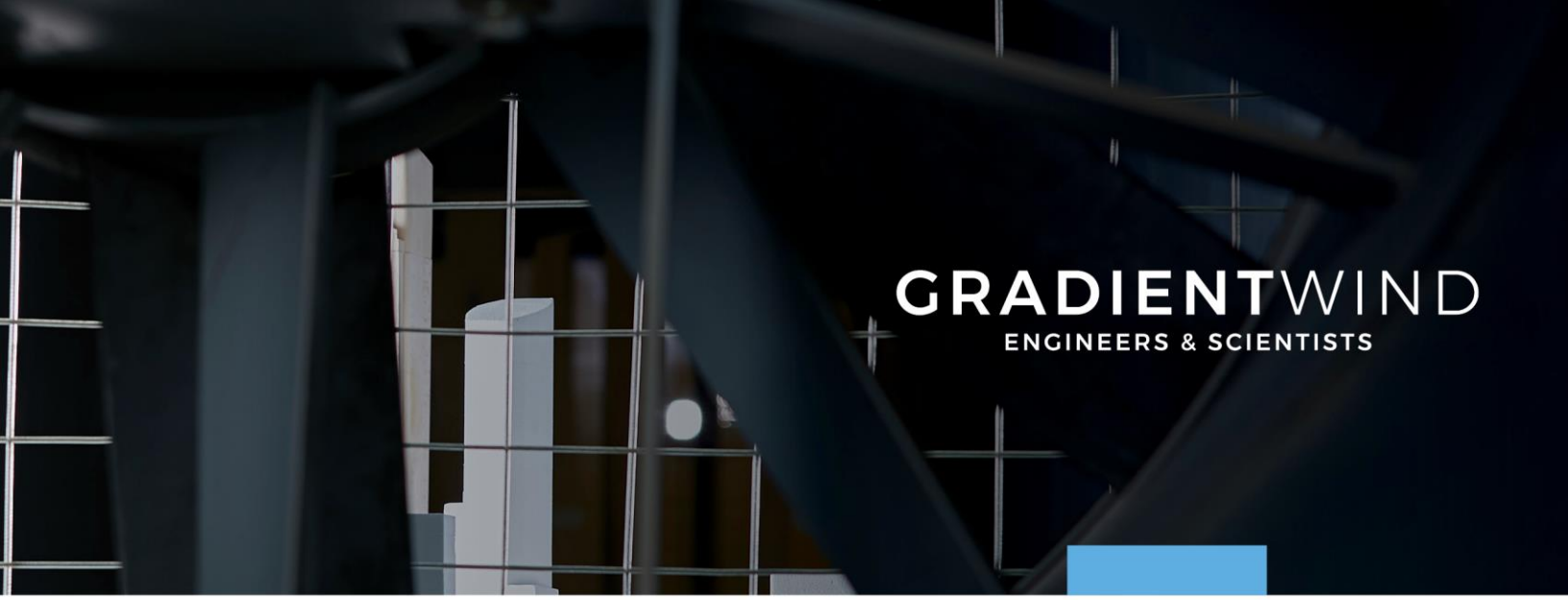
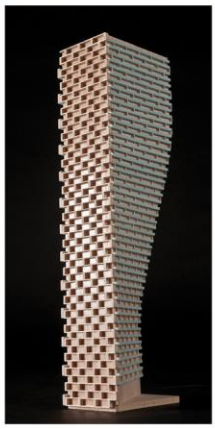


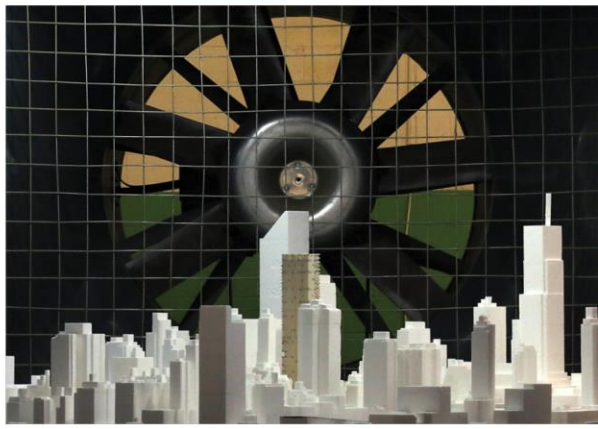
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

1500 Merivale Road
Ottawa, Ontario

Report: 21-166- Traffic Noise Feasibility





August 30, 2021

PREPARED FOR
Claridge Homes
210 Gladstone Avenue
Ottawa, ON K2P 0Y6

PREPARED BY
Giuseppe Garro, MASc., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken to satisfy the requirements for a Zoning By-law Amendment (ZBA) application submission for a proposed multi-building development located at 1500 Merivale Road in Ottawa, Ontario. The proposed development comprises five buildings subdivided into 11 phases, a public park, and several green spaces and pedestrian walkways throughout the site. The primary sources of roadway traffic noise include Baseline Road, Clyde Avenue, and Merivale Road. Figure 1 illustrates a complete site plan with surrounding context.

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

The results of the current analysis indicate that noise levels at the building façades will range between 45 and 70 dBA during the daytime period (07:00-23:00) and between 41 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the southwest corner of the site near the Clyde Avenue and Merivale Road intersection.

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

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

The results indicate that noise levels at the rooftop amenity areas are expected to be between 45 dBA and 53 dBA. The highest noise level at an outdoor amenity area occurs at the Phase 7 Level 8 amenity terrace. As noise levels are below 55 dBA, noise mitigation at the outdoor amenity areas are not required. Similarly, the central square is not expected to exceed 55 dBA.

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

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

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Claridge Homes to undertake a roadway traffic noise feasibility assessment, to satisfy the requirements for a Zoning By-law Amendment (ZBA) application submission, for a proposed multi-building development located at 1500 Merivale Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local roadway traffic.

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

2. TERMS OF REFERENCE

The focus of this roadway traffic noise feasibility assessment is a proposed multi-building development located at 1500 Merivale Road in Ottawa, Ontario. The subject site is located on an irregular parcel of land bounded by Baseline Road to the north, Clyde Avenue to the west, and Merivale Road to the southeast. Throughout this report, Baseline Road is referred to as the north elevation.

Rendering of Proposed Development, West Perspective (Courtesy of EVOQ Architects)

The proposed development comprises five buildings subdivided into 11 phases, a public park, and several green spaces and pedestrian walkways throughout the site. At the southwest of the site, there is an 11-storey building subdivided into Phase 10 at the west and Phase 11 at the east. Phases 10 and 11 include entrances at the west elevation, fronting Clyde Avenue, and at the northeast corner. Phase 10 rises with

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

a roughly constant planform up to Level 9, while Phase 11 rises to Level 10, where the building steps back from the west elevation and rises with a roughly square planform to Level 11.

To the north of Phase 10, there is a 9-storey building (hereinafter referred to as "Phase 9"). Phase 9 includes entrances at the west elevation, fronting Clyde Avenue, and at the southwest corner. Phase 9 maintains a constant planform up to Level 9.

At the northwest of the site, there is a 10-storey building subdivided into Phases 6, 7, and 8 from north to south. The southwest of Phase 8 is connected to the east of Phase 9 by a pedestrian bridge above grade. Phases 6, 7, and 8 include entrances at the north elevation, fronting Baseline Road, and along the east elevation. There are two passageways which pass through Phases 6 and 7 at grade. Phase 6 includes an amenity terrace on the roof at Level 9, while Phase 7 includes an amenity terrace on the roof at Level 8. Phases 7 and 8 rise 9 storeys, while Phase 6 rises 10 storeys above grade.

Along the east elevation of the site, there is an 11-storey building subdivided into Phases 2, 3, 4, and 5. Phases 2, 3, 4, and 5 include entrances at the north elevation, fronting Baseline Road, at the south elevation, fronting Merivale Road, and along the west elevation. There is a passageway which passes through Phases 3 and 4 at grade. Phase 5 includes an amenity terrace at Level 8, while Phase 2 includes an amenity terrace at Level 10. The Phase 2 amenity terrace is planned to be a recreational zone and includes tennis courts.

At the south end of the subject site, to the west of Phase 2, there is a 10-storey building (hereinafter referred to as "Phase 1"). Phase 1 includes entrances at the south elevation, fronting Merivale Avenue, and at the southeast corner. At Level 10, the building pulls back from the east elevation to accommodate an amenity terrace.

At grade, there are several pedestrian walkways and green spaces throughout the site including a public park between Phases 1, 2, 3, 7, and 8. Additionally, there is a recreational zone at grade to the west of Phase 6. As per ENCG, parks are not defined as Outdoor Living Areas (OLAs) or noise sensitive spaces, therefore, the noise levels in these areas have not been evaluated in this assessment. Access to underground parking is provided via a laneway along the north of the public park, accessed from Merivale Road. Furthermore, as the balconies serving the residential units extend less than 4 metres from the

façade, they do not require consideration as an OLA in this study. Outdoor amenity areas have been considered at the rooftop terraces of Phase 1, 2, 5, 6, and 7.

The site is surrounded by low-rise buildings in all directions. Additionally, there is a 12-storey development approximately 180 m to the northwest of the subject site. The primary sources of roadway traffic noise include Baseline Road, Clyde Avenue, and Merivale Road. Lotta Avenue is classified as a 2-Lane Urban Collector roadway and is situated to the southwest corner of the site beyond the Merivale Road and Clyde Avenue intersection. Given its location of approximately 62 m from the development's property line, noise impacts are expected to be negligible compared to noise emanating from Clyde Avenue and Merivale Roads, both of which are classified as 4-Lane Urban Arterials and are much closer to the development. As such, Lotta Avenue was omitted from the analysis. Figure 1 illustrates a complete site plan with surrounding context.

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

3. OBJECTIVES

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

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular

source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

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

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

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

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c

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 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[6].

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

4.2.2 Roadway Traffic Volumes

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

[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[7] City of Ottawa Transportation Master Plan, November 2013

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Baseline Road	4-Lane Arterial (Divided)	60	**35,000**
Clyde Avenue	4-Lane Arterial (Divided)	60	**35,000**
Merivale Road	4-Lane Arterial (Divided)	60	**35,000**

4.2.3 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs: Predictor-Lima and STAMSON 5.04. To provide a general understanding of noise across the site, the employed software program was Predictor-Lima, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid was placed across the subject site, along with a number of discrete receptors at key sensitive areas. Although this program is useful for outputting noise contours, it is not the approved calculation method for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the MECP computerized noise assessment program, STAMSON 5.04, at three sample receptor locations. Receptor distances and exposure angles are illustrated in Figure 3 and 4. Appendix A includes the STAMSON 5.04 input and output data.

Roadway noise calculations were performed by treating each road segment as a separate line source of noise, and by using existing buildings as noise barriers. In addition to the traffic volumes summarized in Table 1, theoretical noise predictions were based on the following parameters:

- The day/night split was taken to be 92%/8% respectively for all streets.
- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground, and absorptive in areas where soft (lawn) ground is present.
- Topography was assumed to be flat/gentle slope surrounding the subject site.

- For select sources where appropriate, the receptors considered the proposed buildings and surrounding, existing buildings as barriers, partially or fully obstructing exposure to the source.
- Noise receptors were strategically placed at 36 locations around the study area, see Figure 2.
- Receptor distances and exposure angles used in the STAMSON calculations are illustrated in Figure 3 and 4.

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the current analysis indicate that noise levels at the building façades will range between 45 and 70 dBA during the daytime period (07:00-23:00) and between 41 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the southwest corner of the site near the Clyde Avenue and Merivale Road intersection. Figures 5 and 6 illustrate daytime and nighttime noise contours throughout the site 1.5 m above grade.

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

The results indicate that noise levels at the rooftop amenity areas are expected to be between 45 dBA and 53 dBA. The highest noise level at an outdoor amenity area occurs at the Phase 7 Level 8 amenity terrace. As noise levels are below 55 dBA, noise mitigation at the OLAs is not required. Similarly, the central square is not expected to exceed 55 dBA.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
PHASE 1				
R1	123	POW - Southeast Facade	69	61
R2	120	POW - Northeast Facade	65	58
PHASE 2				
R3	121	POW - Southeast Facade	68	61
R4	121	POW - Northeast Facade	64	57
R5	121	POW - South Facade	56	49
PHASE 3				
R6	132.5	POW - Southeast Facade	55	48
R7	132.5	POW - Southwest Facade	54	47
R8	132.5	POW - Northeast Facade	55	47
R9	132.5	POW - Northwest Facade	49	41
PHASE 4				
R10	123	POW - West Facade	64	56
R11	123	POW - North Facade	68	61
R12	123	POW - East Facade	62	54
PHASE 5				
R13	118	POW - North Facade	60	53
R14	124	POW - West Facade	66	59
R15	124	POW - North Facade	68	61
R16	124	POW - East Facade	60	53
PHASE 6				
R17	129.8	POW - East Facade	65	57
R18	129.8	POW - North Facade	68	61
R19	129.8	POW - West Facade	65	57
R20	129.8	POW - Southwest Facade	61	53

TABLE 3 (CONT.): EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
PHASE 7				
R21	121	POW - East Facade	56	49
R22	121	POW - West Facade	56	49
PHASE 8				
R23	121	POW - West Facade	56	48
R24	121	POW - South Facade	62	54
R25	121	POW - East Facade	62	54
PHASE 9				
R26	121	POW - West Facade	70	62
PHASE 10				
R27	121	POW - West Facade	70	62
R28	121	POW - South Facade	67	59
PHASE 11				
R29	126.7	POW - Southwest Facade	62	54
R30	126.7	POW - Southeast Facade	64	57
R31	126.7	POW - Northeast Facade	63	55
OUTDOOR LIVING AREA				
R32	123	PH1 - OLA - Level 10 Amenity Terrace	51	N/A*
R33	124	PH2 - OLA - Level 10 Amenity Terrace	52	N/A*
R34	121	PH5 - OLA - Level 8 Amenity Terrace	49	N/A*
R35	127	PH6 - OLA - Level 9 Amenity Terrace	45	N/A*
R36	118	PH7 - OLA - Level 8 Amenity Terrace	53	N/A*

*Noise levels at the OLAs during the nighttime period are not considered as per the ENCG

Table 4 below shows a comparison between the calculated noise levels using Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±1-3dBA. Appendix A includes the STAMSON 5.04 input and output data.

TABLE 4: RESULT CORRELATION BETWEEN PREDICTOR AND STAMSON

Receptor Number	Receptor Location	Absolute Receptor Height (m)	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R11	PH4 - POW - North Facade	123	71	64	68	61
R13	PH5 - POW - North Facade	118	63	56	60	53
R24	PH8 - POW - South Facade	121	64	56	62	54

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels at the building façades will range between 45 and 70 dBA during the daytime period (07:00-23:00) and between 41 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the southwest corner of the site near the Clyde Avenue and Merivale Road intersection.

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

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

The results indicate that noise levels at the rooftop amenity areas are expected to be between 45 dBA and 53 dBA. The highest noise level at an outdoor amenity area occurs at the Phase 7 Level 8 amenity terrace. As noise levels are below 55 dBA, noise mitigation at the OLAs is not required. Similarly, the central square is not expected to exceed 55 dBA.

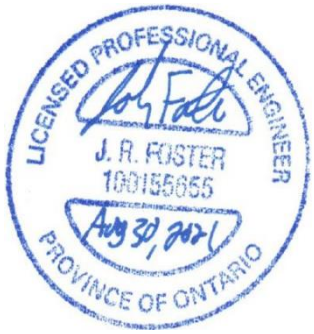
A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each building.

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

Sincerely,

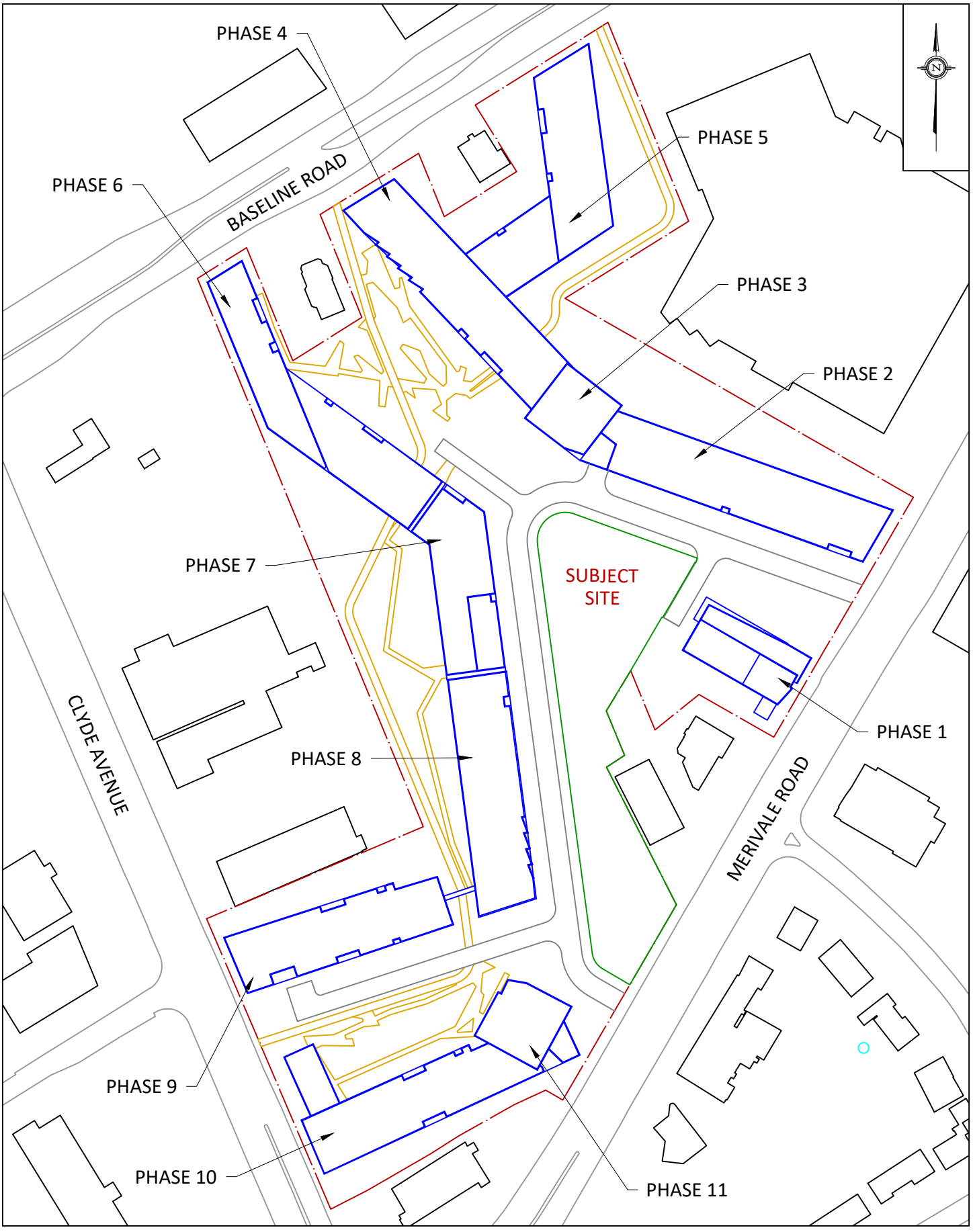
Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Junior Environmental Scientist



Joshua Foster, P.Eng.
Principal

Gradient Wind File 21-166- Traffic Noise Feasibility



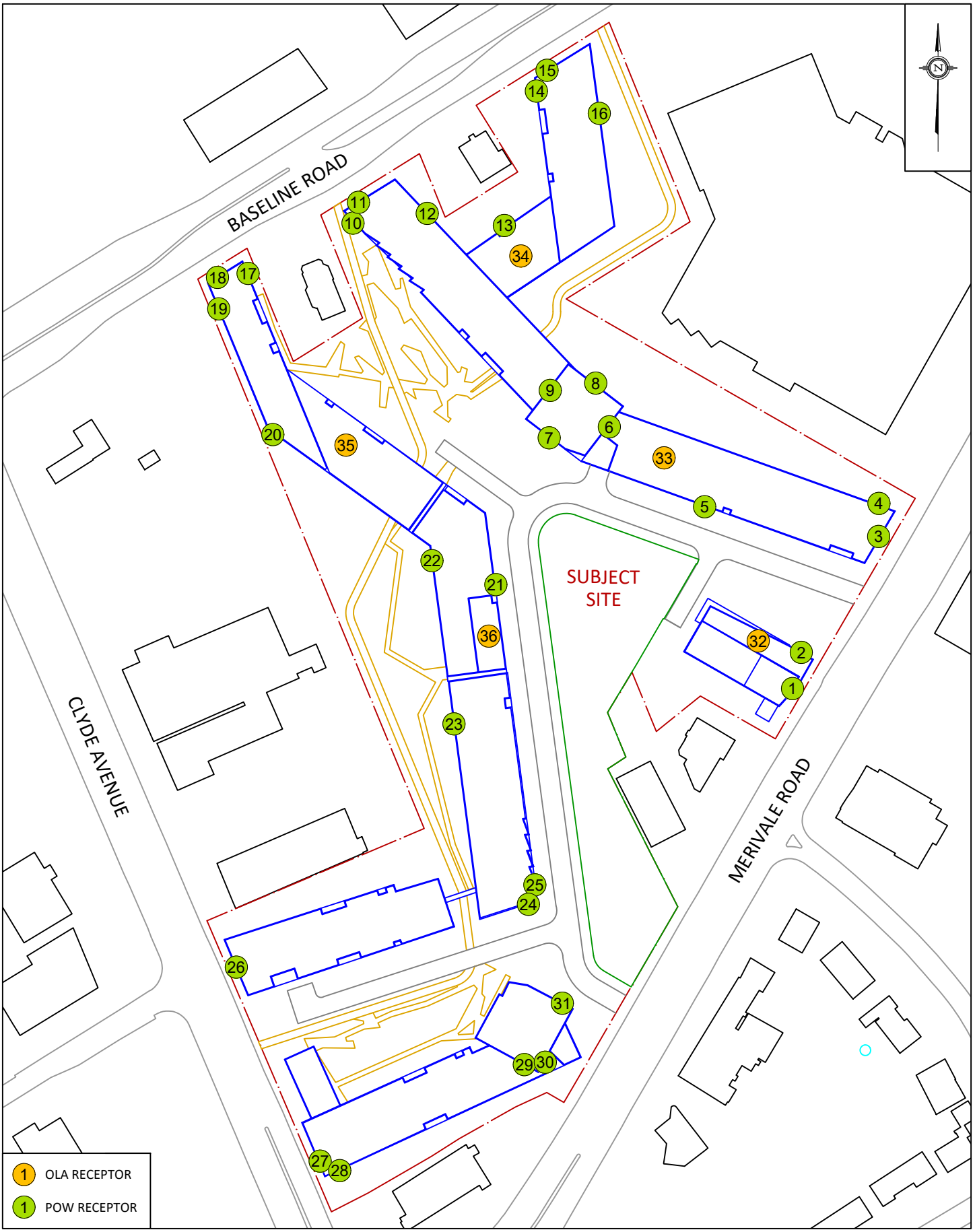
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-166-1
DATE	JUNE 3, 2021
DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



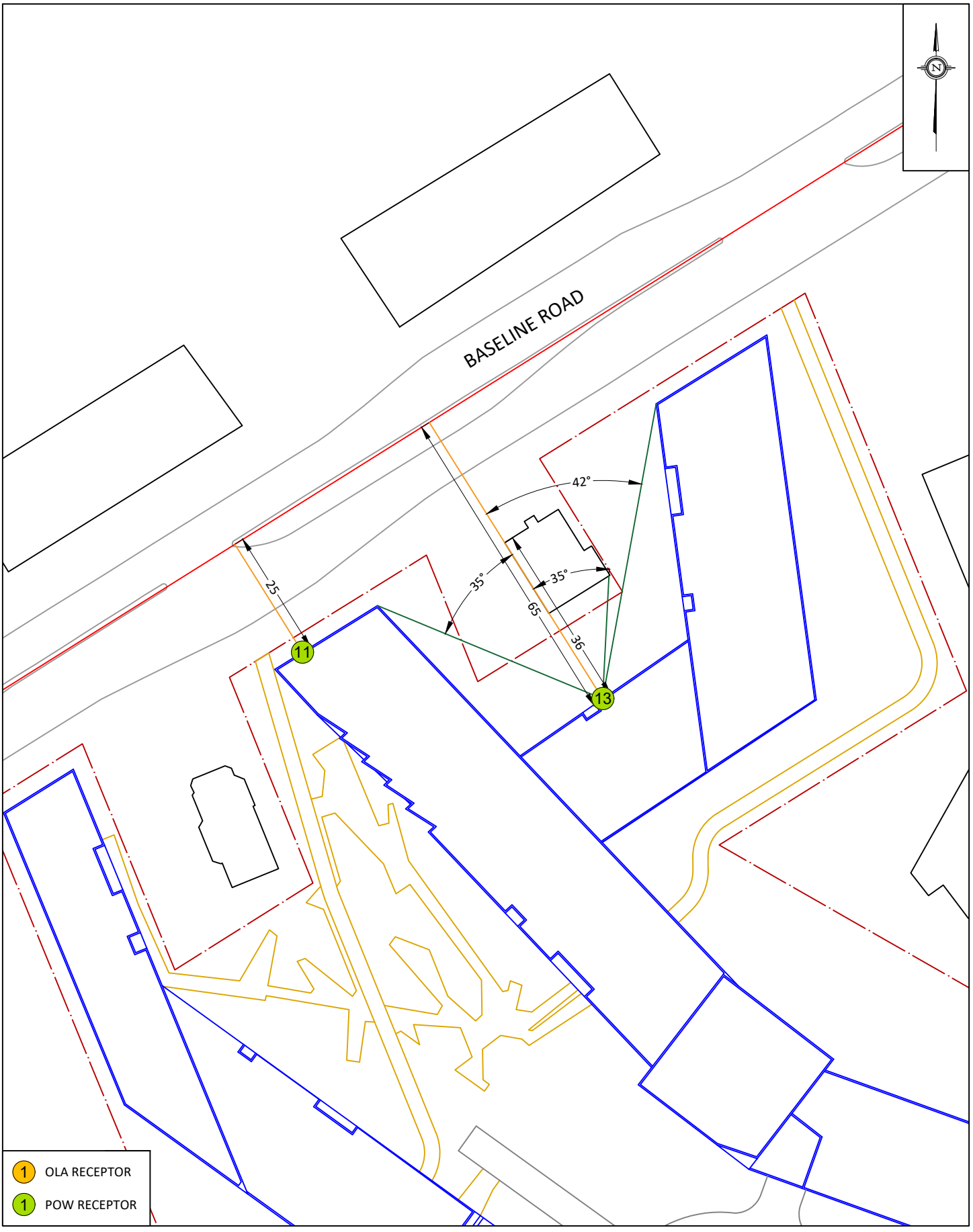
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-166-2
DATE	JUNE 3, 2021
DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

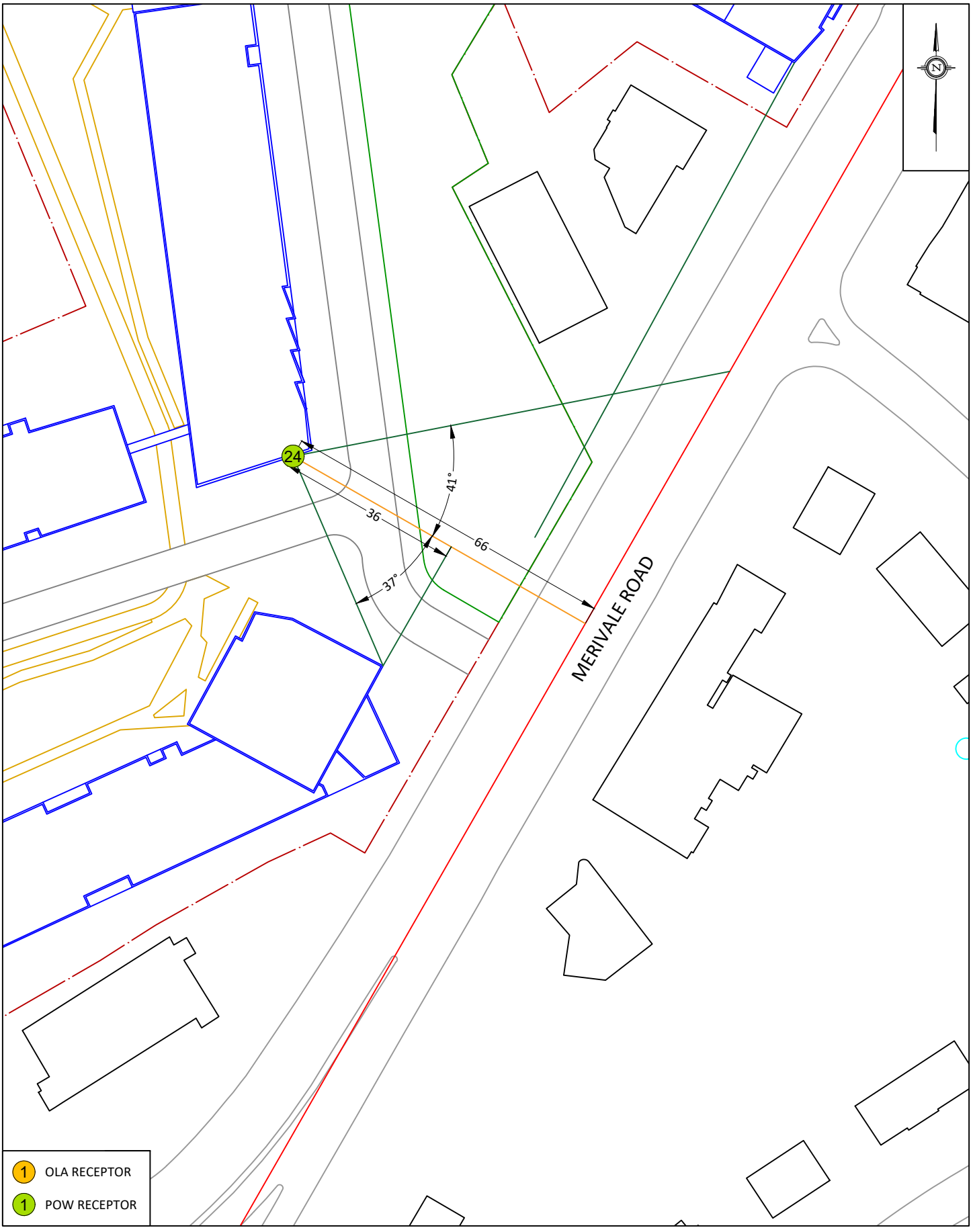


GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-166-3
DATE	JUNE 3, 2021	DRAWN BY	G.G.

FIGURE 3:
RECEPTOR 11 AND 13 STAMSON INPUT PARAMETERS



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	1500 MERIVALE ROAD, OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-166-4
DATE	JUNE 3, 2021	DRAWN BY	G.G.

FIGURE 4:
RECEPTOR 24 STAMSON INPUT PARAMETERS

FIGURE 5: DAYTIME TRAFFIC NOISE CONTOURS (1.5 M ABOVE GRADE)

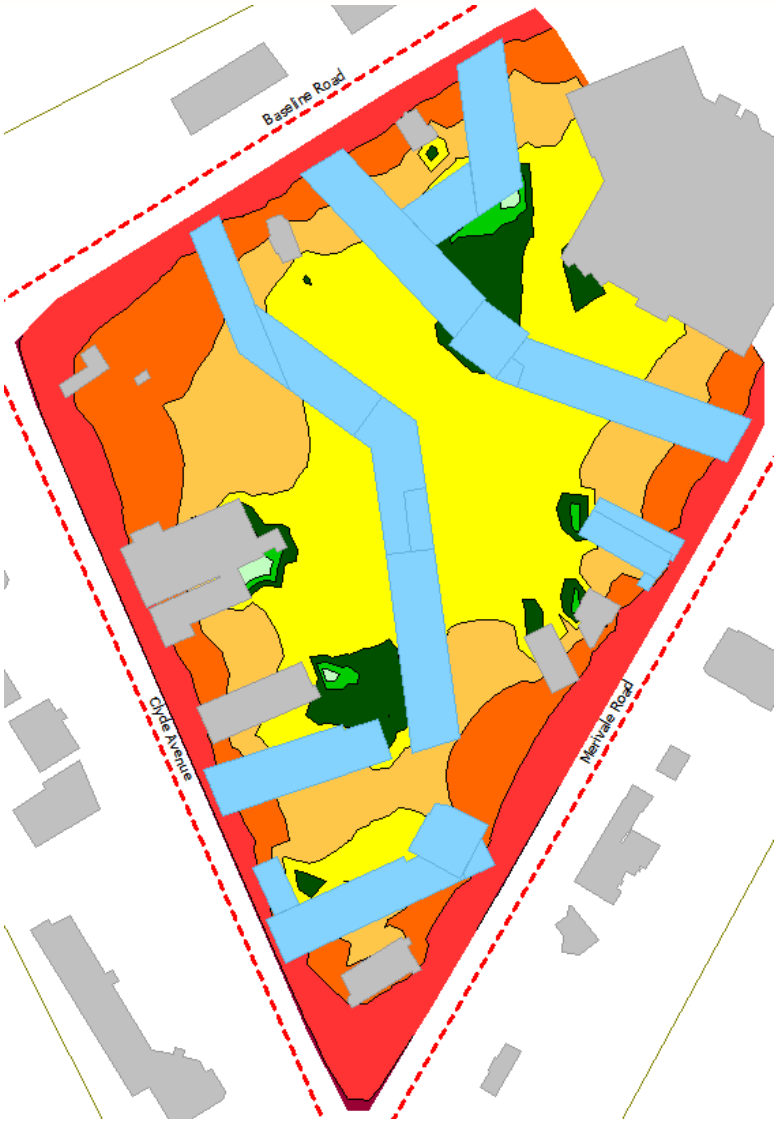


FIGURE 6: NIGHTTIME TRAFFIC NOISE CONTOURS (1.5 M ABOVE GRADE)

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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

```
 STAMSON 5.0         NORMAL REPORT         Date: 03-06-2021 22:02:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Baseline Rd (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   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):  35000
    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: Baseline Rd (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  :  25.00 / 25.00  m
Receiver height           :  26.40 / 26.40  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Baseline Rd (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.46 + 0.00) = 71.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90    0.00  73.68   0.00  -2.22   0.00   0.00   0.00   0.00
71.46
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 71.46 dBA

Total Leq All Segments: 71.46 dBA

Results segment # 1: Baseline Rd (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.86 + 0.00) = 63.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  66.08   0.00  -2.22   0.00   0.00   0.00   0.00
63.86
-------------------------------------------------------------------------
--

Segment Leq : 63.86 dBA

Total Leq All Segments: 63.86 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 71.46
                           (NIGHT): 63.86
```

```
STAMSON 5.0        NORMAL REPORT        Date: 03-06-2021 22:02:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r13.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: BASELINE RD (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   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):  35000
    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: BASELINE RD (day/night)
---------------------------------------------
Angle1   Angle2           : -35.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :  22.00 / 22.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: BASELINE RD (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   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):  35000
    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: BASELINE RD (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :  22.00 / 22.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 35.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :  36.00 / 36.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: BASELINE RD (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 59.90 + 0.00) = 59.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -35      0   0.05  73.68   0.00  -6.66  -7.12   0.00   0.00   0.00
59.90
-------------------------------------------------------------------------
--

Segment Leq : 59.90 dBA

Results segment # 2: BASELINE RD (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       22.00 !       10.64 !        10.64

ROAD (0.00 + 59.90 + 52.87) = 60.68 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     35   0.00  73.68   0.00  -6.37  -7.11   0.00   0.00  -0.07
60.12*
     0     35   0.05  73.68   0.00  -6.66  -7.12   0.00   0.00   0.00
59.90
-------------------------------------------------------------------------
--
    35     42   0.05  73.68   0.00  -6.66 -14.15   0.00   0.00   0.00
52.87
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 60.68 dBA

Total Leq All Segments: 63.32 dBA

Results segment # 1: BASELINE RD (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.30 + 0.00) = 52.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -35      0   0.05  66.08   0.00  -6.66  -7.12   0.00   0.00   0.00
52.30
-------------------------------------------------------------------------
--

Segment Leq : 52.30 dBA

Results segment # 2: BASELINE RD (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       22.00 !       10.64 !        10.64

ROAD (0.00 + 52.30 + 45.27) = 53.08 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     35   0.00  66.08   0.00  -6.37  -7.11   0.00   0.00  -0.07
52.52*
     0     35   0.05  66.08   0.00  -6.66  -7.12   0.00   0.00   0.00
52.30
-------------------------------------------------------------------------
--
    35     42   0.05  66.08   0.00  -6.66 -14.15   0.00   0.00   0.00
45.27
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 53.08 dBA

Total Leq All Segments: 55.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.32
                           (NIGHT): 55.72
```

```
STAMSON 5.0        NORMAL REPORT        Date: 03-06-2021 22:03:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r24.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: MERIVALE RD (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   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):  35000
    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: MERIVALE RD (day/night)
---------------------------------------------
Angle1   Angle2           : -41.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  66.00 / 66.00  m
Receiver height           :  26.00 / 26.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  37.00 deg   Angle2 : 90.00 deg
Barrier height            :  33.50 m
Barrier receiver distance :  36.00 / 36.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: MERIVALE RD (day)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !       26.00 !       12.63 !        12.63

ROAD (63.61 + 43.76 + 0.00) = 63.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -41     37   0.00  73.68   0.00  -6.43  -3.63   0.00   0.00   0.00
63.61
-------------------------------------------------------------------------
--
    37     90   0.00  73.68   0.00  -6.43  -5.31   0.00   0.00 -18.17
43.76
-------------------------------------------------------------------------
--

Segment Leq : 63.65 dBA

Total Leq All Segments: 63.65 dBA

Results segment # 1: MERIVALE RD (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       26.00 !       12.63 !        12.63

ROAD (56.01 + 36.16 + 0.00) = 56.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -41     37   0.00  66.08   0.00  -6.43  -3.63   0.00   0.00   0.00
56.01
-------------------------------------------------------------------------
--
    37     90   0.00  66.08   0.00  -6.43  -5.31   0.00   0.00 -18.17
36.16
-------------------------------------------------------------------------
Segment Leq : 56.06 dBA

Total Leq All Segments: 56.06 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.65
                           (NIGHT): 56.06
```