HGC ENGINEERING

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

Noise Feasibility Study
Proposed Residential Development
Old Church Road and Marilyn Street
Caledon, Ontario

Prepared for:

Stylux Caledon Inc.
40 Vogell Road, Suite 51
Richmond Hill, ON
L4B 3N6

Prepared by

Harry Cai, EIT

Reviewed by

Sheeba Paul, MEng, PEng

DRAFT: July 16, 2019

HGC Project No: 01900354

Table of Contents

1 Introduction and Summary

HGC Engineering was retained by Stylux Caledon Inc. to conduct a noise feasibility study for a proposed residential development located at the north side of Old Church Road and east of Marilyn Street, Caledon, Region of Peel, Ontario. Lands surrounding the subject site are predominantly existing residential. The residential development will consist of 19 new lots. The study is required by the Town of Caledon as part of the planning and approvals process.

The primary source of noise was determined to be road traffic on Old Church Road. Road traffic data was obtained from the Region of Peel for Old Church Road at the intersection with Marilyn Street. The predicted sound levels were compared to the guidelines of the Ministry of Environment, Conservation and Parks (MECP), the Region of Peel and the Town of Caledon to develop noise control recommendations.

The results of the study indicate that future daytime and nighttime sound levels of proposed lots adjacent to Old Church Road will exceed MECP guideline sound levels and will require noise control measures. Forced air ventilation systems with ductwork sized for the future provision of central air conditioning by the occupant and acoustic barriers are required for the row of lots adjacent to Old Church Road. Noise warning clauses are also required for those units to inform future occupants of the traffic noise impacts and to address sound level excesses. For all units, building constructions meeting the minimum requirement of the Ontario Building Code will provide sufficient acoustical insulation for the indoor spaces.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located at the north side of Old Church Road and east of Marilyn Street, Caledon, Region of Peel, Ontario. Figure 2 shows the conceptual development plan prepared by KLM Planning Partners dated November 27th, 2018. The proposed development will include 19 new lots for single detached houses. The rear yards are proposed to be adjacent to Old Church Road. Lands between the subject site and Marilyn Street are owned by a different applicant.

The land area around the development site is fairly flat and suburban in nature. Aside from existing residential units, the area is close to community services such as a fire station, community park and skating arena. The main source of noise that may affect the proposed site is the 2-lane traffic on Old Church Road, which is subject to future road widening.

3 Noise Level Criteria

3.1 Road Traffic Noise

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Road Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road	Nighttime L_{EQ}(8 hour) Road
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms	45 dBA	45 dBA
Inside Bedrooms	45 dBA	40 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur. Small balconies are not considered OLAs for the purposes of assessment. Terraces greater than 4 m in depth (measured perpendicular to the building façade) are considered to be OLAs.

The guidelines in the MECP publication allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically, and administratively practical. The maximum acoustic fence height in the Region of

Peel is 2.0 m with a maximum combined berm and barrier height of 4 m, and fence heights up to 2.4 m have been considered in the past. In the case that the guideline criterion of 55 dBA cannot be met, it must be demonstrated to the Region of Peel that it is not technically feasible to meet the 55 dBA criterion with a warning clause. The Town of Caledon requires 55 dBA in the OLA's. If higher sound levels are to be achieved in the OLA's, it is the proponent's responsibility to delegate Council to seek relief from the 55 dBA requirement for the amenity areas. The maximum acoustic fence height is 2.4 m. The remainder of the acoustic barrier height can be made up with an earth berm.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 59 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

Warning clauses to notify future residents of possible noise excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road traffic.

4 Traffic Sound Level Assessment

4.1 Road Traffic Data

Traffic data for Old Church Road was obtained from the Region of Peel in the form of ultimate AADT traffic values, and is provided in Appendix A. An ultimate volume of 16 200 vehicles per day was applied for the analysis. A commercial vehicle percentage of 5.4% at daytime and 6.7% at nighttime was provided. The commercial percentage was split into 3.6% heavy trucks and 1.8% medium trucks at daytime, and 5.3% heavy trucks and 1.4% medium trucks at nighttime. The most conservative case for medium and heavy truck percentage was used in the analysis, specifically with heavy truck percentage at 5.3% and medium truck percentage at 1.8%. A day/night split of 93%/7% and a speed limit of 50 km/h was used. Table II summarizes the traffic volume data used in this study.

Table II: Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Old Church Road	Daytime	13 996	271	798	15 066
	Nighttime	1 053	20	60	1 134
	Total	**15 050**	**292**	**859**	**16 200**

4.2 Road Traffic Noise Predictions

To assess the levels of road traffic noise which will impact the study area in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix B. Future residential developments outside of the proposed 19 lots per the conceptual development plan were not considered in the analysis.

Predictions of the traffic sound levels were made at the proposed residential lots. Sound levels were predicted at the plane of the 2nd storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation requirements. Predictions were also performed in the rear yard outdoor living areas to be located adjacent to Old Church Road to investigate acoustic

barrier requirements. Figure 2 shows the concept plan of the site with prediction locations. A minimum 6 m front yard setback, 7.5 m rear yard setback, 4.5 m exterior sideyard setback and 1.2 m interior sideyard setback were used in the analysis. The results of these predictions are summarized in Table III.

Table III: Predicted Road Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime – in the OLA $L_{EQ\text{-}16\ hr}$	Daytime – at the Façade $L_{EQ\text{-}16\ hr}$	Nighttime – at the Facade $L_{EQ\text{-}8\ hr}$
A	Lots backing Old Church Road	65	64	56
B	Lot flanking Old Church Rd	63	65	57
C	Lots in 2nd row from Old Church Road	≤55	≤55	≤50
D	2nd lot with flanking exposure to Old Church Road	≤55	≤55	≤50

5 Discussion and Recommendations

The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the six lots directly adjacent to Old Church Road. The remaining lots not adjacent to Old Church Road do not exceed MECP levels. The following discussion outlines the recommendations for acoustic barrier requirements, ventilation requirements, upgraded building façade construction, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

The predicted daytime sound levels in the OLA's of location A and B will be up to 65 and 63 dBA respectively, which is in excess of the MECP's limit of 55 dBA. Physical mitigation in the form of an acoustic barrier is required to address these excesses. The various barrier heights required to achieve MECP's OLA requirements are provided in Table IV.

Table IV: Required Barrier Heights to Achieve Various Sound Levels

	Prediction Location	Sound Level in OLA [dBA]					
		55	56	57	58	59	60
Barrier Height [m]	A	3.0	2.8	2.5	2.3	2.0	--
	B	2.5	2.1	--	--	--	--

The maximum acoustic barrier height in the Region of Peel is to be 4.0 m above the centerline of the road pavement with a maximum barrier fence height of 2.0 m, occasionally up to 2.4 m if approved by the area municipality in consultation with the appropriate road authority.

The MECP's limit and the Town of Caledon's limit for daytime sound levels in the outdoor living areas (OLAs) is 55 dBA. If higher sound levels are to be achieved in the OLA's, it is the proponent's responsibility to delegate Council to seek relief from the 55 dBA requirement for the amenity areas. The maximum acoustic fence height is 2.4 m. The remainder of the acoustic barrier height can be made up with an earth berm.

An acoustic barrier height of 3.0 m is recommended for the rear yards of the five lots adjacent to Old Church Road, designated by prediction location A, to reduce the sound level to 55 dBA. An acoustic barrier height of 2.5 m is recommended for the sideyard of the lot designated by prediction location B adjacent to Old Church Road to meet the 55 dBA objective. Figure 3 shows the location of the required barriers. Future analysis is required when grading information is available, and the acoustic barrier heights should be refined.

Acoustic barriers can be any combination of an earth berm with an acoustic wall on top. Since the maximum fence/wall height is 2.0 m, and in some cases, consideration maybe given to fence height up to 2.4 m, the remainder of the required acoustic barrier height may be made up with an earth berm underneath. All noise barriers must return back to the dwelling units so that the rear yards are entirely shielded from the roadway. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. The walls may be constructed from a variety of materials such as wood, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks within or below its extent.

5.2 Indoor Living Areas and Ventilation Requirements

Provision for Air Conditioning

The predicted future sound levels outside the 2nd storey living room/dining room/bedroom windows of the dwellings on the six lots adjacent to Old Church Road, designated by prediction location A and B, will be between 56 and 65 dBA during the daytime hours and between 51 to 60 dBA during the nighttime hours. To address these excesses, these dwelling units require provisions for the future

installation of central air conditioning systems so that windows may be kept closed. This requirement is typically satisfied through the installation of forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant. These units are indicated in Figure 3. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300.

5.3 Building Façade Constructions

The predicted sound levels at the building façade of all lots will not exceed 65 dBA daytime and 60 dBA nighttime, thus will not require additional building design to conform to noise criteria. Any exterior wall and double-glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation.

5.4 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all lots with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table V.

Suggested wording for future dwellings which have sound levels in excess in the OLA's but do not require mitigation measures is given below.

Type A:

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

Suggested wording for future dwellings which have physical noise mitigation are provided on site is given below.

Type B:

> That the acoustical berm and/or barrier as installed, shall be maintained, repaired or repaired by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards, and having the same colour and appearance of the original.

Suggested wording for future dwellings which have provisions for central air conditionings to be installed is given below.

Type 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 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, Conservation and Parks.

These sample clauses are provided by the MECP as examples, and can be modified by the Municipality as required.

6 Summary and Recommendations

The following list and Table V summarize the recommendations made in this report. The reader is referred to Figure 3 and previous sections of the report where these recommendations are applied and discussed in more detail.

1. Acoustic barriers are required for the five proposed dwellings with rear yards backing onto Old Church Road and for the dwelling with exterior sideyard adjacent to Old Church Road. When grading plans are available, acoustic barrier heights should be refined.

2. Forced air ventilation systems with ductwork sized for future installation of central air conditioning systems will be required for the six proposed dwellings with rear or side yard adjacent to Old Church Road.

3. The use of warning clauses in the property and tenancy agreements is recommended to inform future residents of traffic noise issues.

Table V: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Description	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Upgraded Building Constructions
A	Lots backing Old Church Road	✓	Forced Air	A, B, C	OBC
B	Lot flanking Old Church Road	✓	Forced Air	A, B, C	OBC

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.
✓ Outdoor living areas require acoustic barriers
OBC – Ontario Building Code

6.1 Implementation

To ensure that the noise control recommendations outlined above are properly implemented, it is recommended that:

1. When grading information is available, the acoustic barrier heights should be refined.

1. Prior to the issuance of building permits for this development, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated, installed, and constructed.