

Environmental Noise Feasibility Study

35814 Zion Road

Proposed Residential Development
Township of Wainfleet
Regional Municipality of Niagara

July 12, 2021
Project: 121-0239

Prepared for

Pols Enterprise Ltd



A handwritten signature in black ink, appearing to read "Sam Du".

Guangsheng (Sam) Du, M.Sc., P.Eng.

VALCOUSTICS

Canada Ltd.

Version History

Version #	Date	Comments
1.0	July 12, 2021	Final – Issued to Client

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Environmental Noise Feasibility Study

35814 Zion Road

Proposed Residential Development Township of Wainfleet Regional Municipality of Niagara

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study to support the land use planning application submission to the Township of Wainfleet and the Regional Municipality of Niagara. The project will consist of six (6) single family residential units.

The main noise source with potential to impact the proposed development is road traffic on Highway 3. There are no stationary sources in the vicinity with the potential to significantly impact the subject site.

To meet the applicable transportation noise source guideline limits:

- The residential unit on Lot 6 requires the provision for adding air-conditioning; and
- For all residential units, exterior walls and windows meeting a minimum non-acoustical requirement of the Ontario Building Code (OBC) are sufficient to meet the indoor sound level criteria of the MECP noise guidelines.

Final requirements should be checked when detailed building plans are available. This could be done as a condition for obtaining a building permit.

1.0 INTRODUCTION

VCL was retained to prepare an Environmental Noise Feasibility Study to support the land use planning application submission to the Township of Wainfleet and the Regional Municipality of Niagara. The project will consist of six (6) single family residential units.

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 proposed development is located at 35814 Zion Road in the Township of Wainfleet. The site is bounded by:

- Agricultural lands to the North;
- Zion Road, with residential buildings and agricultural land beyond, to the East;
- Highway 3, with residential buildings and agricultural land beyond, to the South; and
- Existing housing, wetlands and agricultural land, with Wellandport Road beyond, to the West.

A Key Plan is included as Figure 1

This report is based on the concept plan prepared by Upper Canada Consultants Engineers & Planners dated March 5, 2021. The Site Plan is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The project will consist of six (6) single family residential units. Lot 7 is an Environmental Protection Area and will be preserved as such.

2.0 ENVIRONMENTAL NOISE GUIDELINES

2.1 MECP PUBLICATION NPC-300 – TRANSPORTATION SOURCES

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 A.

2.1.1 Architectural Elements

In the daytime (0700 to 2300), 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, 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. The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound level limits, based on the applicable outdoor sound level on the facades.

2.1.2 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

(1) 16-hour energy equivalent sound level (0700-2300 hours).

(2) 8-hour energy equivalent sound level (2300-0700 hours).

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 ($L_{eq \text{ Night}}$) at a noise sensitive window (provision for adding air conditioning is required when greater than 50 dBA).

2.1.3 Outdoors

For outdoor amenity areas (“Outdoor Living Areas” – OLAs), the guideline is $L_{eq \text{ Day}}$ of 55 dBA, with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, providing warning clauses are registered on title. Note that for road traffic sources, 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.

2.2 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.

3.0 NOISE SOURCES

3.1 TRANSPORTATION SOURCES

The noise sources with potential to impact the proposed development is road traffic on Highway 3. Road traffic on Zion Road is minor and is therefore not expected to create significant noise impact on the proposed development.

Ultimate road traffic volumes including Annual Average Daily Traffic (AADT), Summer Average Daily Traffic (SADT), posted speed limit and percentage of trucks for Highway 3 was obtained from the Ministry of Transport Ontario (MTO). SADT was used in this study as it is higher than AADT making the analysis conservative. Heavy trucks and medium trucks are assumed to be 75%/25% of the total truck volumes. Day/night traffic volume split was assumed to be 90% /10%.

The road and rail traffic data is summarized in Table 1. Correspondence is included as Appendix B.

3.2 STATIONARY SOURCES

Based on a visit to the area, there are no stationary sources in the vicinity with the potential to significantly impact the subject site.

4.0 NOISE IMPACT ASSESSMENT

4.1 ANALYSIS METHOD

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 models of the MECP.

The daytime and nighttime sound levels at the building facades were assessed at the second-floor windows, 4.5 m above grade. The daytime sound levels at the OLA were assessed 1.5 m above grade 3 m from the rear facade of the residential unit.

4.2 SOUND LEVEL PREDICTION

The highest daytime/nighttime unmitigated sound levels of 58sho dBA/52 dBA are predicted to occur at the south building facade at the southeast corner of Lot 6. The unmitigated daytime sound level of 55 dBA is predicted to occur at the Outdoor Living Area (rear yard OLA) of Lot 6.

Inherent screening of each building face due to its orientation to the noise source was taken into account for this assessment.

Table 2 summarises the predicted sound levels outdoors at specific locations.

The sound level calculations are included in Appendix C.

4.3 NOISE ABATEMENT REQUIREMENTS

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

Noise abatement requirements are summarised in Table 3 and notes to Table 3.

4.3.1 Indoors

4.3.1.1 Architectural requirements

The indoor sound level guidelines can be achieved by using appropriate construction for exterior walls, windows, and doors. In determining the worst-case architectural requirements for the single-family home, exterior wall and window areas were assumed to be 80% and 30%, respectively, of the associated floor area at a corner room with facades exposed directly or at an angle to the road traffic noise source, for both living/dining areas and sleeping quarters.

For all the residential units, exterior walls and windows meeting the minimum non-acoustical requirement of the OBC are sufficient to meet the indoor sound level criteria of the MECP noise guidelines.

Note, the window frames themselves must also be designed to ensure that the overall sound isolation performance for the entire window unit meets the sound isolation requirement. This must be confirmed by the window manufacturer through the submission of acoustical test data.

The final sound isolation requirements should be reviewed when architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance.

4.3.1.2 Ventilation requirements

Lot 6 requires the provision for adding air conditioning at a later date at the discretion of future occupants. This typically takes the form of a ducted, forced air heating system, suitably sized to accommodate central air conditioning.

There is no special ventilation requirement for the remaining units for noise control purposes.

4.3.2 **Outdoors**

The unmitigated daytime sound level at the OLA's is predicted to be 55 dBA or less meeting the design objective of the MECP noise guidelines. Sound barriers are not required for noise control purposes.

4.3.3 **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.

5.0 **CONCLUSIONS**

With the incorporation of the recommended noise mitigation measures, the indoor and outdoor transportation noise guidelines can be met. Future occupants will be made aware of potential noise situation through warning clauses, as per MECP guidelines.

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

6.0 **REFERENCES**

- 1) PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.
- 2) Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.
- 3) "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning", Ontario Ministry of the Environment, Publication NPC-300, August 2013

TABLE 1 ROAD TRAFFIC DATA

Roadway ⁽¹⁾	Year	24-hour Volume	% Trucks		Day/Night (%)	Speed Limit (kph)
			Medium	Heavy		
Highway 3	Ultimate – SADT ⁽²⁾	6 700	2.5	7.5	90/10	80

Notes:

- (1) Obtained from the Ministry of Transport Ontario.
- (2) SADT – Summer Average Daily Traffic.

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS⁽¹⁾

Location	Source	Distance (m) ⁽²⁾	L _{eq} Day (dBA)	L _{eq} Night (dBA)
R1	Highway 3	61	58	52
R2	Highway 3	61	55	49
R3	Highway 3	103	50	43
R4	Highway 3	103	52	45
OLA1	Highway 3	68	55	-
OLA2	Highway 3	112	51	-

Notes:

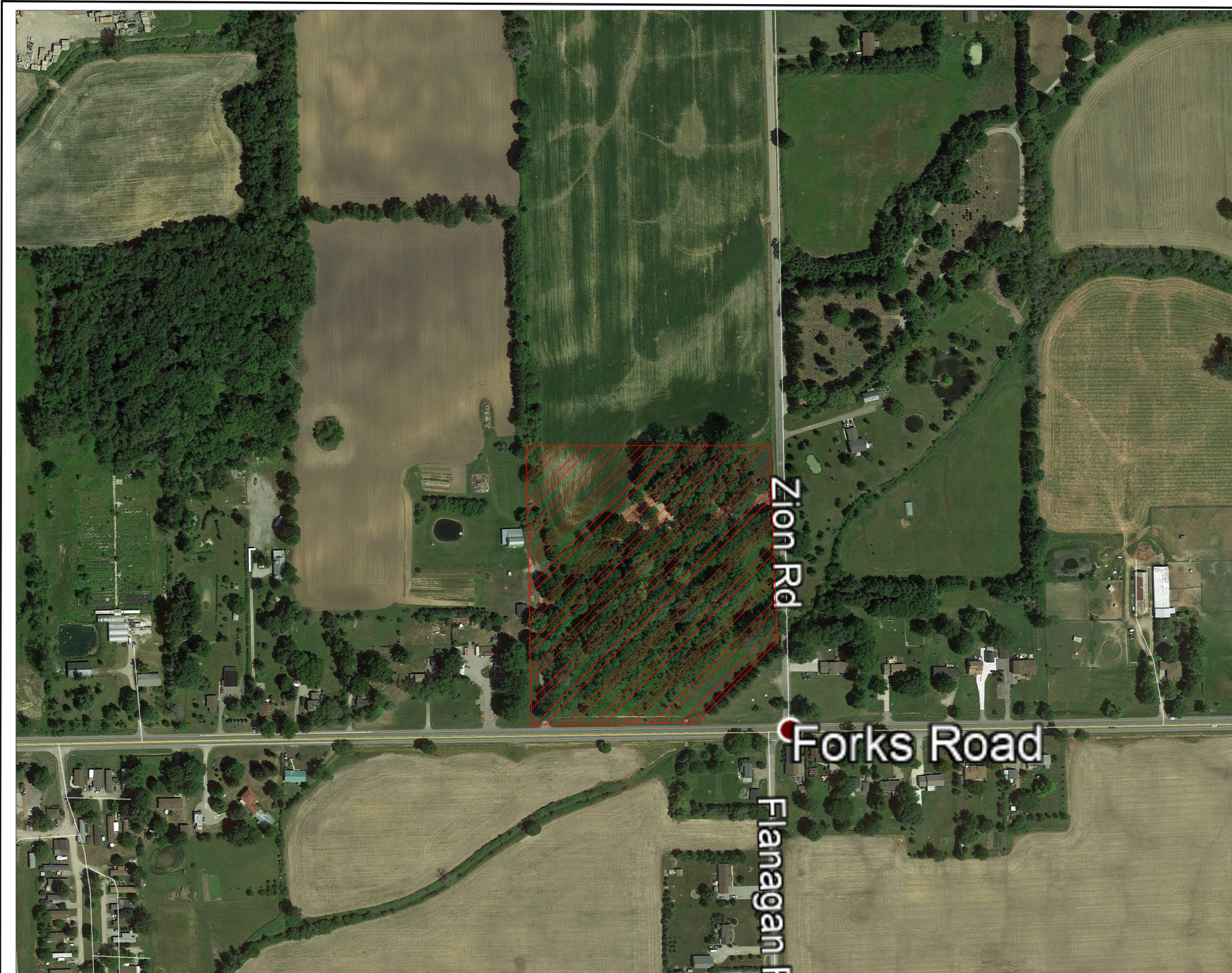
- (1) Daytime/nighttime receptors were taken at the top floor windows. OLA receptors were taken at 1.5 m above grade. Figure 2 shows the assessment receptor locations.
- (2) Distance indicated is from the centreline of the noise sources to facade or OLA.

TABLE 3 MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning ⁽¹⁾	Exterior Wall ⁽²⁾	Window STC Rating ⁽³⁾	Sound Barrier ⁽⁴⁾	Warning Clauses ⁽⁵⁾
Lot 6	Provision for adding	OBC	OBC	None	A + B

Notes:

- (1) Where methods must be provided to allow windows to remain closed for noise control purposes, a commonly used technique for is the use of air conditioning. Provision for adding air conditioning typically takes the form of a ducted ventilation system suitably sized to permit the addition of central air conditioning by the occupant.
- (2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Analyses were based upon the assumption that wall and window areas are as indicated in Section 4.3.1.1 of this report. Requirements should be checked once floor plans have been finalized and exterior wall construction details are defined.
- (3) STC values are based upon the assumption that all wall and window areas are as indicated in Section 4.3.1.1 of this report. Requirements should be checked once floor plans have been finalized and exterior wall construction details are defined.
- (4) If provided, sound barriers must be of solid construction with no gaps, cracks, or holes, and must meet a minimum surface density of 20 kg/m². Suitable material can include wood, concrete metal sandwich panel, glazing or a combination of these.
- (5) The 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 on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, 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 sound level limits of the Municipality and the Ministry of the Environment."
- (6) All exterior doors shall be fully weather-stripped.



General Notes

No.	Revision/Issue	Date

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Project Name
35814 Zion Road,
Wainfleet, Ontario

Title
Key Plan

Project	121-0239	Figure	1
Date	2021-07-12		
Scale	N.T.S.		

APPENDIX A

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX A
ENVIRONMENTAL NOISE GUIDELINES
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE (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 B

ROAD TRAFFIC DATA

Sam Du

From: Wang, Zach (MTO) <Zach.Wang@ontario.ca>
Sent: June 21, 2021 9:30 AM
To: Abhishek Thyagarajan
Cc: Sam Du
Subject: RE: 1210239.000 - Zion Road, 35814/Wainfleet-Noise

Hello Abhishek,

In response to your request please find below the information available from this office for Hwy 3 east of Wellandport Rd, which we are able to provide.

2016 AADT = 4500
2016 SADT = 4950
Number of through lanes = 2
Ultimate AADT = 6100
Ultimate SADT = 6700
Ultimate number of through lanes = 2
Posted Speed = 80 km/hr
Percentage of Trucks = 10%

Please note that the above information is estimated based upon our current knowledge of the area, which may be subject to change in the future. Other information related to ROW and gradient will be available from Central Region Traffic Office.

If you require further information, please don't hesitate to contact me.

Regards,
Zach

Zach Wang | EIT
Systems Analysis and Forecasting Office, Ministry of Transportation

From: Abhishek Thyagarajan <abhishek@valcoustics.com>
Sent: June 17, 2021 2:02 PM
To: Wang, Zach (MTO) <Zach.Wang@ontario.ca>
Cc: Sam Du <sam@valcoustics.com>
Subject: 1210239.000 - Zion Road, 35814/Wainfleet-Noise

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Zach,

We are working on a noise assessment in Wainfleet, ON and we require TMC data at the intersection of Highway 3 and Highway 4 (Please refer image below). Will you be able to provide TMC data for this intersection?

Please let me know if you need any more information on this request.

APPENDIX C

SAMPLE SOUND LEVEL CALCULATIONS

