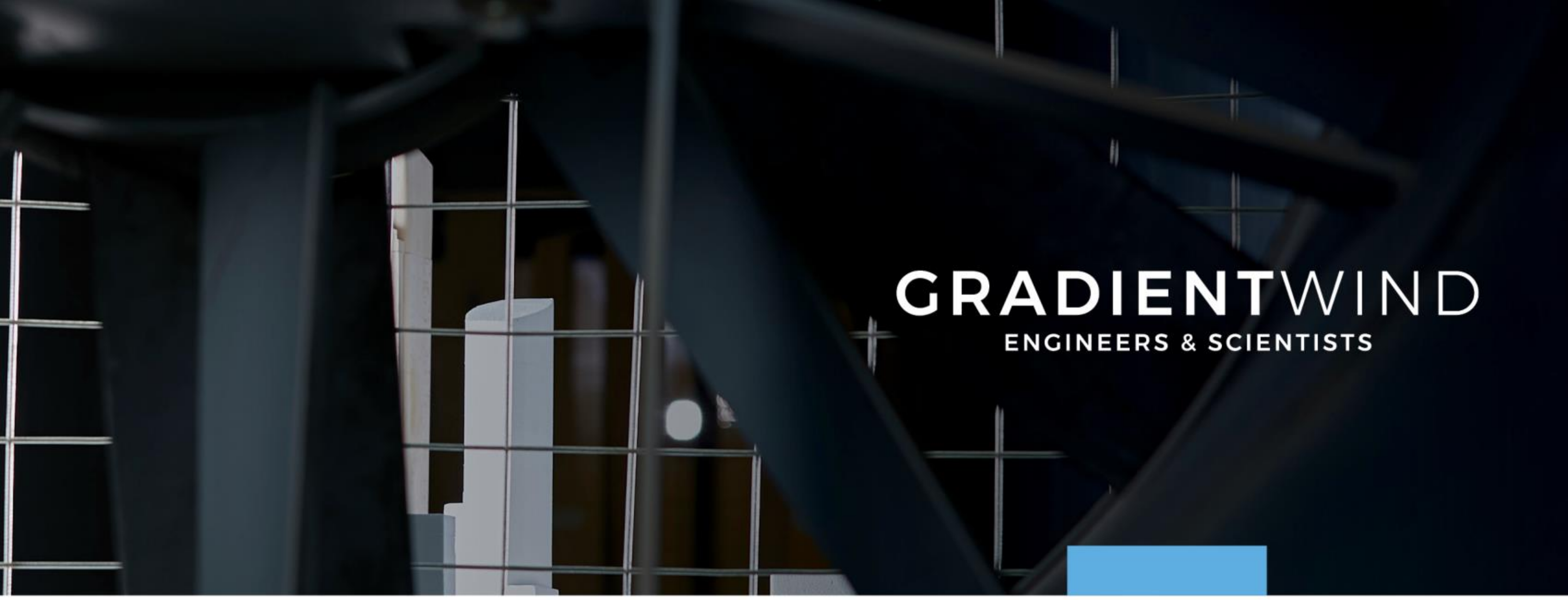
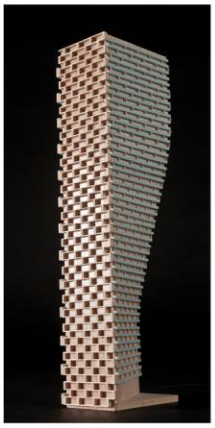
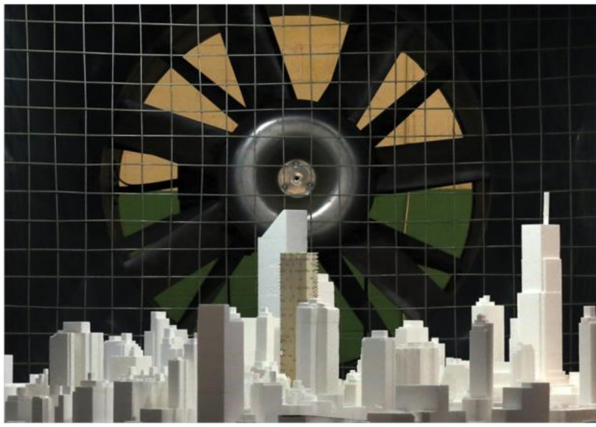


TRANSPORTATION NOISE ASSESSMENT

316-332 Clifton Road
Ottawa, Ontario

REPORT: GW20-172-Transportation Noise





September 11, 2020

PREPARED FOR
Clifton Property Development Inc.
100 Smirle Avenue
Ottawa, ON K1Y 0S3

PREPARED BY
Michael Lafortune, C.E.T., Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a transportation noise assessment undertaken in support a Site Plan Application (SPA) for a proposed residential development at 316-332 Clifton Road in Ottawa, Ontario. The proposed development comprises six blocks of 3-storey townhomes, 29 units in total. The major sources of transportation noise are Scott Street and the future Confederation Line LRT 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) architectural drawings prepared by Hobin Architecture.

The results of the current analysis indicate that maximum noise levels will not exceed 55 dBA during the daytime period (07:00-23:00) and 47 dBA during the nighttime period (23:00-07:00). The highest noise level (55 dBA) occurs at the north façade of the northeastern townhome block, which is nearest and most exposed to Scott Street and the future LRT. As noise levels at the plane of window do not exceed the ENCG 55 and 50 dBA criteria during the daytime and nighttime period, respectively, no specific noise control measures are required.

With regards to stationary noise impacts, a stationary noise study will be performed once mechanical plans for the proposed building become available. This study would assess (i) stationary noise impacts on the study building from neighboring rooftop mechanical units, and (ii) impacts of stationary noise from potential rooftop mechanical units serving the proposed building 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 limits.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Clifton Property Development Inc. to undertake a transportation noise assessment in support of a Site Plan Application (SPA) for a proposed residential development at 316-332 Clifton Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local transportation sources.

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] guidelines. Noise calculations were based on architectural drawings prepared by Hobin Architecture, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed development comprises six blocks of 3-storey townhomes, 29 units in total, with two rows parallel to each other, aligned north to south, and one row perpendicularly adjacent to both sides on the south end of the development, separated by an internal driveway and accessed from Clifton Road at the northeast corner of the site and Wilber Avenue at the southeast corner of the site. No outdoor amenity space is provided for the development that meets the minimum requirements for consideration as an Outdoor Living Area (OLA), as defined by the ENCG.

The site is surrounded by high-rise residential buildings to the west and north, with low-rise residential buildings to the east and south. The major sources of transportation noise are Scott Street and the future Confederation Line LRT to the north. 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

[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 Transportation Noise

4.2.1 Criteria for Transportation Noise

For surface roadway traffic and LRT noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

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

Type of Space	Time Period	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] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Theoretical Transportation 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 a flat/gentle slope surrounding the study building. The future LRT is sunk approximately 6 m below local grade.
- The future LRT modeled using 4-car SRT parameter in STAMSON.
- Noise receptors were strategically placed at 2 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-4.

4.2.3 Roadway Traffic and LRT 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. Confederation Line LRT train volumes are based on information received through GWE's involvement with the Confederation Line Western LRT Environmental Assessment (EA). Table 2 (below) summarizes the AADT values used for each roadway and LRT included in this assessment.

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Scott Street	2-Lane Urban Arterial (2-UAU)	50	**15,000**
Confederation Line	LRT	70	**540/60***

*Daytime/nighttime volumes

5. RESULTS AND DISCUSSION

5.1 Transportation 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 (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	6.5	POW – 2nd Floor – North Façade	55	47
2	6.5	POW – 2nd Floor – East Façade	54	47

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that maximum noise levels will not exceed 55 dBA during the daytime period (07:00-23:00) and 47 dBA during the nighttime period (23:00-07:00). The highest noise level (55 dBA) occurs at the north façade of the northeastern townhome block, which is nearest and most exposed to Scott Street and the future LRT. As noise levels at the plane of window do not exceed the ENCG 55 and 50 dBA criteria during the daytime and nighttime period, respectively, no specific noise control measures are required.

With regards to stationary noise impacts, a stationary noise study will be performed once mechanical plans for the proposed building become available. This study would assess (i) stationary noise impacts on the study building from neighboring rooftop mechanical units, and (ii) impacts of stationary noise from potential rooftop mechanical units serving the proposed building 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 limits.

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

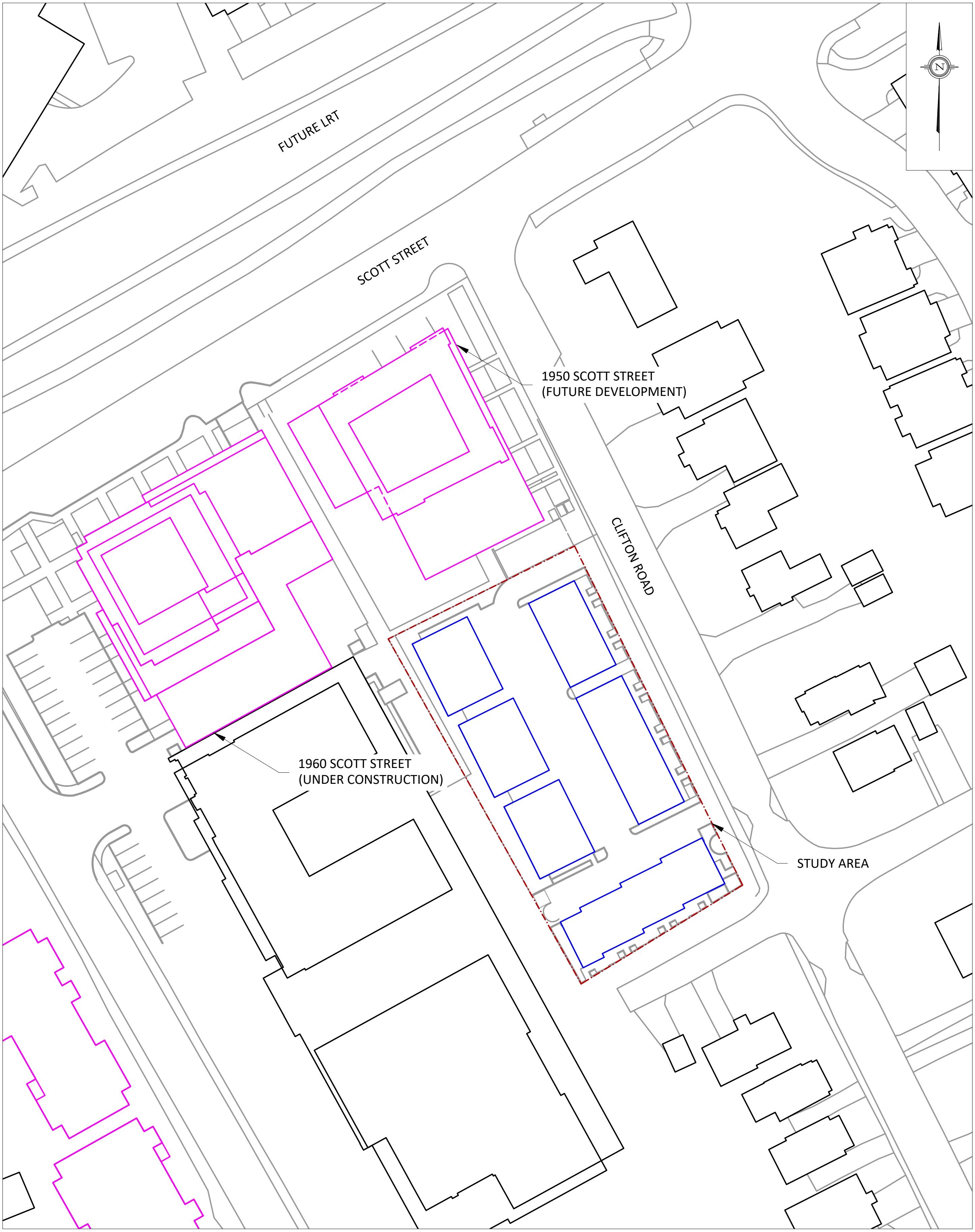
Sincerely,

Gradient Wind Engineering Inc.

Michael Lafortune, C.E.T.
Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #20-172-Transportation Noise



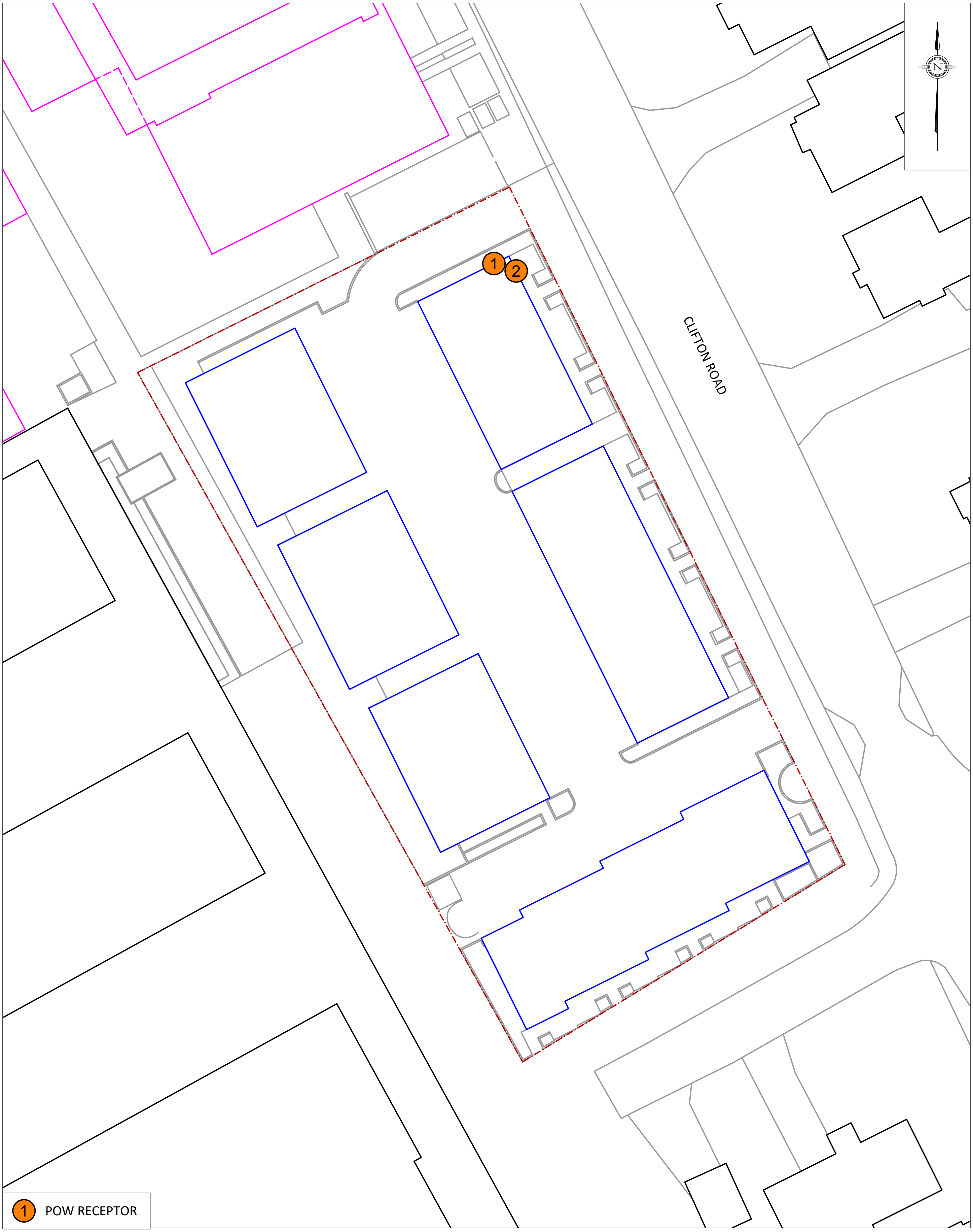
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	316-332 CLIFTON ROAD, OTTAWA TRANSPORTATION NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-172-1
DATE	SEPTEMBER 3, 2020	DRAWN BY	M.L.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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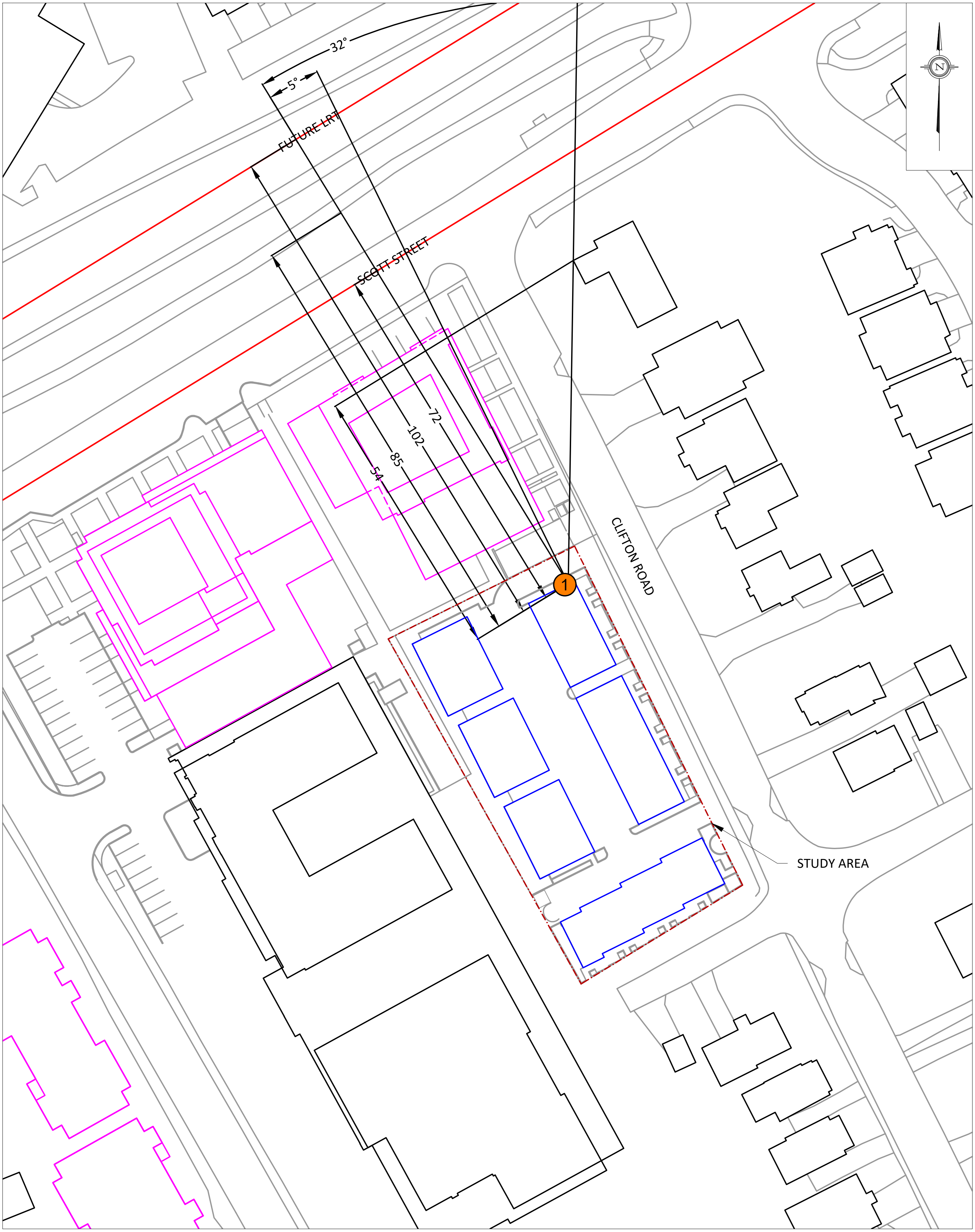
PROJECT	316-332 CLIFTON ROAD, OTTAWA TRANSPORTATION NOISE ASSESSMENT		
SCALE	1:500 (APPROX.)	DRAWING NO.	GW20-172-2
DATE	SEPTEMBER 3, 2020	DRAWN BY	M.L.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS



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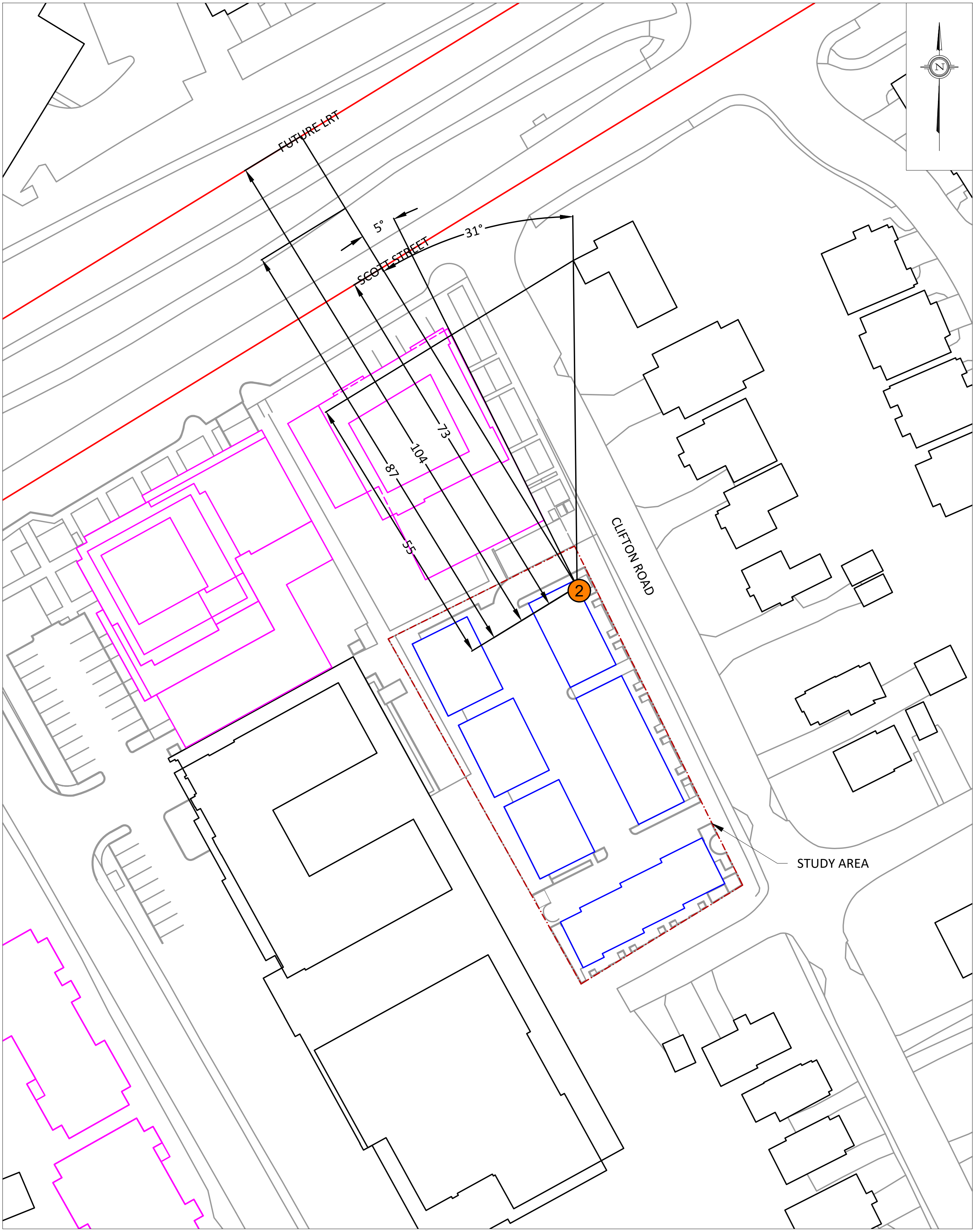
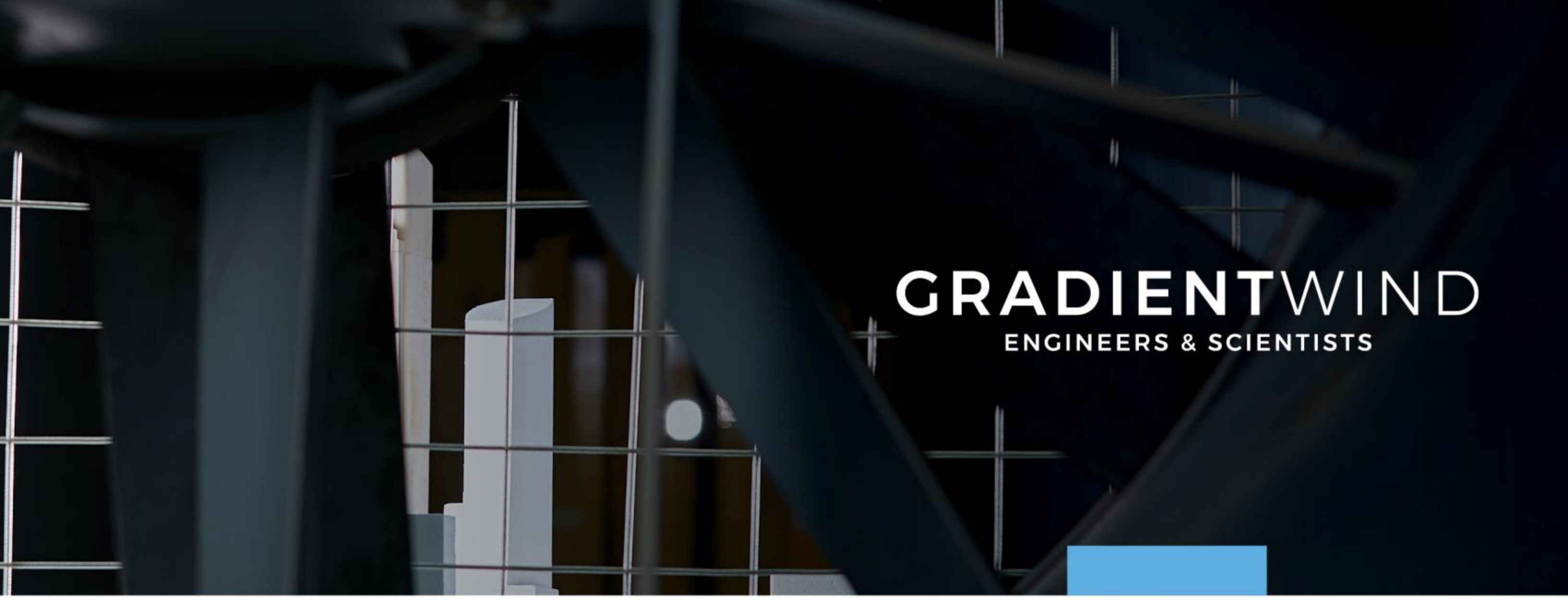
PROJECT	316-332 CLIFTON ROAD, OTTAWA TRANSPORTATION NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-172-3
DATE	SEPTEMBER 3, 2020	DRAWN BY	M.L.

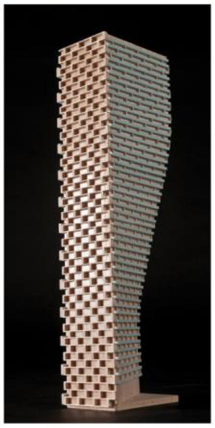
DESCRIPTION

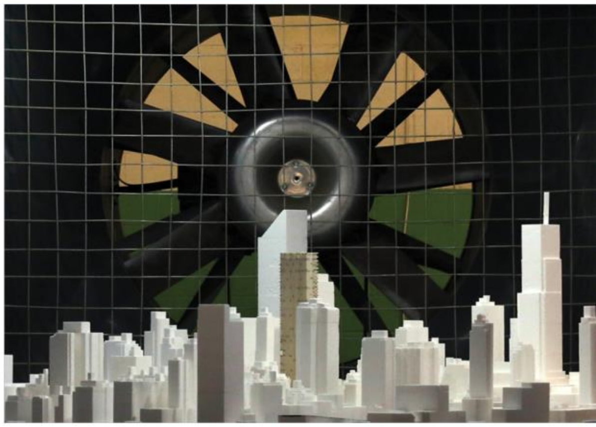
FIGURE 3:
STAMSON INPUT PARAMETERS - RECEPTOR 1



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD , OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT: 316-332 CLIFTON ROAD, OTTAWA TRANSPORTATION NOISE ASSESSMENT	DESCRIPTION: FIGURE 4: STAMSON INPUT PARAMETERS - RECEPTOR 2
	SCALE: 1:1000 (APPROX.)	DRAWING NO.: GW20-172-4
	DATE: SEPTEMBER 3, 2020	DRAWN BY: M.L.







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: 02-09-2020 13:48:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Scott1 (day/night)
------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    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):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Scott1 (day/night)
----------------------------------------
Angle1   Angle2          : -90.00 deg   32.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance  :  72.00 / 72.00  m
Receiver height          :   6.50 / 6.50   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -90.00 deg   Angle2 : 5.00 deg
Barrier height           :  73.00 m
Barrier receiver distance :  54.00 / 54.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
Road data, segment # 2: Scott2 (day/night)
------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    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):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Scott2 (day/night)
----------------------------------------
Angle1   Angle2           :  32.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  72.00 / 72.00  m
Receiver height           :   6.50 / 6.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  32.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  54.00 / 54.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Scott1 (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 !        6.50 !        2.75 !         2.75

ROAD (0.00 + 39.04 + 53.43) = 53.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90      5   0.00  68.48   0.00  -6.81  -2.78   0.00   0.00 -19.85  39.04
----------------------------------------------------------------------------
     5     32   0.00  68.48   0.00  -6.81  -8.24   0.00   0.00   0.00  53.43
----------------------------------------------------------------------------

Segment Leq : 53.58 dBA


Results segment # 2: Scott2 (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 !        6.50 !        2.75 !         2.75

ROAD (0.00 + 47.14 + 0.00) = 47.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
    32     90   0.00  68.48   0.00  -6.81  -4.92   0.00   0.00  -9.61  47.14
----------------------------------------------------------------------------

Segment Leq : 47.14 dBA

Total Leq All Segments: 54.47 dBA
```

```
Results segment # 1: Scott1 (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 !        6.50 !        2.75 !         2.75

ROAD (0.00 + 31.44 + 45.83) = 45.99 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------------
   -90      5   0.00  60.88   0.00  -6.81  -2.78   0.00   0.00 -19.85  31.44
-----------------------------------------------------------------------------
     5     32   0.00  60.88   0.00  -6.81  -8.24   0.00   0.00   0.00  45.83
-----------------------------------------------------------------------------

Segment Leq : 45.99 dBA


Results segment # 2: Scott2 (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 !        6.50 !        2.75 !         2.75

ROAD (0.00 + 39.54 + 0.00) = 39.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------------
    32     90   0.00  60.88   0.00  -6.81  -4.92   0.00   0.00  -9.61  39.54
-----------------------------------------------------------------------------

Segment Leq : 39.54 dBA

Total Leq All Segments: 46.88 dBA
```

```
RT/Custom data, segment # 1: LRT1 (day/night)
---------------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   5.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :   6.50 / 6.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 5.00 deg
Barrier height            :  73.00 m
Barrier receiver distance :  54.00 / 54.00  m
Source elevation          :  -6.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


RT/Custom data, segment # 2: LRT2 (day/night)
---------------------------------------------
1 - Bus:
Traffic volume    :     0/0     veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 2: LRT2 (day/night)
--------------------------------------
Angle1   Angle2           :   5.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :   6.50 / 6.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   5.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  85.00 / 85.00  m
Source elevation          :  -6.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :  -6.00 m
Reference angle           :   0.00
```

```
Results segment # 1: LRT1 (day)
-------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        0.15 !         0.15

RT/Custom (0.00 + 32.51 + 0.00) = 32.51 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      5   0.00  63.44  -8.33  -2.78   0.00   0.00 -19.83  32.51
----------------------------------------------------------------------

Segment Leq : 32.51 dBA


Results segment # 2: LRT2 (day)
-------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        2.50 !        -3.50

RT/Custom (0.00 + -22.27 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     5     90   0.00   0.00  -8.33  -3.26   0.00   0.00 -10.69 -22.27
----------------------------------------------------------------------

Segment Leq : 0.00 dBA

Total Leq All Segments: 32.51 dBA
```

```
Results segment # 1: LRT1 (night)
---------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        0.15 !         0.15

RT/Custom (0.00 + 25.97 + 0.00) = 25.97 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      5   0.00  56.91  -8.33  -2.78   0.00   0.00 -19.83  25.97
----------------------------------------------------------------------

Segment Leq : 25.97 dBA


Results segment # 2: LRT2 (night)
---------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        2.50 !        -3.50

RT/Custom (0.00 + -22.27 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     5     90   0.00   0.00  -8.33  -3.26   0.00   0.00 -10.69 -22.27
----------------------------------------------------------------------

Segment Leq : 0.00 dBA

Total Leq All Segments: 25.97 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.50
                         (NIGHT): 46.91
```

```
STAMSON 5.0        NORMAL REPORT       Date: 02-09-2020 13:48:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Scott1 (day/night)
------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    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):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Scott1 (day/night)
----------------------------------------
Angle1   Angle2           :   5.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  73.00 / 73.00  m
Receiver height           :   6.50 / 6.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  31.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  55.00 / 55.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Scott1 (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 !        6.50 !        2.73 !         2.73

ROAD (53.20 + 47.10 + 0.00) = 54.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
     5     31   0.00  68.48   0.00  -6.87  -8.40   0.00   0.00   0.00  53.20
----------------------------------------------------------------------------
    31     90   0.00  68.48   0.00  -6.87  -4.84   0.00   0.00  -9.67  47.10
----------------------------------------------------------------------------

Segment Leq : 54.16 dBA

Total Leq All Segments: 54.16 dBA


Results segment # 1: Scott1 (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 !        6.50 !        2.73 !         2.73

ROAD (45.61 + 39.50 + 0.00) = 46.56 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
     5     31   0.00  60.88   0.00  -6.87  -8.40   0.00   0.00   0.00  45.61
----------------------------------------------------------------------------
    31     90   0.00  60.88   0.00  -6.87  -4.84   0.00   0.00  -9.67  39.50
----------------------------------------------------------------------------

Segment Leq : 46.56 dBA

Total Leq All Segments: 46.56 dBA
```

```
RT/Custom data, segment # 1: LRT1 (day/night)
---------------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT1 (day/night)
--------------------------------------
Angle1   Angle2           :   5.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 104.00 / 104.00 m
Receiver height           :   6.50 / 6.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   5.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  87.00 / 87.00  m
Source elevation          :  -6.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :  -6.00 m
Reference angle           :   0.00
```

```
Results segment # 1: LRT1 (day)
-------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        2.46 !        -3.54

RT/Custom (0.00 + 41.03 + 0.00) = 41.03 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     5     90   0.00  63.44  -8.41  -3.26   0.00   0.00 -10.74  41.03
----------------------------------------------------------------------

Segment Leq : 41.03 dBA

Total Leq All Segments: 41.03 dBA

Results segment # 1: LRT1 (night)
---------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        6.50 !        2.46 !        -3.54

RT/Custom (0.00 + 34.50 + 0.00) = 34.50 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     5     90   0.00  56.91  -8.41  -3.26   0.00   0.00 -10.74  34.50
----------------------------------------------------------------------

Segment Leq : 34.50 dBA

Total Leq All Segments: 34.50 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.37
                         (NIGHT): 46.82
```