



Noise Feasibility Study Proposed Residential Development Old Barber House 5155 Mississauga Road City of Mississauga, Ontario

Prepared for:

City Park (Old Barber) Homes Inc. 950 Nashville Road Kleinburg, Ontario, L0J 1C0

Prepared by

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June 6, 2016







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1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by City Park (Old Barber) Homes Inc. to perform a noise feasibility study for a proposed residential development located at 5155 Mississauga Road, in the City of Mississauga, Ontario. The residential development site is proposed to include 30 units comprised of: 1 freehold detached dwelling; 8 freehold townhouses; 1 common element condo detached dwelling; 16 common element condo townhouse dwellings; and 4 two storey townhouse units within the Old Barber House. The analysis includes an assessment of road traffic noise on the proposed residential dwellings in accordance with Ministry of the Environment and Climate Change (MOECC) guidelines. The study is required by the City of Mississauga as part of the planning and approvals process.

Road traffic data was obtained through correspondence with the City of Mississauga. The data was provided in the form of ultimate road traffic data and was used to predict future traffic sound levels at the façades of the proposed residential buildings and in rear yard outdoor living areas. The predicted sound levels were compared to the guidelines of the MOECC and the City of Mississauga.

The sound level predictions indicate that the future road traffic sound levels will exceed MOECC guidelines at the dwelling units closest to Mississauga Road. An acoustic barrier is required for the OLA of the single detached dwelling adjacent to Mississauga Road. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant will be required for the dwellings closest to Mississauga Road at the north end of the site. For all dwelling units in the development, building constructions meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation. Warning clauses are also recommended to inform future occupants of the traffic noise impacts.







2 SITE DESCRIPTION AND SOURCES OF SOUND

Figure 1 shows a key plan which identifies the location of the proposed residential development. The residential development is located at the Old Barber House Site, 5155 Mississauga Road in the City of Mississauga, Ontario. The proposed site plan prepared by Flanagan Beresford & Patterson Architects last revised on May 31, 2016 is included as Figure 2. The residential development site is proposed to include 30 units comprised of: 1 freehold detached dwelling; 8 freehold townhouses; 1 common element condo detached dwelling; 16 common element condo townhouse dwellings; and 4 two storey townhouse units within the Old Barber House.

HGC Engineering personnel visited the site in February 2016. The surrounding lands are residential. To the east of the site there is a place of worship (PORTICO a community church). Sounds from these uses were not audible at the subject site over road traffic sounds.

Mississauga Road is a 3 lane roadway (1 lane in each direction and a turning lane) in this area. There are no significant sources of stationary noise within 300 m of the subject site.

3 CRITERIA FOR ACCEPTABLE SOUND LEVELS

3.1 Road Traffic Noise Criteria

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MOECC publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A weighted decibels [dBA].







| | Daytime L _{EQ(16 hour)} | Nighttime L _{EQ(8 hour)} |
|----------------------------|----------------------------------|-----------------------------------|
| Outside Bedroom Windows | 55 dBA | 50 dBA |
| Outdoor Living Areas | 55 dBA | |
| Inside Living/Dining Rooms | 45 dBA | 45 dBA |
| Inside Bedrooms | 45 dBA | 40 dBA |

Table 1: Road Traffic Noise Criteria

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, backyard, terrace, children's playground or other area where passive recreation is expected to occur.

The guidelines in the MOECC publication allow the sound level limit in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the property agreements, offers of purchase and sale and rental agreements to the properties. Where future 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 feasible.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where future nighttime sound levels outside bedroom windows will exceed 60 dBA or future daytime sound levels outside living/dining room windows will exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning by the occupant is required when nighttime sound levels at bedroom windows will be in the range of 51 to 60 dBA or when daytime sound levels at living/dining room windows will be 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 nighttime plane of window sound level will be greater than 60 dBA or the daytime plane of window sound level will be greater than 65 dBA. The use of warning clauses to notify future residents of possible excesses is also required.







4 TRAFFIC SOUND LEVEL ASSESSMENT

4.1 Road Traffic Data

Ultimate road traffic information for Mississauga Road was obtained from City of Mississauga personnel and is provided in Appendix A. A speed limit of 50 km/h was used for Mississauga Road. A commercial vehicle percentage of 2% was used, split into 1.1% medium trucks and 0.9% heavy trucks, along with a day-night split of 90%/10%. Table 2 summarizes the traffic volumes used in the analysis.

| Road Name | | Cars | Medium Trucks | Heavy Trucks | Total |
|-------------|-----------|--------|------------------|-----------------|--------|
| Mississones | Daytime | 17 640 | 198 | 162 | 18 000 |
| Dood | Nighttime | 1 960 | 22 | 18 | 2 000 |
| Nuau | Total | 19 600 | 220 | 180 | 20 000 |

Table 2: Ultimate Road Traffic Data

4.2 Road Traffic Noise Predictions

Future traffic sound levels were predicted using STAMSON version 5.04, a computer algorithm developed by the MOECC. Sample STAMSON output is included in Appendix C.

Sound levels were predicted at the plane of the living/dining room windows during the daytime and at the plane of the bedroom windows during nighttime hours to investigate ventilation requirements. The results of these predictions, without mitigation, are summarized in Table 3.





| Prediction Location | Description | Daytime – in OLA L _{EQ-16 hr} | $\begin{array}{l} \textbf{Daytime}-\textbf{at}\\ \textbf{the Façade}\\ L_{EQ\text{-16}hr} \end{array}$ | $\begin{array}{c} \textbf{Nighttime}-at\\ \textbf{the Facade}\\ \textbf{L}_{EQ\text{-}8hr} \end{array}$ |
|------------------------|---|--|--|---|
| Block 1 | Flanking exposure to Mississauga Rd. | 61 | 65 | 61 |
| Block 2 – Unit 2 | Some backing exposure to Mississauga Rd. | 57 | 57 | 50 |
| Lot 2 | Flanking exposure to Mississauga Rd. | 56 | 55 | <50 |
| Lot 1 | Some backing exposure to Mississauga Rd. | 58 | 60 | 54 |
| Block 4 | Quadplex with some exposure to Mississauga Rd | | 59 | 52 |

Table 3: Predicted Sound Levels, Without Mitigation, [dBA]

5 TRAFFIC NOISE RECOMMENDATIONS

The predictions indicate that the future traffic sound levels will exceed MOECC guidelines at the dwellings closest to Mississauga Road. Recommendations to address these excesses are discussed below.

5.1 Outdoor Living Areas

The predicted daytime sound levels in the OLA of Block 1 with flanking exposure to Mississauga Road will be 61 dBA, which is 6 dBA in excess of the MOECC's limit of 55 dBA. Physical mitigation in the form of an acoustic barrier is required. A 2.0 m high acoustic wall will reduce the sound level to 55 dBA.

The predicted daytime sound levels in the OLA's of Lots 1 and 2, and Block 2 (Unit 1) with some flanking exposure to Mississauga Road will be up to 58 dBA, which is up to 3 dBA in excess of the MOECC's limit of 55 dBA. The 3 dBA sound level excesses are acceptable to the MOECC, if they are acceptable to the municipality with the use of appropriate warning clauses.

As a general note, an acoustic barrier may be a combination of an acoustic wall and an earth berm. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m². The walls may be constructed from a variety of materials such as wood, brick, precast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks. The heights and extents of the barriers should be chosen to reduce the sound levels in the OLA's to







below 60 dBA and as close to 55 dBA as is technically, administratively and economically feasible, subject to the approval of the municipality respecting any applicable fence height by-laws.

The predicted daytime sound levels in the OLA's of the remainder of the lots are less than 55 dBA, thus physical mitigation will not be required.

5.2 Indoor Living Areas

Provision for the Future Installation of Air Conditioning

On Blocks 1, 2 (unit 2), 4 (unit 18, 19) and Lot 1, the predicted sound levels at the plane of the windows are between 56 and 65 dBA during the daytime and between 51 and 60 dBA during the nighttime hours. These units will require forced air ventilation systems with ductwork sized for the future provision of central air conditioning systems by the occupant. This requirement is typically satisfied through the installation of forced air heating systems. These units are indicated in Figure 3.

The remaining lots have no specific ventilation requirements.

5.3 Building Façade Constructions

All the lots in the development will have nighttime sound levels less than 60 dBA and daytime sound levels less than 65 dBA. Any double glazed window construction and exterior wall construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for all the dwelling units in the development.







5.4 Warning Clauses

The MOECC guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all units with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for future dwellings with sound level excesses the MOECC criteria is given below:

Type A:

Purchasers and tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels activities exceed the Municipality's and the Ministry of the Environment and Climate Change's noise criteria.

Suggested wording for future dwellings for which physical mitigation has been provided is given below.

Type B:

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 and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment and Climate Change's noise criteria. The acoustical barrier as installed shall be maintained, repaired or replaced by the owner. Any maintenance, repair or replacement shall be with the same material, to the same standards and having the same colour and appearance of the original.

Suitable wording for future dwellings with minor excesses and requiring forced air ventilation

systems is given below.

Type C:

This dwelling unit has been fitted with a forced air heating system and the ducting etc., was sized to accommodate central air conditioning. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and comply with criteria of MOECC publication NPC-300, as applicable.)







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

6 SUMMARY AND RECOMMENDATIONS

In summary, HGC Engineering has reviewed the site plan and performed calculations to determine the potential road traffic noise impact on the residential properties with respect to MOECC guidelines. The following are the recommendations.

- 1. An acoustic barrier is required for the OLA of Block 1.
- Forced air ventilation systems with ductwork sized for the future installation of central air conditioning system will be required for dwelling units on Blocks 1, 2 (unit 2), 4 (unit 18, 19) and Lot 1. The location, installation and sound ratings of the air conditioning devices should comply with NPC-300, as applicable.
- 3. Building constructions meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for the indoor spaces for all the lots in the subdivision.
- 4. Warning clauses should be used to inform future residents of the traffic noise issues.

The following table summarizes the noise control recommendations and noise warning clauses for the lots in the proposed subdivision. Please see Figures 2 and 3, for reference.







| Lot | Acoustic Barrier | *Ventilation Requirements | Type of Warning Clause | Building Façade Constructions |
|--|---------------------|------------------------------|---------------------------|----------------------------------|
| Block 1 | \checkmark | Forced Air | B, C | OBC |
| Blocks 2 (unit 2) and 4 (unit 18, 19), Lot 2 | | Forced Air | A, C | OBC |
| Remaining Dwellings | | | | OBC |

Table 4: Summary of Noise Control Requirements and Noise Warning Clauses

Notes:

-- no specific requirement

OBC – meeting the minimum requirements of the Ontario Building Code

* The location, installation and sound rating of the air conditioning condensers must be compliant with MOECC Guideline NPC-300, as applicable.

6.1 Implementation

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

1. Prior to assumption of the subdivision, 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.









Figure 1 - Key Plan











APPENDIX A

Road Traffic Data







| Date: | 2 | 29-Jan-16 | DISE REPORT FOR PROPOSED DEVELOPMENT | | | |
|----------------------------|-----------------|--|--|--|--|--|
| F | REQUESTED BY: | | | | | |
| Name: | Victor Garcia | | E CITY OF MISSISSAUGA | | | |
| Company | HGC Engineering | | | | | |
| Fax#: | () - 0 | Location: | Mississauga Road, North of Eglipton Avenue W | | | |
| | PREPARED BY: | | | | | |
| Name: | Loudel Uy | | | | | |
| Tel#: | (905) 615-3200 | Look Up ID | <mark>≭:</mark> 347 | | | |
| | | | | | | |
| | | 01 | N SITE TRAFFIC DATA | | | |
| generationski na S | Specific | | Street Names | | | |
| | | Mississauga Road | | | | |
| AADT: | | 20,000 | | | | |
| # of Lanes | : | 2 | | | | |
| % Trucks: | | 2% | | | | |
| Medium/Heavy Trucks Ratio: | | 55/45 | | | | |
| Day/Night Traffic Split: | | 90/10 | | | | |
| Posted Speed Limit: | | 50 km/h | | | | |
| Gradient of Road: | | <2% | | | | |
| Ultimate R | O W: | 20m | | | | |
| | | | | | | |
| Comments: | | Ultimate Traffic data only. | | | | |
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APPENDIX B

Sample STAMSON 5.04 Output







10LA. TXT Date: 13-05-2016 09: 42: 10 NORMAL REPORT STAMSON 5.0 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Time Period: 16 hours Filename: 101a.te Description: OLA of lot 1 with flanking exposure to Mississauga Rd Road data, segment # 1: Mississauga Car traffic volume : 17640 veh/TimePeriod Medium truck volume :198 veh/TimePeriod *Heavy truck volume :162 veh/TimePeriod *Posted speed limit :50 km/hRoad gradient :0 %Road pavement :1 (Typical asphalt or concrete) Road gradient : Doad pavement : Data for Segment # 1: Mississauga Angl e1 Angl e2 : -90.00 de<u>g</u> -45.00 deg 0 0 No of house rows : Surface Wood depth (No woods.) (Absorptive ground surface) 1 Receiver source distance : 18.85 m Receiver height : 1.50 m Topography : 2 Barrier angle1 : -90.00 deg Barrier height : 7.00 m Barrier receiver distance : 3.50 m (Flat/gentle slope; with barrier) Angle2 : -45.00 deg Source el evation:0.00 mReceiver el evation:0.00 mBarrier el evation:0.00 mReference angle:0.00 Road data, segment # 2: Mississauga _ _ _ _ _ Car traffic volume : 17640 veh/TimePeriod Medium truck volume :198 veh/TimePeriodHeavy truck volume :162 veh/TimePeriodPosted speed limit :50 km/h * Heavy truck volume : Posted speed limit : Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) Data for Segment # 2: Mississauga Angle1 Angle2 : -45.00 deg 90.00 deg 0 Wood depth (No woods.) : No of house rows : 0 Surface (Absorptive ground surface) 1 Receiver source distance : 18.85 m Recei ver height : 1.50 m Topography1.50 mBarrier angle12Barrier height-45.00 degBarrier height2.00 mBarrier receiver distance5.90 mSource el evation0.00 mReceiver el evation0.00 m (Flat/gentle slope; with barrier) Angl e2 : 90.00 deg Source erevationU. UUReceiver elevation0.00Barrier elevation0.00Contract angle0.00 0.00 m 0.00 m Results segment # 1: Mississauga





Page 1

*"*S"

VIBRATION

10LA. TXT Source height = 0.97 mBarrier height for grazing incidence Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 0.97 ! 1.50 ! 1.40 ! 1. 1.40 ROAD (0.00 + 40.39 + 0.00) = 40.39 dBAAngle1 Angle2 Alpha RefLeq P. Adj D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq -90 -45 0.26 64.93 0.00 -1.25 -7.32 0.00 0.00 -15.98 40.39 _____ Segment Leq: 40.39 dBA Results segment # 2: Mississauga _____ Source height = 0.97 m Barrier height for grazing incidence Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 0.97 ! 1.50 ! 1.34 ! 1 1.34 ROAD (0.00 + 54.52 + 0.00) = 54.52 dBAAnglel Angle2 Alpha RefLéq P. Adj D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq _ -45 90 0.56 64.93 0.00 -1.54 -2.16 0.00 0.00 -6.71 54.52 _____ Segment Leq : 54.52 dBA Total Leg ALI Segments: 54.68 dBA







2. TXT NORMAL REPORT Date: 13-05-2016 09: 43: 33 STAMSON 5.0 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Time Period: Day/Night 16/8 hours Filename: 2.te Description: Lot with some backing exposure to Mississauga Rd Road data, segment # 1: Mississauga (day/night) Car traffic volume : 17640/1960 veh/TimePeriod * Medium truck volume : 198/22 veh/TimePeriod Heavy truck volume : 162/18 veh/TimePeriod Heavy truck volume : 162/18 Posted speed limit : 50 km/h Road gradient 0 % : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): Percentage of Annual Growth : 20000 0.00 Number of Years of Growth 0.00 Medium Truck % of Total Volume1.10Heavy Truck % of Total Volume0.90Day (16 hrs) % of Total Volume90.00 Data for Segment # 1: Mississauga (day/night) Angl e1 Angl e2 : 0.00 deg 90.00 deg 0 0 / 1 Wood depth (No woods.) No of house rows : Surface 0 / 0 Surface (Absorptive ground surface) Receiver source distance : 27.00 / 27.00 m Receiver height : 4.50 / 4.50 m (Flat/gentle slope; no barrier) Topography 1 Reference angle 0.00 Results segment # 1: Mississauga (day) Source height = 0.97 mROAD (0.00 + 56.54 + 0.00) = 56.54 dBAAngle1 Angle2 Alpha RefLéq P. Adj D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq 0 90 0.59 64.93 0.00 -4.05 -4.34 0.00 0.00 0.00 56.54 _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ . Segment Leq : 56.54 dBA Total Leg All Segments: 56.54 dBA Results segment # 1: Mississauga (night) _____ Source height = 0.97 mROAD (0.00 + 50.01 + 0.00) = 50.01 dBAAngle1 Angle2 Alpha RefLeq P. Adj D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq 0 90 0.59 58.40 0.00 -4.05 -4.34 0.00 0.00 0.00 50.01

ACOUSTICS



Page 1

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VIBRATION

2. TXT Segment Leq : 50. 01 dBA Total Leq AII Segments: 50. 01 dBA TOTAL Leq FROM ALL SOURCES (DAY): 56. 54 dBA (NIGHT): 50. 01 dBA







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