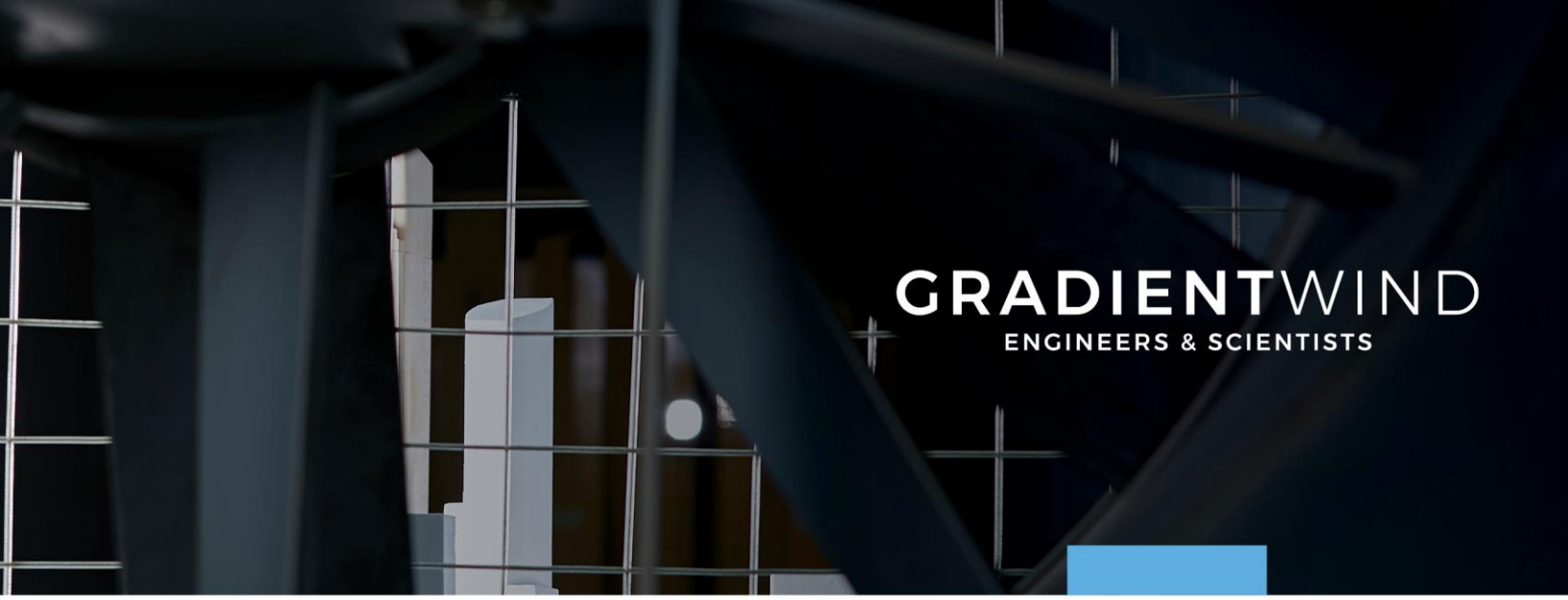

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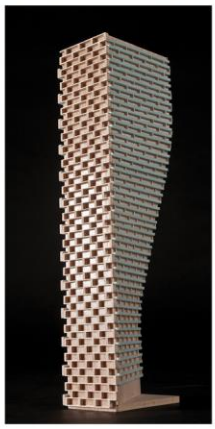
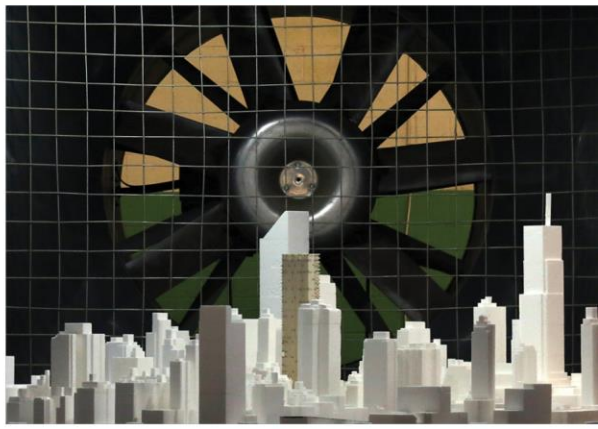
ENVIRONMENTAL NOISE ASSESSMENT

Hard Rock Hotel
4837 Albion Road
Ottawa, Ontario

GRADIENT WIND REPORT: 19-223-Noise





November 19, 2019

PREPARED FOR
Novatech Engineering Consultant Ltd.
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K2M 1P6

PREPARED BY
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EXECUTIVE SUMMARY

This report describes an environmental noise assessment performed for a proposed hotel development and casino expansion located at 4837 Albion Road in Ottawa, Ontario. The development comprises an eight-storey hotel, referred to as Hard Rock Hotel, with a rectangular planform rising to a height of approximately 33 metres (108 feet) from grade to the roof level. The floorplate sets back at the south side of Level 3. Additionally, the existing casino will be expanded to the south containing a new casino area and a new live theater area. The expansion comprises an irregular-shaped planform rising to a height of approximately 7 metres (23 feet) above grade to the roof level. The focus of this environmental noise study is the proposed hotel development. The major source of roadway traffic noise is Albion Street. Figure 1 illustrates the site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings received from Novatech Engineering Consultant Ltd in November 2019.

The results of the current analysis indicate that noise levels will range between 54 and 60 dBA during the daytime period (07:00-23:00) and between 47 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs along the west façade, which are nearest and most exposed to Albion Road. Results of the calculations indicate standard building components will be sufficient to achieve the City of Ottawa's indoor sound criteria listed in Table 1. Results of the calculations also indicate that the development will require provisions for air conditioning (or similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment. For hotels, Packaged Terminal Air Conditioning (PTAC) units are often the preferred mechanical system, which would meet the ventilation requirement.

The primary stationary sources surrounding the proposed development are the mechanical equipment located on the rooftop of the existing casino. Our findings indicate that noise levels at all plane of window receptors of the hotel due to these stationary sources are expected to fall below the ENCG noise criteria.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Novatech Engineering Consultant Ltd. to undertake an environmental noise assessment for the proposed development located at 4837 Albion Road in Ottawa, Ontario. The focus of this environmental noise study is the proposed hotel. This report summarizes the methodology, results, and recommendations related to an environmental noise assessment.

The present scope of work involves assessing exterior and interior noise levels generated by local roadway traffic and existing stationary sources situated on the rooftop of the existing casino. 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 (MECP)[2] guidelines. Noise calculations were based on architectural drawings received from Novatech Engineering Consultant Ltd. in November 2019, with future roadway traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications. The stationary noise assessment was based on Gradient Wind's experience with various types of mechanical equipment and information provided by Novatech Engineering Consultants Ltd.

2. TERMS OF REFERENCE

The focus of this environmental noise assessment is the proposed hotel development at 4837 Albion Road in Ottawa, Ontario. The development comprises an eight-storey hotel with a rectangular planform rising to a height of approximately 33 metres (108 feet) from grade to the roof level. The floorplate sets back at the south side of Level 3. Additionally, the existing casino will be expanded to the south containing a new casino area and a new live theater area. The expansion comprises an irregular-shaped planform rising to a height of approximately 7 metres (23 feet) above grade to the roof level.

The major source of roadway traffic noise is Albion Road. The site is located to the southwest of the existing Hard Rock Casino and primarily surrounded by open green space and paved parking lots. Low-rise

[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

residential homes are situated to the north, south and northwest of the site along Albion Road. Figure 1 illustrates a complete site plan with surrounding context.

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the study building produced by local roadway traffic and stationary sources, (ii) ensure that interior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4 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 vehicle traffic, 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 that 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 dBA for sleeping quarters, respectively, 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]. Therefore, where noise levels exceed 55 dBA daytime and nighttime, the ventilation for the building should consider the need for having windows and doors closed, which normally triggers the need for central air conditioning (or similar systems). Where noise levels exceed 65 dBA daytime and nighttime building components will require higher levels of sound attenuation[5].

4.2.2 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[6] 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 Albion Road included in this assessment.

[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] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[6] City of Ottawa Transportation Master Plan, November 2013

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Albion Road	2-RAU	60	15,000

4.2.3 Theoretical Roadway Noise Predictions

Noise predictions were performed with the aid of the MECP computerized noise assessment program, STAMSON 5.04, for road analysis. Appendix A includes the STAMSON 5.04 input and output data. 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 was taken to be 92%/8% respectively.
- Ground surfaces were taken to be reflective due to the presence of paved ground.
- Site topography was considered flat/gentle slope
- Noise receptors were strategically placed at 4 locations around the study area, see Figure 2.

4.3 Stationary Noise

4.3.1 Criteria for Stationary Noise

For stationary sources, the L_{eq} is commonly calculated on an hourly interval, while for roadways, the L_{eq} is calculated on the basis of a 16-hour daytime/8-hour nighttime split as previously mentioned in Section 4.2.1.

Stationary sources are defined in the ENCG as "all sources of sound and vibration, whether fixed or mobile, that exist or operate on a premises, property or facility, the combined sound and vibration levels of which are emitted beyond the property boundary of the premises, property or facility, unless the source(s) is (are) due to construction" [7].

[7] City of Ottawa Environmental Noise Control Guidelines, page 10

This applies to the plane of window serving the hotel development. The surrounding area of the development would be defined as a Class 1 environment, as background noise levels are dominated by human activities such as roadway noise along Albion Road and aircraft flyovers from Ottawa International Airport. The exclusionary sound level limits for Class 1 areas are summarized in Table 3 below. The applicable sound level criteria is either the values listed in Table 3 or background noise generated by traffic and other sources of noise not under consideration.

TABLE 3: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

Time of Day	Class 1	
	Outdoor Points of Reception	Plane of Window
07:00 – 19:00	50	50
19:00 – 23:00	45	50
23:00 – 07:00	N/A	45

4.3.2 Assumptions

The nearest sources of existing stationary noise are the mechanical equipment located on the rooftop of the existing casino situated to the northeast of the proposed hotel development. The following assumptions have been included in the analysis:

(i) Locations and quantity of mechanical equipment is based on information provided by Novatech Engineering Consultant Ltd.

(ii) Sound power data for mechanical equipment is based on Gradient Wind's experience.

(iii) The six (6) air handling units (AHU) are assumed to operate continuously over a 1-hour period during the daytime, at 50% capacity during the evening and 30% capacity during the nighttime period.

(iv) The five (5) condensing units are assumed to operate continuously over a 1-hour period during the daytime, evening and nighttime periods.

(v) Screening effects of a 2-metre noise barrier around the mechanical equipment has been assumed.

(vi) Default ground surfaces were taken to be absorptive due to the presence of soft ground features such as grass and landscaping. Paved parking and bodies of water are considered as reflective ground.

4.3.3 Determination of Noise Source Power Levels

Sound power data for the rooftop mechanical equipment on the existing casino were assumed based on Gradient Wind's experience with similar types of equipment associated with similar developments. Table 4 summarizes the sound power assumed for each source used in the analysis.

TABLE 4: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Height Above Roof (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1-6	Air Handling Unit	1.00	58	73	84	87	82	81	76	72	90
S7-11	Condensing Unit	1.00	51	65	73	79	80	76	71	64	84

4.3.1 Stationary Source Noise Predictions

The impact of the stationary noise sources of the existing casino on the 4837 Albion Road hotel development was determined by computer modelling. Stationary noise source modelling is based on the software program *Predictor-Lima* developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments and has been accepted by the MECP as part of Environmental Compliance Approvals applications.

Two (2) noise sensor locations on the north and west elevations of the hotel were selected in the *Predictor-Lima* model to measure the noise impact at points of reception (POR) during the daytime (07:00 – 19:00), evening (19:00-23:00) and nighttime (23:00 – 07:00) periods (see Figure 5). For each location, various heights were examined for a total of twelve (12) sensors. POR locations included the plane of windows (POW's) of the 4837 Albion Road development. All mechanical equipment was represented as

point sources in the model. Table 5 below contains Predictor-Lima calculation settings. These are typical settings that have been based on ISO 9613 standards and guidance from the MECP.

Ground absorption over the study area was determined based on topographical features (such as water, concrete, grassland, etc.). An absorption value of 0 is representative of hard ground, while a value of 1 represents grass and similar soft surface conditions. Modelling files and outputs are available upon request.

TABLE 5: CALCULATION SETTINGS

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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway noise calculations are summarized in Table 6 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A.

TABLE 6: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Plane of Window Receptor Location	STAMSON 5.04 Noise Level (dBA)	
		Day	Night
R1	5th Floor - South Façade	59	52
R2	5th Floor - East Façade	54	47
R3	5th Floor - West Façade	60	53
R4	5th Floor - North Façade	54	47

The results of the current analysis indicate that noise levels will range between 54 and 60 dBA during the daytime period (07:00-23:00) and between 47 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs along the west façade, which are nearest and most exposed to Albion Road.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic do not exceed the criteria in Section 4.2 for building components. Therefore, standard building components will be sufficient to attenuating indoor sound levels to meet the ENCG criteria, as listed in Table 1. Results of the calculations also indicate that the development will require provisions for air conditioning (or similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment. For hotels, Packaged Terminal Air Conditioning (PTAC) units are often the preferred mechanical system, which would meet the ventilation requirement.

5.3 Stationary Noise Levels

The anticipated sound levels across the development are summarized in Table 7 and are based on the assumptions outlined in Section 4.3.2. As Table 7 summarizes, noise levels from existing stationary sources located on the rooftop of the existing casino fall below ENCG criteria at all plane of window receptors. Noise contours along the building's north and west façades can be seen in Figures 7-9 for daytime, evening and nighttime conditions, respectively.

TABLE 7: NOISE LEVELS FROM STATIONARY SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)			Meets ENCG Class 1 Criteria		
		Day	Evening	Night	Day	Evening	Night
R1_A	3rd Floor - North Façade	49	47	44	YES	YES	YES
R1_B	4th Floor - North Façade	49	47	45	YES	YES	YES
R1_C	5th Floor - North Façade	50	47	45	YES	YES	YES
R1_D	6th Floor - North Façade	50	47	45	YES	YES	YES
R1_E	7th Floor - North Façade	50	47	45	YES	YES	YES

Table continues on the following page…

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)			Meets ENCG Class 1 Criteria		
		Day	Evening	Night	Day	Evening	Night
R1_F	8th Floor - North Façade	50	47	45	YES	YES	YES
R2_A	3rd Floor – West Façade	49	47	44	YES	YES	YES
R2_B	4th Floor – West Façade	49	47	45	YES	YES	YES
R2_C	5th Floor – West Façade	49	47	45	YES	YES	YES
R2_D	6th Floor – West Façade	49	47	45	YES	YES	YES
R2_E	7th Floor – West Façade	50	47	45	YES	YES	YES
R2_F	8th Floor – West Façade	50	47	45	YES	YES	YES

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 54 and 60 dBA during the daytime period (07:00-23:00) and between 47 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs along the west façade, which are nearest and most exposed to Albion Road. Results of the calculations also indicate that the development will require provisions for air conditioning (or similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment. For hotels, Packaged Terminal Air Conditioning (PTAC) units are often the preferred mechanical system, which would meet the ventilation requirement.

The primary stationary sources surrounding the proposed development are the mechanical equipment located on the rooftop of the existing casino. The results indicate that noise levels at all plane of window receptors due to these existing stationary sources are expected to fall below the ENCG noise criteria, based on the assumptions outlined in Section 4.3.2.

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

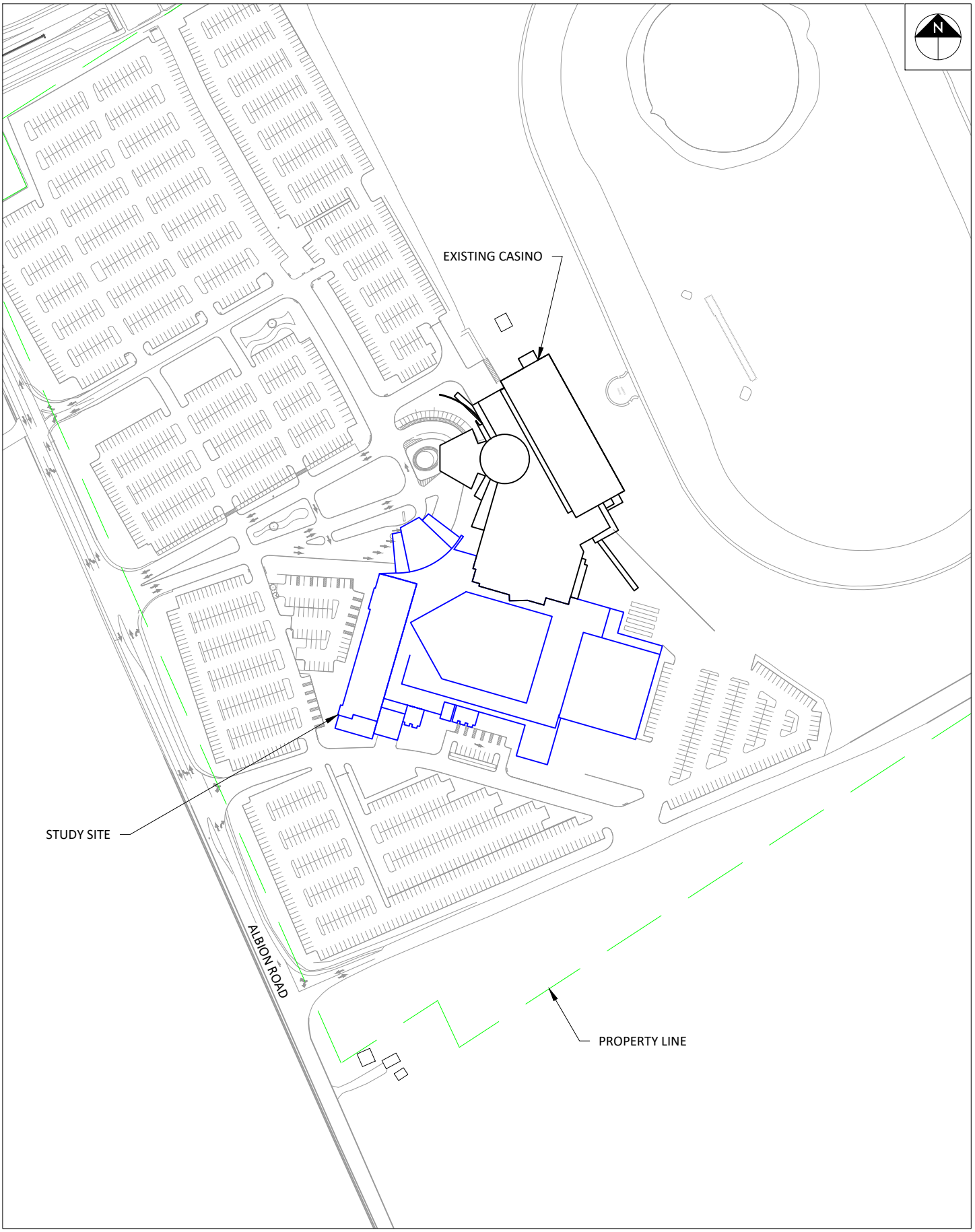
Sincerely,

Gradient Wind Engineering Inc.

Samantha Phillips, B.Eng.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #19-223-Noise



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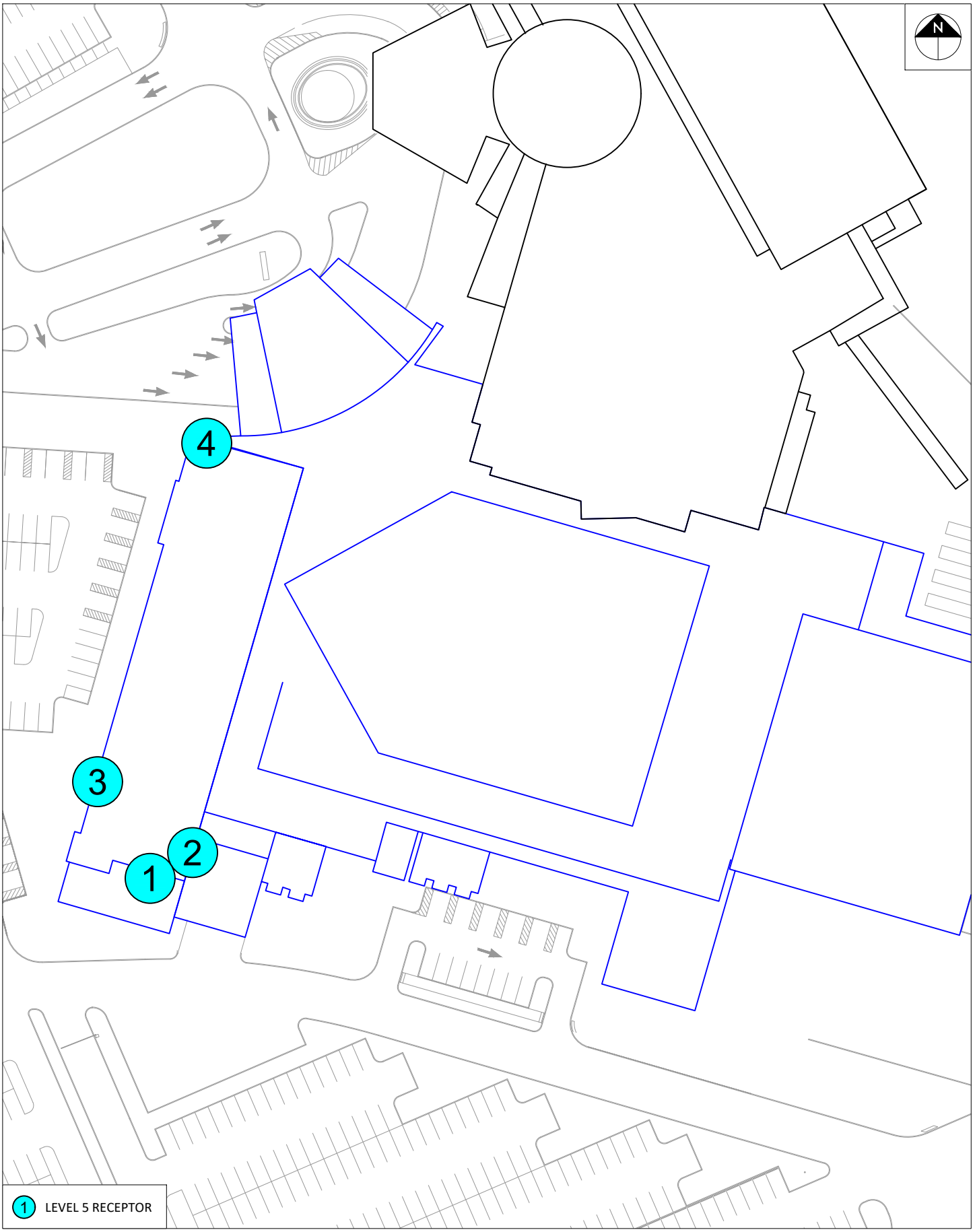
PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:3000 (APPROX.)	DRAWING NO.	GW19-223-1
DATE	NOVEMBER 19, 2019	DRAWN BY	S.P.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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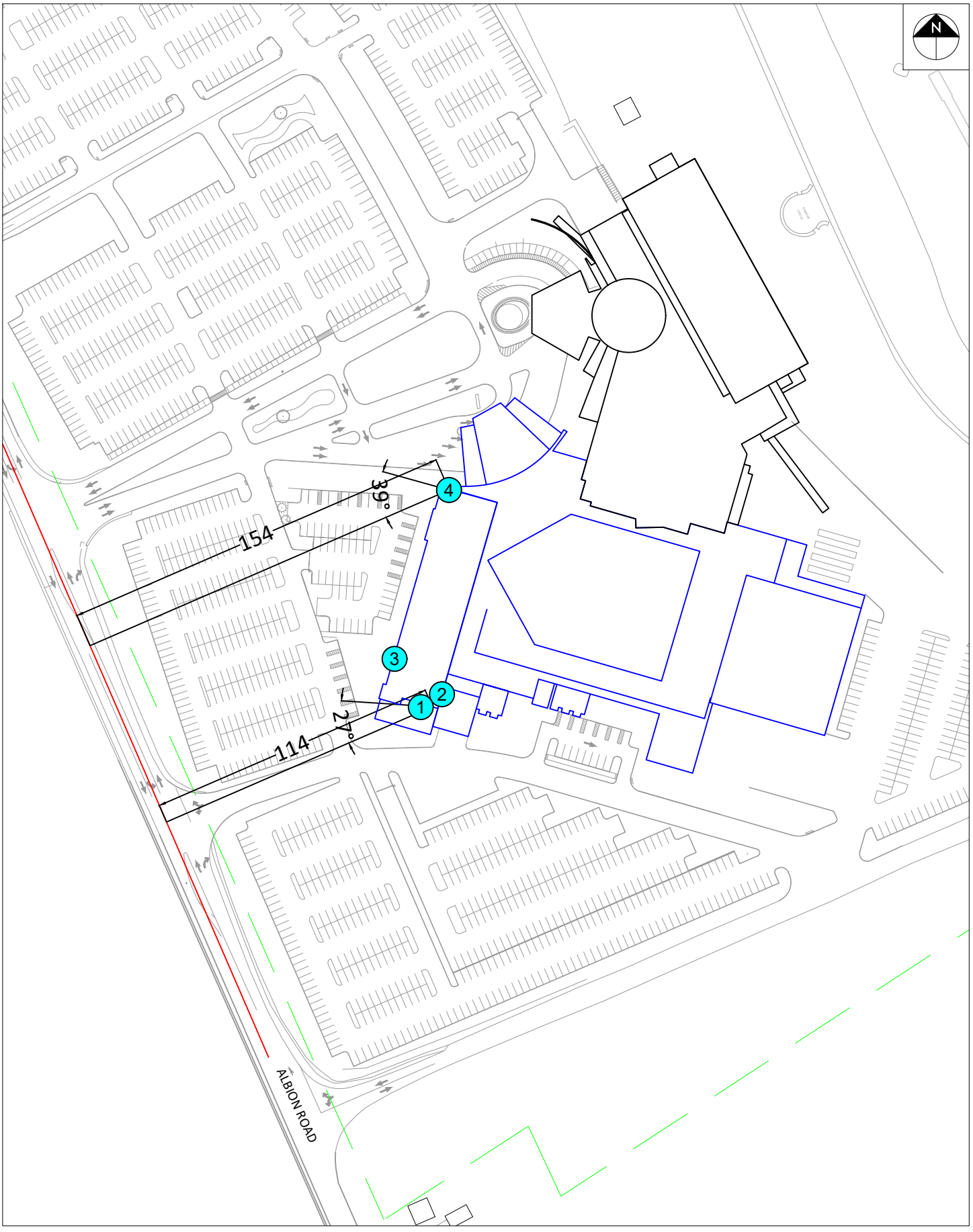
PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GW19-223-2	FIGURE 2: ROADWAY NOISE RECEPTOR LOCATIONS
DATE	NOVEMBER 19, 2019	DRAWN BY S.P.	



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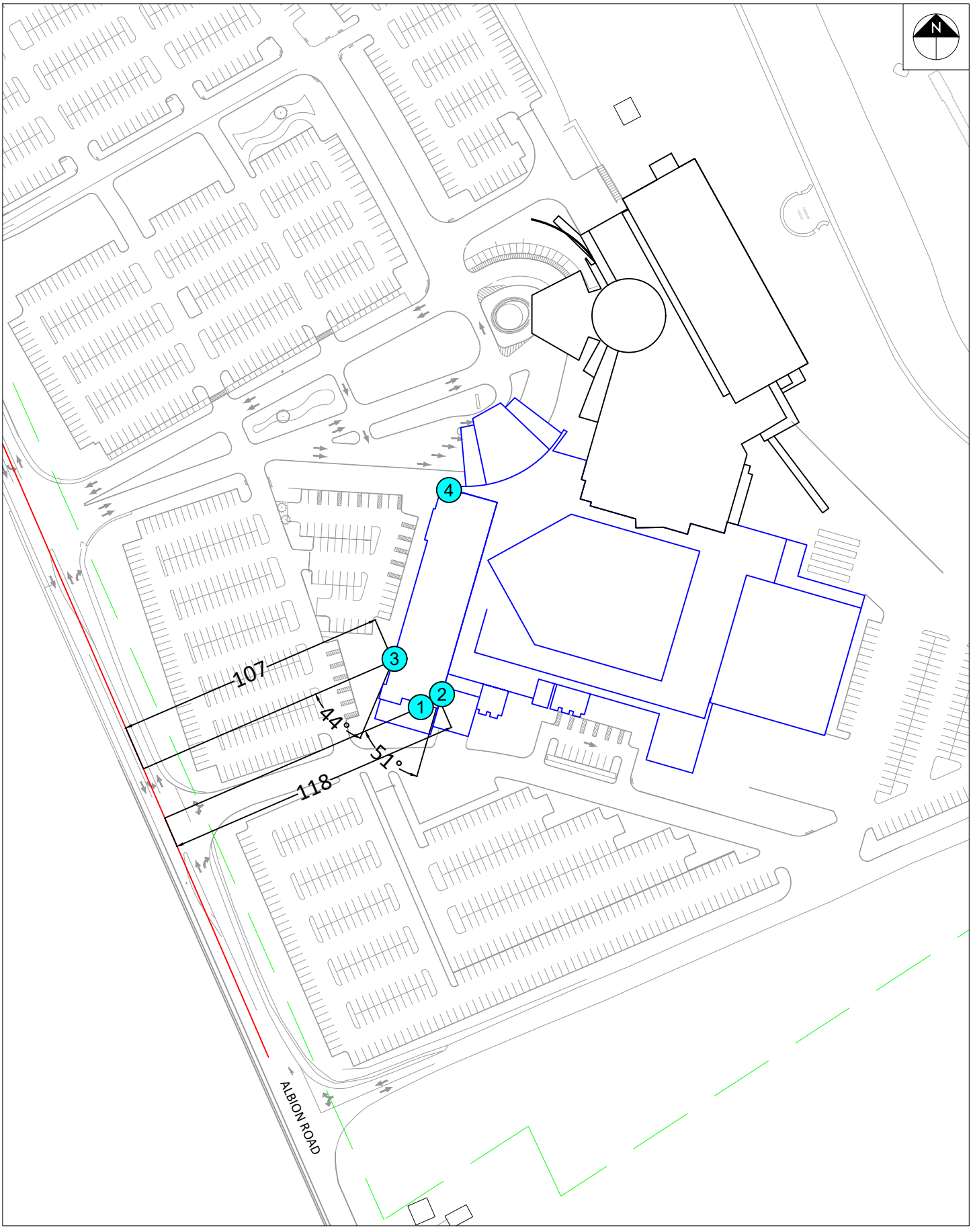
PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW19-223-3
DATE	NOVEMBER 19, 2019	DRAWN BY	S.P.

FIGURE 3:
STAMSON INPUT PARAMETERS - RECEPTOR 1 & 4



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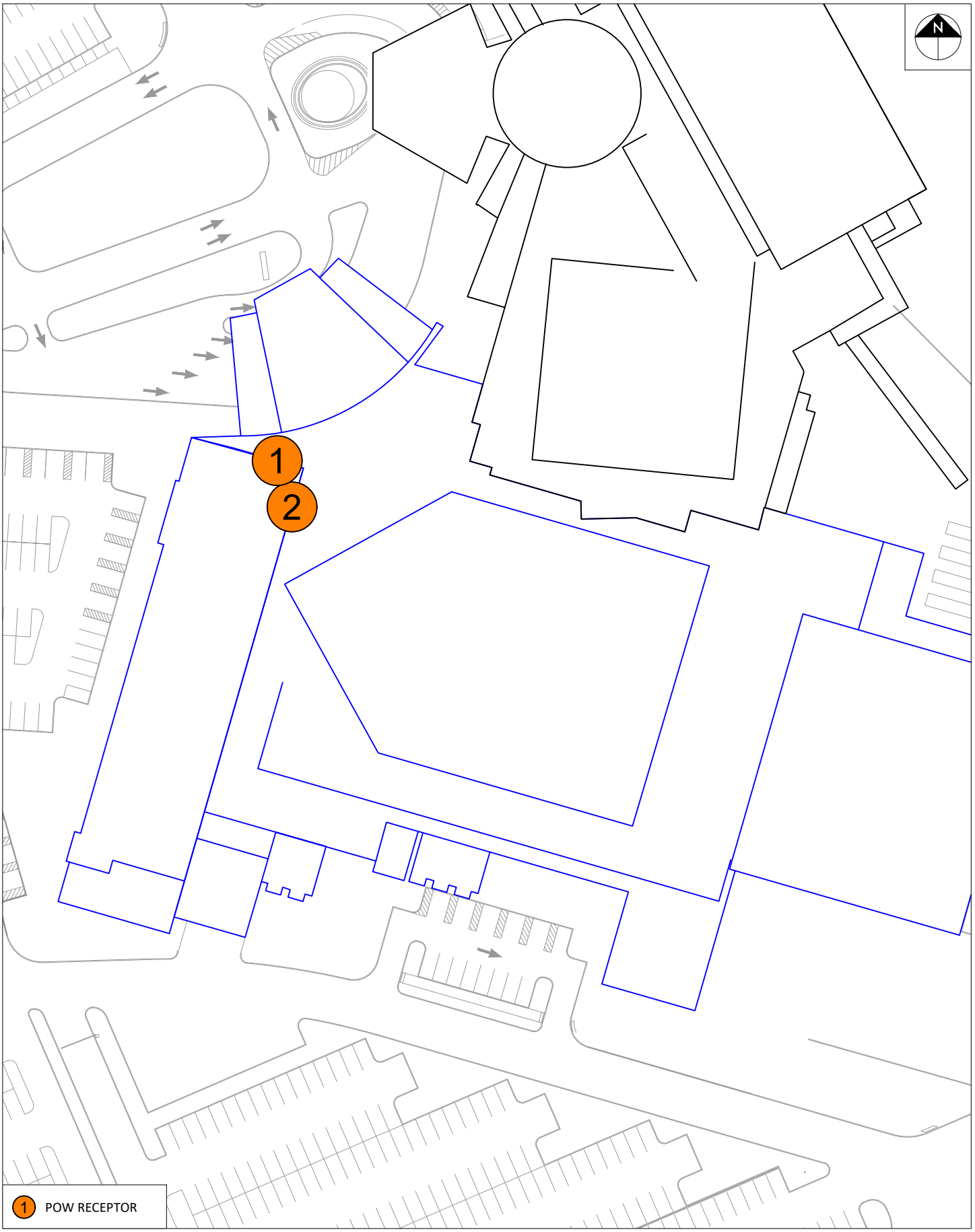
PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW19-223-4
DATE	NOVEMBER 19, 2019	DRAWN BY	S.P.

FIGURE 4:
STAMSON INPUT PARAMETERS - RECEPTOR 2 & 3



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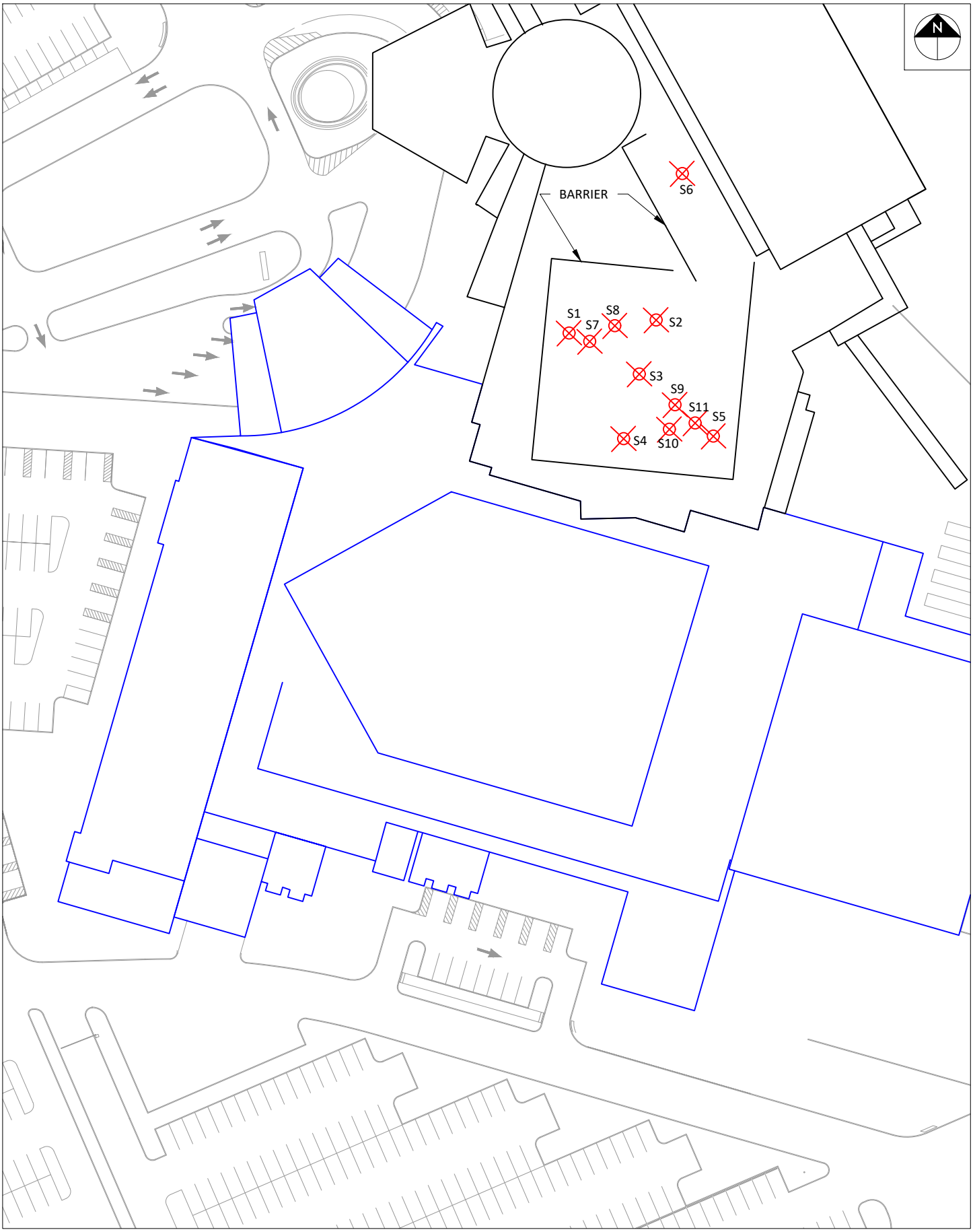
PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GW19-223-5	FIGURE 5: STATIONARY NOISE RECEPTOR LOCATIONS
DATE	NOVEMBER 19, 2019	DRAWN BY S.P.	



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PROJECT	4837 ALBION ROAD, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW19-223-6
DATE	NOVEMBER 19, 2019	DRAWN BY	S.P.

FIGURE 6:
STATIONARY NOISE SOURCE LOCATIONS

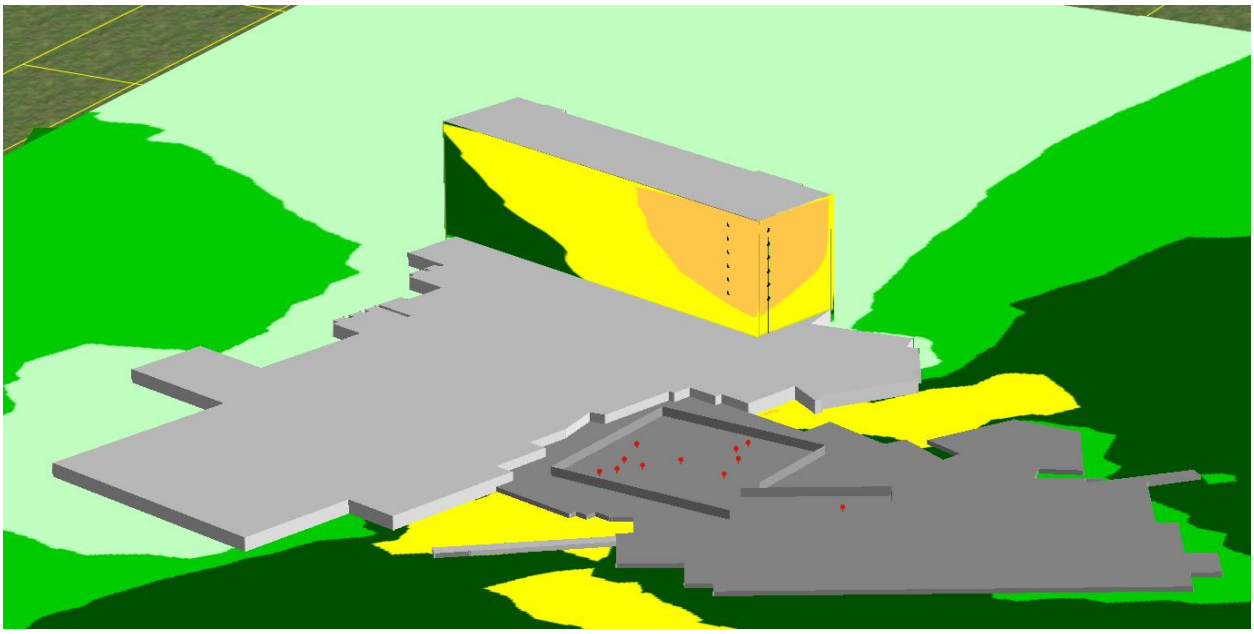

FIGURE 7: NOISE CONTOURS FOR THE SITE AT 4.5 M (DAYTIME PERIOD)

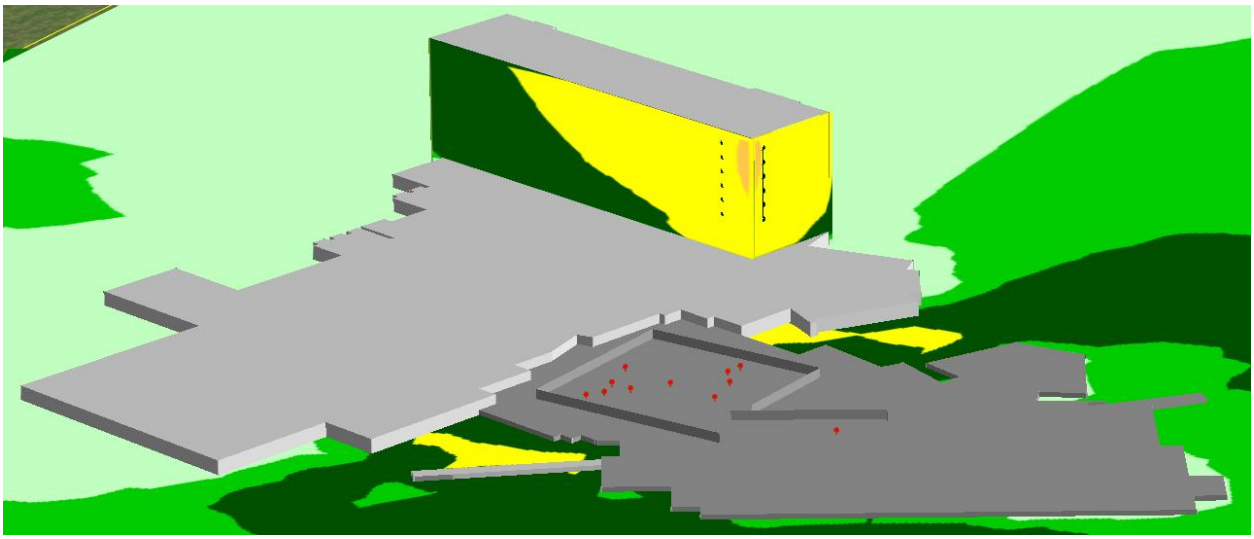

FIGURE 8: NOISE CONTOURS FOR THE SITE AT 4.5 M (EVENING PERIOD)

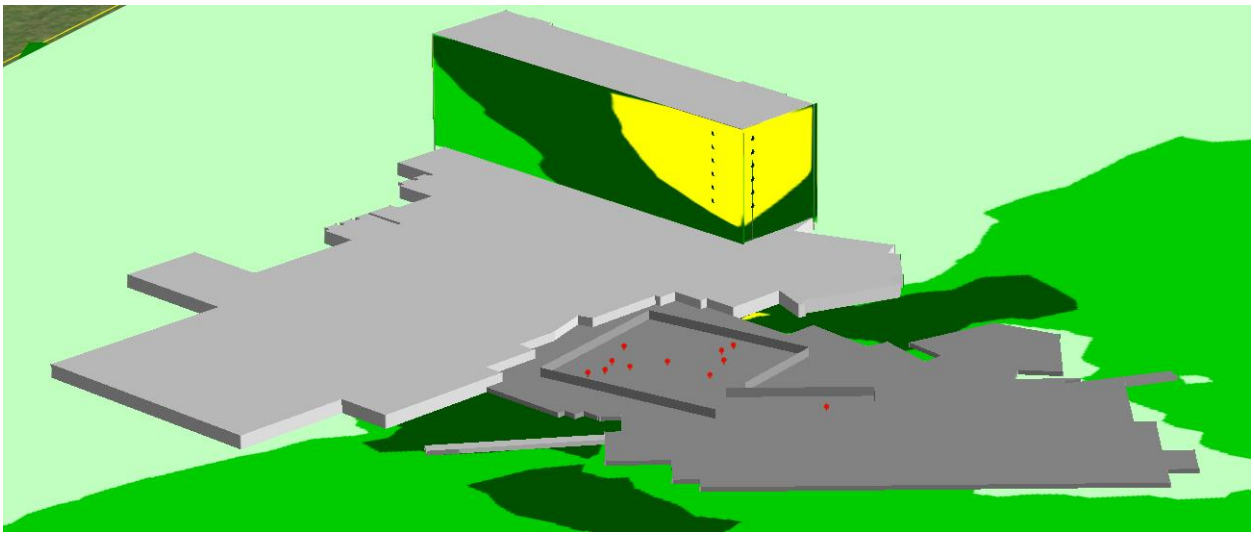

FIGURE 9: NOISE CONTOURS FOR THE SITE AT 4.5 M (NIGHTTIME PERIOD)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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```
STAMSON 5.0        NORMAL REPORT        Date: 19-11-2019 10:19:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albion (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: Albion (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   27.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 114.00 / 114.00 m
Receiver height           :  21.00 / 21.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 59.32 + 0.00) = 59.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     27   0.00  70.00   0.00  -8.81  -1.87   0.00   0.00   0.00
59.32
-------------------------------------------------------------------------
--

Segment Leq : 59.32 dBA

Total Leq All Segments: 59.32 dBA

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

Source height = 1.50 m

ROAD (0.00 + 51.72 + 0.00) = 51.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     27   0.00  62.40   0.00  -8.81  -1.87   0.00   0.00   0.00
51.72
-------------------------------------------------------------------------
--

Segment Leq : 51.72 dBA

Total Leq All Segments: 51.72 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 59.32
                           (NIGHT): 51.72
```

```
STAMSON 5.0        NORMAL REPORT        Date: 19-11-2019 10:20:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albion (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: Albion (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -51.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 118.00 / 118.00 m
Receiver height           :  21.00 / 21.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 54.40 + 0.00) = 54.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -51   0.00  70.00   0.00  -8.96  -6.64   0.00   0.00   0.00
54.40
-------------------------------------------------------------------------
--

Segment Leq : 54.40 dBA

Total Leq All Segments: 54.40 dBA

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

Source height = 1.50 m

ROAD (0.00 + 46.80 + 0.00) = 46.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -51   0.00  62.40   0.00  -8.96  -6.64   0.00   0.00   0.00
46.80
-------------------------------------------------------------------------
--

Segment Leq : 46.80 dBA

Total Leq All Segments: 46.80 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.40
                           (NIGHT): 46.80
```

```
STAMSON 5.0        NORMAL REPORT        Date: 19-11-2019 10:22:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albion (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: Albion (day/night)
----------------------------------------
Angle1   Angle2           : -44.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 107.00 / 107.00 m
Receiver height           :  21.00 / 21.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 60.18 + 0.00) = 60.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -44     90   0.00  70.00   0.00  -8.53  -1.28   0.00   0.00   0.00
60.18
-------------------------------------------------------------------------
--

Segment Leq : 60.18 dBA

Total Leq All Segments: 60.18 dBA


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

Source height = 1.50 m

ROAD (0.00 + 52.58 + 0.00) = 52.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -44     90   0.00  62.40   0.00  -8.53  -1.28   0.00   0.00   0.00
52.58
-------------------------------------------------------------------------
--

Segment Leq : 52.58 dBA

Total Leq All Segments: 52.58 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 60.18
                           (NIGHT): 52.58
```

```
STAMSON 5.0        NORMAL REPORT        Date: 19-11-2019 10:24:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albion (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: Albion (day/night)
----------------------------------------
Angle1   Angle2           :  39.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 154.00 / 154.00 m
Receiver height           :  21.00 / 21.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 54.40 + 0.00) = 54.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    39     90   0.00  70.00   0.00 -10.11  -5.48   0.00   0.00   0.00
54.40
-------------------------------------------------------------------------
--

Segment Leq : 54.40 dBA

Total Leq All Segments: 54.40 dBA


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

Source height = 1.50 m

ROAD (0.00 + 46.81 + 0.00) = 46.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    39     90   0.00  62.40   0.00 -10.11  -5.48   0.00   0.00   0.00
46.81
-------------------------------------------------------------------------
--

Segment Leq : 46.81 dBA

Total Leq All Segments: 46.81 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.40
                           (NIGHT): 46.81
```