Environmental Noise Feasibility Study

400 Lockhart Road

Proposed Residential Development

City of Barrie

October 11, 2018
Project: 118-0349

Prepared for

Barrie Lockhart Road LP

(% Sorbara Group)

Prepared by

Anthony Amarra, M.Sc.

Reviewed by

Mark Levkoe, P.Eng.

VALCOUSTICS

Canada Ltd.

Version History

Version #	Date	Comments
V1.0	October 11, 2018	Issued for Submission

TABLE OF CONTENTS

LIST OF TABLES

…/cont'd

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF APPENDICES

Environmental Noise Feasibility Study

400 Lockhart Road

Proposed Mixed-Use Development

City of Barrie

1.0 INTRODUCTION

Valcoustics Canada Ltd. (VCL) has prepared this Environmental Noise Feasibility Study in support of the Draft Plan of Subdivision application for the proposed mixed-use residential development located at 400 Lockhart Road in the City of Barrie. The purpose is to assess the potential impact of environmental noise on the subject site and determine appropriate mitigation measures to meet the Ministry of the Environment, Conservation and Parks (MECP) sound level guideline limits.

1.1 AREA DESCRIPTION

The site is located on the north side of Lockhart Road, east of Huronia Road, and is legally identified as:

> Part of the South Half of Lot 12
> Concession 11
> Former Township of Innisfil, Now in the City of Barrie.

The site is surrounded by:

- Existing residential uses to the west;
- A woodlot, with existing low rise residential development beyond, to the north;
- Lands designated for residential uses to the east; and
- Lockhart Road, with lands zoned for agricultural and rural residential, to the south.

Figure 1 shows a Key Plan.

The subject site forms the southwest portion of the Hewitt's Secondary Plan, which is an area intended for future residential and mixed-use development bounded by Mapleview Drive and Big Bay Point Road to the north, 20th Sideroad to the east, and Lockhart Road to the south. The site and surrounding area consist primarily of lands zoned for agricultural (AG), rural residential (RR), residential (R2, R3, RM1), open space (OS) and environmental protection (EP) uses. Proposed uses within the Secondary Plan include residential and mixed-use lands.

Appendix A contains a Zoning Map and Land Use Plan.

1.2 PROPOSED SITE

The proposed development consists of 257 single-family dwellings, 138 townhouse dwellings in 21 blocks, 13 future lots/blocks, one mixed-use block, one institutional block, one stormwater management block, and three village squares. The north end of the site is an Environmental Protection area.

The mixed-use block on the southeast corner of Street 'M' and Street 'A' is expected to consist of residential and non-residential (including retail and service commercial, business, live-work, institutional and cultural) uses.

Plans for the mixed-use block have not been finalized. To be conservative, the assessment assumes that the built form would include buildings up to five storeys in height with residential uses.

The assessment is based on the Draft Plan dated September 25, 2018, prepared by Jones Consulting Group. Appendix B contains the Draft Plan.

2.0 ENVIRONMENTAL NOISE GUIDELINES

2.1 MECP PUBLICATION NPC-300

The applicable noise guidelines for new residential development are those in MECP Publication NPC-300, *"Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning"*. The environmental noise guidelines of the MECP, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix C.

2.1.1 Architectural Elements

In the daytime, the indoor criterion for road noise is $L_{eq\ Day}$(1) of 45 dBA, which applies to sensitive spaces such as bedrooms, living/dining rooms, and dens. At night, the indoor criterion for road noise is $L_{eq\ Night}$(2) of 45 dBA for living/dining rooms and dens and 40 dBA for bedrooms.

The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound level limits, based on the applicable sound levels at the facades.

2.1.2 Ventilation

If $L_{eq\ Day}$ at the outdoor plane of a noise-sensitive window is greater than 65 dBA, means must be provided such that windows can be kept closed for noise control purposes. Central air conditioning is required. If $L_{eq\ Day}$ is greater than 55 dBA and less than or equal to 65 dBA, provision for adding air conditioning is required.

During the nighttime period, central air conditioning is required for $L_{eq\ Night}$ greater than 60 dBA. Provision for adding air conditioning is required for $L_{eq\ Night}$ greater than 50 dBA and less than or equal to 60 dBA.

(1) $L_{eq\ Day}$ – 16-hour daytime equivalent continuous sound level (0700-2300 hours).
(2) $L_{eq\ Night}$ – 8-hour nighttime equivalent continuous sound level (2300-0700 hours).

A warning clause advising the occupant of the potential interference with some activities is also required.

2.1.3 Outdoors

For outdoor amenity areas ("Outdoor Living Areas" – OLA's), the guideline is 55 dBA $L_{eq\ Day}$, with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, provided warning clauses are registered on title. Note that for transportation sources, a balcony is not considered an OLA unless it is:

- The only OLA for the occupant;
- At least 4 m in depth; and
- Unenclosed.

3.0 NOISE IMPACT ASSESSMENT

3.1 TRANSPORTATION NOISE SOURCES

The main source of transportation noise in the vicinity, with the potential to impact the site, is road traffic on Lockhart Road. Current (year 2018) traffic data for Lockhart Road was obtained from the City of Barrie Department of Roads, Parks and Fleet. The traffic data was projected to the future (year 2031) condition using an annual growth rate of 9% per year, as provided by the City.

Table 1 summarizes the road traffic data. Appendix D contains the traffic data correspondence.

TABLE 1: ROAD TRAFFIC DATA

Roadway	AADT(1)		% Trucks		Day/Night Split (%)	Speed (km/hr)	Grade(2) (%)
	Current (Year 2018)	Future (Year 2031)	Heavy	Medium			
Lockhart Drive	7 000	21 461	2	2	90/10(3)	60	2

Notes:

(1) AADT – Annual Average Daily Traffic. Data obtained from the City of Barrie.
(2) Road grade obtained from the Simcoe County GIS mapping service.
(3) Day/night split used is a typical value for well travelled roadways.

Road traffic on the future internal roadways was obtained from the Master Transportation Study dated February 2017 and prepared by LEA Consulting Ltd. The east/west street running through the development, "Street A", is a minor collector roadway. On the eastern boundary of the site, the north/south road is a major collector south of "Street A" and a local road north of Street "A". The other internal roadways within the site are local roads. The Master Transportation Study shows a projected volume of about 4,000 vehicles per day for the north/south major collector road to the east. This is considered insignificant, acoustically, and therefore internal roadways were not included in the assessment.

3.2 RESULTS

Using the road traffic data in Table 1, the sound levels (in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$) were calculated using STAMSON V5.04 – ORNAMENT, the computerized traffic noise prediction model of the MECP.

The daytime and nighttime calculations were made at the height of a top storey window (second-storey), 4.5 m above grade. For the mixed-use block, an assumed 5-storey receptor (13.5 m above grade) was used. OLA calculations were made at a height of 1.5 m above grade. All townhouse and single family dwellings were assumed to have rear yard OLA's. The mixed-use block was assumed to not have any grade level amenity spaces and that any balconies/terraces that may be present would be less than 4 m in depth and would not qualify as OLA's.

Table 2 summarizes the predicted sound levels. Figure 2 shows the calculation locations.

TABLE 2: PREDICTED SOUND LEVEL OUTDOORS – NO MITIGATION

Receptor(1)	Source	Distance (m)(2)	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Location 1 Block 283 (South Facade)	Lockhart Road	23	67	61
Location 2 Block 284 (West Facade)	Lockhart Road	67	60	53
Location 3 Block 261 (South Facade)	Lockhart Road	42	65	58
Location 4 Block 260 (East Facade)	Lockhart Road	67	60	53
Location 5 Block 259 (East Facade)	Lockhart Road	109	55	48
Location 6 Block 278 (South Facade)	Lockhart Road	94	55	49
Mixed-use Block South Facade	Lockhart Road	23	67	61
Mixed-use Block East Facade	Lockhart Road	23	64	58
OLA1 Block 283	Lockhart Road	26	63	N/A(3)
OLA2 Block 264	Lockhart Road	28	62	N/A(3)
OLA3 Block 278	Lockhart Road	96	53	N/A(3)
OLA4 Block 261	Lockhart Road	59	55	N/A(3)

Notes:

(1) See Figure 2 for calculation locations. Receptor heights were taken at 4.5 m above grade for the townhouse plane of window, 13.5 m above grade for the mixed-use block, and 1.5 m above grade for the OLAs.
(2) Distance measured from the centreline of the road to the indicated receptor.
(3) Nighttime guideline limits do not apply to OLAs.

The highest daytime and nighttime sound levels of 67 dBA and 61 dBA (respectively) are predicted to occur at the Mixed-Use Block as well as the townhouse blocks closest to Lockhart Road (Block 283).

The highest predicted OLA daytime sound level of 63 dBA occurs at the rear yard of Block 283.

Appendix E contains a sample calculation.

3.3 NOISE CONTROL MEASURES

The noise control measures for transportation noise can be classified into two categories which are interrelated, but which can be treated separately for the most part:

a) Architectural elements to achieve acceptable indoor noise guidelines;

b) Design features to protect the OLA's.

Figure 3, Table 3 and the Notes to Table 3 summarize the transportation noise abatement measures.

3.3.1 Ventilation Requirements

Central air conditioning is required for the dwellings closest to Lockhart Road. These include the Blocks 264 and 283, and any residential dwellings in the mixed-use block.

Blocks 260 to 262, 265 and 284 require the provision to allow for future installation of air conditioning by the occupant. For low-density residential development, this normally takes the form of a ducted ventilation system suitably sized to accommodate the addition of air conditioning.

Figure 3 shows the dwellings requiring air conditioning.

3.3.2 Exterior Wall and Window Construction

The required Sound Transmission Class (STC) ratings for the exterior walls and windows were calculated for the townhouse blocks assuming windows having a surface area equal to 30% of the associated room floor area and exterior walls having a surface area equal to 80% of the associated room floor area. For the mixed-use block, window and wall areas equal to 50% of the associated room floor areas were assumed.

For Blocks 264 and 283, exterior wall construction with a rating of STC 37 and exterior window construction with a rating of STC 27 is expected to be sufficient to achieve the indoor guideline limits. These ratings would be expected to be achieved using exterior wall and window constructions that meet the minimum non-acoustical requirements of the Ontario Building Code (OBC).

For the mixed-use block, exterior wall construction meeting the minimum OBC requirements would be sufficient. Window construction meeting a minimum STC 30 is expected to be sufficient. This is a slight upgrade to the minimum OBC requirements.

Exterior wall and window upgrades beyond the minimum non-acoustical requirements in the OBC would not be required for any other dwelling.

The STC rating assessment for the window and exterior walls should be reviewed once floor plans and elevations are done for the dwellings. This is usually done as part of the building permit submission.

3.3.3 Outdoors

The unmitigated daytime sound levels at the rear yards of Blocks 264 and 283 exceed the 55 dBA sound level objective by up to 8 dBA. To meet the 55 dBA target level, a 2.5 m high sound barrier is required at the southernmost units.

Figure 3 shows the required extent of the sound barrier.

3.3.4 Warning Clauses

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on the title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation.

Table 3 and the notes to Table 3 summarize the warning clauses for the site.

TABLE 3: NOISE ABATEMENT REQUIREMENTS

Building	Air Conditioning(1)	Exterior Wall(2)	Exterior Window(2)(3)	Sound Barrier(4)	Warning Clauses(5)
Blocks 264 and 283	Central Air Conditioning Mandatory	STC 37	STC 27	2.5 m	A + B
Dwellings in the Mixed-Use Block	Central Air Conditioning Mandatory	STC 37	STC 30	None	A + B
Blocks 260 to 262, 265 and 283	Provision for Adding Air Conditioning Required	OBC	OBC	None	A + C
All other lots/blocks	No Special Acoustical requirements			None	None

See next page for Notes to Table 3.

Notes to Table 3

(1) Central air conditioning allows windows to remain closed for noise control purposes. Provision for adding air conditioning typically takes the form of a ducted ventilation system sized to accommodate the addition of central air conditioning by the occupant.

(2) OBC – exterior wall (and window) construction meeting the non-acoustical requirements of the OBC. These are anticipated to meet STC 37 for walls and STC 27 for windows.

(3) A sliding glass walkout door should be considered as a window and be included in the percentage of glazing. Window and exterior wall requirements were based on standard assumptions and should be reviewed once building/floor plans are finalized.

The window STC rating applies to the entire window assembly, not just the glazing.

(4) Sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface density of 20 kg/m^2. A variety of materials are available including wood, masonry, composites, earth berms or a combination of materials.

(5) Warning clauses to be included in Occupancy Agreements:

A. "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 may occasionally interfere with some activities of the dwelling occupants as the sound level may exceed the noise guidelines of the Municipality and the Ministry of the Environment, Conservation and Parks."

B. "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 of the Municipality and the Ministry of the Environment, Conservation and Parks."

C. "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 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, Conservation and Parks."

(6) Conventional roof construction meeting OBC requirements is satisfactory in all cases.

(7) All exterior doors shall be fully weatherstripped.

4.0 INSTITUTIONAL BLOCK AND MIXED USE BLOCK

4.1 NOISE IMPACT TO THE ENVIRONMENT

The future institutional block on the south side of Street 'B' and the mixed-use block have the potential to generate noise which may impact the adjacent dwellings. The buildings must be designed to ensure that the noise impact onto the neighbouring dwellings comply with the sound level guideline limits outlined in NPC-300. This is typically addressed, in part, at the site plan approval stage and/or in the detailed design stage for these blocks. Any resulting mitigation required to meet the applicable MECP guidelines would be the responsibility of the developer/builder of these blocks.

Potential noise sources include rooftop or other mechanical equipment and emergency generators. Addressing the noise impact from these sources may be done during detailed engineering design, considering equipment selection, location and use of silencing components such as sound barriers/screens.

The final noise mitigation requirements should be reviewed when building plans are available. This would typically be required by the municipality at the time of the site plan approval and building permit application. Note that for the institutional block, the School Board will be responsible for providing the site plan.

4.2 NOISE IMPACT FROM THE ENVIRONMENT

Both the mixed-use block and the institutional block may include portions that are sensitive to road traffic noise. An assessment of road traffic noise onto the mixed-use block was included in this report to provide a preliminary indication of the mitigation requirements. The ultimate requirements for both blocks should be reviewed once the site plans are developed. This would typically be done at the time of site plan approval for these blocks.

5.0 CONCLUSIONS

With the incorporation of the recommended mitigation measures, a suitable acoustical environment can be provided for the occupants and the applicable MECP noise guideline requirements met.

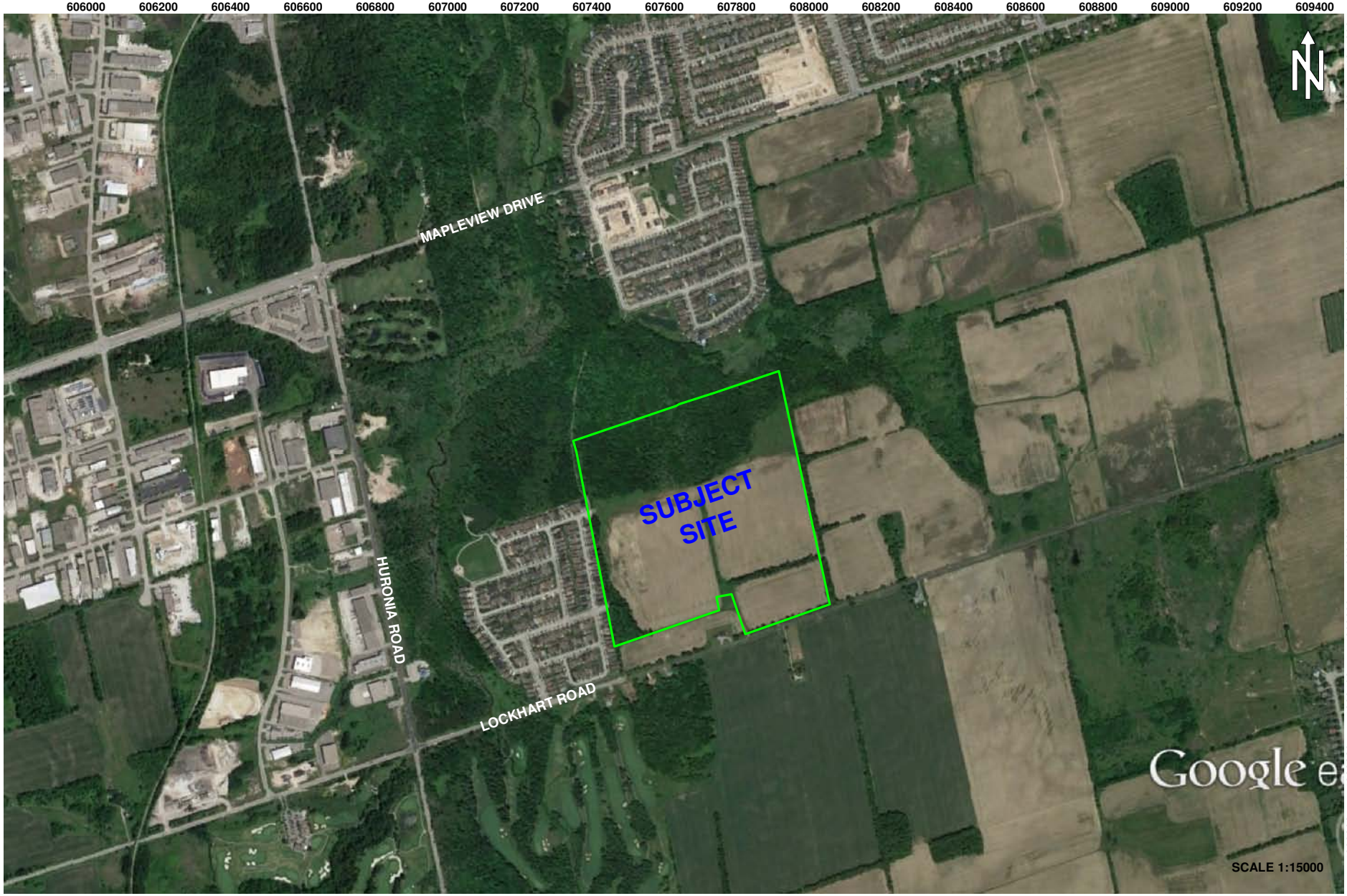
The approvals and administrative procedures are available to ensure that the noise requirements are implemented.

6.0 REFERENCES

1. PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.

2. Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J.D. Quirt, Division of Building Research, National Council of Canada, September 1985.

3. MECP Publication NPC-300, "Stationary and Transportation Sources — Approval and Planning" Ontario Ministry of the Environment, August 2013.

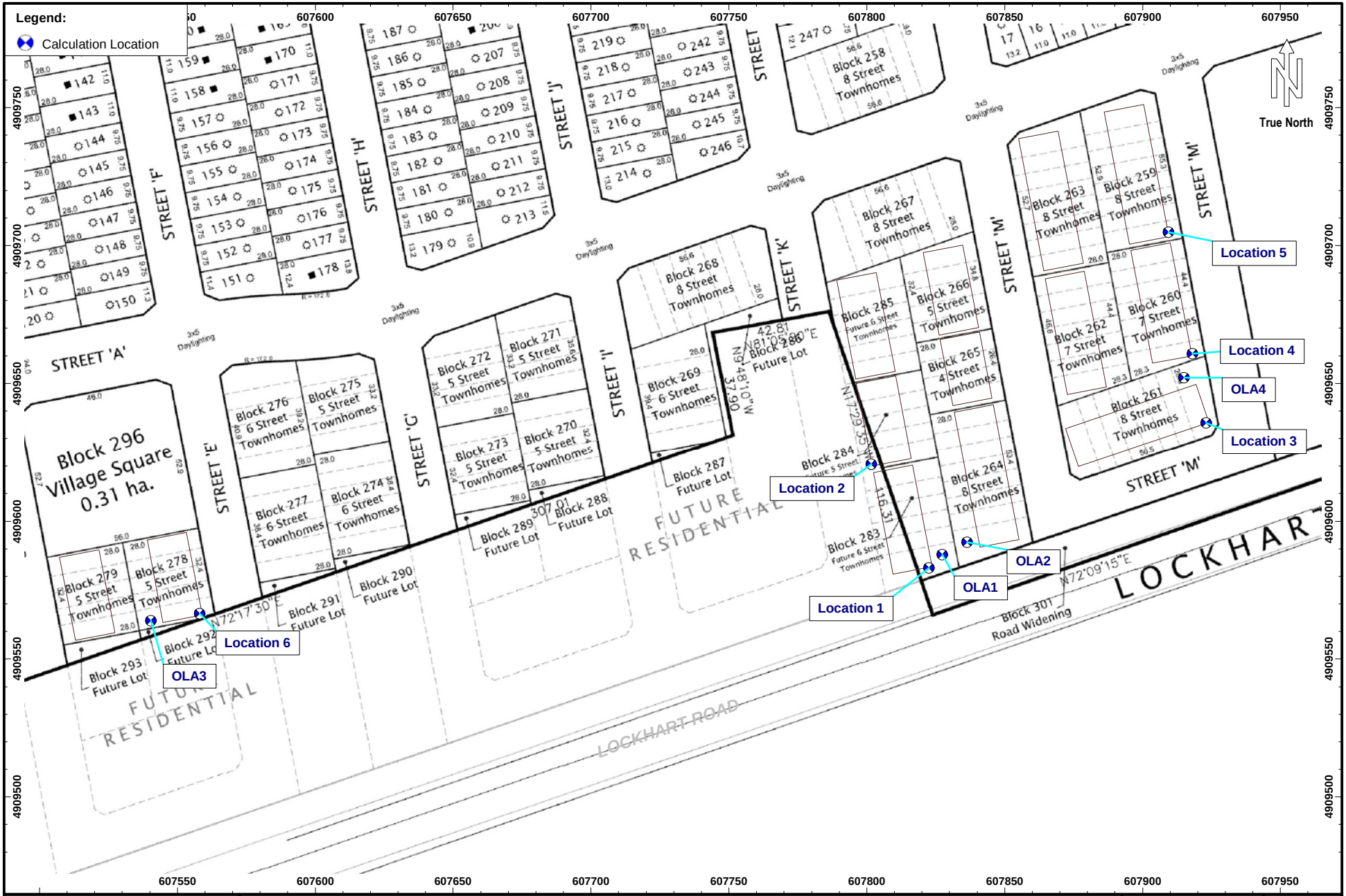


VALCOUSTICS
Canada Ltd.
consulting acoustical engineers

Title	Date	Figure
Key Plan	**2018-08-08**	**1**
Project Name	Project No.	
400 Lockhart Road, Barrie	**118-0349**	

J:\2018\1180349\000\Reports\For V0_1\Figures\KeyPlan.cna

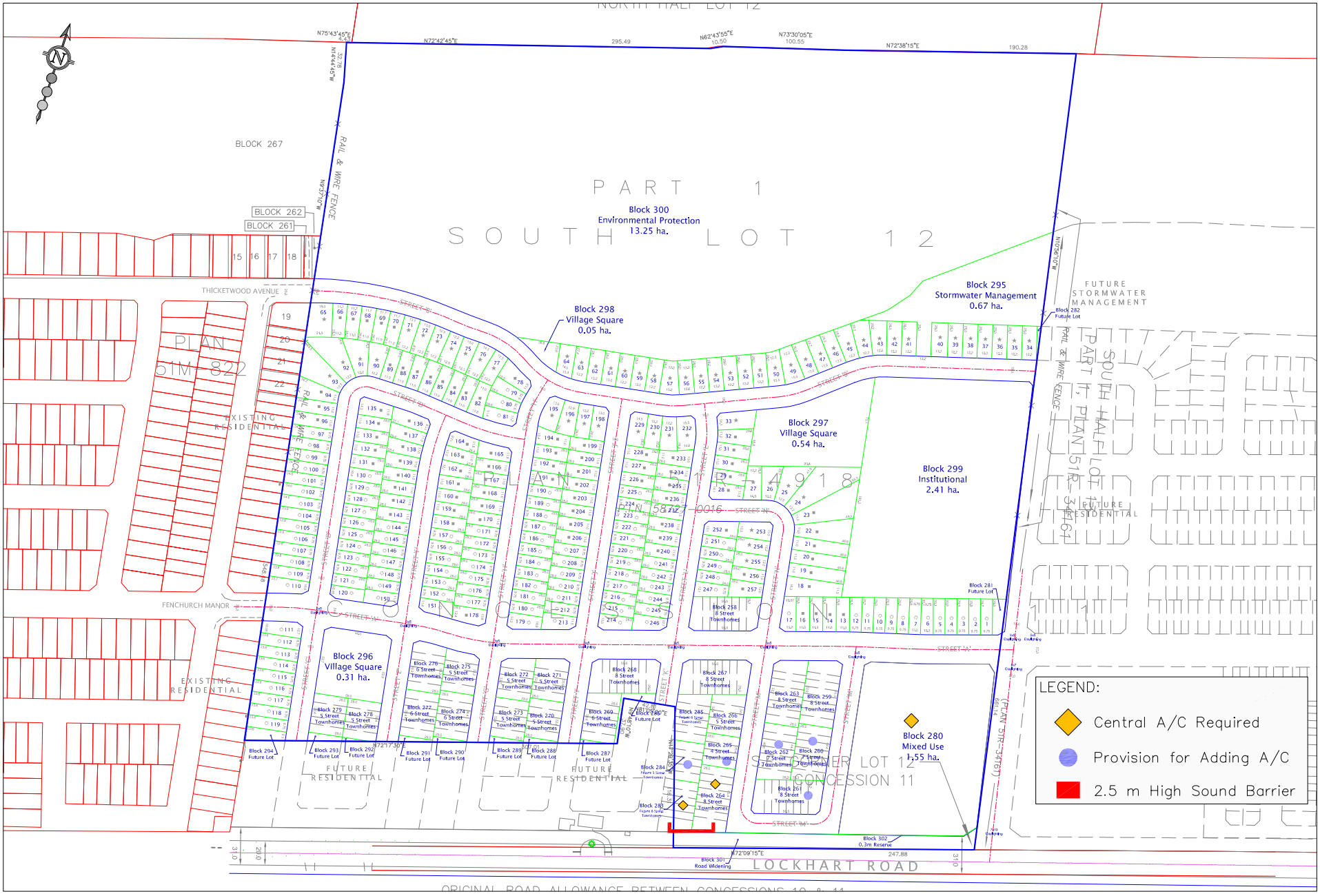
Date Plotted: 08.08.18



VALCOUSTICS Canada Ltd. consulting acoustical engineers	Title: **Calculation Locations**	Date: **2018-10-01**	Figure: **2**
	Project Name: **400 Lockhart Road, Barrie**	Project No.: **118-0349**	

E:\AA\1180349\Figure 2.cna

Date Plotted: 01.10.18

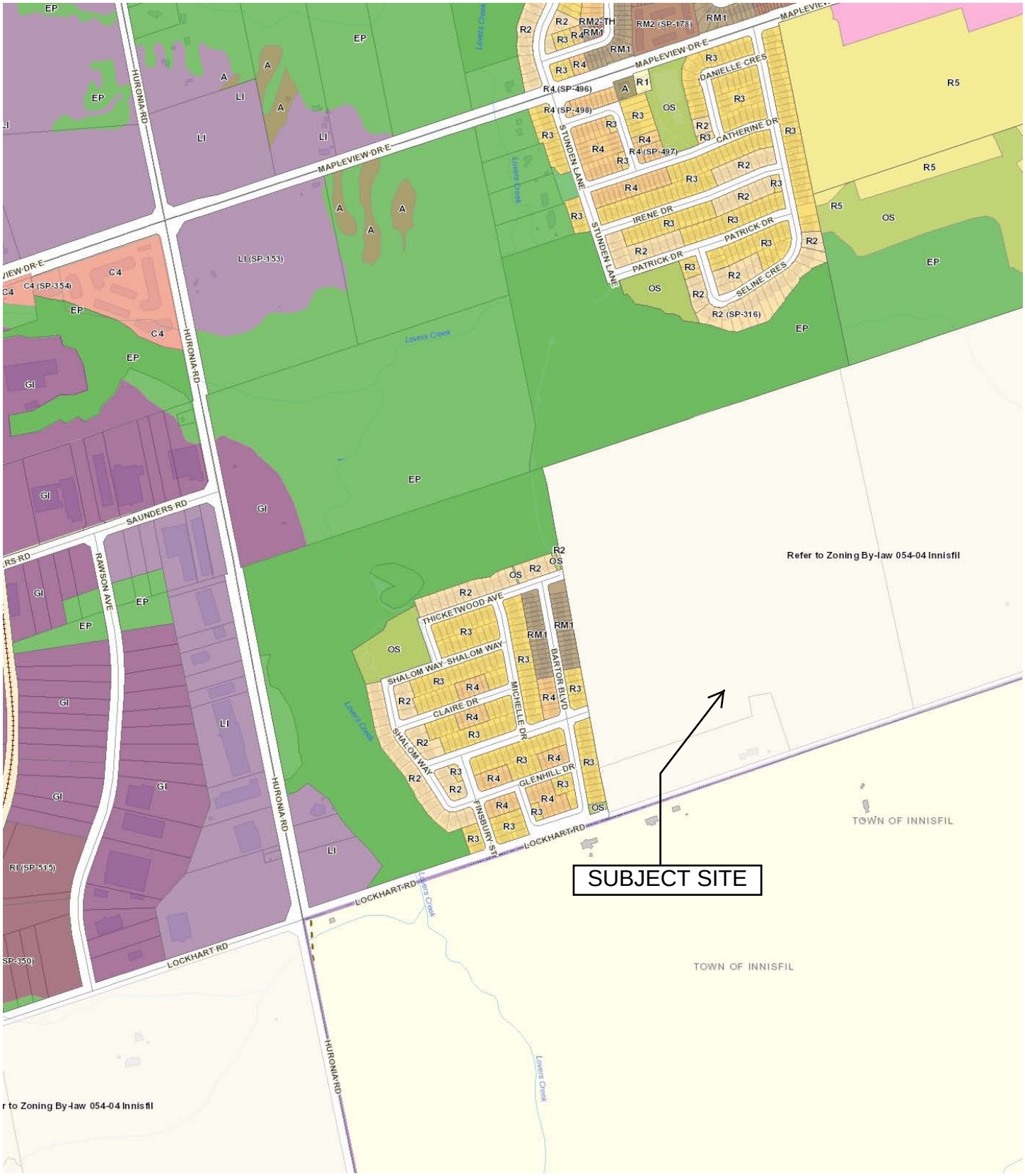


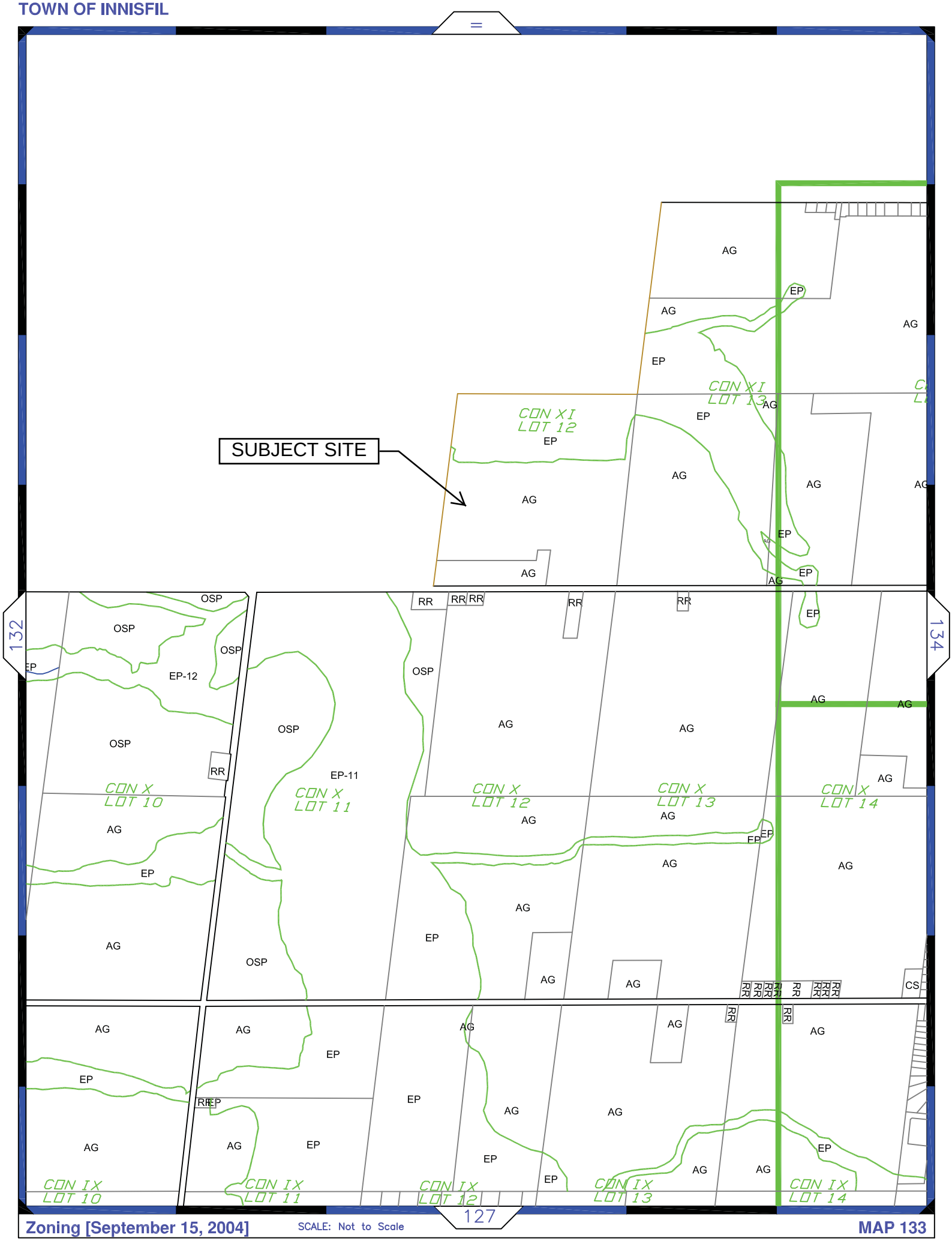
VALCOUSTICS Canada Ltd.	Title: Noise Control Requirements	Date: 2018-10-01	Figure: 3
	Project Name: 400 Lockhart Road, Barrie	Project No.: 118-0349	

APPENDIX A

EXISTING ZONING AND LAND-USE DESIGNATION

CITY OF BARRIE ZONING




SUBJECT SITE
CON XI LOT 12
CON XI LOT 13
CON X LOT 10
CON X LOT 11
CON X LOT 12
CON X LOT 13
CON X LOT 14
CON IX LOT 10
CON IX LOT 11
CON IX LOT 12
CON IX LOT 13
CON IX LOT 14
132
134
127
AG
EP
OSP
RR
CS
EP-12
EP-11

BIG BAY POINT ROAD

YONGE STREET

Section
9.5.4.3

MAPLEVIEW DRIVE EAST

LOCKHART ROAD

SUBJECT SITE

20 SIDEROAD

Secondary Plan Boundary
Urban Area Boundary
Existing Parcel Fabric
Railway
Stream
Stormwater Management Facility
Stormwater Management Facility (Optional)
Existing and Proposed Roads
Pathway System
Natural Heritage System
Residential Area
Med/High Density Residential Area
Yonge Mixed-Use Corridor
Neighbourhood Mixed-Use Node
Rural Area
Defined Policy Area
Secondary School
Recreation Centre/Community Park/School
School/Neighbourhood Park Area
V Village Square

0 0.25 0.5 1 km

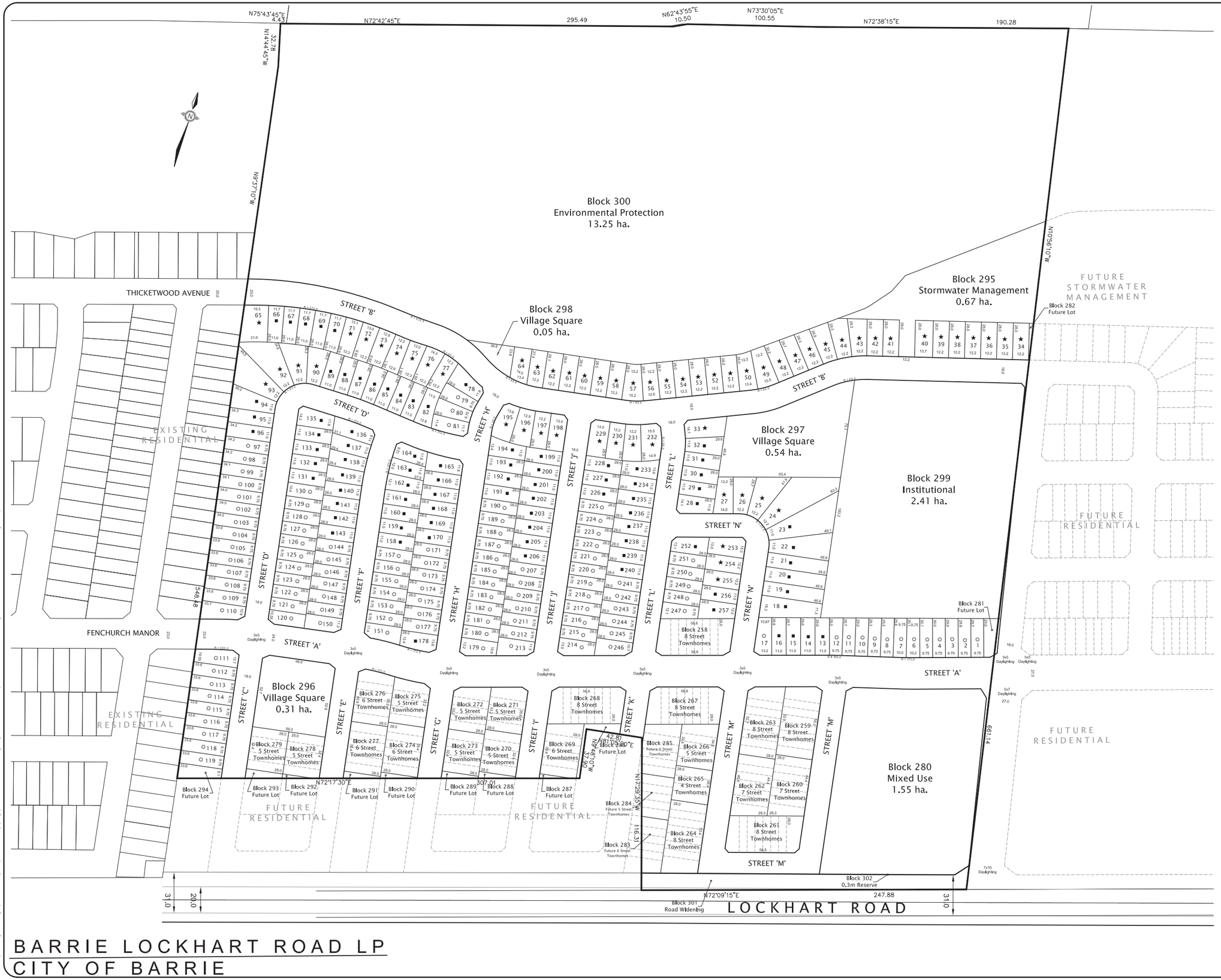
Schedule 9C
Land Use

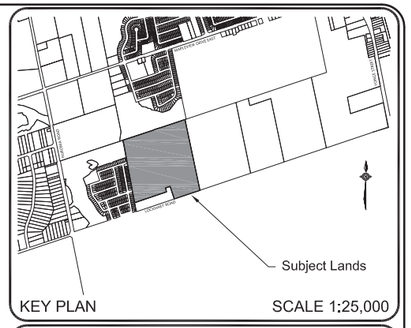
City of Barrie
Hewitt's Secondary Plan

Preliminary Draft - September 2012

APPENDIX B

DRAFT PLAN





Draft Plan of Subdivision

Part of the South Half of Lot 12, Concession 11
Former Township of Innisfil, Now in the

City of Barrie

2018

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE THE JONES CONSULTING GROUP LTD., TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE CITY OF BARRIE FOR APPROVAL.

DATE _____ OWNER _____

SURVEYOR'S CERTIFICATE

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

DATE _____ ONTARIO LAND SURVEYORS _____

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON DRAFT PLAN
b) SHOWN ON DRAFT PLAN
c) SHOWN ON KEY PLAN
d) RESIDENTIAL, SWM, MIXED USE, OPEN SPACE, INSTITUTIONAL & EP
e) SHOWN ON DRAFT PLAN
f) SHOWN ON DRAFT PLAN
g) SHOWN ON DRAFT PLAN
h) MUNICIPAL PIPED WATER TO BE PROVIDED
i) SANDY/CLAY LOAM
j) SHOWN ON DRAFT PLAN
k) ALL MUNICIPAL SERVICES TO BE PROVIDED
l) SHOWN ON DRAFT PLAN

STATISTICS

RESIDENTIAL LOT BREAKDOWN

★ 12.2 m Singles		59 units
■ 11.0 m Singles		85 units
☼ 9.75 m Singles (LOTS 1 - 257)		113 units
SUB TOTAL	8.61 ha.	257 units
Street Townhomes (6.0 m/each) (BLOCKS 258 - 279)	2.60 ha.	138 units
Mixed Use (40 - 120 uph) (BLOCKS 280)	1.55 ha.	62 - 186 units
Future Lots/Blocks (BLOCKS 281 - 294)	0.40 ha.	13 units
Stormwater Management Pond (BLOCK 295)	0.67 ha.	
Village Square Open Spaces (BLOCKS 296 - 298)	0.90 ha.	
Institutional (BLOCK 299)	2.41 ha.	
Environmental Protection (BLOCK 300)	13.25 ha.	
Widening & Reserve (BLOCKS 301 & 302)	0.31 ha.	
Roads (MINOR COLLECTOR, STREET 'A') (LOCAL STREETS 'B' - 'N')	6.04 ha.	
TOTAL	36.72 ha.	470 - 594 units

20 0 20 40 60 80 100 120m
SCALE = 1:1250 (A1)

BARRIE LOCKHART ROAD LP
DRAFT PLAN OF SUBDIVISION

Date Issued:	SEPT. 25, 2018
Checked By:	RD
Project No.:	SOR-17045
Drawn By:	m.c.r.
Drawing Name:	SOR-17045-CP-11.dwg

JONES CONSULTING GROUP LTD.
PLANNERS & ENGINEERS
229 Mapleview Drive East, Unit 1, Barrie, Ontario, L4M 0W5
Phone: 705-734-2538 Fax: 705-734-1056
www.jonesconsultinggroup.com

BARRIE LOCKHART ROAD LP
CITY OF BARRIE

APPENDIX C

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX C

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

Reference: MECP Publication NPC-300, October 2013: *"Environmental Noise Guideline, Stationary and Transportation Source – Approval and Planning"*.

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road	23:00 to 07:00	45 dBA
	Rail	23:00 to 07:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Sleeping quarters	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 0
Sleeping quarters	Road	23:00 to 07:00	40 dBA
	Rail	23:00 to 07:00	35 dBA
	Aircraft	24-hour period	NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30#
	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	55* dBA
		19:00 to 23:00(4)	55* dBA

…./cont'd

SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of Noise Sensitive Spaces	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
		23:00 to 07:00(1)	45* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	50* dBA
		23:00 to 07:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	45* dBA
		23:00 to 07:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	60* dBA
		19:00 to 23:00(4)	60* dBA
		23:00 to 07:00(4)	55* dBA

\# may not apply to in-fill or re-development.
* or the minimum hourly background sound exposure $L_{eq(1)}$, due to road traffic, if higher.
(1) Class 1 Area: Urban.
(2) Class 2 Area: Urban during day; rural-like evening and night.
(3) Class 3 Area: Rural.
(4) Class 4 Area: Subject to land use planning authority's approval.

Reference: MECP Publication ISBN 0-7729-2804-5, 1987: *"Environmental Noise Assessment in Land-Use Planning"*.

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

APPENDIX D

ROAD TRAFFIC CORRESPONDENCE

Anthony Amarra

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Tuesday, July 24, 2018 1:08 PM
To: Anthony Amarra
Subject: RE: Traffic Data Request - Lockhart Drive

ADT counts for Lockhart Drive east of Huronia Road – 5,000 to 7,000 vehicles per day

- Number of lanes – 2 lanes
- Posted speed – 60km/h
- Annual growth rates – 9% per year to a horizon year of 2031
- Percent medium trucks – 2%
- Percent heavy trucks – 2%
- Day/night split – do not have

Thanks,

Justin MacDonald, C.E.T.,
Senior Transportation Operations Technologist
Roads, Parks & Fleet

City of Barrie: Barrie Operations Centre, 165 Ferndale Drive North, Barrie ON, L4N 9V9
Office: 705-739-4220 5178

From: Anthony Amarra [mailto:anthony@valcoustics.com]
Sent: Tuesday, July 24, 2018 12:40 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: RE: Traffic Data Request - Lockhart Drive

Good afternoon Justin,

I just wanted to follow up on the request below. Do you have the data available for Bayview Drive, Thicketwood Ave, and Fenchurch Manor?

Regards,

Anthony Amarra, M.Sc.

30 Wertheim Court, Unit 25
Richmond Hill, Ontario
Canada L4B 1B9
9057645223

From: Anthony Amarra
Sent: Tuesday, July 17, 2018 3:06 PM
To: Justin.MacDonald@barrie.ca
Subject: Traffic Data Request - Lockhart Drive

Good afternoon Justin,

APPENDIX E

SAMPLE CALCULATION

```
STAMSON 5.04        NORMAL REPORT        Date: 10-08-2018 08:37:08
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: L1_SF.te             Time Period: Day/Night 16/8 hours
Description: Location 1 - South Facade


Road data, segment # 1: Lockhart (day/night)
-------------------------------------------
Car traffic volume  : 18542/2060  veh/TimePeriod  *
Medium truck volume :   386/43    veh/TimePeriod  *
Heavy truck volume  :   386/43    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  21461
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Lockhart (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.19 m

ROAD (0.00 + 67.19 + 0.00) = 67.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  69.04   0.00  -1.86   0.00   0.00   0.00   0.00  67.19
-------------------------------------------------------------------------------

Segment Leq : 67.19 dBA

Total Leq All Segments: 67.19 dBA
```

Results segment # 1: Lockhart (night)

Source height = 1.19 m

ROAD (0.00 + 60.66 + 0.00) = 60.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.52	0.00	-1.86	0.00	0.00	0.00	0.00	60.66

Segment Leq : 60.66 dBA

Total Leq All Segments: 60.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.19
(NIGHT): 60.66

```
STAMSON 5.04        NORMAL REPORT        Date: 10-08-2018 08:40:03
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: ola1.te              Time Period: 16 hours
Description: OLA1 - Mitigated

Road data, segment # 1: Lockhart
--------------------------------
Car traffic volume  : 18542 veh/TimePeriod  *
Medium truck volume :   386 veh/TimePeriod  *
Heavy truck volume  :   386 veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Lockhart
------------------------------
Angle1   Angle2           : -90.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  26.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 45.00 deg
Barrier height            :   2.50 m
Barrier receiver distance :   8.60 m
Source elevation          : 264.35 m
Receiver elevation        : 265.39 m
Barrier elevation         : 265.05 m
Reference angle           :   0.00

Results segment # 1: Lockhart
-----------------------------

Source height = 1.19 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.19 !        1.50 !        1.39 !       266.44

ROAD (0.00 + 55.43 + 0.00) = 55.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     45   0.52  69.04   0.00  -3.63  -2.11   0.00   0.00  -7.87  55.43
-------------------------------------------------------------------------------

Segment Leq : 55.43 dBA
Total Leq All Segments: 55.43 dBA

TOTAL Leq FROM ALL SOURCES:       55.43
```