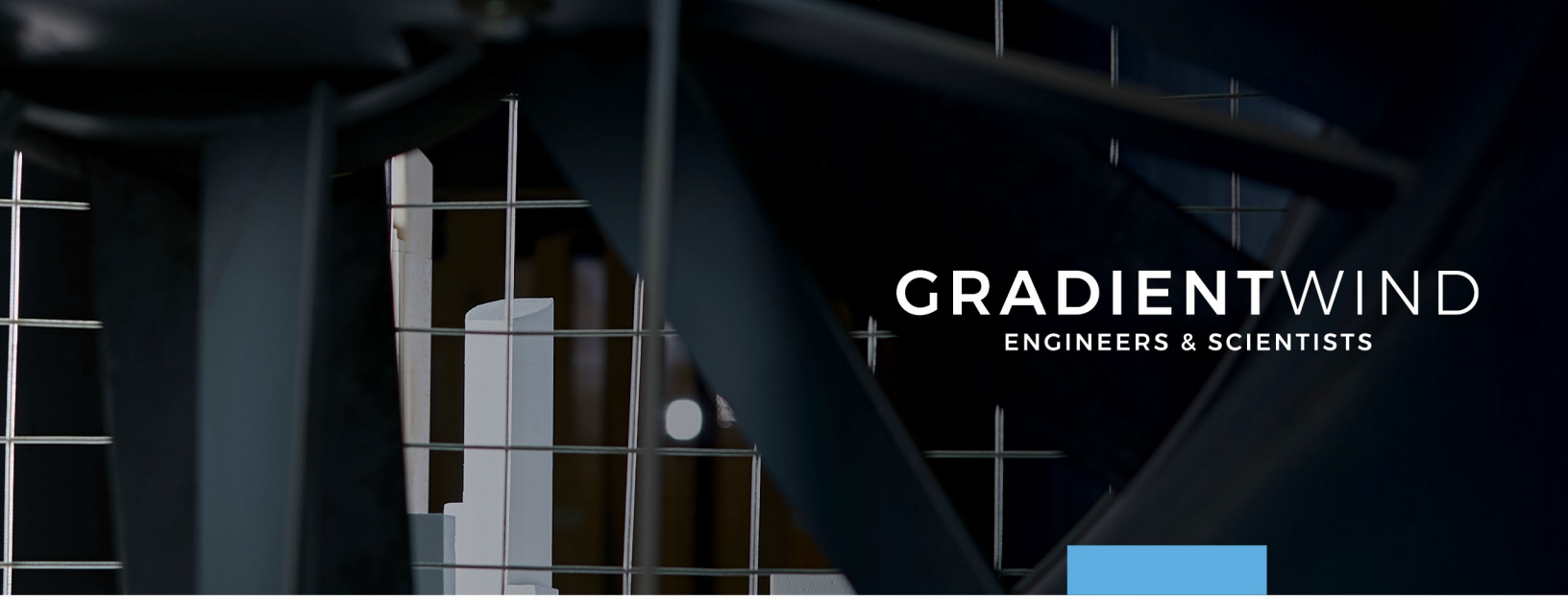
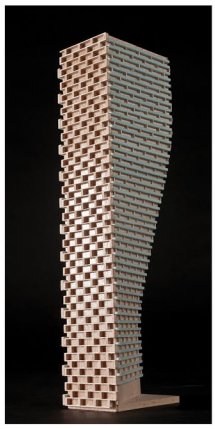


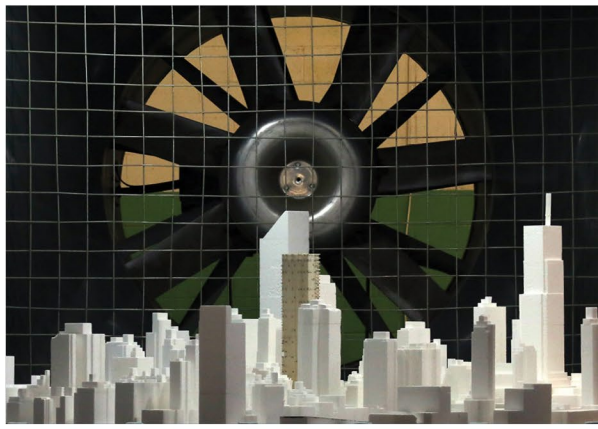
GRADIENTWIND
ENGINEERS & SCIENTISTS

# ROADWAY TRAFFIC NOISE ASSESSMENT

627 Kirkwood Avenue
Ottawa, Ontario

Report: 24-260 – Detailed Traffic Noise





February 18, 2025

PREPARED FOR

Konson Homes Inc.
361 Churchill Avenue North
Ottawa, ON K1Z 5C4


PREPARED BY

Efser Kara, MSc, LEED GA, Acoustic Scientist
Joshua Foster, P.Eng., Lead Engineer



127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

# EXECUTIVE SUMMARY

This report describes a detailed roadway traffic noise assessment performed for the proposed mixed-use development located at 627 Kirkwood Avenue in Ottawa, Ontario (hereinafter referred to as "study site", "subject site" or "the proposed development"). The study site is bordered by Kirkwood Avenue to the west and low-rise residential dwellings in the remaining directions.

The proposed development comprises a 6-storey mixed-use residential building, topped by a penthouse (PH). The surroundings of the proposed development include a low-rise commercial plaza with a surface parking lot to the southeast and low-rise residential buildings in the remaining directions with a high-rise residential building to the west. The major sources of roadway traffic noise are Kirkwood Avenue, Carling Avenue (Westbound) and Highway 417. Figure 1 illustrates the site plan with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings prepared by Architects DCA in December 2024.

The results of the current analysis indicate that noise levels will range between 69 and 48 dBA at Plane of Window (POW) receptors during the daytime period (07:00-23:00) and 65 and 46 dBA during the nighttime period (23:00-07:00). The highest noise levels (68 and 69 dBA) occur along the west and south façades, which are most exposed to Kirkwood Avenue and Highway 417. Figures 4 and 5 illustrate the traffic noise contours for daytime and nighttime periods respectively.

The results of the calculations indicate that the west and south façades of the building will require upgraded building components. Building components compliant with the Ontario Building Code (OBC 2024) will be sufficient for the remaining façades.

The results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system for the residential units, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[1] will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The results of the analysis show that the noise levels at the Roof Terrace Amenity (Receptor 6) will be below the ENCG criterion of 60 dBA. A Type A Warning Clause will be required to be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

The only stationary noise source observed around the subject site is a piece of mechanical equipment on the Hampton Court residential building rooftop, located at 616 Kirkwood Avenue. The building is situated approximately 75 metres to the west of the subject site and the direct line of sight between the equipment and the nearest study building façade is blocked by the Hampton Court residential building's stair/elevator bulkhead and the rooftop floorplate. Therefore, no stationary noise impacts are expected from the surroundings on the study site.

The subject site's stationary noise impacts on the surroundings can be controlled by judicious selection and placement of the mechanical equipment. Noise barriers/screens, acoustic louvres, or silencers can be used to mitigate the noise impacts and provide noise levels within ENCG sound level limits where required.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016

# TABLE OF CONTENTS

# 1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Konson Homes Inc. to undertake a roadway traffic noise assessment for the proposed mixed-use development located at 627 Kirkwood Avenue in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to the assessment of exterior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the City of Ottawa[2] and the Ministry of the Environment, Conservation and Parks (MECP)[3] guidelines. Noise calculations were based on architectural drawings prepared by Architects DCA in December 2024, surrounding street layouts and existing and approved future building massing information obtained from the City of Ottawa, as well as recent satellite imagery, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

# 2. TERMS OF REFERENCE

The subject site is located at 627 Kirkwood Avenue in Ottawa, situated to the north of the intersection of Kirkwood Avenue and Sebring Avenue on a parcel of land bordered by Kirkwood Avenue to the west and low-rise residential dwellings in the remaining directions. The proposed development comprises a 6-storey mixed-use residential building, topped by a penthouse (PH).

Above one level of underground parking, the ground floor includes residential units to the south, a residential main entrance and commercial spaces to the west, and a bike room/storage to the east. An outdoor amenity is provided to the east and private terraces are located at the southeast corner. Access to the underground parking level is provided by a ramp to the north via a drive aisle extending perpendicularly from Kirkwood Avenue. Levels 2-6 are reserved for residential occupancy. The building steps back from the west elevation at Level 4 and the east elevation at Level 5. The PH Level includes setbacks from all elevations with a central communal amenity space and mechanical spaces to the north and south. A common amenity terrace is located to the west facing Kirkwood Avenue at this level.

[2] City of Ottawa Environmental Noise Control Guidelines, January 2016
[3] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

The surroundings of the proposed development include a low-rise commercial plaza with a surface parking lot to the southeast and low-rise residential buildings in the remaining directions with a high-rise residential building to the west. The major sources of roadway traffic noise are Kirkwood Avenue, Carling Avenue (Westbound) and Highway 417. Figure 1 illustrates the site plan with the surrounding context.

# 3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG) 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 level 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 sound pressure level ($2\times10^{-5}$ 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 vehicular traffic, the equivalent sound energy level, $L_{eq}$, provides a measure of the time-varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time-varying noise level over a period of time. For roadways and LRT, 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) for roadways is 45 and 40 dBA for living rooms and sleeping quarters, respectively, and 50 for retail stores as listed in Table 1.

**TABLE 1: INDOOR SOUND LEVEL CRITERIA**

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

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. 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

[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8

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[6].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime period (07:00 to 23:00). When noise levels exceed 55 dBA and are less than or equal to 60 dBA, mitigation should be considered to reduce noise levels to as close to 55 dBA if technically, economically, and administratively feasible. If noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels below 60 dBA.

### 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 analysis model has been recognized by the Ministry of Transportation Ontario (MTO) as the recommended noise model for transportation projects (ref. Environmental Guide for Noise, 2022 by the Ministry of Transportation (MTO)[7]). The Ministry of Environment, Conservation and Parks has also adopted the TMN model as per their "Draft Guideline Noise Pollution Control Publications 306 (NPC-306)[8].

The *Predictor-Lima* computer program can represent three-dimensional surfaces and the first reflection of sound waves over a suitable spectrum for human hearing. Calculations were performed for receptors around the study site to determine the noise impact from roadway sources.

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.

[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[7] Ministry of Transportation, Environmental Guide for Noise, 2022. Retrieved from Environmental Guide for Noise 2022
[8] Ministry of Environment, Conservation and Parks, Ontario, "Methods to determine Sound Levels Due to Road and Rail Traffic", Draft February 12, 2020

- The day/night split for all arterial roads was taken to be 92% / 8%, respectively.
- The day/night split for Highway 417 was taken to be 67% / 33%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard ground (pavement, concrete) on the paths between the receptors and road segments.
- Highway 417 was taken to be 4 metres above the grade level; otherwise, the topography was assumed to be a flat/gentle slope surrounding the study site.
- A total of six (6) receptor locations were chosen around the study site; five (5) of them are at the facades of the building as Plane of Window (POW) receptors and one (1) of them as Outdoor Living Area (OLA) receptor on the roof terrace amenity area. The receptor locations can be seen in Figure 2.
- POW receptor heights were taken to be at the centre of the highest-level windows as well as the second level of the related façade. The OLA receptor height was taken at 1.5 m above the roof terrace walking level.

### 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[9] 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.

The major sources of roadway traffic noise impacting the study site are Kirkwood Avenue, Carling Avenue (Westbound) and Highway 417. Carling Avenue's eastbound traffic was not included in this study as the eastbound lanes of the roadway run more than 300 metres away from the subject site to the south of Highway 417. Moreover, any noise impact from Carling Avenue's eastbound traffic will be blocked by the elevated highway and masked by the highway traffic noise. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

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

**TABLE 2: ROADWAY TRAFFIC DATA**

| Segment | Roadway Traffic Data | Speed Limit (km/h) | Traffic Volumes |
|---|---|---|---|
| Carling Avenue (Westbound) | 6-Lane Urban Arterial Divided (6-UAD) | 60 | **25,000 (For Westbound)** |
| Highway 417 (Westbound) | Freeway | 100 | **73,332** |
| Highway 417 (Eastbound) | Freeway | 100 | **73,332** |
| Kirkwood Avenue | 4-Lane Urban Arterial Divided (4-UAD) | 50 | **15,000** |

## 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 (2024) 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 points in a partition.

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 are achieved. The calculation procedure[10] 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

[10] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which vary according to the intended use of a space

Based on published research[11], 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, detailed floor layouts 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 AND DISCUSSION

## 5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below.

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

| Receptor Number | Receptor Height Above Grade (m) | Receptor Type/Location | Predictor-Lima Noise Level (dBA) | |
|---|---|---|---|---|
| | | | Day | Night |
| 1 | 18 | POW / West Façade - Level 6 | 69 | 62 |
| | 6 | POW / West Façade - Level 2 | 69 | 61 |
| 2 | 18 | POW / South Façade - Level 6 | 68 | 65 |
| | 6 | POW / South Façade - Level 2 | 61 | 53 |
| 3 | 18 | POW / East Façade - Level 6 | 65 | 64 |
| | 6 | POW / East Façade - Level 2 | 49 | 47 |
| 4 | 18 | POW / East Façade - Level 6 | 64 | 63 |
| | 6 | POW / East Façade - Level 2 | 48 | 46 |
| 5 | 18 | POW / North Façade - Level 6 | 65 | 57 |
| | 6 | POW / North Façade - Level 2 | 63 | 55 |
| 6 | 21 | OLA / Roof Terrace Amenity | 58 | N/A* |

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

[11] CMHC, Road & Rail Noise: Effects on Housing

The results of the current analysis indicate that noise levels will range between 69 and 48 dBA at Plane of Window (POW) receptors during the daytime period (07:00-23:00) and 65 and 46 dBA during the nighttime period (23:00-07:00). The highest noise levels (68 and 69 dBA) occur along the west and south façades, which are most exposed to Kirkwood Avenue and Highway 417. The results of the analysis show that the noise levels at the Roof Terrace Amenity (Receptor 6) will be below the ENCG criterion of 60 dBA.

The results of the calculations indicate that the west and south façades of the building will require upgraded building components. Building components compliant with the Ontario Building Code (OBC 2024) will be sufficient for the remaining façades.

In addition, correlation calculations between Predictor-Lima and STAMSON 5.04 (Ministry of the Environment, Conservations and Parks' (MECP) computerized noise assessment program) were performed for three (3) receptor locations. The results of the calculations (Table 4) showed a good correlation with a difference of ±2 points between Predictor-Lima and STAMSON 5.04. Appendix A includes the STAMSON 5.04 input and output data.

**TABLE 4: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC**

| Receptor Number | Receptor Height Above Grade (m) | Receptor Type / Location | Predictor-Lima Noise Level (dBA) | | STAMSON 5.04 Noise Level (dBA) | |
|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night |
| 1 | 18 | POW / West Façade - Level 6 | 69 | 62 | 69 | 64 |
| 2 | 18 | POW / South Façade - Level 6 | 68 | 65 | 68 | 66 |
| 5 | 18 | POW / North Façade - Level 6 | 65 | 57 | 64 | 56 |

## 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 and walls 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). As per the City of Ottawa requirements, detailed STC calculations will be required to be completed prior to the building permit application. The STC requirements for the windows are summarized below for various units within the development (see also Figure 3):

**TABLE 5: NOISE CONTROL MEASURES**

| Façade | STC Requirements | | | Ventilation Requirement | Warning Clause |
|---|---|---|---|---|---|
| | Bedroom | Living Room | Retail | | |
| West | 30 | 30 | 25 | Central Air Conditioning or a similar system | Type D / Type A |
| South | 30 | 30 | 25 | | |
| North and East | OBC Compliant Exterior Building Components | | | | |

- **Residential Windows**

(i) Bedroom and living room windows facing the west and south façades of the building will require a minimum STC of 30.

(ii) All other bedroom and living room windows are to satisfy Ontario Building Code (OBC 2024) requirements.

- **Retail Windows**

(i) Retail windows facing the west and south façades of the building will require a minimum STC of 25.

- **Exterior Walls**

(i) Exterior wall components on north, northwest, northeast, 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.[12]

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a punched window and 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 that have a combination of glass thickness and inter-pane spacing. It is the responsibility of the manufacturer to ensure that the window achieves the required STC.

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

This can only be assured by using window configurations that have been 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.

The results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system for the residential units, 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.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 69 and 48 dBA at Plane of Window (POW) receptors during the daytime period (07:00-23:00) and 65 and 46 dBA during the nighttime period (23:00-07:00). The highest noise levels (68 and 69 dBA) occur along the west and south façades, which are most exposed to Kirkwood Avenue and Highway 417. Figures 4 and 5 illustrate the traffic noise contours for daytime and nighttime periods respectively.

The results of the calculations indicate that the west and south façades of the building will require upgraded building components. Building components compliant with the Ontario Building Code (OBC 2024) will be sufficient for the remaining façades.

The results of the calculations also indicate that the building will require central air conditioning, or a similar ventilation system for the residential units, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[13] will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized below:

[13] City of Ottawa Environmental Noise Control Guidelines, January 2016

**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."*

The results of the analysis show that the noise levels at the Roof Terrace Amenity (Receptor 6) will be below the ENCG criterion of 60 dBA. A Type A Warning Clause will be required to be placed on all Lease, Purchase and Sale Agreements, as summarized below:

**Type A**

> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

The only stationary noise source observed around the subject site is a piece of mechanical equipment on the Hampton Court residential building rooftop, located at 616 Kirkwood Avenue. The building is situated approximately 75 metres to the west of the subject site and the direct line of sight between the equipment and the nearest study building façade is blocked by the Hampton Court residential building's stair/elevator bulkhead and the rooftop floorplate. Therefore, no stationary noise impacts are expected from the surroundings on the study site.

The subject site's stationary noise impacts on the surroundings can be controlled by judicious selection and placement of the mechanical equipment. Noise barriers/screens, acoustic louvres, or silencers can be used to mitigate the noise impacts and provide noise levels within ENCG sound level limits where required.

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.

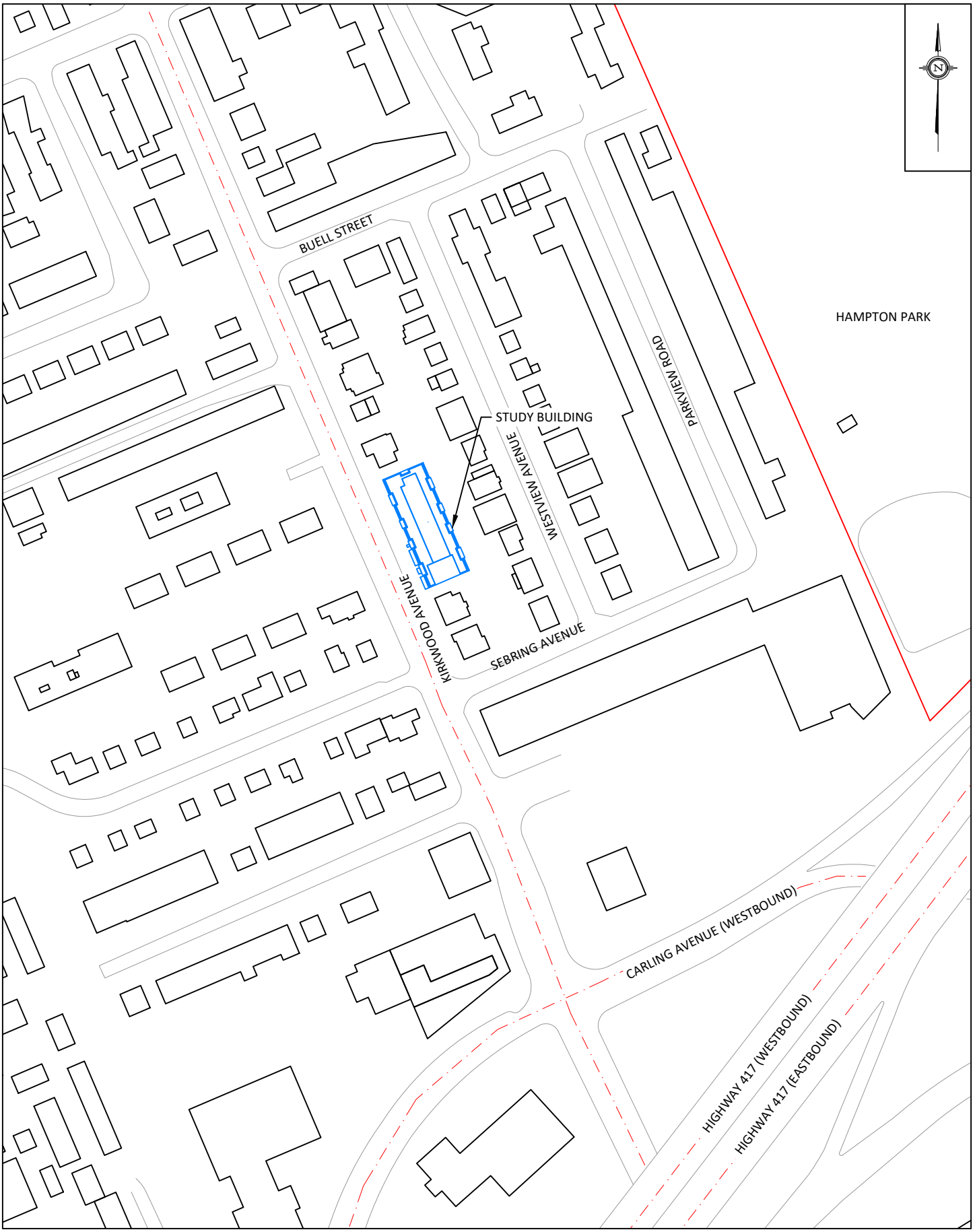
Sincerely,

***Gradient Wind Engineering Inc.***


Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Lead Engineer

*Gradient Wind File #24-260 – Detailed Traffic Noise*



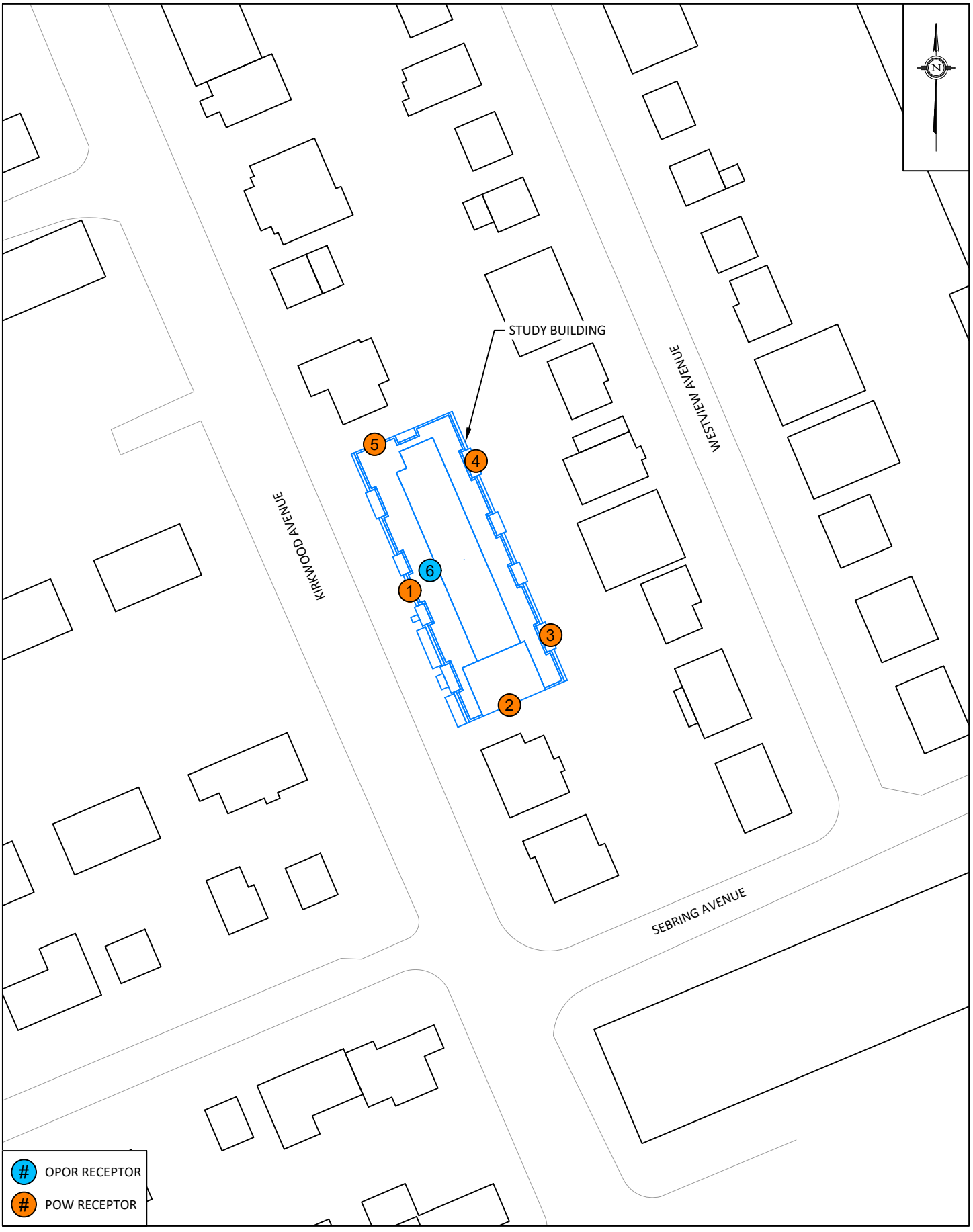

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

| | |
|---|---|
| PROJECT | 627 KIRKWOOD AVENUE, OTTAWA<br>STATIONARY NOISE ASSESSMENT |
| SCALE | 1:2500 (APPROX.) |
| DRAWING NO. | 24-260 - 1 |
| DATE | JANUARY 23, 2025 |
| DRAWN BY | E.K. |

DESCRIPTION

FIGURE 1:
THE STUDY SITE AND SURROUNDING CONTEXT



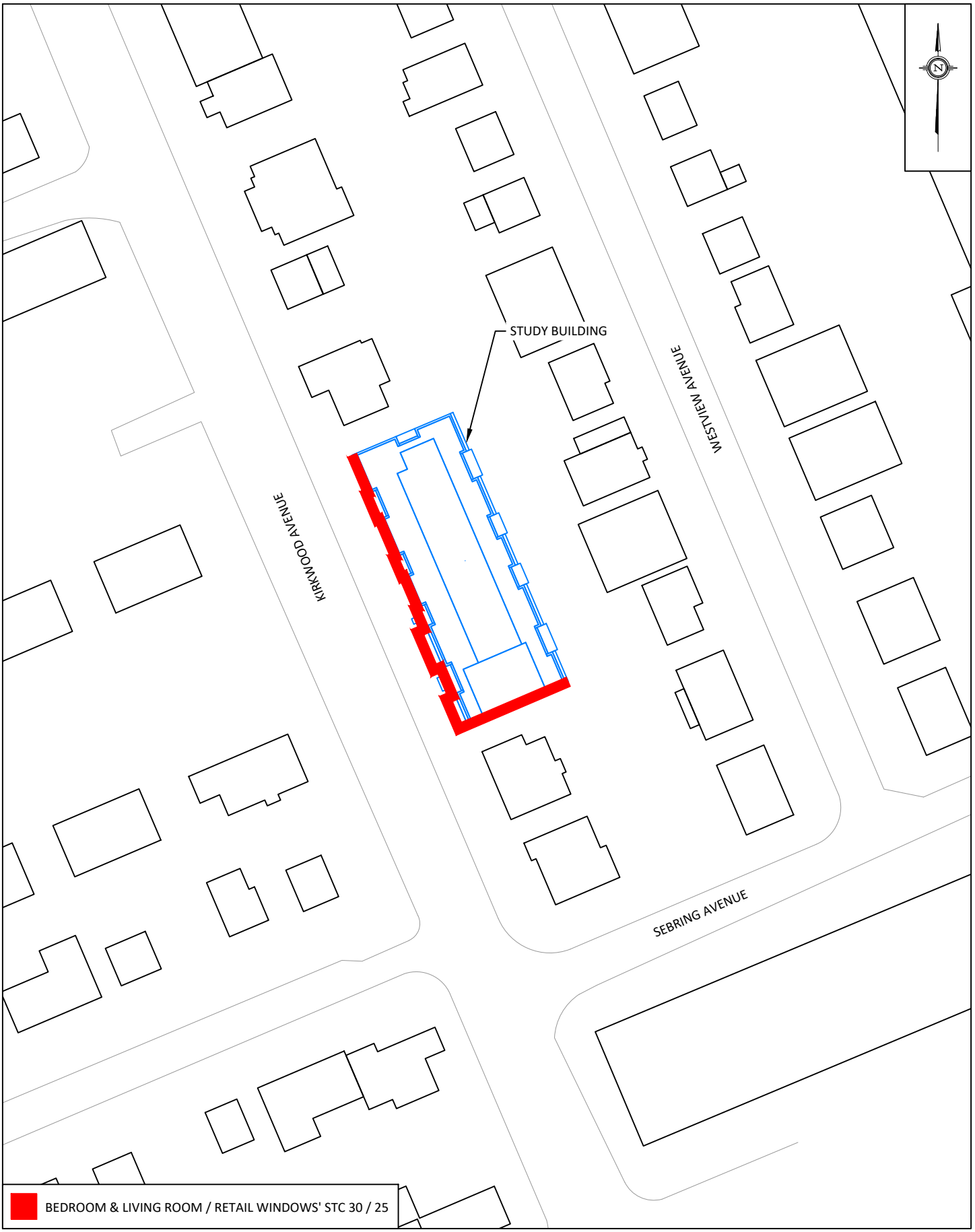

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

| | |
|---|---|
| PROJECT | 627 KIRKWOOD AVENUE, OTTAWA<br>STATIONARY NOISE ASSESSMENT |
| SCALE | 1:1000 (APPROX.) |
| DRAWING NO. | 24-260 - 2 |
| DATE | JANUARY 23, 2025 |
| DRAWN BY | E.K. |

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS




GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

| | | | |
|---|---|---|---|
| PROJECT | 627 KIRKWOOD AVENUE, OTTAWA<br>STATIONARY NOISE ASSESSMENT | | DESCRIPTION |
| SCALE | 1:1000 (APPROX.) | DRAWING NO. 24-260 - 3 | FIGURE 3:<br>STC REQUIREMENTS |
| DATE | JANUARY 23, 2025 | DRAWN BY E.K. | |

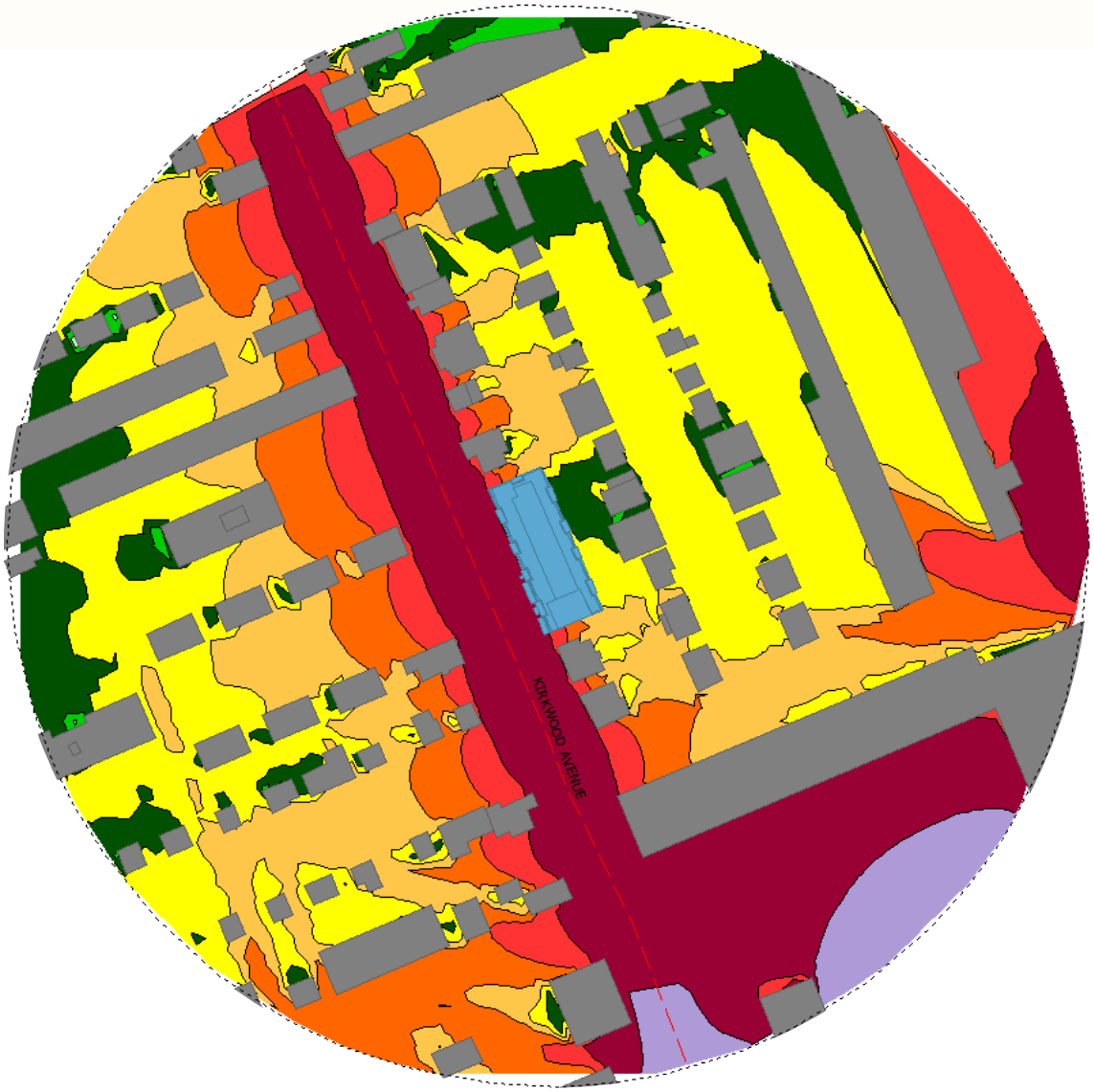



**FIGURE 4: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)**

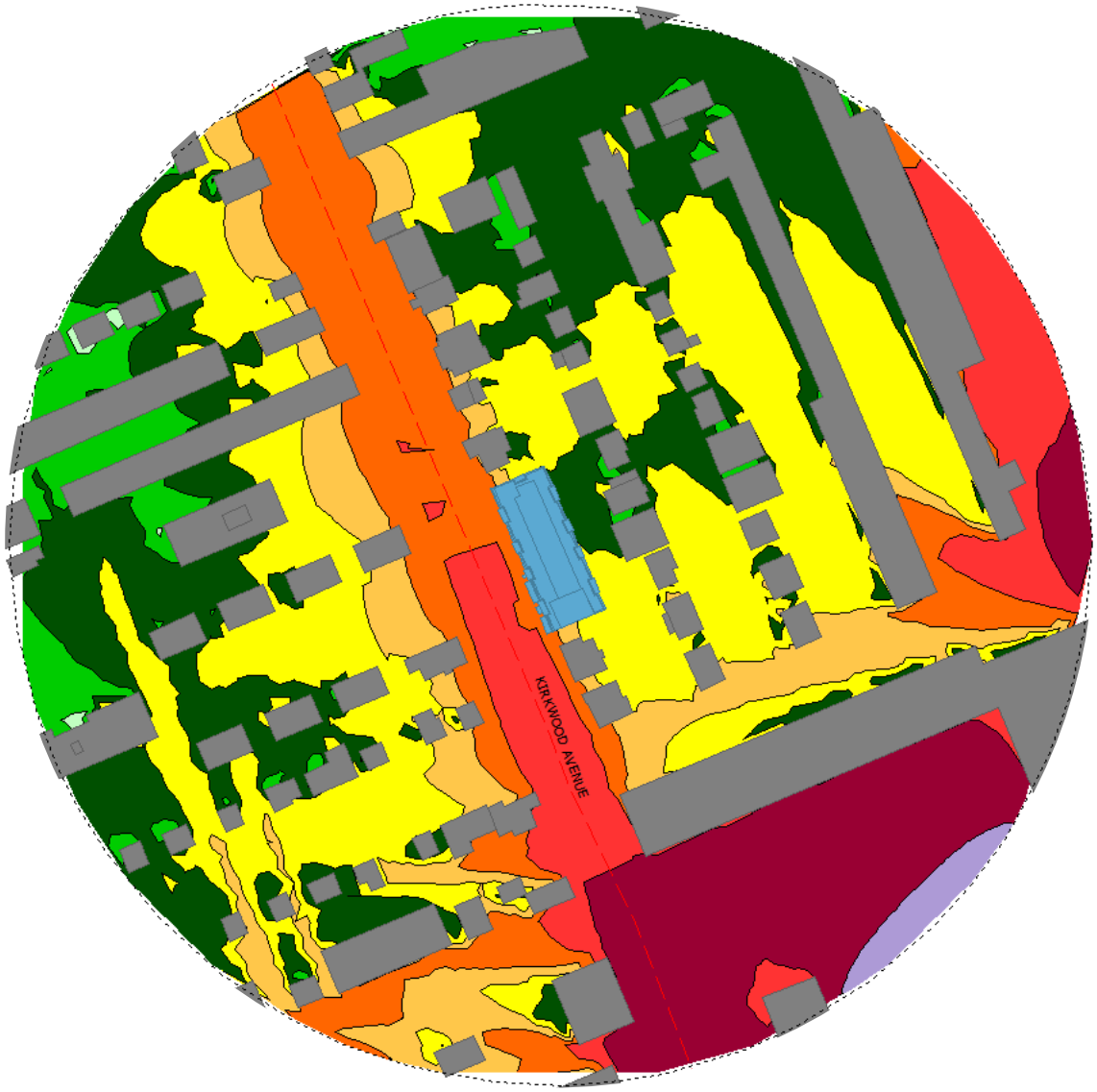
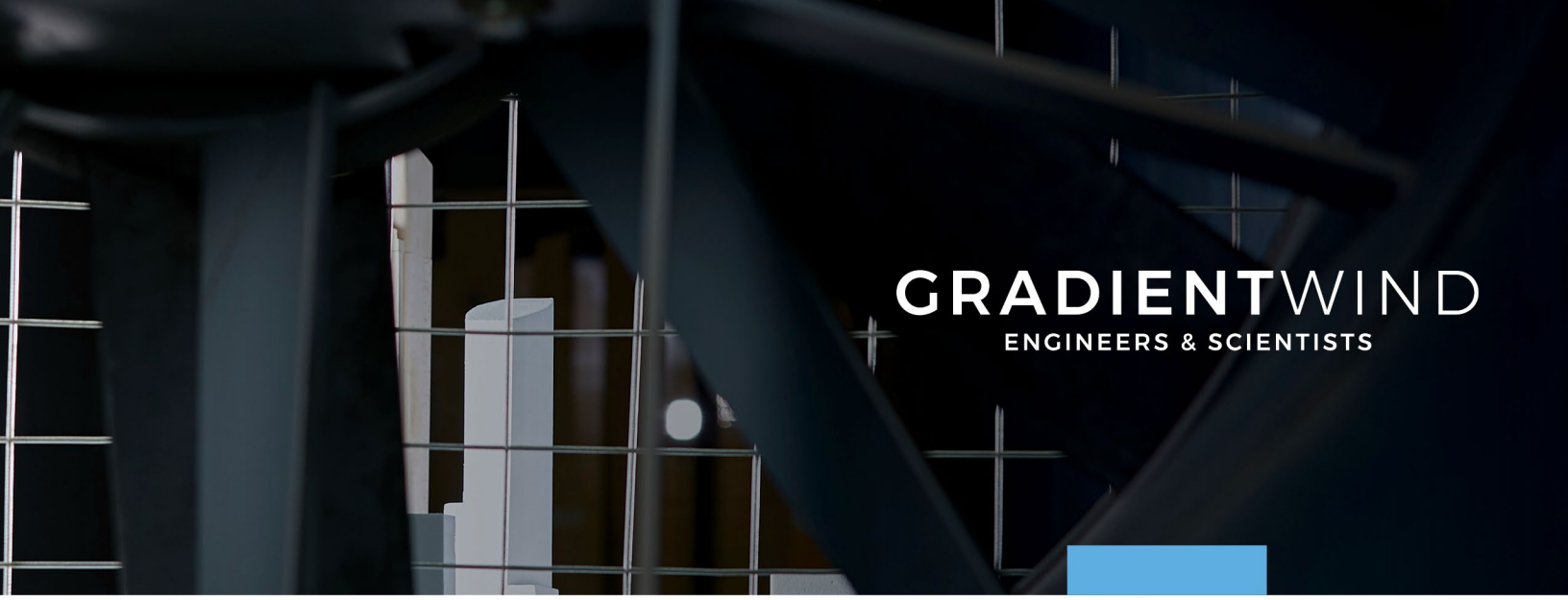
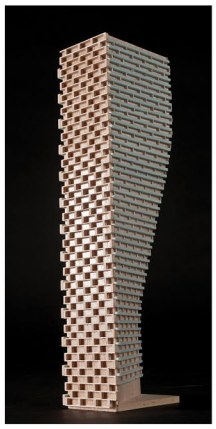
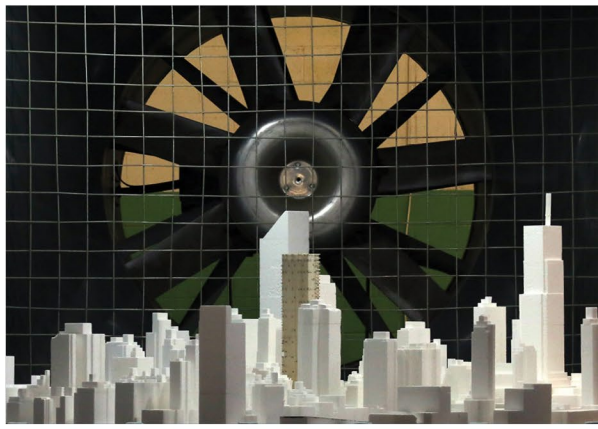



**FIGURE 5: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)**



GRADIENTWIND
ENGINEERS & SCIENTISTS





# APPENDIX A

## STAMSON INPUT-OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

**STAMSON 5.0 NORMAL REPORT Date: 28-01-2025 10:18:05**
**MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT**

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

Road data, segment # 1: Carling Av (day/night)
---
Car traffic volume : 20240/1760 veh/TimePeriod *
Medium truck volume : 1610/140 veh/TimePeriod *
Heavy truck volume : 1150/100 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 25000
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: Carling Av (day/night)
---
Angle1 Angle2 : 3.00 deg 30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 239.00 / 239.00 m
Receiver height : 18.00 / 18.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Hwy WB (day/night)
---
Car traffic volume : 43024/21509 veh/TimePeriod *
Medium truck volume : 3422/1711 veh/TimePeriod *
Heavy truck volume : 2445/1222 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): 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 : 66.67

Data for Segment # 2: Hwy WB (day/night)
---
Angle1 Angle2 : 29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 20 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 295.00 / 295.00 m
Receiver height : 18.00 / 18.00 m
Topography : 3 (Elevated; no barrier)
Elevation : 4.00 m
Reference angle : 0.00

Road data, segment # 3: Hwy EB (day/night)
---
Car traffic volume : 43024/21509 veh/TimePeriod *
Medium truck volume : 3422/1711 veh/TimePeriod *
Heavy truck volume : 2445/1222 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): 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 : 66.67

Data for Segment # 3: Hwy EB (day/night)
---
Angle1 Angle2 : 29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 20 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 315.00 / 315.00 m
Receiver height : 18.00 / 18.00 m
Topography : 3 (Elevated; no barrier)
Elevation : 4.00 m
Reference angle : 0.00

Road data, segment # 4: Kirkwood (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 # 4: Kirkwood (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 : 16.00 / 16.00 m
Receiver height : 18.00 / 18.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Av (day)
---

Source height = 1.50 m

ROAD (0.00 + 51.95 + 0.00) = 51.95 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 30 | 0.00 | 72.21 | 0.00 | -12.02 | -8.24 | 0.00 | 0.00 | 0.00 | 51.95 |

Segment Leq : 51.95 dBA

Results segment # 2: Hwy WB (day)
---

Source height = 1.50 m

ROAD (0.00 + 58.56 + 0.00) = 58.56 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 90 | 0.00 | 80.00 | 0.00 | -12.94 | -4.70 | 0.00 | -3.80 | 0.00 | 58.56 |

Segment Leq : 58.56 dBA

Results segment # 3: Hwy EB (day)
---

Source height = 1.50 m

ROAD (0.00 + 58.28 + 0.00) = 58.28 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 90 | 0.00 | 80.00 | 0.00 | -13.22 | -4.70 | 0.00 | -3.80 | 0.00 | 58.28 |

Segment Leq : 58.28 dBA

Results segment # 4: Kirkwood (day)
---

Source height = 1.50 m

ROAD (0.00 + 68.20 + 0.00) = 68.20 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 | -0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 68.20 |

Segment Leq : 68.20 dBA

Total Leq All Segments: 69.11 dBA

Results segment # 1: Carling Av (night)
---

Source height = 1.50 m

ROAD (0.00 + 44.36 + 0.00) = 44.36 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
3 30 0.00 64.62 0.00 -12.02 -8.24 0.00 0.00 0.00 44.36
---

Segment Leq : 44.36 dBA

Results segment # 2: Hwy WB (night)
---

Source height = 1.50 m

ROAD (0.00 + 58.56 + 0.00) = 58.56 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
29 90 0.00 80.00 0.00 -12.94 -4.70 0.00 -3.80 0.00 58.56
---

Segment Leq : 58.56 dBA

Results segment # 3: Hwy EB (night)
---

Source height = 1.50 m

ROAD (0.00 + 58.28 + 0.00) = 58.28 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 90 | 0.00 | 80.00 | 0.00 | -13.22 | -4.70 | 0.00 | -3.80 | 0.00 | 58.28 |

Segment Leq : 58.28 dBA

Results segment # 4: Kirkwood (night)
---

Source height = 1.50 m

ROAD (0.00 + 60.60 + 0.00) = 60.60 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 | -0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 60.60 |

Segment Leq : 60.60 dBA

Total Leq All Segments: 64.09 dBA

**TOTAL Leq FROM ALL SOURCES (DAY): 69.11**
**(NIGHT): 64.09**

**STAMSON 5.0 NORMAL REPORT Date: 28-01-2025 10:17:26**
**MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT**

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

Road data, segment # 1: Carling Av (day/night)
---
Car traffic volume : 20240/1760 veh/TimePeriod *
Medium truck volume : 1610/140 veh/TimePeriod *
Heavy truck volume : 1150/100 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 25000
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: Carling Av (day/night)
---
Angle1 Angle2 : -29.00 deg 34.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 211.00 / 211.00 m
Receiver height : 18.00 / 18.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Hwy WB (day/night)
---
Car traffic volume : 43024/21509 veh/TimePeriod *
Medium truck volume : 3422/1711 veh/TimePeriod *
Heavy truck volume : 2445/1222 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): 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 : 66.67

Data for Segment # 2: Hwy WB (day/night)
---
Angle1 Angle2 : -61.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 20 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 265.00 / 265.00 m
Receiver height : 18.00 / 18.00 m
Topography : 3 (Elevated; no barrier)
Elevation : 4.00 m
Reference angle : 0.00

Road data, segment # 3: Hwy EB (day/night)
---
Car traffic volume : 43024/21509 veh/TimePeriod *
Medium truck volume : 3422/1711 veh/TimePeriod *
Heavy truck volume : 2445/1222 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): 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 : 66.67

Data for Segment # 3: Hwy EB (day/night)
---
Angle1 Angle2 : -61.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 20 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 286.00 / 286.00 m
Receiver height : 18.00 / 18.00 m
Topography : 3 (Elevated; no barrier)
Elevation : 4.00 m
Reference angle : 0.00

Road data, segment # 4: Kirkwood (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 # 4: Kirkwood (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 : 25.00 / 25.00 m
Receiver height : 18.00 / 18.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Av (day)
---

Source height = 1.50 m

ROAD (0.00 + 56.17 + 0.00) = 56.17 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -29 | 34 | 0.00 | 72.21 | 0.00 | -11.48 | -4.56 | 0.00 | 0.00 | 0.00 | 56.17 |

Segment Leq : 56.17 dBA

Results segment # 2: Hwy WB (day)
---

Source height = 1.50 m

ROAD (0.00 + 62.96 + 0.00) = 62.96 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -61 | 90 | 0.00 | 80.00 | 0.00 | -12.47 | -0.76 | 0.00 | -3.80 | 0.00 | 62.96 |

Segment Leq : 62.96 dBA

Results segment # 3: Hwy EB (day)
---

Source height = 1.50 m

ROAD (0.00 + 62.63 + 0.00) = 62.63 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-61 90 0.00 80.00 0.00 -12.80 -0.76 0.00 -3.80 0.00 62.63
---

Segment Leq : 62.63 dBA

Results segment # 4: Kirkwood (day)
---

Source height = 1.50 m

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.00 68.48 0.00 -2.22 -3.01 0.00 0.00 0.00 63.25
---

Segment Leq : 63.25 dBA

Total Leq All Segments: 68.02 dBA

Results segment # 1: Carling Av (night)
---

Source height = 1.50 m

ROAD (0.00 + 48.58 + 0.00) = 48.58 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -29 | 34 | 0.00 | 64.62 | 0.00 | -11.48 | -4.56 | 0.00 | 0.00 | 0.00 | 48.58 |

Segment Leq : 48.58 dBA

Results segment # 2: Hwy WB (night)
---

Source height = 1.50 m

ROAD (0.00 + 62.96 + 0.00) = 62.96 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -61 | 90 | 0.00 | 80.00 | 0.00 | -12.47 | -0.76 | 0.00 | -3.80 | 0.00 | 62.96 |

Segment Leq : 62.96 dBA

Results segment # 3: Hwy EB (night)
---

Source height = 1.50 m

ROAD (0.00 + 62.63 + 0.00) = 62.63 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -61 | 90 | 0.00 | 80.00 | 0.00 | -12.80 | -0.76 | 0.00 | -3.80 | 0.00 | 62.63 |

Segment Leq : 62.63 dBA

Results segment # 4: Kirkwood (night)
---

Source height = 1.50 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 0 | 0.00 | 60.88 | 0.00 | -2.22 | -3.01 | 0.00 | 0.00 | 0.00 | 55.65 |

Segment Leq : 55.65 dBA

Total Leq All Segments: 66.28 dBA

**TOTAL Leq FROM ALL SOURCES (DAY): 68.02**
**(NIGHT): 66.28**

**STAMSON 5.0 NORMAL REPORT Date: 27-01-2025 21:45:34**
**MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT**

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

Road data, segment # 1: Kirkwood (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: Kirkwood (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 : 21.00 / 21.00 m
Receiver height : 18.00 / 18.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Kirkwood (day)
---

Source height = 1.50 m

ROAD (0.00 + 64.01 + 0.00) = 64.01 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 90 | 0.00 | 68.48 | 0.00 | -1.46 | -3.01 | 0.00 | 0.00 | 0.00 | 64.01 |

Segment Leq : 64.01 dBA

Total Leq All Segments: 64.01 dBA

Results segment # 1: Kirkwood (night)
---

Source height = 1.50 m

ROAD (0.00 + 56.41 + 0.00) = 56.41 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 90 | 0.00 | 60.88 | 0.00 | -1.46 | -3.01 | 0.00 | 0.00 | 0.00 | 56.41 |

Segment Leq : 56.41 dBA

Total Leq All Segments: 56.41 dBA

**TOTAL Leq FROM ALL SOURCES (DAY): 64.01**
**(NIGHT): 56.41**