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Phase 1 Noise Control Feasibility Study

Proposed Residential Development
147 Langstaff Road, Ottawa

Prepared For

Inverness Homes
c/o The Stirling Group

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Report: PG5005-1

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1.0 Introduction

Paterson Group (Paterson) was commissioned by Inverness Homes to conduct a Phase 1 Noise Control Feasibility Study for the proposed residential development to be located at 147 Langstaff Road, in the City of Ottawa.

The objective of the current study is to:

- ❑ Determine the primary noise sources impacting the site and compare the projected sound levels to guidelines set out by the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.
- ❑ Review the projected noise levels and offer recommendations regarding warning classes, construction materials or alternative sound barriers.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to City of Ottawa document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300.

2.0 Background

It is understood that the proposed development will consist of several townhouse and building units with associated landscaped areas. It is anticipated that a local roadway will be constructed through the centre of the development. It is understood that the buildings will consist of townhouses or multi-unit buildings, up to 3 storeys high. It is assumed that all townhouses will have a year yard, that will be defined as an outdoor living area.

3.0 Methodology and Noise Assessment Criteria

The City of Ottawa outlines three (3) sources of environmental noise that must be analyzed separately:

- ☐ Surface Transportation Noise
- ☐ Stationary Noise
 - ☐ new noise-sensitive development applications (noise receptors) in proximity to existing or approved stationary sources of noise, and
 - ☐ new stationary sources of noise (noise generating) in proximity to existing or approved noise-sensitive developments.
- ☐ Aircraft noise

Surface Transportation Noise

The City of Ottawa's Official Plan, in addition to the ENCG dictate that the influence area must contain any of following conditions to classify as a surface transportation noise source for a subject site:

- ☐ Within 100 m of the right-of-way of an existing or proposed arterial, collector or major collector road; a light rail transit corridor; bus rapid transit, or transit priority corridor
- ☐ Within 250 m of the right-of-way for an existing or proposed highway or secondary rail line
- ☐ Within 300 m from the right of way of a proposed or existing rail corridor or a secondary main railway line
- ☐ Within 500 m of an existing 400 series provincial highway, freeway or principle main railway line.

The NPC-300 outlines the limitations of the stationary and environmental noise levels in relation to the location of the receptors. These can be found in the following tables:

Table 1 - Sound Level Limits for Outdoor Living Areas	
Time Period	Required $L_{eq(16)}$ (dBA)
16-hour, 7:00-23:00	55
<input type="checkbox"/> Standards taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas - Road and Rail	

Table 2 - Sound Level Limits for Indoor Living Area			
Type of Space	Time Period	Required L_{eq} (dBA)	
		Road	Rail
Living/Dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc	7:00-23:00	45	40
Theaters, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms	23:00-7:00	45	40
Sleeping quarters	7:00-23:00	45	40
	23:00-7:00	40	35
<input type="checkbox"/> Standards taken from Table 2.2b; Sound Level Limit for Indoor Living Areas - Road and Rail			

It is noted in ENCG, that the limits outlined in Table 2 are for the sound levels on the interior of the glass pane. The ENCG further goes on to state that the limit for the exterior of the pane of glass will be 55 dBA.

If the sound level limits are exceeded at the window panes for the indoor living areas, the following Warning Clauses may be referenced:

Table 3 - Warning Clauses for Sound Level Exceedances	
Warning Clause	Description
Warning Clause Type A	"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air 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."
Warning Clause 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 (rail traffic) (air 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."
Warning Clause 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."
Warning Clause 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."
<input type="checkbox"/> Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines - NPC-300	

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities.

A stationary noise analysis is not applicable for this preliminary review.

Aircraft/Airport Noise

Due to the location of the subject site, an analysis of aircraft/airport noise is not required.

4.0 Analysis

The proposed development is bordered to the north by Langstaff Road, to the east by residential houses followed by Donald B. Munro Drive, to the south by Carp Road and to the west by undeveloped land.

Based on the City of Ottawa Official Plan, Schedule G, 3 roadways were identified to be included in this study: Langstaff Drive was identified as a 2 lane major collector (2-UMCU), Donald B. Munro Drive is considered a 2 lane major collector (2-UMCU) and Carp Road is considered a 2 lane arterial road (2-RAU). There are no other roads within the 100 m radius. It was noted that the Renfrew Rail Corridor is within the 300 m radius, to the south and east of the proposed development. All noise sources are presented in Drawing PG5005-1 - Site Plan, located in Appendix 1.

The noise levels from road traffic are provided by the City of Ottawa, taking into consideration the right-of-way width and the implied roadway class. It is understood that these values represent the maximum allowable capacity of the proposed roadways. The parameters to be used for sound level predictions can be found below.

Table 4 - Traffic and Road Parameters						
Road	Implied Roadway	AADT (Veh/day)	Posted Speed (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Langstaff Drive	2-UMCU	12000	40	92/8	7	5
Donald B. Munro Drive	2-UMCU	12000	40	92/8	7	5
Carp Road	2-RAU	15000	50	92/8	7	5
<input type="checkbox"/> Data obtained from the City of Ottawa document ENCG						

The information regarding the Renfrew Rail Corridor was provided to Paterson from Mr. Tom Fisherton with Nylene Canada Inc. It is understood that Nylene Canada Inc. is the only enterprise that currently utilizes the Renfrew Rail Corridor. From a phone conversation, it was determined that Nylene Canada Inc operates two (2) trains a week along the line. As a worst case scenario, it has been assumed that both trips would occur on the same day. The following information was obtained from Mr. Fisherton:

Table 5 - Rail Parameters				
Rail Line	Engine Type	Maximum Speed (km/hr)	Number of Trips/day	Length of Train
Renfrew Rail	Diesel	80	2	1 engine 7 cars

In this Phase 1 analysis, it was determined that a noise contour map be developed across the site to indicate any areas that may exceed standard noise levels. This preliminary mapping would allow for some areas to be released from an in-depth study and then only focus on the areas where noise attenuation measures may be required.

Two (2) levels of reception points were selected for this analysis. It is understood that the buildings will be up to three (3) storeys high, and any outdoor living areas are assumed to be located on the ground level (i.e. rear yards). Both daytime and nighttime analysis will be completed for all levels of the proposed development. The following elevations were selected from the heights provided on the building elevation plans for this development.

Table 5 - Elevation of Reception Points			
Floor Number	Elevation at Centre of Window (m)	Floor Use	Daytime/Nighttime Analysis
Ground Floor	1.5	Residential	daytime/nighttime
Third Floor	7.5	Residential	daytime/nighttime

All horizontal distances have been measured from the reception point to the edge of the right-of-way. To utilize a conservative approach to the analysis, all roadways were analyzed at angles of -90° to 90°. The analysis is completed so that no effects of sound reflection off of the building facade are considered, as stipulated by the ENGC.

The analysis was completed using STAMSON version 5.04, a computer program which uses the road and rail traffic noise prediction methods using ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environment Analysis Method), publications from the Ontario Ministry of Environment and Energy.

5.0 Results

The primary descriptors are the 16-hour daytime and the 8-hour night time equivalent sound levels, $L_{eq(16)}$ and the $L_{eq(8)}$ for City roads.

The proposed traffic noise levels were analyzed utilizing a grid pattern across the proposed development at a 50 m spacing. These results are presented on a site plan using noise contours at less than 55 dBA, 55 dBA, 60 dBA and 65 dBA. The results of the STAMSON software are presented in Table 7 in Appendix 1, and graphically in Paterson Drawings PG5005-1B through 1E located in Appendix 1.

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

Outdoor living areas are required to be at or below 55 dBA. Assuming that all outdoor living areas are to be located on the ground (i.e. rear yards), the day time contours at 1.5 m are to be analyzed. The units at the northernmost and southernmost portions of the proposed development exceed the 55 dBA threshold and will require additional analysis and/or mitigation measures.

According to the City of Ottawa document, there are 5 recommended mitigation measures where there are exceedances in the outdoor living areas.

- 1) Distance setback with soft ground
Response: The building layout has been optimized to provide the maximum setback with the required layout. The outdoor living area can not be set back further. This mitigation measure has already been utilized.
- 2) Insertion of noise insensitive land uses between the source and sensitive receptor.
Response: Due to the site layout, it is not possible to insert noise insensitive land (such as park land) between the source and sensitive receptor.
- 3) Orientation of buildings to provide sheltered zones in the rear yards.
Response: The proposed development will require the use of a local access road through the centre of the site in order to provide access to the proposed residential buildings. In order to maximize the allowable space, the rear yards will be exposed to the surrounding roadways.
- 4) Earth Berms
Response: Not feasible.
- 5) Acoustic Barriers
Response: Recommended.

The rear yards that border on Landstaff Drive, Carp Road and Donald B Munroe should be reviewed in detail once the final building layouts have been completed. It is recommended that a sound barrier wall be installed along the northern property boundary, adjacent to Langstaff Road, and along the southern property boundary, located nearest to Carp Road in order to reduce the noise levels to 55 dBA.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicates that the daytime $L_{eq(16)}$ does not exceed 65 dBA, thereby indicating that standard construction materials are acceptable and that no further analysis of building materials will be required. However, the noise levels at 1.5 and 7.5 m elevations do exceed 55 dBA at some locations. Where the noise levels exceed 55 dBA., the units should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

7.0 Conclusion

The subject site is located at 147 Langstaff Road. It is understood that the current development will consist of several townhouse and stand alone buildings, up to 3 storeys high. The associated analysis identified four noise sources: Langstaff Road, Donald B. Munro Drive, Carp Road and the Renfrew Rail Corridor.

The results of this Phase 1 Noise Control Feasibility Study indicate that the noise levels exceed the 55 dBA threshold along the northern and southern property line, adjacent to Langstaff Road, and along the area located nearest to Carp Road . A Phase 2 study is recommended to further analyze this regions. It is assumed that a noise barrier will be required to protect the outdoor living areas of the proposed townhouses.

Where the noise levels exceed 55 dBA at the building perimeter, the units should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Inverness Homes or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.



Stephanie A. Boisvenue, P.Eng.



Scott Dennis, P.Eng.



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- ☐ Inverness Homes (3 copies)
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APPENDIX 1

TABLE 7 - SUMMARY OF RESULTS

DRAWING PG5005-1 - SITE PLAN

DRAWING PG5005-1B - NOISE EXPOSURE MAP (7.5 m NIGHT TIME)

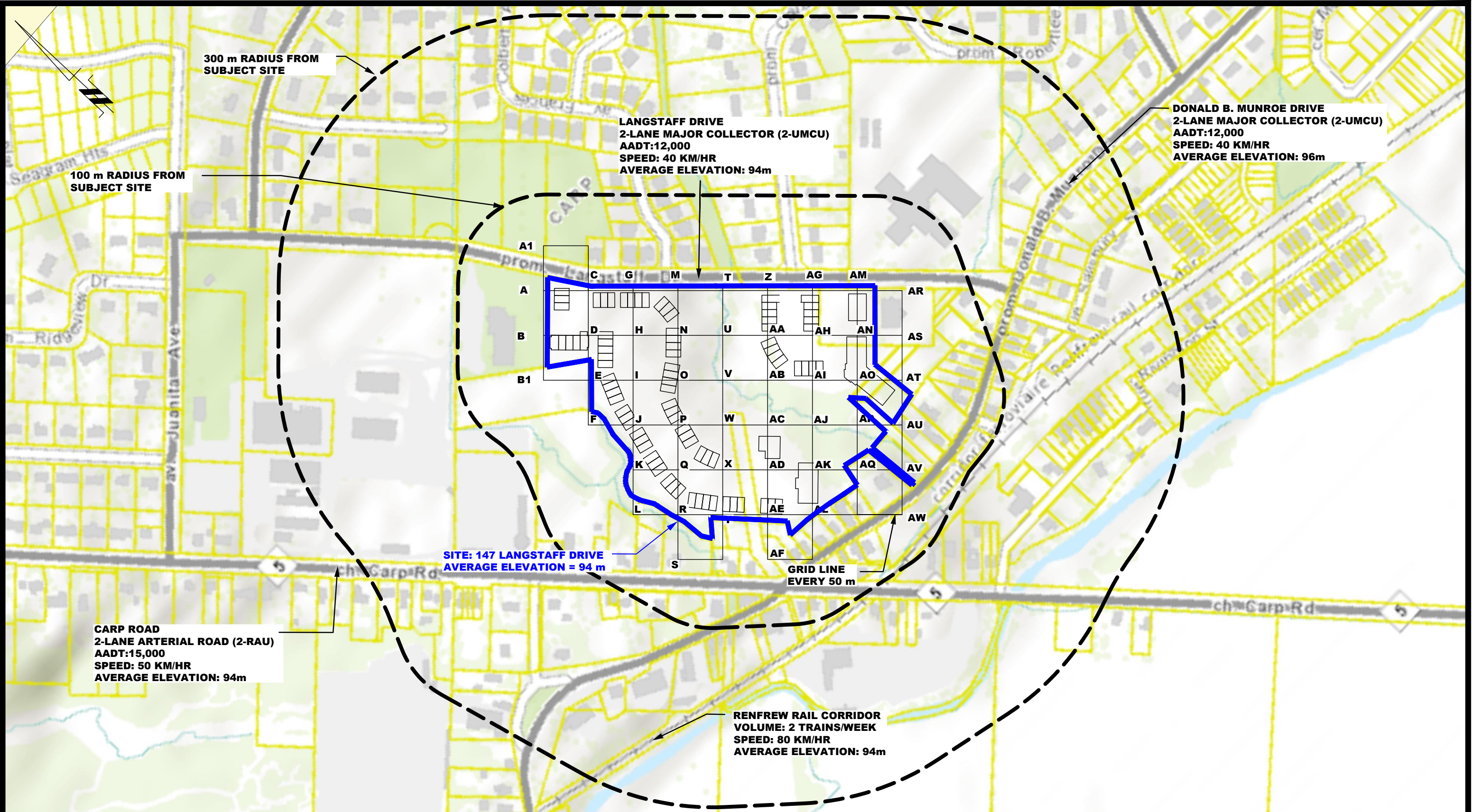
DRAWING PG5005-1C - NOISE EXPOSURE MAP (1.5 m NIGHT TIME)

DRAWING PG5005-1D - NOISE EXPOSURE MAP (7.5 m DAY TIME)

DRAWING PG5005-1C - NOISE EXPOSURE MAP (1.5 m DAY TIME)

Table 7 - Summary of Geometry and Results								
Reception Point	Distance from				STAMSON Results (day)		STAMSON Results (night)	
	Langstaff Drive	Donald B. Munro	Carp Road	Rail Line	at 1.5 m height	at 7.5 m height	at 1.5 m height	at 7.5 m height
A	55	550	370	630	55.35	56.86	56.17	56.56
A1	0	530	320	580	64.32	64.69	56.73	57.11
B	60	520	270	530	55.03	56.64	47.51	49.16
B1	110	500	220	480	52.19	54.32	44.75	46.92
C	0	480	320	550	64.32	64.69	59.16	59.45
D	50	450	270	500	56.16	57.63	48.63	50.14
E	100	450	220	450	52.64	54.72	45.21	47.32
F	150	420	170	400	52.05	54.29	44.67	46.94
G	0	420	330	510	64.33	64.69	56.74	57.11
H	50	400	280	460	56.17	57.63	48.64	50.13
I	100	400	230	410	52.59	54.68	45.18	47.32
J	150	380	180	360	51.89	54.15	47.3	48.85
K	200	340	130	310	52.87	55.01	45.55	47.72
L	250	270	80	260	55.61	57.37	48.21	50.01
M	0	370	330	480	64.33	64.7	56.74	57.12
N	50	360	280	430	56.19	57.66	48.67	50.17
O	100	340	230	380	52.69	54.77	45.3	47.43
P	150	330	180	330	51.99	54.25	44.7	46.99
Q	200	290	130	280	52.99	55.13	45.71	47.88
R	250	240	80	230	55.67	57.44	48.31	50.12
S	300	150	30	180	60.25	63.19	54.74	55.72
T	0	320	330	450	64.33	64.71	56.74	57.13
U	50	310	280	400	56.23	57.72	48.72	50.22
V	100	300	230	350	52.77	54.86	45.41	47.54
W	150	280	180	300	52.17	54.39	44.88	47.17
X	200	230	130	250	53.2	55.33	45.96	48.12
Y	250	180	80	200	55.87	57.65	48.55	50.37
Z	0	280	330	420	64.34	64.72	56.76	57.15
AA	50	260	280	370	56.29	57.79	48.79	50.32
AB	100	240	230	320	52.97	55.05	45.63	47.76
AC	150	230	180	270	52.36	54.6	45.14	47.41
AD	200	180	130	220	53.5	55.62	46.31	48.45
AE	250	130	80	170	56.22	57.98	48.96	50.76
AF	300	60	30	120	62.78	63.75	55.31	56.31
AG	0	230	340	380	64.35	64.74	56.77	57.16
AH	50	210	290	330	56.37	57.87	48.89	50.42
AI	100	200	240	280	53.1	55.19	45.81	47.94
AJ	150	180	190	230	52.56	54.8	45.43	46.79
AK	200	140	140	180	53.65	55.76	46.59	48.72

Table 7 - Summary of Geometry and Results								
Reception Point	Distance from				STAMSON Results (day)		STAMSON Results (night)	
	Langstaff Drive	Donald B. Munro	Carp Road	Rail Line	at 1.5 m height	at 7.5 m height	at 1.5 m height	at 7.5 m height
AL	250	80	90	130	56.61	58.35	49.48	51.25
AM	0	180	340	350	64.37	64.78	45.79	57.2
AN	50	160	290	300	56.57	56.08	49.1	50.64
AO	100	150	240	250	53.53	55.61	46.3	48.39
AP	150	130	190	200	53.53	55.42	46.17	48.33
AQ	200	80	140	150	55.23	57.12	48.14	50.05
AR	0	120	330	300	64.44	64.87	56.87	57.3
AS	50	110	280	250	57	58.52	49.56	51.11
AT	100	100	230	200	54.59	56.54	47.38	49.35
AU	150	80	180	150	54.97	56.88	47.9	49.83
AV	200	30	130	100	60.15	61.26	52.87	54.03
AW	250	15	80	50	64.85	65.36	57.58	58.15



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NOISE ATTENUATION STUDY
147 LANGSTAFF DRIVE

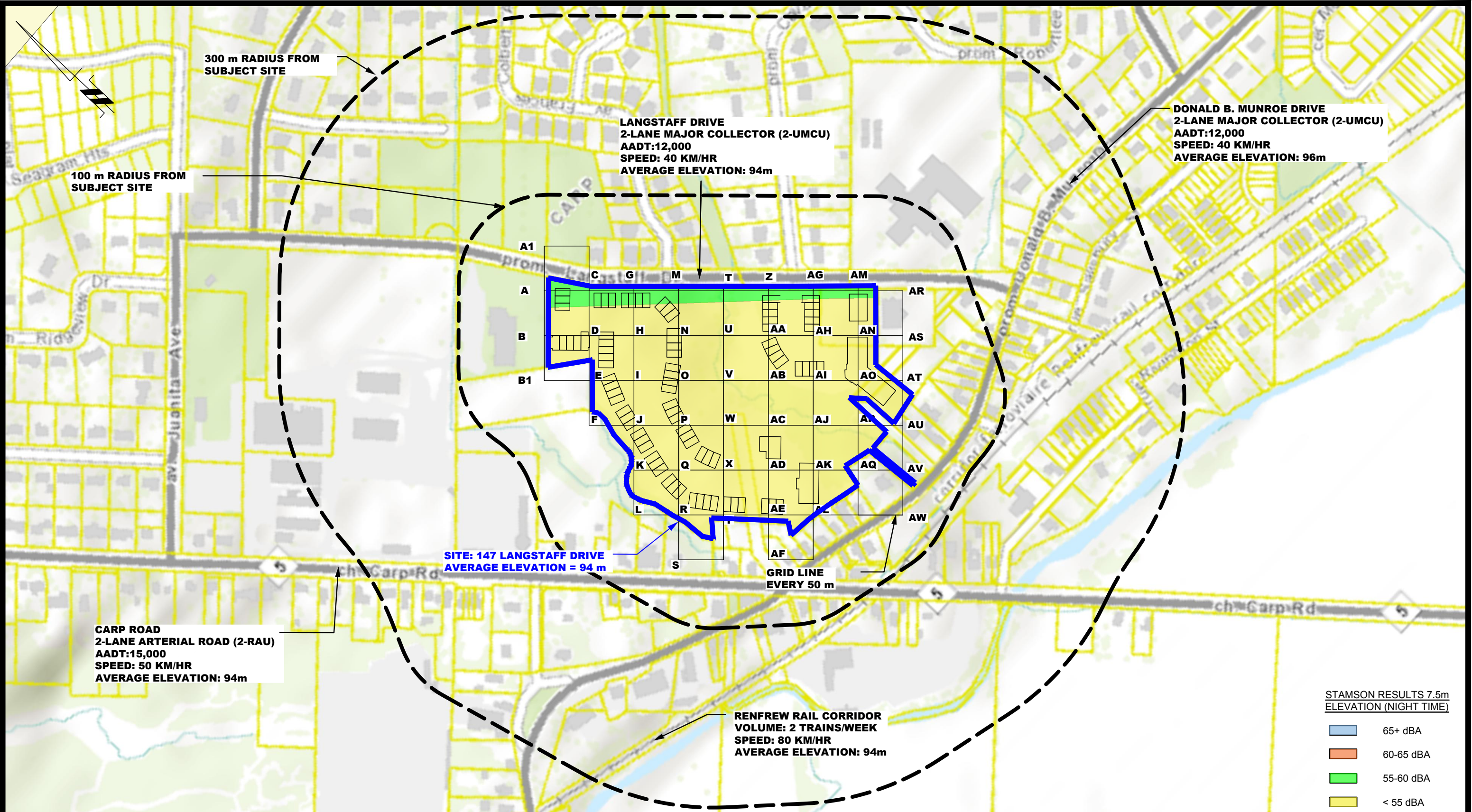
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SITE PLAN

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Approved by:	MSD	Revision No.:	

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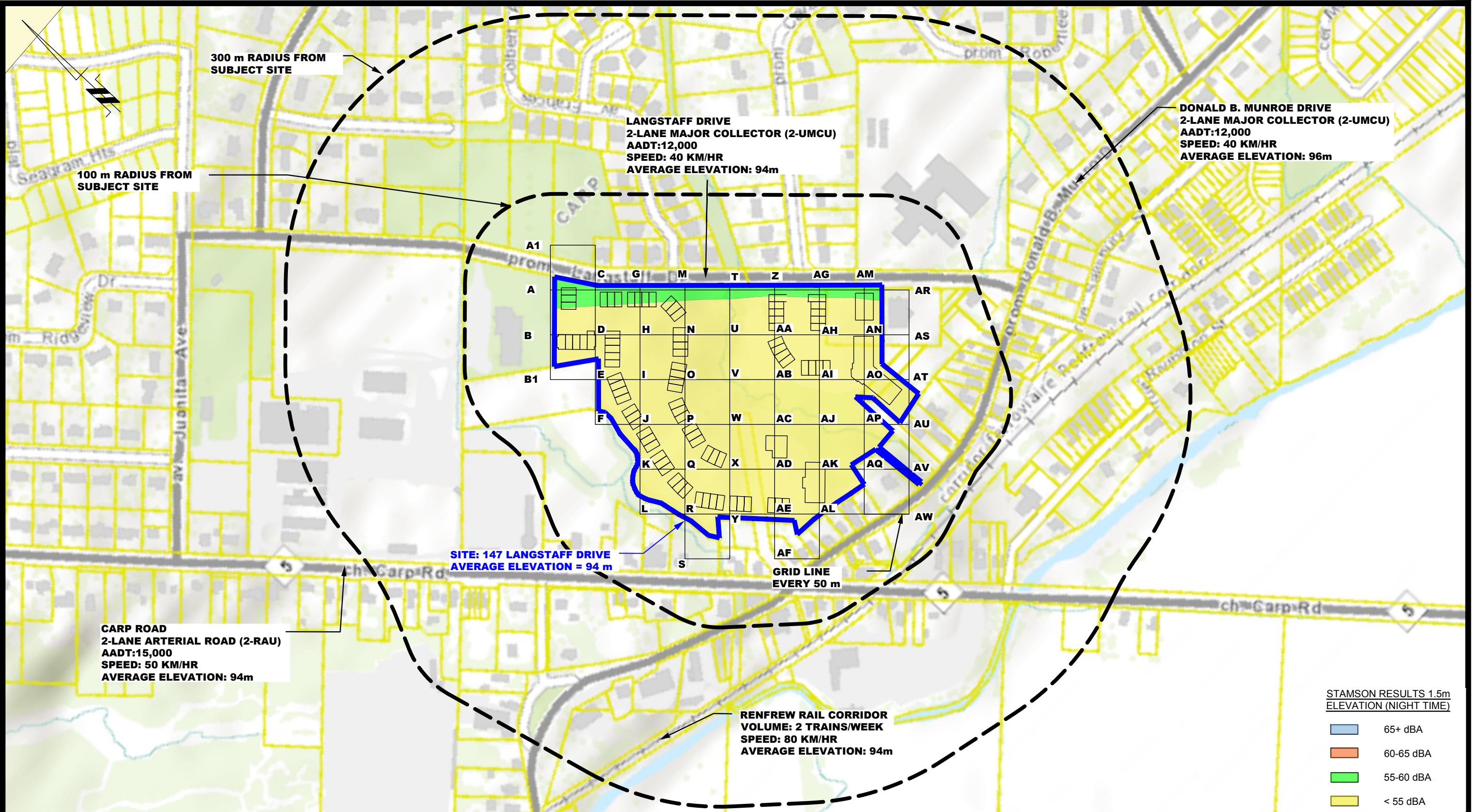
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NOISE EXPOSURE MAP

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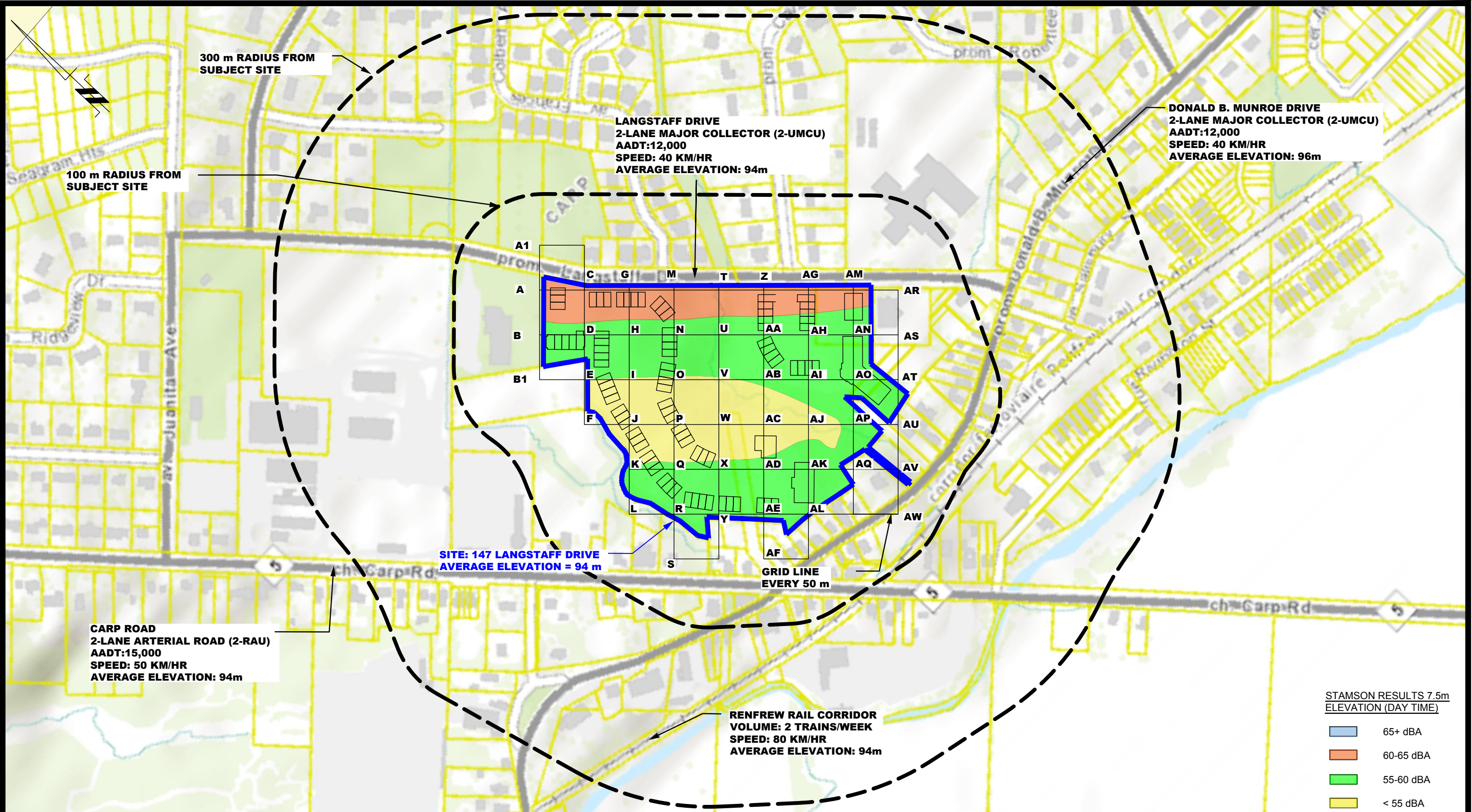
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147 LANGSTAFF DRIVE
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NOISE EXPOSURE MAP

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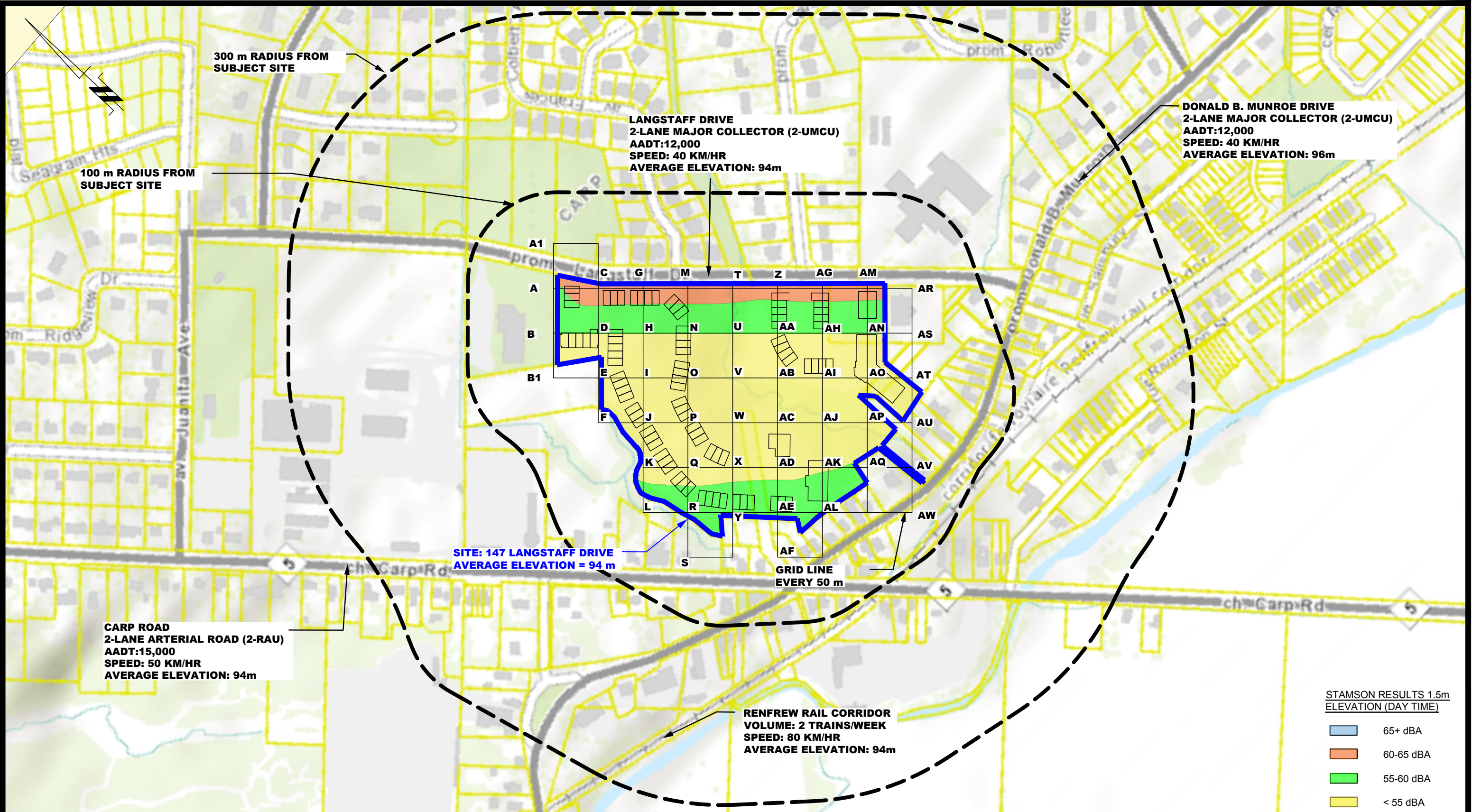
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NOISE EXPOSURE MAP

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Approved by:	MSD	Revision No.:	

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Checked by:	SB	Dwg. No.:	PG5005-1E
Approved by:	MSD	Revision No.:	

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APPENDIX 2

GENERAL STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 26-09-2019 10:42:27
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: reca.te Time Period: Day/Night 16/8 hours
 Description: Sample Calculation - Point E

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	! # loc /Train	! # Cars /Train	! Eng type	! Cont weld
* 1. Rail	2.0/1.0	80.0	1.0	7.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Rail	2.0/1.0	0.00	0.00

Data for Segment # 1: Rail (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 : 450.00 / 450.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00

↑

Results segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 33.97 + 0.00) = 33.97 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	55.71	-20.75	-0.99	0.00	0.00	0.00	33.97

WHEEL (0.00 + 26.28 + 0.00) = 26.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	49.78	-22.30	-1.19	0.00	0.00	0.00	26.28

Segment Leq : 34.65 dBA

Total Leq All Segments: 34.65 dBA

↑

Results segment # 1: Rail (night)

LOCOMOTIVE (0.00 + 33.97 + 0.00) = 33.97 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.41	55.71	-20.75	-0.99	0.00	0.00	0.00	33.97
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WHEEL (0.00 + 26.28 + 0.00) = 26.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.51	49.78	-22.30	-1.19	0.00	0.00	0.00	26.28
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Segment Leq : 34.65 dBA

Total Leq All Segments: 34.65 dBA

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *

Medium truck volume : 773/67 veh/TimePeriod *

Heavy truck volume : 552/48 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000

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: Langstaff (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 : 100.00 / 100.00 m

Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: Donald B (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 : 450.00 / 450.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
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: Carp (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 : 220.00 / 220.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Results segment # 1: Langstaff (day)

Source height = 1.50 m

ROAD (0.00 + 52.38 + 0.00) = 52.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-12.19	-1.14	0.00	0.00	0.00	52.38

Segment Leq : 52.38 dBA



Results segment # 2: Donald B (day)

Source height = 1.50 m

ROAD (0.00 + 42.72 + 0.00) = 42.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-21.86	-1.14	0.00	0.00	0.00	42.72

Segment Leq : 42.72 dBA



Results segment # 3: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 50.08 + 0.00) = 50.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-90	90	0.48	68.48	0.00	-17.26	-1.14	0.00	0.00	0.00	50.08
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Segment Leq : 50.08 dBA

Total Leq All Segments: 54.68 dBA

↑
Results segment # 1: Langstaff (night)

Source height = 1.50 m

ROAD (0.00 + 44.79 + 0.00) = 44.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-12.19	-1.14	0.00	0.00	0.00	44.79

Segment Leq : 44.79 dBA

↑
Results segment # 2: Donald B (night)

Source height = 1.50 m

ROAD (0.00 + 35.12 + 0.00) = 35.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-21.86	-1.14	0.00	0.00	0.00	35.12

Segment Leq : 35.12 dBA

↑
Results segment # 3: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 42.48 + 0.00) = 42.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	60.88	0.00	-17.26	-1.14	0.00	0.00	0.00	42.48

Segment Leq : 42.48 dBA

Total Leq All Segments: 47.08 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.72
(NIGHT): 47.32



STAMSON 5.0 NORMAL REPORT Date: 26-09-2019 11:41:21
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: reca.te Time Period: Day/Night 16/8 hours
 Description: Sample Calculation - Point 0

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	! # loc / Train	! # Cars / Train	! Eng type	! Cont weld
* 1. Rail	2.0/1.0	80.0	1.0	7.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Rail	2.0/1.0	0.00	0.00

Data for Segment # 1: Rail (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 : 380.00 / 380.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00



Results segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 35.00 + 0.00) = 35.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	55.71	-19.72	-0.99	0.00	0.00	0.00	35.00

WHEEL (0.00 + 27.39 + 0.00) = 27.39 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	49.78	-21.20	-1.19	0.00	0.00	0.00	27.39

Segment Leq : 35.69 dBA

Total Leq All Segments: 35.69 dBA

↑

Results segment # 1: Rail (night)

LOCOMOTIVE (0.00 + 35.00 + 0.00) = 35.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.41	55.71	-19.72	-0.99	0.00	0.00	0.00	35.00
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WHEEL (0.00 + 27.39 + 0.00) = 27.39 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.51	49.78	-21.20	-1.19	0.00	0.00	0.00	27.39
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Segment Leq : 35.69 dBA

Total Leq All Segments: 35.69 dBA

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *

Medium truck volume : 773/67 veh/TimePeriod *

Heavy truck volume : 552/48 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000

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: Langstaff (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 : 100.00 / 100.00 m

Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: Donald B (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 : 340.00 / 340.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
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: Carp (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 : 230.00 / 230.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Results segment # 1: Langstaff (day)

Source height = 1.50 m

ROAD (0.00 + 52.38 + 0.00) = 52.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-12.19	-1.14	0.00	0.00	0.00	52.38

Segment Leq : 52.38 dBA



Results segment # 2: Donald B (day)

Source height = 1.50 m

ROAD (0.00 + 44.52 + 0.00) = 44.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-20.06	-1.14	0.00	0.00	0.00	44.52

Segment Leq : 44.52 dBA



Results segment # 3: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 49.79 + 0.00) = 49.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	90	0.48	68.48	0.00	-17.55	-1.14	0.00	0.00	0.00	49.79
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Segment Leq : 49.79 dBA

Total Leq All Segments: 54.72 dBA

↑
Results segment # 1: Langstaff (night)

Source height = 1.50 m

ROAD (0.00 + 44.79 + 0.00) = 44.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-12.19	-1.14	0.00	0.00	0.00	44.79

Segment Leq : 44.79 dBA

↑
Results segment # 2: Donald B (night)

Source height = 1.50 m

ROAD (0.00 + 36.92 + 0.00) = 36.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-20.06	-1.14	0.00	0.00	0.00	36.92

Segment Leq : 36.92 dBA

↑
Results segment # 3: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 42.20 + 0.00) = 42.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	60.88	0.00	-17.55	-1.14	0.00	0.00	0.00	42.20

Segment Leq : 42.20 dBA

Total Leq All Segments: 47.13 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.78
(NIGHT): 47.43



Filename: reca.te Time Period: Day/Night 16/8 hours
 Description: Sample Calculation - Point W

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	! # loc /Train	! # Cars /Train	! Eng type	! Cont weld
* 1. Rail	2.0/1.0	80.0	1.0	7.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Rail	2.0/1.0	0.00	0.00

Data for Segment # 1: Rail (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 : 300.00 / 300.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00



Train # 1: Rail, Segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 36.44 + 0.00) = 36.44 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	55.71	-18.28	-0.99	0.00	0.00	0.00	36.44

WHEEL (0.00 + 28.94 + 0.00) = 28.94 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	49.78	-19.65	-1.19	0.00	0.00	0.00	28.94

Segment Leq : 37.15 dBA

Total Leq All Segments: 37.15 dBA

↑

Train # 1: Rail, Segment # 1: Rail (night)

LOCOMOTIVE (0.00 + 36.44 + 0.00) = 36.44 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.41	55.71	-18.28	-0.99	0.00	0.00	0.00	36.44
-----	----	------	-------	--------	-------	------	------	------	-------

WHEEL (0.00 + 28.94 + 0.00) = 28.94 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.51	49.78	-19.65	-1.19	0.00	0.00	0.00	28.94
-----	----	------	-------	--------	-------	------	------	------	-------

Segment Leq : 37.15 dBA

Total Leq All Segments: 37.15 dBA

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *

Medium truck volume : 773/67 veh/TimePeriod *

Heavy truck volume : 552/48 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000

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: Langstaff (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 : 150.00 / 150.00 m

Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: Donald B (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 : 280.00 / 280.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
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: Carp (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 : 180.00 / 180.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Segment # 1: Langstaff (day)

 Source height = 1.50 m

ROAD (0.00 + 49.78 + 0.00) = 49.78 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-14.80	-1.14	0.00	0.00	0.00	49.78

Segment Leq : 49.78 dBA



Segment # 2: Donald B (day)

 Source height = 1.50 m

ROAD (0.00 + 45.77 + 0.00) = 45.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-18.81	-1.14	0.00	0.00	0.00	45.77

Segment Leq : 45.77 dBA



Segment # 3: Carp (day)

 Source height = 1.50 m

ROAD (0.00 + 51.37 + 0.00) = 51.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	65.72	0.00	-18.81	-1.14	0.00	0.00	0.00	45.77

-90	90	0.48	68.48	0.00	-15.97	-1.14	0.00	0.00	0.00	51.37
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Segment Leq : 51.37 dBA

Total Leq All Segments: 54.31 dBA

↑
Segment # 1: Langstaff (night)

Source height = 1.50 m

ROAD (0.00 + 42.18 + 0.00) = 42.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-14.80	-1.14	0.00	0.00	0.00	42.18

Segment Leq : 42.18 dBA

↑
Segment # 2: Donald B (night)

Source height = 1.50 m

ROAD (0.00 + 38.17 + 0.00) = 38.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	58.12	0.00	-18.81	-1.14	0.00	0.00	0.00	38.17

Segment Leq : 38.17 dBA

↑
Segment # 3: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 43.77 + 0.00) = 43.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.48	60.88	0.00	-15.97	-1.14	0.00	0.00	0.00	43.77

Segment Leq : 43.77 dBA

Total Leq All Segments: 46.71 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.39
(NIGHT): 47.17



Filename: reca.te Time Period: Day/Night 16/8 hours
 Description: Sample Calculation - Point AN

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	! # loc /Train	! # Cars /Train	! Eng type	! Cont weld
* 1. Rail	2.0/1.0	80.0	1.0	7.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Rail	2.0/1.0	0.00	0.00

Data for Segment # 1: Rail (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 : 300.00 / 300.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 No Whistle
 Reference angle : 0.00



Train # 1: Rail, Segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 33.76 + 0.00) = 33.76 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	55.71	-20.62	-1.33	0.00	0.00	0.00	33.76

WHEEL (0.00 + 26.73 + 0.00) = 26.73 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	49.78	-21.60	-1.46	0.00	0.00	0.00	26.73

Segment Leq : 34.55 dBA

Total Leq All Segments: 34.55 dBA

↑

Train # 1: Rail, Segment # 1: Rail (night)

LOCOMOTIVE (0.00 + 33.76 + 0.00) = 33.76 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.58	55.71	-20.62	-1.33	0.00	0.00	0.00	33.76
-----	----	------	-------	--------	-------	------	------	------	-------

WHEEL (0.00 + 26.73 + 0.00) = 26.73 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	90	0.66	49.78	-21.60	-1.46	0.00	0.00	0.00	26.73
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Segment Leq : 34.55 dBA

Total Leq All Segments: 34.55 dBA

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *

Medium truck volume : 773/67 veh/TimePeriod *

Heavy truck volume : 552/48 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000

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: Langstaff (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 : 50.00 / 50.00 m

Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: Donald B (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 : 160.00 / 160.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
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: Carp (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 : 290.00 / 290.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Segment # 1: Langstaff (day)

Source height = 1.50 m

ROAD (0.00 + 55.58 + 0.00) = 55.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.72	0.00	-8.68	-1.46	0.00	0.00	0.00	55.58

Segment Leq : 55.58 dBA



Segment # 2: Donald B (day)

Source height = 1.50 m

ROAD (0.00 + 47.19 + 0.00) = 47.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.72	0.00	-17.07	-1.46	0.00	0.00	0.00	47.19

Segment Leq : 47.19 dBA



Segment # 3: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 45.67 + 0.00) = 45.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
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-90	90	0.66	68.48	0.00	-21.35	-1.46	0.00	0.00	0.00	45.67
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Segment Leq : 45.67 dBA

Total Leq All Segments: 56.54 dBA



Segment # 1: Langstaff (night)

Source height = 1.50 m

ROAD (0.00 + 47.98 + 0.00) = 47.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.12	0.00	-8.68	-1.46	0.00	0.00	0.00	47.98

Segment Leq : 47.98 dBA



Segment # 2: Donald B (night)

Source height = 1.50 m

ROAD (0.00 + 39.60 + 0.00) = 39.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.12	0.00	-17.07	-1.46	0.00	0.00	0.00	39.60

Segment Leq : 39.60 dBA



Segment # 3: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 38.07 + 0.00) = 38.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.88	0.00	-21.35	-1.46	0.00	0.00	0.00	38.07

Segment Leq : 38.07 dBA

Total Leq All Segments: 48.94 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 56.57
(NIGHT): 49.09



STAMSON 5.0 NORMAL REPORT Date: 26-09-2019 13:22:38
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: reca.te Time Period: Day/Night 16/8 hours
 Description: Sample Calculation - Point AW

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	! # loc /Train	! # Cars /Train	! Eng type	! Cont weld
* 1. Rail	2.0/1.0	80.0	1.0	7.0	Diesel	No

* The identified number of trains have been adjusted for future growth using the following parameters:

Train No	Train Name	! Unadj. Trains	! Annual % Increase	! Years of Growth
1.	Rail	2.0/1.0	0.00	0.00

Data for Segment # 1: Rail (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		: 50.00 / 50.00 m	
Receiver height		: 1.50 / 1.50 m	
Topography		: 1	(Flat/gentle slope; no barrier)
No Whistle			
Reference angle		: 0.00	

↑

Results segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	55.71	-8.29	-1.33	0.00	0.00	0.00	46.10

WHEEL (0.00 + 39.64 + 0.00) = 39.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	49.78	-8.68	-1.46	0.00	0.00	0.00	39.64

Segment Leq : 46.98 dBA

Total Leq All Segments: 46.98 dBA

↑

Results segment # 1: Rail (night)

LOCOMOTIVE (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.58	55.71	-8.29	-1.33	0.00	0.00	0.00	46.10
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WHEEL (0.00 + 39.64 + 0.00) = 39.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-90	90	0.66	49.78	-8.68	-1.46	0.00	0.00	0.00	39.64
-----	----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 46.98 dBA

Total Leq All Segments: 46.98 dBA

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *

Medium truck volume : 773/67 veh/TimePeriod *

Heavy truck volume : 552/48 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000

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: Langstaff (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 : 250.00 / 250.00 m

Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: Donald B (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
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: Carp (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 : 80.00 / 80.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Results segment # 1: Langstaff (day)

Source height = 1.50 m

ROAD (0.00 + 43.98 + 0.00) = 43.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.72	0.00	-20.28	-1.46	0.00	0.00	0.00	43.98

Segment Leq : 43.98 dBA



Results segment # 2: Donald B (day)

Source height = 1.50 m

ROAD (0.00 + 64.26 + 0.00) = 64.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.72	0.00	0.00	-1.46	0.00	0.00	0.00	64.26

Segment Leq : 64.26 dBA



Results segment # 3: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 54.96 + 0.00) = 54.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-90	90	0.66	68.48	0.00	-12.07	-1.46	0.00	0.00	0.00	54.96
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Segment Leq : 54.96 dBA

Total Leq All Segments: 64.78 dBA

↑
Results segment # 1: Langstaff (night)

Source height = 1.50 m

ROAD (0.00 + 36.38 + 0.00) = 36.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.12	0.00	-20.28	-1.46	0.00	0.00	0.00	36.38

Segment Leq : 36.38 dBA

↑
Results segment # 2: Donald B (night)

Source height = 1.50 m

ROAD (0.00 + 56.66 + 0.00) = 56.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	58.12	0.00	0.00	-1.46	0.00	0.00	0.00	56.66

Segment Leq : 56.66 dBA

↑
Results segment # 3: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 47.36 + 0.00) = 47.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.88	0.00	-12.07	-1.46	0.00	0.00	0.00	47.36

Segment Leq : 47.36 dBA

Total Leq All Segments: 57.18 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 64.85
(NIGHT): 57.57

