FINAL

NOISE IMPACT STUDY

Proposed Residential Subdivision

"961 Big Bay Point Road"

City of Barrie

Prepared for:

961 Big Bay Ltd.

Prepared by:

Ralph Bouwmeester, P. Eng.

May 3, 2017

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RBA File: A17011

EXECUTIVE SUMMARY

R. BOUWMEESTER & ASSOCIATES has been retained to assess potential noise impacts on residential uses within a proposed residential subdivision on the south side of Big Bay Point Road east of the former City boundary.

The goals and objectives of this study are four-fold, namely:

1. To identify noise sources and noise-sensitive land uses.
2. To recommend mitigation measures, if and where required.
3. To identify those areas, if any, requiring more detailed studies.
4. To satisfy the development approval requirements of the City of Barrie.

The noise source potentially impacting this project is future traffic on Big Bay Point Road.

Traffic data were provided by the City of Barrie. Roadway noise from cars and medium and heavy trucks has been accounted for in this analysis. The traffic volumes have been projected to Year 2027 thereby providing the 10-year minimum projection window required by the MOECC.

The predicted equivalent outdoor sound levels at the subject site resulting from road traffic exceed the limits established by the MOECC in certain areas. Mitigation measures are required in order to bring day and night-time sound levels down to acceptable levels.

The noise control requirements are summarized in Section 7, in Table 4, and on Figure 3.

Certain dwellings require forced air heating systems with duct work sized to accommodate the future installation of central air conditioning at the owners' option and expense. Construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation for these units. The affected lots also require warning clauses registered on title; wording is provided. See Section 7, Table 4, and Figure 3 for details.

In summary, the subject development as proposed can be developed in a manner that satisfies the requirements of MOECC noise guideline NPC-300.

TABLE OF CONTENTS

1. INTRODUCTION

R. BOUWMEESTER & ASSOCIATES has been retained to assess potential noise impacts on residential uses within a proposed residential subdivision on the south side of Big Bay Point Road east of the former City boundary. See Figure 1.

Our analysis is based on the configuration of the development as shown on a Draft Plan of Subdivision prepared by KLM Planning dated April 5, 2017. See App. 'C'.

2. GOALS AND OBJECTIVES

The goals and objectives of this study are four-fold, namely:

1. To identify noise sources and noise-sensitive land uses.
2. To recommend mitigation measures, if and where required.
3. To identify those areas, if any, requiring more detailed studies.
4. To satisfy the development approval requirements of the City of Barrie.

3. NOISE SOURCES

The noise source potentially impacting this project is future traffic on Big Bay Point Road. Traffic data were provided by the City of Barrie. See Appendix 'A'.

4. GUIDELINES AND CRITERIA

Reference is made to Ministry of the Environment (MOECC) publication, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (Publication NPC-300, Aug 2013 ver. #22) which recommends various sound level limits for indoor and outdoor settings, under different time scenarios, and under differing uses.

4.1 Sound Level Limits

The following NPC-300 sound level limits apply to road traffic:

TABLE 1 - Sound Level Limits (Leq)

Location	Time Period		Limit (dBA)
Outdoor			
Outdoor Living Area	Day	0700-2300 hrs	55
Indoor			
Living/Dining Room	All	0700-0700 hrs	45
Bedroom (day)	Day	0700-2300 hrs	45
Bedroom (night)	Night	2300-0700 hrs	40

As compared to earlier MOECC noise guidelines, NPC-300 has set indoor sound level limits in bedrooms for the day-time period in addition to night-time.

4.2 Noise Control Measures

NPC-300 states that *"Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime and 50 dBA or less in the plane of bedroom windows during either daytime or nighttime"*.

4.2.1 Outdoor Living Areas

The above-noted outdoor limit of 55 dBA applies to a protected Outdoor Living Area (OLA) of at least 56 m^2 (600 sq. ft.) in the case of single family detached homes, 46 m^2 (500 sq. ft.) in the case of semi-detached units, and 37 m^2 (400 sq. ft.) in the case of row or townhouse units.

The MOECC guidelines indicate that *"Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime"*.

The guidelines state that if the sound level is greater than 55 dBA and less than or equal to 60 dBA, *"noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A"*.

The guidelines further state that if the sound level in the Outdoor Living Area is greater than 60 dBA, *"noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA."* Acoustic barriers typically provide the mitigation needed, and warning clauses are required to be registered on title against the affected units.

4.2.2 Plane of Window - Ventilation Requirements

Ventilation requirements to reduce indoor sound levels, by allowing windows to remain closed if so desired by the occupants, include the following:

- For outdoor day-time sound levels in the plane of living/dining/bedroom windows greater than 55 dBA and less than or equal to 65 dBA, dwelling units must be equipped with forced air heating systems with ducting sized for the future installation of central air conditioning. Window, wall, and door components meeting normal Ontario Building Code requirements are typically adequate under these conditions, although warning clauses (Types B and C) must be registered on title against the affected dwelling units.

- For outdoor day-time sound levels in the plane of living/dining/bedroom windows greater than 65 dBA, dwelling units must be equipped with central air conditioning. Warning clauses (Types B and D) must be registered on title against these units.

Ventilation requirements under night-time conditions are similar to the above except that 50 and 60 dBA are used in place of 55 dBA and 65 dBA, respectively.

The location and installation of outdoor air conditioning devices should comply with the sound level limits of Publication NPC-216 and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, or should comply with other criteria specified by the municipality.

4.2.3 Indoor Living Areas - Building Component Requirements

If day-time sound levels outside living/dining/bedroom windows exceed 65 dBA (or night-time levels exceed 60 dBA) building components including windows, walls and doors must be designed so that the indoor sound levels meet the sound level limits quoted in Table 1.

The above sound level limits and mitigation requirements can be summarized as follows:

TABLE 2 - Sound Level Limits and Standard Mitigation Requirements

	Outdoor Sound Level Limits (dBA)		
	Plane of Window		
	Day	Night	OLA
Do nothing	≤55	≤50	≤55
Noise barrier or Warning Clause A			56 - 60
Mandatory noise barrier *			>60
Provision for future A/C **	56 - 65	51 - 60	
Mandatory A/C **	>65	>60	
Special building component design	>65	>60	

Notes:
* Warning Clause B required if net resultant sound level is 56-60 dBA (to max. allowable 60 dBA).
** Warning clauses required (B and C for future A/C, B and D for mandatory A/C).

5. ANALYSIS PROCEDURES

5.1 Surroundings and Site Characteristics

The subject site is located on the south side of Big Bay Point Road, immediately east of the former City boundary, in southeast Barrie. See Figure 1. An existing residential subdivision abuts the site to the west, large existing residential lots lie north of Big Bay Point Road and to the east, and vacant lands (future residential) are located to the south,

An existing 2.25 m high acoustic fence is located along street line to the west.

The proposed development calls for 16 single-detached residential lots, along with Blocks for buffer and road widening uses. The site is 0.653 ha in size.

Private outdoor living space is proposed in the rear yards of the lots.

5.2 Noise Sources

The noise source of concern is future traffic on Big Bay Point Road. The proposed local streets are considered acoustically insignificant.

Roadway noise from cars and medium and heavy trucks has been accounted for in this analysis. The noise source heights used are in accordance with MOECC criteria.

This analysis assumes that Big Bay Point Road is of infinite length.

5.3 Traffic Data

The City of Barrie provided Year 2016 traffic counts, truck percentages, and projected annual growth rates to Year 2031 for Big Bay Point Road. Our analysis is based on Year 2027 traffic volumes which provides the 10-year minimum projection window required by the MOECC.

We have assumed that truck traffic is split 50/50 between medium and heavy trucks.

The MOECC-recommended percentage splits for day and night time traffic volumes were used in this study (i.e. 90/10 for arterial roads).

The posted speed limit on Big Bay Point Road adjacent to the subject site is currently 80 kph, reducing to 50 kph just west of the site. We have assumed that the current limit will be reduced to 50 kph as the area develops.

The road grade along Big Bay Point Road is about 1.5% as derived from the Draft Plan.

See Appendix 'A' for further road traffic details.

5.4 Study Periods

The study periods, as per MOECC guidelines, are the 16-hour day-time period between 7:00 AM and 11:00 PM, and the 8-hour night-time period from 11:00 PM and 7:00 AM.

5.5 Sound Level Prediction Model

Noise level calculations were carried out in accordance with MOECC guidelines (Environmental Noise Assessment in Land Use Planning, Training Manual, Ontario Ministry of the Environment, 1987) and through the use of their road noise model ORNAMENT. See References.

5.6 Correction Factors

The corrections required by the MOECC to be applied to the noise levels have been taken into account where applicable. These include corrections such as:

a) Road segment lengths
b) Ground surface type
c) Source - receiver distance
d) Height of elevated source/receiver, and
e) Day/night split in traffic volumes.

6. CALCULATED EQUIVALENT SOUND LEVELS

Indoor sound levels are typically estimated by calculating outdoor levels along the face of a wall exposed to the noise source (i.e. in the plane of windows). Under NPC-300, day and night-time receiver heights are set at bedroom windows which are typically 4.5 m above grade in a typical single or semi-detached house or townhouse.

Shielding by vegetation and buildings was not accounted for in the determination of ventilation and building component requirements, however, building shielding was accounted for in the determination of OLA sound levels.

OLA sound levels are typically calculated for receivers 3.0 m from the midpoint of the rear wall of a dwelling at a height of 1.5 m above finished grade.

Decks and balconies are exempt from the MOECC outdoor noise limits unless they are the only outdoor living area available, and they are at least 4.0 m deep, outside the building façade, and unenclosed.

Our analysis includes a sampling of noise levels that can be expected in OLAs and along the building faces based on the lotting configuration shown on the Draft Plan. These noise level predictions were used to flag those areas requiring a more detailed analysis.

Building envelopes were assumed based on typical setbacks of 3.0 m front, 5.0 m rear, 1.2 m interior side, and 2.0 m exterior side (as per the draft zoning standards for this site).

An overall summary of the predicted outdoor day-time and night-time sound levels for each of the receptor locations is presented in Table 3. See Figure 2 for receptor locations and Appendix 'B' for sample calculations.

TABLE 3 - Predicted Outdoor Sound Levels (dBA)

Receptor	Source	Source / Receiver Dist. (m) (Wall / OLA)	Outdoor Equivalent Sound Levels (Leq) Due to Road Traffic (dBA) (unmitigated) Day	Night	OLA
Lot 1	Big Bay Pt Rd	21.1 / 25.4	61	54	56
Lot 2	Big Bay Pt Rd	32.6 / 36.3	58	51	51
Lot 3	Big Bay Pt Rd	43.1 / 46.8	56	49	<51
Lot 4	Big Bay Pt Rd	53.5 / 57.5	54	48	<51

The results shown in Table 3 confirm that mitigation measures are required in order to ensure that day-time and night-time sound levels meet the MOECC criteria.

The OLA sound levels take into account the existing 2.25 m high acoustic fence to the west. See Figures.

The following summarizes typical acoustic requirements and describes how they apply to this proposed development. See Section 7 and Figure 3 for detailed requirements.

Warning clauses must be registered on title and included in Agreements of Purchase and Sale or Lease where sound level limits are exceeded. Based on the predicted noise levels at the building faces, warning clauses are required for certain dwelling units (see Table 4 and Figure 3) - suggested wording is given in the Notes to Table 4.

Central air conditioning is required where the sound level due to road traffic in the plane of a living/dining/bedroom window exceeds 65 dBA day-time or 60 dBA night-time. Air cooled condenser units should be located in a noise insensitive location. Central air conditioning is not meant to be a sound mitigating measure, although it does provide the dwelling occupants the option of closing windows if so desired. This requirement does not apply to any units.

Special building component design, to ensure that indoor sound levels due to road traffic meet the limits specified in Section 4, is required for residential dwelling units where the sound level in the plane of a living/dining/bedroom window exceeds 65 dBA day-time or 60 dBA night-time. This requirement does not apply to any units.

Forced air heating systems, with duct work sized to accommodate the future installation of central air conditioning, are required where the sound level due to road traffic in the plane of a living/dining/bedroom window exceeds 55 dBA day-time or 50 dBA night-time. Future air cooled condenser units should be located in a noise insensitive location. Construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation. This requirement applies to certain units (see Table 4 and Figure 3).

Acoustic barriers, to protect outdoor living areas, are required where the day-time outdoor sound level in the OLA exceeds 60 dBA. The MOECC's sound level objective for outdoor living areas is 55 dBA, however, sound level excesses of up to 5 dBA are permitted with an appropriate warning clause. Residual noise levels (in excess of 55 dBA) resulting from reduced fence heights must be covered through the use of an appropriately worded warning clause to be included in the Site Plan Agreement and in all Offers of Purchase and Sale or Lease for the affected units, and the clause is to be registered on title against those units.

Based on the configuration of the proposed Draft Plan, acoustic barriers are not required for any lots.

7. RECOMMENDATIONS

1. The first three lots in from Big Bay Point Road require warning clauses registered on title and included in all Development Agreements and Agreements of Purchase and Sale or Lease. See Figure 3 and Table 4 for the specific lots to which this applies, and see Notes to Table 4 for wording.
2. The lots in Recommendation 1 require forced air heating systems sized for the future installation of central air conditioning at the dwelling owners' option and expense.

8. CONCLUSIONS

With the incorporation of the recommended noise controls summarized in Section 7 and as contained in Table 4 and shown on Figure 3, the MOECC noise guidelines can be met in all dwelling units and outdoor living areas.

In summary, the subject development as proposed can be developed in a manner that satisfies the requirements of MOECC noise guideline NPC-300.

Respectfully submitted,

R. BOUWMEESTER & ASSOCIATES

Original signed by

Ralph Bouwmeester, P. Eng.
Principal

TABLE 4 - Summary of Noise Controls

Lot / Block	Central Air Conditioning	Exterior Windows, Walls and Doors	Acoustic Barrier	Warning Clauses [1.]
1 – 3	Provision for Adding	OBC	No	A + B + C
4 – 16	No acoustic requirements			
17 – 18	Not Residential			

Notes:

1. See Notes to Table 4 on following page for wording.

NOTES TO TABLE 4

1. Air cooled condenser units should be located in a noise insensitive location and must comply with MOECC Publication NPC-216 ("Residential Air Conditioning Devices – Publication NPC-216. 1993. Ontario Ministry of Environment and Energy").

2. 'OBC' indicates that construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation. 'Special' indicates that exterior building components such as windows, walls and doors have to be determined by an acoustic consultant when house plans are available and prior to building permit issuance.

3. Acoustic barriers shall be of solid construction with no cracks, holes or gaps, and having a surface density of no less than 20 kg/sm. Any gaps under the noise barrier that are necessary for drainage purposes must be minimized and localized, and must not deteriorate the acoustical performance. A barrier may consist of a berm, a fence, or both.

4. The following warning clauses must be registered on title and included in the Subdivision Agreement and in all Agreements of Purchase and Sale or Lease for those lots and blocks as specified in Table 4:

   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."*

   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 on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

   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."*

   TYPE D: *"This dwelling unit has been supplied with a central air conditioning system which 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."*

5. Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.

6. All exterior doors must be fully weather-stripped.

REFERENCES

1. Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (MOE Publication NPC-300, Aug 2013 ver. #22)
2. Environmental Noise Assessment in Land Use Planning (MOE Training Manual, 1987)
3. Road and Rail Noise: Effects on Housing (CMHC, Rev. 1981)
4. ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) (MOE, October 1989)
5. Traffic data (City of Barrie, May 2016)
6. Zoning By-law 2009-141 as amended (City of Barrie) (including draft amendment related to Salem and Hewitt's Secondary Plans)

FIGURES

Location Plan

Scale: NTS

FIG. 1

May 2017

R. Bouwmeester & Associates

Base map source: Simcoe County

LEGEND

Building envelope and Receptor Location

Receptor Plan

Scale: 1 : 1500

FIG. 2

May 2017

R. Bouwmeester & Associates

Air photo source: Simcoe County
Draft Plan source: KLM Planning

LEGEND

○ Dwellings requiring forced air heating + Warning Clauses

Noise Control Plan

Scale: 1 : 1500

FIG. 3

May 2017

R. Bouwmeester & Associates

Air photo source: Simcoe County
Draft Plan source: KLM Planning

APPENDICES

A. Road Traffic Data
B. Sample Sound Level Calculations
C. Draft Plan (source: KLM Planning)

APPENDIX 'A'

ROAD TRAFFIC DATA

City of Barrie

- Big Bay Point Road east of Prince William Way:
  - Year 2016 ADT is 6,500 with 4% commercial and heavy vehicles
  - Growth rate of 5.5% compounded yearly to Year 2026 plus 5% to Year 2031
  - 50 kph in built-up area, 80 kph in rural section

Ministry of the Environment and Climate Change

The MOECC recommended splits for day/night traffic are:

- arterial roads 90/10

SUMMARY OF DATA USED IN THIS STUDY

For the purpose of this noise assessment, the following Year 2027 data apply:

	Big Bay Point Road
Traffic volume (AADT) *	11,658
Day/night split (%)	90 / 10
Percent trucks M / H	2.0 / 2.0 **
Posted Speed	50 kph (assumed future) (80 kph currently)
Number of lanes	2 (future 4 / 2 lanes with centre left turn lane)
ROW width (m)	27 (future 34 / 27)
Road Grade (%)	1.5
Pavement Type	normal asphalt

* Note: Year 2027 AADT derived as follows:
6500 x (1.055^10) x (1.05^1) = 11,658

**Note: assumed split 50/50

Ralph Bouwmeester

Subject: RE: Traffic Data Request - Hewitt's Secondary Plan
From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Date: 7/8/2016 9:32 AM
To: Ralph Bouwmeester <rbouwmeester@rogers.com>

Good morning Ralph,

Please refer to below regarding the requested growth rates and traffic volumes. For the ROW and lane configurations please refer to the below link to our Multi-Modal Active Transportation Master Plan.

http://www.barrie.ca/City%20Hall/growth/Documents/Oct.%202013%20-%20AT%20MP%20-%20Report%20-%20PG%20141-208.pdf

Big Bay Point Road east of Prince William Way – 6,500 vehicles per day; 5.5% per year to 2026; 5% per year to 2031.
4% commercial and heavy vehicles
50km/h in built up area, turns to 80km/h in rural section.

Mapleview Drive

- East of Country Lane to Yonge – 11,000 vehicles per day; 7% per year to 2026; 6% per year to 2031.
- 3% commercial and heavy vehicles
- 60km/h speed limit

- East of Yonge to Prince William Way – 8,000 vehicles per day; 6% per year to 2026; 4% per year to 2031.
- 3% commercial and heavy vehicles+60 km/h speed limit

- East of Prince William Way – 3,000 vehicles per day; 6% per year to 2026; 5% per year to 2031.
- 3% commercial and heavy vehicles
- 60km/h speed limit

Lockhart Road
3,600 vehicles per day; 6% per year to 2026 (west of Yonge Street), 2% per year to 2026 (east of Yonge Street); 4% per year to 2031 (west of Yonge Street), 2% per year to 2026 (east of Yonge Street);
2% commercial and heavy vehicles
60km/h speed limit

Yonge Street
11,000 vehicles per day; 4% per year to 2026 (Big Bay Point to Mapleview), 2% per year to 2026 (Mapleview to Lockhart), 3% per year to 2031 (Lockhart south); 3% per year to 2031 (Big Bay Point to Mapleview), 1% per year to 2031 (Mapleview to Lockhart), 3% per year to 2026 (Lockhart south)
4% commercial and heavy
60km/h speed limit

Thanks,

Justin MacDonald, C.E.T.
Transportation Technologist
(705) 739-4220 ext. 5178

APPENDIX 'B'

SAMPLE SOUND LEVEL CALCULATIONS

```
STAMSON 5.0        NORMAL REPORT        Date: 03-05-2017 11:31:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70111w.te            Time Period: Day/Night 16/8 hours
Description: Lot 1 day/night at wall


Road data, segment # 1: BBPR (day/night)
----------------------------------------
Car traffic volume  : 10073/1119  veh/TimePeriod  *
Medium truck volume :   210/23    veh/TimePeriod  *
Heavy truck volume  :   210/23    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  11103
    Percentage of Annual Growth        :   5.00
    Number of Years of Growth          :   1.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: BBPR (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  :  21.10 / 21.10  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BBPR (day)
-------------------------------

Source height = 1.19 m

ROAD (0.00 + 60.60 + 0.00) = 60.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.58  64.26   0.00  -2.34  -1.32   0.00   0.00   0.00  60.60
-------------------------------------------------------------------------------

Segment Leq : 60.60 dBA
```

Total Leq All Segments: 60.60 dBA

Results segment # 1: BBPR (night)

Source height = 1.19 m

ROAD (0.00 + 54.03 + 0.00) = 54.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	57.69	0.00	-2.34	-1.32	0.00	0.00	0.00	54.03

Segment Leq : 54.03 dBA

Total Leq All Segments: 54.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.60
(NIGHT): 54.03

```
STAMSON 5.0        NORMAL REPORT        Date: 03-05-2017 11:33:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70111o.te            Time Period: 16 hours
Description: Lot 1 OLA with ex. barrier


Road data, segment # 1: BBPR
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR
--------------------------
Angle1   Angle2           : -90.00 deg   -13.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.40 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -13.00 deg
Barrier height            :   2.25 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: BBPR
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR
--------------------------
Angle1   Angle2           : -13.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.40 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: BBPR
```

```
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: BBPR
--------------------------
Angle1   Angle2           :  40.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1
House density             :     95 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.40 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BBPR
-------------------------

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 !        1.46 !         1.46

ROAD (0.00 + 48.09 + 0.00) = 48.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -13   0.53  64.26   0.00  -3.51  -5.17   0.00   0.00  -7.49  48.09
-------------------------------------------------------------------------------

Segment Leq : 48.09 dBA

Results segment # 2: BBPR
-------------------------

Source height = 1.19 m

ROAD (0.00 + 54.97 + 0.00) = 54.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -13     40   0.66  64.26   0.00  -3.80  -5.50   0.00   0.00   0.00  54.97
-------------------------------------------------------------------------------

Segment Leq : 54.97 dBA

Results segment # 3: BBPR
```

```
-------------------------

Source height = 1.19 m

ROAD (0.00 + 42.04 + 0.00) = 42.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    40     90   0.66  64.26   0.00  -3.80  -8.32   0.00 -10.10   0.00  42.04
-------------------------------------------------------------------------------

Segment Leq : 42.04 dBA

Total Leq All Segments: 55.96 dBA

TOTAL Leq FROM ALL SOURCES:       55.96
```

STAMSON 5.0 NORMAL REPORT Date: 03-05-2017 11:31:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70112w.te Time Period: Day/Night 16/8 hours
Description: Lot 2 day/night at wall

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

Car traffic volume : 10073/1119 veh/TimePeriod *
Medium truck volume : 210/23 veh/TimePeriod *
Heavy truck volume : 210/23 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 11103
Percentage of Annual Growth : 5.00
Number of Years of Growth : 1.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: BBPR (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 : 32.60 / 32.60 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BBPR (day)

Source height = 1.19 m

ROAD (0.00 + 57.62 + 0.00) = 57.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	64.26	0.00	-5.32	-1.32	0.00	0.00	0.00	57.62

Segment Leq : 57.62 dBA

Total Leq All Segments: 57.62 dBA

Results segment # 1: BBPR (night)

Source height = 1.19 m

ROAD (0.00 + 51.04 + 0.00) = 51.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	57.69	0.00	-5.32	-1.32	0.00	0.00	0.00	51.04

Segment Leq : 51.04 dBA

Total Leq All Segments: 51.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.62
(NIGHT): 51.04

```
STAMSON 5.0        NORMAL REPORT        Date: 03-05-2017 11:33:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70112o.te            Time Period: 16 hours
Description: Lot 2 OLA with ex. barrier


Road data, segment # 1: BBPR
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: BBPR
--------------------------
Angle1   Angle2           : -90.00 deg   -1.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.30 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -1.00 deg
Barrier height            :   2.25 m
Barrier receiver distance :   8.50 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: BBPR
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: BBPR
--------------------------
Angle1   Angle2           :  -1.00 deg   17.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.30 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: BBPR
```

```
----------------------------
Car traffic volume  : 10073 veh/TimePeriod  *
Medium truck volume :   210 veh/TimePeriod  *
Heavy truck volume  :   210 veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: BBPR
--------------------------
Angle1   Angle2           :  17.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1
House density             :     95 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.30 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BBPR
-------------------------

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 !        1.43 !         1.43

ROAD (0.00 + 47.62 + 0.00) = 47.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -1   0.53  64.26   0.00  -5.89  -4.31   0.00   0.00  -6.44  47.62
-------------------------------------------------------------------------------

Segment Leq : 47.62 dBA

Results segment # 2: BBPR
-------------------------

Source height = 1.19 m

ROAD (0.00 + 47.85 + 0.00) = 47.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -1     17   0.66  64.26   0.00  -6.37 -10.04   0.00   0.00   0.00  47.85
-------------------------------------------------------------------------------

Segment Leq : 47.85 dBA

Results segment # 3: BBPR
```

```
-------------------------

Source height = 1.19 m

ROAD (0.00 + 42.15 + 0.00) = 42.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    17     90   0.66  64.26   0.00  -6.37  -5.78   0.00  -9.95   0.00  42.15
-------------------------------------------------------------------------------

Segment Leq : 42.15 dBA

Total Leq All Segments: 51.31 dBA

TOTAL Leq FROM ALL SOURCES:       51.31
```

```
STAMSON 5.0        NORMAL REPORT        Date: 03-05-2017 11:32:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70113w.te            Time Period: Day/Night 16/8 hours
Description: Lot 3 day/night at wall


Road data, segment # 1: BBPR (day/night)
----------------------------------------
Car traffic volume  : 10073/1119  veh/TimePeriod  *
Medium truck volume :   210/23    veh/TimePeriod  *
Heavy truck volume  :   210/23    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  11103
    Percentage of Annual Growth        :   5.00
    Number of Years of Growth          :   1.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: BBPR (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  :  43.10 / 43.10  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BBPR (day)
-------------------------------

Source height = 1.19 m

ROAD (0.00 + 55.70 + 0.00) = 55.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.58  64.26   0.00  -7.24  -1.32   0.00   0.00   0.00  55.70
-------------------------------------------------------------------------------

Segment Leq : 55.70 dBA

Total Leq All Segments: 55.70 dBA

Results segment # 1: BBPR (night)
---------------------------------
```

Source height = 1.19 m

ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	57.69	0.00	-7.24	-1.32	0.00	0.00	0.00	49.13

Segment Leq : 49.13 dBA

Total Leq All Segments: 49.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.70
(NIGHT): 49.13

```
STAMSON 5.0        NORMAL REPORT        Date: 03-05-2017 11:32:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70114w.te            Time Period: Day/Night 16/8 hours
Description: Lot 4 day/night at wall


Road data, segment # 1: BBPR (day/night)
----------------------------------------
Car traffic volume  : 10073/1119  veh/TimePeriod  *
Medium truck volume :   210/23    veh/TimePeriod  *
Heavy truck volume  :   210/23    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  11103
    Percentage of Annual Growth        :   5.00
    Number of Years of Growth          :   1.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: BBPR (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  :  53.50 / 53.50  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: BBPR (day)
-------------------------------

Source height = 1.19 m

ROAD (0.00 + 54.22 + 0.00) = 54.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.58  64.26   0.00  -8.72  -1.32   0.00   0.00   0.00  54.22
-------------------------------------------------------------------------------

Segment Leq : 54.22 dBA

Total Leq All Segments: 54.22 dBA

Results segment # 1: BBPR (night)
---------------------------------
```

Source height = 1.19 m

ROAD (0.00 + 47.65 + 0.00) = 47.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	57.69	0.00	-8.72	-1.32	0.00	0.00	0.00	47.65

Segment Leq : 47.65 dBA

Total Leq All Segments: 47.65 dBA

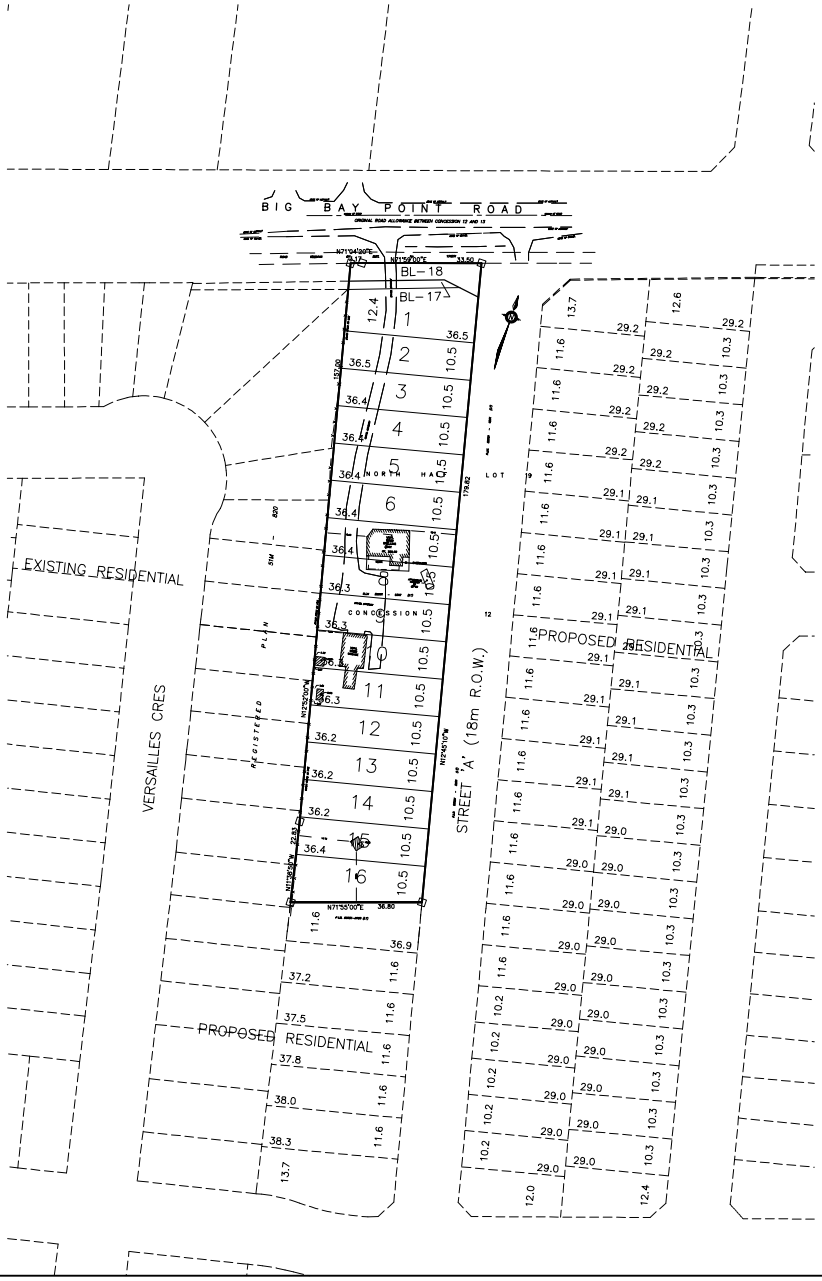
TOTAL Leq FROM ALL SOURCES (DAY): 54.22
(NIGHT): 47.65

APPENDIX ‘C’

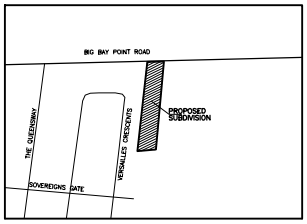
DRAFT PLAN

(Source: KLM Planning)

DRAFT PLAN OF SUBDIVISION
PART OF NORTH HALF LOT 19, CONCESSION 12
(GEOGRAPHIC TOWNSHIP OF INNISFIL
CITY OF BARRIE
COUNTY OF SIMCOE



DRAFT PLAN T–



KEY PLAN N.T.S.

SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

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.

DATE ----------, 2017

RUDY MAK OLS

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF BARRIE FOR APPROVAL.

OWNER

ABC 222222 LTD

C/O

XXX
XXX
XXX
XXX

XXX A.S.O.

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED = 0.653±Ha. (1.613±Acs)

LOTS FOR DETACHED DWELLINGS	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
LOTS 1–16		16	16	0.626	1.547
MIN. LOT FRONTAGE=10.0m. MIN LOT AREA=360.0sq.m.					
SUBTOTAL		16	16	0.626	1.547
BLOCK 17 – BUFFER	1			0.007	0.017
BLOCK 18 – ROAD WIDENING	1			0.020	0.049
TOTAL	2	16	16	0.653	1.613

NOTE – ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM

PROJECT No. P-2803
SCALE 1:500 APR. 5, 2017
(2803DES1) X-REF: (2803MAS & 2803TOPO)
DWG. No. - 17:1

KLM PLANNING PARTNERS INC. 64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
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Planning • Design • Development