

# GRADIENTWIND

ENGINEERS & SCIENTISTS

## ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

1009 Trim Road  
Ottawa, Ontario

Report: GW20-087-T.Noise Feasibility R2



December 15, 2021

PREPARED FOR  
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## EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken in support of a joint Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) application submission for a proposed multi-building development located at 1009 Trim Road in Ottawa, Ontario. The site comprises four proposed buildings, including Building A (28 storeys), Building B (32 storeys), Building C (28 storeys), and Building D (24 storeys). The major sources of traffic noise are re-aligned Trim Road to the southeast of the site, Jeanne D'Arc Boulevard North to the southwest of the site, and Highway 174 to the south. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings prepared by Roderick Lahey Architecture Inc. (RLA) in November 2021.

The results of the current analysis indicate that POW noise levels will range between 65 and 71 dBA during the daytime period (07:00-23:00) and between 57 and 63 dBA during the nighttime period (23:00-07:00). The highest noise levels occur at the south façade of Building B-D, which are nearest and most exposed to Highway 174.

The noise levels predicted due to roadway traffic exceed to criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels due to roadway traffic exceed 65 dBA, as discussed in Section 4.2.1. Results also indicate that each building is expected to require air condition, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required to be placed on all Lease, Purchase, and Sale Agreements. Specific noise control measures can be developed once the design of the building has progressed sufficiently, typically at the time of the site plan control application.

The results indicate that the noise levels at the grade-level outdoor amenity area situated at the northwest corner of the site will be 52 dBA. Therefore, noise control measures are not expected to be required.



Should the need arise for OLA mitigation, this will be explored in more detail at the time of the site plan control application.

A detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regard to stationary noise impacts of the development's mechanical equipment onto surrounding noise sensitive properties, a stationary noise study will be performed for the site during the time of site plan approval or detailed design whenever the mechanical plans become available. This study would assess impacts of stationary noise from rooftop mechanical units and any other stationary sources serving the proposed building on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. The best noise strategy would be to locate noisier pieces of equipment on the center of the roof or in a mechanical penthouse. Where necessary noise screens and silencers can be incorporated into the design.

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## **1. INTRODUCTION**

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 9378-0633 Québec Inc. to undertake a roadway traffic noise feasibility assessment in support of a joint official plan amendment (OPA) and zoning by-law amendment (ZBA) application submission for a proposed multi-building development located at 1009 Trim Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa<sup>1</sup> and Ministry of the Environment, Conservation and Parks (MECP)<sup>2</sup> guidelines. Noise calculations were based on architectural drawings prepared by RLA Architecture in November 2021, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

## **2. TERMS OF REFERENCE**

The focus of this roadway traffic noise feasibility assessment is a proposed multi-building development located at 1009 Trim Road in Ottawa, Ontario. The subject site is situated on an irregular parcel of land bounded by Jeanne d'Arc Boulevard North to the south, Trim Road to the west, and vacant land to the north and east.

The site comprises four proposed buildings, including Building A (28 storeys), Building B (32 storeys), Building C (28 storeys), and Building D (24 storeys). The development will be focused on the south side of the site along Inlet Private. Green space and a body of water occupy the remaining land, north of the high-water mark. Vehicular parking will be provided below grade at two levels. The first floor comprises retail/commercial space. The 2<sup>nd</sup> Floor comprises office space in Building A and B, and residential space in Building C and D. The remaining floors comprise residential space. Outdoor amenity areas are provided at grade level at the northwest corner of the site. As per the ENCG, balconies and terraces extending less than 4 metres from the façade do not require consideration as outdoor living areas (OLA) and therefore

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<sup>1</sup> City of Ottawa Environmental Noise Control Guidelines, January 2016

<sup>2</sup> Ontario Ministry of the Environment, Conservation and Parks – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013



have not been considered in this assessment. The grade-level outdoor amenity space has been considered as an OLA.

The site is surrounded by primarily green space from the southwest clockwise to the northeast with a marina and the Ottawa River to the north, the Petrie's Landing high-rise development to the east, and a mixture of green space and existing low-rise industrial buildings to the south along the north side of Highway 174.

The major sources of traffic noise are re-aligned Trim Road, Jeanne d'Arc Boulevard North, and Highway 174. The future LRT corridor, situated along the centre median of Highway 174, is located beyond 100 metres of the study site and therefore are not included as sources influencing the study site as per ENCG Section 2.1. Figure 1 illustrates a complete site plan with surrounding context.

### **3. OBJECTIVES**

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) explore potential noise mitigation options, where required.

### **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 ( $2 \times 10^{-5}$  Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.



## 4.2 Roadway Traffic Noise

### 4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level,  $L_{eq}$ , provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the  $L_{eq}$  is commonly calculated on the basis of a 16-hour ( $L_{eq16}$ ) daytime (07:00-23:00) / 8-hour ( $L_{eq8}$ ) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

**TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) <sup>3</sup>**

Type of Space	Time Period	$L_{eq}$ (dBA)
General offices, reception areas, <b>retail stores</b> , etc.	07:00 – 23:00	50
Living/dining/den areas of <b>residences</b> , 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 <b>residences</b> , hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction<sup>4</sup>. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment<sup>5</sup>. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers the need

<sup>3</sup> Adapted from ENCG 2016 – Tables 2.2b and 2.2c

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

<sup>5</sup> MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8



for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation<sup>6</sup>.

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. For noise levels between 55 dBA and 60 dBA, mitigation measures, such as noise barriers, should be considered.

#### **4.2.2 Theoretical Roadway Noise Predictions**

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

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be absorptive due to the presence of soft (lawn) ground.
- Topography was assumed to be a flat/gentle slope surrounding the subject site.
- For select sources where appropriate, the receptors considered the proposed buildings as well as existing and future approved buildings as barriers, partially or fully obstructing exposure to the source as illustrated by exposure angles in Figures 3-9.
- Noise receptors were strategically placed at five locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-5.

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<sup>6</sup> MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3





### 4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan<sup>7</sup> 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.

To accommodate the proposed Trim Station of the future light rail transit (LRT) Confederation Line East Extension at the centre of Highway 174, Trim Road will be relocated east of its current location. The re-aligned roadway has been considered in this analysis. Based on the City of Ottawa Transportation Master Plan, to the east of Trim Road, Highway 174 will be widened from 2 lanes to 4 lanes and to the west of Trim Road, the highway will be widened from 4 lanes to 6 lanes. The future widened highway has been considered in this analysis. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

**TABLE 2: ROADWAY TRAFFIC DATA**

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Trim Road	2-Lane Major Collector	50	<b>12,000</b>
Jeanne d'Arc Boulevard North	2-Lane Major Collector	50	<b>12,000</b>
Highway 174	4-Lane Freeway	90	<b>73,332</b>

<sup>7</sup> City of Ottawa Transportation Master Plan, November 2013



## 5. RESULTS AND DISCUSSION

### 5.1 Roadway Traffic Noise Levels

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

**TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC**

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	66	Building A – POW – Level 22 – West Façade	65	57
2	66	Building B – POW – Level 22 – South Façade	71	63
3	66	Building C – POW – Level 22 – South Façade	71	63
4	66	Building D – POW – Level 22 – South Façade	70	63
5	1.5	OLA – Ground Level Amenity	52	N/A



## **6. CONCLUSIONS AND RECOMMENDATIONS**

The results of the current analysis indicate that POW noise levels will range between 65 and 71 dBA during the daytime period (07:00-23:00) and between 57 and 63 dBA during the nighttime period (23:00-07:00). The highest noise levels occur at the south façade of Building B-D, which are nearest and most exposed to Highway 174.

The noise levels predicted due to roadway traffic exceed to criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels due to roadway traffic exceed 65 dBA, as discussed in Section 4.2.1. Results also indicate that each building is expected to require air condition, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required to be placed on all Lease, Purchase, and Sale Agreements. Specific noise control measures can be developed once the design of the building has progressed sufficiently, typically at the time of the site plan control application.

The results indicate that the noise levels at the grade-level outdoor amenity area situated at the northwest corner of the site will be 52 dBA. Therefore, noise control measures are not expected to be required. Should the need arise for OLA mitigation, this will be explored in more detail at the time of the site plan control application.

A detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With regard to stationary noise impacts of the development's mechanical equipment onto surrounding noise sensitive properties, a stationary noise study will be performed for the site during the time of site plan approval or detailed design whenever the mechanical plans become available. This study would assess impacts of stationary noise from rooftop mechanical units and any other stationary sources serving the proposed building on surrounding noise-sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. Noise impacts can generally be minimized by judicious selection and placement of the equipment. The best noise strategy would be to locate noisier pieces of equipment on the center of the roof or in a mechanical penthouse. Where necessary noise screens and silencers can be incorporated into the design.



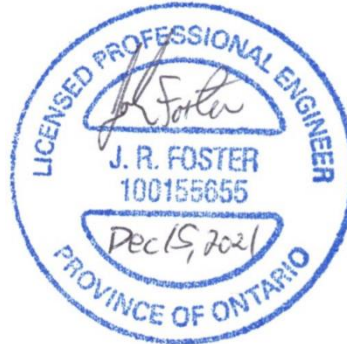
This concludes our roadway traffic noise feasibility assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

***Gradient Wind Engineering Inc.***



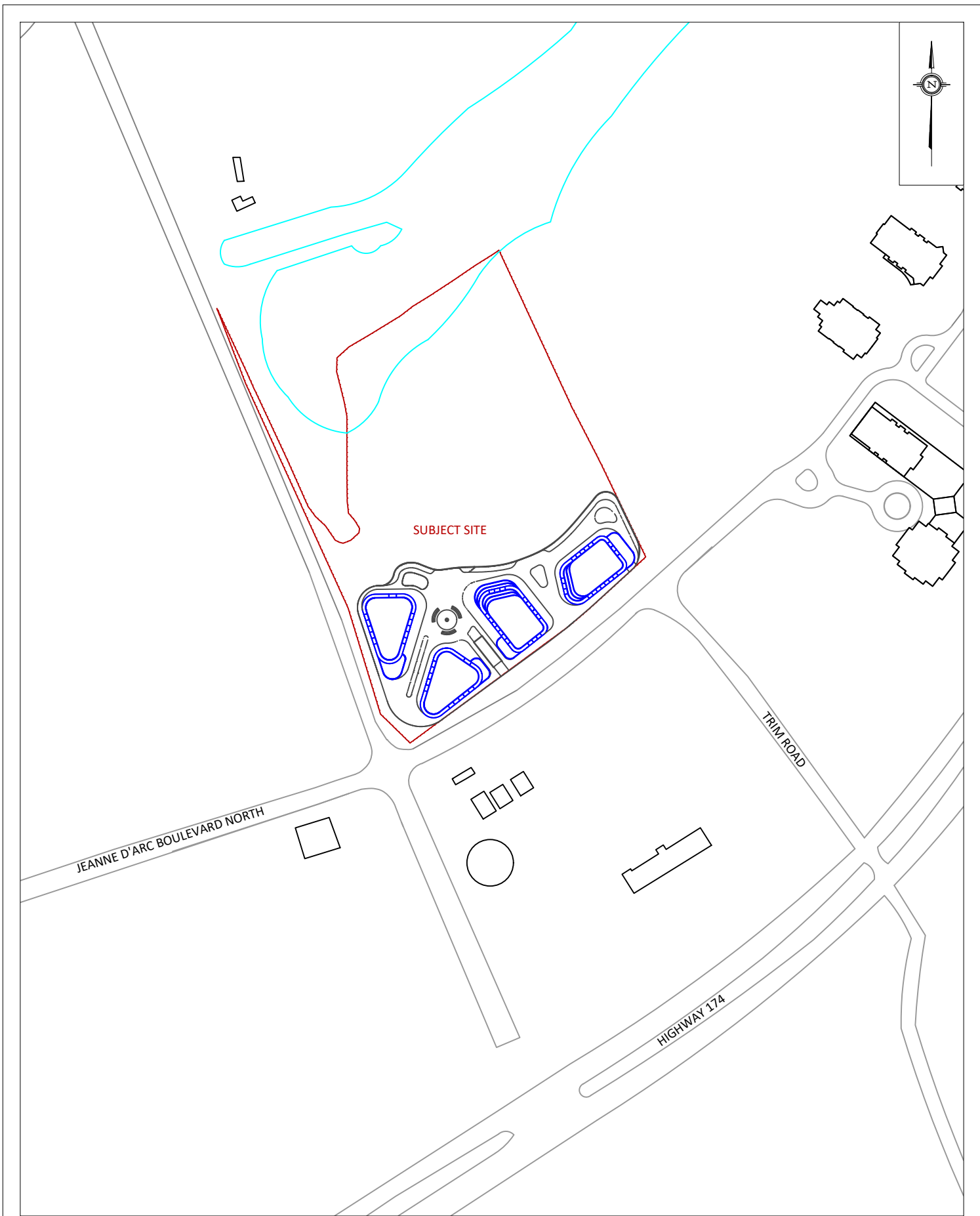
Michael Lafortune, C.E.T.  
Environmental Scientist

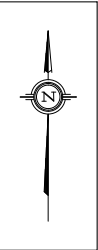


Joshua Foster, P.Eng.  
Lead Engineer

*Gradient Wind File #20-087-T.Noise Feasibility R2*



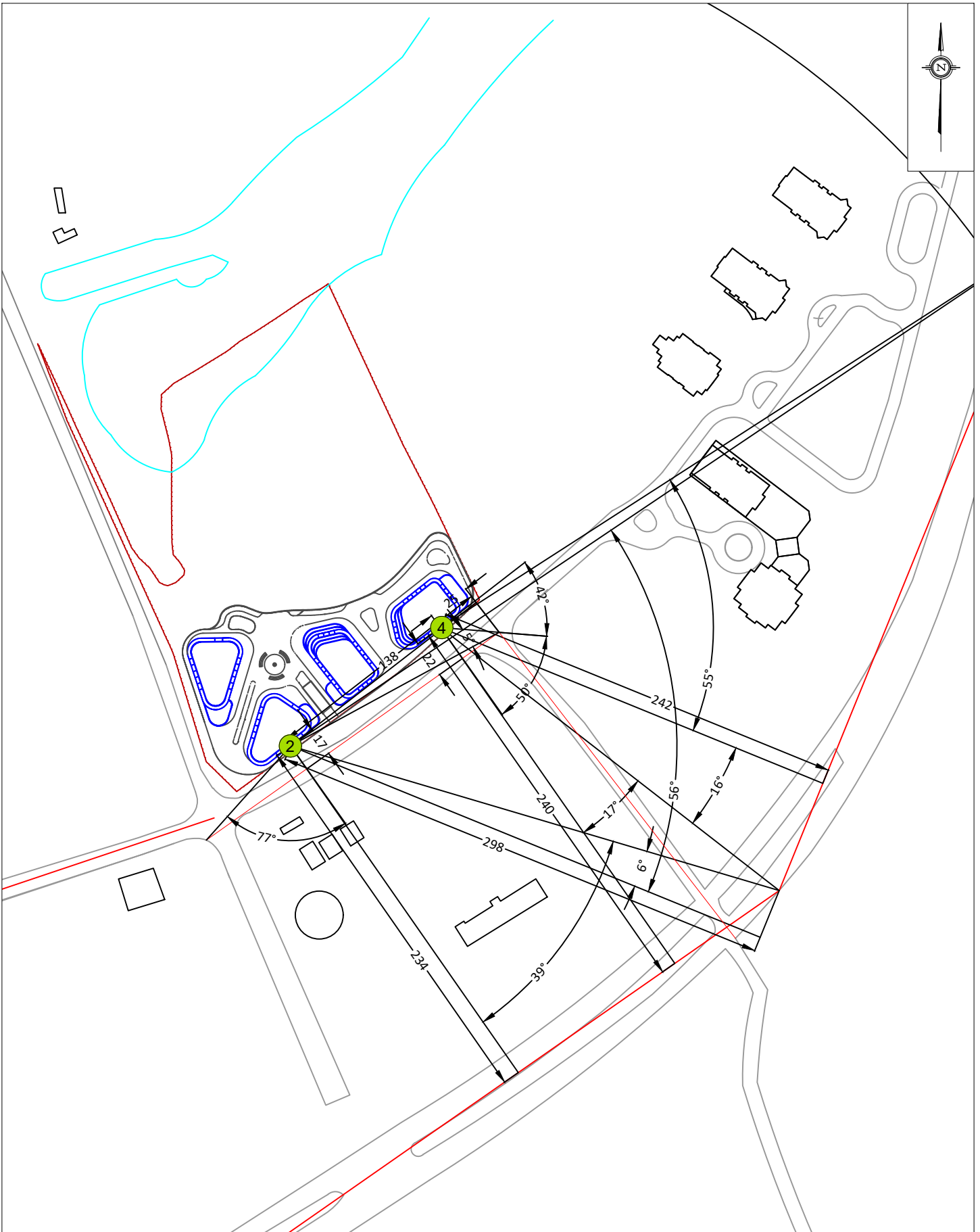




- # OLA RECEPTOR
- # POW RECEPTOR

PROJECT	1009 TRIM ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT	
SCALE	1:1000 (APPROX.)	DRAWING NO. GW20-087-2
DATE	DECEMBER 15, 2021	DRAWN BY M.L.









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## APPENDIX A

### STAMSON 5.04 – INPUT AND OUTPUT DATA

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STAMSON 5.0                      NORMAL REPORT                      Date: 08-12-2021 15:45:23  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 9715/845      veh/TimePeriod \*  
Medium truck volume : 773/67      veh/TimePeriod \*  
Heavy truck volume : 552/48      veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1    Angle2 : 0.00 deg    90.00 deg  
Wood depth : 0    (No woods.)  
No of house rows : 0 / 0  
Surface : 2    (Reflective ground surface)  
Receiver source distance : 68.00 / 68.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1    (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Road data, segment # 2: 174 (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174 (day/night)

-----  
Angle1 Angle2 : 16.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 285.00 / 285.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Results segment # 1: JAB (day)

Source height = 1.50 m

ROAD (0.00 + 57.94 + 0.00) = 57.94 dBA

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

0	90	0.00	67.51	0.00	-6.56	-3.01	0.00	0.00	0.00
57.94									

Segment Leq : 57.94 dBA

Results segment # 2: 174 (day)

Source height = 1.50 m

ROAD (0.00 + 63.79 + 0.00) = 63.79 dBA

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

16	90	0.00	80.43	0.00	-12.79	-3.86	0.00	0.00	0.00
63.79									

Segment Leq : 63.79 dBA

Total Leq All Segments: 64.79 dBA



Results segment # 1: JAB (night)

Source height = 1.50 m

ROAD (0.00 + 50.34 + 0.00) = 50.34 dBA

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

0	90	0.00	59.91	0.00	-6.56	-3.01	0.00	0.00	0.00
50.34									

Segment Leq : 50.34 dBA

Results segment # 2: 174 (night)

Source height = 1.49 m

ROAD (0.00 + 56.19 + 0.00) = 56.19 dBA

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

16	90	0.00	72.84	0.00	-12.79	-3.86	0.00	0.00	0.00
56.19									

Segment Leq : 56.19 dBA

Total Leq All Segments: 57.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.79  
(NIGHT): 57.19



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STAMSON 5.0                      NORMAL REPORT                      Date: 15-12-2021 13:26:30  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 9715/845      veh/TimePeriod \*  
Medium truck volume : 773/67      veh/TimePeriod \*  
Heavy truck volume : 552/48      veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1    Angle2 : 5.00 deg    90.00 deg  
Wood depth : 0    (No woods.)  
No of house rows : 0 / 0  
Surface : 2    (Reflective ground surface)  
Receiver source distance : 138.00 / 138.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1    (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Road data, segment # 2: 174L (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174L (day/night)

-----  
Angle1 Angle2 : -56.00 deg -6.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 298.00 / 298.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00





Road data, segment # 3: 174R (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174R (day/night)

-----  
Angle1 Angle2 : -39.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 234.00 / 234.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



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

-----  
Car traffic volume : 9715/845 veh/TimePeriod \*  
Medium truck volume : 773/67 veh/TimePeriod \*  
Heavy truck volume : 552/48 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1 Angle2 : -90.00 deg 77.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 17.00 / 17.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



## Results segment # 1: Trim (day)

Source height = 1.50 m

ROAD (0.00 + 54.61 + 0.00) = 54.61 dBA

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

5	90	0.00	67.51	0.00	-9.64	-3.26	0.00	0.00	0.00
54.61									

Segment Leq : 54.61 dBA

## Results segment # 2: 174L (day)

Source height = 1.50 m

ROAD (0.00 + 61.89 + 0.00) = 61.89 dBA

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

-56	-6	0.00	80.43	0.00	-12.98	-5.56	0.00	0.00	0.00
61.89									

Segment Leq : 61.89 dBA



Results segment # 3: 174R (day)

Source height = 1.50 m

ROAD (0.00 + 67.06 + 0.00) = 67.06 dBA

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

-39	90	0.00	80.43	0.00	-11.93	-1.45	0.00	0.00	0.00
67.06									

Segment Leq : 67.06 dBA

Results segment # 4: JAB (day)

Source height = 1.50 m

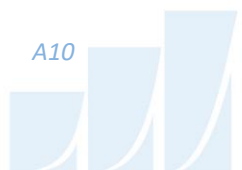
ROAD (0.00 + 66.64 + 0.00) = 66.64 dBA

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

-90	77	0.00	67.51	0.00	-0.54	-0.33	0.00	0.00	0.00
66.64									

Segment Leq : 66.64 dBA

Total Leq All Segments: 70.62 dBA



Results segment # 1: Trim (night)

Source height = 1.50 m

ROAD (0.00 + 47.02 + 0.00) = 47.02 dBA

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

5	90	0.00	59.91	0.00	-9.64	-3.26	0.00	0.00	0.00
47.02									

Segment Leq : 47.02 dBA

Results segment # 2: 174L (night)

Source height = 1.49 m

ROAD (0.00 + 54.29 + 0.00) = 54.29 dBA

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

-56	-6	0.00	72.84	0.00	-12.98	-5.56	0.00	0.00	0.00
54.29									

Segment Leq : 54.29 dBA



Results segment # 3: 174R (night)

Source height = 1.49 m

ROAD (0.00 + 59.46 + 0.00) = 59.46 dBA

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

-39	90	0.00	72.84	0.00	-11.93	-1.45	0.00	0.00	0.00
59.46									

Segment Leq : 59.46 dBA

Results segment # 4: JAB (night)

Source height = 1.50 m

ROAD (0.00 + 59.04 + 0.00) = 59.04 dBA

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

-90	77	0.00	59.91	0.00	-0.54	-0.33	0.00	0.00	0.00
59.04									

Segment Leq : 59.04 dBA

Total Leq All Segments: 63.02 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.62  
(NIGHT): 63.02



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 15-12-2021 13:28:54  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 9715/845      veh/TimePeriod \*  
Medium truck volume : 773/67      veh/TimePeriod \*  
Heavy truck volume : 552/48      veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Trim (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 : 81.00 / 81.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1    (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Road data, segment # 2: 174L (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174L (day/night)

-----  
Angle1 Angle2 : -56.00 deg 4.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 270.00 / 270.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00





Road data, segment # 3: 174R (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174R (day/night)

-----  
Angle1 Angle2 : -29.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 237.00 / 237.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



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

-----  
Car traffic volume : 9715/845 veh/TimePeriod \*  
Medium truck volume : 773/67 veh/TimePeriod \*  
Heavy truck volume : 552/48 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 4: JAB (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 : 19.00 / 19.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Results segment # 1: Trim (day)

Source height = 1.50 m

ROAD (0.00 + 56.33 + 0.00) = 56.33 dBA

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

16	90	0.00	67.51	0.00	-7.32	-3.86	0.00	0.00	0.00
56.33									

Segment Leq : 56.33 dBA

Results segment # 2: 174L (day)

Source height = 1.50 m

ROAD (0.00 + 63.11 + 0.00) = 63.11 dBA

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

-56	4	0.00	80.43	0.00	-12.55	-4.77	0.00	0.00	0.00
63.11									

Segment Leq : 63.11 dBA



Results segment # 3: 174R (day)

Source height = 1.50 m

ROAD (0.00 + 66.65 + 0.00) = 66.65 dBA

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

-29	90	0.00	80.43	0.00	-11.99	-1.80	0.00	0.00	0.00
66.65									

Segment Leq : 66.65 dBA

Results segment # 4: JAB (day)

Source height = 1.50 m

ROAD (0.00 + 66.48 + 0.00) = 66.48 dBA

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

-90	90	0.00	67.51	0.00	-1.03	0.00	0.00	0.00	0.00
66.48									

Segment Leq : 66.48 dBA

Total Leq All Segments: 70.62 dBA



Results segment # 1: Trim (night)

Source height = 1.50 m

ROAD (0.00 + 48.73 + 0.00) = 48.73 dBA

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

16	90	0.00	59.91	0.00	-7.32	-3.86	0.00	0.00	0.00
48.73									

Segment Leq : 48.73 dBA

Results segment # 2: 174L (night)

Source height = 1.49 m

ROAD (0.00 + 55.51 + 0.00) = 55.51 dBA

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

-56	4	0.00	72.84	0.00	-12.55	-4.77	0.00	0.00	0.00
55.51									

Segment Leq : 55.51 dBA



Results segment # 3: 174R (night)

Source height = 1.49 m

ROAD (0.00 + 59.05 + 0.00) = 59.05 dBA

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

-29	90	0.00	72.84	0.00	-11.99	-1.80	0.00	0.00	0.00
59.05									

Segment Leq : 59.05 dBA

Results segment # 4: JAB (night)

Source height = 1.50 m

ROAD (0.00 + 58.89 + 0.00) = 58.89 dBA

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

-90	90	0.00	59.91	0.00	-1.03	0.00	0.00	0.00	0.00
58.89									

Segment Leq : 58.89 dBA

Total Leq All Segments: 63.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.62  
(NIGHT): 63.03

# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 15-12-2021 13:32:14  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: 174L (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174L (day/night)

-----  
Angle1 Angle2 : -55.00 deg 16.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 242.00 / 242.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Road data, segment # 2: 174R (day/night)

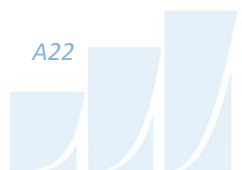
-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332  
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: 174R (day/night)

-----  
Angle1 Angle2 : -17.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 240.00 / 240.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00





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

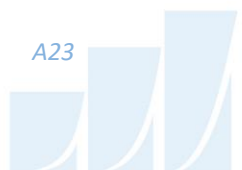
-----  
Car traffic volume : 9715/845 veh/TimePeriod \*  
Medium truck volume : 773/67 veh/TimePeriod \*  
Heavy truck volume : 552/48 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1 Angle2 : 42.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 25.00 / 25.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



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

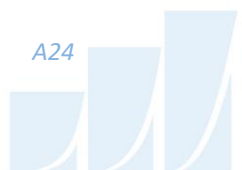
-----  
Car traffic volume : 9715/845 veh/TimePeriod \*  
Medium truck volume : 773/67 veh/TimePeriod \*  
Heavy truck volume : 552/48 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1 Angle2 : -50.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 22.00 / 22.00 m  
Receiver height : 66.00 / 66.00 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Results segment # 1: 174L (day)

Source height = 1.50 m

ROAD (0.00 + 64.32 + 0.00) = 64.32 dBA

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

-55	16	0.00	80.43	0.00	-12.08	-4.04	0.00	0.00	0.00
64.32									

Segment Leq : 64.32 dBA

Results segment # 2: 174R (day)

Source height = 1.50 m

ROAD (0.00 + 66.13 + 0.00) = 66.13 dBA

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

-17	90	0.00	80.43	0.00	-12.04	-2.26	0.00	0.00	0.00
66.13									

Segment Leq : 66.13 dBA



Results segment # 3: Trim (day)

Source height = 1.50 m

ROAD (0.00 + 59.55 + 0.00) = 59.55 dBA

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

42	90	0.00	67.51	0.00	-2.22	-5.74	0.00	0.00	0.00
59.55									

Segment Leq : 59.55 dBA

Results segment # 4: JAB (day)

Source height = 1.50 m

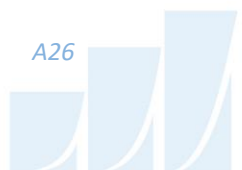
ROAD (0.00 + 64.76 + 0.00) = 64.76 dBA

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

-50	90	0.00	67.51	0.00	-1.66	-1.09	0.00	0.00	0.00
64.76									

Segment Leq : 64.76 dBA

Total Leq All Segments: 70.29 dBA



Results segment # 1: 174L (night)

Source height = 1.49 m

ROAD (0.00 + 56.72 + 0.00) = 56.72 dBA

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

-55	16	0.00	72.84	0.00	-12.08	-4.04	0.00	0.00	0.00
56.72									

Segment Leq : 56.72 dBA

Results segment # 2: 174R (night)

Source height = 1.49 m

ROAD (0.00 + 58.54 + 0.00) = 58.54 dBA

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

-17	90	0.00	72.84	0.00	-12.04	-2.26	0.00	0.00	0.00
58.54									

Segment Leq : 58.54 dBA



## Results segment # 3: Trim (night)

Source height = 1.50 m

ROAD (0.00 + 51.95 + 0.00) = 51.95 dBA

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

42	90	0.00	59.91	0.00	-2.22	-5.74	0.00	0.00	0.00
51.95									

Segment Leq : 51.95 dBA

## Results segment # 4: JAB (night)

Source height = 1.50 m

ROAD (0.00 + 57.16 + 0.00) = 57.16 dBA

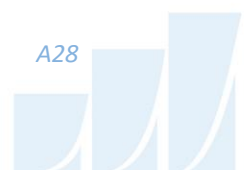
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
SubLeq									

-50	90	0.00	59.91	0.00	-1.66	-1.09	0.00	0.00	0.00
57.16									

Segment Leq : 57.16 dBA

Total Leq All Segments: 62.70 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.29  
(NIGHT): 62.70



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 15-12-2021 13:34:23  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: 174L (day/night)

-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 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): 73332  
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: 174L (day/night)

-----  
Angle1    Angle2 : -48.00 deg    4.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 352.00 / 352.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -43.00 deg    Angle2 : 4.00 deg  
Barrier height : 30.00 m  
Barrier receiver distance : 112.00 / 112.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



Road data, segment # 2: 174C (day/night)

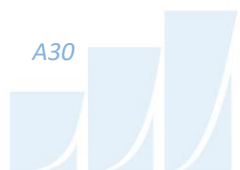
-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332  
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: 174C (day/night)

-----  
Angle1 Angle2 : -29.00 deg -5.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 309.00 / 309.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -29.00 deg Angle2 : -15.00 deg  
Barrier height : 30.00 m  
Barrier receiver distance : 75.00 / 75.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00





Road data, segment # 3: 174R (day/night)

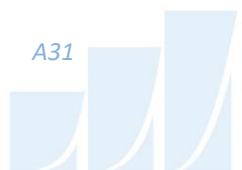
-----  
Car traffic volume : 59370/5163 veh/TimePeriod \*  
Medium truck volume : 4723/411 veh/TimePeriod \*  
Heavy truck volume : 3373/293 veh/TimePeriod \*  
Posted speed limit : 90 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332  
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: 174R (day/night)

-----  
Angle1 Angle2 : -5.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 309.00 / 309.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -5.00 deg Angle2 : 90.00 deg  
Barrier height : 30.00 m  
Barrier receiver distance : 75.00 / 75.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



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

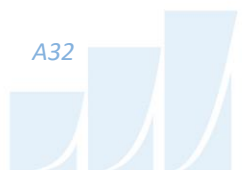
-----  
Car traffic volume : 9715/845 veh/TimePeriod \*  
Medium truck volume : 773/67 veh/TimePeriod \*  
Heavy truck volume : 552/48 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000  
Percentage of Annual Growth : 0.00  
Number of Years of Growth : 0.00  
Medium Truck % of Total Volume : 7.00  
Heavy Truck % of Total Volume : 5.00  
Day (16 hrs) % of Total Volume : 92.00

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

-----  
Angle1 Angle2 : -15.00 deg -5.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 92.00 / 92.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Results segment # 1: 174L (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	1.50	1.50

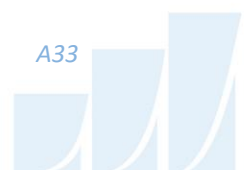
ROAD (41.10 + 40.90 + 0.00) = 44.01 dBA

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

-48	-43	0.66	80.43	0.00	-22.75	-16.58	0.00	0.00	0.00
41.10									

-43	4	0.00	80.43	0.00	-13.70	-5.83	0.00	0.00	-20.00
40.90									

Segment Leq : 44.01 dBA



Results segment # 2: 174C (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	1.50	1.50

ROAD (0.00 + 36.20 + 46.02) = 46.45 dBA

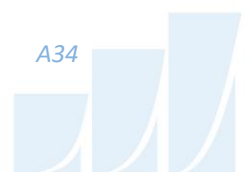
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-29	-15	0.00	80.43	0.00	-13.14	-11.09	0.00	0.00	-20.00
-15	-5	0.66	80.43	0.00	-21.81	-12.60	0.00	0.00	0.00

SubLeq

36.20

46.02

Segment Leq : 46.45 dBA



Results segment # 3: 174R (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	1.50	1.50

ROAD (0.00 + 46.07 + 0.00) = 46.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-5	90	0.00	80.43	0.00	-13.14	-2.78	0.00	0.00	-18.45

46.07

Segment Leq : 46.07 dBA



## Results segment # 4: JAB (day)

Source height = 1.50 m

ROAD (0.00 + 47.08 + 0.00) = 47.08 dBA

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

-15	-5	0.00	67.51	0.00	-7.88	-12.55	0.00	0.00	0.00
47.08									

Segment Leq : 47.08 dBA

Total Leq All Segments: 52.06 dBA

## Results segment # 1: 174L (night)

Source height = 1.49 m

Barrier height for grazing incidence

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

ROAD (33.50 + 33.30 + 0.00) = 36.41 dBA

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

-48	-43	0.66	72.84	0.00	-22.75	-16.58	0.00	0.00	0.00
33.50									

-43	4	0.00	72.84	0.00	-13.70	-5.83	0.00	0.00	-20.00
33.30									

Segment Leq : 36.41 dBA



Results segment # 2: 174C (night)

Source height = 1.49 m

Barrier height for grazing incidence

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

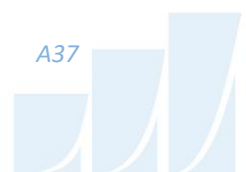
ROAD (0.00 + 28.61 + 38.43) = 38.86 dBA

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

-29	-15	0.00	72.84	0.00	-13.14	-11.09	0.00	0.00	-20.00
28.61									

-15	-5	0.66	72.84	0.00	-21.81	-12.60	0.00	0.00	0.00
38.43									

Segment Leq : 38.86 dBA



Results segment # 3: 174R (night)

Source height = 1.49 m

Barrier height for grazing incidence

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

ROAD (0.00 + 38.48 + 0.00) = 38.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-5	90	0.00	72.84	0.00	-13.14	-2.78	0.00	0.00	-18.45

SubLeq

38.48

Segment Leq : 38.48 dBA

Results segment # 4: JAB (night)

Source height = 1.50 m

ROAD (0.00 + 39.48 + 0.00) = 39.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-15	-5	0.00	59.91	0.00	-7.88	-12.55	0.00	0.00	0.00

SubLeq

39.48

Segment Leq : 39.48 dBA

Total Leq All Segments: 44.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.06  
(NIGHT): 44.47

