HGC ENGINEERING

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Noise Feasibility Study

Proposed Residential Development

Neyagawa Boulevard & Burnhamthorpe Road West

Oakville, Ontario

Prepared for:

Sherborne Lodge Developments
8600 Dufferin Street
Vaughan, ON L4K 5P5

Prepared by:

Mandy Chan, PEng

May 6, 2021

HGC Project No. 02000325

Table of Contents

1 Introduction and Summary

HGC Engineering was retained by Sherborne Lodge Developments to conduct a noise feasibility study for a proposed residential development in Oakville, Ontario. The location of the proposed development site is located on the east side of Neyagawa Boulevard and on the south side of Burnhamthope Road West (future William Halton Parkway). The purpose of this study is to determine the impact of future environmental noise from the surrounding roadways on the proposed site and to determine the required acoustic requirements in accordance with the Ministry of Environment, Conservation, and Parks (MECP) guidelines, The Region of Halton and the Town of Oakville. This study has been prepared as part of the approval process by the municipality.

The primary noise source of noise was determined to be road traffic on the future William Halton Parkway and Neyagawa Boulevard. Road traffic data was obtained from the Region of Halton. The data was used to predicted sound levels at the future dwelling facades and in potential outdoor living areas. All road traffic noise predictions were compared with the guidelines detailed by the MECP.

The results of the study indicate that it is feasible to achieve the MECP sound level guidelines at the proposed residential development. The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the dwelling units adjacent to Neyagawa Boulevard. Physical mitigation in the form of an acoustic barrier is required for the rear yard of the flanking dwelling unit directly adjacent to Neyagawa Boulevard. The dwellings adjacent to Neyagawa Boulevard will require forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant. The MECP guidelines recommend that noise warning clauses be used to inform future residents of the traffic noise impacts and the presence of commercial and institutional facilities. Any building construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for the interior spaces. When detailed information is available for the apartment block, a noise study shall be conducted to determine any noise control requirements for the block.

2 Site Description and Noise Sources

The key plan for the site is attached as Figure 1. The site is located east of Neyagawa Boulevard and south of Burnhamthorpe Rd West (future William Halton Parkway). A draft plan of subdivision prepared by Bousfield Inc. dated April 13, 2021 is provided as Figure 2 and also includes prediction locations. The development will consist of dual frontage townhouses, back-to-back townhouses, street townhouses, single detached lots, apartment block, commercial block, school block and a village square.

HGC Engineering personnel visited the site during the month of March 2021. The acoustical environment surrounding the site is urban in nature. There are numerous developments in the area. Neygawa Boulevard and Burnhamthorpe Road West are the primary existing noise sources in the area. There are no significant stationary sources of noise within 500 m of this site.

3 Sound Level Criteria

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MECP 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)

Space	Daytime L_{EQ} (16 hour) Road	Nighttime L_{EQ} (8 hour) Road
Outdoor Living Areas	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, while nighttime refers to the 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. Balconies and terraces that are less than 4 m in depth are not considered to be outdoor living areas under MECP guidelines.

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 feasible. The Region of Halton's minimum noise barrier height is 2.4 m. The Town of Oakville maximum acoustic fence height is 2.4 m.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom/living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom/living/dining room windows 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/living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom/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 bedroom/living/dining room 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 are required to notify future residents of possible excesses when nighttime sound levels exceed 50 dBA at the plane of the bedroom/living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom/living/dining room window due to road traffic.

4 Traffic Noise Assessment

4.1 Road Traffic Data

Future annual average daily traffic 35,000 vehicles per day was applied to Neyagawa Boulevard and the future William Halton Parkway as provided by the Region of Halton and attached as Appendix A. For Neyagawa Boulevard, a commercial vehicles percentage of 1.0% for medium trucks and 1.5% for heavy trucks was calculated from existing traffic volumes and used in the analysis. For William Halton Parkway, a commercial vehicles percentage of 4.0% for medium trucks and 2% for heavy trucks was provided by the Region. A speed limit of 60 kph was used for both roadways. A day/night split of 90%/10% was also applied. Table II summarizes the traffic volume data used in this study.

Table II: Future Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Neyagawa Boulevard	Daytime	30 713	315	473	31 500
	Nighttime	3 413	35	53	3 500
	Total	**34 125**	**350**	**525**	**35 000**
William Halton Parkway	Daytime	29 610	1 260	630	31 500
	Nighttime	3 290	140	70	3 500
	Total	**32 900**	**1 400**	**700**	**35 000**

4.2 Road Traffic Prediction

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

Predictions of the traffic sound levels were made at the window at the upper storey of the townhouses and detached units. An assumed building setback of 6 m front yard and rear yard and 3m exterior side yard were used. Table III summarizes the predicted sound levels.

Table III: Predicted Traffic Sound Levels [dBA]

Prediction Location	Lot/ Block No.	Description	Daytime L_{EQ16hr} - OLA [dBA]	Daytime L_{EQ16hr} - Facade dBA	Nighttime L_{EQ8hr} - Facade dBA
[A]	Block 100	Dual frontage unit adjacent to Neyagawa Blvd	--	64	58
[B]	1	Unit flanking Neyagawa Blvd	61	63	56
[C]	2	Second unit from Neyagawa Blvd	55	56	<50
[D]	Block 101	Back to back townhouse units, second row from the roadways	--	55	<50
[E]	Lot 78	Second row of units from Neyagawa	<55	<55	<50

Further Analysis

When detailed information is available for Block 105 (Apartments), an assessment of traffic noise shall be conducted to determine any noise control requirements for the block.

At the northwest corner of the site, there is a Commercial Block (Block 106) proposed. Some dwellings near this future block may be impacted by the activities associated with uses proposed for this block. A noise study is typically required during the approvals process when siting plans including elevations are available. Noisy sources such as rooftop mechanical equipment, compressor or condenser units, rooftop cooling towers or trucking activities along with loading areas will need to be considered. A noise study shall be conducted to ensure that the noise emissions from the commercial/business facilities complies with MECP guidelines limits contained in NPC-300.

5 Discussion and Recommendations

The predictions indicate that the future traffic sound levels will exceed MECP guidelines at the dwelling units adjacent to Neyagawa Boulevard. Recommendations to address these excesses are discussed below.

5.1 Outdoor Living Areas

The three storey townhouses adjacent to Neyagawa Boulevard are dual frontage units and do not include rear yards.

The rear yard of the flanking single detached unit adjacent to Neyagawa (prediction location [B]) has a predicted sound level of 61 dBA. Calculations indicate the minimum noise barrier height of 2.4 m per Region of Halton would reduce the sound level in the OLA to 55 dBA. A noise warning clause is also recommended to inform future residents of the noise excesses.

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/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. 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, subject to the approval of the municipality/Region respecting any applicable fence height by-laws.

All other rear yards are well shielded from road traffic noise and do not require further mitigation.

5.2 Indoor Living Areas and Ventilation Requirements

Provision for the Future Installation of Air Conditioning by the Occupant

For all dwellings adjacent to Neyagawa Boulevard, the predicted sound levels are predicted between 51 and 60 dBA during the night and between 56 dBA and 65 dBA during the day. To address these excesses, the MECP guidelines recommend that these dwelling units be equipped with a forced air ventilation system with ducts sized to accommodate the future installation of air conditioning by the occupant. The guidelines also recommend warning clauses for these blocks and lots. 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. Blocks requiring forced air heating are shown on Figure 3.

For the remaining dwelling units in the development, there are no specific ventilation requirements.

5.3 Building Façade Constructions

Since the future road traffic sound levels outside all the dwellings units are less than 60 dBA during nighttime and 65 dBA during daytime, 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 for all lots and blocks with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for future dwellings with minor sound level excesses is given below:

Type A:

> Purchasers and 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 activities exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwellings with daytime OLA sound levels exceeding the MECP criteria by 6 dB or more, 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 sound level limits of the Municipality and the Ministry of the Environment, Conservation and Park.

Suitable wording for future dwellings 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 sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording to inform future residents of the presence of the neighbouring institutional and commercial uses.

Type D:

> Purchasers are advised that due to the proximity of commercial/institutional facilities, sound from these facilities may at times be audible and the operations may change in the future.

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

6 Summary of Recommendations

The results of the study indicate that the proposed residential development is feasible. Future road traffic sound levels in some areas will exceed MECP guidelines, but feasible means exist to reduce the impact to within acceptable limits.

The following list and Table IV summarize the recommendations made in this report.

1. Forced air ventilation with ductwork sized for the future installation of central air conditioning by the occupant is required for the dwelling units adjacent to Neyagawa Boulevard.

2. An acoustic barrier is required for the rear yard of the flanking dwelling unit adjacent to Neyagawa Boulevard.

3. Warning clauses should be included in the property and tenancy agreements and offers of

purchase and sale or rental agreements to inform all the future residents of the presence of nearby institutional and commercial facilities and traffic noise impact.

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

Block/Lot No.	Acoustic Barrier	Ventilation Requirements	Type of Warning Clause	Building Constructions
Lot 1	✓	Forced Air	A, B, C	OBC
Lot 2	--	Forced Air	A, C	OBC
Lots 60 – 67	--	--	D	OBC
Lots 79 – 84	--	--	D	OBC
Blocks 90 – 91	--	--	D	OBC
Blocks 94 – 98	--	Forced Air	A, C	OBC
Blocks 99 – 100	--	Forced Air	A, C, D	OBC
Blocks 101 – 103	--	--	D	OBC
All Remaining Units	--	--	--	OBC

Notes:
-- no specific requirement
OBC – meeting the minimum requirements of the Ontario Building Code

6.1 Implementation

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

1) When siting information is available for Blocks 105, a detailed noise study shall be conducted to determine any noise control requirements.

2) Prior to site plan approval, a Professional Engineer qualified to perform acoustical services in the province of Ontario shall review the grading plan to certify that the noise control measures as specified have been properly incorporated.

3) Prior to the issuance of occupancy permits for this development, a Professional Engineer qualified to perform acoustical services in the province of Ontario or the town building department shall certify that the sound control measures have been properly installed and constructed.

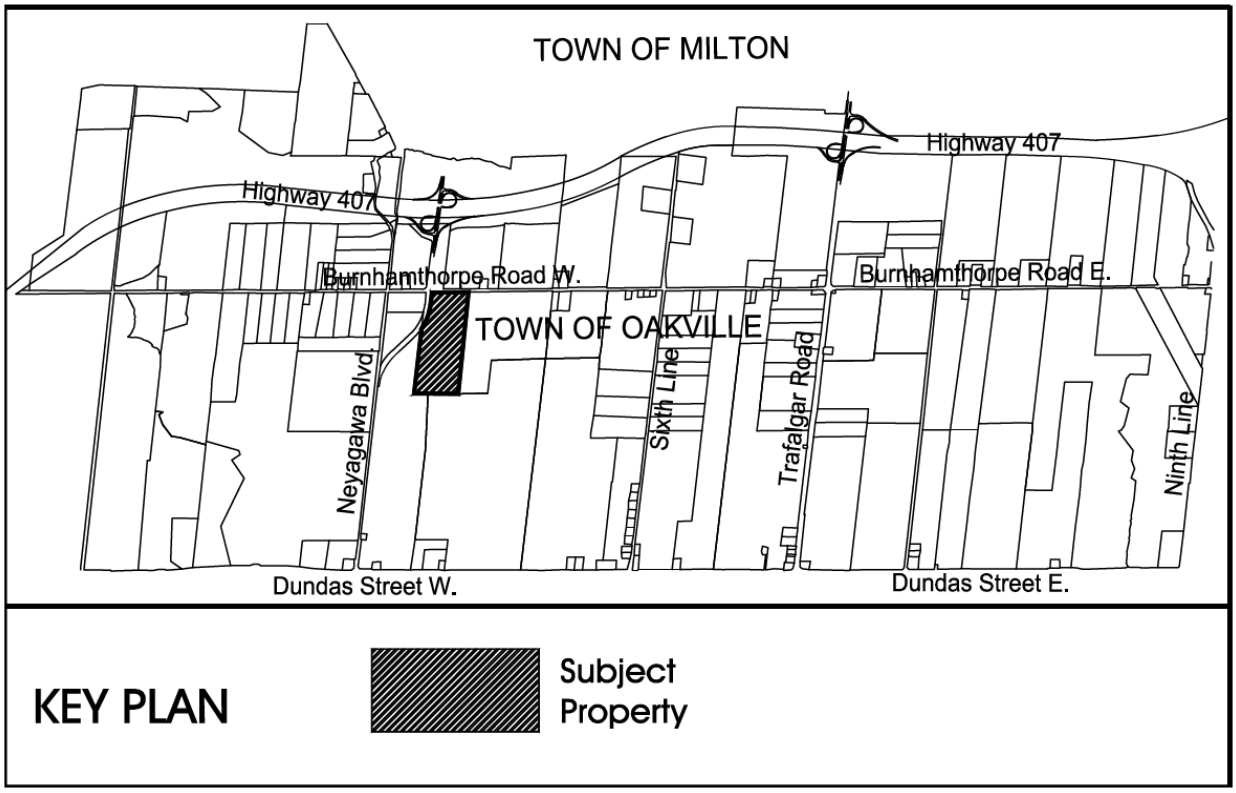
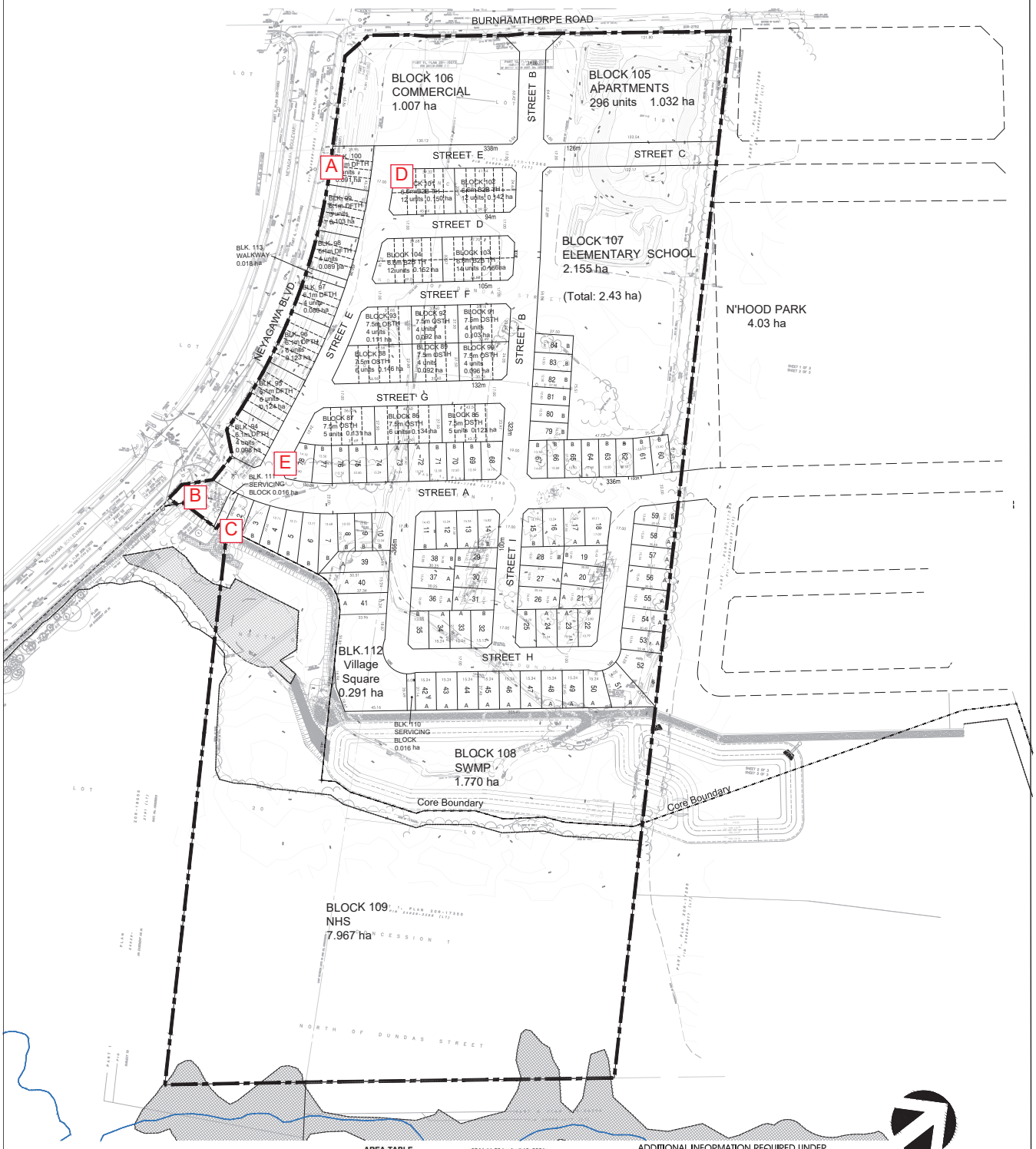


Figure 1: Key Plan

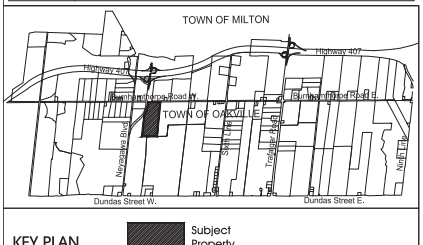


NOTES

All dimensions are in metres.
All area measurements are computer generated.
All elevations refer to Geodetic Datum.
All existing buildings to be demolished.

REVISION TABLE

Date	Revision
Sept., 11, 2020	First submission
Jan. 28, 2021	Village Square added, re-lotting, Pond details updated
April 13, 2021	Servicing Block relocated



KEY PLAN — Subject Property

AREA TABLE 9544-11-56dp April 13, 2021

Residential Singles	Lots 1-84	3.627 ha±
On Street Townhouses	Blocks 85-93	1.028
Double Frontage Townhouses	Blocks 94-100	0.716
Back to Back Townhouses	Blocks 101-104	0.610
Apartments	Block 105	1.032
Commercial	Block 106	1.007
School	Block 107	2.155
Storm Water Mgt. Pond	Block 108	1.770
NHS	Block 109	7.967
Servicing Blocks	Blocks 110, 111	0.032
Village Square	Block 112	0.291
Walkway	Block 113	0.018
Roads		3.542
	Total	23.795 ha±

ROADS

22.0m R.O.W.	336 m	0.740
19.0m R.O.W.	323 m	0.629
17.0m R.O.W.	1261 m	2.173
Total	1920 m	3.542 ha

UNIT COUNT

15.24m Single-Detached	A	39
12.5m Single-Detached	B	45
7.5m On St. Town.	OSTH	42
6.1m Double Frontage Town.	DFTH	33
6.6m Back to Back Town.	B2B	50
Apartments		296
Total		505 units

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

C. This represents the applicant's entire holding of undeveloped land in this vicinity.
D. Residential singles, semi-detached, back to back towns., apartments, walkway, commercial, school, SWMP, NHS, servicing blocks, village square, roads.
H. Piped water to be provided.
I. Clay loam soil.
K. Sanitary & storm sewers to be provided.

OWNER'S AUTHORIZATION

I/we,
Sherborne Lodge Developments Limited
being the registered owner(s) of the subject lands hereby authorize **Bousfields Inc.** to prepare and submit a draft plan of subdivision for approval.

Signature
Day Month Year

Signature
Day Month Year

SURVEYOR'S CERTIFICATE

I hereby certify that the boundaries of the land to be subdivided as shown on this plan, and their relationship to the adjacent land are accurately and correctly shown.

Signature
Day Month Year

20 10 0 25 50m

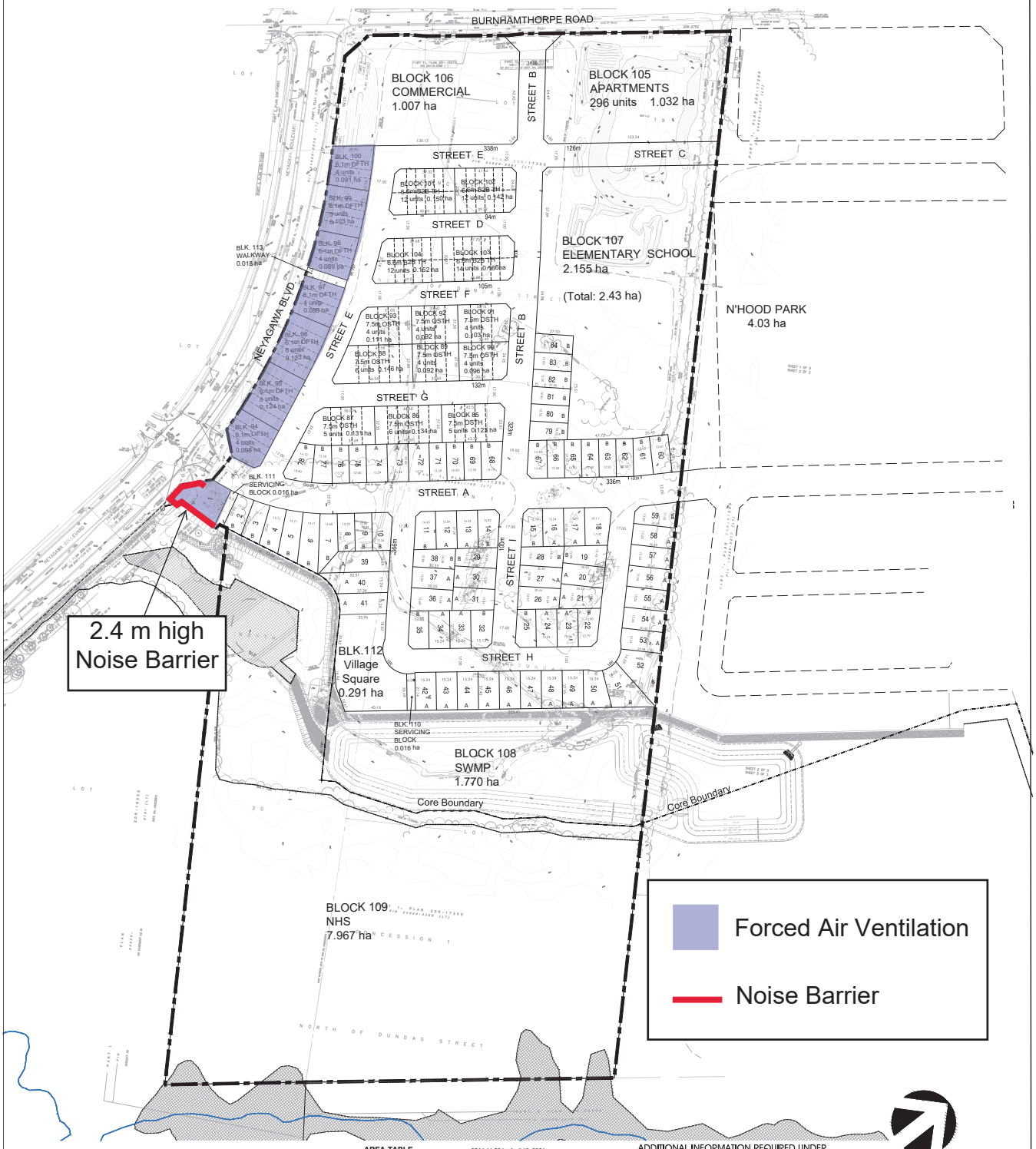
LEGEND
Boundary of Subdivision

REVISED DRAFT PLAN OF SUBDIVISION
PART OF LOT 19 & 20, CON.1
NORTH OF DUNDAS STREET
(Geographic Township of Trafalgar)
TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

BOUSFIELDS INC.
3 Church Street, Suite 200
Toronto, Ontario M5E 1M2
(416) 947-9744
Fax (416) 947-0781
e-mail drafting@bousfields.ca

1:750	April 13, 2021	9544-11-56dp
Scale	Date	Drawing Number

Figure 2 - Draft Plan of Subdivision Showing Prediction Locations



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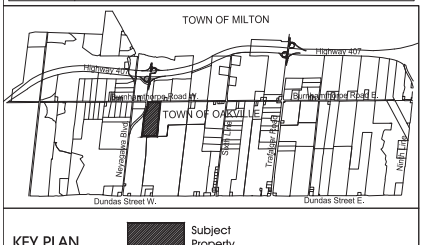

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(416) 947-9744
Fax (416) 947-0781
e-mail drafting@bousfields.ca

1:750 | April 13, 2021 | 9544-11-56dp (Drawing Number)

Figure 3 - Plan of Showing Ventilation & Noise Barrier Requirements

APPENDIX A
ROAD TRAFFIC DATA

Burnhamthorpe Rd W @ Neyagawa Blvd

Total Count Diagram

Municipality: Halton Region
Site #: 0000003297
Intersection: Neyagawa Blvd & Burnhamthorpe R
TFR File #: 3
Count date: 4-Dec-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Neyagawa Blvd runs N/S

North Leg Total:	3757
North Entering:	1825
North Peds:	0
Peds Cross:	⋈

Heavys	4	40	13	57
Trucks	0	13	5	18
Cars	113	1508	129	1750
Totals	117	1561	147	

Heavys	25
Trucks	22
Cars	1885
Totals	1932

East Leg Total:	3684
East Entering:	1803
East Peds:	0
Peds Cross:	⧖

Neyagawa Blvd

Heavys	Trucks	Cars	Totals
34	12	847	893

Cars	Trucks	Heavys	Totals
125	3	9	137
236	3	10	249
1407	4	6	1417
1768	10	25	

Burnhamthorpe Rd W

N
W E
S

Heavys	Trucks	Cars	Totals
3	1	98	102
12	2	250	264
17	4	462	483
32	7	810	

Burnhamthorpe Rd W

Cars	Trucks	Heavys	Totals
1830	17	34	1881

Neyagawa Blvd

Peds Cross:	⧖
West Peds:	1
West Entering:	849
West Leg Total:	1742

Cars	3377
Trucks	21
Heavys	63
Totals	3461

Cars	498	1662	1451	3611
Trucks	9	18	10	37
Heavys	20	13	9	42
Totals	527	1693	1470	

Peds Cross:	⋈
South Peds:	1
South Entering:	3690
South Leg Total:	7151

Comments

Mandy Chan

From: Krusto, Matt <Matt.Krusto@halton.ca>
Sent: March 4, 2021 9:33 AM
To: Mandy Chan
Subject: RE: Ultimate traffic data - Oakville

Hi Mandy,

I hope things are well.

Your request was just forwarded to me this morning, sorry for the delay.

Burnhamthorpe Road:

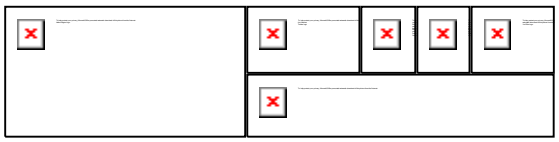
In 2015 Regional Council, as part of Road Rationalization Review, approved the transferring of Burnhamthorpe to the Town, once the new William Halton Parkway was constructed. In order to facilitate the Town of Oakville initiating the detailed design and implementing the recommendations from its Burnhamthorpe Road Character Study, Town staff have requested transfer of the road to its jurisdiction **now** for this purpose. This is all being finalized now (report to Regional Council was completed in in the fall 2020), therefore, **Town staff** will be able to provide you with acceptable ultimate volumes and other assumptions for Burnhamthorpe Road.

Regarding Neyagawa Boulevard, please use 35,000 AADT and 4 lanes. For truck percentages for Neyagawa Boulevard, please be sure to obtain the latest turning movement count from Road Operations (trafficdatarequests@halton.ca) and use **existing** medium and heavy truck percentages as part of the future analysis.

I hope this helps.

Matt

Matt Krusto
Project Manager II, Transportation Planning Coordination
Infrastructure Planning & Policy
Public Works
Halton Region
905-825-6000, ext. 7225 | 1-866-442-5866



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Mandy Chan

From: Krusto, Matt <Matt.Krusto@halton.ca>
Sent: March 31, 2021 2:41 PM
To: Mandy Chan
Subject: RE: Ultimate traffic data - Oakville

Hi Mandy,

All good, same for you as well I hope.

Yes it is. Sorry I should have caught that and provided you with the ultimate William Halton Parkway volumes.

Please use William Halton Parkway: 35,000, 4% medium, 2% heavy, 4 lanes.

Hope this helps.

Matt

From: Mandy Chan <machan@hgcengineering.com>
Sent: Wednesday, March 31, 2021 2:27 PM
To: Krusto, Matt <Matt.Krusto@halton.ca>
Subject: RE: Ultimate traffic data - Oakville

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. If you are unsure or need assistance please contact the IT Service Desk.

Hi Matt,

Hope things are well with you!

Just to follow up, one of our sites is right at the southeast corner of Neyagawa Blvd and Burnhamthorpe Road. Is north border road part of William Halton Parkway?

APPENDIX B
SAMPLE STAMSON OUTPUT

```
STAMSON 5.0        NORMAL REPORT        Date: 07-05-2021 13:50:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te                 Time Period: Day/Night 16/8 hours
Description: Predicted daytime and nighttime sound levels at the upper storey windows
of units adjacent Neyagawa Blvd, Location A

Road data, segment # 1: Neyagawa (day/night)
-----------------------------------------------
Car traffic volume  : 30713/3413  veh/TimePeriod  *
Medium truck volume :   315/35    veh/TimePeriod  *
Heavy truck volume  :   473/53    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    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     :   1.50
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Neyagawa (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  :  31.50 / 31.50  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: William (day/night)
-----------------------------------------------
Car traffic volume  : 29610/3290  veh/TimePeriod  *
Medium truck volume :  1260/140   veh/TimePeriod  *
Heavy truck volume  :   630/70    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: William (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  : 107.00 / 107.00 m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Neyagawa (day)
-----------------------------------

Source height = 1.11 m

ROAD (0.00 + 63.96 + 0.00) = 63.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.49  69.93   0.00  -4.81  -1.16   0.00   0.00   0.00  63.96
-------------------------------------------------------------------------------

Segment Leq : 63.96 dBA

Results segment # 2: William (day)
-----------------------------------

Source height = 1.19 m

ROAD (0.00 + 54.31 + 0.00) = 54.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.49  71.18   0.00 -12.71  -4.17   0.00   0.00   0.00  54.31
-------------------------------------------------------------------------------

Segment Leq : 54.31 dBA

Total Leq All Segments: 64.41 dBA

Results segment # 1: Neyagawa (night)
-------------------------------------

Source height = 1.11 m

ROAD (0.00 + 57.45 + 0.00) = 57.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.49  63.41   0.00  -4.81  -1.16   0.00   0.00   0.00  57.45
-------------------------------------------------------------------------------

Segment Leq : 57.45 dBA

Results segment # 2: William (night)
-------------------------------------

Source height = 1.19 m

ROAD (0.00 + 47.78 + 0.00) = 47.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.49  64.65   0.00 -12.71  -4.17   0.00   0.00   0.00  47.78
-------------------------------------------------------------------------------

Segment Leq : 47.78 dBA

Total Leq All Segments: 57.89 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.41
                           (NIGHT): 57.89
```

```
STAMSON 5.0        COMPREHENSIVE REPORT        Date: 07-05-2021 13:51:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bola.te              Time Period: 16 hours
Description: Predicted daytime sound level in the OLA of the flanking unit adjacent
to Neyagawa Blvd with a 2.4m noise barrier., Location [B]

Road data, segment # 1: Neyagawa
---------------------------------
Car traffic volume  : 30713 veh/TimePeriod  *
Medium truck volume :   315 veh/TimePeriod  *
Heavy truck volume  :   473 veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Neyagawa
-------------------------------
Angle1   Angle2           : -40.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  39.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -40.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   8.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Segment # 1: Neyagawa
---------------------

Source height = 1.11 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.11 !        1.50 !        1.42 !         1.42

ROAD (0.00 + 54.08 + 0.00) = 54.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -40     90   0.53  69.93   0.00  -6.34  -2.29   0.00   0.00  -7.22  54.08
-------------------------------------------------------------------------------

Segment Leq : 54.08 dBA

Total Leq All Segments: 54.08 dBA

TOTAL Leq FROM ALL SOURCES:       54.08
```