Environmental Noise Feasibility Study

5209 Stonehaven Drive

Proposed Residential Development

City of Burlington

December 9, 2020
Project: 117-0082-100

Prepared for

IBI Group

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Canada Ltd.

Version History

Version #	Date	Comments
1.0	May 25, 2017	Final – Issued for Submission
2.0	July 13, 2020	Final – Issued for Redline Submission
2.1	December 9, 2020	Revisions to Appendix F based on comments from City of Burlington

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1.0 INTRODUCTION

1.1 BACKGROUND

Valcoustics Canada Ltd. (VCL) previously prepared an Environmental Noise Feasibility Study dated May 25, 2017 (herein referred to as the "Noise Report") in support of the Draft Plan of Subdivision and Re-zoning application for the proposed residential development on the south side of Dundas Street (municipally known as 5209 Stonehaven Drive) as well as the Consent application for the 3-lot parcel on the east side of Orchard Road (municipally known as 2474 Sutton Drive) in the City of Burlington. Subsequent addendum letters for both parcels were also provided on November 17, 2017, March 14, 2018, June 14, 2019 and August 19, 2019 in response to comments from the City of Burlington and Region of Halton.

The City of Burlington approved the Consent application for 2474 Sutton Drive on April 5, 2018 and the zoning by-law amendment application for 5209 Stonehaven Drive on June 18, 2018.

1.2 PURPOSE

This Environmental Noise Feasibility Study has been prepared to update the noise assessment based on the updated Draft Plan for 5209 Stonehaven Drive. The purpose is to determine appropriate mitigation measures required to meet the applicable Ministry of the Environment, Conservation and Parks (MECP) noise guidelines as well as the requirements of the City of Burlington and Region of Halton.

This report addresses the minor changes that have been made to the Draft Plan for 5209 Stonehaven Drive. The changes include moving the cul-de-sac slightly east, which also resulted in some of the lot lines shifting around the cul-de-sac.

2.0 SITE AND SURROUNDING AREA

2.1 SITE LOCATION

The site is located on the southeast corner of Dundas Street and the Canadian National Railways (CN) Halton Subdivision. The site is surrounded by:

- The CN rail line, with an existing fitness centre and other retail/commercial uses beyond, to the west;
- Dundas Street, with existing industrial uses beyond (Dufferin Concrete and Meridian Brick), to the north;
- A proposed park, with an existing school beyond (John William Boich Public School), to the east; and
- Existing residential uses to the south.

Figure 1 shows the key plan.

The site is currently vacant. At the western edge adjacent to the rail line, there is an existing berm with a 3.0 m high acoustic fence on top. The acoustic fence and berm continue southward and are part of the noise mitigation measures for the existing dwellings to the south.

The site is currently zoned RO3 – Residential Zones (Orchard Community), which permits single-family and townhouse dwellings. The surrounding area includes other lands zoned RO3, as well as D (Development Zone), CR (Regional Commercial), GE (General Employment) and S (Utility Services).

Appendix A contains a zoning map.

2.2 PROPOSED DEVELOPMENT

The site consists of 10 detached lots (Lots 1 to 10) and one 8-unit townhouse block (Block 11). It is understood that the dwellings will be two-storeys in height. Outdoor living areas (OLAs) in the form of rear yards will be provided for all dwellings.

The assessment is based on the Draft Plan dated March 27, 2020, the drawing titled “Proposed Footprints” dated March 11, 2020, and the Grading Plan dated May 1, 2020, prepared by IBI Group.

Appendix B contains the relevant drawings.

Sound barriers will be provided around the east, north and west sides of the overall site, including:

- The existing 3.0 m high acoustic fence atop berm on the west portion of Lots 1 to 3 and part of Lot 4;
- A proposed 3.0 m high acoustic fence atop berm (to match the existing acoustic fence and berm) on part of the west portion of Lot 4, and along the property line parallel with Dundas Street on Lots 4 to 7; and
- A proposed 2.5 m high acoustic fence on the east portion of Lots 7 to 10.

The sound barriers are shown on Figure 2.

3.0 NOISE SOURCES

3.1 TRANSPORTATION NOISE SOURCES

The primary transportation noise sources with potential to impact the site are road traffic on Dundas Street and rail traffic on the CN rail line. Appleby Line is over 400 m west of the site and is not expected to cause any significant noise impact, relative to the primary sources. In addition, traffic volumes on other surrounding minor roadways would also be minor compared to Dundas Street and have therefore not been included.

Road and rail traffic data correspondence are included as Appendix C.

3.2 ROAD TRAFFIC

Existing (2016) road traffic volumes for Dundas Street were obtained from the Region of Halton. The data was in the form of 15 minute volume counts over a 24 hour period. The volumes were also provided in terms of length of vehicle. Percentage of commercial vehicles (heavy/medium trucks) were derived from the length data based on guidance from the Region.

The day/night split was taken from the traffic counts. The 24-hour volume was escalated to the year 2040 (20 year future projection) as per the Region of Halton Noise Abatement Policy for regional roads.

The Region of Halton is in the process of completing detailed design work for the road widening of Dundas Street. It will eventually be six lanes. As part of the Class Environmental Assessment, a noise assessment was done by MMM Group. The assessment used a future (2031) traffic volume of 42,800 vehicles per day with the Dundas Street widening (corresponding to 51,150 vehicles per day escalating to the year 2040 with a 2% growth rate). This volume was less than that provided by the Region of Halton for this study (58,858 vehicles per day for the year 2040). Thus, to be conservative, the higher volume obtained using the traffic counts from the Region of Halton was used.

Note, the grade of Dundas Street is elevated relative to the site, as the highway passes over the railway line. This was accounted for in the assessment.

The road traffic data is shown in Table 1A.

3.3 RAIL TRAFFIC

CN rail traffic for the Halton Subdivision applicable to the year 2019 was obtained directly from CN. The rail traffic data was escalated to the year 2030 design condition (10-year future projection) at a rate of 2.5% compounded annually, as indicated in the traffic data correspondence from CN.

The rail traffic data is summarized in Table 1B.

The CN Halton Subdivision contains two mainline tracks and is continuously welded throughout the study area.

3.4 STATIONARY SOURCES

The stationary sources in the vicinity of the site include:

- The Meridian Brick facility (formerly Forterra Brick) to the north;
- John William Boich Public School to the east;
- Existing commercial buildings to the west and northwest; and
- The Dufferin Concrete facility to the northwest.

In the previous Noise Report it was concluded that sound levels from the stationary sources were expected to comply with the applicable MECP noise guideline limits. The changes to the Draft Plan would not affect the results of that assessment or the conclusions. That is, compliance with the applicable sound level limits is still expected. Hence, the stationary noise sources have not been considered further in this report.

4.0 ENVIRONMENTAL NOISE REQUIREMENTS

4.1 MECP ENVIRONMENTAL NOISE GUIDELINES

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 contained in NPC-300 are discussed briefly below and summarized in Appendix D.

4.1.1 Architectural Elements

During daytime hours (0700 to 2300 hours), the indoor criterion for road noise is $L_{eq,Day}$(1) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night (2300 to 0700 hours), the indoor criterion for road noise is $L_{eq,Night}$(2) of 45 dBA for sensitive spaces such as living/dining rooms and dens, and 40 dBA for bedrooms (i.e. sleeping quarters).

For rail noise, the indoor sound levels are $L_{eq\ Day}$ of 40 dBA for living/dining rooms and bedrooms, $L_{eq\ Night}$ of 40 dBA for living/dining rooms, and $L_{eq\ Night}$ of 35 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.

4.1.2 Ventilation Requirements

In accordance with the MECP noise guidelines for transportation noise sources, if the daytime sound level ($L_{eq,Day}$) at the exterior facade 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, and central air conditioning is required. For daytime sound levels between 56 dBA and 65 dBA

(1) 16-hour daytime (0700 to 2300 hours) equivalent continuous sound pressure level.

(2) 8-hour nighttime (2300 to 0700 hours) equivalent continuous sound pressure level.

inclusive, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupants of the potential interference with some activities is also required. At nighttime, air conditioning would be required when the sound level exceeds 60 dBA ($L_{eq,Night}$) at a noise sensitive window. The provision for adding air conditioning is required when the nighttime sound level is greater than 50 dBA.

4.1.3 Outdoors

For OLA's the guideline sound level limit is a daytime 16-hour equivalent sound level ($L_{eq,Day}$) of 55 dBA, with an excess not more than 5 dBA considered acceptable if it is not feasible to achieve the 55 dBA objective for technical, economic or administrative reasons (i.e. an upper allowable design limit of 60 dBA). In these cases, warning clauses must be provided and registered on title. There are no nighttime sound level limits for OLAs.

The point of assessment for an at-grade OLA is 3 m from the building facade, 1.5 m above grade, and aligned with the midnight of the subject building facade. It should be noted that a balcony/terrace is only considered an OLA:

- if it is the only OLA for the occupant,
- it is unenclosed, and
- it is 4 m in depth or more.

4.2 REGION OF HALTON NOISE ABATEMENT GUIDELINES

The Region of Halton has published a Noise Attenuation Technical Policy for Regional Roads and New Developments (Report CS-69-06) as well as a Noise Abatement Guideline document. These policies indicate that the sound level criteria that should be met and are essentially the same as those outlined in the MECP noise guidelines (i.e., NPC-300). There are also some additional requirements for sound barriers and on the extrapolation of road traffic data in the Policy:

- Sound barriers must be installed on complete blocks and constructed on the Region's right-of-way (where feasible).
- The maximum height of a noise barrier wall is 3 metres measured from the base elevation, with higher noise barrier walls allowed by the Region subject to investigation of the aesthetics and depending on the availability of a wide right-of-way (R.O.W.) and deep residential lots.
- The Region also requires that noise assessments be based on a future 20-year design criterion, i.e., road traffic volumes are to be extrapolated 20 years in the future.

4.3 FEDERATION OF CANADIAN MUNICIPALITIES/RAILWAY ASSOCIATION OF CANADA

The Federation of Canadian Municipalities and Railway Association of Canada (FCM/RAC) published noise control guidelines in 2013. CN has adopted the use of these guidelines. The publication suggests a dwelling setback of at least 30 m for a residential development adjacent to a principal main line, if in combination with a safety berm of at least 2.5 m (at a 2.5:1 slope). A 5.5 m high sound barrier is also suggested (i.e., 3.0 m high acoustic fence atop the 2.5 m high safety berm). It is noted that reduced setback distances can be used under certain conditions.

Aside from the above, the sound level design objectives of the FCM/RAC are similar to those of the MECP.

5.0 TRANSPORTATION NOISE ASSESSMENT

5.1 METHOD

Using the traffic data in Tables 1A and 1B, the sound levels in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$ were determined using STAMSON V5.04 – ORNAMENT/STEAM, the computerized road and rail traffic noise prediction model of the MECP.

The daytime and nighttime sound levels were calculated at 4.5 m above grade representing the second-storey windows. At the rear yard OLAs, the receptor height was 1.5 m above grade.

To be conservative, the existing and proposed sound barriers as described in Section 2.2 were not included in the assessment of noise at the plane of windows. However, this screening was included in the OLA noise assessment.

5.2 RESULTS

The highest predicted sound levels of 69 dBA during the daytime and 66 dBA during the nighttime are predicted to occur on the west façade of Lot 4, closest to both Dundas Street and the railway line. A nighttime sound level of 66 dBA is also predicted at the west facades of Lots 1 to 3.

At the OLAs, the highest predicted daytime sound level of 60 dBA occurs at the rear yard of Lots 5 and 6.

Table 2 shows the predicted sound levels due to the transportation sources. Sample calculations are included as Appendix E.

5.3 TRANSPORTATION NOISE CONTROL MEASURES

The noise control measures for transportation noise sources include ventilation and architectural elements to protect the indoor noise environment, design features to protect OLAs, and appropriate warning clauses.

Table 3, the notes to Table 3 and Figure 2 summarize the noise control measures for the site. These are also discussed in the following sections.

5.3.1 Ventilation Requirements

Air conditioning is mandatory for Lots 1 to 7 to allow for windows and exterior doors to remain closed for noise control purposes.

Lots 8 to 10 and Block 11 require the provision to allow for the future installation of air conditioning by the occupant. For low-density developments, this normally takes the form of a ducted forced-air heating system suitably sized to accommodate the addition of central air conditioning.

5.3.2 Exterior Wall and Window Construction

The required Sound Transmission Class (STC) ratings for the exterior facades were calculated assuming windows have a surface area equalling 30% of the associated room floor area and exterior walls have a surface area equalling 80% of the associated room floor area.

Based on these assumptions, the following window and exterior wall constructions would be needed to meet the MECP indoor noise guideline limits:

- Lots 1 to 6 – brick veneer (or masonry equivalent) exterior wall construction and windows meeting up to STC 36.

- Lots 7 to 10 and Block 11 – exterior wall construction meeting STC 54 and windows meeting up to STC 30.

The above requirements are based on assumed window and wall areas. The assessment should be updated and the STC requirements confirmed once detailed floor plan and elevation drawings are available.

5.3.3 Outdoors

With the sound barriers as described in Section 2.2, daytime sound levels of 59 dBA to 60 dBA are predicted at Lots 1 to 7. At Lots 8, 9 and 10 the daytime sound levels are predicted to be 57 dBA. These OLA sound levels exceed the 55 dBA target sound level but are within the allowable +5 dBA leeway indicated in the MECP guidelines.

The proposed mitigation measures (including the existing acoustic fence on berm) are considered the most feasible and result in compliance with the MECP noise guidelines. Thus, additional mitigation is not recommended.

- For Lots 1 to 3, the proposed mitigation makes use of the existing infrastructure (berm and fence) and will result in a consistent appearance with the existing dwellings to the south. Increasing the barrier height at these lots, would require the demolition and reconstruction of the existing berm and acoustic fence, which is not practicable.
- At Lots 4 to 7, the proposed height will result in a consistent appearance with the existing sound barrier at Lots 1 to 3 and the existing dwellings to the south.
- At Lots 8 to 10, the predicted OLA sound level is close enough to 55 dBA that increasing the sound barrier height would have no significant effect in practice.

For completeness, Appendix F includes a table showing the different acoustic fence heights required to achieve sound levels from 55 dBA to 60 dBA (in 1 dB increments) at Lots 3 to 7. Note, the sound barrier heights shown for Lot 3 would also apply to Lots 1 and 2.

5.3.4 Railway Safety Berm

Although not specifically a noise requirement, the berm between the railway line and Lots 1 to 4 is considered part of the noise mitigation for the rear yards. The top of berm is 3 m (or more) above the top of rail. This is expected to meet the requirements of the RAC/FCM guidelines.

It should be noted that the berm is a railway safety feature, and the requirements and suitability of the proposed berm from a safety perspective will need to be confirmed by others.

5.3.5 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 (and noise control measures implemented), 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 appropriate warning clauses for the dwellings.

6.0 CONCLUSIONS

The noise assessment has been updated based on the revised Draft Plan and building footprints. With the proposed noise mitigation, the predicted sound levels comply with the applicable MECP noise guidelines, the safety requirements of the Region of Halton and City of Burlington. The site is considered feasible from the acoustic perspective.

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TABLE 1A: ROAD TRAFFIC DATA

Roadway	AADT(1)		% Trucks		Day/Night Split (%)	Speed (km/hr)	Grade (%)
	Current(2)	Future(3)	Medium	Heavy			
Dundas Street	36 593	58 858	3.1	1.1	91.7/8.3	80	2.3

Notes:

(1) AADT – Annual Average Daily Traffic.

(2) Current volume represents year 2016 ATR counts obtained from the Region of Halton Waste Management and Road Operations Department.

(3) Future volume has been projected to the year 2040 design condition (20-year projection, as per the Region of Halton requirements) using a 2% growth rate compounded annually. The volume was split equally between the eastbound and westbound traffic in the analysis.

TABLE 1B: RAIL TRAFFIC DATA

Railway	Time Period	Train Type	Volume		# of Locomotives per Train	# of Cars per Train	Speed (km/hr)
			Current(1)	Future(2)			
CN Halton Subdivision	Daytime	Freight	10	13.1	4	140	80
		Way Freight	2	2.6	4	25	80
	Nighttime	Freight	4	5.2	4	140	80

Notes:

(1) Current (year 2019) data obtained from CN.

(2) Future (year 2030) projections calculated using a 2.5% growth rate compounded annually.

TABLE 2: PREDICTED SOUND LEVELS DUE TO TRANSPORTATION SOURCES

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Lot 1 West Facade	CN Halton Sub.	48	66	65
	Dundas St. WB	118	59	52
	Dundas St. EB	105	60	53
	TOTAL	**—**	**68**	**66**
Lot 4 Northwest Facade	CN Halton Sub.	48	66	65
	Dundas St. WB	84	61	54
	Dundas St. EB	70	62	55
	TOTAL	**—**	**69**	**66**
Lot 7 North Facade	Dundas St. WB	79	62	55
	Dundas St. EB	65	63	56
	TOTAL	**—**	**66**	**58**
Lot 8 North Facade	Dundas St. WB	95	59	52
	Dundas St. EB	81	60	53
	TOTAL	**—**	**63**	**55**
Block 11 North Facade	Dundas St. WB	141	58	50
	Dundas St. EB	128	58	51
	TOTAL	**—**	**61**	**54**
Lot 3 OLA[3]	CN Halton Sub.	44	56	N/A[4]
	Dundas St. WB	99	53	N/A[4]
	Dundas St. EB	86	54	N/A[4]
	TOTAL	**—**	**59**	**N/A[4]**
Lot 4 OLA[3]	CN Halton Sub.	44	56	N/A[4]
	Dundas St. WB	87	53	N/A[4]
	Dundas St. EB	74	55	N/A[4]
	TOTAL	**—**	**59**	**N/A[4]**
Lot 5 OLA[3]	CN Halton Sub.	51	55	N/A[4]
	Dundas St. WB	74	55	N/A[4]
	Dundas St. EB	61	57	N/A[4]
	TOTAL	**—**	**60**	**N/A[4]**

TABLE 2: PREDICTED SOUND LEVELS DUE TO TRANSPORTATION SOURCES

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Lot 6 OLA[3]	CN Halton Sub.	67	50	N/A[4]
	Dundas St. WB	71	55	N/A[4]
	Dundas St. EB	58	57	N/A[4]
	TOTAL	**—**	**60**	**N/A[4]**
Lot 7 OLA[3]	CN Halton Sub.	92	44	N/A[4]
	Dundas St. WB	81	55	N/A[4]
	Dundas St. EB	67	57	N/A[4]
	TOTAL	**—**	**59**	**N/A[4]**
Lot 8 OLA[3]	Dundas St. WB	101	53	N/A[4]
	Dundas St. EB	87	55	N/A[4]
	TOTAL	**—**	**57**	**N/A[4]**

Notes:

(1) Facade receptors taken at 4.5 m above grade. OLA receptors taken at 1.5 m above grade.

(2) Distance measured from the receptor to the centreline of the roadway/railway.

(3) OLA sound levels account for the attenuation due to the sound barriers described in Section 2.2.

(4) MECP guideline limits do not apply to OLAs during the nighttime.

TABLE 3: NOISE ABATEMENT MEASURES

Dwelling	Air Conditioning[1]	Exterior Wall[2]	Exterior Window[2][3]	Sound Barrier[4]	Warning Clause[5]
Lots 1 to 3	Mandatory	Brick Veneer	STC 36	Existing 3.0 m high acoustic fence on berm	A + B + D + E + F + G + H
Lot 4	Mandatory	Brick Veneer	STC 36	Existing 3.0 m high acoustic fence on berm on a portion of the west boundary Proposed 3.0 m high acoustic fence on berm on portions of the west boundary and north boundary	A + B + D + E + F + G + H
Lots 5 and 6	Mandatory	Brick Veneer	STC 36	Proposed 3.0 m high acoustic fence on berm	A + B + D + E + F + G + H
Lot 7	Mandatory	STC 54	STC 30	3.0 m high acoustic fence on berm on north boundary; 2.5 m high acoustic fence on east boundary	A + B + D + E + F + G + H
Lot 8 to 10	Provision for Adding	STC 54	STC 30	2.5 m high acoustic Fence	A + C + D + E + F + G + H
Block 11	Provision for Adding	STC 54	STC 30	None	A + C + D + E + F + G + H

For notes to Table 3, see the following page.

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) Window and exterior wall requirements were based on standard assumptions and should be reviewed once building (floor) plans are finalized.

3) The window STC rating applies to the entire window assembly and not just the glazing. A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.

   The window supplier should provide acoustical laboratory test data (following a recognized test standard) for the intended windows indicated the STC ratings can be met.

4) Sound barriers must be of solid construction with no gaps cracks or holes and must have a minimum surface density of 20 kg/m².

5) Standard example warning clauses to be registered on title and be included in Offers of Purchase and Sale and Leases on designated units:

   A. "Purchasers 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 lev el may exceed the noise guidelines of the Municipality and the Ministry of the Environment."

   B. "This dwelling unit has been designed with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that Ministry of the Environment."

   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."

   D. "Warning: Canadian National Railway has a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). Canadian National Railway will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

   E. "Purchasers/occupants are advised that due to the proximity to the Dufferin Concrete Facility, noise from this facility may at times be audible."

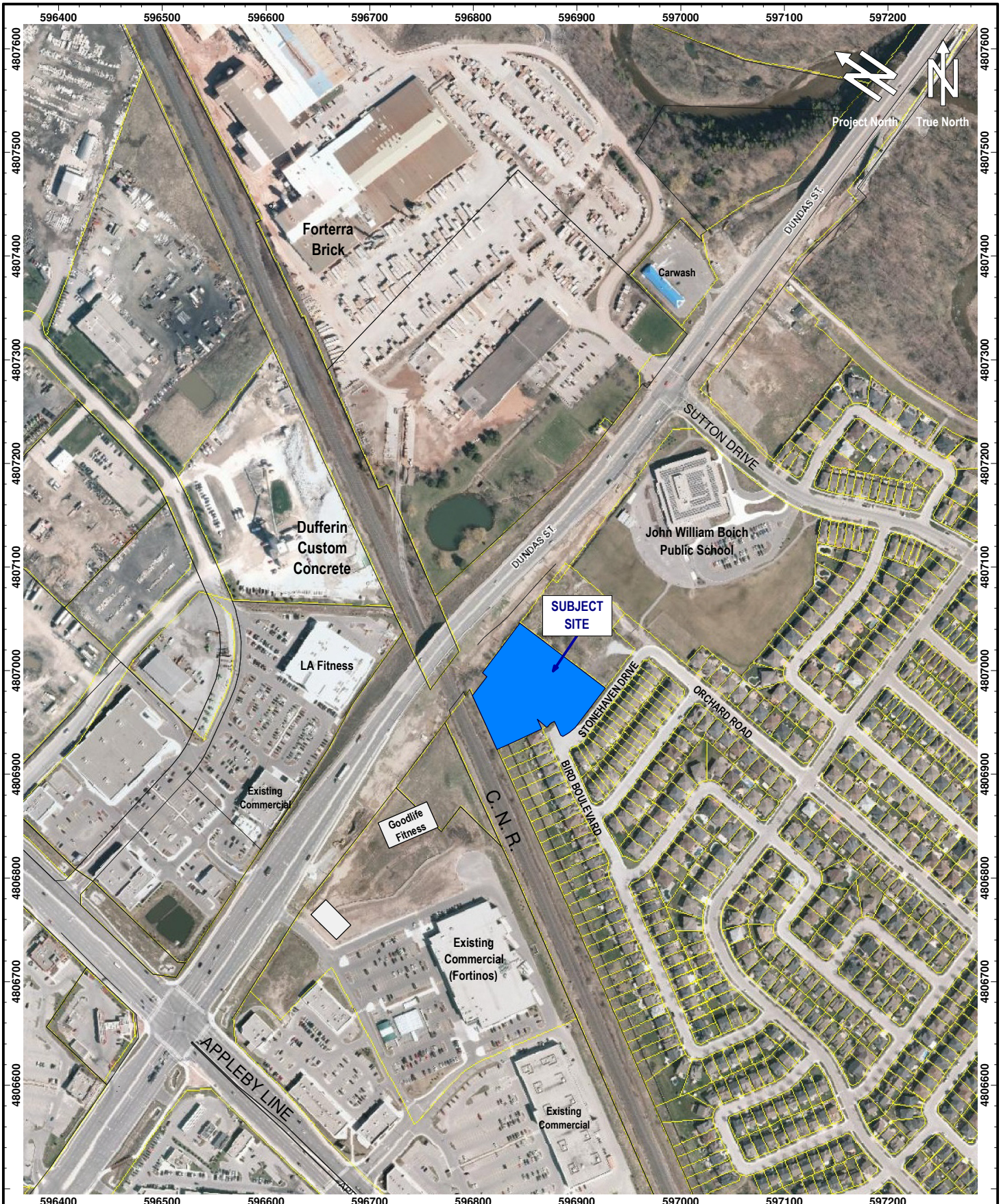
   F. "Purchasers/occupants are advised that due to the proximity to the Meridian Brick Facility, noise from this facility may at times be audible."

   G. "Purchasers/occupants are advised that due to the proximity to the John Boich Public School, noise from this facility may at times be audible."

   H. "Purchasers/occupants are advised that due to the proximity to the commercial uses in the vicinity, noise from these facilities may at times be audible."

6) Conventional roof construction meeting Ontario Building Code requirements is satisfactory in all cases.

7) All exterior doors shall be fully weatherstripped



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Title	Date	Figure
Key Plan	**2020-04-23**	**1**
Project Name	Project No.	
5209 Stonehaven Drive/Burlington	**117-0082-100**	

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Date Plotted: 23.04.20



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Title	Date	Figure
Noise Control Requirements	**2020-04-23**	**2**
Project Name	Project No.	
5209 Stonehaven Drive/Burlington	**117-0082-100**	

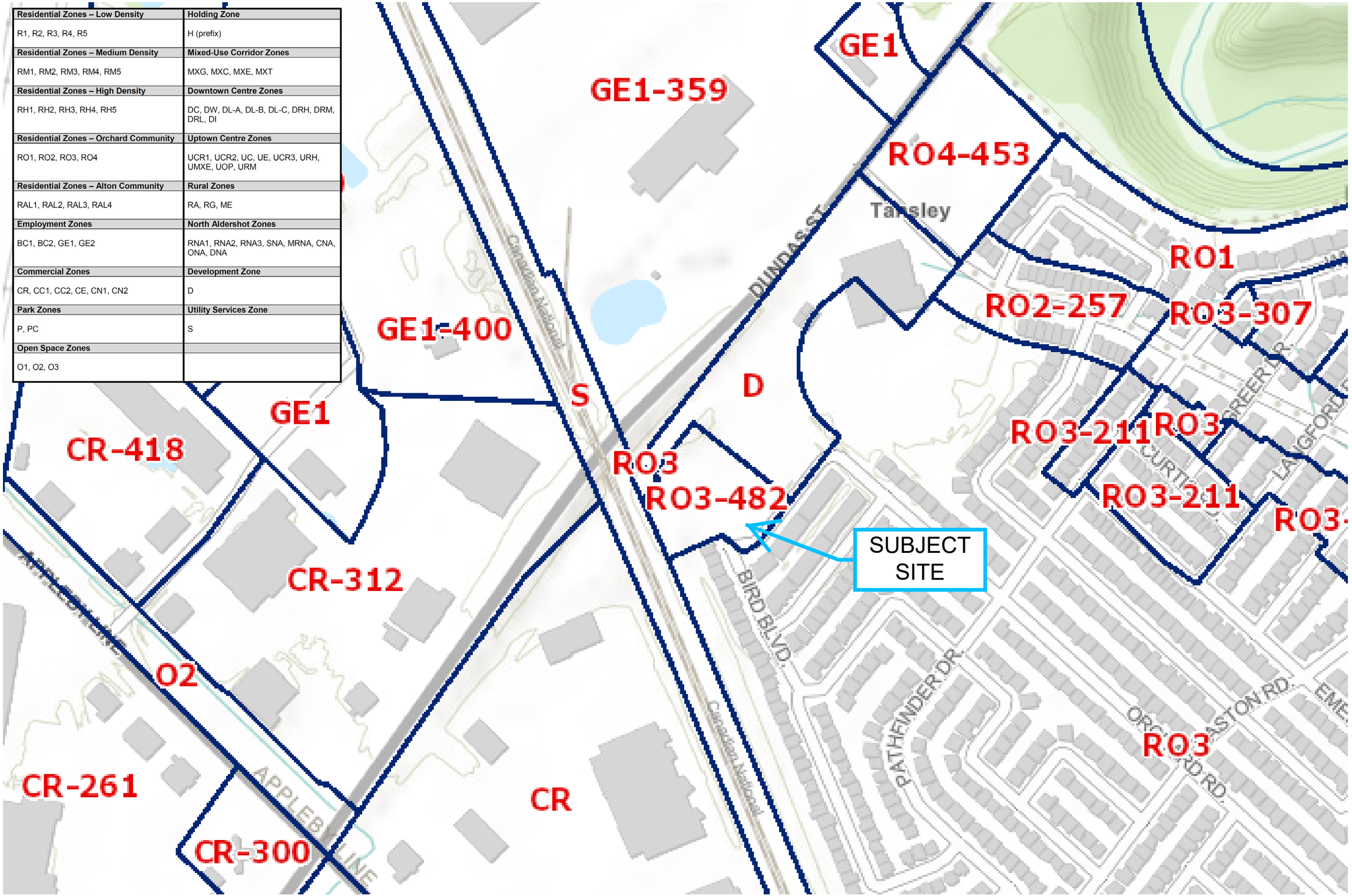
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Date Plotted: 23.04.20

APPENDIX A

ZONING MAP

Residential Zones – Low Density	Holding Zone
R1, R2, R3, R4, R5	H (prefix)
Residential Zones – Medium Density	**Mixed-Use Corridor Zones**
RM1, RM2, RM3, RM4, RM5	MXG, MXC, MXE, MXT
Residential Zones – High Density	**Downtown Centre Zones**
RH1, RH2, RH3, RH4, RH5	DC, DW, DL-A, DL-B, DL-C, DRH, DRM, DRL, DI
Residential Zones – Orchard Community	**Uptown Centre Zones**
RO1, RO2, RO3, RO4	UCR1, UCR2, UC, UE, UCR3, URH, UMXE, UOP, URM
Residential Zones – Alton Community	**Rural Zones**
RAL1, RAL2, RAL3, RAL4	RA, RG, ME
Employment Zones	**North Aldershot Zones**
BC1, BC2, GE1, GE2	RNA1, RNA2, RNA3, SNA, MRNA, CNA, ONA, DNA
Commercial Zones	**Development Zone**
CR, CC1, CC2, CE, CN1, CN2	D
Park Zones	**Utility Services Zone**
P, PC	S
Open Space Zones	
O1, O2, O3	



APPENDIX B

DRAWINGS

DUNDAS STREET WEST

(WIDENED LIMIT BY DEPOSITED PLAN No. 445 MISC. (F-1555-8) 174135)

EASEMENT TO BE REMOVED BY "BELL CANADA", BURLINGTON HYDRO AND CITY OF BURLINGTON

DEVELOPMENT (D)

UTILITY ZONE (S) - RAILWAY TRACK

LOT 5

LOT 6

LOT 4

LOT 7

LOT 3

LOT 2

LOT 1

LOT 8

LOT 9

LOT 10

BLOCK 11
TOWNHOUSES
0.12 ha
8 UNITS
57.1 UPH (INCLUDING LANDS TO BE ACQUIRED)

STREET 'A' 14.2 METRES WIDE
(DEDICATED BY REGISTERED PLAN 20M-)

PIN 07184-4591

EXPROPRIATION PLAN No. 70 MISC.

LOT 5 CONCESSION 1, S.D.S.
LOT 4 CONCESSION 1, S.D.S.

EASEMENT 0.02 ha
SUBJECT TO EASEMENT AS IN INSTRUMENTS HR190304 AND HR368397

SUBJECT TO EASEMENT AS IN INST. Nos HR190294 AND HR190310

EXISTING RESIDENTIAL (RO3)

BIRD BOULEVARD

REGISTERED PLAN 20M-857

BLOCK 28

JOHN WILLIAM BOICH PARKETTE

CONCESSION LOT

DRAFT PLAN OF SUBDIVISION

24T-17001B

PART OF LOT 4 CONCESSION 1 S.D.S.
GEOGRAPHIC TOWNSHIP OF NELSON
ALL OF BLOCK 28, PART OF BLOCK 29, AND 30 (0.30 RESERVE)
PART OF STONEHAVEN DRIVE (SUBDIVISION REGISTERED PLAN 20M-857
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

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This drawing has been prepared solely for the intended use, thus any reproduction or distribution for any purpose other than authorized by IBI Group is forbidden. The contractor shall verify and be responsible for all dimensions and conditions on the job, and IBI Group shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to IBI Group for general conformance before proceeding with fabrication.

IBI Group Professional Services (Canada) Inc.
is a member of the IBI Group of companies

LAND USE SCHEDULE

LOTS/BLKS	LAND USE	AREA ha	POTENTIAL # OF UNITS	
RESIDENTIAL			MIN	MAX
LOTS 1-10	SINGLE FAMILY HOMES	0.65	10	10
BLOCK 11	TOWNHOUSES	0.14	8	8
STREET 'A'		0.69		
TOTAL		0.84	18	18

#	DATE	BY	DESCRIPTION

REVISIONS

KEY PLAN

SUBJECT SITE

INFORMATION REQUIRED

UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED

(a) - AS SHOWN
(b) - AS SHOWN
(c) - AS SHOWN
(d) - AS LISTED BELOW
(e) - AS SHOWN
(f) - AS SHOWN
(g) - AS SHOWN
(h) - MUNICIPAL WATER
(i) - SILT TILL; CLAY SILT; & SILTY CLAY TILL
(j) - AS SHOWN
(k) - MUNICIPAL SANITARY & STORM
(l) - AS SHOWN

SURVEYOR'S CERTIFICATE

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

SIGNED _____
ONTARIO LAND SURVEYOR
For: MacKay, Mott & Peters Limited

DATE 03/25/2020

OWNER'S CERTIFICATE

I HEREBY CONSENT TO THE FILING OF THIS PLAN BY IBI GROUP, IN DRAFT FORM.

SIGNED _____
BASINGSTOKE ENTERPRISES LIMITED

DATE _____

APPROVALS

IBI GROUP
7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel 416 596 1930 fax 416 596 0644
ibigroup.com

PROJECT

REDLINE REVISION
ORCHARD COMMUNITY

5209 STONEHAVEN DRIVE

PROJECT NO: 123369	
DRAWN BY: O.G.	CHECKED BY: S.A.
PROJECT MGR: J.C.	APPROVED BY:

DRAFT PLAN

SHEET NUMBER	ISSUE
DP. 100	

True North Project North

1:250

SCALE CHECK 1:100

File Location: J:\123369_Orchard_Comm\7.0_Production\7.02_Conceptual_Design\17_Planning\123369C_03 27 20.dwg Last Saved: March 27, 2020, by oscar.g@ibigroup Plotted: Friday, March 27, 2020 2:29:20 PM by Oscar Gladowski

PROPOSED LOT LAYOUT

24T-17001B

SKETCH OF
PART OF LOT 4 CONCESSION 1 S.D.S.
(GEOGRAPHIC TOWNSHIP OF NELSON)
PART OF BLOCK 28, 29 AND 30 (0.30 RESERVE)
PART OF STONEHAVEN DRIVE REGISTERED PLAN 20M-857
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

COPYRIGHT

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IBI Group Professional Services (Canada) Inc.
is a member of the IBI Group of companies

LAND USE SCHEDULE

LOTS/BLKS	LAND USE	AREA ha	POTENTIAL # OF UNITS	
RESIDENTIAL			MIN	MAX
LOTS 1-10	SINGLE FAMILY HOMES	0.60	10	10
BLOCK 11	TOWNHOUSES	0.14	8	8
STREET 'A'		0.10		
TOTAL		0.84	18	18

#	DATE	BY	DESCRIPTION
			REVISIONS

KEY PLAN



INFORMATION REQUIRED

UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED

(a) - AS SHOWN
(b) - AS SHOWN
(c) - AS SHOWN
(d) - AS LISTED BELOW
(e) - AS SHOWN
(f) - AS SHOWN
(g) - AS SHOWN
(h) - MUNICIPAL WATER
(i) - SILT TILL; CLAY SILT; & SILTY CLAY TILL
(j) - AS SHOWN
(k) - MUNICIPAL SANITARY & STORM
(l) - AS SHOWN

SURVEYOR'S CERTIFICATE

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

SIGNED _____

ROY C. MAYO
ONTARIO LAND SURVEYOR
For: MacKay, MacKay & Peters Limited

DATE _____

OWNER'S CERTIFICATE

I HEREBY CONSENT TO THE FILING OF THIS PLAN BY IBI GROUP, IN DRAFT FORM.

SIGNED _____

DAWN VICTORIA HOMES

DATE _____

APPROVALS

IBI GROUP
7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel 416 596 1930 fax 416 596 0644
ibigroup.com

PROJECT

REDLINE REVISION
ORCHARD COMMUNITY

5209 STONEHAVEN DRIVE

PROJECT NO: 123369	
DRAWN BY: **O.G.**	CHECKED BY: **S.A.**
PROJECT MGR: **J.C.**	APPROVED BY:

PROPOSED FOOTPRINTS

SHEET NUMBER	ISSUE
PLL. 100	

SCALE/CHECK 1:350

1:350

File Location: J:\123369_Orchard_Comm\7.0_Production\7.02_Conceptual_Design\7.1 Planning\123369C_03.03.20.dwg Last Saved: March 11, 2020 by oscar.grabowski Plotted: Wednesday, March 11, 2020 11:38:14 AM by Oscar Grabowski

APPENDIX C
TRAFFIC DATA

Class/Volume Report Graph

HI-Star ID: 20DF4				Begin: 2016-09-29 12:00 AM					End: 2016-09-30 12:00 AM				
Street: Dundas St - EB				Lane: EB					Hours: 24:00				
State: ON				Oper: MD					Period: 15				
City: Halton Region				Posted: 80					Raw Count: 18590				
Area: at Bronte Creek				AADT Factor: 1					AADT Count: 18590				
NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total	
2016-09-29 [12:00 AM-12:15 AM]			20	10	10	0	0	0	0	0	0	20	
2016-09-29 [12:15 AM-12:30 AM]			19	10	9	0	0	0	0	0	0	19	
2016-09-29 [12:30 AM-12:45 AM]			9	7	2	0	0	0	0	0	0	9	
2016-09-29 [12:45 AM-01:00 AM]			16	4	12	0	0	0	0	0	0	16	
			64	31	33	0	0	0	0	0	0	64	
2016-09-29 [01:00 AM-01:15 AM]			14	6	8	0	0	0	0	0	0	14	
2016-09-29 [01:15 AM-01:30 AM]			15	6	8	0	0	0	1	0	0	15	
2016-09-29 [01:30 AM-01:45 AM]			3	1	1	1	0	0	0	0	0	3	
2016-09-29 [01:45 AM-02:00 AM]			7	4	3	0	0	0	0	0	0	7	
			39	17	20	1	0	0	1	0	0	39	
2016-09-29 [02:00 AM-02:15 AM]			6	4	1	0	0	0	0	0	0	5	
2016-09-29 [02:15 AM-02:30 AM]			4	3	1	0	0	0	0	0	0	4	
2016-09-29 [02:30 AM-02:45 AM]			4	2	1	0	1	0	0	0	0	4	
2016-09-29 [02:45 AM-03:00 AM]			9	7	2	0	0	0	0	0	0	9	
			23	16	5	0	1	0	0	0	0	22	
2016-09-29 [03:00 AM-03:15 AM]			9	4	5	0	0	0	0	0	0	9	
2016-09-29 [03:15 AM-03:30 AM]			6	4	2	0	0	0	0	0	0	6	
2016-09-29 [03:30 AM-03:45 AM]			10	5	4	0	0	0	0	0	0	9	
2016-09-29 [03:45 AM-04:00 AM]			9	3	6	0	0	0	0	0	0	9	
			34	16	17	0	0	0	0	0	0	33	
2016-09-29 [04:00 AM-04:15 AM]			12	10	2	0	0	0	0	0	0	12	
2016-09-29 [04:15 AM-04:30 AM]			20	9	10	1	0	0	0	0	0	20	
2016-09-29 [04:30 AM-04:45 AM]			21	11	7	1	1	1	0	0	0	21	
2016-09-29 [04:45 AM-05:00 AM]			33	20	12	1	0	0	0	0	0	33	
			86	50	31	3	1	1	0	0	0	86	
2016-09-29 [05:00 AM-05:15 AM]			55	30	23	1	0	0	0	0	0	54	
2016-09-29 [05:15 AM-05:30 AM]			71	31	35	1	2	0	0	1	0	70	
2016-09-29 [05:30 AM-05:45 AM]			102	53	44	0	2	0	1	0	0	100	
2016-09-29 [05:45 AM-06:00 AM]			144	66	73	2	1	0	0	1	0	143	
			372	180	175	4	5	0	1	2	0	367	
2016-09-29 [06:00 AM-06:15 AM]			193	100	87	2	2	0	0	0	0	191	
2016-09-29 [06:15 AM-06:30 AM]			331	177	146	2	4	2	0	0	0	331	
2016-09-29 [06:30 AM-06:45 AM]			396	226	152	4	6	3	0	0	0	391	
2016-09-29 [06:45 AM-07:00 AM]			494	281	201	5	4	1	0	0	0	492	
			1414	784	586	13	16	6	0	0	0	1405	
2016-09-29 [07:00 AM-07:15 AM]			571	334	214	8	8	3	0	0	0	567	
2016-09-29 [07:15 AM-07:30 AM]			630	359	245	13	6	3	1	1	0	628	
2016-09-29 [07:30 AM-07:45 AM]			673	399	235	15	11	1	2	4	0	667	
2016-09-29 [07:45 AM-08:00 AM]			632	387	218	8	11	1	1	2	1	629	
			2506	1479	912	44	36	8	4	7	1	2491	
2016-09-29 [08:00 AM-08:15 AM]			576	341	200	19	7	2	1	0	2	572	
2016-09-29 [08:15 AM-08:30 AM]			548	321	198	14	8	1	1	0	3	546	
2016-09-29 [08:30 AM-08:45 AM]			498	286	182	15	10	1	0	0	1	495	
2016-09-29 [08:45 AM-09:00 AM]			466	284	154	16	7	0	1	0	1	463	
			2088	1232	734	64	32	4	3	0	7	2076	
2016-09-29 [09:00 AM-09:15 AM]			385	203	152	10	8	1	2	5	0	381	
2016-09-29 [09:15 AM-09:30 AM]			311	172	109	9	13	1	0	2	0	306	
2016-09-29 [09:30 AM-09:45 AM]			312	163	119	7	10	3	1	3	0	306	
2016-09-29 [09:45 AM-10:00 AM]			258	137	97	6	10	2	3	1	0	256	
			1266	675	477	32	41	7	6	11	0	1249	

NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total
2016-09-29 [10:00 AM-10:15 AM]			247	111	111	9	10	1	2	1	1	246
2016-09-29 [10:15 AM-10:30 AM]			246	120	104	8	5	3	1	3	0	244
2016-09-29 [10:30 AM-10:45 AM]			241	130	90	5	10	2	2	1	0	240
2016-09-29 [10:45 AM-11:00 AM]			237	129	94	4	3	2	2	1	1	236
			971	490	399	26	28	8	7	6	2	966
2016-09-29 [11:00 AM-11:15 AM]			225	131	75	5	8	0	1	3	1	224
2016-09-29 [11:15 AM-11:30 AM]			232	118	97	6	6	0	1	1	1	230
2016-09-29 [11:30 AM-11:45 AM]			228	119	89	4	6	1	0	2	5	226
2016-09-29 [11:45 AM-12:00 PM]			228	119	89	9	6	0	2	3	0	228
			913	487	350	24	26	1	4	9	7	908
2016-09-29 [12:00 PM-12:15 PM]			211	122	76	1	6	2	2	0	2	211
2016-09-29 [12:15 PM-12:30 PM]			218	106	94	5	5	3	1	1	1	216
2016-09-29 [12:30 PM-12:45 PM]			269	153	85	8	7	1	2	4	2	262
2016-09-29 [12:45 PM-01:00 PM]			253	134	96	4	11	1	2	1	2	251
			951	515	351	18	29	7	7	6	7	940
2016-09-29 [01:00 PM-01:15 PM]			239	114	102	6	7	3	0	4	0	236
2016-09-29 [01:15 PM-01:30 PM]			208	107	81	3	9	2	1	2	0	205
2016-09-29 [01:30 PM-01:45 PM]			228	123	93	1	7	2	0	1	0	227
2016-09-29 [01:45 PM-02:00 PM]			201	114	75	3	6	1	1	0	0	200
			876	458	351	13	29	8	2	7	0	868
2016-09-29 [02:00 PM-02:15 PM]			221	115	93	4	8	0	1	0	0	221
2016-09-29 [02:15 PM-02:30 PM]			197	107	81	1	1	0	1	2	0	193
2016-09-29 [02:30 PM-02:45 PM]			187	105	71	4	1	2	0	2	0	185
2016-09-29 [02:45 PM-03:00 PM]			236	132	96	3	2	1	0	0	0	234
			841	459	341	12	12	3	2	4	0	833
2016-09-29 [03:00 PM-03:15 PM]			191	98	77	5	4	1	0	1	1	187
2016-09-29 [03:15 PM-03:30 PM]			214	106	91	7	2	1	2	3	1	213
2016-09-29 [03:30 PM-03:45 PM]			236	132	92	4	5	1	0	2	0	236
2016-09-29 [03:45 PM-04:00 PM]			220	134	76	1	6	0	1	0	0	218
			861	470	336	17	17	3	3	6	2	854
2016-09-29 [04:00 PM-04:15 PM]			285	166	101	5	5	2	2	1	0	282
2016-09-29 [04:15 PM-04:30 PM]			258	145	100	6	5	1	0	0	0	257
2016-09-29 [04:30 PM-04:45 PM]			276	156	97	8	7	1	0	3	1	273
2016-09-29 [04:45 PM-05:00 PM]			291	179	102	5	2	0	0	0	0	288
			1110	646	400	24	19	4	2	4	1	1100
2016-09-29 [05:00 PM-05:15 PM]			287	157	109	9	5	1	0	0	1	282
2016-09-29 [05:15 PM-05:30 PM]			307	172	126	4	1	0	0	1	0	304
2016-09-29 [05:30 PM-05:45 PM]			290	160	117	7	2	1	2	0	0	289
2016-09-29 [05:45 PM-06:00 PM]			287	167	105	6	4	0	0	2	0	284
			1171	656	457	26	12	2	2	3	1	1159
2016-09-29 [06:00 PM-06:15 PM]			271	163	99	3	2	2	0	0	0	269
2016-09-29 [06:15 PM-06:30 PM]			283	175	98	1	4	1	1	1	0	281
2016-09-29 [06:30 PM-06:45 PM]			206	110	86	3	4	1	0	0	1	205
2016-09-29 [06:45 PM-07:00 PM]			210	121	80	1	3	0	2	0	0	207
			970	569	363	8	13	4	3	1	1	962
2016-09-29 [07:00 PM-07:15 PM]			182	101	74	3	3	0	0	0	0	181
2016-09-29 [07:15 PM-07:30 PM]			190	107	74	5	2	0	1	0	0	189
2016-09-29 [07:30 PM-07:45 PM]			166	89	68	5	1	0	0	0	1	164
2016-09-29 [07:45 PM-08:00 PM]			165	83	76	1	2	0	0	1	0	163
			703	380	292	14	8	0	1	1	1	697
2016-09-29 [08:00 PM-08:15 PM]			139	71	64	2	1	0	0	0	0	138
2016-09-29 [08:15 PM-08:30 PM]			142	80	57	2	2	0	0	0	0	141
2016-09-29 [08:30 PM-08:45 PM]			132	74	52	3	1	1	0	0	0	131
2016-09-29 [08:45 PM-09:00 PM]			112	69	38	3	0	0	0	0	0	110
			525	294	211	10	4	1	0	0	0	520

NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total
2016-09-29 [09:00 PM-09:15 PM]			106	60	41	1	2	0	0	0	1	105
2016-09-29 [09:15 PM-09:30 PM]			103	59	37	6	0	0	0	0	0	102
2016-09-29 [09:30 PM-09:45 PM]			86	47	35	3	0	0	0	0	0	85
2016-09-29 [09:45 PM-10:00 PM]			79	44	28	2	1	0	0	1	0	76
			374	210	141	12	3	0	0	1	1	368
2016-09-29 [10:00 PM-10:15 PM]			92	57	31	4	0	0	0	0	0	92
2016-09-29 [10:15 PM-10:30 PM]			83	47	34	1	0	0	0	0	0	82
2016-09-29 [10:30 PM-10:45 PM]			64	35	23	2	3	0	0	0	0	63
2016-09-29 [10:45 PM-11:00 PM]			49	24	23	1	0	0	0	0	0	48
			288	163	111	8	3	0	0	0	0	285
2016-09-29 [11:00 PM-11:15 PM]			43	24	17	0	0	0	0	1	0	42
2016-09-29 [11:15 PM-11:30 PM]			40	26	9	1	0	0	2	0	0	38
2016-09-29 [11:30 PM-11:45 PM]			28	21	4	1	0	0	0	0	0	26
2016-09-29 [11:45 PM-12:00 AM]			33	19	14	0	0	0	0	0	0	33
			144	90	44	2	0	0	2	1	0	139
Daily Totals:			18590	10367	7137	375	335	67	50	69	31	18431
Total Counted:		18590										
Total Classified:		18431	18590	10367	7137	375	335	67	50	69	31	18431
Total Unclassified:		159										
Report Percentages:				56.25%	38.72%	2.03%	1.82%	0.36%	0.27%	0.37%	0.17%	
Peak Time: (AM):		2016-09-29 [07:30 AM-07:45 AM]			Peak Count:	673						
Peak Time: (PM):		2016-09-29 [05:15 PM-05:30 PM]			Peak Count:	307						

Class/Volume Report Graph

HI-Star ID: 20DEC				Begin: 2016-09-29 12:00 AM					End: 2016-09-30 12:00 AM				
Street: Dundas St - WB				Lane: WB					Hours: 24:00				
State: ON				Oper: MD					Period: 15				
City: Halton Region				Posted: 80					Raw Count: 18003				
Area: at Bronte Creek				AADT Factor: 1					AADT Count: 18003				
NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total	
2016-09-29 [12:00 AM-12:15 AM]			41	28	13	0	0	0	0	0	0	41	
2016-09-29 [12:15 AM-12:30 AM]			22	16	5	0	0	0	0	0	0	21	
2016-09-29 [12:30 AM-12:45 AM]			19	14	5	0	0	0	0	0	0	19	
2016-09-29 [12:45 AM-01:00 AM]			21	16	5	0	0	0	0	0	0	21	
			103	74	28	0	0	0	0	0	0	102	
2016-09-29 [01:00 AM-01:15 AM]			6	4	1	0	0	0	0	0	0	5	
2016-09-29 [01:15 AM-01:30 AM]			12	6	6	0	0	0	0	0	0	12	
2016-09-29 [01:30 AM-01:45 AM]			9	8	1	0	0	0	0	0	0	9	
2016-09-29 [01:45 AM-02:00 AM]			13	6	7	0	0	0	0	0	0	13	
			40	24	15	0	0	0	0	0	0	39	
2016-09-29 [02:00 AM-02:15 AM]			10	5	5	0	0	0	0	0	0	10	
2016-09-29 [02:15 AM-02:30 AM]			7	3	3	0	0	0	0	0	0	6	
2016-09-29 [02:30 AM-02:45 AM]			7	4	3	0	0	0	0	0	0	7	
2016-09-29 [02:45 AM-03:00 AM]			5	2	3	0	0	0	0	0	0	5	
			29	14	14	0	0	0	0	0	0	28	
2016-09-29 [03:00 AM-03:15 AM]			6	4	2	0	0	0	0	0	0	6	
2016-09-29 [03:15 AM-03:30 AM]			6	1	4	0	0	0	0	0	0	5	
2016-09-29 [03:30 AM-03:45 AM]			6	5	0	0	0	1	0	0	0	6	
2016-09-29 [03:45 AM-04:00 AM]			5	4	1	0	0	0	0	0	0	5	
			23	14	7	0	0	1	0	0	0	22	
2016-09-29 [04:00 AM-04:15 AM]			5	1	2	0	1	0	0	0	0	4	
2016-09-29 [04:15 AM-04:30 AM]			5	3	1	0	0	0	0	0	0	4	
2016-09-29 [04:30 AM-04:45 AM]			9	5	1	0	1	0	0	0	0	7	
2016-09-29 [04:45 AM-05:00 AM]			17	11	4	0	0	0	0	1	0	16	
			36	20	8	0	2	0	0	1	0	31	
2016-09-29 [05:00 AM-05:15 AM]			20	12	8	0	0	0	0	0	0	20	
2016-09-29 [05:15 AM-05:30 AM]			19	13	6	0	0	0	0	0	0	19	
2016-09-29 [05:30 AM-05:45 AM]			45	22	19	2	0	0	1	0	0	44	
2016-09-29 [05:45 AM-06:00 AM]			44	26	15	0	1	0	0	0	0	42	
			128	73	48	2	1	0	1	0	0	125	
2016-09-29 [06:00 AM-06:15 AM]			39	21	13	2	0	0	1	0	0	37	
2016-09-29 [06:15 AM-06:30 AM]			47	25	13	3	0	0	2	0	0	43	
2016-09-29 [06:30 AM-06:45 AM]			85	39	35	3	1	1	1	1	0	81	
2016-09-29 [06:45 AM-07:00 AM]			95	48	35	7	2	0	0	0	0	92	
			266	133	96	15	3	1	4	1	0	253	
2016-09-29 [07:00 AM-07:15 AM]			143	85	43	2	5	1	1	0	1	138	
2016-09-29 [07:15 AM-07:30 AM]			141	69	54	8	3	3	0	0	0	137	
2016-09-29 [07:30 AM-07:45 AM]			198	98	86	2	2	1	0	0	0	189	
2016-09-29 [07:45 AM-08:00 AM]			250	151	82	3	4	0	0	2	0	242	
			732	403	265	15	14	5	1	2	1	706	
2016-09-29 [08:00 AM-08:15 AM]			262	141	98	4	11	1	2	1	0	258	
2016-09-29 [08:15 AM-08:30 AM]			274	151	106	1	4	0	3	2	0	267	
2016-09-29 [08:30 AM-08:45 AM]			264	144	98	2	6	0	2	2	2	256	
2016-09-29 [08:45 AM-09:00 AM]			255	147	89	5	2	5	1	2	0	251	
			1055	583	391	12	23	6	8	7	2	1032	
2016-09-29 [09:00 AM-09:15 AM]			222	118	91	3	4	1	1	0	1	219	
2016-09-29 [09:15 AM-09:30 AM]			276	144	107	4	6	2	2	0	1	266	
2016-09-29 [09:30 AM-09:45 AM]			203	101	76	7	7	0	4	3	0	198	
2016-09-29 [09:45 AM-10:00 AM]			219	120	79	6	6	0	2	2	0	215	
			920	483	353	20	23	3	9	5	2	898	

NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total
2016-09-29 [10:00 AM-10:15 AM]			195	109	68	4	6	0	1	3	0	191
2016-09-29 [10:15 AM-10:30 AM]			175	103	58	6	2	0	2	1	0	172
2016-09-29 [10:30 AM-10:45 AM]			182	102	65	6	4	0	1	0	0	178
2016-09-29 [10:45 AM-11:00 AM]			175	103	56	5	4	1	1	0	0	170
			727	417	247	21	16	1	5	4	0	711
2016-09-29 [11:00 AM-11:15 AM]			152	75	59	5	8	1	0	1	1	150
2016-09-29 [11:15 AM-11:30 AM]			175	93	65	8	3	1	1	0	0	171
2016-09-29 [11:30 AM-11:45 AM]			214	111	93	2	4	1	0	2	0	213
2016-09-29 [11:45 AM-12:00 PM]			192	98	81	3	4	1	1	1	0	189
			733	377	298	18	19	4	2	4	1	723
2016-09-29 [12:00 PM-12:15 PM]			215	115	84	5	5	0	1	2	0	212
2016-09-29 [12:15 PM-12:30 PM]			206	118	79	3	2	2	0	1	0	205
2016-09-29 [12:30 PM-12:45 PM]			225	131	80	2	3	1	1	1	0	219
2016-09-29 [12:45 PM-01:00 PM]			184	103	70	3	1	0	2	1	1	181
			830	467	313	13	11	3	4	5	1	817
2016-09-29 [01:00 PM-01:15 PM]			197	109	76	2	5	0	0	2	1	195
2016-09-29 [01:15 PM-01:30 PM]			218	130	71	7	3	0	1	0	1	213
2016-09-29 [01:30 PM-01:45 PM]			230	123	93	5	4	0	1	1	2	229
2016-09-29 [01:45 PM-02:00 PM]			231	140	78	4	2	0	2	1	0	227
			876	502	318	18	14	0	4	4	4	864
2016-09-29 [02:00 PM-02:15 PM]			204	118	69	7	3	3	0	2	0	202
2016-09-29 [02:15 PM-02:30 PM]			239	139	84	8	1	0	0	0	0	232
2016-09-29 [02:30 PM-02:45 PM]			268	148	100	8	7	3	0	0	0	266
2016-09-29 [02:45 PM-03:00 PM]			330	197	113	4	6	1	1	0	1	323
			1041	602	366	27	17	7	1	2	1	1023
2016-09-29 [03:00 PM-03:15 PM]			392	213	153	4	4	3	1	1	1	380
2016-09-29 [03:15 PM-03:30 PM]			452	283	157	1	5	1	2	0	0	449
2016-09-29 [03:30 PM-03:45 PM]			485	319	136	3	1	0	0	2	1	462
2016-09-29 [03:45 PM-04:00 PM]			540	363	155	2	4	2	1	0	0	527
			1869	1178	601	10	14	6	4	3	2	1818
2016-09-29 [04:00 PM-04:15 PM]			538	353	164	6	4	0	2	1	0	530
2016-09-29 [04:15 PM-04:30 PM]			549	350	168	2	7	2	1	0	0	530
2016-09-29 [04:30 PM-04:45 PM]			497	338	144	1	1	1	1	1	1	488
2016-09-29 [04:45 PM-05:00 PM]			549	374	145	5	3	1	4	2	0	534
			2133	1415	621	14	15	4	8	4	1	2082
2016-09-29 [05:00 PM-05:15 PM]			511	335	160	4	4	1	0	1	0	505
2016-09-29 [05:15 PM-05:30 PM]			517	343	148	3	1	5	1	0	0	501
2016-09-29 [05:30 PM-05:45 PM]			518	340	165	3	2	0	1	3	0	514
2016-09-29 [05:45 PM-06:00 PM]			532	363	154	0	7	1	0	1	0	526
			2078	1381	627	10	14	7	2	5	0	2046
2016-09-29 [06:00 PM-06:15 PM]			498	349	138	1	3	0	1	0	0	492
2016-09-29 [06:15 PM-06:30 PM]			539	356	166	0	4	2	1	0	0	529
2016-09-29 [06:30 PM-06:45 PM]			450	314	116	3	2	0	1	1	0	437
2016-09-29 [06:45 PM-07:00 PM]			319	202	105	2	3	1	0	0	0	313
			1806	1221	525	6	12	3	3	1	0	1771
2016-09-29 [07:00 PM-07:15 PM]			307	212	91	0	1	0	0	1	0	305
2016-09-29 [07:15 PM-07:30 PM]			267	168	80	2	2	0	1	0	0	253
2016-09-29 [07:30 PM-07:45 PM]			235	149	78	1	2	0	1	0	0	231
2016-09-29 [07:45 PM-08:00 PM]			224	151	66	1	0	0	0	0	0	218
			1033	680	315	4	5	0	2	1	0	1007
2016-09-29 [08:00 PM-08:15 PM]			207	121	76	0	1	0	1	2	0	201
2016-09-29 [08:15 PM-08:30 PM]			161	98	56	1	0	1	1	0	0	157
2016-09-29 [08:30 PM-08:45 PM]			150	97	51	0	0	0	0	0	0	148
2016-09-29 [08:45 PM-09:00 PM]			128	84	42	1	0	0	1	0	0	128
			646	400	225	2	1	1	3	2	0	634

NC200 - Metres				0.0 to 4.9	5.0 to 8.4	8.5 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 22.4	22.5 >	Total
2016-09-29 [09:00 PM-09:15 PM]			115	83	29	1	1	0	0	0	0	114
2016-09-29 [09:15 PM-09:30 PM]			121	78	39	0	0	0	0	0	0	117
2016-09-29 [09:30 PM-09:45 PM]			95	60	32	1	0	0	0	0	0	93
2016-09-29 [09:45 PM-10:00 PM]			89	49	35	0	1	0	1	1	0	87
			420	270	135	2	2	0	1	1	0	411
2016-09-29 [10:00 PM-10:15 PM]			79	49	26	1	1	0	0	0	0	77
2016-09-29 [10:15 PM-10:30 PM]			90	69	18	0	0	0	0	0	0	87
2016-09-29 [10:30 PM-10:45 PM]			42	24	17	0	0	0	0	0	0	41
2016-09-29 [10:45 PM-11:00 PM]			41	23	18	0	0	0	0	0	0	41
			252	165	79	1	1	0	0	0	0	246
2016-09-29 [11:00 PM-11:15 PM]			64	40	22	0	0	0	0	0	0	62
2016-09-29 [11:15 PM-11:30 PM]			55	35	18	1	0	0	0	0	0	54
2016-09-29 [11:30 PM-11:45 PM]			73	42	27	0	0	0	0	0	0	69
2016-09-29 [11:45 PM-12:00 AM]			35	25	10	0	0	0	0	0	0	35
			227	142	77	1	0	0	0	0	0	220
Daily Totals:			18003	11038	5972	211	207	52	62	52	15	17609
Total Counted:		18003										
Total Classified:		17609	18003	11038	5972	211	207	52	62	52	15	17609
Total Unclassified:		394										
Report Percentages:				62.68%	33.91%	1.20%	1.18%	0.30%	0.35%	0.30%	0.09%	
Peak Time: (AM):		2016-09-29 [09:15 AM-09:30 AM]			Peak Count:	276						
Peak Time: (PM):		2016-09-29 [04:15 PM-04:30 PM]			Peak Count:	549						

Classification Table – FHWA to Nu-Metrics
Measurements in Meters

Represented Classifications								
FHWA class bins	**1-4**	**5**	**6**	**7**	**8**	**9**	**10**	**11-13**
NC-97 class bins	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Readings to Conform to FHWA								
Meters From:	0	6.0	8.5	10.0	13.0	16.0	19.0	>22.5
To:	5.5	8.0	9.5	12.5	15.5	18.5	22.0	

NC-97 Class (Length) Bins

1 = Up to 5.5 meters in length - Cars, small pick-ups

2 = 6.0 - 8.0 meters in length - large pick-ups

3 = 8.5 - 9.5 meters in length - Buses, recreational vehicles, cube vans, medium trucks

4 = 10.0 - 12.5 meters in length - 3 axle trucks, cube vans

5 =13.0 - 15.5 meters in length - Straight truck

6 = 16.0 - 18.5 meters in length - tractor trailer

7 = 19.0 - 22.0 meters in length - tractor trailer, multi trailers

8 = More then 22.5 meters in length - multi trailers

Train Count Data

System Engineering
Engineering Services

1 Administration Road
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

TRANSMITTAL

To: *Destinataire :*	Valcoustics Canada Ltd 30 Wertheim Court, Unit 25 Richmond Hill, Ontario Canada L4B 1B9	*Project :*	HAL-43.74- Dundas St, Burlington, ON
Att'n:	Seema Nagaraj	*Routing:*	seema@valcoustics.com
From: *Expéditeur :*	Michael Vallins	*Date:*	2019/10/28
Cc:	Adjacent Development CN via e-mail		

☐ Urgent ☐ For Your Use ☐ For Review ☐ For Your Information ☐ Confidential

Re: Train Traffic Data – CN Halton Subdivision near Dundas St in Burlington, ON

Please find attached the requested Train Traffic Data; this data does not reflect GO Metrolinx Traffic. The application fee in the amount of **$500.00** +HST will be invoiced.

Should you have any questions, please do not hesitate to contact the undersigned at 905-669-3264.

Sincerely,
CN Design & Construction

Michael Vallins P.Eng
Manager of Public Works
permits.gld@cn.ca

Date: 2019/10/28 Project Number: HAL-43.74- Dundas St, Burlington, ON

Dear Seema:

Re: Train Traffic Data – CN Halton Subdivision near Dundas St in Burlington, ON

The following is provided in response to Seema's 2019/08/22 request for information regarding rail traffic in the vicinity of Dundas St, in Burlington, ON at approximately Mile 43.74 on CN's Halton Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	10	140	50	4
Way Freight	2	25	50	4
Passenger	0	10	50	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	4	140	50	4
Way Freight	0	25	50	4
Passenger	0	10	50	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Halton Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are two (2) at-grade crossings in the immediate vicinity of the study area at Mile 41.63 Tremaine Rd and Mile 42.20 Burnhamthorpe Rd W. Anti-whistling bylaws are in effect at these crossings. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The double mainline track is considered to be continuously welded rail throughout the study area. The presence of three (3) switches located at Mile 42.98, Mile 43.20 and Mile 43.73 may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager of Public Works

APPENDIX D

ENVIRONMENTAL NOISE GUIDELINES

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 E

SAMPLE CALCULATIONS

```
STAMSON 5.04       NORMAL REPORT        Date: 07-07-2020 13:21:29
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS/ NOISE ASSESSMENT

Filename: l4_wf.te             Time Period: Day/Night 16/8 hours
```
Description: Lot 4 - Northwest Facade

```
Rail data, segment # 1: CN Halton (day/night)
-----------------------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
  1. Freight     !  13.1/5.2   !  80.0 !  4.0 !140.0 !Diesel! Yes
  2. Way Freight !   2.6/0.0   !  80.0 !  4.0 ! 25.0 !Diesel! Yes

Data for Segment # 1: CN Halton (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  48.00 / 48.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1            : -90.00 deg   Angle2 : 75.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          : 154.00 m
Receiver elevation        : 156.60 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00

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

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+---------------
       4.00 !        4.50 !        1.84 !       159.94
       0.50 !        4.50 !        0.52 !       158.62

LOCOMOTIVE (0.00 + 65.52 + 0.00) = 65.52 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     75   0.50  74.40  -7.55  -1.33   0.00   0.00  -0.40  65.12*
   -90     75   0.50  74.40  -7.55  -1.33   0.00   0.00   0.00  65.52
-------------------------------------------------------------------------

 * Bright Zone !

WHEEL (0.00 + 58.09 + 0.00) = 58.09 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     75   0.60  67.67  -8.08  -1.50   0.00   0.00  -4.55  53.54*
   -90     75   0.60  67.67  -8.08  -1.50   0.00   0.00   0.00  58.09
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 66.24 dBA

Total Leq All Segments: 66.24 dBA
```

Results segment # 1: CN Halton (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	4.50	1.84	159.94
0.50	4.50	0.52	158.62

LOCOMOTIVE (0.00 + 64.21 + 0.00) = 64.21 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	75	0.50	73.09	-7.55	-1.33	0.00	0.00	-0.40	63.81*
-90	75	0.50	73.09	-7.55	-1.33	0.00	0.00	0.00	64.21

* Bright Zone !

WHEEL (0.00 + 56.92 + 0.00) = 56.92 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	75	0.60	66.49	-8.08	-1.50	0.00	0.00	-4.55	52.37*
-90	75	0.60	66.49	-8.08	-1.50	0.00	0.00	0.00	56.92

* Bright Zone !

Segment Leq : 64.95 dBA

Total Leq All Segments: 64.95 dBA

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

Car traffic volume : 25637/2320 veh/TimePeriod *
Medium truck volume : 540/49 veh/TimePeriod *
Heavy truck volume : 810/73 veh/TimePeriod *
Posted speed limit : 80 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): 29429
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 : 3.00
Day (16 hrs) % of Total Volume : 91.70

Data for Segment # 1: Dundas WB (day/night)

Angle1 Angle2 : -90.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.00 / 84.00 m
Receiver height : 4.50 / 4.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 25.00 deg
Barrier height : 0.00 m
Elevation : 7.50 m
Barrier receiver distance : 63.00 / 63.00 m
Source elevation : 164.10 m
Receiver elevation : 156.60 m
Barrier elevation : 164.10 m
Reference angle : 0.00

```
Road data, segment # 2: Dundas EB (day/night)
----------------------------------------------
Car traffic volume  : 25637/2320  veh/TimePeriod  *
Medium truck volume :   540/49    veh/TimePeriod  *
Heavy truck volume  :   810/73    veh/TimePeriod  *
Posted speed limit  :    80 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):  29429
    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      :   3.00
    Day (16 hrs) % of Total Volume      :  91.70

Data for Segment # 2: Dundas EB (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  70.00 / 70.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 25.00 deg
Barrier height            :   0.00 m
Elevation                 :   7.50 m
Barrier receiver distance :  63.00 / 63.00  m
Source elevation          : 164.10 m
Receiver elevation        : 156.60 m
Barrier elevation         : 164.10 m
Reference angle           :   0.00

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

Source height = 1.32 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.32 !        4.50 !        0.24 !       164.34

ROAD (0.00 + 61.24 + 0.00) = 61.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     25   0.35  73.97   0.00 -10.10  -2.63   0.00   0.00  -4.93  56.31*
   -90     25   0.35  73.97   0.00 -10.10  -2.63   0.00   0.00   0.00  61.24
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 61.24 dBA
```

Results segment # 2: Dundas EB (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.32	4.50	0.88	164.98

ROAD (0.00 + 62.31 + 0.00) = 62.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	25	0.35	73.97	0.00	-9.04	-2.63	0.00	0.00	-1.77	60.54*
-90	25	0.35	73.97	0.00	-9.04	-2.63	0.00	0.00	0.00	62.31

* Bright Zone !

Segment Leq : 62.31 dBA

Total Leq All Segments: 64.82 dBA

Results segment # 1: Dundas WB (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.31	4.50	0.24	164.34

ROAD (0.00 + 53.81 + 0.00) = 53.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	25	0.35	66.54	0.00	-10.10	-2.63	0.00	0.00	-4.93	48.87*
-90	25	0.35	66.54	0.00	-10.10	-2.63	0.00	0.00	0.00	53.81

* Bright Zone !

Segment Leq : 53.81 dBA

```
Results segment # 2: Dundas EB (night)
--------------------------------------

Source height = 1.31 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.31 !        4.50 !        0.88 !       164.98

ROAD (0.00 + 54.88 + 0.00) = 54.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     25   0.35  66.54   0.00  -9.04  -2.63   0.00   0.00  -1.78  53.10*
   -90     25   0.35  66.54   0.00  -9.04  -2.63   0.00   0.00   0.00  54.88
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 54.88 dBA

Total Leq All Segments: 57.39 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.60
                           (NIGHT): 65.65
```

```
STAMSON 5.04       NORMAL REPORT        Date: 07-07-2020 13:22:09
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS/ NOISE ASSESSMENT

Filename: l4_ola.te            Time Period: 16 hours
Description: Lot 4 - Rear Yard

Rail data, segment # 1: CN Halton
---------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
  1. Freight     !  13.1/10.5  !  80.0 !  4.0 !140.0 !Diesel! Yes
  2. Way Freight !   2.6/1.0   !  80.0 !  4.0 ! 25.0 !Diesel! Yes

Data for Segment # 1: CN Halton
-------------------------------
Angle1   Angle2           : -90.00 deg   22.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  44.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1            : -90.00 deg   Angle2 : 22.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  16.00 m
Source elevation          : 154.90 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00

Rail data, segment # 2: CN Halton
---------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
  1. Freight     !  12.4/10.5  !  80.0 !  4.0 !140.0 !Diesel! Yes
  2. Way Freight !   2.5/1.0   !  80.0 !  4.0 ! 25.0 !Diesel! Yes

Data for Segment # 2: CN Halton
-------------------------------
Angle1   Angle2           :  22.00 deg   65.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  44.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1            :  22.00 deg   Angle2 : 65.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  16.00 m
Source elevation          : 154.90 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00
```

Results segment # 1: CN Halton

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	0.23	158.33
0.50	1.50	-1.05	157.05

LOCOMOTIVE (0.00 + 54.02 + 0.00) = 54.02 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	22	0.41	74.40	-6.57	-2.85	0.00	0.00	-10.97	54.02

WHEEL (0.00 + 44.26 + 0.00) = 44.26 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	22	0.51	67.67	-7.06	-3.01	0.00	0.00	-13.34	44.26

Segment Leq : 54.46 dBA

Results segment # 2: CN Halton

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	0.23	158.33
0.50	1.50	-1.05	157.05

LOCOMOTIVE (0.00 + 48.83 + 0.00) = 48.83 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	65	0.41	74.17	-6.57	-6.85	0.00	0.00	-11.92	48.83

WHEEL (0.00 + 38.40 + 0.00) = 38.40 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	65	0.51	67.43	-7.06	-7.01	0.00	0.00	-14.97	38.40

Segment Leq : 49.21 dBA

Total Leq All Segments: 55.59 dBA

```
Road data, segment # 1: Dundas WB
---------------------------------
Car traffic volume  : 25637 veh/TimePeriod  *
Medium truck volume :   540 veh/TimePeriod  *
Heavy truck volume  :   810 veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Dundas WB
-------------------------------
Angle1   Angle2           : -90.00 deg   -41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  87.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -41.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  10.00 m
Source elevation          : 164.10 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00

Road data, segment # 2: Dundas WB
---------------------------------
Car traffic volume  : 25637 veh/TimePeriod  *
Medium truck volume :   540 veh/TimePeriod  *
Heavy truck volume  :   810 veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Dundas WB
-------------------------------
Angle1   Angle2           : -41.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  87.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -41.00 deg   Angle2 : 55.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  20.00 m
Source elevation          : 164.10 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00

Road data, segment # 3: Dundas EB
---------------------------------
Car traffic volume  : 25637 veh/TimePeriod  *
Medium truck volume :   540 veh/TimePeriod  *
Heavy truck volume  :   810 veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 3: Dundas EB
--------------------------------
Angle1   Angle2           : -90.00 deg   -41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  74.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -41.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  10.00 m
Source elevation          : 164.10 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00

Road data, segment # 4: Dundas EB
----------------------------------
Car traffic volume  : 25637 veh/TimePeriod  *
Medium truck volume :   540 veh/TimePeriod  *
Heavy truck volume  :   810 veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: Dundas EB
--------------------------------
Angle1   Angle2           : -41.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  74.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -41.00 deg   Angle2 : 55.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  20.00 m
Source elevation          : 164.10 m
Receiver elevation        : 156.50 m
Barrier elevation         : 158.10 m
Reference angle           :   0.00
```

```
Results segment # 1: Dundas WB
------------------------------

Source height = 1.32 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.32 !        1.50 !        0.75 !       158.85

ROAD (0.00 + 46.37 + 0.00) = 46.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -41   0.49  73.97   0.00 -11.34  -7.81   0.00   0.00  -8.45  46.37
-------------------------------------------------------------------------------

Segment Leq : 46.37 dBA

Results segment # 2: Dundas WB
------------------------------

Source height = 1.32 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.32 !        1.50 !        1.60 !       159.70

ROAD (0.00 + 52.27 + 0.00) = 52.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -41     55   0.49  73.97   0.00 -11.34  -3.01   0.00   0.00  -7.36  52.27
-------------------------------------------------------------------------------

Segment Leq : 52.27 dBA

Results segment # 3: Dundas EB
------------------------------

Source height = 1.32 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.32 !        1.50 !        0.90 !       159.00

ROAD (0.00 + 47.67 + 0.00) = 47.67 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -41   0.49  73.97   0.00 -10.30  -7.81   0.00   0.00  -8.20  47.67
-------------------------------------------------------------------------------

Segment Leq : 47.67 dBA
```

```
Results segment # 4: Dundas EB
------------------------------

Source height = 1.32 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.32 !        1.50 !        1.90 !       160.00

ROAD (0.00 + 54.03 + 0.00) = 54.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -41     55   0.49  73.97   0.00 -10.30  -3.01   0.00   0.00  -6.63  54.03
-------------------------------------------------------------------------------

Segment Leq : 54.03 dBA

Total Leq All Segments: 57.19 dBA

TOTAL Leq FROM ALL SOURCES:      59.47
```

APPENDIX F

SOUND BARRIER HEIGHT REQUIREMENTS

APPENDIX F

SOUND BARRIER HEIGHT REQUIREMENTS

Table F-1 shows the sound barriers required to meet sound levels from 55 dBA to 60 dBA (in 1 dB increments). The sound barriers denoted "West Barrier", "North Barrier" and "East Barrier" are shown in Figure F-1. Note the below assessment assumes the berm heights remain as proposed and only the acoustic fence height varies.

TABLE F-1: REAR YARD SOUND BARRIER ASSESSMENT

Lot #	Sound Barrier	Acoustic Fence Height (m) to Achieve Target Sound Levels (dBA)[1]					
		55 dBA	56 dBA	57 dBA	58 dBA	59 dBA	60 dBA
Lot 3	West Barrier	6.0 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.2 m high acoustic fence on berm	3.5 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[2]**	N/A
	North Barrier	6.0 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.2 m high acoustic fence on berm	3.5 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[3]**	N/A
	East Barrier	N/A	N/A	N/A	N/A	N/A	N/A
Lot 4	West Barrier	5.5 m high acoustic fence on berm	4.8 m high acoustic fence on berm	4.1 m high acoustic fence on berm	3.5 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[2]**	N/A
	North Barrier	5.5 m high acoustic fence on berm	4.8 m high acoustic fence on berm	4.1 m high acoustic fence on berm	3.5 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[3]**	N/A
	East Barrier	N/A	N/A	N/A	N/A	N/A	N/A
Lot 5	West Barrier	7.5 m high acoustic fence on berm	6.0 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.2 m high acoustic fence on berm	3.6 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[2]**
	North Barrier	7.5 m high acoustic fence on berm	6.0 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.2 m high acoustic fence on berm	3.6 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[3]**
	East Barrier	N/A	N/A	N/A	N/A	N/A	N/A
Lot 6	West Barrier	5.9 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.3 m high acoustic fence on berm	3.8 m high acoustic fence on berm	3.2 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[2]**
	North Barrier	5.9 m high acoustic fence on berm	5.0 m high acoustic fence on berm	4.3 m high acoustic fence on berm	3.8 m high acoustic fence on berm	3.2 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[3]**
	East Barrier	N/A	N/A	N/A	N/A	N/A	N/A
Lot 7	West Barrier	N/A	N/A	N/A	N/A	N/A	N/A
	North Barrier	5.5 m high acoustic fence on berm	4.9 m high acoustic fence on berm	4.4 m high acoustic fence on berm	3.9 m high acoustic fence on berm	**3.0 m high acoustic fence on berm[3]**	N/A
	East Barrier	4.5 m high acoustic fence	4.0 m high acoustic fence	3.5 m high acoustic fence	3.0 m high acoustic fence	**2.5 m high acoustic fence[3]**	N/A

Notes:

(1) Acoustic fence heights based on the Grading Plan dated May 1, 2020.

(2) Existing acoustic fence proposed to remain as is.

(3) Proposed acoustic fence.

To achieve 55 dBA, the acoustic fences would need to be higher than the maximum allowed by the Region of Halton; in the worst-case (i.e. Lot 5), a 7.5 m high acoustic fence (4.5 m over the maximum allowed fence height) is required. Alternatively, the total sound barrier height increase could be achieved by raising the berm (resulting in a significantly larger footprint), or a combination (raise the berm and install a higher acoustic fence).

- For Lots 1 to 3 and the south portion of Lot 4, the existing acoustic fence will need to be removed in order to raise the berm and/or acoustic fence. This will be a costly and onerous task and will also result in a step condition between the sound barrier on the subject site and the sound barrier at the existing dwellings to the south.

- For the north portion of Lots 4 to 7, a higher sound barrier would have an undesirable aesthetic and could interfere with the existing Hydro corridor to the north (if the berm were to be raised).

Therefore, increasing the sound barrier heights is not considered practicable.

For Lots 8 to 10, sound levels up to 57 dBA are predicted at the rear yards. This is only 2 dBA over the target sound level and is within the +5 dBA allowable leeway under NPC-300. Therefore, the 2.5 m high acoustic fence along the east property boundary of Lots 8 to 10 is considered sufficient.

Based on the above, the sound barriers shown in Figure 2 represent the most feasible option.

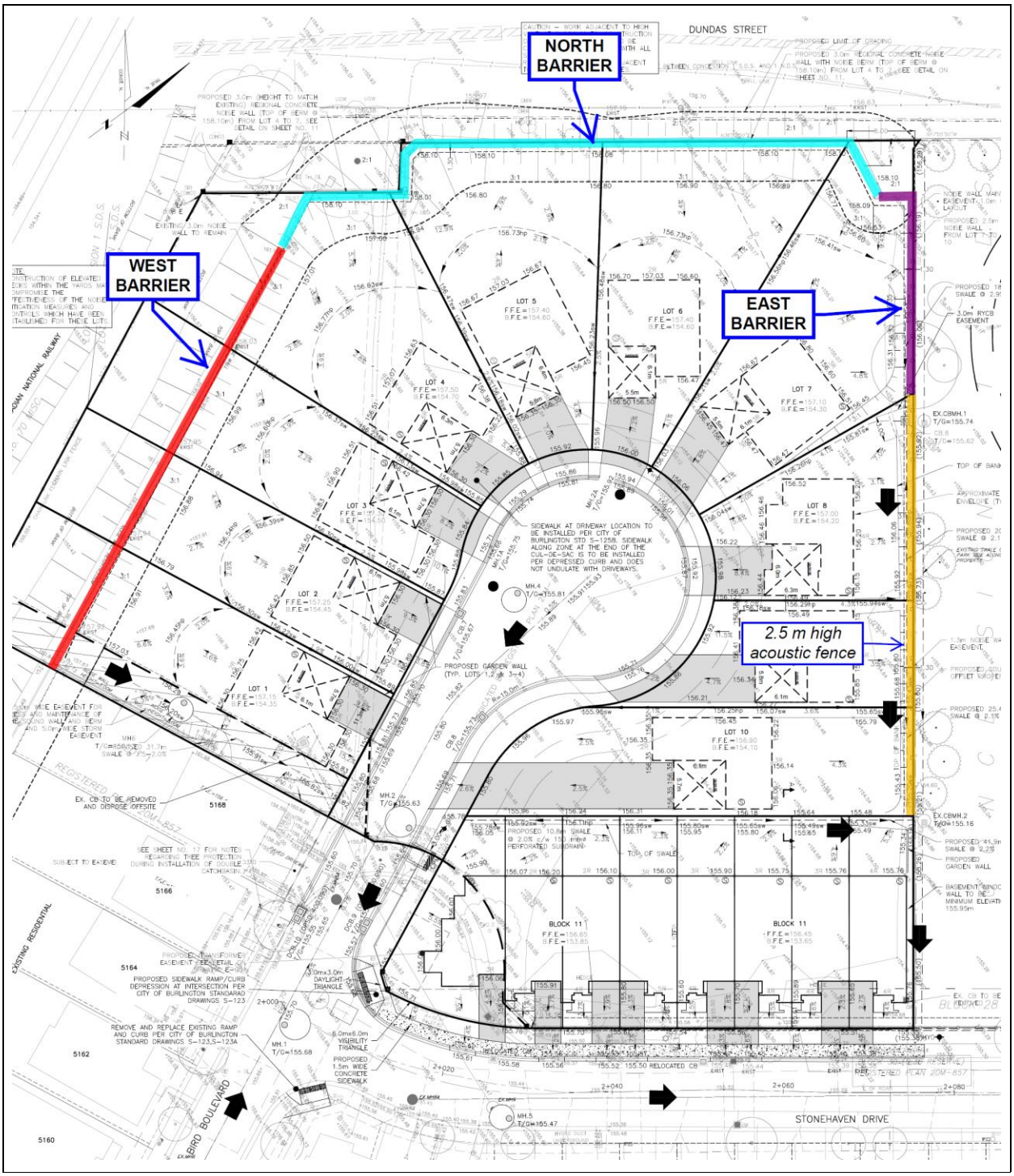


Figure F-1: West, North and East Sound Barriers