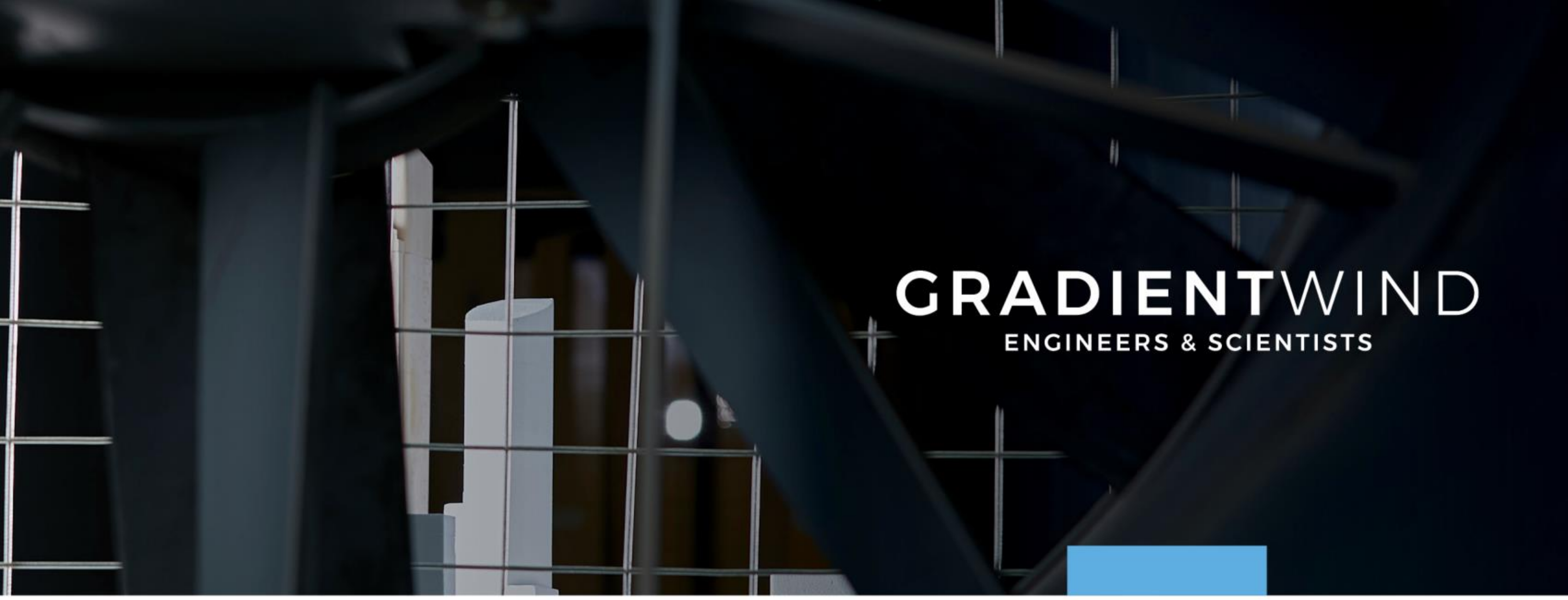
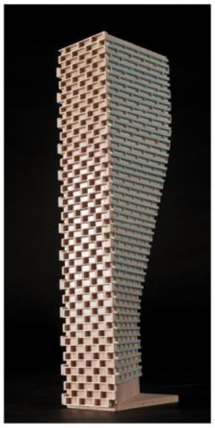
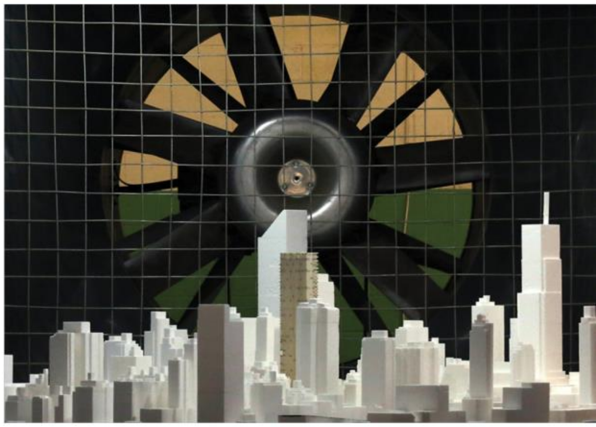


STATIOANRY NOISE FEASIBILITY ASSESSMENT

1545 Bank Street
Ottawa, Ontario

GRADIENT WIND REPORT: 18-128 - Stationary Noise





May 8, 2019

PREPARED FOR
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EXECUTIVE SUMMARY

This report describes a stationary noise feasibility assessment in support of a Site Plan Application (SPA) for a proposed mixed-use development located at 1545 Bank Street in Ottawa, Ontario. The proposed development is an eight-storey 'J'-shape planform building with 2 levels of underground parking. The first floor is intended for commercial, residential and amenity use, with the remaining floors above intended for residential use. There is a roof top amenity area situated toward the eastern side of the development. Surrounding the site is a mix of low-rise residential and commercial buildings. This study examines the on-site and off-site noise impacts of the proposed mechanical equipment associated with the development. The primary sources of stationary noise include the roof top Make-Up Air handling unit (MUA), cooling tower and emergency generator. 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 Chmiel Architects dated April 12, 2019; and (iv) mechanical information provided by Smith + Anderson.

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 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 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 installation of the equipment.

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

- A solid noise wall flush with the mechanical penthouse façade which extends outward toward the roof top edge approximately 7.5-meters as shown in Figure 3. Alternatively, a solid noise wall along the northeastern corner of the roof top terrace as indicated in Figure 3. The top-of-wall height should be at least 1-meter greater than the height of the cooling tower. The barrier itself must be of solid construction with no gaps along the length of the wall. The panels must be

constructed of materials having and overall surface density of 20 kg/m^2 or a sound transmission class rating of 30. The design of barrier should be reviewed by a qualified acoustic engineer during detailed design once proposed grades of the site are known.

- With regard to the cooling tower, the implementation of Whisper (Ultra) Quiet Fans as indicated in Section 4.3.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Financial Eastern Star to undertake a stationary noise feasibility assessment in support of a Sit Plan Application (SPA) for the proposed mixed-use development located at 1545 Bank 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 rooftop air handling equipment, cooling tower and 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, architectural drawings prepared by Chmiel Architects dated April 12, 2019, mechanical information provided by Smith + Anderson, 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 mixed-use development located at 1545 Bank Street in Ottawa, Ontario. The development is located on a "pentagonal shaped" parcel of land bound by Bank Street to the west, Evans Boulevard to the south, commercial land to the north and residential land to the east. The proposed development is an eight-storey 'J'-shape planform building with 2 levels of underground parking which is accessed via Evans Boulevard on the southeast corner of the development. The first floor is intended for commercial, residential and amenity use, with the remaining floors above intended for residential use. There is a common amenity area (terrace) situated on the roof toward the eastern side of the development. As per ENCG guidelines, the roof top terrace is identified as a noise sensitive as it is greater than 4 meters in depth. The primary sources of stationary noise include the roof top Make-Up Air handling unit (MUA), cooling tower and emergency generator. Figure 1 illustrates a site plan with surrounding context.

[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

2.1 Assumptions

Gradient Wind has been provided preliminary sound data of the roof top mechanical equipment by Smith + Anderson. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment. The following assumptions have been made in the analysis:

(i) Preliminary sound data for the roof top units are based on manufacturer's data.

(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) The generator will only be tested during the daytime hours (07:00 to 19:00)).

(iv) The generator was modelled with a standard-acoustically rated enclosure with a rating of 75 dBA at 7 m.

(v) The intake of the Make-Up Air unit has been strategically placed on the north façade of the mechanical penthouse as shown in Figure 3.

(vi) The cooling tower and emergency generator has been strategically placed as far back as possible from the roof top edge and the roof top terrace to limit the amount of exposure to the surrounding noise sensitive spaces as outlined in Figure 3.

(vii) A 4-meter-high solid noise barrier has been investigated along the south portion of the cooling tower and emergency generator area (proposed barrier location), as well as the northeastern corner of the roof top terrace (proposed alternative barrier location) as depicted in Figure 3.

(viii) Screening effects of parapets have been conservatively excluded from the analysis.

The equipment assumed in the model consisted of:

(i) Make-Up Air Unit (Comefri Model THLZ 200 T)

(ii) Cooling Tower (Baltimore Aircoil Company Model PT2-0412A-1H1)

(iii) Emergency Generator (Seneca Model 150GDMN)

Figure 3 illustrates the location of all the stationary sources within the development.

3. OBJECTIVES

The main goals of this work are to (i) calculate the on-site and off-site future 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. Nine (9) 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].

[3] NPC – 300, page 16

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, 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 adjacent to an arterial roadway. 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

4.3 Determination of Noise Source Power Levels

Preliminary mechanical information for the development has been based on information provided by Smith + Anderson, as well as Gradient Wind’s experience with similar developments. It should be noted that the cooling tower was modelled as a rectangular structure with sound emanating from all sides excluding the base representing the fans (top), air inlets (side) and motor (side). Gradient Wind has investigated the sound power associated with an assumed cooling tower fitted with a Low Noise Fan. It

[4] NPC – 300, page 14

was determined that sound levels at nearby on-site and off-site noise sensitive areas exceed exclusionary limits stipulated in Table 1 with the inclusion of noise mitigation methods such as acoustic louvers and solid walls surrounding the mechanical area. It was found that updating the cooling tower with a Whisper Quiet Fan (or Ultra Quiet Fan depending on manufacture options) and including a strategically placed solid noise barrier would be a more economically feasible noise mitigation solution. Table 2 summarizes the sound power of each source used in the analysis.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Equipment	Source ID	Description	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
N/A	Gen	Emergency Generator	-	-	-	-	100	-	-	-	100
N/A	S1	MUA	52	64	70	77	80	78	72	62	84
BAC-Whisper Quiet Fan	S2, S3	Cooling Tower Air In	56	70	77	80	78	73	72	70	84*
	S4	Cooling Tower Fan	57	72	81	84	83	81	76	69	89*
	S5	Cooling Tower Motor	58	71	81	82	79	75	74	71	87*
	S6	Cooling Tower Opp. Motor	57	70	80	80	78	73	72	70	85*

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

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 nine (9) 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. The emergency generator and cooling tower fan (S4) were modelled as a point source and emitting façade respectively, while the remaining sources were modelled as emitting façades. 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 in Appendix A. *Predictor-Lima* sample calculations are presented in Appendix A.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	OPOR – Roof Top Terrace	25.5
R2	OPOR – 1213 Willowdale Avenue	1.5
R3	POW – 1213 Willowdale Avenue	4.5
R4	POW – 1207 Willowdale Avenue	4.5
R5	OPOR – 1207 Willowdale Avenue	1.5
R6	POW – 1292 Chattaway Avenue	4.5
R7	OPOR – 1292 Chattaway Avenue	1.5
R8	OPOR – 1294 Chattaway Avenue	1.5
R9	POW – 1294 Chattaway Avenue	4.5

TABLE 4: CALCULATION SETTINGS

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

5. RESULTS AND DISCUSSION

Noise levels produced by the mechanical equipment are presented Table 5 while those due to the emergency generator are presented in Table 6. Emergency generators are only tested during the daytime period (07:00 – 19:00). Therefore, the criterion is 55 dBA. The emergency generator was evaluated separately from other sources of noise[5] (See NPC-300 C4.5.3). Noise levels at all outdoor points of reception and other plane of window receptors due to the generator fall below ENCG criteria provided our assumptions for noise control in Section 2.1 are adhered to.

TABLE 5: NOISE LEVELS FROM HVAC 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	OPOR – Roof Top Terrace	46	N/A	50	N/A	Yes	Yes
R2	OPOR – 1213 Willowdale Avenue	44	N/A	50	N/A	Yes	Yes
R3	POW – 1213 Willowdale Avenue	45	42	50	45	Yes	Yes
R4	POW – 1207 Willowdale Avenue	43	40	50	45	Yes	Yes
R5	OPOR – 1207 Willowdale Avenue	40	N/A	50	N/A	Yes	Yes

[5] Environmental Noise Guideline "Stationary and Transportation Sources – Approval and Planning" NPC-300

TABLE 5 (CONT): 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
R6	POW – 1292 Chattaway Avenue	45	42	50	45	Yes	Yes
R7	OPOR – 1292 Chattaway Avenue	45	N/A	50	N/A	Yes	Yes
R8	OPOR – 1294 Chattaway Avenue	42	N/A	50	N/A	Yes	Yes
R9	POW – 1294 Chattaway Avenue	44	41	50	45	Yes	Yes

N/A = sound levels during the nighttime are not considered as per ENCG

TABLE 6: NOISE LEVELS FROM EMERGENCY GENERATOR

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)	Sound Level Limits	Meets ENCG Class 1 Criteria
		Day	Day	Day
R1	OPOR – Roof Top Terrace	51	55	Yes
R2	OPOR – 1213 Willowdale Avenue	46	55	Yes
R3	POW – 1213 Willowdale Avenue	49	55	Yes
R4	POW – 1207 Willowdale Avenue	48	55	Yes
R5	OPOR – 1207 Willowdale Avenue	31	55	Yes
R6	POW – 1292 Chattaway Avenue	54	55	Yes
R7	OPOR – 1292 Chattaway Avenue	50	55	Yes
R8	OPOR – 1294 Chattaway Avenue	47	55	Yes
R9	POW – 1294 Chattaway Avenue	52	55	Yes

As Table 5 and 6 summarizes, noise levels fall below ENCG criteria at all receptors as long as the assumptions presented in Section 2.1 are adhered to. Noise contours at 1.5 m above grade can be seen in Figure 4 and 5 for daytime and nighttime conditions respectively. The main contributor of noise at the noise sensitive locations is the cooling tower which was determined to have to greatest impact on the roof top terrace (R1). As previously mentioned, the cooling tower and the emergency generator should be situated near the mechanical penthouse and away from the roof top edge, avoiding direct line of sight with noise sensitive areas if possible. As mentioned in Section 2.1, a solid noise wall was investigated at two strategic locations on the roof top, which both result in similar sound power levels below the exclusionary limits, as presented in Table 5 and 6. The first option is to include a solid noise wall flush with the mechanical penthouse façade and extend toward the roof top edge approximately 7.5-meters as shown in Figure 3. The top-of-wall height should be at least 1-meter greater than the height of the cooling tower. Should access to the generator and cooling tower be required, a portion of the solid wall flush with the mechanical penthouse can be placed offset from the remaining portion of the wall. This will create an access pathway while also blocking direct line of sight to the mechanical equipment.

The second option is to include a solid noise wall along the northeastern corner of the roof top terrace as indicated in Figure 3. The top-of-wall height should be at least 1-meter greater than the height of the cooling tower. With consideration of Gradient Wind's recommendations, the proposed development is expected to be compatible with the existing land uses.

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 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 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 installation of the equipment.

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

- A solid noise wall flush with the mechanical penthouse façade which extends outward toward the roof top edge approximately 7.5-meters as shown in Figure 3. Alternatively, a solid noise wall along the northeastern corner of the roof top terrace as indicated in Figure 3. The top-of-wall height should be at least 1-meter greater than the height of the cooling tower. The barrier itself must be of solid construction with no gaps along the length of the wall. The panels must be constructed of materials having and overall surface density of 20 kg/m^2 or a sound transmission class rating of 30. The design of barrier should be reviewed by a qualified acoustic engineer during detailed design once proposed grades of the site are known.

- With regard to the cooling tower, the implementation of Whisper Quiet Fans as indicated in Section 4.3.

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.

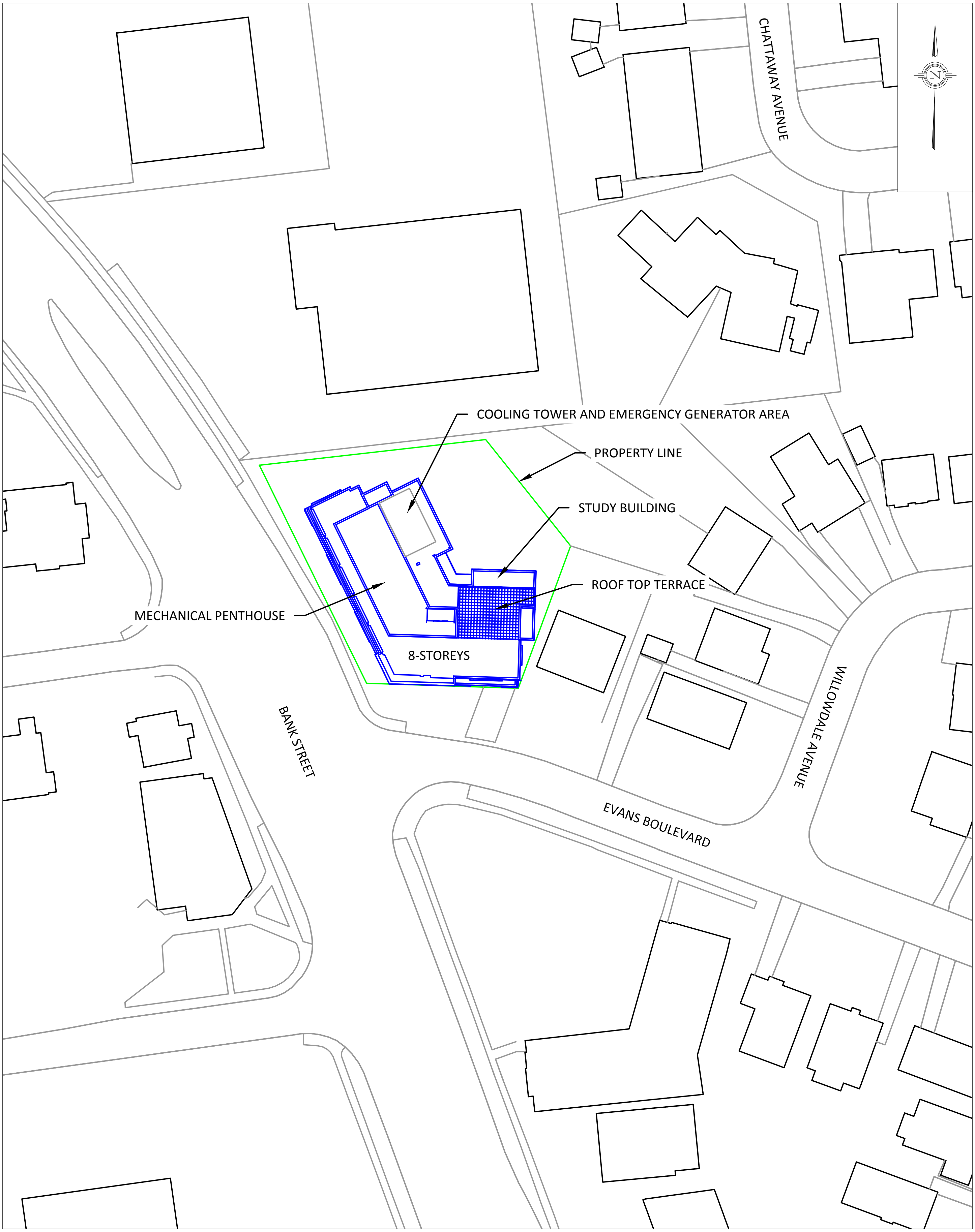
Sincerely,

Gradient Wind Engineering Inc.

LICENSED PROFESSIONAL ENGINEER
J. R. FOSTER
100155655
May 8, 2019
PROVINCE OF ONTARIO

Giuseppe Garro. MASc
Junior Environmental Scientist
Gradient Wind File #18-128 – Stationary Noise

Joshua Foster, P.Eng.
Principal



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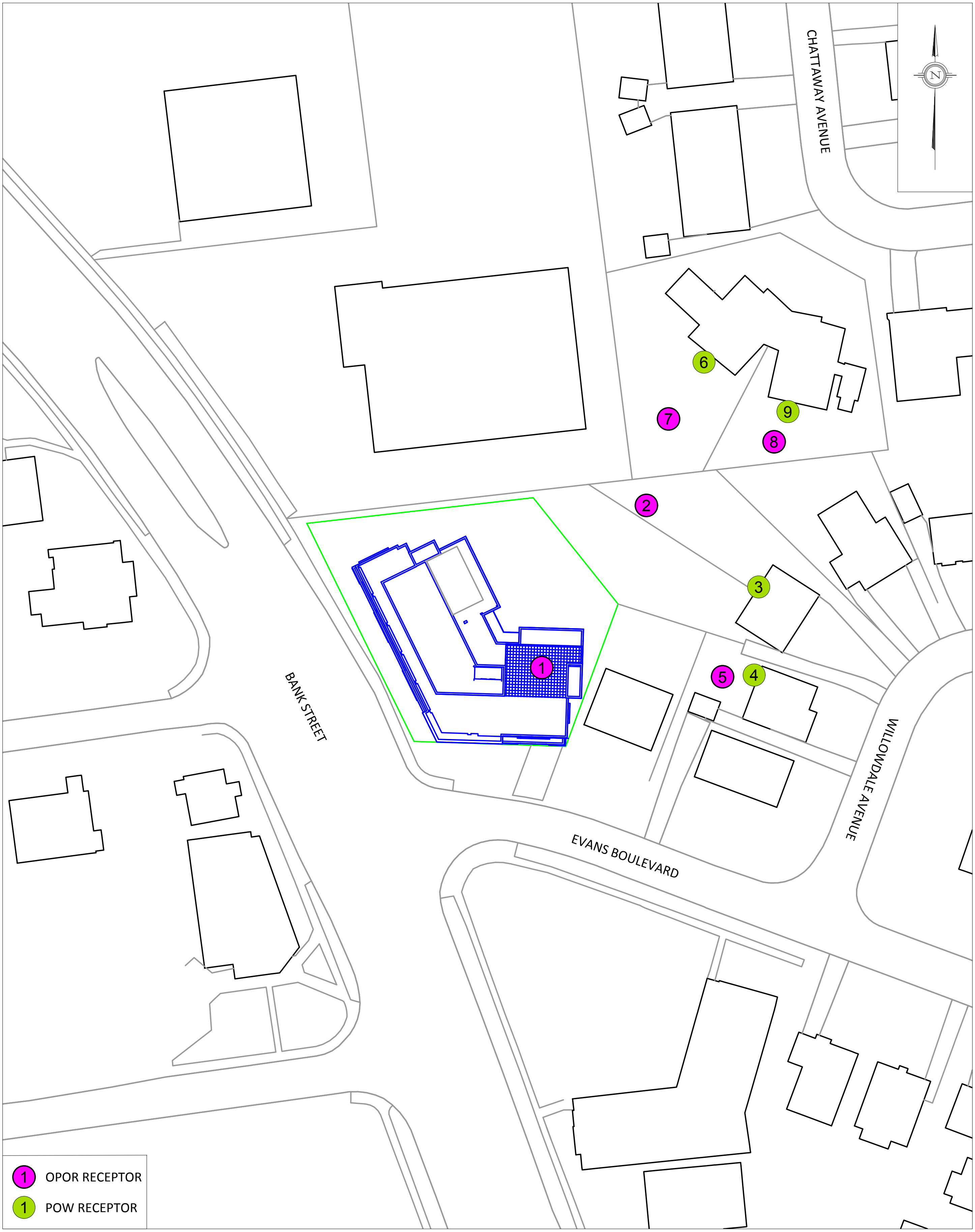
PROJECT		DESCRIPTION
1545 BANK STREET - STATIONARY NOISE FEASIBILITY STUDY		FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
SCALE: 1:1000 (APPROX.)	DRAWING NO.: GWE18-128-1	
DATE: MAY 2, 2019	DRAWN BY: G.G.	



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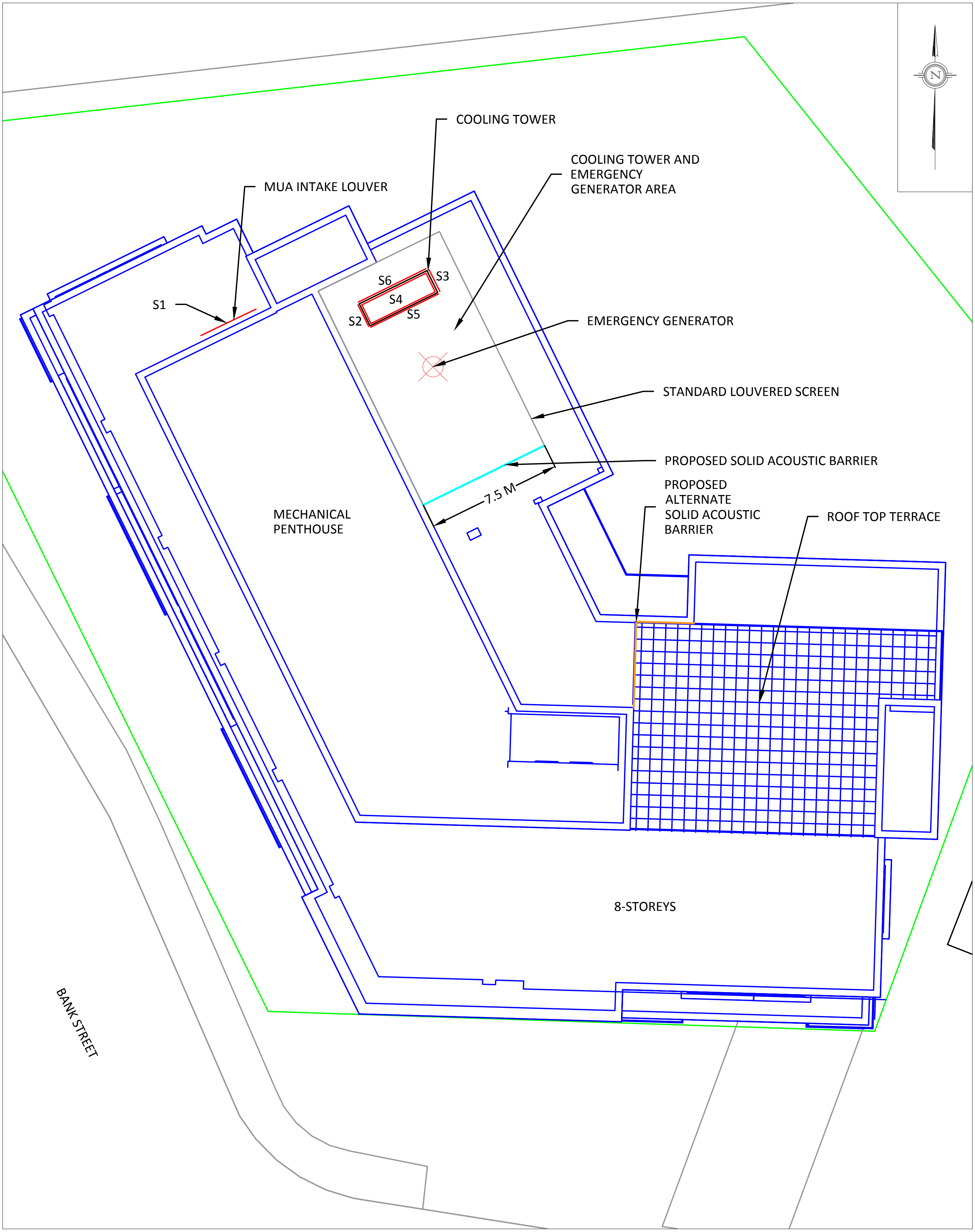
PROJECT	1545 BANK STREET - STATIONARY NOISE FEASIBILITY STUDY		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE18-128-2
DATE	MAY 2, 2019	DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS



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PROJECT	1545 BANK STREET - STATIONARY NOISE FEASIBILITY STUDY
SCALE	1:250 (APPROX.)
DRAWING NO.	GWE18-128-3
DATE	MAY 2, 2019
DRAWN BY	G.G.
DESCRIPTION	FIGURE 3: STATIONARY NOISE SOURCE LOCATIONS

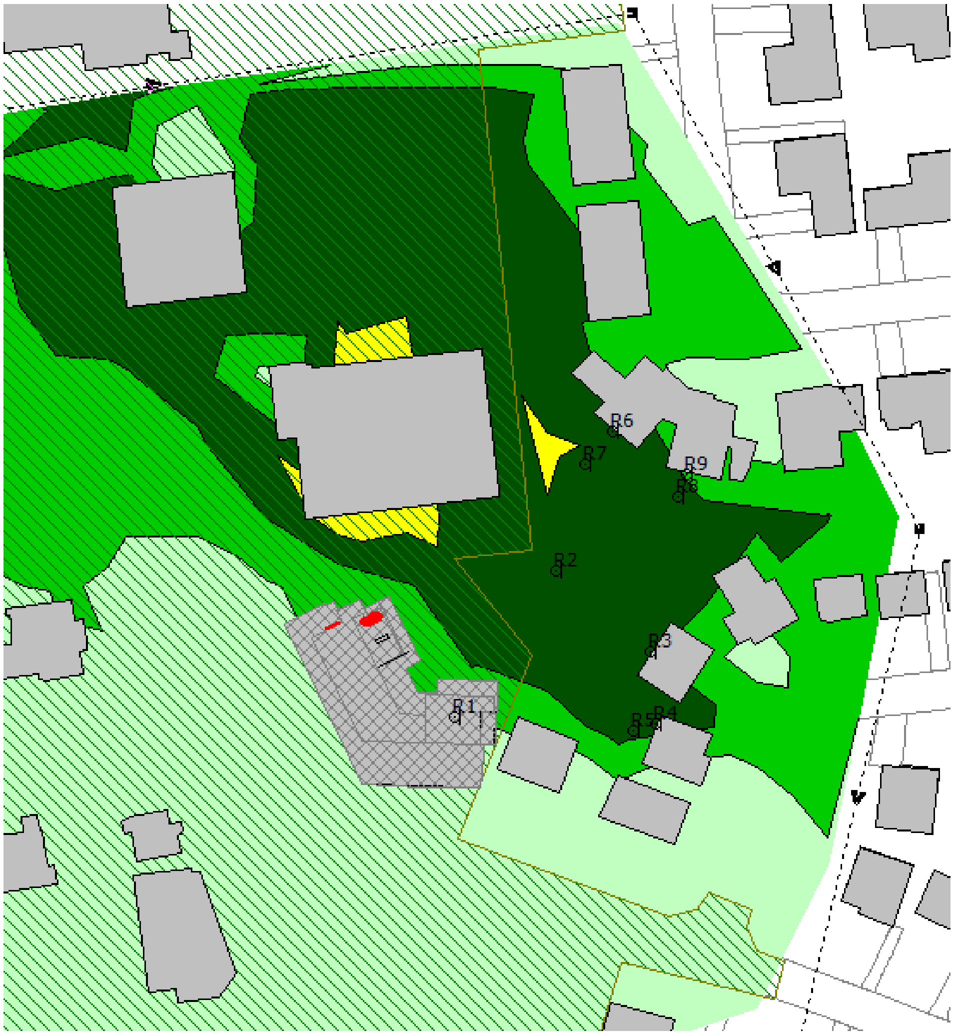


FIGURE 4: GROUND LEVEL NOISE CONTOURS FOR THE SITE (DAYTIME PERIOD)

	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

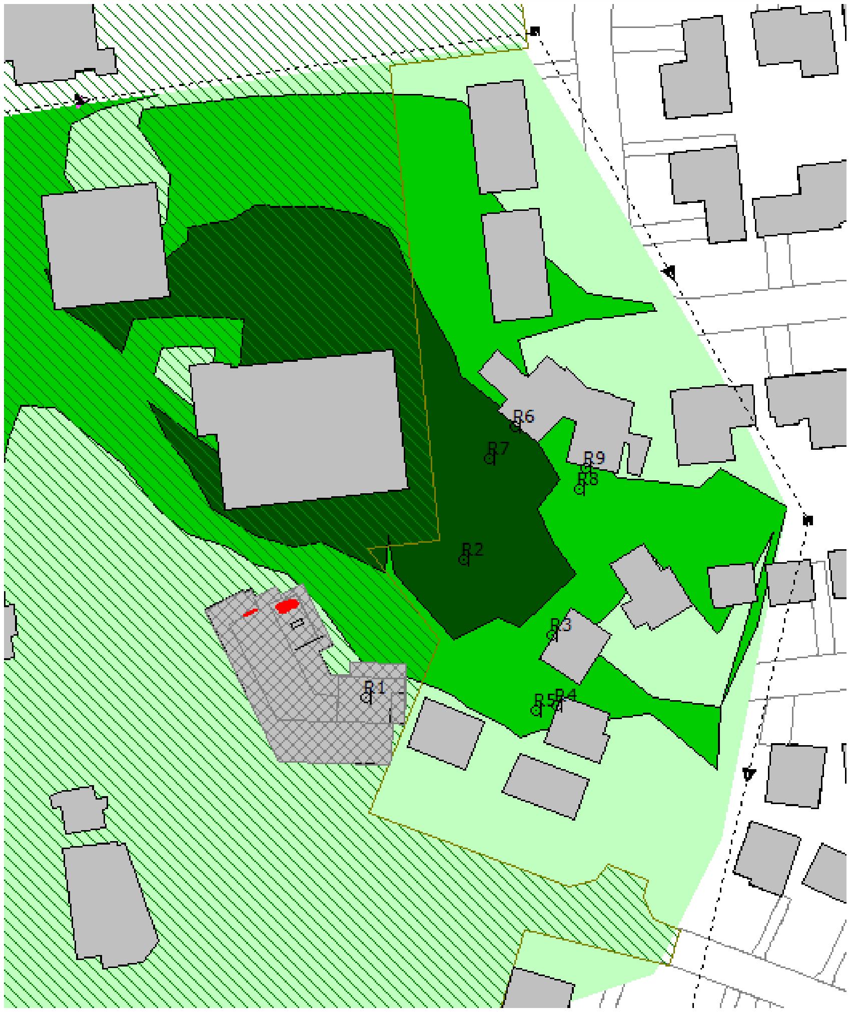
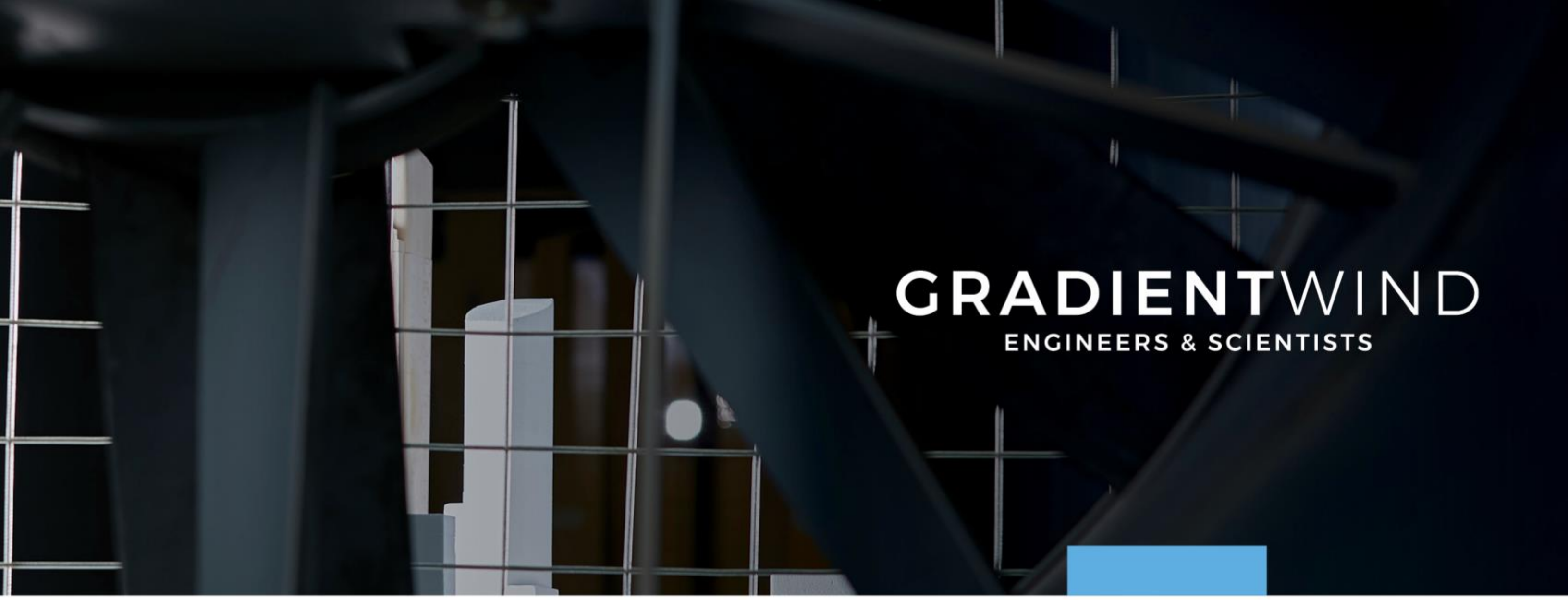


FIGURE 5: GROUND LEVEL NOISE CONTOURS FOR THE SITE (NIGHTTIME PERIOD)

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



APPENDIX A

PREDICTOR - LIMA – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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Cross	section	for	receiver	R1	(Id=-3124)	and	source	Gen	(Id=4617)
ItemType	Id	Distance	X	Y	Hgrnd	Height	GrndFact	Cluster	
Receiver	R1	0	369965.1	5027067	110.86	1.5	0		
Building	LWPOLYLIN	6.972	369960.2	5027072	86.86	24	0	252	
Building	LWPOLYLIN	14.623	369954.8	5027078	86.86	24	0	252	
Barrier	B	17.65	369952.7	5027080	110.86	4	0	252	
Pointsourc	Gen	22.068	369949.6	5027083	110.86	1.7	0		

L(wr)	--	--	--	--	--	100	--	--	--		
A(ground)	-3	-3	-3	-3	-3	-3	-3	-3	-3		
A(barrier)	6.39	7.56	9.23	11.38	13.89	16.63	19.49	20	20		
A(veg)	0	0	0	0	0	0	0	0	0		
A(sit)	0	0	0	0	0	0	0	0	0		
A(bld)	0	0	0	0	0	0	0	0	0		
A(air)	0	0	0.01	0.02	0.04	0.08	0.21	0.72	2.58		
A(geo)	37.87	37.87	37.87	37.87	37.87	37.87	37.87	37.87	37.87		
C(meteo)	0	0	0	0	0	0	0	0	0		

L(p)	--	--	--	--	--	48.43	--	--	--	|	48.43

Cross	section	for	receiver	R1	(Id=-3124)	and	source	Gen	(Id=4617)
[Reflection	in	facade	LWPOLYLIN	(Id=1439)]					
ItemType	Id	Distance	X	Y	Hgrnd	Height	GrndFact	Cluster	
Receiver	R1	0	369965.1	5027067	110.86	1.5	0		
Building(R)	LWPOLYLIN	18.882	369948.9	5027077	110.86	4	0		
Barrier	B	19.846	369949	5027078	110.86	4	0	252	
Pointsourc	Gen	24.908	369949.6	5027083	110.86	1.7	0		

L(wr)	--	--	--	--	--	100	--	--	--		
A(ground)	-3	-3	-3	-3	-3	-3	-3	-3	-3		
A(barrier)	6.23	7.31	8.89	10.96	13.41	16.12	18.97	20	20		
A(veg)	0	0	0	0	0	0	0	0	0		
A(sit)	0	0	0	0	0	0	0	0	0		
A(bld)	0	0	0	0	0	0	0	0	0		
A(air)	0	0	0.01	0.03	0.05	0.09	0.24	0.82	2.91		
A(geo)	38.92	38.92	38.92	38.92	38.92	38.92	38.92	38.92	38.92		
A(refl)	--	--	--	--	--	-0.97	-0.97	-0.97	-0.97		
C(meteo)	0	0	0	0	0	0	0	0	0		

L(p)	--	--	--	--	--	46.9	--	--	--	|	46.9

===

	Height	Source	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
	1.5	Gen	1	50.74	--	--	--	--	--	50.74	--	--	--
	1.5	Gen	2	--	--	--	--	--	--	--	--	--	--
	1.5	Gen	3	--	--	--	--	--	--	--	--	--	--
	1.5	Gen	4	--	--	--	--	--	--	--	--	--	--

===

	Height	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
	1.5	1	50.74	--	--	--	--	--	50.74	--	--	--
	1.5	2	--	--	--	--	--	--	--	--	--	--
	1.5	3	--	--	--	--	--	--	--	--	--	--
	1.5	4	--	--	--	--	--	--	--	--	--	--

	0.0000;	142;	0.0000001;	TTimerSet - overhead
	0.0005;	71;	0.0000071;	WriteTestString