

Environmental Noise Feasibility Study

308 & 314 Main Street East

Proposed Residential Development Town of Grimsby

November 30, 2018
Project: 118-0306

Prepared for

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VALCOUSTICS

Canada Ltd.

Version History

Version #	Date	Comments
1.0	November 30, 2018	Issued to Client

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Environmental Noise Feasibility Study

308 & 314 Main Street East

Proposed Residential Development Town of Grimsby

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study report for the proposed residential development to support the Official Plan Amendment (OPA) application submission to the Town of Grimsby.

The significant noise source in the vicinity with potential to impact the proposed development is road traffic on Main Street East. There are no stationary noise sources in the vicinity that are expected to have a significant impact at the subject site.

The sound levels on site have been determined and compared with the applicable noise guideline limits to determine the need for noise mitigation.

To meet the applicable transportation noise guidelines:

- The dwellings on Lots 1, 2 and 51 to 55 require the provision for adding air conditioning;
- exterior wall and window construction meeting the minimum non-acoustical requirements stated in the Ontario Building Code (OBC) will be sufficient to meet the indoor noise criteria; and
- a 1.8 m high sound barrier is required at the rear yard of the dwelling at Lot 1.

1.0 INTRODUCTION

VCL was retained to prepare an Environmental Noise Feasibility Study for the proposed residential development to support the OPA application submission to the Town of Grimsby.

The predicted sound levels and noise mitigation measures needed for the proposed development to comply with noise guidelines of the Ministry of the Environment, Conservation and Parks (MECP) are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The site is located at 308 & 314 Main Street East in the Town of Grimsby. The site is bounded by:

- Main Street East, with existing detached residential dwellings and vacant land beyond, to the north;
- existing detached residential dwellings the west and east; and
- existing woodland to the south.

The site is currently occupied by existing buildings that will be demolished as part of the development.

Figure 1 shows a Key Plan.

This report is based on the Draft Plan of Subdivision prepared by Glen Schnarr & Associates Inc., dated November 13, 2018, The Draft Plan of Subdivision is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The development will consist of 55 two-storey, detached single-family dwellings. The five lots on the north side of Street 'C' (Lots 51 to 55) will be rear-lane homes fronting onto Main Street East. Each of these dwellings will be provided with a grade-level rear yard amenity area between dwelling and the rear garage. The remaining dwellings front onto the internal roadways and will be provided with grade-level rear yard amenity space.

2.0 NOISE SOURCES

2.1 TRANSPORTATION NOISE SOURCES

The noise source with potential to impact the proposed development is road traffic on Main Street East. The Queen Elizabeth Way and the Canadian National Railway (CN) Grimsby Subdivision are located over 300 m to the north. Due to the distance separation and the rows of intervening development, noise from these sources is not expected to have a significant impact at the subject site. Traffic volumes on the other surrounding roadways are anticipated to be minor and no significant noise impact at the subject site is expected.

Current (year 2017) 24 Hour Automatic Traffic Recorder (ATR) data, including Average Annual Daily Traffic (AADT), posted speed and vehicle classification studies for Main Street East was obtained from Niagara Region Transportation Services. The road traffic volumes were projected, as required by Niagara Region, to the year 2038, using a growth rate of 2% compounded annually. "Small Trucks" were considered to be medium trucks. "Tractor Trailers" were considered to be heavy trucks. "Trucks/Buses" were split 60%/40% medium/heavy trucks. A day/night split of 90%/10% was assumed based on a typical pattern for well-travelled roadways.

Table 1 summarizes the traffic data used in the assessment. Appendix A contains the traffic data.

2.2 STATIONARY SOURCES

The existing TSC Stores building (a country hardware store) is located approximately 85 m to the northeast of the site, on the north side of Main Street East. The main noise sources at this store are anticipated to be the rooftop HVAC equipment and vehicle movements in the loading/outdoor storage area at the rear of the building. The loading area is on the opposite side of the building from the subject site, and is screened from the subject site by the hardware store building itself.

The Niagara West YMCA (a community centre) is located to the east of the TSC Stores building. The main noise sources at YMCA are anticipated to be the rooftop HVAC units. Based on aerial imagery, the westernmost unit appears to have a “U”-shaped screen around the north, west and south sides.

A church building is located approximately 150 m to the west of the site, on the south side of Main Street East. The main noise sources at the church are anticipated to be the rooftop HVAC units.

Based on the distance separation, screening by existing buildings between the noise sources and the subject site and the presence of existing residential dwellings at closer setback distances, noise from the above facilities is not expected to have significant impact at the subject site. This was confirmed during a site visit by VCL staff on August 18, 2018, when noise from the facilities was not audible at the subject site over the ambient road traffic noise. Thus, these sources have not been considered further in this assessment.

3.0 ENVIRONMENTAL NOISE GUIDELINES

3.1 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 B.

3.1.1 Architectural Elements

In the daytime (0700 to 2300), the indoor criterion for road noise is $L_{eq\ Day}$ (16-hour energy equivalent sound level) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night (2300 to 0700), the indoor criterion for road noise is $L_{eq\ Night}$ (8-hour energy equivalent sound level) of 45 dBA for sensitive spaces such as living/dining rooms and dens and 40 dBA for bedrooms.

3.1.2 Ventilation

In accordance with the MECP noise guideline for road traffic sources, if the daytime sound level, $L_{eq\ Day}$, at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so 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 inclusive, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupant 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 (provision for adding air conditioning is required when greater than 50 dBA).

3.1.3 Outdoors

For outdoor amenity areas (“Outdoor Living Areas” – OLA’s), the guideline is $L_{eq\ Day}$ of 55 dBA, 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, a balcony is not considered an OLA, unless it is the only OLA for the occupant and it is:

- at least 4 m in depth; and
- unenclosed.

3.2 NIAGARA REGION

Niagara Region noise guidelines are contained in a Public Works Department Policy Manual, Regional Road Traffic Noise Control, dated November 9, 2006.

The noise requirements for new developments are very similar to the MECP requirements described above. Note that Niagara Region requires traffic volumes to be projected to a condition 20 years in the future.

4.0 NOISE IMPACT ASSESSMENT

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

Table 2 summarizes the unmitigated daytime and nighttime sound level predictions. Appendix C contains a sample calculation.

4.1 SOUND LEVELS AT THE BUILDING FACADES

The daytime and nighttime sound levels at the dwelling facades were calculated at the top (second) floor bedroom windows (the worst-case locations) at a height of 4.5 m above grade.

Inherent screening of the building due to its orientation to the noise source was taken into account. To be conservative, screening from existing development in the vicinity of the site was not included in the assessment.

The highest unmitigated daytime/nighttime sound levels of 62 dBA/55 dBA are predicted to occur at the north facade of the dwellings fronting onto Main Street East (Lots 51 to 55).

4.2 SOUND LEVELS IN THE OUTDOOR LIVING AREAS

For dwellings with rear yard outdoor amenity areas, the OLA sound levels were assessed at a standing height of 1.5 m above grade, 3 m from the rear wall and aligned with the midpoint of the applicable façade. For the dwellings fronting onto Main Street with the outdoor amenity area between the dwelling and the garage, the OLA sound levels were assessed at the centre of the amenity area, at a standing height of 1.5 m above grade.

The highest unmitigated daytime OLA sound level of 59 dBA is predicted at the rear yard of dwelling on Lot 1, flanking Main Street East.

For the dwellings on Lots 51 to 55 fronting onto Main Street, the highest unmitigated daytime OLA sound level is predicted to be 48 dBA.

5.0 NOISE ABATEMENT REQUIREMENTS

The noise control measures for transportation noise sources can generally 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; and
- b) Design features to protect the OLAs.

Figure 2, Table 3 and the Notes to Table 3 summarize the transportation noise abatement requirements for the site.

5.1 INDOORS

5.1.1 Architectural Requirements

The indoor noise guidelines can be achieved by using appropriate construction for exterior walls, windows and doors.

In determining the worst-case architectural requirements for residential buildings, wall and window areas were assumed to be 80% and 30% of the associated floor area, respectively, on each facade of a corner room with both facades exposed to the noise source.

Based on the above assumptions, exterior wall and window construction meeting the minimum non-acoustical requirements of the OBC will be sufficient to meet the indoor noise criteria.

5.1.2 Ventilation Requirements

Based on the predicted sound levels, the dwellings fronting onto Main Street East (Lots 51 to 55) and the two northerly dwellings flanking Main Street East (Lots 1 and 2) require the provision for adding air conditioning at a future date by the occupant. This typically takes the form of a ducted, forced air heating system, suitably sized to accommodate central air conditioning.

5.2 OUTDOORS

The unmitigated daytime OLA sound levels at the rear yard of the dwellings on Lots 1 and 2 are predicted to be 59 dBA and 56 dBA, respectively. This exceeds the 55 dBA design objective. A 1.8 m high sound barrier along the north and west property lines of Lot 1 would mitigate the daytime OLA sound level at Lot 1 to 53 dBA. This sound barrier would also provide acoustic screening to Lot 2 and mitigate the daytime OLA sound level to 54 dBA.

The location and orientation of the sound barrier is shown on Figure 2.

The unmitigated daytime OLA sound levels at all other dwellings are predicted to be within the 55 dBA design objective. Thus, sound barriers are not required at these locations.

Sound barriers must be of solid construction with no gaps, cracks or holes (except for small openings required for water drainage) and must have a minimum surface weight of 20 kg/m². A variety of materials are available, including concrete, masonry, glass, wood, specialty composite materials, or a combination of the above.

The sound barrier calculation was based on flat topography and should be confirmed once grading information is available.

5.3 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 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.

6.0 CONCLUSIONS

With the incorporation of the recommended design measures, it is expected the applicable MECP noise guidelines can be met and a suitable acoustical environment provided for the occupants.

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

7.0 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. "Environmental Noise Assessment in Land-Use Planning 1987", Ontario Ministry of the Environment, February 1987, ISBN 0-7729-2804-5.
4. MECP Publication NPC-300, "Stationary and Transportation Sources – Approval and Planning" Ontario Ministry of the Environment, August 2013.

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TABLE 1: ROAD TRAFFIC DATA

Roadway	Year	AADT ⁽¹⁾	% Trucks		Speed Limit (kph)	% Day/Night Split
			Medium	Heavy		
Main Street East ⁽²⁾	2017	12 337	1.8	0.9	50	90/10

Notes:

- (1) AADT – Annual Average Daily Traffic
- (2) Ultimate 24 Hour Automatic Traffic Recorder (ATR) obtained from Niagara Region. Day/Night percentages were assumed to be split 90%/10%. Traffic volumes were escalated to the year 2038 at a growth rate of 2% compounded annually.

TABLE 2: PREDICTED OUTDOOR SOUND LEVELS

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq} Day (dBA)	L _{eq} Night (dBA)
Lot 1 (North face)	Main Street East	21	61	55
Lot 1 (West face)	Main Street East	21	59	52
Lot 1 (OLA — Rear yard)	Main Street East	25	59	—
Lot 2 (West face)	Main Street East	33	56	49
Lot 2 (OLA — Rear yard)	Main Street East	38	56	—
Lot 3 (West face)	Main Street East	47	53	47
Lot 3 (OLA — Rear yard)	Main Street East	51	53	—
Lot 55 (North face)	Main Street East	19	62	55
Lot 55 (West face)	Main Street East	19	59	52
Lot 55 (OLA — Between dwelling and garage)	Main Street East	34	48	—

Notes:

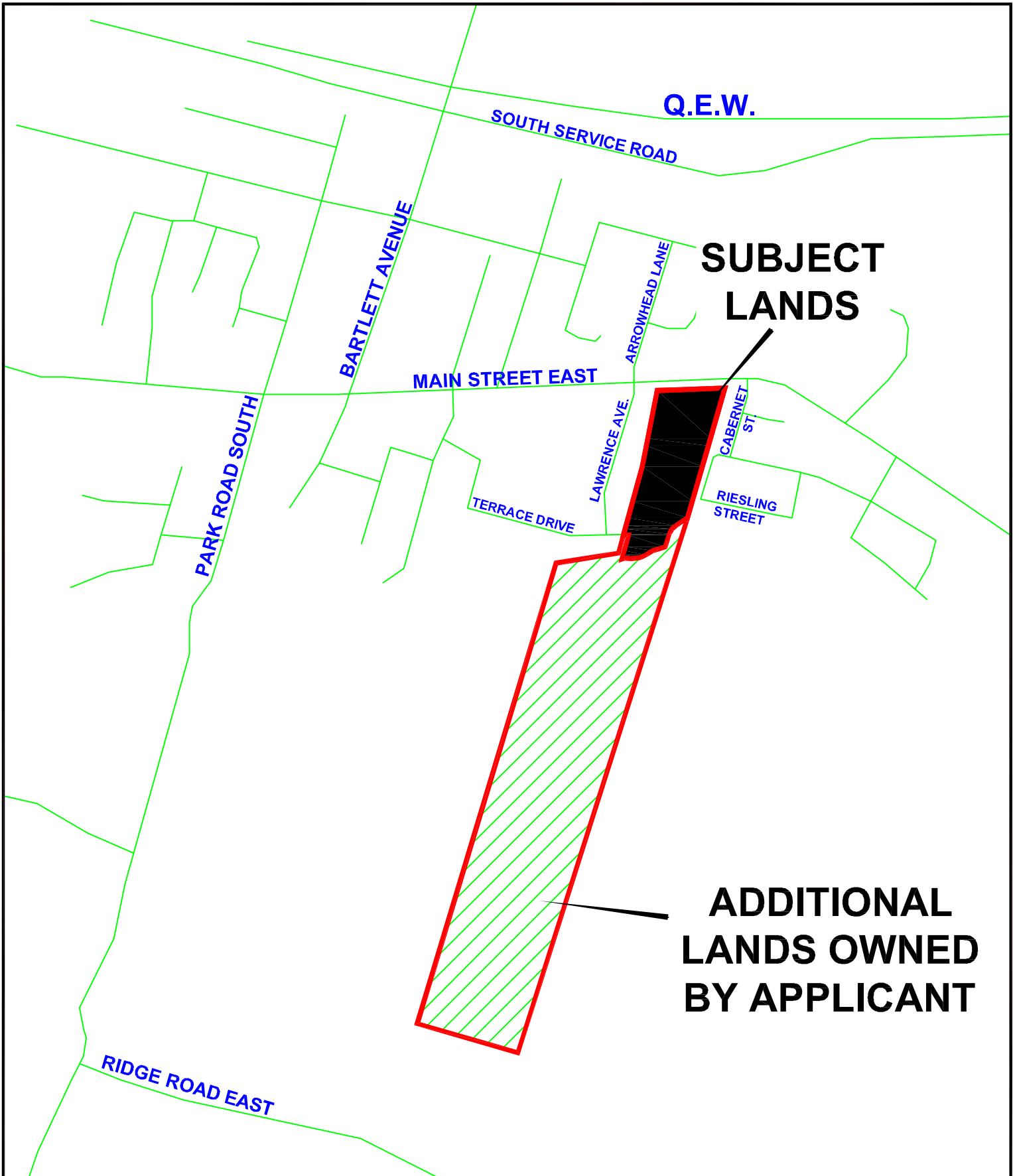
- (1) See Figure 2.
- (2) Distance indicated is from the centreline of the road.
- (3) Sound levels at building facades were assessed at a top floor height of 4.5 m above grade. Sound levels at the OLA's were assessed at a standing height of 1.5 m above grade.

TABLE 3: MINIMUM NOISE ABATEMENT REQUIREMENTS

Lot(s) / Block(s)	Air Conditioning ⁽¹⁾	Exterior Wall ⁽²⁾	Window STC Rating ⁽³⁾	Sound Barrier ⁽⁴⁾	Warning Clauses ⁽⁵⁾
Lot 1	Provision for Adding	No Special Noise Abatement Requirements		1.8 m high	A + B
Lot 2	Provision for Adding	No Special Noise Abatement Requirements		No Special Noise Abatement Requirements ⁽⁸⁾	A + B
Lots 51 to 55	Provision for Adding	No Special Noise Abatement Requirements			A + B
All remaining dwellings	No Special Noise Abatement Requirements				

Notes:

- (1) Where means must be provided to allow windows to remain closed for noise control purposes, a commonly used technique is that of central air conditioning. Where possible, air cooled condenser units, if any, should be located in a noise insensitive area.
Provision for air conditioning would correspond to a ducted, forced air heating system, which would allow the addition of central air conditioning at a later date by the occupant.
- (2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Values, where shown, are based on assumed areas. Requirements should be checked once building plans become available.
- (3) STC - Sound Transmission Class Rating (Reference ASTM-E413). A sliding glass walkout door should be considered as a window and be included in the percentage of glazing. Values shown are based on assumed areas. Requirements should be checked once building plans become available.
- (4) Sound barriers must be of solid construction having a minimum face density of 20 kg/m² with no gaps or cracks. Earthen berms, solid fences or combinations of berms/fences are acceptable.
- (5) Warning clauses to be registered on title and be included in Offers of Purchase and Sale for designated lots:
 - 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 criteria of the municipality and/or the Ministry of the Environment, Conservation and Parks."
 - B. "This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the noise criteria of the municipality and/or the Ministry of the Environment, Conservation and Parks."
- (6) Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.
- (7) All exterior doors shall be fully weatherstripped.
- (8) With provision of acoustical screening from the sound barrier at the adjacent lot to the north.



No.	Revision/Issue	Date


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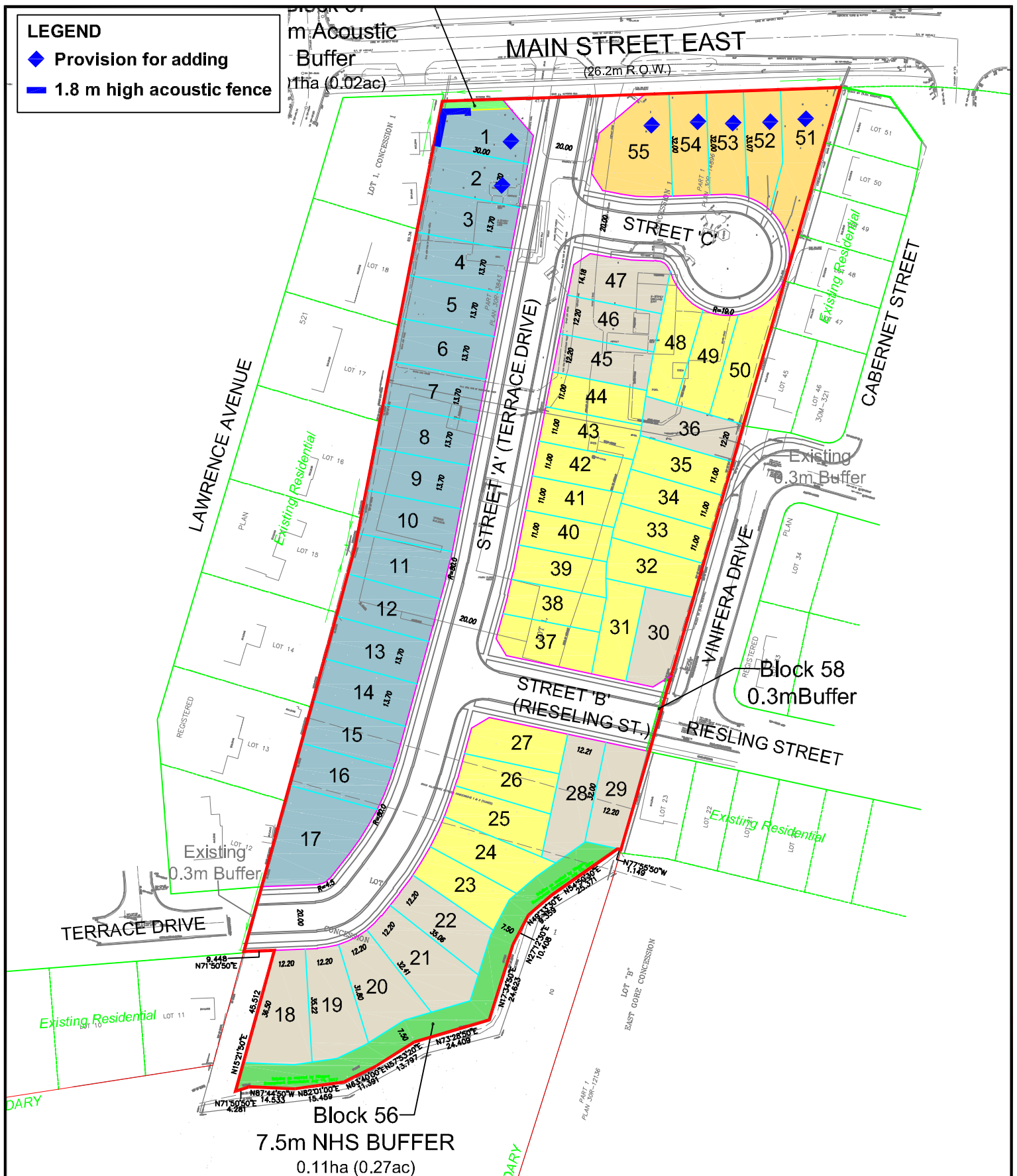
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Title	Project No.	Date
Key Plan	118-0306	Nov. 23, 2018
Project Name	Scale	Figure
308 & 314 Main Street E. Grimsby - Noise	N.T.S.	1

Project No.	Date
118-0306	Nov. 23, 2018
Scale	Figure
N.T.S.	1

LEGEND

- ◆ Provision for adding
- 1.8 m high acoustic fence



No.	Revision/Issue	Date

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Title	Project No.	Date
Draft Plan	118-0306	Nov. 30, 2018
Project Name	Scale	Figure
308 & 314 Main Street E. Grimsby - Noise	N.T.S.	2

Project No.	Date
118-0306	Nov. 30, 2018
Scale	Figure
N.T.S.	2

APPENDIX A

ROAD TRAFFIC DATA

**MH Corbin Traffic Analyzer Study
 Computer Generated Summary Report
 City: Niagara Region
 Street: 610014 - EB
 Location: 6867**

A study of vehicle traffic was conducted with the device having serial number 135167. The study was done in the EB lane at 610014 - EB in Niagara Region, ON in county. The study began on 2017-06-02 at 12:00 AM and concluded on 2017-06-03 at 12:00 AM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 6,125 vehicles passed through the location with a peak volume of 176 on 2017-06-02 at [04:45 PM-05:00 PM] and a minimum volume of 0 on 2017-06-02 at [12:45 AM-01:00 AM]. The AADT count for this study was 6,125.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 KM/H range or lower. The average speed for all classified vehicles was 52 KM/H with 76.11% vehicles exceeding the posted speed of 50 KM/H. 0.00% percent of the total vehicles were traveling in excess of 89 KM/H. The mode speed for this traffic study was 50KM/H and the 85th percentile was 59.81 KM/H.

< to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 to 99	100 to 104	105 to >
341	305	778	2394	1297	590	160	51	31	14	0	0	0	0	0

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 5812 which represents 98 percent of the total classified vehicles. The number of Small Trucks in the study was 62 which represents 1 percent of the total classified vehicles. The number of Trucks/Buses in the study was 70 which represents 1 percent of the total classified vehicles. The number of Tractor Trailers in the study was 17 which represents 0 percent of the total classified vehicles.

< to 4.9	5.0 to 7.9	8.0 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 21.9	22.0 to >							
3961	1851	62	70	5	4	6	2							

CHART 2

HEADWAY

During the peak traffic period, on 2017-06-02 at [04:45 PM-05:00 PM] the average headway between vehicles was 5.085 seconds. During the slowest traffic period, on 2017-06-02 at [12:45 AM-01:00 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 15.00 and 46.00 degrees C.

**MH Corbin Traffic Analyzer Study
 Computer Generated Summary Report
 City: Niagara Region
 Street: 610014 - WB
 Location: 6867**

A study of vehicle traffic was conducted with the device having serial number 132463. The study was done in the WB lane at 610014 - WB in Niagara Region, ON in county. The study began on 2017-06-02 at 12:00 AM and concluded on 2017-06-03 at 12:00 AM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 6,212 vehicles passed through the location with a peak volume of 140 on 2017-06-02 at [03:15 PM-03:30 PM] and a minimum volume of 0 on 2017-06-02 at [01:30 AM-01:45 AM]. The AADT count for this study was 6,212.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 KM/H range or lower. The average speed for all classified vehicles was 54 KM/H with 79.19% vehicles exceeding the posted speed of 50 KM/H. 0.00% percent of the total vehicles were traveling in excess of 89 KM/H. The mode speed for this traffic study was 50KM/H and the 85th percentile was 61.36 KM/H.

< to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 to 99	100 to 104	105 to >
247	259	722	2207	1412	620	278	88	46	23	0	0	0	0	0

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 5729 which represents 97 percent of the total classified vehicles. The number of Small Trucks in the study was 71 which represents 1 percent of the total classified vehicles. The number of Trucks/Buses in the study was 70 which represents 1 percent of the total classified vehicles. The number of Tractor Trailers in the study was 32 which represents 1 percent of the total classified vehicles.

< to 4.9	5.0 to 7.9	8.0 to 9.9	10.0 to 12.9	13.0 to 15.9	16.0 to 18.9	19.0 to 21.9	22.0 to >							
3231	2498	71	70	13	7	7	5							

CHART 2

HEADWAY

During the peak traffic period, on 2017-06-02 at [03:15 PM-03:30 PM] the average headway between vehicles was 6.383 seconds. During the slowest traffic period, on 2017-06-02 at [01:30 AM-01:45 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 15.00 and 45.00 degrees C.

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B
ENVIRONMENTAL NOISE GUIDELINES
MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

Reference: MECP Publication NPC-300, October 2013: “*Environmental Noise Guideline, Stationary and Transportation Sources – 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⁾ 19:00 to 23:00 ⁽¹⁾	50 ⁺ dBA 50 ⁺ dBA
	Class 2 Area	07:00 to 19:00 ⁽²⁾ 19:00 to 23:00 ⁽²⁾	50 ⁺ dBA 45 ⁺ dBA
	Class 3 Area	07:00 to 19:00 ⁽³⁾ 19:00 to 23:00 ⁽³⁾	45 ⁺ dBA 40 ⁺ dBA
	Class 4 Area	07:00 to 19:00 ⁽⁴⁾ 19:00 to 23:00 ⁽⁴⁾	55 ⁺ dBA 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 C

SAMPLE SOUND EXPOSURE CALCULATIONS

STAMSON 5.04 NORMAL REPORT Date: 18-10-2018 14:33:15
MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS/ NOISE ASSESSMENT

Filename: L55_nf.te Time Period: Day/Night 16/8 hours
Description: Predicted Sound Levels - Lot 55, North Facade

Road data, segment # 1: Main St E (day/night)

Car traffic volume : 16375/1819 veh/TimePeriod *
Medium truck volume : 303/34 veh/TimePeriod *
Heavy truck volume : 151/17 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12337
Percentage of Annual Growth : 2.00
Number of Years of Growth : 21.00
Medium Truck % of Total Volume : 1.80
Heavy Truck % of Total Volume : 0.90
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Main St E (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.00 / 19.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Main St E (day)

Source height = 0.97 m

ROAD (0.00 + 61.91 + 0.00) = 61.91 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.59 64.87 0.00 -1.63 -1.33 0.00 0.00 0.00 61.91

Segment Leq : 61.91 dBA

Total Leq All Segments: 61.91 dBA

Results segment # 1: Main St E (night)

Source height = 0.98 m

ROAD (0.00 + 55.40 + 0.00) = 55.40 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.59 58.36 0.00 -1.63 -1.33 0.00 0.00 0.00 55.40

Segment Leq : 55.40 dBA

Total Leq All Segments: 55.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.91
(NIGHT): 55.40