

AECOM

NOISE & VIBRATION IMPACT STUDY

SHELL CANADA

HAZELDEAN ROAD AND FRINGEWOOD AVENUE
OTTAWA, ONTARIO

APRIL 2020



wsp



NOISE & VIBRATION IMPACT STUDY

SHELL CANADA
HAZELDEAN ROAD AND
FRINGEWOOD AVENUE
OTTAWA, ONTARIO

AECOM

PROJECT NO. 19M-00672-01
DATE: APRIL 2020

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April 20, 2020

Brent Payne
Vice President
AECOM
3292 Production Way, 4th Floor
Burnaby, BC V5A 4R4

Mr. Payne:

Subject: Noise & Vibration Impact Study – Shell Canada Hazeldean Road and Fringewood Avenue

We are pleased to submit the following Noise & Vibration Impact Study for the proposed gas station development composed of a gas bar, convenience store, and car wash which will be located on the southwest quadrant of Hazeldean Road and Fringewood Avenue, in the City of Ottawa.

Based on the assessment of the stationary sound sources of the proposed car washes, it is concluded that the stationary noise does not pose any constraint to this development proposal, given that appropriate mitigation is incorporated into the design.

We thank you for the opportunity of undertaking this study. Should you have any questions or comments, please feel free to contact the undersigned at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read 'Bill Hoogeveen'.

Bill Hoogeveen, P.Eng.
Senior Project Manager – Noise and Vibration
+ 1 289-982-4730

SIGNATURES



Bill Hoogeveen, P.Eng.
Senior Project Manager

April 20, 2020

Date

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TABLE OF CONTENTS

1	INTRODUCTION	1
2	NOISE EVALUATION	2
2.1	SOUND SOURCES	2
2.2	SOURCE SOUND LEVEL MEASUREMENTS.....	2
2.3	ESTIMATION PROCEDURES	3
2.4	RECEPTOR LOCATIONS	3
2.5	NOISE ASSESSMENT CRITERIA FOR STATIONARY SOURCE	4
2.6	SOUND LEVELS AT RECEPTOR LOCATIONS.....	4
3	CONCLUSIONS AND RECOMMENDATIONS	8
3.1	CONCLUSIONS.....	8
3.2	RECOMMENDATIONS	8

TABLES

TABLE 2-1: MECP SOUND LEVEL LIMITS - BACKGROUND SOUND LEVELS.....	4
TABLE 2-2: UNATTENUATED STATIONARY SOUND LEVELS	5
TABLE 2-3 ATTENUATED STATIONARY SOUND LEVELS.....	7

APPENDICES

A	PLANS
B	REFERENCE SOUND DATA
C	WEATHER DATA
D	SOUND LEVEL ANALYSIS

1 INTRODUCTION

WSP Canada Group Limited was retained by AECOM to undertake a Noise & Vibration Impact Study (the “Report”) for a proposed gas station development (the Site) which will be located on the southwest quadrant of Hazeldean Road and Fringewood Avenue, in the City of Ottawa. The Site is currently vacant. The development will consist of a gas bar, convenience store, and a car wash. The location of the proposed development and the study area are illustrated in the plans attached in **Appendix A**.

The objectives of this study are to:

- Estimate the overall stationary sound levels produced by the uses on the Site;
- Determine if the predicted stationary sound levels exceed the Ministry of the Environment, Conservation and Parks (MECP) sound level criteria at the critical receptor locations; and
- Determine appropriate noise mitigation measures to ensure the noise sensitive land uses in the vicinity of the Site will not be impacted by stationary noise if the sound level limits are exceeded.

This Report outlines the nature of the sound sources, predicted sound levels from the sources and noise mitigation measures required to mitigate any excess noise.

As well, following a review of the Site, no significant sources of vibration were identified. Furthermore, the proposed development does not include any uses that are sensitive to vibration. Accordingly, the proposed residential development and existing surrounding residential buildings will not be impacted by vibration from the proposed gas station and car wash, nor will these commercial uses be impacted by vibration. As a result, a vibration impact analysis was not completed.

2 NOISE EVALUATION

2.1 SOUND SOURCES

Stationary sources of sound identified in this study were determined based on the definitions provided in the MECP publication, *NPC-300 Environmental Noise Guideline (2013)*. The stationary sources of sound at the proposed development includes car wash operations, idling car in the car wash queue, a car vacuum, and air pump.

A description for each of the stationary sound sources are described below.

Car Wash Operations

The gas station development is proposed to include a car wash facility on the south side of the Site. The car wash will be equipped with doors at the entrance and exit. When the doors are closed, little noise is emitted from the car wash and the sound levels at nearby noise sensitive areas will be negligible. However, when cars enter and exit the opened doors, noise emitted from the car wash can be significant.

Car Idling

The car wash includes a drive-through stacking lane. While the car wash operations are expected to have a more significant impact than idling cars, there is not sufficient information to qualitatively omit this source of noise. Hence, noise from the idling of cars in the stacking lane was included in the noise assessment to determine if nearby noise sensitive areas will be impacted by the noise of idling cars.

Car Vacuum & Air Pump

A car vacuum and air pump are located north of the car wash. Both will only operate in short durations. Furthermore, based on layout of the Site, both will be well-shielded by the car wash building. As a result, sound from the car vacuum and air pump will be negligible in comparison to the car wash noise at the nearest receptors and has been neglected from the assessment.

2.2 SOURCE SOUND LEVEL MEASUREMENTS

WSP staff undertook octave band sound level measurements of the car wash and car idling identified in **Section 2.1** of this Report. Sound level measurements of a car wash operation were taken at another existing Shell gas station that uses the same equipment as the proposed car wash facility in Ottawa. This surrogate site is located at 10700 Bathurst Street in the City of Vaughan. The equipment at the surrogate site was confirmed by the Client.

Based on the observation of the operation of the existing facility, the main sources of sound were identified to be during the prewash cycle at the entrance and the dry cycle at the exit when doors are open. Sound levels during other cycles of the car wash operation in-between were determined to be negligible as doors at the entrance and exit were closed. Each car wash cycle was observed to be approximately 6 minutes long, of which prewash and dry cycles took approximately 36 and 73 seconds, respectively.

Reference sound levels for car idling were taken from WSP's reference sound level library. These reference sound levels were attained through measurements.

The octave band frequency sound data for the prewash and dry cycles, and car idling, are attached in **Appendix B**.

Equipment used for the sound level measurements included the following:

- Larson Davis LDL Model 831 (Type 1) sound level meter; and
- Larson Davis Precision Acoustic Calibrator Model CA 200.

The use of sound level meter, battery checks, calibration, microphone orientation and timing all conformed to the MECP noise measurement procedures contained in the MECP Publications NPC-102, NPC-103 and NPC-104, and the procedures provided by the acoustical equipment manufacturer. **Appendix C** contains hourly weather data from the nearest weather station (Buttonville Airport) to the surrogate site for the date of measurements. This data was available from the Government of Canada website.

2.3 ESTIMATION PROCEDURES

Sound levels due to sources of stationary sound were estimated by prediction using CadnaA computer software. CadnaA is based on the ISO 9613-2 (Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation, 1996) standard.

Based on the observations, it was estimated that up to 10 vehicles could be washed per hour. Accordingly, the prewash and dry cycles were assumed to operate for a total duration of 6 and 12.2 minutes in each hour, respectively, in the noise assessment. The demand for car washes is expected to be significantly less during the nighttime hours. However, the car wash was assumed to operate continuously throughout each hour of the day, evening and night.

The noise assessment has been modelled to include 10 cars in the car wash stacking lane as per the Site Plan attached in **Appendix A**. The length of car idling has been set to 60 minutes for each car, which assumes that the queue is at its maximum length for the entire hour. Considering that the number of cars in the car wash stacking lanes during the nighttime would be considerably lower than during the daytime and eveningtime, the number of idling cars in the nighttime assessment was assumed to be half of the daytime.

2.4 RECEPTOR LOCATIONS

According to MECP Publication NPC-300, stationary noise receptor (i.e. “point of reception”) is a point on a noise sensitive land use where stationary sound from an adjacent land use is received. Outdoor receptors are located within 30 metres of a façade of a dwelling/building, typically in backyards/frontyards. Indoor living area receptors are assumed to be located on the exterior dwelling façades, representing window locations, nearest to the sound source(s). The point of reception for an indoor living area receptor is called the Plane of Window (POW) location.

The future residential development by Campanale Homes situated to the south of the Site, the existing residential buildings south of the Site, and the future retirement community (Wellings of Stittsville) to the north of the Site have been identified as noise sensitive land uses in the vicinity of the proposed development, due to their proximity to the noise sources. The future residential development includes 65 townhouse units, two semi-detached units, and seven single-detached dwellings. It has been confirmed that all units in this development are two storeys. The existing residential community on Cloverloft Court consists of one-storey units. Current renderings show the retirement home to be five storeys.

Daytime, eveningtime and nighttime façade receptors were assessed at heights of 1.5, 4.5, and/or 13.5 metres above grade depending on the number of storeys of the dwelling/building, which represent the typical height of

first, or second floor windows of single units and fifth floor windows of the retirement home, respectively. The daytime and eveningtime outdoor receptors were taken at heights of 1.5 metres.

The locations of the critical receptors are illustrated in the Noise Receptor Locations (**Figure A.1**) attached in **Appendix A**. The locations of sources of noise are illustrated in the Summary of Noise Sources (**Figure A.2**) also attached in **Appendix A**.

2.5 NOISE ASSESSMENT CRITERIA FOR STATIONARY SOURCE

The noise assessment criteria are based on Section B – Stationary Sources of the MECP publication, NPC-300. This section provides sound level limits for stationary sources affecting points of reception in noise sensitive land uses. NPC-300 stipulates that the sound level limits for stationary sound sources at receptor locations are set as the higher of either the applicable exclusion limits or the minimum background sound levels typically caused by road traffic. The background sound levels were not monitored, and hence, exclusion limits were used throughout the study.

The sound level limits for stationary sources based on the exclusion limits are summarized in **Table 2-1**.

Table 2-1: MECP Sound Level Limits – Background Sound Levels

POINT OF RECEPTION	TIME OF DAY (PERIOD)	L _{eq} 1-hr (dBA)
Outdoor	07:00 – 19:00 (Day)	50
	19:00 – 23:00 (Evening)	50
Plane of Window	07:00 – 19:00 (Day)	50
	19:00 – 23:00 (Evening)	50
	23:00 – 07:00 (Night)	45

2.6 SOUND LEVELS AT RECEPTOR LOCATIONS

Predicted sound levels at the critical receptor locations were determined using CadnaA software. It should be noted that the screening and/or reflection provided by any existing and future structures/terrain features were included in the noise assessment. Since, it is possible that the gas station will be constructed before the proposed Campanale residential development, two assessments were completed; with and without the proposed residential community. The proposed residential development will provide shielding for the existing residential community. As a result, one assessment was completed with receptors located on existing residential land uses and neglecting the shielding provided by the proposed residential community to assess the scenario until the Campanale development is complete, and another assessment was completed with receptors located on the proposed residential community to assess the future scenario after the Campanale development is complete.

Table 2-2 summarizes the predicted unattenuated sound levels emitted by the on-site stationary noise sources at the critical receptor locations. Receptors POW1 through POW5 and OLA1 through OLA5 represent the scenario before the Campanale development is completed. The stationary sound level results from CadnaA are attached in **Appendix D**.

Table 2-2: Unattenuated Stationary Sound Levels

RECEPTOR	RECEPTOR HEIGHT (m)	UNATTENUATED SOUND LEVEL AT RECEPTOR Leq 1-hr (dBA)		
		Day	Evening	Night
POW1	1.5	32	32	32
POW2	1.5	42	42	42
POW3	1.5	41	41	41
POW4	1.5	40	40	40
POW5	1.5	38	38	38
POW6	4.5	48	48	48
POW7	4.5	55	55	55
POW8	4.5	54	54	54
POW9	4.5	50	50	50
POW10	4.5	48	48	48
POW11	4.5	44	44	44
POW12	4.5	41	41	41
POW13	13.5	36	36	36
OLA1	1.5	32	32	-
OLA2	1.5	44	44	-
OLA3	1.5	43	43	-
OLA4	1.5	42	42	-
OLA5	1.5	40	40	-
OLA6	1.5	51	51	-
OLA7	1.5	58	58	-
OLA8	1.5	56	56	-
OLA9	1.5	51	51	-
OLA10	1.5	49	49	-
OLA11	1.5	45	45	-
OLA12	1.5	41	41	-

1) Bold values signify exceedances of MECP sound levels limits

It is expected that unattenuated noise levels will exceed MECP sound level limits at receptors POW7 to POW9, OLA6 to OLA9 during all periods, and POW6 and POW10 during nighttime only. Therefore, noise control measures to reduce sound levels at these receptor locations for the proposed development will be required.

Attenuation of sound levels from the stationary sources of noise will be possible by implementing the following measures:

- **Silencers installed as part of the car wash dryer.** The noise level data of dryer with and without silencers was provided by the car wash equipment manufacturer for a previous Shell car wash project. Based on this, it was determined that implementation of silencers reduces overall sound levels emitted by dryer by 3 dBA at the exit and by between 1 and 2 dBA at the entrance.
- **A 2.3 metre long sound barrier at the car wash exit along the south side** extending from the edge of the building westwards (along the curb). The height of the sound barrier should be 3.0 metres. The sound barrier must be constructed of a durable material with a surface density of not less than 20 kg/m² and in a continuous line without gaps or openings.
- **A 1.0 metre long sound barrier at the car wash entrance along the south side** extending from the edge of the building eastwards (along the curb). The height of the sound barrier should be 3.0 metres. The sound barrier must be constructed of a durable material with a surface density of not less than 20 kg/m² and in a continuous line without gaps or openings.

A summary of the attenuated sound levels achieved with the implementation of noise control measures is shown in **Table 2-3**. The locations and details of these sound barriers can be found in Proposed Sound Barrier Locations (**Figure A.3**) attached in **Appendix A**.

Table 2-3 Attenuated Stationary Sound Levels

RECEPTOR	RECEPTOR HEIGHT (m)	ATTENUATED SOUND LEVEL AT RECEPTOR L _{eq} 1-hr (dBA)		
		Day	Evening	Night
POW1	1.5	27	27	25
POW2	1.5	30	30	30
POW3	1.5	30	30	30
POW4	1.5	30	30	30
POW5	1.5	30	30	30
POW6	4.5	43	43	43
POW7	4.5	43	43	43
POW8	4.5	43	43	43
POW9	4.5	45	45	45
POW10	4.5	44	44	44
POW11	4.5	40	40	40
POW12	4.5	37	37	37
POW13	13.5	33	33	33
OLA1	1.5	29	29	-
OLA2	1.5	32	32	-
OLA3	1.5	32	32	-
OLA4	1.5	31	31	-
OLA5	1.5	32	32	-
OLA6	1.5	46	46	-
OLA7	1.5	44	44	-
OLA8	1.5	46	46	-
OLA9	1.5	47	47	-
OLA10	1.5	45	45	-
OLA11	1.5	42	42	-
OLA12	1.5	38	38	-

Based on prediction, with the recommended noise control measures in place, the sound levels from the stationary sources at all receptor locations are expected to be within MECP acceptable limits. The attenuated stationary noise prediction results can be found in **Appendix D**. Details and locations of the recommended car wash building and sound barrier for controlling the sound levels are illustrated in **Figure A.1** attached in **Appendix A**.

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 CONCLUSIONS

The issue of excess stationary noise produced from the proposed car wash operation does not pose any constraint to this development proposal provided that the noise control measures recommended in this Report are implemented.

Outdoor and Plane of Window sound levels at some of the critical receptor locations in the vicinity of the subject Site will exceed the MECP criteria due to the on-site stationary noise sources. Accordingly, the implementation of noise control measures for the stationary sound is required.

Following a review of the site, no significant sources of vibration were identified. As a result there was no need to complete an analysis of vibration impact.

3.2 RECOMMENDATIONS

Installation of silencers as part of the car wash dryer is required in order to reduce overall sound levels emitted by the dryer.

It is recommended that sound barriers be installed along the south side of the car wash building at the exit and entrance extending from the edge of the building westwards and eastwards, respectively.

The barrier at the car wash exit should be built with the subsequent constraints:

- Minimum length of 2.3 metres,
- Minimum height of 3.0 metres,
- Constructed of a durable material with a surface density of not less than 20 kg/m² and in a continuous line without gaps or openings.

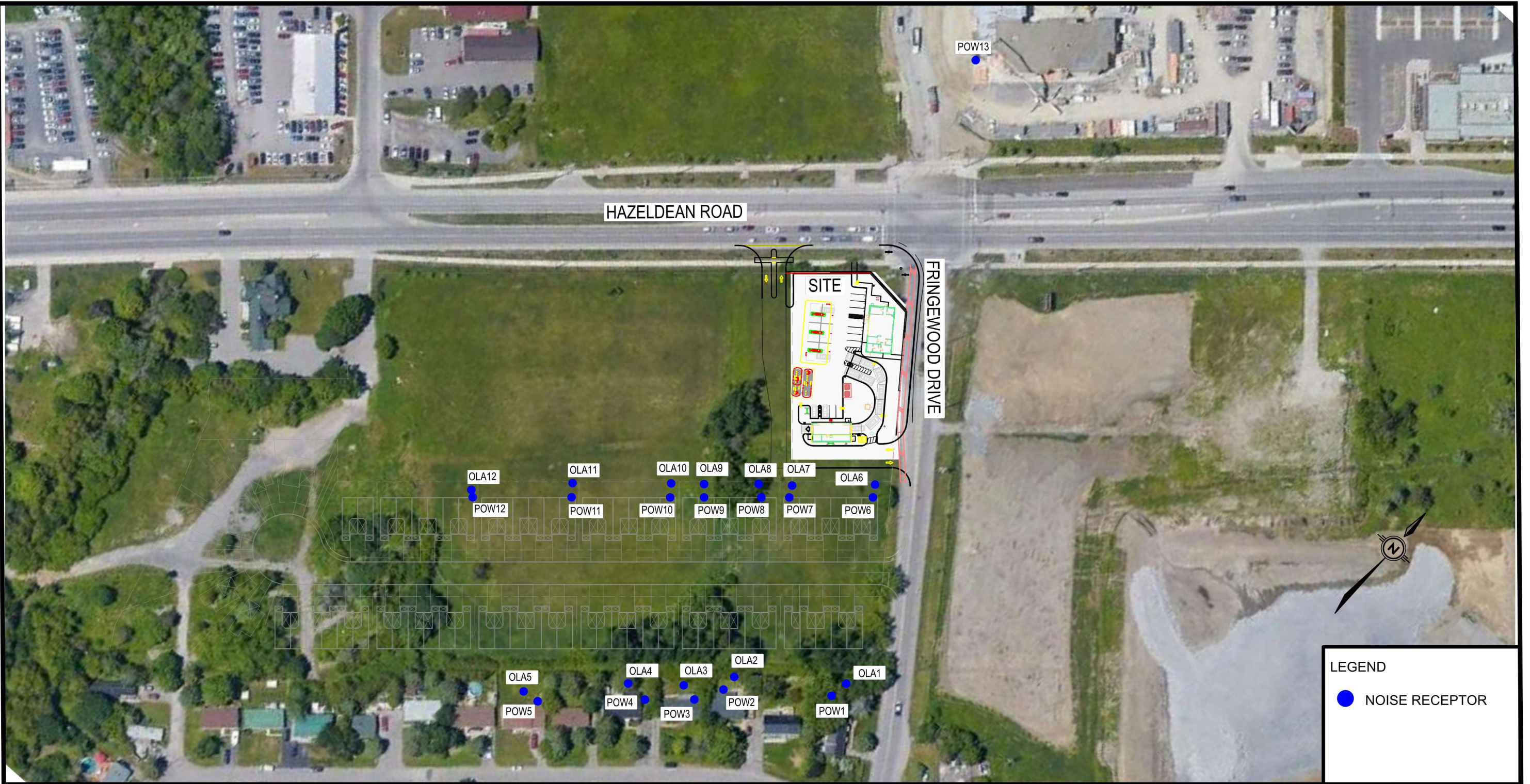
The barrier at the car wash entrance should be built with the subsequent constraints:

- Minimum length of 1.0 metre,
- Minimum height of 3.0 metres,
- Constructed of a durable material with a surface density of not less than 20 kg/m² and in a continuous line without gaps or openings.

APPENDIX

A PLANS







100 COMMERCE VALLEY DRIVE WEST
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PROJECT: NOISE IMPACT STUDY
SHELL CANADA; HAZELDEAN ROAD AND FRINGEWOOD AVENUE, OTTAWA, ONTARIO

CLIENT: AECOM


TITLE: NOISE RECEPTOR LOCATIONS

LEGEND	
	NOISE RECEPTOR

SCALE: 1:1500	
DATE: APRIL 2020	
PROJECT NO: 19M-00672-01	
FIGURE NO: A.1	REV. #



LEGEND

-  CAR WASH
ENTRANCE/EXIT
SOURCES
-  CAR IDLING
SOURCES

SCALE: 1:250 0 2m

DATE: APRIL 2020

PROJECT NO: 19M-00672-01

FIGURE NO: **A.2** REV. #

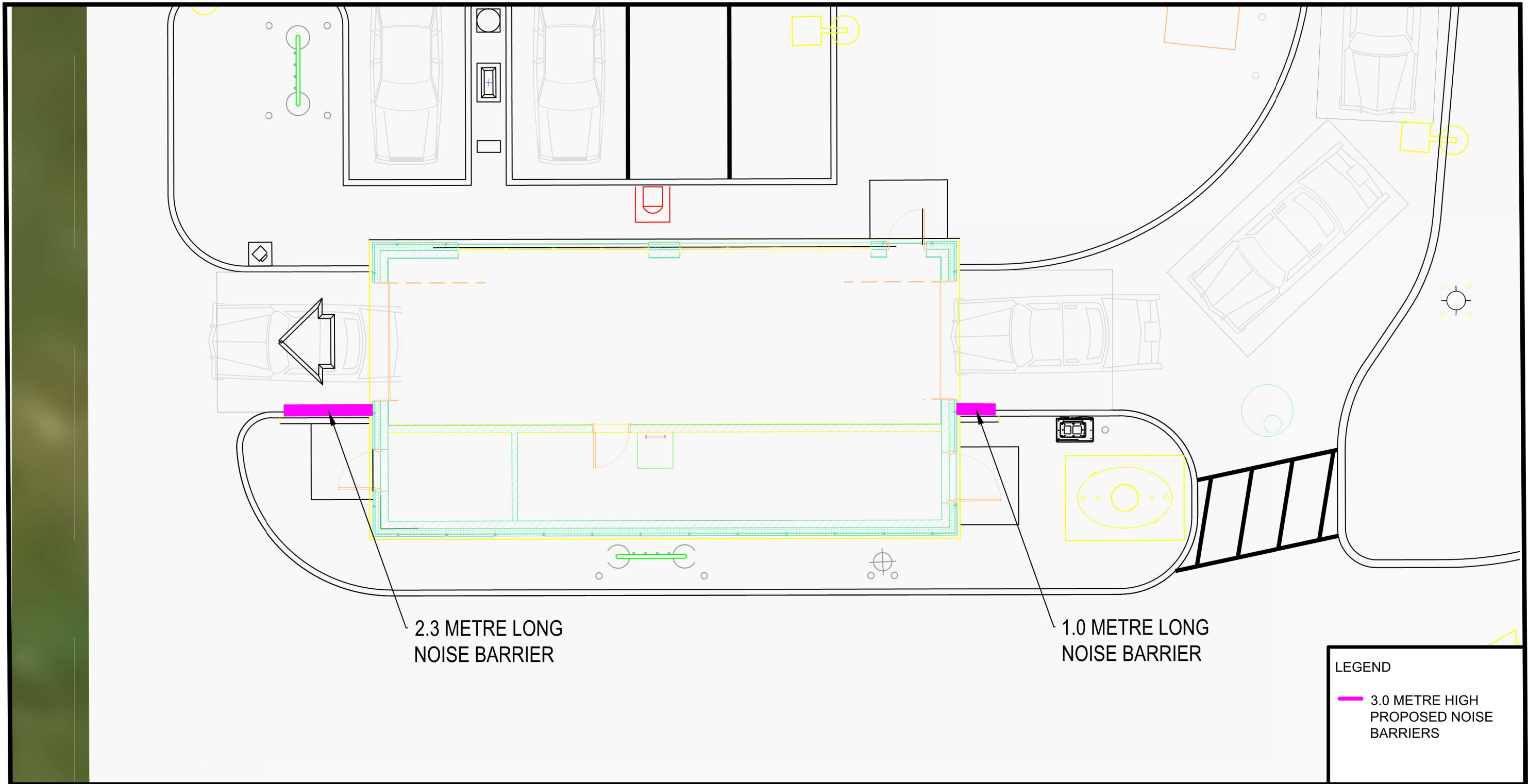


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PROJECT: NOISE IMPACT STUDY
SHELL CANADA; HAZELDEAN ROAD AND FRINGEWOOD AVENUE, OTTAWA, ONTARIO

CLIENT: AECOM

TITLE: SUMMARY OF NOISE SOURCES



LEGEND	
<div></div>	3.0 METRE HIGH PROPOSED NOISE BARRIERS
SCALE: 1:100 <div>0 1 m</div>	
DATE: APRIL 2020	
PROJECT NO: 19M-00672-01	
FIGURE NO: A.3	REV. #

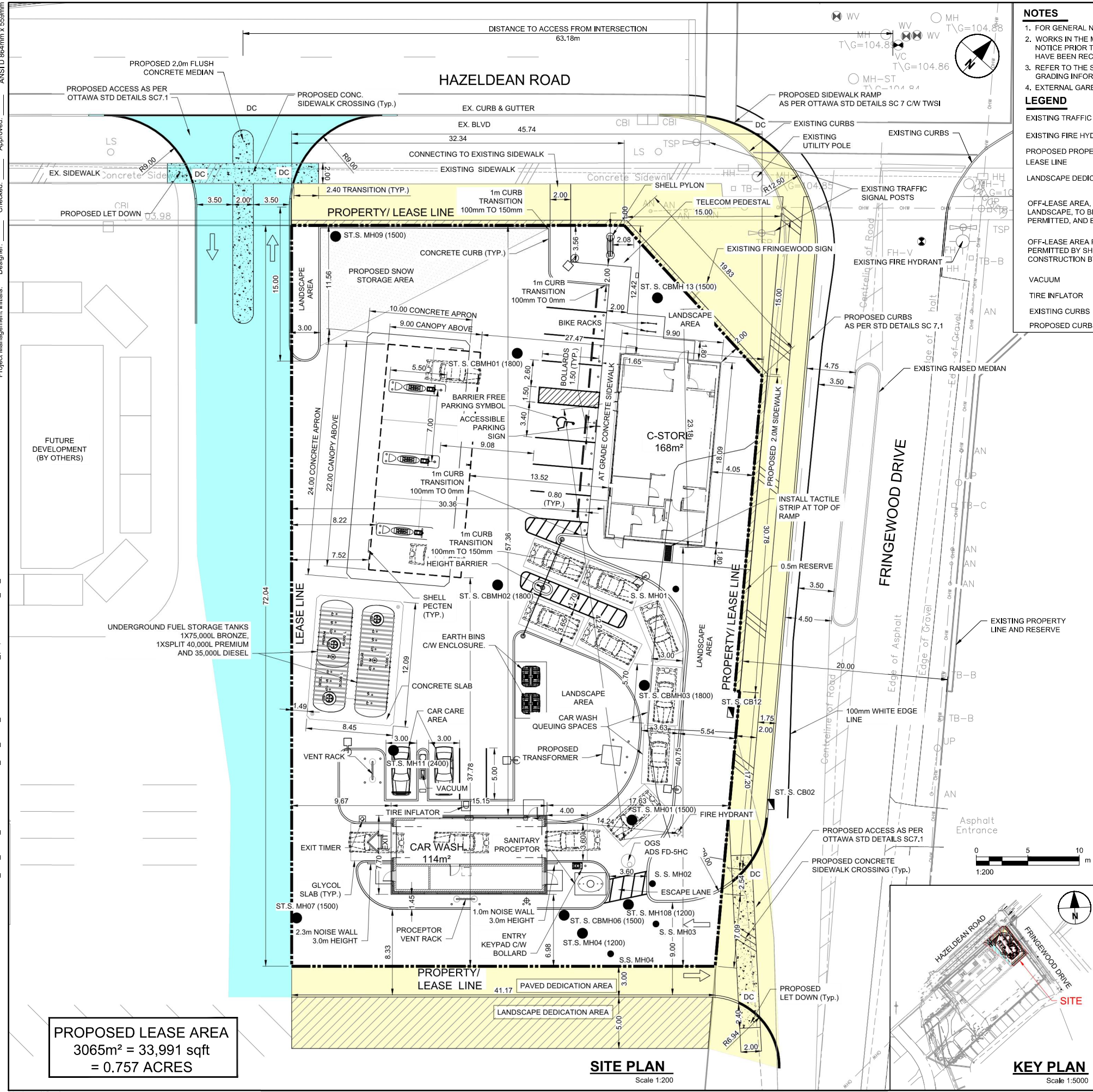


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PROJECT:	NOISE IMPACT STUDY SHELL CANADA; HAZELDEAN ROAD AND FRINGEWOOD AVENUE, OTTAWA, ONTARIO
CLIENT:	AECOM
TITLE:	PROPOSED NOISE BARRIER LOCATIONS

Last saved by: REIDJ2(2020-04-15) Last Plotted: 2020-04-16
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Printed on: 3% Post-Consumer Recycled Content Paper

Project Management Initials: Designer: Checked: Approved: ANS/D 864mm x 559mm



PROPOSED LEASE AREA
3065m² = 33,991 sqft
= 0.757 ACRES

SITE PLAN
Scale 1:200

KEY PLAN
Scale 1:5000

NOTES

- FOR GENERAL NOTES SEE DRAWING C001.0
- WORKS IN THE MUNICIPAL RIGHT-OF-WAY BEING PERFORMED BY THE CITY'S CONTRACTOR WILL REQUIRE 4 TO 6 WEEK NOTICE PRIOR TO COMMENCEMENT OF CONSTRUCTION AFTER ALL DRAWINGS HAVE BEEN APPROVED AND SECURITIES HAVE BEEN RECEIVED.
- REFER TO THE SITE GRADING PLAN PREPARED BY AECOM, DRAWING C104.0 FOR THE PURPOSES OF OBTAINING SITE GRADING INFORMATION.
- EXTERNAL GARBAGE ENCLOSURE TO BE COMPLIANT WITH THE URBAN DESIGN GUIDELINE #39

LEGEND

EXISTING TRAFFIC SIGNAL	PROPOSED STORMWATER / CATCH BASIN MANHOLE / MANHOLE	ST.S. CBMH / ST.S. MH
EXISTING FIRE HYDRANT	PROPOSED SANITARY MANHOLE	S.S. MH
PROPOSED PROPERTY AND LEASE LINE	PROPOSED STORMWATER CATCH BASIN	ST.S. CB
LANDSCAPE DEDICATION AREA	PROPOSED OGS ADS FD-5HC	HYD
OFF-LEASE AREA, INCLUDING LANDSCAPE, TO BE DESIGNED, PERMITTED, AND BUILT BY SHELL	PROPOSED FIRE HYDRANT	GAS METER
OFF-LEASE AREA PAVING TO BE PERMITTED BY SHELL. DESIGN AND CONSTRUCTION BY CAMPANALE	PROPOSED LIGHT STANDARD	PROPOSED LIGHT STANDARD
VACUUM	EARTH BIN	DC
TIRE INFLATOR	SANITARY PROCEPTOR	
EXISTING CURBS	DEPRESSED CURBS	
PROPOSED CURBS		

DETAILS OF DEVELOPMENT		
DATA	REQUIRED	PROPOSED
ZONING	ARTERIAL MAINSTREET SUBZONE 9 - AM9	
SETBACKS (C-STORE)	Front Yard (Hazeldean Road) - No Min. Corner Yard (Corner Property Line) - No Min. Exterior Side Yard (Fringewood Drive) - N/A Interior Side Yard (West Lease Line) - No Min. Rear Yard (South lease line) - Min. 10 m	12.42 m 2.00 m 4.05 m 30.36 m 40.75 m
SETBACKS (CARWASH)	Front Yard (Hazeldean Road) - No Min. Exterior Side Yard (Fringewood Drive) - N/A Interior Side Yard (West lease line) - No Min. Rear Yard (South lease line) - 10 m	57.36 m 17.63 m 9.67 m 6.98 m
SETBACKS (CANOPY)	Front Yard (Hazeldean Road) - No Min. Exterior Side Yard (Fringewood Drive) - N/A Interior Side Yard (West Lease line) - No Min. Rear Yard (South Lease Line) - Min. 10 m	11.56 m 27.47 m 7.52 m 37.78 m
LOT AREA (sq.m.)	NO MIN.	3065 sq.m.
BUILDING COVERAGE (%)	NO MIN.	9.70%
LOT FRONTAGE - MIN. (m)	N/A	45.74 m
LOT DEPTH (m)	N/A	72.04 m
FLOOR AREA RATIO	NOT SPECIFIED	0.054 (C-STORE) 0.037 (CARWASH)
LANDSCAPED AREA	NOT SPECIFIED	636 sq.m.
LANDSCAPE COVERAGE	MIN 15.00%	20.75%
BUILDING HEIGHT MAX.(m)	15m	5.14m (C-STORE) 6.00m (CAR WASH) 5.30m (CANOPY)
CANOPY	NOT SPECIFIED	198 sq.m.
C-STORE	NOT SPECIFIED	168 sq.m.
CARWASH	NOT SPECIFIED	114 sq.m.
CARWASH STACKING	10 SPACES	10 SPACES
PAVED AREA	NOT SPECIFIED	1613.50 sq.m.
LOADING SPACES (3.5m WIDE X 9m LONG X 4.2m. VERT CLEARANCE)	0	0
PARKING	REQUIRED	PROVIDED
Barrier-Free	Spaces Stall Length Stall Width	1 5.2 m (MIN) 3.4 m (MIN) 5.5 m 3.4 m
Standard Parking	Spaces Stall Length Stall Width	6 5.2 m (MIN) 6.7 m (MAX) 2.6 m (MIN) 3.1 m (MAX) 11 5.5 m 2.6 m
Overall Number of Spaces	7	12
Aisle Width	6.7 m (MIN)	9.0 m
Bicycle Parking	1	4
LAND USE: NORTH: AM9, AM9(474), AM7(1894) SOUTH: AM9 EAST: AM7 WEST: O1R		

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PROJECT

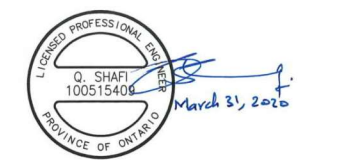
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Hazeldean Road and
Fringewood Drive NTI

5 Orchard Drive
Stittsville, Ontario
CLIENT

Shell Canada
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CONSULTANT

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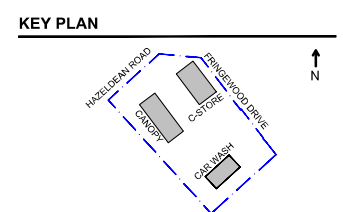
REGISTRATION

LEGAL DESCRIPTION
PART OF BLOCK 21 OF DRAFT PLAN OF SUBDIVISION OF PARTS OF LOTS 26 AND 27 CONCESSION 11 GEOGRAPHIC TOWNSHIP OF GOULBOURN (CITY OF OTTAWA)

ISSUE/REVISION

A	DATE	DESCRIPTION
1	2020-03-31	ISSUED FOR SPA

DRAWN BY
SG



GLOBAL PROJECT ID NUMBER
CAN01444

SHEET TITLE
SITE PLAN

AECOM FILE NAME
C102.0-SIP-HZLX

SHEET NUMBER
C102.0

APPENDIX

B REFERENCE SOUND DATA

Octave Band Frequency Data for Stationary Sound Sources

Name	ID	Type	Oktave Spectrum (dB)													Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin		
Car	Car	Lw		69.2	69.8	68.2	64.8	64.8	62.9	62.6	59.6	58.5	69.1	75.6	Car	
Entrance	Entrance	Lw		87.6	87.9	86.0	83.7	94.1	91.9	90.9	88.5	87.8	97.6	99.3	Entrance	
Exit	Exit	Lw		82.1	90.9	93.0	89.5	99.6	96.8	95.2	89.8	83.4	101.8	103.6	Exit	
Entrance Silencer	Entrance_Silencer	Lw		85.9	86.2	84.3	82.0	92.4	90.2	89.2	86.8	86.1	95.9	97.6	Entrance Silencer	
Exit Silencer	Exit_Silencer	Lw		79.1	87.9	90.0	86.5	96.6	93.8	92.2	86.8	80.4	98.8	100.6	Exit Silencer	

APPENDIX

C WEATHER DATA





Hourly Data Report for September 15, 2017

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

TORONTO BUTTENVILLE A ONTARIO										
Latitude:		43°51'39.000" N		Longitude:		79°22'07.000" W		Elevation:		198.10 m
Climate ID:		6158409		WMO ID:		TC ID:		YKZ		
TIME	Temp °C	Dew Point °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
00:00	17.6	15.1	85	4	3	M	99.17			NA
01:00	17.2	15.3	88	30	3	M	99.21			NA
02:00	16.8	15.2	90	4	2	M	99.22			NA
03:00	16.2	15.1	93	27	1	M	99.23			NA
04:00	15.9	14.5	92	33	8	M	99.28			NA
05:00	16.5	15.2	92	35	3	M	99.33			NA
06:00	16.7	15.3	92	32	7	M	99.42			NA
07:00	17.8	16.3	91	32	4	M	99.47			NA
08:00	19.6	16.6	83	33	5	M	99.53			NA
09:00	21.4	16.0	71	34	7	M	99.58	26		NA
10:00	22.9	16.0	65	34	3	M	99.58	28		NA
11:00	24.3	17.1	64		0	M	99.58	30		NA
12:00	24.7	15.9	58	33	7	M	99.55	29		NA
13:00	26.4	16.2	53	22	5	M	99.54	31		NA
14:00	25.4	15.7	55	31	5	M	99.53	30		NA
15:00	25.4	16.8	58	1	5	M	99.52	31		NA
16:00	25.6	16.9	58	20	3	M	99.51	31		NA
17:00	24.6	16.9	62	21	8	M	99.55	30		NA
18:00	23.2	16.4	65	20	10	M	99.58	28		NA
19:00	21.9	16.1	69	18	6	M	99.61	27		NA
20:00	21.1	16.2	73	21	4	M	99.65	26		NA
21:00	20.3	16.4	78	16	1	M	99.68	25		NA
22:00	18.8	15.9	83	32	2	M	99.72			NA
23:00	18.2	16.0	87	3	2	M	99.74			NA

Legend

E = Estimated

M = Missing

NA = Not Available*

[empty] = Indicates an unobserved value

Date modified:
2019-12-04

APPENDIX

D SOUND LEVEL ANALYSIS

Unattenuated Stationary Sound Levels at Receptor Locations

Existing Home on Cloverloft Court

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height	Coordinates		
			Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type		X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)	(m)	(m)	(m)
OLA1			32.2	32.2	31.6	50.0	50.0	0.0				1.50	r 350844.59	5015755.17	1.50
OLA2			44.1	44.1	44.1	50.0	50.0	0.0				1.50	r 350810.87	5015728.28	1.50
OLA3			43.1	43.1	43.1	50.0	50.0	0.0				1.50	r 350798.70	5015712.87	1.50
OLA4			42.0	42.0	42.0	50.0	50.0	0.0				1.50	r 350782.42	5015699.13	1.50
OLA5			40.3	40.3	40.3	50.0	50.0	0.0				1.50	r 350754.50	5015669.86	1.50
POW1			32.1	32.1	31.8	50.0	50.0	45.0				1.50	r 350843.57	5015747.89	1.50
POW2			41.7	41.7	41.7	50.0	50.0	45.0				1.50	r 350811.11	5015721.90	1.50
POW3			41.0	41.0	41.0	50.0	50.0	45.0				1.50	r 350805.41	5015711.57	1.50
POW4			40.3	40.3	40.3	50.0	50.0	45.0				1.50	r 350791.35	5015698.83	1.50
POW5			38.4	38.4	38.4	50.0	50.0	45.0				1.50	r 350761.09	5015670.64	1.50

Proposed Campanale Home & Wellings of Stittsville Developments

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height	Coordinates		
			Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type		X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)	(m)	(m)	(m)
OLA6			50.6	50.6	50.5	50.0	50.0	0.0				1.50	r 350801.52	5015819.46	1.50
OLA7			57.6	57.6	57.6	50.0	50.0	0.0				1.50	r 350778.09	5015797.81	1.50
OLA8			55.5	55.5	55.5	50.0	50.0	0.0				1.50	r 350768.13	5015789.68	1.50
OLA9			51.3	51.3	51.3	50.0	50.0	0.0				1.50	r 350752.67	5015775.59	1.50
OLA10			49.3	49.3	49.3	50.0	50.0	0.0				1.50	r 350743.11	5015767.33	1.50
OLA11			45.4	45.4	45.3	50.0	50.0	0.0				1.50	r 350714.79	5015741.92	1.50
OLA12			41.0	41.0	41.0	50.0	50.0	0.0				1.50	r 350687.69	5015713.96	1.50
POW6			48.2	48.2	48.2	50.0	50.0	45.0				4.50	r 350804.21	5015815.19	4.50
POW7			55.0	55.0	55.0	50.0	50.0	45.0				4.50	r 350780.35	5015793.68	4.50
POW8			53.5	53.5	53.5	50.0	50.0	45.0				4.50	r 350772.39	5015786.50	4.50
POW9			49.6	49.6	49.6	50.0	50.0	45.0				4.50	r 350756.09	5015771.81	4.50
POW10			47.6	47.6	47.6	50.0	50.0	45.0				4.50	r 350746.44	5015763.10	4.50
POW11			44.0	44.0	44.0	50.0	50.0	45.0				4.50	r 350718.17	5015737.61	4.50
POW12			40.6	40.6	40.6	50.0	50.0	45.0				4.50	r 350689.97	5015712.18	4.50
POW13			36.3	36.3	36.3	50.0	50.0	45.0				13.50	r 350721.01	5015966.65	13.50

Attenuated Stationary Sound Levels at Receptor Locations

Existing Home on Cloverloft Court

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
OLA1			28.6	28.6	27.0	50.0	50.0	0.0				1.50	r	350844.59	5015755.17	1.50
OLA2			32.0	32.0	31.9	50.0	50.0	0.0				1.50	r	350810.87	5015728.28	1.50
OLA3			31.8	31.8	31.7	50.0	50.0	0.0				1.50	r	350798.70	5015712.87	1.50
OLA4			31.2	31.2	31.2	50.0	50.0	0.0				1.50	r	350782.42	5015699.13	1.50
OLA5			31.6	31.6	31.5	50.0	50.0	0.0				1.50	r	350754.50	5015669.86	1.50
POW1			26.7	26.7	25.4	50.0	50.0	45.0				1.50	r	350843.57	5015747.89	1.50
POW2			30.1	30.1	30.0	50.0	50.0	45.0				1.50	r	350811.11	5015721.90	1.50
POW3			29.9	29.9	29.8	50.0	50.0	45.0				1.50	r	350805.41	5015711.57	1.50
POW4			29.8	29.8	29.8	50.0	50.0	45.0				1.50	r	350791.35	5015698.83	1.50
POW5			30.1	30.1	30.0	50.0	50.0	45.0				1.50	r	350761.09	5015670.64	1.50

Proposed Campanale Homes & Wellings of Stittsville Developments

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
OLA6			45.9	45.9	45.6	50.0	50.0	0.0				1.50	r	350801.52	5015819.46	1.50
OLA7			44.0	44.0	44.0	50.0	50.0	0.0				1.50	r	350778.09	5015797.81	1.50
OLA8			45.6	45.6	45.6	50.0	50.0	0.0				1.50	r	350768.13	5015789.68	1.50
OLA9			46.5	46.5	46.5	50.0	50.0	0.0				1.50	r	350752.67	5015775.59	1.50
OLA10			45.2	45.2	45.1	50.0	50.0	0.0				1.50	r	350743.11	5015767.33	1.50
OLA11			41.7	41.7	41.6	50.0	50.0	0.0				1.50	r	350714.79	5015741.92	1.50
OLA12			37.7	37.7	37.7	50.0	50.0	0.0				1.50	r	350687.69	5015713.96	1.50
POW6			43.3	43.3	43.1	50.0	50.0	45.0				4.50	r	350804.21	5015815.19	4.50
POW7			42.6	42.6	42.6	50.0	50.0	45.0				4.50	r	350780.35	5015793.68	4.50
POW8			43.4	43.4	43.4	50.0	50.0	45.0				4.50	r	350772.39	5015786.50	4.50
POW9			44.8	44.8	44.7	50.0	50.0	45.0				4.50	r	350756.09	5015771.81	4.50
POW10			43.5	43.5	43.5	50.0	50.0	45.0				4.50	r	350746.44	5015763.10	4.50
POW11			40.3	40.3	40.3	50.0	50.0	45.0				4.50	r	350718.17	5015737.61	4.50
POW12			37.1	37.1	37.1	50.0	50.0	45.0				4.50	r	350689.97	5015712.18	4.50
POW13			32.6	32.6	32.6	50.0	50.0	45.0				13.50	r	350721.01	5015966.65	13.50