GRADIENTWIND
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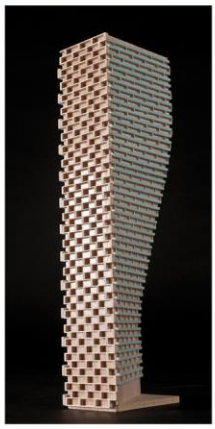
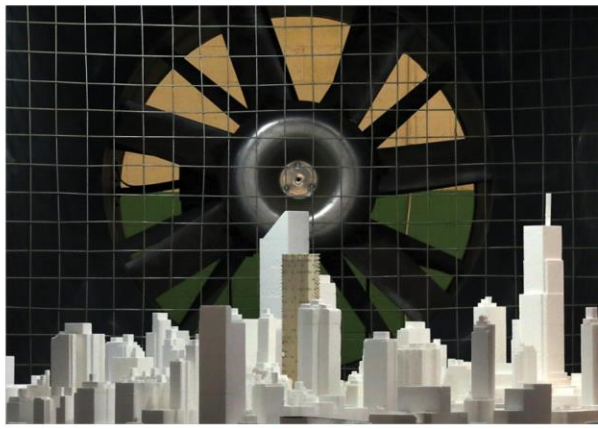
DETAILED TRAFFIC NOISE ASSESSMENT

South Nepean Town Centre
Ottawa, Ontario

REPORT: GWE19-035 – Traffic Noise R2





September 20, 2019

PREPARED FOR
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EXECUTIVE SUMMARY

This report describes a detailed roadway traffic noise assessment undertaken for the proposed South Nepean Town Centre subdivision development in Ottawa, Ontario. The proposed development is a nearly rectangular lot and comprises back-to-back townhomes and apartment buildings on six (6) primary separate blocks. The site is surrounded by undeveloped land in all directions, with a number of existing low-rise residential properties located along Greenbank Road to the east. The major sources of traffic noise are Greenbank Road, Jockvale Road, Chapman Mills Drive and the associate Buss Rapid Transit (BRT) lanes. 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) Version 6 concept drawings prepared by Korsiak Urban Planning, dated September 12, 2019.

The results of the current analysis indicate that noise levels will range between 51 and 72 dBA during the daytime period (07:00-23:00) and between 43 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs at the eastern end of the development, which is nearest and most exposed to Greenbank Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Building 1,2,3,4,5,11,12,13,14,17,23,24 will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. Building 6,22,27,28,29 will require forced air heating with provision for central air conditioning. Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels at the Block 3 amenity space are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Further analysis investigated the noise mitigating impact of including a 2.2 m noise barrier at the norther end of the amenity area (Figure 5). Results of the investigation proved that noise levels can be reduced to 56 dBA. The noise barrier must be constructed from materials having a minimum surface

density of 20 kg/m^2 (STC rating of 30) and contain no gaps. Design of the noise barrier will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Caivan Communities to undertake a detailed roadway traffic noise assessment of the proposed South Nepean Town Centre subdivision development in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on Version 6 concept drawings prepared by Korsiak Urban Planning, dated September 12, 2019, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed plan of subdivision development is a nearly rectangular lot and comprises back-to-back townhomes and apartment buildings on six (6) primary separate blocks. Blocks 1 and 4 are found at the west side, Block 3 and 6 at the east side and Block 2 and 5 at the centre of the site. Block 3 features apartment buildings, Block 1,2,3 and 5 comprise townhomes and Block 6 features a school. The development site is bound by Greenbank Road to the east, Chapman Mills Drive to the north and proposed Street 'B' to the south. Jockvale Road extends north to south through the middle of the site between Blocks 1 and 2, while proposed Street 'A' travels through the site separating Blocks 2 and 3.

The site is surrounded by undeveloped land in all directions, with a number of existing low-rise residential properties located along Greenbank Road to the east. The major sources of traffic noise are Greenbank Road, Jockvale Road, Chapman Mills Drive and the associate Buss Rapid Transit (BRT) lanes. Each building considered in the assessment has been designated a number, as illustrated in Figure 1 along with a complete site plan with surrounding context.

[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

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

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

Noise predictions were performed with the aid of the MECP computerized noise assessment program, STAMSON 5.04, for road analysis. Appendix A includes the STAMSON 5.04 input and output data.

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective and absorptive based on intermediate ground characteristics.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Receptor height was taken to be 4.5 metres at Level 2 for the centre of the window (height to 2nd floor + 1.5 metres), based on ORNMENT recommendations. Ground level receptor height is 1.5 m.
- Stacked townhouses considered as noise barrier at 9 m in height.
- The apartment buildings are 8 storeys in height (approximately 24 metres), but are not considered as blockage in STAMSON calculations.
- Noise receptors were strategically placed at 12 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figure A1-5.

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

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

are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Greenbank Road	4-UAD	60	**35,000**
Jockvale Road	2-UCU	50	**8,000**
Chapman Mills Drive	2-UMCU	50	**12,000**
BRT	Bus	50	**191/67***

* - Daytime/nighttime traffic volumes

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

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

[8] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

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

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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

[9] CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	4.5	POW – Building 24 – East Façade	72	65
2	4.5	POW – Building 24 – North Façade	70	62
3	4.5	POW – Building 11 – North Façade	67	60
4	4.5	POW – Building 11 – West Façade	67	59
5	4.5	POW – Building 1 – North Façade	66	59
6	4.5	POW – Building 27 – East Façade	65	58
7	4.5	POW – Building 5 – East Façade	66	58
8	4.5	POW – Building 18 – South Façade	51	43
9	4.5	POW – Building 9 – West Façade	53	46
10	1.5	School	60	52
11	1.5	Park	55	47
12	1.5	Block 3 Amenity	60	53

The results of the current analysis indicate that noise levels will range between 51 and 72 dBA during the daytime period (07:00-23:00) and between 43 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs at the eastern end of the development, which is nearest and most exposed to Greenbank Road.

5.2 Noise Control Measures

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

TABLE 4: WINDOW STC REQUIREMENTS

Building Number	Bedroom Windows				Living Room Windows			
	North Façade	East Façade	South Façade	West Façade	North Façade	East Façade	South Façade	West Façade
1	31	OBC	OBC	OBC	26	OBC	OBC	OBC
2	31	OBC	OBC	OBC	26	OBC	OBC	OBC
3	31	OBC	OBC	OBC	26	OBC	OBC	OBC
4	31	31	OBC	OBC	26	26	OBC	OBC
5	OBC	31	OBC	OBC	OBC	26	OBC	OBC
11	31	OBC	OBC	31	26	OBC	OBC	26
12	31	OBC	OBC	OBC	26	OBC	OBC	OBC
13	31	OBC	OBC	OBC	26	OBC	OBC	OBC
14	31	OBC	OBC	OBC	26	OBC	OBC	OBC
17	OBC	OBC	OBC	31	OBC	OBC	OBC	26
23	31	OBC	OBC	OBC	26	OBC	OBC	OBC
24	35	35	31	OBC	30	30	26	OBC

Exterior wall components on these façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[10]. The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have specified an example window configuration, however several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to

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

the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that various buildings will require air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment; while other buildings will require forced air heating with provisions for central air conditioning, as indicated in Table 5 and illustrated in Figure 4. In addition to ventilation requirements, Warning Clauses will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized Section 6.

TABLE 5: SITE VENTILATION REQUIREMENTS

Building Number	Ventilation Requirements
1,2,3,4,5,11,12,13,14,17,23,24	Air Conditioning
6,22,27,28,29	Forced Air Heating with Provisions for Air Conditioning

5.3 Noise Barrier Calculation

Noise levels at the Block 3 amenity space are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Further analysis investigated the noise mitigating impact of including a 2.2 m noise barrier at the norther end of the amenity area (Figure 5). Results of the investigation proved that noise levels can be reduced to 56 dBA. Table 6 summarizes the results of the barrier investigation.

TABLE 6: RESULTS OF NOISE BARRIER INVESTIGATION

Reference Receptor	Barrier Height (m)	Daytime Noise Level (dBA)
12	No Barrier	60
	2.2	56

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 51 and 72 dBA during the daytime period (07:00-23:00) and between 43 and 65 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs at the eastern end of the development, which is nearest and most exposed to Greenbank Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Building 1,2,3,4,5,11,12,13,14,17 will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[11] will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants, as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change. To help address the need for sound attenuation, this development includes:*
>
> - *STC rated multi-pane glazing elements*
> - *STC rated exterior walls*
>
> *This dwelling unit has also been designed with air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.*
>
> *To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."*

[11] City of Ottawa Environmental Noise Control Guidelines, January 2016

Building 23,24 will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[12] will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants, as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change. To help address the need for sound attenuation, this development includes:*
>
> - *STC rated multi-pane glazing elements*
> - *STC rated exterior walls*
> - *An acoustic barrier of 2.2 m in height*
>
> *This dwelling unit has also been designed with air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.*
>
> *To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."*

[12] City of Ottawa Environmental Noise Control Guidelines, January 2016

Building 6,22,27,28,29 will require forced air heating with provision for central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[13] will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

> *"Purchasers/tenants are advised sound levels due to increasing roadway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City the Ministry of the Environment, Conservation and Parks.*
>
> *To help address the need for sound attenuation this unit has been designed with forced air heating and provision for central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment, Conservation and Parks.*

Noise levels at the Block 3 amenity space are expected to approach 60 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA. Further analysis investigated the noise mitigating impact of including a 2.2 m noise barrier at the norther end of the amenity area (Figure 5). Results of the investigation proved that noise levels can be reduced to 56 dBA. The noise barrier must be constructed from materials having a minimum surface density of 20 kg/m^2 (STC rating of 30) and contain no gaps. Design of the noise barrier will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.

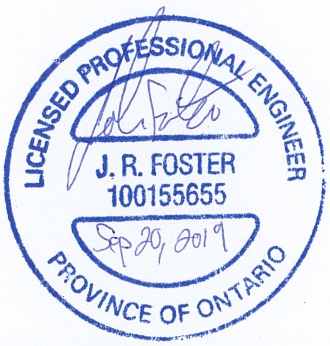
[13] City of Ottawa Environmental Noise Control Guidelines, January 2016

3. Layout plan, and wall elevations, showing proposed colours and patterns.

This concludes our detailed 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.



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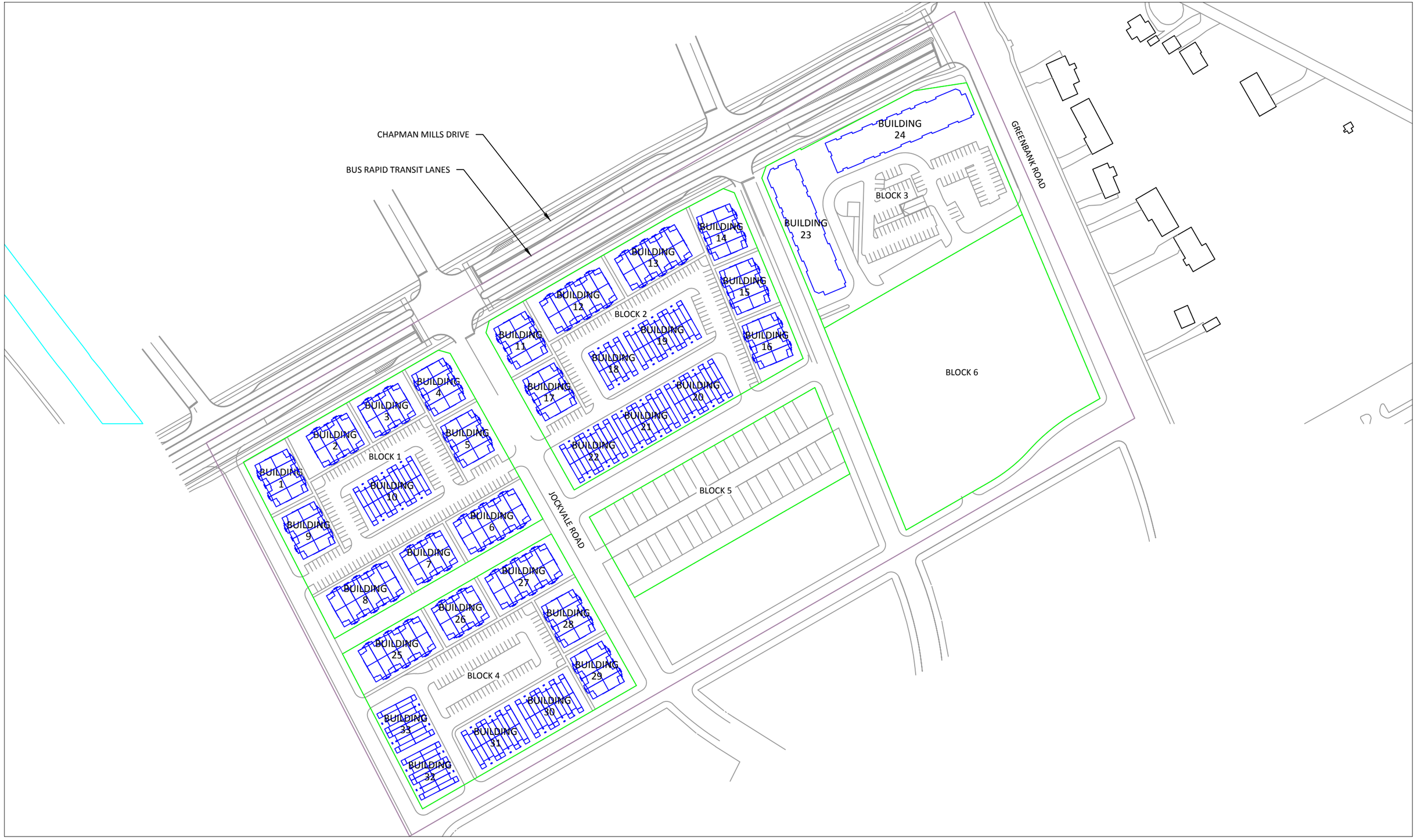

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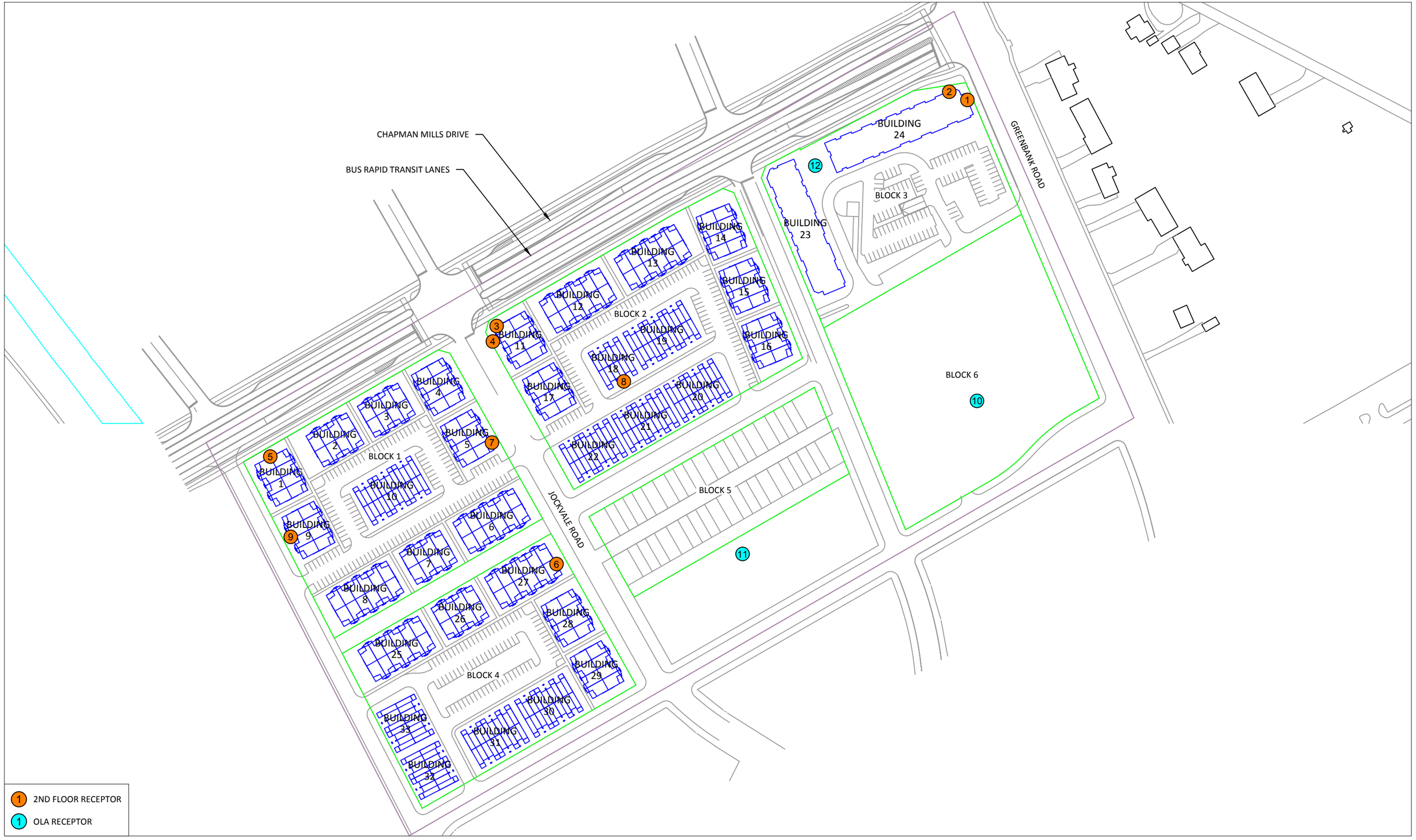
PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE19-035-1
DATE	SEPTEMBER 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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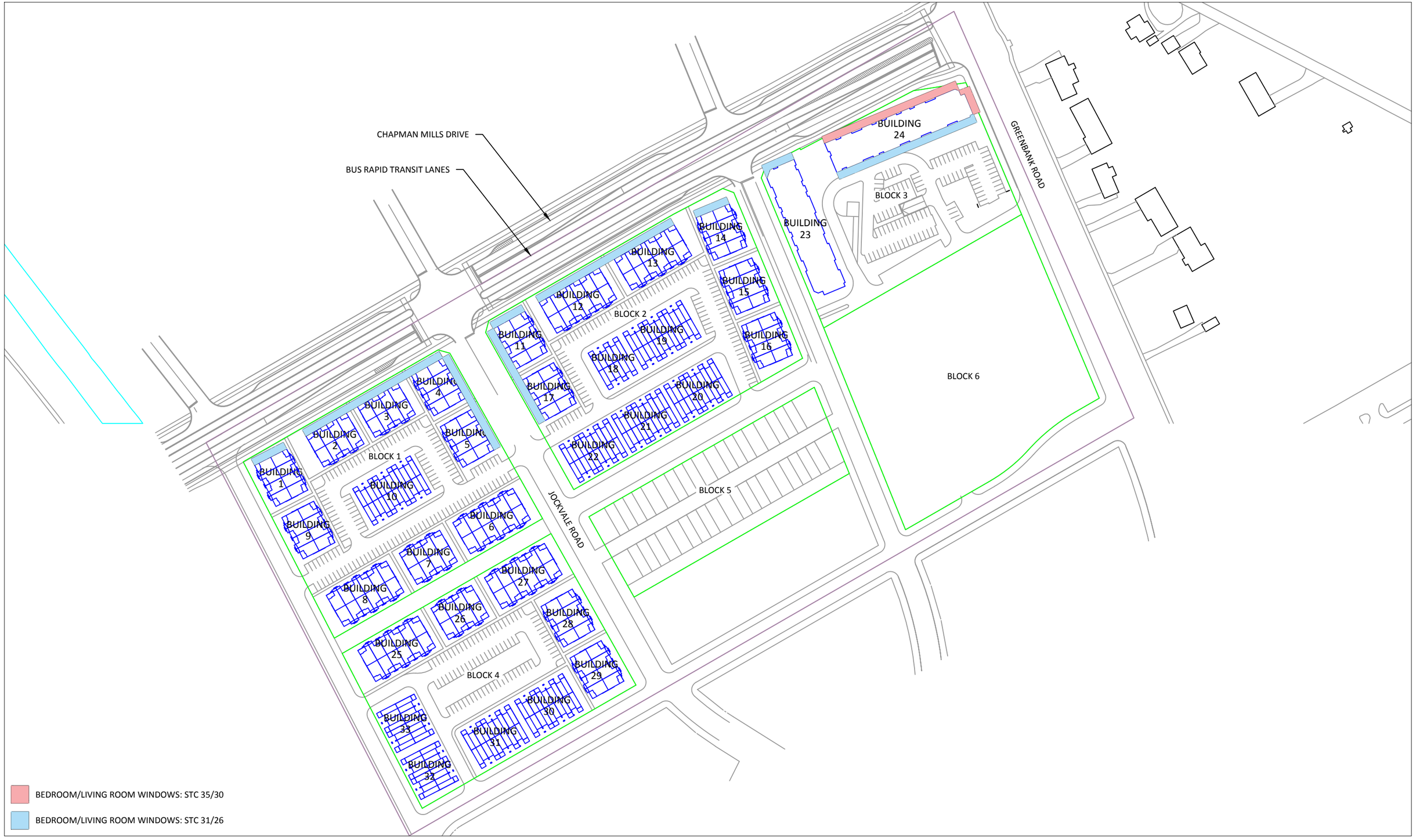
PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GWE19-035-2
DATE	SEPTEMBER 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

N



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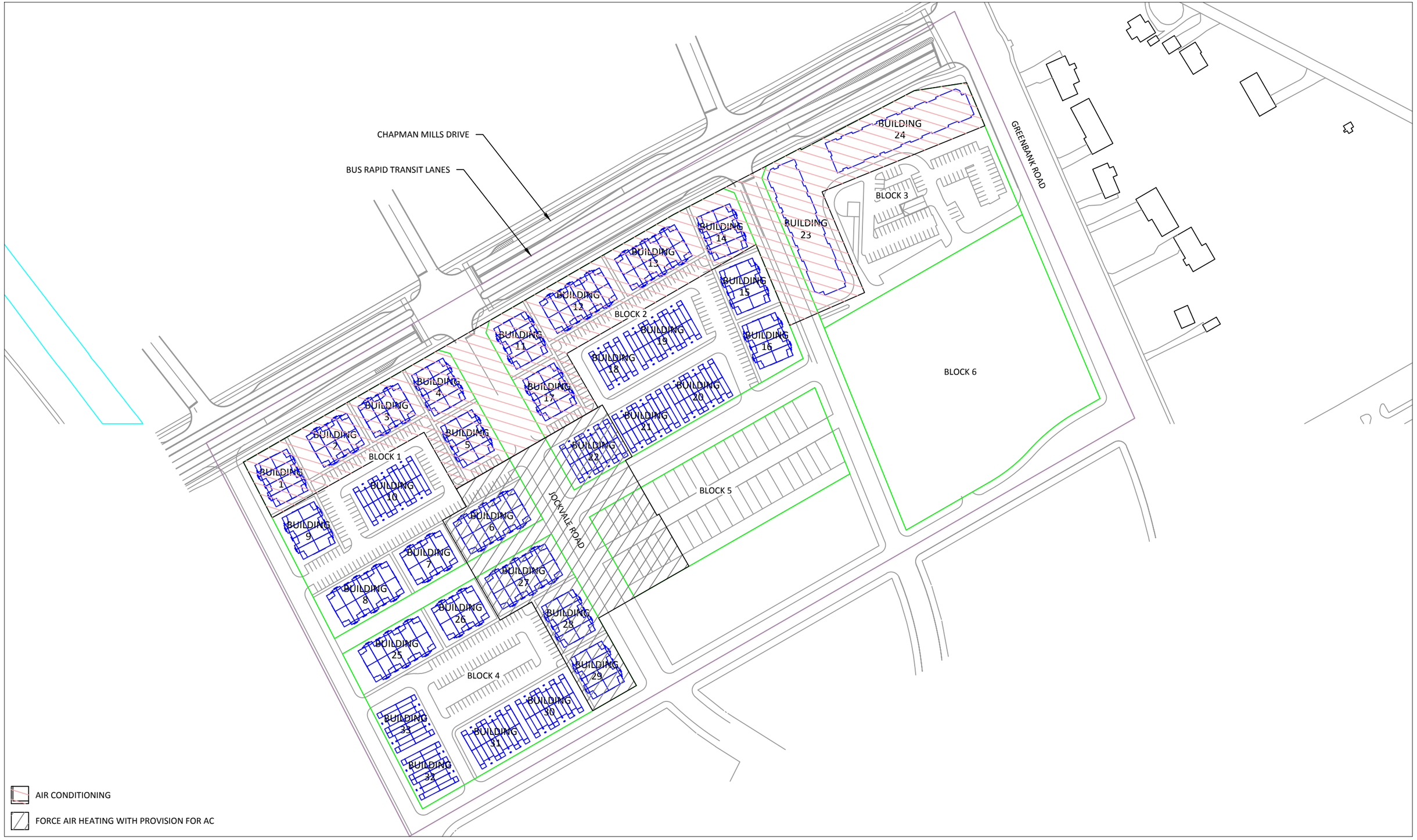
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE19-035-3
DATE	SEPTEMBER 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 3:
WINDOW STC REQUIREMENTS



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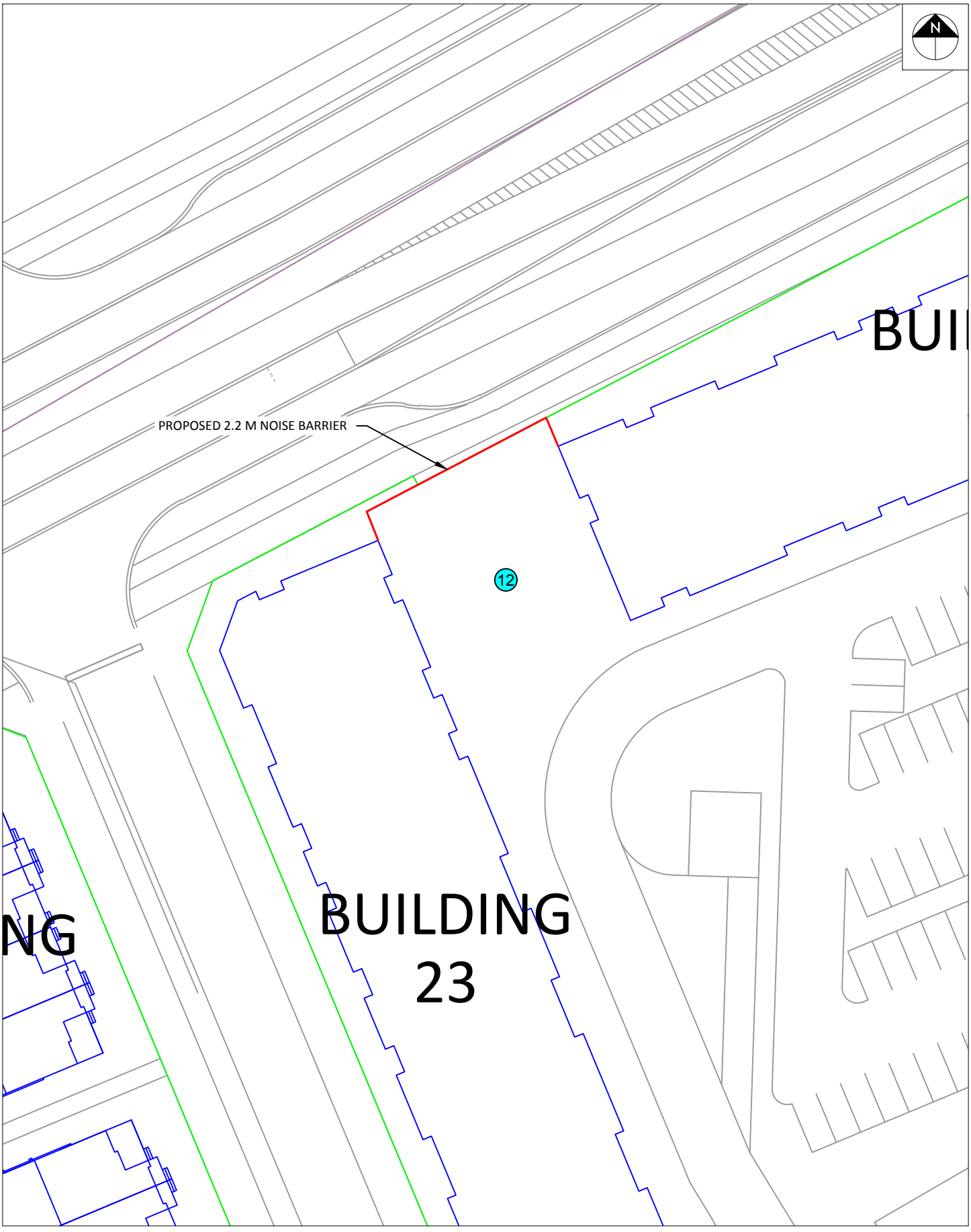
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE19-035-4
DATE	SEPTEMBER 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 4:
VENTILATION REQUIREMENTS

N



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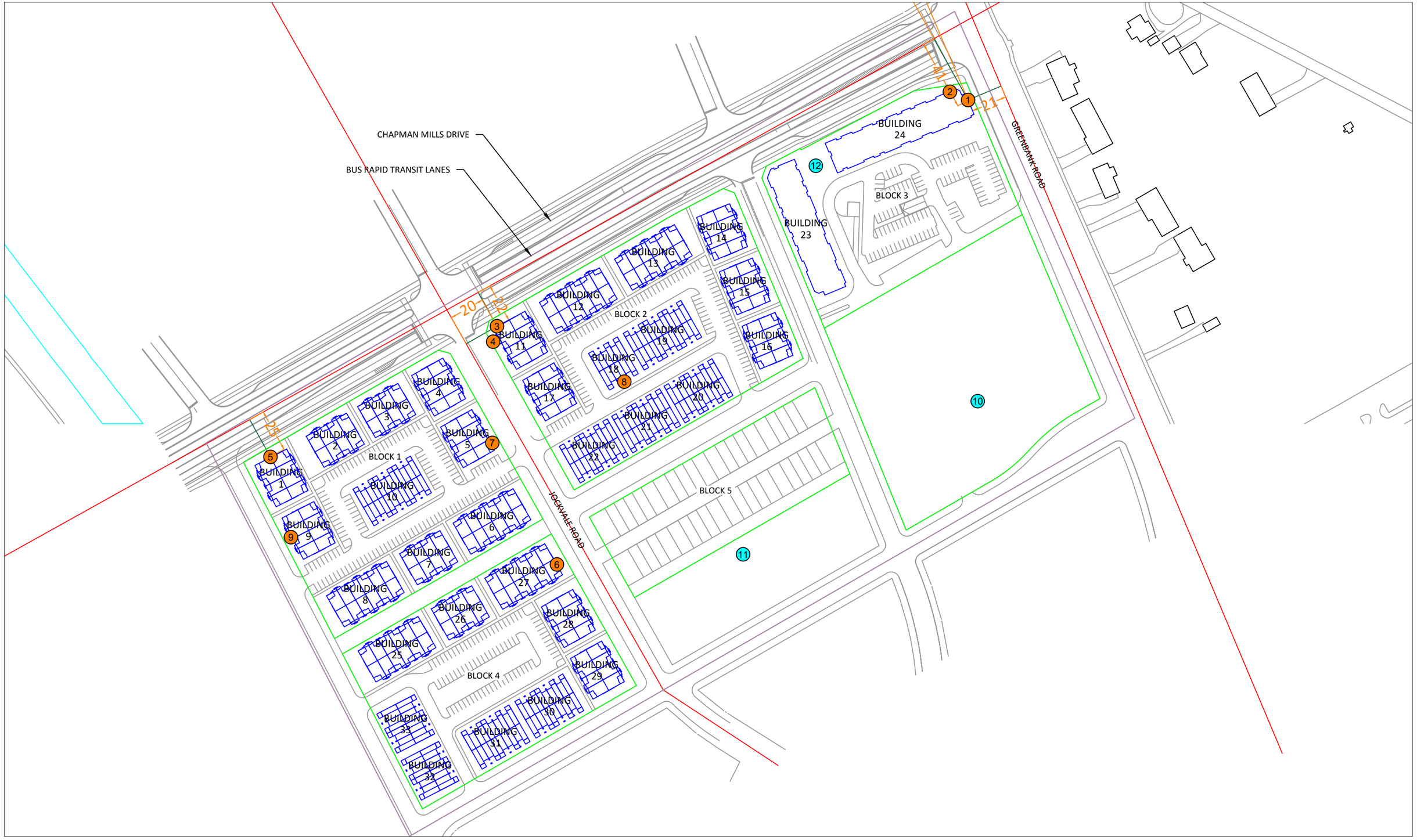
PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:500 (APPROX.)	DRAWING NO.	GWE19-035-5
DATE	SEPTEMBER 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 5:
PROPOSED NOISE BARRIER LOCATION



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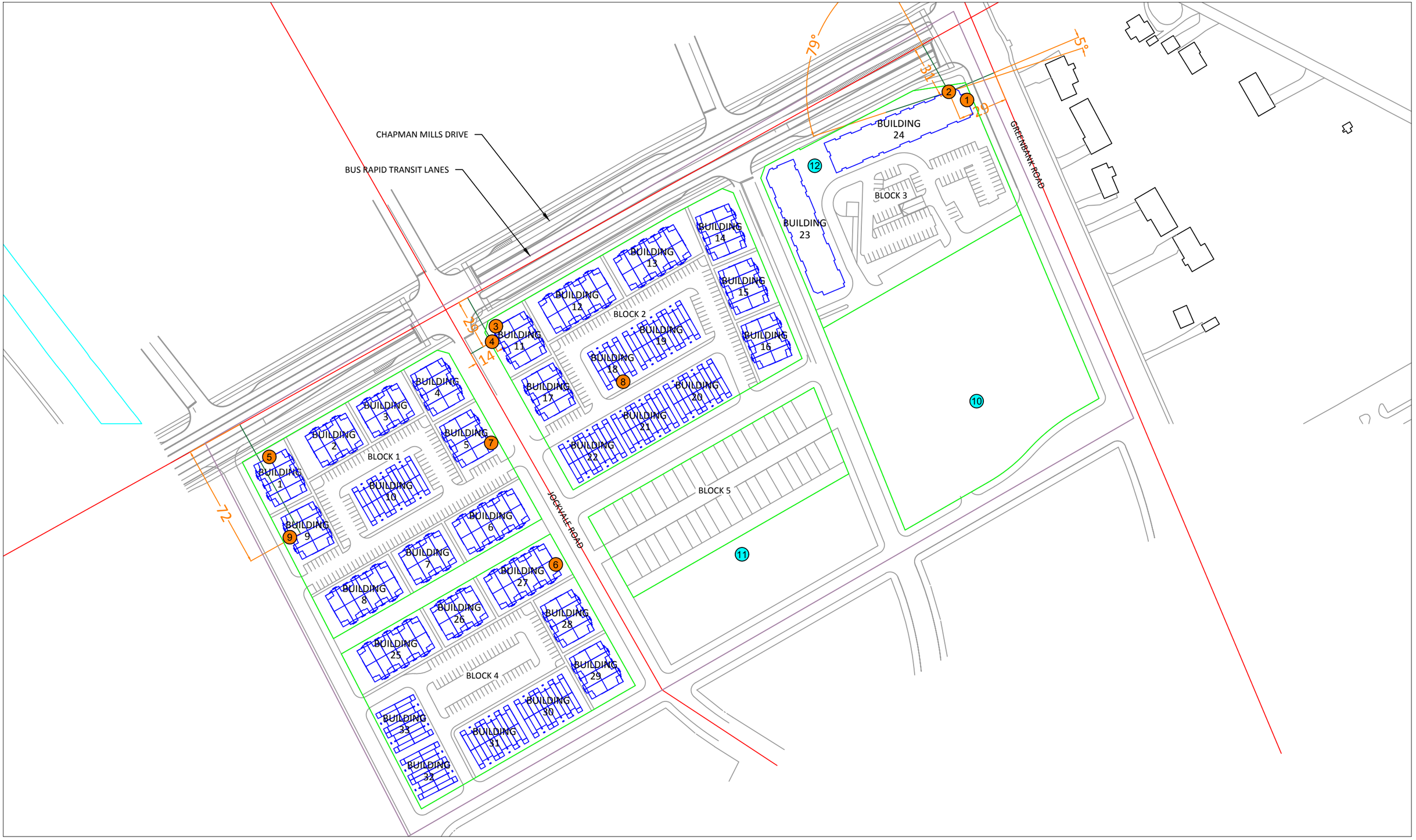
SCALE	1:2000 (APPROX.)
DRAWING NO.	GWE19-035-A1
DATE	SEPTEMBER 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE A1:
STAMSON INPUT PARAMETERS: RECEPTOR 1,3,5

N



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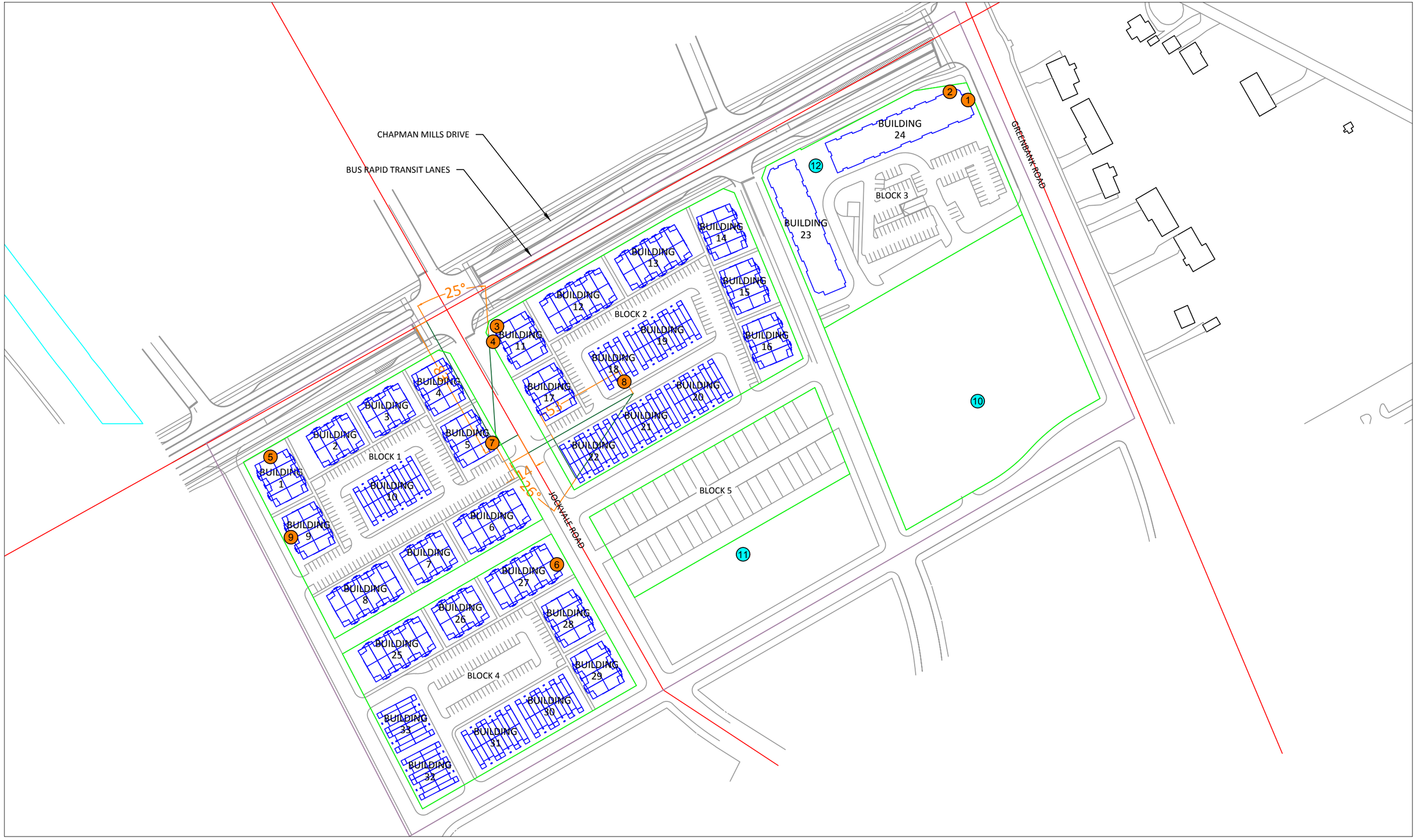
SCALE	1:2000 (APPROX.)
DRAWING NO.	GWE19-035-A2
DATE	SEPTEMBER 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE A2:
STAMSON INPUT PARAMETERS: RECEPTOR 2,4,9

N



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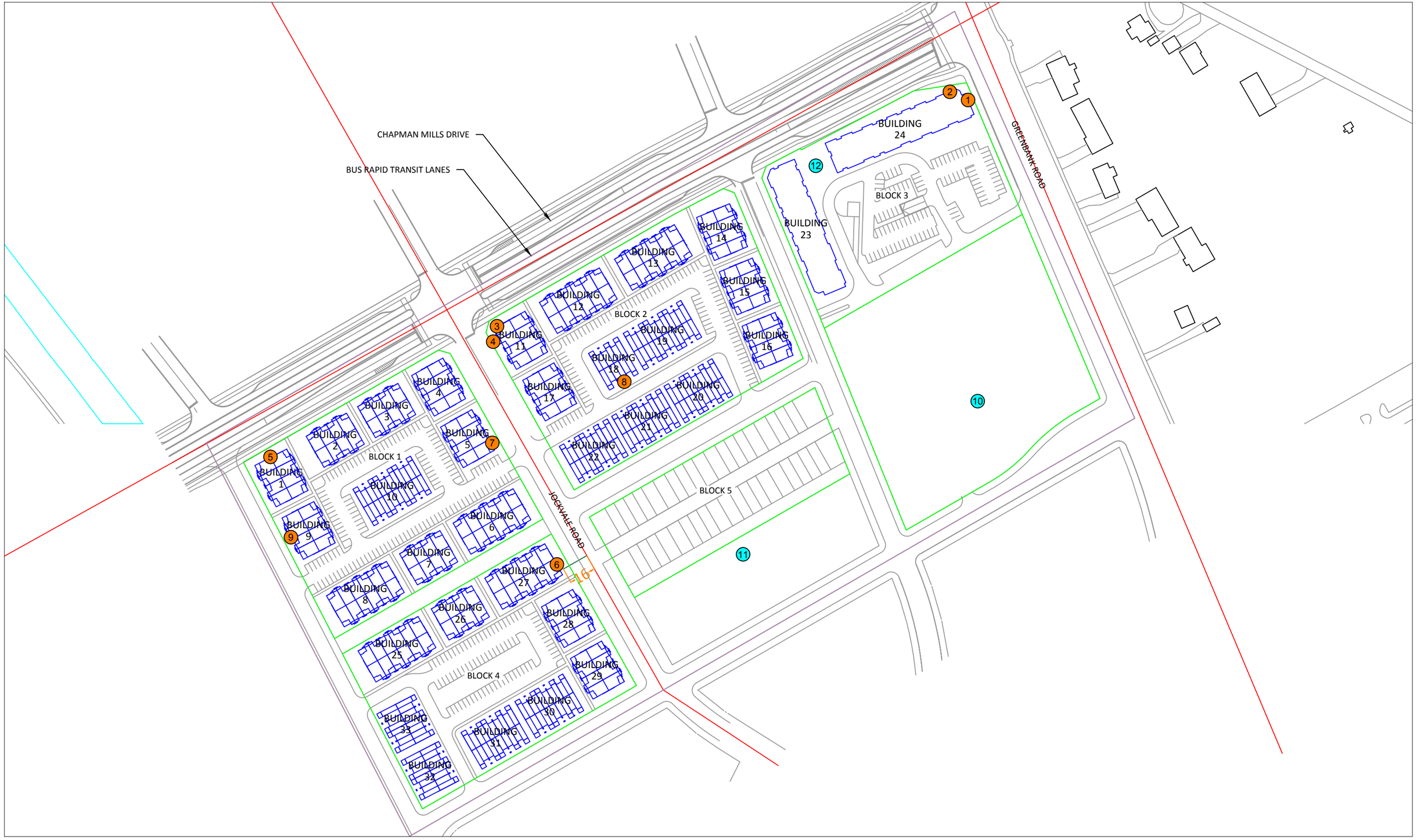
PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT	DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO. GWE19-035-A3
DATE	SEPTEMBER 20, 2019	DRAWN BY M.L.

FIGURE A3:
STAMSON INPUT PARAMETERS: RECEPTOR 7,8

N



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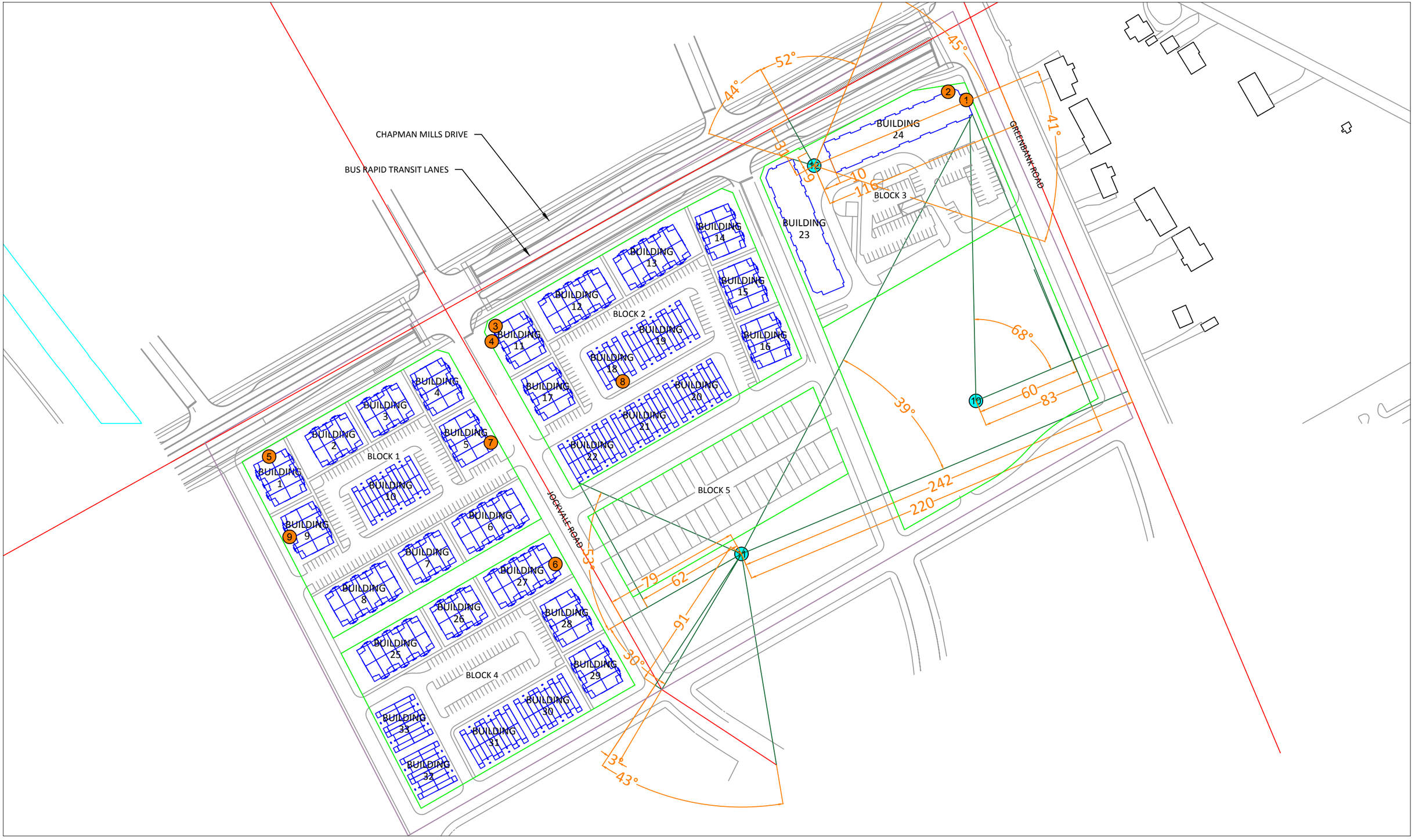
PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE19-035-A4
DATE	SEPTEMBER 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE A4:
STAMSON INPUT PARAMETERS: RECEPTOR 6

N



127 Walgreen Road Ottawa, Ontario Canada K0A 1L0 (613) 836 0934 www.gradientwind.com	PROJECT	SOUTH NEPEAN TOWN CENTRE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT	DESCRIPTION
	SCALE	1:2000 (APPROX.)	DRAWING NO. GWE19-035-A5
	DATE	SEPTEMBER 20, 2019	DRAWN BY M.L.

FIGURE A5:
STAMSON INPUT PARAMETERS: RECEPTOR 10,11,12

N

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:45:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (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  :  21.00 / 21.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           :   6.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  41.00 / 41.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 72.21 + 0.00) = 72.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.68   0.00  -1.46   0.00   0.00   0.00   0.00  72.21
-------------------------------------------------------------------------------

Segment Leq : 72.21 dBA


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

Source height = 1.50 m

ROAD (0.00 + 59.83 + 0.00) = 59.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     6     90   0.00  67.51   0.00  -4.37  -3.31   0.00   0.00   0.00  59.83
-------------------------------------------------------------------------------

Segment Leq : 59.83 dBA

Total Leq All Segments: 72.45 dBA


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

Source height = 1.50 m

ROAD (0.00 + 64.62 + 0.00) = 64.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.08   0.00  -1.46   0.00   0.00   0.00   0.00  64.62
-------------------------------------------------------------------------------

Segment Leq : 64.62 dBA


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

Source height = 1.50 m

ROAD (0.00 + 52.23 + 0.00) = 52.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     6     90   0.00  59.91   0.00  -4.37  -3.31   0.00   0.00   0.00  52.23
-------------------------------------------------------------------------------

Segment Leq : 52.23 dBA

Total Leq All Segments: 64.86 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (day/night)
-------------------------------------
Angle1   Angle2           :   6.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  41.00 / 41.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 0.50 m

RT/Custom (0.00 + 46.86 + 0.00) = 46.86 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     6     90   0.00  54.54  -4.37  -3.31   0.00   0.00   0.00  46.86
-------------------------------------------------------------------------

Segment Leq : 46.86 dBA

Total Leq All Segments: 46.86 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 45.32 + 0.00) = 45.32 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     6     90   0.00  53.00  -4.37  -3.31   0.00   0.00   0.00  45.32
-------------------------------------------------------------------------

Segment Leq : 45.32 dBA

Total Leq All Segments: 45.32 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 72.47
                           (NIGHT): 64.91
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:47:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (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  :  29.00 / 29.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           : -79.00 deg   90.00 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: Greenbank (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.04 + 0.00) = 68.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      5   0.00  73.68   0.00  -2.86  -2.78   0.00   0.00   0.00  68.04
-------------------------------------------------------------------------------

Segment Leq : 68.04 dBA


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

Source height = 1.50 m

ROAD (0.00 + 64.08 + 0.00) = 64.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -79     90   0.00  67.51   0.00  -3.15  -0.27   0.00   0.00   0.00  64.08
-------------------------------------------------------------------------------

Segment Leq : 64.08 dBA

Total Leq All Segments: 69.51 dBA


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

Source height = 1.50 m

ROAD (0.00 + 60.44 + 0.00) = 60.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      5   0.00  66.08   0.00  -2.86  -2.78   0.00   0.00   0.00  60.44
-------------------------------------------------------------------------------

Segment Leq : 60.44 dBA


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

Source height = 1.50 m

ROAD (0.00 + 56.49 + 0.00) = 56.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -79     90   0.00  59.91   0.00  -3.15  -0.27   0.00   0.00   0.00  56.49
-------------------------------------------------------------------------------

Segment Leq : 56.49 dBA

Total Leq All Segments: 61.91 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (day/night)
-------------------------------------
Angle1   Angle2           : -79.00 deg   90.00 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: Bus (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 51.11 + 0.00) = 51.11 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79     90   0.00  54.54  -3.15  -0.27   0.00   0.00   0.00  51.11
-------------------------------------------------------------------------

Segment Leq : 51.11 dBA

Total Leq All Segments: 51.11 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 49.57 + 0.00) = 49.57 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79     90   0.00  53.00  -3.15  -0.27   0.00   0.00   0.00  49.57
-------------------------------------------------------------------------

Segment Leq : 49.57 dBA

Total Leq All Segments: 49.57 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 69.57
                           (NIGHT): 62.16
```

```
STAMSON 5.0         NORMAL REPORT         Date: 20-09-2019 14:47:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Jockvale (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  :    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):   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 # 1: Jockvale (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  :  20.00 / 20.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (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  :  22.00 / 22.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 61.49 + 0.00) = 61.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  65.75   0.00  -1.25  -3.01   0.00   0.00   0.00  61.49
-------------------------------------------------------------------------------

Segment Leq : 61.49 dBA


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

Source height = 1.50 m

ROAD (0.00 + 65.85 + 0.00) = 65.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  67.51   0.00  -1.66   0.00   0.00   0.00   0.00  65.85
-------------------------------------------------------------------------------

Segment Leq : 65.85 dBA

Total Leq All Segments: 67.21 dBA


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

Source height = 1.50 m

ROAD (0.00 + 53.90 + 0.00) = 53.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.00  58.16   0.00  -1.25  -3.01   0.00   0.00   0.00  53.90
-------------------------------------------------------------------------------

Segment Leq : 53.90 dBA


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

Source height = 1.50 m

ROAD (0.00 + 58.25 + 0.00) = 58.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  59.91   0.00  -1.66   0.00   0.00   0.00   0.00  58.25
-------------------------------------------------------------------------------

Segment Leq : 58.25 dBA

Total Leq All Segments: 59.61 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (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  :  22.00 / 22.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 0.50 m

RT/Custom (0.00 + 52.87 + 0.00) = 52.87 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  54.54  -1.66   0.00   0.00   0.00   0.00  52.87
-------------------------------------------------------------------------

Segment Leq : 52.87 dBA

Total Leq All Segments: 52.87 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 51.33 + 0.00) = 51.33 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  53.00  -1.66   0.00   0.00   0.00   0.00  51.33
-------------------------------------------------------------------------

Segment Leq : 51.33 dBA

Total Leq All Segments: 51.33 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.36
                           (NIGHT): 60.21
```

```
STAMSON 5.0         NORMAL REPORT         Date: 20-09-2019 14:47:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Jockvale (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  :    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):   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 # 1: Jockvale (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  :  15.00 / 20.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.75   0.00   0.00   0.00   0.00   0.00   0.00  65.75
-------------------------------------------------------------------------------

Segment Leq : 65.75 dBA


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

Source height = 1.50 m

ROAD (0.00 + 61.64 + 0.00) = 61.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  67.51   0.00  -2.86  -3.01   0.00   0.00   0.00  61.64
-------------------------------------------------------------------------------

Segment Leq : 61.64 dBA

Total Leq All Segments: 67.17 dBA


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

Source height = 1.50 m

ROAD (0.00 + 56.91 + 0.00) = 56.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.16   0.00  -1.25   0.00   0.00   0.00   0.00  56.91
-------------------------------------------------------------------------------

Segment Leq : 56.91 dBA


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

Source height = 1.50 m

ROAD (0.00 + 54.04 + 0.00) = 54.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  59.91   0.00  -2.86  -3.01   0.00   0.00   0.00  54.04
-------------------------------------------------------------------------------

Segment Leq : 54.04 dBA

Total Leq All Segments: 58.72 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 0.50 m

RT/Custom (0.00 + 48.66 + 0.00) = 48.66 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  54.54  -2.86  -3.01   0.00   0.00   0.00  48.66
-------------------------------------------------------------------------

Segment Leq : 48.66 dBA

Total Leq All Segments: 48.66 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 47.12 + 0.00) = 47.12 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  53.00  -2.86  -3.01   0.00   0.00   0.00  47.12
-------------------------------------------------------------------------

Segment Leq : 47.12 dBA

Total Leq All Segments: 47.12 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 67.24
                           (NIGHT): 59.01
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:47:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (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: Chapman (day)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.29 + 0.00) = 65.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  67.51   0.00  -2.22   0.00   0.00   0.00   0.00  65.29
-------------------------------------------------------------------------------

Segment Leq : 65.29 dBA

Total Leq All Segments: 65.29 dBA


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

Source height = 1.50 m

ROAD (0.00 + 57.69 + 0.00) = 57.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  59.91   0.00  -2.22   0.00   0.00   0.00   0.00  57.69
-------------------------------------------------------------------------------

Segment Leq : 57.69 dBA

Total Leq All Segments: 57.69 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (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: Bus (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 52.32 + 0.00) = 52.32 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  54.54  -2.22   0.00   0.00   0.00   0.00  52.32
-------------------------------------------------------------------------

Segment Leq : 52.32 dBA

Total Leq All Segments: 52.32 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 50.78 + 0.00) = 50.78 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  53.00  -2.22   0.00   0.00   0.00   0.00  50.78
-------------------------------------------------------------------------

Segment Leq : 50.78 dBA

Total Leq All Segments: 50.78 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.50
                           (NIGHT): 58.50
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:47:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Jockvale (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  :    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):   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 # 1: Jockvale (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  :  16.00 / 16.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.75   0.00  -0.28   0.00   0.00   0.00   0.00  65.47
-------------------------------------------------------------------------------

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA


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

Source height = 1.50 m

ROAD (0.00 + 57.88 + 0.00) = 57.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.16   0.00  -0.28   0.00   0.00   0.00   0.00  57.88
-------------------------------------------------------------------------------

Segment Leq : 57.88 dBA

Total Leq All Segments: 57.88 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.47
                           (NIGHT): 57.88
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:47:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Jockvale (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  :    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):   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 # 1: Jockvale (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  :  15.00 / 15.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  83.00 / 83.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.75   0.00   0.00   0.00   0.00   0.00   0.00  65.75
-------------------------------------------------------------------------------

Segment Leq : 65.75 dBA


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

Source height = 1.50 m

ROAD (0.00 + 51.51 + 0.00) = 51.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     25   0.00  67.51   0.00  -7.43  -8.57   0.00   0.00   0.00  51.51
-------------------------------------------------------------------------------

Segment Leq : 51.51 dBA

Total Leq All Segments: 65.91 dBA


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

Source height = 1.50 m

ROAD (0.00 + 58.16 + 0.00) = 58.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.16   0.00   0.00   0.00   0.00   0.00   0.00  58.16
-------------------------------------------------------------------------------

Segment Leq : 58.16 dBA

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

Source height = 1.50 m

ROAD (0.00 + 43.91 + 0.00) = 43.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     25   0.00  59.91   0.00  -7.43  -8.57   0.00   0.00   0.00  43.91
-------------------------------------------------------------------------------

Segment Leq : 43.91 dBA

Total Leq All Segments: 58.32 dBA
```

```
RT/Custom data, segment # 1: Bus (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (day/night)
-------------------------------------
Angle1   Angle2           :   0.00 deg   25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  83.00 / 83.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 0.50 m

RT/Custom (0.00 + 38.53 + 0.00) = 38.53 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     25   0.00  54.54  -7.43  -8.57   0.00   0.00   0.00  38.53
-------------------------------------------------------------------------

Segment Leq : 38.53 dBA

Total Leq All Segments: 38.53 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 36.99 + 0.00) = 36.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     25   0.00  53.00  -7.43  -8.57   0.00   0.00   0.00  36.99
-------------------------------------------------------------------------

Segment Leq : 36.99 dBA

Total Leq All Segments: 36.99 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.92
                           (NIGHT): 58.35
```

```
STAMSON 5.0         NORMAL REPORT         Date: 20-09-2019 14:47:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te                 Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Jockvale (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  :    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):   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 # 1: Jockvale (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  :  70.00 / 70.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -26.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :  53.00 / 53.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Jockvale (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 !        2.23 !         2.23

ROAD (0.00 + 40.24 + 50.66) = 51.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -26   0.00  65.75   0.00  -6.69  -4.49   0.00   0.00 -14.33  40.24
-------------------------------------------------------------------------------
   -26      0   0.00  65.75   0.00  -6.69  -8.40   0.00   0.00   0.00  50.66
-------------------------------------------------------------------------------

Segment Leq : 51.03 dBA

Total Leq All Segments: 51.03 dBA


Results segment # 1: Jockvale (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 !        2.23 !         2.23

ROAD (0.00 + 32.64 + 43.06) = 43.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -26   0.00  58.16   0.00  -6.69  -4.49   0.00   0.00 -14.33  32.64
-------------------------------------------------------------------------------
   -26      0   0.00  58.16   0.00  -6.69  -8.40   0.00   0.00   0.00  43.06
-------------------------------------------------------------------------------

Segment Leq : 43.44 dBA

Total Leq All Segments: 43.44 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 51.03
                           (NIGHT): 43.44
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:47:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Chapman (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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: Chapman (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  :  72.00 / 72.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 52.50 + 0.00) = 52.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  67.51   0.00 -10.70  -4.31   0.00   0.00   0.00  52.50
-------------------------------------------------------------------------------

Segment Leq : 52.50 dBA

Total Leq All Segments: 52.50 dBA


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

Source height = 1.50 m

ROAD (0.00 + 44.90 + 0.00) = 44.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  59.91   0.00 -10.70  -4.31   0.00   0.00   0.00  44.90
-------------------------------------------------------------------------------

Segment Leq : 44.90 dBA

Total Leq All Segments: 44.90 dBA


RT/Custom data, segment # 1: Bus (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus (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  :  72.00 / 72.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 0.50 m

RT/Custom (0.00 + 39.27 + 0.00) = 39.27 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.60  54.54 -10.90  -4.37   0.00   0.00   0.00  39.27
-------------------------------------------------------------------------

Segment Leq : 39.27 dBA

Total Leq All Segments: 39.27 dBA

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

Source height = 0.50 m

RT/Custom (0.00 + 37.73 + 0.00) = 37.73 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.60  53.00 -10.90  -4.37   0.00   0.00   0.00  37.73
-------------------------------------------------------------------------

Segment Leq : 37.73 dBA

Total Leq All Segments: 37.73 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 52.70
                           (NIGHT): 45.66
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:45:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te              Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (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  :  83.00 / 83.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -68.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :  60.00 / 60.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Greenbank (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 + 44.16 + 59.64) = 59.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -68   0.12  73.68   0.00  -8.32 -10.12   0.00   0.00 -11.07  44.16
-------------------------------------------------------------------------------
   -68     90   0.66  73.68   0.00 -12.33  -1.70   0.00   0.00   0.00  59.64
-------------------------------------------------------------------------------

Segment Leq : 59.76 dBA

Total Leq All Segments: 59.76 dBA


Results segment # 1: Greenbank (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 + 36.57 + 52.05) = 52.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -68   0.12  66.08   0.00  -8.32 -10.12   0.00   0.00 -11.07  36.57
-------------------------------------------------------------------------------
   -68     90   0.66  66.08   0.00 -12.33  -1.70   0.00   0.00   0.00  52.05
-------------------------------------------------------------------------------

Segment Leq : 52.17 dBA

Total Leq All Segments: 52.17 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 59.76
                           (NIGHT): 52.17
```

```
STAMSON 5.0         NORMAL REPORT         Date: 20-09-2019 14:46:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (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  : 242.00 / 242.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -39.00 deg
Barrier height            :   9.00 m
Barrier receiver distance : 220.00 / 220.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Jockvale1 (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  :    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):   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: Jockvale1 (day/night)
-------------------------------------------
Angle1   Angle2           : -30.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  79.00 / 79.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  53.00 deg   Angle2 : 90.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :  62.00 / 62.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: Jockvale2 (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  :    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):   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 # 3: Jockvale2 (day/night)
-------------------------------------------
Angle1   Angle2           : -43.00 deg   -3.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  91.00 / 91.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Greenbank (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 + 41.15 + 51.13) = 51.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -39   0.12  73.68   0.00 -13.53  -6.05   0.00   0.00 -12.94  41.15
-------------------------------------------------------------------------------
   -39     90   0.66  73.68   0.00 -20.05  -2.49   0.00   0.00   0.00  51.13
-------------------------------------------------------------------------------

Segment Leq : 51.55 dBA


Results segment # 2: Jockvale1 (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 (50.09 + 36.85 + 0.00) = 50.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -30     53   0.66  65.75   0.00 -11.98  -3.68   0.00   0.00   0.00  50.09
-------------------------------------------------------------------------------
    53     90   0.12  65.75   0.00  -8.08  -7.60   0.00   0.00 -13.21  36.85
-------------------------------------------------------------------------------

Segment Leq : 50.29 dBA
```

```
Results segment # 3: Jockvale2 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 45.92 + 0.00) = 45.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -43     -3   0.66  65.75   0.00 -13.00  -6.83   0.00   0.00   0.00  45.92
-------------------------------------------------------------------------------

Segment Leq : 45.92 dBA

Total Leq All Segments: 54.61 dBA


Results segment # 1: Greenbank (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 + 33.55 + 43.54) = 43.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -39   0.12  66.08   0.00 -13.53  -6.05   0.00   0.00 -12.94  33.55
-------------------------------------------------------------------------------
   -39     90   0.66  66.08   0.00 -20.05  -2.49   0.00   0.00   0.00  43.54
-------------------------------------------------------------------------------

Segment Leq : 43.95 dBA


Results segment # 2: Jockvale1 (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 (42.50 + 29.26 + 0.00) = 42.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -30     53   0.66  58.16   0.00 -11.98  -3.68   0.00   0.00   0.00  42.50
-------------------------------------------------------------------------------
    53     90   0.12  58.16   0.00  -8.08  -7.60   0.00   0.00 -13.21  29.26
-------------------------------------------------------------------------------

Segment Leq : 42.70 dBA
```

```
Results segment # 3: Jockvale2 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 38.33 + 0.00) = 38.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -43     -3   0.66  58.16   0.00 -13.00  -6.83   0.00   0.00   0.00  38.33
-------------------------------------------------------------------------------

Segment Leq : 38.33 dBA

Total Leq All Segments: 47.01 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.61
                           (NIGHT): 47.01
```

```
STAMSON 5.0         NORMAL REPORT         Date: 20-09-2019 14:53:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Greenbank2 (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Greenbank2 (day/night)
--------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 41.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: Chapman1 (day/night)
----------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 3: Chapman1 (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   -44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -44.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: Chapman2 (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 4: Chapman2 (day/night)
-----------------------------------------
Angle1   Angle2           : -44.00 deg   52.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 5: Chapmen3 (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 5: Chapmen3 (day/night)
------------------------------------------
Angle1   Angle2           :  52.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  52.00 deg   Angle2 : 90.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Greenbank1 (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 49.88 + 0.00) = 49.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -90    -45   0.66  73.68   0.00 -14.75  -9.05   0.00   0.00   0.00  49.88
--------------------------------------------------------------------------------

Segment Leq : 49.88 dBA


Results segment # 2: Greenbank2 (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 + 41.58 + 50.47) = 51.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -45     41   0.00  73.68   0.00  -8.88  -3.21   0.00   0.00 -20.00  41.58
--------------------------------------------------------------------------------
    41     90   0.66  73.68   0.00 -14.75  -8.46   0.00   0.00   0.00  50.47
--------------------------------------------------------------------------------

Segment Leq : 51.00 dBA


Results segment # 3: Chapman1 (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 + 39.40 + 0.00) = 39.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -90    -44   0.00  67.51   0.00  -3.15  -5.93   0.00   0.00 -19.03  39.40
--------------------------------------------------------------------------------

Segment Leq : 39.40 dBA
```

```
Results segment # 4: Chapman2 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.19 + 0.00) = 59.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     52   0.66  67.51   0.00  -5.23  -3.09   0.00   0.00   0.00  59.19
-------------------------------------------------------------------------------

Segment Leq : 59.19 dBA


Results segment # 5: Chapmen3 (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 + 38.75 + 0.00) = 38.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    52     90   0.00  67.51   0.00  -3.15  -6.75   0.00   0.00 -18.85  38.75
-------------------------------------------------------------------------------

Segment Leq : 38.75 dBA

Total Leq All Segments: 60.29 dBA


Results segment # 1: Greenbank1 (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 42.28 + 0.00) = 42.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -45   0.66  66.08   0.00 -14.75  -9.05   0.00   0.00   0.00  42.28
-------------------------------------------------------------------------------

Segment Leq : 42.28 dBA
```

```
Results segment # 2: Greenbank2 (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 + 33.99 + 42.87) = 43.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     41   0.00  66.08   0.00  -8.88  -3.21   0.00   0.00 -20.00  33.99
-------------------------------------------------------------------------------
    41     90   0.66  66.08   0.00 -14.75  -8.46   0.00   0.00   0.00  42.87
-------------------------------------------------------------------------------

Segment Leq : 43.40 dBA


Results segment # 3: Chapman1 (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 + 31.80 + 0.00) = 31.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -44   0.00  59.91   0.00  -3.15  -5.93   0.00   0.00 -19.03  31.80
-------------------------------------------------------------------------------

Segment Leq : 31.80 dBA


Results segment # 4: Chapman2 (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.59 + 0.00) = 51.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     52   0.66  59.91   0.00  -5.23  -3.09   0.00   0.00   0.00  51.59
-------------------------------------------------------------------------------

Segment Leq : 51.59 dBA
```

```
Results segment # 5: Chapmen3 (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 + 31.15 + 0.00) = 31.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    52     90   0.00  59.91   0.00  -3.15  -6.75   0.00   0.00 -18.85  31.15
-------------------------------------------------------------------------------

Segment Leq : 31.15 dBA

Total Leq All Segments: 52.69 dBA


RT/Custom data, segment # 1: Bus1 (day/night)
---------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   -44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -44.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   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: Bus2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 2: Bus2 (day/night)
--------------------------------------
Angle1   Angle2           : -44.00 deg   52.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


RT/Custom data, segment # 3: Bus3 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 3: Bus3 (day/night)
--------------------------------------
Angle1   Angle2           :  52.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  52.00 deg   Angle2 : 90.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: Bus1 (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 !        1.21 !         1.21

RT/Custom (0.00 + 26.40 + 0.00) = 26.40 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------
   -90    -44   0.00  54.54  -3.15  -5.93   0.00   0.00 -19.06  26.40
-----------------------------------------------------------------------

Segment Leq : 26.40 dBA
```

```
Results segment # 2: Bus2 (day)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 46.21 + 0.00) = 46.21 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -44     52   0.66  54.54  -5.23  -3.09   0.00   0.00   0.00  46.21
-------------------------------------------------------------------------

Segment Leq : 46.21 dBA


Results segment # 3: Bus3 (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 !        1.21 !         1.21

RT/Custom (0.00 + 25.75 + 0.00) = 25.75 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    52     90   0.00  54.54  -3.15  -6.75   0.00   0.00 -18.88  25.75
-------------------------------------------------------------------------

Segment Leq : 25.75 dBA

Total Leq All Segments: 46.29 dBA


Results segment # 1: Bus1 (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 !        1.21 !         1.21

RT/Custom (0.00 + 24.86 + 0.00) = 24.86 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -44   0.00  53.00  -3.15  -5.93   0.00   0.00 -19.06  24.86
-------------------------------------------------------------------------

Segment Leq : 24.86 dBA
```

```
Results segment # 2: Bus2 (night)
---------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 44.68 + 0.00) = 44.68 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -44     52   0.66  53.00  -5.23  -3.09   0.00   0.00   0.00  44.68
-------------------------------------------------------------------------

Segment Leq : 44.68 dBA


Results segment # 3: Bus3 (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 !        1.21 !         1.21

RT/Custom (0.00 + 24.21 + 0.00) = 24.21 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    52     90   0.00  53.00  -3.15  -6.75   0.00   0.00 -18.88  24.21
-------------------------------------------------------------------------

Segment Leq : 24.21 dBA

Total Leq All Segments: 44.76 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 60.46
                           (NIGHT): 53.34
```

```
STAMSON 5.0        NORMAL REPORT        Date: 20-09-2019 14:57:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12B.te              Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank1 (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank1 (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -45.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Greenbank2 (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Greenbank2 (day/night)
--------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 41.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: Chapman1 (day/night)
------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 3: Chapman1 (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   -44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -44.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: Chapman2 (day/night)
----------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 4: Chapman2 (day/night)
------------------------------------------
Angle1   Angle2           : -44.00 deg   52.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -44.00 deg   Angle2 : 52.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: Chapmen3 (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    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):  12000
    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 # 5: Chapmen3 (day/night)
------------------------------------------
Angle1   Angle2           :  52.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  52.00 deg   Angle2 : 90.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Greenbank1 (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 + 46.09 + 0.00) = 46.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -45   0.53  73.68   0.00 -13.58  -8.52   0.00   0.00  -5.49  46.09
-------------------------------------------------------------------------------

Segment Leq : 46.09 dBA


Results segment # 2: Greenbank2 (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 + 41.58 + 50.47) = 51.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     41   0.00  73.68   0.00  -8.88  -3.21   0.00   0.00 -20.00  41.58
-------------------------------------------------------------------------------
    41     90   0.66  73.68   0.00 -14.75  -8.46   0.00   0.00   0.00  50.47
-------------------------------------------------------------------------------

Segment Leq : 51.00 dBA
```

```
Results segment # 3: Chapman1 (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 + 39.40 + 0.00) = 39.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -44   0.00  67.51   0.00  -3.15  -5.93   0.00   0.00 -19.03  39.40
-------------------------------------------------------------------------------

Segment Leq : 39.40 dBA


Results segment # 4: Chapman2 (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 + 53.10 + 0.00) = 53.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     52   0.53  67.51   0.00  -4.82  -3.02   0.00   0.00  -6.58  53.10
-------------------------------------------------------------------------------

Segment Leq : 53.10 dBA


Results segment # 5: Chapmen3 (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 + 38.75 + 0.00) = 38.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    52     90   0.00  67.51   0.00  -3.15  -6.75   0.00   0.00 -18.85  38.75
-------------------------------------------------------------------------------

Segment Leq : 38.75 dBA

Total Leq All Segments: 55.88 dBA
```

```
Results segment # 1: Greenbank1 (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 + 38.49 + 0.00) = 38.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -45   0.53  66.08   0.00 -13.58  -8.52   0.00   0.00  -5.49  38.49
-------------------------------------------------------------------------------

Segment Leq : 38.49 dBA


Results segment # 2: Greenbank2 (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 + 33.99 + 42.87) = 43.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     41   0.00  66.08   0.00  -8.88  -3.21   0.00   0.00 -20.00  33.99
-------------------------------------------------------------------------------
    41     90   0.66  66.08   0.00 -14.75  -8.46   0.00   0.00   0.00  42.87
-------------------------------------------------------------------------------

Segment Leq : 43.40 dBA


Results segment # 3: Chapman1 (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 + 31.80 + 0.00) = 31.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -44   0.00  59.91   0.00  -3.15  -5.93   0.00   0.00 -19.03  31.80
-------------------------------------------------------------------------------

Segment Leq : 31.80 dBA
```

```
Results segment # 4: Chapman2 (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 + 45.50 + 0.00) = 45.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     52   0.53  59.91   0.00  -4.82  -3.02   0.00   0.00  -6.58  45.50
-------------------------------------------------------------------------------

Segment Leq : 45.50 dBA


Results segment # 5: Chapmen3 (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 + 31.15 + 0.00) = 31.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    52     90   0.00  59.91   0.00  -3.15  -6.75   0.00   0.00 -18.85  31.15
-------------------------------------------------------------------------------

Segment Leq : 31.15 dBA

Total Leq All Segments: 48.28 dBA


RT/Custom data, segment # 1: Bus1 (day/night)
---------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Bus1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   -44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -44.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   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: Bus2 (day/night)
-----------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 2: Bus2 (day/night)
---------------------------------------
Angle1   Angle2           : -44.00 deg   52.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -44.00 deg   Angle2 : 52.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
RT/Custom data, segment # 3: Bus3 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 3: Bus3 (day/night)
--------------------------------------
Angle1   Angle2           :  52.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  52.00 deg   Angle2 : 90.00 deg
Barrier height            :  24.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: Bus1 (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 !        1.21 !         1.21

RT/Custom (0.00 + 26.40 + 0.00) = 26.40 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -44   0.00  54.54  -3.15  -5.93   0.00   0.00 -19.06  26.40
-------------------------------------------------------------------------

Segment Leq : 26.40 dBA
```

```
Results segment # 2: Bus2 (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 !        1.21 !         1.21

RT/Custom (0.00 + 38.79 + 0.00) = 38.79 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -44     52   0.56  54.54  -4.91  -3.03   0.00   0.00  -7.80  38.79
-------------------------------------------------------------------------

Segment Leq : 38.79 dBA


Results segment # 3: Bus3 (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 !        1.21 !         1.21

RT/Custom (0.00 + 25.75 + 0.00) = 25.75 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    52     90   0.00  54.54  -3.15  -6.75   0.00   0.00 -18.88  25.75
-------------------------------------------------------------------------

Segment Leq : 25.75 dBA

Total Leq All Segments: 39.23 dBA
```

```
Results segment # 1: Bus1 (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 !        1.21 !         1.21

RT/Custom (0.00 + 24.86 + 0.00) = 24.86 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -44   0.00  53.00  -3.15  -5.93   0.00   0.00 -19.06  24.86
-------------------------------------------------------------------------

Segment Leq : 24.86 dBA


Results segment # 2: Bus2 (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 !        1.21 !         1.21

RT/Custom (0.00 + 37.25 + 0.00) = 37.25 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -44     52   0.56  53.00  -4.91  -3.03   0.00   0.00  -7.80  37.25
-------------------------------------------------------------------------

Segment Leq : 37.25 dBA


Results segment # 3: Bus3 (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 !        1.21 !         1.21

RT/Custom (0.00 + 24.21 + 0.00) = 24.21 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    52     90   0.00  53.00  -3.15  -6.75   0.00   0.00 -18.88  24.21
-------------------------------------------------------------------------

Segment Leq : 24.21 dBA

Total Leq All Segments: 37.69 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 55.97
                           (NIGHT): 48.64
```