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Noise Feasibility Study
Phase 3, Proposed Residential Development
Part of Lot 86, Concession 1
Aurora, Ontario

Prepared for:

Shining Hill Estate Collection Inc.
2235 Sheppard Avenue East, #903
Toronto, Ontario, M2J 5B5

Prepared by

Victor Garcia, PEng

Reviewed by

Sheeba Paul, MEng, PEng

November 11, 2021

Table of Contents

1 Introduction and Summary

HGC Engineering was retained by Shining Hill Estate Collection Inc. to conduct a noise feasibility study for Phase 3 of a proposed residential development to be located on Part of Lot 86, Concession 1 in the Town of Aurora, Regional Municipality of York, Ontario. The study is required by the Municipality and Region of York as part of the planning and approvals process.

This report has been updated to address the latest comment from the Town and includes a review of the latest grading plan, updated traffic data, as well as changes to the lot numbering.

The primary source of noise is road traffic on St. John's Sideroad. Street A is a secondary source of noise. Relevant road traffic data was obtained from the Region of York for St. John's Sideroad and from a traffic study prepared by Dillon Consulting titled, "Shining Hill Estates, Phase 3, Towns of Newmarket and Aurora" dated October 2019 for Street A. The predicted sound levels were compared to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP) and the Region of York to develop noise control recommendations.

The sound level predictions indicate that with suitable noise control measures integrated into the design of the dwellings, it is feasible to achieve the indoor MECP guideline sound levels. An acoustic barrier is required for the rear yard with flanking exposure to St. John's Sideroad. Forced-air ventilation systems with ducts sized to accommodate the future installation of central air conditioning by the occupant are required for dwellings with exposure to St. John's Sideroad and Street A. Any building and glazing construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for all of the dwelling units. Associated acoustical requirements are specified in this report. Warning clauses are recommended to inform future residents of the road traffic noise impacts and to address sound level excesses.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed development. The proposed development is located on Part of Lot 86, Concession 1 in the Town of Aurora, Ontario. Figure 2 shows the draft plan prepared by Malone Given Parsons Ltd. last revised November 1, 2021. The proposed residential development site includes single detached dwellings, lane access single detached dwellings, medium density block, school block, neighbourhood park, and a natural heritage system. Prediction locations [A] to [F] are indicated on Figure 2 for reference. The preliminary grading plan is also included in Figure 3 dated November 2021.

There are existing residences to the south of the site and to the east. Lands to the north are proposed residential. The development land is fairly flat. The primary source of noise impacting the site was found to be road traffic on St. John's Sideroad. St. John's Sideroad is currently one lane (two lanes total) in each direction but is expected to be expanded to two lanes in each direction (four lanes total) as indicated in the Region of York's traffic data provided in Appendix A. There are no significant stationary sources of noise within 500 m of the subject site.

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 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table 1: 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 OLA 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 feasible.

Region of York guidelines indicate that where predicted sound levels in the rear yard exceed the 55 dBA criterion, it must be demonstrated to the Region and the municipality that it is not technically feasible to meet the 55 dBA sound level criterion. Where it is not feasible, the Region will allow a tolerance of not more than 5 dBA above the criterion along with the use of a noise warning clause. The Region of York's minimum noise barrier fence height is 2.2 m and the maximum is 3.0 m. The remainder of the height should be made up of a 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 60 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 St. John's Sideroad was obtained from the Region of York in the form of ultimate Average Annual Daily Traffic (AADT) values, and is provided in Appendix A. An ultimate AADT of 30 000 vehicles per day was applied for St. John's Sideroad in the analysis. A commercial vehicle percentage of 2% was split into 2% heavy trucks and 2% medium trucks was provided in the data. A day/night split of 93/7% was used along with a speed limit of 60 km/h.

Traffic data for Street A was obtained from a traffic study prepared by Dillon Consulting titled, "Shining Hill Estates, Phase 3, Towns of Newmarket and Aurora" dated October 2019 was also used. The traffic data was provided in the form of peak hour volumes for the year 2039. Commercial vehicle percentages of 2%, further split into 1% medium trucks and 1% heavy trucks were assumed for Street A. A speed limit of 50 km/h was assumed for the roadways along with a day/night split of 90%/10%. Table 2 summarized the traffic data used in this study.

Table 2: Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
St. John's Sideroad *Ultimate*	Daytime	26 784	558	558	27 900
	Nighttime	2 016	42	42	2 100
	Total	**28 800**	**600**	**600**	**30 000**
Street A *2039 Projected*	Daytime	5 336	54	54	5 444
	Nighttime	593	6	6	605
	Total	**5 929**	**60**	**60**	**6 049**

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.

Prediction locations were chosen around the residential site to obtain a representation of the future sound levels at various dwellings. Sound levels were predicted at the plane of the top storey bedroom and/or living/dining room windows during the daytime and nighttime hours to investigate ventilation requirements. Sound levels were also predicted in rear yard outdoor living areas to investigate acoustic barrier requirements. The results of these predictions are summarized in Table 3.

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

Prediction Location	Description	Daytime – in the OLA $L_{EQ-16\ hr}$	Daytime – at the Façade $L_{EQ-16\ hr}$	Nighttime – at the Facade $L_{EQ-8\ hr}$
[A]	Dwelling flanking onto St. John's Sideroad	63	65	57
[B]	Dwellings fronting onto St. John's Sideroad	55	65	57
[C]	Dwellings with some flanking exposure to St. John's Sideroad	56	57	50
[D]	Dwellings in second row form St. John's Sideroad	--	56	<50
[E]	Dwellings fronting onto Street A	<55	57	50
[F]	Dwellings flanking onto Street A	56	58	52
[G]	Dwellings with some backing exposure to St. John's Sideroad	55	56	<50

5 Discussion and Recommendations

The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the dwelling units with exposure to St. John's Sideroad and Street A. The following discussion outlines the recommendations for acoustic barrier requirements, ventilation requirements and warning clauses to achieve the noise criteria stated in Table 1.

5.1 Outdoor Living Areas

The predicted daytime sound levels in the OLA of the dwelling flanking onto St. John's Sideroad (prediction location [A]) will be 61 dBA, which is 6 dBA in excess of the MECP's limit of 55 dBA. Physical mitigation in the form of an acoustic barrier is required. A 2.2 m high acoustic barrier will reduce sound levels in the OLA's to 57 dBA, the 2 dBA sound level excess is acceptable to the MECP if it is acceptable to the municipality with the use of a noise warning clause. Alternatively, a 3.0 m acoustic barrier will reduce sound level in the OLA to 55 dBA.

The predicted daytime sound level in the OLA of the dwellings with some flanking exposure onto St. John's Sideroad (prediction location [C]) will be 56 dBA, 1 dBA in excess of the MECP's limit of 55 dBA. The 1 dBA sound level excess is acceptable to the MECP with the use of a noise warning clause if it is acceptable to the municipality. Alternatively, a 2.2 high acoustic fence will reduce the sound level to less than 55 dBA.

The predicted daytime sound level in the OLA of the dwellings flanking onto Street A (prediction location [F]) will be 56 dBA, 1 dBA in excess of the MECP's limit of 55 dBA. The 1 dBA sound level excess is acceptable to the MECP with the use of a noise warning clause if it is acceptable to the municipality. Alternatively, a 2.0 high acoustic fence will reduce the sound level to less than 55 dBA.

Figure 4 indicates the approximate location and extent of the required acoustic barriers. When detailed lot siting and grading information is available, the acoustic barrier heights should be refined.

An acoustic barrier may be any combination of an earth berm with an acoustic wall on top. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. If acoustic walls are to be used, 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. All barrier heights are stated relative to the elevation of the rear yard. The heights and extents of the barriers should be chosen to reduce the sound levels in the OLA's to 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 55 dBA or less, thus physical mitigation will not be required. When final lot grading and siting information is available for the proposed development, the acoustic barrier requirements should be refined.

a) School Block (Block 93)

There is a school block (Block 93) in the interior of the development. A detailed noise study should be conducted for the school block by the developer of the school when siting and mechanical equipment information is known to determine the specific rooftop screening requirements, acoustic barrier requirements, and ventilation requirements for the building along with envelope construction.

5.2 Indoor Living Areas and Ventilation Requirements

Provision for the Future Installation of Air Conditioning

The predicted future sound levels outside the top storey living/dining room/bedroom windows of dwellings with exposure St. John's Sideroad and Street A will be between 56 and 65 dBA during the daytime hours (prediction locations [A], [B], [C], [E], and [F]). To address these excesses, the MECP guidelines recommend that these dwellings be equipped with forced air ventilation systems with ducts sized to accommodate the future installation of air conditioning by the occupant.

Figure 4 shows the ventilation requirements for the development. Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. 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, as applicable. The guidelines also recommend warning clauses for all units with ventilation requirements.

5.3 Building Façade Constructions

All the dwelling units within the development will have daytime and nighttime sound levels at the top storey façade that are less than 65 and 60 dBA respectively. Any exterior wall, and double-glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

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 dwellings with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table 4.

A suggested wording for future dwellings with sound level excesses of the MECP criteria but do not require physical 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 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 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, Conservation and Parks' 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.

A suggested wording for future dwellings requiring forced air ventilation systems 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.

Suggested wording for future dwellings adjacent to institutional facilities is given below.

Type D:

> Purchasers are advised that due to the proximity of the institutional facility, sound levels from this facility may at times be audible.

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

1. An acoustic barrier is required for the rear yard of the dwellings flanking onto St. John's Sideroad. When final lot grading and siting information is available, acoustic barrier heights should be refined.

2. Forced air ventilation systems with ducts sized to accommodate the future installation of central air conditioning by the occupant is recommended for dwellings with exposure to St. John's Sideroad and Street A. The location, installation and sound ratings of the air conditioning devices should comply with NPC-300, as applicable.

3. Any exterior wall, and double-glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

4. Noise warning clauses should be included in the Development Agreements registered on titles, and in purchase, sale and lease agreements, to inform future owners of noise concerns.

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

Prediction Location	Lot No.	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Building Constructions
[A]	1	✓	Forced Air	B, C	OBC
[B]	79 – 87	--	Forced Air	A, C	OBC
[C]	70	--	--	--	OBC
[D]	71 – 77	--	--	--	OBC
[E]	2 – 13, 18 – 20, 33 – 35	--	Forced Air	A, C	OBC
[F]	21, 32, 78, Block 88 (western end unit), Block 92 (western end unit)	--	Forced Air	A, C	OBC
[G]	65 – 67	--	Forced Air	A, C	OBC
--	53 – 58	--	--	D	OBC
--	Remaining Dwellings	--	--	--	OBC

Notes:
-- no specific requirement
* 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. 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.

2. 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 installed and constructed.

Limitations

This document was prepared solely for the addressed party and titled project or named part thereof, and should not be relied upon or used for any other project without obtaining prior written authorization from HGC Engineering. HGC Engineering accepts no responsibility or liability for any consequence of this document being used for a purpose other than for which it was commissioned. Any person or party using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm their agreement to indemnify HGC Engineering for all loss or damage resulting therefrom. HGC Engineering accepts no responsibility or liability for this document to any person or party other than the party by whom it was commissioned.

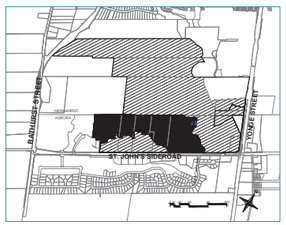
Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

Figure 1 - Key Plan

DRAFT PLAN OF SUBDIVISION

Part of Lot 86, Concession 1
Town of Aurora
Regional Municipality of York

KEY PLAN



SUBJECT PROPERTY
OTHER LANDS OWNED BY APPLICANT

SCHEDULE OF LAND USE

LOT / BLOCK	LAND USE		UNITS	AREA
1-78	Single Detached Min. 15.24m	□	23	1.46
	Single Detached Min. 13.70m	+	28	1.43
	Single Detached Min. 12.20m	O	27	1.18
79-87	Lane Access Single Detached Min. 13.70m	^	5	0.30
	Lane Access Single Detached Min. 12.20m	~	4	0.18
88-92	Townhouses Min. 6.1m	=	21	0.54
93	Saint Anne's School			4.28
94	Neighbourhood Park			1.61
95	Natural Heritage / Open Space			17.77
96-97	SWM / Trailhead			0.21
98 & 111	Servicing Blocks			0.04
99-100	Overland Flow			0.01
101	Access to Saint Anne's School			0.05
102-109	Vista's / Open Space			0.07
110	Road Widening			0.21
112-113	0.3m Reserves			0.01
Street A	23.0m Right of Way 436m			1.02
Street B-D	18.0m Right of Way 490m			0.96
Street E	16.5m Right of Way 165m			0.27
Street B	15.0m Right of Way 160m			0.19
TOTAL			**108**	**31.79**

OWNER'S AUTHORIZATION

I hereby authorize Malone Given Parsons Ltd. to prepare and submit this Draft Plan of Subdivision to the Town of Aurora.

See Original
Angelo DeGasperis

See Original
Date

SURVEYOR'S CERTIFICATE

I hereby certify that the boundaries of the lands to be subdivided and their relationship to the adjacent lands are correctly shown.

See Original
Neil A. LeGrow

See Original
Date

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT, CHAPTER P.13(R.S.O. 1990).
(a),(e),(f),(g),(j),(l) - As shown of the Draft Plan.
(b),(c) - As shown on the Draft and Key Plan.
(d) - Land to be used in accordance with the Schedule of Land Use.
(i) - Soil is clay loam and sandy loam.
(h),(k) - Full municipal services to be provided.

Prepared by:

140 Renfrew Drive, Suite 201
Markham, Ontario, L3R 6B3
Tel: (905) 513-0170
www.mgp.ca

Prepared for:
SHINING HILL ESTATES COLLECTION INC.

Date: March 8, 2021 | Project No.: 15-2374

Date	Revision	By
Oct 7/21	Revise the plan according to Town's comments	DR
Nov 1/21	Add servicing block and temporary turning circle	DR

Figure 2 - Proposed Draft Plan Showing Prediction Locations

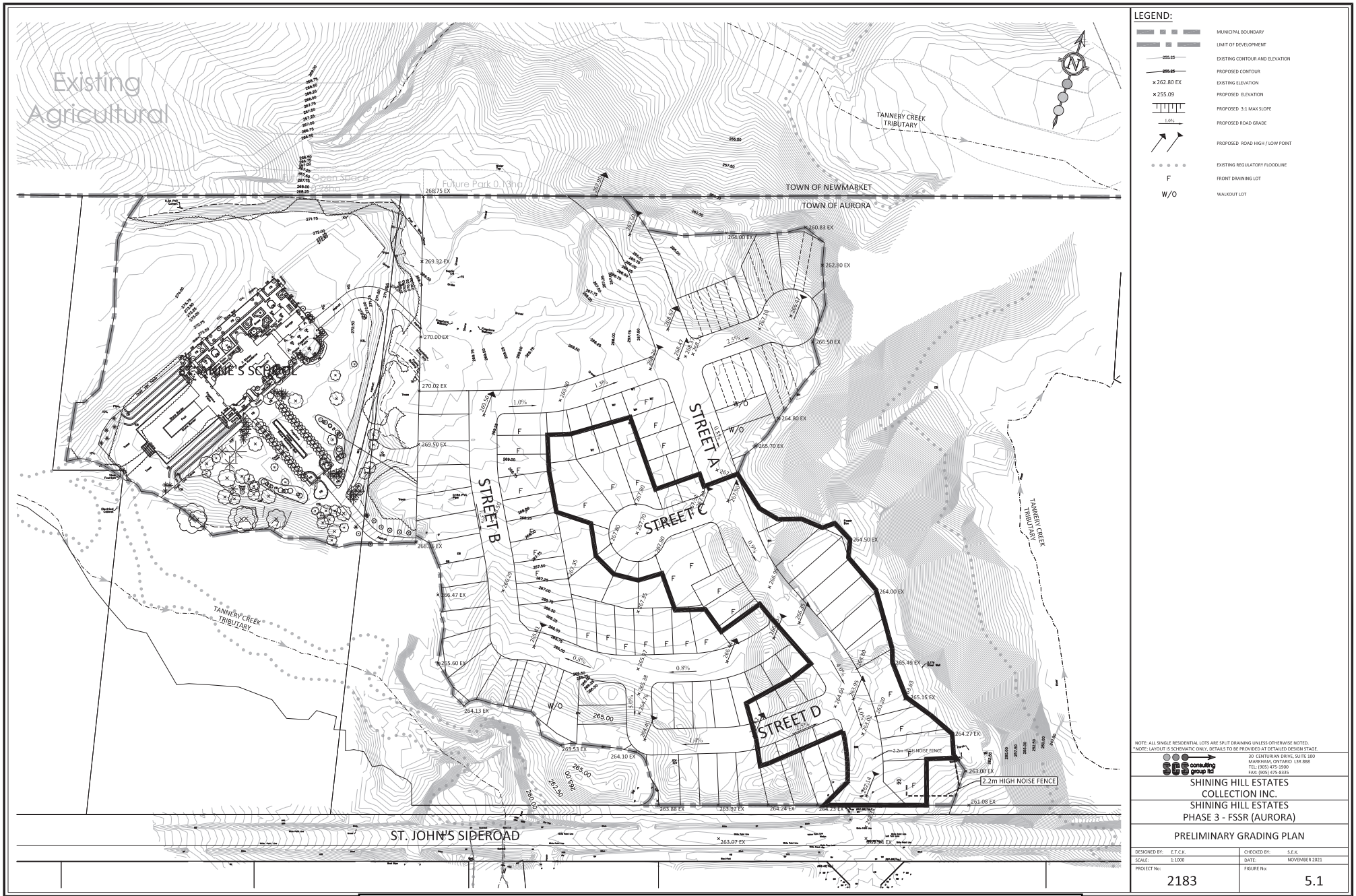
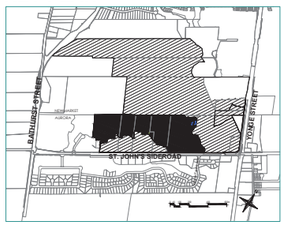


Figure 3 - Preliminary Grading Plan

DRAFT PLAN OF SUBDIVISION

Part of Lot 86, Concession 1
Town of Aurora
Regional Municipality of York

KEY PLAN



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95	Natural Heritage / Open Space			17.77
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98 & 111	Servicing Blocks			0.04
99-100	Overland Flow			0.01
101	Access to Saint Anne's School			0.05
102-109	Vista's / Open Space			0.07
110	Road Widening			0.21
112-113	0.3m Reserves			0.01
Street A	23.0m Right of Way 436m			1.02
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TOTAL			**108**	**31.79**

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(h),(k) - Full municipal services to be provided.

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Date: March 8, 2021 | Project No.: 15-2374

Date	Revision	By
Oct 7/21	Revise the plan according to Town's comments	DR
Nov 1/21	Add servicing block and temporary turning circle	DR

Figure 4 - Proposed Draft Plan Showing Barrier and Ventilation Requirements

APPENDIX A

Road Traffic Information

York Region

Transportation Services Department
Transportation and Infrastructure Planning

March 2, 2021

Victor Garcia
HGC Engineering
2000 Argentia Road
Plaza One, Suite 203
Mississauga, ON L5N 1P7

Re: Request for Traffic Data
File No. T09, Forecasts - Aurora

As requested, the traffic data for your study are summarized below.

	St. John's Sideroad	**Yonge Street**
Section No.	26-24	01-26
Location	West of Yonge Street	North of St. John's Sideroad
Existing AADT	19,100 (2019)	34,500 (2018)
Ultimate AADT	30,000	46,000*
No. of Lanes	2 (future 4)	4 (future 6)
Posted Speed	60 km/h	60 km/h
Trucks (Med/Heavy)	2% / 2%	2% / 2%
Grade	Up to 9%	Up to 5%
Day/Night Split	93/7	93/7
Planned ROW	Up to 36 m	Up to 45 m

Note:
*Widening from 4 to 6 lanes for the purpose of Rapid Transit Corridor and the additional lanes will be dedicated transit lanes.

I trust that this will be satisfactory for your study. The invoice will be mailed to you separately.

Sincerely,

Wenli Gao
Transportation Planning, Forecasting

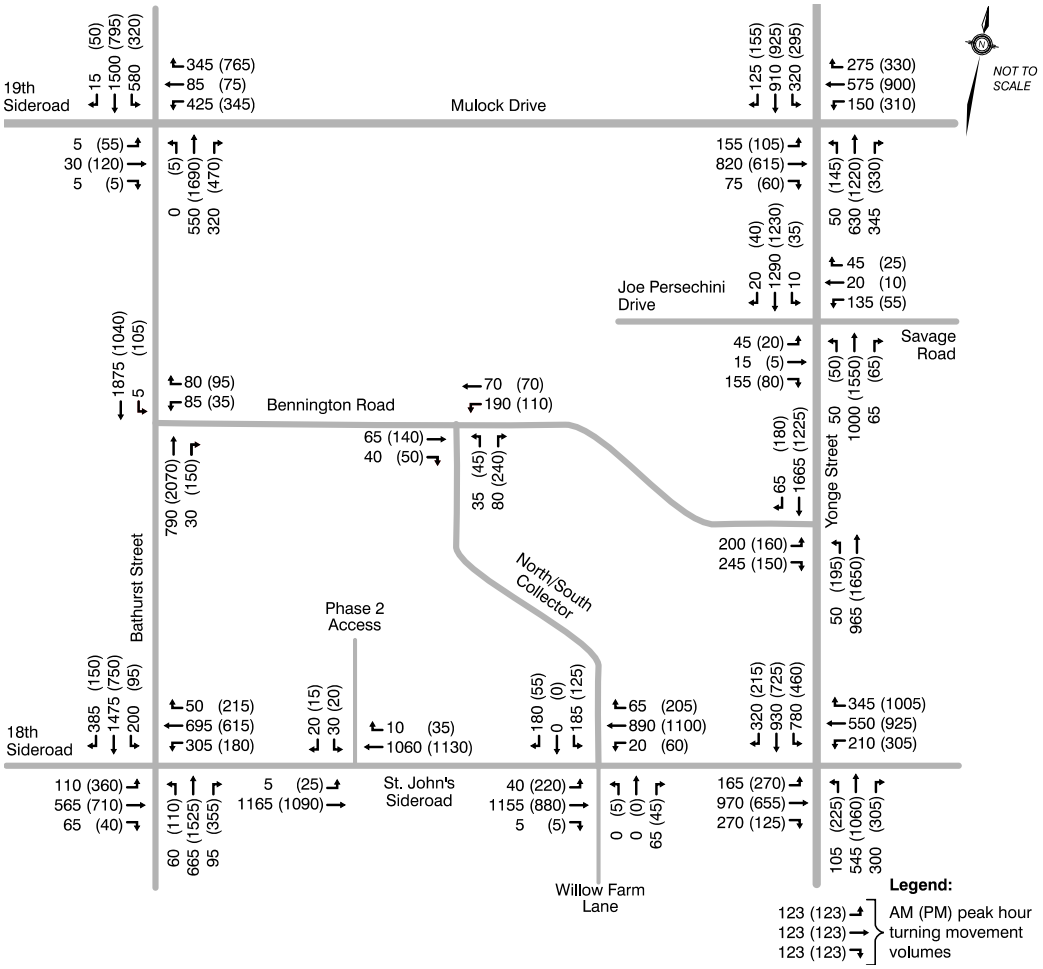
WG/wg

YORK-#12653618-v1-210015_Garcia_StJohns_Yonge.docx

4.4 Total Future Traffic Volumes

Total future traffic volumes represent the level of traffic that would be anticipated with the development of the site, and were calculated by adding the site traffic volumes to the projected future background traffic volumes. The resulting total future traffic volumes are illustrated in ***Figure*** 9.

Figure 9: Total Future Traffic Volumes



APPENDIX B

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 11-11-2021 11:41:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours

Description: Dwelling flanking onto St. John's Sideroad

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

Car traffic volume : 26784/2016 veh/TimePeriod *
Medium truck volume : 558/42 veh/TimePeriod *
Heavy truck volume : 558/42 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 9 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000
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 : 2.00
Day (16 hrs) % of Total Volume : 93.00

Data for Segment # 1: St Johns (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 : 34.50 / 34.50 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Street A (day/night)

Car traffic volume : 5336/593 veh/TimePeriod *
Medium truck volume : 54/6 veh/TimePeriod *
Heavy truck volume : 54/6 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:

```
                                          A
    24 hr Traffic Volume (AADT or SADT):   6050
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.00
    Heavy Truck  % of Total Volume     :   1.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Street A (day/night)
------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.00 / 27.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: St Johns (day)
-----------------------------------

Source height = 1.19 m

ROAD (0.00 + 64.75 + 0.00) = 64.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.58  71.78   0.00  -5.71  -1.32   0.00   0.00   0.00  64.75
-------------------------------------------------------------------------------

Segment Leq : 64.75 dBA

Results segment # 2: Street A (day)
-----------------------------------

Source height = 1.00 m

ROAD (0.00 + 51.46 + 0.00) = 51.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.59  59.84   0.00  -4.05  -4.34   0.00   0.00   0.00  51.46
-------------------------------------------------------------------------------

Segment Leq : 51.46 dBA

Total Leq All Segments: 64.95 dBA

Results segment # 1: St Johns (night)
-------------------------------------
```

Source height = 1.19 m

ROAD (0.00 + 56.52 + 0.00) = 56.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.55	0.00	-5.71	-1.32	0.00	0.00	0.00	56.52

Segment Leq : 56.52 dBA

Results segment # 2: Street A (night)

Source height = 1.00 m

ROAD (0.00 + 44.92 + 0.00) = 44.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.59	53.31	0.00	-4.05	-4.34	0.00	0.00	0.00	44.92

Segment Leq : 44.92 dBA

Total Leq All Segments: 56.81 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.95 dBA
(NIGHT): 56.81 dBA

STAMSON 5.0 NORMAL REPORT Date: 11-11-2021 11:42:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aola.te Time Period: 16 hours

Description: OLA of dwellings flanking onto St. John's Sideroad with a 2.2 m acoustic barrier

Road data, segment # 1: St Johns

Car traffic volume : 26784 veh/TimePeriod *
Medium truck volume : 558 veh/TimePeriod *
Heavy truck volume : 558 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 9 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: St Johns

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 39.90 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 45.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 8.00 m
Source elevation : 262.34 m
Receiver elevation : 262.14 m
Barrier elevation : 262.14 m
Reference angle : 0.00

Road data, segment # 2: St Johns

Car traffic volume : 26784 veh/TimePeriod *
Medium truck volume : 558 veh/TimePeriod *
Heavy truck volume : 558 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 9 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: St Johns

Angle1 Angle2 : 45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0

```
Surface                    :      1       (Absorptive ground surface)
Receiver source distance   :  39.90 m
Receiver height            :   1.50 m
Topography                 :      2       (Flat/gentle slope; with barrier)
Barrier angle1             :  45.00 deg   Angle2 : 90.00 deg
Barrier height             :   7.00 m
Barrier receiver distance  :   3.00 m
Source elevation           : 262.34 m
Receiver elevation         : 262.14 m
Barrier elevation          : 262.14 m
Reference angle            :   0.00

Results segment # 1: St Johns
------------------------------

Source height = 1.19 m

Barrier height for grazing incidence
-------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.19 !        1.50 !        1.48 !       263.62

ROAD (0.00 + 56.77 + 0.00) = 56.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     45   0.54  71.78   0.00  -6.53  -2.14   0.00   0.00  -6.34  56.77
-------------------------------------------------------------------------------

Segment Leq : 56.77 dBA

Results segment # 2: St Johns
------------------------------

Source height = 1.19 m

Barrier height for grazing incidence
-------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.19 !        1.50 !        1.49 !       263.63

ROAD (0.00 + 43.52 + 0.00) = 43.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    45     90   0.25  71.78   0.00  -5.31  -7.29   0.00   0.00 -15.65  43.52
```

Segment Leq : 43.52 dBA

Total Leq All Segments: 56.97 dBA

TOTAL Leq FROM ALL SOURCES: 56.97 dBA