REPORT
PROJECT: 116761-5.2.2.2

NOISE CONTROL FEASIBILITY STUDY
MER BLEUE PHASE 1
2503 & 2559 MER BLEUE ROAD
MER BLEUE URBAN EXPANSION AREA

Prepared for Claridge Homes
by IBI GROUP

November 2021

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1 Introduction

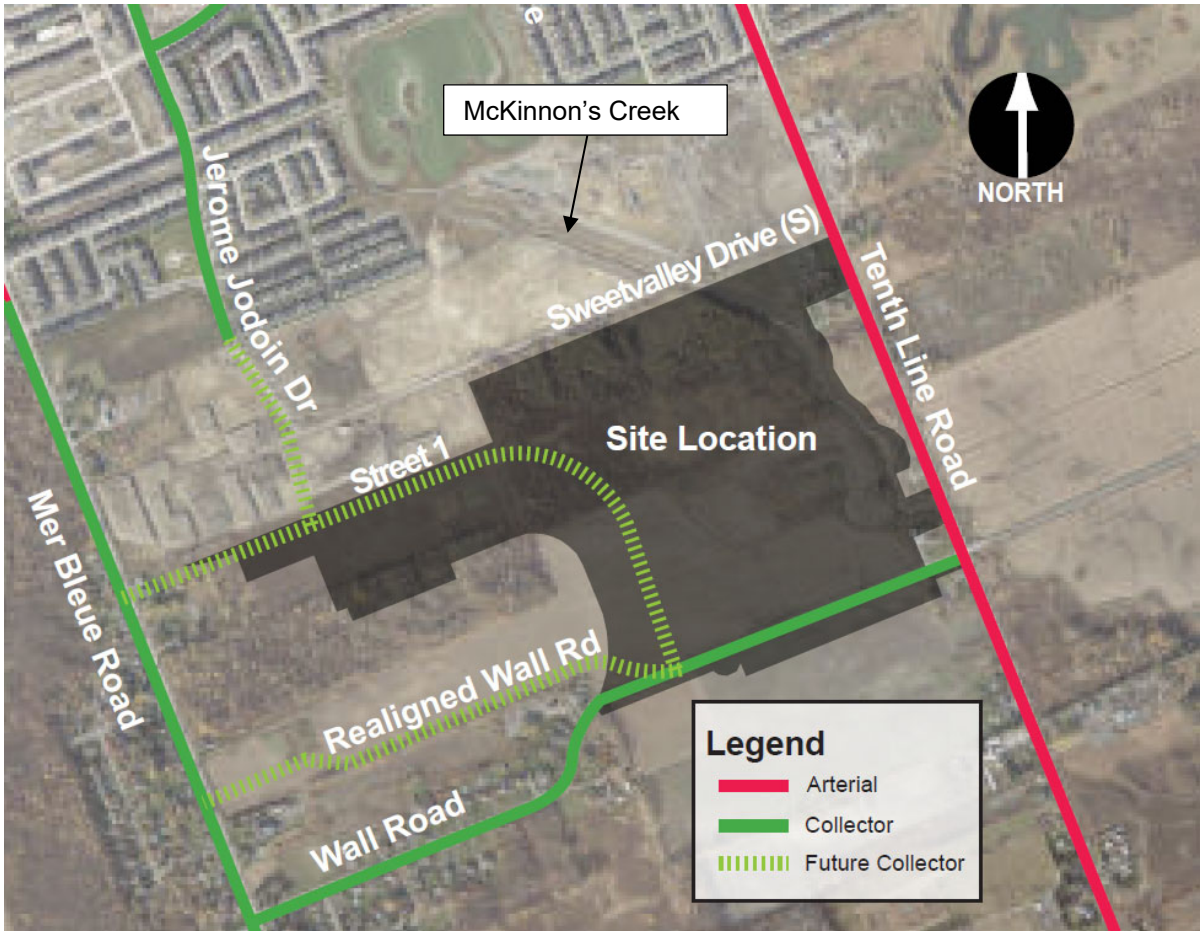
IBI Group (IBI) was retained by Claridge Homes to undertake a Noise Control Feasibility Study in support of a Draft Plan of Subdivision application for a proposed residential development to be located within the Mer Bleue Urban Expansion Area at 2503 & 2559 Mer Bleue Road and 2666 Tenth Line Road, Ottawa.

This report presents preliminary analyses through a review of transportation noise contour lines to help identify potential locations for noise control measures and warning clauses for the subject development, as required.

The Phase 1 site occupies approximately 49 hectares and is generally bound by Mattamy's Summerside (Phases 4, 5 and 6) development to the north, Wall Road to the south, Tenth Line Road to the east and Mer Bleue Road to the west. The subject site will be generally built out from east to west, beginning with the portion to the east of McKinnon's Creek.

The site location and its surrounding context is illustrated in **Figure 1** below.

Figure 1 – Site Location



2 Background

2.1 Noise Sources

The study area will be primarily subjected to roadway noise from Tenth Line Road, as well as Street 1 and Wall Road which will form the collector road network within limits of the proposed development.

The subject site is located outside of the Airport Vicinity Development Zone (AVDZ), as shown on Schedule C14 of the 2021 Official Plan, therefore aircraft noise from the Ottawa International Airport has not been considered in this study.

There are no rail lines within 500 metres of the site, therefore no consideration has been given to the noise impacts from rail traffic in accordance with the City of *Ottawa Environmental Noise Control Guidelines (January 2016)*, hereafter referred to as the ENC Guidelines.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the *City of Ottawa Environmental Noise Control Guidelines* and the *Ministry of Environment Publication NPC-300 (August 2013)*. Noise levels are expressed in the form Leq (T), which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor sound level criterion – ventilation and warning clause requirements

The recommended indoor sound level criteria from Table 2.2b of the ENC Guidelines are as follows:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq (8 hours)
- Living Room – 07:00 to 23:00 – 45 dBA Leq (16 hours)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels of the semi-detached units, the outdoor sound levels are observed at the plane of the living room window at 1.5 metres above the ground for daytime noise and at the plane of the bedroom window 4.5 metres above the ground for nighttime noise in accordance with the ENC Guidelines.

As per NPC-300 C7.1.2.1 and C7.1.2.2, when the outdoor noise levels are greater than 55 dBA and less than or equal to 65 dBA at the living room window and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window, then a warning clause is compulsory. This warning clause specifies that forced air heating with a provision for central air conditioning is required. Should the outdoor sound levels exceed the criteria, central air conditioning is mandatory, and a warning clause is required.

2.2.2 Outdoor sound level criterion

As per Table 2.2a of the ENC Guidelines, the sound level criteria for the outdoor living area (OLA) during the daytime (i.e. 07:00 and 23:00 hours) is 55 dBA Leq (16). Sound levels for the OLA are typically calculated 3 metres from the building face at the centre of the unit, or in the middle of the OLA at a height of 1.5 metres above the ground/elevated terrace.

If the Leq sound level is less than or equal to the above criteria, then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may, with City approval, either provide a warning clause to prospective tenants or install physical

attenuation. For sound levels greater than 5 dBA above the criteria control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

2.2.3 Indoor Sound Level Criterion – Building Components

As per NPC-300 C7.1.3, when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

3 Roadway Noise

3.1 Road Traffic Data

Based on the configuration of the road transportation network with respect to the proposed development, it is assumed that the significant transportation noise impacting the site will originate from the following:

- **Tenth Line Road** is presently configured as a two-lane rural arterial road adjacent to the subject site with a posted speed limit of 60km/h and a right-of-way protection of 37.5 metres. The 2013 Transportation Master Plan (TMP) 2031 'Affordable Network' indicates that this arterial is planned for upgrade to accommodate a four-lane urban divided cross-section (4-UAD) within the 2031 planning horizon. As such, this facility has been conservatively modelled with this widened cross-section for the purposes of this study.
- **Wall Road** is an existing two-lane rural collector road which extends east-west through the southernmost portion of the subject site. The posted speed limit is 50 km/h within the residential portion near Mer Bleue Road, and transitions to 60 km/h midway between Mer Bleue Road and Tenth Line Road within the subject lands. It is expected that Wall Road will be realigned in the future and the existing western portion will be downgraded to a local road. A right-of-way protection of 24 metres is indicated in the Draft Plan to accommodate the urbanization of this collector road through the subject lands.
- **Street 1** is a new collector road (2-UCU) which will intersect with Wall Road and then curve westward to intersect with Mer Bleue Road. The posted speed limit along this new road is assumed to be 50 km/h.

Table 3.1 below summarizes the traffic and road parameters used in this report. These parameters were extracted from Appendix B: Table B1 of the ENC Guidelines, and are conservatively based on roadway capacity.

Table 3.1 below summarizes the traffic and road parameters which were used to assess the noise levels.

TABLE 3.1: TRAFFIC AND ROAD DATA SUMMARY

	TENTH LINE ROAD (4-UAD)	STREET 1 (2-UCU)	WALL ROAD (2-UCU)
Annual Average Daily Traffic (AADT)	35,000	8,000	8,000
Posted Speed Limit (km/h)	60	50	60
% Medium Trucks	7%	7%	7%
% Heavy Trucks	5%	5%	5%
% Daytime Traffic	92%	92%	92%

It should be noted that Mer Bleue Road, which is identified in the Official Plan as a collector road within closest proximity to the site, is separated from the subject lands by a significant distance of at least 105 metres. As such, the transportation-related noise impacts from this road were not considered in the analysis for this study.

Jerome Jodoin Drive presently exists as a two-lane urban collector road (2-UCU) which will be extended south of Street 1 through the subject site as a local road. Given its proposed 18-metre right-of-way and local road classification within the subject lands, the transportation-related noise impacts associated with this facility have not been considered in this study.

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

Noise contours for source-receiver distances were evaluated for both the indoor and outdoor sounds level criteria thresholds under daytime and nighttime conditions, as outlined previously in Section 2.2.

The distances in **Table 3.2** below are measured from the right-of-way centreline for each collector roadway identified previously in **Table 3.1**.

For Tenth Line Road, separate source-receiver distances were determined at the centre of the northbound and southbound through lanes, assuming a typical four-lane, divided cross-section, for key noise limit thresholds described in Section 2.2.

TABLE 3.2: NOISE CONTOUR OFFSETS

NOISE CRITERIA		SB/NB LANES OR ROAD CENTRELINE DISTANCE (M)		
		TENTH LINE ROAD (4-UAD – 60 KM/H)	STREET 1 (2-UCU – 50KM/H)	WALL ROAD (2-UCU – 60KM/H)
Indoor Daytime	65 dBA	35.8/48.3	12.7	16.8
	55 dBA	157.5/170.0	54.4	67.2
Indoor Nighttime	60 dBA	25.5/38.0	7.3	10.3
	50 dBA	125.1/137.6	41.0	51.2
Outdoor Living Area (Daytime Only)	60 dBA	76.1/88.6	27.2	33.6
	55 dBA	157.5/170.0	54.4	67.2

Based on **Table 3.2** above for the indoor noise evaluation, the daytime contours for the collector and arterial roads are further from centreline than the nighttime levels for each criterion. As such, only the daytime conditions will be considered in the noise analysis for this study. Noise contours for both indoor (daytime only) and outdoor noise evaluation are shown in **Figure 2**. These contours have not been adjusted to reflect screening from proposed buildings. For clarity purposes, the noise contours have not been extended where they intersect with the noise contours from the higher-order roads.

For the 65dBA contour line associated with Street 1, the road centreline offset was determined to be less than 15 metres and thus the calculation could not be performed using the STAMSON noise software. Instead, a divergence calculation was completed; the results of which are attached in **Appendix B**. Given Street 1 has a 24m right-of-way and that the limit of the 65dBA noise level would occur approximately 12.7m from the road centreline, it can be concluded that no dwelling units along this collector road would experience these noise levels.

4 Results

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour shown in **Figure 2** represent the limit in which a Type 'C' Warning Clause and forced air heating with provision for central air conditioning are required for the residential units.

The daytime indoor 65 dBA contour is the limit in which a Type 'D' warning clause, central air conditioning and an acoustical review/ design of the building components are required. As noted in Section 3.2, the noise contours have not been adjusted to account for screening by the proposed buildings.

A summary of the results for each road is provided below:

Tenth Line Road (4-UAD) – Any dwelling units which directly front or flank Tenth Line Road are located within the 65 dBA noise contour and therefore will require a Type 'D' warning clause, central air conditioning and an acoustical review/design of the building components. The 55 dBA noise contour impacts a larger number of units, however the noise impacts will be reduced due to screening from the buildings closer to the road which were not considered in the analysis conducted for this study.

Street 1 (2-UCU) – As shown on **Figure 2**, the 65 dBA contour falls approximately 0.7 metres outside of the road ROW and therefore would not impact any dwelling units adjacent to the road. All units directly fronting or flanking Street 1 will experience noise levels above 55 dBA, requiring alternative means of ventilation and a Type 'C' warning clause. The exact number of units that exceed 55 dBA will be determined during the detailed design stage.

Wall Road (2-UCU) – As shown on **Figure 2**, the 65 dBA contour falls approximately 4.8 metres beyond the road ROW and therefore may potentially impact a select number of dwelling units fronting or flanking Wall Road and its realignment within the subject property. Any units which cross the 65 dBA contour would require a Type 'D' warning clause, central air conditioning and an acoustical review/design of the building components. All units which experience noise levels below 65 dBA but above 55 dBA require an alternative means of ventilation and a Type 'C' warning clause. The exact number of units that exceed 55 dBA will be determined during detailed design stage.

Warning clauses for indoor noise are indicated below:

Type 'C'

"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

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 City's and the Ministry of the Environment's noise criteria."

4.2 Outdoor Sound Levels

The outdoor 60 dBA contour indicated on **Figure 2** represents the limit in which physical attenuation is required in the outdoor living areas of residential units. For units between the 60 dBA and 55 dBA contours, physical attenuation may not be required but should be considered as stated in Part 4, Section 3.4 of the ENC Guidelines.

A summary of the results for each roadway is provided below:

Tenth Line Road (4-UAD) – As the 60 dBA outdoor contour is located a significant distance of approximately 44.9 metres beyond the ROW protection for Tenth Line, all outdoor living areas (OLA) in this range are expected to require physical attenuation. Some noise attenuation will be achieved through screening from adjacent buildings which has not been considered in this preliminary analysis. Potential noise barrier locations in the northeast corner of the development and at the southwest corner of Tenth Line & wall are identified in **Figure 2**. These noise barriers should be 2.5 metres in height, the maximum permitted in the ENC Guidelines, which is considered appropriate for screening noise from arterial roads. At locations where the unattenuated noise levels are below 60 dBA but above 55 dBA Type 'A' warning clause could be considered in lieu of a barrier.

Street 1 (2-UCU) – As the 60 dBA outdoor contour is located approximately 27.2 m from the centreline of the road, all dwelling units directly flanking this collector road will require physical attenuation. Potential noise barrier locations for dwelling units flanking Street 1 are indicated in **Figure 2**. These noise barriers should be 2.2 metres in height, consistent numerous other recent studies conducted by IBI involving collector roads. At locations where the noise level is below 60 dBA but above 55 dBA, warning clause Type 'A' could be considered in lieu of a barrier.

Wall Road (2-UCU) – As the 60 dBA outdoor contour is located approximately 33.6 metres from the centreline of the road, all outdoor living areas (OLAs) in this range will require physical attenuation. The majority of dwellings front directly onto Wall Road, thereby providing a nature sound barrier for the OLAs associated with these units. As such, potential noise barrier are limited to two locations within the proposed realignment of Wall Road for units directly flanking this facility, as shown in **Figure 2**. These noise barriers should be 2.2 metres high, similar to any noise barriers recommended for Wall Road. At locations where the noise level is below 60 dBA but above 55 dBA, warning clause Type 'A' could be considered in lieu of a barrier.

Warning clauses for outdoor noise are as follows:

Type 'A'

"Purchasers/tenants are advised that sound levels due to increasing Tenth Line Road, Street 1 and Wall Road traffic volumes may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

Type 'B'

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing Tenth Line Road, Street 1 and Wall Road traffic volumes may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

5 Conclusion

This report outlines the impact of roadway noise on the Mer Bleue Phase 1 development located at 2503 & 2559 Mer Bleue Road & 2666 Tenth Line Road in Ottawa. The exact location of residential units requiring noise warning clauses, ventilation, air conditioning requirements, acoustical review/design of building components, as well as the the location and size of any noise attenuation measures will be determined during the detailed design phase once the Draft Plan and detailed grading plan are finalized.

6 Professional Authorization

Prepared by:

Ben Pascolo-Neveu, P. Eng.

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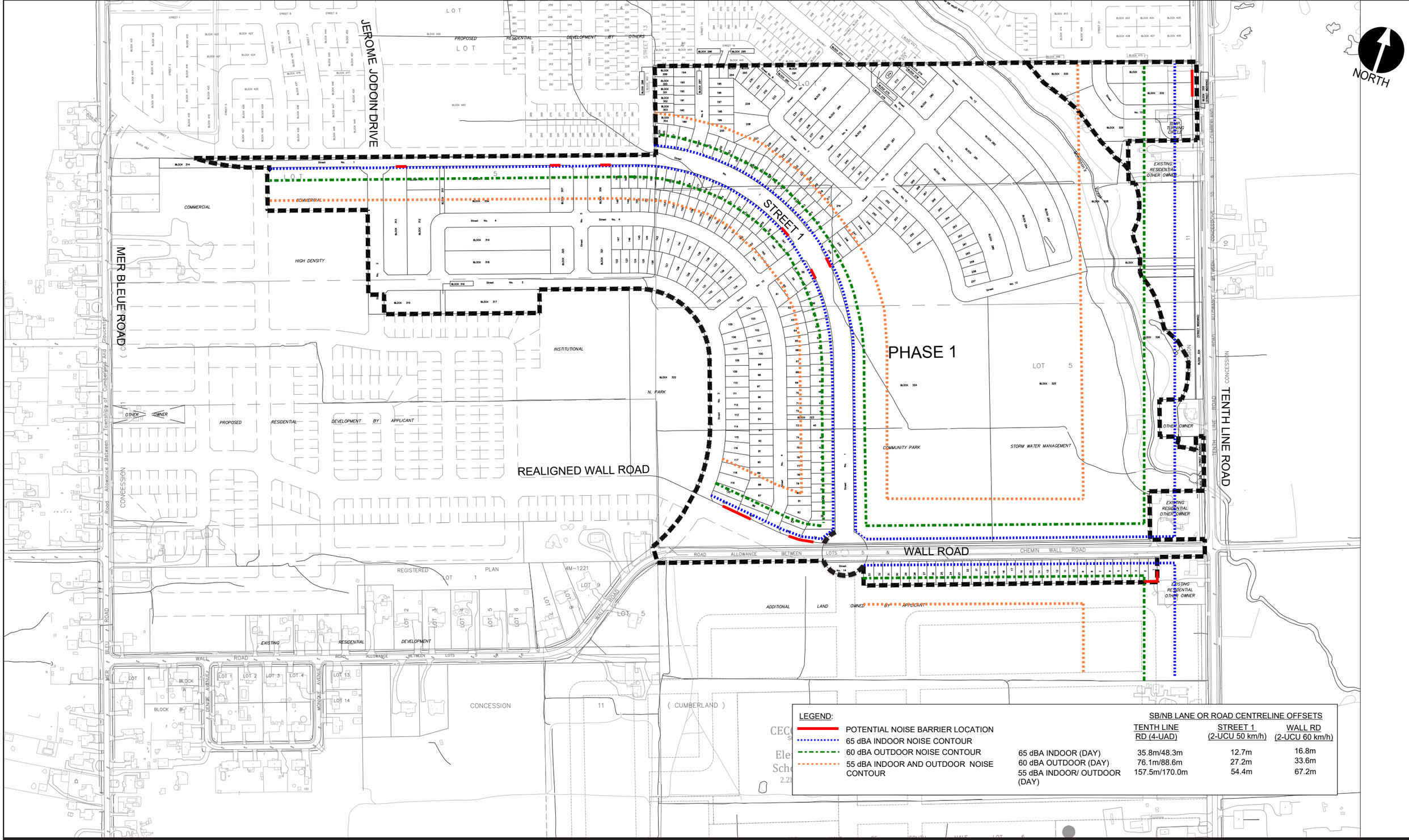

IBI

Mer Bleue Phase 1
Noise Control Feasibility Study

Figure 2 - Noise Plan

PROJECT No. 116761

SCALE: 0m 50m 100m

Appendix A –
STAMSON Noise Calculations

Tenth Line Road (4-UAD - 60km/h)

STAMSON 5.0 NORMAL REPORT Date: 24-11-2021 34:48:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tl6560.te Time Period: Day/Night 16/8 hours
Description: Tenth Line - 65 dBA Daytime/ 60 dBA nighttime

Road data, segment # 1: Tenth L NB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L NB (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 : 48.30 / 38.02 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Road data, segment # 2: Tenth L SB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L SB (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 : 35.80 / 25.53 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: Tenth L NB (day)

Source height = 1.50 m

ROAD (0.00 + 60.78 + 0.00) = 60.78 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-8.43	-1.46	0.00	0.00	0.00	60.78

Segment Leq : 60.78 dBA

FF
Results segment # 2: Tenth L SB (day)

Source height = 1.50 m

ROAD (0.00 + 62.94 + 0.00) = 62.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-6.27	-1.46	0.00	0.00	0.00	62.94

Segment Leq : 62.94 dBA

Total Leq All Segments: 65.00 dBA

FF
Results segment # 1: Tenth L NB (night)

Source height = 1.50 m

ROAD (0.00 + 55.42 + 0.00) = 55.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-6.34	-1.30	0.00	0.00	0.00	55.42

Segment Leq : 55.42 dBA

FF
Results segment # 2: Tenth L SB (night)

Source height = 1.50 m

ROAD (0.00 + 58.14 + 0.00) = 58.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-3.63	-1.30	0.00	0.00	0.00	58.14

Segment Leq : 58.14 dBA

Total Leq All Segments: 60.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:06:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tl6050.te Time Period: Day/Night 16/8 hours
Description: Tenth Line - 60 dBA daytime, 50 dBA nighttime

Road data, segment # 1: Tenth L NB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L NB (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 : 88.60 / 125.10 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Road data, segment # 2: Tenth L SB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L SB (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 : 76.10 / 137.60 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: Tenth L NB (day)

Source height = 1.50 m

ROAD (0.00 + 56.40 + 0.00) = 56.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-12.80	-1.46	0.00	0.00	0.00	56.40

Segment Leq : 56.40 dBA

FF
Results segment # 2: Tenth L SB (day)

Source height = 1.50 m

ROAD (0.00 + 57.50 + 0.00) = 57.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-11.71	-1.46	0.00	0.00	0.00	57.50

Segment Leq : 57.50 dBA

Total Leq All Segments: 60.00 dBA

FF
Results segment # 1: Tenth L NB (night)

Source height = 1.50 m

ROAD (0.00 + 47.30 + 0.00) = 47.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-14.46	-1.30	0.00	0.00	0.00	47.30

Segment Leq : 47.30 dBA

FF
Results segment # 2: Tenth L SB (night)

Source height = 1.50 m

ROAD (0.00 + 46.65 + 0.00) = 46.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-15.11	-1.30	0.00	0.00	0.00	46.65

Segment Leq : 46.65 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:09:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tl5550.te Time Period: Day/Night 16/8 hours
Description: Tenth Line - 55 dBA daytime, 50 dBA nighttime

Road data, segment # 1: Tenth L NB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L NB (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 : 170.00 / 125.10 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Road data, segment # 2: Tenth L SB (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Tenth L SB (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 : 157.50 / 137.60 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: Tenth L NB (day)

Source height = 1.50 m

ROAD (0.00 + 51.71 + 0.00) = 51.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-17.50	-1.46	0.00	0.00	0.00	51.71

Segment Leq : 51.71 dBA

FF
Results segment # 2: Tenth L SB (day)

Source height = 1.50 m

ROAD (0.00 + 52.26 + 0.00) = 52.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.67	0.00	-16.95	-1.46	0.00	0.00	0.00	52.26

Segment Leq : 52.26 dBA

Total Leq All Segments: 55.00 dBA

FF
Results segment # 1: Tenth L NB (night)

Source height = 1.50 m

ROAD (0.00 + 47.30 + 0.00) = 47.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-14.46	-1.30	0.00	0.00	0.00	47.30

Segment Leq : 47.30 dBA

FF
Results segment # 2: Tenth L SB (night)

Source height = 1.50 m

ROAD (0.00 + 46.65 + 0.00) = 46.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	63.07	0.00	-15.11	-1.30	0.00	0.00	0.00	46.65

Segment Leq : 46.65 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

Collector (2-UCU – 50km/h) – Street 1

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:20:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ucu6560.te Time Period: Day/Night 16/8 hours
Description: Street 1 - 65 dBA day,60dBA night

Road data, segment # 1: UCU (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 : 1 %
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: UCU (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 64.29 + 0.00) = 64.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	0.00	-1.46	0.00	0.00	0.00	64.29

Segment Leq : 64.29 dBA

Total Leq All Segments: 64.29 dBA

FF
Results segment # 1: UCU (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	90	0.57	58.16	0.00	0.00	-1.30	0.00	0.00	0.00	56.85

Segment Leq : 56.85 dBA

Total Leq All Segments: 56.85 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 64.29
(NIGHT): 56.85

FF

FF

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:23:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ucu6050.te Time Period: Day/Night 16/8 hours
Description: Street 1 - 60 dBA day,50dBA night

Road data, segment # 1: UCU (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 : 1 %
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: UCU (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 : 27.20 / 40.99 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	-4.29	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

FF
Results segment # 1: UCU (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	-6.86	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 50.00

FF

FF

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:25:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ucu5550.te Time Period: Day/Night 16/8 hours
Description: Street 1 - 55 dBA day,50dBA night

Road data, segment # 1: UCU (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 : 1 %
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: UCU (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 : 54.43 / 40.99 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	-9.29	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

FF
Results segment # 1: UCU (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	-6.86	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

FF

FF

Collector (UCU – 60km/h) – Wall Road

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:26:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wa6560.te Time Period: Day/Night 16/8 hours
Description: Wall Road - 65 dBA daytime, 60 dBA nighttime

Road data, segment # 1: UCU (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 : 60 km/h
Road gradient : 1 %
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: UCU (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 : 16.78 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	67.27	0.00	-0.81	-1.46	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

FF
Results segment # 1: UCU (night)

Source height = 1.50 m

ROAD (0.00 + 58.37 + 0.00) = 58.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	59.67	0.00	0.00	-1.30	0.00	0.00	0.00	58.37

Segment Leq : 58.37 dBA

Total Leq All Segments: 58.37 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 58.37

FF

FF

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:33:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wa6050.te Time Period: Day/Night 16/8 hours
Description: Wall Road - 60 dBA daytime, 50 dBA nighttime

Road data, segment # 1: UCU (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 : 60 km/h
Road gradient : 1 %
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: UCU (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 : 33.59 / 51.17 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	67.27	0.00	-5.81	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

FF
Results segment # 1: UCU (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	59.67	0.00	-8.37	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 50.00

FF

FF

STAMSON 5.0 NORMAL REPORT Date: 25-11-2021 11:37:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wa5550.te Time Period: Day/Night 16/8 hours
Description: Wall Road - 55 dBA daytime, 50 dBA nighttime

Road data, segment # 1: UCU (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 : 60 km/h
Road gradient : 1 %
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: UCU (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 : 67.22 / 51.17 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: UCU (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	67.27	0.00	-10.81	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

FF
Results segment # 1: UCU (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	59.67	0.00	-8.37	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

FF

FF

Divergence Calculations - For Source-Receiver Distances < 15m Apart

Divergence - Line Source - 60 dBA (Nighttime) - 2-UCU 50km/h - Street 1

Origin	Distance	d1	15	m
	Noise	n1	56.85	dBA
Receiver	Noise	n2	60	dBA
Distance (est)		d2	7.2625855	

Note: Distance (est) = d1 / (10^((n2-n1)/10))
*When n2>n1

Divergence - Line Source - 65 dBA (Daytime) - 2-UCU 50km/h - Street 1

Origin	Distance	d1	15	m
	Noise	n1	64.29	dBA
Receiver	Noise	n2	65	dBA
Distance (est)		d2	12.737707	

Note: Distance (est) = d1 / (10^((n2-n1)/10))
*When n2>n1

Divergence - Line Source - 60 dBA (Nighttime) - 2-UCU 60km/h - Wall Road

Origin	Distance	d1	15	m
	Noise	n1	58.37	dBA
Receiver	Noise	n2	60	dBA
Distance (est)		d2	10.306027	

Note: Distance (est) = d1 / (10^((n2-n1)/10))
*When n2>n1