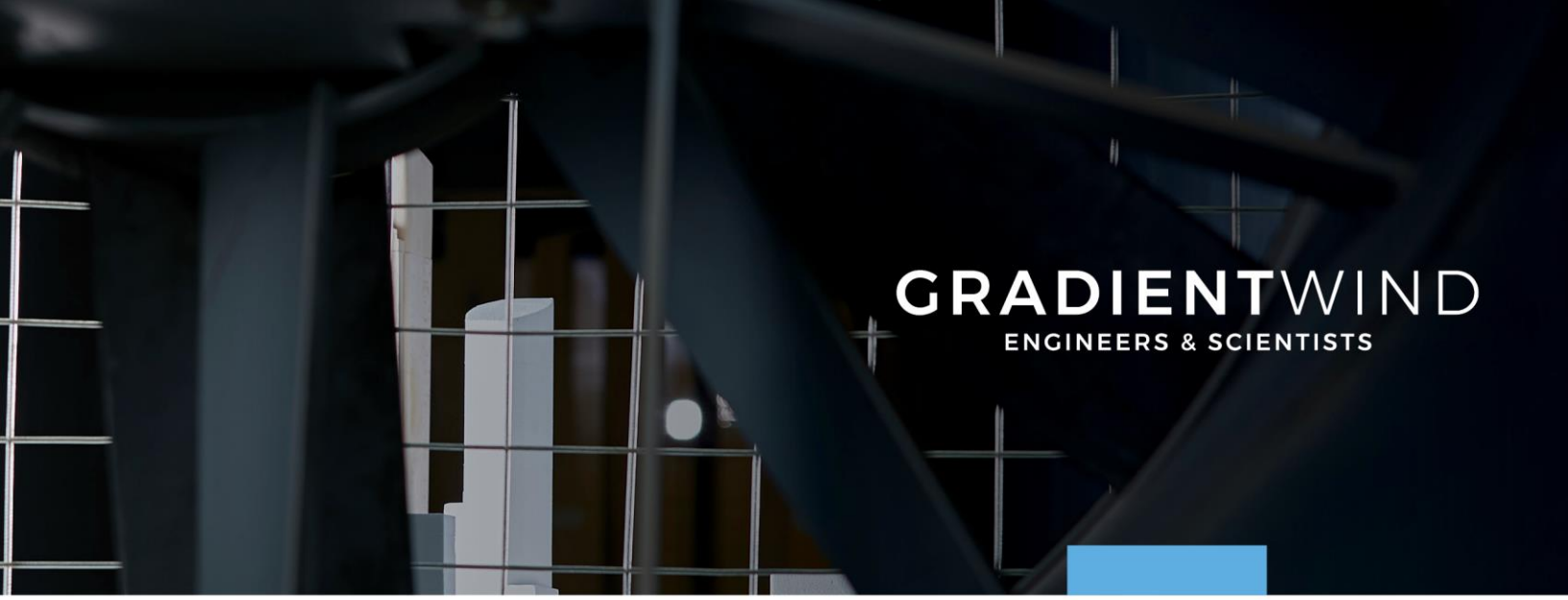

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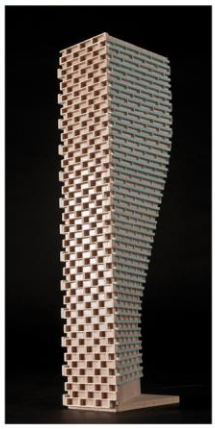
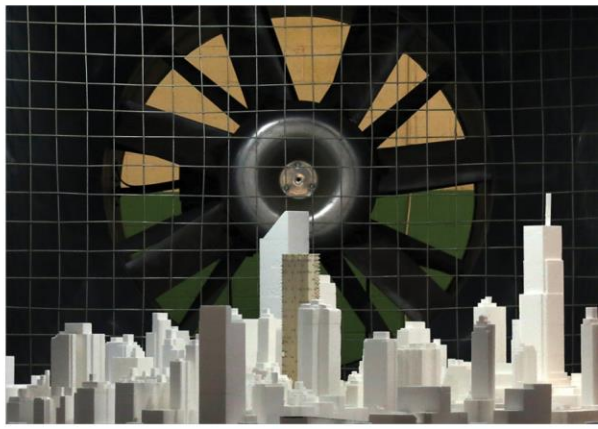
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

3718 Greenbank Road
Ottawa, Ontario

REPORT: 20-279 – Traffic Noise Feasibility





July 23, 2021

PREPARED FOR

Mattamy Homes
50 Hines Road, Suite 100
Ottawa, Ontario
K2K 2M5

PREPARED BY

Giuseppe Garro, MASc., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken in support of Zoning By-Law Amendment (ZBA) and Draft Plan Approval applications for the proposed mixed-use residential/commercial development, located at 3718 Greenbank Road in Ottawa, Ontario. Primary sources of noise impacting the site include roadway traffic along the realigned Greenbank Road, a proposed minor collector along Block 195 (Dundonald Road), and the Bus Rapid Transit (BRT) lane in the center of the realigned Greenbank Road. 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) draft site plan drawings provided by Mattamy Homes in June 2021.

The results of the current study indicate that noise levels due to roadway traffic over the site will range between approximately 56 and 73 dBA during the daytime period (07:00-23:00), and 57 and 66 dBA during the nighttime period (23:00-07:00). The highest roadway traffic noise levels will occur nearest to the realigned Greenbank Road. Results of the roadway traffic noise calculations indicate that dwellings exposed to or near the realigned Greenbank Road will require updated building components and internal ventilation such as central air conditioning. Similarly, the central and southern blocks will likely require forced air heating with provisions for central air conditioning. A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development.

Additionally, the results of the roadway traffic noise calculations also indicate that the amenity areas to the south and center of the site will exceed 55 dBA during the daytime period. As previously mentioned, parks are not defined as Outdoor Living Areas or noise sensitive spaces, therefore, noise levels at the outdoor amenity spaces are included for contextual purposes only and noise mitigation is not required. As the development will be comprised of stacked townhouse blocks, there are no OLAs proposed for the site.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Mattamy Homes to undertake a roadway traffic noise feasibility assessment in support of Zoning By-Law Amendment (ZBA) and Draft Plan Approval applications for the proposed mixed-use residential/commercial development, located at 3718 Greenbank Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a roadway traffic noise feasibility assessment and was prepared in consideration of the client's Draft Plan Approval application. Gradient Wind's scope of work involved assessing exterior noise levels throughout the site, 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 draft site plan drawings provided by Mattamy Homes in June 2021, 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 feasibility assessment is a proposed mixed-use residential/commercial development located at 3718 Greenbank Road in Ottawa, Ontario. The proposed subdivision is located on a rectangular 4.30-hectare (ha) parcel of land fronted by the future realigned Greenbank Road to the east and nestled between adjacent townhomes to the west (future Caivan development), and a 3.10-ha community park across future Greenbank Road to the northeast of the site. The proposed development comprises 19 blocks of 228 stacked back-to-back townhomes, separated by internal driveways. At-grade parking spaces serving the townhomes are accessed from internal driveways. The site also comprises a future 1.22-ha commercial area to the south and several outdoor amenity area situated to the north, south, and center of the proposed development.

[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

Primary sources of noise impacting the site include roadway traffic along the realigned Greenbank Road, a proposed minor collector along Block 195 (Dundonald Road), and the Bus Rapid Transit (BRT) lane in the center of the realigned Greenbank Road. Figure 1 illustrates a complete site plan with surrounding context.

3. OBJECTIVES

The principal objective of this work is to calculate the future noise levels on the study site produced by local roadway traffic and explore potential for noise mitigation where required, noise calculations are based on initial concept plan provided by Mattamy Homes, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

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 45 and 40 dBA for living rooms and sleeping quarters, respectively, 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 (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). As per ENCG, parks are not defined as Outdoor Living Areas or noise sensitive spaces, therefore,

[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

noise levels at the outdoor amenity spaces are included for informational purposes only. As the development will be comprised of stacked townhouse blocks, there are no OLAs proposed for the site.

As such, when noise levels at the POW exceed the criteria, specific Warning Clause requirements may apply. As this is a preliminary assessment, noise control recommendations are of a general nature. Specific mitigation requirements would be the work of a future study.

4.2.2 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs. To provide a general sense of noise across the site, the employed software program was Predictor-Lima (TNM calculation), which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid with 5 × 5 m spacing was placed across the study site, along with a number of discrete receptors at key sensitive areas.

Although this program outputs noise contours, it is not the approved model for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the Ministry of the Environment, Conservations and Parks (MECP) computerized noise assessment program, STAMSON 5.04, at key receptor locations coinciding with receptor locations in Predictor as shown in Figures 2 and 3, as well as receptor distances. Appendix A includes the STAMSON 5.04 input and output data.

Roadway noise calculations were performed by treating each road segment as separate line sources of noise. In addition to the traffic volumes summarized in Table 2 below, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split was taken to be 92% / 8% respectively for all streets.
- Receptor heights taken to be 4.5 m and 1.5 m above grade, representative of the second level Plane of Window (POW) and at-grade amenity areas, respectively.

- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics.
- The study site was treated as having flat or gently sloping topography.
- Massing associated with the study site was included as potential noise screening elements.
- 7 receptors were strategically placed throughout the study area.
- Receptor distances and exposure angles are illustrated in Figures 2 and 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. As for the BRT, volumes were used based on Gradient Wind's experience with similar developments. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Roadway	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes	Assumed Volumes
Greenbank Road (Realigned)	4-Lane Urban Arterial Divided (4-UAD)	70	**35,000**	-
Bus Rapid Transit	BRT	80	-	**191/67***
Block 195 (Dundonald Road)	2-Lane Urban Collector Undivided (2-UCU)	40	**8,000**	-

* Daytime and nighttime volumes based on correspondence with the City of Ottawa

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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

Noise contours for the roadway traffic noise calculations covering the entire study site are shown in Figures 4 and 5 for the daytime and nighttime periods, respectively. Discrete receptors were also placed at 4.5 meters and 1.5 meters above grade at key locations throughout the site. The noise contours were generated using TNM and verified with discrete receptors using STAMSON 5.04, as shown in Figures 2 and 3, and summarized in Table 3 below. Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)		Predictor-Lima Noise Level (dBA)	
			Day	Night	Day	Night
1	4.5	POW - Block 3- Northeast Facade	73	66	70	63
2	4.5	POW - Block 3 - Northwest Facade	69	62	66	59
3	4.5	POW - Block 17 - Northeast Facade	64	57	61	54
4	4.5	POW - Block 12 - Northeast Facade	64	57	61	54
5*	1.5	Outdoor Amenity Area	56	N/A	58	N/A
6*	1.5	Outdoor Amenity Area	60	N/A	62	N/A
7*	1.5	Outdoor Amenity Area	67	N/A	68	N/A

*Noise levels at the outdoor amenity areas were provided for informational purposes only as parks are not considered noise sensitive in the ENCG

The results of the current study indicate that noise levels due to roadway traffic over the site will range between approximately 56 and 73 dBA during the daytime period (07:00-23:00), and 57 and 66 dBA during the nighttime period (23:00-07:00). The highest roadway traffic noise levels will occur nearest to the realigned Greenbank Road. As shown above, the results calculated from TNM have good correlation with calculations performed in STAMSON 5.04. A tolerance of 3 dBA between models is considered acceptable given human hearing cannot detect a change in sound level of less than 3 dBA.

Results of the roadway traffic noise calculations also indicate that the amenity areas to the south and center of the site will exceed 55 dBA during the daytime period. As previously mentioned, parks are not defined as Outdoor Living Areas or noise sensitive spaces, therefore, noise levels at the outdoor amenity spaces are included for informational purposes only and noise mitigation is not required. As the development will be comprised of stacked townhouse blocks, there are no OLAs proposed for the site.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic, at select receptors, exceed the criteria listed in the ENCG for Plane of Windows, as discussed in Section 4.2. Based on expected noise levels, blocks in the dark red region in Figures 4 and 5 will require upgraded building components and central air conditioning. Blocks in the dark orange and red regions in Figures 4 and 5 will likely require forced air heating with provisions for central air conditioning. Warning Clauses will also be required on purchase, sale, and lease agreements. Specific mitigation will be determined during the detailed design assessment.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels due to roadway traffic over the site will range between approximately 56 and 73 dBA during the daytime period (07:00-23:00), and 57 and 66 dBA during the nighttime period (23:00-07:00). The highest roadway traffic noise levels will occur nearest to the realigned Greenbank Road. Results of the roadway traffic noise calculations indicate that dwellings exposed to or near the realigned Greenbank Road will require updated building components and internal ventilation such as central air conditioning. Similarly, the central and southern blocks will likely require forced air heating with provisions for central air conditioning. A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development.

Additionally, the results of the roadway traffic noise calculations also indicate that the amenity areas to the south and center of the site will exceed 55 dBA during the daytime period. As previously mentioned, parks are not defined as Outdoor Living Areas or noise sensitive spaces, therefore, noise levels at the outdoor amenity spaces are included for contextual purposes only and noise mitigation is not required. As the development will be comprised of stacked townhouse blocks, there are no OLAs proposed for the site.

This concludes our roadway 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.

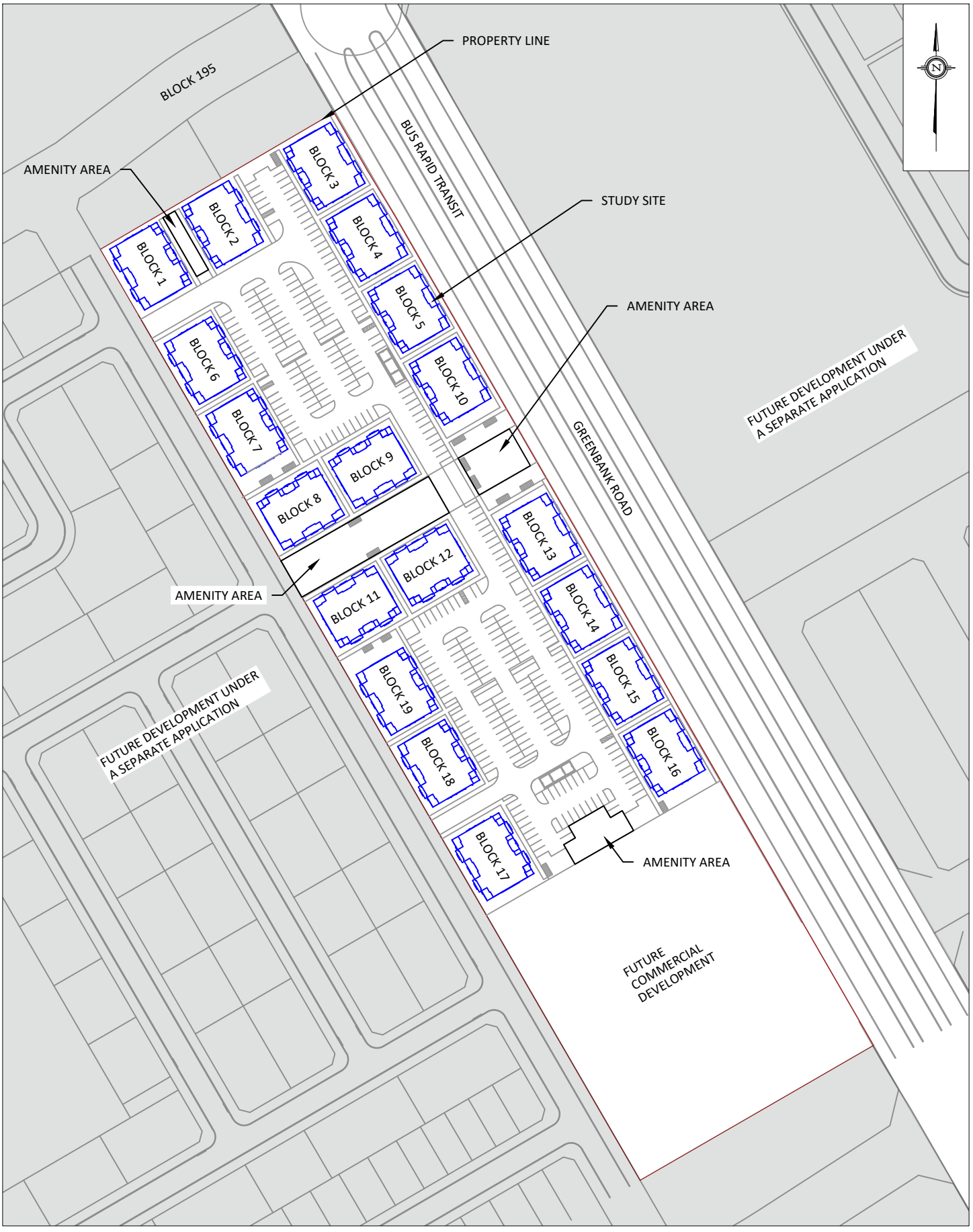
Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.,
Junior Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #20-279 – Traffic Noise Feasibility



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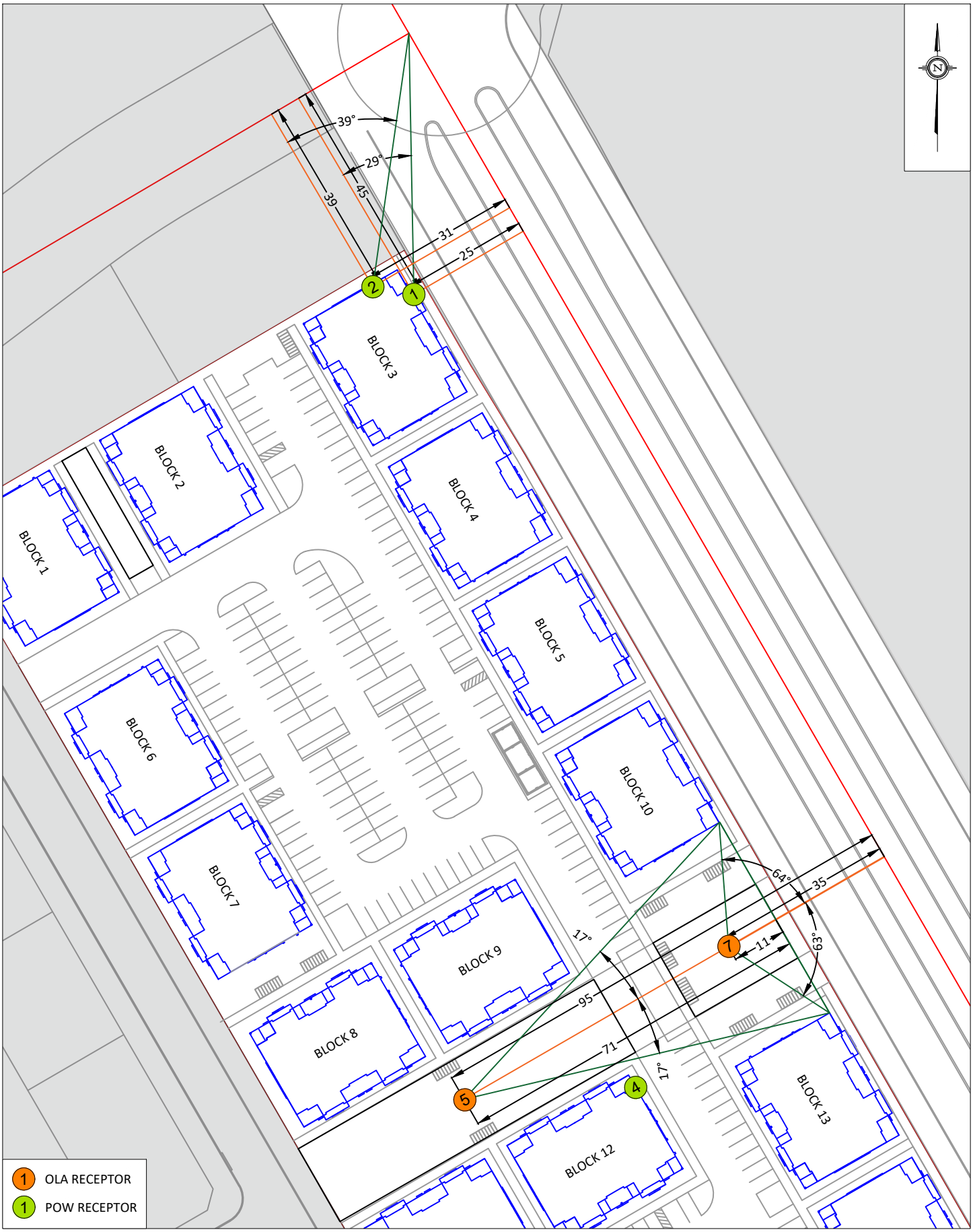
PROJECT	3718 GREENBANK ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW20-279-1
DATE	JUNE 21, 2021	DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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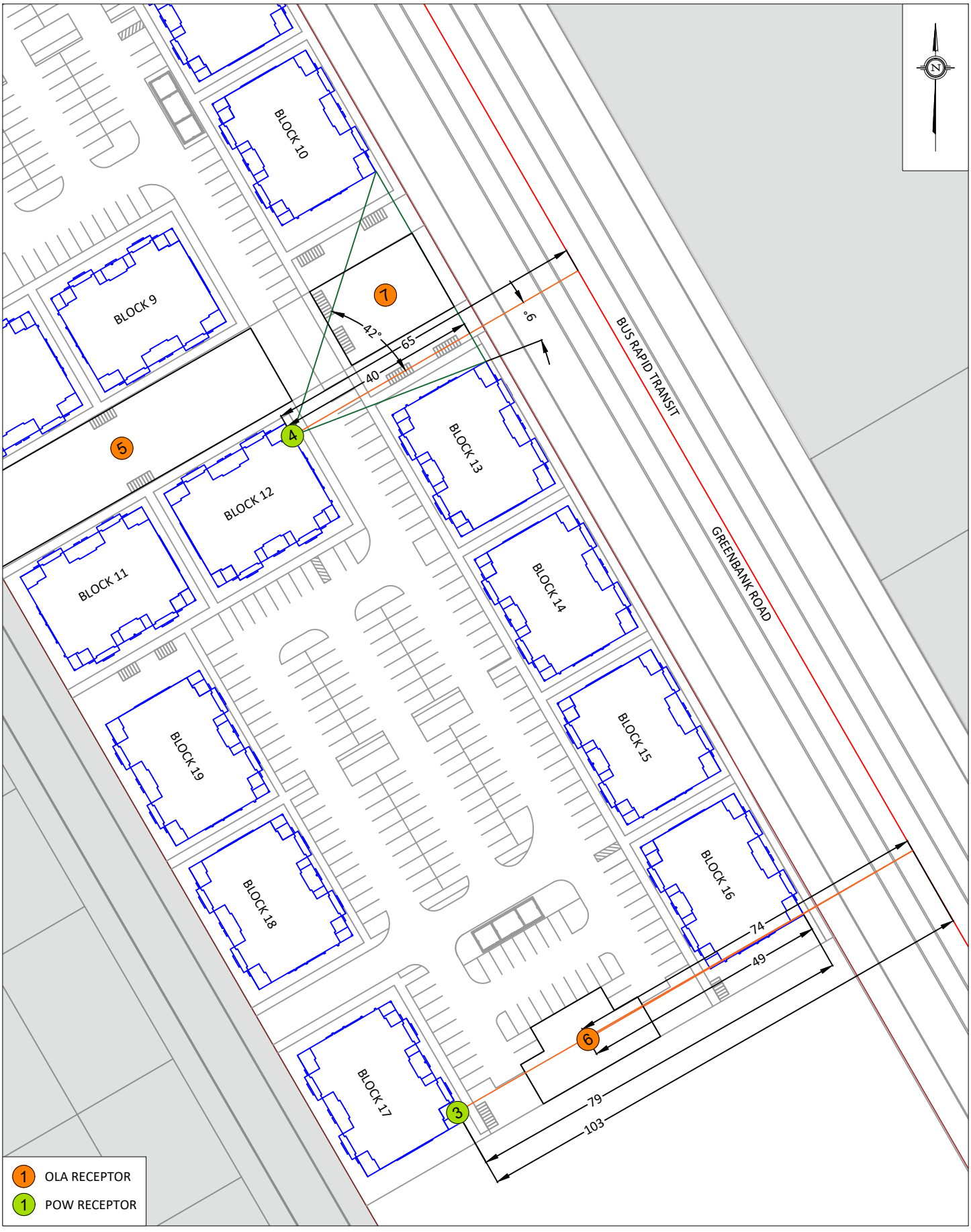
PROJECT	3718 GREENBANK ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW20-279-2
DATE	JUNE 21, 2021
DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
STAMSON INPUT PARAMETERS



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PROJECT	3718 GREENBANK ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-279-3
DATE	JUNE 21, 2021	DRAWN BY	G.G.

FIGURE 3:
STAMSON INPUT PARAMETERS

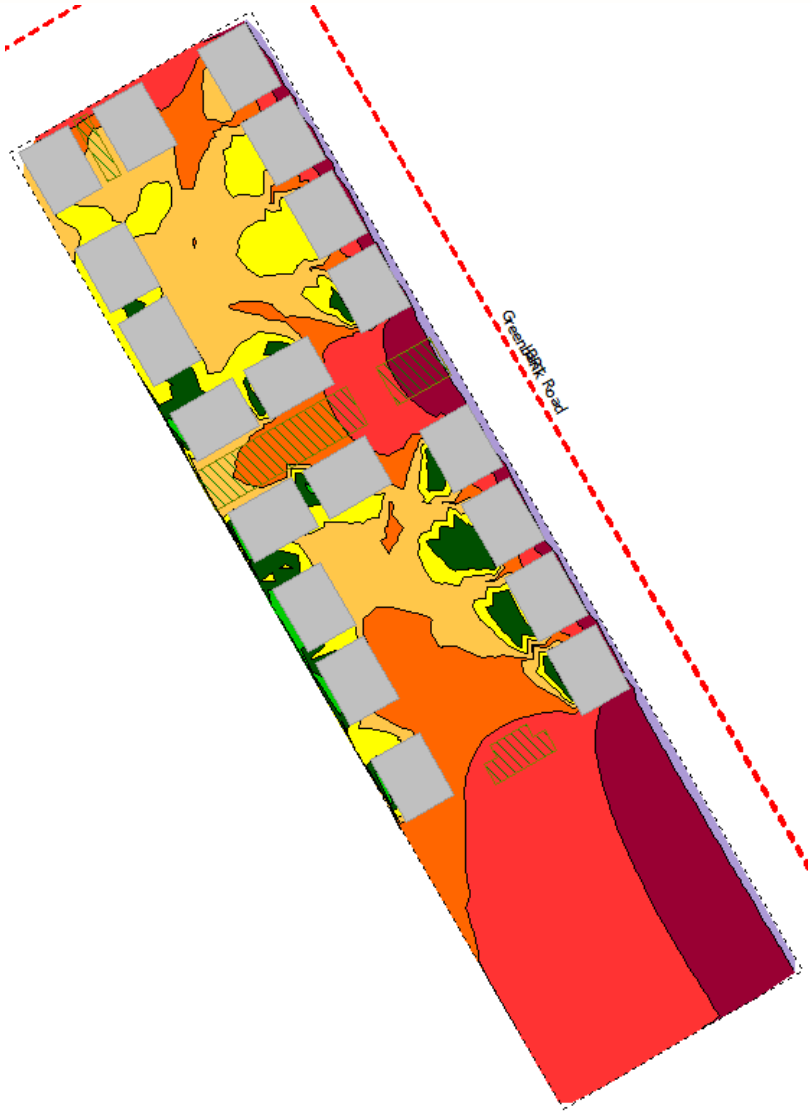


FIGURE 4: NOISE CONTOURS 4.5 METERS ABOVE GRADE (DAYTIME PERIOD)

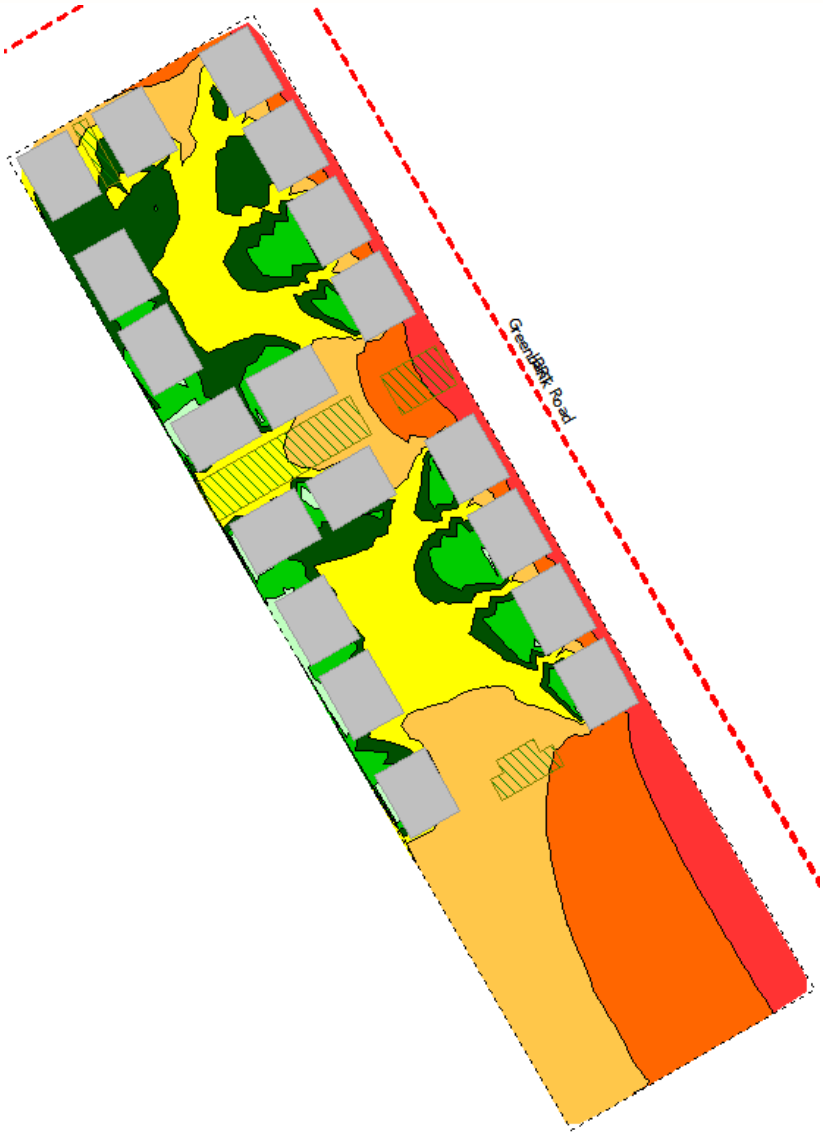
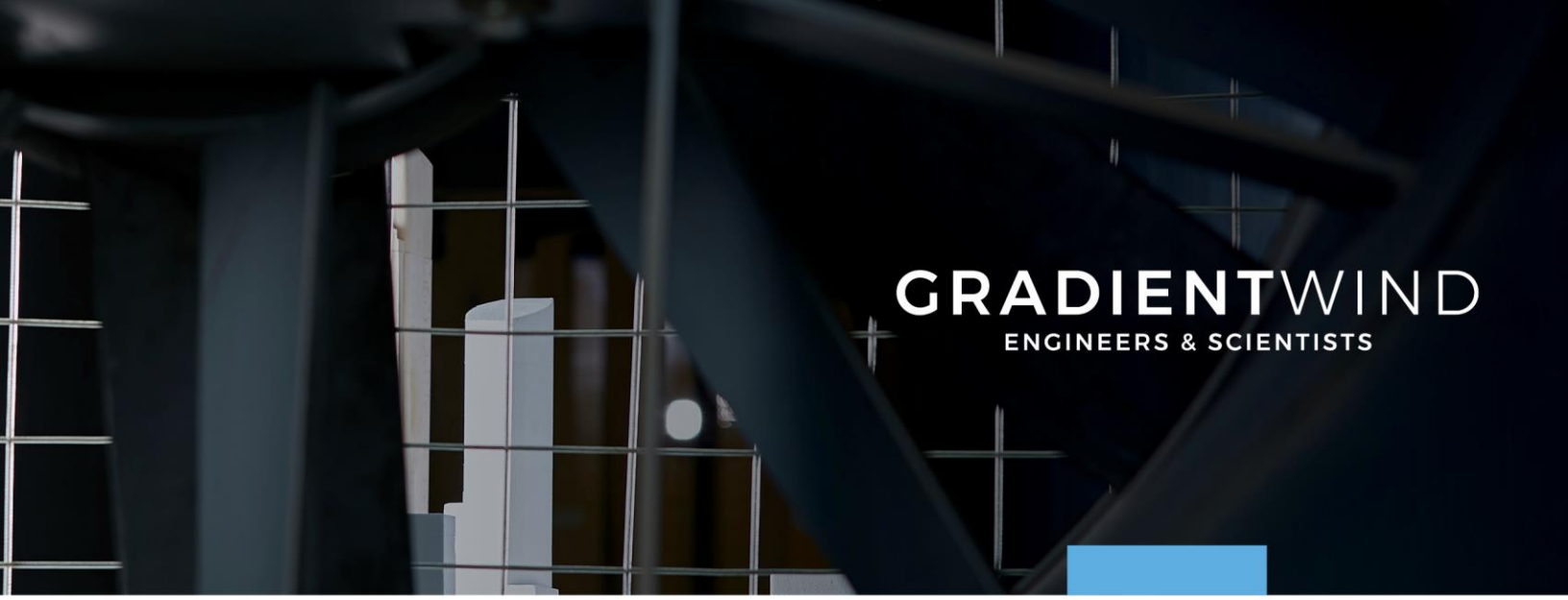
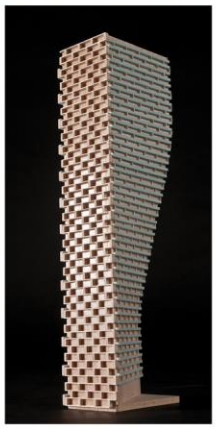
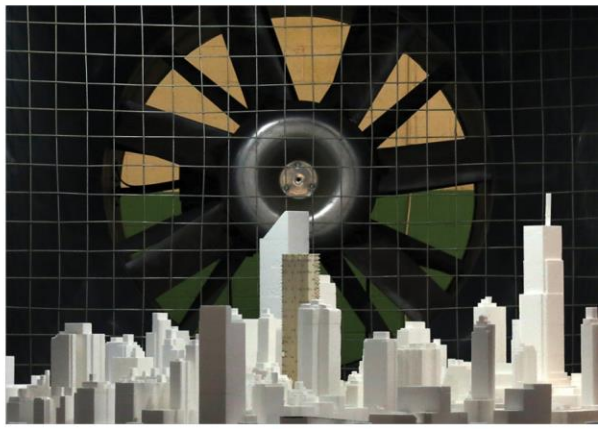


FIGURE 5: NOISE CONTOURS 4.5 METERS ABOVE GRADE (NIGHTTIME PERIOD)







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: 21-06-2021 14:13:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (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           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Block 195 (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 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):   8000
    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: Block 195 (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   29.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.00 / 45.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 72.78 + 0.00) = 72.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  75.00   0.00  -2.22   0.00   0.00   0.00   0.00
72.78
-------------------------------------------------------------------------------
--

Segment Leq : 72.78 dBA

Results segment # 2: Block 195 (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.26 + 0.00) = 51.26 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     29   0.00  63.96   0.00  -4.77  -7.93   0.00   0.00   0.00
51.26
-------------------------------------------------------------------------------
--

Segment Leq : 51.26 dBA

Total Leq All Segments: 72.81 dBA
```

```
Results segment # 1: GREENBANK RD (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.18 + 0.00) = 65.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  67.40   0.00  -2.22   0.00   0.00   0.00   0.00
65.18
-------------------------------------------------------------------------
--

Segment Leq : 65.18 dBA

Results segment # 2: Block 195 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 43.66 + 0.00) = 43.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     29   0.00  56.36   0.00  -4.77  -7.93   0.00   0.00   0.00
43.66
-------------------------------------------------------------------------
--

Segment Leq : 43.66 dBA

Total Leq All Segments: 65.21 dBA

RT/Custom data, segment # 1: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (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           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
```

```
Reference angle           :   0.00

Results segment # 1: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 57.20 + 0.00) = 57.20 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  59.41  -2.22   0.00   0.00   0.00   0.00  57.20
-------------------------------------------------------------------------

Segment Leq : 57.20 dBA

Total Leq All Segments: 57.20 dBA

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

Source height = 0.50 m

RT/Custom (0.00 + 55.66 + 0.00) = 55.66 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  57.87  -2.22   0.00   0.00   0.00   0.00  55.66
-------------------------------------------------------------------------

Segment Leq : 55.66 dBA

Total Leq All Segments: 55.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.93
                           (NIGHT): 65.67
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (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  :  31.00 / 31.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Block 195 (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 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):   8000
    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: Block 195 (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   39.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.00 / 39.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.83 + 0.00) = 68.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  75.00   0.00  -3.15  -3.01   0.00   0.00   0.00
68.83
-------------------------------------------------------------------------------
--

Segment Leq : 68.83 dBA

Results segment # 2: Block 195 (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.36 + 0.00) = 58.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     39   0.00  63.96   0.00  -4.15  -1.45   0.00   0.00   0.00
58.36
-------------------------------------------------------------------------------
--

Segment Leq : 58.36 dBA

Total Leq All Segments: 69.20 dBA
```

```
Results segment # 1: GREENBANK RD (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.24 + 0.00) = 61.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  67.40   0.00  -3.15  -3.01   0.00   0.00   0.00
61.24
-------------------------------------------------------------------------
--

Segment Leq : 61.24 dBA

Results segment # 2: Block 195 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.77 + 0.00) = 50.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     39   0.00  56.36   0.00  -4.15  -1.45   0.00   0.00   0.00
50.77
-------------------------------------------------------------------------
--

Segment Leq : 50.77 dBA

Total Leq All Segments: 61.61 dBA

RT/Custom data, segment # 1: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (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  :  31.00 / 31.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
```

```
Reference angle           :   0.00

Results segment # 1: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 53.25 + 0.00) = 53.25 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  59.41  -3.15  -3.01   0.00   0.00   0.00  53.25
-------------------------------------------------------------------------

Segment Leq : 53.25 dBA

Total Leq All Segments: 53.25 dBA

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

Source height = 0.50 m

RT/Custom (0.00 + 51.71 + 0.00) = 51.71 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  57.87  -3.15  -3.01   0.00   0.00   0.00  51.71
-------------------------------------------------------------------------

Segment Leq : 51.71 dBA

Total Leq All Segments: 51.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.31
                           (NIGHT): 62.04
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (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  : 103.00 / 103.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  79.00 / 79.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (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 !        4.50 !        2.20 !         2.20

ROAD (0.00 + 51.59 + 63.62) = 63.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  75.00   0.00  -8.37  -3.01   0.00   0.00 -12.03
51.59
-------------------------------------------------------------------------
--
     0     90   0.00  75.00   0.00  -8.37  -3.01   0.00   0.00   0.00
63.62
-------------------------------------------------------------------------
--

Segment Leq : 63.88 dBA

Total Leq All Segments: 63.88 dBA

Results segment # 1: GREENBANK RD (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 !        4.50 !        2.20 !         2.20

ROAD (0.00 + 43.99 + 56.02) = 56.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  67.40   0.00  -8.37  -3.01   0.00   0.00 -12.03
43.99
-------------------------------------------------------------------------
--
     0     90   0.00  67.40   0.00  -8.37  -3.01   0.00   0.00   0.00
56.02
-------------------------------------------------------------------------
--

Segment Leq : 56.28 dBA

Total Leq All Segments: 56.28 dBA
```

```
RT/Custom data, segment # 1: BRT (day/night)
----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (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  : 103.00 / 103.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  79.00 / 79.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BRT (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 !        4.50 !        1.43 !         1.43

RT/Custom (0.00 + 35.10 + 48.04) = 48.25 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -90      0   0.00  59.41  -8.37  -3.01   0.00   0.00 -12.94  35.10
-------------------------------------------------------------------
     0     90   0.00  59.41  -8.37  -3.01   0.00   0.00   0.00  48.04
-------------------------------------------------------------------

Segment Leq : 48.25 dBA

Total Leq All Segments: 48.25 dBA
```

```
Results segment # 1: BRT (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 !        4.50 !        1.43 !         1.43

RT/Custom (0.00 + 33.56 + 46.50) = 46.71 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  57.87  -8.37  -3.01   0.00   0.00 -12.94  33.56
-------------------------------------------------------------------------
     0     90   0.00  57.87  -8.37  -3.01   0.00   0.00   0.00  46.50
-------------------------------------------------------------------------

Segment Leq : 46.71 dBA

Total Leq All Segments: 46.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.00
                           (NIGHT): 56.73
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (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  :  65.00 / 65.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: GREENBANK RD (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  :    70 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: GREENBANK RD (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  :  65.00 / 65.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   6.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (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 !        4.50 !        2.65 !         2.65

ROAD (0.00 + 52.52 + 62.31) = 62.74 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -42   0.00  75.00   0.00  -6.37  -5.74   0.00   0.00 -10.37
52.52
-------------------------------------------------------------------------------
--
   -42      0   0.00  75.00   0.00  -6.37  -6.32   0.00   0.00   0.00
62.31
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 62.74 dBA

Results segment # 2: GREENBANK RD (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 !        4.50 !        2.65 !         2.65

ROAD (53.86 + 53.51 + 0.00) = 56.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0      6   0.00  75.00   0.00  -6.37 -14.77   0.00   0.00   0.00
53.86
-------------------------------------------------------------------------------
--
     6     90   0.00  75.00   0.00  -6.37  -3.31   0.00   0.00 -11.80
53.51
-------------------------------------------------------------------------------
--

Segment Leq : 56.70 dBA

Total Leq All Segments: 63.71 dBA

Results segment # 1: GREENBANK RD (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 !        4.50 !        2.65 !         2.65

ROAD (0.00 + 44.92 + 54.71) = 55.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
```

```
   -90    -42   0.00  67.40   0.00  -6.37  -5.74   0.00   0.00 -10.37
44.92
-------------------------------------------------------------------------
--
   -42      0   0.00  67.40   0.00  -6.37  -6.32   0.00   0.00   0.00
54.71
-------------------------------------------------------------------------
--

Segment Leq : 55.14 dBA

Results segment # 2: GREENBANK RD (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 !        4.50 !        2.65 !         2.65

ROAD (46.26 + 45.92 + 0.00) = 49.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0      6   0.00  67.40   0.00  -6.37 -14.77   0.00   0.00   0.00
46.26
-------------------------------------------------------------------------
--
     6     90   0.00  67.40   0.00  -6.37  -3.31   0.00   0.00 -11.80
45.92
-------------------------------------------------------------------------
--

Segment Leq : 49.10 dBA

Total Leq All Segments: 56.11 dBA

RT/Custom data, segment # 1: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (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  :  65.00 / 65.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

RT/Custom data, segment # 2: BRT (day/night)
-------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 2: BRT (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  :  65.00 / 65.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   6.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BRT (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 !        4.50 !        2.04 !         2.04

RT/Custom (0.00 + 36.21 + 46.73) = 47.10 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
```

-90	-42	0.00	59.41	-6.37	-5.74	0.00	0.00	-11.09	36.21
-42	0	0.00	59.41	-6.37	-6.32	0.00	0.00	0.00	46.73

Segment Leq : 47.10 dBA

Results segment # 2: BRT (day)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	4.50	2.04	2.04

RT/Custom (38.27 + 37.13 + 0.00) = 40.75 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	6	0.00	59.41	-6.37	-14.77	0.00	0.00	0.00	38.27
6	90	0.00	59.41	-6.37	-3.31	0.00	0.00	-12.60	37.13

Segment Leq : 40.75 dBA

Total Leq All Segments: 48.01 dBA

Results segment # 1: BRT (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	4.50	2.04	2.04

RT/Custom (0.00 + 34.67 + 45.19) = 45.56 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-42	0.00	57.87	-6.37	-5.74	0.00	0.00	-11.09	34.67
-42	0	0.00	57.87	-6.37	-6.32	0.00	0.00	0.00	45.19

```
Segment Leq : 45.56 dBA

Results segment # 2: BRT (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 !        4.50 !        2.04 !         2.04

RT/Custom (36.74 + 35.59 + 0.00) = 39.21 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0      6   0.00  57.87  -6.37 -14.77   0.00   0.00   0.00  36.74
-------------------------------------------------------------------------
     6     90   0.00  57.87  -6.37  -3.31   0.00   0.00 -12.60  35.59
-------------------------------------------------------------------------

Segment Leq : 39.21 dBA

Total Leq All Segments: 46.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.82
                           (NIGHT): 56.55
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -17.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  71.00 / 71.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: GREENBANK RD (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  :    70 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: GREENBANK RD (day/night)
-----------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  17.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  71.00 / 71.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 47.92 + 51.40) = 53.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -17   0.24  75.00   0.00  -9.94  -4.71   0.00   0.00 -12.42
47.92
-------------------------------------------------------------------------------
--
   -17      0   0.66  75.00   0.00 -13.31 -10.29   0.00   0.00   0.00
51.40
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 53.01 dBA

Results segment # 2: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (51.40 + 47.92 + 0.00) = 53.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     17   0.66  75.00   0.00 -13.31 -10.29   0.00   0.00   0.00
51.40
-------------------------------------------------------------------------------
--
    17     90   0.24  75.00   0.00  -9.94  -4.71   0.00   0.00 -12.42
47.92
-------------------------------------------------------------------------------
--

Segment Leq : 53.01 dBA

Total Leq All Segments: 56.02 dBA

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 40.33 + 43.80) = 45.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
```

```
   -90    -17   0.24  67.40   0.00  -9.94  -4.71   0.00   0.00 -12.42
40.33
-------------------------------------------------------------------------
--
   -17      0   0.66  67.40   0.00 -13.31 -10.29   0.00   0.00   0.00
43.80
-------------------------------------------------------------------------
--

Segment Leq : 45.41 dBA

Results segment # 2: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (43.80 + 40.33 + 0.00) = 45.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     17   0.66  67.40   0.00 -13.31 -10.29   0.00   0.00   0.00
43.80
-------------------------------------------------------------------------
--
    17     90   0.24  67.40   0.00  -9.94  -4.71   0.00   0.00 -12.42
40.33
-------------------------------------------------------------------------
--

Segment Leq : 45.41 dBA

Total Leq All Segments: 48.42 dBA

RT/Custom data, segment # 1: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg    0.00 deg
Wood depth                :      0        (No woods.)
```

```
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -17.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  71.00 / 71.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

RT/Custom data, segment # 2: BRT (day/night)
-------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 2: BRT (day/night)
-------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  17.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  71.00 / 71.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BRT (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 !        1.50 !        0.75 !         0.75

RT/Custom (0.00 + 31.23 + 35.82) = 37.11 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------
```

```
   -90    -17   0.27  59.41 -10.18  -4.80   0.00   0.00 -13.20  31.23
-------------------------------------------------------------------------
   -17      0   0.66  59.41 -13.31 -10.29   0.00   0.00   0.00  35.82
-------------------------------------------------------------------------

Segment Leq : 37.11 dBA

Results segment # 2: BRT (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 !        1.50 !        0.75 !         0.75

RT/Custom (35.82 + 31.23 + 0.00) = 37.11 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     17   0.66  59.41 -13.31 -10.29   0.00   0.00   0.00  35.82
-------------------------------------------------------------------------
    17     90   0.27  59.41 -10.18  -4.80   0.00   0.00 -13.20  31.23
-------------------------------------------------------------------------

Segment Leq : 37.11 dBA

Total Leq All Segments: 40.12 dBA

Results segment # 1: BRT (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 !        1.50 !        0.75 !         0.75

RT/Custom (0.00 + 29.69 + 34.28) = 35.57 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -17   0.27  57.87 -10.18  -4.80   0.00   0.00 -13.20  29.69
-------------------------------------------------------------------------
   -17      0   0.66  57.87 -13.31 -10.29   0.00   0.00   0.00  34.28
-------------------------------------------------------------------------
```

```
Segment Leq : 35.57 dBA

Results segment # 2: BRT (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 !        1.50 !        0.75 !         0.75

RT/Custom (34.28 + 29.69 + 0.00) = 35.57 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     17   0.66  57.87 -13.31 -10.29   0.00   0.00   0.00  34.28
-------------------------------------------------------------------------
    17     90   0.27  57.87 -10.18  -4.80   0.00   0.00 -13.20  29.69
-------------------------------------------------------------------------

Segment Leq : 35.57 dBA

Total Leq All Segments: 38.58 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.13
                           (NIGHT): 48.85
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  74.00 / 74.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  49.00 / 49.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 49.52 + 59.02) = 59.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.24  75.00   0.00  -8.60  -3.64   0.00   0.00 -13.24
49.52
-------------------------------------------------------------------------
--
     0     90   0.66  75.00   0.00 -11.51  -4.47   0.00   0.00   0.00
59.02
-------------------------------------------------------------------------
--

Segment Leq : 59.48 dBA

Total Leq All Segments: 59.48 dBA

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 41.92 + 51.43) = 51.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.24  67.40   0.00  -8.60  -3.64   0.00   0.00 -13.24
41.92
-------------------------------------------------------------------------
--
     0     90   0.66  67.40   0.00 -11.51  -4.47   0.00   0.00   0.00
51.43
-------------------------------------------------------------------------
--

Segment Leq : 51.89 dBA

Total Leq All Segments: 51.89 dBA
```

```
RT/Custom data, segment # 1: BRT (day/night)
----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  74.00 / 74.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  49.00 / 49.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BRT (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 !        1.50 !        0.84 !         0.84

RT/Custom (0.00 + 32.94 + 43.44) = 43.81 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.27  59.41  -8.80  -3.71   0.00   0.00 -13.96  32.94
-------------------------------------------------------------------------
     0     90   0.66  59.41 -11.51  -4.47   0.00   0.00   0.00  43.44
-------------------------------------------------------------------------

Segment Leq : 43.81 dBA

Total Leq All Segments: 43.81 dBA

Results segment # 1: BRT (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 !        1.50 !        0.84 !         0.84

RT/Custom (0.00 + 31.40 + 41.90) = 42.27 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.27  57.87  -8.80  -3.71   0.00   0.00 -13.96  31.40
-------------------------------------------------------------------------
     0     90   0.66  57.87 -11.51  -4.47   0.00   0.00   0.00  41.90
-------------------------------------------------------------------------

Segment Leq : 42.27 dBA

Total Leq All Segments: 42.27 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.60
                           (NIGHT): 52.34
```

```
STAMSON 5.0        NORMAL REPORT        Date: 21-06-2021 14:13:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: GREENBANK RD (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  :    70 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: GREENBANK RD (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -64.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: GREENBANK RD (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  :    70 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: GREENBANK RD (day/night)
-----------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  63.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 48.28 + 63.75) = 63.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -64   0.24  75.00   0.00  -4.56 -10.17   0.00   0.00 -11.97
48.28
-------------------------------------------------------------------------------
--
   -64      0   0.66  75.00   0.00  -6.11  -5.14   0.00   0.00   0.00
63.75
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 63.87 dBA

Results segment # 2: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (63.70 + 48.37 + 0.00) = 63.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     63   0.66  75.00   0.00  -6.11  -5.18   0.00   0.00   0.00
63.70
-------------------------------------------------------------------------------
--
    63     90   0.24  75.00   0.00  -4.56  -9.97   0.00   0.00 -12.08
48.37
-------------------------------------------------------------------------------
--

Segment Leq : 63.83 dBA

Total Leq All Segments: 66.86 dBA

Results segment # 1: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 40.69 + 56.15) = 56.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
```

```
   -90    -64    0.24  67.40   0.00  -4.56 -10.17   0.00   0.00 -11.97
40.69
-------------------------------------------------------------------------
--
   -64      0    0.66  67.40   0.00  -6.11  -5.14   0.00   0.00   0.00
56.15
-------------------------------------------------------------------------
--

Segment Leq : 56.27 dBA

Results segment # 2: GREENBANK RD (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 !        1.50 !        1.50 !         1.50

ROAD (56.11 + 40.78 + 0.00) = 56.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     63    0.66  67.40   0.00  -6.11  -5.18   0.00   0.00   0.00
56.11
-------------------------------------------------------------------------
--
    63     90    0.24  67.40   0.00  -4.56  -9.97   0.00   0.00 -12.08
40.78
-------------------------------------------------------------------------
--

Segment Leq : 56.23 dBA

Total Leq All Segments: 59.26 dBA

RT/Custom data, segment # 1: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
```

```
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -64.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

RT/Custom data, segment # 2: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 2: BRT (day/night)
-------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  63.00 deg   Angle2 : 90.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BRT (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 !        1.50 !        1.19 !         1.19

RT/Custom (0.00 + 32.05 + 48.17) = 48.27 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
```

```
   -90    -64    0.27  59.41  -4.67 -10.38   0.00   0.00 -12.31  32.05
-------------------------------------------------------------------------
   -64      0    0.66  59.41  -6.11  -5.14   0.00   0.00   0.00  48.17
-------------------------------------------------------------------------

Segment Leq : 48.27 dBA

Results segment # 2: BRT (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 !        1.50 !        1.19 !         1.19

RT/Custom (48.12 + 32.14 + 0.00) = 48.23 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     63    0.66  59.41  -6.11  -5.18   0.00   0.00   0.00  48.12
-------------------------------------------------------------------------
    63     90    0.27  59.41  -4.67 -10.18   0.00   0.00 -12.42  32.14
-------------------------------------------------------------------------

Segment Leq : 48.23 dBA

Total Leq All Segments: 51.26 dBA

Results segment # 1: BRT (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 !        1.50 !        1.19 !         1.19

RT/Custom (0.00 + 30.51 + 46.63) = 46.73 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -64    0.27  57.87  -4.67 -10.38   0.00   0.00 -12.31  30.51
-------------------------------------------------------------------------
   -64      0    0.66  57.87  -6.11  -5.14   0.00   0.00   0.00  46.63
-------------------------------------------------------------------------
```

```
Segment Leq : 46.73 dBA

Results segment # 2: BRT (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 !        1.50 !        1.19 !         1.19

RT/Custom (46.58 + 30.60 + 0.00) = 46.69 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     63   0.66  57.87  -6.11  -5.18   0.00   0.00   0.00  46.58
-------------------------------------------------------------------------
    63     90   0.27  57.87  -4.67 -10.18   0.00   0.00 -12.42  30.60
-------------------------------------------------------------------------

Segment Leq : 46.69 dBA

Total Leq All Segments: 49.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.98
                           (NIGHT): 59.72
```