Burnett Lands - 3370 Greenbank Road

Noise Impact Feasibility Report

BURNETT LANDS

3370 GREENBANK ROAD

NOISE IMPACT FEASIBILITY REPORT

Prepared for:

Claridge Homes

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

December 9, 2016

Novatech File: 111117
Ref: R-2016-174

December 9, 2016

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning Services Branch
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: **Mr. Don Herweyer, Manager of Development Review South**

Reference: **Burnett Lands - 3370 Greenbank Road**
Noise Impact Feasibility Report
Novatech File No.: 111117

Enclosed herein are three (3) copies of the "Noise Impact Feasibility Report" for the proposed development of the Burnett Lands located at 3370 Greenbank Road, Ottawa. The report is submitted in support of applications for Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision. It will address the environmental impact of noise from traffic on the outdoor living areas, and assess the feasibility of mitigation measures to attenuate noise to acceptable levels.

Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH

Greg MacDonald, P.Eng.
Director, Land Development and Public Sector Projects

Encl.

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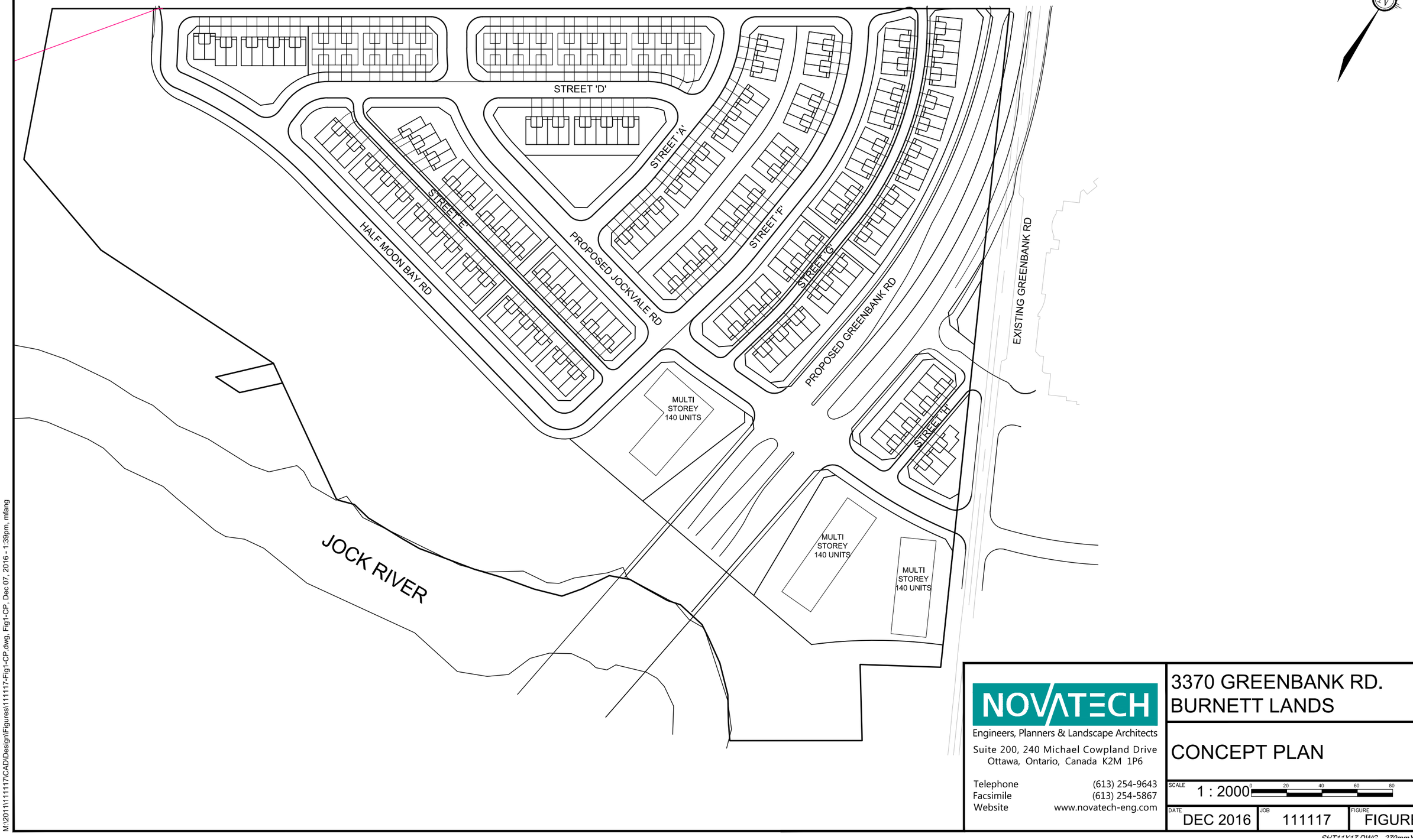
1.0 INTRODUCTION

Novatech has been retained by Claridge Homes (South Nepean) LP to prepare a Noise Impact Feasibility Report in support of an Official Plan Amendment (OPA), a Draft Plan of Subdivision, and a Zoning By-Law Amendment (ZBLA) to allow for the development of the lands at 3370 Greenbank Road, Ottawa. The site is planned to be developed with a mix of two to three storeys townhomes (247 units) including back-to-back townhomes and street orientated townhomes. In addition, two high rise residential blocks, which will generate an additional 420 residential units, are proposed on the south part of the realigned Greenbank Road and proposed Jockvale Road as shown on **Figure 1**. The proposed development provides access to the future district park- Half Moon Bay Park (along the Jock River), various trails, and to multi-use path identified in the *Official Plan*, *South Nepean Secondary Plan*, and *South Nepean Community Design Plan*.

The study will assess the environmental impact of noise from traffic on the outdoor living areas, and review the feasibility of mitigation methods. Mitigation of in-door noise levels will not be discussed in this report since floor areas, window/door areas and building sections are not yet available. These components will be reviewed as part of the detailed subdivision design.

1.1 SITE LOCATION AND CONTEXT

The Subject Site is approximately 15.5 hectares in area and is located immediate north of the Jock River, south of Strandherd Drive and between the Kennedy Burnett Stormwater Management Facility and the existing Greenbank Road as shown on **Figure 2**. The Burnett Municipal Drain is a tributary to the Jock River and travels through the subject site. The subject site currently has farm and accessory structures located near its southern boundary with an existing gravel access on to Greenbank Road. The remainder of the site is currently used for passive agriculture activities. The site is generally flat with a gentle slope from the northeastern corner to the southwestern corner.



M:\2011\111117\CAD\Design\Figures\111117-Fig1-CP.dwg, Fig1-CP, Dec 07, 2016 - 1:39pm, mfang

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3370 GREENBANK RD. BURNETT LANDS

CONCEPT PLAN

SCALE 1 : 2000 (0, 20, 40, 60, 80)

DATE DEC 2016 | JOB 111117 | FIGURE FIGURE 1

SHT11X17.DWG - 279mm X 432mm

Figure 2: Site Location (Base Map Source: GeoOttawa)

The following describes the existing and planned land uses adjacent to the subject site:

North: Lands to the north, owned by Caivan Communities, are currently under the development approval process and have recently obtained OPA and ZBLA approval (Amendment #144) from the City to permit High Rise and Mid Rise Mixed-Use Residential developments, Mid Rise Residential Dwellings, and a Neighbourhood Park as per *Schedule 1- Land Use Plan, South Nepean Secondary Plan (Area 7)*. Further north of the Caivan Communities' development is the planned Barrhaven Town Centre which will include a variety of retail uses to service the surrounding existing and planned residential developments.

East: Lands east of the subject site contain a mixture of low density residential dwellings (single detached houses), a secondary school (St. Joseph Catholic High School), and an existing vegetated area. Greenbank Road currently forms the eastern boundary of the site. The realigned Greenbank Road will bisect the site as per the design by the City.

South: The Jock River runs west – east along the majority of the southern boundary of the property until it turns south near the southeastern corner of the site. The lands south of Jock River are within the Barrhaven *South Community Design Plan* and are intended for a future district park and residential uses as shown on *Figure 17* of the *Barrhaven South Community Design Plan.*

West: The Kennedy Burnett stormwater management facility is located north west of the subject site and drains into the Jock River. Lands immediately west are currently vacant and intended for mostly conservation and residential uses as identified in Schedule B of the Official Plan.

2.0 BACKGROUND AND REPORT ASSUMPTIONS

The City of Ottawa's Official Plan (OP) and Environmental Noise Control Guidelines (ENCG) stipulates that a noise study shall be prepared when a residential development is located within close proximity to surface transportation, stationary sources and aircraft noise sources. This report considers noise from traffic on the future Jockvale Road and Greenbank Road las all other sources of noise are located beyond the limits of consideration as outlined in Section 2.1 of the ENCG. Jockvale Road and Greenbank Road are classified as future collector and arterial roads, respectively, on Schedule E - Urban Road Network in the OP. Jockvale Road will be classified as a 2 lane urban collector and Greenbank Road will be classified as a 4 lane urban arterial divided road. This report also takes into consideration the future bus route on Greenbank Road.

3.0 CITY OF OTTAWA NOISE CONTROL GUIDELINES

3.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways, and railways, as expressed in Tables 2.2a: Sound Level Limit for Outdoor Living Areas – Road and Rail, Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail, and Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces – Road and Rail of the ENCG. As per Table 2.2a, the maximum suggested sound level for outdoor living areas between 7am and 11pm is 55 dBA. For reference, Table 2.2a of the ENCG is included in **Appendix A**.

Outdoor Living Area (OLA) is defined as follows:

"The outdoor amenity area provided for quiet enjoyment of the outdoor environment during the daytime period (i.e., backyards, terraces and patios). OLA noise levels are considered 3.0m from the building façade, 1.5m above grade."

3.2 Noise Attenuation Requirements

When OLA sound levels are predicted to be approximately equal to or less than 55 dBA attenuation measures are not required. If the predicted noise levels are found to exceed 55 dBA, physical forms of mitigation is suggested and which may also include the provision of warning clauses to inform purchasers of the expected noise levels and specific mitigation measures.

4.0 PREDICTION AND MITIGATION OF NOISE LEVELS

4.1 Road Traffic

Table 1 outlines the traffic parameters used to predict the noise levels for the site.

Table 1: Traffic Parameters

Road	Implied Roadway Class	AADT	Traffic Split (%)		
			Day Night	Medium Trucks	Heavy Trucks
Jockvale	2 Lane Urban Collector	8,000	92/8	7	5
Greenbank	4 Lane Urban Arterial Divided	35,000	92/8	7	5

In addition to the traffic volumes listed in Table 1, Greenbank Road will serve as a transit corridor for 144 bus trips per day. For reference, excerpts from the ENCG confirming the Jockvale Road and Greenbank Road AADT and email an confirming the Greenbank Road future bus traffic volumes are included in **Appendix A**.

4.2 Noise Level Analysis

The noise levels for the site were analyzed using version 5.03 of the STAMSON computer noise modelling program. For the most part, due to the planned orientation of the outdoor living areas, noise levels will be below the new OLA guideline of 55 dBA. The exception is Block 8. Due to the backyards within Block 8 backing on to the district park physical mitigation of noise will be required. It is proposed to install a 2.2 meter high noise wall along these back yards which will reduce the noise level from 65.34 dBA to just below 60 dBA. This is still above the new OLA guideline of 55 dBA (the previous guideline as of January 2016 was 60 dBA). To further reduce the noise level to the new criteria would result in a noise wall higher than 3.0 meters. A 3.0 m high barrier would be aesthetically unappealing to the local resident and its advantages (further reducing noise) would be minimal.

Refer to the Noise Control Plan (Drawing Number 111117-NC), located in **Appendix B** for receiver locations, receiver elevations, and receiver distances to noise sources. The noise levels for all receiver locations generated from STAMSON are listed in **Table 2** with detailed modeling results in **Appendix B.**

Table 2: Predicted Noise Levels

Receiver	File	Calculated Noise Level (dBa), 7:00-23:00		Mitigation Method
Name		Unattenuated	Attenuated	
OLA1	OLA1.te	45.85	-	N/A
OLA2	OLA2.te	65.34	59.97	2.2m Noise Barrier
OLA3	OLA3.te	65.17	59.73	2.2m Noise Barrier
OLA4	OLA4.te	49.26	-	N/A
OLA5	OLA5.te	49.20	-	N/A

It is also recommended that the following noise clauses be registered on title and incorporated into the agreement of purchase and sales:

> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."
>
> "To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. The measures for sound attenuation utilized is an acoustic barrier to be owned and maintained by the City.

5.0 CONCLUSIONS

This report confirms the predicted outdoor noise levels for the proposed residential development from the adjacent Jockvale Road and Greenbank Road are in excess of the City of Ottawa's and Ministry of the Environment guidelines. To mitigate the noise levels and inform potential buyers/tenants, the following noise attenuation measures are proposed:

- The installation of an acoustic noise barrier, 2.2 meters in height along the rear yards of Block 8 as indicated on the Noise Control Plan (111117-NC).
- The inclusion of a noise warning clause registered on title and incorporated into the purchase and sale agreements of the units requiring outdoor noise attenuation.
- Indoor noise mitigation methods and additional warning clauses to be registered on title and into the sales/rental agreements are to be confirmed during detailed design

This report is respectfully submitted for City of Ottawa approval.

NOVATECH

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Project Manager
Land Development Engineering

Reviewed by:

Greg MacDonald, P.Eng.
Director
Land Development and Public Sector Infrastructure

Appendix A
Environmental Noise Control Guidelines Excerpts

Table 2.2a: Sound Level Limit for Outdoor Living Areas - Road and Rail
(from NPC-300, 2013 Table C-1)

Time Period	Required Leq (16) (dBA)
16-hour, 07:00 – 23:00	55

Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail
(from NPC-300, 2013 Table C-2)

Type of Space	Time Period	Required Leq (dBA) Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

The Province also provides for supplementary indoor sound level limits for land uses not generally considered noise sensitive (see Table 2.2c below). These good practice design objectives should be addressed in any noise study prepared for the City. These supplementary sound level limits are based on the windows and doors to an indoor space being closed.

Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces - Road and Rail (adapted from NPC-300 Table C-9)

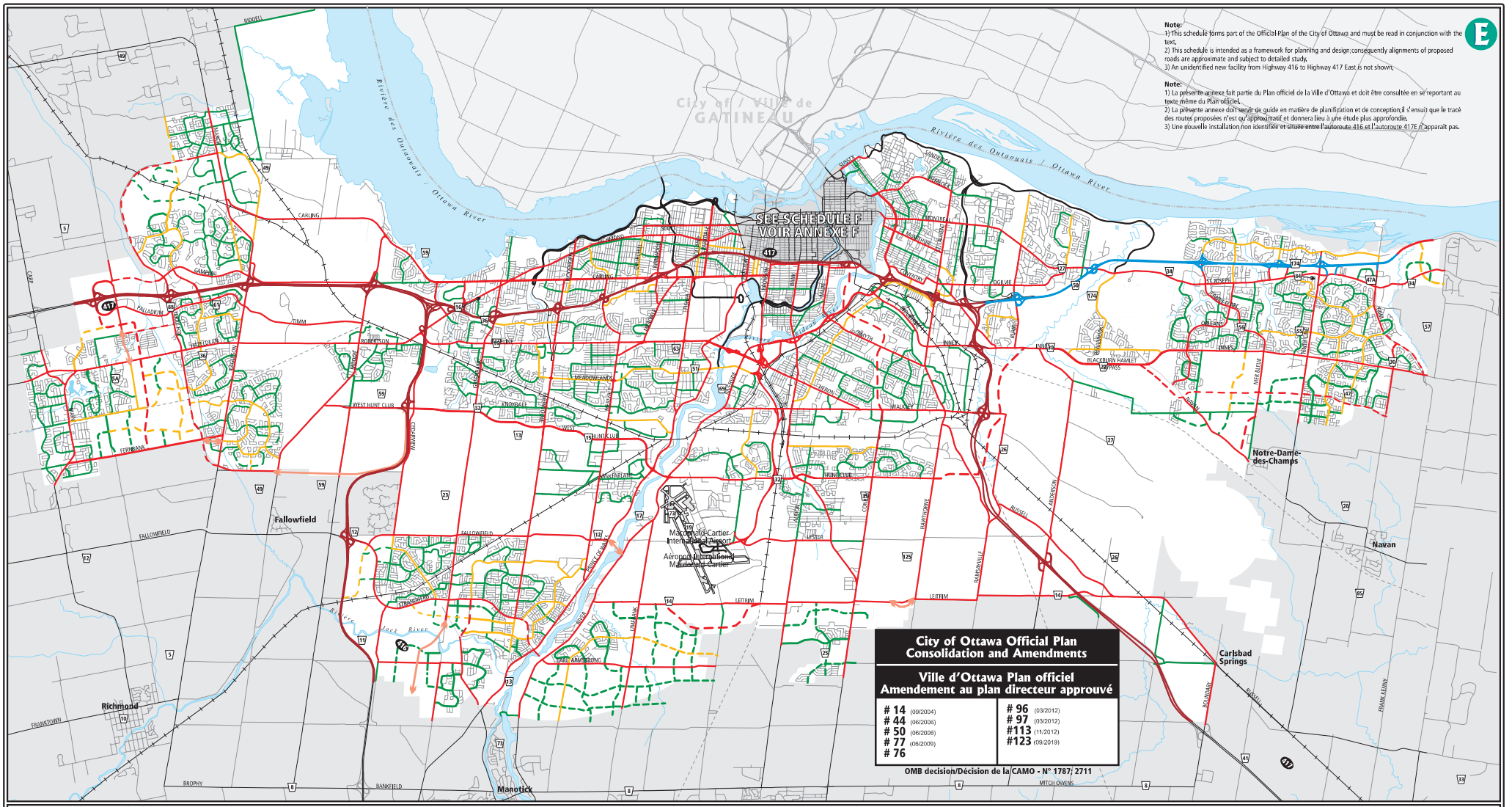
Type of Space	Time Period	Required Leq (dBA) Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions

Table B1 Traffic And Road Parameters To Be Used For Sound Level Predictions

Row Width (m)	Implied Roadway Class	AADT Vehicles/Day	Posted Speed Km/Hr	Day/Night Split %	Medium Trucks %	Heavy Trucks % [1]
NA [2]	Freeway, Queensway, Highway	18,333 per lane	100	92/8	7	5
37.5-44.5	6-Lane Urban Arterial-Divided (6 UAD)	50,000	50-80	92/8	7	5
34-37.5	4-Lane Urban Arterial-Divided (4-UAD)	35,000	50-80	92/8	7	5
23-34	4-Lane Urban Arterial-Undivided (4-UAU)	30,000	50-80	92/8	7	5
23-34	4-Lane Major Collector (4-UMCU)	24,000	40-60	92/8	7	5
30-35.5	2-Lane Rural Arterial (2-RAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Urban Arterial (2-UAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Major Collector (2-UMCU)	12,000	40-60	92/8	7	5
30-35.5	2-Lane Outer Rural Arterial (near the extremities of the City) (2-RAU)	10,000	50-80	92/8	7	5
20-30	2-Lane Urban Collector (2-UCU)	8,000	40-50	92/8	7	5

[1] The MOE Vehicle Classification definitions should be used to estimate automobiles, medium trucks and heavy trucks.
[2] The number of lanes is determined by the future mature state of the roadway.



Official Plan - Schedule E
Urban Road Network

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit

Plan officiel - Annexe E
Routes Arterial - Urbain

Preparé par : Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques

Provincial Highway / City Freeway	Route provinciale / Autoroute de ville
Federally Owned Road: Existing, Proposed (Alignment defined)	Chemins de propriété fédéral: Établie, Proposé (Alignement déterminée)
Arterials: Existing, Proposed (Alignment Defined), Conceptual (Alignment Undefined)	Artère: Établie, Proposé (Alignement déterminée), Conceptuelle (Alignement à déterminée)
Major Collectors: Existing, Proposed	Grande collectrice: Établie, Proposé
Collectors: Existing, Proposed	Collectrice: Établie, Proposé

Ottawa

Scale / Échelle

2km 1 0 1 2 3 4km

Appendix B
STAMPSON Noise Modelling Results and Noise Control Plan

OLA 1
Unattenuated

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-09-2016 09:39:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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Description:
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uated\OLA1


Road data, segment # 1: JOCKVALE (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  89.00 / 89.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	45.85	45.85
Total			45.85 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	38.26	38.26
Total			38.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 45.85
(NIGHT): 38.26

OLA 2
Unattenuated

```
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uated\OLA2


Road data, segment # 1: JOCKVALE (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (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  :  16.00 / 16.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	65.34	65.34
Total			65.34 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	57.75	57.75
Total			57.75 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.34
(NIGHT): 57.75

OLA 3
Unattenuated

```
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uated\OLA3


Road data, segment # 1: JOCKVALE (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (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  :  17.00 / 17.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: GREENBANK (day/night)

Angle1 Angle2	: -90.00 deg	0.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 78	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 3: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	:	35000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 3: GREENBANK (day/night)

Angle1 Angle2	: 0.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 46	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	64.91	64.91
2.GREENBANK	1.50	45.85	45.85
3.GREENBANK	1.50	51.77	51.77
Total			65.17 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	57.31	57.31
2.GREENBANK	1.50	38.25	38.25
3.GREENBANK	1.50	44.17	44.17
Total			57.57 dBA

RT/Custom data, segment # 1: GBANK (day/night)
---

1 - Bus:
Traffic volume : 128/16 veh/TimePeriod
Speed : 60 km/h

Data for Segment # 1: GBANK (day/night)

Angle1 Angle2	: -90.00 deg	0.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 78 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

RT/Custom data, segment # 2: GBANK (day/night)

1 - Bus:

Traffic volume	: 128/16	veh/TimePeriod
Speed	: 60 km/h	

Data for Segment # 2: GBANK (day/night)

Angle1 Angle2	: 0.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 46 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	26.28	26.28
2.GBANK	0.50	32.20	32.20
Total			33.19 dBA

Result summary (night)
---

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	20.26	20.26
2.GBANK	0.50	26.18	26.18
Total			27.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.17
(NIGHT): 57.57

OLA 4
Unattenuated

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-09-2016 10:31:57
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uated\OLA4


Road data, segment # 1: JOCKVALE (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     86 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: GREENBANK (day/night)

Angle1 Angle2	: -90.00 deg	-45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 80	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 120.00 / 120.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 3: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 3: GREENBANK (day/night)

Angle1 Angle2	: -45.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 90	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 120.00 / 120.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	42.47	42.47
2.GREENBANK	1.50	43.12	43.12
3.GREENBANK	1.50	46.58	46.58
Total			49.23 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	34.88	34.88
2.GREENBANK	1.50	35.52	35.52
3.GREENBANK	1.50	38.98	38.98
Total			41.63 dBA

RT/Custom data, segment # 1: GBANK (day/night)

1 - Bus:

Traffic volume	: 128/16	veh/TimePeriod
Speed	: 60 km/h	

Data for Segment # 1: GBANK (day/night)

Angle1 Angle2	: -90.00 deg	-45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 80 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 120.00 / 120.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

RT/Custom data, segment # 2: GBANK (day/night)
---

1 - Bus:
Traffic volume : 128/16 veh/TimePeriod
Speed : 60 km/h

Data for Segment # 2: GBANK (day/night)

Angle1 Angle2	: -45.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 90 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 120.00 / 120.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	23.55	23.55
2.GBANK	0.50	27.01	27.01
Total			28.63 dBA

Result summary (night)
---

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	17.53	17.53
2.GBANK	0.50	20.99	20.99
Total			22.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.26
(NIGHT): 41.68

OLA 5
Unattenuated

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-09-2016 10:50:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola5.te              Time Period: Day/Night 16/8 hours
Description:
\\NOVATECH2008\Nova2\2011\111117\DATA\Calculations\Noise\20160929\Unatten
uated\OLA5


Road data, segment # 1: JOCKVALE (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     81 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 162.00 / 162.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: GREENBANK (day/night)

Angle1 Angle2	: -90.00 deg	-15.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 80	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 127.00 / 127.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 3: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	:	35000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 3: GREENBANK (day/night)

Angle1 Angle2	: -15.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 90	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 127.00 / 127.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	40.01	40.01
2.GREENBANK	1.50	46.16	46.16
3.GREENBANK	1.50	44.93	44.93
Total			49.16 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	32.41	32.41
2.GREENBANK	1.50	38.57	38.57
3.GREENBANK	1.50	37.33	37.33
Total			41.57 dBA

RT/Custom data, segment # 1: GBANK (day/night)

1 - Bus:

Traffic volume	: 128/16	veh/TimePeriod
Speed	: 60 km/h	

Data for Segment # 1: GBANK (day/night)

Angle1 Angle2	: -90.00 deg	-15.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 80 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 127.00 / 127.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

RT/Custom data, segment # 2: GBANK (day/night)
---

1 - Bus:
Traffic volume : 128/16 veh/TimePeriod
Speed : 60 km/h

Data for Segment # 2: GBANK (day/night)

Angle1 Angle2	: -15.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 90 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 127.00 / 127.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	26.60	26.60
2.GBANK	0.50	25.36	25.36
Total			29.03 dBA

Result summary (night)
---

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	20.58	20.58
2.GBANK	0.50	19.34	19.34
Total			23.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.20
(NIGHT): 41.63

OLA 2
Attenuated

```
STAMSON 5.0        SUMMARY REPORT        Date: 11-10-2016 14:19:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola2.te              Time Period: Day/Night 16/8 hours
Description:
\\NOVATECH2008\Nova2\2011\111117\DATA\Calculations\Noise\20160929\Attenua
ted\OLA2\22mBarrier


Road data, segment # 1: JOCKVALE (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (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  :  16.00 / 16.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : 66.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   3.60 / 3.60   m
Source elevation          :  93.77 m
Receiver elevation        :  93.95 m
Barrier elevation         :  93.70 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	59.97	59.97
Total			59.97 dBA

Barrier table for segment # 1: JOCKVALE (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.40	55.84	55.84
4.20	97.90	55.26	55.26
4.70	98.40	54.87	54.87
5.20	98.90	54.63	54.63
5.70	99.40	54.49	54.49
6.20	99.90	54.40	54.40
6.70	100.40	54.35	54.35
7.20	100.90	54.31	54.31
7.70	101.40	54.29	54.29
8.20	101.90	54.27	54.27

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	52.37	52.37
Total			52.37 dBA

Barrier table for segment # 1: JOCKVALE (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.40	48.25	48.25
4.20	97.90	47.67	47.67
4.70	98.40	47.28	47.28
5.20	98.90	47.04	47.04
5.70	99.40	46.90	46.90
6.20	99.90	46.81	46.81
6.70	100.40	46.76	46.76
7.20	100.90	46.72	46.72
7.70	101.40	46.70	46.70
8.20	101.90	46.68	46.68

TOTAL Leq FROM ALL SOURCES (DAY): 59.97
(NIGHT): 52.37

OLA 3
Attenuated

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-09-2016 15:15:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA3.te              Time Period: Day/Night 16/8 hours
Description:
\\NOVATECH2008\Nova2\2011\111117\DATA\Calculations\Noise\20160929\Attenua
ted\OLA3\22mBarrier


Road data, segment # 1: JOCKVALE (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: JOCKVALE (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  17.00 / 17.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -72.00 deg   Angle2 : 44.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   5.70 / 5.70   m
Source elevation          :  93.66 m
Receiver elevation        :  93.97 m
Barrier elevation         :  93.65 m
Reference angle           :   0.00
```

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

Car traffic volume	6477/563	veh/TimePeriod *
Medium truck volume	515/45	veh/TimePeriod *
Heavy truck volume	368/32	veh/TimePeriod *
Posted speed limit	60	km/h
Road gradient	1	%
Road pavement	1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

Data for Segment # 2: JOCKVALE (day/night)

Angle1 Angle2	44.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	1 / 1	
House density	95 %	
Surface	1	(Absorptive ground surface)
Receiver source distance	17.00 / 17.00	m
Receiver height	1.50 / 1.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

Road data, segment # 3: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	:	35000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 3: GREENBANK (day/night)

Angle1 Angle2	: -90.00 deg	0.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 84	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 4: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 4: GREENBANK (day/night)

Angle1 Angle2	: 0.00 deg	25.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 33	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 5: GREENBANK (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 60	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 5: GREENBANK (day/night)

Angle1 Angle2	: 25.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 69	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 25.00 deg	Angle2 : 90.00 deg
Barrier height	: 2.20	m
Barrier receiver distance	: 3.00 / 3.00	m
Source elevation	: 93.66	m
Receiver elevation	: 93.97	m
Barrier elevation	: 93.65	m
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	58.61	58.61
2.JOCKVALE	1.50	47.37	47.37
3.GREENBANK	1.50	44.86	44.86
4.GREENBANK	1.50	48.29	48.29
5.GREENBANK	1.50	47.71	47.71
Total			59.72 dBA

Barrier table for segment # 1: JOCKVALE (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.35	53.70	53.70
4.20	97.85	52.93	52.93
4.70	98.35	52.43	52.43
5.20	98.85	52.08	52.08
5.70	99.35	51.87	51.87
6.20	99.85	51.79	51.79
6.70	100.35	51.76	51.76
7.20	100.85	51.75	51.75
7.70	101.35	51.74	51.74
8.20	101.85	51.74	51.74

Barrier table for segment # 5: GREENBANK (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.35	43.78	43.78
4.20	97.85	42.89	42.89
4.70	98.35	42.22	42.22
5.20	98.85	41.71	41.71
5.70	99.35	41.34	41.34
6.20	99.85	41.13	41.13
6.70	100.35	41.04	41.04
7.20	100.85	41.04	41.04
7.70	101.35	41.10	41.10
8.20	101.85	41.22	41.22

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.JOCKVALE	1.50	51.02	51.02
2.JOCKVALE	1.50	39.78	39.78
3.GREENBANK	1.50	37.26	37.26
4.GREENBANK	1.50	40.69	40.69
5.GREENBANK	1.50	40.11	40.11
Total			52.13 dBA

Barrier table for segment # 1: JOCKVALE (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.35	46.11	46.11
4.20	97.85	45.34	45.34
4.70	98.35	44.83	44.83
5.20	98.85	44.49	44.49
5.70	99.35	44.28	44.28
6.20	99.85	44.20	44.20
6.70	100.35	44.17	44.17
7.20	100.85	44.15	44.15
7.70	101.35	44.15	44.15
8.20	101.85	44.15	44.15

Barrier table for segment # 5: GREENBANK (night)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
3.70	97.35	36.18	36.18
4.20	97.85	35.29	35.29
4.70	98.35	34.62	34.62
5.20	98.85	34.12	34.12
5.70	99.35	33.75	33.75
6.20	99.85	33.53	33.53
6.70	100.35	33.44	33.44
7.20	100.85	33.44	33.44
7.70	101.35	33.50	33.50
8.20	101.85	33.62	33.62

RT/Custom data, segment # 1: GBANK (day/night)

1 - Bus:

Traffic volume	: 128/16	veh/TimePeriod
Speed	: 60	km/h

Data for Segment # 1: GBANK (day/night)

Angle1 Angle2	: -90.00 deg	0.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 3 / 3	
House density	: 84	%
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

RT/Custom data, segment # 2: GBANK (day/night)

1 - Bus:

Traffic volume	: 128/16	veh/TimePeriod
Speed	: 60 km/h	

Data for Segment # 2: GBANK (day/night)

Angle1 Angle2	: 0.00 deg	25.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 33 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 133.00 / 133.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

RT/Custom data, segment # 3: GBANK (day/night)
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1 - Bus:
Traffic volume : 128/16 veh/TimePeriod
Speed : 60 km/h

Data for Segment # 3: GBANK (day/night)

Angle1 Angle2 : 25.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 69 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 133.00 / 133.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 25.00 deg Angle2 : 90.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 93.66 m
Receiver elevation : 93.97 m
Barrier elevation : 93.65 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	25.29	25.29
2.GBANK	0.50	28.72	28.72
3.GBANK	0.50	27.95	27.95
Total			32.32 dBA

Barrier table for segment # 3: GBANK (day)

Barrier Height	Elev of Barr Top	RT/CUST dBA	Tot Leq dBA
3.70	97.35	23.77	23.77
4.20	97.85	22.88	22.88
4.70	98.35	22.22	22.22
5.20	98.85	21.72	21.72
5.70	99.35	21.35	21.35
6.20	99.85	21.14	21.14
6.70	100.35	21.06	21.06
7.20	100.85	21.06	21.06
7.70	101.35	21.12	21.12
8.20	101.85	21.23	21.23

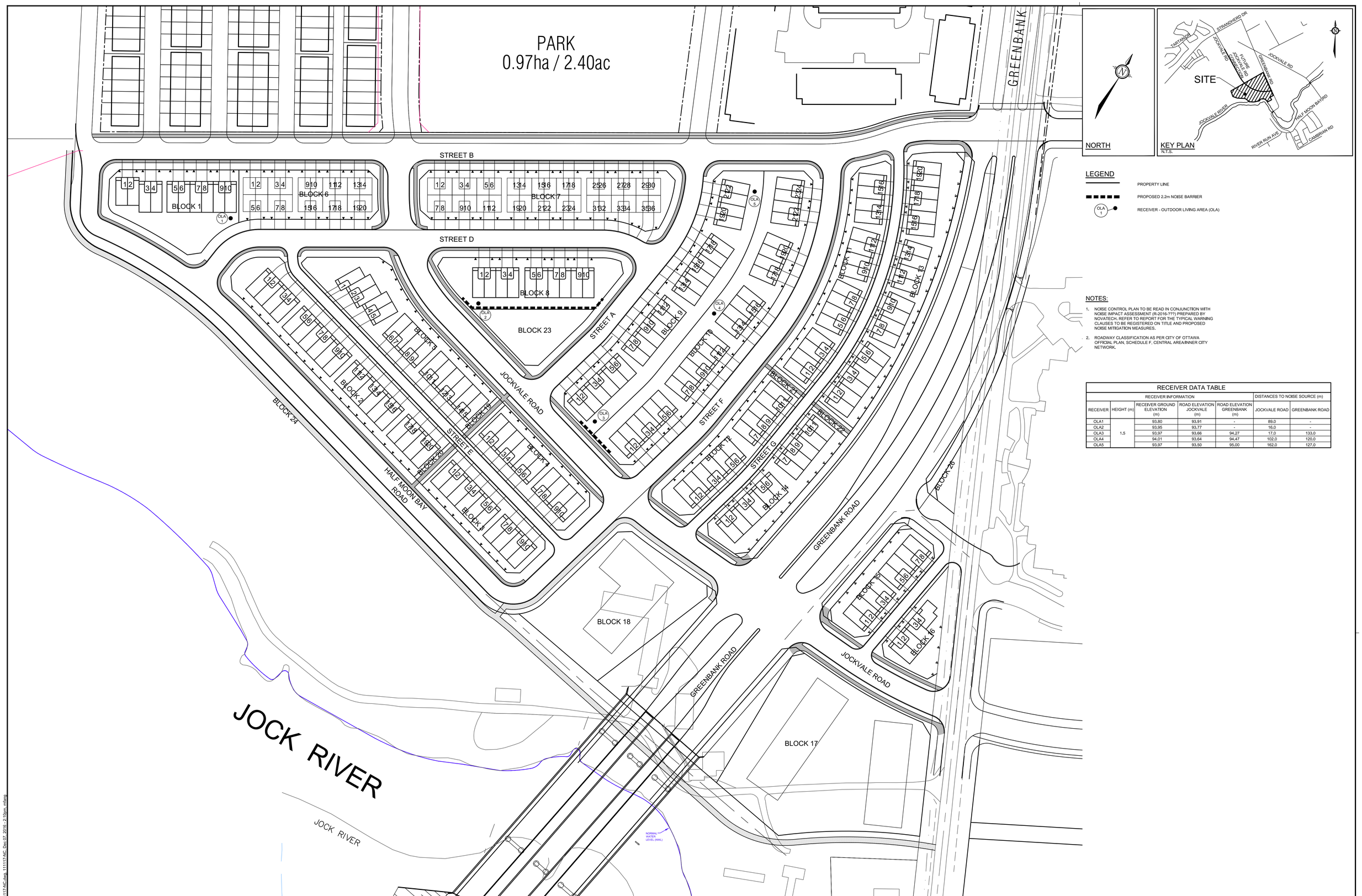
Result summary (night)

	source height (m)	Gen Leq (dBA)	Total Leq (dBA)
1.GBANK	0.50	19.27	19.27
2.GBANK	0.50	22.70	22.70
3.GBANK	0.50	21.93	21.93
Total			26.30 dBA

Barrier table for segment # 3: GBANK (night)

Barrier Height	Elev of Barr Top	RT/CUST dBA	Tot Leq dBA
3.70	97.35	17.75	17.75
4.20	97.85	16.86	16.86
4.70	98.35	16.20	16.20
5.20	98.85	15.70	15.70
5.70	99.35	15.33	15.33
6.20	99.85	15.12	15.12
6.70	100.35	15.04	15.04
7.20	100.85	15.03	15.03
7.70	101.35	15.10	15.10
8.20	101.85	15.21	15.21

TOTAL Leq FROM ALL SOURCES (DAY): 59.73
(NIGHT): 52.14



LEGEND

- PROPERTY LINE
- PROPOSED 2.2m NOISE BARRIER
- OLA 1 — RECEIVER - OUTDOOR LIVING AREA (OLA)

NOTES:

1. NOISE CONTROL PLAN TO BE READ IN CONJUNCTION WITH NOISE IMPACT ASSESSMENT (R-2016-777) PREPARED BY NOVATECH. REFER TO REPORT FOR THE TYPICAL WARNING CLAUSES TO BE REGISTERED ON TITLE AND PROPOSED NOISE MITIGATION MEASURES.
2. ROADWAY CLASSIFICATION AS PER CITY OF OTTAWA OFFICIAL PLAN, SCHEDULE F, CENTRAL AREA/INNER CITY NETWORK.

RECEIVER DATA TABLE

RECEIVER	HEIGHT (m)	RECEIVER INFORMATION: RECEIVER GROUND ELEVATION (m)	ROAD ELEVATION JOCKVALE (m)	ROAD ELEVATION GREENBANK (m)	DISTANCES TO NOISE SOURCE (m): JOCKVALE ROAD	GREENBANK ROAD
OLA1	1.5	93.80	93.91	-	89.0	-
OLA2		93.95	93.77	-	16.0	-
OLA3		93.97	93.66	94.27	17.0	133.0
OLA4		94.01	93.64	94.47	102.0	120.0
OLA5		93.97	93.50	95.00	162.0	127.0

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED WITH DRAFT PLAN OF SUBDIVISION	DEC 6/16	MWB

SCALE: 1:750 (1:750, 0 10 20 30)

DESIGN MWB | CHECKED MWB | DRAWN SAM | CHECKED MWB | APPROVED MWB

FOR REVIEW ONLY

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LOCATION
CITY of OTTAWA
3370 GREENBANK ROAD

DRAWING NAME
NOISE CONTROL PLAN

PROJECT No. 111117-00
REV REV # 1
DRAWING No. 111117-NC