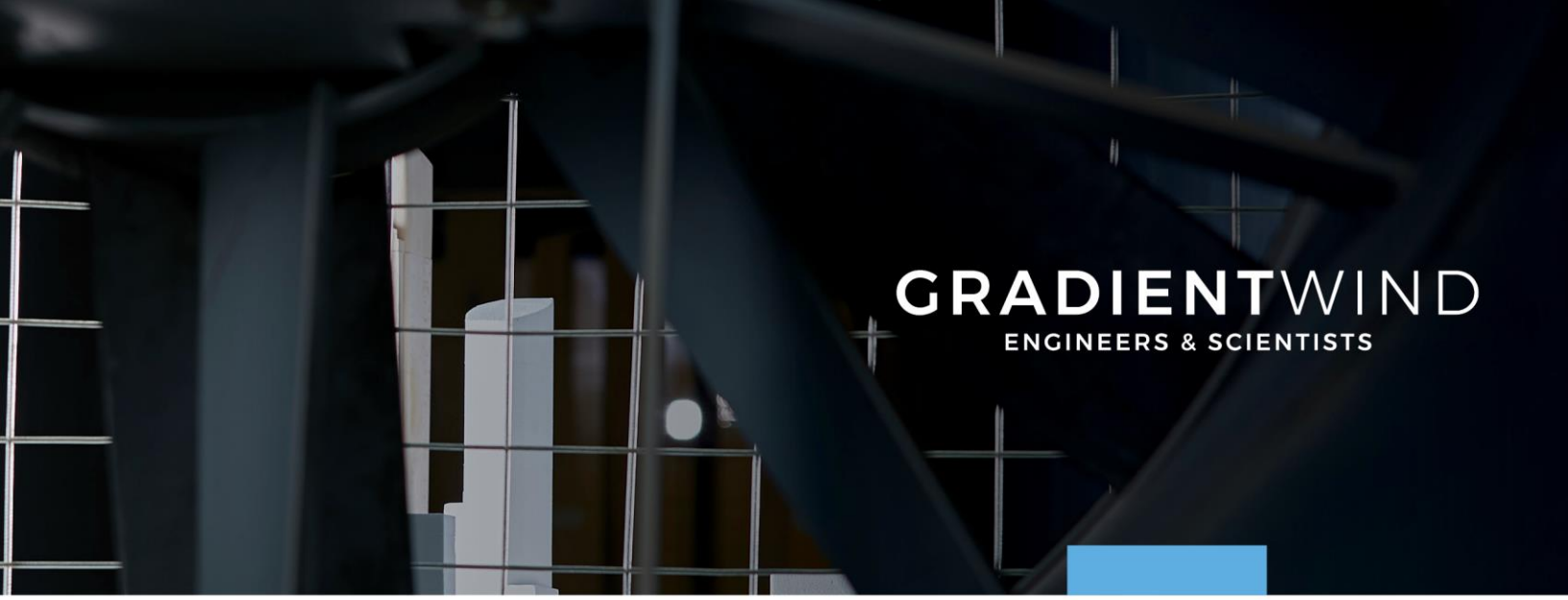

GRADIENTWIND
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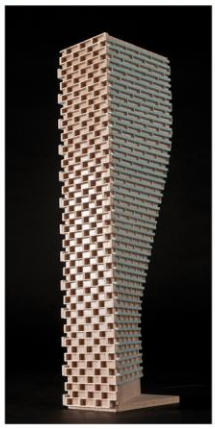
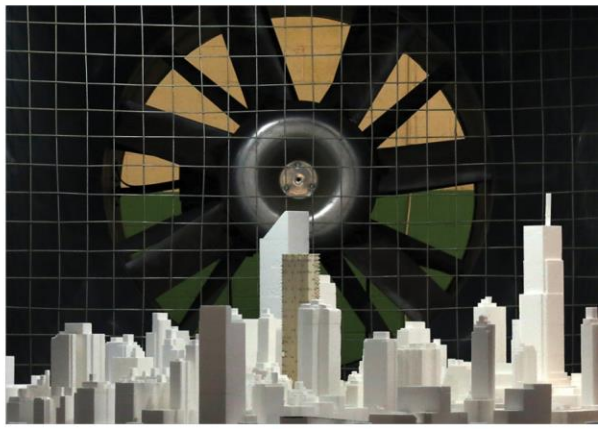
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

1015 Tweddle Road
Ottawa, Ontario

Report: 20-087-2024-T.Noise Feasibility





October 21, 2024

PREPARED FOR
Trim Road 1 LP Inc.
115 Champagne Avenue South
Ottawa, ON K1S 3L8

PREPARED BY
Sergio Nunez Andres, B.A.Sc., Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes an environmental noise assessment undertaken to satisfy Site Plan Control application submission requirements for the proposed mixed-use residential development located at 1015 Tweddle Road in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). This study aims to analyze the sound pressure levels in the area of interest.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300, and City of Ottawa Environmental Noise Control Guidelines (ENCG) guidelines; (ii) future vehicular traffic volumes corresponding to roadway classification obtained from the City of Ottawa.

The results of the roadway traffic noise calculations are summarized in Table 3. The results of the current analysis indicate that noise levels for POW receptors will range between 46 and 67 dBA during the daytime period (07:00-23:00) and between 39 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at the south façade of Building 3, which is directly exposed to the noise generated by Jeanne D'Arc Boulevard North, Trim Road, and Highway 174. Noise contours for the roadway traffic noise calculations are shown in Figures 5 and 6 for the daytime and nighttime periods, respectively.

Upgraded building components will be required for Buildings 2, 3, and 4 as the noise levels exceed the 65 dBA criteria at POW receptors. Results also indicate that the buildings will require central air conditioning or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, a Type D warning clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Ontario Building Code (OBC 2020) compliant building components will be sufficient for Building 1. The building should be designed with the provision for adding central air conditioning. However, it is anticipated that central air conditioning or a similar mechanical system will be provided for residential units. For Building 1, a Type C warning Clause will be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels for OLA receptors will range between 38 and 53 dBA during the daytime period (07:00-23:00) and between 30 and 46 dBA during the nighttime period (23:00-07:00). As such no noise mitigation is required for the OLA.

Regarding stationary noise sources, there are no stationary noise sources that may impact the proposed development in the vicinity of the subject site. The noise from small mechanical equipment located on the rooftops of neighbouring low-rise commercial buildings can be mitigated by OBC-compliant building components. Stationary noise impacts from the development onto the surroundings can be minimized by judicious placement of mechanical equipment or the incorporation of silencers and noise screens, as necessary. It is also recommended that any large pieces of HVAC equipment, which is required to be situated outdoors, be placed closer to the penthouse avoiding the line of sight with the surrounding noise-sensitive buildings.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc was retained by Trim Road 1 LP Inc. to undertake an environmental noise assessment for the proposed mixed-use residential development located at 1015 Tweddle Road in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300, Ministry of Transportation Ontario (MTO), and City of Ottawa Environmental Noise Control Guidelines (ENCG) guidelines. Noise calculations were based on site plan drawings provided by NEUF architects in October 2024, with future traffic volumes corresponding to roadway classification and theoretical roadway capacities, and recent satellite imagery.

2. TERMS OF REFERENCE

The subject site is located at 1015 Tweddle Road in Ottawa, situated to the northeast at the intersection of Jeanne-D'Arc Boulevard North and Tweddle Road.

The proposed development comprises four buildings: Tower B1, a 28-storey tower atop a 2-storey podium located at the northwest corner of the subject site fronting Tweddle Road; Tower B2 (32-storeys) and Tower B3 (28-storeys), which share a 2-storey podium centrally located along the south perimeter of the subject site fronting Jeanne-D'Arc Boulevard North; and Tower B4, a 24-storey tower atop a 2-storey podium located at the southeast corner of the subject site fronting Jeanne-D'Arc Boulevard North. A pedestrian walkway extends from an entrance plaza located at the southwest corner of the subject site to a central plaza situated to the north of Tower B2. The pedestrian walkway continues east around the shared podium serving Towers B2 and B3 to central gardens located to the west of Tower B4 before extending between Towers B3 and B4 to reconnect to Jeanne-D'Arc Boulevard North. A nature path extends east from Tweddle Road along the north perimeter of the subject site with a nature park situated along the northern site boundary. The underground parking levels are accessed via parking ramps located at the west elevation of Tower B1 from Tweddle Road and along the south elevation of Tower B4 from Jeanne-d'Arc Boulevard North. Designated loading/drop-off areas and parking areas are located along the north side of Jeanne-D'Arc Boulevard North and the east side of Tweddle Road.

The ground floor of Tower B1 is programmed for mixed-use, comprising commercial space along the south and east elevations and residential amenities to the northwest. A residential lobby is located centrally along the west elevation. The ground floor of the shared podium belonging to Towers B2 and B3 is similarly programmed as mixed-use, comprising commercial space along the south elevation fronting Jeanne D'Arc Boulevard North and residential amenities along the north elevation. Residential lobbies are located along the south elevation beneath their respective towers. The ground floor of Tower B4 comprises mostly residential units with a lobby along the south elevation. Notably, the primary access points to the residential lobbies serving Towers B2-B4 are outfitted with vestibules and the planforms of Towers B2-B4 overhang their respective primary residential access points while the primary residential access point to Tower B1 includes an overhead canopy.

A setback along the pedestrian walkway along the commercial spine at grade in the podium serving Tower B1 and in the shared podium serving Towers B2 and B3 accompanies amenity terraces serving the proposed development at Level 2. Towers B1-B4 include amenities terraces atop their respective podia at Level 3. The four towers are reserved for residential occupancy above their respective ground floors and are each topped with a mechanical penthouse (MPH).

The primary sources of noise impacting the site are Trim Road, Highway 174, Jeanne D d'Arc Boulevard North, and Tweddle Road.

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) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2.1 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For 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 during daytime and sleeping quarters during nighttime, respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [1]

Type of Space	Time Period	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window can provide a minimum 20 dBA noise reduction2. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment. Therefore, where noise levels exceed 55 dBA during daytime and 50 dBA at 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[3].

The objective sound level for Outdoor Living Areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). Predicted noise levels at the outdoor living areas dictate the action required to achieve the recommended sound levels. According to the ENCG, if an area is to be used as an OLA, noise control measures are recommended where technical and administratively feasible to reduce the L_{eq} to 55 dBA. Where noise levels exceed 60 dBA, noise mitigation is required. If these measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

[1] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[2] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[2] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[3] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

As such, when noise levels at the POWs and OLAs exceed the criteria, specific Warning Clause requirements may apply.

4.2.2 Theoretical Roadway Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *Predictor-Lima* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM model is also being accepted in the updated Environmental Guide for Noise of Ontario, 2022 by the Ministry of Transportation (MTO)[4]. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. As comparison with MECP's software STAMSON 5.04 was made at two receptors.

A total of twelve (12) receptor locations were identified around the site, as illustrated in Figure 2. Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing and proposed building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split was taken to be 92% / 8% respectively for all streets.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Default ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Seven (7) Plane of Window (POW) receptors at different heights, representative of the different levels on the building, were strategically placed as well as five (5) Outdoor Living Area (OLA) receptors throughout the study area.

[4] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", February 2022

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[5] 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
Jeanne-d'Arc Blvd N	2-Lane Major Collector	50	**12,000**
Tweddle Road	2-Lane Major Collector	40	**12,000**
Highway 174	4-Lane Freeway	90	**73,332**
Trim Road	2-Lane Urban Collector	50	**12,000**

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness, and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

[5] City of Ottawa Transportation Master Plan, November 2013

As per Section 4.2, when daytime noise levels from road sources at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[6] considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

Based on published research[7], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels + safety factor).

5. ROADWAY TRAFFIC NOISE RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3. The results of the current analysis indicate that noise levels for POW receptors will range between 46 and 67 dBA during the daytime period (07:00-23:00) and between 39 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at the south façade of Building 3, which is directly exposed to the noise generated by Jeanne D'Arc Boulevard North, Trim Road, and Highway 174. Noise contours for the roadway traffic noise calculations are shown in Figures 5 and 6 for the daytime and nighttime periods, respectively.

[6] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985
[7] CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO TRANSPORTATION SOURCES

Receptor / Receptor Type	Location	Receptor Height (m)	Noise Level (dBA)	
			Day	Night
R01 / POW	Building 1 West Facade	4	62	54
		50	63	55
		94	62	55
R02 / POW	Building 2 South Facade	4	64	56
		50	66	59
		100	66	58
R03 / POW	Building 3 South Facade	40	68	59
		80	68	59
R04 / POW	Building 4 South Facade	4	65	57
		20	67	59
		80	67	59
R05 / POW	Building 4 East Facade	4	61	53
R06 / POW	Building 4 West Facade	20	58	50
		80	59	51
R07 / POW	Building 2 North Facade	50	46	39
		94	46	39
R08 / OLA	Building 2-3 Center	10	48	N/A

*Noise levels during the nighttime are not considered for OLAs

TABLE 3 (CONTINUED): EXTERIOR NOISE LEVELS DUE TO TRANSPORTATION SOURCES

Receptor / Receptor Type	Location	Receptor Height (m)	Noise Level (dBA)	
			Day	Night
R09 / OLA	Building 1 North-West Patio	10	38	N/A
R10 / OLA	Building 3 Roof	100	51	N/A
R11 / OLA	Building 4 East Roof	99	44	N/A
R12 / OLA	Building 4 Tower Roof	90	48	N/A

*Noise levels during the nighttime are not considered for OLAs

The results of the comparison test between STAMSON and TMN are summarized in Table 4 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A. The results indicate a good comparison between the two acoustic models.

TABLE 4: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	TMN Noise Level (dBA)		STAMSON 5.04 Noise Level (dBA)	
					Day	Night
1	50	Building 1 West Facade – POW	63	55	64	56
3	40	Building 3 South Facade – POW	68	59	71	61

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels + safety factor). The STC requirements for the windows are summarized below for various units within the development (see Figure 4):

- **Bedroom Windows**

(i) Bedroom windows facing south will require a minimum STC of 35.

(ii) Bedroom windows facing east and west will require a minimum STC of 33.

(iii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements.

- **Living Room Windows**

(iv) Living room windows facing south will require a minimum STC of 35.

(i) Living Room windows facing east and west will require a minimum STC of 33

(ii) All other living room windows are to satisfy Ontario Building Code (OBC 2012) requirements.

- **Exterior Walls**

(i) Exterior wall components on the southwest, southeast, and east façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[8].

The STC requirements apply to windows, doors, spandrel panels and curtainwall and window wall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a stud wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have specified an example window configuration, however several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been

[8] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, 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 in all Lease, Purchase and Sale Agreements, as summarized in Section 6. As noise levels at all OLA are less then 55 dBA, no screens or barriers are required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the roadway traffic noise calculations are summarized in Table 4. The results of the current analysis indicate that noise levels for POW receptors will range between 46 and 67 dBA during the daytime period (07:00-23:00) and between 39 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at the south façade of Building 3, which is directly exposed to the noise generated by Jeanne D'Arc Boulevard North, Trim Road, and Highway 174. Noise contours for the roadway traffic noise calculations are shown in Figures 5 and 6 for the daytime and nighttime periods, respectively.

Upgraded building components will be required, as the noise levels exceed the 65 dBA criteria at POW receptors. Results also indicate that the buildings will require central air conditioning or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, a Type D warning clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type D

> *"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

Regarding stationary noise sources, there are no stationary noise sources that may impact the proposed development in the vicinity of the subject site. The noise from small mechanical equipment located on the rooftops of neighbouring low-rise commercial buildings can be mitigated by OBC-compliant building

components. Stationary noise impacts from the development onto the surroundings can be minimized by judicious placement of mechanical equipment or the incorporation of silencers and noise screens, as necessary. It is also recommended that any large pieces of HVAC equipment, which is required to be situated outdoors, be placed closer to the penthouse avoiding the line of sight with the surrounding noise-sensitive buildings.

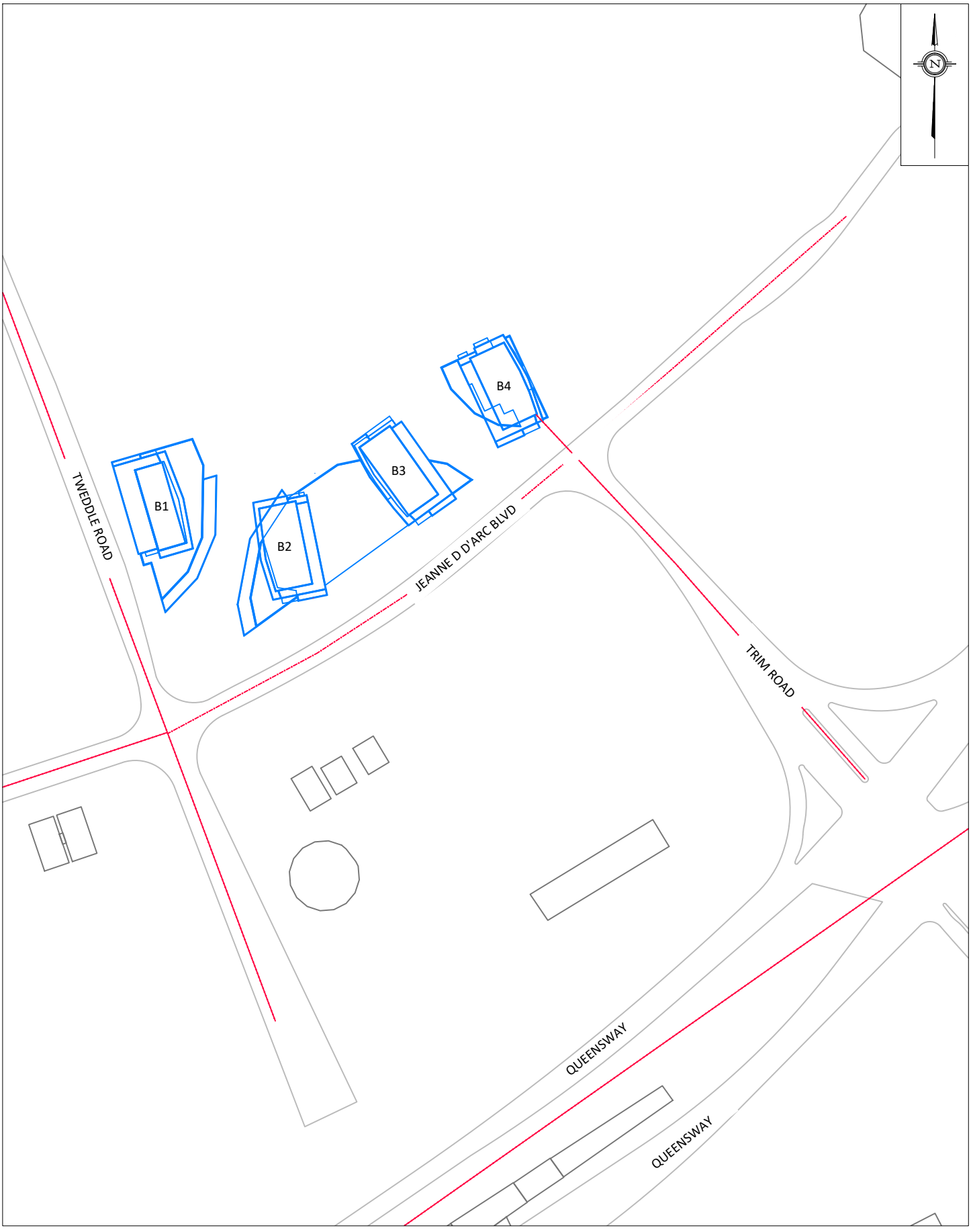
This concludes our traffic noise assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

Sergio Nunez Andres, B.A.Sc.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer



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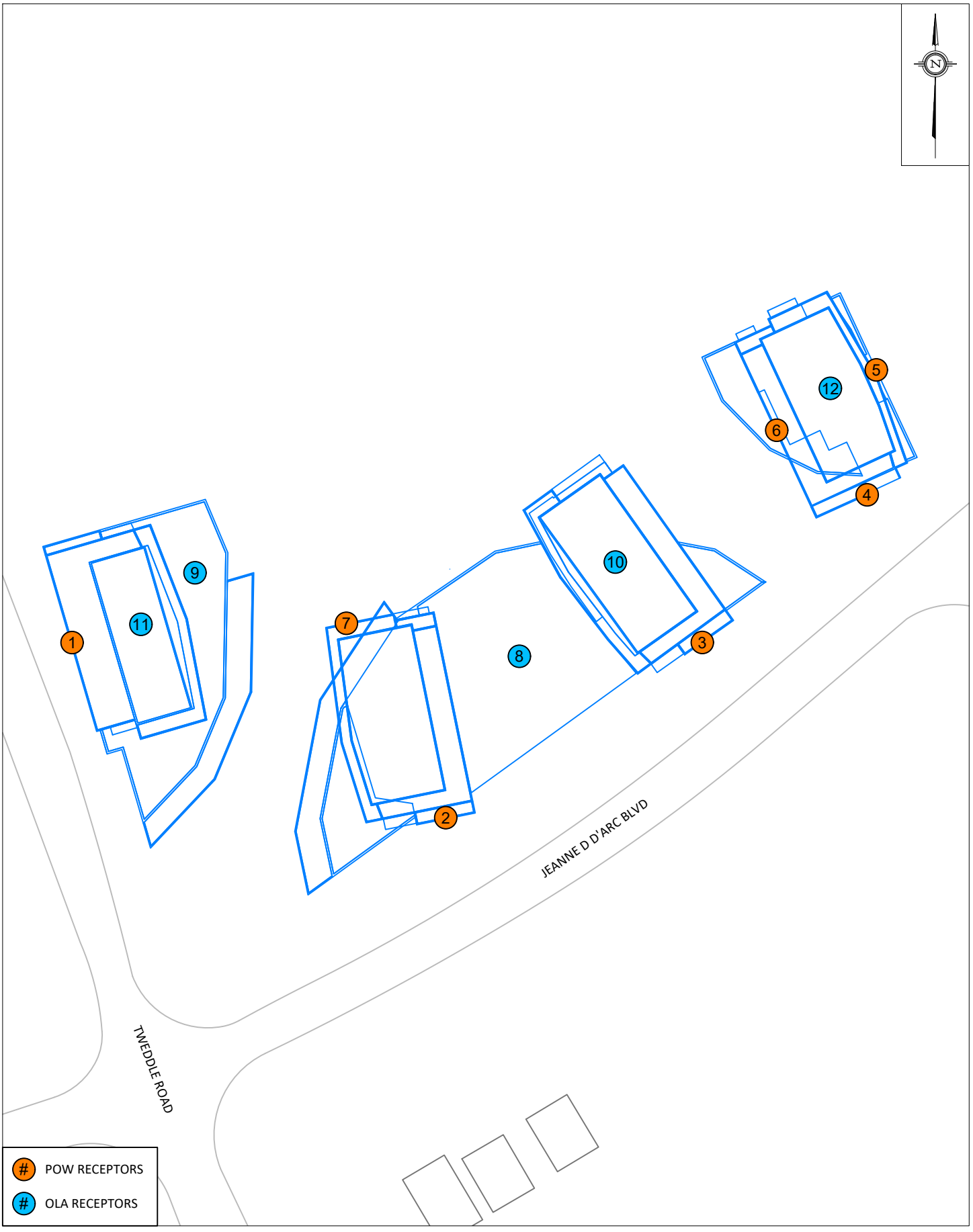
PROJECT	1015 TWEDDLE ROAD, OTTAWA, ONTARIO ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW20-087-2024-1
DATE	OCTOBER 10, 2024	DRAWN BY	S.N.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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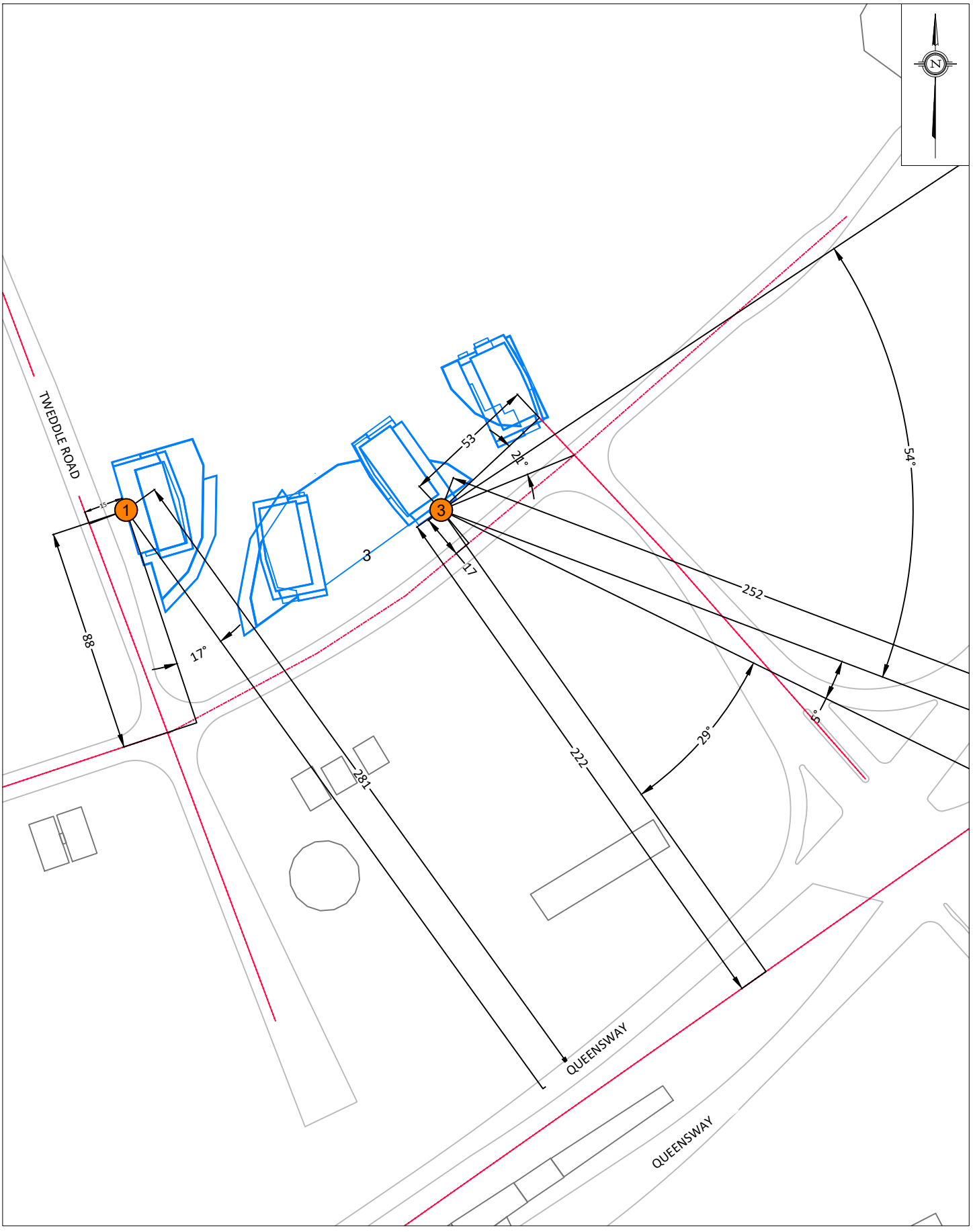
PROJECT	1015 TWEDDLE ROAD, OTTAWA, ONTARIO ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-087-2024-2
DATE	OCTOBER 10, 2024	DRAWN BY	S.N.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS



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PROJECT	1015 TWEDDLE ROAD, OTTAWA, ONTARIO ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW20-087-2024-3
DATE	OCTOBER 10, 2024	DRAWN BY	S.N.

FIGURE 3:
STAMSON RECEPTORS LOCATIONS

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SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-087-2024-4
DATE	OCTOBER 10, 2024	DRAWN BY	S.N.

FIGURE 4:
STC RATINGS

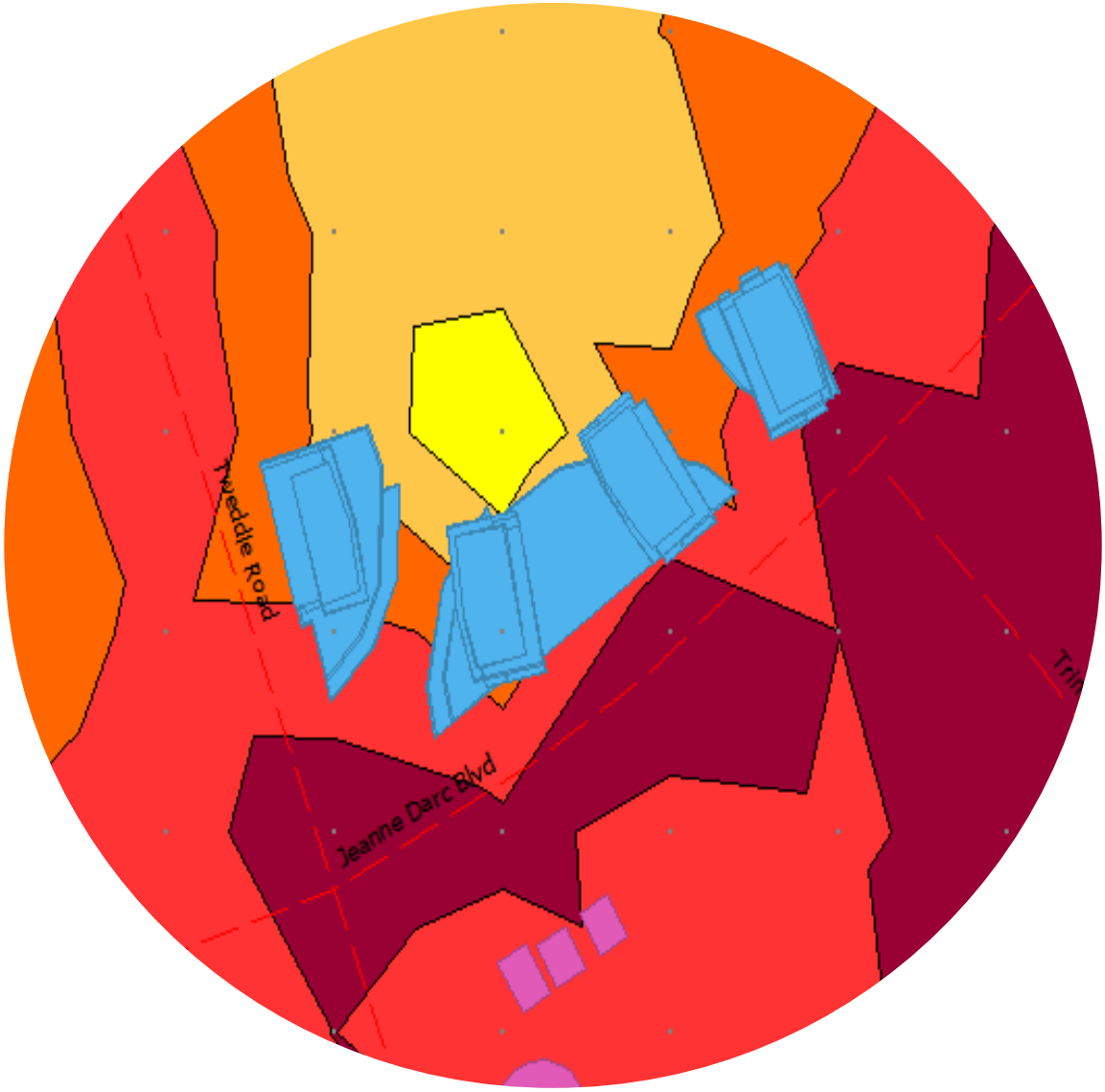

FIGURE 5: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)

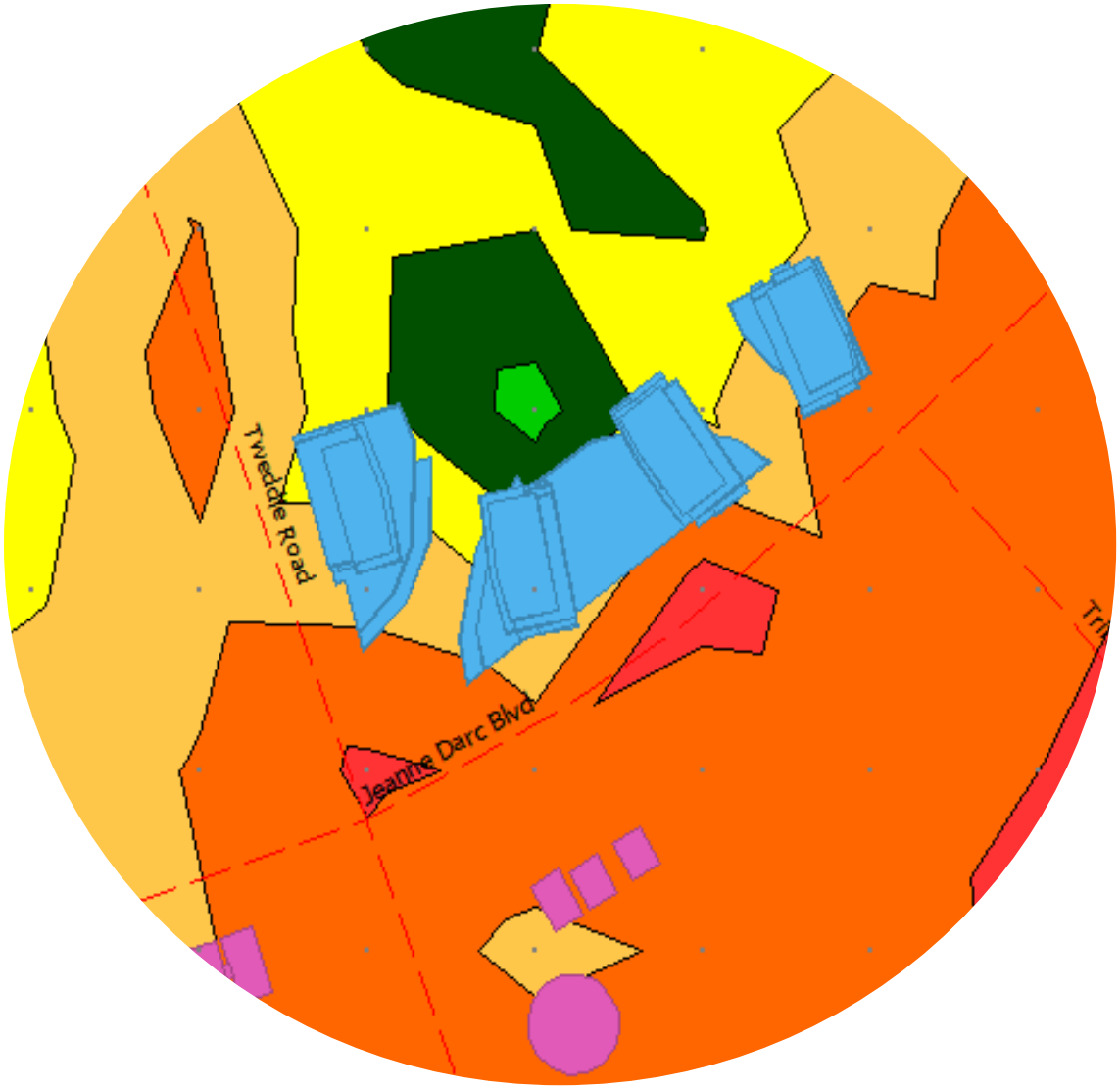

FIGURE 6: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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STAMSON 5.0 NORMAL REPORT Date: 16-10-2024 16:42:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 9715/2400 veh/TimePeriod
Medium truck volume : 773/480 veh/TimePeriod
Heavy truck volume : 552/240 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 : 88.00 / 88.00 m
Receiver height : 50.00 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 59370/800 veh/TimePeriod
Medium truck volume : 4723/160 veh/TimePeriod
Heavy truck volume : 3373/80 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: Queensway (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 : 281.00 / 281.00 m
Receiver height : 50.00 / 4.50 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 + 56.82 + 0.00) = 56.82 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	-7.68	-3.01	0.00	0.00	0.00	56.82

Segment Leq : 56.82 dBA

Results segment # 2: Queensway (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
17	90	0.00	80.43	0.00	-12.73	-3.92	0.00	0.00	0.00	63.79

Segment Leq : 63.79 dBA

Total Leq All Segments: 64.59 dBA

Results segment # 1: JAB (night)

Source height = 1.67 m

ROAD (0.00 + 56.26 + 0.00) = 56.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	66.96	0.00	-7.68	-3.01	0.00	0.00	0.00	56.26

Segment Leq : 56.26 dBA

Results segment # 2: Queensway (night)

Source height = 1.67 m

ROAD (0.00 + 41.66 + 0.00) = 41.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
17	90	0.57	67.14	0.00	-19.92	-5.57	0.00	0.00	0.00	41.66

Segment Leq : 41.66 dBA

Total Leq All Segments: 56.41 Dba

TOTAL Leq FROM ALL SOURCES (DAY): 64.59
(NIGHT): 56.41

STAMSON 5.0 NORMAL REPORT Date: 16-10-2024 19:44:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Time Period: Day/Night 16/8 hours
Description: R3 TRIM ROAD

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

Car traffic volume : 9715/800 veh/TimePeriod
Medium truck volume : 773/160 veh/TimePeriod
Heavy truck volume : 552/80 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 Road (day/night)

Angle1 Angle2 : 21.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 53.00 / 53.00 m
Receiver height : 40.00 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 59370/800 veh/TimePeriod
Medium truck volume : 4723/160 veh/TimePeriod
Heavy truck volume : 3373/80 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: Queensway (day/night)

Angle1 Angle2 : -54.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 252.00 / 252.00 m
Receiver height : 40.00 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 59370/800 veh/TimePeriod
Medium truck volume : 4723/160 veh/TimePeriod
Heavy truck volume : 3373/80 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: Queensway (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 : 222.00 / 222.00 m
Receiver height : 40.00 / 4.50 m

Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 9715/800 veh/TimePeriod
Medium truck volume : 773/160 veh/TimePeriod
Heavy truck volume : 552/80 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 : 1 (Absorptive ground surface)
Receiver source distance : 17.00 / 15.00 m
Receiver height : 40.00 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Trim Road (day)

Source height = 1.50 m

ROAD (0.00 + 57.87 + 0.00) = 57.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
21	90	0.00	67.51	0.00	-5.48	-4.16	0.00	0.00	0.00	57.87

Segment Leq : 57.87 dBA

Results segment # 2: Queensway (day)

Source height = 1.50 m

ROAD (0.00 + 63.34 + 0.00) = 63.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-54	5	0.00	80.43	0.00	-12.25	-4.84	0.00	0.00	0.00	63.34

Segment Leq : 63.34 dBA

Results segment # 3: Queensway (day)

Source height = 1.50 m

ROAD (0.00 + 66.93 + 0.00) = 66.93 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	-12.25	-1.80	0.00	0.00	0.00	66.38

Segment Leq : 66.38 dBA

Results segment # 4: JAB (day)

Source height = 1.50 m

ROAD (0.00 + 66.97 + 0.00) = 66.97 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	-0.54	0.00	0.00	0.00	0.00	66.97

Segment Leq : 66.97 dBA

Total Leq All Segments: 70.83 dBA

Results segment # 1: Trim Road (night)

Source height = 1.67 m

ROAD (0.00 + 47.69 + 0.00) = 47.69 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
21 90 0.57 62.18 0.00 -8.58 -5.92 0.00 0.00 0.00 47.69

Segment Leq : 47.69 dBA

Results segment # 2: Queensway (night)

Source height = 1.67 m

ROAD (0.00 + 42.77 + 0.00) = 42.77 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-54 5 0.57 67.14 0.00 -19.18 -5.20 0.00 0.00 0.00 42.77

Segment Leq : 42.77 dBA

Results segment # 3: Queensway (night)

Source height = 1.67 m

ROAD (0.00 + 45.20 + 0.00) = 45.20 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-29 90 0.57 67.14 0.00 -19.18 -2.77 0.00 0.00 0.00 45.20

Segment Leq : 45.20 dBA

Results segment # 4: JAB (night)

Source height = 1.67 m

ROAD (0.00 + 60.89 + 0.00) = 60.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	62.18	0.00	0.00	-1.29	0.00	0.00	0.00	60.89

Segment Leq : 60.89 dBA

Total Leq All Segments: 61.27 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.83
(NIGHT): 61.27