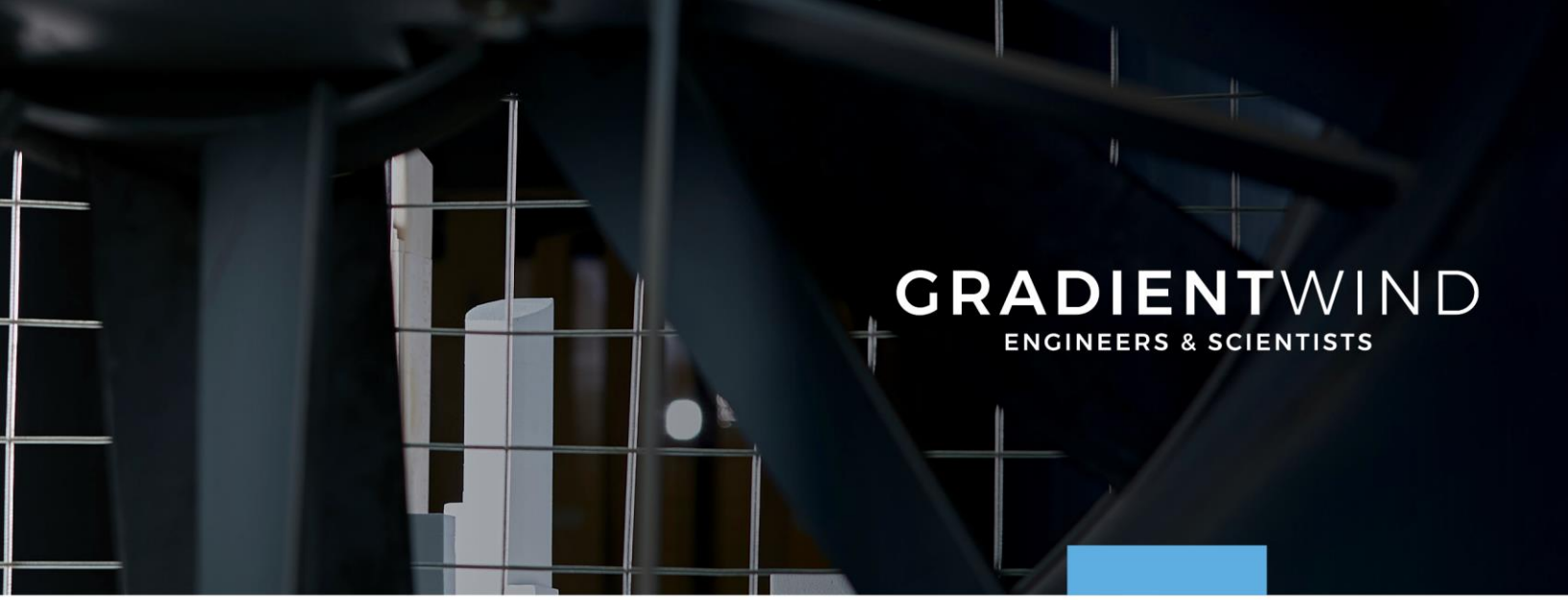
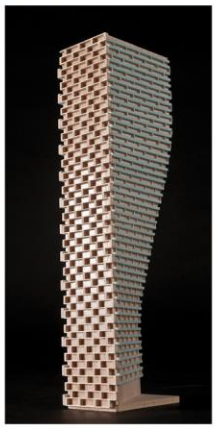


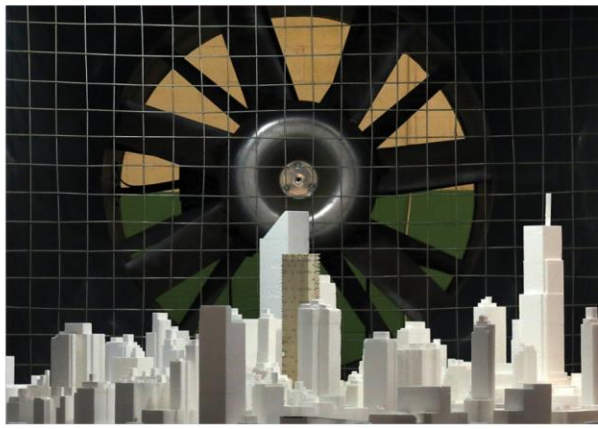
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE ASSESSMENT

620 Bobolink Ridge
Ottawa, Ontario

Report: 21-083–Traffic Noise





May 12, 2021

PREPARED FOR
Richcraft Group of Companies
2280 St. Laurent Boulevard, Suite 201
Ottawa, ON K1G 4K1

PREPARED BY
Efser Kara, MSc, LEED GA, Acoustic Scientist
Joshua Foster, P.Eng., Principal

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

EXECUTIVE SUMMARY

This report describes a traffic noise assessment undertaken for a proposed subdivision development known as CRT Lands – Block 344, located at 620 Bobolink Ridge in Ottawa, Ontario. The subdivision comprises a rectangular parcel of land and is part of the approved Fernbank Community Design Plan. The development is bounded by Bobolink Ridge to the northwest, Robert Grant Avenue from the north to the southeast, Cope Drive to the southeast/south, and Embankment Street to the west. Throughout this report, the elevation parallel with Bobolink Ridge is referred to as the north elevation.

The proposed development comprises seven blocks of terrace flats, each with 12 dwelling units, an accessory building, and amenity areas. Amenity areas are provided at grade on the west side of Block 2, on the east side of the accessory building, and at the southeast corner of the study site. These communal areas will be programmed as parks or passive landscaped areas. They are not intended to be used as outdoor living areas (OLA). At the rear of each block, OLAs are provided in the form of a rear yard. Vehicular access (driveways) is provided via Embankment Street with parking provided at grade.

The primary sources of traffic noise on the residential subdivision are Robert Grant Avenue and Cope Drive. Figure 1 illustrates the site location with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) concept plans prepared by M. David Blakely Architect Inc., dated April 2021.

The results of the current analysis indicated that noise levels at Plane of Window (POW) receptors will range between 48 and 63 dBA during the daytime period (07:00-23:00) and between 41 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the facades of the dwellings, which are nearest and most exposed to Robert Grant Avenue and Cope Road. Building components compliant with the Ontario Building Code (OBC 2012) will be sufficient for the dwellings as noise levels at POW receptors do not exceed 65 dBA ENCG criteria. Figures 6 and 7 illustrate daytime and nighttime noise contours throughout the site at a height of 9.5 m above grade.

The noise levels at the outdoor living areas (OLA), represented by Receptors 8 and 9 (Blocks 5 and 3, respectively) exceed the ENCG criteria. Therefore, a noise barrier investigation was conducted using Predictor-Lima. The result of the noise barrier investigation indicated that a noise barrier with a standard height of 2.2 metres will be required to reduce the noise levels below 60 dBA. The noise barrier should be built with solid elements having a minimum surface mass of 20 kg/m² and contain no gaps. The location of the noise barriers can be seen in Figure 4. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

The results of the analysis also indicated that forced air heating with provision for the installation of central air conditioning will be required (see Figures 5 and 6) for the blocks of the proposed development. Warning Clauses will also be required to be placed on all Lease, Purchase and Sale Agreements for the development.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Richcraft Group of Companies to undertake a traffic noise assessment for a proposed subdivision development known as CRT Lands – Block 344 located at 620 Bobolink Ridge in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on concept plans prepared by M. David Blakely Architect Inc., dated April 2021, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications and theoretical capacities.

2. TERMS OF REFERENCE

The focus of this traffic noise assessment is a proposed subdivision development known as CRT Lands – Block 344, located at 620 Bobolink Ridge in Ottawa, Ontario. The subdivision comprises a rectangular parcel of land and is part of the approved Fernbank Community Design Plan. The development is bounded by Bobolink Ridge to the northwest, Robert Grant Avenue from the north to the southeast, Cope Drive to the southeast/south, and Embankment Street to the west. Throughout this report, the Bobolink Ridge elevation is referred to as the north elevation.

The proposed development comprises seven blocks of townhouses, each with 12 units, an accessory building, and outdoor amenity areas. Amenity areas are provided at grade on the west side of Block 2, on the east side of the accessory building, and at the southeast corner of the study site. These communal areas will be programmed as parks or passive landscaped areas. They are not intended to be used as outdoor living areas (OLA). At the rear of each block, OLAs are provided in the form of a rear yard. Vehicular access (driveways) is provided via Embankment Street with parking provided at grade. The

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment, Conservation and Parks – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

proposed development is surrounded by low-rise residential buildings to the east, future low-rise residential buildings to the north and west, and an open area to the south.

The primary sources of traffic noise on the residential subdivision are Robert Grant Avenue and Cope Drive. Figure 1 illustrates the site location with the surrounding context.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

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 particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise 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 better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a 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 period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8})

nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

Type of Space	Time Period	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of **residences**, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of **residences**, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[6].

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

4.2.2 Theoretical Roadway Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. A set of comparative calculations were performed in the current Ontario traffic noise prediction model STAMSON for comparisons to Predictor simulation results. The STAMSON model is, however, older and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections and multiple screening elements, and curved road geometry. A total of eleven (11) receptor locations were identified around the site, as illustrated in Figure 2.

Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing and proposed building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all roads was taken to be 92% / 8%, respectively.
- The ground surface was modelled as absorptive where grass and foliage (soft ground) are present, and as reflective where pavement and concrete are present (hard ground).
- Topography was assumed to be a flat/gentle slope throughout the study site.
- Six (6) receptor locations were chosen at the façades of the dwellings as Plane of Window (POW) receptors at two different heights above grade; 4.5 and 9.5 metres (see Figure 2).
- Five (5) receptor locations were chosen as OLA receptors at 1.5 metres above grade (see Figure 2).

- One (1) OLA and Two (2) POW receptors with direct exposure from Robert Grant Avenue and Cope Drive were calculated in STAMSON in order to display the correlation between the Predictor and STAMSON calculation results. The receptor distances to roadway traffic sources and exposure angles are illustrated in Figure 3.
- The intermediate surface in the STAMSON calculations was taken as absorptive due to the presence of lawn at the immediate area of the receptors.

4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[7] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Robert Grant Avenue	2-Lane Urban Arterial	60	**15,000**
Cope Drive	2-Lane Major Collector	50	**12,000**

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below. The results of the current analysis indicated that noise levels at Plane of Window (POW) receptors will range between 48 and 63 dBA during the daytime period (07:00-23:00) and between 41 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the facades of the dwellings, which are nearest and most exposed to Robert Grant Avenue and Cope Road. Figures 6 and 7 illustrate daytime and nighttime noise contours throughout the site at a height of 9.5 m above grade.

[7] City of Ottawa Transportation Master Plan, November 2013

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor ID	Receptor Location	Receptor Height (m)	PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night
R1	POW – Block 7 South Façade	4.5	63	55
		9.5	62	55
R2	POW – Block 6 East Façade	4.5	62	54
		9.5	62	54
R3	POW – Block 5 East Façade	4.5	62	55
		9.5	62	55
R4	POW – Block 2 East Façade	4.5	63	55
		9.5	63	55
R5	POW – Block 1 East Façade	4.5	60	53
		9.5	60	53
R6	POW – Block 1 North Façade	4.5	48	41
		9.5	49	42
R7	OLA – Block 7 North Backyard	1.5	55	N/A*
R8	OLA – Block 5 North Backyard	1.5	62	N/A*
R9	OLA – Block 3 North Backyard	1.5	62	N/A*
R10	OLA – Block 2 West Backyard	1.5	40	N/A*
R11	OLA – Block 1 South Backyard	1.5	60	N/A*

* Outdoor Living Areas (OLA) during the nighttime are not considered as per the ENCG.

Table 4 shows a comparison of results from Predictor and STAMSON. Noise levels calculated in STAMSON were found to have a good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±0-2 dBA.

TABLE 4: RESULT CORRELATION WITH STAMSON

Receptor ID	Receptor Location	Receptor Height (m)	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R2	POW – Block 6 East Façade	4.5	63	56	62	54
R3	POW – Block 5 East Façade	4.5	63	55	62	55
R9	OLA – Block 3 North Backyard	1.5	62	N/A*	62	N/A*

* Outdoor Living Areas (OLA) during the nighttime are not considered as per the ENCG.

Building components compliant with the Ontario Building Code (OBC 2012) will be sufficient for the dwellings as noise levels at POW receptors do not exceed the 65 dBA ENCG criteria. The noise levels at the OLA receptors, represented by Receptors 8 and 9 (Blocks 5 and 3, respectively) exceed the ENCG criteria. A noise barrier investigation was conducted using Predictor (see Section 5.2).

5.2 Noise Barrier Calculation

When OLA noise levels exceed 55 dBA and are less than or equal to 60 dBA, mitigation should be considered to reduce noise levels to 55 dBA if technically, economically, and administratively feasible. If noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels below 60 dBA. Our preliminary analysis showed that reducing the noise levels to 55 dBA would not be feasible. Further analysis of noise barriers showed that the Outdoor Living Area (OLA) noise levels only exceed 60 dBA at Receptors 8 and 9, the OLA of Blocks 5 and 3, respectively. The result of the noise barrier investigation indicated that installation of a noise barrier with a standard height of 2.2 metres will be required to reduce the noise levels below 60 dBA. The noise barrier should be built with solid elements having a minimum surface mass of 20 kg/m² and contain no gaps. Table 5 summarizes the results of the barrier investigation. The location of the noise barriers can be seen in Figure 4.

TABLE 5: RESULTS OF NOISE BARRIER INVESTIGATION

Receptor ID	Barrier Height Above Grade (m)	Above Grade Receptor Height (m)	Receptor Location	Daytime L_{eq} Noise Levels (dBA)	
				Without Barrier	With Barrier
8	2.2	1.5	OLA – Block 5 North Backyard	62	58
8	2.2	1.5	OLA – Block 3 North Backyard	62	58

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicated that noise levels at Plane of Window (POW) receptors will range between 48 and 63 dBA during the daytime period (07:00-23:00) and between 41 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the facades of the dwellings, which are nearest and most exposed to Robert Grant Avenue and Cope Road. Building components compliant with the Ontario Building Code (OBC 2012) will be sufficient for the dwellings as noise levels at POW receptors do not exceed 65 dBA ENCG criteria. Figures 6 and 7 illustrate daytime and nighttime noise contours throughout the site at a height of 9.5 m above grade.

The noise levels at the outdoor living areas (OLA), represented by Receptors 8 and 9 (Blocks 5 and 3, respectively) exceed the ENCG criteria. Therefore, a noise barrier investigation was conducted using Predictor-Lima. The result of the noise barrier investigation indicated that a noise barrier with a standard height of 2.2 metres will be required to reduce the noise levels below 60 dBA. The noise barrier should be built with solid elements having a minimum surface mass of 20 kg/m² and contain no gaps. The location of the noise barriers can be seen in Figure 4. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.

3. Layout plan, and wall elevations, showing proposed colours and patterns.

The results of the analysis also indicated that forced air heating with provision for the installation of central air conditioning will be required (see Figures 5 and 6) for the blocks of the proposed development. Warning Clauses will also be required to be placed on all Lease, Purchase and Sale Agreements for the development.

Warning Clause for Blocks 3, 4 & 5:

> *"Purchasers/tenants are advised that sound levels due to increasing roadway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.*
>
> *To help address the need for sound attenuation this development includes:*
>
> - *An acoustic barrier*
>
> *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.*
>
> *The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.*
>
> *This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment."*

Warning Clause for Blocks 1, 2, 6 and 7:

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the dwellings, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.*
>
> *This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment."*

This concludes our roadway traffic noise assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

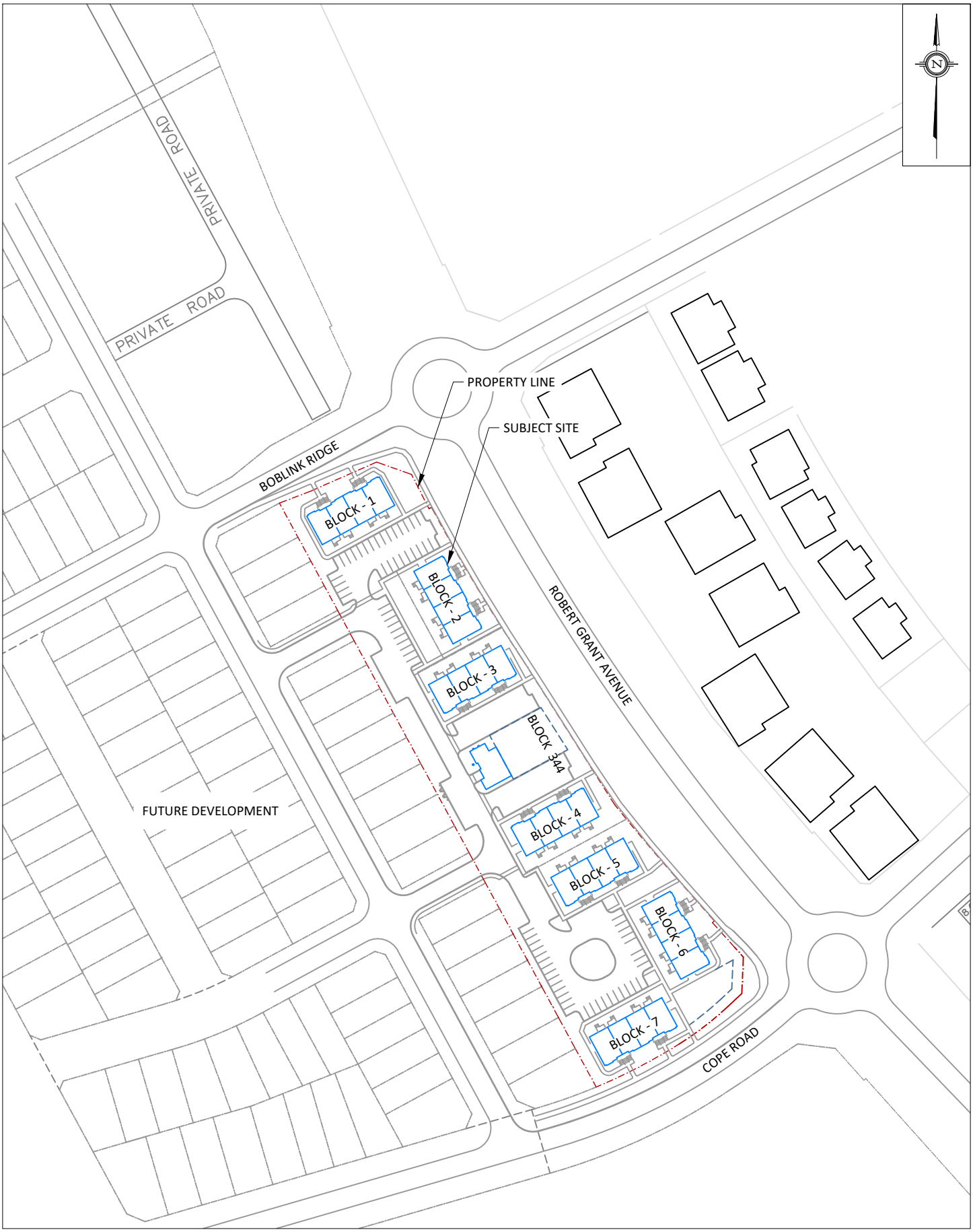
Sincerely,

Gradient Wind Engineering Inc.

Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #21-083-Traffic Noise



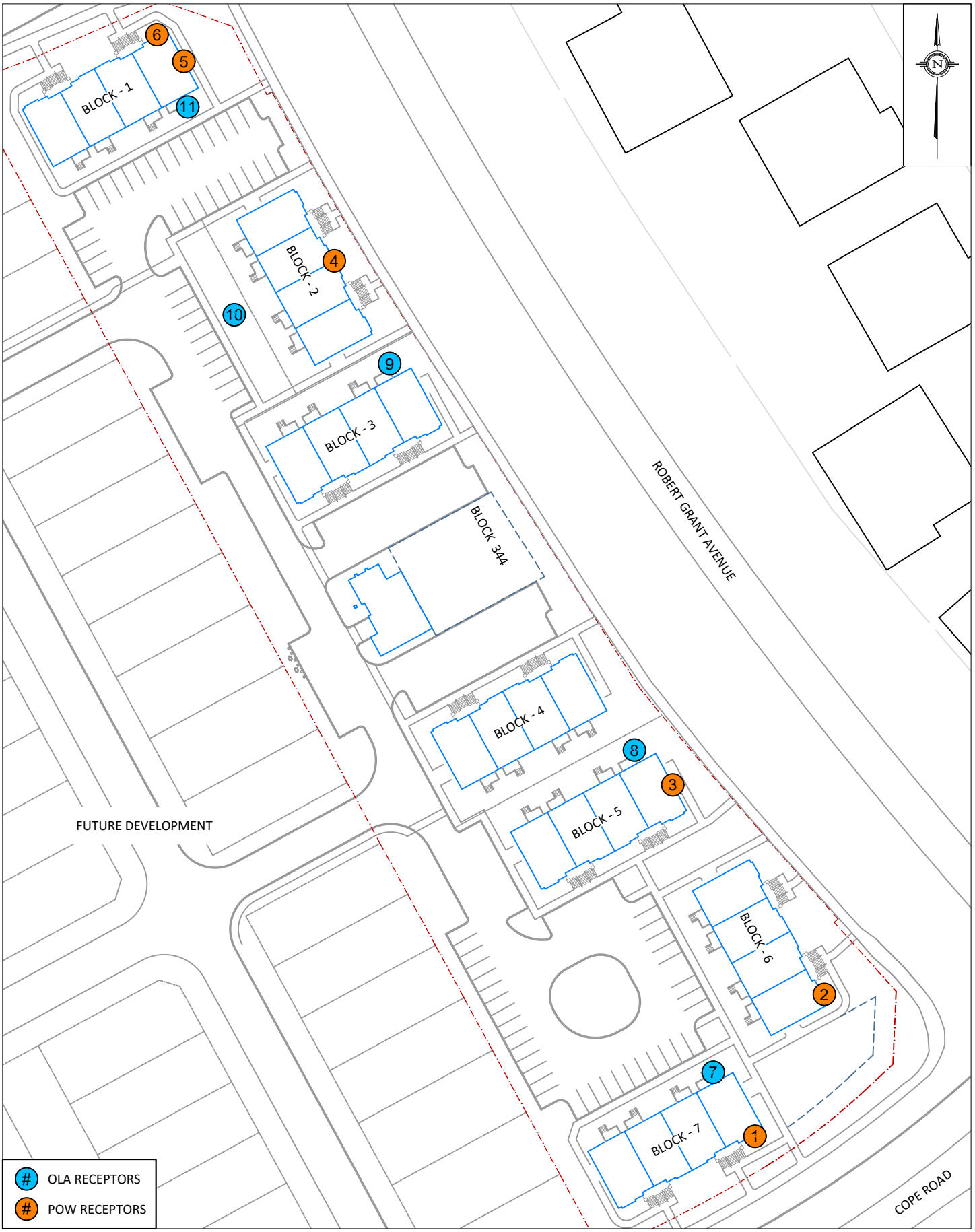
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	620 BOBOLINK RIDGE, STITTSVILLE OTTAWA TRAFFIC NOISE ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW21-083-1
DATE	APRIL 22, 2021	DRAWN BY	E.K.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

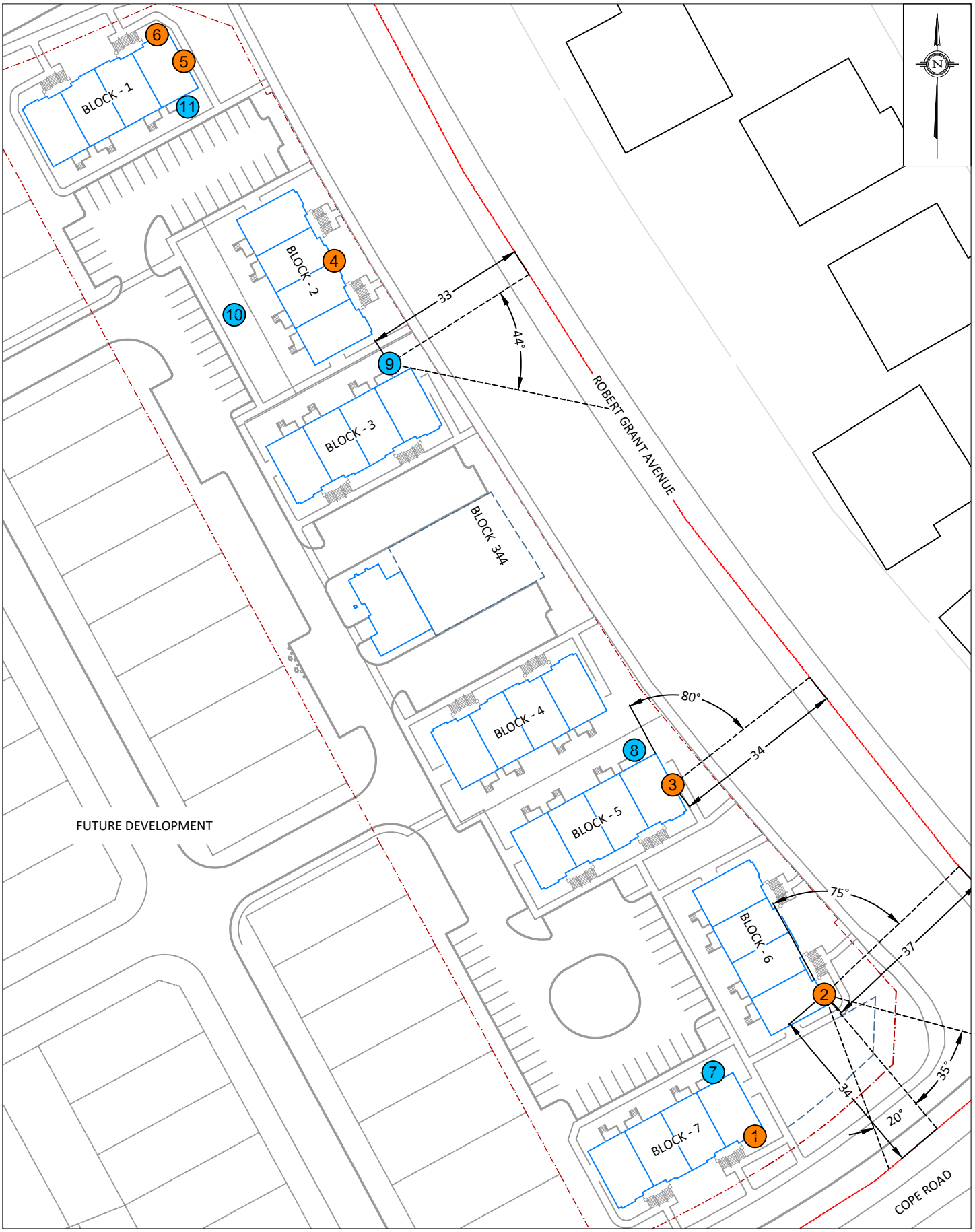


GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	620 BOBOLINK RIDGE, STITTSVILLE OTTAWA TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-083-2
DATE	APRIL 22, 2021	DRAWN BY	E.K.

FIGURE 2:
RECEPTOR LOCATIONS



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	620 BOBOLINK RIDGE, STITTSVILLE OTTAWA TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-083-3
DATE	APRIL 22, 2021	DRAWN BY	E.K.

FIGURE 3:
STAMSON INPUT DATA
FOR RECEPTORS 2, 3 & 9

GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	620 BOBOLINK RIDGE, STITTSVILLE OTTAWA TRAFFIC NOISE ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GW21-083-4
DATE	APRIL 22, 2021
DRAWN BY	E.K.

DESCRIPTION

FIGURE 4:
NOISE BARRIER LOCATIONS

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

PROJECT	620 BOBOLINK RIDGE, STITTSVILLE OTTAWA TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW21-083-5
DATE	APRIL 22, 2021
DRAWN BY	E.K.
DESCRIPTION	FIGURE 5: VENTILATION REQUIREMENTS

FIGURE 6: DAYTIME TRAFFIC NOISE CONTOURS (9.5 M ABOVE GRADE)

FIGURE 7: NIGHTTIME TRAFFIC NOISE CONTOURS (9.5 M ABOVE GRADE)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

STAMSON 5.0 NORMAL REPORT Date: 22-04-2021 18:00:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R02.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Robert Grant (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Robert Grant (day/night)

Angle1 Angle2 : -75.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 37.00 / 37.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Cope Drive (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Cope Drive (day/night)

Angle1 Angle2 : -35.00 deg 20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Robert Grant (day)

Source height = 1.50 m

ROAD (0.00 + 62.39 + 0.00) = 62.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	90	0.57	70.00	0.00	-6.16	-1.45	0.00	0.00	0.00	62.39

Segment Leq : 62.39 dBA

Results segment # 2: Cope Drive (day)

Source height = 1.50 m

ROAD (0.00 + 56.66 + 0.00) = 56.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	20	0.57	67.51	0.00	-5.58	-5.27	0.00	0.00	0.00	56.66

Segment Leq : 56.66 dBA

Total Leq All Segments: 63.42 dBA

Results segment # 1: Robert Grant (night)

Source height = 1.50 m

ROAD (0.00 + 54.79 + 0.00) = 54.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	90	0.57	62.40	0.00	-6.16	-1.45	0.00	0.00	0.00	54.79

Segment Leq : 54.79 dBA

Results segment # 2: Cope Drive (night)

Source height = 1.50 m

ROAD (0.00 + 49.06 + 0.00) = 49.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	20	0.57	59.91	0.00	-5.58	-5.27	0.00	0.00	0.00	49.06

Segment Leq : 49.06 dBA

Total Leq All Segments: 55.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.42
(NIGHT): 55.82

STAMSON 5.0 NORMAL REPORT Date: 22-04-2021 17:46:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R03.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Robert Grant (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Robert Grant (day/night)

Angle1 Angle2 : -80.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Robert Grant (day)

Source height = 1.50 m

ROAD (0.00 + 63.04 + 0.00) = 63.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	90	0.57	70.00	0.00	-5.58	-1.38	0.00	0.00	0.00	63.04

Segment Leq : 63.04 dBA

Total Leq All Segments: 63.04 dBA

Results segment # 1: Robert Grant (night)

Source height = 1.50 m

ROAD (0.00 + 55.44 + 0.00) = 55.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	90	0.57	62.40	0.00	-5.58	-1.38	0.00	0.00	0.00	55.44

Segment Leq : 55.44 dBA

Total Leq All Segments: 55.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.04
(NIGHT): 55.44

STAMSON 5.0 NORMAL REPORT Date: 22-04-2021 17:25:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R09.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Robert Grant (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Robert Grant (day/night)

Angle1 Angle2 : -90.00 deg 44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 / 33.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Robert Grant (day)

Source height = 1.50 m

ROAD (0.00 + 61.99 + 0.00) = 61.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	44	0.66	70.00	0.00	-5.68	-2.32	0.00	0.00	0.00	61.99

Segment Leq : 61.99 dBA

Total Leq All Segments: 61.99 dBA

Results segment # 1: Robert Grant (night)

Source height = 1.50 m

ROAD (0.00 + 54.39 + 0.00) = 54.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	44	0.66	62.40	0.00	-5.68	-2.32	0.00	0.00	0.00	54.39

Segment Leq : 54.39 dBA

Total Leq All Segments: 54.39 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.99
(NIGHT): 54.39