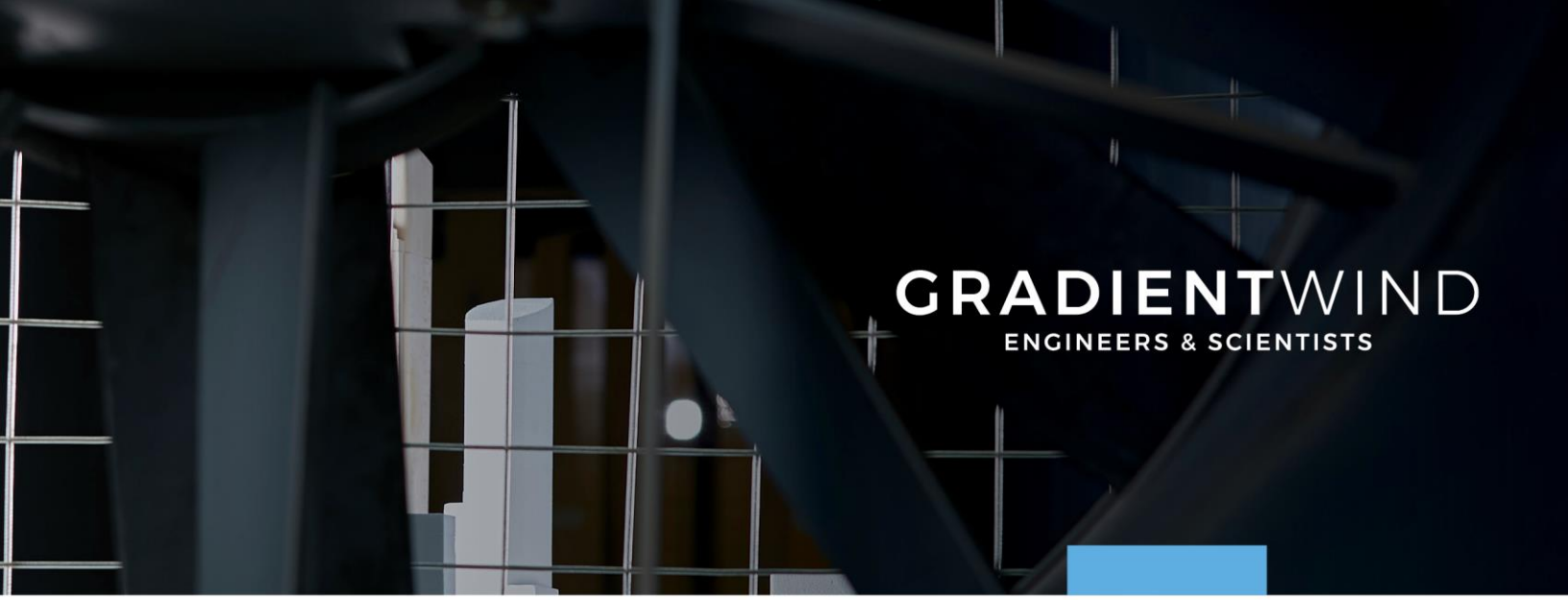

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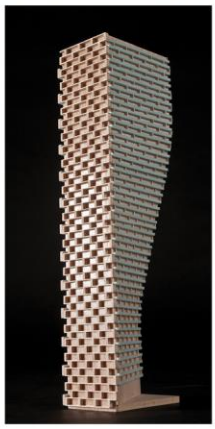
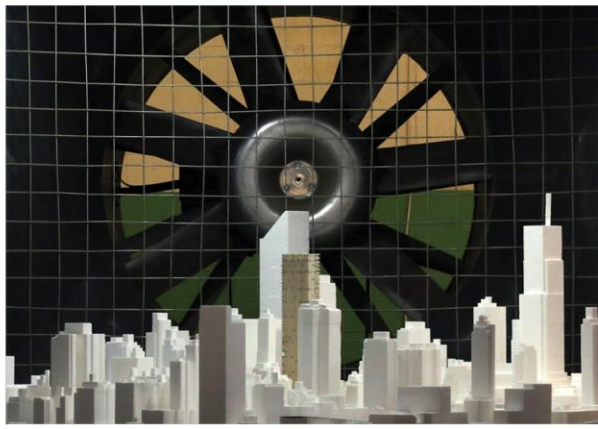
NOISE & VIBRATION ASSESSMENT

3745 St. Joseph Boulevard
Ottawa, Ontario

REPORT: 23-067 – Traffic Noise





May 11th, 2023

PREPARED FOR

13890767 Canada Inc.
3735 Saint Joseph Boulevard, Unit #1
Ottawa, ON K1C 1T1

PREPARED BY

Essraa Alqassab, BASc, Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a noise and vibration assessment undertaken in support of concurrent Zoning By-law Amendment (ZBLA) and Site Plan Control Application (SPA) submissions for a proposed development located at 3745 St. Joseph Boulevard in Ottawa, Ontario. The proposed development comprises a 6-storey building. The primary source of roadway traffic noise is St. Joseph Boulevard. There are no significant sources of ground-borne vibrations in close proximity to the site. Figure 1 illustrates a complete 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 MECP's and 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 provided by CSV Architects in March 2023.

The results of the current analysis indicate that traffic noise levels will range between 66 and 69 dBA during the daytime period (07:00-23:00) and between 58 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (69 dBA) occurs at the south façade, which is closest and most exposed to St. Joseph Boulevard. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA. Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment.

Stationary noise impacts from the environment onto the proposed development are expected to be negligible as the building is not in proximity to any large mechanical equipment. The setback distance between the proposed development and mechanical equipment servicing neighboring facilities is expected to be sufficient in attenuating noise. Moreover, noise and air quality impact from the surrounding facilities are minimal, as they are small low-rise commercial operations do not produce adverse noise and air quality impacts. This is discussed further in Section 2 of this report.

The stationary noise impacts from the proposed development onto the surroundings are also expected to be negligible as the nearest noise-sensitive land is further than 100 m south of the proposed development.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 13890767 Canada Inc. to undertake a noise and vibration assessment for a proposed development located at 3745 St. Joseph Boulevard in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] noise guidelines. Noise calculations were based on architectural drawings provided by CSV Architects, dated March 2023, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is a proposed development located at 3745 St. Joseph Boulevard in Ottawa, Ontario. The study site is located on a parcel of bounded by St. Joseph Boulevard to the south and low-rise light industrial properties in all other compass directions.

The proposed development includes a 6-storey building with retail, commercial spaces, hotel rooms, and a restaurant. Above 3 levels of underground parking, the ground level comprises of three commercial spaces, a large community space, an atrium, and the hotel reception. Level 2 is entirely dedicated to various commercial spaces, including a gym and a co-working area. Levels 3-5 feature hotel suites along the perimeter of the floorplan. Level 6 is also dedicated to hotel suites, but also includes a restaurant space to the west. The building is topped with a mechanical penthouse and an adjacent rooftop terrace. As per the NPC-300, outdoor locations associated with a noise-sensitive commercial property are not points of reception. As such, no Outdoor Living Areas (OLAs) are included in this assessment.

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

2.1 Potential Vibration Impacts

The nearest railway line, the Quebec Gatineau Railway, is further than 3 km away from the study site. As per the railway guidelines, vibration studies are not required for sites more the 75 m from a principal rail line. In addition, the movement of delivery trucks serving the surrounding retail and commercial industries are not of concern with regards to ground vibrations. Therefore, negative ground vibration impacts onto the site are not expected.

2.2 Potential Stationary Noise Impacts

Ten meters to the west of the subject site is a low-rise retail building currently occupied by a nail spa, a message therapy office, a computer repair shop, and a barbershop. None of these occupancies are expected to produce negative air quality or noise impacts. Approximately 15 m north of the subject site is a warehouse, located at 530 Lacolle Way. No operation serving the warehouse is expected to produce negative air quality and noise impacts onto the subject site, there are no rooftop units located on the building. 120 m east of the subject site are three low-rise office buildings. The mechanical equipment serving these buildings are small, and the setback distance is sufficient in attenuating any noise. Within 100 m east of the subject site are office buildings and a church, a retail store, and a daycare and play center. None of these sites are expected to have negative impacts onto the proposed building. Furthermore, the subject site is not in close proximity to any large mechanical equipment. The setback distance between the proposed development and mechanical equipment servicing neighboring facilities is expected to be sufficient in attenuating noise.

Therefore, noise and air quality impacts from the surrounding environment onto the proposed development are minimal and not of concern. The subject site is not in close proximity to any large mechanical equipment and as summarized above, the surrounding facilities are small low-rise developments whose operations do not produce adverse noise and air quality impacts.

The stationary noise impacts from the proposed development onto the surroundings are also expected to be negligible as the nearest noise-sensitive land is further than 100 m south of the proposed development. Figure 1 illustrates a complete site plan with surrounding context.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines and the MECP 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 50, 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

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

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

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

4.2.2 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.

[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 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

Roadway traffic noise calculations were performed by treating each roadway segment as separate line sources of noise. 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 assumed to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- 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 placed at 3 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figure A1.

4.2.3 Roadway Traffic Volumes

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
St. Joseph Boulevard	4-Lane Urban Arterial Undivided (2-UAU)	50	**30,000**

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in

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

conformance with the Ontario Building Code (2020) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing.

As per Section 4.2, when daytime noise levels from road sources at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[8] considers:

- Indoor sound level criteria, which varies according to the intended use of a space.
- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry

Based on published research[9], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels).

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A.

[8] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985
[9] CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	16.5	POW – North Façade	69	62
2	16.5	POW – West Façade	66	58
3	16.5	POW – East Façade	66	58

*Noise levels during the nighttime are not considered as per ENCG

The results of the current analysis indicate that Plane-of-Window noise levels will range between 66 and 69 dBA during the daytime period (07:00-23:00) and between 58 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (69 dBA) occurs at the south façade, which is closest and most exposed to St. Joseph Boulevard.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figure 3):

- **Hotel Suite Windows**

(i) Hotel windows facing south will require a minimum STC of 27.

(ii) Hotel windows facing east and west will require a minimum STC of 24.

(i) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Retail/Commercial Windows**

(i) Retail/Commercial windows facing south will require a minimum STC of 22.

(ii) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements.

- **Exterior Walls**

(i) Exterior wall components on the north and east façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[10]

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have specified an example window configuration, however several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required in all Agreements of Purchase and Sale and Lease Agreements, as summarized in Section 6.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that traffic noise levels will range between 66 and 69 dBA during the daytime period (07:00-23:00) and between 58 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (69 dBA) occurs at the south façade, which is closest and most exposed to to St. Joseph Boulevard. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3. Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment.

Stationary noise impacts from the environment onto the proposed development are expected to be negligible as the building is not in proximity to any large mechanical equipment. The setback distance between the proposed development and mechanical equipment servicing neighboring facilities is

[10] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

expected to be sufficient in attenuating noise. Moreover, noise and air quality impact from the surrounding facilities are minimal, as they are small low-rise developments whose operations do not produce adverse noise and air quality impacts.

The stationary noise impacts from the proposed development onto the surroundings are also expected to be negligible as the nearest noise-sensitive land is further than 100 m south of the proposed development.

This concludes our 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.

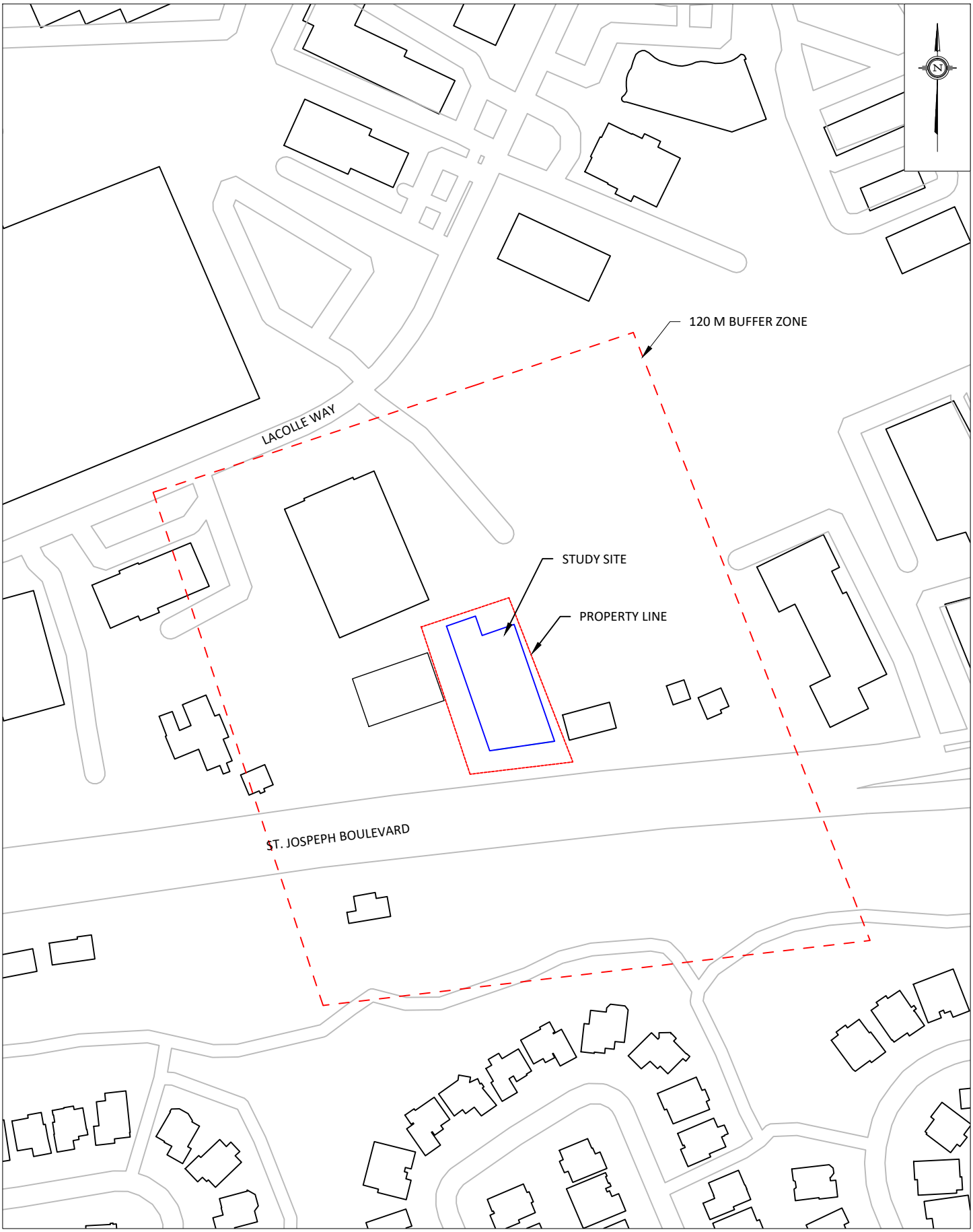
Sincerely,

Gradient Wind Engineering Inc.

Essraa Alqassab, BASc.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #23-067-Traffic Noise



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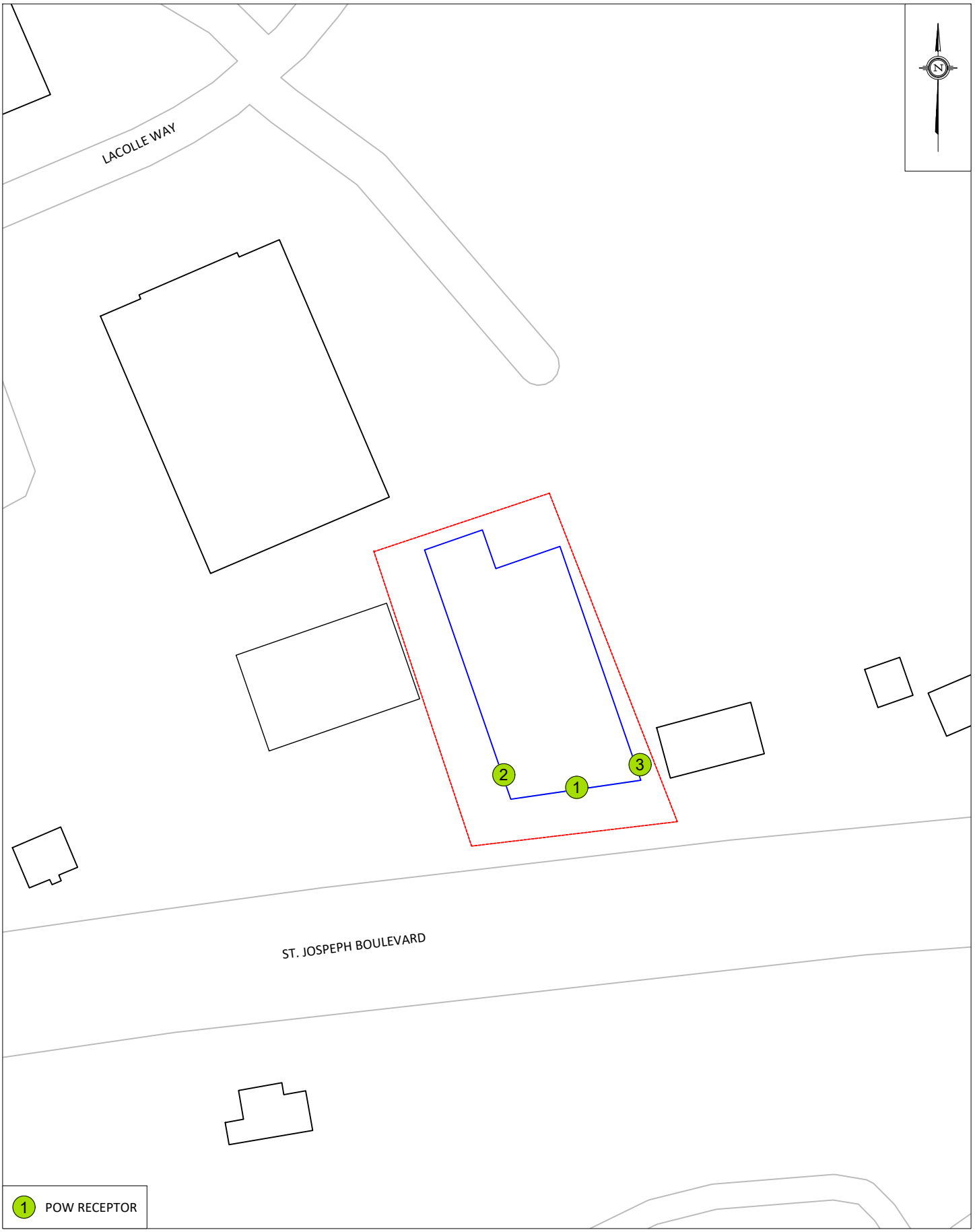
PROJECT	3745 ST JOSEPH BOULEVARD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW23-067-1
DATE	APRIL 18, 2023	DRAWN BY	E.A.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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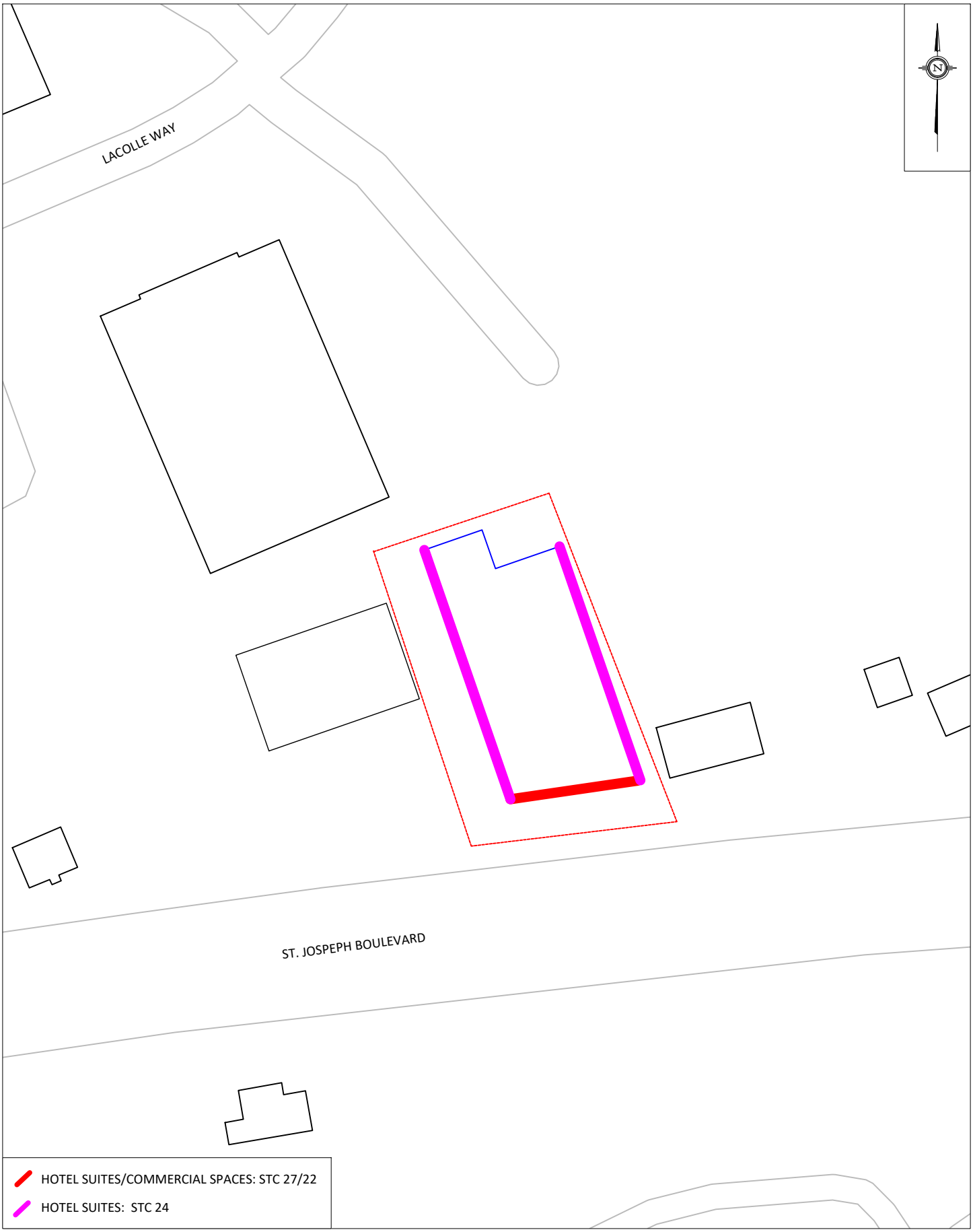
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW23-067-2
DATE	APRIL 18, 2023	DRAWN BY	E.A.

FIGURE 2:
RECEPTOR LOCATIONS



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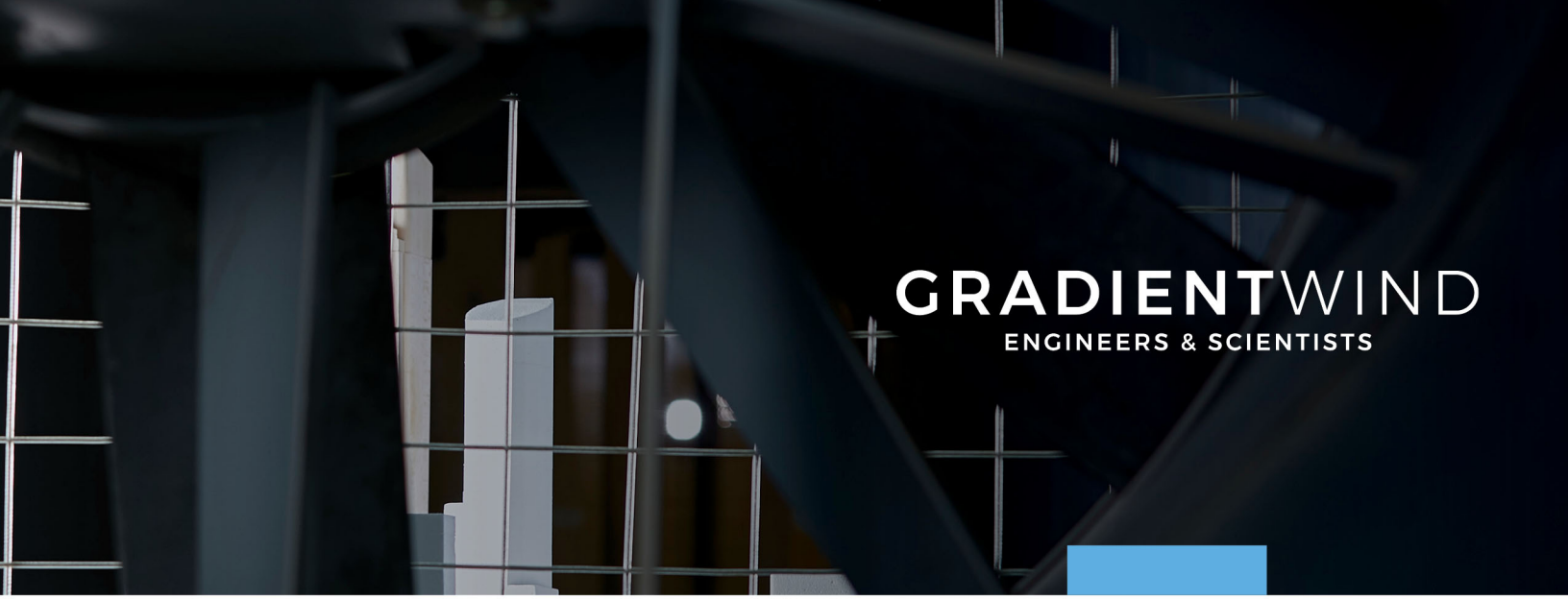
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW23-067-3
DATE	APRIL 18, 2023	DRAWN BY	E.A.

FIGURE 3:
STC RECOMMENDATIONS



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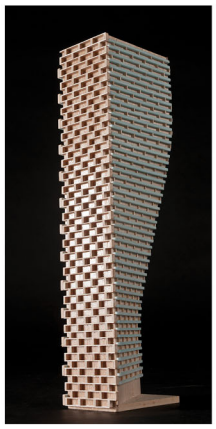

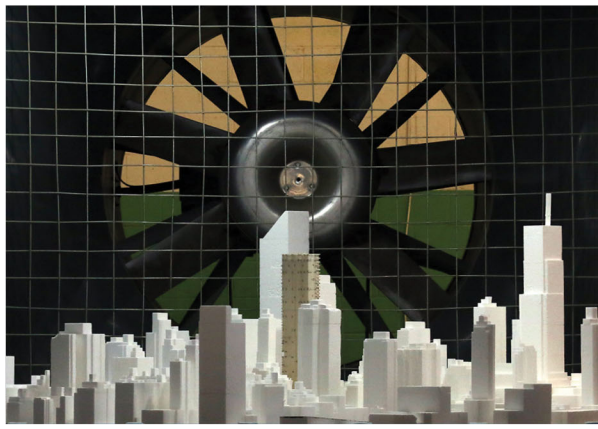

APPENDIX A

STAMSON CALCULATIONS

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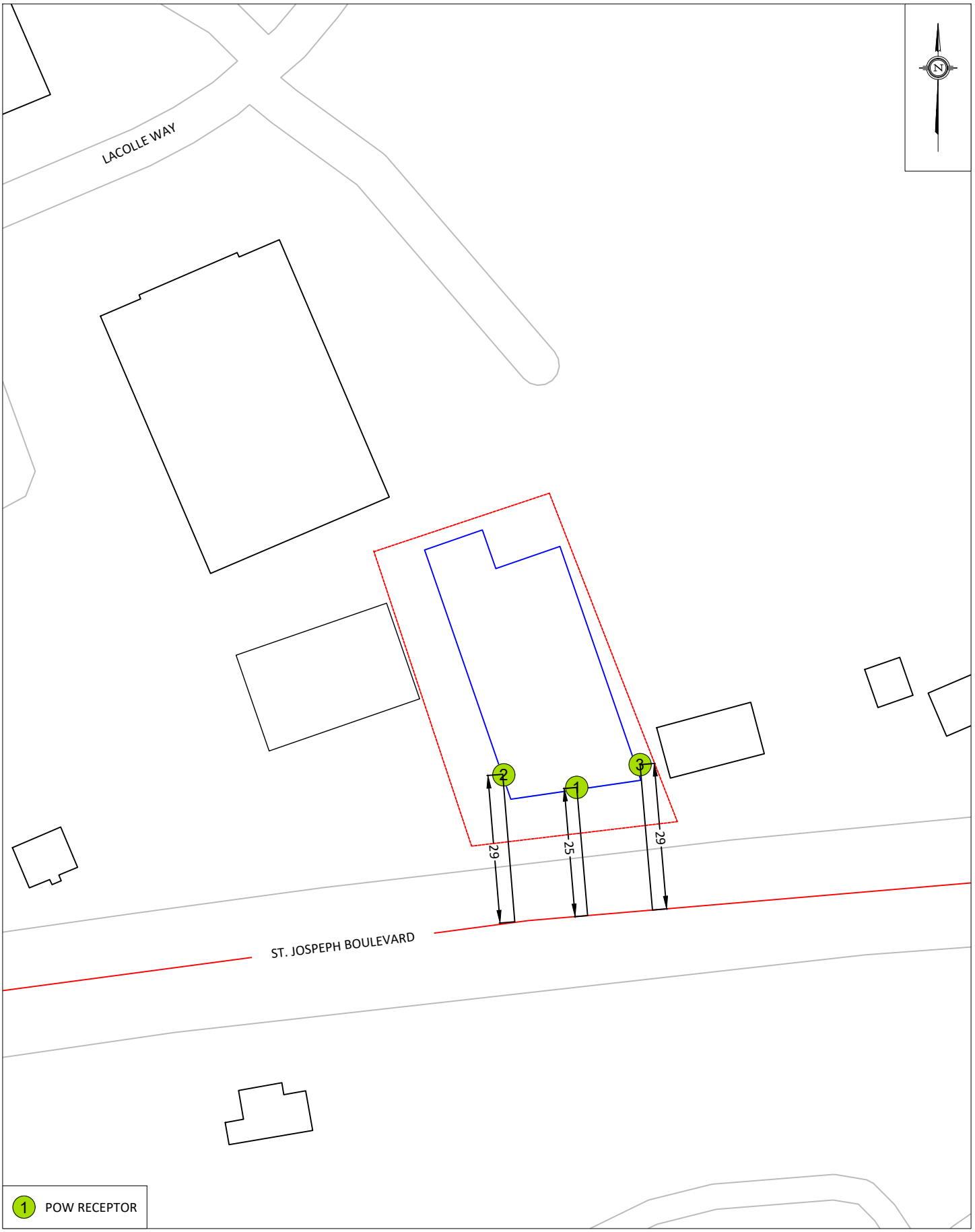

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PROJECT	3745 ST JOSEPH BOULEVARD, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW23-067-A1
DATE	APRIL 18, 2023	DRAWN BY	E.A.

FIGURE A1:
STAMSON PARAMETERS

```
STAMSON 5.0         NORMAL REPORT         Date: 17-04-2023 16:50:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.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           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  25.00 / 25.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 69.27 + 0.00) = 69.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90    0.00  71.49   0.00  -2.22   0.00   0.00   0.00   0.00
69.27
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 69.27 dBA

Total Leq All Segments: 69.27 dBA


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

Source height = 1.50 m

ROAD (0.00 + 61.68 + 0.00) = 61.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  63.89   0.00  -2.22   0.00   0.00   0.00   0.00
61.68
-------------------------------------------------------------------------
--

Segment Leq : 61.68 dBA

Total Leq All Segments: 61.68 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 69.27
                           (NIGHT): 61.68
```

```
STAMSON 5.0         NORMAL REPORT         Date: 17-04-2023 16:51:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.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          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 65.62 + 0.00) = 65.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90    0.00  71.49   0.00  -2.86  -3.01   0.00   0.00   0.00
65.62
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 65.62 dBA

Total Leq All Segments: 65.62 dBA


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

Source height = 1.50 m

ROAD (0.00 + 58.02 + 0.00) = 58.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  63.89   0.00  -2.86  -3.01   0.00   0.00   0.00
58.02
-------------------------------------------------------------------------
--

Segment Leq : 58.02 dBA

Total Leq All Segments: 58.02 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.62
                           (NIGHT): 58.02
```

```
STAMSON 5.0         NORMAL REPORT         Date: 17-04-2023 16:51:40
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           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 65.62 + 0.00) = 65.62 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  -2.86  -3.01   0.00   0.00   0.00
65.62
-------------------------------------------------------------------------------
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```

```
Segment Leq : 65.62 dBA

Total Leq All Segments: 65.62 dBA


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

Source height = 1.50 m

ROAD (0.00 + 58.02 + 0.00) = 58.02 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  -2.86  -3.01   0.00   0.00   0.00
58.02
-------------------------------------------------------------------------
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Segment Leq : 58.02 dBA

Total Leq All Segments: 58.02 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.62
                           (NIGHT): 58.02
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