



Traffic Noise Assessment

5 Orchard Drive

Stittsville, Ontario

REPORT: GWE18-014 - Traffic Noise

Prepared For:

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June 12, 2018

EXECUTIVE SUMMARY

This document describes a roadway traffic noise assessment performed for a proposed multi-building mixed-use development at 5 Orchard Drive in Stittsville, Ontario. The proposed development comprises of a commercial area on the northern half of the site, and a residential area on the southern half of the site. The primary focus of this report will be roadway traffic noise impacts on the residential areas of the development, which will precede the commercial area in development. The major sources of noise impacting the site is roadway traffic noise from Hazeldean Road and Sweetnam Drive. Figure 1 illustrates the site plan and surrounding context.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment and Climate Change (MOECC) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings provided by Campanale Homes.

The results of the current analysis indicate that noise levels will range between 48 and 60 dBA during the daytime period (07:00-23:00) and between 41 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs on the north façade of Block 5 and 7, which are nearest and most exposed to Hazeldean Road and Sweetnam Drive. Noise levels at the outdoor living areas for Block 1 to 3 and Block 14 to 19 are expected to be below 55 dBA, therefore, require no mitigation. As for Block 4 to 13, noise control measures are required as discussed in Section 5.1.1. Ground level noise contours of the site are illustrated in Figures 6-7 for the daytime/evening and nighttime period, respectively.

Noise levels at the rear yards of Block 4 to 13 are expected to exceed 55 dBA during the daytime period. According to the ENCG noise control measures (barriers) are required to reduce the L_{eq} to 55 dBA where technically, economically, and administratively feasible. Investigation into the application of a noise barrier surrounding the rear yards of these blocks proved that noise levels can be reduced to 55 dBA with the application of a 2.9-metre tall noise barrier, as illustrated in Figure 3. Table 4 summarizes the results of the barrier investigation. The wall 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 barriers 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.

The noise levels predicted due to roadway traffic do not exceed the criteria listed in Section 4.2 for building components. Therefore, standard building components will be sufficient to attenuate indoor sound levels to meet the ENCG criteria listed in Table 1. Additionally, Block 4 to 13 require forced air heating system with provision for central air conditioning. This will allow the occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, a Warning Clause will also be required for these buildings on all Lease, Purchase and Sale Agreements as summarized in Section 6. Block 1 to 3 and Block 14 to 19 do not have any ventilation requirements as noise levels were under 55 dBA.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Campanale Homes to undertake a traffic noise assessment of the proposed multi-building mixed-use development at 5 Orchard Drive in Stittsville, Ontario. The primary focus of this report will be roadway traffic noise impacts on the residential areas of the development, which will precede the commercial area in development. This report summarizes the methodology, results and recommendations related to a traffic noise assessment. GWE's scope of work involved assessing exterior noise levels throughout the site that are generated by local roadway traffic. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa¹ and Ministry of the Environment and Climate Change (MOECC)² guidelines. Noise calculations were based on site plan and architectural drawings provided by Campanale Homes, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is a proposed multi-building mixed-use development located at 5 Orchard Drive in Stittsville, Ontario. The development is located on the southwest corner of the Hazeldean Road & Fringewood Drive intersection. The development consists of a commercial component on the northern half of the site, and a residential component on the southern half of the site. The primary focus of this traffic assessment is the residential component, which will precede the commercial component in development. Therefore, the commercial buildings have been ignored in our analysis as barriers and noise screens. The residential component consists of 66 executive townhouse units, 1 semi-detached unit, and 7 single homes. Outdoor amenity spaces are located mainly at the rear yards of the dwellings.

The site is surrounded by mixed-land use on all sides. There are residential areas to the south, commercial areas to the north and west, and finally open space zones to the east and northeast. The major sources of roadway noise are Hazeldean Road to the north, and Sweetnam Drive to the west. Figure 1 illustrates a complete site plan with surrounding context.

¹ City of Ottawa Environmental Noise Control Guidelines, January 2016

² Ministry of the Environment and Climate Change (MOECC) – Environmental Noise Guideline, Publication NPC-300, August 2013

3. OBJECTIVES

The main objectives of this work are to: (i) calculate the future noise levels on the study building produced by local roadway traffic, (ii) ensure that interior noise do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4 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 Criteria for Roadway Traffic Noise

For vehicle traffic, 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 impacts 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 residence living rooms and sleeping quarters respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) ³

Type of Space	Time Period	L _{eq} (dBA)
		Road
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 reduction⁴. 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 normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation⁵.

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 – Part 1, Table 2.2c

⁴ Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

⁵ MOECC, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.3 Roadway Noise Assessment

4.3.1 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs. To provide a general sense of noise across the site, the software program *Predictor-Lima*, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid with 5 × 5 m spacing was placed across the study site, along with a number of discrete receptors at key sensitive areas. This program outputs noise contours, however, is not the approved model for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the Ministry of the Environment and Climate Change's (MOECC) computerized noise assessment program, STAMSON 5.04, at twelve (12) receptor locations coinciding with receptor locations in Predictor as shown in Figure 2.

Appendix A includes the STAMSON 5.04 input and output data. Roadway noise calculations were performed by treating each road segment as separate line sources of noise. In addition to the traffic volumes summarized in Table 2 below, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split was taken to be 92% / 8% respectively for all streets.
- Plane of window Receptor height placed at 4.5 metres (second storey) due to unavailable elevation drawings for the townhouses and single homes as stated in the Ontario Road Noise Analysis Method for Environmental and Transportation (ORNAMENT) technical document⁶.
- Outdoor Living Area Receptors placed at a height of 1.5 m as per ORNAMENT and ENCG guidelines.
- Townhomes and single homes modelled in *Predictor-Lima* with a height of 6 metres above grade, due to unavailable elevation drawings.

⁶ ORNAMENT Technical Document, October 1989, Section 5.5.4
Campanale Homes

- Proposed commercial development north of the site ignored as a barrier or screen potential for the residential component south of it. This is due to the residential component preceding the commercial area in development.
- Existing homes northwest of the proposed development conservatively ignored as potential screening elements due to redevelopment potential.
- Absorptive ground surface due to soft ground between sources and receivers. However, OLA barrier calculations (R3b, R5b, R7b and R9b) used hard ground surface to account for future commercial development to ensure barrier heights can meet present and future noise requirements.
- Receptor exposure angles illustrated in Figures 4 and 5; Receptors 2-7 and Receptor 12 have similar exposure angles, while Receptors 8-11 have similar exposure angles.
- Receptor 9 exposure angle ended at 68, due to the line of sight broken by the proposed single home (Block 5).
- Receptor 12 accounted for Block 8 to 13 as a barrier using the row of houses feature in STAMSON.

4.3.2 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 Plan⁷, which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Roadway	Roadway Class	Speed Limit (km/h)	Official Plan AADT
Hazeldean Road	4-Lane Urban Arterial-Divided (4-UAD)	60	35,000
Sweetnam Drive	2-Lane Urban Collector (2-UCU)	40	8,000

⁷ City of Ottawa Transportation Master Plan, November 2013
Campanale Homes

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Location	STAMSON 5.04 Noise Level (dBA)		Predictor Lima Noise Level (dBA)	
		Day	Night	Day	Night
1	POW – 2 nd Floor – Block 13 East Façade	56	48	57	49
2	POW – 2 nd Floor – Block 11 North Façade	59	51	59	52
3	OLA – Ground level – Block 11 Rear Yard	58	-	57	-
4	POW – 2 nd Floor – Block 9 North Façade	59	51	58	51
5	OLA – Ground level – Block 9 Rear Yard	58	-	56	-
6	POW – 2 nd Floor – Block 7	60	53	60	52
7	OLA – Ground level – Block 7 Rear Yard	59	-	57	-
8	POW – 2 nd Floor – Block 5	60	52	58	50
9	OLA – Ground level – Block 5 Rear Yard	59	-	56	-
10	POW – 2 nd Floor – Block 3	49	41	53	46
11	OLA – Ground level – Block 3 Rear Yard	48	-	52	-
12	POW – 2 nd Floor – Block 16 North Façade	48	41	40	33

The results of the current analysis indicate that noise levels will range between 48 and 60 dBA during the daytime period (07:00-23:00) and between 41 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs on the north façade of Block 5 and 7, which are nearest and most exposed to Hazeldean Road and Sweetnam Drive. Noise levels at the outdoor living areas for Block 1 to 3 and Block 14 to 19 are expected to be below 55 dBA, therefore, require no mitigation. As for Block 4 to 13, noise control measures are required as discussed in Section 5.1.1.

As shown above, the results calculated from *Predictor-Lima* generally have good correlation with calculations performed in STAMSON 5.04. A tolerance of 3 dBA between models is generally considered

acceptable given human hearing cannot detect a change in sound level of less than 3 dBA. Receptor 12 contains a larger difference due to the method of calculation in STAMSON, which is more conservative than *Predictor-Lima*. Ground level noise contours of the site are illustrated in Figures 6-7 for the daytime/evening and nighttime period, respectively.

The noise levels predicted due to roadway traffic do not exceed the criteria listed in Section 4.2 for building components. Therefore, standard building components will be sufficient to attenuate indoor sound levels to meet the ENCG criteria listed in Table 1. Additionally, Block 4 to 13 require forced air heating system with provision for central air conditioning. This will allow the occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, a Warning Clause will also be required for these buildings on all Lease, Purchase and Sale Agreements as summarized in Section 6. Block 1 to 3 and Block 14 to 19 do not have any ventilation requirements as noise levels were under 55 dBA.

5.1.1 Noise Barrier Calculation

Noise levels at the rear yards of Block 4 to 13 are expected to exceed 55 dBA during the daytime period. According to the ENCG noise control measures (barriers) are required to reduce the L_{eq} to 55 dBA where technically, economically, and administratively feasible. Investigation into the application of a noise barrier surrounding the rear yards of these blocks proved that noise levels can be reduced to 55 dBA with the application of a 2.9-metre tall noise barrier, as illustrated in Figure 3. Table 4 summarizes the results of the barrier investigation. The wall must be constructed from materials having a minimum surface density of 20 kg/m² (STC rating of 30) and contain no gaps. Design of the barriers will conform to the requirements outlined in Part 5 of the ENCG.

TABLE 4: RESULTS OF BARRIER INVESTIGATION

Location	Reference Receptor	Barrier Height (m)	Daytime L_{eq} Noise Levels (dBA)	
			Without Barrier	With Barrier
OLA – Ground level – Block 11 Rear Yard	3	2.9	58	55
OLA – Ground level – Block 9 Rear Yard	5	2.9	58	54
OLA – Ground level – Block 7 Rear Yard	7	2.9	59	54
OLA – Ground level – Block 3 Rear Yard	9	2.9	59	55

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 48 and 60 dBA during the daytime period (07:00-23:00) and between 41 and 53 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 60 dBA) occurs on the north façade of Block 5 and 7, which are nearest and most exposed to Hazeldean Road and Sweetnam Drive. Noise levels at the outdoor living areas for Block 1 to 3 and Block 14 to 19 are expected to be below 55 dBA, therefore, require no mitigation. As for Block 4 to 13, noise control measures are required as discussed in Section 5.1.1. Ground level noise contours of the site are illustrated in Figures 6-7 for the daytime/evening and nighttime period, respectively.

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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.

Sound attenuation has been addressed for Block 4 to 13 in the form of an acoustic barrier for the outdoor living area and inclusion of a forced air heating system with provision for central air conditioning. If installed this will allow the occupants to keep windows closed and maintain a comfortable living environment. With the inclusion of the barrier, noise levels will be equal or be less than 55 dBA, therefore the following Warning Clause will also be required for Block 4 to 13 on all Lease, Purchase and Sale Agreements as summarized below:

“Purchasers/tenants are advised that sound levels due to increasing road traffic may, on occasion interfere with some outdoor activities of the dwelling occupants as the sound levels may exceed the sound level limits of the City and Ministry of Environment.

To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- *An acoustic barrier with a height of 2.9 metres along the property line for Block 4 to 13*

To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.

This dwelling unit has been designed with forced air heating and the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant 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 of Ottawa and the Ministry of the Environment and Climate Change.”

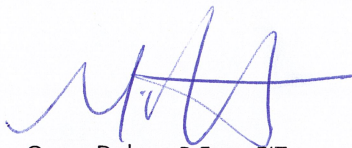
This concludes our assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Yours truly,

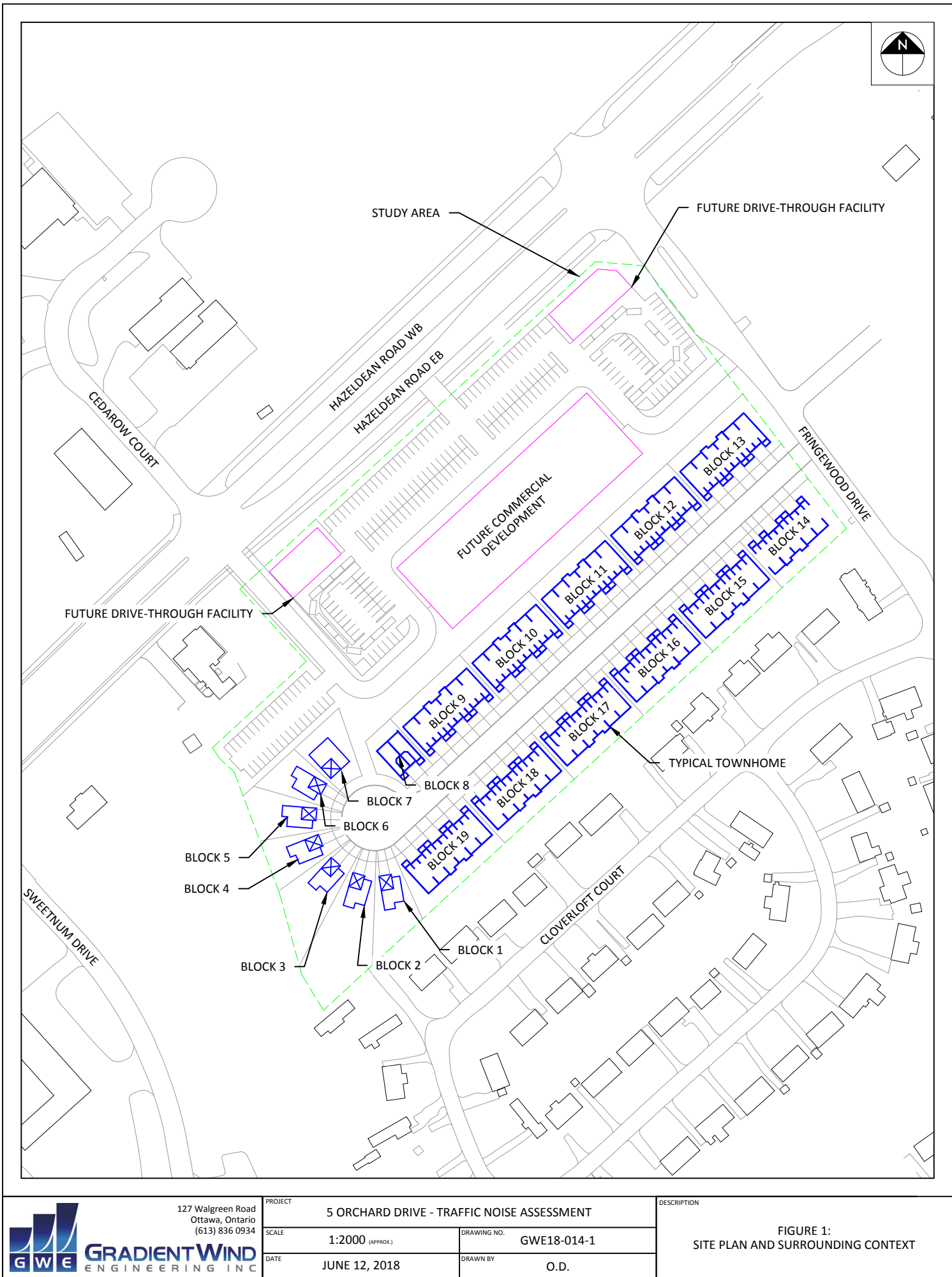
Gradient Wind Engineering Inc.

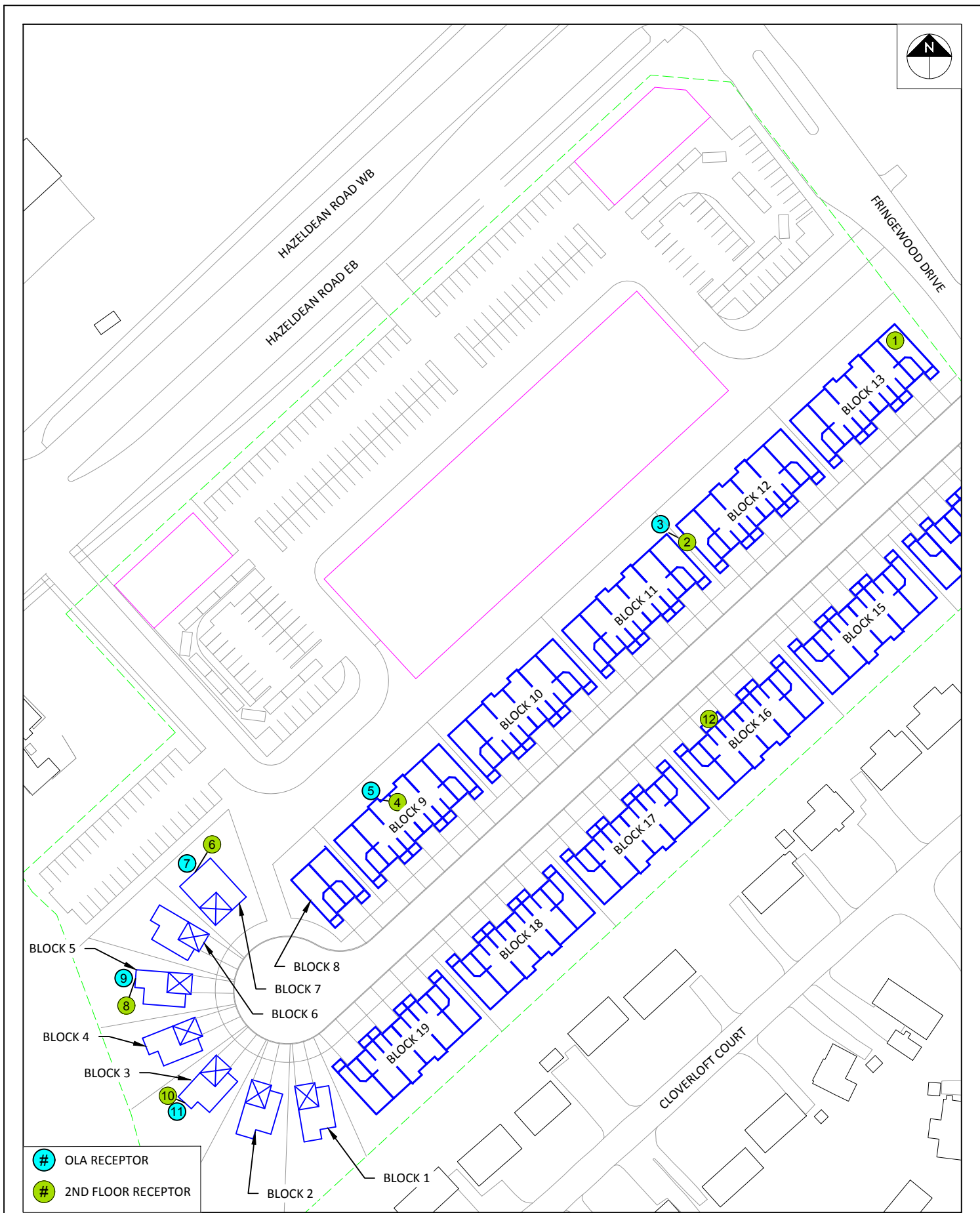


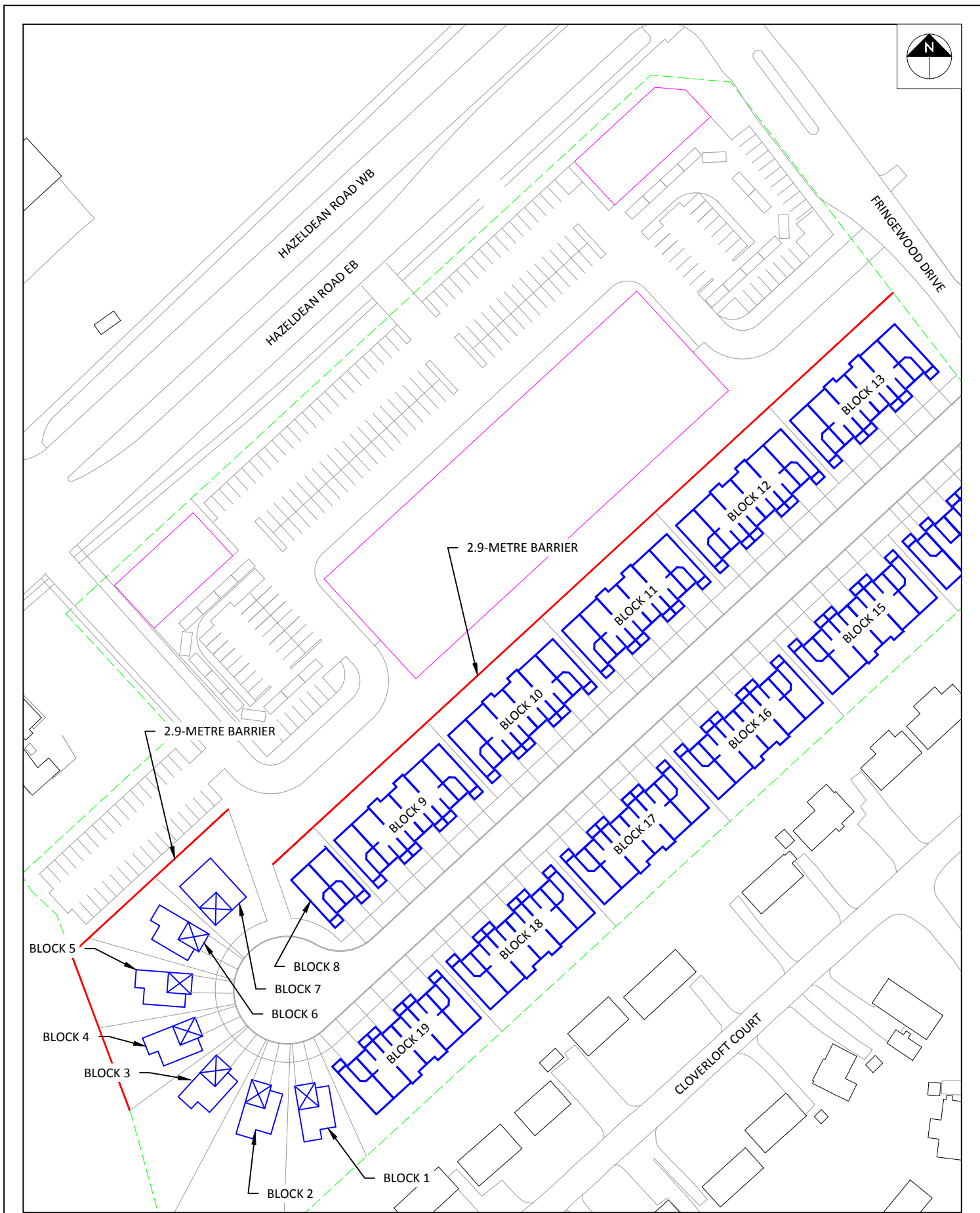
Joshua Foster, P.Eng.
Principal

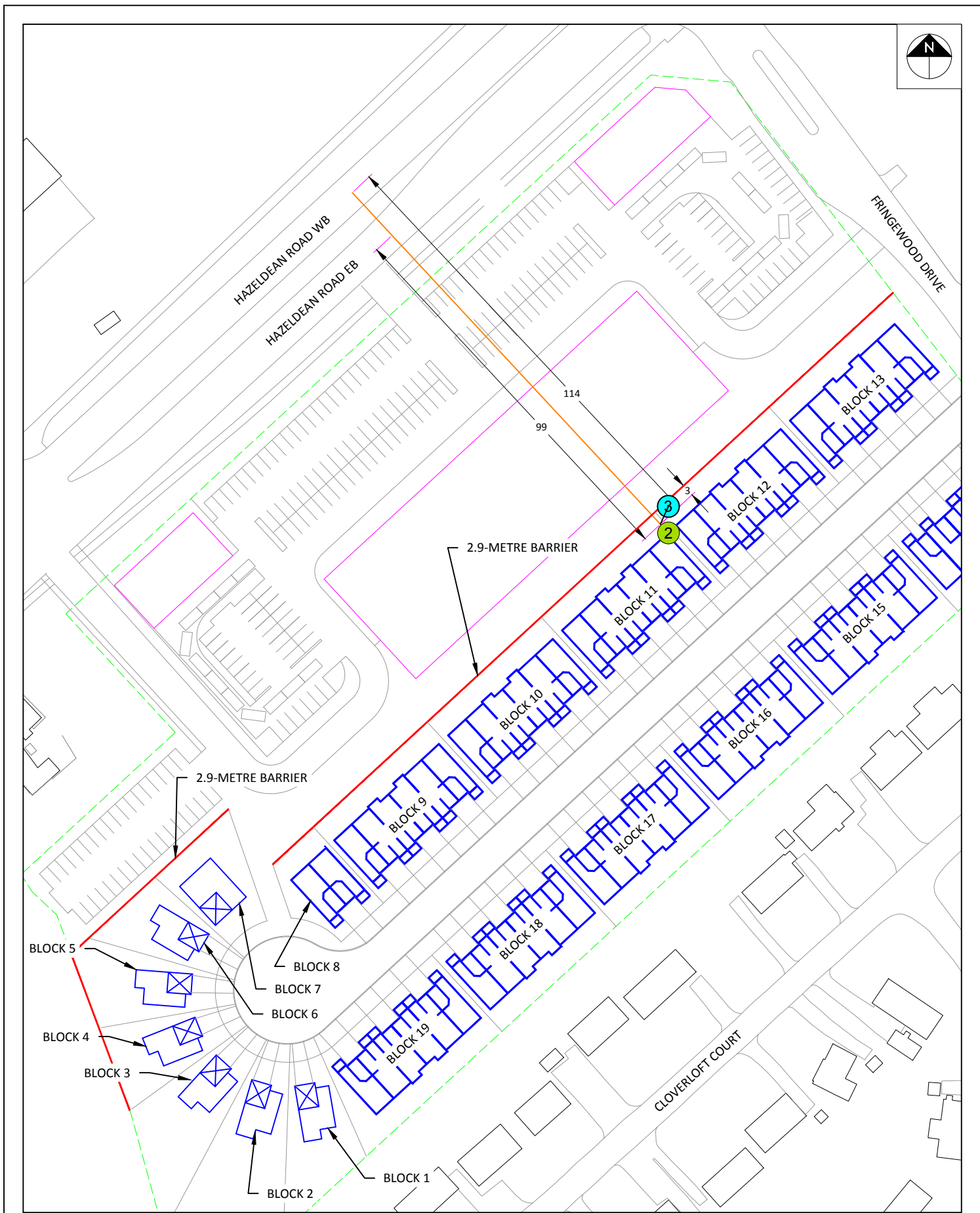
P.P. 


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GWE18-014 - Traffic Noise

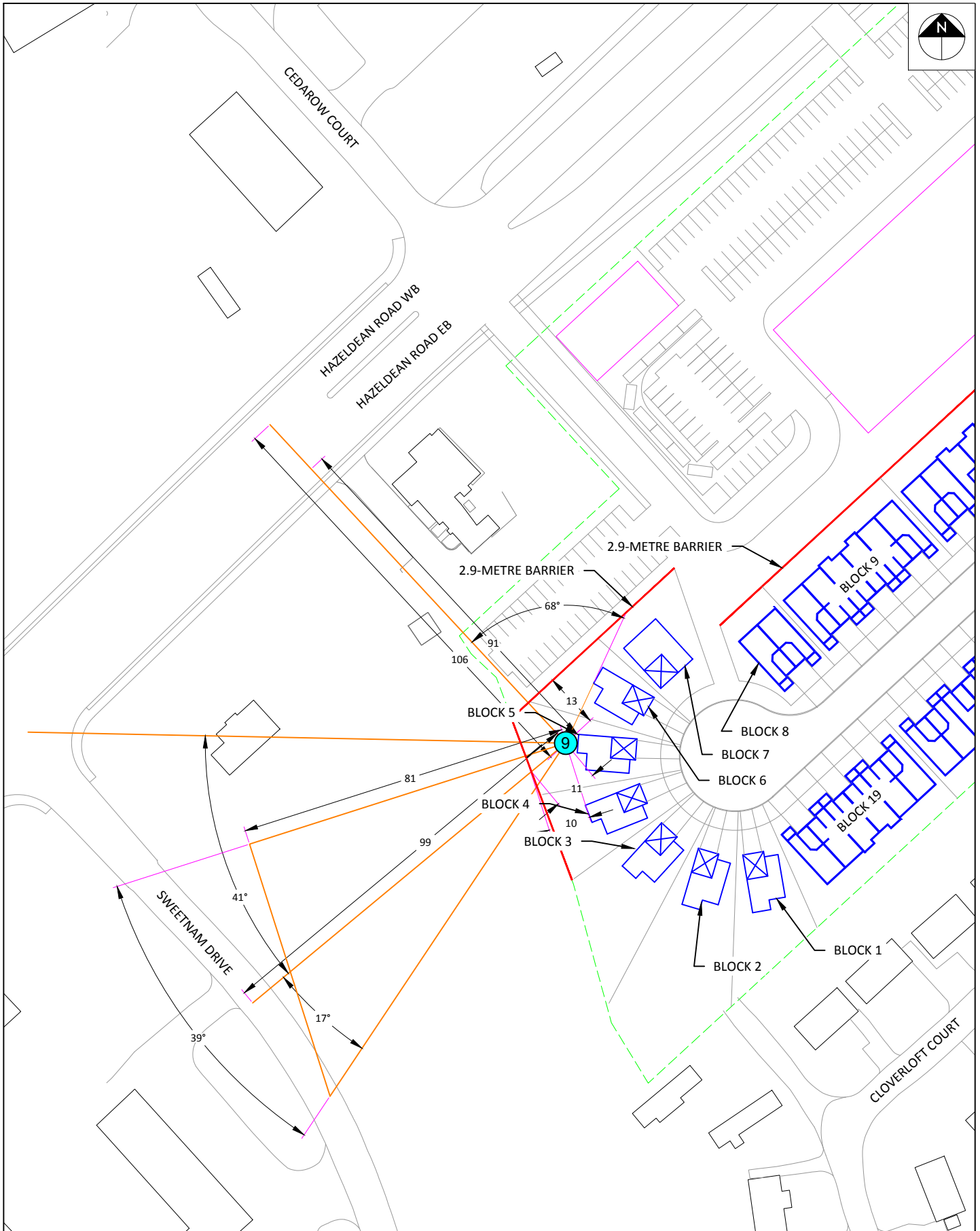








 <div>127 Walgreen Road Ottawa, Ontario (613) 836 0934</div> <div>GRADIENT WIND ENGINEERING INC</div>	PROJECT 5 ORCHARD DRIVE - TRAFFIC NOISE ASSESSMENT		DESCRIPTION
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GRADIENTWIND
ENGINEERING INC

127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

PROJECT	5 ORCHARD DRIVE - TRAFFIC NOISE ASSESSMENT	
SCALE	1:1250 (APPROX.)	DRAWING NO. GWE18-014-5
DATE	JUNE 12, 2018	DRAWN BY O.D.

DESCRIPTION	FIGURE 5: RECEPTOR ANGLES
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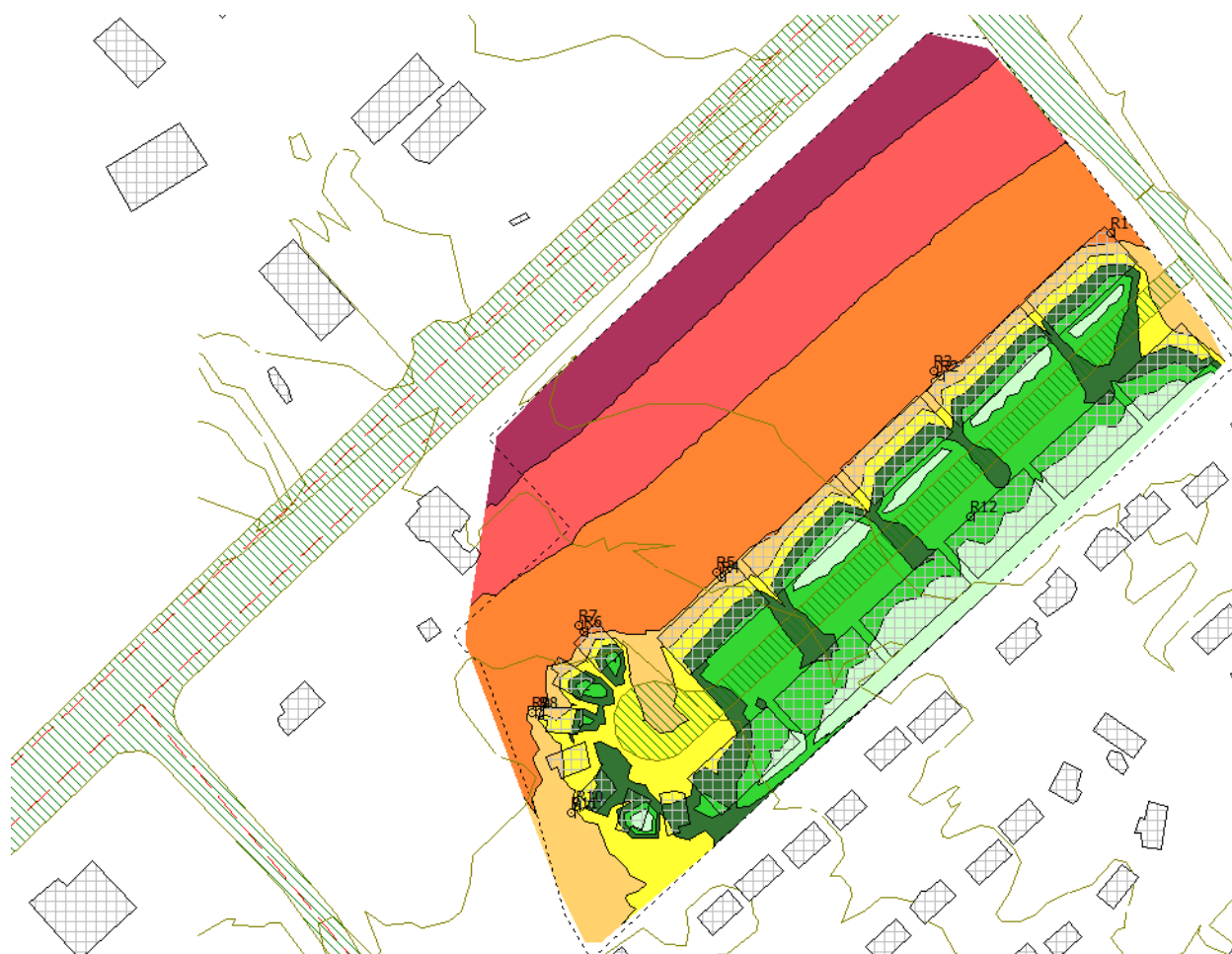
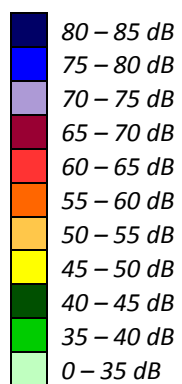


FIGURE 6: GROUND LEVEL NOISE CONTOURS 1.5 M ABOVE GRADE (DAYTIME & EVENING PERIOD)



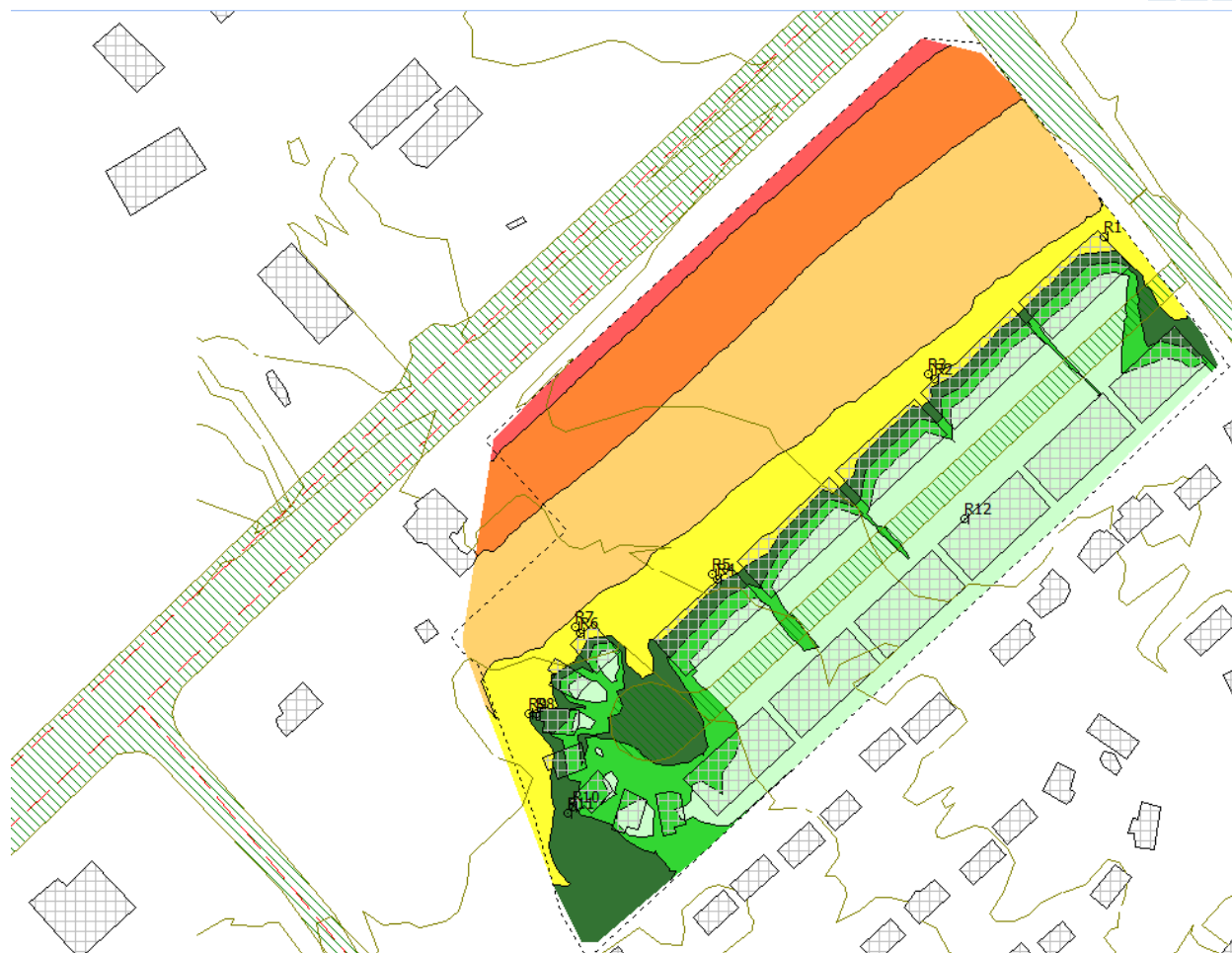
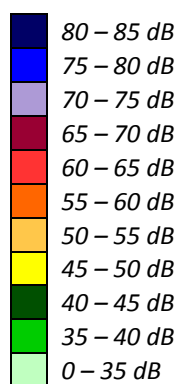


FIGURE 7: GROUND LEVEL NOISE CONTOURS 1.5 M ABOVE GRADE (NIGHTTIME PERIOD)



APPENDIX A

STAMSON 5.04 - INPUT AND OUTPUT DATA

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:02:32
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

 Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanEB (day/night)

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 106.00 / 106.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 120.00 / 120.00 m

Receiver height : 4.50 / 4.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 53.02 + 0.00) = 53.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	70.67	0.00	-13.33	-4.31	0.00	0.00	0.00	53.02

Segment Leq : 53.02 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 52.17 + 0.00) = 52.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	70.67	0.00	-14.18	-4.31	0.00	0.00	0.00	52.17

Segment Leq : 52.17 dBA

Total Leq All Segments: 55.63 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 45.42 + 0.00) = 45.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	63.07	0.00	-13.33	-4.31	0.00	0.00	0.00	45.42

Segment Leq : 45.42 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 44.58 + 0.00) = 44.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	63.07	0.00	-14.18	-4.31	0.00	0.00	0.00	44.58

Segment Leq : 44.58 dBA

Total Leq All Segments: 48.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.63
(NIGHT): 48.03

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:06:15
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 102.00 / 102.00 m
Receiver height  : 4.50 / 4.50 m
Topography      : 1          (Flat/gentle slope; no barrier)
Reference angle  : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (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 : 117.00 / 117.00 m

Receiver height : 4.50 / 4.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 56.29 + 0.00) = 56.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-13.07	-1.30	0.00	0.00	0.00	56.29

Segment Leq : 56.29 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 55.36 + 0.00) = 55.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-14.01	-1.30	0.00	0.00	0.00	55.36

Segment Leq : 55.36 dBA

Total Leq All Segments: 58.86 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-13.07	-1.30	0.00	0.00	0.00	48.69

Segment Leq : 48.69 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 47.76 + 0.00) = 47.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-14.01	-1.30	0.00	0.00	0.00	47.76

Segment Leq : 47.76 dBA

Total Leq All Segments: 51.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.86
(NIGHT): 51.26

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:07:25
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 99.00 / 99.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (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 : 114.00 / 114.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 55.60 + 0.00) = 55.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-13.60	-1.46	0.00	0.00	0.00	55.60

Segment Leq : 55.60 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 54.59 + 0.00) = 54.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-14.62	-1.46	0.00	0.00	0.00	54.59

Segment Leq : 54.59 dBA

Total Leq All Segments: 58.13 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 48.01 + 0.00) = 48.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-13.60	-1.46	0.00	0.00	0.00	48.01

Segment Leq : 48.01 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 46.99 + 0.00) = 46.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-14.62	-1.46	0.00	0.00	0.00	46.99

Segment Leq : 46.99 dBA

Total Leq All Segments: 50.54 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.13
(NIGHT): 50.54

STAMSON 5.0 NORMAL REPORT Date: 11-06-2018 33:45:53
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3b2.te Time Period: Day/Night 16/8 hours
 Description:

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 99.00 / 99.00 m
Receiver height  : 1.50 / 1.50 m
Topography      : 2 (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg   Angle2 : 90.00 deg
Barrier height   : 2.90 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 105.50 m
Receiver elevation : 104.50 m
Barrier elevation : 104.50 m
Reference angle  : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (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 : 114.00 / 114.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 105.50 m
 Receiver elevation : 104.50 m
 Barrier elevation : 104.50 m
 Reference angle : 0.00

Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.53	106.03

ROAD (0.00 + 52.49 + 0.00) = 52.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.67	0.00	-8.20	0.00	0.00	0.00	-9.98	52.49

Segment Leq : 52.49 dBA



Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.53	106.03

ROAD (0.00 + 51.87 + 0.00) = 51.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.67	0.00	-8.81	0.00	0.00	0.00	-9.99	51.87

Segment Leq : 51.87 dBA

Total Leq All Segments: 55.20 dBA

Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.53	106.03

ROAD (0.00 + 44.89 + 0.00) = 44.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.07	0.00	-8.20	0.00	0.00	0.00	-9.98	44.89

Segment Leq : 44.89 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.53	106.03

ROAD (0.00 + 44.28 + 0.00) = 44.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.07	0.00	-8.81	0.00	0.00	0.00	-9.99	44.28

Segment Leq : 44.28 dBA

Total Leq All Segments: 47.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 55.20
(NIGHT) : 47.61

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:07:49
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 102.00 / 102.00 m
Receiver height  : 4.50 / 4.50 m
Topography      : 1           (Flat/gentle slope; no barrier)
Reference angle  : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (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 : 117.00 / 117.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 56.29 + 0.00) = 56.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-13.07	-1.30	0.00	0.00	0.00	56.29

Segment Leq : 56.29 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 55.36 + 0.00) = 55.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-14.01	-1.30	0.00	0.00	0.00	55.36

Segment Leq : 55.36 dBA

Total Leq All Segments: 58.86 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-13.07	-1.30	0.00	0.00	0.00	48.69

Segment Leq : 48.69 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 47.76 + 0.00) = 47.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-14.01	-1.30	0.00	0.00	0.00	47.76

Segment Leq : 47.76 dBA

Total Leq All Segments: 51.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.86
(NIGHT): 51.26

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:08:02
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 99.00 / 99.00 m
Receiver height : 1.50 / 1.50 m
Topography    : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (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 : 114.00 / 114.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 55.60 + 0.00) = 55.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-13.60	-1.46	0.00	0.00	0.00	55.60

Segment Leq : 55.60 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 54.59 + 0.00) = 54.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-14.62	-1.46	0.00	0.00	0.00	54.59

Segment Leq : 54.59 dBA

Total Leq All Segments: 58.13 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 48.01 + 0.00) = 48.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-13.60	-1.46	0.00	0.00	0.00	48.01

Segment Leq : 48.01 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 46.99 + 0.00) = 46.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-14.62	-1.46	0.00	0.00	0.00	46.99

Segment Leq : 46.99 dBA

Total Leq All Segments: 50.54 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.13
(NIGHT): 50.54

STAMSON 5.0 NORMAL REPORT Date: 11-06-2018 33:45:22
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5b2.te Time Period: Day/Night 16/8 hours
 Description:

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 99.00 / 99.00 m
Receiver height      : 1.50 / 1.50 m
Topography           : 2           (Flat/gentle slope; with barrier)
Barrier angle1       : -90.00 deg   Angle2 : 90.00 deg
Barrier height       : 2.90 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation     : 106.10 m
Receiver elevation   : 106.00 m
Barrier elevation    : 106.40 m
Reference angle      : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (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 : 114.00 / 114.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 106.10 m
 Receiver elevation : 106.00 m
 Barrier elevation : 106.40 m
 Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.10	107.50

ROAD (0.00 + 51.00 + 0.00) = 51.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.67	0.00	-8.20	0.00	0.00	0.00	-11.47	51.00

Segment Leq : 51.00 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.10	107.50

ROAD (0.00 + 50.40 + 0.00) = 50.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.67	0.00	-8.81	0.00	0.00	0.00	-11.45	50.40

Segment Leq : 50.40 dBA

Total Leq All Segments: 53.72 dBA

Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.10	107.50

ROAD (0.00 + 43.41 + 0.00) = 43.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.07	0.00	-8.20	0.00	0.00	0.00	-11.47	43.41

Segment Leq : 43.41 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.10	107.50

ROAD (0.00 + 42.81 + 0.00) = 42.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.07	0.00	-8.81	0.00	0.00	0.00	-11.45	42.81

Segment Leq : 42.81 dBA

Total Leq All Segments: 46.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 53.72
(NIGHT) : 46.13

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:09:52
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod   *
Medium truck volume : 1127/98      veh/TimePeriod   *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 84.00 / 84.00 m
Receiver height : 4.50 / 4.50 m
Topography   : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (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 : 99.00 / 99.00 m

Receiver height : 4.50 / 4.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 57.62 + 0.00) = 57.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-11.75	-1.30	0.00	0.00	0.00	57.62

Segment Leq : 57.62 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 56.50 + 0.00) = 56.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-12.87	-1.30	0.00	0.00	0.00	56.50

Segment Leq : 56.50 dBA

Total Leq All Segments: 60.11 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 50.02 + 0.00) = 50.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-11.75	-1.30	0.00	0.00	0.00	50.02

Segment Leq : 50.02 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 48.90 + 0.00) = 48.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-12.87	-1.30	0.00	0.00	0.00	48.90

Segment Leq : 48.90 dBA

Total Leq All Segments: 52.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.11
(NIGHT): 52.51

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:10:10
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 81.00 / 81.00 m
Receiver height  : 1.50 / 1.50 m
Topography      : 1           (Flat/gentle slope; no barrier)
Reference angle  : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB (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 : 96.00 / 96.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 57.05 + 0.00) = 57.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-12.16	-1.46	0.00	0.00	0.00	57.05

Segment Leq : 57.05 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 55.83 + 0.00) = 55.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-13.38	-1.46	0.00	0.00	0.00	55.83

Segment Leq : 55.83 dBA

Total Leq All Segments: 59.49 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 49.45 + 0.00) = 49.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-12.16	-1.46	0.00	0.00	0.00	49.45

Segment Leq : 49.45 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 48.23 + 0.00) = 48.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	63.07	0.00	-13.38	-1.46	0.00	0.00	0.00	48.23

Segment Leq : 48.23 dBA

Total Leq All Segments: 51.89 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.49
(NIGHT): 51.89

STAMSON 5.0 NORMAL REPORT Date: 11-06-2018 33:45:31
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7b2.te Time Period: Day/Night 16/8 hours
 Description:

Road data, segment # 1: HazeldeanEB (day/night)

 Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanEB (day/night)

 Angle1 Angle2 : -90.00 deg -21.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 81.00 / 81.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : -21.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 106.20 m
 Receiver elevation : 107.00 m
 Barrier elevation : 107.00 m
 Reference angle : 0.00

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (day/night)

Angle1 Angle2 : -90.00 deg -21.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 96.00 / 96.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : -21.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 106.20 m
 Receiver elevation : 107.00 m
 Barrier elevation : 107.00 m
 Reference angle : 0.00

Road data, segment # 3: HazeldeanEB1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanEB1 (day/night)

Angle1 Angle2 : -21.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 81.00 / 81.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -21.00 deg Angle2 : 90.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 3.00 / 3.00 m
 Source elevation : 106.20 m
 Receiver elevation : 107.00 m
 Barrier elevation : 107.00 m
 Reference angle : 0.00

Road data, segment # 4: HazeldeanWB1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *

Medium truck volume : 1127/98 veh/TimePeriod *

Heavy truck volume : 805/70 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): 17500

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: HazeldeanWB1 (day/night)

Angle1 Angle2 : -21.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 96.00 / 96.00 m

Receiver height : 1.50 / 1.50 m

Topography : 2 (Flat/gentle slope; with barrier)

Barrier angle1 : -21.00 deg Angle2 : 90.00 deg

Barrier height : 2.90 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 106.20 m

Receiver elevation : 107.00 m

Barrier elevation : 107.00 m

Reference angle : 0.00

Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 44.39 + 0.00) = 44.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-21	0.49	70.67	0.00	-10.88	-5.71	0.00	0.00	-9.68	44.39

Segment Leq : 44.39 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 43.33 + 0.00) = 43.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-21	0.49	70.67	0.00	-11.98	-5.71	0.00	0.00	-9.64	43.33

Segment Leq : 43.33 dBA



Results segment # 3: HazeldeanEB1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 50.60 + 0.00) = 50.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.00	70.67	0.00	-7.32	-2.10	0.00	0.00	-10.65	50.60

Segment Leq : 50.60 dBA



Results segment # 4: HazeldeanWB1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 49.90 + 0.00) = 49.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.00	70.67	0.00	-8.06	-2.10	0.00	0.00	-10.61	49.90

Segment Leq : 49.90 dBA

Total Leq All Segments: 54.18 dBA

Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 36.80 + 0.00) = 36.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-21	0.49	63.07	0.00	-10.88	-5.71	0.00	0.00	-9.68	36.80

Segment Leq : 36.80 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 35.73 + 0.00) = 35.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-21	0.49	63.07	0.00	-11.98	-5.71	0.00	0.00	-9.64	35.73

Segment Leq : 35.73 dBA

Results segment # 3: HazeldeanEB1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 43.00 + 0.00) = 43.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.00	63.07	0.00	-7.32	-2.10	0.00	0.00	-10.65	43.00

Segment Leq : 43.00 dBA

Results segment # 4: HazeldeanWB1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.47

ROAD (0.00 + 42.30 + 0.00) = 42.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.00	63.07	0.00	-8.06	-2.10	0.00	0.00	-10.61	42.30

Segment Leq : 42.30 dBA

Total Leq All Segments: 46.58 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 54.18
(NIGHT) : 46.58

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:12:50
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 93.00 / 93.00 m
Receiver height : 4.50 / 4.50 m
Topography    : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (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 : 108.00 / 108.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 3: Sweetnam (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Sweetnam (day/night)

Angle1 Angle2 : -90.00 deg -37.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 84.00 / 84.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 4: Sweetnam 2 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: Sweetnam 2 (day/night)

Angle1 Angle2 : -17.00 deg 39.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 101.00 / 101.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 56.92 + 0.00) = 56.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-12.44	-1.30	0.00	0.00	0.00	56.92

Segment Leq : 56.92 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 55.90 + 0.00) = 55.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-13.46	-1.30	0.00	0.00	0.00	55.90

Segment Leq : 55.90 dBA



Results segment # 3: Sweetnam (day)

Source height = 1.50 m

ROAD (0.00 + 44.59 + 0.00) = 44.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-37	0.57	63.96	0.00	-11.75	-7.62	0.00	0.00	0.00	44.59

Segment Leq : 44.59 dBA

Results segment # 4: Sweetnam 2 (day)

Source height = 1.50 m

ROAD (0.00 + 45.73 + 0.00) = 45.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	39	0.57	63.96	0.00	-13.00	-5.22	0.00	0.00	0.00	45.73

Segment Leq : 45.73 dBA

Total Leq All Segments: 59.76 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 49.32 + 0.00) = 49.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-12.44	-1.30	0.00	0.00	0.00	49.32

Segment Leq : 49.32 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 48.31 + 0.00) = 48.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-13.46	-1.30	0.00	0.00	0.00	48.31

Segment Leq : 48.31 dBA



Results segment # 3: Sweetnam (night)

Source height = 1.50 m

ROAD (0.00 + 37.00 + 0.00) = 37.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-37	0.57	56.36	0.00	-11.75	-7.62	0.00	0.00	0.00	37.00

Segment Leq : 37.00 dBA

Results segment # 4: Sweetnam 2 (night)

Source height = 1.50 m

ROAD (0.00 + 38.14 + 0.00) = 38.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	39	0.57	56.36	0.00	-13.00	-5.22	0.00	0.00	0.00	38.14

Segment Leq : 38.14 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: 01-03-2018 13:16:08
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

 Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanEB (day/night)

 Angle1 Angle2 : -90.00 deg 68.00 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

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (day/night)

Angle1 Angle2 : -90.00 deg 68.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 106.00 / 106.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 3: Sweetnam1 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *

Medium truck volume : 515/45 veh/TimePeriod *

Heavy truck volume : 368/32 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 7.00

Heavy Truck % of Total Volume : 5.00

Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Sweetnam1 (day/night)

Angle1 Angle2 : -90.00 deg -39.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 81.00 / 81.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 4: Sweetnam2 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: Sweetnam2 (day/night)

Angle1 Angle2 : -17.00 deg 41.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 99.00 / 99.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	68	0.66	70.67	0.00	-13.00	-1.70	0.00	0.00	0.00	55.97

Segment Leq : 55.97 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 54.87 + 0.00) = 54.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	68	0.66	70.67	0.00	-14.10	-1.70	0.00	0.00	0.00	54.87

Segment Leq : 54.87 dBA

Results segment # 3: Sweetnam1 (day)

Source height = 1.50 m

ROAD (0.00 + 43.61 + 0.00) = 43.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-39	0.66	63.96	0.00	-12.16	-8.18	0.00	0.00	0.00	43.61

Segment Leq : 43.61 dBA

Results segment # 4: Sweetnam2 (day)

Source height = 1.50 m

ROAD (0.00 + 45.24 + 0.00) = 45.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	41	0.66	63.96	0.00	-13.60	-5.11	0.00	0.00	0.00	45.24

Segment Leq : 45.24 dBA

Total Leq All Segments: 58.80 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 48.37 + 0.00) = 48.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	68	0.66	63.07	0.00	-13.00	-1.70	0.00	0.00	0.00	48.37

Segment Leq : 48.37 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 47.27 + 0.00) = 47.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	68	0.66	63.07	0.00	-14.10	-1.70	0.00	0.00	0.00	47.27

Segment Leq : 47.27 dBA

Results segment # 3: Sweetnam1 (night)

Source height = 1.50 m

ROAD (0.00 + 36.02 + 0.00) = 36.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-39	0.66	56.36	0.00	-12.16	-8.18	0.00	0.00	0.00	36.02

Segment Leq : 36.02 dBA



Results segment # 4: Sweetnam2 (night)

Source height = 1.50 m

ROAD (0.00 + 37.65 + 0.00) = 37.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-17	41	0.66	56.36	0.00	-13.60	-5.11	0.00	0.00	0.00	37.65
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Segment Leq : 37.65 dBA

Total Leq All Segments: 51.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.80
(NIGHT): 51.20

STAMSON 5.0 NORMAL REPORT Date: 11-06-2018 33:45:44
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9b2.te Time Period: Day/Night 16/8 hours
 Description:

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (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 : 91.00 / 91.00 m
Receiver height  : 1.50 / 1.50 m
Topography      : 2           (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg   Angle2 : 0.00 deg
Barrier height    : 2.90 m
Barrier receiver distance : 13.00 / 13.00 m
Source elevation  : 106.30 m
Receiver elevation : 107.20 m
Barrier elevation  : 107.10 m
Reference angle   : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (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 : 106.00 / 106.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 13.00 / 13.00 m
 Source elevation : 106.30 m
 Receiver elevation : 107.20 m
 Barrier elevation : 107.10 m
 Reference angle : 0.00

Road data, segment # 3: HazeldeanEB2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanEB2 (day/night)

Angle1 Angle2 : 0.00 deg 68.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 91.00 / 91.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 0.00 deg Angle2 : 68.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 13.00 / 13.00 m
 Source elevation : 106.30 m
 Receiver elevation : 107.20 m
 Barrier elevation : 107.10 m
 Reference angle : 0.00

Road data, segment # 4: HazeldeanWB2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB2 (day/night)

Angle1 Angle2 : 0.00 deg 68.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 106.00 / 106.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 0.00 deg Angle2 : 68.00 deg
 Barrier height : 2.90 m
 Barrier receiver distance : 13.00 / 13.00 m
 Source elevation : 106.30 m
 Receiver elevation : 107.20 m
 Barrier elevation : 107.10 m
 Reference angle : 0.00

Road data, segment # 5: Sweetnam1 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 5: Sweetnam1 (day/night)

Angle1 Angle2 : -90.00 deg -39.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 81.00 / 81.00 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 : 2.90 m
 Barrier receiver distance : 10.00 / 10.00 m
 Source elevation : 106.80 m
 Receiver elevation : 107.20 m
 Barrier elevation : 107.10 m
 Reference angle : 0.00

Road data, segment # 6: Sweetnam2 (day/night)

Car traffic volume	:	6477/563	veh/TimePeriod	*
Medium truck volume	:	515/45	veh/TimePeriod	*
Heavy truck volume	:	368/32	veh/TimePeriod	*
Posted speed limit	:	40 km/h		
Road gradient	:	0 %		
Road pavement	:	1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT):	8000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 6: Sweetnam2 (day/night)

Angle1	Angle2	:	-17.00 deg	41.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	1	(Absorptive ground surface)	
Receiver source distance	:	99.00 / 99.00	m	
Receiver height	:	1.50 / 1.50	m	
Topography	:	2	(Flat/gentle slope; with barrier)	
Barrier angle1	:	-17.00 deg	Angle2 :	41.00 deg
Barrier height	:	2.90 m		
Barrier receiver distance	:	11.00 / 11.00	m	
Source elevation	:	106.80 m		
Receiver elevation	:	107.20 m		
Barrier elevation	:	107.10 m		
Reference angle	:	0.00		

Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.57

ROAD (0.00 + 47.60 + 0.00) = 47.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.49	70.67	0.00	-11.64	-4.16	0.00	0.00	-7.27	47.60

Segment Leq : 47.60 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.49	108.59

ROAD (0.00 + 46.70 + 0.00) = 46.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.49	70.67	0.00	-12.62	-4.16	0.00	0.00	-7.19	46.70

Segment Leq : 46.70 dBA

Results segment # 3: HazeldeanEB2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.57

ROAD (0.00 + 50.74 + 0.00) = 50.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	70.67	0.00	-7.83	-4.23	0.00	0.00	-7.87	50.74

Segment Leq : 50.74 dBA

Results segment # 4: HazeldeanWB2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.49	108.59

ROAD (0.00 + 50.18 + 0.00) = 50.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	70.67	0.00	-8.49	-4.23	0.00	0.00	-7.76	50.18

Segment Leq : 50.18 dBA



Results segment # 5: Sweetnam1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.55	108.65

ROAD (0.00 + 38.74 + 0.00) = 38.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-39	0.49	63.96	0.00	-10.88	-7.56	0.00	0.00	-6.77	38.74

Segment Leq : 38.74 dBA

Results segment # 6: Sweetnam2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.56	108.66

ROAD (0.00 + 38.32 + 0.00) = 38.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	41	0.49	63.96	0.00	-12.18	-5.06	0.00	0.00	-8.39	38.32

Segment Leq : 38.32 dBA

Total Leq All Segments: 55.33 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.57

ROAD (0.00 + 40.00 + 0.00) = 40.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.49	63.07	0.00	-11.64	-4.16	0.00	0.00	-7.27	40.00

Segment Leq : 40.00 dBA



Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.49	108.59

ROAD (0.00 + 39.10 + 0.00) = 39.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.49	63.07	0.00	-12.62	-4.16	0.00	0.00	-7.19	39.10

Segment Leq : 39.10 dBA

Results segment # 3: HazeldeanEB2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.47	108.57

ROAD (0.00 + 43.14 + 0.00) = 43.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	63.07	0.00	-7.83	-4.23	0.00	0.00	-7.87	43.14

Segment Leq : 43.14 dBA

Results segment # 4: HazeldeanWB2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.49	108.59

ROAD (0.00 + 42.59 + 0.00) = 42.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	63.07	0.00	-8.49	-4.23	0.00	0.00	-7.76	42.59

Segment Leq : 42.59 dBA



Results segment # 5: Sweetnam1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.55	108.65

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
-90	-39	0.49	56.36	0.00	-10.88	-7.56	0.00	0.00	-6.77	31.15

Segment Leq : 31.15 dBA



Results segment # 6: Sweetnam2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.56	108.66

ROAD (0.00 + 30.73 + 0.00) = 30.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	41	0.49	56.36	0.00	-12.18	-5.06	0.00	0.00	-8.39	30.73

Segment Leq : 30.73 dBA

Total Leq All Segments: 47.74 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 55.33
(NIGHT) : 47.74

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:15:50
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Sweetnam (day/night)

```
-----
Car traffic volume   : 6477/563   veh/TimePeriod  *
Medium truck volume : 515/45    veh/TimePeriod  *
Heavy truck volume  : 368/32    veh/TimePeriod  *
Posted speed limit  : 40 km/h
Road gradient       : 0 %
Road pavement       : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth       : 0.00
Number of Years of Growth         : 0.00
Medium Truck % of Total Volume    : 7.00
Heavy Truck % of Total Volume     : 5.00
Day (16 hrs) % of Total Volume    : 92.00
```

Data for Segment # 1: Sweetnam (day/night)

```
-----
Angle1   Angle2       : -90.00 deg  -19.00 deg
Wood depth : 0         (No woods.)
No of house rows : 0 / 0
Surface     : 1         (Absorptive ground surface)
Receiver source distance : 86.00 / 86.00 m
Receiver height : 4.50 / 4.50 m
Topography    : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: Sweetnam2 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Sweetnam2 (day/night)

Angle1 Angle2 : 3.00 deg 53.00 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 : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Sweetnam (day)

Source height = 1.50 m

ROAD (0.00 + 46.30 + 0.00) = 46.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.57	63.96	0.00	-11.91	-5.75	0.00	0.00	0.00	46.30

Segment Leq : 46.30 dBA

Results segment # 2: Sweetnam2 (day)

Source height = 1.50 m

ROAD (0.00 + 45.70 + 0.00) = 45.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	53	0.57	63.96	0.00	-12.29	-5.96	0.00	0.00	0.00	45.70

Segment Leq : 45.70 dBA

Total Leq All Segments: 49.02 dBA



Results segment # 1: Sweetnam (night)

Source height = 1.50 m

ROAD (0.00 + 38.70 + 0.00) = 38.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.57	56.36	0.00	-11.91	-5.75	0.00	0.00	0.00	38.70

Segment Leq : 38.70 dBA

Results segment # 2: Sweetnam2 (night)

Source height = 1.50 m

ROAD (0.00 + 38.11 + 0.00) = 38.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	53	0.57	56.36	0.00	-12.29	-5.96	0.00	0.00	0.00	38.11

Segment Leq : 38.11 dBA

Total Leq All Segments: 41.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.02
(NIGHT): 41.43

STAMSON 5.0 NORMAL REPORT Date: 21-02-2018 16:16:53
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Sweetnam (day/night)

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Sweetnam (day/night)

 Angle1 Angle2 : -90.00 deg -19.00 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 : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: Sweetnam2 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Sweetnam2 (day/night)

Angle1 Angle2 : 3.00 deg 54.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 88.00 / 88.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: Sweetnam (day)

Source height = 1.50 m

ROAD (0.00 + 45.66 + 0.00) = 45.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.66	63.96	0.00	-12.33	-5.96	0.00	0.00	0.00	45.66

Segment Leq : 45.66 dBA

Results segment # 2: Sweetnam2 (day)

Source height = 1.50 m

ROAD (0.00 + 45.25 + 0.00) = 45.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	54	0.66	63.96	0.00	-12.76	-5.95	0.00	0.00	0.00	45.25

Segment Leq : 45.25 dBA

Total Leq All Segments: 48.47 dBA



Results segment # 1: Sweetnam (night)

Source height = 1.50 m

ROAD (0.00 + 38.06 + 0.00) = 38.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.66	56.36	0.00	-12.33	-5.96	0.00	0.00	0.00	38.06

Segment Leq : 38.06 dBA

Results segment # 2: Sweetnam2 (night)

Source height = 1.50 m

ROAD (0.00 + 37.65 + 0.00) = 37.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
3	54	0.66	56.36	0.00	-12.76	-5.95	0.00	0.00	0.00	37.65

Segment Leq : 37.65 dBA

Total Leq All Segments: 40.87 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.47
(NIGHT): 40.87

STAMSON 5.0 NORMAL REPORT Date: 01-03-2018 12:46:55
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: HazeldeanEB (day/night)

```
-----
Car traffic volume   : 14168/1232   veh/TimePeriod  *
Medium truck volume : 1127/98      veh/TimePeriod  *
Heavy truck volume  : 805/70       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): 17500
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: HazeldeanEB (day/night)

```
-----
Angle1   Angle2       : -90.00 deg   90.00 deg
Wood depth : 0         (No woods.)
No of house rows : 1 / 1
House density : 94 %
Surface : 1           (Absorptive ground surface)
Receiver source distance : 144.00 / 144.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1         (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: HazeldeanWB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
 Medium truck volume : 1127/98 veh/TimePeriod *
 Heavy truck volume : 805/70 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): 17500
 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: HazeldeanWB (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 94 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 158.00 / 158.00 m
 Receiver height : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: HazeldeanEB (day)

Source height = 1.50 m

ROAD (0.00 + 45.73 + 0.00) = 45.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-15.42	-1.30	0.00	-8.21	0.00	45.73

Segment Leq : 45.73 dBA

Results segment # 2: HazeldeanWB (day)

Source height = 1.50 m

ROAD (0.00 + 45.19 + 0.00) = 45.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	70.67	0.00	-16.06	-1.30	0.00	-8.12	0.00	45.19

Segment Leq : 45.19 dBA

Total Leq All Segments: 48.48 dBA



Results segment # 1: HazeldeanEB (night)

Source height = 1.50 m

ROAD (0.00 + 38.14 + 0.00) = 38.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-15.42	-1.30	0.00	-8.21	0.00	38.14

Segment Leq : 38.14 dBA

Results segment # 2: HazeldeanWB (night)

Source height = 1.50 m

ROAD (0.00 + 37.59 + 0.00) = 37.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-16.06	-1.30	0.00	-8.12	0.00	37.59

Segment Leq : 37.59 dBA

Total Leq All Segments: 40.88 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.48
(NIGHT): 40.88