Preliminary Environmental Noise Impact Assessment

Revised August 2022

556 and 576 Conservation Drive
City of Waterloo

MERITECH

1315 Bishop Street North, Suite 202
Cambridge, ON N1R 6Z2

t 519.623.1140
f 519.623.7334
www.meritech.ca

Project No.: 1279

August 31, 2022

GSP Group
72 Victoria Street South, Suite 201
Kitchener, ON N2G 2A9

Attention: Ms. Kristen Barisdale MCIP RPP
Planner

Dear Ms. Barisdale,

Re: Preliminary Environmental Noise Impact Assessment
556 and 576 Conservation Drive
City of Waterloo

Please find enclosed the revised Preliminary Environmental Noise Impact Assessment for the above-noted project in support of Draft Plan Approval. A detailed report will be prepared in support of engineering approvals prior to construction.

The report summarizes the expected noise levels based on traffic information provided in the 2015 "Beaver Creek Road and Conservation Dr. Upgrades and Extension of Municipal Services Class Environmental Assessment". The results support the current draft plan submission as a viable option for noise attenuation based on the criteria and policies set forth by the Regional Municipality of Waterloo and Ministry of Environment guidelines.

The noise modelling shows that noise attenuation measures and noise warning clauses for indoor and outdoor noise levels are not required at distances of 40m and greater from the centerline of Conservation Drive. The nearest row of freehold street townhomes is approximately 100m from the centerline of Conservation Drive; therefore, noise modeling is no longer necessary in support of the Draft Plan submission. Blocks 105 and 106 will require individual noise assessments in support of Site Plan Approval.

Yours very truly,

MERITECH ENGINEERING



Chris Togeretz, P. Eng.
Project Engineer

CHT/
Enclosures (0)

cc Ian Cook, 2115881 Ontario Limited
Brad Trussler, Mattamy Development Corporation

Executive Summary

This Environmental Noise Impact Assessment has been completed for the proposed residential subdivision northwest of the intersection of Conservation Drive and Beaver Creek Road in support of draft plan approval. The development is comprised of a mix of townhomes and single-family residences.

The study has been completed in conformance with guidelines set by the Ontario Ministry of the Environment and Regional Municipality of Waterloo.

The analysis was done using STAMSON 5.03 with traffic volumes from the 2015 "Beaver Creek Road and Conservation Dr. Upgrades and Extension of Municipal Services Class Environmental Assessment", preliminary road profiles for Conservation Road and internal streets and the proposed grading plan.

Noise Warning Clauses with the provision for future installation of air conditioning are required for all lots within 40m of Conservation Drive.

A detailed report should be prepared in support of engineering approvals following Draft Plan Approval but prior to construction, and site-specific reports will be required in support of Site Plan Approval.

Use and Reproduction of this Document

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For Further Information

For further information regarding this report please contact the author at the following address:

Meritech Engineering
Attention: Mr. Norm B. Litchfield, P.Eng., MBA
Director of Engineering
1315 Bishop Street North, Suite 202
Cambridge, ON N1R 6Z2
t (519) 623-1140
f (519) 623-7334
email: norml@meritech.ca

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Introduction

An Environmental Noise Impact Assessment was completed for the property located on the northwest corner of Conservation Drive and Beaver Creek Road in Waterloo as indicated in Figure 1. It will address the expected noise levels for the grading plan for the proposed development.

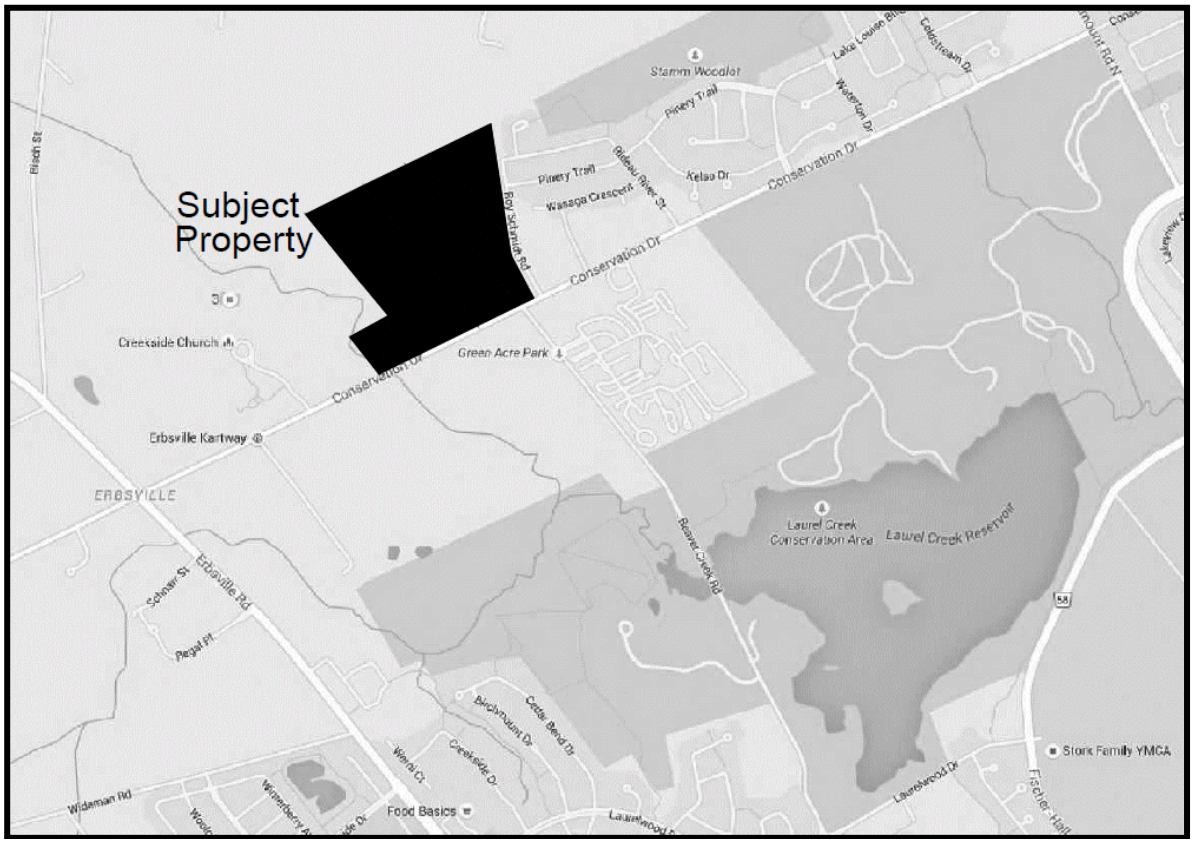


Figure 1: Subdivision Location

Approach

The assessment is based on the principles outlined by the Ontario Ministry of the Environment (MOE) and the Regional Municipality of Waterloo (RMOW). Conservation Drive is the major noise generator affecting the subdivision and is the subject of the noise assessment.

The MOE Environmental Noise Guideline NPC-300 applies to stationary sources, such as industries, and to transportation sources of noise, including road, rail and air traffic. It is applied in approvals issued by the MOE and is used for land use planning decisions made by municipalities. Region of Waterloo guidelines provide the majority of the design criteria.

Aircraft noise is not considered in this report, as the site does not fall within NEF/NEP 25 contours. The closest rail line is approximately 3.5 kilometres to the southeast and is not

considered in this report, as the Region of Waterloo has set an "inclusionary limit" of 200 metres for road noise and 300 metres for rail noise, outside of which distances a noise study is not required.

Future commercial uses are planned at the southeast corner of Beaver Creek Road and Conservation Drive but are not considered in this report as they have not yet been determined. Although it is expected that they will likely be an insignificant noise generator compared to traffic on Conservation Drive, the noise report in support of future Site Plan applications will confirm.

Objectives

The main objective of this assessment is to determine whether the draft plan and grading design satisfy the noise criteria established by the Ministry of the Environment in 2013 in publication NPC-300, Environmental Noise Guideline; Stationary and Transportation Sources – Approval and Planning. The Region of Waterloo's Implementation Guidelines for Noise Policies, 1999, contain the same noise criteria.

The Region's Implementation Guidelines provide a goal for new development: "the overall objective is to limit the construction of new noise barriers by finding alternative means of attenuating the noise generated by road and rail traffic." The guidelines describe that the preferred approach is the use of passive noise mitigation measures such as increased building setbacks, residential front lotting, non-traditional street layout and buffering with noise insensitive land uses.

When passive measures do not reduce noise levels for the development, the guidelines describe additional measures, such as:

- Noise Warning Clause (included on landowner's deed)
- Active Noise Control Measures (i.e. noise barrier and/or berm)
- Provision for Air Conditioning
- Building Component Requirements (i.e. brick veneer)

The tables below contain a summary of the noise level objectives, and the noise control measures necessary when the objectives are exceeded. Refer to NPC-300: Table C-9 and section C7.1.

Projected Daytime Outdoor Noise Level	Noise Control Measures
55 dBA	Objective
56-60 dBA	Reduce to 55 dBA OR Type A Noise Warning Clause (NWC)
61+ dBA	Alternative Land Use Alternative Layout to reduce to 55 dBA Barrier(s) to reduce to 55 dBA Possible: Type B NWC & reduce to 60 dBA or less

Table 1: OLA Noise Control Requirements

Projected Indoor Noise Level *		Noise Control Measures
Daytime	Nighttime	
45 dBA	40 dBA	Objective
46-55 dBA	41-50 dBA	Provision for future A/C Type C NWC
56+ dBA	51+ dBA	Installation of A/C Type D NWC

* Defined as 10 dBA less than the noise level at the exterior plane of window

Table 2: Residential ILA Noise Control Requirements

Projected Indoor Noise Level		Noise Control Measures
Daytime	Nighttime	
45 dBA	40 dBA	None
46-55 dBA	41-50 dBA	Compliance with OBC
56+ dBA	51+ dBA	Building components to achieve indoor sound level objective Type D NWC

Table 3: Residential Building Component Requirements

Discussion

The analysis was based on traffic volumes provided in the 2015 "Beaver Creek Road and Conservation Dr. Upgrades and Extension of Municipal Services Class Environmental Assessment", geometric details of Conservation Drive provided on conceptual centreline elevations provided on a plan/profile drawing, and the proposed grading plan for the development. The proposed grading plan includes the proposed centreline elevations for the proposed reconstruction of Conservation Drive.

Traffic Volumes

Information obtained from the EA document indicated forecasted traffic volumes for 2035, which is beyond the 10-year forecast required by the Region of Waterloo. As a result, depending on the length of time needed to achieve Draft Plan Approval, the traffic numbers may be over-conservative. As a result, the detailed report that will be prepared following Draft Plan Approval in support of engineering approvals prior to construction may use AADTs with a revised forecast horizon. For the purposes of this preliminary report, the following information was used for input; refer to relevant excerpts from the EA in Appendix B:

	West of Beaver Creek Rd
• 2035 AADT:	13,280
• Posted Speed:	50
• % Medium Trucks:	1.8
• % Heavy Trucks:	0.7
• Road Grade:	4.0

The preliminary plan and profile drawing for Conservation Drive reflected on the Conceptual Grading Plan and the Noise Assessment Plan, in Appendix C, shows that the steepest road grades on either side of the intersection are approximately 4.0% and 3.2% respectively. The plans in Appendix C shows the high-level elevations used in the modeling.

Background information related to the traffic volumes is attached in Appendix B.

Analysis

The STAMSON 5.03 computer program was used to generate the predicted noise levels. Daytime noise levels were based on 90% of the traffic occurring in the 16-hour period between 07:00 and 23:00. Night-time noise levels were based on the remaining 10% of the traffic during the 8-hour period between 23:00 and 07:00.

The Outdoor Living Area (OLA) noise level was evaluated with the receiver height set as 1.5 metres above the rear yard grade. Daytime noise levels were taken at the nearest exposed pane of glass. Night-time noise levels were checked at the window-pane at a height of 4.5 metres above the finished grade. Conventional construction techniques are assumed to attenuate noise levels by 10 dBA for the calculation of indoor noise levels, as per RMOW guidelines.

Analysis locations are shown on the Noise Assessment Plan in Appendix B. Significant locations expected to receive high noise levels were checked against the Regional criteria. Additional locations were checked later to determine the extent of units requiring noise warning clauses. Calculations from the STAMSON output are contained in Appendix D.

The residential units within 40m of Conservation Drive are generally subject to noise levels exceeding the Regional criteria by less than 10 dBA indoors. A summary of the results is displayed in Table 4.

Analysis Location	Outdoor Living Area (dBA)	Indoor Day Time (dBA)	Indoor Night Time (dBA)	Comments
OLA A (17m)	54 *	-	-	Noise Warning Clause
ILA A (20m)	-	50	44	Provision for future air conditioning; Noise Warning Clause
OLA @ 20m	60			
ILA @ 40m	55	45	39	No attenuation measures required

* With theoretical noise wall

Table 4: Calculated Forecasted Noise Levels

The line indicating a distance of 40 metres from the road represents the location at which noise warning clause is no longer needed for indoor noise levels. The line indicating a distance of 20m shows that if the rear-yard analysis locations are closer, a noise wall might be required.

The remaining units are further from the noise generators and will have equivalent or lower noise levels.

Specific building components to attenuate indoor noise levels are not required.

Noise attenuation for Blocks 105 and 106 will be designed when these blocks are submitted for site plan approval.

Recommendations

Further Study

Noise attenuation measures are anticipated for Blocks 105 and 106 and further analysis will be required during the site plan approval process. This analysis should also address if noise attenuation for noise generated from the site (delivery trucks, HVAC) is required to be attenuated to protect neighbouring residential uses.

Further updates to this noise report will be completed if Draft Plan changes are required.

Noise Warning Clauses

Several blocks are anticipated to be subject to noise levels exceeding the objectives set by the Regional Municipality of Waterloo.

As a result, the owner shall enter into an agreement with the Regional Municipality of Waterloo for lots and blocks within 40m of Conservation Drive, and the following clauses shall be included in agreements of Offers of Purchase and Sale, lease/rental agreements, and condominium declarations, as applicable:

Lots and blocks within 40m of Conservation Drive:

> *Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Region of Waterloo and the Ministry of the Environment.*
>
> *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 Region of Waterloo and the Ministry of the Environment.*

The required noise warning clauses will be confirmed in support of Site Plan Approval.

No Warning Clause

The remaining lots/units are not anticipated to require noise warnings as they meet the requirements of Tables 1 and 2. This will be confirmed with a detailed report, following Draft Plan Approval.

Building Materials

No units require specific building components.

References

Ontario Ministry of the Environment, Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning (Publication NPC-300), August 2013

Regional Municipality of Waterloo, Implementation Guidelines for Noise Policies, July 1999

Regional Municipality of Waterloo, Regional Municipality of Waterloo Implementation Guidelines for Noise Policies, March 2004

Consultant Statutory Declaration

CONSULTANT STATUTORY DECLARATION

CANADA) In the Matter of the Environmental
) Protection Act and the Planning Act
PROVINCE OF ONTARIO)

) And in the Matter of
)

) 556 and 576 Conservation Drive,
) City of Waterloo, in the Regional
) Municipality of Waterloo

I, Chris Togeretz, of the City of Cambridge, in the Region of Waterloo, SOLEMNLY DECLARE THAT:

1. I am a Professional Engineer employed by Meritech Services Inc. (Meritech Engineering) which holds a Certificate of Authorization and have personal knowledge of the matters set out below.

2. I was retained or employed as the principal consultant to undertake the assessment of noise impacts and recommendation of noise mitigation measures for the property described as 556 and 576 Conservation Drive.

3. I had the expertise required to perform these services. Any assessment activities or recommendations requiring the application of engineering principles have been undertaken or supervised by an engineer qualified to perform such services.

4. The information used in the study entitled Preliminary Environmental Noise Impact Assessment; 556 and 576 Conservation Drive; City of Waterloo dated August 2022, is the best available information as of the date of the study.

5. The noise level calculations, the interpretation of the noise attenuation requirements, and the recommended measures are in accordance with Ministry of Environment Guidelines, Region of Waterloo policies, and any applicable policy or guidelines of the area municipality, and any other applicable policy or guidelines.

6. The physical noise attenuation measures proposed in this study are feasible to implement and will provide the level of attenuation indicated in the study.

7. I acknowledge that this study may be subject to a peer review conducted at my cost.

8. I acknowledge that public authorities and future owners, occupants and others may rely on this statement.

AND I make this solemn Declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

DECLARED before me in the City of)
Cambridge, in the Regional Municipality of)
Waterloo)
this 25th day of August 2022.)
)

Linda May Jantzi, a Commissioner, etc.,
Province of Ontario, for
Meritech Services Inc.
Expires November 21, 2022.

Owner / Authorized Agent Statement

OWNER/AUTHORIZED AGENT STATEMENT

I am the owner of the property, or the owner's agent, and that I understand and agree with the noise attenuation measures proposed in the study entitled Preliminary Environmental Noise Impact Assessment; 556 and 576 Conservation Drive; City of Waterloo and dated August 2022.

The application has been designed to avoid the use of berms or walls as noise attenuation features where feasible.

If the application is changed in a way that may affect the noise level calculations, I will have a revised noise study submitted to the Region.

Mr. Ian Cook
Name

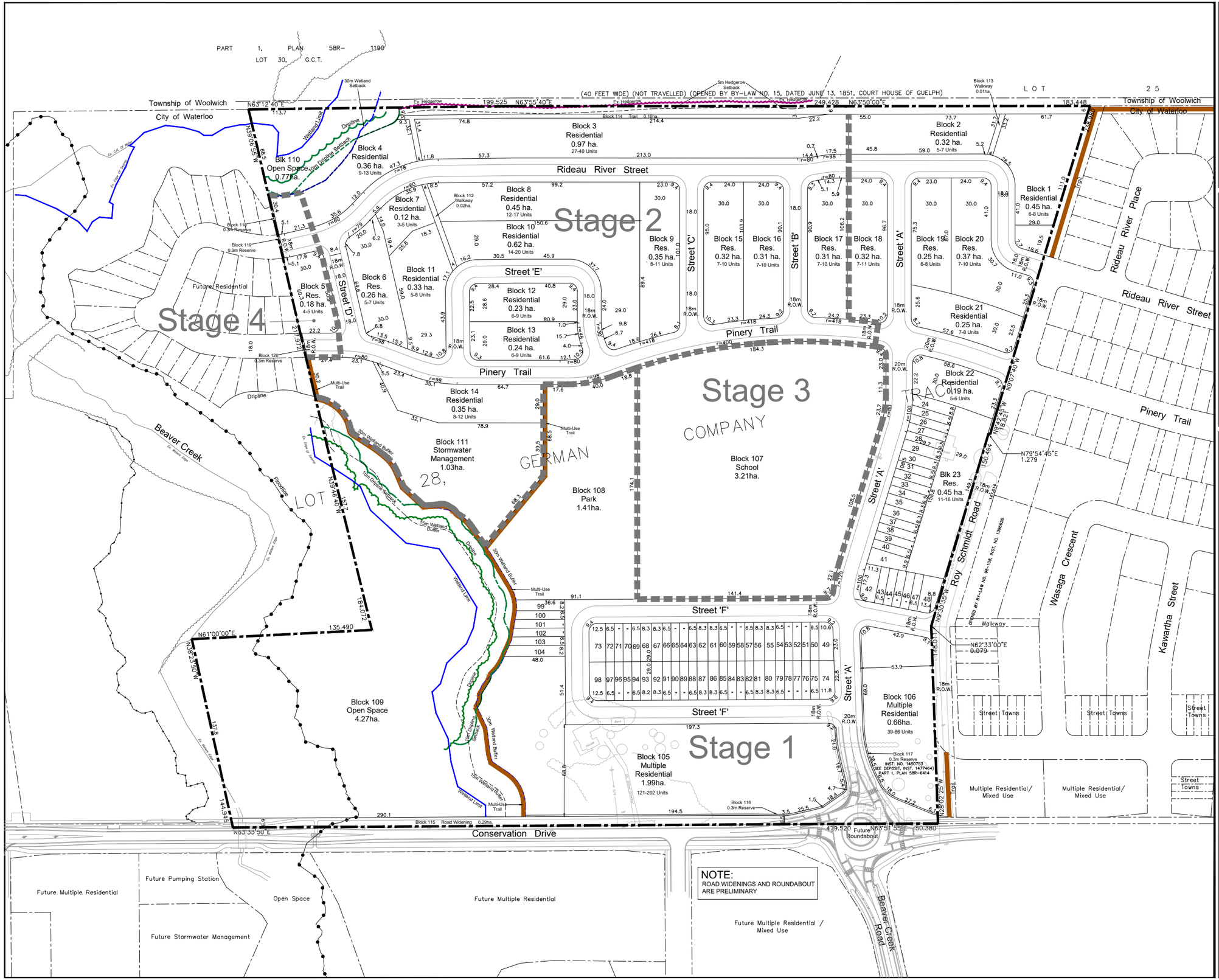
Partner
Title

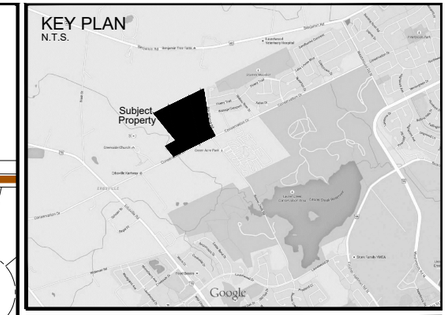
AUG 24/ 2022
Date

Signature

2115881 Ontario Limited
Company

Appendix A: Draft Plan





DRAFT PLAN OF SUBDIVISION

Part of Lot 28
German Company Tract
City of Waterloo
Regional Municipality of Waterloo

LAND USE SCHEDULE

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential (single detached)	1-23	182-260	7.98
Street Townhouses	24-104	81	1.73
Multiple Residential	105,106	160-268	2.65
School	107		3.21
Park	108		1.41
Open Space	109,110		5.04
Stormwater Management	111		1.03
Walkway	112,113		0.04
Trail	114		0.09
Road Widening	115		0.29
0.3m Reserve	116,120		0.00
Roads			5.16
Total		423-609	28.63

UNIT BREAKDOWN

Min. Potential Singles	182
13.1m internal lot	*152*
13.75m corner lot	*30*
Max. Potential Singles	260
9.0m internal lot	*230*
12.5m corner lot	*30*
Street Townhouses	81

NOTE: Wetland boundary provided by NRSI August 2021

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT)

INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and l ARE AS SHOWN ON THE DRAFT PLAN.
h) Municipal water supply
i) Well-drained sandy loam on lacustrine deposits
k) All sanitary and storm sewers as required

OWNER'S CERTIFICATE

I AUTHORIZE THE GSP GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE REGIONAL MUNICIPALITY OF WATERLOO.

2119881 ONTARIO LIMITED — August 17, 2016 DATE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

RAYMOND J SIBTHORP, O.L.S. — August 18, 2016 DATE
MacDonald Tamblyn Lord Surveying Limited

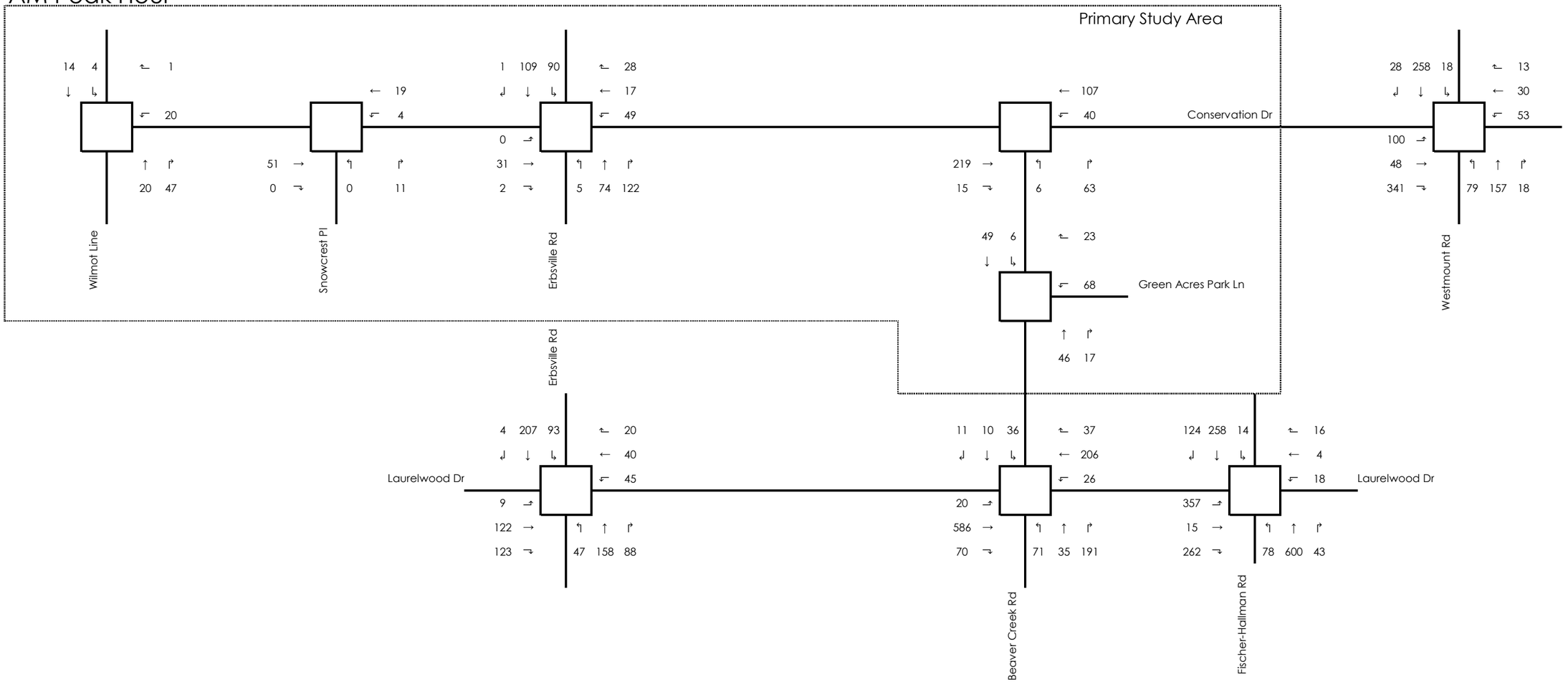
GSP group
PLANNING I URBAN DESIGN I LANDSCAPE ARCHITECTURE
gspgroup.ca

REVISIONS
April 30, 2020
June 25, 2020
March 10, 2020
March 15, 2020
March 19, 2020
August 19, 2021
December 15, 2021

Date: July 29, 2015 | Drawn By: S.L./ML | Dwg. File Name: dp09009zo.dwg
Scale: 1:1250 metric | Project No.: 09009.40

Appendix B: Traffic Information

AM Peak Hour

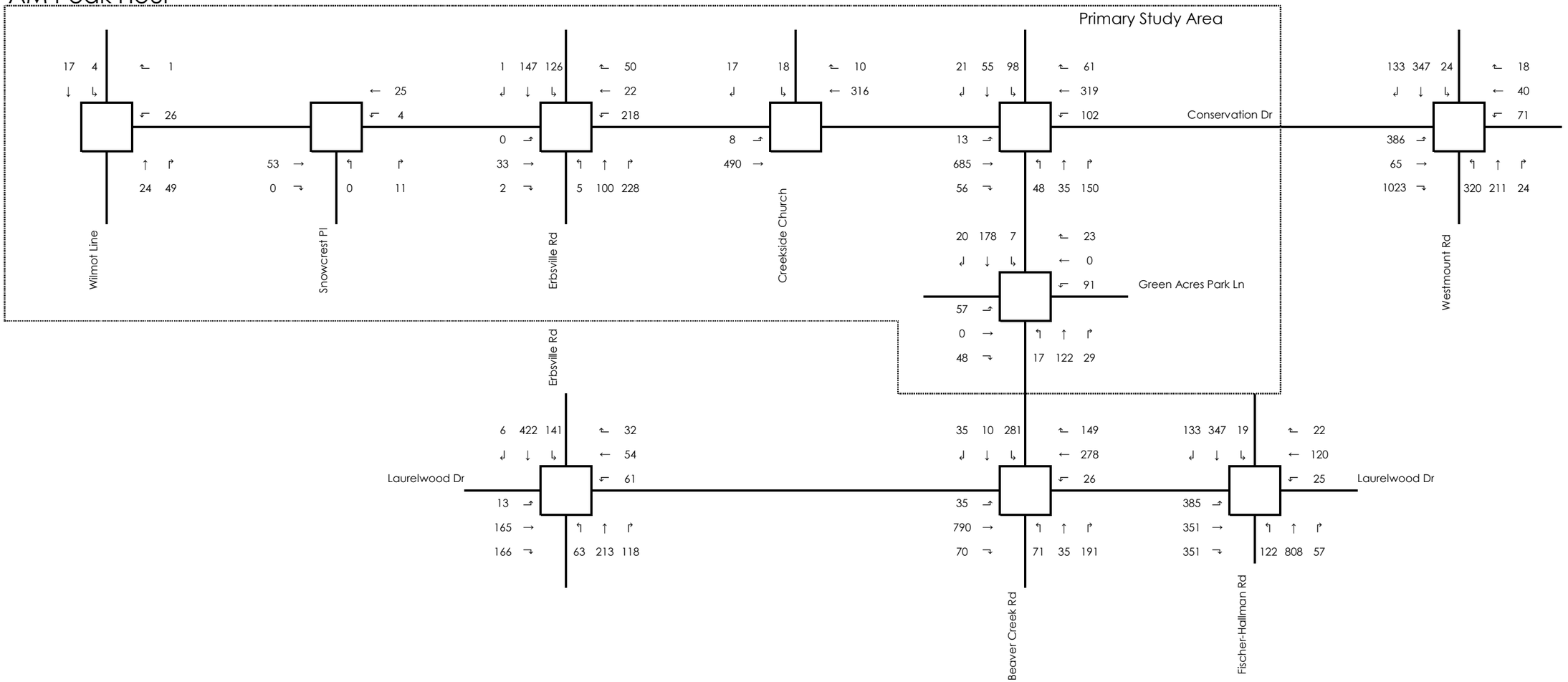


Note: Traffic counts were not balanced across the network / between intersections.

Stantec Consulting Ltd.
1331 Clyde Avenue, Suite 400
Ottawa, ON, Canada K2C 3G4
Tel: (613) 722-4420
www.stantec.com

City of Waterloo
Beaver Creek Rd and Conservation Dr Widening EA
Figure 5
2015 Existing Traffic Volumes, AM Peak

AM Peak Hour



Note: Traffic counts were not balanced across the network / between intersections.

Stantec Consulting Ltd.
1331 Clyde Avenue, Suite 400
Ottawa, ON, Canada K2C 3G4
Tel: (613) 722-4420
www.stantec.com

City of Waterloo
Beaver Creek Rd and Conservation Dr Widening EA
Figure 12
2035 Ultimate Forecast Traffic Volumes, AM Peak

Table 19 City of Waterloo Speed Survey Results

Street	Location	Year	Speed Limit km/h	85TH % km/h	AADT
Beaver Creek Road	Conservation & Laurelwood	2014	60	68.7	1442
Conservation Drive	Beaver Creek & Erbsville	2014	50	75.9	3608
	Rideau River & Beaver Creek	2014	50/60	73.9	4747
	Rideau River & Beaver Creek	2013	50/60	73.3	5008
	Rideau River & Beaver Creek	2012	50/60	68.4	4823
	Rideau River & Lake Louise	2014	60	73.6	4882
	Lake Louise & Rideau River	2013	60	76.4	4801
	Lake Louise & Rideau River	2012	60	64.1	5070
	Westmount & Coldstream	2013	60	71.8	6011

A review of Beaver Creek Road shows the 85th percentile speeds below the 10 km/h threshold and do not require further consideration for traffic calming measures. It is noted that urbanization and inclusion of cycling lanes north of the Laurel Creek Conservation Area will likely reduce the speeds by approximately 5 km/h, as recognized in other municipalities.

Along Conservation Drive, the 85th percentile speeds, 71 to 76 km/h, are observed to be constant through both the 50 km/h and 60 km/h zones. As a result, these speeds exceed the 10 km/h threshold and potential traffic calming measures will need to be considered along Conservation Drive.

The nature of Conservation Drive, east of Beaver Creek Road, limits the traffic calming alternatives that might be considered. East of Beaver Creek Road Conservation Drive transitions from 50 km/h to 60 km/h and becomes an urbanized section with bike lanes and is considered a collector road. The provision of bikes lanes limits the physical traffic calming measures available. As such, passive calming measures should be considered, including pavement markings and warning signs as they would not impede the bike lanes, emergency services and transit services. An example of possible pavement markings would be zig-zag markings near intersections and accesses. Studies have shown that these markings can reduce a roads travel speed by up to 10 km/h. These traffic calming measures could be implemented in the short term to help address current speeds.

Beaver Creek Rd @ Conservation Dr

Total Count Diagram

Municipality: Waterloo
Site #: 0000000009
Intersection: Conservation Dr & Beaver Creek Rc
TFR File #: 3
Count date: 17-Sep-2014

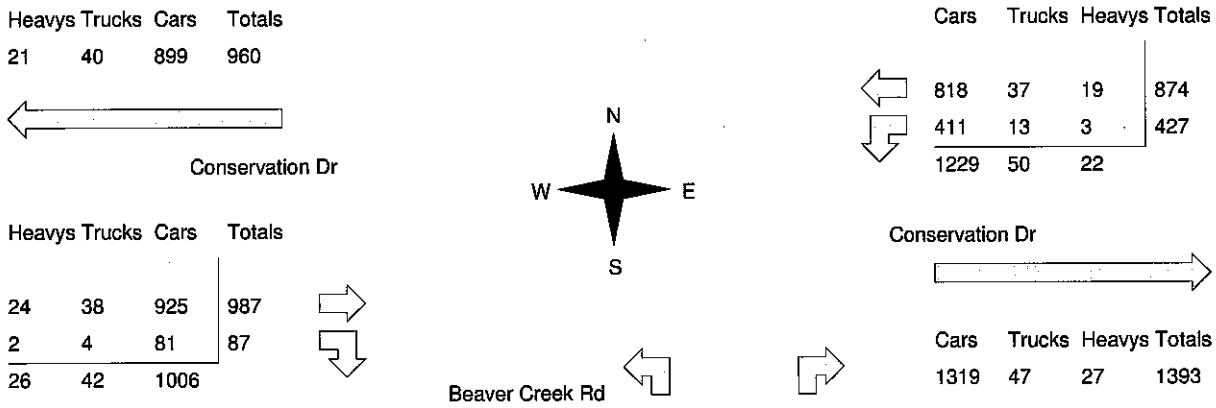
Weather conditions:
Sunny/Dry

Person(s) who counted:
Eugene

**** Non-Signalized Intersection ****

Major Road: Conservation Dr runs W/E

East Leg Total: 2694
East Entering: 1301
East Peds: 11
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 2
West Entering: 1074
West Leg Total: 2034

Cars 492
Trucks 17
Heavys 5
Totals 514

Cars 81 394 475
Trucks 3 9 12
Heavys 2 3 5
Totals 86 406

Peds Cross: ⋈
South Peds: 10
South Entering: 492
South Leg Total: 1006

Comments

Table 4-11: Preliminary Design Criteria

Attribute	Present Conditions	Design Standards	
		TAC	Proposed Standards
Classification	Rural Collector	UCU60	UCU60
Design Speed (Note 1)	50 km/h	60 km/h	60 km/h
Posted Speed Conservation Drive Beaver Creek Road	 50 km/h 60 km/h	 N/A N/A	 50 km/h 60 km/h
Number of Lanes	2	N/A	2
Minimum Stopping Sight Distance	45m±	75-85 m	94 m
Minimum Radius Conservation Drive Beaver Creek Road	 N/A 250m±	 1290m (NC) 185m (RC)	 2000m 250m (RC)
Maximum Grades Conservation Drive Beaver Creek Road	 6.1% 6.2%	 6-10%	 4.5% 5.2%
Minimum Grades	0.2% (flat)	0.3%	0.4%
Vertical Curves (Min K) Crest Sag	 6 10	 10 to 13 8 to 9	 17 10
Lane Widths Through (TL) Left Turn Right Turn	 3.5m± N/A N/A	 3.5 to 3.7m 3.3 m 3.3 m	 3.5m to 3.7m 3.5 m N/A
Superelevation	N/A	N/A)	N/A
Right-of-Way Conservation Drive Beaver Creek Road	 12.2 to 16.1 m 12.2 to 16.1 m	 N/A N/A	 20 to 24 m 20 m
Sidewalk Width	N/A	-	1.5 m
Multi-Use Trail Width	N/A	-	2.5 - 3.0 m

Notes 1: Design speeds of 10 km/hr greater than posted speeds on Conservation Drive are recommended as a safety allowance for determining future intersection locations.

Appendix C: Noise Assessment Plan and Conceptual Grading Plan

Street F

Lots 49-98

Street F

Street A

Block 106

Block 105

ILA 40m
45dBA Day
39dBA Night

40m from CL

ILA 20m
50dBA Day
44dBA Night

OLA "A"
(17m from CL)
54dBA Day (with wall)

20m from CL

Buffer

High Point

4.0% Grade

Conservation Drive

High Point

3.2% Grade

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meritech.ca

DRAWING: Noise Assessment Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279.Figures	DATE:	Aug 2022
SCALE:	1: 1000		
	Figure 2		

Rideau River Street

Pinery Trail

Rideau River Place

Street A

Street B

Street C

Street D

Street E

Street F

SWM Pond

Park

School

Roy Schmidt Road

Wasaga Crescent

2.5m Asphalt Trail

3.0m Asphalt Walkway

Infiltration gallery

Area to be developed in the future when grading allows.

Match existing elevations along entire northern limit

Bollards/gates to be confirmed in detailed design

Proposed Conservation Drive layout

Ex. Edge of Swamp

Ex. Edge of Water

Ex. Water Edge

15m Wetland Buffer

Wetland Limit

Ditch

4.0m Maintenance Road Access

1.0m Asphalt Walkway

1 & 1/2 Storey Storm Building

All lots are back-to-front or split drainage unless shown otherwise:

W/O = "walkout" type lot
SS = "sunshine" or "lookout" type lot

MERITECH
Civil Land Dev
1315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meritechcivil.ca

Preliminary Grading Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279.Figure	DATE:	Aug 2022

SCALE: 1 : 1000

1279-SG

Appendix D: Calculations

```
STAMSON 5.0        NORMAL REPORT        Date: 08-11-2017 15:06:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: AOLA.te              Time Period: Day/Night 16/8 hours
Description: OLA A


Road data, segment # 1:  (day/night)
----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  17.00 / 20.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   1.30 m
Reference angle           :   0.00

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

Source height = 0.92 m

ROAD (0.00 + 61.05 + 0.00) = 61.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90    0.64  63.36   0.00  -0.89  -1.42   0.00   0.00   0.00
61.05
-------------------------------------------------------------------------
---

Segment Leq : 61.05 dBA
```

```
STAMSON 5.0        NORMAL REPORT        Date: 08-11-2017 16:06:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aolawall.te          Time Period: Day/Night 16/8 hours
Description: A OLA - 1.8m Wall


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  17.00 / 20.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   1.80 m
Elevation                 :   1.30 m
Barrier receiver distance :   4.00 / 13.00  m
Source elevation          : 100.00 m
Receiver elevation        : 101.30 m
Barrier elevation         : 101.30 m
Reference angle           :   0.00

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

Source height = 0.92 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       0.92 !        1.50 !        1.06 !       102.36

ROAD (0.00 + 54.07 + 0.00) = 54.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.53  63.36   0.00  -0.83  -1.23   0.00   0.00  -7.23
54.07
-------------------------------------------------------------------------
---

Segment Leq : 54.07 dBA
```

```
STAMSON 5.0        NORMAL REPORT        Date: 08-11-2017 15:14:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: AILA.te              Time Period: Day/Night 16/8 hours
Description: ILA A


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  20.00 / 20.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   1.30 m
Reference angle           :   0.00


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

Source height = 0.92 m

ROAD (0.00 + 59.89 + 0.00) = 59.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.64  63.36   0.00  -2.05  -1.42   0.00   0.00   0.00
59.89
-------------------------------------------------------------------------
---
```

```
Segment Leq : 59.89 dBA

Total Leq All Segments: 59.89 dBA


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

Source height = 0.91 m

ROAD (0.00 + 53.58 + 0.00) = 53.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.55  56.78   0.00  -1.94  -1.26   0.00   0.00   0.00
53.58
-------------------------------------------------------------------------
---

Segment Leq : 53.58 dBA

Total Leq All Segments: 53.58 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 59.89
                           (NIGHT): 53.58
```

```
STAMSON 5.0        NORMAL REPORT        Date: 08-11-2017 15:34:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA20.te             Time Period: Day/Night 16/8 hours
Description: OLA - 20m from Source


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  20.00 / 20.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 0.92 m

ROAD (0.00 + 59.83 + 0.00) = 59.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  63.36   0.00  -2.07  -1.46   0.00   0.00   0.00
59.83
-------------------------------------------------------------------------
---

Segment Leq : 59.83 dBA
```

```
STAMSON 5.0        NORMAL REPORT        Date: 09-11-2017 11:01:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola40.te             Time Period: Day/Night 16/8 hours
Description: OLA - 40m from Source


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  40.00 / 20.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 0.92 m

ROAD (0.00 + 54.83 + 0.00) = 54.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  63.36   0.00  -7.07  -1.46   0.00   0.00   0.00
54.83
-------------------------------------------------------------------------
---

Segment Leq : 54.83 dBA
```

```
STAMSON 5.0        NORMAL REPORT        Date: 08-11-2017 15:51:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ILA40.te             Time Period: Day/Night 16/8 hours
Description: ILA - 40m from Source


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  : 11653/1295  veh/TimePeriod  *
Medium truck volume :   215/24    veh/TimePeriod  *
Heavy truck volume  :    84/9     veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  13280
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.80
    Heavy Truck  % of Total Volume     :   0.70
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1:  (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  :  40.00 / 40.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 0.92 m

ROAD (0.00 + 54.83 + 0.00) = 54.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  63.36   0.00  -7.07  -1.46   0.00   0.00   0.00
54.83
-------------------------------------------------------------------------
---

Segment Leq : 54.83 dBA
```

```
Total Leq All Segments: 54.83 dBA


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

Source height = 0.91 m

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.59  56.78   0.00  -6.76  -1.33   0.00   0.00   0.00
48.69
-------------------------------------------------------------------------
---

Segment Leq : 48.69 dBA

Total Leq All Segments: 48.69 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.83
                           (NIGHT): 48.69
```