided.

(ii) The Sound power data for the generator and the Fluid Coolers based on Gradient Wind's experience with similar projects, all other sound data is based on the equipment manufacturer data provided by the mechanical engineers.

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

(iv) The ground region was modelled as reflective ground due to the presence of pavement (hard ground). The ground was also assumed to be flat.

(v) All mechanical equipment was modelled as point sources, and the mechanical equipment was modeled at a height of 1 and 1.5 metre (m) above the roof.

(vi) A total of 5 receptors, each Plane of Window (POW) receptor having two different heights, were strategically placed on the closest noise-sensitive buildings in the surrounding area. The location of the receptors can be seen in Figure 3.

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 of the proposed development and (ii) ensure that exterior noise levels do not exceed the allowable limits specified by the ENCG, as outlined in Section 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 *CadnaA* 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. 5 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 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" [2].

[2] 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 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"[3]. 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. As the site is bordered by two arterial roads, the area is considered as a Class 1 area as per the ENCG. The recommended maximum noise levels for a Class 1 area at a POR are outlined in Table 1 below.

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

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

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

4.3 Determination of Noise Source Power Levels

Table 2 summarizes the sound power of each source used in the analysis, as per NPC-300. Sources of stationary noise consist of 1 make up air unit or MUA, 2 Modular Heat Pump referred as ASHP-24-01 and ASHP-24-01, 1 Generator and 2 Exhaust Fans referred as EF-ROOF-01 And EF-ROOF-02. The stationary noise source locations can be seen in Figure 2 and the characteristics of the sources described in Table 2.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Height Above Grade or Roof (m)	Sound Power Levels (dBA)
			Total
S1	MUA-24-01	1.5	**85**
S2	ASHP-24-01	1	**92**
S3	ASHP-24-02	1	**92**
S4	EF-ROOF-01 Inlet	1	**85**
	EF-ROOF-01 Outlet	1	**87**
S5	EF-ROOF-02	1	**87**
S6	FC-24-01	1	**105**
S7	FC-24-02	1	**105**
S8	Generator	1.5	**100**

4.4 Stationary Source Noise Predictions

A total of 5 receptor locations were chosen on the surrounding noise-sensitive buildings to measure the noise impact at the outdoor point of reception (OPOR) and plane of window (POW) receptors during the daytime/evening period (07:00 – 23:00), as well as during the nighttime period (23:00 – 07:00). Receptor locations are illustrated in Figure 3. At each POW receptor location, the noise was assessed at 2 different heights for a total of 5 discrete points of reception. Besides POW receptors. All mechanical units were represented as point sources in the CadnaA model. Table 3 below contains CadnaA 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 3: 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

5. VIBRATION CONTROL

The primary sources of building vibrations are from reciprocating and rotating mechanical equipment, including a make up air unit, two air sourced heat pumps, a generator, and two large exhaust fans. In order to ensure a comfortable living environment, mechanical equipment in the building will require the following minimum isolation:

(i) The makeup air unit shall be supported on spring isolators, having a minimum static deflection of 38 mm. The springs should be mounted directly to the equipment. Alternatively, components such as the blower fan can be internally isolated.

(ii) The generator should be isolated with spring isolators having a minimum deflection of 50 mm.

(iii) Air-source heat pumps and fluid coolers shall be mounted on restrained spring isolators with a minimum deflection of 38 mm

(iv) The ceiling-mounted exhaust fans should be isolated by spring or neoprene hangers. with a minimum static deflection of 25 mm.

(v) Transformers should be isolated on rubber / neoprene pads 10 mm thick.

6. TRANSFORMER NOISE

The transformer on the 13th floor will be isolated form residential uses using a closet with STC rating of 55. Which can be achieved by 92 mm steel studs and two layers of 16 mm Type X gypsum board on both sides. The concreate floor / ceiling will be sufficient to isolate noise above and below the electrical closet. The transformer

The electrical room on the 13th floor houses several large dry-type transformers, these transformers generally exhibit sound power levels ranging from 85 to 95 dBA at 1 meter, with a dominant tonal frequency around 120 Hz and its harmonics.

The electrical room is adjacent to multiple sensitive receptor spaces, including studio apartments and larger multi-bedroom residential units, as well as a central corridor. These spaces require stringent noise control measures due to their high sensitivity:

- Bedrooms and living areas in the apartments are subject to interior noise limits of 35 dBA and 40 dBA, respectively, according to Ontario's NPC-300 guidelines.

- The central corridor, while less sensitive, must still maintain acceptable sound levels to avoid occupant annoyance.

Given these factors, the primary concern is the transmission of low-frequency tonal noise and vibration through structural elements and airborne paths into the adjacent residential units and corridor. To mitigate noise and vibration transmission from the transformers to sensitive spaces, the following measures are recommended:

- Mount transformers on 10 mm thick rubber / neoprene pads to minimize structure-borne vibration.
- Implement acoustic treatments within the electrical room, including walls and doors with a minimum Sound Transmission Class (STC) rating of 55. Which can be achieved by 92 mm steel studs and two layers of 16 mm Type X gypsum board on both sides. The concreate slab above and below will be sufficient.
- Seal all penetrations, such as cable trays and ductwork, with appropriate fire-rated acoustic sealants to prevent airborne noise leakage.

7. RESULTS AND MITIGATION MEASURES

The preliminary calculations showed that the impact of the proposed equipment on the closest residential buildings will not exceed the ENCG required criteria, therefore noise mitigation will not be required. The results of the calculations without any mitigation measures can be seen in and Table 4 for HVAC equipment and Table 5 for the generator.

TABLE 4: HVAC NOISE LEVELS WITHOUT MITIGATION MEASURES

Receptor Number	Receptor Type	Height Above Grade (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day*	Night	Day*	Night	Day*	Night
R1	POW	20	36	33	50	45	Yes	Yes
		40	43	40	50	45	Yes	Yes
R2	POW	20	39	36	50	45	Yes	Yes
		40	45	42	50	45	Yes	Yes
R3	POW	20	43	39	50	45	Yes	Yes
		40	46	43	50	45	Yes	Yes
R4	POW	20	42	39	50	45	Yes	Yes
		40	46	42	50	45	Yes	Yes
R5	POW	20	37	34	50	45	Yes	Yes
		60	42	39	50	45	Yes	Yes

* Day values include both day and evening results.

TABLE 5: GENERATOR NOISE LEVELS WITHOUT MITIGATION MEASURES

Receptor Number	Receptor Type	Height Above Grade (m)	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
			Day*	Night	Day*	Night	Day*	Night
R1	POW	20	23	N/A*	55	N/A*	Yes	Yes
		40	36	N/A*	55	N/A*	Yes	Yes
R2	POW	20	24	N/A*	55	N/A*	Yes	Yes
		40	33	N/A*	55	N/A*	Yes	Yes
R3	POW	20	28	N/A*	55	N/A*	Yes	Yes
		40	34	N/A*	55	N/A*	Yes	Yes
R4	POW	20	21	N/A*	55	N/A*	Yes	Yes
		40	36	N/A*	55	N/A*	Yes	Yes
R5	POW	4	19	N/A*	55	N/A*	Yes	Yes
		60	22	N/A*	55	N/A*	Yes	Yes

8. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the noise criteria provided that the parameters outlined in Section 2.1 are adhered to during the installation of the equipment.

As such, the proposed development is expected to be compatible with the existing and future noise-sensitive land uses.

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.

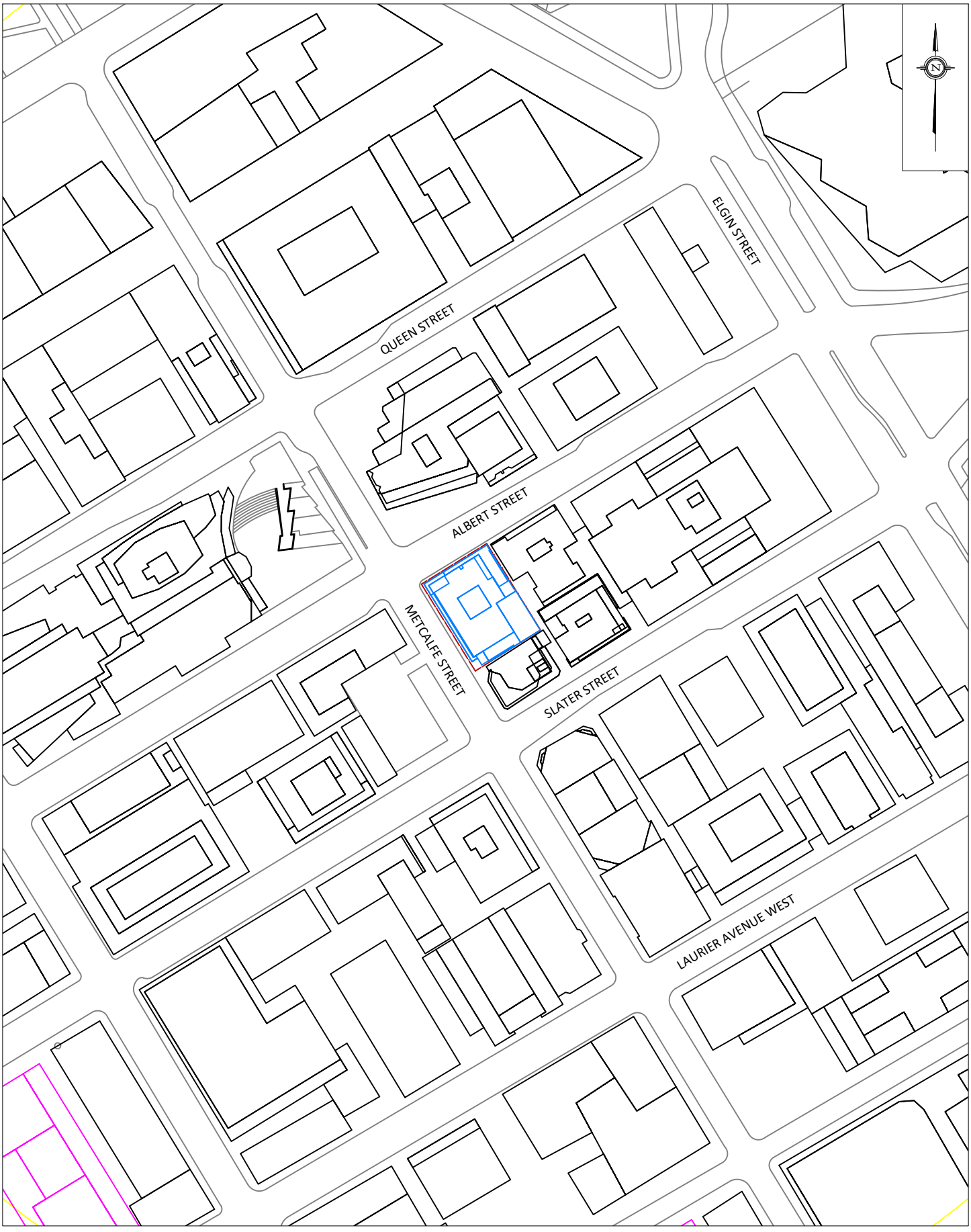
Sincerely,

Gradient Wind Engineering Inc.

Sergio Nunez Andres, B.Eng,
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #24-254 – Stationary Noise Assessment



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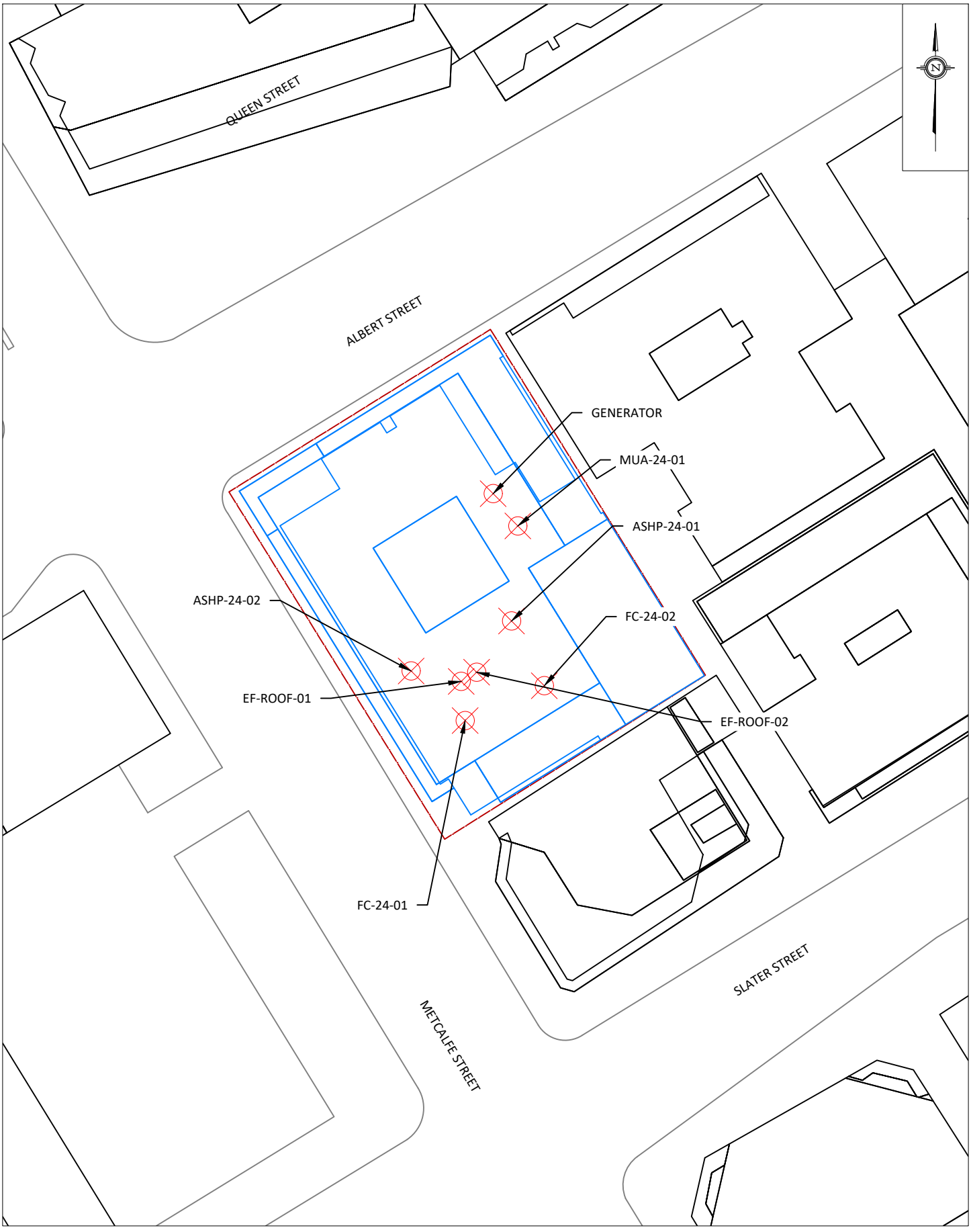
PROJECT	77 METCALFE STREET, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000	DRAWING NO. 24-254-1	FIGURE 1: PROPERTY LINE AND SURROUNDING CONTEXT
DATE	JUNE 13, 2024	DRAWN BY T.K.	



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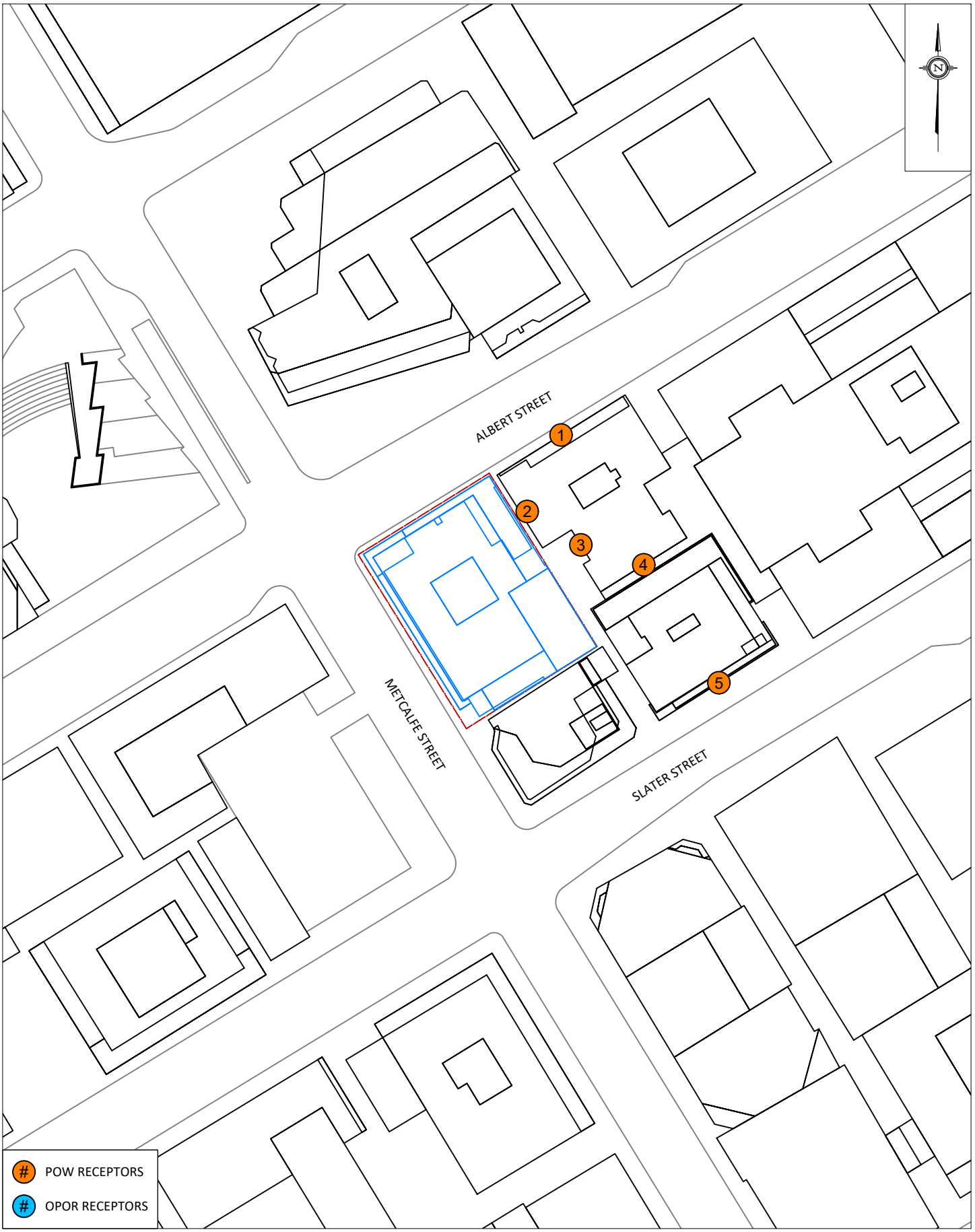
PROJECT	77 METCALFE STREET, OTTAWA STATIONARY NOISE ASSESSMENT
SCALE	1:1000
DRAWING NO.	24-254-2
DATE	JUNE 13, 2024
DRAWN BY	T.K.

DESCRIPTION

FIGURE 2:
STATIONARY NOISE SOURCE & RECEIVER LOCATIONS



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PROJECT	77 METCALFE STREET, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000	DRAWING NO. 24-254-3	FIGURE 3: RECEPTOR LOCATION
DATE	JUNE 13, 2024	DRAWN BY T.K.	

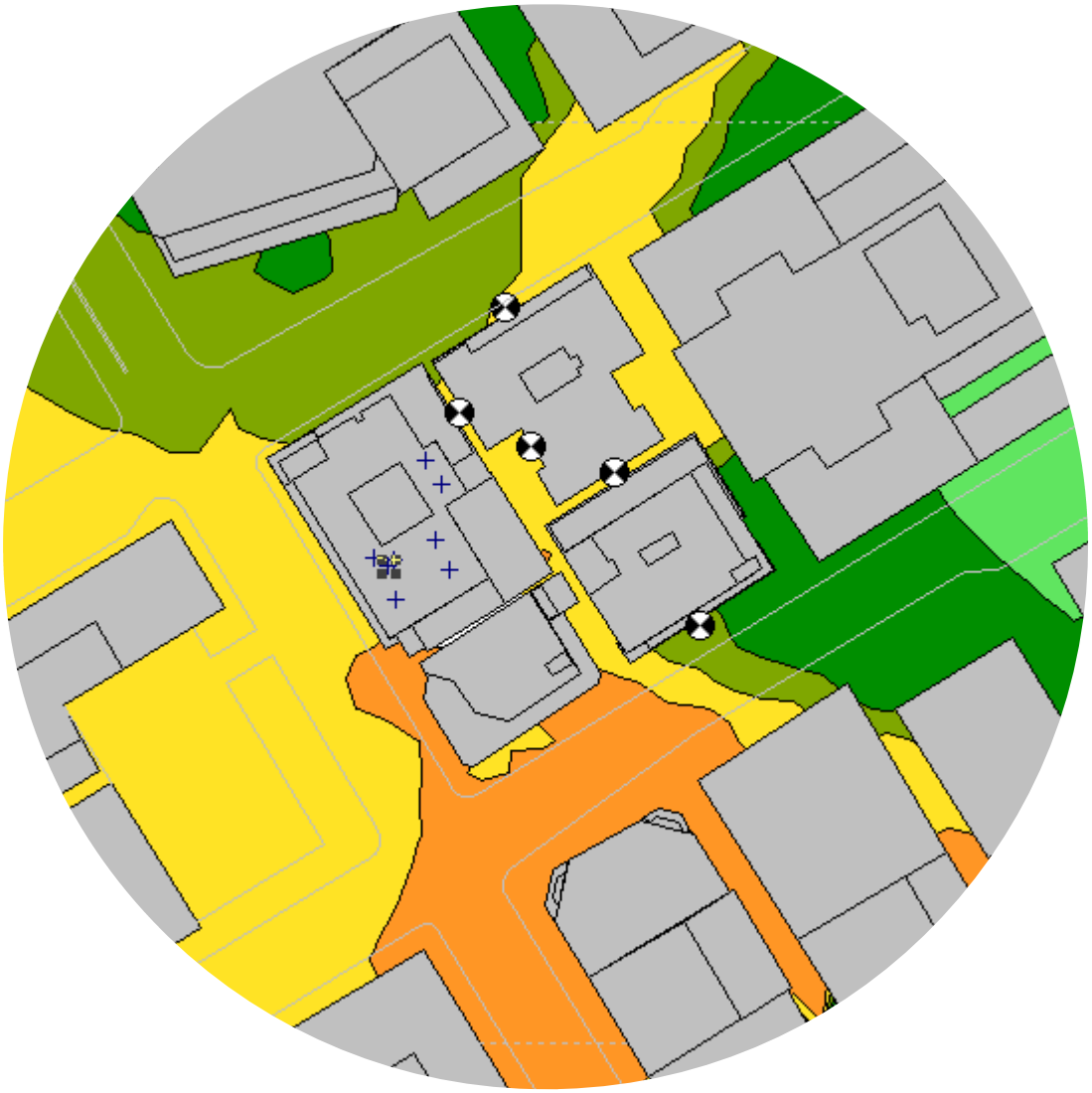

FIGURE 4: DAYTIME NOISE CONTOURS

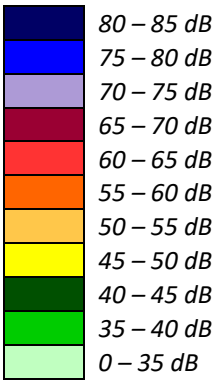

FIGURE 5: NIGHTTIME NOISE CONTOURS

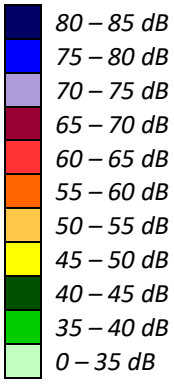

FIGURE 6: GENERATOR DAYTIME NOISE CONTOURS

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