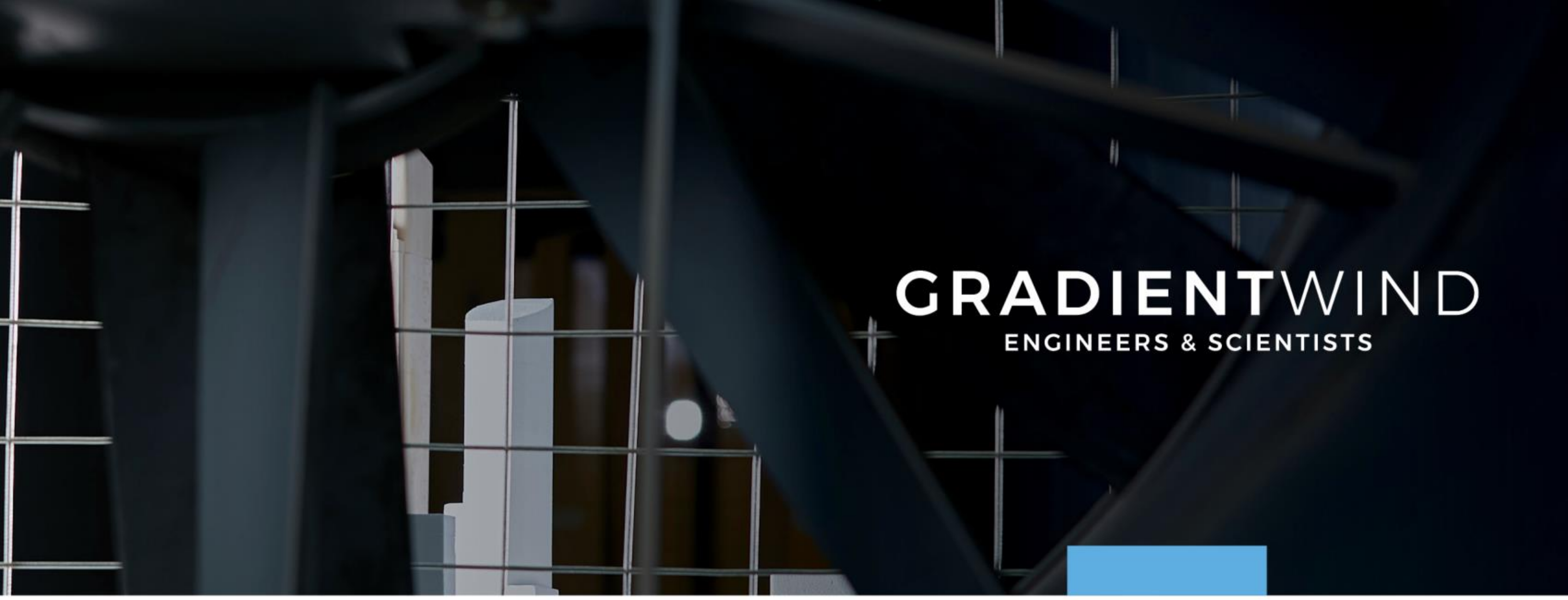
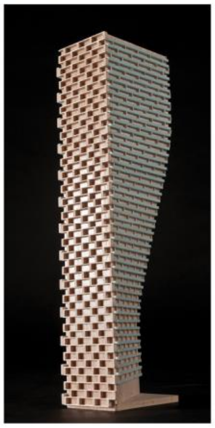
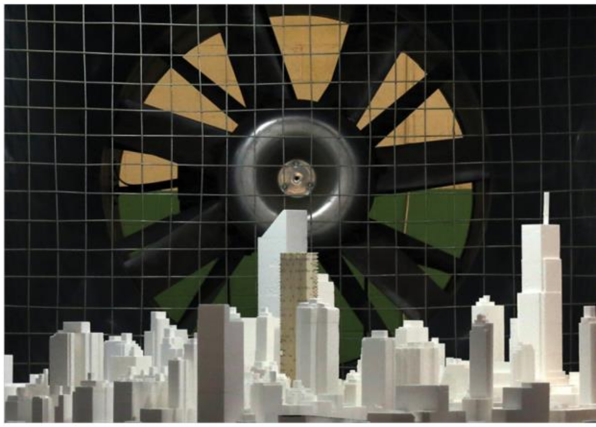


TRAFFIC NOISE FEASIBILITY ASSESSMENT

Kanata North Subdivision
Ottawa, Ontario

REPORT: GWE19-064 – Traffic Noise Feasibility





May 14, 2019

PREPARED FOR
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EXECUTIVE SUMMARY

This document describes a roadway traffic noise feasibility assessment performed in support of Zoning By-Law Amendment (ZBA) and Draft Plan of Subdivision Approval (DPA) applications for the proposed Kanata North Subdivision development located at located at 1020 and 1070 March Road in Ottawa, Ontario. The proposed development is on a rectangular lot and comprises approximately 300 townhomes, 300 single homes and 115 apartment units. The development also features commercial/mixed-use blocks at the west side fronting March Road, an institutional block and large park at the centre, and open green space at the southwest corner of the site. The development site is bordered by March Road to the west, existing residential homes to the north, a former rail corridor to the east and a proposed, separate residential development to the south. As per the Community Design Plan (CDP), the rail corridor is not considered a source of noise or vibrations. The major sources of roadway noise affecting the development are March Road and the internal Collector Street No. 1 and No. 8, as identified on Schedule E of the City of Ottawa's Official Plan.

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) a concept plan prepared by Valecraft Homes Ltd. As the site plan may be subject to change, the approach undertaken in this feasibility study is to establish noise contours around the site without the consideration of site massing.

The results of the current study indicate that noise levels due to roadway traffic over the site will range between approximately 40 and 70 dBA during the daytime period (07:00-23:00). The highest roadway traffic noise levels will occur nearest to March Road.

Results of the roadway traffic noise calculations also indicate that outdoor living areas having direct exposure to the noise sources that are within approximately 30 metres of March Road, Street No. 1 and Street No. 8 may require noise control measures. These measures are described in Section 5.2, with the aim to reduce the L_{eq} at the OLA to as close to 55 dBA as technically, economically and administratively feasible.

A detailed roadway traffic noise study will be required at the time of subdivision reservation approval to determine specific noise control measures for the development.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Valecraft Homes Ltd. to undertake a roadway traffic noise feasibility assessment of the proposed Kanata North Subdivision development located at located at 1020 and 1070 March Road in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a roadway traffic noise feasibility assessment and was prepared in consideration of the client's draft plan of subdivision application. Gradient Wind's scope of work involved assessing exterior noise levels throughout the site, generated by local roadway traffic. The report also quantitatively addresses any potential noise impact mitigation. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks[2] guidelines. Noise calculations were based on an initial concept plan prepared by Valecraft Homes Ltd., with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed development is on a rectangular lot and comprises approximately 300 townhomes, 300 single homes and 115 apartment units. The development also features commercial/mixed-use blocks at the west side fronting March Road, an institutional block and large park at the centre, and open green space at the southwest corner of the site. The development site is bordered by March Road to the west, existing residential homes to the north, a former rail corridor to the east and a proposed, separate residential development to the south.

The major sources of roadway noise affecting the development are March Road and the internal Collector Street No. 1 and No. 8, as identified on Schedule E of the City of Ottawa's Official Plan. As per the community design plan, the abandoned rail corridor will be converted into a recreation pathway and is not considered to be a source of noise. Figure 1 illustrates the site location with surrounding context.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment and Climate Change – Publication NPC-300

Due to the current state of the development, the final site configuration is uncertain and may be subject to change. Therefore, the approach undertaken in this feasibility assessment was to establish noise contours around the site as per the current plans, however site massing was ignored.

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	Leq (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 5 × 5 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 and 3. Receptor distances and exposure angles are also illustrated in Figure 2 and 3. 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 1 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
- Absorptive ground surface between source and receivers
- The study site was treated as having flat or gently sloping topography
- No massing considered as potential noise screening elements

4.2.1 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

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

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
March Road	4-UAU (Urban Arterial)	80	**30,000**
Street No. 1	2-UCU (Urban Collector)	40	**8,000**
Street No. 8	2-UCU (Urban Collector)	40	**8,000**

5. RESULTS AND DISCUSSION

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 4. Discrete receptors were also placed at ground level at key locations throughout the site. The noise contours were generated using *TNM* and verified with discrete receptors using STAMSON 5.04, as summarized in Table 2 below. Receptor 1 and 2 are located along March Road and Street No. 8, respectively. Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	Predictor-Lima Noise Level (dBA)
			Day	Day
1	1.5	OLA – Block 311	65	67
2	1.5	OLA – Block 309	54	55
3	1.5	OLA – Block 317	62	62
4	1.5	OLA – Block 309	49	52

As shown above, the results calculated from *TNM* have good correlation 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. As stated in Section 4.3.1, no massing of proposed buildings was considered as potential screening elements. Results of the roadway traffic noise calculations also indicate that outdoor living areas having direct exposure to the noise sources that are within approximately 30 metres of March Road, Street No. 1 and Street No. 8 may require noise control measures. These measures are described in Section 5.2, with the aim to reduce the L_{eq} at the OLA to as close to 55 dBA as technically, economically and administratively feasible.

5.2 Summary of Noise Control Measures

The OLA noise levels predicted due to roadway traffic, at a number of receptors, exceed the criteria listed in the ENCG for outdoor living areas, as discussed in Section 4.2. 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 55 dBA:

- 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

Examining the noise control measures listed above, these conclusions consider the possibility that not all of the proposed buildings will be oriented to provide screening elements for their OLA against roadway traffic sources. Distance setback, insertion of non-noise sensitive land uses, and building orientation to provide sheltered zones in rear yards may not be feasible due to the requirements of the Community Development Plan. It is also not feasible to have shared outdoor amenity areas for this development with respect to rear yards, as this would have a significant impact on salability. Therefore, the most feasible measures are insertion of earth berms or acoustic wall barriers between the sensitive rear yards and sources of noise. By siding lots along the collector roadway, the extent of barriers is minimized. The use of earth berms or acoustic barriers will depend on the grading plan when it becomes available. Both options can reduce OLA noise levels to below 55 dBA. Regarding Figure 4, the area(s) with noise levels under 55 dBA (yellow and light orange) have no mitigation requirements. The area(s) with noise levels between 55 and 60 dBA (orange) may require forced air heating with provision for central air conditioning.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels due to roadway traffic over the site will range between approximately 40 and 70 dBA during the daytime period (07:00-23:00). The highest roadway traffic noise levels will occur nearest to March Road.

Results of the roadway traffic noise calculations also indicate that outdoor living areas having direct exposure to the noise sources that are within approximately 30 metres of March Road, Street No. 1 and Street No. 8 may require noise control measures. These measures are described in Section 5.2, with the aim to reduce the L_{eq} at the OLA to as close to 55 dBA as technically, economically and administratively feasible.

A detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

This concludes our 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.

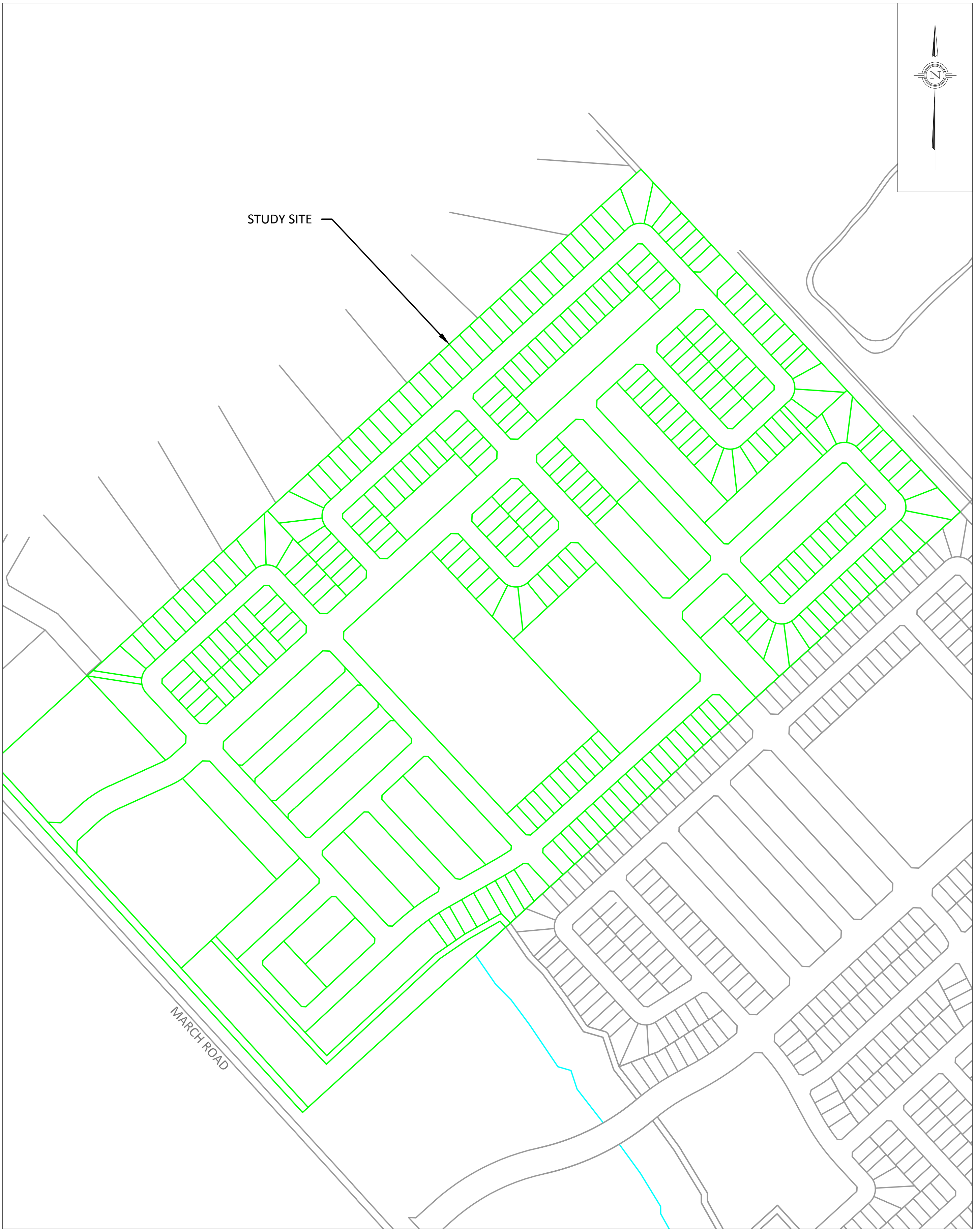
Sincerely,

Gradient Wind Engineering Inc.

LICENSED PROFESSIONAL ENGINEER
J. R. FOSTER
100155655
May 14, 2019
PROVINCE OF ONTARIO

Michael Lafortune, C.E.T.,
Environmental Scientist
GWE19-069 – Traffic Noise Feasibility

Joshua Foster, P.Eng.
Principal



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD , OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT: KANATA NORTH SUBDIVISION TRAFFIC NOISE FEASIBILITY STUDY		DESCRIPTION: FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	SCALE: 1: 5000 (APPROX.)	DRAWING NO.: GWE19-069-1	
	DATE: APRIL 24, 2019	DRAWN BY: M.L.	

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ENGINEERS & SCIENTISTS

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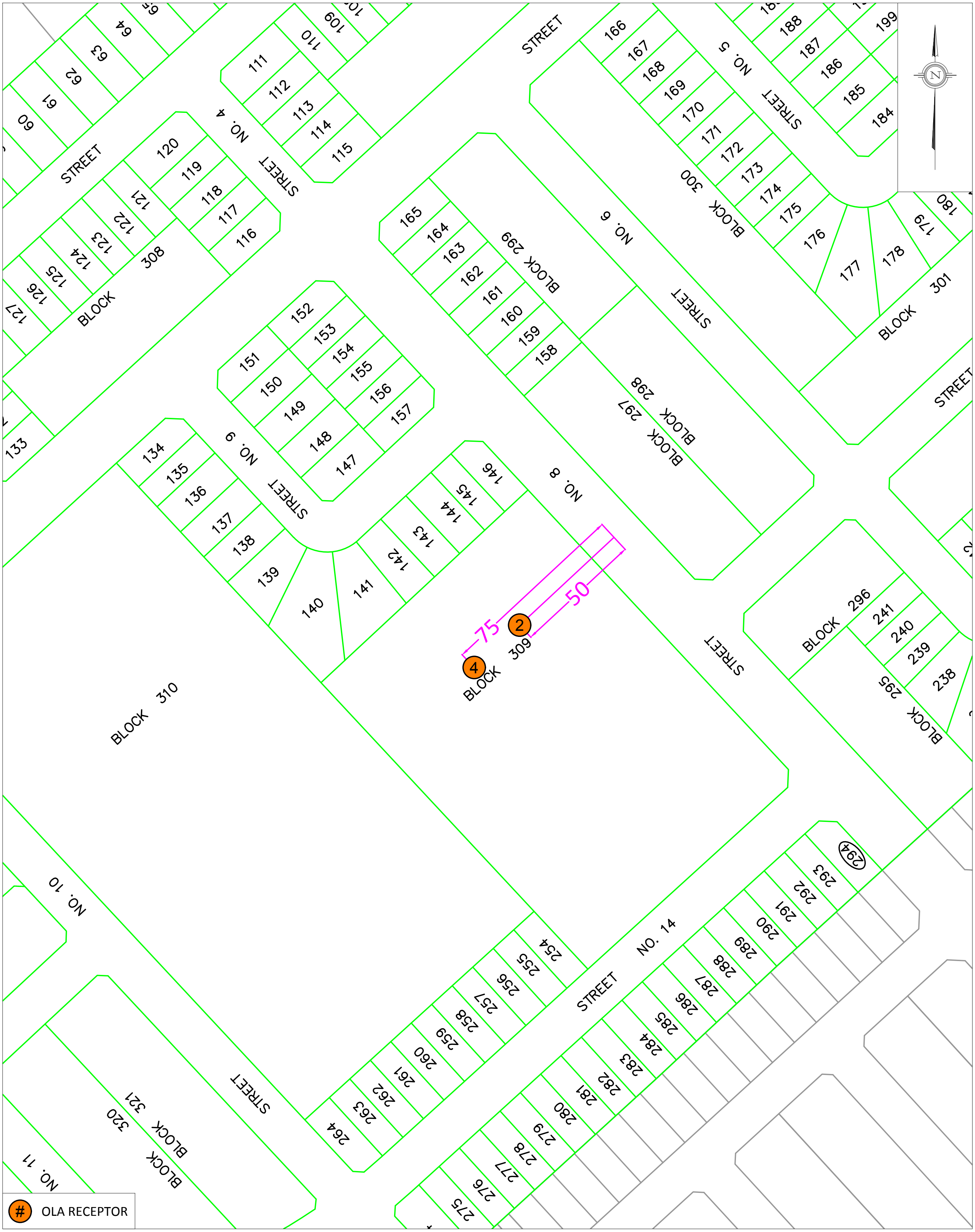
PROJECT		DESCRIPTION
KANATA NORTH SUBDIVISION TRAFFIC NOISE FEASIBILITY STUDY		FIGURE 2: RECEPTOR 1,3 LOCATION AND EXPOSURE ANGLES
SCALE: 1:2000 (APPROX.)	DRAWING NO.: GWE19-069-2	
DATE: APRIL 24, 2019	DRAWN BY: M.L.	



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PROJECT	KANATA NORTH SUBDIVISION TRAFFIC NOISE FEASIBILITY STUDY		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE19-069-3
DATE	APRIL 24, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 3:
RECEPTOR 2,4 LOCATION AND EXPOSURE ANGLES

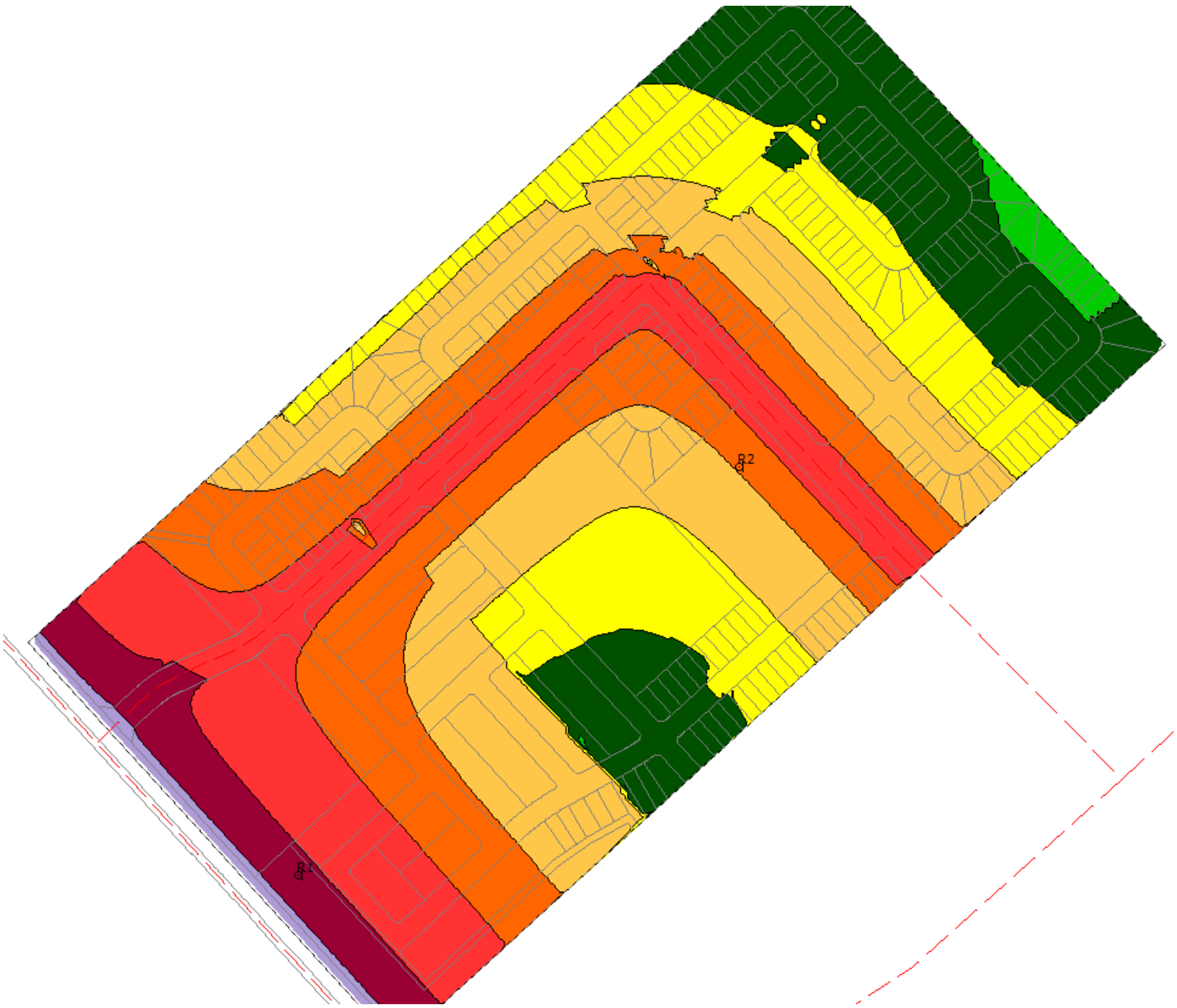
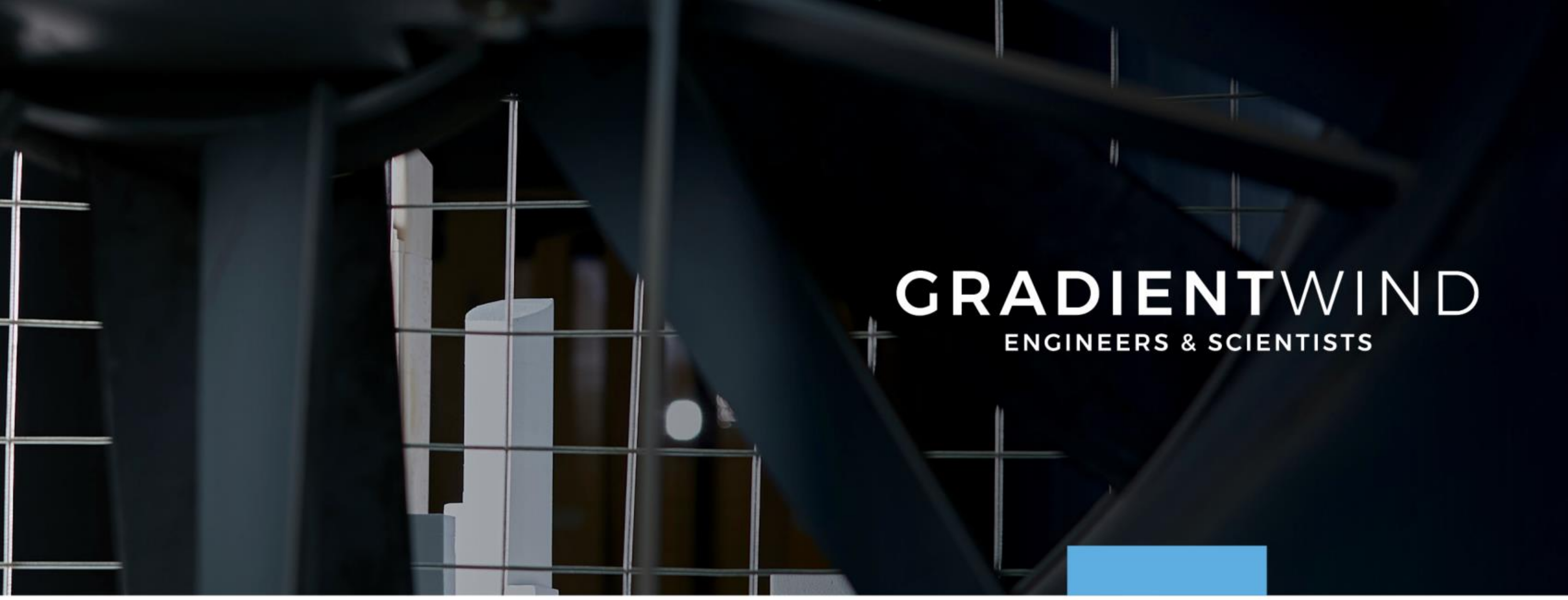
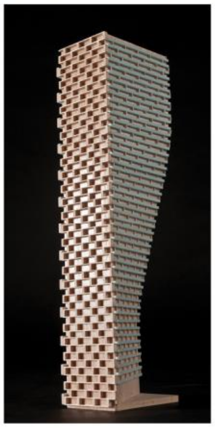
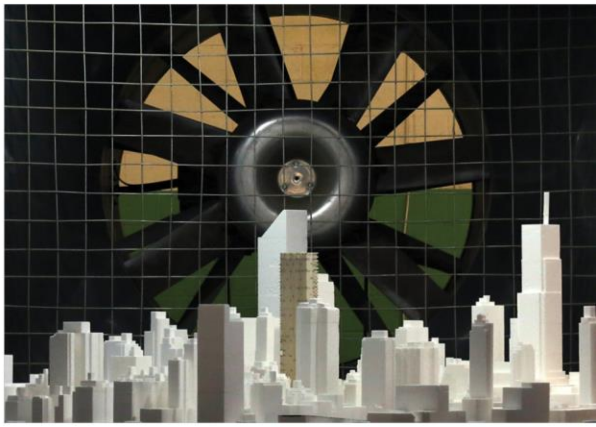


FIGURE 4: GROUND LEVEL NOISE CONTOURS FOR THE SITE (DAYTIME PERIOD)

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







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: 23-04-2019 14:31:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te                 Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: March (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: March (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  :  50.00 / 50.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: March (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.36 + 0.00) = 65.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  75.50   0.00  -8.68  -1.46   0.00   0.00   0.00
65.36
--------------------------------------------------------------------------
--

Segment Leq : 65.36 dBA

Total Leq All Segments: 65.36 dBA


Results segment # 1: March (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.76 + 0.00) = 57.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  67.90   0.00  -8.68  -1.46   0.00   0.00   0.00
57.76
--------------------------------------------------------------------------
--

Segment Leq : 57.76 dBA

Total Leq All Segments: 57.76 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.36
                         (NIGHT): 57.76
```

```
STAMSON 5.0        NORMAL REPORT        Date: 23-04-2019 14:31:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                 Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Street 8 (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 8 (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   :  50.00 / 50.00  m
Receiver height            :   1.50 / 1.50   m
Topography                 :      1       (Flat/gentle slope; no barrier)
Reference angle            :   0.00
```

```
Results segment # 1: Street 8 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.82 + 0.00) = 53.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.66  63.96   0.00  -8.68  -1.46   0.00   0.00   0.00
53.82
-------------------------------------------------------------------------
--

Segment Leq : 53.82 dBA

Total Leq All Segments: 53.82 dBA


Results segment # 1: Street 8 (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 46.23 + 0.00) = 46.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.66  56.36   0.00  -8.68  -1.46   0.00   0.00   0.00
46.23
-------------------------------------------------------------------------
--

Segment Leq : 46.23 dBA

Total Leq All Segments: 46.23 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 53.82
                         (NIGHT): 46.23
```

```
STAMSON 5.0        NORMAL REPORT        Date: 09-05-2019 16:01:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te                    Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: March (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: March (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   :  75.00 / 75.00  m
Receiver height            :   1.50 / 1.50   m
Topography                 :      1       (Flat/gentle slope; no barrier)
Reference angle            :   0.00
```

```
Results segment # 1: March (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.44 + 0.00) = 62.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  75.50   0.00 -11.60  -1.46   0.00   0.00   0.00
62.44
--------------------------------------------------------------------------
--

Segment Leq : 62.44 dBA

Total Leq All Segments: 62.44 dBA


Results segment # 1: March (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.84 + 0.00) = 54.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  67.90   0.00 -11.60  -1.46   0.00   0.00   0.00
54.84
--------------------------------------------------------------------------
--

Segment Leq : 54.84 dBA

Total Leq All Segments: 54.84 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 62.44
                         (NIGHT): 54.84
```

```
STAMSON 5.0         NORMAL REPORT         Date: 09-05-2019 16:01:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                 Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Street 8 (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 8 (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  : 100.00 / 100.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Street 8 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.82 + 0.00) = 48.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  63.96   0.00 -13.68  -1.46   0.00   0.00   0.00
48.82
--------------------------------------------------------------------------
--

Segment Leq : 48.82 dBA

Total Leq All Segments: 48.82 dBA


Results segment # 1: Street 8 (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 41.23 + 0.00) = 41.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
--
   -90     90   0.66  56.36   0.00 -13.68  -1.46   0.00   0.00   0.00
41.23
--------------------------------------------------------------------------
--

Segment Leq : 41.23 dBA

Total Leq All Segments: 41.23 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 48.82
                         (NIGHT): 41.23
```