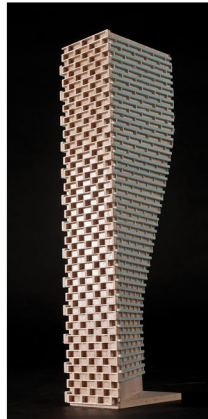


**ROADWAY TRAFFIC NOISE  
FEASIBILITY ASSESSMENT**

384 Arlington Avenue  
Ottawa, Ontario

Report: 22-131- Traffic Noise Feasibility



July 27, 2022

PREPARED FOR  
Windmill Development Group  
150 Elgin Street, Suite 1000  
Ottawa, ON K2P 1L4

PREPARED BY  
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Joshua Foster, P.Eng., Lead Engineer

## EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken to satisfy the requirements for a Zoning By-law Amendment (ZBA) application submission for a residential development located at 384 Arlington Avenue. The primary sources of roadway traffic noise include Queensway and Bronson Avenue.

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 provided by Neuf Architects in June 2022.

The results of the current analysis indicate that noise levels at the building façades will range between 56 and 79 dBA during the daytime period (07:00-23:00) and between 48 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the south façade of the building, which is nearest and most exposed to Queensway.

Upgraded building components will be required for all residential buildings where noise levels exceed 65 dBA. Based on the results, select facades where noise level exceeds this criterion will require upgraded building components. Due to the limited information available at the time of the study, which was prepared for a ZBA application submission, detailed STC calculations could not be performed at this time. A detailed review of the window and wall assemblies should be performed by a qualified engineer with expertise in acoustics during the detailed design stage of each building.

Results of the calculations also indicate that the study site will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements for all buildings.

The results indicate that noise levels at the outdoor amenity areas are expected to be between 72 dBA and 73 dBA. The highest noise level at an OLA occurs at the Level 4 and Level 9 Amenity Areas. As noise



levels are above 55 dBA in all outdoor amenity areas, noise mitigation is required in the form of a noise barrier or perimeter guard.

A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each building.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block 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. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

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## 1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Windmill Development Group to undertake a roadway traffic noise feasibility assessment, to satisfy the requirements for a Zoning By-law Amendment (ZBA) application submission, for a proposed residential development located at 384 Arlington Avenue in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior 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 provided by Neuf Architects in June 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

## 2. TERMS OF REFERENCE

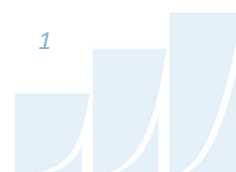
The subject site is located at 384 Arlington Avenue in Ottawa; situated on a parcel of land bounded by Arlington Avenue to the north, Arthur Lane North to the east, Raymond Street to the south, and Bell Street North to the west. The proposed development comprises a nominally rectangular 24-storey residential tower topped with a mechanical penthouse level (MPH), rising above an eight-storey podium comprising a 'C'-shaped planform with its long axis-oriented along Arthur Lane North.

Above two below-grade parking levels, the ground floor includes a main entrance and common space to the west, activities room, yoga, and gym at the northwest corner, residential units to the east, services at the southeast corner, and residential units and an elevator core to the south. Access to below-grade parking is provided by a ramp at the southeast corner of the proposed development via a laneway from Raymond Street. Green space is situated within the western inset of the 'C'-shaped planform. Level 4 is served by an amenity terrace at the northwest corner and Level 9 is served by an amenity terrace, which will be used for urban farming, to the north. Levels 2-24 are reserved for residential use and Levels 9-24 comprise a nominally rectangular planform.

---

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

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



With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block 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. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

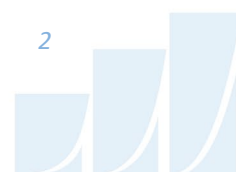
### **3. OBJECTIVES**

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 45 and 40 dBA for living rooms and sleeping quarters, respectively, for roadway traffic as listed in Table 1.

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

Type of Space	Time Period	Leq (dBA)
		Road / LRT
General offices, reception areas, <b>retail stores</b> , etc.	07:00 – 23:00	50
<b>Living/dining/den areas of 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
<b>Sleeping quarters of 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

<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

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 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 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

#### 4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway’s classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa’s Official Plan (OP) and Transportation Master 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. 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
Queensway (Highway 417)	Freeway	100	<b>146,664</b>
Bronson Avenue	4-Lane Arterial (Undivided)	50	<b>30,000</b>

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

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

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



### 4.2.3 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.

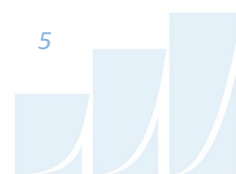
Roadway traffic noise calculations were performed by treating each roadway segment as a separate line source of noise, and by using proposed and existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- The day/night split was taken to be 92%/8% respectively for all streets.
- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be flat/gentle slope surrounding the subject site.
- For select sources where appropriate, the receptors considered the proposed buildings and surrounding, existing buildings as barriers, partially or fully obstructing exposure to the source.
- Noise receptors were strategically placed at 11 locations around the study area, see Figure 2.
- Receptor distances and exposure angles used in the STAMSON calculations are illustrated in Figure 3, 4, and 5.

## 5. RESULTS AND DISCUSSION

The results of the current analysis indicate that noise levels at the building façades will range between 56 and 79 dBA during the daytime period (07:00-23:00) and between 48 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the south façade, which is nearest and most exposed to the Queensway.

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 at the facades where noise levels exceed 65 dBA, as discussed in Section 4.2.1. Results also indicate that the development will require central air conditioning, or a similar ventilation system, 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 buildings has progressed sufficiently, typically at the time of the site plan control application.

The results indicate that noise levels at the outdoor amenity areas are expected to be between 72 dBA and 73 dBA. The highest noise level at an OLA occurs at the Level 4 and Level 9 Amenity Areas. As noise levels are above 55 dBA in all outdoor amenity areas, noise mitigation is required in the form of a noise barrier or perimeter guard.

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

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
R1	69.5	POW - South Facade	79	71
R2	69.5	POW - East Facade	75	67
R3	69.5	POW - North Facade	58	50
R4	69.5	POW - West Facade	75	68
R5	27.25	POW - East Facade	74	66
R6	27.25	POW - North Facade	56	48
R7	27.25	OLA – Level 9 Outdoor Amenity	73	N/A*
R8	12	OLA – Level 4 Outdoor Amenity	73	N/A*
R9	1.5	OLA – Ground Level Outdoor Amenity	72	N/A*
R10	27.25	POW - West Facade	72	64
R11	12	POW - West Facade	73	65

\*Noise level during the nighttime is not considered for OLAs

## **6. CONCLUSIONS AND RECOMMENDATIONS**

The results of the current analysis indicate that noise levels at the building façades will range between 56 and 79 dBA during the daytime period (07:00-23:00) and between 48 and 71 dBA during the nighttime period (23:00-07:00). The highest noise level (79 dBA) occurs at the south façade which is nearest and most exposed to the Queensway.

Based on the results, building facades that experience noise levels above 65 dBA will require upgraded building components. Due to the limited information available at the time of the study, which was prepared for a ZBA application submission, detailed STC calculations could not be performed at this time. A detailed review of the window and wall assemblies should be performed by a qualified engineer with expertise in acoustics during the detailed design stage of each building.

Results of the calculations also indicate that the study site will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements for all buildings.

The results indicate that noise levels at the outdoor amenity areas are expected to be between 72 dBA and 73 dBA. The highest noise level at an OLA occurs at the Level 4 and Level 9 Amenity Areas. As noise levels are above 55 dBA in all outdoor amenity areas, noise mitigation is required in the form of a noise barrier or perimeter guard.

A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each building.



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.***

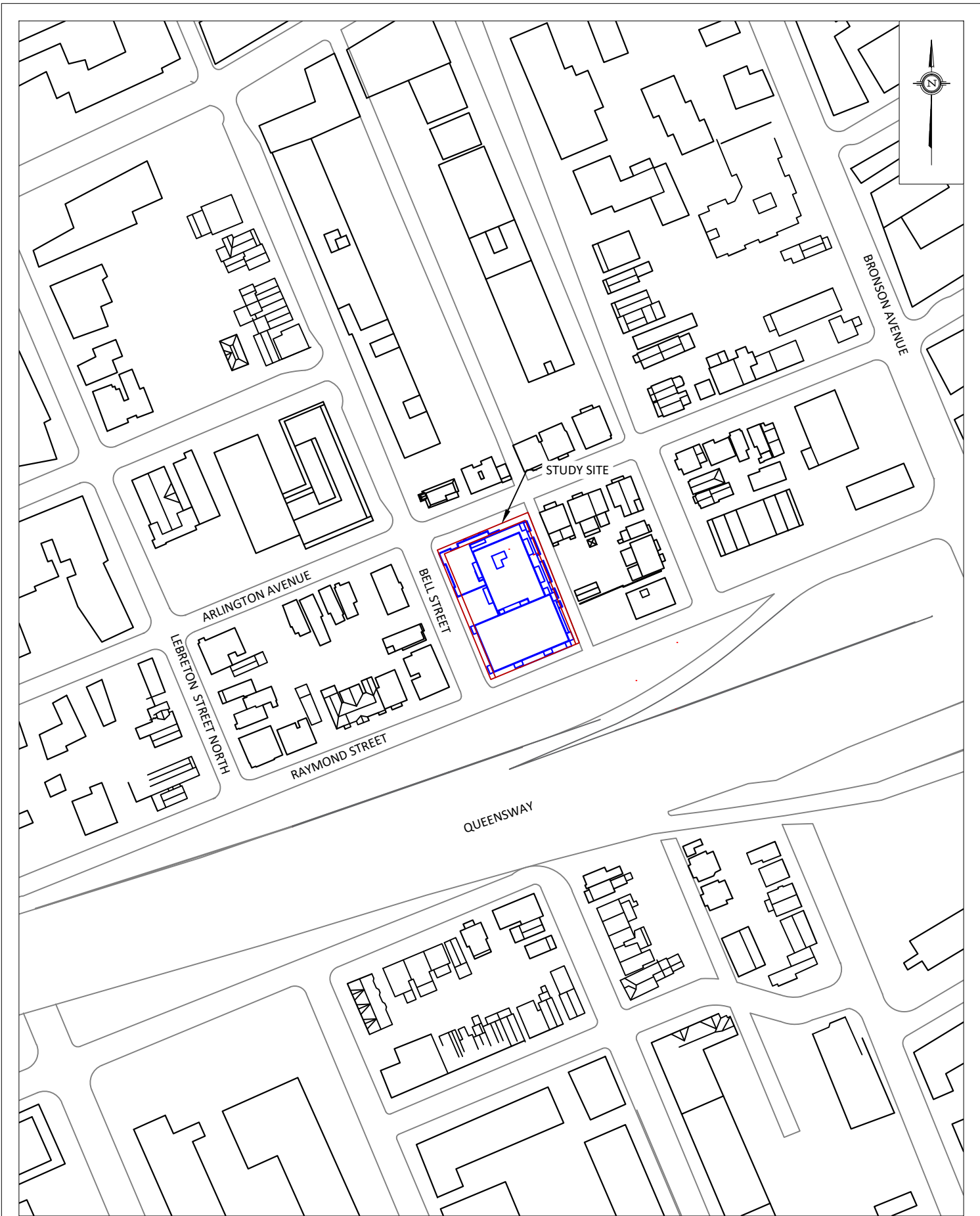


Essraa Alqassab, BAsC  
Junior Environmental Scientist



Joshua Foster, P.Eng.  
Lead Engineer

*Gradient Wind File 22-131- Traffic Noise Feasibility*



PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC FEASIBILITY ASSESSMENT	
SCALE	1:2000 (APPROX.)	DRAWING NO. GW22-131-1
DATE	JULY 18, 2022	DRAWN BY E.A.

DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
-------------	--



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC FEASIBILITY ASSESSMENT	DESCRIPTION
	SCALE	1:200 (APPROX.)	DRAWING NO. GW22-131-2
	DATE	JULY 18, 2022	DRAWN BY E.A.

FIGURE 2:  
RECEPTOR LOCATIONS



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC FEASIBILITY ASSESSMENT	
SCALE	1:200 (APPROX.)	DRAWING NO. GW22-131-3
DATE	JULY 18, 2022	DRAWN BY E.A.



PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC FEASIBILITY ASSESSMENT	
SCALE	1:200 (APPROX.)	DRAWING NO. GW22-131-4
DATE	JULY 18, 2022	DRAWN BY E.A.

DESCRIPTION	FIGURE 4: STAMSON PARAMETERS (2)
-------------	-------------------------------------



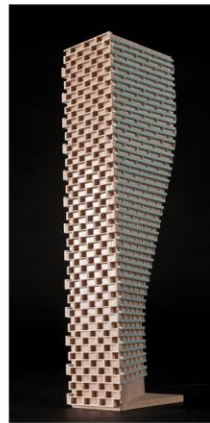


- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	384 ARLINGTON AVENUE, OTTAWA ON ROADWAY TRAFFIC FEASIBILITY ASSESSMENT	DESCRIPTION	FIGURE 5: STAMSON PARAMETERS (3)	
	SCALE	1:1000 (APPROX.)	DRAWING NO.		GW22-131-5
	DATE	JULY 19, 2022	DRAWN BY		E.A.

# GRADIENTWIND

ENGINEERS & SCIENTISTS



## APPENDIX A

### STAMSON 5.04 – INPUT AND OUTPUT DATA

# GRADIENTWIND

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STAMSON 5.0                      COMPREHENSIVE REPORT                      Date: 20-07-2022 13:29:58  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----

Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: Queens Way (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 : 55.00 / 55.00 m  
Receiver height : 69.50 / 69.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg  
Barrier height : 3.50 m  
Barrier receiver distance : 33.00 / 33.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

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

-----

Car traffic volume : 24288/2112 veh/TimePeriod \*  
Medium truck volume : 1932/168 veh/TimePeriod \*  
Heavy truck volume : 1380/120 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:



# GRADIENTWIND

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24 hr Traffic Volume (AADT or SADT): 30000  
 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: Bronson (day/night)

```
-----
Angle1 Angle2      : -90.00 deg  0.00 deg
Wood depth          :      0      (No woods.)
No of house rows   :      0 / 0
Surface            :      2      (Reflective ground surface)
Receiver source distance : 185.00 / 185.00 m
Receiver height    : 69.50 / 69.50 m
Topography         :      2      (Flat/gentle slope; with barrier)
Barrier angle1     : -90.00 deg  Angle2 : 0.00 deg
Barrier height     : 26.00 m
Barrier receiver distance : 9.00 / 9.00 m
Source elevation   : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation  : 0.00 m
Reference angle    : 0.00
-----
```

Segment # 1: Queens Way (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !      69.50 !      28.70 !      28.70
-----
```

ROAD (0.00 + 78.76 + 0.00) = 78.76 dBA

```
-----
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
   -90    90  0.00  84.41  0.00 -5.64  0.00  0.00  0.00 -0.01  78.75*
   -90    90  0.00  84.41  0.00 -5.64  0.00  0.00  0.00  0.00  78.76
-----
```

\* Bright Zone !

Segment Leq : 78.76 dBA

Segment # 2: Bronson (day)

Source height = 1.50 m



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Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.50	!	69.50	!
		66.19	!
			66.19

ROAD (0.00 + 57.57 + 0.00) = 57.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	71.49	0.00	-10.91	-3.01	0.00	0.00	-0.00	57.57*
-90	0	0.00	71.49	0.00	-10.91	-3.01	0.00	0.00	0.00	57.57

\* Bright Zone !

Segment Leq : 57.57 dBA

Total Leq All Segments: 78.79 dBA

Segment # 1: Queens Way (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.50	!	69.50	!
		28.70	!
			28.70

ROAD (0.00 + 71.17 + 0.00) = 71.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	76.81	0.00	-5.64	0.00	0.00	0.00	-0.01	71.16*
-90	90	0.00	76.81	0.00	-5.64	0.00	0.00	0.00	0.00	71.17

\* Bright Zone !

Segment Leq : 71.17 dBA

Segment # 2: Bronson (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)



# GRADIENTWIND

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Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----  
 1.50 ! 69.50 ! 66.19 ! 66.19

ROAD (0.00 + 49.97 + 0.00) = 49.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.89	0.00	-10.91	-3.01	0.00	0.00	-0.00	49.97*
-90	0	0.00	63.89	0.00	-10.91	-3.01	0.00	0.00	0.00	49.97

\* Bright Zone !

Segment Leq : 49.97 dBA

Total Leq All Segments: 71.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 78.79  
 (NIGHT): 71.20

STAMSON 5.0                    NORMAL REPORT                    Date: 20-07-2022 13:22:32  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
 Car traffic volume : 118740/10325 veh/TimePeriod \*  
 Medium truck volume : 9445/821 veh/TimePeriod \*  
 Heavy truck volume : 6747/587 veh/TimePeriod \*  
 Posted speed limit : 100 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): 146665  
 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: QueensWay (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 65.00 / 65.00 m



# GRADIENTWIND

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```

Receiver height      : 69.50 / 69.50 m
Topography          : 2          (Flat/gentle slope; with barrier)
Barrier angle1     : -90.00 deg   Angle2 : 0.00 deg
Barrier height      : 3.50 m
Barrier receiver distance : 42.00 / 42.00 m
Source elevation    : 0.00 m
Receiver elevation  : 0.00 m
Barrier elevation   : 0.00 m
Reference angle     : 0.00
  
```

Results segment # 1: QueensWay (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	69.50	25.56	25.56

ROAD (0.00 + 75.03 + 0.00) = 75.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	84.41	0.00	-6.37	-3.01	0.00	0.00	-0.01	75.02*
-90	0	0.00	84.41	0.00	-6.37	-3.01	0.00	0.00	0.00	75.03

---

\* Bright Zone !

Segment Leq : 75.03 dBA

Total Leq All Segments: 75.03 dBA

Results segment # 1: QueensWay (night)

---

Source height = 1.50 m

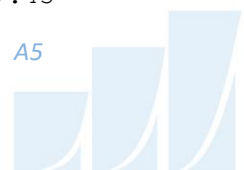
Barrier height for grazing incidence

---

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	69.50	25.56	25.56

ROAD (0.00 + 67.43 + 0.00) = 67.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	76.81	0.00	-6.37	-3.01	0.00	0.00	-0.01	67.42*
-90	0	0.00	76.81	0.00	-6.37	-3.01	0.00	0.00	0.00	67.43



---

\* Bright Zone !

Segment Leq : 67.43 dBA

Total Leq All Segments: 67.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 75.03  
(NIGHT): 67.43





# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 20-07-2022 13:22:54  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QUEENS WAY (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 : 75.00 / 75.00 m  
Receiver height : 69.60 / 69.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg  
Barrier height : 83.15 m  
Barrier receiver distance : 20.00 / 20.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

Results segment # 1: QUEENS WAY (day)

-----  
Source height = 1.50 m

Barrier height for grazing incidence

-----  
Source ! Receiver ! Barrier ! Elevation of  
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
-----+-----+-----+-----



# GRADIENTWIND

ENGINEERS & SCIENTISTS

1.50 !            69.60 !            51.44 !            51.44

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	84.41	0.00	-6.99	0.00	0.00	0.00	-19.40	58.02

Segment Leq : 58.02 dBA

Total Leq All Segments: 58.02 dBA

Results segment # 1: QUEENS WAY (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.50 !	69.50 !	51.37 !	51.37

ROAD (0.00 + 50.42 + 0.00) = 50.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	76.81	0.00	-6.99	0.00	0.00	0.00	-19.40	50.42

Segment Leq : 50.42 dBA

Total Leq All Segments: 50.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.02  
(NIGHT): 50.42



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 20-07-2022 13:22:21  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

---

Car traffic volume : 118739/10325 veh/TimePeriod \*  
 Medium truck volume : 9445/821 veh/TimePeriod \*  
 Heavy truck volume : 6747/587 veh/TimePeriod \*  
 Posted speed limit : 100 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): 146664  
 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: Queens Way (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 : 64.00 / 64.00 m  
 Receiver height : 69.50 / 69.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 0.00 deg Angle2 : 90.00 deg  
 Barrier height : 3.50 m  
 Barrier receiver distance : 43.00 / 43.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Queens Way (day)

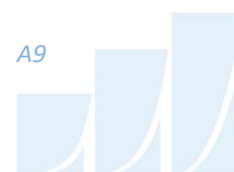
---

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	69.50	23.81	23.81



# GRADIENTWIND

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ROAD (0.00 + 75.10 + 0.00) = 75.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	84.41	0.00	-6.30	-3.01	0.00	0.00	-0.01	75.08*
0	90	0.00	84.41	0.00	-6.30	-3.01	0.00	0.00	0.00	75.10

\* Bright Zone !

Segment Leq : 75.10 dBA

Total Leq All Segments: 75.10 dBA

Results segment # 1: Queens Way (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	69.50	23.81	23.81

ROAD (0.00 + 67.50 + 0.00) = 67.50 dBA

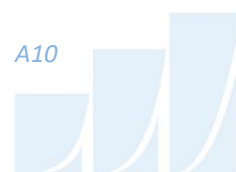
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	76.81	0.00	-6.30	-3.01	0.00	0.00	-0.01	67.49*
0	90	0.00	76.81	0.00	-6.30	-3.01	0.00	0.00	0.00	67.50

\* Bright Zone !

Segment Leq : 67.50 dBA

Total Leq All Segments: 67.50 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 75.10  
(NIGHT) : 67.50



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 19-07-2022 09:52:03  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----

Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QUEENSWAY (day/night)

-----

Angle1 Angle2 : -90.00 deg 0.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 90.00 / 90.00 m  
Receiver height : 27.25 / 27.25 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg  
Barrier height : 3.50 m  
Barrier receiver distance : 67.00 / 67.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

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

-----

Car traffic volume : 24288/2112 veh/TimePeriod \*  
Medium truck volume : 1932/168 veh/TimePeriod \*  
Heavy truck volume : 1380/120 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:



# GRADIENTWIND

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24 hr Traffic Volume (AADT or SADT): 30000  
 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: BRONSON (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 : 167.00 / 167.00 m
Receiver height  :  27.25 / 27.25 m
Topography      :          2   (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg   Angle2 : 90.00 deg
Barrier height   :    9.00 m
Barrier receiver distance :  7.00 / 7.00 m
Source elevation :    0.00 m
Receiver elevation :    0.00 m
Barrier elevation :    0.00 m
Reference angle  :    0.00
-----
```

Results segment # 1: QUEENSWAY (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !          27.25 !          8.08 !          8.08
-----
```

ROAD (0.00 + 73.62 + 0.00) = 73.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	84.41	0.00	-7.78	-3.01	0.00	0.00	-0.15	73.47*
-90	0	0.00	84.41	0.00	-7.78	-3.01	0.00	0.00	0.00	73.62

\* Bright Zone !

Segment Leq : 73.62 dBA

Results segment # 2: BRONSON (day)

Source height = 1.50 m



# GRADIENTWIND

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Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	27.25	26.17	26.17

ROAD (0.00 + 61.02 + 0.00) = 61.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-10.47	0.00	0.00	0.00	-0.01	61.02*
-90	90	0.00	71.49	0.00	-10.47	0.00	0.00	0.00	0.00	61.02

\* Bright Zone !

Segment Leq : 61.02 dBA

Total Leq All Segments: 73.85 dBA

Barrier table for segment # 1: QUEENSWAY (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
5.00	5.00	73.62	73.62
5.50	5.50	73.62	73.62
6.00	6.00	73.62	73.62
6.50	6.50	73.62	73.62
7.00	7.00	73.62	73.62
7.50	7.50	73.62	73.62
8.00	8.00	73.62	73.62
8.50	8.50	68.46	68.46
9.00	9.00	67.94	67.94
9.50	9.50	67.17	67.17

Barrier table for segment # 2: BRONSON (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
10.50	10.50	61.02	61.02
11.00	11.00	61.02	61.02
11.50	11.50	61.02	61.02
12.00	12.00	61.02	61.02
12.50	12.50	61.02	61.02
13.00	13.00	61.02	61.02
13.50	13.50	61.02	61.02
14.00	14.00	61.02	61.02
14.50	14.50	61.02	61.02



# GRADIENTWIND

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15.00 ! 15.00 ! 61.02 ! 61.02 !

Results segment # 1: QUEENSWAY (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50 !	27.25 !	8.08 !	8.08

ROAD (0.00 + 66.02 + 0.00) = 66.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	76.81	0.00	-7.78	-3.01	0.00	0.00	-0.15	65.87*
-90	0	0.00	76.81	0.00	-7.78	-3.01	0.00	0.00	0.00	66.02

\* Bright Zone !

Segment Leq : 66.02 dBA

Results segment # 2: BRONSON (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50 !	27.25 !	26.17 !	26.17

ROAD (0.00 + 53.43 + 0.00) = 53.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-10.47	0.00	0.00	0.00	-0.01	53.42*
-90	90	0.00	63.89	0.00	-10.47	0.00	0.00	0.00	0.00	53.43

\* Bright Zone !

Segment Leq : 53.43 dBA

Total Leq All Segments: 66.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.85  
 (NIGHT): 66.25





# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 20-07-2022 13:25:13  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QUEENS WAY (day/night)

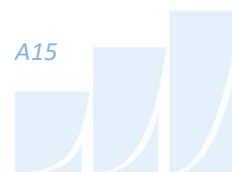
-----  
Angle1 Angle2 : -90.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 107.00 / 107.00 m  
Receiver height : 27.25 / 72.00 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg  
Barrier height : 72.00 m  
Barrier receiver distance : 32.00 / 32.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

Results segment # 1: QUEENS WAY (day)

-----  
Source height = 1.50 m

Barrier height for grazing incidence

-----  
Source ! Receiver ! Barrier ! Elevation of  
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
-----+-----+-----+-----



# GRADIENTWIND

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1.50 !            27.25 !            19.55 !            19.55

ROAD (0.00 + 56.15 + 0.00) = 56.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	84.41	0.00	-8.53	0.00	0.00	0.00	-19.72	56.15

Segment Leq : 56.15 dBA

Total Leq All Segments: 56.15 dBA

Results segment # 1: QUEENS WAY (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
1.50 !	72.00 !	50.91 !	50.91

ROAD (0.00 + 49.94 + 0.00) = 49.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	76.81	0.00	-8.53	0.00	0.00	0.00	-18.34	49.94

Segment Leq : 49.94 dBA

Total Leq All Segments: 49.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.15  
(NIGHT): 49.94

STAMSON 5.0                    COMPREHENSIVE REPORT                    Date: 22-07-2022 10:39:22  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 118739/10325 veh/TimePeriod \*

Medium truck volume : 9445/821 veh/TimePeriod \*

Heavy truck volume : 6747/587 veh/TimePeriod \*

Posted speed limit : 100 km/h

Road gradient : 0 %



# GRADIENTWIND

ENGINEERS & SCIENTISTS

Road pavement : 1 (Typical asphalt or concrete)

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

```

24 hr Traffic Volume (AADT or SADT): 146664
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: QUEENSWAY (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 : 89.00 / 89.00 m
Receiver height  : 27.25 / 27.25 m
Topography      : 2          (Flat/gentle slope; with barrier)
Barrier angle1   : -43.00 deg   Angle2 : 58.00 deg
Barrier height   : 72.00 m
Barrier receiver distance : 13.00 / 13.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle  : 0.00
  
```

Segment # 1: QUEENSWAY (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !      27.25 !      23.49 !      23.49
  
```

ROAD (70.84 + 54.16 + 69.17) = 73.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-43	0.00	84.41	0.00	-7.73	-5.83	0.00	0.00	0.00	70.84
-43	58	0.00	84.41	0.00	-7.73	-2.51	0.00	0.00	-20.00	54.16
58	90	0.00	84.41	0.00	-7.73	-7.50	0.00	0.00	0.00	69.17

Segment Leq : 73.15 dBA

Total Leq All Segments: 73.15 dBA



# GRADIENTWIND

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Segment # 1: QUEENSWAY (night)

-----  
 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50	!	27.25	!
		23.49	!
			23.49

ROAD (63.25 + 46.57 + 61.58) = 65.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-43	0.00	76.81	0.00	-7.73	-5.83	0.00	0.00	0.00	63.25
-43	58	0.00	76.81	0.00	-7.73	-2.51	0.00	0.00	-20.00	46.57
58	90	0.00	76.81	0.00	-7.73	-7.50	0.00	0.00	0.00	61.58

-----  
 Segment Leq : 65.56 dBA

Total Leq All Segments: 65.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 73.15  
 (NIGHT) : 65.56



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 22-07-2022 10:32:45  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

```
-----
Car traffic volume   : 118739/10325 veh/TimePeriod *
Medium truck volume : 9445/821   veh/TimePeriod *
Heavy truck volume  : 6747/587   veh/TimePeriod *
Posted speed limit  : 100 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): 146664
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: Queenway (day/night)

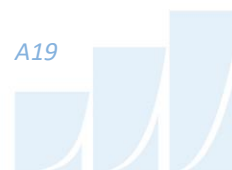
```
-----
Angle1  Angle2      : -90.00 deg  90.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 2 (Reflective ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height  : 12.00 / 12.00 m
Topography      : 2 (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg  Angle2 : 10.00 deg
Barrier height   : 72.00 m
Barrier receiver distance : 23.00 / 23.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle  : 0.00
```

Results segment # 1: Queenway (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !      12.00 !      9.51 !      9.51
```



# GRADIENTWIND

ENGINEERS & SCIENTISTS

ROAD (0.00 + 53.92 + 72.78) = 72.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	10	0.00	84.41	0.00	-8.11	-2.55	0.00	0.00	-19.82	53.92
10	90	0.00	84.41	0.00	-8.11	-3.52	0.00	0.00	0.00	72.78

Segment Leq : 72.83 dBA

Total Leq All Segments: 72.83 dBA

Results segment # 1: Queenway (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	12.00	9.51	9.51

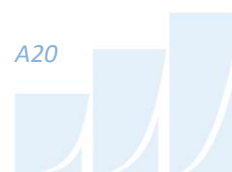
ROAD (0.00 + 46.33 + 65.18) = 65.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	10	0.00	76.81	0.00	-8.11	-2.55	0.00	0.00	-19.82	46.33
10	90	0.00	76.81	0.00	-8.11	-3.52	0.00	0.00	0.00	65.18

Segment Leq : 65.24 dBA

Total Leq All Segments: 65.24 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.83  
(NIGHT): 65.24



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 22-07-2022 10:36:00  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QueensWay (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 : 81.00 / 81.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 35.00 deg  
Barrier height : 72.00 m  
Barrier receiver distance : 7.00 / 7.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

## Results segment # 1: QueensWay (day)

-----  
Source height = 1.50 m

## Barrier height for grazing incidence

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



# GRADIENTWIND

ENGINEERS & SCIENTISTS

ROAD (0.00 + 55.61 + 71.93) = 72.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	35	0.00	84.41	0.00	-7.32	-1.58	0.00	0.00	-19.89	55.61
35	90	0.00	84.41	0.00	-7.32	-5.15	0.00	0.00	0.00	71.93

Segment Leq : 72.03 dBA

Total Leq All Segments: 72.03 dBA

Results segment # 1: QueensWay (night)

Source height = 1.50 m

Barrier height for grazing incidence

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

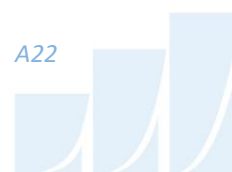
ROAD (0.00 + 48.01 + 64.34) = 64.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	35	0.00	76.81	0.00	-7.32	-1.58	0.00	0.00	-19.89	48.01
35	90	0.00	76.81	0.00	-7.32	-5.15	0.00	0.00	0.00	64.34

Segment Leq : 64.44 dBA

Total Leq All Segments: 64.44 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 72.03  
(NIGHT) : 64.44





# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      COMPREHENSIVE REPORT                      Date: 22-07-2022 10:54:00  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QUEENSWAY (day/night)

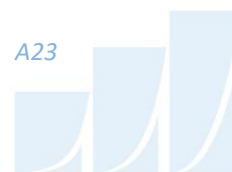
-----  
Angle1 Angle2 : 0.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 90.00 / 90.00 m  
Receiver height : 27.25 / 27.25 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 0.00 deg Angle2 : 35.00 deg  
Barrier height : 72.00 m  
Barrier receiver distance : 15.00 / 15.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

Segment # 1: QUEENSWAY (day)

-----  
Source height = 1.50 m

Barrier height for grazing incidence

-----  
Source ! Receiver ! Barrier ! Elevation of  
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
-----  
1.50 ! 27.25 ! 22.96 ! 22.96



# GRADIENTWIND

ENGINEERS & SCIENTISTS

ROAD (0.00 + 49.51 + 71.48) = 71.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.00	84.41	0.00	-7.78	-7.11	0.00	0.00	-20.00	49.51
35	90	0.00	84.41	0.00	-7.78	-5.15	0.00	0.00	0.00	71.48

Segment Leq : 71.50 dBA

Total Leq All Segments: 71.50 dBA

Segment # 1: QUEENSWAY (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	27.25	22.96	22.96

ROAD (0.00 + 41.92 + 63.88) = 63.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.00	76.81	0.00	-7.78	-7.11	0.00	0.00	-20.00	41.92
35	90	0.00	76.81	0.00	-7.78	-5.15	0.00	0.00	0.00	63.88

Segment Leq : 63.91 dBA

Total Leq All Segments: 63.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 71.50  
(NIGHT) : 63.91



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 18-07-2022 11:04:34  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 118739/10325 veh/TimePeriod \*  
Medium truck volume : 9445/821 veh/TimePeriod \*  
Heavy truck volume : 6747/587 veh/TimePeriod \*  
Posted speed limit : 100 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): 146664  
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: QUEENSWAY (day/night)

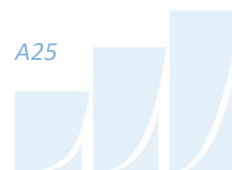
-----  
Angle1 Angle2 : 0.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 96.00 / 96.00 m  
Receiver height : 12.05 / 27.25 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 17.00 deg Angle2 : 90.00 deg  
Barrier height : 7.00 m  
Barrier receiver distance : 14.00 / 14.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

Results segment # 1: QUEENSWAY (day)

-----  
Source height = 1.50 m

Barrier height for grazing incidence

-----  
Source ! Receiver ! Barrier ! Elevation of  
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
-----  
1.50 ! 12.05 ! 10.51 ! 10.51  
-----



# GRADIENTWIND

ENGINEERS & SCIENTISTS

ROAD (66.10 + 72.43 + 0.00) = 73.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	17	0.00	84.41	0.00	-8.06	-10.25	0.00	0.00	0.00	66.10
17	90	0.00	84.41	0.00	-8.06	-3.92	0.00	0.00	-0.21	72.22*
17	90	0.00	84.41	0.00	-8.06	-3.92	0.00	0.00	0.00	72.43

\* Bright Zone !

Segment Leq : 73.34 dBA

Total Leq All Segments: 73.34 dBA

Results segment # 1: QUEENSWAY (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	27.25	23.49	23.49

ROAD (58.50 + 64.83 + 0.00) = 65.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	17	0.00	76.81	0.00	-8.06	-10.25	0.00	0.00	0.00	58.50
17	90	0.00	76.81	0.00	-8.06	-3.92	0.00	0.00	-0.01	64.82*
17	90	0.00	76.81	0.00	-8.06	-3.92	0.00	0.00	0.00	64.83

\* Bright Zone !

Segment Leq : 65.74 dBA

Total Leq All Segments: 65.74 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.34  
(NIGHT): 65.74

