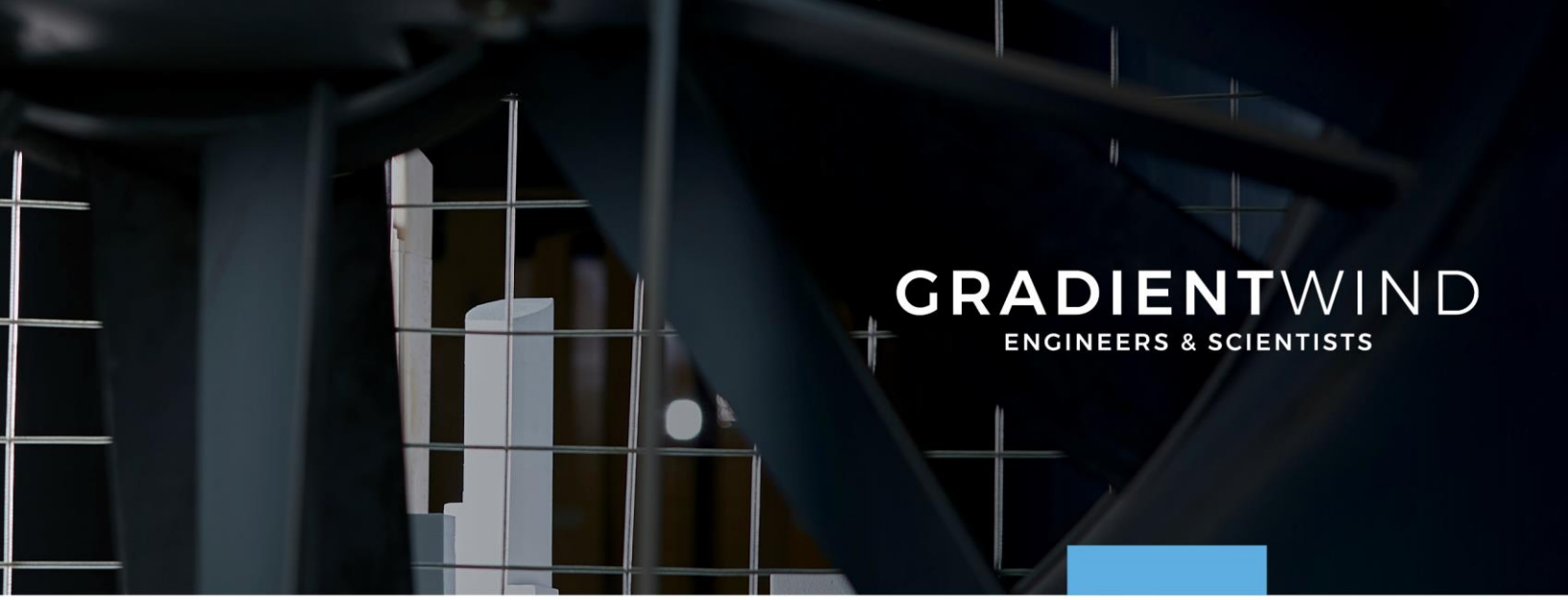

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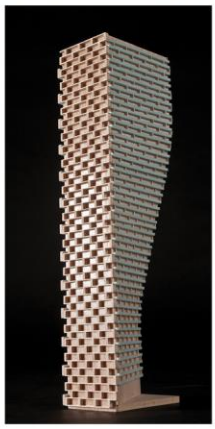
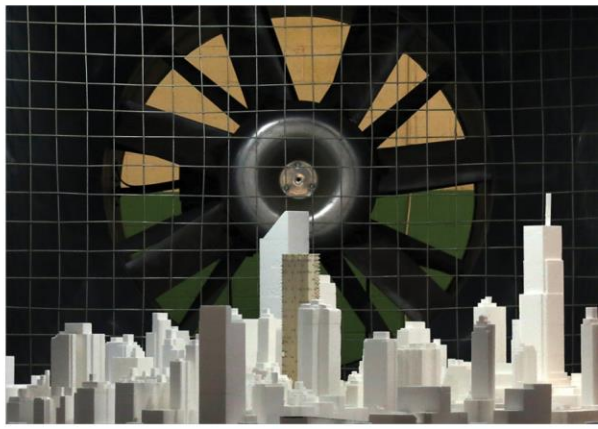
STATIONARY NOISE ASSESSMENT

1357 Baseline Road
Ottawa, Ontario

GRADIENT WIND REPORT: 19-141 - Stationary Noise





January 15, 2020

PREPARED FOR

Selection Group International Inc.
2400 Boulevard Daniel-Johnson
Laval, Quebec
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PREPARED BY

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EXECUTIVE SUMMARY

This report describes a stationary noise assessment in support of a Site Plan Application (SPA) for a proposed mixed-use development located at 1357 Baseline Road in Ottawa, Ontario. The development consists of two residential buildings: Fridom Residence (15 storeys) and Signature Senior Residence (15 storeys), rising above a common 1-storey podium. Five levels at the north side connect the towers. The podium features residential lobbies, common amenity space, commercial space, a health centre and building services. Green space occupies the rooftop of the podium, between the towers, as well as at grade along the west perimeter of the site. Both towers feature rounded corners and alternating arc-shaped screens on the cantilevered balconies.

This report focuses on stationary noise impact assessment arising from the rooftop mechanical equipment serving the nearby commercial buildings. These buildings are located in the Laurentian Place centre and includes the Walmart Supercentre to the northeast of the site, the Stantec building to the north and retail buildings to the east. The primary sources of stationary noise include nearby roof top units (RTU), exhaust louvers and chiller units. Figure 1 illustrates a site plan with 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); (iii) architectural drawings prepared by ACDF Architecture provided November 2019; and (iv) mechanical information based on Gradient Wind's past experience with similar developments.

The results of the current study indicate that noise levels due to stationary noise sources from individual properties are expected to be at or below 50 dBA and 45 dBA for the daytime and nighttime periods respectively. These results are based on assumptions outlined in Section 2.1. The Stantec Building to the north is the dominant source of stationary noise influencing the site, however it is expected to be masked by roadway noise from Clyde Avenue and Baseline Road.

Gradient Wind has advised that the development be fitted with air conditioning to address noise impacts from nearby roadway traffic noise (ref. GWE19-141 – Transportation Noise, dated January 15, 2020). This will further assist in ensuring a comfortable indoor living environment due to nearby stationary noise

sources. As such, the proposed development is expected to be compatible with the existing noise sources and will satisfy all site plan conditions.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Selection Group International Inc. to undertake a stationary noise assessment in support of a Site Plan Application (SPA) for the proposed mixed-use development located at 1357 Baseline Road 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 existing rooftop mechanical equipment onto the proposed development. 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, architectural drawings prepared by ACDF Architecture provided in November 2019, mechanical information based on Gradient Wind's past experience with similar developments, 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 a proposed mixed-use development located at 1357 Baseline Road in Ottawa, Ontario. The study site is situated on the north corner at the intersection of Baseline Road and Clyde Avenue. The proposed development comprises two 15-storey buildings. On the west side of the development, the Fridom Residence building rises approximately 52 meters (m) to the top of its mechanical penthouse, while on the east side the Signature Senior Residence building rises 49 m to the top of its mechanical penthouse. The buildings are connected by a stepped podium of one-storey on the south side and five storeys on the north side.

The development includes parking at grade and on three levels below grade. The ground floor plan of the development includes retail, lobby, and office spaces, as well as an indoor amenity space that leads to an outdoor amenity area on the west side of the Fridom Residence building. Level 2 of the Signature Senior Residence building comprises various indoor amenities. The remaining floors contain residential space. The floorplate steps back on the south side at Level 2 to create a horseshoe building planform and an

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

outdoor amenity area on the roof of the 1-storey podium. The two buildings share a 5-storey podium at the north end and rise independently from Levels 6-15.

Public spaces are included at grade level around the full perimeter of the subject site with amenity terraces on the west side and southwest corner of the site. The lower podium includes a large public outdoor terrace, which is mostly situated between the two buildings but also extends around the south side of the Signature Senior Residence building. The main entrances to the Fridom Residence building, Health Centre, and Signature Senior Residence building are situated on the north side, while retail entrances are located on the south side fronting Baseline Road.

The site is bound by Clyde Avenue to the west, office and commercial buildings to the north and east, as well as Baseline Road to the south. The primary sources of stationary noise include nearby rooftop mechanical equipment serving the nearby commercial buildings. These buildings are located in the Laurentian Place centre and include the Walmart Supercentre to the northeast of the site, the Stantec building to the north and retail buildings to the east. Figure 1 illustrates a complete site plan with surrounding context.

2.1 Assumptions

Stationary sources of noise on nearby buildings were identified based on a review of satellite imagery near the development. Mechanical information for the equipment was based on Gradient Wind's past experience with similar developments. Based on the information gathered, the following assumptions have been included in the analysis:

(i) Locations, quantity, and tonnage of air handling and condensing units have been conservatively assumed based on Gradient Wind's experience with similar developments, both commercial and retail buildings.

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

(iii) Screening effects of parapets haven been included in the analysis.

(iv) Reflective intermediate ground surfaces were assumed due to the presence of hard (paved) ground throughout the site.

(v) To obtain a more accurate depiction of the noise sources influencing the development, roof top units located within a 100 metre "zone of influence" from the façades of the development were included. Therefore, 28 noise sources were assessed.

Figure 3 and 4 illustrates the location of all the stationary sources throughout the site.

3. OBJECTIVES

The main goals of this work are to (i) calculate the on-site future noise levels produced by off-site 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 development 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. Eight (8) 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 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, campgrounds, and noise sensitive buildings such as schools and places of worship. According to the ENCG, the recommended maximum noise level for an urban (Class 1) environment at a POR is either the lowest one-hour background noise level due to other sources, or the exclusionary limits outlined in Table 1, whichever is higher. 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. These conditions indicate 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

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

4.3 Determination of Noise Source Power Levels

Sound power data was assumed based on Gradient Wind's experience with similar types of retail and commercial buildings and typical pieces equipment associated with said buildings. 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 Roof (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1-S24	"5-10" Ton RTU	1.5	68	68	75	78	78	73	68	60	**83***
S25	Fluid Cooler	2	-	-	-	-	83	-	-	-	**83***
S26	Fluid Cooler	3	-	-	-	-	83	-	-	-	**83***
S27	Fluid Cooler	3	-	-	-	-	85	-	-	-	**85***
S28	MUA Louver	2.5	-	-	-	-	83	-	-	-	**83***

*Sound power levels based on Gradient Wind's experience with similar mechanical equipment

4.4 Stationary Source Noise Predictions

The impact of nearby stationary noise sources onto the development 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 eight (8) 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 sources were modelled as a point source, with the exception of the MUA louver (S28) which was modelled as an emitting façade. 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. *Predictor-Lima* sample calculations are available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	POW – 15th Floor – South Façade	46.5
R2	POW – 15th Floor – West Façade	46.5
R3	POW – 15th Floor – North Façade	46.5
R4	POW – 5th Floor – North Façade	16.5
R5	POW – 15th Floor – North Façade	45.5
R6	POW – 15th Floor – East Façade	45.5
R7	OLA – Ground Floor – Amenity Area	1.5
R8	OLA – Ground Floor – Amenity Area	1.5

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

5. RESULTS AND DISCUSSION

The results of the current study indicate that noise levels from mechanical equipment from individual properties are expected to be at or below 50 dBA and 45 dBA for the daytime and nighttime periods

respectively. The Stantec Building to the north is the dominant source of stationary noise influencing the site. Noise levels from the Stantec building alone are expected to reach 50 dBA and 45 dBA during the daytime and nighttime periods respectively at the north façade of the study building. Other noise sources from individual properties achieve sound levels less than the ENCG noise criteria. Table 5 depicts the expected noise levels as discrete receptors throughout the site influenced by stationary noise emanating from the Stantec Building.

It should be noted that ambient noise generated from roadway traffic along Clyde Avenue and Baseline Road, which are classified as arterial roadways, is expected to be above noise levels from nearby rooftop mechanical equipment. Furthermore, Gradient Wind has advised that the development be fitted with air conditioning to address noise impacts from nearby roadway traffic noise (ref. GWE19-141 – Transportation Noise, dated January 15, 2020). This will further assist in ensuring a comfortable indoor living environment by limiting the impact from nearby stationary noise sources. Noise contours at 1.5 m, and 46.5 m above grade can be seen in Figure 5-8 for daytime and nighttime conditions respectively.

TABLE 5: NOISE LEVELS FROM THE STANTEC BUILDING ROOFTOP MECHANICAL EQUIPMENT

Receptor Number	Receptor Location	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
		Day	Night	Day	Night	Day	Night
R1	POW – 15th Floor – South Façade	18	14	50	45	Yes	Yes
R2	POW – 15th Floor – West Façade	41	35	50	45	Yes	Yes
R3	POW – 15th Floor – North Façade	49	45	50	45	Yes	Yes
R4	POW – 5th Floor – North Façade	50	45	50	45	Yes	Yes
R5	POW – 15th Floor – North Façade	47	44	50	45	Yes	Yes
R6	POW – 15th Floor – East Façade	19	16	50	45	Yes	Yes
R7	OPOR – Ground Floor – Amenity Area	15	N/A	50	N/A	Yes	N/A
R8	OPOR – Ground Floor – Amenity Area	40	N/A	50	N/A	Yes	N/A

N/A = Noise levels are not considered at OPOR during the nighttime

6. CONCLUSIONS AND RECOMMENDATIONS

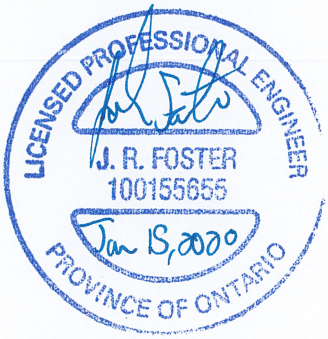
The results of the current study indicate that noise levels due to stationary noise sources from individual properties are expected to be at or below 50 dBA and 45 dBA for the daytime and nighttime periods respectively. These results are based on assumptions outlined in Section 2.1. The Stantec Building to the north is the dominant source of stationary noise influencing the site, however it is expected to be masked by roadway noise from Clyde Avenue and Baseline Road.

Gradient Wind has advised that the development be fitted with air conditioning to address noise impacts from nearby roadway traffic noise (ref. GWE19-141 – Transportation Noise, dated January 15, 2020). This will further assist in ensuring a comfortable indoor living environment due to nearby stationary noise sources. As such, the proposed development is expected to be compatible with the existing noise sources and will satisfy all site plan conditions.

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.



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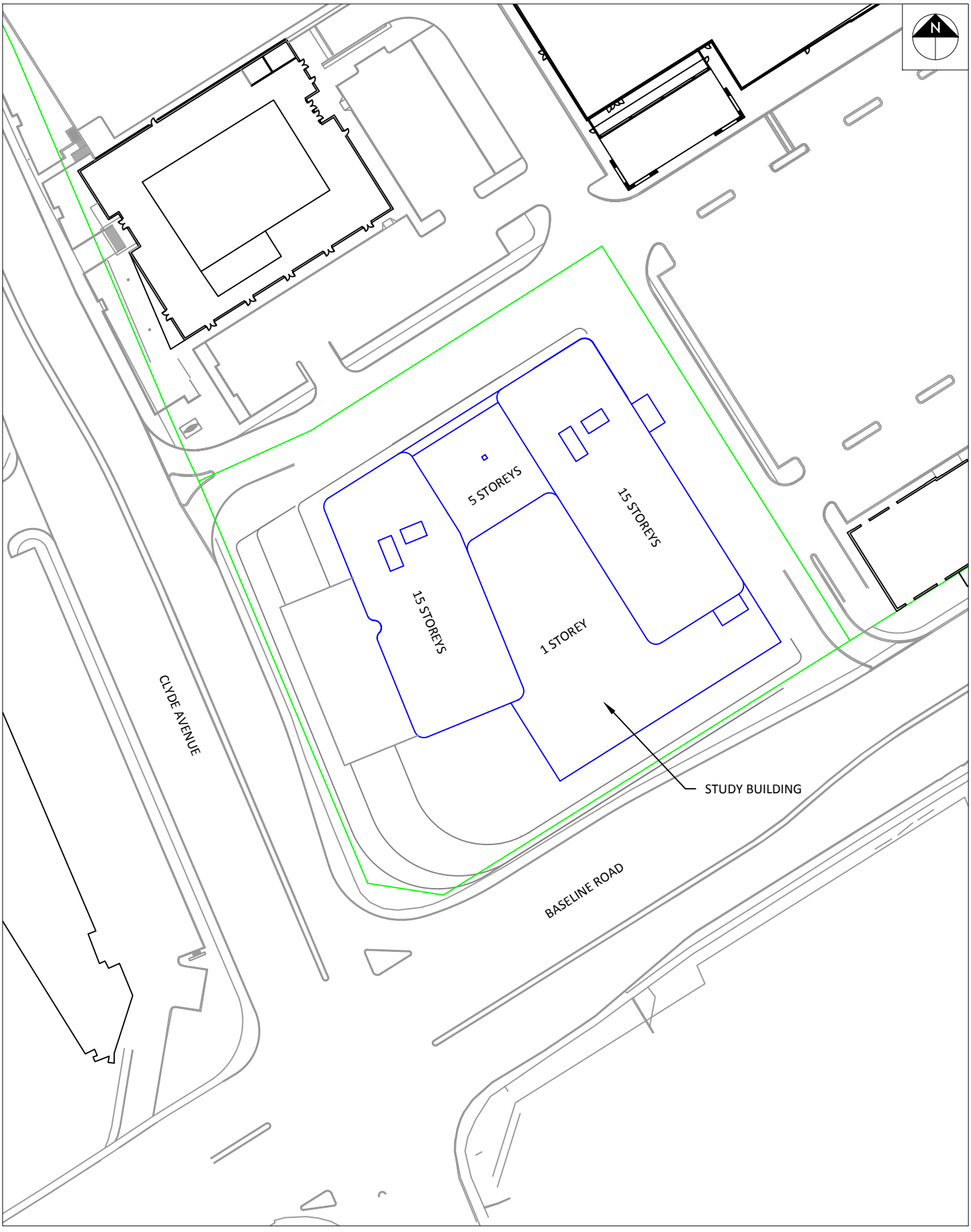
Principal

Gradient Wind File #19-141 – Stationary Noise



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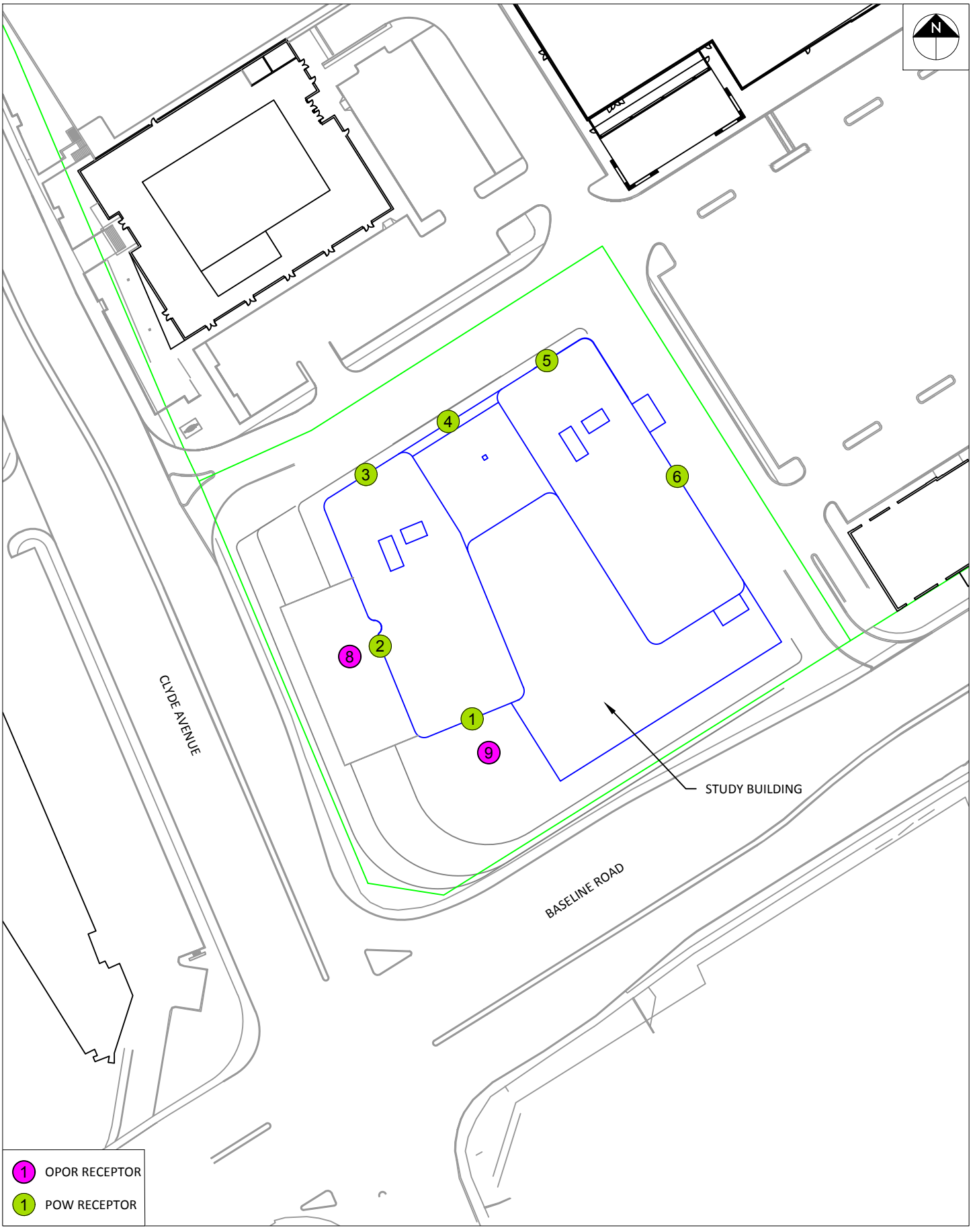
PROJECT	1357 BASELINE ROAD, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GWE19-141-1	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
DATE	NOVEMBER 22, 2019	DRAWN BY G.G.	



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SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE19-141-2
DATE	NOVEMBER 22, 2019
DRAWN BY	G.G.
DESCRIPTION	FIGURE 2: RECEPTOR LOCATIONS

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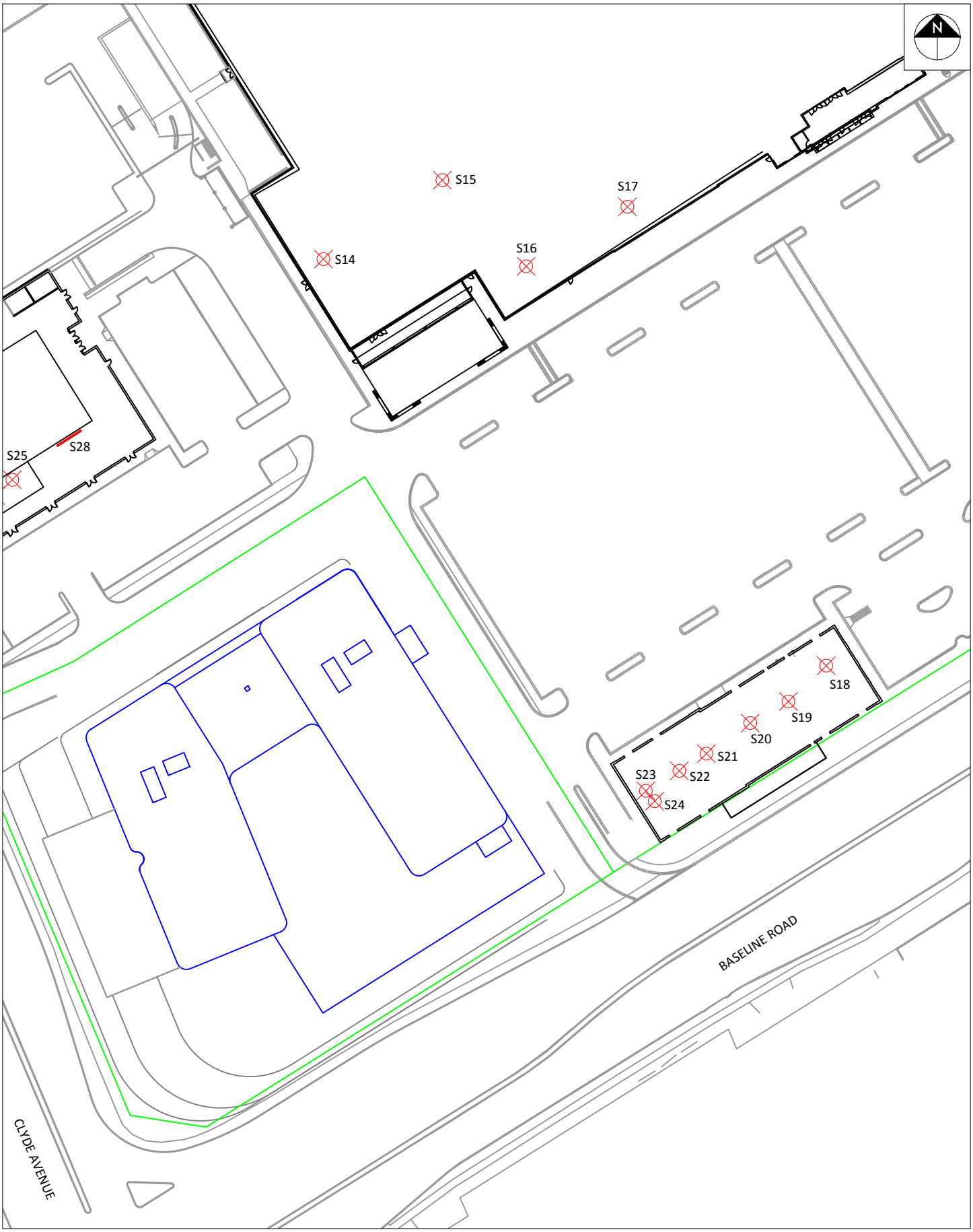
PROJECT	1357 BASELINE ROAD, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GWE19-141-3	FIGURE 3: STATIONARY NOISE SOURCE LOCATIONS
DATE	NOVEMBER 22, 2019	DRAWN BY G.G.	



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SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE19-141-4
DATE	NOVEMBER 22, 2019	DRAWN BY	G.G.

DESCRIPTION

FIGURE 4:
STATIONARY NOISE SOURCE LOCATIONS

FIGURE 5: GROUND LEVEL NOISE CONTOURS FOR THE SITE (DAYTIME PERIOD)

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

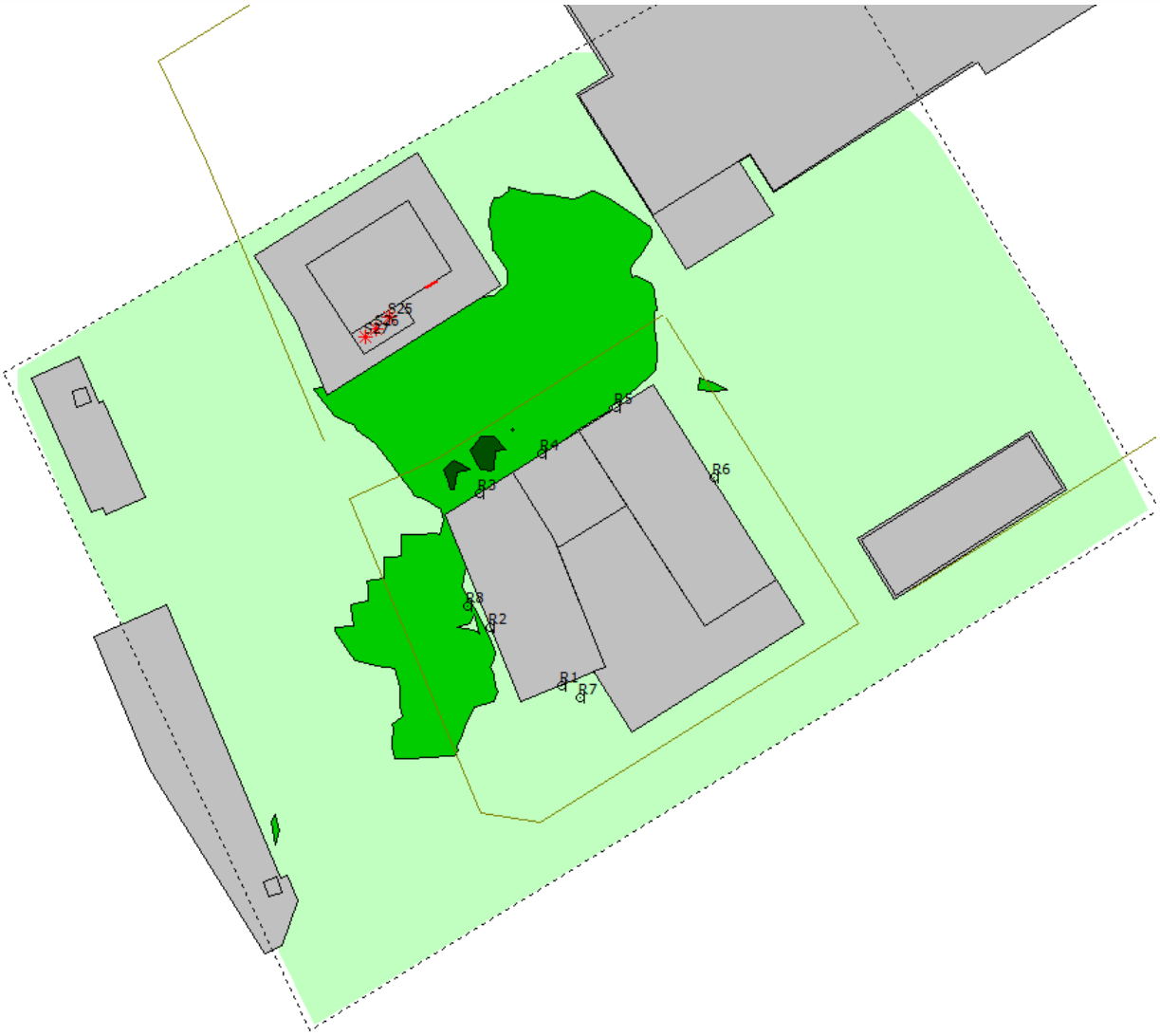

FIGURE 6: GROUND LEVEL NOISE CONTOURS FOR THE SITE (NIGHTTIME PERIOD)

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 7: NOISE CONTOURS 46.5M ABOVE GRADE (DAYTIME PERIOD)

FIGURE 8: NOISE CONTOURS 46.5M ABOVE GRADE (NIGHTTIME PERIOD)

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