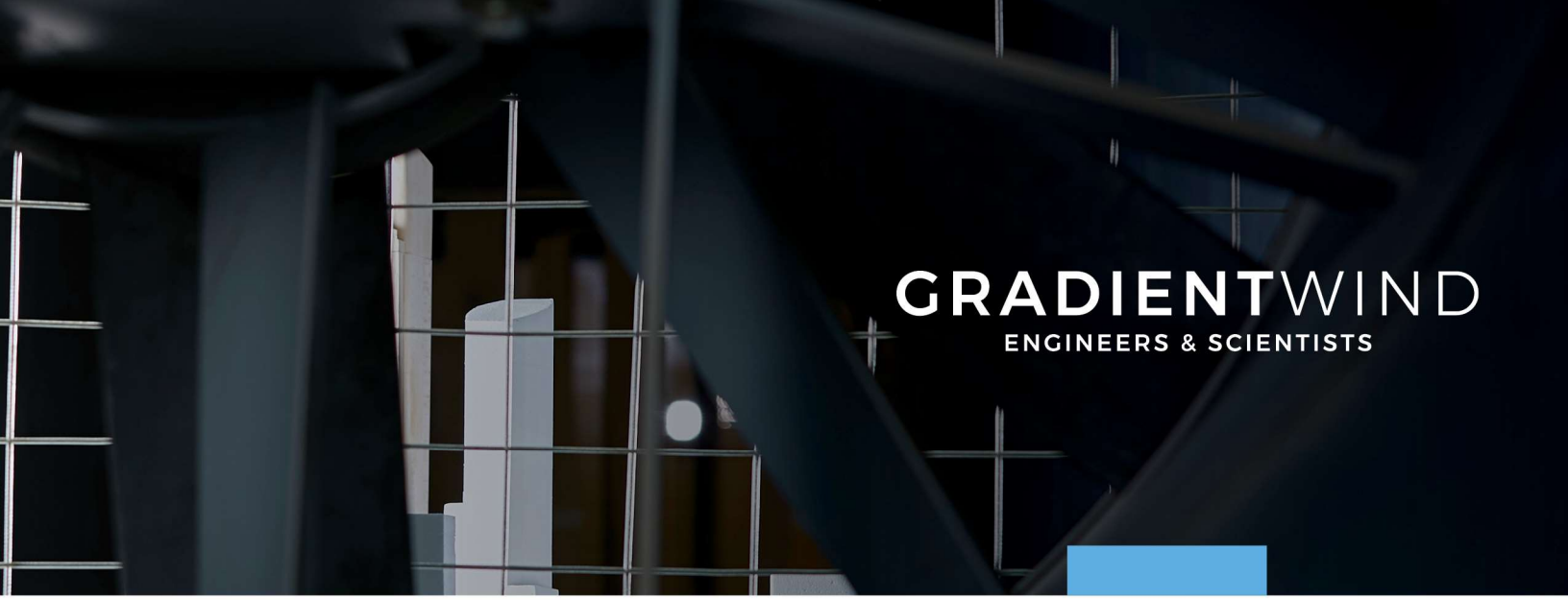

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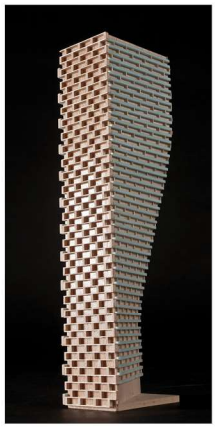
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

359 Kent St. and 436 & 444 Maclaren St.
Ottawa, Ontario

REPORT: 21-239-Traffic Noise



August 30, 2021

PREPARED FOR

359 Kent Street Ltd.
c/o Taggart Realty Management
225 Metcalfe Street, Suite 708
Ottawa, Ontario
K2P 1P9

PREPARED BY

Michael Lafortune, C.E.T., Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment to satisfy the requirements for a concurrent Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBLA) application, for the proposed high-rise residential development, located on the lands municipally known at 359 Kent Street and 436 & 444 Maclaren Street in Ottawa, Ontario. The proposed development features single tower located on 359 Kent Street, riding to a height of approximately 110 m above grade. The existing dwellings at 436 and 444 MacLaren Street are to be retained. The major sources of roadway traffic noise are Kent Street, Somerset Street W and Bank Street. 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) concept drawings prepared by Hobin Architecture Inc.

The results of the current analysis indicate that noise levels will range between 44 and 68 dBA during the daytime period (07:00-23:00) and between 36 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the west façade, which is nearest and most exposed to Kent Street.

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels exceed 65 dBA, as discussed in Section 4.2.1. The results also indicate that the development will require air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements. It is expected that noise impacts on potential outdoor living areas, in the form of rooftop terraces, can be controlled with noise mitigating guardrails, where necessary. Specific noise control for the development would be evaluated at the time of site plan control.

Off-site stationary noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. It is recommended a stationary noise study be conducted once mechanical plans for the proposed building become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building 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.

Existing stationary noise sources surrounding the study comprise small rooftop units associated with the surrounding commercial and mid-rise residential properties. A review of satellite imagery does not reveal any sources that would not be mitigated by setback distance to the study site. Further analysis of off-site stationary noise sources will not be required.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 359 Kent Street Ltd. to undertake a roadway traffic noise feasibility assessment to satisfy the requirements for a concurrent Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBLA) application, for the proposed high-rise residential development, located on the lands municipally known at 359 Kent Street and 436 & 444 Maclaren Street in Ottawa, Ontario (hereinafter referred to as "subject site" or "proposed development"). This report summarizes the methodology, results, and recommendations related to the assessment of exterior 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 concept drawings prepared by Hobin Architecture Inc., with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed development features single tower located on 359 Kent Street, riding to a height of approximately 110 m above grade. The existing dwellings at 436 and 444 MacLaren Street are to be retained. The development will include several levels of potential below-grade parking as part of the overall development. The subject site is surrounded by low and medium-rise residential building in all directions, with a commercial-use office building located to the south. The major sources of roadway traffic noise are Kent Street, Somerset Street W and Bank Street. Figure 1 illustrates a complete site plan with 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 exterior noise levels do not exceed the allowable

[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

limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-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) [3]

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, 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[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.

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[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
[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Theoretical Roadway Noise Predictions

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

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 7 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-4.

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[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.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Kent Street	2-Lane Urban Arterial	50	**15,000**
Somerset Street West	2-Lane Urban Arterial	50	**15,000**
Bank Street	2-Lane Urban Arterial	50	**15,000**

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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	18	POW – Podium – East Façade	45	37
2	18	POW – Podium – South Façade	64	57
3	18	POW – Podium – West Façade	68	61
4	100	POW – Tower – North Façade	66	58
5	100	POW – Tower – East Façade	44	36
6	100	POW – Tower – South Façade	64	57
7	100	POW – Tower – West Façade	68	61

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 44 and 68 dBA during the daytime period (07:00-23:00) and between 36 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the west façade, which is nearest and most exposed to Kent Street.

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels exceed 65 dBA, as discussed in Section 4.2.1. The results also indicate that the development will require air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements. It is expected that noise impacts on potential outdoor living areas, in the form of rooftop terraces, can be controlled with noise mitigating

guardrails, where necessary. Specific noise control for the development would be evaluated at the time of site plan control.

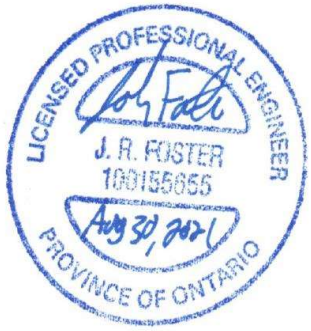
Off-site stationary noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. It is recommended a stationary noise study be conducted once mechanical plans for the proposed building become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building 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.

Existing stationary noise sources surrounding the study comprise small rooftop units associated with the surrounding commercial and mid-rise residential properties. A review of satellite imagery does not reveal any sources that would not be mitigated by setback distance to the study site. Further analysis of off-site stationary noise sources will not be required.

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,

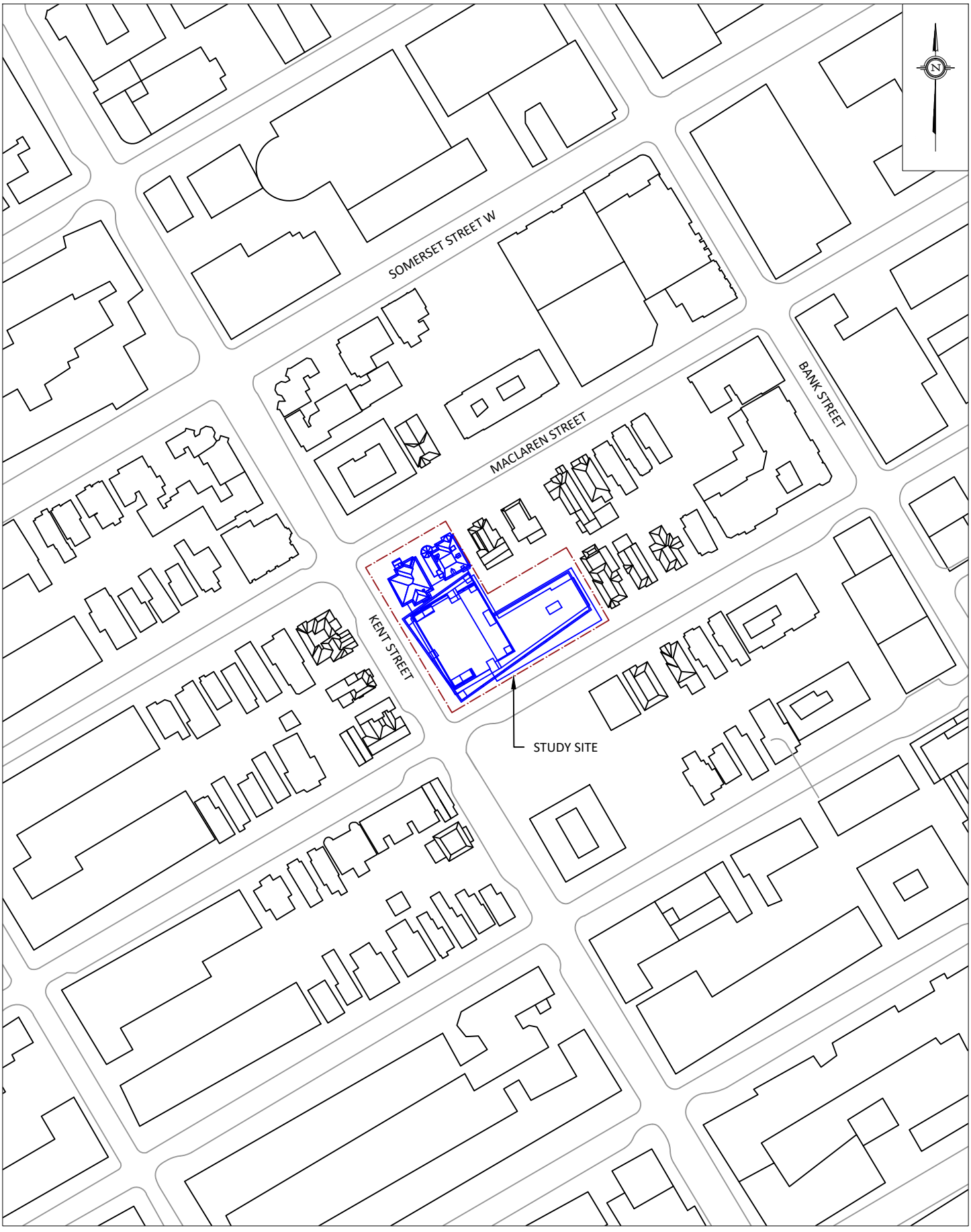
Gradient Wind Engineering Inc.



Michael Lafortune, C.E.T.
Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #21-239-Traffic Noise



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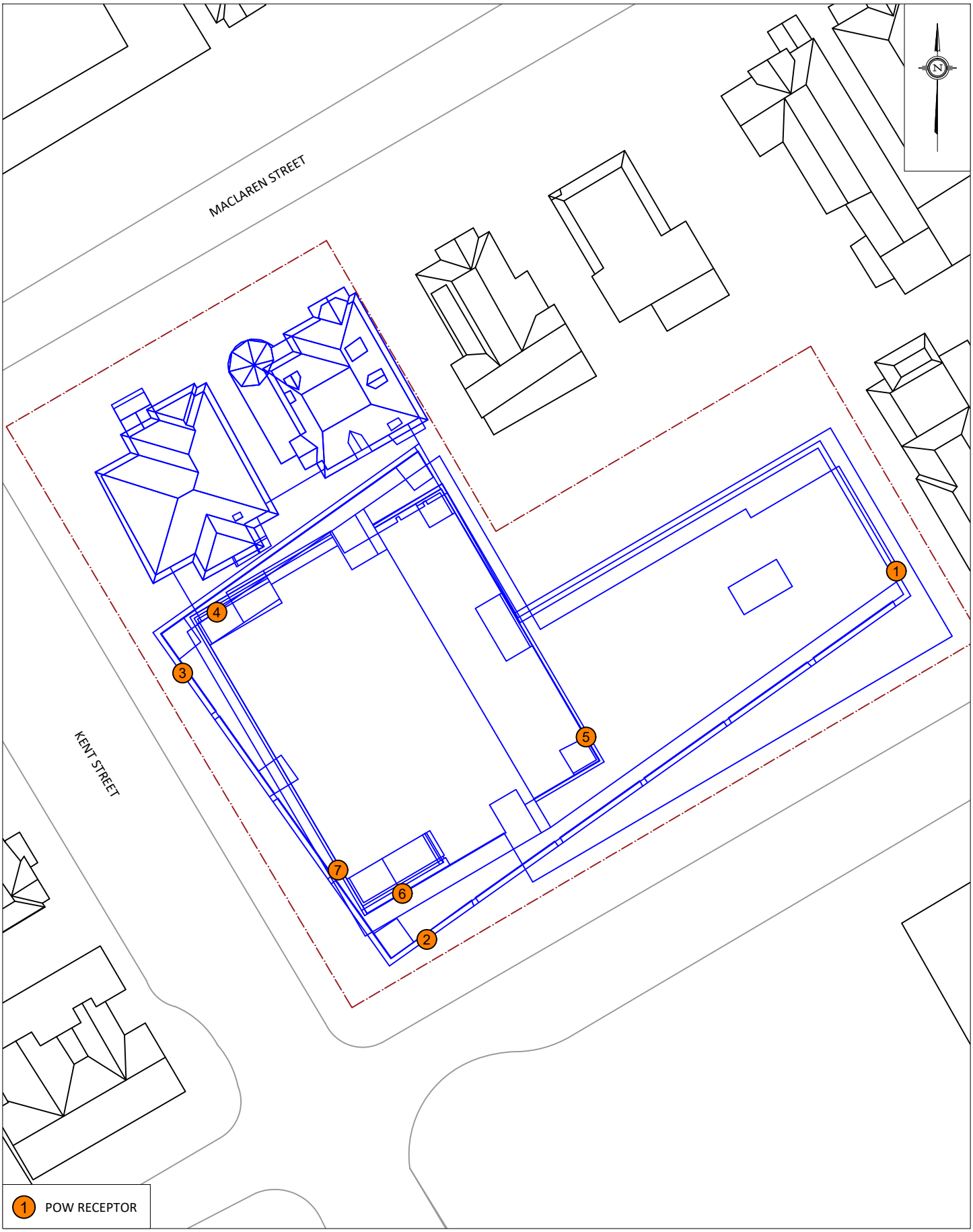
PROJECT	359 KENT ST. AND 436 & 444 MACLAREN ST., OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-239-1
DATE	AUGUST 17, 2021
DRAWN BY	M.L.
DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT



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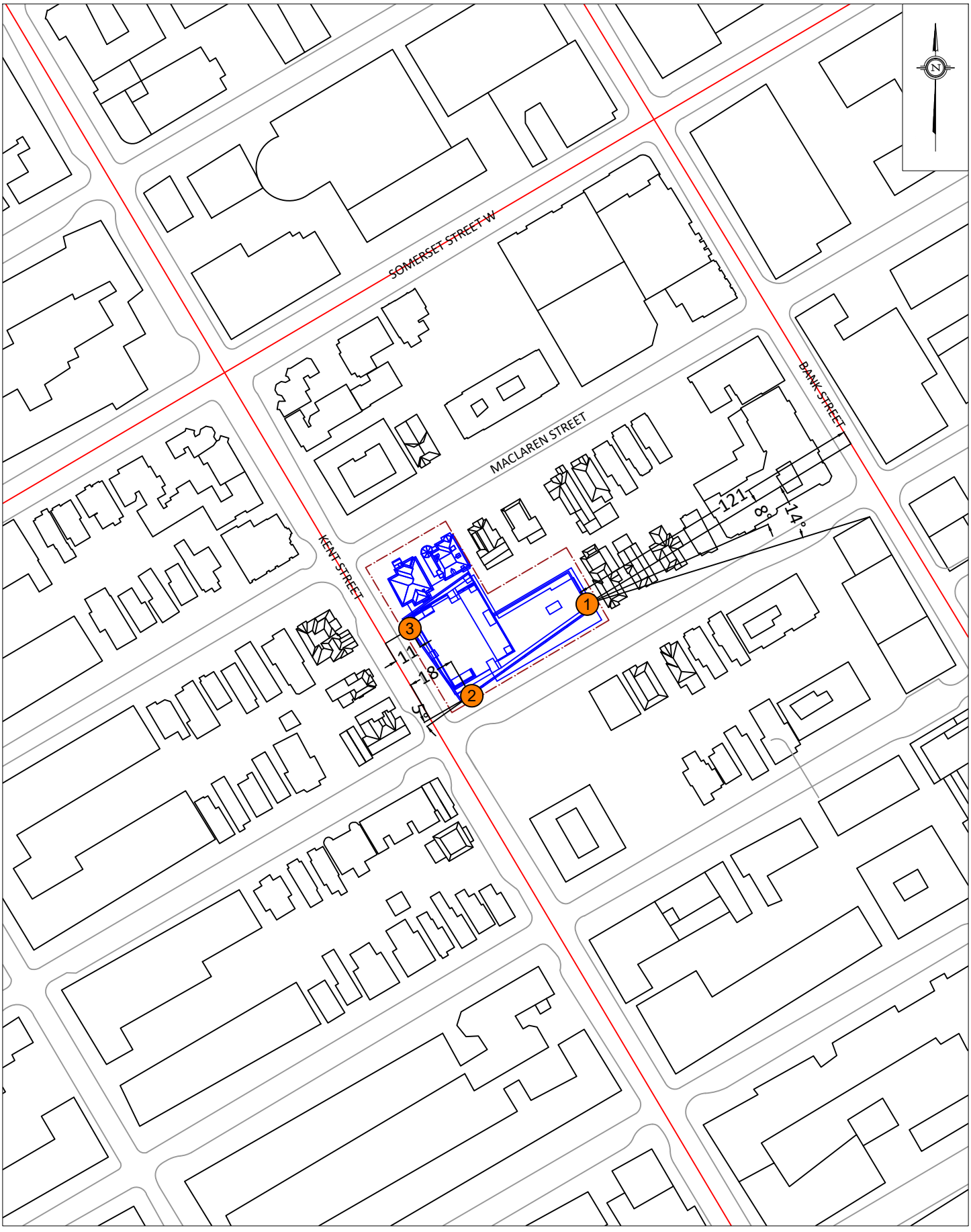
PROJECT	359 KENT ST. AND 436 & 444 MACLAREN ST., OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO. GW21-239-2	FIGURE 2: RECEPTOR LOCATIONS
DATE	AUGUST 17, 2021	DRAWN BY M.L.	



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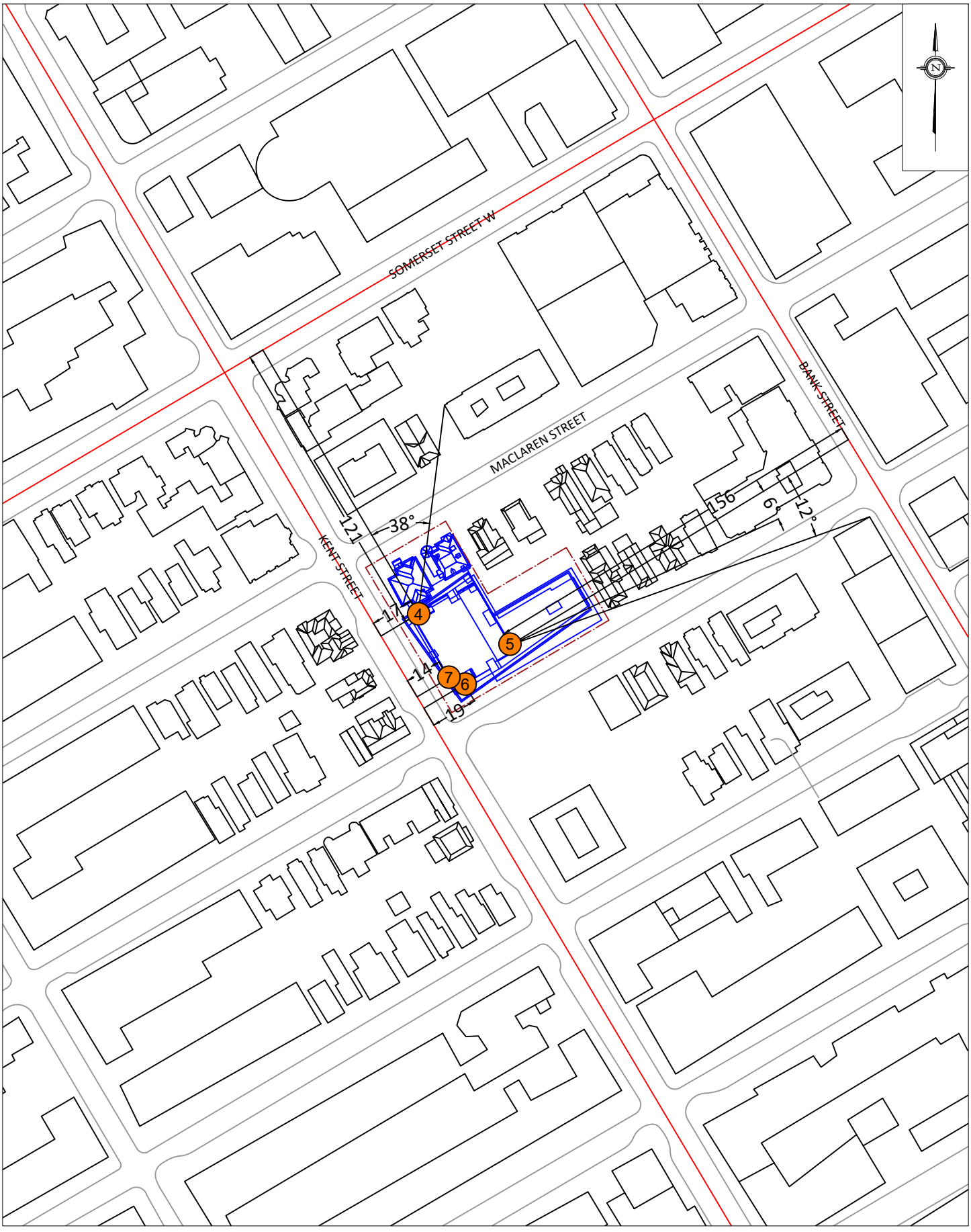
PROJECT	359 KENT ST. AND 436 & 444 MACLAREN ST., OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW21-239-3
DATE	AUGUST 17, 2021
DRAWN BY	M.L.

DESCRIPTION

FIGURE 3:
STAMSON INPUT PARAMETERS - RECEPTOR 1-3



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PROJECT	359 KENT ST. AND 436 & 444 MACLAREN ST., OTTAWA ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW21-239-4
DATE	AUGUST 17, 2021	DRAWN BY	M.L.

DESCRIPTION

FIGURE 4:
STAMSON INPUT PARAMETERS - RECEPTOR 4-7

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
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```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Bank (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: Bank (day/night)
--------------------------------------
Angle1   Angle2           :   8.00 deg   14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 121.00 / 121.00 m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Bank (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 44.64 + 0.00) = 44.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     8     14   0.00  68.48   0.00  -9.07 -14.77   0.00   0.00   0.00
44.64
-------------------------------------------------------------------------
--

Segment Leq : 44.64 dBA

Total Leq All Segments: 44.64 dBA


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

Source height = 1.50 m

ROAD (0.00 + 37.05 + 0.00) = 37.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     8     14   0.00  60.88   0.00  -9.07 -14.77   0.00   0.00   0.00
37.05
-------------------------------------------------------------------------
--

Segment Leq : 37.05 dBA

Total Leq All Segments: 37.05 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 44.64
                           (NIGHT): 37.05
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Kent (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: Kent (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   -5.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  18.00 / 18.00  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Kent (day)
-------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.43 + 0.00) = 64.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     -5   0.00  68.48   0.00  -0.79  -3.26   0.00   0.00   0.00
64.43
-------------------------------------------------------------------------
--

Segment Leq : 64.43 dBA

Total Leq All Segments: 64.43 dBA


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

Source height = 1.50 m

ROAD (0.00 + 56.83 + 0.00) = 56.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     -5   0.00  60.88   0.00  -0.79  -3.26   0.00   0.00   0.00
56.83
-------------------------------------------------------------------------
--

Segment Leq : 56.83 dBA

Total Leq All Segments: 56.83 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 64.43
                           (NIGHT): 56.83
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Kent (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: Kent (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  18.00 / 18.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Kent (day)
-------------------------------

Source height = 1.50 m

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

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.48 dBA


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

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00   0.00
60.88
-------------------------------------------------------------------------
--

Segment Leq : 60.88 dBA

Total Leq All Segments: 60.88 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 68.48
                           (NIGHT): 60.88
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Kent (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: Kent (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  :  17.00 / 17.00  m
Receiver height           : 100.00 / 100.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Somerset (day/night)
---------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Somerset (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   38.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 121.00 / 121.00 m
Receiver height           : 100.00 / 100.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Kent (day)
-------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.93 + 0.00) = 64.93 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  -0.54  -3.01   0.00   0.00   0.00
64.93
-------------------------------------------------------------------------
--

Segment Leq : 64.93 dBA


Results segment # 2: Somerset (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.93 + 0.00) = 57.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     38   0.00  68.48   0.00  -9.07  -1.48   0.00   0.00   0.00
57.93
-------------------------------------------------------------------------
--

Segment Leq : 57.93 dBA

Total Leq All Segments: 65.72 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.33 + 0.00) = 57.33 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  -0.54  -3.01   0.00   0.00   0.00
57.33
-------------------------------------------------------------------------
--

Segment Leq : 57.33 dBA


Results segment # 2: Somerset (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.34 + 0.00) = 50.34 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     38   0.00  60.88   0.00  -9.07  -1.48   0.00   0.00   0.00
50.34
-------------------------------------------------------------------------
--

Segment Leq : 50.34 dBA

Total Leq All Segments: 58.12 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.72
                           (NIGHT): 58.12
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Bank (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: Bank (day/night)
--------------------------------------
Angle1   Angle2           :   6.00 deg   12.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 156.00 / 156.00 m
Receiver height           : 100.00 / 100.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Bank (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 43.54 + 0.00) = 43.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     6     12   0.00  68.48   0.00 -10.17 -14.77   0.00   0.00   0.00
43.54
-------------------------------------------------------------------------
--

Segment Leq : 43.54 dBA

Total Leq All Segments: 43.54 dBA


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

Source height = 1.50 m

ROAD (0.00 + 35.94 + 0.00) = 35.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     6     12   0.00  60.88   0.00 -10.17 -14.77   0.00   0.00   0.00
35.94
-------------------------------------------------------------------------
--

Segment Leq : 35.94 dBA

Total Leq All Segments: 35.94 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 43.54
                           (NIGHT): 35.94
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:20:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Kent (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: Kent (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           : 100.00 / 100.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Kent (day)
--------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.44 + 0.00) = 64.44 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  -1.03  -3.01   0.00   0.00   0.00
64.44
-------------------------------------------------------------------------
--

Segment Leq : 64.44 dBA

Total Leq All Segments: 64.44 dBA


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

Source height = 1.50 m

ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  60.88   0.00  -1.03  -3.01   0.00   0.00   0.00
56.85
-------------------------------------------------------------------------
--

Segment Leq : 56.85 dBA

Total Leq All Segments: 56.85 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 64.44
                           (NIGHT): 56.85
```

```
STAMSON 5.0        NORMAL REPORT        Date: 16-08-2021 14:21:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Kent (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: Kent (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           : 100.00 / 100.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Kent (day)
-------------------------------

Source height = 1.50 m

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

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.48 dBA


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

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00   0.00
60.88
-------------------------------------------------------------------------
--

Segment Leq : 60.88 dBA

Total Leq All Segments: 60.88 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 68.48
                           (NIGHT): 60.88
```