



Transportation Noise Feasibility Assessment

**3960 & 3930 Riverside Drive
Ottawa, Ontario**

REPORT: GWE18-039 – Transportation Noise

Prepared For:

Alex Turner
Taggart Realty Management
225 Metcalfe Street, Suite 708
Ottawa, Ontario K2P 1P9
Canada

Prepared By:

Omar Daher, B.Eng., EIT, Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

March 28, 2018

EXECUTIVE SUMMARY

This document describes a transportation noise feasibility assessment in support of a rezoning application for the proposed vacant land condominium in Ottawa, Ontario. The development site includes a hotel, commercial blocks, and a senior retirement residence, as indicated on the concept site plan. Currently, the land use permits a hotel, retirement residence, and retail. Taggart Realty Management is seeking rezoning approval to expand the land use to also include residential, school and car dealership. The major sources of transportation noise are Riverside Drive to the east, and Hunt Club Road to the south. There are no Outdoor Living Areas (OLA) associated with this development. The site is also influenced by aircraft noise from the McDonald Cartier International Airport. The site is situated just outside the Airport Operating and Influence Zone (AOIZ). Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment 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) site plan drawings received from Hobin Architecture Inc.

The results of the current analysis indicate that noise levels from roadway traffic will range between 59 and 68 dBA during the daytime period (07:00-23:00) and between 51 and 61 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 68 dBA) occur along the hotel's and school's east façade, which is nearest and most exposed to Riverside Drive and Hunt Club Road. Noise levels predicted due to surface transportation sources exceed the criteria listed in Section 4.2 for building components. Therefore, upgraded building components will be required where noise levels exceed 65 dBA. As per City of Ottawa requirements, detailed Sound Transmission Class (STC) calculations will be required to be completed prior to site plan control.

In order to help address roadway traffic noise and aircraft noise, the installation of central air conditioning will be required for the senior retirement residence, hotel, school, and residential which will allow occupants to keep windows closed and maintain a comfortable living environment. Since these facilities will have central air conditioning, the ventilation requirements will be met for roadway traffic noise and aircraft noise. In addition to ventilation requirements, warning clauses will be required. Additionally, due to the school, retirement residence, hotel, and residential uses being noise-sensitive, and located just outside the Airport Operating Influence Zone (AOIZ), a review of the proposed building components will

be required to confirm indoor noise levels due to aircraft noise will be compliant with the ENCG. At the time of site plan control, specific noise mitigation and appropriate warning clauses will be determined.

TABLE OF CONTENTS

1. INTRODUCTION.....	1
2. TERMS OF REFERENCE.....	1
3. OBJECTIVES.....	2
4. METHODOLOGY	2
4.1 Background	2
4.2 Roadway Traffic Noise.....	2
4.2.1 Criteria for Roadway Traffic Noise	2
4.2.2 Theoretical Roadway Noise Predictions	3
4.3 Roadway Traffic Volumes.....	4
4.4 Aircraft Noise Assessment.....	5
4.4.1 Criteria for Aircraft Noise.....	5
4.4.1 Aircraft Noise Calculations.....	6
5. RESULTS AND DISCUSSION	7
5.1 Roadway Traffic Noise Levels	7
5.2 Aircraft Noise	8
6. CONCLUSIONS AND RECOMMENDATIONS	9

FIGURES

APPENDICES:

Appendix A – STAMSON 5.04 Input and Output Data

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Taggart Realty Management to undertake a transportation noise feasibility assessment in support of a rezoning application for the proposed vacant land condominium in Ottawa, Ontario. Currently, the land use permits a hotel, retirement residence, and retail. Taggart Realty Management is seeking rezoning approval to expand the land use to also include a school, car dealership, and potential for residential. This report summarizes the methodology, results, and recommendations related to a transportation noise feasibility assessment. GWE's scope of work involved assessing exterior and interior noise levels generated by local roadway traffic and aircraft 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 architectural drawings received from Hobin Architecture Inc., with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications, as well as Annex 10 of the City of Ottawa's (OP).

2. TERMS OF REFERENCE

The focus of this transportation noise feasibility assessment is a proposed vacant land condominium development located at 3930 and 3960 Riverside drive, in Ottawa, Ontario. The site is in the northwest corner of the Hunt Club Road and Riverside Drive intersection. The development site includes a hotel, commercial blocks, and a senior retirement residence, as indicated on the concept site plan. Currently, the land use permits a hotel, retirement residence, and retail. Taggart Realty Management is seeking rezoning approval to expand the land use to also include a school, car dealership, and potential for residential. The school is expected to be two levels above grade and is situated on the north east corner of the site. The hotel is located on the southwest corner of the site, while the retirement building is located on the far west side of the site, close to the Rideau River. Commercial blocks such as two car dealerships and a retail block are to be located on the central and southeast side of the site. The application also includes consideration of residential. Surrounding the site is the Rideau River to the west, residential properties to the north and east, and commercial areas to the southeast. The major sources of transportation noise are roadway traffic from Hunt Club Road and Riverside Drive and influence due to

¹ City of Ottawa Environmental Noise Control Guidelines, January 2016

² Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

aircraft noise since the site is located just outside the NEF/NEP 30 contour line. Figure 1 illustrates a complete site plan with surrounding context.

3. OBJECTIVES

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

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For 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 impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for retirement homes, schools, and sleeping quarters of hotels/ retirement homes 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. Roadway Noise Assessment

4.2.2 Theoretical Roadway Noise Predictions

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

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions
- The day/night split was taken to be 92% / 8% respectively for all streets

³ Adapted from ENCG 2016 – Tables 2.2b and 2.2c

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

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

- Reflective intermediate ground surfaces assumed due to the parking lot between all sources and receivers
- Topography assumed to be a flat/gentle slope for conservatism despite the difference in elevation between Hunt Club Road and grade height of proposed development. Elevation heights would be considered as part of a future more detailed assessment.
- Receptor height taken to be 4.5 metres at the second floor for the centre of the window in the absence of elevation drawings as stated in the Ontario Road Noise Analysis Method for Environmental and Transportation (ORNAMENT) technical document⁶
- Receptors placed on the senior retirement residence and hotel ignored the school and commercial buildings as potential barriers. Due to unavailable information on potential building heights, receptors were placed at the 2nd floor as the worst-case.
- Noise receptors were strategically placed at 9 locations around the study area (see Figure 1).
- Receptor drawings illustrated in Figures 2-4; Receptor 1 and 3 have similar exposure angles while Receptors 6, 8 and 9 have similar exposure angles

4.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master 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

Segment	Roadway / Transit Class	Speed Limit (km/h)	Traffic Volumes
Riverside Drive	4-UAD	60	35,000
Hunt Club Road	4-UAD	80	35,000

⁶ ORNAMENT Technical Document, October 1989, Section 5.5.4

⁷ City of Ottawa Transportation Master Plan, November 2013

4.4 Aircraft Noise Assessment

4.4.1 Criteria for Aircraft Noise

The ENCG outlines the sound level criteria for aircraft noise based on a site's location near the Ottawa International Airport. The Ottawa Airport Vicinity Development Zone (OAVDZ) is a zone around the airport defined by NEF/NEP contour lines that follow fixed features, such as roads or lot boundaries. NEF/NEP contours reflect the predetermined noise levels which would impact sensitive areas around airports. These contours include the influences of noise levels from aircraft flight, take-off, and ground operations to specific urban areas. Noise generated from aircraft traffic is represented as Effective Perceived Noise Levels (EPNL), a unit of noise measurement that accounts for variations in the human perception of pure tones and noise duration. Computer predicted noise levels are plotted geographically to generate NEF/NEP contour maps, where lower NEF/NEP levels correspond to lower average outdoor noise levels. These combined contours form The Ottawa Airport Vicinity Development Zone (OAVDZ), which generally represents the 25 NEF/NEP contour, and The Ottawa Airport Operating Influence Zone (OAOIZ), which generally represents the NEF/NEP 30 contour. Within the OAOIZ, noise-sensitive development is not permitted, although infill and redevelopment may occur in specific areas within the zone in keeping with the criteria set out in the Official Plan. Between the OAOIZ and the OAVDZ, noise sensitive land-use development requires a noise impact study for commercial and institutional developments.

According to accepted research⁸, Health and Welfare Canada states that people continuously exposed to NEF/NEP values less than 35 will not suffer adverse physical or psychological effects. Sociological surveys⁹ have indicated that negative community reactions to noise levels may start at about 25 NEF/NEP. Table 3 identifies the sound level criteria for relevant outdoor and indoor living spaces exposed to aircraft noise.

⁸ Report of the Special Meeting on Aircraft Noise in the Vicinity of Aerodromes, Montreal ICAO, 1969.

⁹ Noise in Urban and Suburban Areas. Bolt, Beanik and Newman, Inc., Washington, January 1967.

TABLE 3: OUTDOOR AND INDOOR AIRCRAFT SOUND LEVEL CRITERIA¹⁰

Type of Space	NEF/NEP	Approximate $L_{eq}(24Hr)$
Outdoor Point of Reception	30	61 dBA
General offices, reception areas, retail stores, etc.	15	46 dBA
Individual or semi-private offices, conference rooms, etc.	10	41 dBA
Living/dining areas of residences, sleeping quarters in hotels/motels, theatres, libraries, schools, day-care centres, places of worship, etc.	5	36 dBA
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0	31 dBA

4.4.1 Aircraft Noise Calculations

As indicated in Figure 5, all noise-sensitive buildings of the new development are located just outside the Ottawa Airport Operating Influence Zone (AOIZ), NEF/NEP 30 contour, as per Schedule K of the Official Plan Annex 10. For noise-sensitive developments located between NEF/NEP 25 and 30 contours, the ENCG requires an impact noise study to be completed for commercial and institutional buildings to address airport noise. As the development is located just outside the boundary of the Airport Operating Influence Zone (AOIZ), noise levels are expected to be closer to that of NEF/NEP 30 (61 dBA). A review of the proposed building components will be required at the time of site plan control to confirm that indoor noise levels due to aircraft noise will be compliant with the ENCG.

¹⁰ Adapted from ENCG – Tables 1.2, 1.3
Taggart Realty Management

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 4 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A.

TABLE 4: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	4.5	POW – 2 nd Floor – School North Façade	64	57
2	4.5	POW – 2 nd Floor – School East Façade	68	61
3	4.5	POW – 2 nd Floor – School South Façade	66	58
4	4.5	POW – 2 nd Floor – Hotel East Façade	68	61
5	4.5	POW – 2 nd Floor – Hotel North Façade	66	58
6	4.5	POW – 2 nd Floor – Retirement Building East Façade	63	55
7	4.5	POW – 2 nd Floor – Retirement Building East Façade	59	51
8	4.5	POW – 2 nd Floor – Retirement Building East Façade	64	56
9	4.5	POW – 2 nd Floor – Retirement Building East Façade	63	56

The results of the current analysis indicate that noise levels from roadway traffic will range between 59 and 68 dBA during the daytime period (07:00-23:00) and between 51 and 61 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 68 dBA) occur along the hotel's and school's east façade, which is nearest and most exposed to Riverside Drive and Hunt Club Road. Noise levels predicted due to surface transportation source exceed the criteria listed in Section 4.2 for building components. Therefore, upgraded building components will be required where noise levels exceed 65 dBA. As per City of Ottawa requirements, detailed Sound Transmission Class (STC) calculations will be required to be completed prior to site plan control.

In order to help address roadway traffic noise, the installation of central air conditioning will be required for the senior retirement residence, hotel, school, and residential which will allow occupants to keep windows closed and maintain a comfortable living environment. Since these facilities will have central air conditioning, the ventilation requirements will be met for roadway traffic noise and aircraft noise. In

addition to ventilation requirements, warning clauses will be required. At the time of site plan control, specific noise mitigation and appropriate warning clauses will be determined.

5.2 Aircraft Noise

Additionally, due to the school, retirement residence, hotel, and residences being noise-sensitive, and located just outside the boundary of the Airport Operating Influence Zone (AOIZ), central air conditioning which these facilities will have, will be sufficient. Central air conditioning will allow occupants to keep windows closed and maintain a comfortable living environment. Also, a review of the proposed building components will be required to confirm indoor noise levels due to aircraft noise will be compliant with the indoor sound levels as per the ENCG. In addition to ventilation requirements, Warning Clauses will be required on Lease, Purchase and Sale agreements. At the time of site plan control, the specific noise control measures for the development will be determined.

It should be noted under the City's Official Plan, Section 4.8.6, noise sensitive land uses are permitted on this site, subject to noise attenuation measures, as would form part of a detailed noise study at the time of site plan approval. Excerpts from the official plan are presented below.

The boundary of the Ottawa 'Airport Operating Influence Zone' (AOIZ) is based on the most restrictive of either the 30 NEF and NEP contours (the 30 NEF and NEP noise composite line). Within this area, residential and noise sensitive development is not permitted. Notwithstanding, very limited residential infill and redevelopment may occur when strictly in keeping with the policies established below.

*The border delimiting the Ottawa Airport Operating Influence Zone, as shown on Schedule K, has been drawn to coincide with physical features such as roads, creeks, rail lines, and lot lines where possible. **The identified boundary of the zone is not subject to interpretation and its precise location should be read from a map at a scale of 1:50 000 available from the City of Ottawa and the Ottawa International Airport Authority.***

Noise-sensitive uses are permitted between the 25 NEF/NEP noise composite line and the boundary of the Ottawa Airport Operating Influence Zone provided the noise is attenuated. Where residential and noise sensitive uses are proposed these are subject to the preparation of a Noise Control Detailed Study and implementation of the noise study recommendations that result.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels from roadway traffic will range between 59 and 68 dBA during the daytime period (07:00-23:00) and between 51 and 61 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 68 dBA) occur along the hotel's and school's east façade, which is nearest and most exposed to Riverside Drive and Hunt Club Road. Noise levels predicted due to surface transportation sources exceed the criteria listed in Section 4.2 for building components. Therefore, upgraded building components will be required where noise levels exceed 65 dBA. As per City of Ottawa requirements, detailed Sound Transmission Class (STC) calculations will be required to be completed prior to site plan control.

In order to help address roadway traffic noise and aircraft noise, the installation of central air conditioning will be required for the senior retirement residence, hotel, school, and residential which will allow occupants to keep windows closed and maintain a comfortable living environment. Since these facilities will have central air conditioning, the ventilation requirements will be met for roadway traffic noise and aircraft noise. In addition to ventilation requirements, warning clauses will be required. Additionally, due to the school, retirement residence, and hotel being noise-sensitive, and located just outside the Airport Operating Influence Zone (AOIZ), a review of the proposed building components will be required to confirm indoor noise levels due to aircraft noise will be compliant with the ENCG. At the time of site plan control, specific noise mitigation and appropriate warning clauses will be determined.

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,

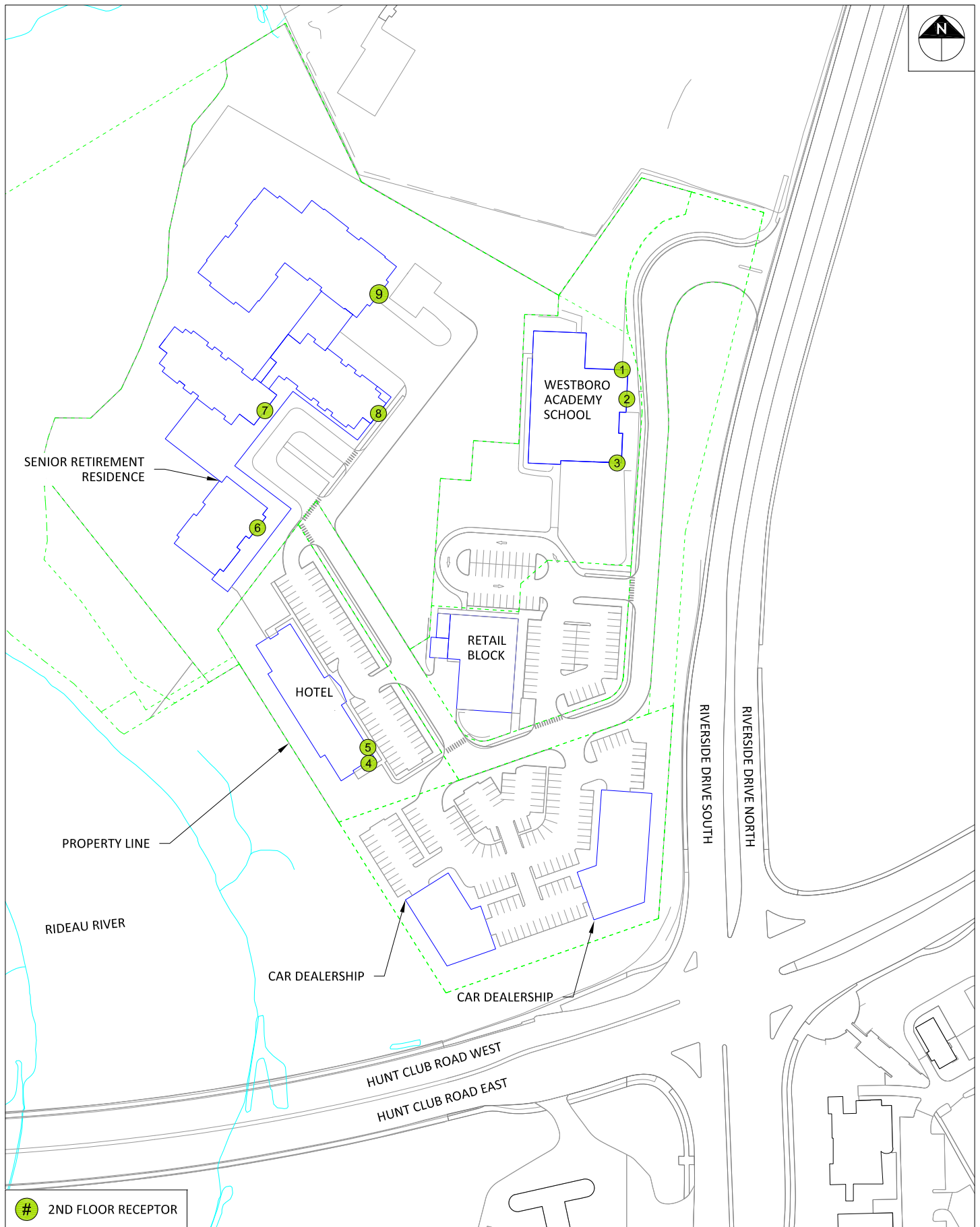
Gradient Wind Engineering Inc.



Omar Daher, B.Eng., EIT
Junior Environmental Scientist
GWE18-039



Joshua Foster, P.Eng.
Principal



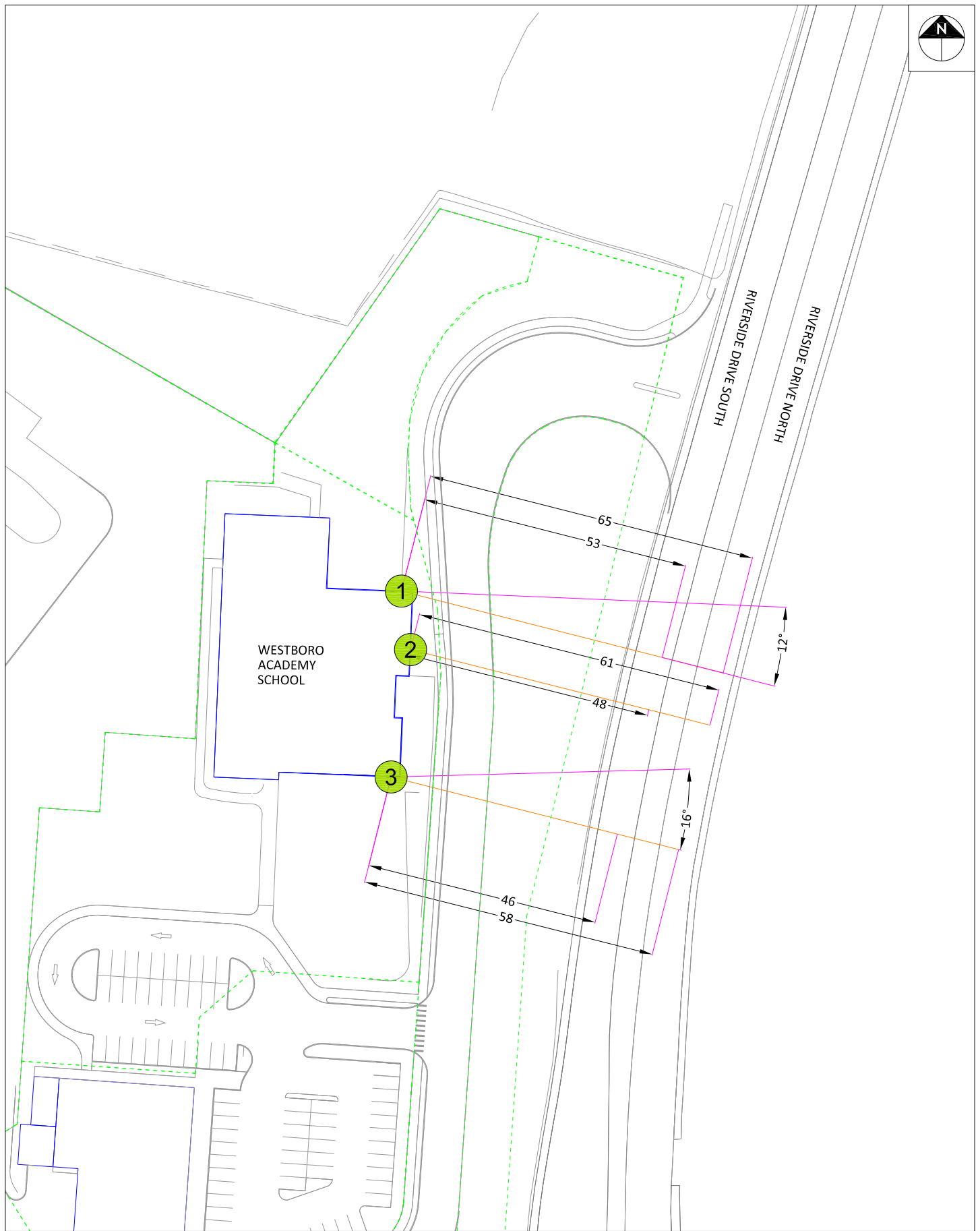
127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

GRADIENT WIND
ENGINEERING INC

PROJECT 3960 & 3930 RIVERSIDE DRIVE - NOISE FEASIBILITY ASSESSMENT		
SCALE	1:2000 (APPROX)	DRAWING NO. GWE18-039-1
DATE	MARCH 28, 2018	DRAWN BY O.D.

DESCRIPTION

FIGURE 1:
SITE PLAN, SURROUNDING CONTEXT AND RECEPTOR LOCATIONS



127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

GRADIENT WIND
ENGINEERING INC

PROJECT
3960 & 3930 RIVERSIDE DRIVE - NOISE FEASIBILITY ASSESSMENT

SCALE
1:1000 (APPROX)

DATE
MARCH 28, 2018

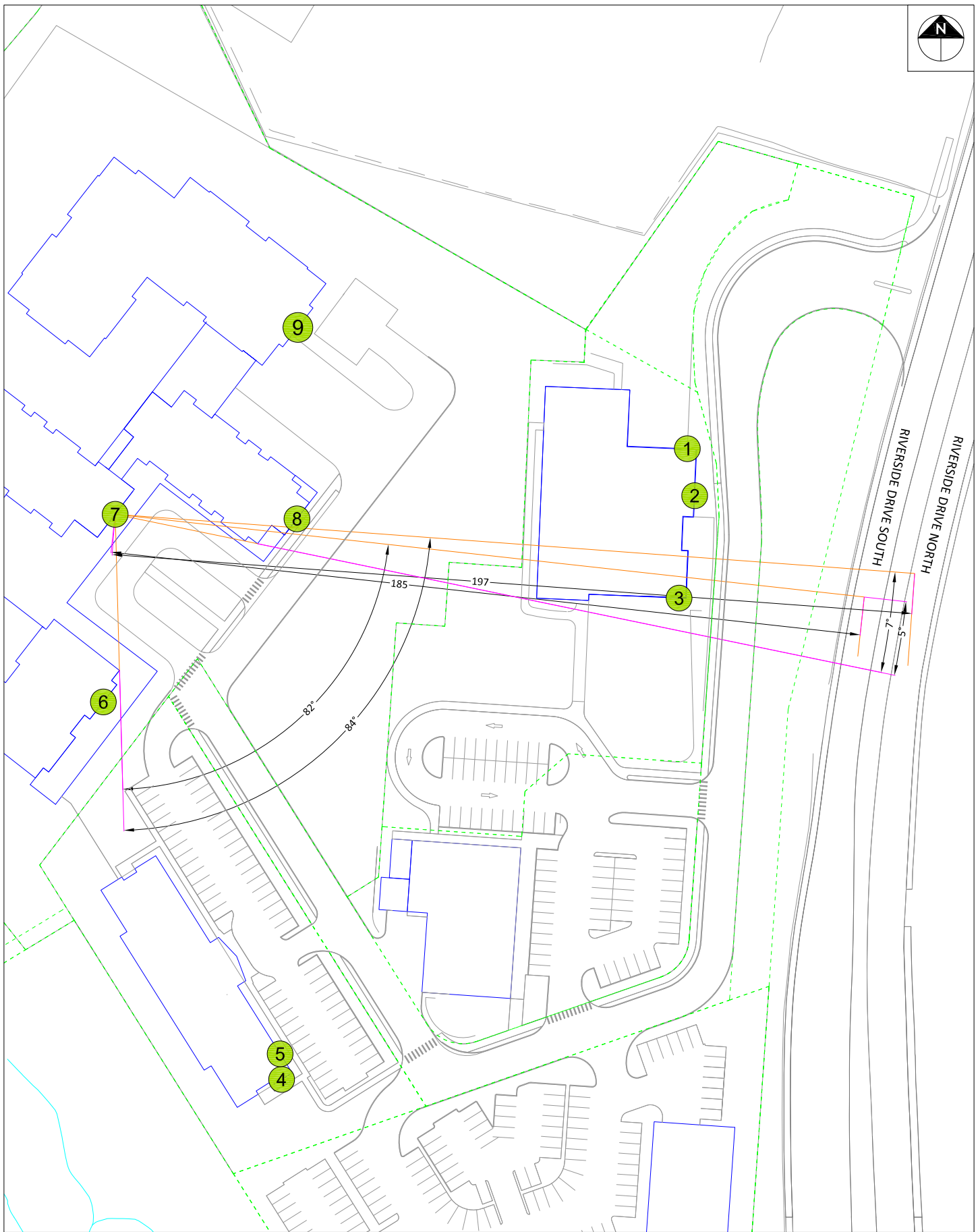
DRAWING NO.
GWE18-039-2

DRAWN BY
O.D.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS







3960 & 3930 RIVERSIDE DRIVE

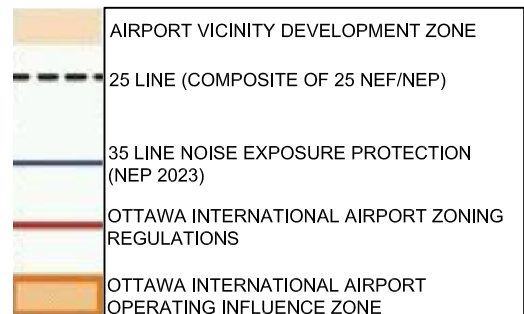
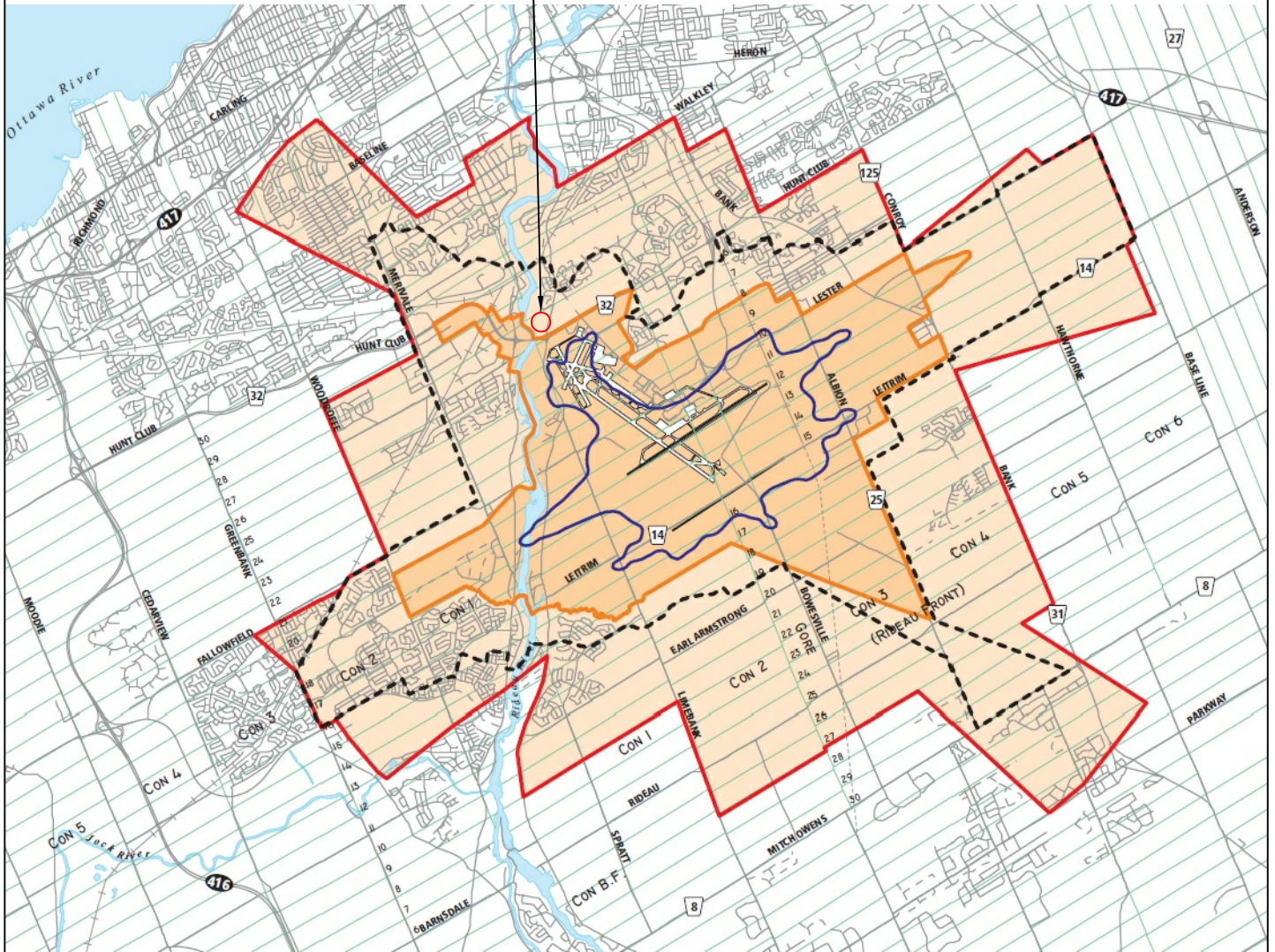


FIGURE REPRODUCED FROM THE CITY OF OTTAWA OFFICIAL PLAN - ANNEX 10 (LAND USE CONSTRAINTS DUE TO AIRCRAFT NOISE) PREPARED IN SEPTEMBER 2011

APPENDIX A

STAMSON 5.04 - INPUT AND OUTPUT DATA



STAMSON 5.0 NORMAL REPORT Date: 15-03-2018 40:30:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -90.00 deg -12.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 53.00 / 53.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

```
-----
Angle1 Angle2          : -90.00 deg  -12.00 deg
Wood depth              : 0          (No woods.)
No of house rows        : 0 / 0
Surface                 : 2          (Reflective ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height         : 4.50 / 4.50 m
Topography              : 1          (Flat/gentle slope; no barrier)
Reference angle         : 0.00
```

Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 61.55 + 0.00) = 61.55 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-12	0.00	70.67	0.00	-5.48	-3.63	0.00	0.00	0.00	61.55

Segment Leq : 61.55 dBA



Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 60.67 + 0.00) = 60.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-12	0.00	70.67	0.00	-6.37	-3.63	0.00	0.00	0.00	60.67

Segment Leq : 60.67 dBA

Total Leq All Segments: 64.14 dBA

Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 53.96 + 0.00) = 53.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-12	0.00	63.07	0.00	-5.48	-3.63	0.00	0.00	0.00	53.96

Segment Leq : 53.96 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 53.07 + 0.00) = 53.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-12	0.00	63.07	0.00	-6.37	-3.63	0.00	0.00	0.00	53.07

Segment Leq : 53.07 dBA

Total Leq All Segments: 56.55 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.14
(NIGHT): 56.55



STAMSON 5.0 NORMAL REPORT Date: 15-03-2018 40:30:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Riverside S (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: Riverside S (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 : 48.00 / 48.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Riverside N (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: Riverside N (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 : 61.00 / 61.00 m
Receiver height         : 4.50 / 4.50 m
Topography              : 1          (Flat/gentle slope; no barrier)
Reference angle         : 0.00
```

Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 65.61 + 0.00) = 65.61 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	-5.05	0.00	0.00	0.00	0.00	65.61

Segment Leq : 65.61 dBA



Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 64.57 + 0.00) = 64.57 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	-6.09	0.00	0.00	0.00	0.00	64.57

Segment Leq : 64.57 dBA

Total Leq All Segments: 68.13 dBA

Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 58.02 + 0.00) = 58.02 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	-5.05	0.00	0.00	0.00	0.00	58.02

Segment Leq : 58.02 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 56.98 + 0.00) = 56.98 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	-6.09	0.00	0.00	0.00	0.00	56.98

Segment Leq : 56.98 dBA

Total Leq All Segments: 60.54 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.13
(NIGHT): 60.54



STAMSON 5.0 NORMAL REPORT Date: 15-03-2018 40:32:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -16.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 46.00 / 46.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1	Angle2	:	-16.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	58.00 / 58.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		



Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 63.50 + 0.00) = 63.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	90	0.00	70.67	0.00	-4.87	-2.30	0.00	0.00	0.00	63.50

Segment Leq : 63.50 dBA

Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 62.49 + 0.00) = 62.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	90	0.00	70.67	0.00	-5.87	-2.30	0.00	0.00	0.00	62.49

Segment Leq : 62.49 dBA

Total Leq All Segments: 66.03 dBA



Results segment # 1: Riverside S (night)

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
-16	90	0.00	63.07	0.00	-4.87	-2.30	0.00	0.00	0.00	55.90

Segment Leq : 55.90 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 54.90 + 0.00) = 54.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	90	0.00	63.07	0.00	-5.87	-2.30	0.00	0.00	0.00	54.90

Segment Leq : 54.90 dBA

Total Leq All Segments: 58.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.03
(NIGHT): 58.44



STAMSON 5.0 NORMAL REPORT Date: 15-03-2018 40:34:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Hunt Club W (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 : 80 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: Hunt Club W (day/night)

Angle1 Angle2 : -69.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective 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

Road data, segment # 2: Hunt Club E (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	:	80 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: Hunt Club E (day/night)

Angle1	Angle2	:	-69.00 deg	90.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	135.00 / 135.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		

Road data, segment # 3: Riverside S (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: Riverside S (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	:	132.00 / 132.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		

Road data, segment # 4: Riverside N (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: Riverside N (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 : 148.00 / 148.00 m
Receiver height     : 4.50 / 4.50 m
Topography          : 1           (Flat/gentle slope; no barrier)
Reference angle     : 0.00

```

Results segment # 1: Hunt Club W (day)

Source height = 1.50 m

ROAD (0.00 + 63.59 + 0.00) = 63.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.00	73.16	0.00	-9.03	-0.54	0.00	0.00	0.00	63.59

Segment Leq : 63.59 dBA

Results segment # 2: Hunt Club E (day)

Source height = 1.50 m

ROAD (0.00 + 63.08 + 0.00) = 63.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.00	73.16	0.00	-9.54	-0.54	0.00	0.00	0.00	63.08

Segment Leq : 63.08 dBA



Results segment # 3: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 61.22 + 0.00) = 61.22 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	-9.44	0.00	0.00	0.00	0.00	61.22

Segment Leq : 61.22 dBA

Results segment # 4: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 60.72 + 0.00) = 60.72 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	-9.94	0.00	0.00	0.00	0.00	60.72

Segment Leq : 60.72 dBA

Total Leq All Segments: 68.34 dBA

Results segment # 1: Hunt Club W (night)

Source height = 1.50 m

ROAD (0.00 + 55.99 + 0.00) = 55.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.00	65.56	0.00	-9.03	-0.54	0.00	0.00	0.00	55.99

Segment Leq : 55.99 dBA



Results segment # 2: Hunt Club E (night)

Source height = 1.50 m

ROAD (0.00 + 55.48 + 0.00) = 55.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	90	0.00	65.56	0.00	-9.54	-0.54	0.00	0.00	0.00	55.48

Segment Leq : 55.48 dBA

Results segment # 3: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 53.62 + 0.00) = 53.62 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	-9.44	0.00	0.00	0.00	0.00	53.62

Segment Leq : 53.62 dBA

Results segment # 4: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 53.13 + 0.00) = 53.13 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	-9.94	0.00	0.00	0.00	0.00	53.13

Segment Leq : 53.13 dBA

Total Leq All Segments: 60.74 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.34
(NIGHT): 60.74



STAMSON 5.0 NORMAL REPORT Date: 15-03-2018 40:35:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -90.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 132.00 / 132.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1	Angle2	:	-90.00 deg	60.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	148.00 / 148.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		

Road data, segment # 3: Hunt Club W (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	:	80 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: Hunt Club W (day/night)

Angle1	Angle2	:	-90.00 deg	-19.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	126.00 / 126.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		

Road data, segment # 4: Hunt Club E (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	:	80 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: Hunt Club E (day/night)

Angle1	Angle2	:	-90.00 deg	-19.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	142.00 / 142.00 m		
Receiver height	:	4.50 / 4.50 m		
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		



Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 60.43 + 0.00) = 60.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-90	60	0.00	70.67	0.00	-9.44	-0.79	0.00	0.00	0.00	60.43
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 60.43 dBA

Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 59.93 + 0.00) = 59.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-90	60	0.00	70.67	0.00	-9.94	-0.79	0.00	0.00	0.00	59.93
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 59.93 dBA



Results segment # 3: Hunt Club W (day)

Source height = 1.50 m

ROAD (0.00 + 59.87 + 0.00) = 59.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.00	73.16	0.00	-9.24	-4.04	0.00	0.00	0.00	59.87

Segment Leq : 59.87 dBA

Results segment # 4: Hunt Club E (day)

Source height = 1.50 m

ROAD (0.00 + 59.35 + 0.00) = 59.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.00	73.16	0.00	-9.76	-4.04	0.00	0.00	0.00	59.35

Segment Leq : 59.35 dBA

Total Leq All Segments: 65.93 dBA



Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 52.83 + 0.00) = 52.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	60	0.00	63.07	0.00	-9.44	-0.79	0.00	0.00	0.00	52.83

Segment Leq : 52.83 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 52.34 + 0.00) = 52.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	60	0.00	63.07	0.00	-9.94	-0.79	0.00	0.00	0.00	52.34

Segment Leq : 52.34 dBA



Results segment # 3: Hunt Club W (night)

Source height = 1.50 m

ROAD (0.00 + 52.28 + 0.00) = 52.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.00	65.56	0.00	-9.24	-4.04	0.00	0.00	0.00	52.28

Segment Leq : 52.28 dBA

Results segment # 4: Hunt Club E (night)

Source height = 1.50 m

ROAD (0.00 + 51.76 + 0.00) = 51.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-19	0.00	65.56	0.00	-9.76	-4.04	0.00	0.00	0.00	51.76

Segment Leq : 51.76 dBA

Total Leq All Segments: 58.34 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.93
(NIGHT): 58.34



STAMSON 5.0 NORMAL REPORT Date: 14-03-2018 09:00:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Riverside S (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: Riverside S (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 : 183.00 / 183.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Riverside N (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: Riverside N (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 : 196.00 / 196.00 m
Receiver height         : 4.50 / 4.50 m
Topography              : 1          (Flat/gentle slope; no barrier)
Reference angle         : 0.00
  
```

Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 59.80 + 0.00) = 59.80 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	-10.86	0.00	0.00	0.00	0.00	59.80

Segment Leq : 59.80 dBA

Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 59.50 + 0.00) = 59.50 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	-11.16	0.00	0.00	0.00	0.00	59.50

Segment Leq : 59.50 dBA

Total Leq All Segments: 62.66 dBA



Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 52.21 + 0.00) = 52.21 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	-10.86	0.00	0.00	0.00	0.00	52.21

Segment Leq : 52.21 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 51.91 + 0.00) = 51.91 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	-11.16	0.00	0.00	0.00	0.00	51.91

Segment Leq : 51.91 dBA

Total Leq All Segments: 55.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.66
(NIGHT): 55.07



STAMSON 5.0 NORMAL REPORT Date: 14-03-2018 09:01:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 5.00 deg 82.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 185.00 / 185.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1	Angle2	:	7.00 deg	84.00 deg
Wood depth	:	0	(No woods.)	
No of house rows	:	0 / 0		
Surface	:	2	(Reflective ground surface)	
Receiver source distance	:	197.00 / 197.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		



Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 56.07 + 0.00) = 56.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	82	0.00	70.67	0.00	-10.91	-3.69	0.00	0.00	0.00	56.07

Segment Leq : 56.07 dBA

Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 55.79 + 0.00) = 55.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
7	84	0.00	70.67	0.00	-11.18	-3.69	0.00	0.00	0.00	55.79

Segment Leq : 55.79 dBA

Total Leq All Segments: 58.94 dBA



Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 48.47 + 0.00) = 48.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	82	0.00	63.07	0.00	-10.91	-3.69	0.00	0.00	0.00	48.47

Segment Leq : 48.47 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 48.20 + 0.00) = 48.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
7	84	0.00	63.07	0.00	-11.18	-3.69	0.00	0.00	0.00	48.20

Segment Leq : 48.20 dBA

Total Leq All Segments: 51.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.94
(NIGHT): 51.35



STAMSON 5.0 NORMAL REPORT Date: 14-03-2018 09:02:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Riverside S (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: Riverside S (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 : 142.00 / 142.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Riverside N (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: Riverside N (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	:	154.00 / 154.00	m	
Receiver height	:	4.50 / 4.50	m	
Topography	:	1	(Flat/gentle slope; no barrier)	
Reference angle	:	0.00		



Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 60.90 + 0.00) = 60.90 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	-9.76	0.00	0.00	0.00	0.00	60.90

Segment Leq : 60.90 dBA

Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 60.55 + 0.00) = 60.55 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	-10.11	0.00	0.00	0.00	0.00	60.55

Segment Leq : 60.55 dBA

Total Leq All Segments: 63.74 dBA



Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 53.31 + 0.00) = 53.31 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	-9.76	0.00	0.00	0.00	0.00	53.31

Segment Leq : 53.31 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 52.95 + 0.00) = 52.95 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	-10.11	0.00	0.00	0.00	0.00	52.95

Segment Leq : 52.95 dBA

Total Leq All Segments: 56.14 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.74
(NIGHT): 56.14



STAMSON 5.0 NORMAL REPORT Date: 14-03-2018 09:02:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Riverside S (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: Riverside S (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 : 153.00 / 153.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Riverside N (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: Riverside N (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 : 165.00 / 165.00 m
Receiver height     : 4.50 / 4.50 m
Topography          : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

Results segment # 1: Riverside S (day)

Source height = 1.50 m

ROAD (0.00 + 60.58 + 0.00) = 60.58 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	-10.09	0.00	0.00	0.00	0.00	60.58

Segment Leq : 60.58 dBA



Results segment # 2: Riverside N (day)

Source height = 1.50 m

ROAD (0.00 + 60.25 + 0.00) = 60.25 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	-10.41	0.00	0.00	0.00	0.00	60.25

Segment Leq : 60.25 dBA

Total Leq All Segments: 63.43 dBA

Results segment # 1: Riverside S (night)

Source height = 1.50 m

ROAD (0.00 + 52.98 + 0.00) = 52.98 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	-10.09	0.00	0.00	0.00	0.00	52.98

Segment Leq : 52.98 dBA

Results segment # 2: Riverside N (night)

Source height = 1.50 m

ROAD (0.00 + 52.66 + 0.00) = 52.66 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	-10.41	0.00	0.00	0.00	0.00	52.66

Segment Leq : 52.66 dBA

Total Leq All Segments: 55.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.43
(NIGHT): 55.83