

Noise Assessment Report

19 & 23 Bachman Terrace



Prepared for:
Tega Homes

Prepared by:
Stantec Consulting Ltd.

March 24, 2014

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NOISE ASSESSMENT REPORT

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NOISE ASSESSMENT REPORT

Introduction
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1.0 Introduction

1.1 PURPOSE OF REPORT

Stantec Consulting Ltd. has been retained by Tega Homes, to prepare an environmental noise assessment for the development site located at 19 and 23 Bachman Terrace, in the City of Ottawa. A site plan application has been submitted and a Noise Assessment Study is required to address City policies regarding residential development adjacent to arterial and collector roads.

The purpose of this report is to:

- outline the Ministry's guidelines and criteria for noise levels and residential land use;
- apply the noise level standards of the Ontario Ministry of the Environment to the site in conjunction with the City of Ottawa document "Environmental Noise Control Guidelines";
- determine the extent to which noise levels will be of concern to future residents of the proposed development, using the computerized version (STAMSON 5.03) of the M.O.E.'s noise model;
- outline recommendations for noise attenuation, as necessary, to achieve acceptable noise levels for future residents of the proposed development.

1.2 LOCATION

The site is located at 19 and 23 Bachman Terrace, north of Hazeldean Road and along Pickford Drive, as illustrated in Figure 1. The proposed development consists of 25 townhome units. This report will focus on the residential units with exposure to Hazeldean Road and Pickford Drive.

Surrounding land uses are as follows:

- north – existing residential;
- east – existing residential;
- south – existing commercial;
- west – existing residential.

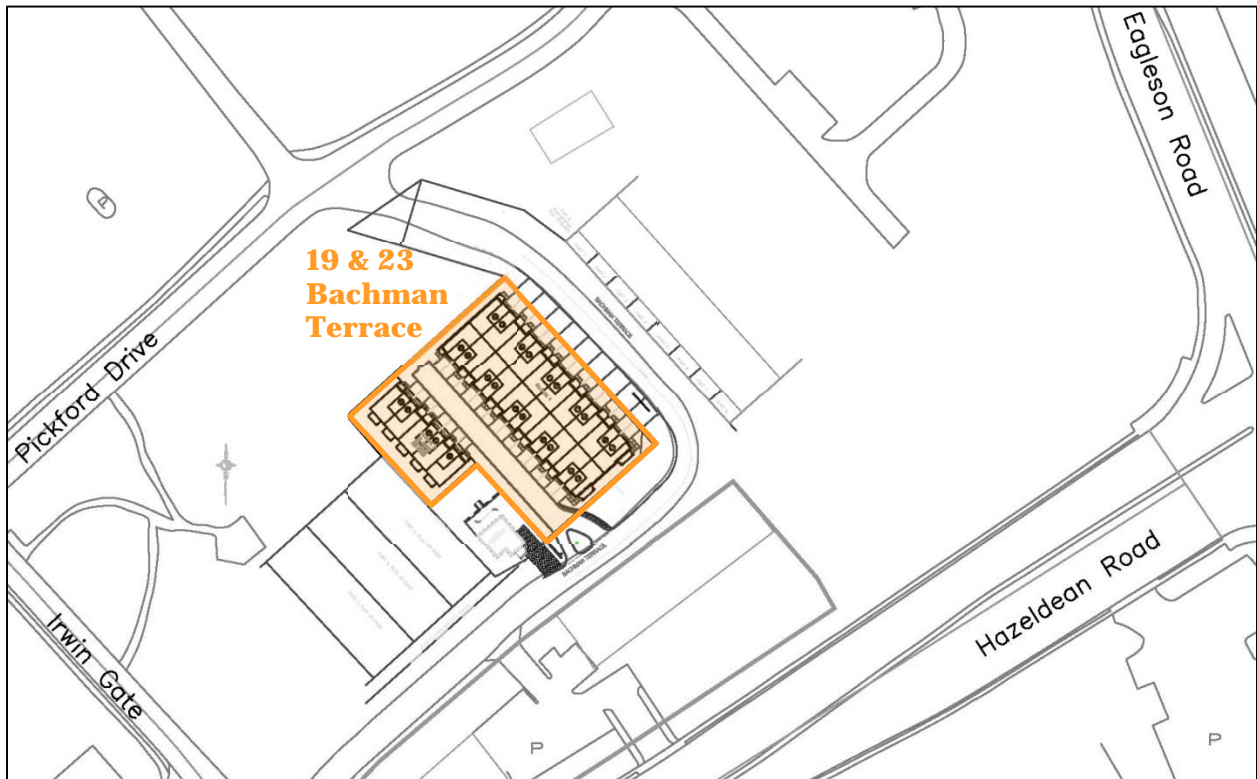
The main potential noise source that may impact the subject site is vehicular traffic on Pickford Drive, along the north site boundary, and Hazeldean Road to the south. The traffic volumes for Hazeldean Road and Pickford Drive are based on the City of Ottawa document "Environmental Noise Control Guidelines".

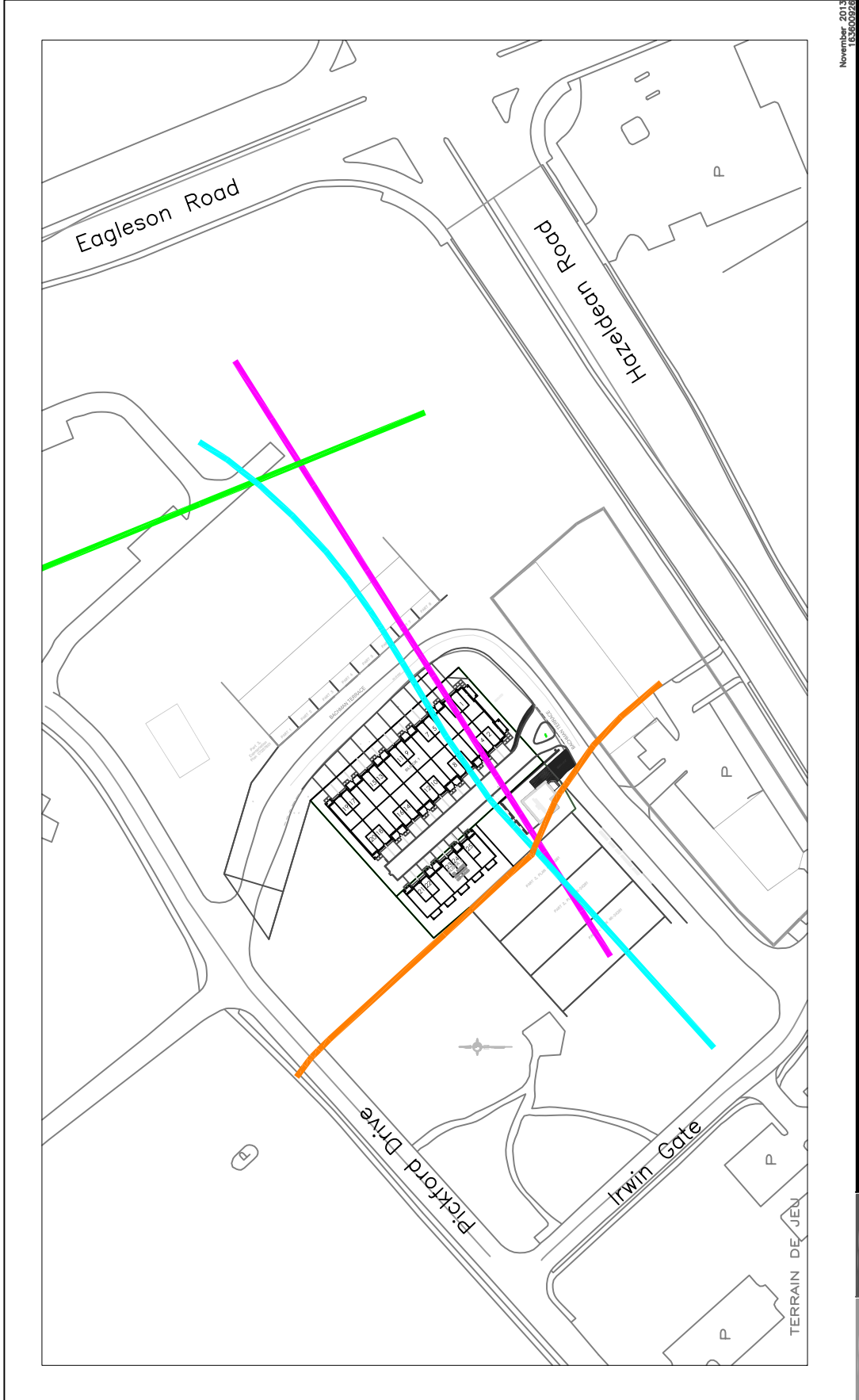
The influence zones for each of the study area roadways is shown in Figure 2.

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Figure 1 Bachman Terrace Residential Development





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Figure No. 2
Title ROAD INFLUENCE NOISE ZONES

Notes: Not To Scale

100m Influence Zone from Eagleson Road
100m Influence Zone from Hazeldean Road
100m Influence Zone from Irwin Gate
100m Influence Zone from Pickford Drive

Legend



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Noise Level Criteria
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2.0 Noise Level Criteria

2.1 GUIDELINES

The Ontario Ministry of Environment (M.O.E.) has produced guidelines for noise levels for use in noise assessment and land use planning. Noise level criteria for residential land use are summarized in Table 1 below. Noise levels in excess of the guidelines presented are acceptable under certain conditions and with certain provisions.

Table 1 Noise Criteria for Residential Land Use

Location	7 a.m. - 11 p.m.	11 p.m. - 7 a.m.
Outdoor Living Areas	55 dBA	N/A
Indoor Living Areas	55 dBA at plane of living room windows	50 dBA at plane of bedroom windows

Table 2 and Table 3 set out noise levels in excess of the criteria and the required provisions to allow residential activity in locations where noise level criteria are expected.

Table 2 Combination of Road and Rail Noise
Day-Time Outdoor, Ventilation and Warning Clause Requirements

Location	Leq (16 hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Outdoor Living Area	Less than or equal to 55 dBA	N/A	None required	Not required
	Greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) not required but should be considered	Required if resultant Leq exceeds 55 dBA Type A
	Greater than 60 dBA	N/A	Control measures (barriers) required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant Leq exceeds 60 dBA Type B
Plane of Living Room Window	Leq 16 hr less than or equal to 55 dBA	None required	N/A	Not required
	Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	Greater than 65 dBA	Central air conditioning	N/A	Required Type D

(Source: Ministry of the Environment, Noise Assessment Criteria in Land Use Planning: Requirements, Procedures and Implementation, October 1997)

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Noise Level Criteria
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**Table 3 Combination of Road and Rail Noise,
Night-Time Ventilation and Warning Clause Requirements**

Location	Leq (8 hr) (dBA)	Ventilation Requirements	Warning Clause
Plane of Bedroom Window	Greater than 50 dBA to less or equal to 60 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Greater than 60 dBA	Central air conditioning	Required Type D

(Source: Ministry of the Environment, Noise Assessment Criteria in Land Use Planning: Requirements, Procedures and Implementation, October 1997)

The M.O.E. also specifies building component requirements when indoor noise levels exceed the criteria by certain levels. These requirements are summarized in Table 4.

Table 4 Road and Rail Noise – Building Component Requirements

Location		Leq (16 hr) (dBA)	Building Component Requirements
Plane of Living Room Window - Daytime	Road	Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
		Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	Rail	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

Location		Leq (8 hr) (dBA)	Building Component Requirements
Plane of Bedroom Window - Nighttime	Road	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	Rail	Less than or equal to 55 dBA	Building compliant with the Ontario Building Code
		Greater than 55 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

(Source: Ministry of the Environment, Noise Assessment Criteria in Land Use Planning: Requirements, Procedures and Implementation, October 1997)

NOISE ASSESSMENT REPORT

Observations and Calculations
March 24, 2014

3.0 Observations and Calculations

3.1 NOISE LEVEL PREDICTIONS

Noise predictions in this report were completed using the computerized version (STAMSON 5.03) of the M.O.E. noise model, ORNAMENT to calculate noise levels from various sources. The program accepts variables related to noise sources and receivers, road traffic volumes and the nature and extent of noise attenuation barriers, if required.

3.2 ROAD TRAFFIC VOLUMES

Traffic volume data for Hazeldean Road and Pickford Drive were provided by the City of Ottawa document "Environmental Noise Control Guidelines". The document indicates that the average annual daily traffic volume for Hazeldean Road will be 50,000 vehicles per day for a 6-lane divided urban arterial and Pickford Drive will be 8,000 vehicles per day for a 2-lane urban collector. Additional information regarding applicable assumptions and ratios for day/night traffic and car/ truck traffic is summarized as follows:

- heavy truck traffic for this segment is estimated to be 5% of total traffic volume;
- medium truck traffic for this segment is estimated to be 7% of total traffic volume; the rest is assumed to be car traffic;
- daytime (7 am – 11 pm) traffic is assumed to be 92%, with the remaining 8% at night (11 pm – 7 am);
- speed limit for Hazeldean Road is 60 km/hour and for Pickford Drive is 50 km/hour.

Table 5 and Table 6 summarize the traffic volumes used for calculations in this report.

Table 5 Traffic Volumes – Hazeldean Road, 6-Lane Urban Arterial - Divided

	Day	Night	Total
Car	40,480	3,520	44,000
Medium Truck	3,220	280	3,500
Heavy Truck	2,300	200	2,500
TOTAL	46,000	4,000	50,000
Speed Limit	60 km/hr		
Gradient	0%		
Surface	Asphalt		

NOISE ASSESSMENT REPORT

Observations and Calculations
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Table 6 Traffic Volumes – Pickford Drive, 2-Lane Urban Collector

	Day	Night	Total
Car	6,477	563	7,040
Medium Truck	515	45	560
Heavy Truck	368	32	400
TOTAL	7,360	640	8,000
Speed Limit	50 km/hr		
Gradient	0%		
Surface	Asphalt		

3.3 PROJECTED NOISE LEVELS

Using the M.O.E. noise model, ORNAMENT, noise levels were calculated for daytime conditions at the point representing the anticipated building location, based on the site plan.

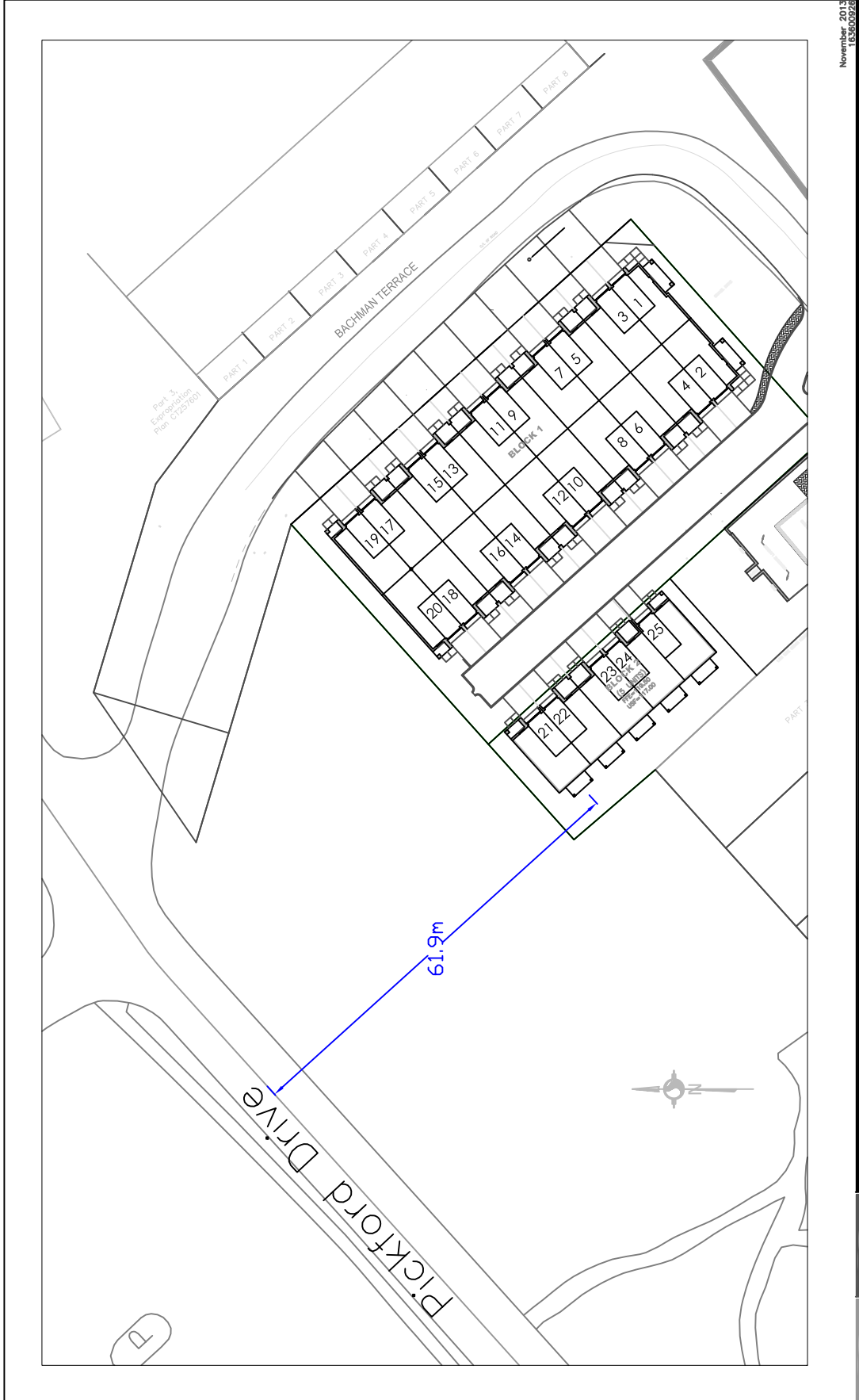
For the townhome units with exposure to the road network, calculations were completed assuming the amenity area would be at a 3.0 metre offset from the rear of the units and at a height of 1.5 metres, as shown in Figure 3.

The receiver heights for indoor daytime and nighttime noise level calculations for the proposed buildings were completed at the ground level (2.5m above grade) and at the second level (4.5m above grade). These receivers were placed at the most exposed area of the units, as shown in Figure 4 and Figure 5.

Unattenuated noise level calculations are provided in Appendix A for daytime and nighttime building face noise levels, as well as, outdoor living area noise levels and have been summarized below.

Table 7 Summary of Projected Unattenuated Noise Levels

Receiver	Location (Block/Unit)	Daytime- Building Face (dBA)	Nighttime- Building Face (dBA)	Outdoor Living Area (dBA)
R1	21	53.5	46.3	53.2
R2	19/20	54.3	47.2	-
R3	1	53.6	46.6	-
R4	2	49.5	42.7	-



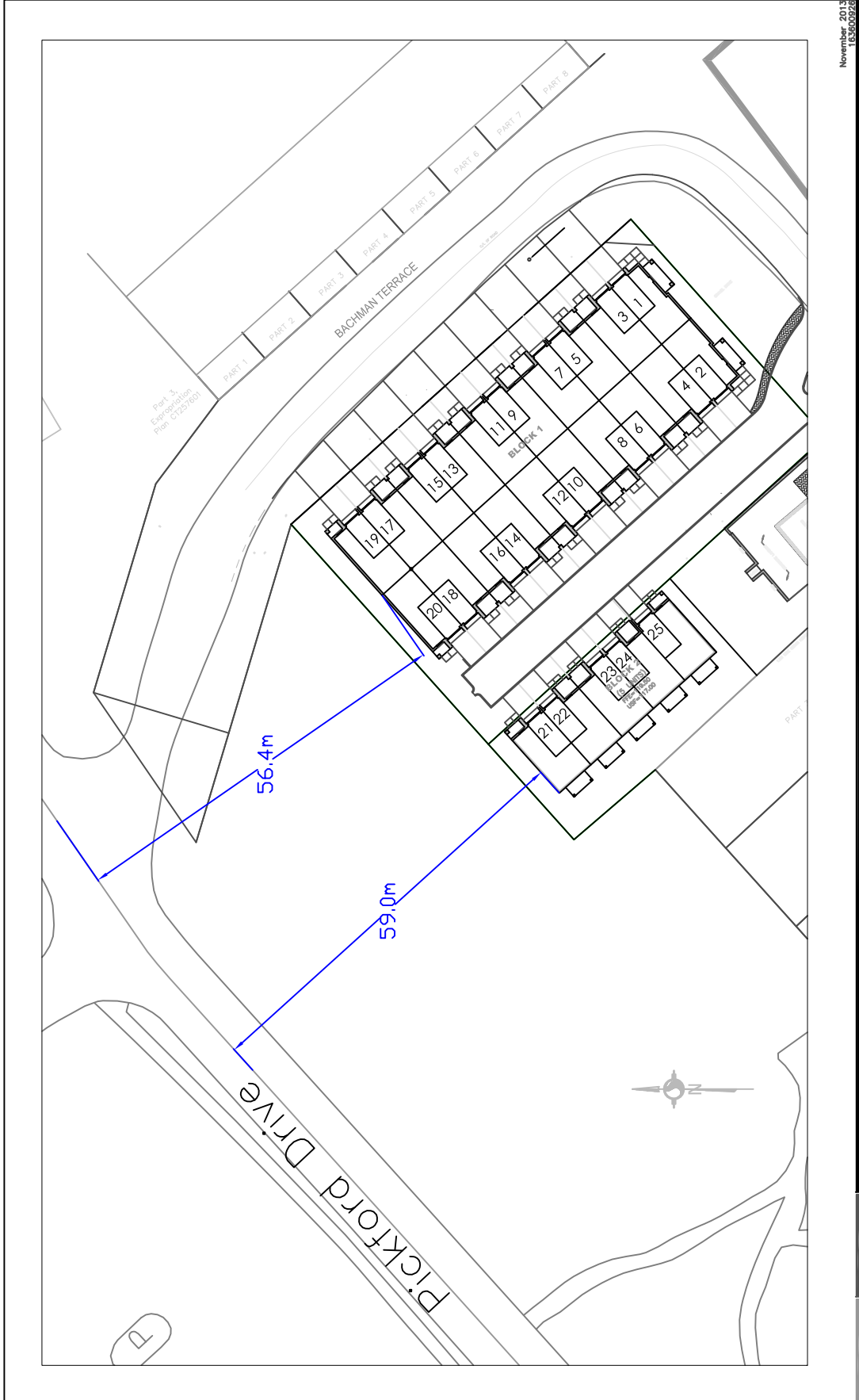
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Figure No. 3
Title OUTDOOR LIVING AREAS
Notes: Not To Scale



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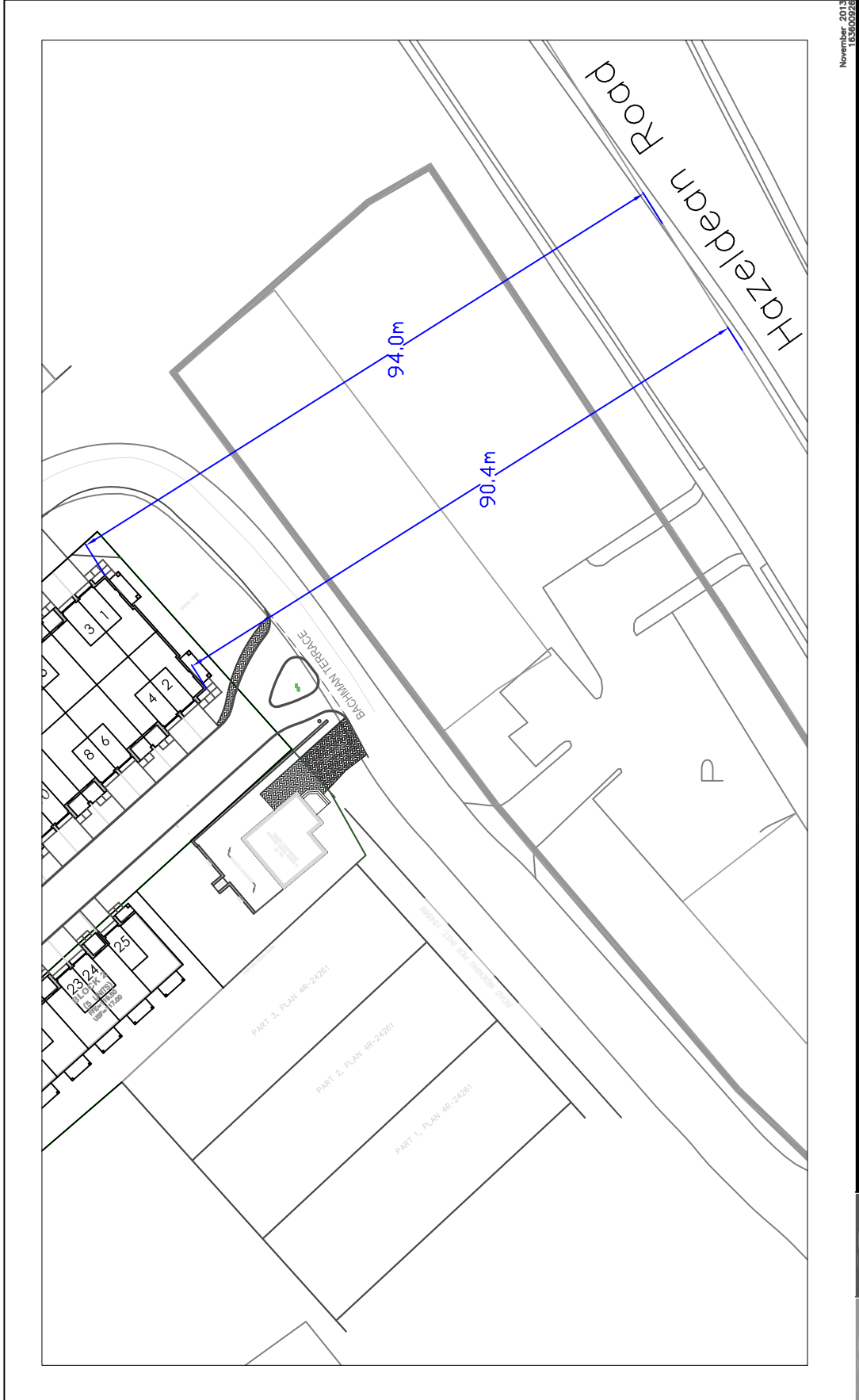
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Figure No. 5
Title INDOOR LIVING AREAS 2

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Conclusions and Recommendations
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4.0 Conclusions and Recommendations

4.1 CONCLUSIONS

Predicted noise levels are below City of Ottawa and M.O.E. criteria at the daytime building face, the nighttime building face and outdoor living area for potential units facing Hazeldean Road and Pickford Drive.

As a result, no mitigation or noise clauses are required for the 19 and 23 Bachman Terrace residential development to proceed in accordance with MOE criteria with respect to environmental noise.

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Appendix A Noise Level Calculations
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Appendix A Noise Level Calculations

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Appendix A Noise Level Calculations
March 24, 2014

A.1 INDOOR RECEIVER STAMSON REPORTS

Filename: r1in.te Time Period: Day/Night 16/8 hours
Description: Receiver 1 - Unit 21 Indoor

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

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.90 / 61.90 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Pickford (day)

Source height = 1.50 m

ROAD (0.00 + 53.46 + 0.00) = 53.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.63	65.75	0.00	-10.04	-2.25	0.00	0.00	0.00	53.46

Segment Leq : 53.46 dBA

Total Leq All Segments: 53.46 dBA

Results segment # 1: Pickford (night)

Source height = 1.50 m

ROAD (0.00 + 46.31 + 0.00) = 46.31 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 45 0.57 58.16 0.00 -9.67 -2.18 0.00 0.00 0.00 46.31

Segment Leq : 46.31 dBA

Total Leq All Segments: 46.31 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.46
(NIGHT): 46.31

Filename: r2in.te Time Period: Day/Night 16/8 hours
Description: Receiver 2 - Unit 19/20 Indoor

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

Angle1 Angle2 : -90.00 deg 52.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 56.40 / 56.40 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Pickford (day)

Source height = 1.50 m

ROAD (0.00 + 54.33 + 0.00) = 54.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	52	0.63	65.75	0.00	-9.38	-2.04	0.00	0.00	0.00	54.33

Segment Leq : 54.33 dBA

Total Leq All Segments: 54.33 dBA

Results segment # 1: Pickford (night)

Source height = 1.50 m

ROAD (0.00 + 47.16 + 0.00) = 47.16 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 52 0.57 58.16 0.00 -9.03 -1.96 0.00 0.00 0.00 47.16

Segment Leq : 47.16 dBA

Total Leq All Segments: 47.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.33
(NIGHT): 47.16

Filename: r3in.te Time Period: Day/Night 16/8 hours
Description: Receiver 3 - Unit 1 Indoor

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

Car traffic volume : 40480/3520 veh/TimePeriod *
Medium truck volume : 3220/280 veh/TimePeriod *
Heavy truck volume : 2300/200 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): 50000
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: Hazeldean (day/night)

Angle1 Angle2 : -76.00 deg -39.00 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 : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 53.57 + 0.00) = 53.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	-39	0.63	75.22	0.00	-12.99	-8.67	0.00	0.00	0.00	53.57

Segment Leq : 53.57 dBA

Total Leq All Segments: 53.57 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 46.61 + 0.00) = 46.61 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-76	-39	0.57	67.63	0.00	-12.51	-8.50	0.00	0.00	0.00	46.61
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Segment Leq : 46.61 dBA

Total Leq All Segments: 46.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.57
(NIGHT): 46.61

Filename: r4in.te Time Period: Day/Night 16/8 hours
Description: Receiver 4 - Unit 2 Indoor

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

Car traffic volume : 40480/3520 veh/TimePeriod *
Medium truck volume : 3220/280 veh/TimePeriod *
Heavy truck volume : 2300/200 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): 50000
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: Hazeldean (day/night)

Angle1 Angle2 : -85.00 deg -64.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 90.40 / 90.40 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 49.47 + 0.00) = 49.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-64	0.63	75.22	0.00	-12.72	-13.04	0.00	0.00	0.00	49.47

Segment Leq : 49.47 dBA

Total Leq All Segments: 49.47 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 42.68 + 0.00) = 42.68 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-85	-64	0.57	67.63	0.00	-12.25	-12.70	0.00	0.00	0.00	42.68
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Segment Leq : 42.68 dBA

Total Leq All Segments: 42.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.47
(NIGHT): 42.68

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Appendix A Noise Level Calculations
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A.2 OUTDOOR RECEIVER STAMSON REPORTS

Filename: Time Period: Day/Night 16/8 hours
Description: Receiver 1 - Unit 21 OLA

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

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.90 / 61.90 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Pickford (day)

Source height = 1.50 m

ROAD (0.00 + 53.24 + 0.00) = 53.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.66	65.75	0.00	-10.22	-2.29	0.00	0.00	0.00	53.24

Segment Leq : 53.24 dBA

Total Leq All Segments: 53.24 dBA

Results segment # 1: Pickford (night)

Source height = 1.50 m

ROAD (0.00 + 46.31 + 0.00) = 46.31 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 45 0.57 58.16 0.00 -9.67 -2.18 0.00 0.00 0.00 46.31

Segment Leq : 46.31 dBA

Total Leq All Segments: 46.31 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.24
(NIGHT): 46.31