



## **Noise Impact Assessment 1158 Second Line Road Ottawa, Ontario**

**Type of Document:**  
Site Plan Submission

**Client:**  
Theberge Homes

**Project Number:**  
OTT-00245003-A0

**Prepared By:** M. Ghadban, EIT.

**Reviewed By:** B. Thomas, P.Eng.

EXP Services Inc.  
100-2650 Queensview Drive  
Ottawa, ON K2B 8H6

**Date Submitted:**  
April 2018

# Noise Impact Assessment

## 1158 Second Line Road, Ottawa, Ontario

**Type of Document:**

Plan of Subdivision Submission

**Project Name:**

1158 Second Line Road

**Project Number:**

OTT-00245003-A0

**Prepared By:**

EXP

100-2650 Queensview Drive

Ottawa, ON K2B 8H6

Canada

T: 613 688-1899

F: 613 225-7337

[www.EXP.com](http://www.EXP.com)

---

Mohammed Ghadban, EIT.  
Project Engineer  
Infrastructure Services

---

Bruce Thomas, P.Eng.  
Senior Project Manager  
Infrastructure Services

**Date Submitted:**

April 2018

## Legal Notification

This report was prepared by EXP Services Inc. for the account of **Theberge Homes**.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

## Table of Contents

	Page
1 Introduction .....	1
2 References .....	2
3 Sound Level Criteria.....	2
3.1 Vehicular Traffic Noise .....	5
3.2 Aircraft/Airport Noise .....	6
3.3 Stationary Noise .....	6
4 Road Noise Prediction Procedures .....	6
5 Summary of Results.....	7
6 Mitigation Measures .....	8
7 Recommendations .....	9

## List of Appendices

Appendix A – Figures

Appendix B – Tables

Appendix C - Architectural Plans

Appendix D – STAMSON Output

## List of Figures

Figure 1 - Site Location Plan.....	Appendix A
Figure 2 – Source/Receiver Locations for Building Facade.....	Appendix A
Figure 3 – Required Noise Wall Locations.....	Appendix A

## List of Tables

	<b>Page</b>
Table 3-1: MOECC and City of Ottawa Indoor and Outdoor Criteria for Noise from Road Traffic.....	2
Table 3-2: Outdoor, Ventilation & Warning Clause Requirements Road Noise, Daytime (0700-2300).....	3
Table 3-3: Ventilation and Warning Clause Requirements Road Noise, Nighttime (2300-0700).....	4
Table 3-4: Building Component Requirements Road Noise, Daytime (0700-2300) .....	4
Table 3-5: Building Component Requirements Road Noise, Nighttime (2300-0700) .....	4
Table 3-6: MOECC Warning Clauses .....	5
Table 4-1: Traffic and Road Parameters.....	7
Table 5-1: Summary of Anticipated Noise Levels .....	7
Table 6-1: Summary of Requirements based on Receiver Location .....	8
Table 6-2: Summary of Attenuation Barrier Requirements .....	8
Table B1- Noise Source/Receiver Data .....	Appendix B
Table B2- Summary of Warning Clauses.....	Appendix B

# 1 Introduction

Theberge Homes retained EXP Services Inc. (EXP) to undertake a noise impact assessment in support of a plan of subdivision application for a proposed 49 unit townhome development located at 1158 Second Line Road in the City of Ottawa. The site is situated on the east side of Second Line Road between Goward Drive and Klondike Road. As the site is within 100m of Second Line Road, which is classified as a major collector, a noise impact assessment is required.

This report assesses noise impact from surface transportation sources only. No stationary noise sources were noted at the site which would exceed the sound level criteria, and therefore an assessment of stationary noise sources was not completed as part of project report.

This study was carried out in accordance with the Ministry of the Environment and Climate Change's (MOECC) Environmental Noise Control Guideline NPC-300 and the City of Ottawa's Environmental Noise Control Guidelines (COENCG). The findings of the study will address noise levels, and recommend if noise abatement measures are necessary to bring noise levels to acceptable levels. This noise impact study is prepared to address the following requirements as identified in Section 2.1 of the COENCG and Section 4.8.7 of the City's Official Plan (COOP):

*Development proposals for new noise sensitive land uses are required to include a noise feasibility study and/or detailed noise study in the following locations:*

- *Mixed Use Centre, Town Centre and Mainstreets as identified on Schedule B;  
or within*
- *100 metres from the right-of-way of:*
  - ◆ *an existing or proposed arterial, collector or major collector road identified on Schedules E and F; or*
  - ◆ *a light rail transit corridor; bus rapid transit, or transit priority corridor identified on Schedule D;*
- *250 metres from the right-of-way of:*
  - ◆ *an existing or proposed highway;*
- *300 metres from the right of way of*
  - ◆ *a proposed or existing rail corridor or;*
  - ◆ *secondary main railway line;*
- *500 metres from the right-of-way of:*
  - ◆ *a 400-series provincial highway, freeway or*
  - ◆ *a principle main railway line.*

## 2 References

A summary of the documents that were referenced during the preparation of this report include the following:

- Ministry of the Environment Technical Document, ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, Sept 1999.
- Ministry of the Environment & Climate Change Publication NPC-300, Stationary and Transportation Sources Approvals and Planning, August 2013.
- City of Ottawa Official Plan (COOP), 2013.
- City of Ottawa Transportation Master Plan (COTMP), November 2013.
- City of Ottawa Environmental Noise Control Guidelines (COENCG), January 2016.

## 3 Sound Level Criteria

Ministry of the Environment & Climate Change requirements and the City of Ottawa Guidelines place limitations on indoor and outdoor sound levels from road traffic which are summarized in Table 3-1 below. Noise criteria is taken from Tables 2.2a and 2.2b from the COENCG.

**Table 3-1: MOECC and City of Ottawa Indoor and Outdoor Criteria for Noise from Road Traffic**

Location	Space	Time Period	Equivalent Level Leq (dBA)
Indoors	Sleeping quarters of residences, hospitals, schools, nursing / retirement homes, etc.	Nighttime 23:00 to 07:00	40
	Sleeping quarters of hotels/motels	Nighttime 23:00 to 07:00	45
	Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Daytime 07:00 to 23:00	45
	Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Nighttime 23:00 to 07:00	40
	General offices, reception areas, retail stores, etc.	Daytime 07:00 to 23:00	50
Outdoors	Outdoor Living Areas	Daytime 07:00 to 23:00	55

The basic physical measurement of noise used in this report is the A-weighted sound level measured in dBA, which is an overall measurement of sound over a full range of frequencies. Because noise from roadway traffic fluctuates over the audible range of hearing, it is convenient to describe noise in terms of an equivalent 24-hour sound level (denoted as Leq). MOECC Guidelines require that traffic noise be evaluated in relation to specific locations during certain time periods.

In general, noise levels are predicted for outdoor living areas (generally the backyard of a residential home) during the day and for indoor areas (living areas during the day and bedrooms during the nighttime). A summary of these requirements is shown in Tables 3-2 through 3-5.

**Table 3-2: Outdoor, Ventilation & Warning Clause Requirements Road Noise, Daytime (0700-2300)**

ASSESSMENT LOCATION	Leq (16 hr) (dBA)	VENTILATION REQUIREMENTS	OUTDOOR CONTROL MEASURES	WARNING CLAUSE
Outdoor Living Area (OLA)	Less than or equal to 55 dBA	N/A	None required	Not required
	Greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not required but should be considered	Required if resultant Leq exceeds 55 dBA, Type A
	Greater than 60 dBA	N/A	Control measures (barriers) required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant Leq exceeds 55 dBA, Type B
Plane of Living Room Window	Greater than 50 dBA to less than or equal to 55 dBA	None required	N/A	Not required
	Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	Greater than 65 dBA	Central air conditioning	N/A	Required Type D



**Table 3-3: Ventilation and Warning Clause Requirements Road Noise, Nighttime (2300-0700)**

ASSESSMENT LOCATION	$L_{eq}$ (8 hr) (dBA)	VENTILATION REQUIREMENTS	WARNING CLAUSE
Plane of Bedroom Window	Greater than 50 dBA to less or equal to 60 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Greater than 60 dBA	Central air conditioning	Required Type D

**Table 3-4: Building Component Requirements Road Noise, Daytime (0700-2300)**

ASSESSMENT LOCATION	NOISE SOURCE	$L_{eq}$ (16 hr) (dBA)	WARNING CLAUSE
Plane of Living Room Window	Road	Less than or equal to 65 dBA	Building compliant with Ontario Building Code
		Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

**Table 3-5: Building Component Requirements Road Noise, Nighttime (2300-0700)**

ASSESSMENT LOCATION	NOISE SOURCE	$L_{eq}$ (8 hr) (dBA)	WARNING CLAUSE
Plane of Bedroom Window	Road	Less than or equal to 60 dBA	Building compliant with Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

The warning clauses referred to above are contained in Table 3-6 below. Ministry of the Environment & Climate Change warning clauses and City of Ottawa specific warning clauses (*red italics*) are shown. Where applicable, these clauses are to be inserted on all Offers/Agreements of Purchase and Sale or Leases to notify potential purchasers and tenants of these environmental concerns. The City of Ottawa warning clauses were taken from Table A1 of the COENCG.

**Table 3-6: MOECC Warning Clauses**

Type A	<p>“Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.”</p> <p><i>“Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.”</i></p>
Type B	<p>“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.”</p> <p><i>“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.”</i></p>
Type C	<p>“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”</p> <p><i>“This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”</i></p>
Type D	<p>“This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”</p> <p><i>“This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”</i></p>
Type E	<p><i>“Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible.”</i></p> <p><i>“Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times interfere with outdoor activities.”</i></p>

### 3.1 Vehicular Traffic Noise

The site is located within 100 meters from the right-of-way of an existing urban major collector (Second Line Rd) therefore per the City’s guidelines a noise assessment is required

Figure 2 in Appendix A illustrates the noise source and receiver locations used. In general, noise levels are predicted at the: 1) building façade or plane of window (POW) during the daytime and nighttime, and 2) for Outdoor Living Areas (OLA) during the daytime.

The predicted noise levels were used to dictate the action required to achieve the recommended sound abatement requirements. The mitigation of the indoor sound levels is achieved by selection of building

architectural components (walls, windows, doors), based on the noise reduction required to meet the indoor noise level criteria. The 16-hour daytime and 8-hour nighttime sound levels were calculated at five (5) OLA locations around the site, and one (1) building façade or plane of window (POW). The results of the predicted noise levels at the six locations stipulate the ventilation, building code and associated warning clause requirements.

STAMSON file names used were denoted based on the receiver used location.

### **3.2 Aircraft/Airport Noise**

The site is located outside the Airport Vicinity Development Zone and outside the Airport Operating Influence Zone as per Schedule K of the Ottawa Official Plan. The site is also outside both the 25 NEF and NEP contours therefore noise from air traffic does not impact this site.

### **3.3 Stationary Noise**

A review of the surrounding building uses and the zoning of adjacent properties were completed to determine if there was a potential impact or influence from stationary noise sources. Typically, industrial and commercial land uses can be a potential stationary noise source. Stationary sources of noise include all sources of sound and vibration that will exist or operate within the site, excluding construction noise. The noise level criteria for stationary noise sources is the higher value between the exclusion limit values prescribed by the MOECC (and City of Ottawa) or the corresponding minimum hourly background /ambient sound level due to traffic. For OLA during the daytime and POW during the daytime or nighttime the exclusion limit values are 50 dBA and 45 dBA, respectively.

From our observations, there are no significant stationary noise sources have been identified that are likely to cause noise levels exceeding the MOECC and City of Ottawa requirements.

## **4 Road Noise Prediction Procedures**

All noise levels have been predicted using MOECC's software and methodology. STAMSON Version 5.03 (1999), which is based on the Ontario Road Noise Analysis Method for Environment and Transportation ("ORNAMENT") Model, was used for all calculations in this report. Detailed output files are attached in Appendix D for reference. In addition to the traffic data that was used in the analysis, theoretical noise predictions were based on the following information:

- Truck traffic on Second Lind Rd consists of 5% heavy trucks, 7% medium trucks.
- The Day/Night split used was 92% and 8%.
- Intermediate surfaces between the source and receiver locations were assessed as an absorptive ground surface.
- Topography was assessed as flat/gentle slope between the noise source and the receivers.
- Road pavement and road gradient was assessed as typical asphalt or concrete and flat grade.

Traffic information used for this study was obtained from the review of the City of Ottawa's Noise Control Guidelines. Road and traffic parameters used in our analysis are summarized in Table 4-1 below.

**Table 4-1: Traffic and Road Parameters**

Traffic Parameters	Second Line Rd
R.O.W. WIDTH (m)	Approx. 20 m
Roadway Type	2 Lane Urban Major Collector (2-UMCU)
A.A.D.T. (veh/day)	12,000
Day/night split (%)	92 / 8
Medium trucks (%)	7
Heavy trucks (%)	5
Posted Speed Limit (km/hr)	60 km/hr

## 5 Summary of Results

The anticipated noise levels at the assessed receiver locations range from approximately 47.1 - 67.0 dBa during the daytime and between 45.1 – 59.6 dBa during the nighttime.

A summary of predicted noise levels for various assessment locations is summarized below in Table 5-1 and 5-2 below. Detailed results and output from STAMSON Version 5.03 are contained in Appendix D.

Note that unattenuated results are based on existing noise walls in place on adjacent lots.

**Table 5-1: Summary of Anticipated Noise Levels**

Receiver Location	Receptor Type	Unattenuated Noise Level Leq (dBA)		Attenuated Noise Level Leq (dBA) With Barrier	
		Daytime (07:00 – 23:00)	Nighttime (23:00– 07:00)	Daytime (07:00 – 23:00)	Nighttime (23:00– 07:00)
R1	Façade	67.03	59.61	67.03	59.61
R2	OLA	63.64	57.50	58.29	56.92
R3	OLA	58.81	58.73	56.35	57.08
R4	OLA	47.07	45.09	46.24	41.75
R5	OLA	48.99	47.17	47.87	45.58
R6	OLA	55.46	52.65	51.97	51.24

## 6 Mitigation Measures

Table 6-1 below summarizes the requirements for ventilation, outdoor control measures and building components for all assessment locations.

**Table 6-1: Summary of Requirements based on Receiver Location**

Receiver Location	Outdoor Control Measures Warning Clause	Ventilation Requirement		*Building Component Requirement	
		Plane of Living Room Windows (Daytime)	Plane of Bedroom Windows (Nighttime)	Plane of Living Room Windows (Daytime)	Plane of Bedroom Windows (Nighttime)
R1	N/A	Type D	Type C	Type D	Non-Compliant
R2	Type B	Type C	Type C	Type C	Compliant
R3	Type A	Type C	Type C	Type C	Compliant
R4	None	None	None	None	Compliant
R5	None	None	None	None	Compliant
R6	Type A	Type C	Type C	Type C	Compliant

*\*Building Code Requirements.*

*Required = Building components must be designed to achieve indoor sound levels criteria, or*

*Compliant = Building compliant with Ontario Building Code.*

Table 6-2 below summarizes the noise attenuation barrier required to reduce noise levels in the outdoor living areas to acceptable levels. A minimum attenuation barrier of 2.5m is required connecting the existing noise barrier walls adjacent to either sides of the site and tying into the closest unit as shown in Figure 3.

**Table 6-2: Summary of Attenuation Barrier Requirements**

Assessment Location	Height of Barrier Required (m)
OLA-1 (Rear yard Area at Ground Level)	2.5m

## 7 Recommendations

We recommend that this application for the proposed development at 1158 Second Line Rd be approved from a “Noise Study” assessment perspective, based on the following:

Noise attenuation barriers will be located as illustrated in Figure 3 to reduce noise levels in the rearyard outdoor living areas. The noise attenuation barrier to meet specifications identified in Part 5 of the City of Ottawa Environmental Noise Control Guidelines. A 2.5m high attenuation barrier is proposed to reduce the anticipated noise levels for the outdoor living areas. The acoustic noise barrier wall shall have a minimum surface density of 20 Kg/m<sup>3</sup> as City of Ottawa guidelines.

### **Block 8 (Units 7-10) as Identified in Figure 2**

A requirement for Central Air Conditioning Type “D” Warning Clause for the indoor areas is required for these units. The following Notices on Title for these residential lots shall be included in all Agreements of Purchase and Sale in accordance with the terms specified by the Development Agreement:

*Type D Warning Clause: “This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”*

### **Block 1 (Unit 11) as Identified in Figure 2**

A Type “B” Warning Clause for the Outdoor Living Area is required along with a requirement for Central Air Conditioning Type “D” Warning Clause for the indoor areas is required for these units. The following Notices on Title for these residential lots shall be included in all Agreements of Purchase and Sale in accordance with the terms specified by the Development Agreement:

*Type B Warning Clause: “Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.”*

*Type D Warning Clause: “This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”*

### **Block 7 (Unit 1) as Identified in Figure 2**

A Type “A” Warning Clause for the Outdoor Living Area is required along with a requirement for Central Air Conditioning Type “D” Warning Clause for the indoor areas is required for these units. The following Notices on Title for these residential lots shall be included in all Agreements of Purchase and Sale in accordance with the terms specified by the Development Agreement:

*Type A Warning Clause: “Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.”*

*Type D Warning Clause: “This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”*

**Block 1 (Units 12, 13) and Block 7 (Unit 2) as Identified in Figure 2**

A Type “A” Warning Clause for the Outdoor Living Area is required along with a Provision for Central Air Conditioning Type “C” Warning Clause for the indoor areas. The following Notices on Title for these residential lots shall be included in all Agreements of Purchase and Sale in accordance with the terms specified by the Development Agreement:

*Type A Warning Clause: “Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.”*

*Type C Warning Clause: “This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”*

**Block 7 (Units 3 and 4) and Block 1 (Unit 14) as Identified in Figure 2**

A Provision for Central Air Conditioning Type “C” Warning Clause for the indoor areas is required for these lots. The following Notices on Title for these residential lots shall be included in all Agreements of Purchase and Sale in accordance with the terms specified by the Development Agreement:

*Type C Warning Clause: “This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.”*

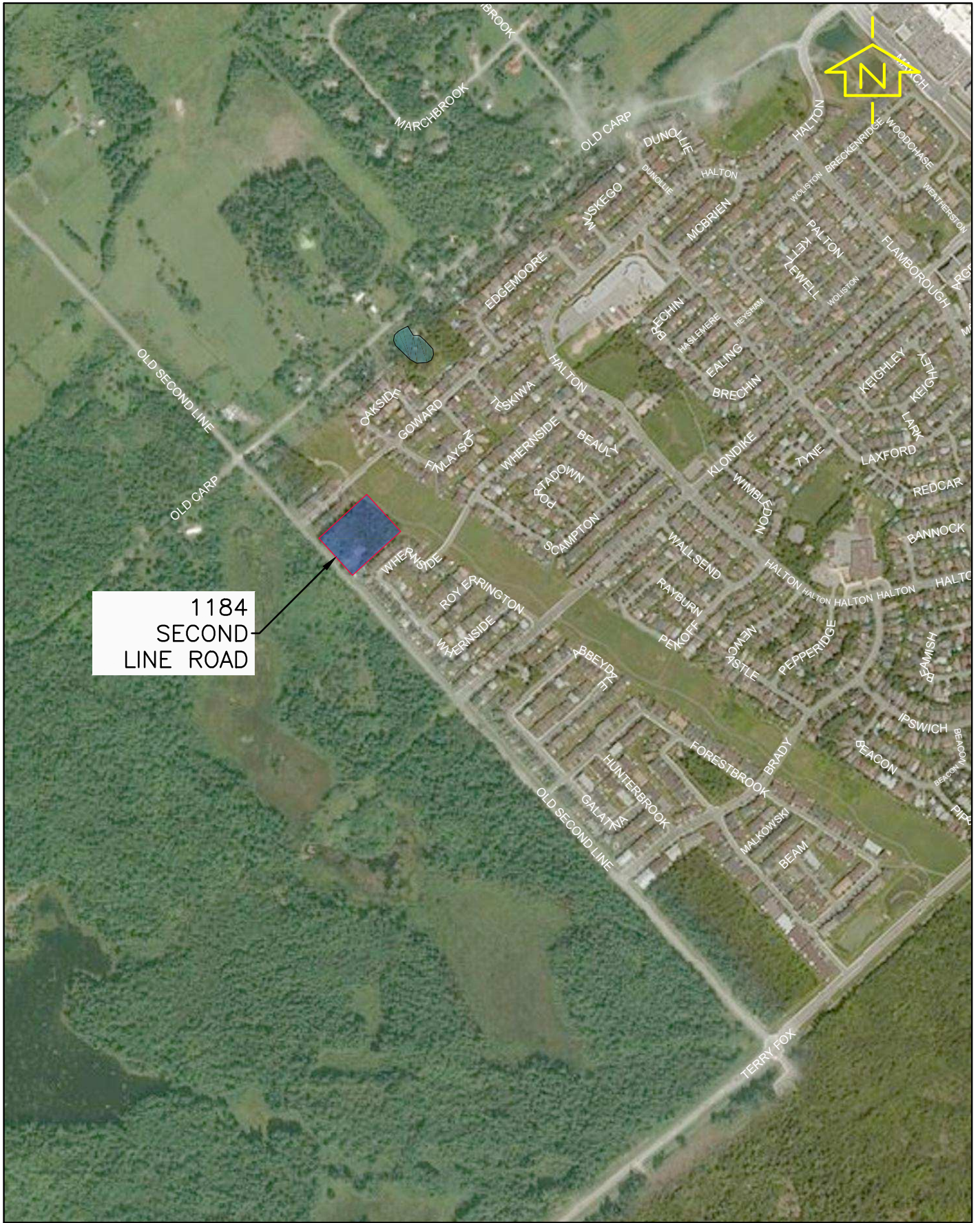
## **Appendix A – Figures**

**Figure 1 – Site Location Plan**


**Figure 2 – Source/Receiver Locations for Building Facade**

**Figure 3 – Required Noise Wall Locations**





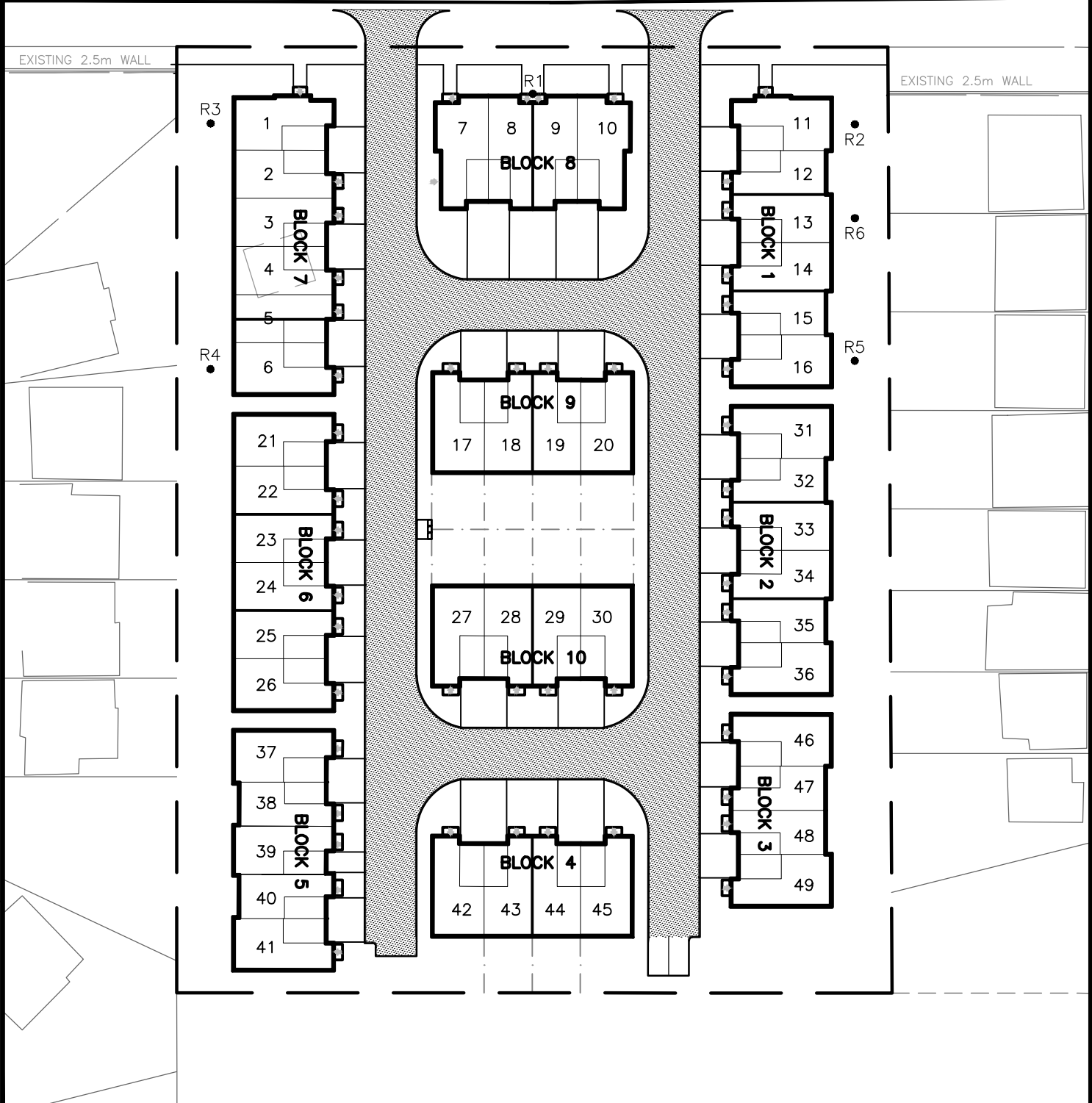
1184  
SECOND  
LINE ROAD

<b>exp Services Inc.</b> 100-2650 Queensview Drive Ottawa, ON K2B 8H6  <a href="http://www.exp.com">www.exp.com</a>		DESIGN JLF	1158 SECOND LINE ROAD THEBERGE HOMES  SITE LOCATION PLAN	SCALE 1:10000
		DRAWN SAB		SKETCH NO
		DATE APR 2018		FIG 1
		FILE NO 245003		





NOISE SOURCE: SECOND LINE ROAD, 60km/hr



Filename: P:\Projects\Civil\245000\OTT-00245003-A0 - 1158 Second Line - Theberge\60-EXECUTION\64-DWG\245003-Noise Study.dwg  
 Last Saved: Apr 16, 2018 1:43 PM Last Plotted: Apr 17, 2018 12:02 PM Plotted by: ShadbanM

**exp Services Inc.**  
 100-2650 Queensview Drive  
 Ottawa, ON K2B 8H6  
 www.exp.com



DESIGN	MZG
DRAWN	MZG
DATE	18-04-11
FILE NO	OTT-00245003-A0

**1158 SECOND LINE ROAD**  
**THEBERGE HOMES**

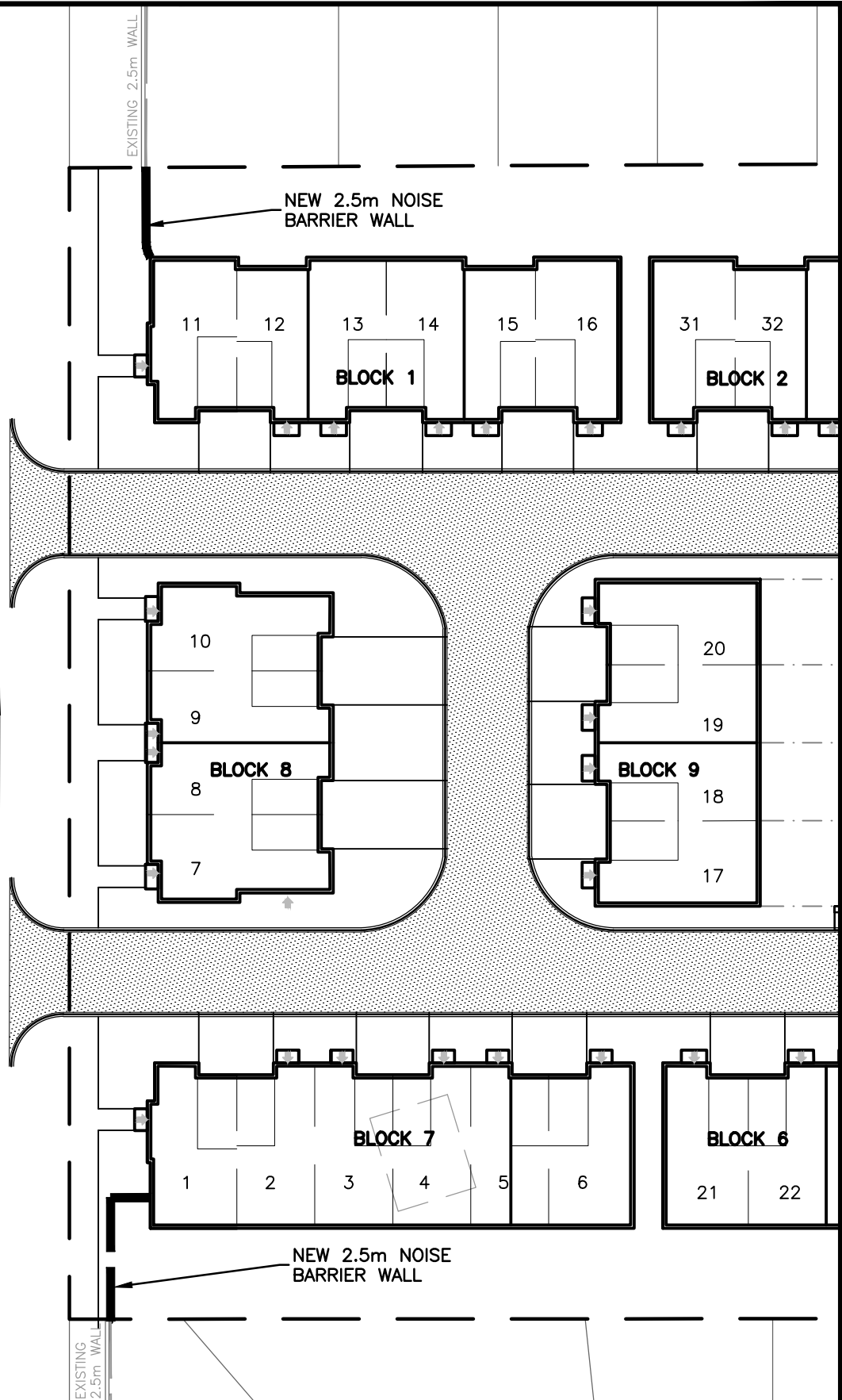
**NOISE SOURCE/RECEIVER**  
**LOCATIONS**

SCALE  
 1:750  
 SKETCH NO

**FIG 2**



NOISE SOURCE: SECOND LINE ROAD, 60km/hr



Filenane: P:\Projects\Civil\245000\OTT-00245003-A0 - 1158 Second Line - Theberge\60-EXECUTION\64-DWG\245003-Noise Study.dwg  
 Last Saved: Apr 16, 2018 1:43 PM Last Plotted: Apr 17, 2018 12:02 PM Plotted by: ChadbanM

**exp Services Inc.**  
 100-2650 Queensview Drive  
 Ottawa, ON K2B 8H6  
 www.exp.com



DESIGN	MZG
DRAWN	MZG
DATE	18-04-11
FILE NO	OTT-00245003-A0

**1158 SECOND LINE ROAD**  
**THEBERGE HOMES**

**REQUIRED NOISE WALL**  
**LOCATIONS**

SCALE  
 1:500  
 SKETCH NO

**FIG 3**

## **Appendix B – Tables**

**Table B1- Noise Source/Receiver Data**

**Table B2- Summary of Warning Clauses**

**TABLE B1 - SOURCE/Combined Stamson DATA**

Location	Assessment Location	Noise Source	Angles		Source to Receiver Dist (m)	Source Ground Elev (m)	Receiver Ground Elev (m)	Receiver Height (m)	Barrier to Receiver Dist (m)	Base of Barrier Elev (m)	Height of Wall Determined	AADT	Speed Limit (km/h)	Combined Equivalent Noise Level Leq (dBA)		Combined Equivalent Noise Level Leq (dBA) With Barrier	
			From	To										Daytime (7:00-23:00)	Nighttime (23:00-7:00)	Daytime (7:00-23:00)	Nighttime (23:00-7:00)
R1	OLA	2nd Line Rd	-90	90	16.2	103.76	103.74	1.5	0.0	NA	NA	12,000	60	67.03	59.61	67.03	59.61
R2	OLA	2nd Line Rd	-39	86	20.4	102.94	102.75	1.5	4.0	102.30	2.50	12,000	60	63.64	57.50	58.29	56.92
R3	OLA	2nd Line Rd	-90	40	20.1	104.34	104.6	1.5	6.9	104.56	2.50	12,000	60	58.81	58.73	56.35	57.08
R4	OLA	2nd Line Rd	-46	5	53.1	104.34	103.3	1.5	40.1	104.56	2.50	12,000	60	47.07	45.09	46.24	41.75
R5	OLA	2nd Line Rd	-5	29	52.3	102.94	102.35	1.5	36.0	102.30	2.50	12,000	60	48.99	47.17	47.87	45.58
R6	OLA	2rd Line Rd	-11	52	32.8	102.94	102.65	1.5	16.7	102.3	2.5	12,000	60	55.46	52.65	51.97	51.24

TABLE B2- SUMMARY OF WARNING CLAUSES - SORTED BY RECEIVER LOCATIONS

Receiver Location	Outdoor Control Measures Warning Clause	Ventilation Requirement			*Building Component Requirement		
		Plane of Living Room Windows (Daytime)	Plane of Bedroom Windows (Nighttime)	Governing Warning Clause Requirement	Plane of Living Room Windows (Daytime)	Plane of Bedroom Windows (Nighttime)	Governing BC Requirement
R1	N/A	Type D	Type C	Type D	Non-Compliant	Compliant	Non-Compliant
R2	Type B	Type C	Type C	Type C	Compliant	Compliant	Compliant
R3	Type A	Type C	Type C	Type C	Compliant	Compliant	Compliant
R4	None	None	None	None	Compliant	Compliant	Compliant
R5	None	None	None	None	Compliant	Compliant	Compliant
R6	Type A	Type C	Type C	Type C	Compliant	Compliant	Compliant

## **Appendix C - Architectural Plan**





## **Appendix D – STAMSON Output**

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

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

-----  
 Car traffic volume : 9715/845    veh/TimePeriod \*  
 Medium truck volume : 773/67    veh/TimePeriod \*  
 Heavy truck volume : 552/48    veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Seg 1 (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 : 16.17 / 16.17 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

ROAD (0.00 + 67.03 + 0.00) = 67.03 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -90 90 0.66 69.03 0.00 -0.54 -1.46 0.00 0.00 0.00 67.03  
 -----

Segment Leq : 67.03 dBA

Total Leq All Segments: 67.03 dBA

Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

ROAD (0.00 + 59.61 + 0.00) = 59.61 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -90 90 0.57 61.43 0.00 -0.51 -1.30 0.00 0.00 0.00 59.61  
 -----

Segment Leq : 59.61 dBA

Total Leq All Segments: 59.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.03  
 (NIGHT): 59.61

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

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -39.00 deg 48.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.40 / 20.40 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

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

-----  
 Car traffic volume : 1600/800 veh/TimePeriod  
 Medium truck volume : 320/160 veh/TimePeriod  
 Heavy truck volume : 160/80 veh/TimePeriod  
 Posted speed limit : 60 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

R2.txt  
 Angle1 Angle2 : 48.00 deg 86.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.40 / 20.40 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 48.00 deg Angle2 : 86.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 4.00 / 4.00 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.75 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

^  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m  
 ROAD (0.00 + 63.36 + 0.00) = 63.36 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -39 48 0.66 69.03 0.00 -2.22 -3.45 0.00 0.00 0.00 63.36  
 -----

Segment Leq : 63.36 dBA

^  
 Results segment # 2: Seg 2 (day)

-----  
 Source height = 1.67 m  
 Barrier height for grazing incidence  
 -----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----+-----+-----+-----  
 1.67 ! 1.50 ! 2.02 ! 104.32  
 -----  
 ROAD (0.00 + 47.01 + 0.00) = 47.01 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 48 86 0.51 63.68 0.00 -2.01 -8.99 0.00 0.00 -5.67 47.01  
 -----

Segment Leq : 47.01 dBA R2.txt

Total Leq All Segments: 63.46 dBA

Results segment # 1: Seg 1 (night)

Source height = 1.50 m

ROAD (0.00 + 55.92 + 0.00) = 55.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-39	48	0.57	61.43	0.00	-2.10	-3.41	0.00	0.00	0.00	55.92

Segment Leq : 55.92 dBA

Results segment # 2: Seg 2 (night)

Source height = 1.67 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.67	4.50	4.43	106.73

ROAD (0.00 + 52.35 + 0.00) = 52.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
48	86	0.42	63.68	0.00	-1.89	-8.62	0.00	0.00	-0.10	53.07*
48	86	0.57	63.68	0.00	-2.09	-9.24	0.00	0.00	0.00	52.35

\* Bright Zone !

Segment Leq : 52.35 dBA

Total Leq All Segments: 57.50 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.46 R2.txt  
(NIGHT): 57.50

Filename: r2wall.te Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -39.00 deg 86.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.40 / 20.40 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -39.00 deg Angle2 : 86.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 4.00 / 4.00 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.75 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

R2WALL.txt  
 Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 1.50 ! 1.99 ! 104.29

ROAD (0.00 + 58.29 + 0.00) = 58.29 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -39 86 0.51 69.03 0.00 -2.02 -2.34 0.00 0.00 -6.39 58.29  
 -----

Segment Leq : 58.29 dBA

Total Leq All Segments: 58.29 dBA

Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 4.50 ! 4.40 ! 106.70

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  
 -----  
 -39 86 0.42 61.43 0.00 -1.90 -2.22 0.00 0.00 -0.03 57.27\*  
 -39 86 0.57 61.43 0.00 -2.10 -2.41 0.00 0.00 0.00 56.92  
 -----

\* Bright Zone !

Segment Leq : 56.92 dBA

Total Leq All Segments: 56.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.29

R2WALL.txt  
(NIGHT): 56.92



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

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -90.00 deg -34.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.10 / 20.10 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -90.00 deg Angle2 : -34.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 6.90 / 6.90 m  
 Source elevation : 104.34 m  
 Receiver elevation : 104.60 m  
 Barrier elevation : 104.56 m  
 Reference angle : 0.00

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

-----  
 Car traffic volume : 1600/800 veh/TimePeriod  
 Medium truck volume : 320/160 veh/TimePeriod  
 Heavy truck volume : 160/80 veh/TimePeriod

R3.txt  
 Posted speed limit : 60 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

-----  
 Angle1 Angle2 : -34.00 deg 40.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.10 / 20.10 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

↑  
 Results segment # 1: Seg 1 (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	1.45	106.01

 -----  
 ROAD (0.00 + 52.92 + 0.00) = 52.92 dBA  

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-34	0.51	69.03	0.00	-1.92	-7.06	0.00	0.00	-7.13	52.92

 -----  
 Segment Leq : 52.92 dBA

↑  
 Results segment # 2: Seg 2 (day)

-----  
 Source height = 1.67 m  
 ROAD (0.00 + 57.51 + 0.00) = 57.51 dBA  

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	40	0.66	63.68	0.00	-2.10	-4.07	0.00	0.00	0.00	57.51

 -----

Segment Leq : 57.51 dBA R3.txt

Total Leq All Segments: 58.81 dBA

Results segment # 1: Seg 1 (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	4.50	3.42	107.98

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
-90	-34	0.42	61.43	0.00	-1.81	-6.76	0.00	0.00	-1.97	50.90*
-90	-34	0.57	61.43	0.00	-2.00	-7.26	0.00	0.00	0.00	52.17

\* Bright Zone !

Segment Leq : 52.17 dBA

Results segment # 2: Seg 2 (night)

Source height = 1.67 m

ROAD (0.00 + 57.65 + 0.00) = 57.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	40	0.57	63.68	0.00	-1.99	-4.04	0.00	0.00	0.00	57.65

Segment Leq : 57.65 dBA

Total Leq All Segments: 58.73 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.81 R3.txt  
(NIGHT): 58.73



Filename: r3wall.te Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -90.00 deg 40.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 20.10 / 20.10 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -90.00 deg Angle2 : 40.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 6.90 / 6.90 m  
 Source elevation : 104.60 m  
 Receiver elevation : 104.34 m  
 Barrier elevation : 104.56 m  
 Reference angle : 0.00

↑  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

R3WALL.txt  
 Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 1.50 ! 1.37 ! 105.93

ROAD (0.00 + 56.35 + 0.00) = 56.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	40	0.51	69.03	0.00	-1.92	-2.27	0.00	0.00	-8.49	56.35

Segment Leq : 56.35 dBA

Total Leq All Segments: 56.35 dBA

↑  
 Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 4.50 ! 3.34 ! 107.90

ROAD (0.00 + 57.08 + 0.00) = 57.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	40	0.42	61.43	0.00	-1.81	-2.15	0.00	0.00	-0.98	56.49*
-90	40	0.57	61.43	0.00	-2.00	-2.35	0.00	0.00	0.00	57.08

\* Bright Zone !

Segment Leq : 57.08 dBA

Total Leq All Segments: 57.08 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 56.35

R3WALL.txt  
(NIGHT): 57.08



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

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -46.00 deg -7.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 53.10 / 53.10 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -46.00 deg Angle2 : -7.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 40.10 / 40.10 m  
 Source elevation : 104.34 m  
 Receiver elevation : 103.30 m  
 Barrier elevation : 104.56 m  
 Reference angle : 0.00

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

-----  
 Car traffic volume : 1600/800 veh/TimePeriod  
 Medium truck volume : 320/160 veh/TimePeriod  
 Heavy truck volume : 160/80 veh/TimePeriod

R4.txt  
 Posted speed limit : 60 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

-----  
 Angle1 Angle2 : -7.00 deg 5.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 54.00 / 54.00 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

^  
 Results segment # 1: Seg 1 (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	1.02	105.58

ROAD (0.00 + 45.10 + 0.00) = 45.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-46	-7	0.51	69.03	0.00	-8.29	-6.94	0.00	0.00	-8.70	45.10

Segment Leq : 45.10 dBA

^  
 Results segment # 2: Seg 2 (day)

-----  
 Source height = 1.67 m

ROAD (0.00 + 42.70 + 0.00) = 42.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-7	5	0.66	63.68	0.00	-9.21	-11.77	0.00	0.00	0.00	42.70

Segment Leq : 42.70 dBA

Total Leq All Segments: 47.07 dBA

Results segment # 1: Seg 1 (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	4.50	1.76	106.32

ROAD (0.00 + 40.56 + 0.00) = 40.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-46	-7	0.42	61.43	0.00	-7.80	-6.89	0.00	0.00	-6.18	40.56

Segment Leq : 40.56 dBA

Results segment # 2: Seg 2 (night)

Source height = 1.67 m

ROAD (0.00 + 43.20 + 0.00) = 43.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-7	5	0.57	63.68	0.00	-8.71	-11.77	0.00	0.00	0.00	43.20

Segment Leq : 43.20 dBA

Total Leq All Segments: 45.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.07  
 (NIGHT): 45.09

Filename: r4wall.te Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -46.00 deg 5.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 53.10 / 53.10 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -46.00 deg Angle2 : 5.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 40.10 / 40.10 m  
 Source elevation : 104.34 m  
 Receiver elevation : 103.30 m  
 Barrier elevation : 104.56 m  
 Reference angle : 0.00

↑  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

R4WALL.txt  
 Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 1.50 ! 1.02 ! 105.58

ROAD (0.00 + 46.24 + 0.00) = 46.24 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -46 5 0.51 69.03 0.00 -8.29 -5.70 0.00 0.00 -8.79 46.24  
 -----

Segment Leq : 46.24 dBA

Total Leq All Segments: 46.24 dBA

↑  
 Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 4.50 ! 1.76 ! 106.32

ROAD (0.00 + 41.75 + 0.00) = 41.75 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -46 5 0.42 61.43 0.00 -7.80 -5.66 0.00 0.00 -6.22 41.75  
 -----

Segment Leq : 41.75 dBA

Total Leq All Segments: 41.75 dBA

↑  
 TOTAL Leq FROM ALL SOURCES (DAY): 46.24  
 (NIGHT): 41.75

↑  
 ↑

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

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -5.00 deg 7.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 52.30 / 52.30 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

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

-----  
 Car traffic volume : 1600/800 veh/TimePeriod  
 Medium truck volume : 320/160 veh/TimePeriod  
 Heavy truck volume : 160/80 veh/TimePeriod  
 Posted speed limit : 60 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

R5.txt  
 Angle1 Angle2 : 7.00 deg 29.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 52.30 / 52.30 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 7.00 deg Angle2 : 29.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 36.00 / 36.00 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.35 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

^  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m  
 ROAD (0.00 + 48.26 + 0.00) = 48.26 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -5 7 0.66 69.03 0.00 -9.00 -11.77 0.00 0.00 0.00 48.26  
 -----

Segment Leq : 48.26 dBA

^  
 Results segment # 2: Seg 2 (day)

-----  
 Source height = 1.67 m  
 Barrier height for grazing incidence  
 -----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----+-----+-----+-----  
 1.67 ! 1.50 ! 2.07 ! 104.37  
 -----  
 ROAD (0.00 + 40.86 + 0.00) = 40.86 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 7 29 0.51 63.68 0.00 -8.16 -9.25 0.00 0.00 -5.40 40.86  
 -----

Segment Leq : 40.86 dBA R5.txt

Total Leq All Segments: 48.99 dBA

Results segment # 1: Seg 1 (night)

Source height = 1.50 m

ROAD (0.00 + 41.15 + 0.00) = 41.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-5	7	0.57	61.43	0.00	-8.52	-11.77	0.00	0.00	0.00	41.15

Segment Leq : 41.15 dBA

Results segment # 2: Seg 2 (night)

Source height = 1.67 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.67	4.50	3.00	105.30

ROAD (0.00 + 45.92 + 0.00) = 45.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
7	29	0.42	63.68	0.00	-7.68	-9.23	0.00	0.00	-4.40	42.37*
7	29	0.57	63.68	0.00	-8.49	-9.27	0.00	0.00	0.00	45.92

\* Bright Zone !

Segment Leq : 45.92 dBA

Total Leq All Segments: 47.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.99 R5.txt  
(NIGHT): 47.17

Filename: r5wall.te Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -5.00 deg 29.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 52.30 / 52.30 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -5.00 deg Angle2 : 29.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 36.00 / 36.00 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.35 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

↑  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

R5WALL.txt  
 Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 1.50 ! 1.95 ! 104.25

ROAD (0.00 + 47.87 + 0.00) = 47.87 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -5 29 0.51 69.03 0.00 -8.19 -7.32 0.00 0.00 -5.65 47.87  
 -----

Segment Leq : 47.87 dBA

Total Leq All Segments: 47.87 dBA

↑  
 Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 4.50 ! 2.89 ! 105.19

ROAD (0.00 + 45.58 + 0.00) = 45.58 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -5 29 0.42 61.43 0.00 -7.70 -7.31 0.00 0.00 -4.65 41.77\*  
 -5 29 0.57 61.43 0.00 -8.52 -7.33 0.00 0.00 0.00 45.58  
 -----

\* Bright Zone !

Segment Leq : 45.58 dBA

Total Leq All Segments: 45.58 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 47.87



R5WALL.txt  
(NIGHT): 45.58



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

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -11.00 deg 15.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 32.80 / 32.80 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

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

-----  
 Car traffic volume : 1600/800 veh/TimePeriod  
 Medium truck volume : 320/160 veh/TimePeriod  
 Heavy truck volume : 160/80 veh/TimePeriod  
 Posted speed limit : 60 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

R6.txt  
 Angle1 Angle2 : 15.00 deg 52.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 32.80 / 32.80 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 15.00 deg Angle2 : 52.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 16.70 / 16.70 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.65 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

^  
 Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m  
 ROAD (0.00 + 54.96 + 0.00) = 54.96 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -11 15 0.66 69.03 0.00 -5.64 -8.43 0.00 0.00 0.00 54.96  
 -----

Segment Leq : 54.96 dBA

^  
 Results segment # 2: Seg 2 (day)

-----  
 Source height = 1.67 m  
 Barrier height for grazing incidence  
 -----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----+-----+-----+-----  
 1.67 ! 1.50 ! 2.08 ! 104.38  
 -----  
 ROAD (0.00 + 45.80 + 0.00) = 45.80 dBA  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 15 52 0.51 63.68 0.00 -5.11 -7.32 0.00 0.00 -5.45 45.80  
 -----

Segment Leq : 45.80 dBA R6.txt

Total Leq All Segments: 55.46 dBA

Results segment # 1: Seg 1 (night)

Source height = 1.50 m

ROAD (0.00 + 47.67 + 0.00) = 47.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-11	15	0.57	61.43	0.00	-5.34	-8.43	0.00	0.00	0.00	47.67

Segment Leq : 47.67 dBA

Results segment # 2: Seg 2 (night)

Source height = 1.67 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.67	4.50	3.55	105.85

ROAD (0.00 + 50.99 + 0.00) = 50.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
15	52	0.42	63.68	0.00	-4.81	-7.24	0.00	0.00	-1.03	50.60*
15	52	0.57	63.68	0.00	-5.32	-7.37	0.00	0.00	0.00	50.99

\* Bright Zone !

Segment Leq : 50.99 dBA

Total Leq All Segments: 52.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.46 R6.txt  
(NIGHT): 52.65

↑  
↑

Filename: r6wall.te Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 9715/845 veh/TimePeriod \*  
 Medium truck volume : 773/67 veh/TimePeriod \*  
 Heavy truck volume : 552/48 veh/TimePeriod \*  
 Posted speed limit : 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): 12000  
 Percentage of Annual Growth : 0.00  
 Number of Years of Growth : 0.00  
 Medium Truck % of Total Volume : 7.00  
 Heavy Truck % of Total Volume : 5.00  
 Day (16 hrs) % of Total Volume : 92.00

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

-----  
 Angle1 Angle2 : -11.00 deg 52.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 32.80 / 32.80 m  
 Receiver height : 1.50 / 4.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -11.00 deg Angle2 : 52.00 deg  
 Barrier height : 2.50 m  
 Barrier receiver distance : 4.00 / 4.00 m  
 Source elevation : 102.94 m  
 Receiver elevation : 102.65 m  
 Barrier elevation : 102.30 m  
 Reference angle : 0.00

Results segment # 1: Seg 1 (day)

-----  
 Source height = 1.50 m

R6WALL.txt  
 Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 1.50 ! 1.88 ! 104.18

ROAD (0.00 + 51.97 + 0.00) = 51.97 dBA

-----  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -11 52 0.51 69.03 0.00 -5.13 -4.83 0.00 0.00 -7.10 51.97  
 -----

Segment Leq : 51.97 dBA

Total Leq All Segments: 51.97 dBA

Results segment # 1: Seg 1 (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----  
 1.50 ! 4.50 ! 4.52 ! 106.82

ROAD (0.00 + 51.24 + 0.00) = 51.24 dBA

-----  
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq  
 -----  
 -11 52 0.42 61.43 0.00 -4.83 -4.78 0.00 0.00 0.00 51.82\*  
 -11 52 0.57 61.43 0.00 -5.34 -4.86 0.00 0.00 0.00 51.24  
 -----

\* Bright Zone !

Segment Leq : 51.24 dBA

Total Leq All Segments: 51.24 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.97

R6WALL.txt  
(NIGHT): 51.24

