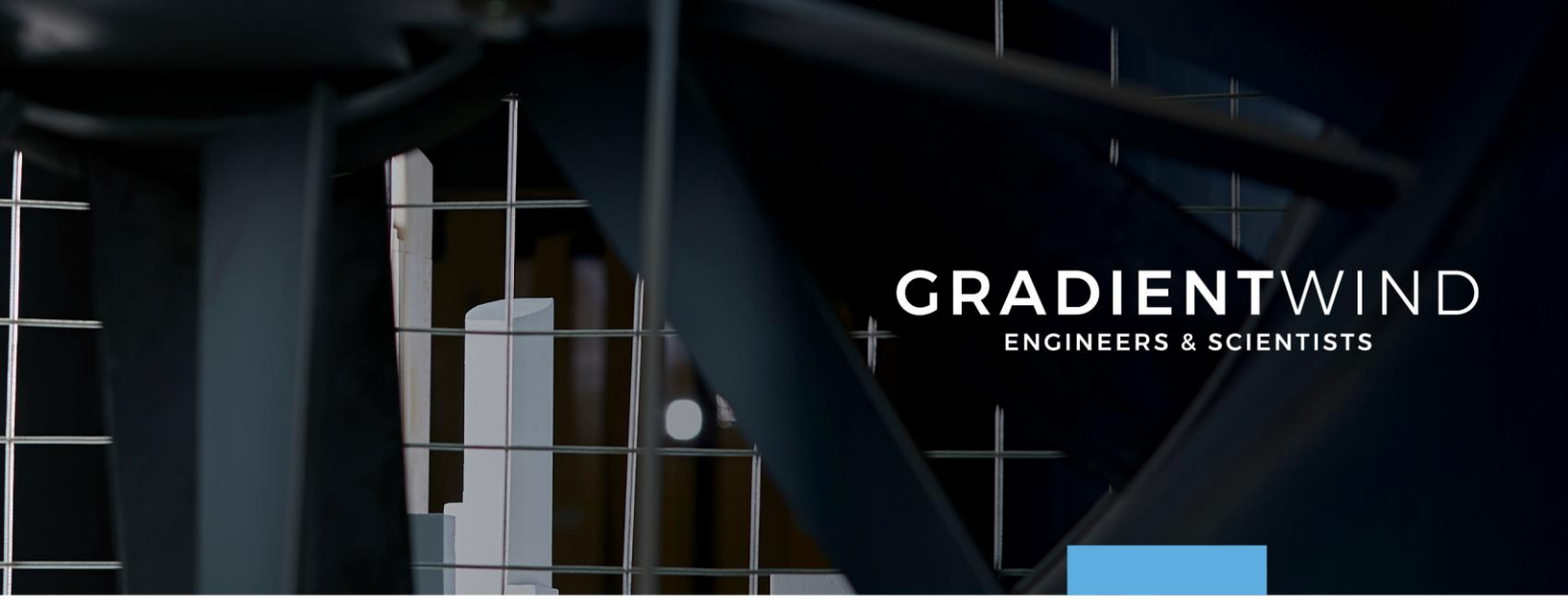
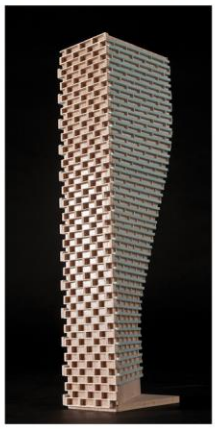


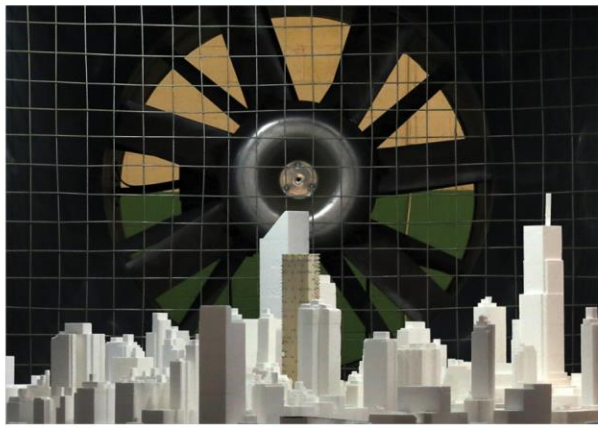
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

3430 Carling Avenue
Ottawa, Ontario

REPORT: GW21-116 - Traffic Noise Feasibility





July 28, 2021

PREPARED FOR

3430 Carling Property Inc.
555 Legget Drive, Suite 304, Tower A
Kanata, ON, K2K 3B8

PREPARED BY

Caleb Alexander, B.Eng., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken in support of a Zoning By-Law Amendment (ZBA) application submission for the proposed residential development located at 3430 Carling Avenue in Ottawa, Ontario. The proposed development comprises two separate buildings: the west building and the east building, both rising to nine storeys with rectangular and trapezoidal planforms for the east and west buildings, respectively. The primary source of roadway traffic noise is Carling Avenue to the north. 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 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) site plan drawings prepared by Project1 Studio, dated July 2021.

The results of the current analysis indicate that noise levels will range between 66 and 72 dBA during the daytime period (07:00-23:00) and between 58 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs at the north façade of the west building, which is nearest and most exposed to Carling Avenue. The noise levels predicted due to roadway traffic exceed the criteria listed in ENCG for building components and upgraded building components will be required for both the west and east buildings.

Results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

The results also indicate that noise levels for the outdoor amenity spaces (Receptor 6) are expected to exceed the criteria listed in NPC-300 for outdoor living areas, as discussed in Section 4.2. Therefore, acoustic mitigation, such as perimeter guards, may be required. Furthermore, a detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regards to stationary noise impacts, it is recommended a stationary noise study be conducted once mechanical plans for the proposed buildings become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed buildings on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG and NPC-300 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.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 3430 Carling Property Inc. to undertake a roadway traffic noise feasibility assessment in support of a Zoning By-Law Amendment (ZBA) application for the proposed residential development located at 3430 Carling Avenue in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a roadway traffic noise feasibility assessment of exterior noise levels generated by local roadway traffic.

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 site plan drawings prepared by Project1 Studio, dated July 2021.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise feasibility assessment is a proposed residential development located at 3430 Carling Avenue in Ottawa, Ontario. The proposed development comprises two separate buildings: west and east buildings, both rising to nine storeys. The east building has a rectangular podium with a uniform rectangular planform building rising from it at the 5th floor and the west building has a trapezoidal podium with a uniform rectangular planform building rising from it at the 5th floor. Outdoor terraces are present at the 5th floor on top of the podia of the west and east buildings with the largest outdoor space present at the northwest corner of the west building. The development is located on a trapezoidal parcel of land, overlooking Carling Avenue to the north with Elterwater Avenue to the south, adjacent to existing residential uses in all directions and the Ottawa River approximately 250 metres (m) to the north of the subject site. The property is accessible by Carling Avenue. The study site has low rise residential buildings to the south and sparse low rise residential buildings to the north.

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

[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

allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range is 50, 45, and 40 dBA for reception/retail, living rooms, and sleeping quarters, respectively, as listed in Table 1. Based on Gradient Wind's experience, more comfortable indoor noise levels should be targeted, towards 47, 42, and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

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

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

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

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

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.

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 taken 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 flat/gentle slope.
- For select receptors, the proposed building was considered as a noise barrier partially obstructing exposure to the roadway (Figures 2-3).
- Noise receptors were strategically placed at 6 locations around the study area (see Figure 1).
- Receptor distances and exposure angles are illustrated in Figures 2-3.

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 Volume
Carling Avenue	4-Lane Urban Arterial Divided (4-UAD)	60	**35,000**

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

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.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade/Roof (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
EAST BUILDING				
1	25.5	POW – 9th Floor – East Façade	68	60
2	25.5	POW – 9th Floor – North Façade	71	64
WEST BUILDING				
3	25.5	POW – 9th Floor – East Façade	66	58
4	25.5	POW – 9th Floor – North Façade	72	64
5	25.5	POW – 9th Floor – West Façade	67	60
OUTDOOR AMENITY				
6	13.5	OLA – 4th Floor – West Building Amenity Terrace	67	N/A*

*OLA noise levels during the nighttime are not considered as per ENCG

The results of the current analysis indicate that noise levels will range between 66 and 72 dBA during the daytime period (07:00-23:00) and between 58 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs at the north façade of the west building, which is nearest and most exposed to Carling Avenue.

6. CONCLUSIONS AND RECOMMENDATIONS

The noise levels predicted due to roadway traffic exceed the criteria listed in ENCG for building components, therefore, upgraded building components will be required for both the east and west buildings. Due to the limited information available at the time of the study, which was prepared for a ZBA application, detailed STC calculations could not be performed at this time. A detailed review of the

window and wall assemblies should be performed by a qualified engineer with expertise in acoustics during the detailed design stage of the building.

Results of the calculations also indicate that both the West and East buildings will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

The results also indicate that noise levels for the outdoor amenity space (Receptor 6) are expected to exceed the criteria listed in NPC-300 for outdoor living areas, as discussed in Section 4.2. Therefore, acoustic mitigation, such as perimeter guards, may be required. A detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regards to stationary noise impacts, it is recommended a stationary noise study be conducted once mechanical plans for the proposed buildings become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed buildings on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG and NPC-300 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.

This concludes our roadway traffic noise feasibility 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.

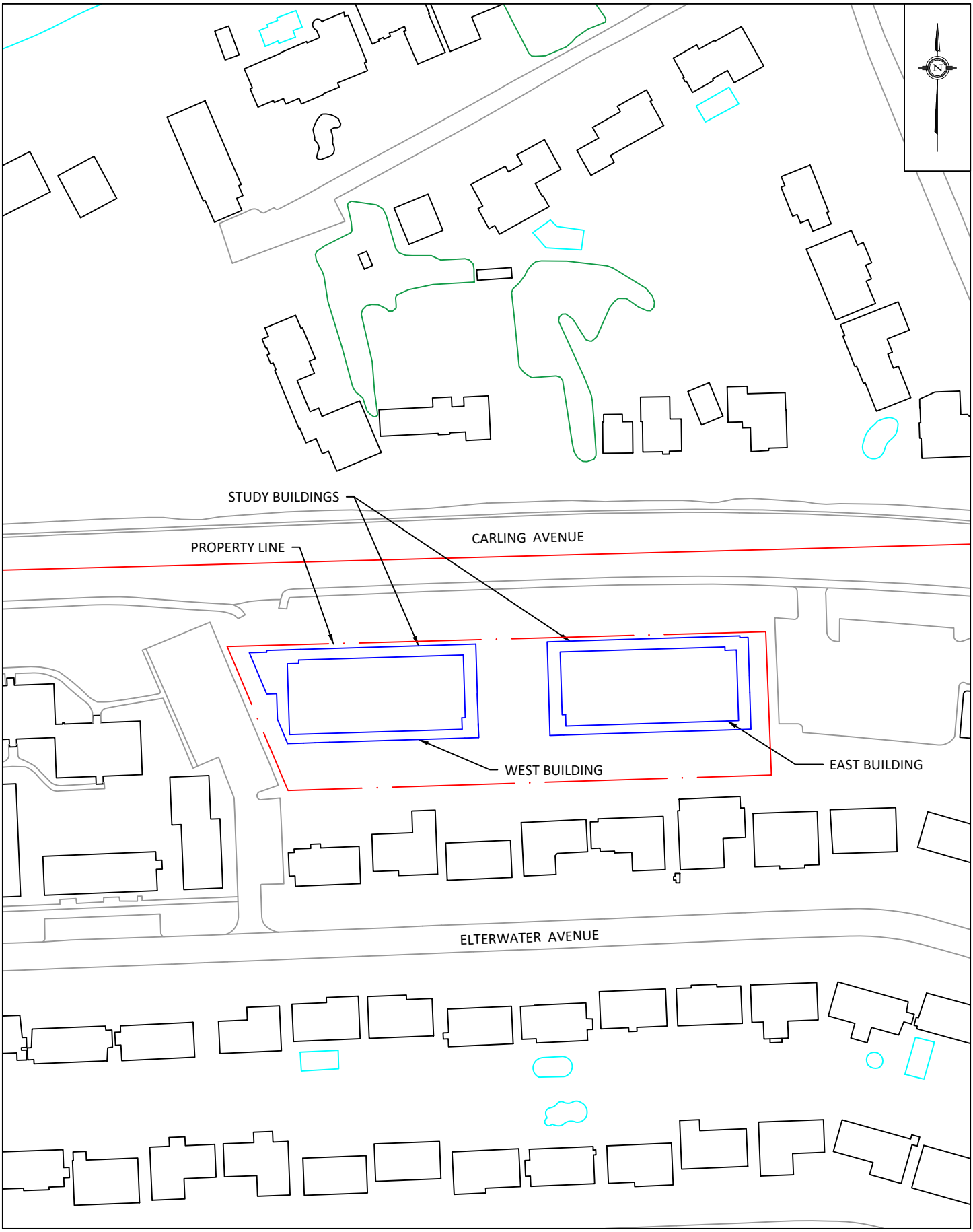
Sincerely,

Gradient Wind Engineering Inc.

Caleb Alexander
Junior Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File 21-116 – Traffic Noise Feasibility

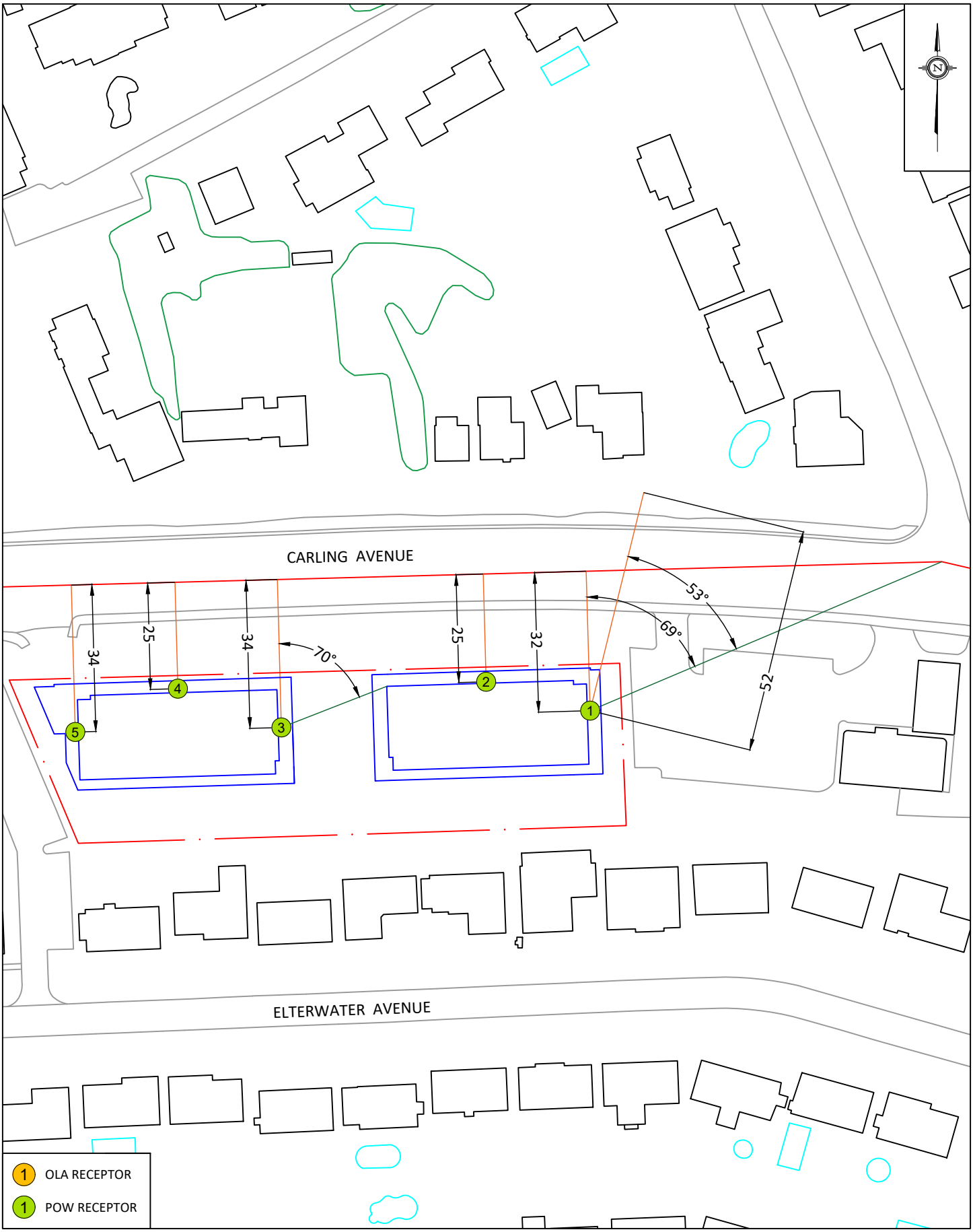


GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	3430 CARLING AVENUE, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1300 (APPROX.)	DRAWING NO.	GW21-116-1
DATE	JULY 28, 2021	DRAWN BY	C.A.

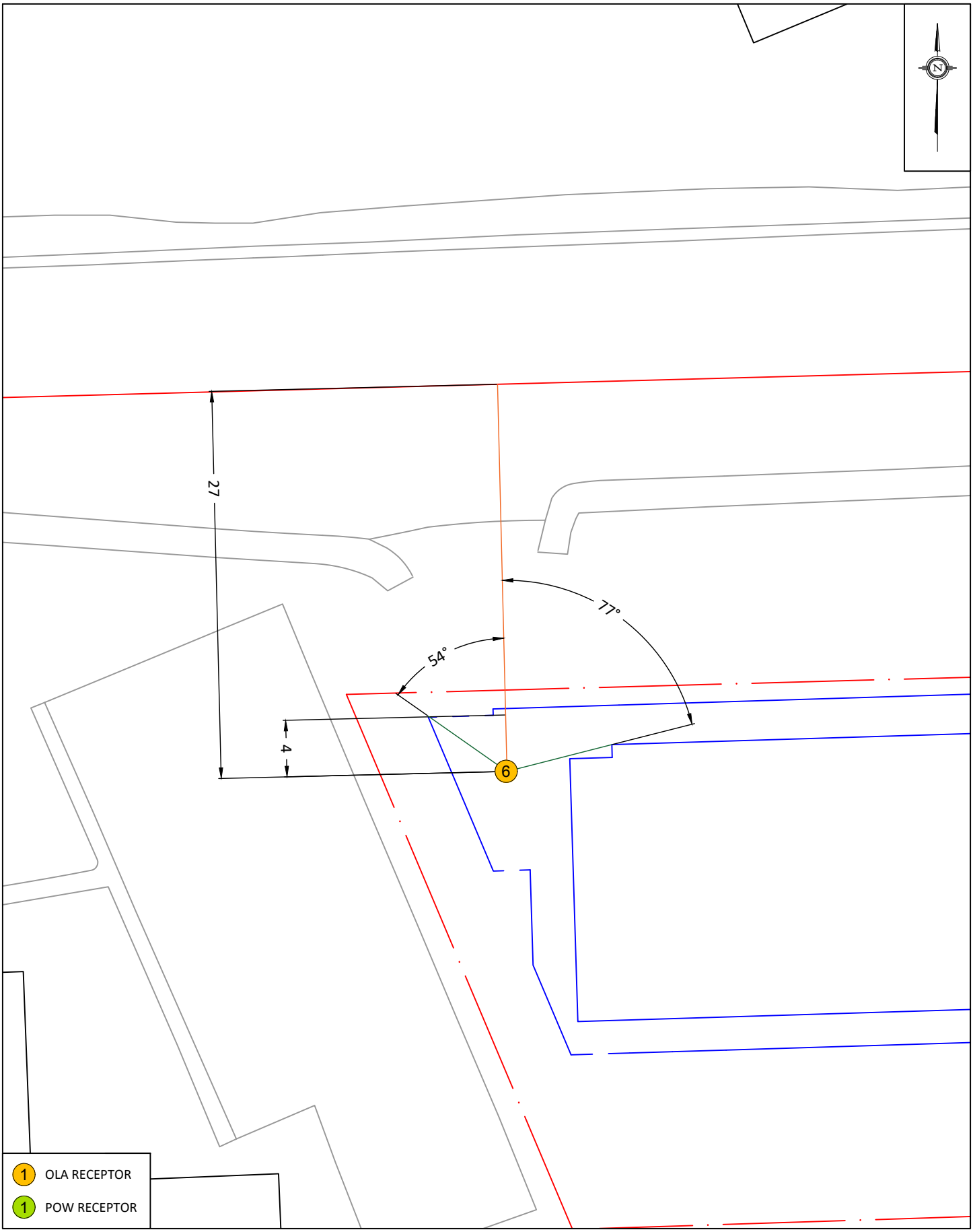
FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



GRADIENTWIND
ENGINEERS & SCIENTISTS

PROJECT	3430 CARLING AVENUE, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1200 (APPROX.)	DRAWING NO.	GW21-116-2
DATE	JULY 26, 2021	DRAWN BY	C.A.

FIGURE 2:
RECEPTORS 1-5



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	3430 CARLING AVENUE, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:600 (APPROX.)
DRAWING NO.	GW21-116-3
DATE	JULY 26, 2021
DRAWN BY	C.A.

DESCRIPTION

FIGURE 3:
RECEPTOR 6

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:17:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Carling Av1 (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: Carling Av1 (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   69.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Carling Av2 (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 # 2: Carling Av2 (day/night)
---------------------------------------------
Angle1   Angle2           :  53.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  51.00 / 51.00  m
Receiver height           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 66.36 + 0.00) = 66.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     69   0.00  73.68   0.00  -3.15  -4.16   0.00   0.00   0.00
66.36
-------------------------------------------------------------------------
--

Segment Leq : 66.36 dBA


Results segment # 2: Carling Av2 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.49 + 0.00) = 61.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    53     90   0.00  73.68   0.00  -5.31  -6.87   0.00   0.00   0.00
61.49
-------------------------------------------------------------------------
--

Segment Leq : 61.49 dBA

Total Leq All Segments: 67.58 dBA
```

```
Results segment # 1: Carling Av1 (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.76 + 0.00) = 58.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     69   0.00  66.08   0.00  -3.15  -4.16   0.00   0.00   0.00
58.76
-------------------------------------------------------------------------
--

Segment Leq : 58.76 dBA


Results segment # 2: Carling Av2 (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.89 + 0.00) = 53.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    53     90   0.00  66.08   0.00  -5.31  -6.87   0.00   0.00   0.00
53.89
-------------------------------------------------------------------------
--

Segment Leq : 53.89 dBA

Total Leq All Segments: 59.98 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.58
                           (NIGHT): 59.98
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:17:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Carling Av1 (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: Carling Av1 (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           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.46 + 0.00) = 71.46 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  -2.22   0.00   0.00   0.00   0.00
71.46
-------------------------------------------------------------------------
--

Segment Leq : 71.46 dBA

Total Leq All Segments: 71.46 dBA


Results segment # 1: Carling Av1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.86 + 0.00) = 63.86 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  -2.22   0.00   0.00   0.00   0.00
63.86
-------------------------------------------------------------------------
--

Segment Leq : 63.86 dBA

Total Leq All Segments: 63.86 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 71.46
                           (NIGHT): 63.86
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:29:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Carling Av1 (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: Carling Av1 (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  34.00 / 34.00  m
Receiver height           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 66.02 + 0.00) = 66.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  73.68   0.00  -3.55  -4.10   0.00   0.00   0.00
66.02
-------------------------------------------------------------------------
--

Segment Leq : 66.02 dBA

Total Leq All Segments: 66.02 dBA


Results segment # 1: Carling Av1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.42 + 0.00) = 58.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  66.08   0.00  -3.55  -4.10   0.00   0.00   0.00
58.42
-------------------------------------------------------------------------
--

Segment Leq : 58.42 dBA

Total Leq All Segments: 58.42 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 66.02
                           (NIGHT): 58.42
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:30:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Carling Av1 (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: Carling Av1 (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           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.46 + 0.00) = 71.46 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  -2.22   0.00   0.00   0.00   0.00
71.46
-------------------------------------------------------------------------
--

Segment Leq : 71.46 dBA

Total Leq All Segments: 71.46 dBA


Results segment # 1: Carling Av1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.86 + 0.00) = 63.86 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  -2.22   0.00   0.00   0.00   0.00
63.86
-------------------------------------------------------------------------
--

Segment Leq : 63.86 dBA

Total Leq All Segments: 63.86 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 71.46
                           (NIGHT): 63.86
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:30:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Carling Av1 (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: Carling Av1 (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  :  34.00 / 34.00  m
Receiver height           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.11 + 0.00) = 67.11 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  -3.55  -3.01   0.00   0.00   0.00
67.11
-------------------------------------------------------------------------
--

Segment Leq : 67.11 dBA

Total Leq All Segments: 67.11 dBA


Results segment # 1: Carling Av1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.52 + 0.00) = 59.52 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  -3.55  -3.01   0.00   0.00   0.00
59.52
-------------------------------------------------------------------------
--

Segment Leq : 59.52 dBA

Total Leq All Segments: 59.52 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.11
                           (NIGHT): 59.52
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2021 16:30:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Carling Av1 (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: Carling Av1 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  27.00 / 27.00  m
Receiver height           :  13.50 / 13.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -53.00 deg   Angle2 : 77.00 deg
Barrier height            :  12.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Carling Av1 (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 !       13.50 !       11.72 !        11.72

ROAD (64.25 + 64.35 + 0.00) = 67.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -53   0.00  73.68   0.00  -2.55  -6.87   0.00   0.00   0.00
64.25
-------------------------------------------------------------------------------
--
   -53     77   0.00  73.68   0.00  -2.55  -1.41   0.00   0.00  -5.36
64.35
-------------------------------------------------------------------------------
--

Segment Leq : 67.31 dBA

Total Leq All Segments: 67.31 dBA
```

```
Results segment # 1: Carling Av1 (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 !       13.50 !       11.72 !        11.72

ROAD (56.66 + 56.76 + 0.00) = 59.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -53   0.00  66.08   0.00  -2.55  -6.87   0.00   0.00   0.00
56.66
-------------------------------------------------------------------------------
--
   -53     77   0.00  66.08   0.00  -2.55  -1.41   0.00   0.00  -5.36
56.76
-------------------------------------------------------------------------------
--

Segment Leq : 59.72 dBA

Total Leq All Segments: 59.72 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 67.31
                           (NIGHT): 59.72
```