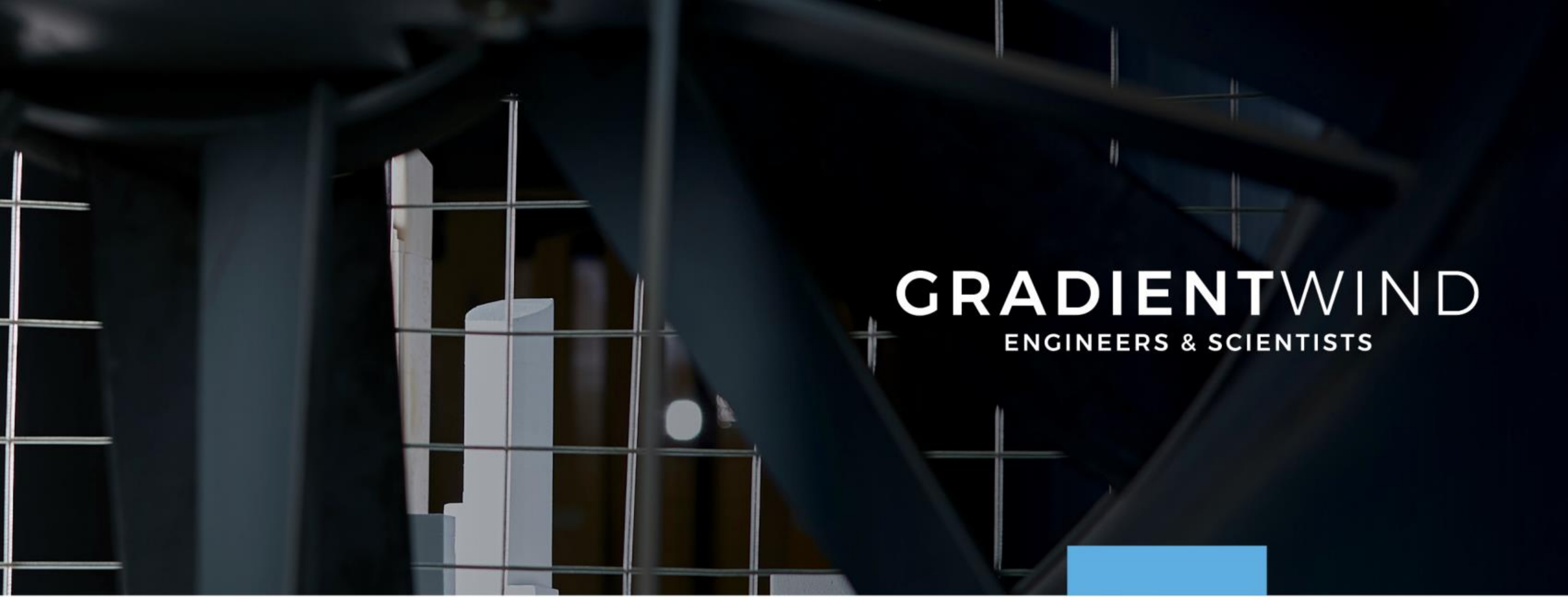
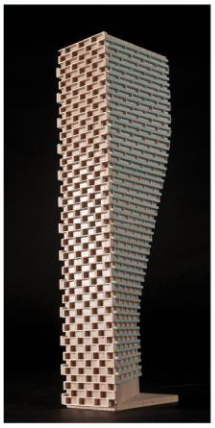
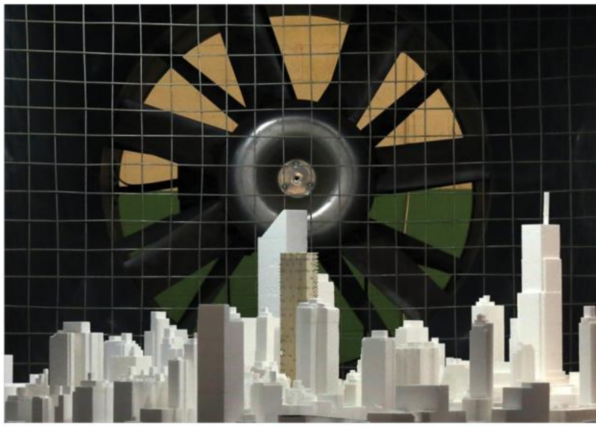


TRAFFIC NOISE FEASIBILITY STUDY

5993, 6070, 6115 Flewellyn Road
Stittsville, Ontario

Report: 21-420–Traffic Noise Feasibility Final





November 5th, 2024

PREPARED FOR

Caivan (Stittsville South) Inc. &
Caivan (Stittsville West) Ltd.
3713 Borrisokane Road,
Nepean, ON, K2J 4J4

PREPARED BY

Benjamin Page, AdvDip., Junior Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

EXECUTIVE SUMMARY

This report describes a traffic noise feasibility study for the proposed subdivision located at 5993, 6070, 6115 Flewellyn Road in Stittsville, Ontario. The proposed development comprises numerous lots and blocks, for which building massing has not been finalized. It is expected that the buildings will comprise single houses, townhouses, and stacked townhouses with outdoor living areas in the rear yard of each dwelling. The major sources of roadway traffic noise are Flewellyn Road to the south and Shea Road to the east. Figure 1 illustrates the site location 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) land information and survey drawings from J.D. Barnes Limited in June 2024.

The results of the current analysis indicate that noise levels will range between 51 and 67 dBA during the daytime period (07:00-23:00) and between 47 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at receptor 2 near the intersection of Flewellyn Road and Internal Road 1. Figures 4-5 illustrate daytime and nighttime noise contours throughout the site at a height of 4.5 m above grade.

Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, which occurs on the exterior, road adjacent sides of the subdivision. Detailed outdoor to indoor noise calculations will be required once plans and elevations are finalized to determine appropriate STC ratings for windows and walls. Based on Gradient Wind experience window ratings of up to STC 35 may be required, which are readily available. Results of the calculations indicate that parts of the development will require central air conditioning, or a similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living/working environment. The following Type C and D Warning Clauses[1] will also be required on all Lease, Purchase and Sale Agreements, as summarized below. The contour and setback distances where the Type C and D Warning Clauses are required can be seen in Figure 3.

[1] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8

Results of the roadway traffic noise calculations also indicate that the outdoor living areas having direct exposure to traffic noise may require noise control measures. If these roadway adjacent areas are to be designed as OLA's, mitigation measures are described in Section 5.1.1, with the aim to reduce the L_{eq} to as close to 55 dBA as technically, economically, and administratively feasible. A detailed roadway traffic noise study will be required to determine specific noise control measures for the development.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Caivan (Stittsville South) Inc. and Caivan (Stittsville West) Ltd. to undertake a traffic noise feasibility assessment for a proposed residential subdivision located at 5993, 5070, 6115 Flewellyn Road in Stittsville, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the City of Ottawa[2] and Ministry of the Environment, Conservation and Parks (MECP)[3] guidelines. Noise calculations were based on the final draft plan drawings by J.D. Barnes Limited in June 2024, the masing model provided by Caivan, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

This study includes the proposed draft plan and additional lands, the Eder Lands, which currently reside outside the urban boundary. The Eder Lands are not part of the proposed and studied subdivision but have been evaluated and included as part of the NFS for community integration with the W-4 Urban Expansion Lands and in support of the Official Plan Amendment being filed. Figure 1 illustrates the site location with the surrounding context.

2. TERMS OF REFERENCE

The focus of this traffic noise feasibility study is the proposed subdivision located in Stittsville, at the northwest corner of the Shea Road and Flewellyn Road intersection. The proposed development comprises numerous lots and blocks, for which building massing has not been finalized. It is expected that the buildings will comprise single houses, townhouses, and stacked townhouses with outdoor living areas in the rear yard of each dwelling. The individual properties are accessed by a series of internal roadways.

The primary sources of traffic noise include Flewellyn Road to the south and Shea Road to the east. Two of the main internal roadways were also included in this assessment. The study site is surrounded by existing low-rise residential properties to the northwest, along with scattered low-rise residential and

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

office space to the southeast. Furthermore, the area northwest of the development is developed and suburban, while the southwest is undeveloped forest, farmland and rural. Local and interior roads such as Parade Drive and Beckett Crescent were deemed insignificant due to low traffic volumes. Figure 1 illustrates the site location with the surrounding context.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels produced by local roadway traffic, and (ii) explore potential noise mitigation 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 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [4]

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

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[5]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[6]. 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[7].

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

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)[8]). 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)[9].

A set of comparative calculations were also performed for comparisons using STAMSON. The *Predictor-Lima* computer program can represent three-dimensional surfaces and the first reflection of sound waves over a suitable spectrum for human hearing. The STAMSON model, however, is an older software and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections, multiple screening elements, and curved road geometry. The result of the comparative calculations can be seen in Section 5, Table 4.

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

- Vehicle parameters such as truck traffic volume percentages, posted speed limit, and day/night split are summarized in Table 2 below.
- Default ground surfaces were taken to be absorptive, due to the abundance of fauna and farmland along the traffic sources.
- The study site was treated as having flat or gently sloping topography.
- For select sources where appropriate, receptors considered the proposed and existing building as a barrier partially or fully obstructing exposure to the source.
- Five (5) receptors were strategically placed throughout the study area as seen in Figure 2.

---

[8] Ministry of Transportation, Environmental Guide for Noise, 2022. Retrieved from Environmental Guide for Noise 2022

[9] Ministry of Environment, Conservation and Parks, Ontario, "Methods to determine Sound Levels Due to Road and Rail Traffic", Draft February 12, 2020

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[10] 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. While Table B1 of the ENCG typically prescribes an AADT of 8,000 for 2-lane collector roadways, the specific rural context of this subdivision and input from the transportation engineer suggests a more accurate anticipated traffic volume of 6,000 AADT for the internal collectors. The transportation engineer noted that this estimate has been consistently used for over 10 years and aligns with the TIA forecast of 900 to 4,050 AADT across the three collector road connections. Specifically, the two connections to Flewellyn are projected to reach a combined 6,030 AADT, while the connection to Shea is expected to reach 900 AADT. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY SOURCE DATA

Source	Classification	Speed Limit (km/h)	AADT	Day/Night Split	Medium/Large Truck Pct. (%)
Flewellyn Road	2-Lane Rural Collector	80	**8,000**	92/8	7/5
Shea Road	2-Lane Rural Collector	80	**8,000**		
Internal Road 1	2-Lane Residential Collector	40	**6,000**		
Internal Road 2	2-Lane Residential Collector	40	**6,000**		

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the current analysis indicate that noise levels will range between 51 and 67 dBA during the daytime period (07:00-23:00) and between 47 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at receptor 2 near the intersection of Flewellyn Road and Internal Road

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

1. Figures 4-5 illustrate daytime and nighttime noise contours throughout the site at a height of 4.5 m above grade.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY SOURCES

Receptor #	Height (m)	Receptor Location	Roadway Noise Level (dBA)	
			Day	Night
1	4.5	POW – West townhouse	55	47
2		POW – Access Road 1	67	59
3		POW – Central townhouse	55	47
4		POW – Access Road 2	65	57
5		POW – East townhouse 1a	64	56
6		POW – East townhouse 1b	60	53
7		POW – East townhouse 2	65	58
8		POW – North townhouse	68	60
9	1.5	OLA – West townhouse yard	51	N/A*
10		OLA – Access Road 1 yard	68	N/A*
11		OLA – Central townhouse yard	53	N/A*
12		OLA – Access Road 2 yard	62	N/A*
13		OLA – East townhouse 1 yard	63	N/A*
14		OLA – East townhouse 2 yard	66	N/A*
15		OLA – North townhouse yard	66	N/A*

*Noise levels during the nighttime are not considered for OLAs

Table 4 below provides a comparison between Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have a good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±1-3 dBA.

TABLE 4: RESULT CORRELATION WITH STAMSON

Receptor ID	Receptor Location	Receptor Height (m)	PREDICTOR-LIMA Noise Level (dBA)		STAMSON 5.04 Noise Level (dBA)	
			Day	Night	Day	Night
1	POW – West townhouse	4.5	55	47	56	49
3	POW – Central townhouse		55	47	56	48

5.1.1 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in the NPC-300 for potential outdoor living areas (OLA). Therefore, noise control measures as described below will be required to reduce the L_{eq} to 55 dBA at some receptors:

- Distance setback with soft ground
- Insertion of noise-insensitive land uses between the source and sensitive points of reception
- Orientation of buildings to provide sheltered zones
- Earth berms (sound barriers)
- Acoustic barriers

It should be noted that outdoor living areas should be designed for the quiet enjoyment of the outdoors. The best way to mitigate excessive noise levels at OLAs is to shield the area from exposure to the roadways by using building massing. However, where necessary, noise screens may be required. Specific noise control measures will be explored for each building during the subdivision registration stage.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 51 and 67 dBA during the daytime period (07:00-23:00) and between 47 and 59 dBA during the nighttime period (23:00-07:00). The highest noise level (67 dBA) occurs at receptor 2 near the intersection of Flewellyn Road and Internal Road 1. Figures 4-5 illustrate daytime and nighttime noise contours throughout the site at a height of 4.5 m above grade.

Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, which occurs on the exterior, road adjacent sides of the subdivision. Detailed outdoor to indoor noise calculations will be required once plans and elevations are finalized to determine appropriate STC ratings for windows and walls. Based on Gradient Wind experience window ratings of up to STC 35 maybe required, which are readily available. Results of the calculations indicate that parts of the development will require central air conditioning, or similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living/working environment. The following Type C and D Warning Clauses[11] will also be required on all Lease, Purchase and Sale Agreements, as summarized below. The contour and setback distances where the Type C and D Warning Clauses are required can be seen in Figure 3.

Type C:

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments 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."

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."

Results of the roadway traffic noise calculations also indicate that the outdoor living areas having direct exposure to traffic noise may require noise control measures. If these roadway adjacent areas are to be designed as OLA's, mitigation measures are described in Section 5.1.1, with the aim to reduce the L_{eq} to as close to 55 dBA as technically, economically, and administratively feasible. A detailed roadway traffic noise study will be required to determine specific noise control measures for the development.

[11] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8

This concludes our 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.

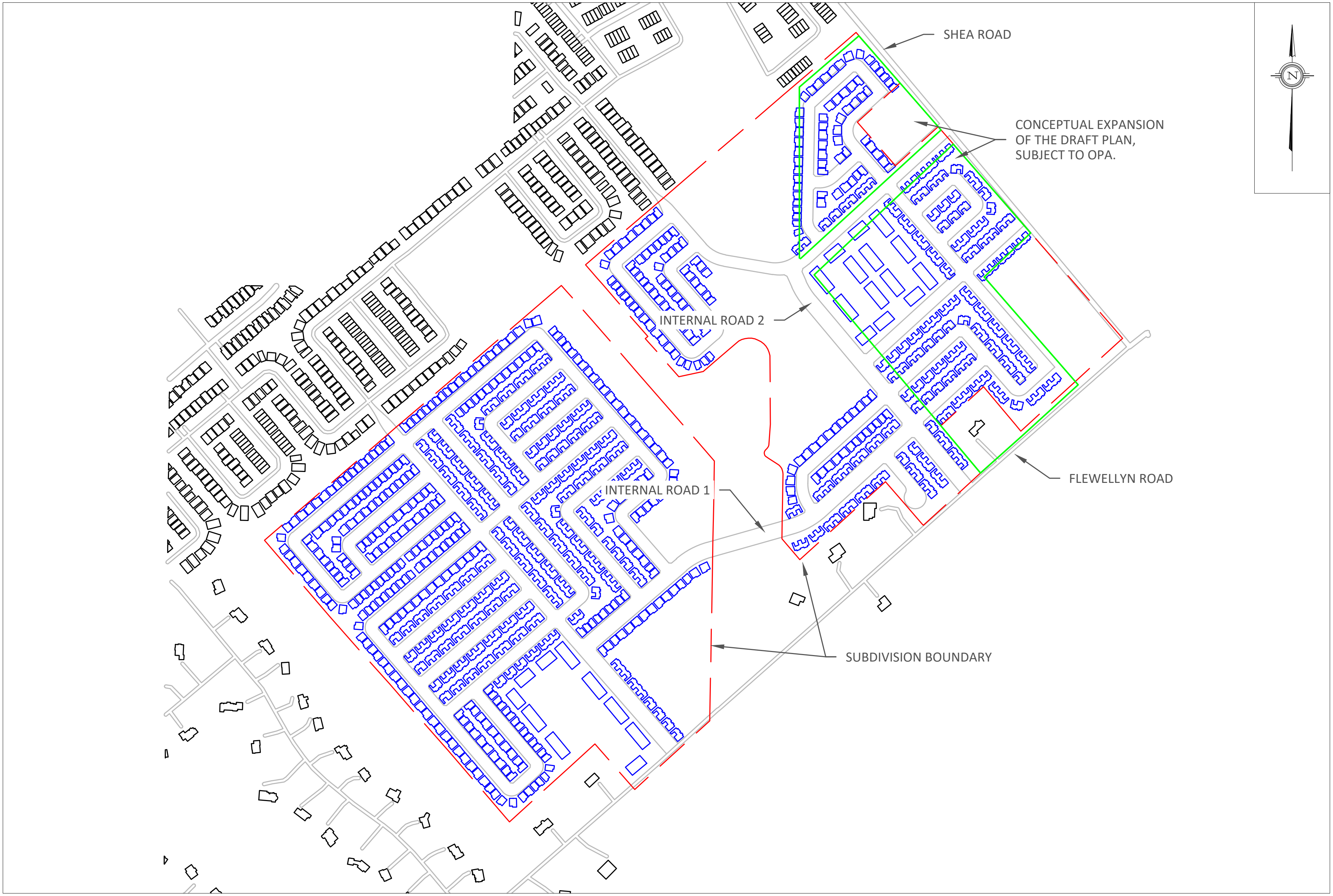
Sincerely,

Gradient Wind Engineering Inc.

Benjamin Page, AdvDip.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #21-420 - Traffic Noise Feasibility Final



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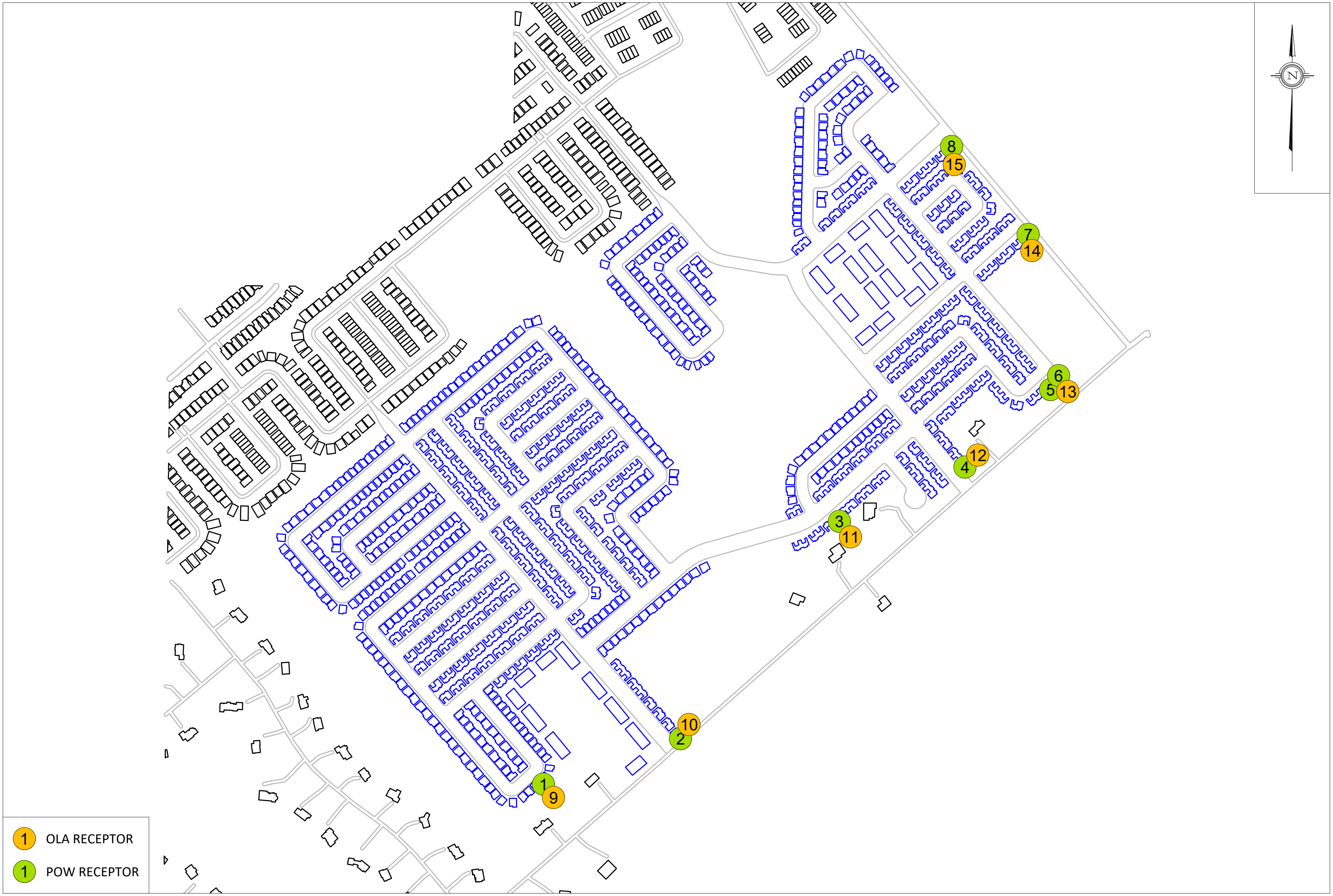
PROJECT	5993, 6070, 6115 FLEWELLYN, STITTSVILLE TRAFFIC NOISE FEASIBILITY STUDY
SCALE	1:8000 (APPROX.)
DRAWING NO.	GW21-420-1
DATE	NOVEMBER 5, 2024
DRAWN BY	A.B.
DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT



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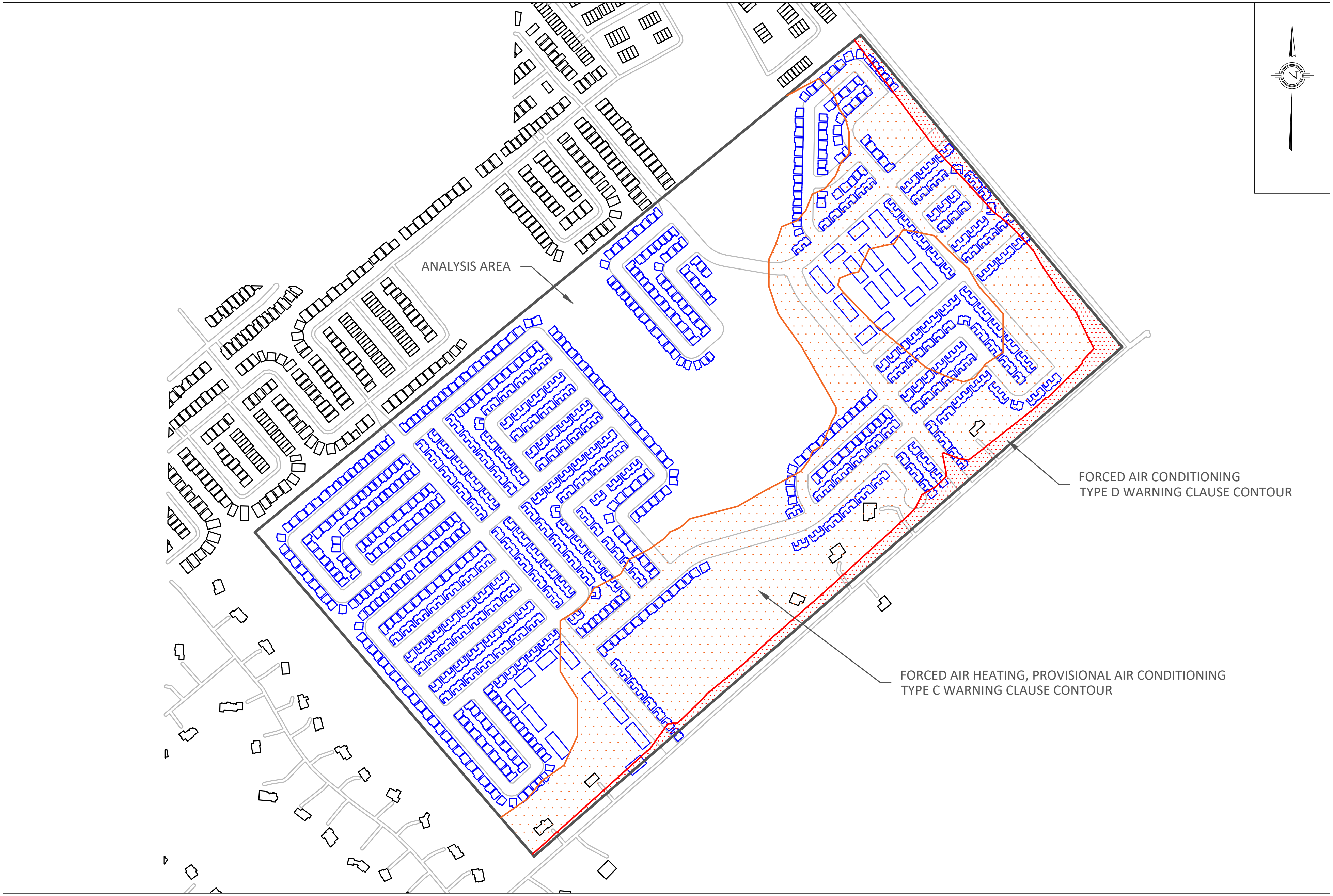
PROJECT	5993, 6070, 6115 FLEWELLYN, STITTSVILLE TRAFFIC NOISE FEASIBILITY STUDY		
SCALE	1:8000 (APPROX.)	DRAWING NO.	GW21-420-2
DATE	NOVEMBER 5, 2024	DRAWN BY	A.B.

DESCRIPTION

FIGURE 2:
TRAFFIC NOISE RECEPTOR LOCATIONS



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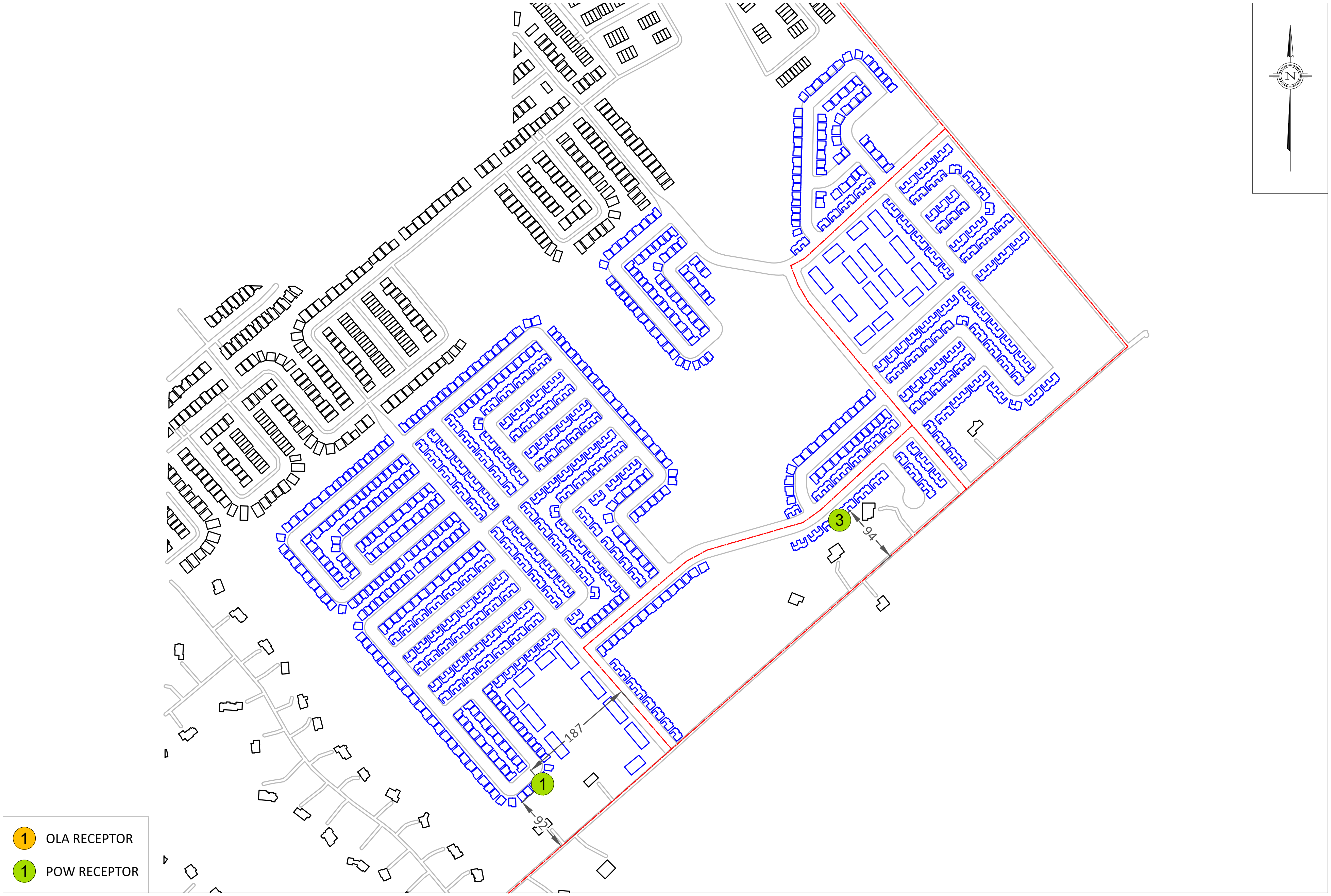
PROJECT	5993, 6070, 6115 FLEWELLYN, STITTSVILLE TRAFFIC NOISE FEASIBILITY STUDY		
SCALE	1:8000 (APPROX.)	DRAWING NO.	GW21-420-3
DATE	NOVEMBER 5, 2024	DRAWN BY	A.B.

DESCRIPTION

FIGURE 3:
WARNING CLAUSE CONTOURS



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PROJECT	5993, 6070, 6115 FLEWELLYN, STITTSVILLE TRAFFIC NOISE FEASIBILITY STUDY		
SCALE	1:8000 (APPROX.)	DRAWING NO.	GW21-420-A1
DATE	NOVEMBER 5, 2024	DRAWN BY	A.B.

DESCRIPTION

FIGURE A1:
STAMSON DISTANCES AND EXPOSURE ANGLES

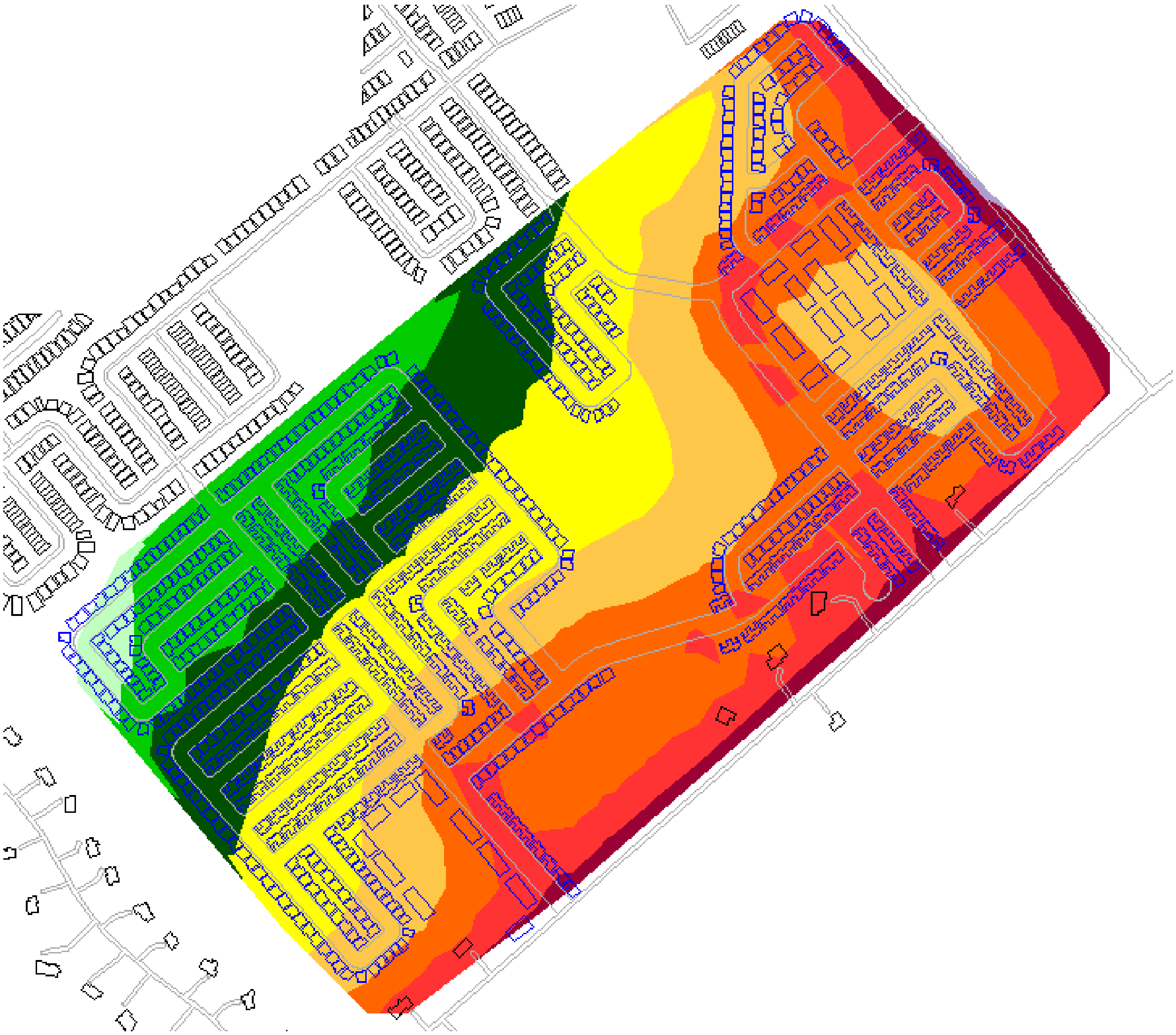
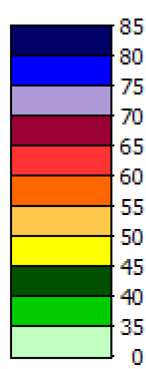


FIGURE 4: DAYTIME ROADWAY TRAFFIC NOISE CONTOURS
(4.5m ABOVE GRADE)



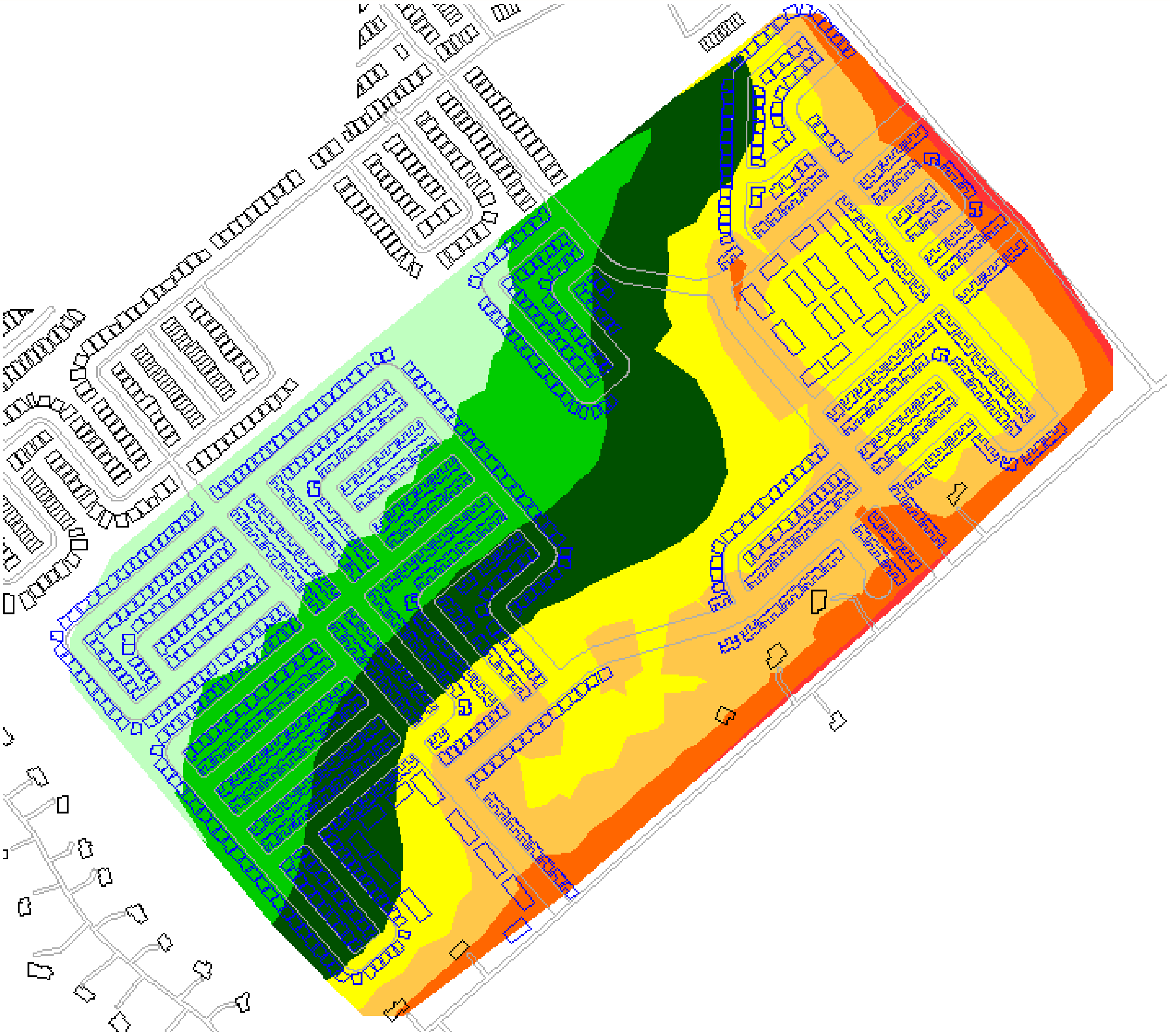


FIGURE 5: NIGHTTIME ROADWAY TRAFFIC NOISE CONTOURS
(4.5m ABOVE GRADE)

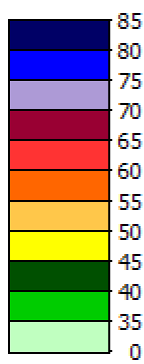


FIGURE 6: DAYTIME ROADWAY TRAFFIC NOISE CONTOURS (1.5m ABOVE GRADE)

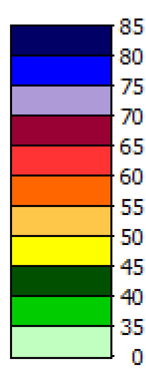
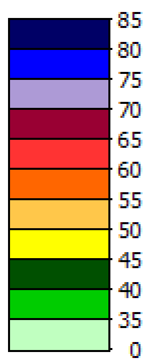
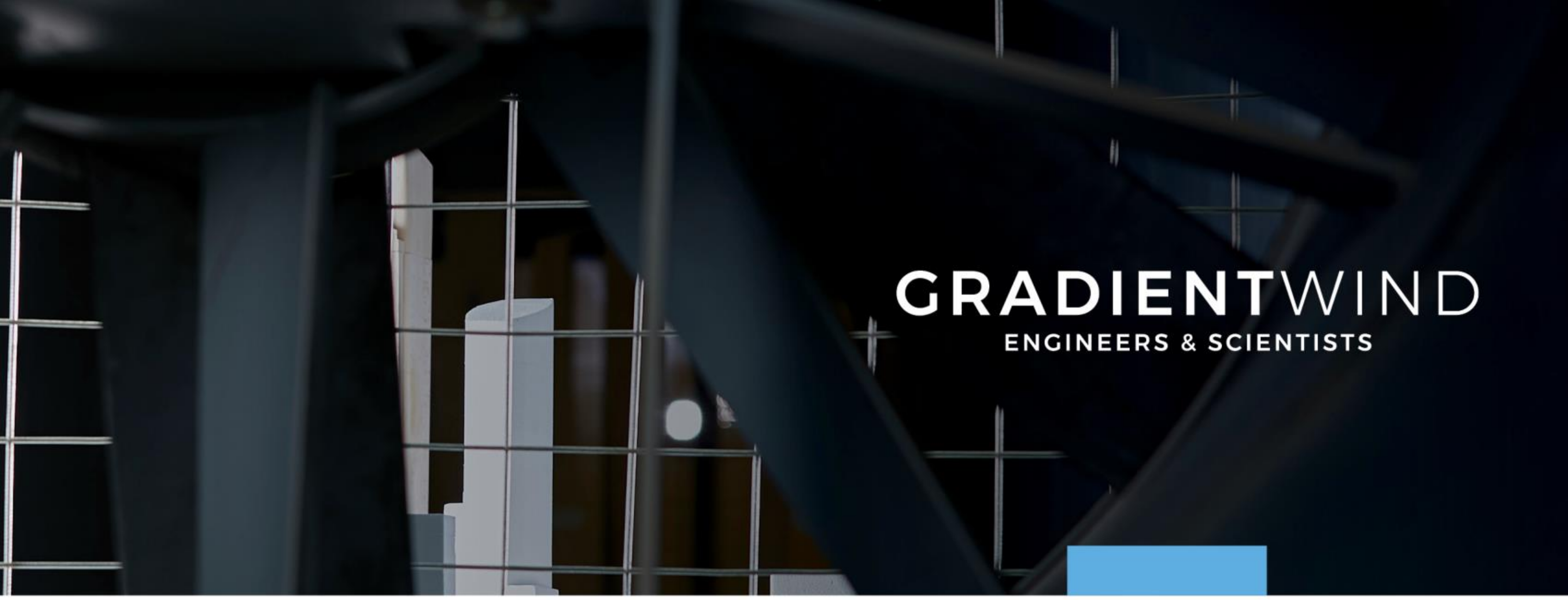
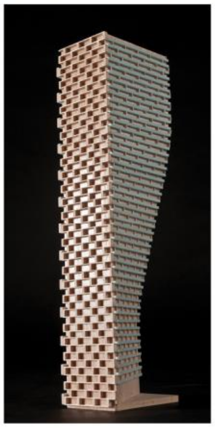
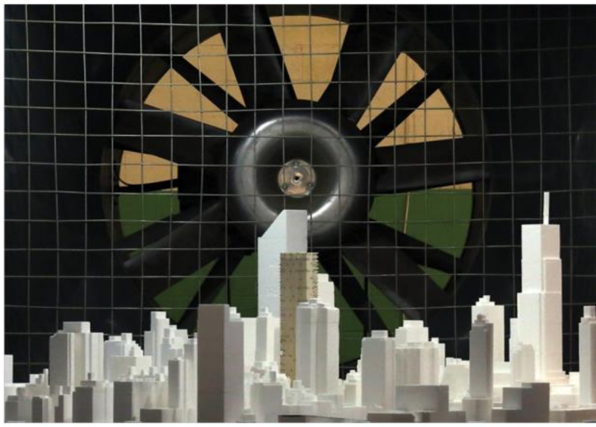


FIGURE 7: NIGHTTIME ROADWAY TRAFFIC NOISE CONTOURS (1.5m ABOVE GRADE)









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: 17-07-2024 10:59:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1.te                   Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Flewellyn (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    80 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):   8000
    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: Flewellyn (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  :  92.00 / 92.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Road 1 (day/night)
------------------------------------------
Car traffic volume  :  4858/422   veh/TimePeriod  *
Medium truck volume :   386/34    veh/TimePeriod  *
Heavy truck volume  :   276/24    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):   6000
    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: Road 1 (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  : 187.00 / 187.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 56.09 + 0.00) = 56.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.57  69.76   0.00 -12.37  -1.30   0.00   0.00   0.00  56.09
----------------------------------------------------------------------------

Segment Leq : 56.09 dBA

Results segment # 2: Road 1 (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 41.19 + 0.00) = 41.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
     0     90   0.57  62.71   0.00 -17.20  -4.31   0.00   0.00   0.00  41.19
----------------------------------------------------------------------------

Segment Leq : 41.19 dBA

Total Leq All Segments: 56.23 dBA

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

Source height = 1.50 m

ROAD (0.00 + 48.49 + 0.00) = 48.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.57  62.16   0.00 -12.37  -1.30   0.00   0.00   0.00  48.49
----------------------------------------------------------------------------

Segment Leq : 48.49 dBA
```

```
Results segment # 2: Road 1 (night)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 33.60 + 0.00) = 33.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
     0     90   0.57  55.12   0.00 -17.20  -4.31   0.00   0.00   0.00  33.60
----------------------------------------------------------------------------

Segment Leq : 33.60 dBA

Total Leq All Segments: 48.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.23
                         (NIGHT): 48.63
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2024 11:00:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.te                  Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Flewellyn (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    80 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):   8000
    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: Flewellyn (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  :  94.00 / 94.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 55.94 + 0.00) = 55.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.57  69.76   0.00 -12.51  -1.30   0.00   0.00   0.00  55.94
----------------------------------------------------------------------------

Segment Leq : 55.94 dBA

Total Leq All Segments: 55.94 dBA
```

```
Results segment # 1: Flewellyn (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.35 + 0.00) = 48.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------------
   -90     90   0.57  62.16   0.00 -12.51  -1.30   0.00   0.00   0.00  48.35
----------------------------------------------------------------------------

Segment Leq : 48.35 dBA

Total Leq All Segments: 48.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.94
                         (NIGHT): 48.35
```