

**ROADWAY TRAFFIC NOISE  
FEASIBILITY ASSESSMENT**

1186-1194 Wellington Street West  
Ottawa, Ontario

REPORT: GW21-113 - Traffic Noise Feasibility



June 22, 2021

PREPARED FOR  
Welldale Limited Partnership  
200-180 Kent Street  
Ottawa, ON K1P 0B6

PREPARED BY  
Caleb Alexander, B.Eng., Junior Environmental Scientist  
Joshua Foster, P.Eng., Principal

## EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken in support of a Zoning By-Law Amendment (ZBA) application submission for the proposed residential development located at 1186-1194 Wellington Street West in Ottawa, Ontario. The proposed development comprises a 6-storey rectangular planform podium with an 18-storey tower rising on the east side. The primary sources of roadway traffic noise include Wellington Street West to the north and Parkdale Avenue to the east, as well as Highway 417 to the south. Figure 1 illustrates a complete site plan with surrounding context.

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

The results of the current analysis indicate that noise levels will range between 65 and 69 dBA during the daytime period (07:00-23:00) and between 57 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (69 dBA) occurs at the north and east façades of the building, which are most exposed to Wellington Street West and Parkdale Avenue. The noise levels predicted due to roadway traffic exceed the criteria listed in ENCG for building components and upgraded building components will be required for the north and east façades.

Results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

The results also indicate that noise levels for the outdoor amenity spaces are expected to exceed the criteria listed in NPC-300 for outdoor living areas, as discussed in Section 4.2. Therefore, acoustic mitigation, such as perimeter guards, may be required. Furthermore, a detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.



With respect to noise impacts from the building on the surroundings and the building itself, noise from HVAC equipment can generally be minimized by judicious selection and placement of the equipment. Locating large pieces of equipment, such as cooling towers, generators, and air handling units, on a high roof, allows the building to shield nearby sensitive areas from noise exposure. Where necessary, noise levels can be controlled by adding silencers, acoustic barriers, or noise screens. A stationary noise study should be conducted for the site during the detailed design once mechanical plans for the proposed building become available. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below NPC-300 limits.



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## 1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Welldale Limited Partnership to undertake a roadway traffic noise feasibility assessment in support of a Zoning By-Law Amendment (ZBA) application for the proposed residential development located at 1186-1194 Wellington Street West in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a roadway traffic noise feasibility assessment of exterior noise levels generated by local roadway traffic.

The assessment was performed on the basis of 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 site plan drawings prepared by Dialog Design in May 2021 January 20, 2021.

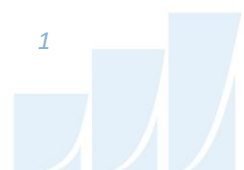
## 2. TERMS OF REFERENCE

The subject site is located at 1186-1194 Wellington Street West on the north edge of a rectangular parcel of land bounded by Wellington Street West to the north, Parkdale Avenue to the east, Tyndall Street to the south, and Hamilton Avenue North to the west. The proposed development comprises an 18-storey building with a 6-storey podium. The grade level has a rectangular planform with the long axis along Wellington Street West. Access to underground parking is provided by ramp at the south accessed via a laneway along the south elevation. At Level 2 the building steps back from the southwest corner, and at Level 7 the building steps back from the west elevation to provide outdoor terraces. Above Level 7, the building rises with a roughly square planform. The surroundings comprise of dominantly lo-rise residential buildings with some mid-rise buildings to the northeast.

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<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



### **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 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 ( $2 \times 10^{-5}$  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 is 50, 45, and 40 dBA for reception/retail, living rooms, and sleeping quarters, respectively, as listed in Table 1. Based on Gradient Wind’s experience, more comfortable indoor noise levels should be targeted,



towards 47, 42, and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

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

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

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

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

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

<sup>5</sup> 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

## 4.2.2 Theoretical Roadway Noise Predictions

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

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be flat/gentle slope.
- For select receptors, the proposed building was considered as a noise barrier partially obstructing exposure to the roadway.
- Noise receptors were strategically placed at 7 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-8.

## 4.2.3 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan<sup>7</sup> which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

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



**TABLE 2: ROADWAY TRAFFIC DATA**

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volume
Wellington Street West	2-Lane Urban Arterial Undivided (2-UAU)	50	<b>15,000</b>
Parkdale Avenue	2-Lane Urban Arterial Undivided (2-UAU)	40	<b>15,000</b>
Highway 417	400 Series Highway	100	<b>144,000</b>

## 5. RESULTS AND DISCUSSION

### 5.1 Roadway Traffic Noise Levels

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

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

Receptor Number	Receptor Height Above Grade/Roof (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	19.5	POW – 6 <sup>th</sup> Floor – North Façade	69	61
2	55.5	POW – 18 <sup>th</sup> Floor – North Façade	69	61
3	55.5	POW – 18 <sup>th</sup> Floor – East Façade	69	61
4	19.5	POW – 6 <sup>th</sup> Floor – South Façade	66	62
5	19.5	POW – 6 <sup>th</sup> Floor – West Façade	65	57
6	7.5	OLA – 2 <sup>nd</sup> Floor – Amenity Terrace	61	N/A*
7	22.5	OLA – 7 <sup>th</sup> Floor – Amenity Terrace	62	N/A*

\*OLA noise levels during the nighttime are not considered as per ENCG

The results of the current analysis indicate that noise levels will range between 65 and 69 dBA during the daytime period (07:00-23:00) and between 57 and 62 dBA during the nighttime period (23:00-07:00) for plane of window receptors. At the rooftop terrace on level 2 (receptor 6), the daytime noise level is 61 dBA, and at the rooftop terrace on level 7 (receptor 7), the daytime noise level is 62 dBA. The highest



noise level (69 dBA) occurs at the north and east façades, which are most exposed to Wellington Street West and Parkdale Avenue.

## **6. CONCLUSIONS AND RECOMMENDATIONS**

The noise levels predicted due to roadway traffic exceed the criteria listed in ENCG for building components, therefore, upgraded building components will be required for all façades. Due to the limited information available at the time of the study, which was prepared for a ZBA application, 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 the building.

Results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system, due to roadway traffic noise. This will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required on all Lease, Purchase and Sale Agreements.

The results also indicate that noise levels for the outdoor amenity spaces (Receptor 6 & 7) are expected to exceed the criteria listed in NPC-300 for outdoor living areas, as discussed in Section 4.2. Therefore, acoustic mitigation, such as perimeter guards, may be required if the areas are used as common terraces. Furthermore, a detailed roadway traffic noise study will be required at the time of site plan approval to determine specific noise control measures for the development.

With respect to noise impacts from the building on the surroundings and the building itself, noise from HVAC equipment can generally be minimized by judicious selection and placement of the equipment. Locating large pieces of equipment, such as cooling towers, generators, and air handling units, on a high roof, allows the building to shield nearby sensitive areas from noise exposure. Where necessary noise levels can be controlled by adding silencers, acoustic barriers, or noise screens. A stationary noise study should be conducted for the site during the detailed design once mechanical plans for the proposed building become available. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below NPC-300 limits.

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.***

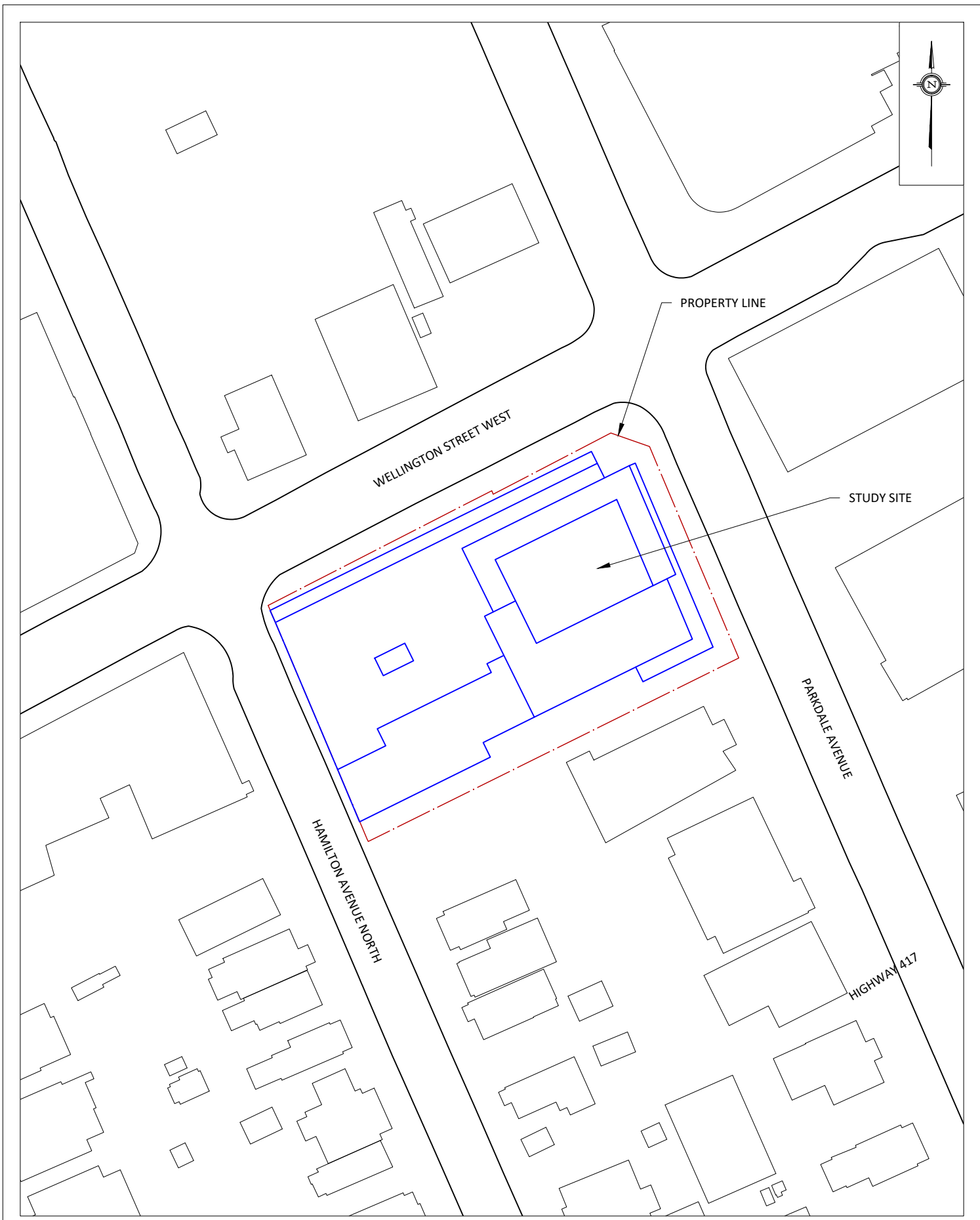


Caleb Alexander  
Junior Environmental Scientist

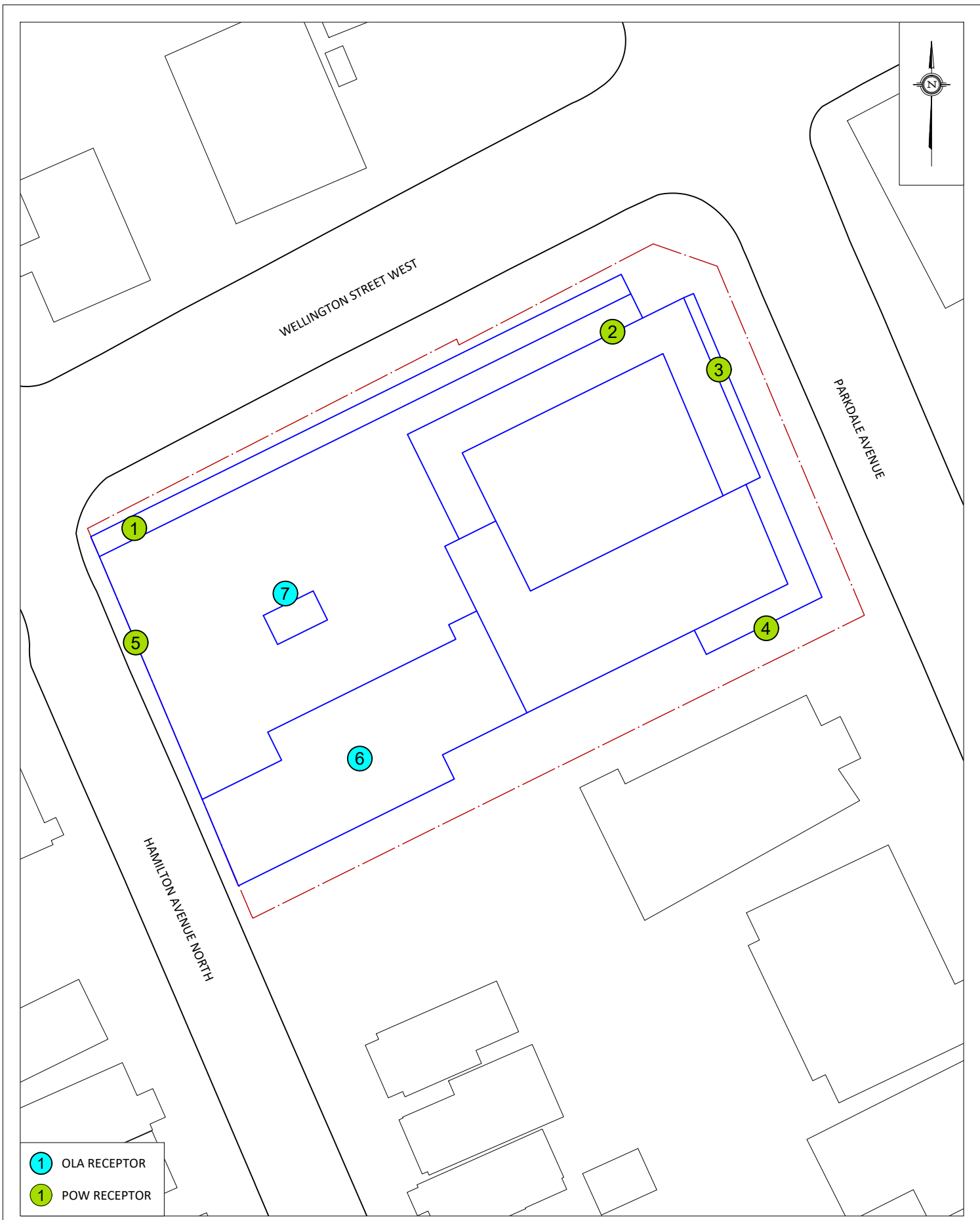
Gradient Wind File 21-113 – Traffic Noise Feasibility



Joshua Foster, P.Eng.  
Principal

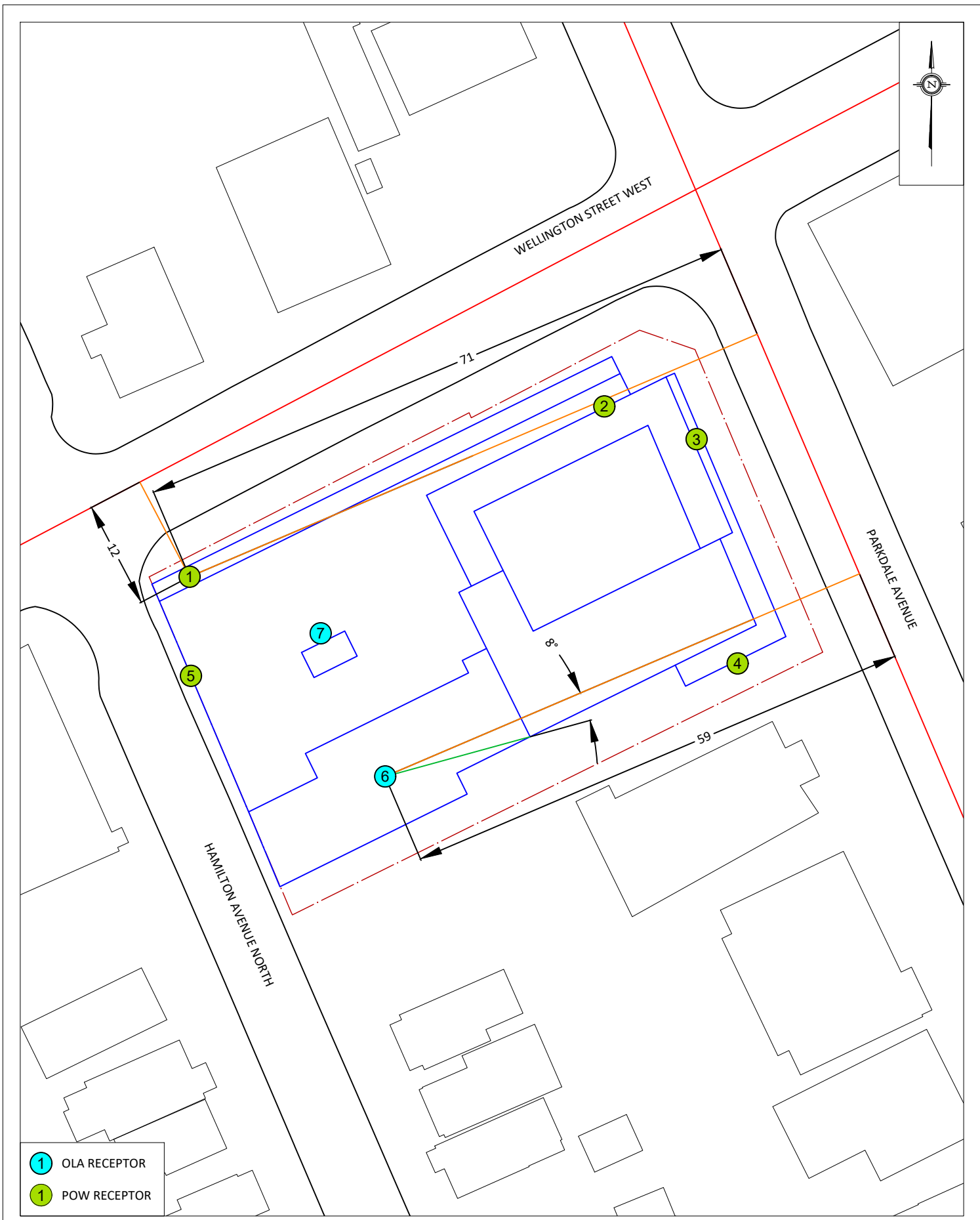


<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION	<b>FIGURE 1:</b> SITE PLAN AND SURROUNDING CONTEXT
	SCALE	1:2000 (APPROX.)	DRAWING NO.	21-113-1	
	DATE	JUNE 17, 2021	DRAWN BY	C.A.	



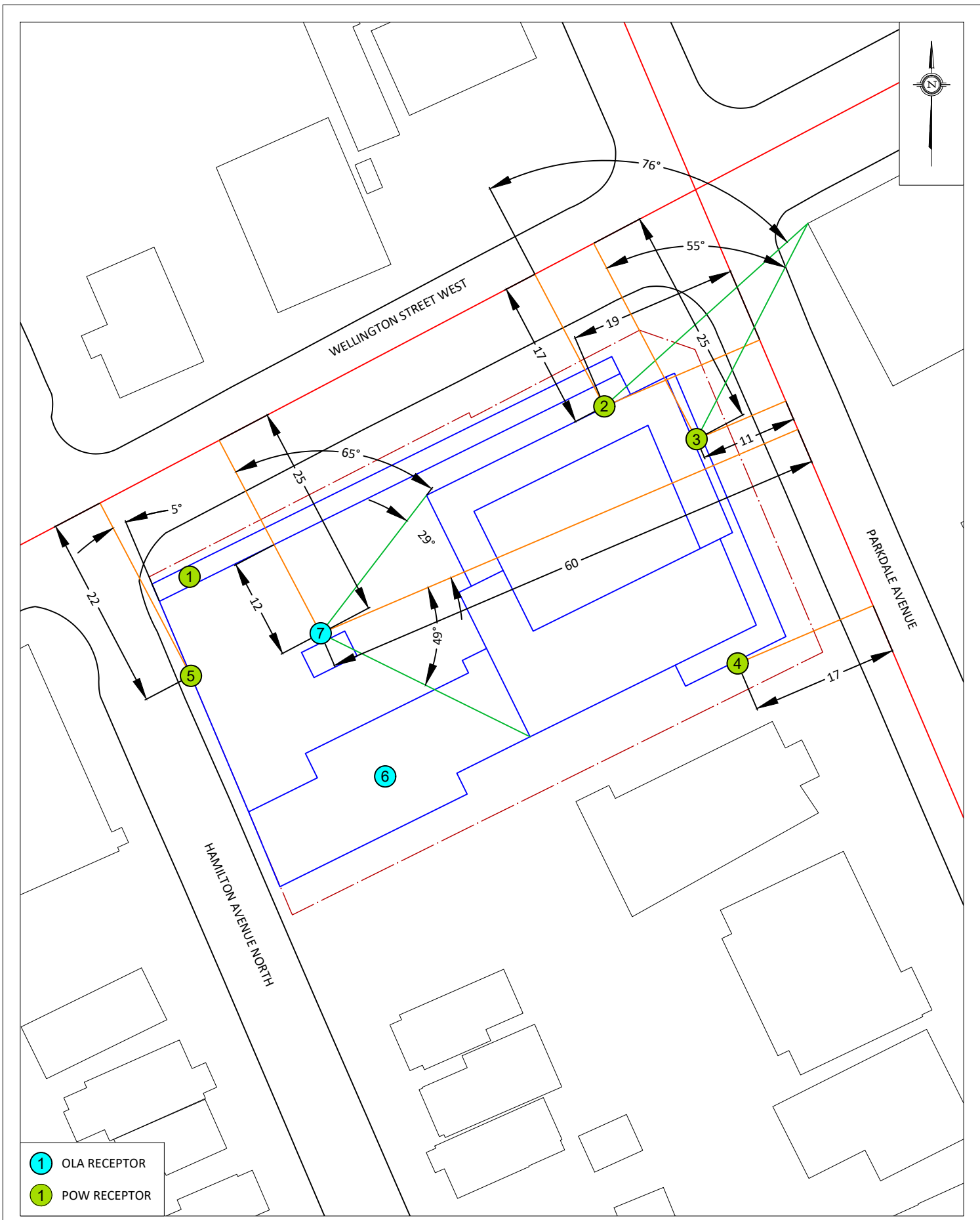
- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION  <b>FIGURE 2: RECEPTOR LOCATIONS</b>	
	SCALE	1:1000 (APPROX.)	DRAWING NO.		21-113-2
	DATE	JUNE 17, 2021	DRAWN BY		C.A.



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION	<b>FIGURE 3: RECEPTORS 1 &amp; 6</b>
	SCALE	1:1000 (APPROX.)	DRAWING NO.	21-113-3	
	DATE	JUNE 17, 2021	DRAWN BY	C.A.	



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION  <p style="text-align: center;"><b>FIGURE 4: RECEPTORS 2-5 &amp; 7</b></p>	
	SCALE	1:1000 (APPROX.)	DRAWING NO.		21-113-4
	DATE	JUNE 17, 2021	DRAWN BY		C.A.

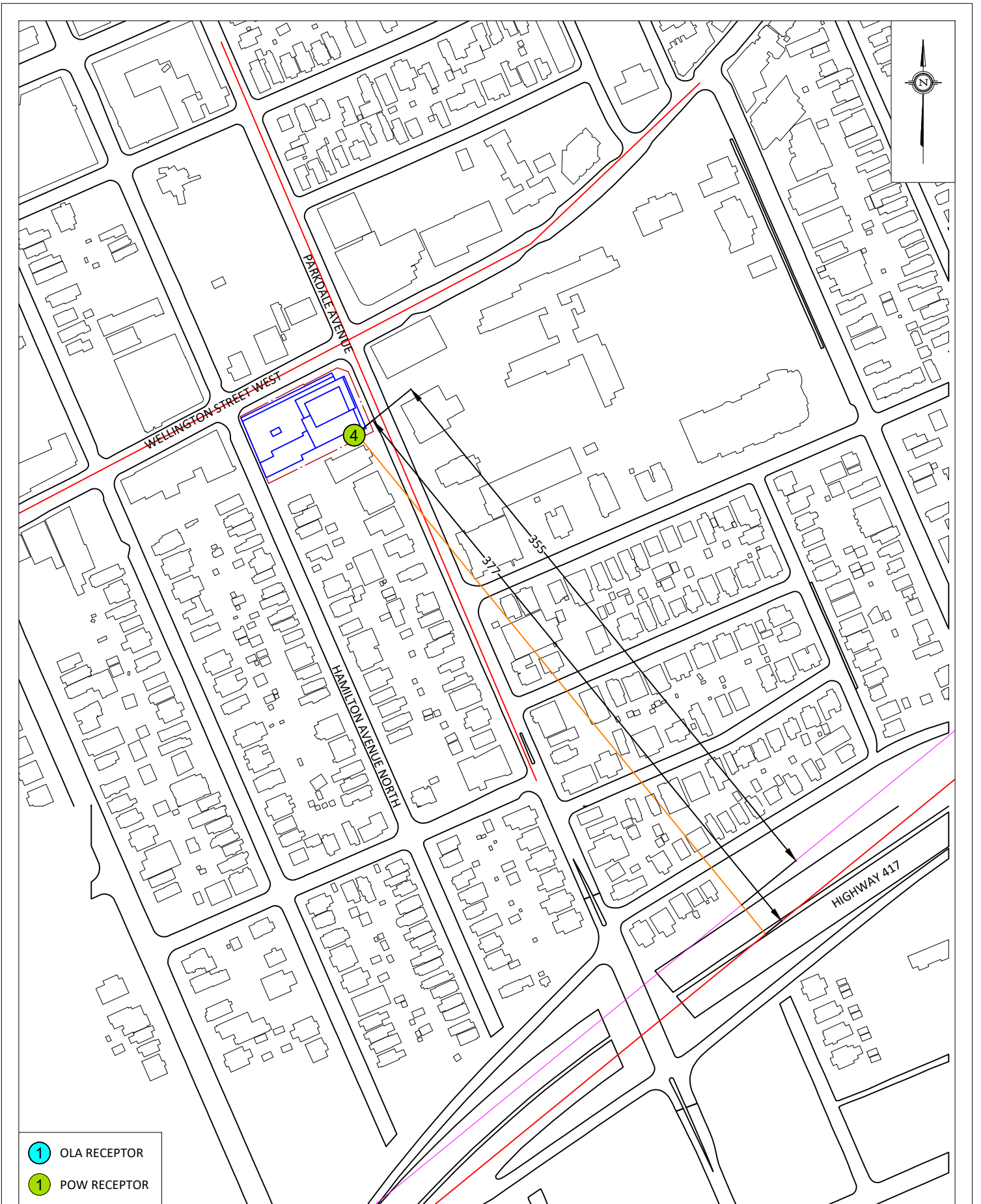




- ❶ OLA RECEPTOR
- ❶ POW RECEPTOR

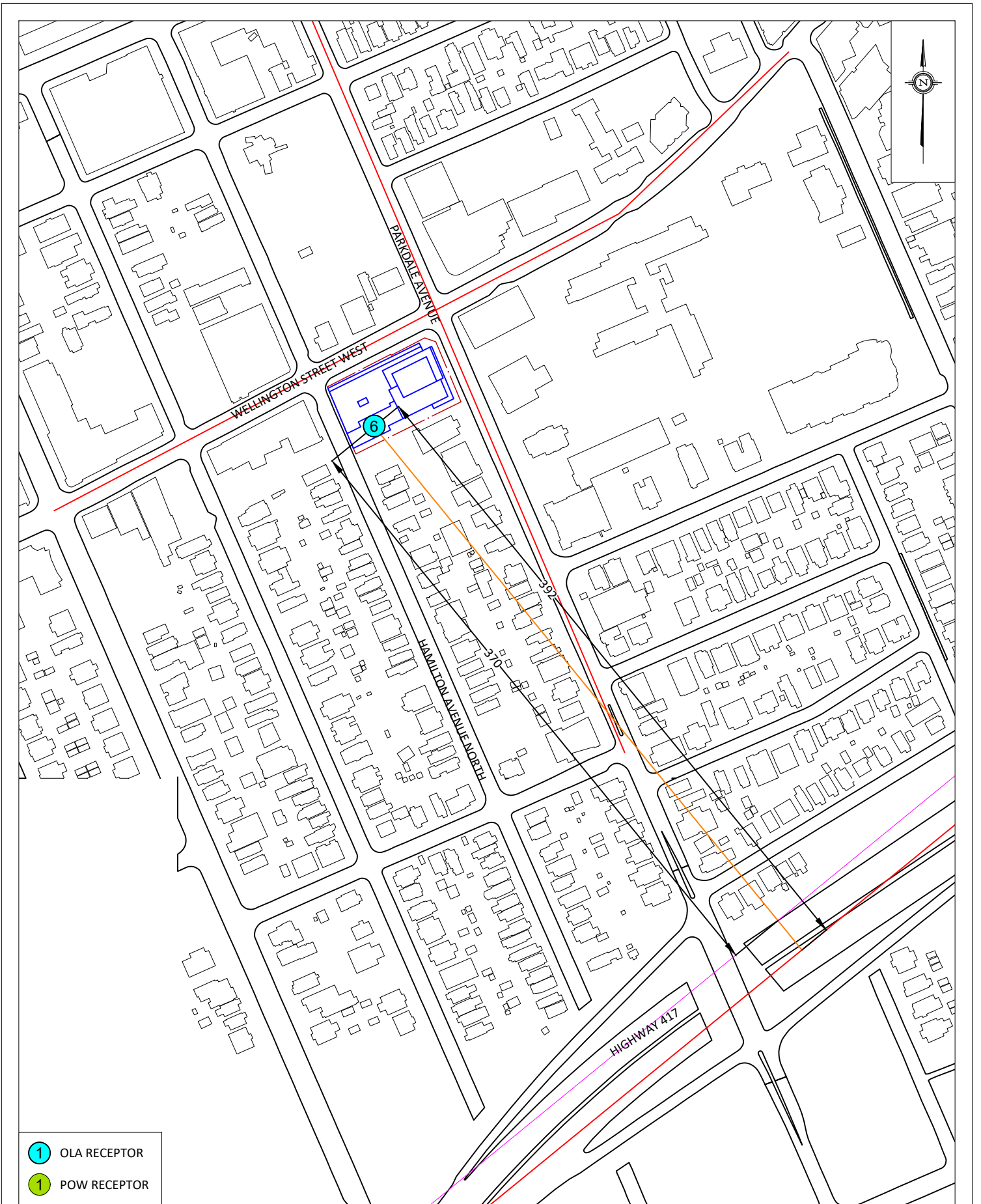
<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION	FIGURE 5: RECEPTORS 3 & 5: HIGHWAY 417
	SCALE	1:2000 (APPROX.)	DRAWING NO.	21-113-5	
	DATE	JUNE 18, 2021	DRAWN BY	C.A.	





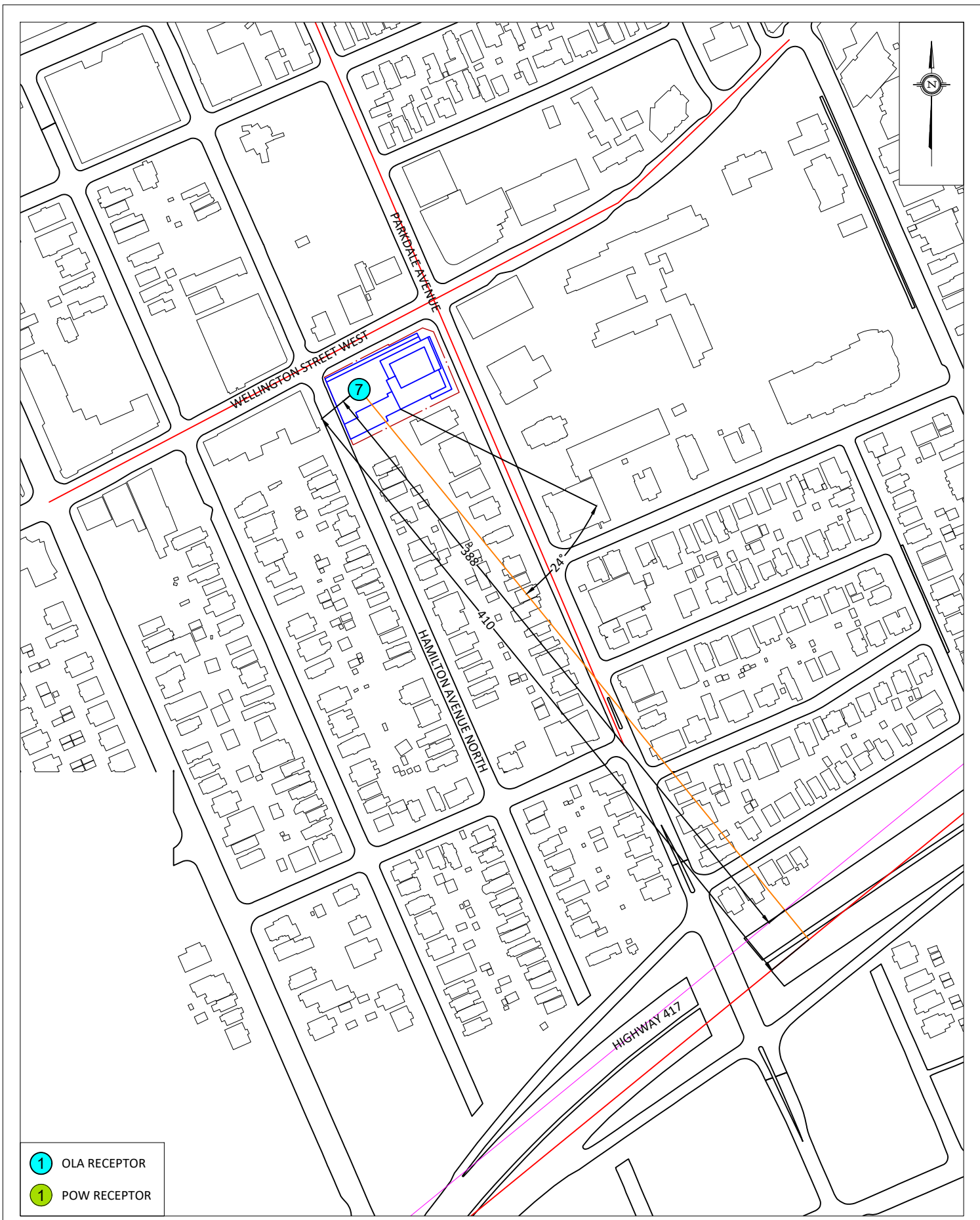
PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT	
SCALE	1:2000 (APPROX.)	DRAWING NO. 21-113-6
DATE	JUNE 18, 2021	DRAWN BY C.A.

DESCRIPTION	FIGURE 6: RECEPTOR 4: HIGHWAY 417
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- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<p><b>GRADIENTWIND</b> ENGINEERS &amp; SCIENTISTS</p> <p>127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM</p>	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT	DESCRIPTION	
	SCALE	1:2000 (APPROX.)	DRAWING NO.	21-113-7
	DATE	JUNE 18, 2021	DRAWN BY	C.A.
			<p><b>FIGURE 7:</b> RECEPTOR 6: HIGHWAY 417</p>	



- ① OLA RECEPTOR
- ① POW RECEPTOR

<b>GRADIENTWIND</b> ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION	FIGURE 8: RECEPTOR 7: HIGHWAY 417
	SCALE	1:2000 (APPROX.)	DRAWING NO.	21-113-8	
	DATE	JUNE 18, 2021	DRAWN BY	C.A.	

# GRADIENTWIND

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## APPENDIX A

### STAMSON 5.04 – INPUT AND OUTPUT DATA



# GRADIENTWIND

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STAMSON 5.0                      NORMAL REPORT                      Date: 17-06-2021 15:58:54  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 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): 15000  
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: Wellington (day/night)

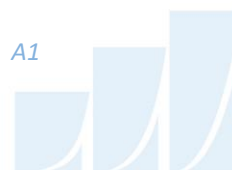
-----  
Angle1 Angle2 : -90.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 15.00 / 15.00 m  
Receiver height : 19.50 / 19.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

## Road data, segment # 2: Parkdale 1 (day/night)

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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



# GRADIENTWIND

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Data for Segment # 2: Parkdale 1 (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 : 71.00 / 71.00 m
Receiver height     : 19.50 / 19.50 m
Topography          :      1      (Flat/gentle slope; no barrier)
Reference angle     :      0.00
  
```

Results segment # 1: Wellington (day)

Source height = 1.50 m

ROAD (0.00 + 68.48 + 0.00) = 68.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.48	0.00	0.00	0.00	0.00	0.00	0.00	68.48

Segment Leq : 68.48 dBA

Results segment # 2: Parkdale 1 (day)

Source height = 1.50 m

ROAD (0.00 + 56.92 + 0.00) = 56.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.69	0.00	-6.75	-3.01	0.00	0.00	0.00	56.92

Segment Leq : 56.92 dBA

Total Leq All Segments: 68.77 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.88	0.00	0.00	0.00	0.00	0.00	0.00	60.88



Segment Leq : 60.88 dBA

Results segment # 2: Parkdale 1 (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 49.33 + 0.00) = 49.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	59.09	0.00	-6.75	-3.01	0.00	0.00	0.00	49.33

-----  
Segment Leq : 49.33 dBA

Total Leq All Segments: 61.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.77  
(NIGHT): 61.17



# GRADIENTWIND

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STAMSON 5.0                      NORMAL REPORT                      Date: 17-06-2021 15:59:06  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

---

Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 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): 15000  
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: Wellington (day/night)

---

Angle1 Angle2 : -90.00 deg 76.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 17.00 / 17.00 m  
Receiver height : 55.50 / 55.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

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

---

Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)





# GRADIENTWIND

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

24 hr Traffic Volume (AADT or SADT): 15000  
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: Wellington 2 (day/night)

-----  
Angle1 Angle2 : 76.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 17.00 / 17.00 m  
Receiver height : 55.50 / 55.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 76.00 deg Angle2 : 90.00 deg  
Barrier height : 30.00 m  
Barrier receiver distance : 8.00 / 8.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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



# GRADIENTWIND

ENGINEERS & SCIENTISTS

Data for Segment # 3: Parkdale (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 : 19.00 / 19.00 m
Receiver height     : 55.50 / 55.50 m
Topography          :      1      (Flat/gentle slope; no barrier)
Reference angle     :      0.00
  
```

Results segment # 1: Wellington (day)

Source height = 1.50 m

ROAD (0.00 + 67.58 + 0.00) = 67.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	76	0.00	68.48	0.00	-0.54	-0.35	0.00	0.00	0.00	67.58

Segment Leq : 67.58 dBA

Results segment # 2: Wellington 2 (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	55.50	30.09	30.09

ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
76	90	0.00	68.48	0.00	-0.54	-11.09	0.00	0.00	-5.00	51.85*
76	90	0.00	68.48	0.00	-0.54	-11.09	0.00	0.00	0.00	56.85

\* Bright Zone !

Segment Leq : 56.85 dBA



# GRADIENTWIND

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Results segment # 3: Parkdale (day)

---

Source height = 1.50 m

ROAD (0.00 + 62.65 + 0.00) = 62.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.69	0.00	-1.03	-3.01	0.00	0.00	0.00	62.65

---

Segment Leq : 62.65 dBA

Total Leq All Segments: 69.06 dBA

Results segment # 1: Wellington (night)

---

Source height = 1.50 m

ROAD (0.00 + 59.99 + 0.00) = 59.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	76	0.00	60.88	0.00	-0.54	-0.35	0.00	0.00	0.00	59.99

---

Segment Leq : 59.99 dBA

Results segment # 2: Wellington 2 (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	55.50	30.09	30.09

ROAD (0.00 + 49.25 + 0.00) = 49.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
76	90	0.00	60.88	0.00	-0.54	-11.09	0.00	0.00	-5.00	44.25*
76	90	0.00	60.88	0.00	-0.54	-11.09	0.00	0.00	0.00	49.25

---

\* Bright Zone !

Segment Leq : 49.25 dBA



Results segment # 3: Parkdale (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 55.05 + 0.00) = 55.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	59.09	0.00	-1.03	-3.01	0.00	0.00	0.00	55.05

-----  
Segment Leq : 55.05 dBA

Total Leq All Segments: 61.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.06  
(NIGHT): 61.47



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 18-06-2021 18:45:25  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume    : 12144/1056    veh/TimePeriod    \*  
Medium truck volume :    966/84        veh/TimePeriod    \*  
Heavy truck volume  :    690/60        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): 15000  
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: Wellington (day/night)

-----  
Angle1    Angle2                    :    5.00 deg    55.00 deg  
Wood depth                        :     0        (No woods.)  
No of house rows                  :     0 / 0  
Surface                             :     2        (Reflective ground surface)  
Receiver source distance         : 25.00 / 25.00 m  
Receiver height                    : 55.50 / 55.50 m  
Topography                         :     1        (Flat/gentle slope; no barrier)  
Reference angle                    :     0.00



# GRADIENTWIND

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 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): 15000  
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: Wellington 2 (day/night)

-----  
Angle1 Angle2 : 55.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 25.00 / 25.00 m  
Receiver height : 55.50 / 55.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 55.00 deg Angle2 : 90.00 deg  
Barrier height : 30.00 m  
Barrier receiver distance : 16.00 / 16.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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: Parkdale (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 : 15.00 / 19.00 m  
Receiver height : 55.50 / 55.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



# GRADIENTWIND

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Road data, segment # 4: HWY417 (day/night)

-----  
Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY417 (day/night)

-----  
Angle1 Angle2 : -90.00 deg 16.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 400.00 / 400.00 m  
Receiver height : 55.50 / 55.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 16.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 378.00 / 378.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00





# GRADIENTWIND

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Results segment # 1: Wellington (day)

-----

Source height = 1.50 m

ROAD (0.00 + 60.70 + 0.00) = 60.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	55	0.00	68.48	0.00	-2.22	-5.56	0.00	0.00	0.00	60.70

-----

Segment Leq : 60.70 dBA

Results segment # 2: Wellington 2 (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	55.50	20.94	20.94

ROAD (0.00 + 50.12 + 0.00) = 50.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.00	68.48	0.00	-2.22	-7.11	0.00	0.00	-9.03	50.12

-----

Segment Leq : 50.12 dBA

Results segment # 3: Parkdale (day)

-----

Source height = 1.50 m

ROAD (0.00 + 66.69 + 0.00) = 66.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.69	0.00	0.00	0.00	0.00	0.00	0.00	66.69

-----

Segment Leq : 66.69 dBA

Results segment # 4: HWY417 (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	55.50	4.47	4.47

ROAD (0.00 + 62.53 + 0.00) = 62.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	16	0.00	84.33	0.00	-14.26	-2.30	0.00	0.00	-5.24	62.53

Segment Leq : 62.53 dBA

Total Leq All Segments: 68.88 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 53.10 + 0.00) = 53.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	55	0.00	60.88	0.00	-2.22	-5.56	0.00	0.00	0.00	53.10

Segment Leq : 53.10 dBA

Results segment # 2: Wellington 2 (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	55.50	20.94	20.94

ROAD (0.00 + 42.52 + 0.00) = 42.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.00	60.88	0.00	-2.22	-7.11	0.00	0.00	-9.03	42.52

Segment Leq : 42.52 dBA



# GRADIENTWIND

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Results segment # 3: Parkdale (night)

Source height = 1.50 m

ROAD (0.00 + 58.06 + 0.00) = 58.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	59.09	0.00	-1.03	0.00	0.00	0.00	0.00	58.06

Segment Leq : 58.06 dBA

Results segment # 4: HWY417 (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	55.50	4.47	4.47

ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	16	0.00	76.73	0.00	-14.26	-2.30	0.00	0.00	-5.24	54.93

Segment Leq : 54.93 dBA

Total Leq All Segments: 60.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 68.88  
(NIGHT) : 60.69





# GRADIENTWIND

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Road data, segment # 2: HWY417 1 (day/night)

-----  
Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY417 1 (day/night)

-----  
Angle1 Angle2 : -90.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 377.00 / 377.00 m  
Receiver height : 19.50 / 19.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 355.00 / 10.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

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Results segment # 1: Parkdale (day)

---

Source height = 1.50 m

ROAD (0.00 + 63.27 + 0.00) = 63.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	90	0.00	66.69	0.00	-0.54	-2.87	0.00	0.00	0.00	63.27

---

Segment Leq : 63.27 dBA

Results segment # 2: HWY417 1 (day)

---

Source height = 1.50 m

Barrier height for grazing incidence

---

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	19.50	2.55	2.55

ROAD (0.00 + 62.19 + 0.00) = 62.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	84.33	0.00	-14.00	0.00	0.00	0.00	-8.14	62.19

---

Segment Leq : 62.19 dBA

Total Leq All Segments: 65.77 dBA

Results segment # 1: Parkdale (night)

---

Source height = 1.50 m

ROAD (0.00 + 55.68 + 0.00) = 55.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	90	0.00	59.09	0.00	-0.54	-2.87	0.00	0.00	0.00	55.68

---

Segment Leq : 55.68 dBA



# GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 2: HWY417 1 (night)

---

Source height = 1.50 m

Barrier height for grazing incidence

---

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50	!	19.50	!
		19.02	!
			19.02

ROAD (0.00 + 60.71 + 0.00) = 60.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	76.73	0.00	-14.00	0.00	0.00	0.00	-0.01	62.72*
-90	90	0.12	76.73	0.00	-15.68	-0.34	0.00	0.00	0.00	60.71

---

\* Bright Zone !

Segment Leq : 60.71 dBA

Total Leq All Segments: 61.90 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.77  
(NIGHT): 61.90



# GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0                      NORMAL REPORT                      Date: 18-06-2021 18:45:52  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 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): 15000  
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: Wellington (day/night)

-----  
Angle1 Angle2 : -90.00 deg 5.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 22.00 / 22.00 m  
Receiver height : 19.50 / 19.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00





# GRADIENTWIND

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Road data, segment # 2: HWY417 1 (day/night)

-----  
Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY417 1 (day/night)

-----  
Angle1 Angle2 : 16.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 416.00 / 416.00 m  
Receiver height : 19.50 / 19.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 16.00 deg Angle2 : 90.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 394.00 / 394.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 1: Wellington (day)

-----

Source height = 1.50 m

ROAD (0.00 + 64.04 + 0.00) = 64.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	5	0.00	68.48	0.00	-1.66	-2.78	0.00	0.00	0.00	64.04

-----

Segment Leq : 64.04 dBA

Results segment # 2: HWY417 1 (day)

-----

Source height = 1.50 m

Barrier height for grazing incidence

-----

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	19.50	2.45	2.45

ROAD (0.00 + 58.05 + 0.00) = 58.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
16	90	0.00	84.33	0.00	-14.43	-3.86	0.00	0.00	-7.99	58.05

-----

Segment Leq : 58.05 dBA

Total Leq All Segments: 65.02 dBA

Results segment # 1: Wellington (night)

-----

Source height = 1.50 m

ROAD (0.00 + 56.44 + 0.00) = 56.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	5	0.00	60.88	0.00	-1.66	-2.78	0.00	0.00	0.00	56.44

-----

Segment Leq : 56.44 dBA



# GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 2: HWY417 1 (night)

---

Source height = 1.50 m

Barrier height for grazing incidence

---

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50	!	19.50	!
		2.45	!
			2.45

ROAD (0.00 + 50.45 + 0.00) = 50.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
16	90	0.00	76.73	0.00	-14.43	-3.86	0.00	0.00	-7.99	50.45

---

Segment Leq : 50.45 dBA

Total Leq All Segments: 57.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.02  
(NIGHT): 57.42





# GRADIENTWIND

ENGINEERS & SCIENTISTS

Road data, segment # 2: HWY 417 2 (day/night)

-----  
Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY 417 2 (day/night)

-----  
Angle1 Angle2 : 0.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 392.00 / 392.00 m  
Receiver height : 7.50 / 7.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 370.00 / 370.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

ENGINEERS & SCIENTISTS

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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: Parkdale (day/night)

-----  
Angle1 Angle2 : 8.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 59.00 / 59.00 m  
Receiver height : 7.50 / 7.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



# GRADIENTWIND

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Results segment # 1: HWY 417 1 (day)

---

Source height = 1.50 m

Barrier height for grazing incidence

---

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.83	1.83

ROAD (0.00 + 54.77 + 0.00) = 54.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.18	84.33	0.00	-16.72	-3.50	0.00	0.00	-9.34	54.77

---

Segment Leq : 54.77 dBA

Results segment # 2: HWY 417 2 (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	7.50	1.83	1.83

ROAD (0.00 + 54.77 + 0.00) = 54.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.18	84.33	0.00	-16.72	-3.50	0.00	0.00	-9.34	54.77

---

Segment Leq : 54.77 dBA

Results segment # 3: Parkdale (day)

---

Source height = 1.50 m

ROAD (0.00 + 57.32 + 0.00) = 57.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
8	90	0.00	66.69	0.00	-5.95	-3.41	0.00	0.00	0.00	57.32

---



Segment Leq : 57.32 dBA

Total Leq All Segments: 60.57 dBA

Results segment # 1: HWY 417 1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.83	1.83

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.18	76.73	0.00	-16.72	-3.50	0.00	0.00	-9.34	47.17

Segment Leq : 47.17 dBA

Results segment # 2: HWY 417 2 (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	7.50	1.83	1.83

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.18	76.73	0.00	-16.72	-3.50	0.00	0.00	-9.34	47.17

Segment Leq : 47.17 dBA





# GRADIENTWIND

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Results segment # 3: Parkdale (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 49.73 + 0.00) = 49.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
8	90	0.00	59.09	0.00	-5.95	-3.41	0.00	0.00	0.00	49.73

-----

Segment Leq : 49.73 dBA

Total Leq All Segments: 52.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.57  
(NIGHT): 52.97



# GRADIENTWIND

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STAMSON 5.0                      NORMAL REPORT                      Date: 18-06-2021 18:46:46  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 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): 15000  
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: Wellington (day/night)

-----  
Angle1 Angle2 : -90.00 deg 65.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 25.00 / 25.00 m  
Receiver height : 22.50 / 19.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -90.00 deg Angle2 : 65.00 deg  
Barrier height : 21.00 m  
Barrier receiver distance : 12.00 / 12.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

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Road data, segment # 2: HWY417 1 (day/night)

-----  
Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY417 1 (day/night)

-----  
Angle1 Angle2 : -24.00 deg 0.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 410.00 / 410.00 m  
Receiver height : 22.50 / 22.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -24.00 deg Angle2 : 0.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 388.00 / 388.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



# GRADIENTWIND

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Road data, segment # 3: HWY417 2 (day/night)

---

Car traffic volume : 116582/10138 veh/TimePeriod \*  
Medium truck volume : 9274/806 veh/TimePeriod \*  
Heavy truck volume : 6624/576 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): 144000  
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: HWY417 2 (day/night)

---

Angle1 Angle2 : 0.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 410.00 / 410.00 m  
Receiver height : 22.50 / 22.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 388.00 / 388.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m  
Reference angle : 0.00



Road data, segment # 4: Parkdale 1 (day/night)

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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: Parkdale 1 (day/night)

-----  
Angle1 Angle2 : -90.00 deg -29.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 60.00 / 60.00 m  
Receiver height : 22.50 / 22.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



# GRADIENTWIND

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Road data, segment # 5: Parkdale 2 (day/night)

-----  
Car traffic volume : 12144/1056 veh/TimePeriod \*  
Medium truck volume : 966/84 veh/TimePeriod \*  
Heavy truck volume : 690/60 veh/TimePeriod \*  
Posted speed limit : 40 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): 15000  
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 # 5: Parkdale 2 (day/night)

-----  
Angle1 Angle2 : 49.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 60.00 / 60.00 m  
Receiver height : 22.50 / 22.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



# GRADIENTWIND

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Results segment # 1: Wellington (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	22.50	12.42	12.42

ROAD (0.00 + 47.80 + 0.00) = 47.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	65	0.00	68.48	0.00	-2.22	-0.65	0.00	0.00	-17.81	47.80

-----

Segment Leq : 47.80 dBA

Results segment # 2: HWY417 1 (day)

-----

Source height = 1.50 m

Barrier height for grazing incidence

-----

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 51.64 + 0.00) = 51.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-24	0	0.00	84.33	0.00	-14.37	-8.75	0.00	0.00	-9.57	51.64

-----

Segment Leq : 51.64 dBA

Results segment # 3: HWY417 2 (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	22.50	2.62	2.62



# GRADIENTWIND

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ROAD (0.00 + 58.96 + 0.00) = 58.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	84.33	0.00	-14.37	-3.01	0.00	0.00	-7.99	58.96

Segment Leq : 58.96 dBA

Results segment # 4: Parkdale 1 (day)

Source height = 1.50 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-29	0.00	66.69	0.00	-6.02	-4.70	0.00	0.00	0.00	55.97

Segment Leq : 55.97 dBA

Results segment # 5: Parkdale 2 (day)

Source height = 1.50 m

ROAD (0.00 + 54.24 + 0.00) = 54.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
49	90	0.00	66.69	0.00	-6.02	-6.42	0.00	0.00	0.00	54.24

Segment Leq : 54.24 dBA

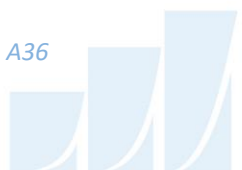
Total Leq All Segments: 62.19 dBA

Results segment # 1: Wellington (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	19.50	10.86	10.86





# GRADIENTWIND

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ROAD (0.00 + 39.44 + 0.00) = 39.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	65	0.00	60.88	0.00	-2.22	-0.65	0.00	0.00	-18.57	39.44

Segment Leq : 39.44 dBA

Results segment # 2: HWY417 1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 44.05 + 0.00) = 44.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-24	0	0.00	76.73	0.00	-14.37	-8.75	0.00	0.00	-9.57	44.05

Segment Leq : 44.05 dBA

Results segment # 3: HWY417 2 (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	22.50	2.62	2.62

ROAD (0.00 + 51.36 + 0.00) = 51.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	76.73	0.00	-14.37	-3.01	0.00	0.00	-7.99	51.36

Segment Leq : 51.36 dBA



# GRADIENTWIND

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Results segment # 4: Parkdale 1 (night)

Source height = 1.50 m

ROAD (0.00 + 48.37 + 0.00) = 48.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-29	0.00	59.09	0.00	-6.02	-4.70	0.00	0.00	0.00	48.37

Segment Leq : 48.37 dBA

Results segment # 5: Parkdale 2 (night)

Source height = 1.50 m

ROAD (0.00 + 46.64 + 0.00) = 46.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
49	90	0.00	59.09	0.00	-6.02	-6.42	0.00	0.00	0.00	46.64

Segment Leq : 46.64 dBA

Total Leq All Segments: 54.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.19  
(NIGHT): 54.56

