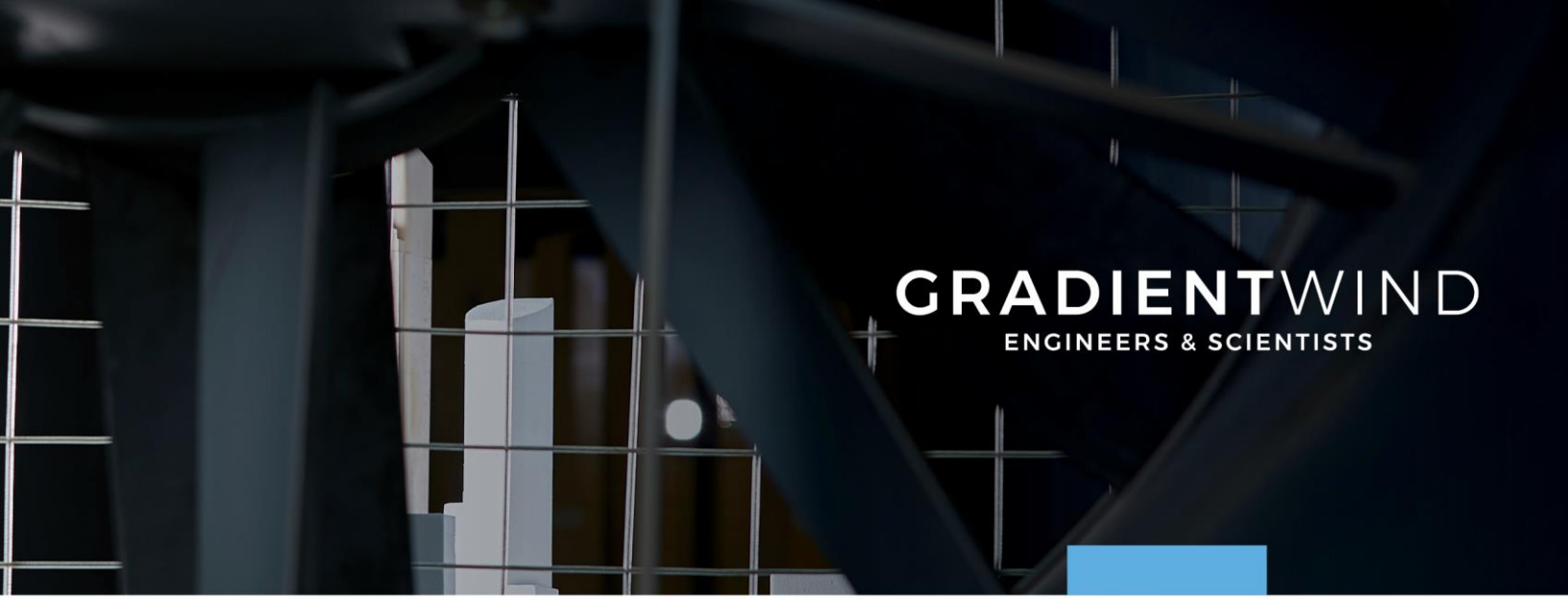

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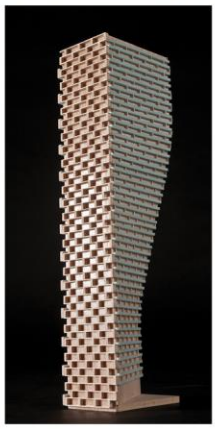
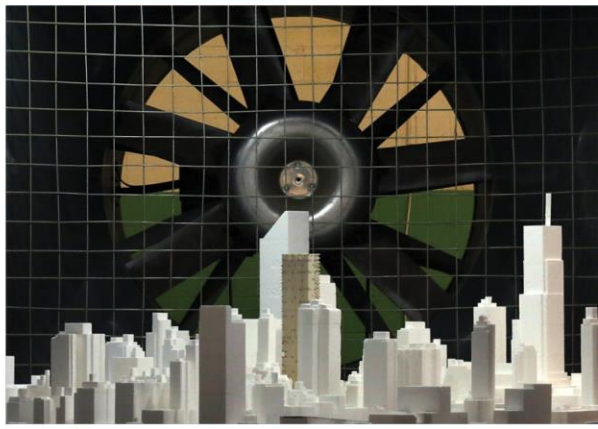
ENGINEERS & SCIENTISTS

TRANSPORTATION NOISE ASSESSMENT

1136 Gabriel Street
Ottawa, Ontario

Report: 24-139-Transportation Noise Assessment





September 18, 2024

PREPARED FOR
Nemorin Group Limited
135 Laurier Ave W #100
Ottawa, ON K1P 5J2

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

EXECUTIVE SUMMARY

This report describes a transportation noise assessment undertaken in support of a Site Plan Control (SPC) application for the proposed residential development located at 1136 Gabriel Street in Ottawa, Ontario. The proposed development comprises a four-storey rectangular building. The primary sources of roadway traffic noise include St. Joseph Boulevard to the south and Place D'Orleans Drive to the east. Figure 1 illustrates a complete site plan 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) NPC-300, Ministry of Transportation Ontario (MTO), and City of Ottawa Environmental Noise Control Guidelines (ENCG) guidelines; (ii) future vehicular traffic volumes corresponding to roadway classification, roadway traffic volumes obtained from the City of Ottawa; and (iii) architectural drawings provided by Lalande and Doyle Architects Inc. in May 2024.

The results of the current analysis indicate that noise levels will range between 46 and 62 dBA during the daytime period (07:00-23:00) and between 44 and 54 dBA during the nighttime period (23:00-07:00). The highest noise level (62 dBA) occurs at the east façade, which is nearest and most exposed to Place D'Orleans Drive. Figures 4 - 7 illustrate daytime and nighttime noise contours of the site 1.5 m and 13.3 m above grade.

The results indicate that upgraded building components and central air conditioning will not be required as noise levels predicted due to roadway traffic do not exceed the criteria of 65 dBA during the daytime listed in ENCG. However, noise levels fall between 55 dBA and 65 dBA during the daytime period. As such, the development will need forced air heating with provisions for central air conditioning, as a minimum requirement. If installed air condiiting will allow occupants to keep windows closed and maintain a comfortable living environment. A Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The results also indicate that noise levels at the at-grade amenity area are expected to be 46 dBA. As noise levels are below 55 dBA, noise mitigation at the OLA is not required.

With regard to stationary noise impacts from proposed mechanical systems on the building, they will be designed to ensure compliance with the ENCG sound level limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. It is recommended a stationary noise study be conducted once mechanical plans for the proposed building become available. This study would assess the impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas.

TABLE OF CONTENTS

1. INTRODUCTION 1

2. TERMS OF REFERENCE 1

3. OBJECTIVES 2

4. METHODOLOGY 2

4.1 Background 2

4.2 Roadway Traffic Noise 2

4.2.1 Criteria for Roadway Traffic Noise 2

4.2.2 Roadway Traffic Volumes 4

4.2.3 Theoretical Roadway Traffic Noise Predictions 4

5. RESULTS 5

5.1 Roadway Traffic Noise Levels 5

5.1.1 Noise Control Measures 6

6. CONCLUSIONS AND RECOMMENDATIONS 6

FIGURES

APPENDICES

Appendix A – STAMSON SAMPLE CALCULATIONS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Nemorin Group Limited to undertake a transportation noise assessment, in support of a Site Plan Control (SPC) application for the proposed residential development located at 1136 Gabriel Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise and vibration levels generated by local transportation traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300[1], Ministry of Transportation Ontario (MTO)[2], and City of Ottawa Environmental Noise Control Guidelines (ENCG)[3] guidelines. Noise calculations were based on architectural drawings provided by Lalande and Doyle Architects Inc. in May 2024, with future traffic volumes corresponding to roadway classification and theoretical roadway capacities, and recent satellite imagery.

2. TERMS OF REFERENCE

The focus of this transportation noise assessment is the proposed residential development located at 1136 Gabriel Street in Ottawa, Ontario. The subject site is located on a rectangular parcel of land northwest of the intersection of St. Joseph Boulevard and Gabriel Street.

The proposed development comprises a four-storey rectangular building. The building comprises several residential units at each level, including the basement level. Additionally, at the basement level is a mechanical room, and levels two, three, and four comprise balconies. An at-grade outdoor amenity area is provided in the southeast corner of the rear yard.

The site is surrounded by low-rise residential and commercial buildings in all compass directions. The primary sources of roadway traffic noise include St. Joseph Boulevard to the south and Place D'Orleans Drive to the east. Figure 1 illustrates a complete site plan with the surrounding context.

[1] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013
[2] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", August 2021
[3] City of Ottawa Environmental Noise Control Guidelines, January 2016

With regard to stationary noise impacts from proposed mechanical systems on the building, they will be designed to ensure compliance with the ENCG sound level limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. It is recommended a stationary noise study be conducted once mechanical plans for the proposed building become available. This study would assess the impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study building produced by local transportation sources and, (ii) explore potential noise 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. NPC-300 specifies that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for retail/office/indoor amenity space, living rooms, and sleeping quarters, respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [4]

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[5]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[6]. 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[7].

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 should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

[4] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Table C-9
[5] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[7] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

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[8] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
St. Joseph Boulevard	4 - Lane Urban Arterial Undivided (4-UAU)	50	**30,000**
Place D'Orleans Drive	4 - Lane Urban Arterial Divided (4-UAD)	60	**35,000**

4.2.3 Theoretical Roadway Traffic Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM model is also being accepted in the updated Environmental Guide for Noise of Ontario, 2021 by the Ministry of Transportation (MTO)[9]. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. A set of comparative calculations were performed in the current Ontario traffic noise prediction model STAMSON for comparisons to Predictor simulation results. The STAMSON model is, however, older and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections and multiple screening elements, and curved road geometry. A total of 5 receptor locations were identified around the site, as illustrated in Figure 2.

[8] City of Ottawa Transportation Master Plan, November 2013
[9] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", August 2021, pg. 16

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all roads was taken to be 92% / 8%, respectively.
- Default ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 5 locations around the study area (see Figure 2).

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the transportation noise calculations are summarized in Table 3 below.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Height Above Grade/Roof (m)	Receptor Location	Roadway Noise Level (dBA)	
			Day	Night
R1	13.3	POW - Level 4 - East Façade	62	54
R2	13.3	POW - Level 4 - North Façade	57	50
R3	13.3	POW - Level 4 - West Façade	51	44
R4	13.3	POW - Level 4 - South Façade	59	51
R5	1.5	OLA – At-Grade Outdoor Amenity	46	**N/A***

*Noise levels during the nighttime are not considered for OLAs

The results of the current analysis indicate that noise levels will range between 46 and 62 dBA during the daytime period (07:00-23:00) and between 44 and 54 dBA during the nighttime period (23:00-07:00). The highest noise level (62 dBA) occurs at the east façade, which is nearest and most exposed to Place D'Orleans Drive. Figures 4 - 7 illustrate daytime and nighttime noise contours of the site 1.5 m and 13.3 m above grade.

Table 4 shows a comparison in results between Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have a good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±0-3 dBA. STAMSON input parameters are shown in Appendix A.

TABLE 4: RESULTS OF STAMSON/PREDICTOR-LIMA CORRELATION

Receptor ID	Receptor Height (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R1	13.3	POW - Level 4 - East Façade	64	56	62	54
R2	13.3	POW - Level 4 - North Façade	60	52	57	50
R3	13.3	POW - Level 4 - West Façade	53	46	51	44

*Noise levels during the nighttime are not considered for OLAs

5.1.1 Noise Control Measures

The results indicate that upgraded building components and central air conditioning will not be required as noise levels predicted due to roadway traffic do not exceed the criteria of 65 dBA during the daytime listed in ENCG. However, noise levels fall between 55 dBA and 65 dBA during the daytime period. As such, the development will need forced air heating with provisions for central air conditioning, as a minimum requirement. These requirements will allow occupants to keep windows closed and maintain a comfortable living environment. A Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The results also indicate that noise levels at the at-grade amenity area are expected to be 46 dBA. As noise levels are below 55 dBA, noise mitigation at the OLAs is not required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 46 and 62 dBA during the daytime period (07:00-23:00) and between 44 and 54 dBA during the nighttime period (23:00-07:00). The highest noise level (62 dBA) occurs at the east façade, which is nearest and most exposed to Place

D'Orleans Drive. Figures 4 - 7 illustrate daytime and nighttime noise contours of the site 1.5 m and 13.3 m above grade.

The results indicate that upgraded building components and central air conditioning will not be required as noise levels predicted due to roadway traffic do not exceed the criteria of 65 dBA during the daytime listed in ENCG. However, noise levels fall between 55 dBA and 65 dBA during the daytime period. As such, the development will need forced air heating with provisions for central air conditioning, as a minimum requirement. These requirements will allow occupants to keep windows closed and maintain a comfortable living environment. A Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below.

Type C:

> *"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

The results also indicate that noise levels at the at-grade amenity area are expected to be 46 dBA. As noise levels are below 55 dBA, noise mitigation at the OLAs is not required.

With regard to stationary noise impacts from proposed mechanical systems on the building, they will be designed to ensure compliance with the ENCG sound level limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. It is recommended a stationary noise study be conducted once mechanical plans for the proposed building become available. This study would assess the impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise-sensitive areas.

This concludes our transportation noise and vibration 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.

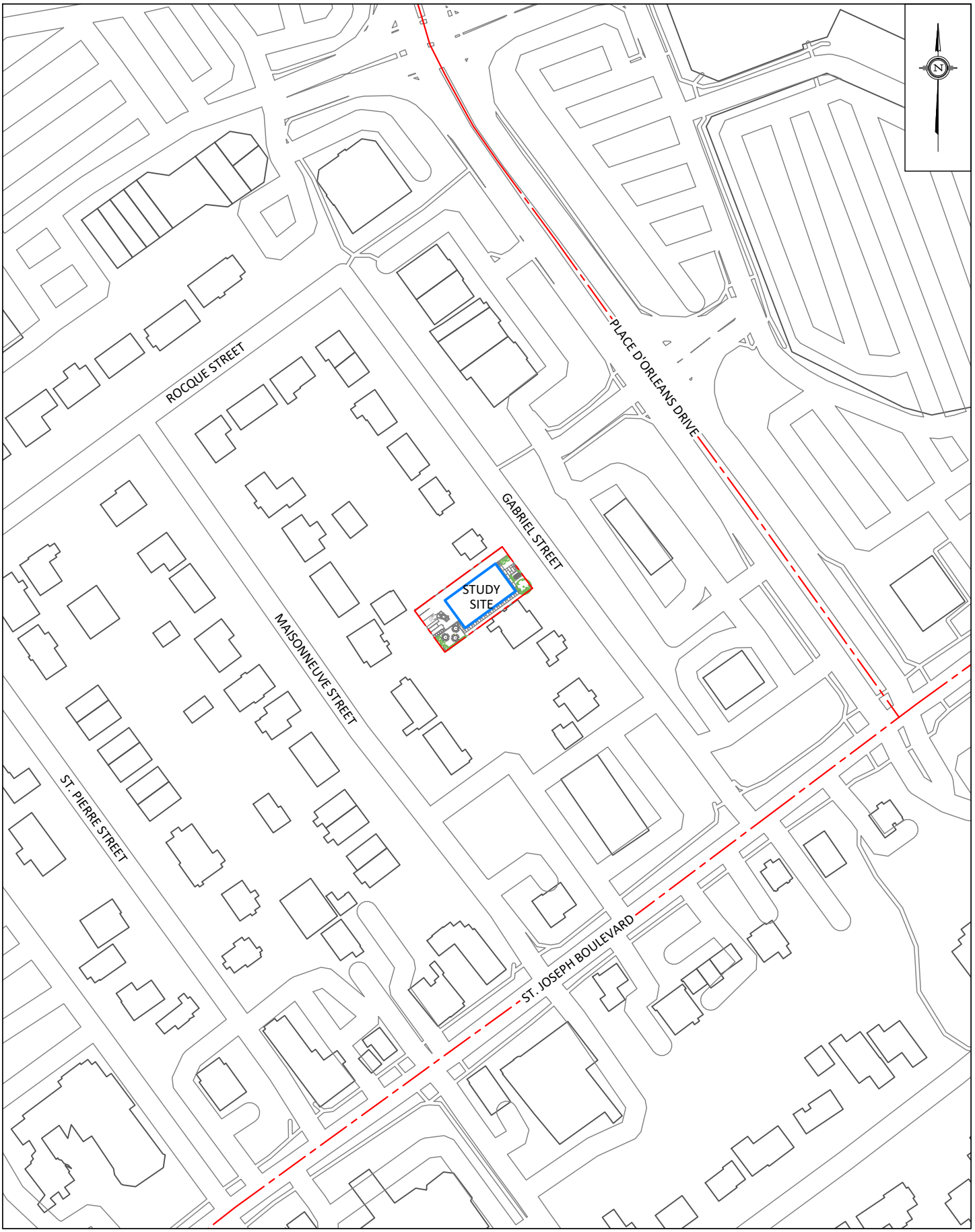
Sincerely,

Gradient Wind Engineering Inc.

Benjamin Page, AdvDip.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 24-139- Transportation Noise Assessment



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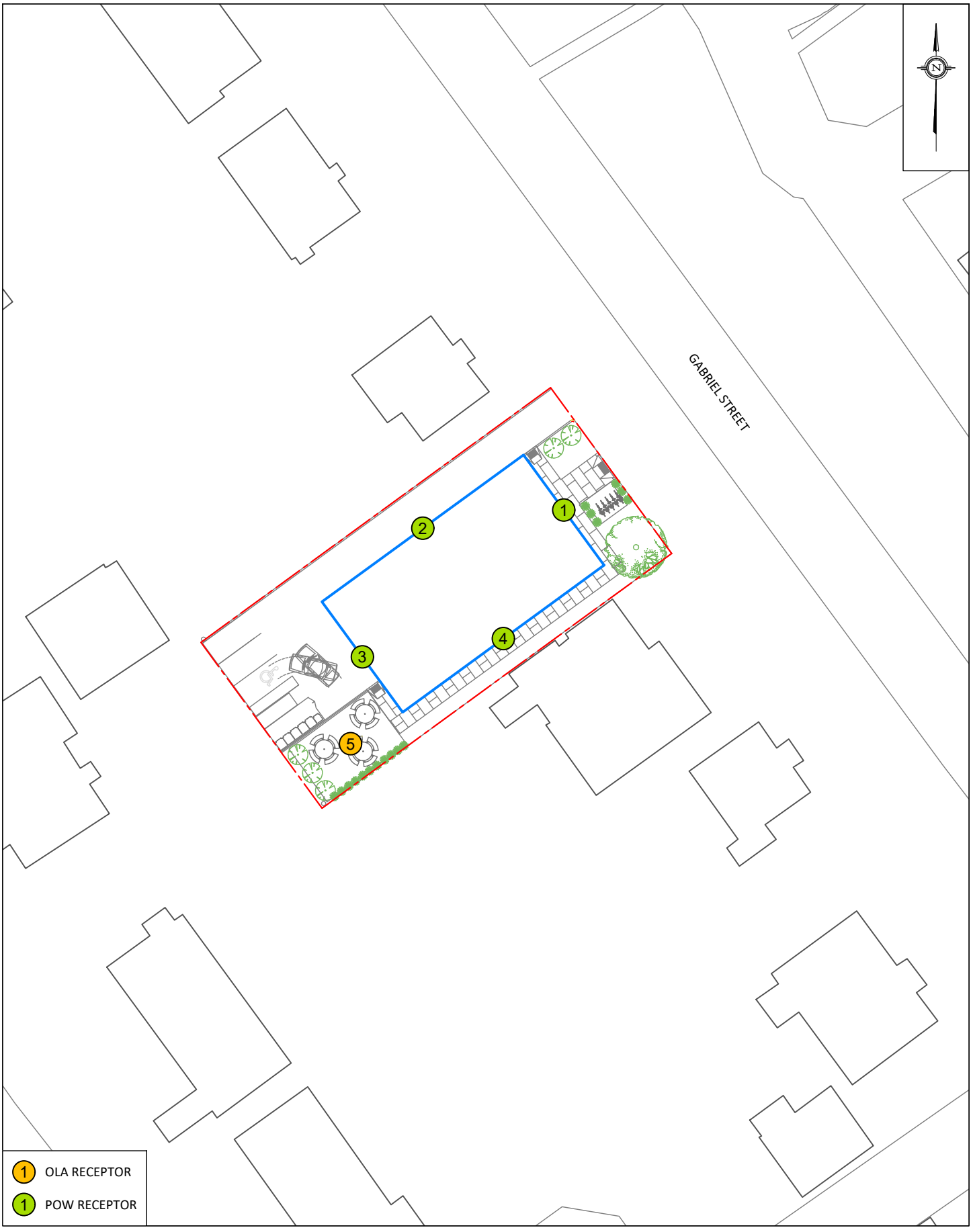
PROJECT	1136 GABRIEL STREET, OTTAWA TRANSPORTATION NOISE STUDY
SCALE	1:2000
DRAWING NO.	24-139-NOISE-FIG1
DATE	SEPTEMBER 18, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 1:
PROPOSED SITE PLAN AND SURROUNDING CONTEXT



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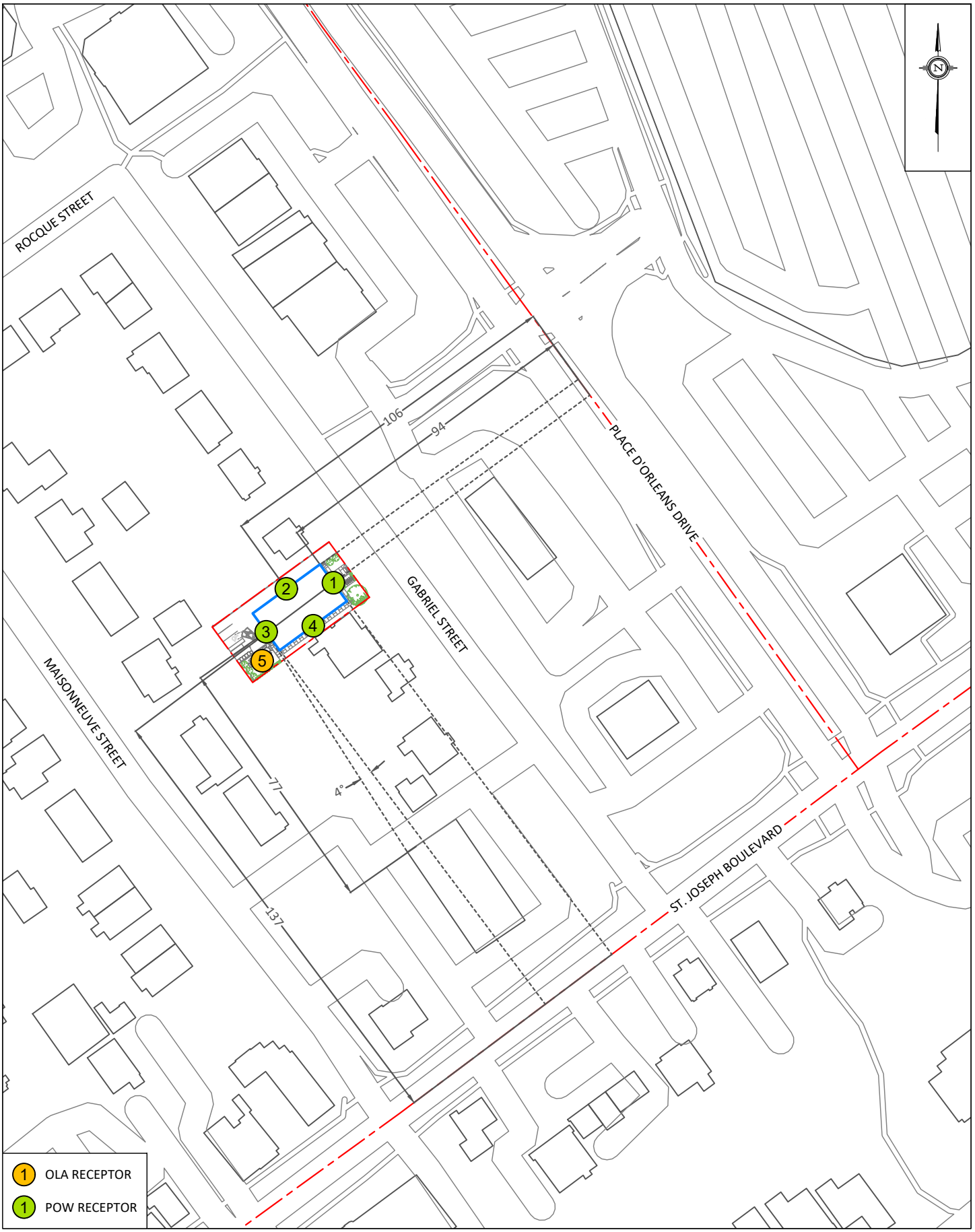
SCALE	1:500
DRAWING NO.	24-139-NOISE-FIG2
DATE	SEPTEMBER 18, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATION



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PROJECT	1136 GABRIEL STREET, OTTAWA TRANSPORTATION NOISE STUDY
SCALE	1:1500
DRAWING NO.	24-139-NOISE-FIG3
DATE	SEPTEMBER 18, 2024
DRAWN BY	B.P.

DESCRIPTION

FIGURE 3:
STAMSON 5.04 INPUT DATA

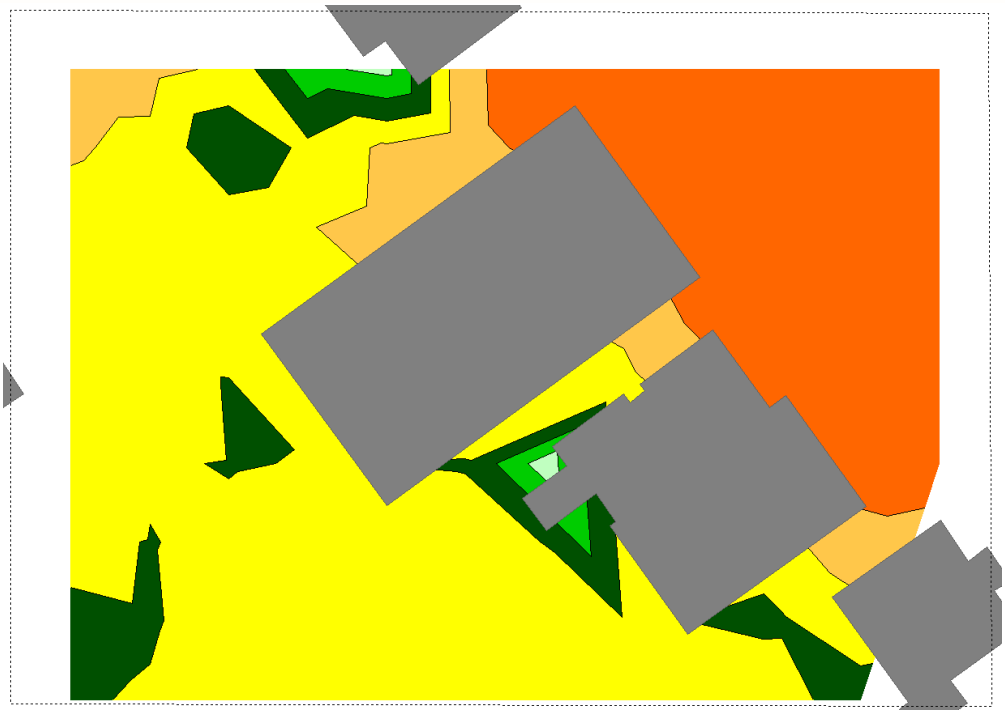


FIGURE 4: DAYTIME TRANSPORTATION NOISE CONTOURS (1.5 M ABOVE GRADE)

- *80 – 85 dB*
- *75 – 80 dB*
- *70 – 75 dB*
- *65 – 70 dB*
- *60 – 65 dB*
- *55 – 60 dB*
- *50 – 55 dB*
- *45 – 50 dB*
- *40 – 45 dB*
- *35 – 40 dB*
- *0 – 35 dB*

FIGURE 5: NIGHTTIME TRANSPORTATION NOISE CONTOURS (1.5 M ABOVE GRADE)

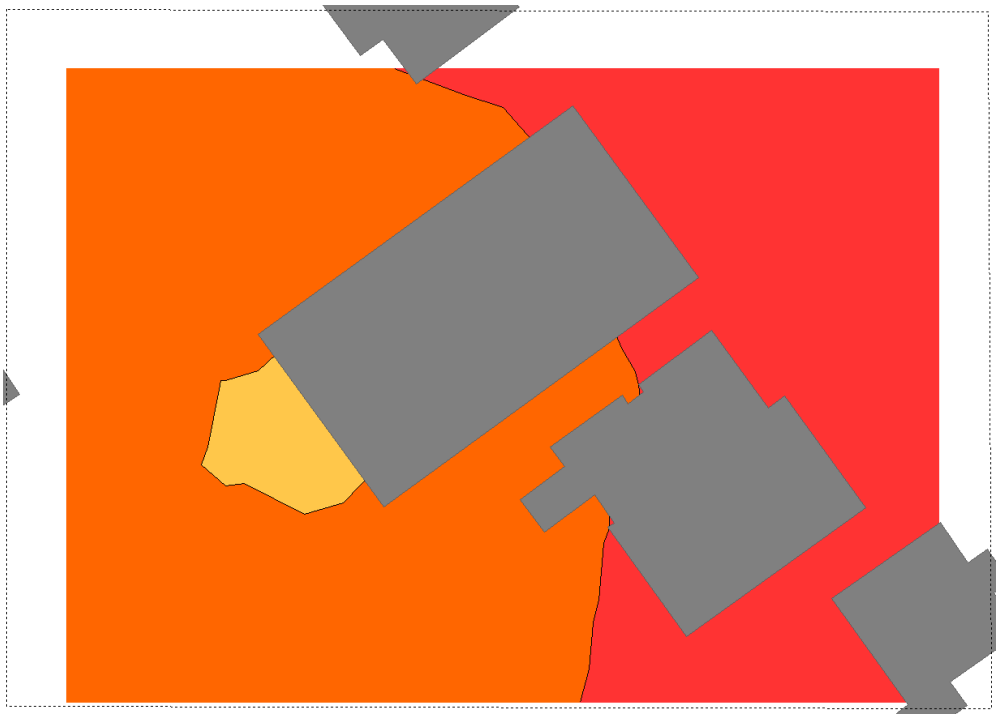
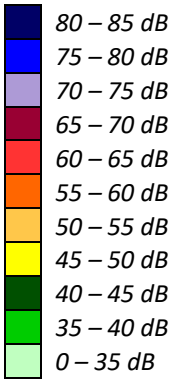


FIGURE 6: DAYTIME TRANSPORTATION NOISE CONTOURS (13.3 M ABOVE GRADE)



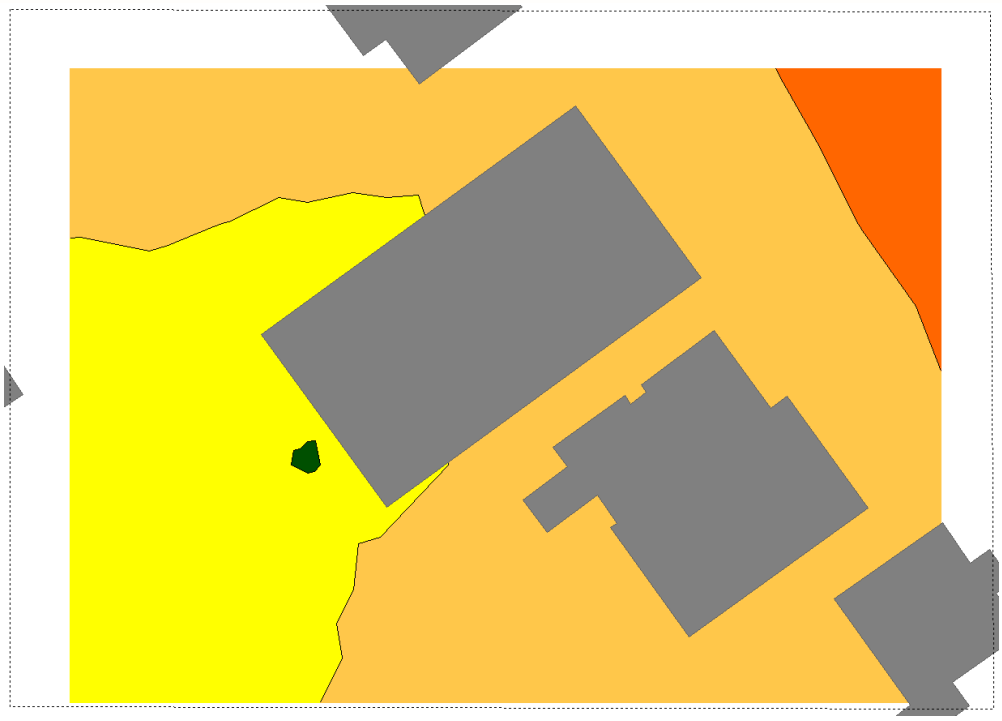


FIGURE 7: NIGHTTIME TRANSPORTATION NOISE CONTOURS (13.3 M ABOVE GRADE)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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STAMSON 5.0 NORMAL REPORT Date: 26-07-2024 11:37:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Place D'orle (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 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): 35000
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: Place D'orle (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 45 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 94.00 / 94.00 m
Receiver height : 13.30 / 13.30 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: St. Joseph (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 : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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 # 2: St. Joseph (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     50 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 137.00 / 137.00 m
Receiver height           :  13.30 / 13.30  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Place D'orle (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.36 + 0.00) = 63.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.68   0.00  -7.97   0.00   0.00  -2.34   0.00  63.36
-------------------------------------------------------------------------------

Segment Leq : 63.36 dBA

Results segment # 2: St. Joseph (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.79 + 0.00) = 54.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  71.49   0.00  -9.61  -3.01   0.00  -4.09   0.00  54.79
-------------------------------------------------------------------------------

Segment Leq : 54.79 dBA

Total Leq All Segments: 63.93 dBA

Results segment # 1: Place D'orle (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.77 + 0.00) = 55.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.08   0.00  -7.97   0.00   0.00  -2.34   0.00  55.77
-------------------------------------------------------------------------------

Segment Leq : 55.77 dBA
```

```
Results segment # 2: St. Joseph (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 47.19 + 0.00) = 47.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  63.89   0.00  -9.61  -3.01   0.00  -4.09   0.00  47.19
-------------------------------------------------------------------------------

Segment Leq : 47.19 dBA

Total Leq All Segments: 56.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.93
                           (NIGHT): 56.33
```

STAMSON 5.0 NORMAL REPORT Date: 26-07-2024 11:40:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

```
Road data, segment # 1: Place D'orle (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   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):  35000
    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: Place D'orle (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     45 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 106.00 / 106.00 m
Receiver height           :  13.30 / 13.30  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Place D'orle (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.85 + 0.00) = 59.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  73.68   0.00  -8.49  -3.01   0.00  -2.32   0.00  59.85
-------------------------------------------------------------------------------

Segment Leq : 59.85 dBA

Total Leq All Segments: 59.85 dBA
```

```
Results segment # 1: Place D'orle (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.25 + 0.00) = 52.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  66.08   0.00  -8.49  -3.01   0.00  -2.32   0.00  52.25
-------------------------------------------------------------------------------

Segment Leq : 52.25 dBA

Total Leq All Segments: 52.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.85
                           (NIGHT): 52.25
```

STAMSON 5.0 NORMAL REPORT Date: 26-07-2024 11:49:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: St Joseph (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 : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 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: St Joseph (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 50 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 137.00 / 137.00 m
Receiver height : 13.30 / 13.30 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 4.00 deg
Barrier height : 13.00 m
Barrier receiver distance : 77.00 / 77.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

```
Results segment # 1: St Joseph (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.30 !        6.67 !          6.67

ROAD (0.00 + 30.02 + 53.09) = 53.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0      4   0.00  71.49   0.00  -9.61 -16.53   0.00  -5.59   0.00  39.77
     0      4   0.00  71.49   0.00  -9.61 -16.53   0.00   0.00 -15.33  30.02
-------------------------------------------------------------------------------
     4     90   0.00  71.49   0.00  -9.61  -3.21   0.00  -5.59   0.00  53.09
-------------------------------------------------------------------------------

Segment Leq : 53.11 dBA

Total Leq All Segments: 53.11 dBA

Results segment # 1: St Joseph (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.30 !        6.67 !          6.67

ROAD (0.00 + 22.43 + 45.49) = 45.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0      4   0.00  63.89   0.00  -9.61 -16.53   0.00  -5.59   0.00  32.17
     0      4   0.00  63.89   0.00  -9.61 -16.53   0.00   0.00 -15.33  22.43
-------------------------------------------------------------------------------
     4     90   0.00  63.89   0.00  -9.61  -3.21   0.00  -5.59   0.00  45.49
-------------------------------------------------------------------------------

Segment Leq : 45.52 dBA

Total Leq All Segments: 45.52 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.11
                           (NIGHT): 45.52
```