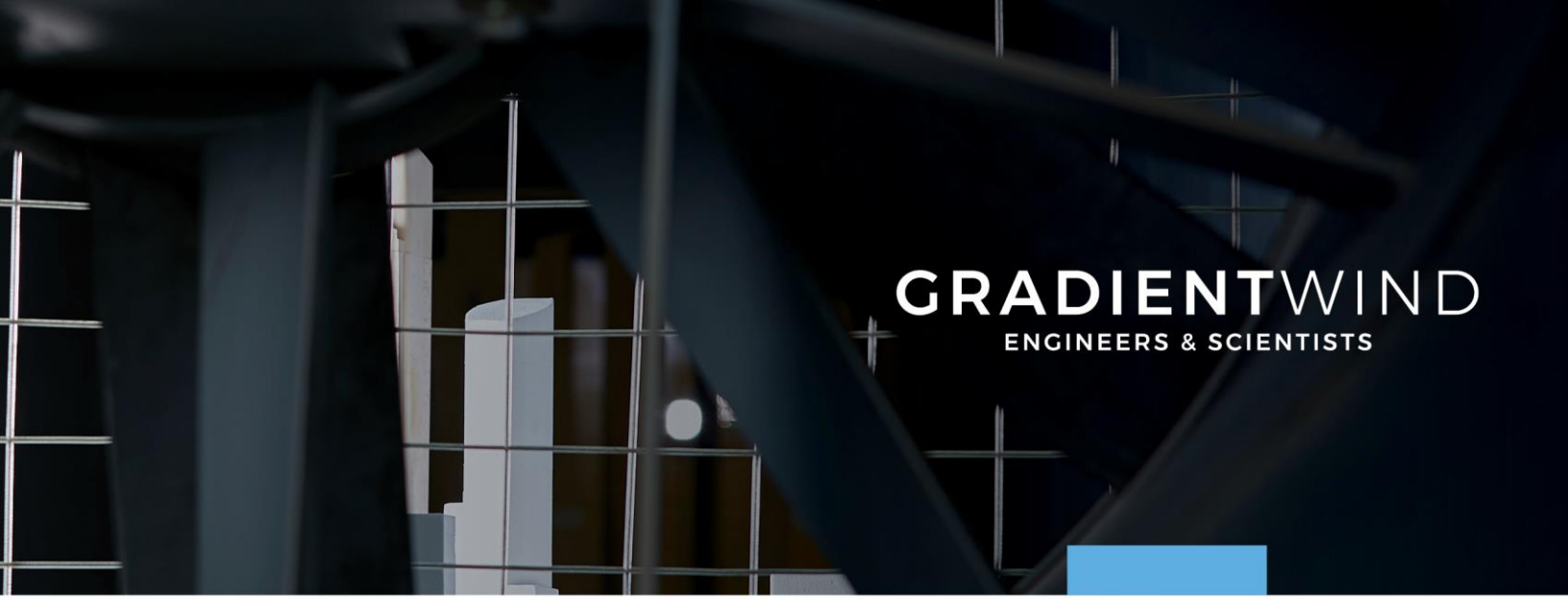
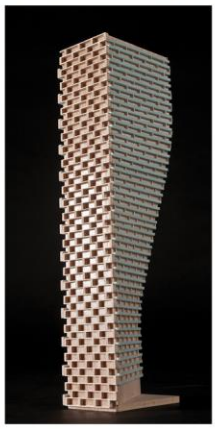


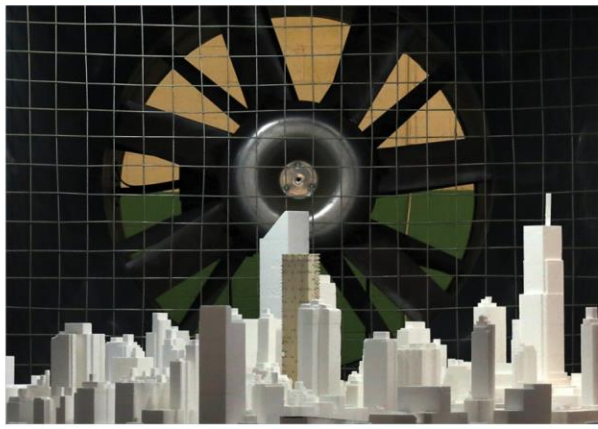
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

Cardinal Creek Village South
Ottawa, Ontario

Report: 21-428 – Traffic Noise





November 19, 2024

PREPARED FOR

Tamarack Developments
3187 Albion Road South
Ottawa, ON
K1V 8Y3

PREPARED BY

Benjamin Page, AdvDip, Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment for the proposed Cardinal Creek Village South subdivision development located in Ottawa, Ontario. The site is adjacent to Phase 5 of Cardinal Creek Village located across Old Montreal Road, bound by Cox Country Road to the east. The proposed development comprises numerous lots and blocks, for which building massing has not been finalized. It is expected that the buildings will comprise 2-storey single-family dwellings and townhouses. Outdoor living areas are expected in the rear yard of each dwelling. The major sources of roadway traffic noise are Old Montreal Road to the north, Cox Country Road to the east, and the internal Streets No. 1, 11, and 13 connecting Old Montreal Road to Cox Country Road. 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) drawings provided by Annis, O'Sullivan, Vollebekk Ltd. in October 2024.

Results of the roadway traffic noise calculations indicate that dwellings within the 55 to 65 dBA contour (red and orange areas in contours in Figure 8) will require forced air heating with provision for air conditioning (see Figure 3). Dwellings within the 65 dBA and 70 dBA contours (maroon areas in contours of Figure 8) with require the installation of air conditioning (see Figure 3). Results of the roadway traffic noise calculations also indicate that outdoor living areas on blocks adjacent to and having direct exposure to Old Montreal Road and/or Cox Country Road will likely require noise control measures (see Figure 3). These measures are briefly described in Section 5.2, with the aim to reduce the L_{eq} to as close to 55 dBA as technically, economically and administratively feasible. It should be noted that dwellings within the subdivision will benefit from the blockage provided by the surrounding dwellings. A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development. Warning Clauses will also be required on purchase, sale, and lease agreements. Specific mitigation will be determined during the detailed design assessment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Tamarack Developments to undertake a roadway traffic noise feasibility assessment for the proposed Cardinal Creek Village South subdivision development located in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a roadway traffic noise feasibility assessment, prepared in support of draft plan of subdivision and rezoning applications.

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 a plan of subdivision drawings provided by Annis, O'Sullivan, Vollebekk Ltd. in October 2024, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications. This report has been updated since the original report was issued on January 4, 2022, to address changes in the draft plan of the subdivision

2. TERMS OF REFERENCE

The proposed development is located in the east end of Orleans, southwest of the intersection of Old Montreal Road and Cox Country Road. The site is adjacent to Phase 5 of the Cardinal Creek Village subdivision across Old Montreal Road. The proposed development comprises numerous lots and blocks, for which building massing has not been finalized. It is expected that the buildings will comprise 2-storey single-family dwellings and townhouses. Outdoor living areas are expected in the rear yard of each dwelling. The properties are accessed by a series of internal roadways labelled Streets No. 1 to 14. Schools are located at blocks 349 and 409, and a park at block 348.

The site is surrounded by Cardinal Creek Village Phase 5 to the north, Phase 4 to the west, an existing subdivision to the east, and open farmland to the south. The major sources of roadway traffic noise are Old Montreal Road to the north, Cox Country Road to the east, and the internal Streets No. 1, 11, and 13 connecting Old Montreal Road to Cox Country Road.

[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

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) explore potential mitigation where required.

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].

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.

[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

4.2.2 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs. To provide a general sense of noise across the site, the employed software program was Predictor-Lima (TNM calculation), which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid with 10 × 10 m spacing was placed across the study site, along with a number of discrete receptors at key sensitive areas.

Although this program outputs noise contours, it is not the approved model for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the Ministry of the Environment, Conservations and Parks (MECP) computerized noise assessment program, STAMSON 5.04, at key receptor locations coinciding with receptor locations in Predictor as shown in Figure 2, as well as receptor distances. Appendix A includes the STAMSON 5.04 input and output data.

Roadway noise calculations were performed by treating each road segment as separate line sources of noise. In addition to the traffic volumes summarized in Table 2 below, 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 was taken to be 92% / 8% respectively for all streets.
- Receptor heights taken to be 4.5 m above grade, representative of a 2nd-floor window.
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics.
- The study site was treated as having flat or gently sloping topography.
- Six receptors were strategically placed throughout the study area as indicated in Figure 2.
- Receptor distances and exposure angles are illustrated in Figures 4 to 6.

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. With the Transportation Master Plan now under review, the expansion of Old Montreal Road is unlikely to occur within the affordability network.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Internal Streets No. 1, 15, 12	2-Lane Collector (2-UCU)	40	**8,000**
Old Montreal Road	2-Lane Urban Arterial-Undivided (2-UAU)	80	**15,000**
Cox Country Road	2-Lane Collector (2-UCU)	80	**8,000**

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations for the daytime period, covering the entire study site, are shown in Figure 7-8 at ground level and 4.5 m above grade. Discrete receptors were also placed at key locations throughout the site. The noise contours were generated using TNM and verified with discrete receptors using STAMSON 5.04, as shown in Figure 2 and summarized in Table 3 below. Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations.

[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)	STAMSON 5.04 Noise Level (dBA)		Predictor-Lima Noise Level (dBA)	
			Day	Night	Night	Day
R1	POW – Lot 199 East Façade	4.5	66	59	67	60
R2	POW – Lot 295 North Façade	4.5	69	61	69	61
R3	POW – Lot 1 East Façade	4.5	60	52	61	53
R4	POW – Lot 110 North Façade	4.5	62	55	62	53
R5	POW – Lot 398 East Façade	4.5	67	59	67	59
R6	POW – Lot 171 East Façade	4.5	67	60	67	59

As shown above, the results calculated from TNM correlate well with calculations performed in STAMSON 5.04. A tolerance of 3 dBA between models is generally considered acceptable given human hearing cannot detect a change in sound level of less than 3 dBA.

5.2 Noise Control Measures

Results of the roadway traffic noise calculations indicate that dwellings within the 55 dBA and 65 dBA contours (red and orange areas in contours in Figure 8) will require forced air heating with provision for air conditioning (see Figure 3). Dwellings within the 65 dBA and 70 dBA contours (maroon areas in contours in Figure 8) require the installation of air conditioning (see Figure 3). It should be noted that dwellings within the subdivision will benefit from the blockage provided by the surrounding dwellings.

Outdoor living areas on blocks adjacent to and having direct exposure to Old Montreal Road and/or Cox Country Road will likely require noise control measures (see Figure 3) as the noise levels predicted due to roadway traffic exceed the criteria listed in the ENCG for outdoor living areas. Therefore, noise control measures as described below, subscribing to Table 2.3a in the ENCG and listed in order of preference, will be required to reduce the L_{eq} to below 60 dBA and as close to 55 dBA as technically and administratively feasible:

- Distance setback with soft ground
- Insertion of noise-insensitive land uses between the source and sensitive points of reception
- Orientation of buildings to provide sheltered zones in rear yards
- Shared outdoor amenity areas
- Earth berms (sound barriers)
- Acoustic barriers

A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development. Warning Clauses will also be required on purchase, sale, and lease agreements. Specific mitigation will be determined during the detailed design assessment.

6. CONCLUSIONS AND RECOMMENDATIONS

Results of the roadway traffic noise calculations indicate that dwellings within the 55 to 65 dBA contour (red and orange areas in contours of Figure 8) will require forced air heating with provision for air conditioning (see Figure 3). Dwellings within the 65 dBA and 70 dBA contours (maroon areas in contours of Figure 8) require the installation of air conditioning (see Figure 3). Results of the roadway traffic noise calculations also indicate that outdoor living areas on blocks adjacent to and having direct exposure to Old Montreal Road and/or Cox Country Road will likely require noise control measures (see Figure 3). These measures are briefly described in Section 5.2, with the aim to reduce the L_{eq} to as close to 55 dBA as technically, economically and administratively feasible. It should be noted that dwellings within the subdivision will benefit from the blockage provided by the surrounding dwellings. A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development. Warning Clauses will also be required on purchase, sale, and lease agreements. Specific mitigation will be determined during the detailed design assessment.

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.

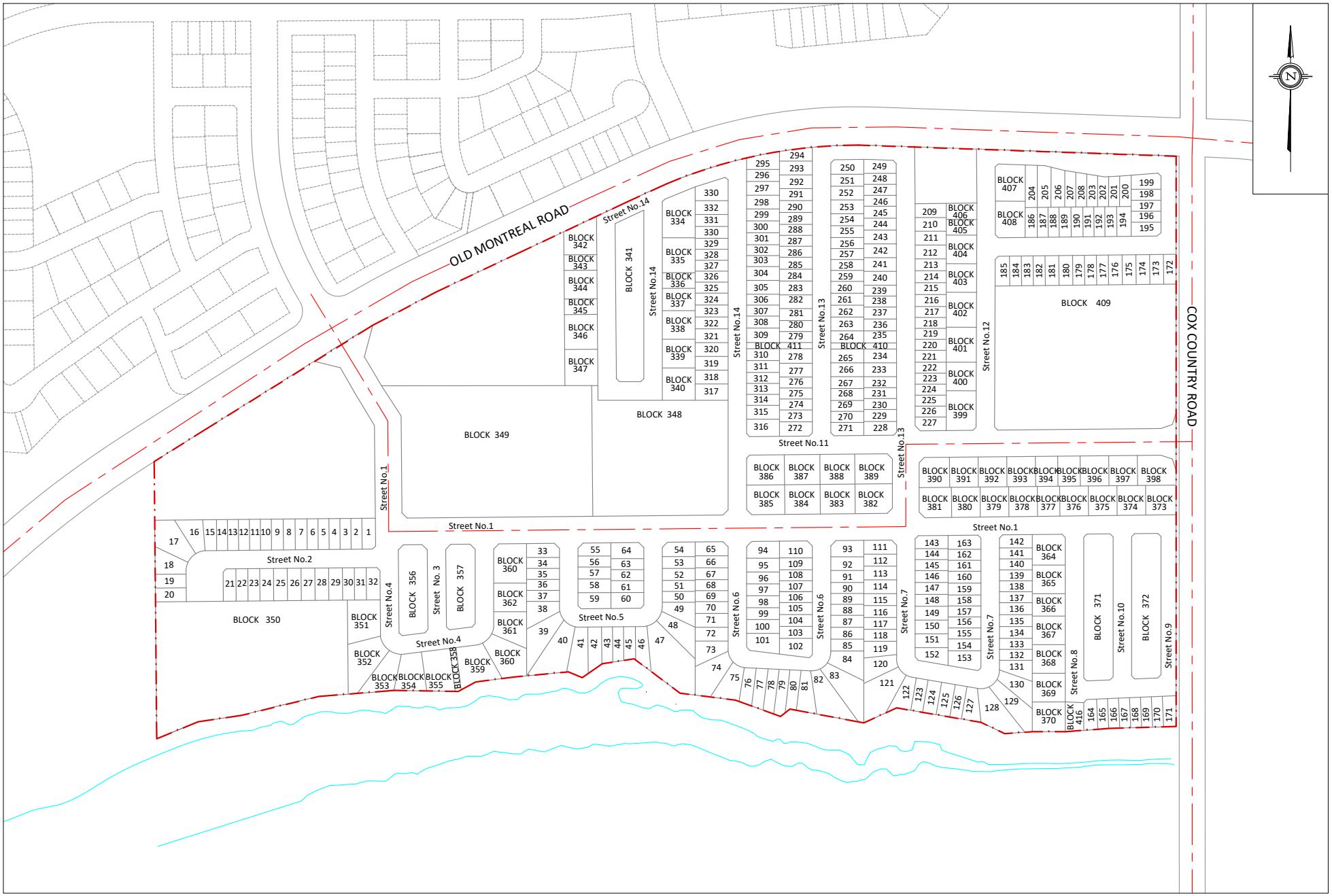
Sincerely,

Gradient Wind Engineering Inc.

Benjamin Page, Adv.Dip.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #21-428 - Traffic Noise



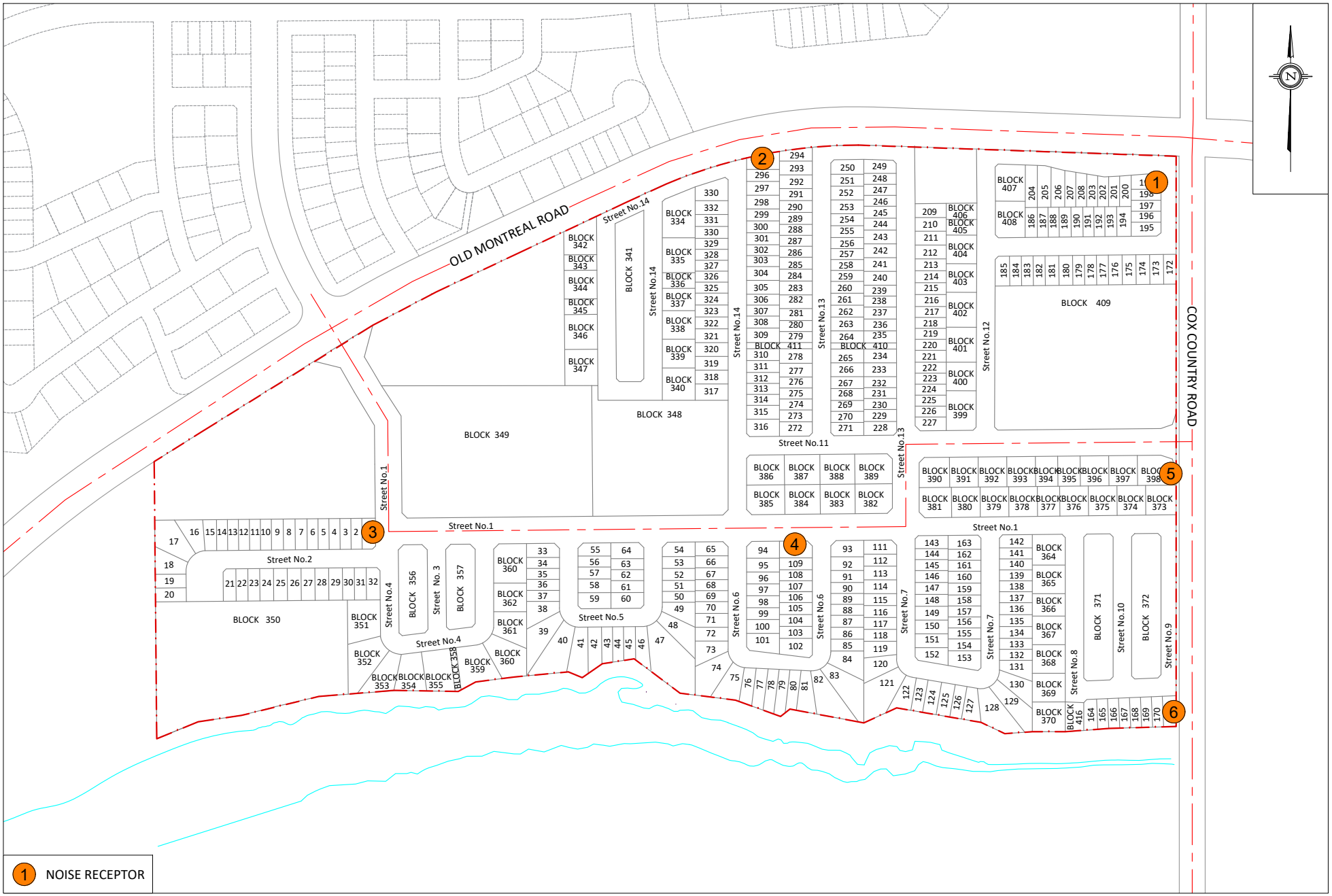
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:5000 (APPROX.)	DRAWING NO.	21-428-1
DATE	NOVEMBER 19, 2024	DRAWN BY	B.P.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



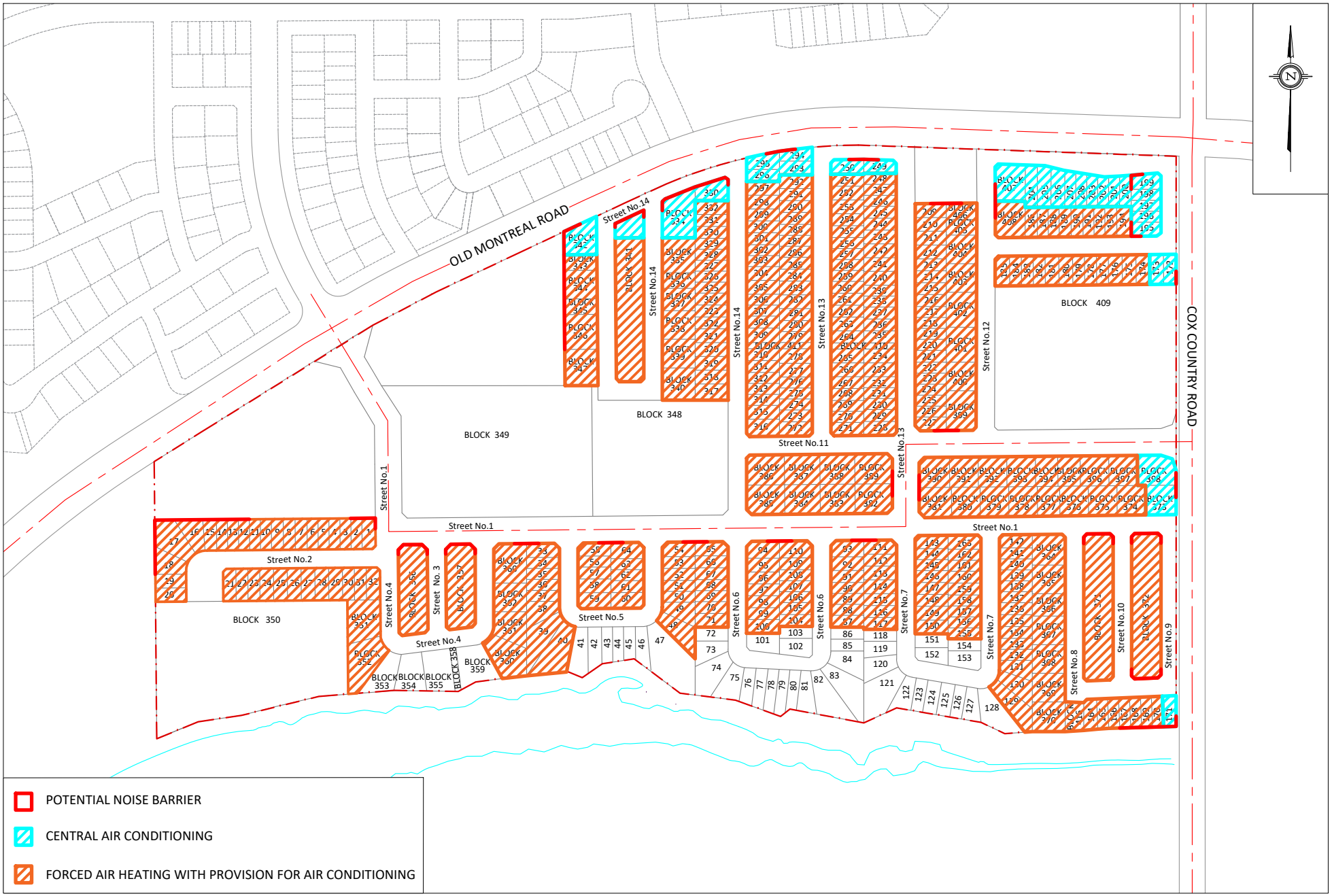
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:5000 (APPROX.)
DRAWING NO.	21-428-2
DATE	NOVEMBER 19, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 2:
NOISE SOURCE AND RECEPTOR LOCATIONS



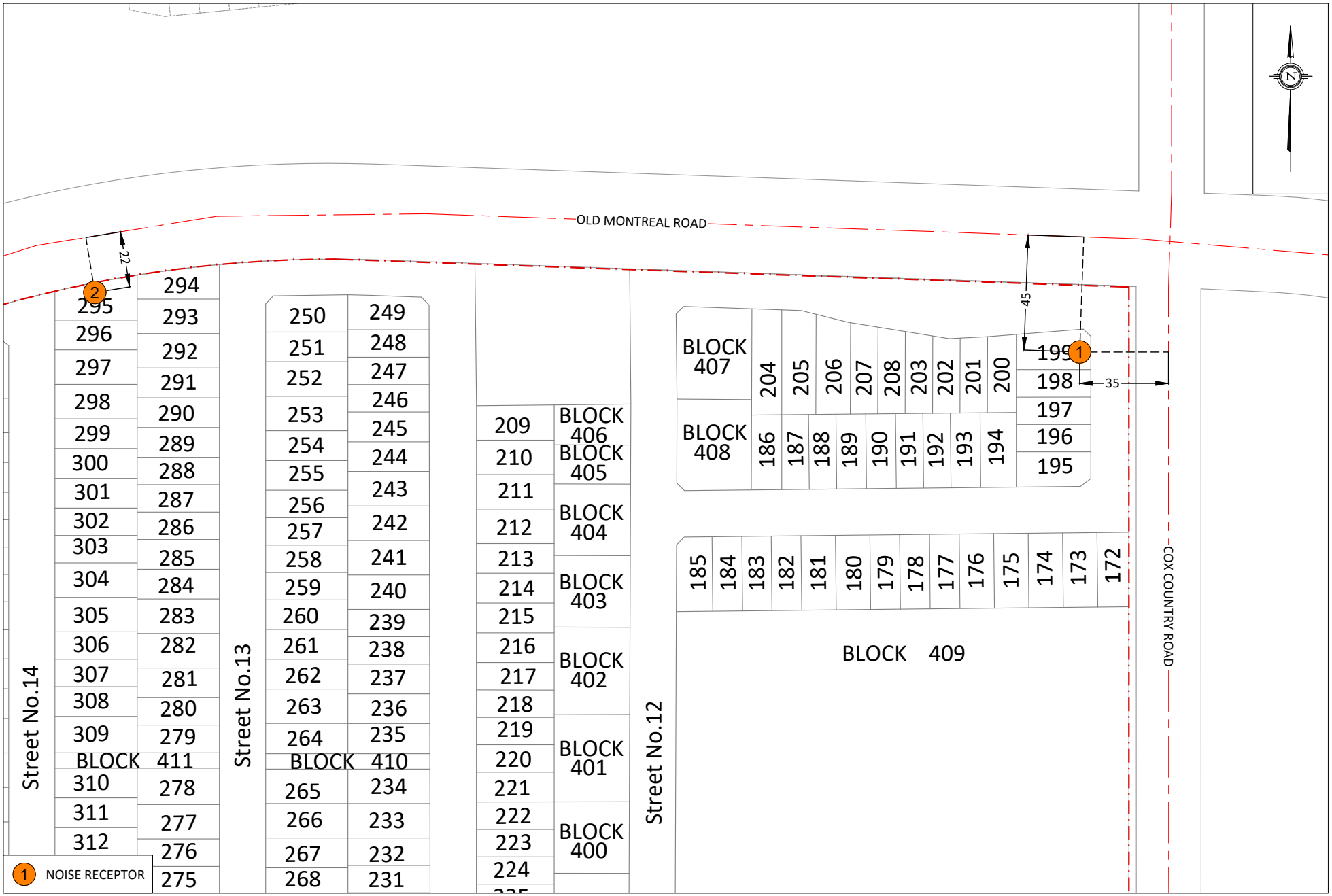
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:5000 (APPROX.)
DRAWING NO.	21-428-3
DATE	NOVEMBER 19, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 3:
ESTIMATED VENTILATION REQUIREMENTS AND NOISE BARRIER LOCATIONS



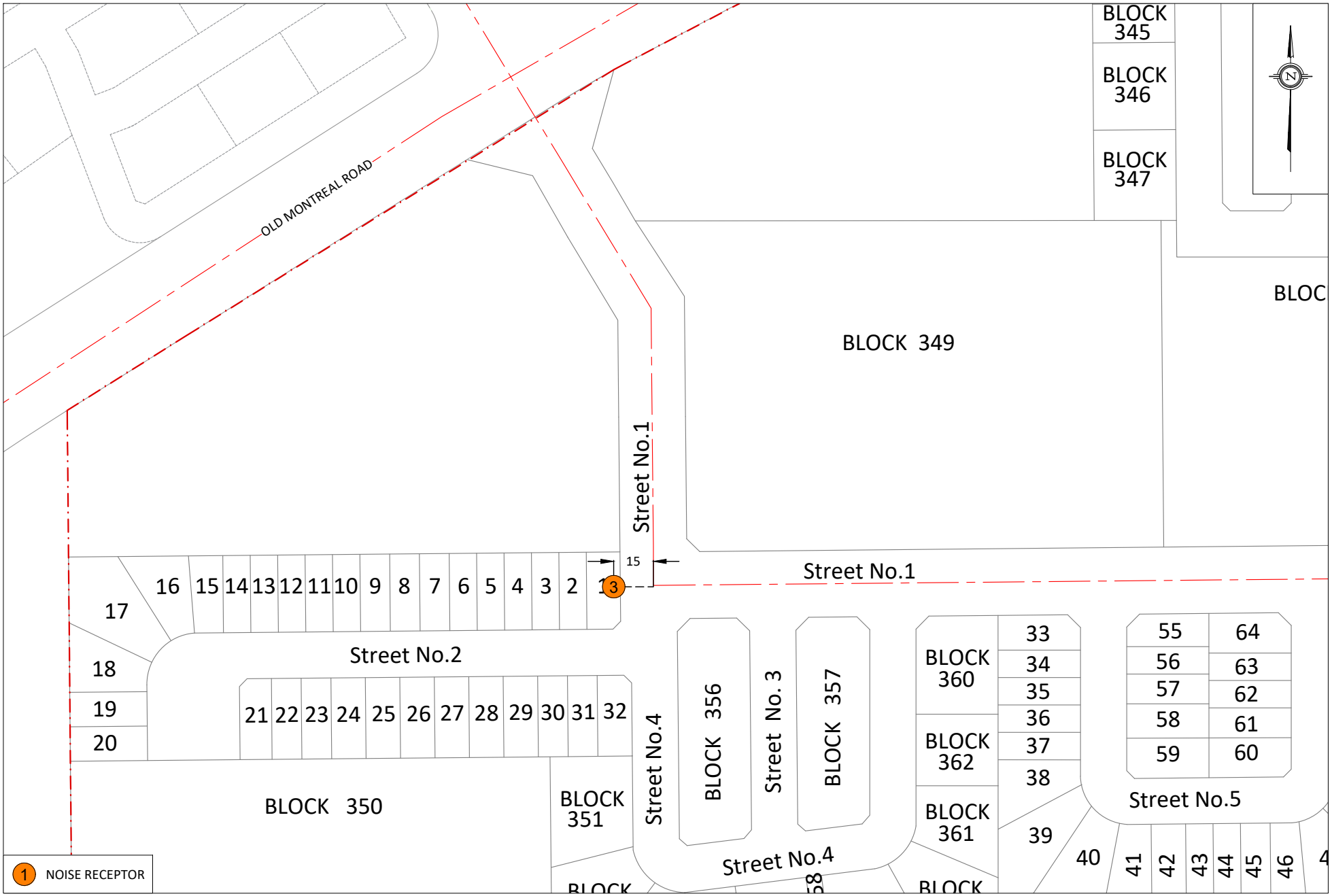
GRADIENTWIND ENGINEERS & SCIENTISTS

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

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	21-428-4
DATE	NOVEMBER 19, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 4:
RECEPTORS 1 AND 2 STAMSON INPUT PARAMETERS

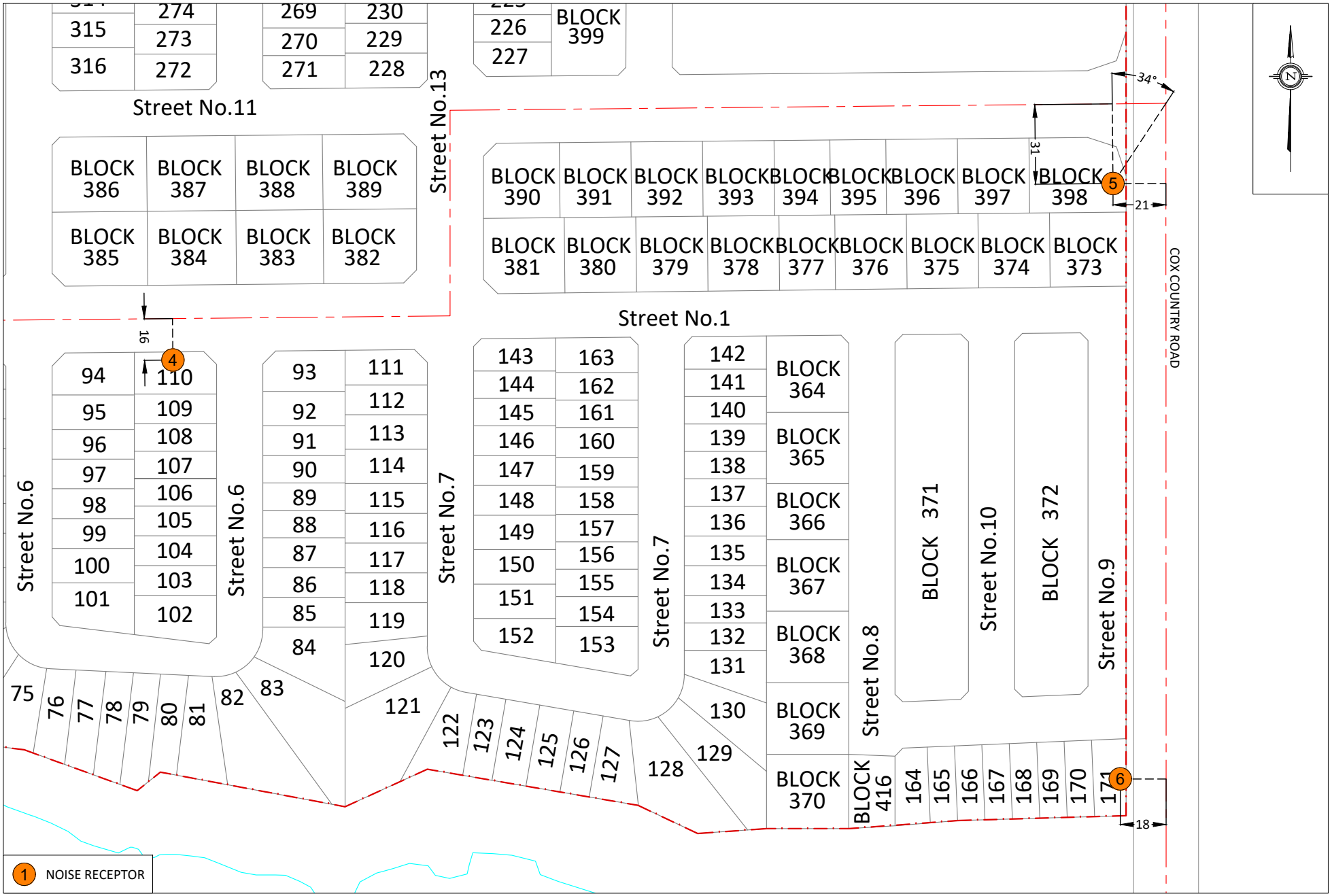


GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	21-428-5
DATE	NOVEMBER 19, 2024	DRAWN BY	B.P.

DESCRIPTION

FIGURE 5:
RECEPTOR 3 STAMSON INPUT PARAMETERS



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

PROJECT	CARDINAL CREEK VILLAGE SOUTH, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	21-428-6
DATE	NOVEMBER 19, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 6:
RECEPTORS 4, 5 AND 6 STAMSON INPUT PARAMETERS

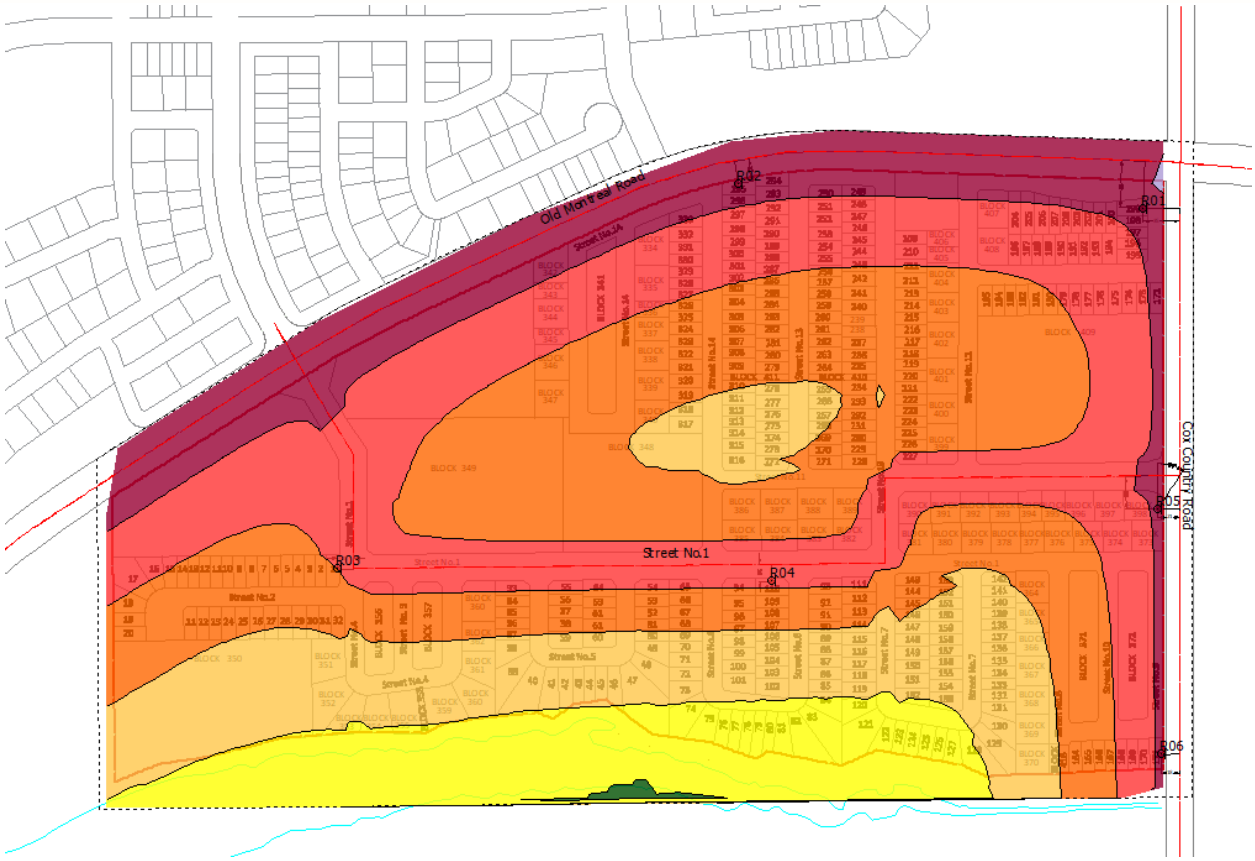


FIGURE 7: GROUND LEVEL NOISE CONTOURS (DAYTIME PERIOD)

- *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*

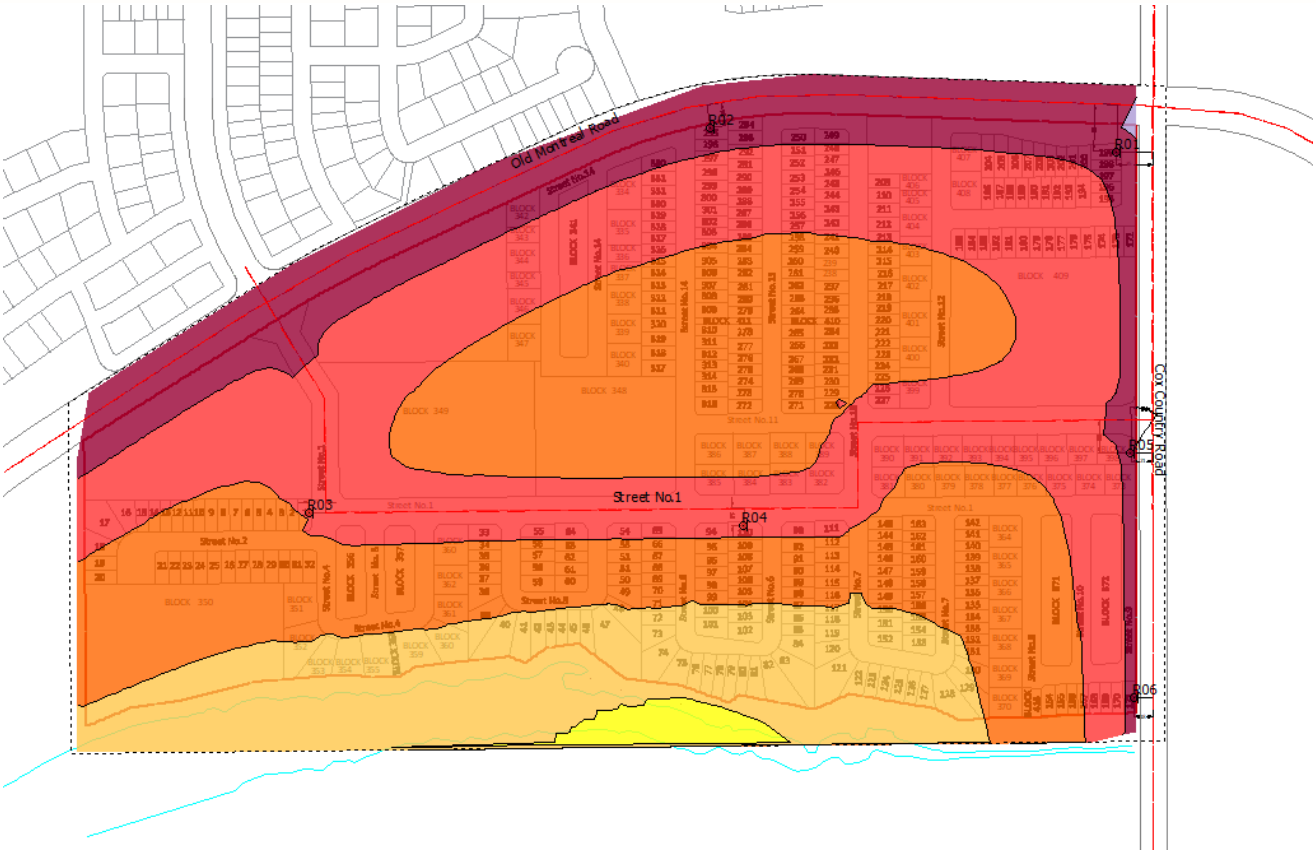


FIGURE 8: NOISE CONTOURS AT 4.5 METERS (DAYTIME PERIOD)

- *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*

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: 18-11-2024 08:51:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Old Montreal (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 : 80 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: Old Montreal (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 45.00 / 45.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Road data, segment # 2: Cox Country (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    80 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):   8000
    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: Cox Country (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Old Montreal (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.69 + 0.00) = 63.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.57  72.49   0.00  -7.49  -1.30   0.00   0.00   0.00
63.69
-------------------------------------------------------------------------------
--

Segment Leq : 63.69 dBA
```

```
Results segment # 2: Cox Country (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.68 + 0.00) = 62.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  69.76   0.00  -5.78  -1.30   0.00   0.00   0.00
62.68
-------------------------------------------------------------------------
--

Segment Leq : 62.68 dBA

Total Leq All Segments: 66.22 dBA

Results segment # 1: Old Montreal (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.10 + 0.00) = 56.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  64.89   0.00  -7.49  -1.30   0.00   0.00   0.00
56.10
-------------------------------------------------------------------------
--

Segment Leq : 56.10 dBA
```

```
Results segment # 2: Cox Country (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.08 + 0.00) = 55.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.57  62.16   0.00  -5.78  -1.30   0.00   0.00   0.00
55.08
-------------------------------------------------------------------------------
--

Segment Leq : 55.08 dBA

Total Leq All Segments: 58.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.22
                           (NIGHT): 58.63
```

STAMSON 5.0 NORMAL REPORT Date: 18-11-2024 08:52:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R2.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Old Montreal (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 : 80 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: Old Montreal (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 / 22.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Results segment # 1: Old Montreal (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.57 + 0.00) = 68.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  72.49   0.00  -2.61  -1.30   0.00   0.00   0.00
68.57
-------------------------------------------------------------------------
--

Segment Leq : 68.57 dBA

Total Leq All Segments: 68.57 dBA

Results segment # 1: Old Montreal (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.98 + 0.00) = 60.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  64.89   0.00  -2.61  -1.30   0.00   0.00   0.00
60.98
-------------------------------------------------------------------------
--

Segment Leq : 60.98 dBA

Total Leq All Segments: 60.98 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.57
                           (NIGHT): 60.98
```

STAMSON 5.0 NORMAL REPORT Date: 18-11-2024 08:59:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Street No.1 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Street No.1 (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Results segment # 1: Street No.1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.64 + 0.00) = 59.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.57  63.96   0.00   0.00  -4.31   0.00   0.00   0.00
59.64
-------------------------------------------------------------------------
--

Segment Leq : 59.64 dBA

Total Leq All Segments: 59.64 dBA

Results segment # 1: Street No.1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.05 + 0.00) = 52.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.57  56.36   0.00   0.00  -4.31   0.00   0.00   0.00
52.05
-------------------------------------------------------------------------
--

Segment Leq : 52.05 dBA

Total Leq All Segments: 52.05 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.64
                           (NIGHT): 52.05
```

STAMSON 5.0 NORMAL REPORT Date: 18-11-2024 09:00:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R4.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Street No.1 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000
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: Street No.1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 / 16.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Results segment # 1: Street No.1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.21 + 0.00) = 62.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  63.96   0.00  -0.44  -1.30   0.00   0.00   0.00
62.21
-------------------------------------------------------------------------
--

Segment Leq : 62.21 dBA

Total Leq All Segments: 62.21 dBA

Results segment # 1: Street No.1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.62 + 0.00) = 54.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  56.36   0.00  -0.44  -1.30   0.00   0.00   0.00
54.62
-------------------------------------------------------------------------
--

Segment Leq : 54.62 dBA

Total Leq All Segments: 54.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.21
                           (NIGHT): 54.62
```

STAMSON 5.0 NORMAL REPORT Date: 18-11-2024 09:17:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R5.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Cox Country (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 80 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): 8000
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: Cox Country (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.00 / 21.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Road data, segment # 2: Street No.1 (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 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):   8000
    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: Street No.1 (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   34.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Cox Country (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 66.16 + 0.00) = 66.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.57  69.76   0.00  -2.29  -1.30   0.00   0.00   0.00
66.16
-------------------------------------------------------------------------------
--

Segment Leq : 66.16 dBA
```

```
Results segment # 2: Street No.1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.43 + 0.00) = 56.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     34   0.57  63.96   0.00  -4.95  -2.57   0.00   0.00   0.00
56.43
-------------------------------------------------------------------------
--

Segment Leq : 56.43 dBA

Total Leq All Segments: 66.60 dBA

Results segment # 1: Cox Country (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.57 + 0.00) = 58.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  62.16   0.00  -2.29  -1.30   0.00   0.00   0.00
58.57
-------------------------------------------------------------------------
--

Segment Leq : 58.57 dBA
```

```
Results segment # 2: Street No.1 (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.84 + 0.00) = 48.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     34    0.57  56.36   0.00  -4.95  -2.57   0.00   0.00   0.00
48.84
-------------------------------------------------------------------------------
--

Segment Leq : 48.84 dBA

Total Leq All Segments: 59.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.60
                           (NIGHT): 59.01
```

STAMSON 5.0 NORMAL REPORT Date: 18-11-2024 09:15:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R6.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Cox Country (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 80 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): 8000
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: Cox Country (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 18.00 / 18.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

```
Results segment # 1: Cox Country (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.21 + 0.00) = 67.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  69.76   0.00  -1.24  -1.30   0.00   0.00   0.00
67.21
-------------------------------------------------------------------------
--

Segment Leq : 67.21 dBA

Total Leq All Segments: 67.21 dBA

Results segment # 1: Cox Country (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.62 + 0.00) = 59.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.57  62.16   0.00  -1.24  -1.30   0.00   0.00   0.00
59.62
-------------------------------------------------------------------------
--

Segment Leq : 59.62 dBA

Total Leq All Segments: 59.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.21
                           (NIGHT): 59.62
```