Conservation Meadows Subdivision, Phase 2 – Noise Assessment Report



Prepared for:
Activa Holdings Inc.
55 Columbia Street East,
Waterloo ON N2J 4N7

Prepared by:
Stantec Consulting Ltd.

Project #603-08671

July 2017

Table of Contents

1.0 INTRODUCTION 1
1.1 PURPOSE OF REPORT 1
1.2 LOCATION & SITE PLAN CONCEPTS 1

2.0 NOISE LEVEL CRITERIA 3
2.1 GUIDELINES 3

3.0 OBSERVATIONS AND CALCULATIONS 5
3.1 NOISE LEVEL PREDICTIONS 5
3.2 ROAD TRAFFIC VOLUMES 5
3.3 PROJECTED NOISE LEVELS 6

4.0 CONCLUSIONS AND RECOMMENDATIONS 10
4.1 CONCLUSIONS 10

LIST OF TABLES

Table 1 Noise Criteria for Residential Land Use 3
Table 2 Combination of Road and Rail Noise Day-Time Outdoor, Ventilation and Warning Clause Requirements 3
Table 3 Combination of Road and Rail Noise, Night-Time Ventilation and Warning Clause Requirements 4
Table 4 Road and Rail Noise – Building Component Requirements 4
Table 5 Traffic Volumes – Conservation Drive 5
Table 6 Summary of Projected Unattenuated Noise Contours 6

LIST OF FIGURES

Figure 1 Site Location Plan 2
Figure 2 Indoor – Daytime Unattenuated Noise Contours 7
Figure 3 Indoor – Nighttime Unattenuated Noise Contours 8
Figure 4 Outdoor – Unattenuated Noise Contours 9

LIST OF APPENDICES

APPENDIX A CITY OF WATERLOO CORRESPONDENCE A.1

APPENDIX B NOISE LEVEL CALCULATIONS B.1
B.1 Indoor Receiver Stamson Reports B.2
B.2 Outdoor Receiver Stamson Reports B.3

APPENDIX C NOISE WARNING CLAUSES C.1

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

Activa Holdings Incorporated has retained Stantec Consulting Ltd. to prepare a preliminary environmental noise assessment for the Conservation Meadows Subdivision, Phase 2. The subject property is located northeast of the intersection of Conservation Drive and Beaver Creek Road in the City of Waterloo. This report provides sufficient information in support of submission for Draft Plan of Subdivision.

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 and Climate Change to the site in conjunction with the Regional Municipality of Waterloo Implementation Guidelines for Noise Reports;
- determine the extent to which noise level contours will be of concern to future residents of the proposed development, using the computerized version (STAMSON 5.03) of the M.O.E.C.C.'s noise model;
- outline potential locations for noise attenuation and noise mitigation techniques, as necessary, to achieve acceptable noise levels for future residents of the proposed development.

1.2 LOCATION & SITE PLAN CONCEPTS

The site is directly bound by Conservation Drive to the South, Rideau River Street to the east, existing residential properties to the north and Roy Schmidt Road to the west. The property location is illustrated in Figure 1. The proposed development consists of approximately 7.9 ha of land, and contains a mixture of townhome and single detached units. This report will focus on the noise contours on the subject property that are expected to be generated by exposure to conservation Drive.



V:\01603\active\60308671\design\drawing\civil\sheet_files\60308671_Location Plan.dwg
2017/05/09 10:08 AM By: Rose, Martin

May, 2017
60308671

Stantec

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1:10000 0 100 300 500m

Client/Project
ACTIVA HOLDINGS INC.
CONSERVATION MEADOWS
Waterloo, ON.

Figure No.
1

Title
SITE LOCATION PLAN

2.0 NOISE LEVEL CRITERIA

2.1 GUIDELINES

The Ontario Ministry of Environment (M.O.E.C.C.) 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	Leq16hr less than or equal to 55 dBA	N/A	None required	Not required
	Leq16hr greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not be required but should be considered	Required if resultant Leq exceeds 55 dBA Type A
	Leq16hr 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 55 dBA Type B
Plane of Living Room Window	Leq16hr less than or equal to 55 dBA	None required	N/A	Not required
	Leq16hr 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
	Leq16hr 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)

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

Location	Leq (8 hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Plane of Bedroom Window	Leq8hr greater than 50 dBA to less or equal to 60 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	Leq8hr greater than 60 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)

The M.O.E.C.C. 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
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)

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.C.C. 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

Conservation Drive has been identified as the only road traffic noise source of concern for this development. Traffic volume data for Conservation Drive was provided by the City of Waterloo with a 2026 forecasted average annual daily traffic volume of 9,000 vehicles per day. Traffic data correspondence from the City of Waterloo is included in Appendix "A". 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 2% of total traffic volume
- medium truck traffic for this segment is estimated to be 1.6% of total traffic volume; the rest is assumed to be car traffic
- daytime (7 am – 11 pm) traffic is assumed to be 90%, with the remaining 10% at night (11 pm – 7 am)
- speed limit for Conservation Drive is 50 km/hour.

Table 5 summarizes the traffic volumes used for calculations in this report.

Table 5 Traffic Volumes – Conservation Drive

	Day	**Night**	**Total**
Car	7,808	868	8,676
Medium Truck	130	14	144
Heavy Truck	162	18	180
TOTAL	**8,100**	**900**	**9,000**
Speed Limit	50 km/hr		
Gradient	1.1%		
Surface	Asphalt		

3.3 PROJECTED NOISE LEVELS

Using the M.O.E.C.C. noise model, ORNAMENT, noise level contours were calculated for daytime and nighttime conditions at the point representing the anticipated centerline of Conservation Drive based on the preliminary draft plan concept prepared by MHBC Planning Ltd. The resulting noise contours and clause ranges are illustrated in **Figure 2**, **Figure 3**, and **Figure 4**.

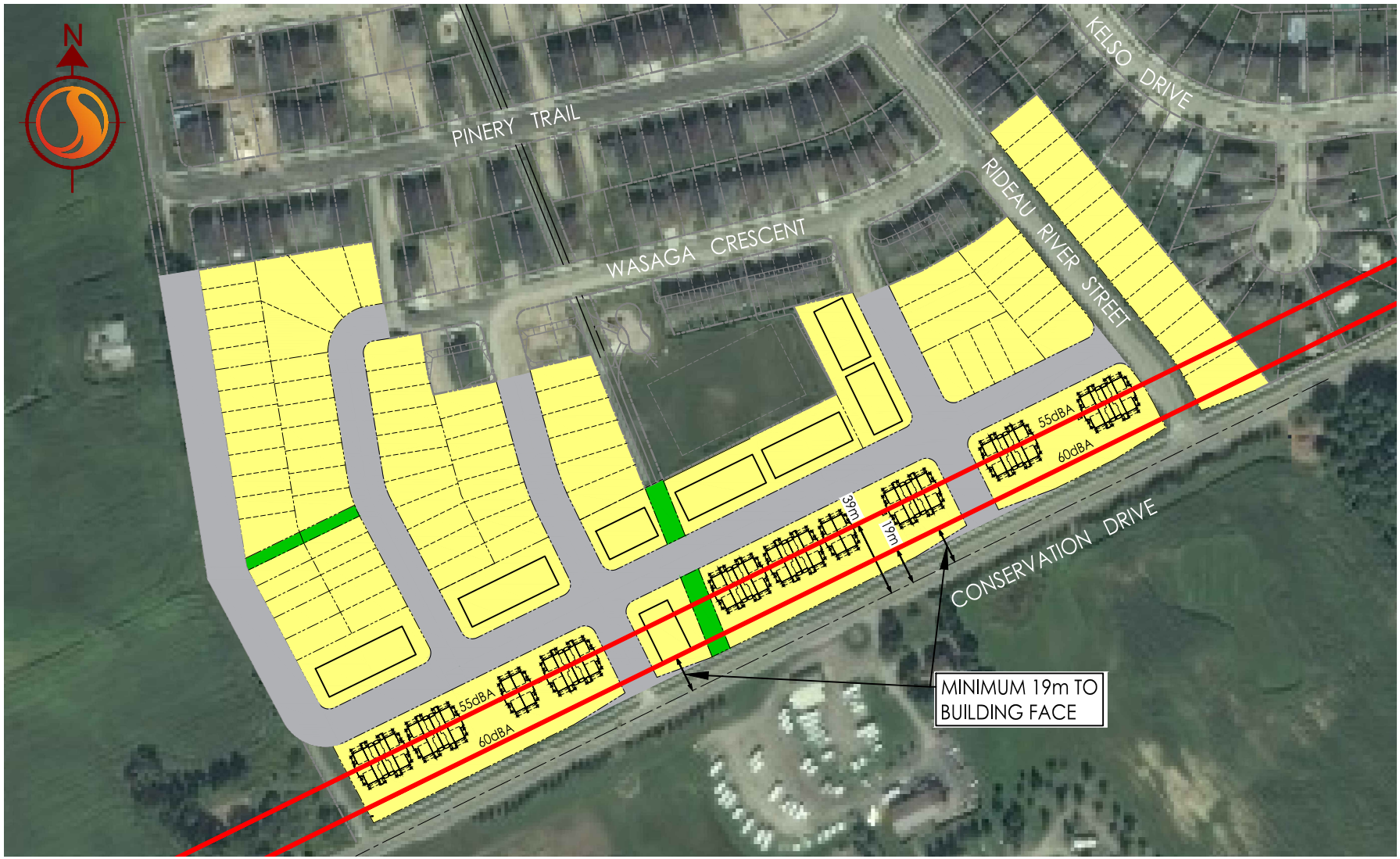
The receiver heights for indoor daytime and nighttime noise level calculations for the future buildings were completed at an assumed ground level (2.5m above road grade) and at the second level (4.5m above road grade). The outdoor living areas were assumed at 1.5 m above road grade. Outdoor living areas and building elevations were considered as elevated 0.75 m above Conservation Drive per current grading concept of the proposed residential lots.

Blocks 10, 12, 16, 21, 22, 23 and 24, fronting/siding onto Conservation Drive were analyzed to determine the Unattenuated noise levels generated by Conservation Drive.

Unattenuated noise level calculations are provided in **Table 6** for daytime and nighttime building face noise levels, as well as, outdoor living area noise levels and have been summarized below.

Table 6 Summary of Projected Unattenuated Noise Contours

Road(s)	Contour (dBA)	Daytime-Building Face Distance (m)	Nighttime-Building Face Distance (m)	Outdoor Living Area Distance (m)
Conservation Drive	50	79	32.5	76
	55	39	15.5	38
	60	19	--	19



V:\01603\active\60308671\design\drawing\civil\sheet_files\60308671_Noise Contours.dwg
2017/05/15 11:44 AM By: Rose, Martin

ORIGINAL SHEET - ANSI A

December, 2016
60308671

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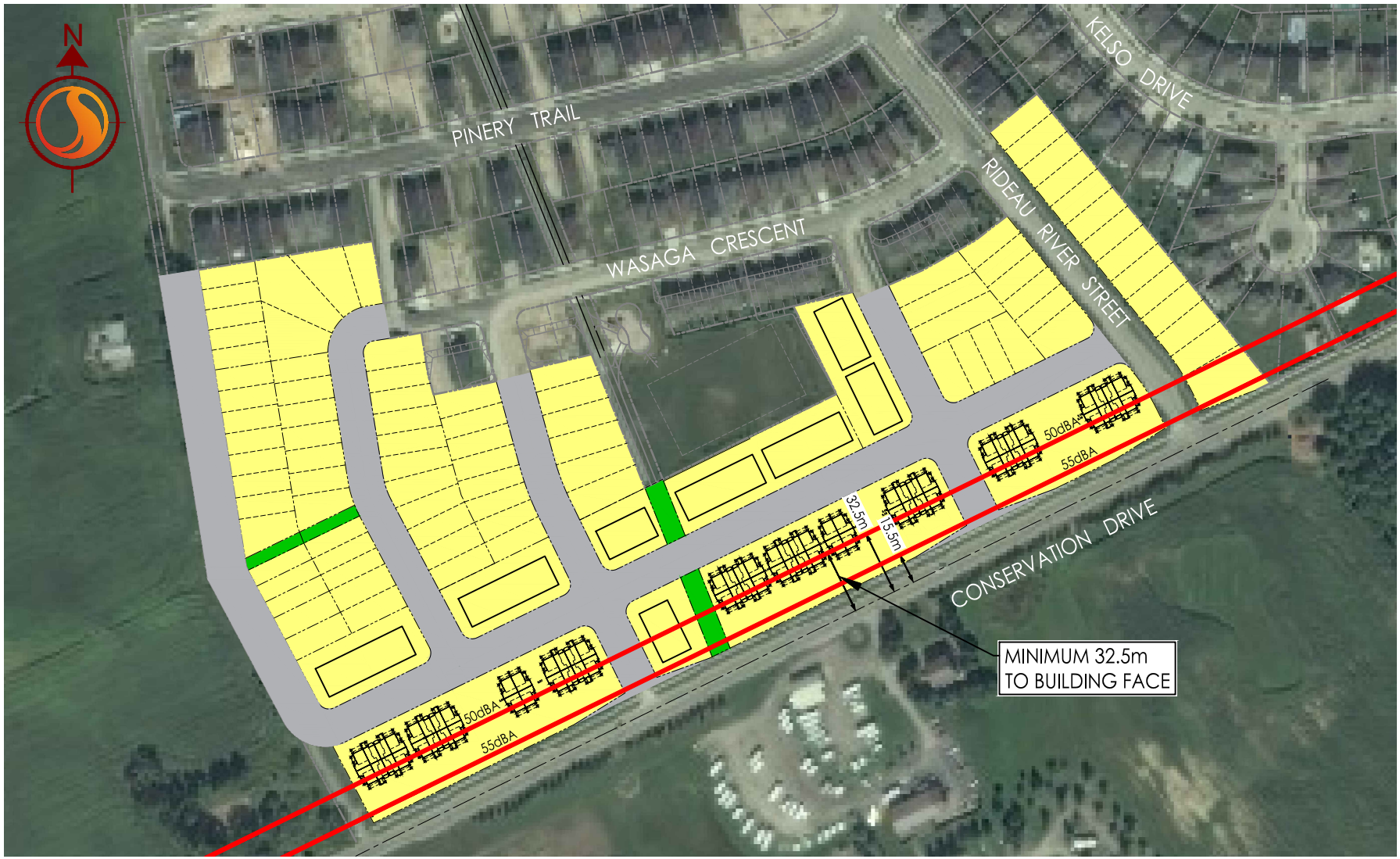
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1:3000 0 30 90 150m

Client/Project
ACTIVA HOLDINGS INC.
CONSERVATION MEADOWS SUBDIVISION - PHASE 2
WATERLOO, ON.

Figure No.
2

Title
INDOOR DAYTIME
NOISE CONTOURS



V:\01603\active\60308671\design\drawing\civil\sheet_files\60308671_Noise Contours.dwg
2017/05/15 11:43 AM By: Rose, Martin

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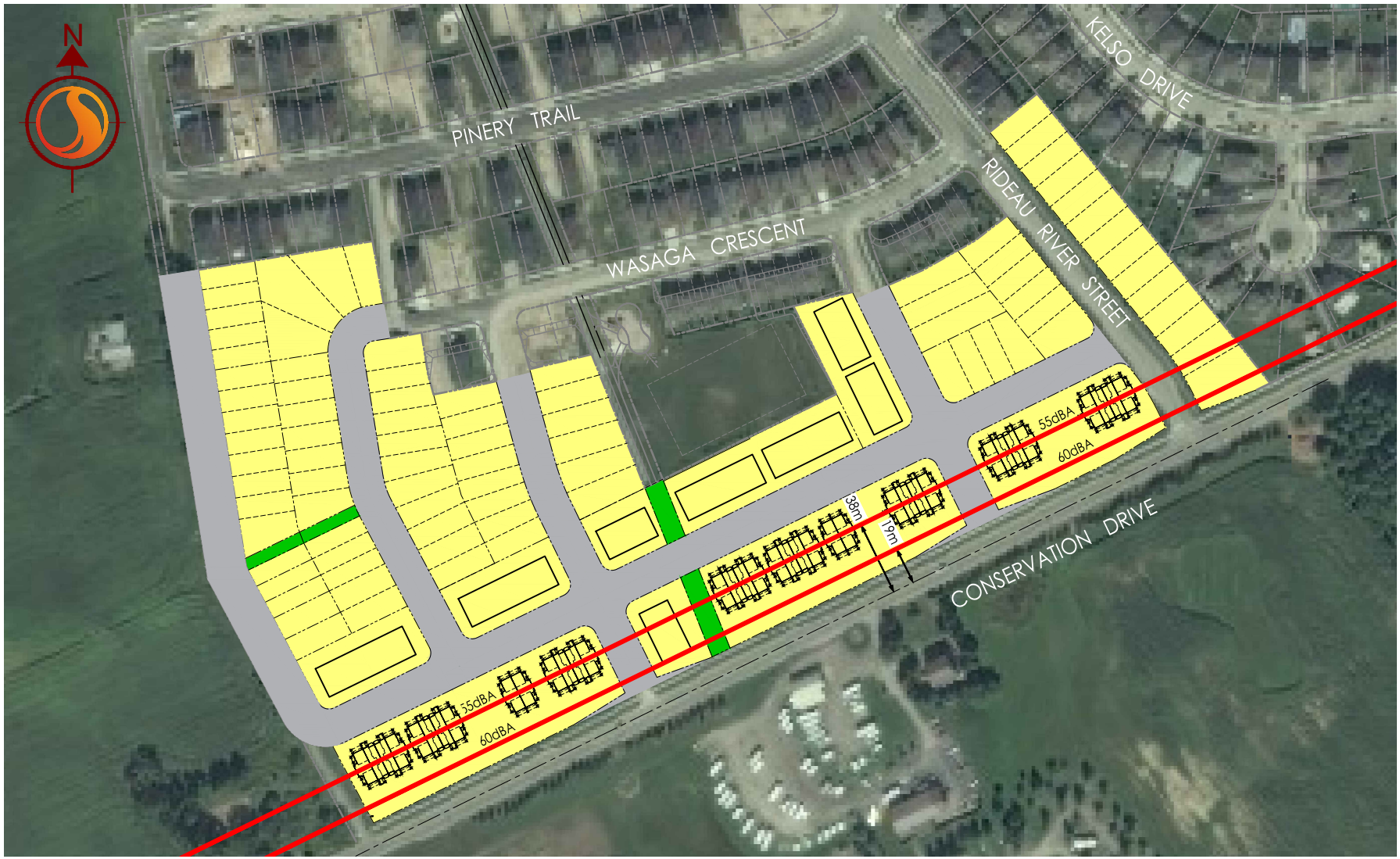
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1:3000 0 30 90 150m

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WATERLOO, ON.

Figure No.
3

Title
INDOOR NIGHTIME
NOISE CONTOURS



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2017/05/15 11:41 AM By: Rose, Martin

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CONSERVATION MEADOWS SUBDIVISION - PHASE 2
WATERLOO, ON.

Figure No.
4

Title
OUTDOOR
NOISE CONTOURS

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

For the residential lots fronting/siding onto Conservation Drive, predicted noise levels are expected to be between 55-60 dBA for the outdoor living areas, 55-60 dBA for the indoor living areas at the outside plane of the living room window(s) and 50-55 dBA for the indoor nighttime areas at the outside plane of the bedroom window(s).

For the dwellings fronting/siding on to Conservation Drive, consideration must be given by the homebuilder when determining the final lot layout and building separation distance from Conversation Drive. In order to avoid the use of noise barriers, lots fronting onto Conservation Drive must have a minimum building setback distance of 22 m from the centerline of Conservation Drive and lots siding onto Conservation Drive must have a minimum building setback distance of 19.5 m from the centerline of Conservation Drive.

It is anticipated that forced air heating/provision for central air conditioning and Warning Clauses A and C will be required for all lots fronting/siding onto Conservation Drive.

Noise warning clauses are provided in Appendix C.

The consideration of these measures will allow the residential development to proceed in accordance with City of Waterloo's planning approval process and form the basis for meeting the M.O.E.C.C. criteria with respect to environmental noise.

Respectfully Submitted By:



Sergio Zaga, M.Eng.,

Project Coordinator



Darren Scott, P.Eng.,

Project Manager

Appendix A CITY OF WATERLOO CORRESPONDENCE

Zaga, Sergio

From: Scott, Darren
Sent: Tuesday, December 06, 2016 9:06 AM
To: Zaga, Sergio
Subject: FW: Noise Assessment Application-Conservation Drive, City of Waterloo
Attachments: 2026 _AADT_Forecast_for_Noise_Study_-_Conservation_Drive_(Beaver_Creek_Road_to_Westmount_Road_North).pdf

Sergio,

See below email chain.

Darren Scott, P.Eng.
Project Manager, Community Development
Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Phone: (519) 585-7278
Cell: (519) 502-6173
darren.scott@stantec.com



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From: Scott, Darren
Sent: Wednesday, November 30, 2016 11:00 AM
To: 'Christine Koehler'
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Yes, thanks!

Darren Scott, P.Eng.
Project Manager, Community Development
Stantec
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Waterloo ON N2L 0A4
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From: Christine Koehler [mailto:Christine.Koehler@waterloo.ca]
Sent: Wednesday, November 30, 2016 10:57 AM
To: Scott, Darren
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hi Darren.

The only other thing would be the 2016 AADT of 4500 based on our 2015 AADT of 4200.

Thanks
Chris

Christine Koehler, CET
Acting Director – Transportation Services
Traffic Operations Program Manager – Transportation Services
Integrated Planning & Public Works, City of Waterloo
265 Lexington Court
PO Box 337 Station Waterloo
Waterloo, ON N2J 4A8
P: 1.519.886.2310 ext. 30228
F: 1.519.886.5788
TTY: 1.866.786.3941
E: christine.koehler@waterloo.ca
www.waterloo.ca
www.twitter.com/citywaterloo
www.youtube.com/citywaterloo
www.facebook.com/citywaterloo





From: Scott, Darren [mailto:darren.scott@stantec.com]
Sent: Wednesday, November 30, 2016 10:53 AM
To: Christine Koehler
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Christine,

As discussed via telephone today, the data provided by the Region is to be modified as follows, as per your direction:

Forecast AADT (2026): 9,000
% Medium Trucks: 1.6%
% Heavy Trucks: 2.0%
Posted Speed Limit: 50 km/h

We'll use the above data in our traffic noise modeling.

Thanks,

Darren Scott, P.Eng.
Project Manager, Community Development
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From: Scott, Darren
Sent: Wednesday, November 30, 2016 8:21 AM
To: 'Christine Koehler'
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hi Christine,

Do you have a direct line that I can reach you at?

Thanks,

Darren Scott, P.Eng.
Project Manager, Community Development
Stantec
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Waterloo ON N2L 0A4
Phone: (519) 585-7278
Cell: (519) 502-6173
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From: Scott, Darren
Sent: Tuesday, November 29, 2016 1:48 PM
To: 'Christine Koehler'
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Thanks, Christine. I'll try reaching you tomorrow morning around 8am.

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From: Christine Koehler [mailto:Christine.Koehler@waterloo.ca]
Sent: Tuesday, November 29, 2016 1:39 PM
To: Scott, Darren
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hi Darren.

I am at my desk until 2 – meetings for the remainder of the day. Tomorrow I am only available between 8 and 9.

Thanks
Chris

From: Scott, Darren [mailto:darren.scott@stantec.com]
Sent: Tuesday, November 29, 2016 12:44 PM
To: Christine Koehler
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hi Christine,

Please let me know when you are available to discuss the attached traffic forecast. We will be preparing a Noise Assessment Study for an Activa development on Conservation Drive, and I'd like to verify the suitability of the data provided by the Region. I'll be available and in the office for most of the week. I'm hoping that we'll be able to touch base via telephone in short order - please let me know your availability.

Thanks,

Darren Scott, P.Eng.
Project Manager, Community Development
Stantec
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Phone: (519) 585-7278
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From: Tabot Eneme [mailto:TEneme@regionofwaterloo.ca]
Sent: Tuesday, November 29, 2016 12:11 PM
To: Scott, Darren
Cc: Hanan Wahib; Transportation Email; Corridor Management; christine.koehler@waterloo.ca
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hello Darren,

I have completed and attached a copy of the AADT forecast you requested to carry out a noise study at the above location. Given that Conservation Drive falls under the jurisdiction of the City of Waterloo, please confirm the validity of the data and forecast related to this road with Christine Koehler (cc'd above) from the city of Waterloo.

I would like to apologize for getting this to you past the deadline. You may contact me if you have any further questions.

Regards,

Tabot Eneme, P.Eng, M.A.Sc
Transportation Planning Engineer
Transportation & Environmental Services | Regional Municipality of Waterloo
150 Frederick Street, 7th Floor, Kitchener, Ontario N2G 4J3
(T) 519-575-4834 **(F)** 519-575-4453
(E) teneme@regionofwaterloo.ca

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From: Scott, Darren [mailto:darren.scott@stantec.com]
Sent: Tuesday, November 29, 2016 11:26 AM
To: Tabot Eneme
Subject: RE: Noise Assessment Application-Conservation Drive, City of Waterloo

Hello Tabot,

I haven't received the requested forecasts. Can you please provide?

Darren Scott, P.Eng.
Project Manager, Community Development
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From: Hanan Wahib [mailto:HWahib@regionofwaterloo.ca]
Sent: Thursday, November 10, 2016 9:48 AM
To: Scott, Darren
Cc: Geoffrey Keyworth; Tabot Eneme; Christine Koehler (Christine.Koehler@waterloo.ca)
Subject: Noise Assessment Application-Conservation Drive, City of Waterloo

Hi Darren,

We have received your request for traffic data and AADT forecast for a noise assessment at Conservation Drive, city of Waterloo. You will receive your forecast by **Friday Nov 25, 2016.** Tabot Eneme (copied) will complete this forecast.
It should be noted that Conservation Drive falls under the jurisdiction of the City of Waterloo, please confirm the validity of the data and forecast related to this road with Christine Koehler from the city of Waterloo (copied), PH#519-886-2310 ext:30228 .

If you have any questions, please contact Tabot.

Regards,

H

Hanan Wahib, P.Eng
Senior Transportation Planning Engineer
Transportation and Environmental Services
Strategic Transportation Planning
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Kitchener, On, N2G 4J3
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hwahib@regionofwaterloo.ca

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Appendix B NOISE LEVEL CALCULATIONS

B.1 INDOOR RECEIVER STAMSON REPORTS

STAMSON 5.0 NORMAL REPORT Date: 08-12-2016 14:37:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_I50.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Indoor 50dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 78.82 / 32.47 m
Receiver height : 3.25 / 5.25 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Conservation (day)

Source height = 1.19 m

ROAD (0.00 + 50.01 + 0.00) = 50.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.62	63.04	0.00	-11.65	-1.38	0.00	0.00	0.00	50.01

Segment Leq : 50.01 dBA

Total Leq All Segments: 50.01 dBA

Results segment # 1: Conservation (night)

Source height = 1.19 m

ROAD (0.00 + 49.99 + 0.00) = 49.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	56.49	0.00	-5.22	-1.28	0.00	0.00	0.00	49.99

Segment Leq : 49.99 dBA

Total Leq All Segments: 49.99 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.01
(NIGHT): 49.99

STAMSON 5.0 NORMAL REPORT Date: 08-12-2016 14:39:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_I55.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Indoor 55dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 38.68 / 15.49 m
Receiver height : 3.25 / 5.25 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Conservation (day)

Source height = 1.19 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	0.62	63.04	0.00	-6.65	-1.38	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Conservation (night)

Source height = 1.19 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	0.56	56.49	0.00	-0.22	-1.28	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

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

STAMSON 5.0 COMPREHENSIVE REPORT Date: 08-12-2016 14:45:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_I60.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Indoor 60dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 19.00 / 15.00 m
Receiver height : 3.25 / 5.25 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: Conservation (day)

Source height = 1.19 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	0.62	63.04	0.00	-1.66	-1.38	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Segment # 1: Conservation (night)

Source height = 1.19 m

ROAD (0.00 + 55.22 + 0.00) = 55.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	56.49	0.00	0.00	-1.28	0.00	0.00	0.00	55.22

Segment Leq : 55.22 dBA

Total Leq All Segments: 55.22 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 55.22

B.2 OUTDOOR RECEIVER STAMSON REPORTS

STAMSON 5.0 NORMAL REPORT Date: 08-12-2016 13:44:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_O50.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Outdoor 50dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 75.98
Receiver height : 2.25
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Conservation (day)

Source height = 1.19 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	0.65	63.04	0.00	-11.60	-1.43	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.00

STAMSON 5.0 NORMAL REPORT Date: 08-12-2016 13:46:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_O55.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Outdoor 55dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 37.79
Receiver height : 2.25
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Conservation (day)

Source height = 1.19 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	0.65	63.04	0.00	-6.61	-1.43	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00

STAMSON 5.0 NORMAL REPORT Date: 08-12-2016 13:47:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: CO_A_O60.te Time Period: Day/Night 16/8 hours
Description: Conservation Drive Outdoor 60dBA

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

Car traffic volume : 7808/868 veh/TimePeriod *
Medium truck volume : 130/14 veh/TimePeriod *
Heavy truck volume : 162/18 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): 9000
Percentage of Annual Growth : 5.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Conservation (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 : 18.76
Receiver height : 2.25
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Conservation (day)

Source height = 1.19 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	0.65	63.04	0.00	-1.60	-1.43	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

Appendix C NOISE WARNING CLAUSES

WARNING CLAUSES

The following warning clauses may be used individually or in combination:

TYPE A: (L_{eq}(16) in the OLA greater than 55 dBA and less than or equal to 60 dBA)

"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE B: (L_{eq}(16) in the OLA greater than 60 dBA)

"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 road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE C: (L_{eq}(16) in the OLA greater than 55 dBA and less than or equal to 65 dBA or (L_{eq}(8) in the OLA greater than 50 dBA and less than or equal to 60 dBA)

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

TYPE D: (L_{eq}(16) in the OLA greater than 65 dBA or L_{eq}(8) in the OLA greater than 60 dBA)

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits

Source: Ontario Ministry of the Environment, *Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning Publication NPC-300*, Queen's Printer for Ontario, 2013