

# **Environmental Noise Control Study Proposed Development**

3317 Navan Road  
Ottawa, Ontario

Prepared for Renfoe Land Management

Report PG6556-1 dated June 6, 2023

## Table of Contents

	<b>PAGE</b>
<b>1.0 Introduction.....</b>	<b>1</b>
<b>2.0 Proposed Development .....</b>	<b>1</b>
<b>3.0 Methodology and Noise Assessment Criteria.....</b>	<b>2</b>
<b>4.0 Analysis.....</b>	<b>6</b>
<b>5.0 Results.....</b>	<b>8</b>
<b>6.0 Discussion and Recommendations .....</b>	<b>9</b>
6.1 Outdoor Living Areas.....	9
6.2 Indoor Living Areas and Ventilation.....	9
<b>7.0 Summary of Findings .....</b>	<b>10</b>
<b>8.0 Statement of Limitations .....</b>	<b>11</b>

## Appendices

<b>Appendix 1</b>	Table 8 – Summary of Reception Points and Geometry Drawing PG6556-1 – Site Plan Drawing PG6556-2 – Receptor Plan Drawing PG6556-3 – Site Geometry Drawing PG5665-3A – Site Geometry – REC 1-1 and REC 1-4 Drawing PG5665-3B – Site Geometry – REC 2-1 and REC 2-4 Drawing PG5665-3C – Site Geometry – REC 3-1 and REC 3-4 Drawing PG5665-3D – Site Geometry – REC 4-1 and REC 4-4 Drawing PG5665-3E – Site Geometry – REC 5-1 and REC 5-4 Drawing PG5665-3F – Site Geometry – REC 6-1 and REC 5-4 Drawing PG5665-3G – Site Geometry – REC 7-1 and REC 6-4
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<b>Appendix 2</b>	STAMSON Results
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## 1.0 Introduction

Paterson Group (Paterson) was commissioned by Renfoe Land Management to conduct an environmental noise control study for the proposed development at 3317 Navan Road, in the City of Ottawa, Ontario.

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).
- 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 the Ontario Ministry of the Environment Guideline NPC-300.

## 2.0 Proposed Development

It is understood that the proposed development will consist of three (3) four storey residential buildings. Associated walkways, driveways, and landscaped areas are further anticipated. Outdoor living areas, consisting of rooftop terraces, balcony terraces, and at-grade amenity area were not identified on the proposed site plan.

### 3.0 Methodology and Noise Assessment Criteria

The MOECC 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

Surface roadway traffic noise, equivalent to sound level energy  $L_{eq}$ , provides a measure of the time varying noise level over a period of time. For roadways, the  $L_{eq}$  is commonly calculated on the basis of 16-hour ( $L_{eq16}$ ) daytime (07:00-23:00) and 8-hour ( $L_{eq8}$ ) nighttime (23:00-7:00) split to assess its impact on residential, commercial and institutional buildings.

The NPC-300 dictates 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 Environmental Noise Guidelines for Stationary and Transportation Sources – NPC-300 outlines the limitations of noise levels in relation to the location of the receptors. These can be found in the following tables:

<b>Table 1 – Noise Level Limit for Outdoor Living Areas</b>	
<b>Time Period</b>	<b>L<sub>eq</sub> Level (dBA)</b>
Daytime, 7:00-23:00	55
➤ Standard taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas – Road and Rail	

<b>Table 2 – Noise Level Limits for Indoor Living Areas</b>			
<b>Type of Space</b>	<b>Time Period</b>	<b>L<sub>eq</sub> Level (dBA)</b>	
		<b>Road</b>	<b>Rail</b>
General offices, reception areas, retail stores, etc.	Daytime 7:00-23:00	50	45
Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	Daytime 7:00-23:00	45	40
Living/dining/den areas of <b>residences</b> , hospitals, nursing/retirement homes, schools, day-care centres	Daytime 7:00-23:00	45	40
Living/dining/den areas of <b>residences</b> , hospitals, nursing/retirement homes etc. (except schools or day-care centres)	Nighttime 23:00-7:00	45	40
Sleeping quarters of hotels/motels	Nighttime 23:00-7:00	45	40
Sleeping quarters of <b>residences</b> , hospitals, nursing/retirement homes, etc.	Nighttime 23:00-7:00	40	35
➤ Standards taken from 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			

Predicted noise levels at the pane of window dictate the action required to achieve recommended noise levels. It is noted in ENCG that the limits outlined in Table 2 are for the noise levels on the interior of the window glass pane. An open window is considered to provide a 10 dBA noise reduction, while a standard closed window is capable to provide a minimum 20 dBA noise reduction. The noise level limits of residential building are 45 dBA daytime and 40 dBA nighttime. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, central air conditioning will be required, and the building components will require higher levels of sound attenuation.

When the noise levels are equal to or less than the specified criteria, no noise attenuation (control) measures are required.

When the exceedance of the recommended noise level limits is between 1 dBA and 5 dBA for outdoor living areas ( $55 \text{ dBA} < L_{eq} \leq 60 \text{ dBA}$ ), the proposed development can be completed with no noise control measures incorporated into the site, but the prospective purchasers / tenants should be made aware by suitable Warning Clauses. When the exceedance of recommended noise level limits is more than 5 dBA for outdoor living areas ( $L_{eq} > 60 \text{ dBA}$ ), noise control measures are required to reduce  $L_{eq}$  to below 60 dBA and as close as 55 dBA as it is technically and economically feasible.

Noise attenuation (control) measures include any or all the following:

- Noise attenuation barrier
- Provisions for the installation of central air conditioning
- Central air conditioning
- Architectural components designed to provide additional acoustic insulation

In addition to the implementation of noise attenuation features, if required, the following Warning Clauses may be recommended to advise the prospective purchasers / tenants of affected units of potential environmental noise problem:

<b>Table 3 – Warning Clauses for Outdoor Living Areas</b>		
<b>Leq (dBA)</b>	<b>Warning Clause</b>	<b>Description</b>
$55 \text{ dBA} < L_{eq(16)} \leq 60 \text{ dBA}$	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."
$60 \text{ dBA} < L_{eq(16)}$	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."
<ul style="list-style-type: none"> <li>➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300</li> </ul>		



<b>Table 4 – Warning Clauses for Indoor Living Areas</b>		
<b>Leq (dBA)</b>	<b>Warning Clause</b>	<b>Description</b>
$55 \text{ dBA} < L_{\text{eq}(16)} \leq 65 \text{ dBA}$ $50 \text{ dBA} < L_{\text{eq}(8)} \leq 60 \text{ dBA}$	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."
$65 \text{ dBA} < L_{\text{eq}(16)}$ $60 \text{ dBA} < L_{\text{eq}(8)}$	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."
<p>➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300</p>		

## 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.

The existing Waste Connections of Canada – Ottawa Landfill is located south of the proposed development. The ENGCC states that any stationary noise sources located within 100 m of the development will need to be reviewed. It is noted that the Ottawa landfill is located further than 100 m away from the proposed residential development and therefore is not considered a stationary noise for the proposed development. Therefore, a stationary noise analysis will not be required.

## Aircraft / Airport Noise

The subject site is not located within the Airport Vicinity Development Zone. Therefore this project will not require an aircraft/airport noise analysis. No warning clauses regarding aircraft or airport noise will be required.

## 4.0 Analysis

### Surface Transportation Noise

The subject development is bordered to the north by residential dwellings, Glenlivet Avenue, Birkhill Place, and Cardoness Private. It is bordered to the east by undeveloped grassed area, residential dwellings, and Markinch Road. It is bordered to the south by Navan Road followed by an undeveloped grassed area and construction area. It is bordered to the west by a construction area, residential dwellings, Navan Road, Bon Temps Way, and Broadridge Crescent. Glenlivet Avenue, Birkhill Place, Cardoness Private, Markinch Road, Navan Road, Bon Temps Way, and Broadridge Crescent are identified within the 100 m radius of proposed development.

Based on the City of Ottawa’s Official Plan, Schedule E, Navan Road is considered 2-lane urban arterial road (2-UAU). Other roads within the 100 m radius of the proposed development are not classified as either arterial, collector or major collector roads and therefore are not included in this study. The major source of traffic noise is due to the Navan Road to the south of the proposed development.

All noise sources are presented in Drawing PG6556-1 – Site Plan located in Appendix 1.

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

<b>Table 5 – Traffic and Road Parameters</b>						
<b>Segment</b>	<b>Roadway Classification</b>	<b>AADT Veh/Day</b>	<b>Speed Limit (km/h)</b>	<b>Day/Night Split %</b>	<b>Medium Truck %</b>	<b>Heavy Truck %</b>
Navan Road	2-UAU	15,000	50	92/8	7	5
➤ Data obtained from the City of Ottawa document ENCG						

The subject site is sloping down to the south and at grade with the neighbouring roads within the 100 m radius.



Two (2) levels of reception points were selected for this analysis. The following elevations were selected from assumed buildings heights.

<b>Table 6 – Elevations of Reception Points</b>			
<b>Floor Number</b>	<b>Elevation at Centre of Window (m)</b>	<b>Floor Use</b>	<b>Daytime / Nighttime Analysis</b>
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Fourth Floor	10.5	Living Area/Bedroom	Daytime / Nighttime

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. Reception points are detailed on Drawing PG6556-2 - Receptor Locations presented in Appendix 1.

All horizontal distances have been measured from the reception point to the edge of the right-of-way. The roadway was analyzed where it intersected the 100 m buffer zone, which is reflected in the local angles described in Paterson Drawings PG6556-3A to 3H - Site Geometry in Appendix 1.

Table 8 - Summary of Reception Points and Geometry, located in Appendix 1, provides a summary of the points of reception and their geometry with respect to the noise sources. The analysis is completed so that no effects of sound reflection off the building facade are considered, as stipulated by the ENG C.

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. The analysis is completed so that no effects of sound reflection off of the building facade are considered, as stipulated by the ENG C.

## 5.0 Results

### Surface Transportation Noise

The primary descriptors are the 16-hour daytime (7:00-23:00) and the 8-hour nighttime (23:00-7:00) equivalent sound levels,  $L_{eq(16)}$  and  $L_{eq(8)}$  for City roads.

The exterior noise levels due to roadway traffic sources were analyzed with the STAMSON version 5.04 software at all reception points. The input and output data of the STAMSON modeling can be found in Appendix 2, and the summary of the results can be found in Table 7.

<b>Reception Point</b>	<b>Height Above Grade (m)</b>	<b>Receptor Location</b>	<b>Daytime <math>L_{eq(16)}</math> (dBA)</b>	<b>Nighttime <math>L_{eq(8)}</math> (dBA)</b>
REC 1-1	1.5	Bldg 1: East Elevation, 1 <sup>st</sup> Floor	58.97	51.38
REC 1-4	10.5	Bldg 1: East Elevation, 4 <sup>th</sup> Floor	60.2	52.64
REC 2-1	1.5	Bldg 1: South Elevation, 1 <sup>st</sup> Floor	63.33	55.73
REC 2-4	10.5	Bldg 1: South Elevation, 4 <sup>th</sup> Floor	64.41	56.81
REC 3-1	1.5	Bldg 1: West Elevation, 1 <sup>st</sup> Floor	58.96	51.36
REC 3-4	10.5	Bldg 1: West Elevation, 4 <sup>th</sup> Floor	60.21	52.62
REC 4-1	1.5	Bldg 2: South Elevation, 1 <sup>st</sup> Floor	55.33	47.74
REC 4-4	10.5	Bldg 2: South Elevation, 4 <sup>th</sup> Floor	57.24	49.64
REC 5-1	1.5	Bldg 2: West Elevation, 1 <sup>st</sup> Floor	55.10	47.51
REC 5-4	10.5	Bldg 2: West Elevation, 4 <sup>th</sup> Floor	57.18	49.59
REC 6-1	1.5	Bldg 3: South Elevation, 1 <sup>st</sup> Floor	46.61	39.01
REC 6-4	10.5	Bldg 3: South Elevation, 4 <sup>th</sup> Floor	48.88	41.28
REC 7-1	1.5	Bldg 3: West Elevation, 1 <sup>st</sup> Floor	40.39	32.80
REC 7-4	10.5	Bldg 3: West Elevation, 4 <sup>th</sup> Floor	43.37	35.78

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## **6.0 Discussion and Recommendations**

### **6.1 Outdoor Living Areas**

No outdoor living areas were identified on the proposed site plan.

### **6.2 Indoor Living Areas and Ventilation**

The results of the STAMSON modeling indicate that the noise levels at proposed residential building will range between 40.4 dBA and 64.4 dBA during the daytime period (07:00-23:00) and between 32.8 dBA and 56.8 dBA during the nighttime period (23:00-07:00). The noise levels at Building 1 and Building 2 will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, the units within Building 1 and 2 should be designed with the provision of a central air conditioning unit, along with the warning clause Type D, as outlined in Table 3. It is also noted that the results of STAMSON modeling indicate that the noise levels at proposed building will be below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

## 7.0 Summary of Findings

The subject site at 3317 Navan Road is located at the City of Ottawa, Ontario. It is understood that the proposed development will consist of three (3) four storey residential buildings. Associated walkways, driveways, and landscaped areas are further anticipated. Outdoor living areas, consisting of rooftop terraces, balcony terraces, and at-grade amenity area were not identified on the proposed site plan. There is one major source of surface transportation noise to the proposed development: Navan Road.

Several reception points were selected for the surface transportation noise analysis, consisting of the centre of first level and top level of all three proposed buildings where lines of sight were identified to Navan Road. The results of STAMSON modeling indicate that Building 1 and 2 are expected to exceed the 55 dBA threshold specified by the ENCG. Therefore, design with the provision for a central air conditioning unit, along with a warning clause Type D, will be required for the units within Building 1 and 2. It is also noted that the modeling indicates that the noise levels are below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

The following warning clause is to be included on all Offers of Purchase and Sale and/or lease agreements of Buildings 1 and 2:

“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.”

## 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 Renfoe Land Management 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.**



Yolanda Tang, M.A.Sc.



Stephanie A. Boisvenue, P.Eng.

**Report Distribution:**

- Renfoe Land Management (email copy)
- Paterson Group (1 copy)

# **APPENDIX 1**

## **Table 8 - Summary of Reception Points and Geometry**

**Drawing PG6402-1 - Site Plan**

**Drawing PG6556-2 - Receptor Location Plan**

**Drawing PG6556-3 - Site Geometry**

**Drawing PG6556-3A - Site Geometry (REC 1-1 and REC 1-4)**

**Drawing PG6556-3B - Site Geometry (REC 2-1 and REC 2-4)**

**Drawing PG6556-3C - Site Geometry (REC 3-1 and REC 3-4)**

**Drawing PG6556-3D - Site Geometry (REC 4-1 and REC 4-4)**

**Drawing PG6556-3E – Site Geometry (REC 5-1 and REC 5-4)**

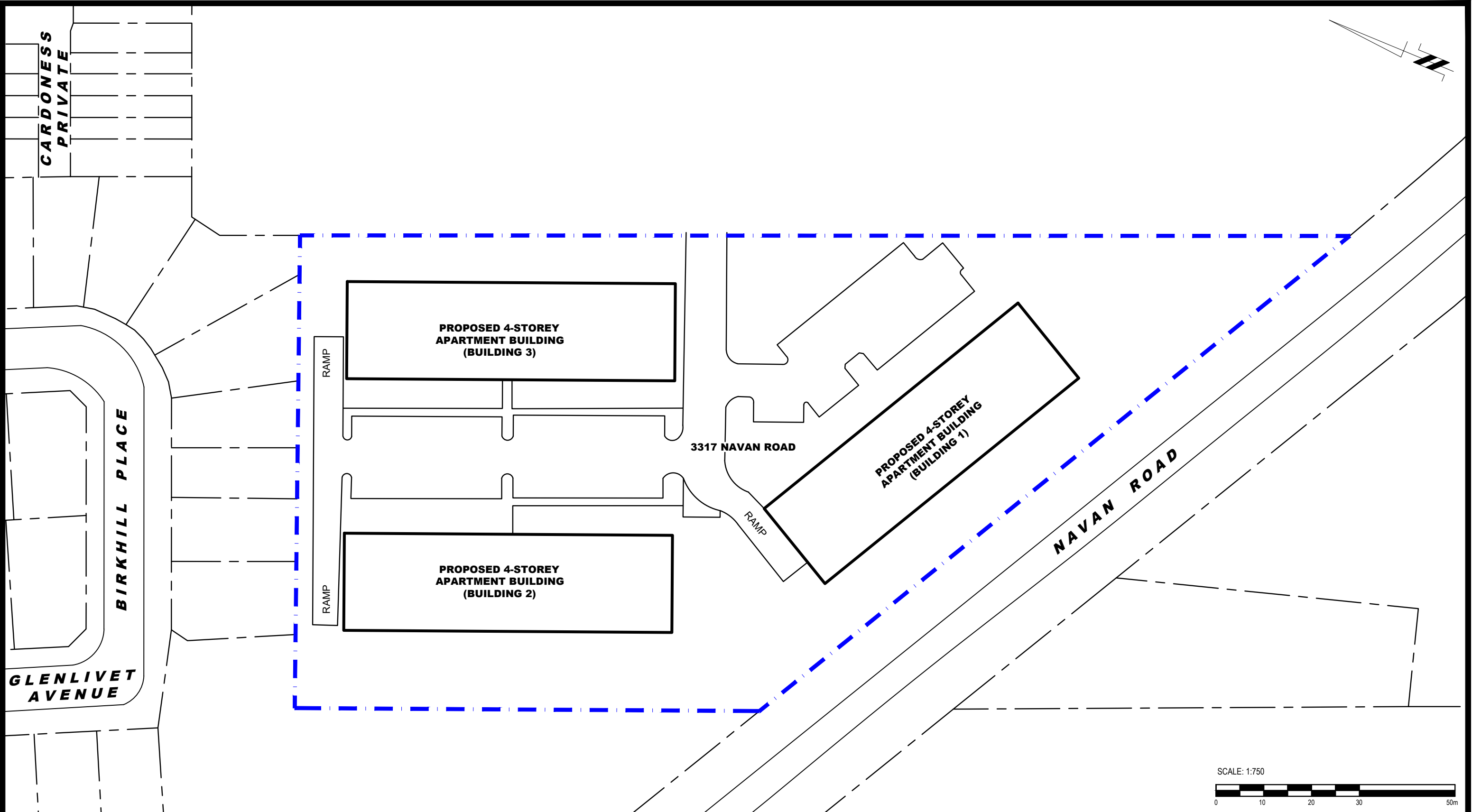
**Drawing PG6556-3F - Site Geometry (REC 6-1 and REC 6-4)**

**Drawing PG6556-3G – Site Geometry (REC 7-1 and REC 7-4)**

**Table 8 - Summary of Reception Points and Geometry**  
**3317 Navan Road**

Point of Reception	Location	Leq Day (dBA)	Navan Road					
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)
REC 1-1	Bldg 1: East Elevation, 1 <sup>st</sup> Floor	58.97	30	1.5	30.0	(-85, 0)	0	n/a
REC 1-4	Bldg 1: East Elevation, 4 <sup>th</sup> Floor	60.24	30	10.5	31.8	(-85, 0)	0	n/a
REC 2-1	Bldg 1: South Elevation, 1 <sup>st</sup> Floor	63.33	20	1.5	20.1	(-89, 87)	0	n /a
REC 2-4	Bldg 1: South Elevation, 4 <sup>th</sup> Floor	64.41	20	10.5	22.6	(-89, 87)	0	n/a
REC 3-1	Bldg 1: West Elevation, 1 <sup>st</sup> Floor	58.96	30	1.5	30.0	(0, 84)	0	n/a
REC 3-4	Bldg 1: West Elevation, 4 <sup>th</sup> Floor	60.21	30	10.5	31.8	(0, 84)	0	n/a
REC 4-1	Bldg 2: South Elevation, 1 <sup>st</sup> Floor	55.33	50	1.5	50.0	(-90, 0)	0	n/a
REC 4-4	Bldg 2: South Elevation, 4 <sup>th</sup> Floor	57.24	50	10.5	51.1	(-90, 0)	0	n/a
REC 5-1	Bldg 2: West Elevation, 1 <sup>st</sup> Floor	55.10	65	1.5	65.0	(-90, 31)	0	n/a
REC 5-4	Bldg 2: West Elevation, 4 <sup>th</sup> Floor	57.18	65	10.5	65.8	(-90, 31)	0	n/a
REC 6-1	Bldg 3: South Elevation, 1 <sup>st</sup> Floor	46.61	100	1.5	100.0	(-28, 0)	0	n/a
REC 6-4	Bldg 3: South Elevation, 4 <sup>th</sup> Floor	48.88	100	10.5	100.5	(-28, 0)	0	n/a
REC 7-1	Bldg 3: West Elevation, 1 <sup>st</sup> Floor	40.39	120	1.5	120.0	(-57, -45)	0	n/a
REC 7-4	Bldg 3: West Elevation, 4 <sup>th</sup> Floor	43.37	120	10.5	120.5	(-57, -45)	0	n/a





NO.	REVISIONS	DATE	INITIAL

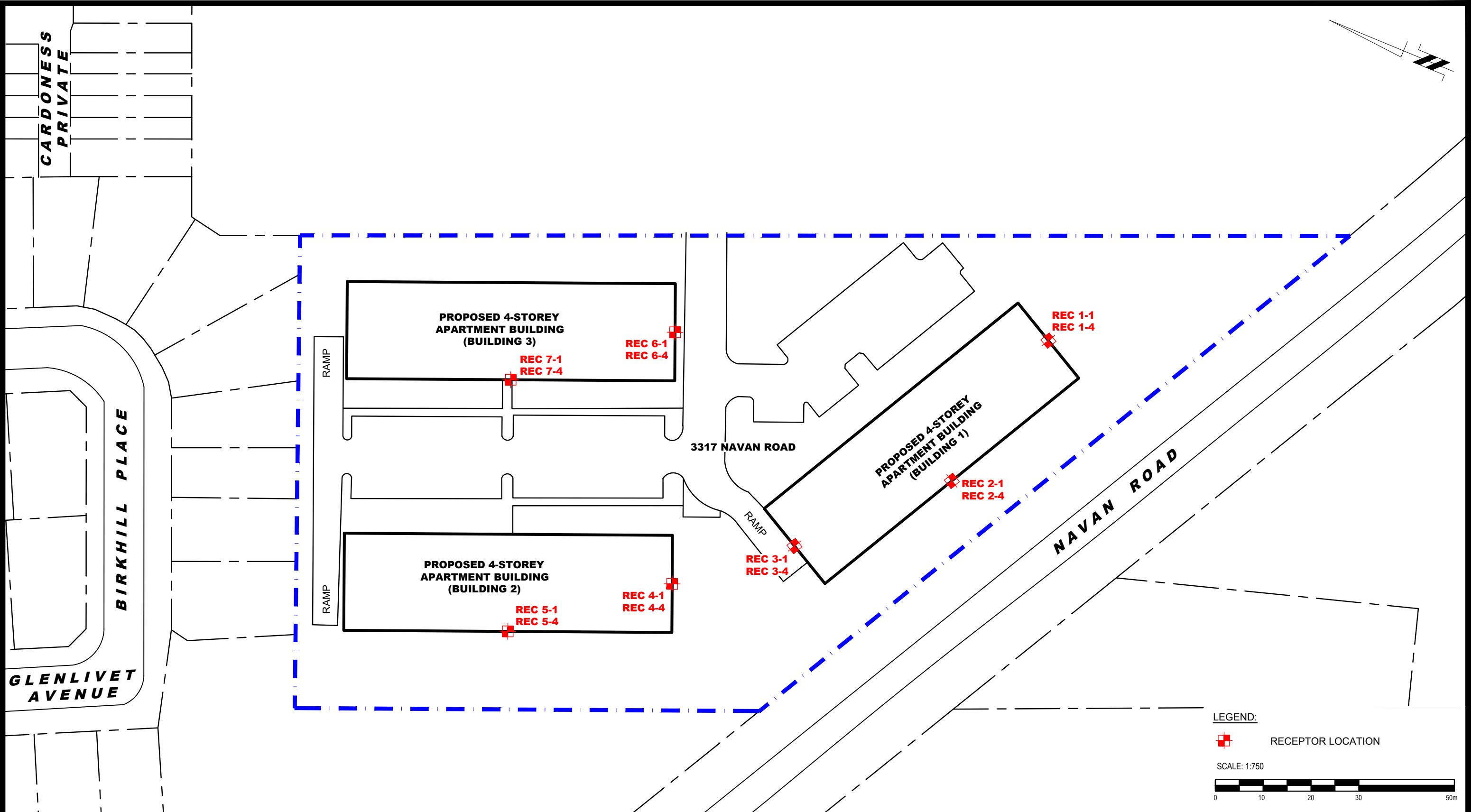
OTTAWA,  
 Title:

**RENFROE LAND MANAGEMENT  
 NOISE ATTENUATION STUDY  
 PROPOSED DEVELOPMENT  
 3317 NAVAN ROAD**

ONTARIO

**SITE PLAN**

Scale:	1:750	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-1</b>
Approved by:	SB	Revision No.:	



**LEGEND:**  
 RECEPTOR LOCATION

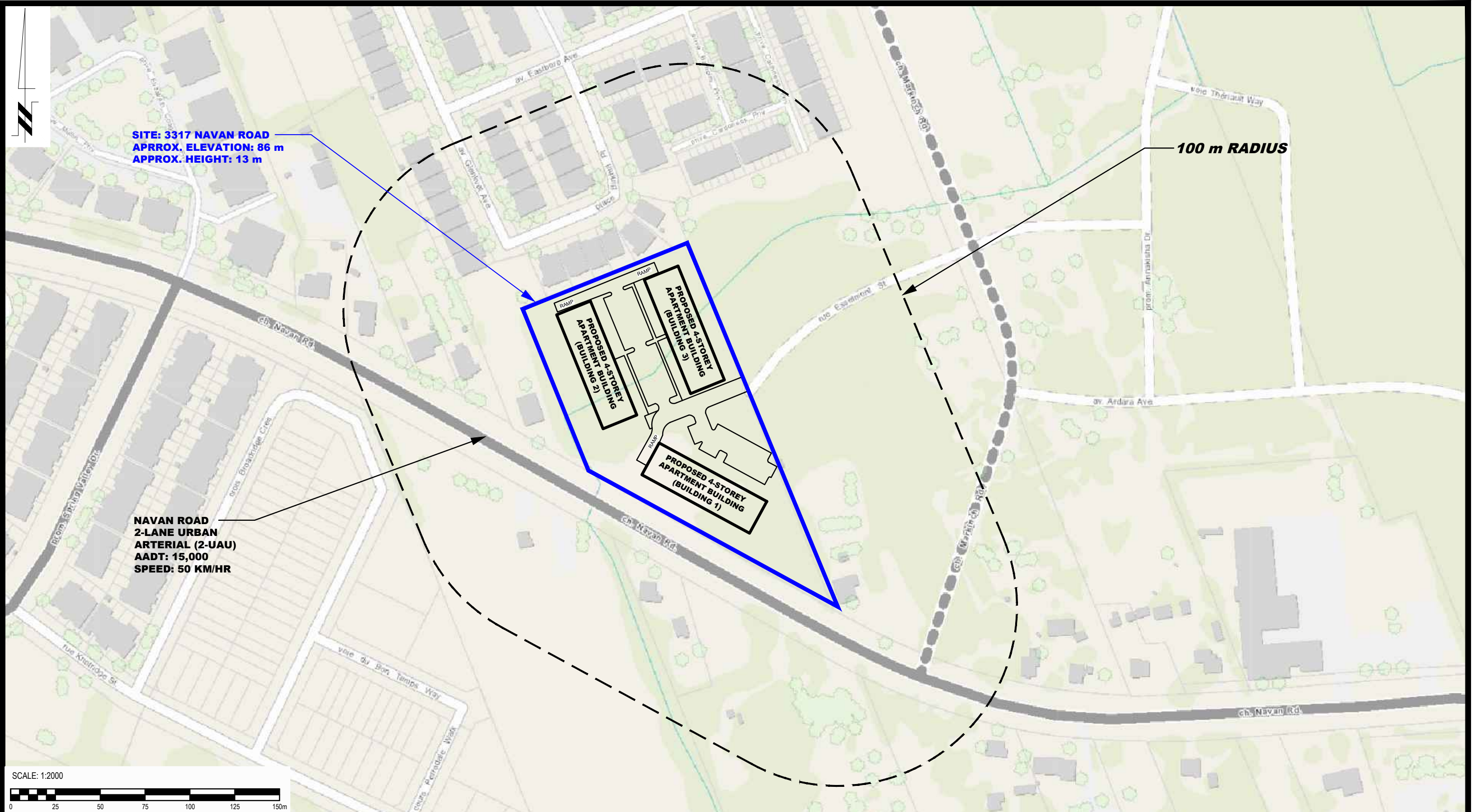
SCALE: 1:750

9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

OTTAWA,  
 Title: **RECFROE LAND MANAGEMENT  
 NOISE ATTENUATION STUDY  
 PROPOSED DEVELOPMENT  
 3317 NAVAN ROAD** ONTARIO

Scale:	1:750	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-2</b>
Approved by:	SB	Revision No.:	



**SITE: 3317 NAVAN ROAD**  
**APPROX. ELEVATION: 86 m**  
**APPROX. HEIGHT: 13 m**

**100 m RADIUS**

**NAVAN ROAD**  
**2-LANE URBAN**  
**ARTERIAL (2-UAU)**  
**AADT: 15,000**  
**SPEED: 50 KM/HR**

**PROPOSED 4-STORY APARTMENT BUILDING (BUILDING 2)**

**PROPOSED 4-STORY APARTMENT BUILDING (BUILDING 3)**

**PROPOSED 4-STORY APARTMENT BUILDING (BUILDING 1)**



**PATERSON GROUP**  
 9 AURIGA DRIVE  
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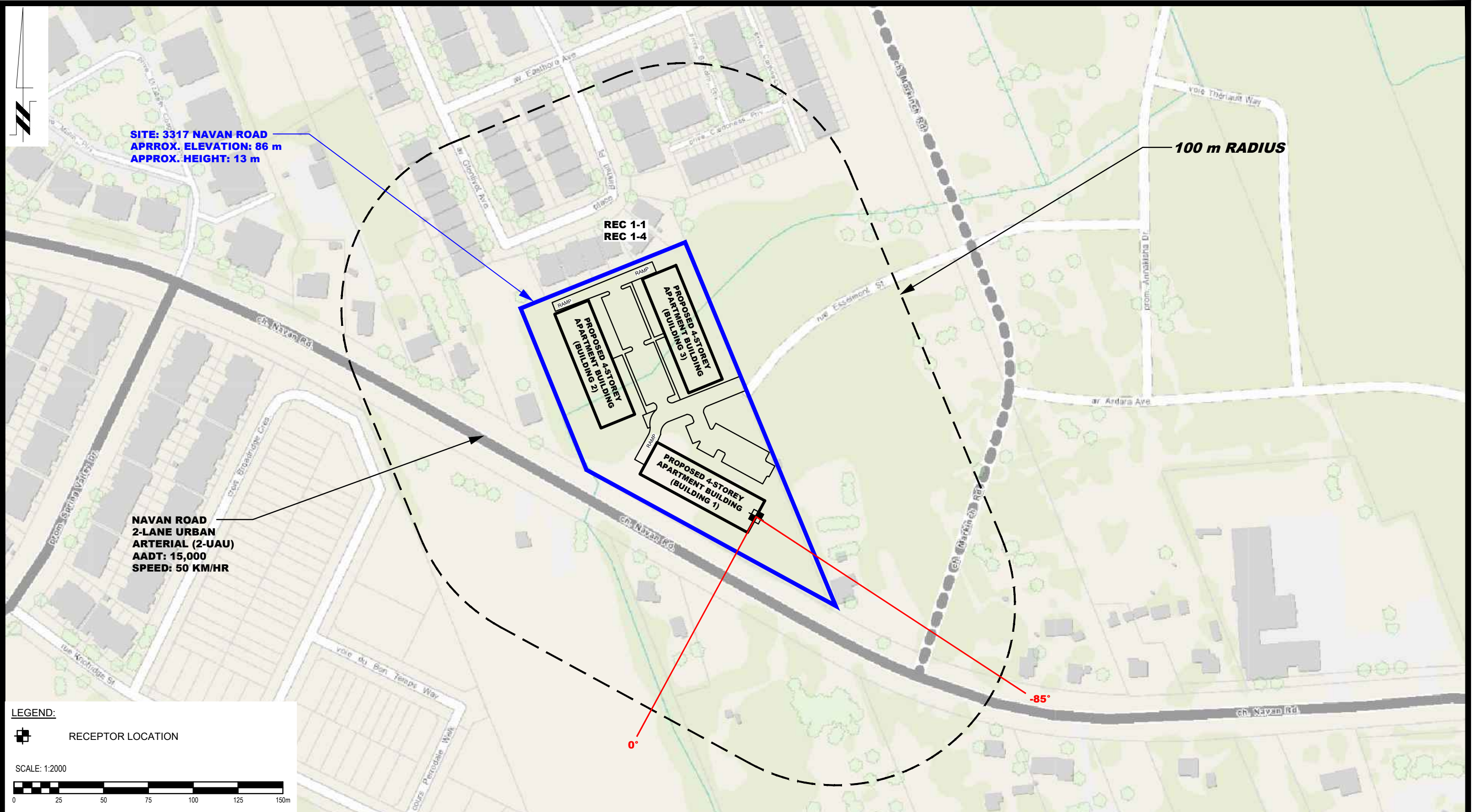
**OTTAWA, ONTARIO**

**RENFROE LAND MANAGEMENT**  
**NOISE ATTENUATION STUDY**  
**PROPOSED DEVELOPMENT**  
**3317 NAVAN ROAD**

**SITE GEOMETRY**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3</b>
Approved by:	SB	Revision No.:	





**LEGEND:**

RECEPTOR LOCATION

SCALE: 1:2000

**PATERSON GROUP**  
 9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

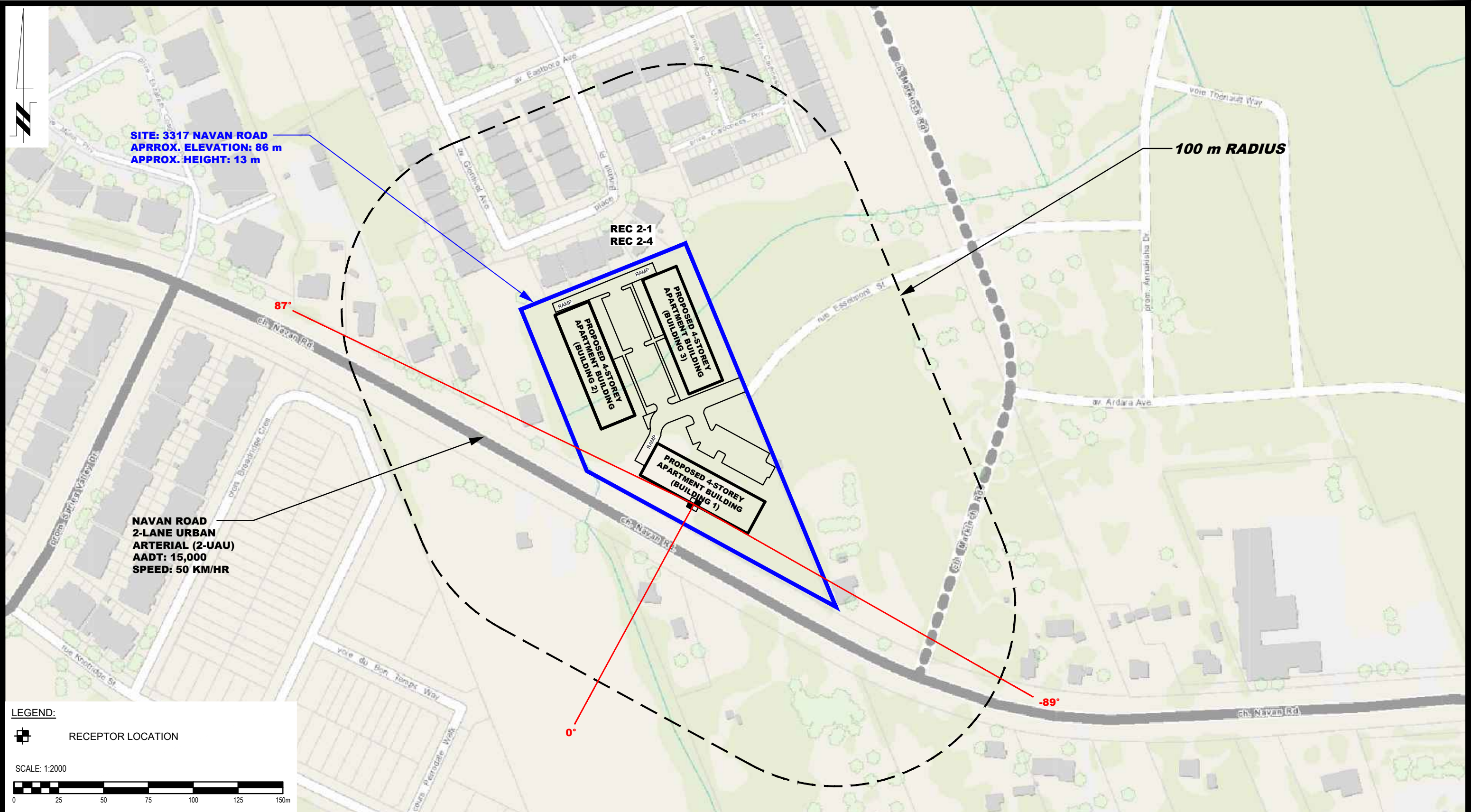
**RENFROE LAND MANAGEMENT**  
**NOISE ATTENUATION STUDY**  
**PROPOSED DEVELOPMENT**  
**3317 NAVAN ROAD**

OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 1-1 AND REC 1-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3A</b>
Approved by:	SB	Revision No.:	





**LEGEND:**

RECEPTOR LOCATION

SCALE: 1:2000

**PATERSON GROUP**  
 9 AURIGA DRIVE  
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 K2E 7T9  
 TEL: (613) 226-7381

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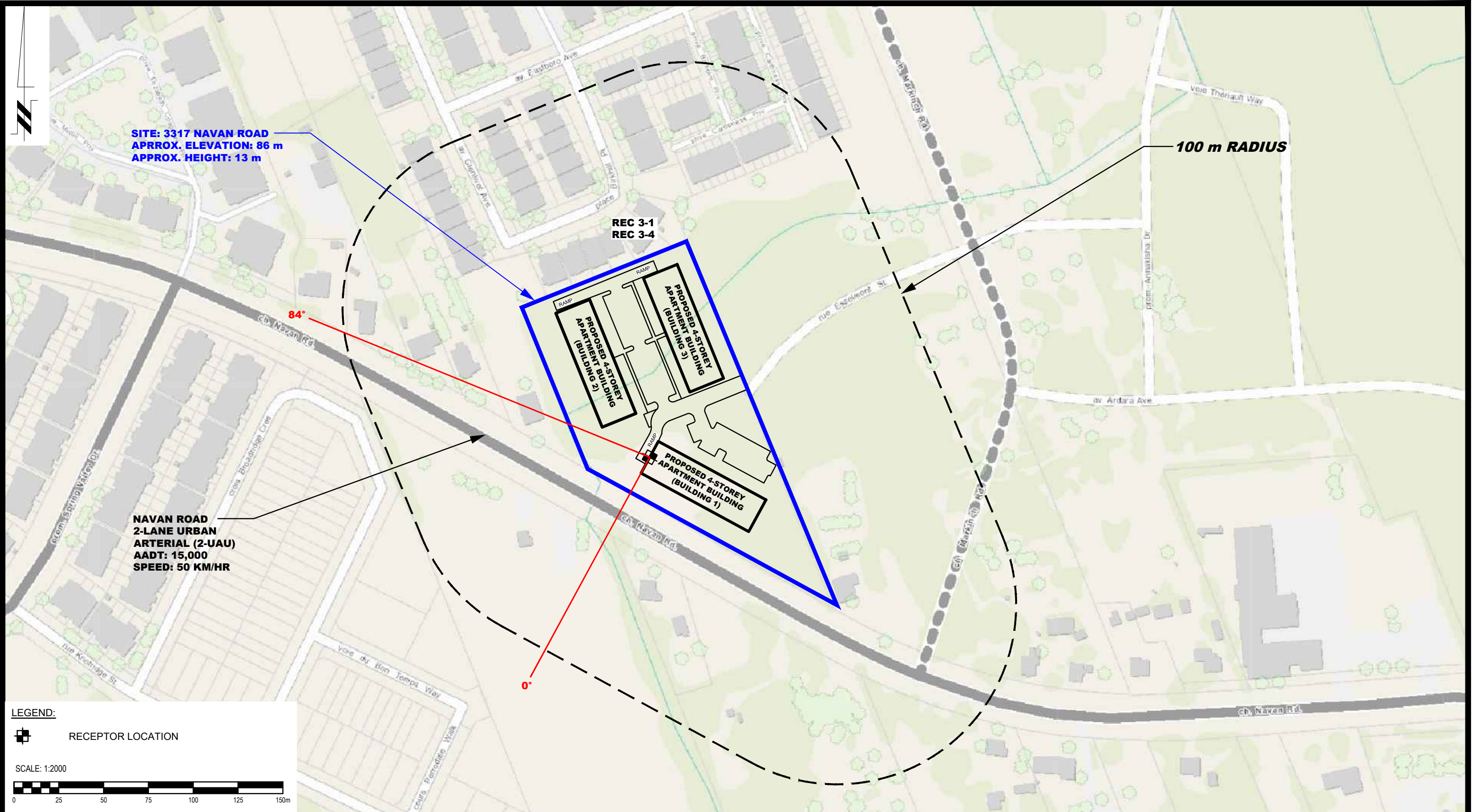
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 NOISE ATTENUATION STUDY  
 PROPOSED DEVELOPMENT  
 3317 NAVAN ROAD

OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 2-1 AND REC 2-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3B</b>
Approved by:	SB	Revision No.:	





**LEGEND:**

 RECEPTOR LOCATION

SCALE: 1:2000




**PATERSON GROUP**  
 9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

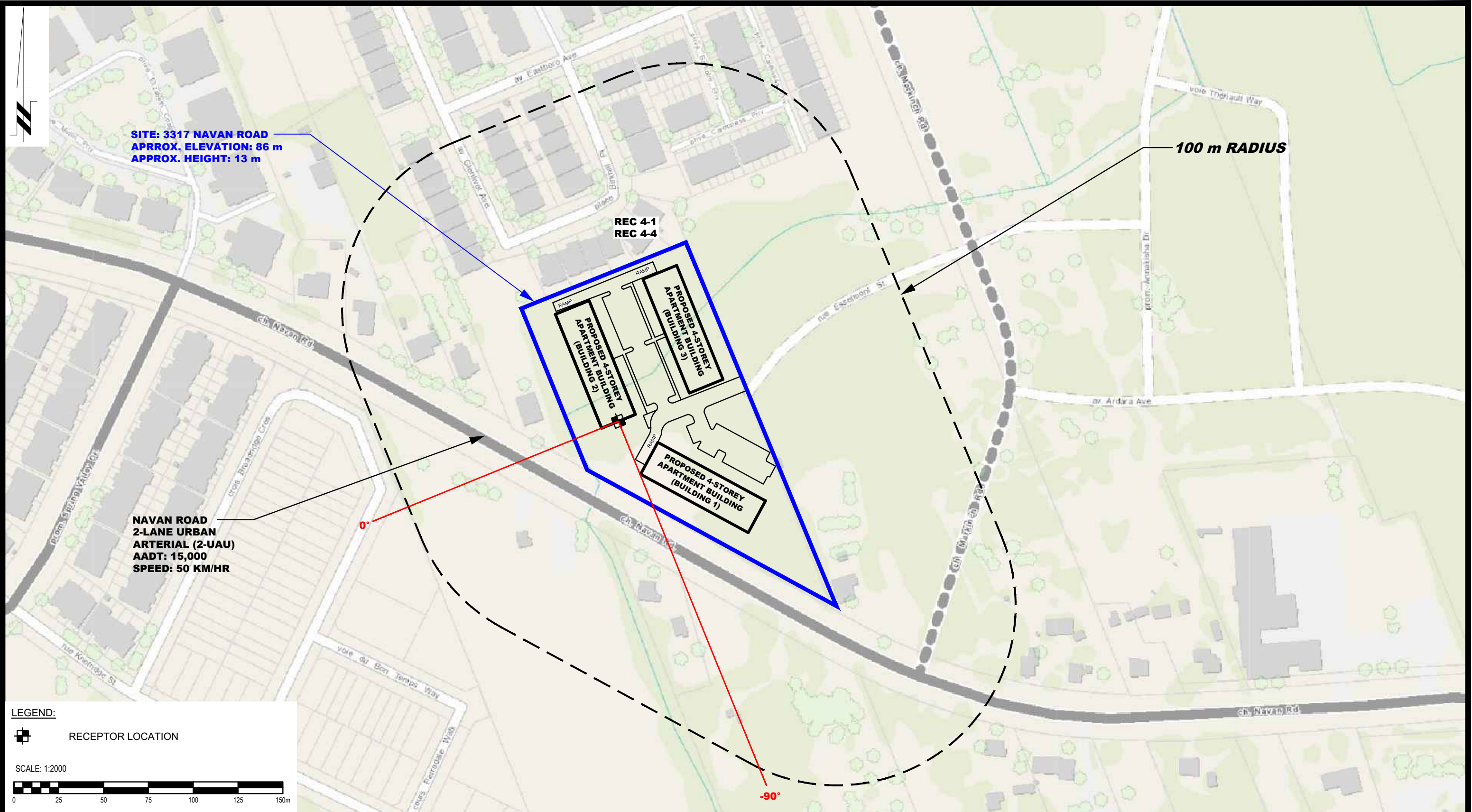
**RENFROE LAND MANAGEMENT**  
**NOISE ATTENUATION STUDY**  
**PROPOSED DEVELOPMENT**  
**3317 NAVAN ROAD**

OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 3-1 AND REC 3-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3C</b>
Approved by:	SB	Revision No.:	





**PATERSON GROUP**  
 9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

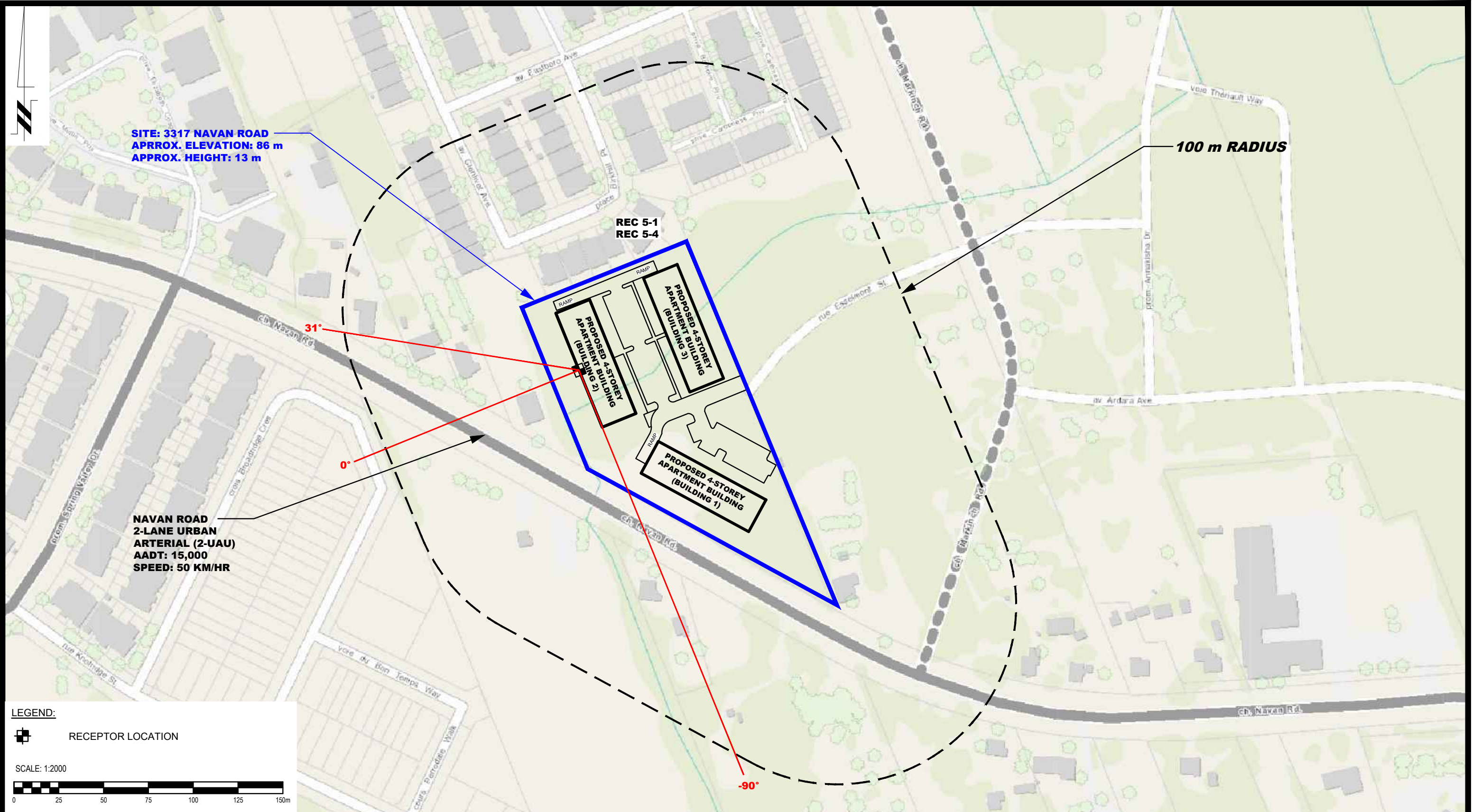
**RENFROE LAND MANAGEMENT**  
**NOISE ATTENUATION STUDY**  
**PROPOSED DEVELOPMENT**  
**3317 NAVAN ROAD**

**OTTAWA, ONTARIO**

Title: **SITE GEOMETRY - REC 4-1 AND REC 4-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3D</b>
Approved by:	SB	Revision No.:	





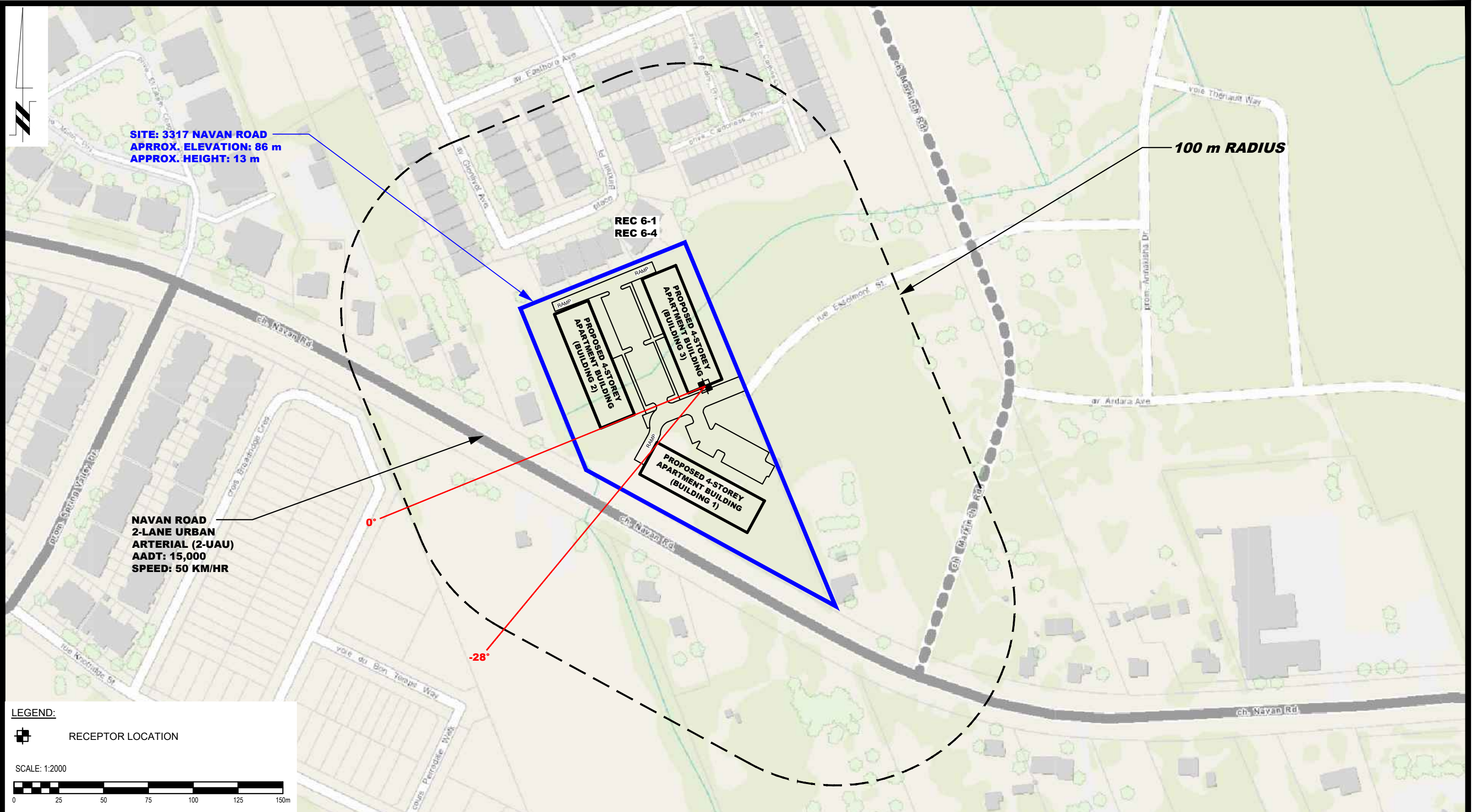
NO.	REVISIONS	DATE	INITIAL

RENFROE LAND MANAGEMENT  
 NOISE ATTENUATION STUDY  
 PROPOSED DEVELOPMENT  
 3317 NAVAN ROAD  
 OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 5-1 AND REC 5-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3E</b>
Approved by:	SB	Revision No.:	





**LEGEND:**

RECEPTOR LOCATION

SCALE: 1:2000

**PATERSON GROUP**  
 9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

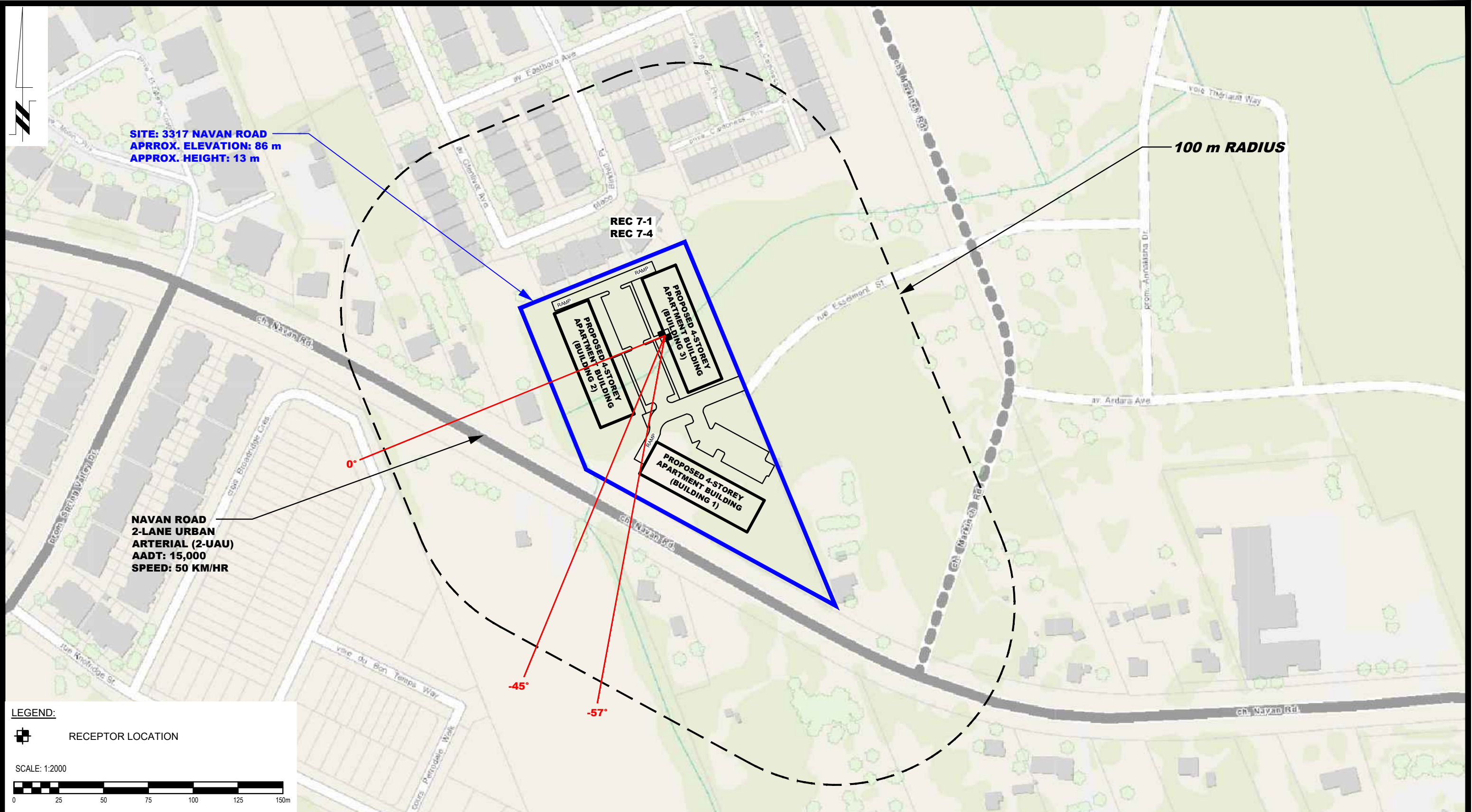
RENFROE LAND MANAGEMENT  
 NOISE ATTENUATION STUDY  
 PROPOSED DEVELOPMENT  
 3317 NAVAN ROAD

OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 6-1 AND REC 6-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3F</b>
Approved by:	SB	Revision No.:	





**SITE: 3317 NAVAN ROAD**  
**APPROX. ELEVATION: 86 m**  
**APPROX. HEIGHT: 13 m**

**100 m RADIUS**

**REC 7-1**  
**REC 7-4**

**NAVAN ROAD**  
**2-LANE URBAN**  
**ARTERIAL (2-UAU)**  
**AADT: 15,000**  
**SPEED: 50 KM/HR**

**-45°**  
**-57°**

**LEGEND:**

 RECEPTOR LOCATION

SCALE: 1:2000




**PATERSON GROUP**  
 9 AURIGA DRIVE  
 OTTAWA, ON  
 K2E 7T9  
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

**RENFROE LAND MANAGEMENT**  
**NOISE ATTENUATION STUDY**  
**PROPOSED DEVELOPMENT**  
**3317 NAVAN ROAD**

OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 7-1 AND REC 7-4**

Scale:	1:2000	Date:	06/2023
Drawn by:	YA	Report No.:	PG6556-1
Checked by:	YT	Dwg. No.:	<b>PG6556-3G</b>
Approved by:	SB	Revision No.:	

# **APPENDIX 2**

## **STAMSON RESULTS**

Filename: rec11.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 1-1

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

```
-----
Angle1  Angle2      : -85.00 deg  0.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height  : 1.50 / 1.50 m
Topography      : 1 (Flat/gentle slope; no barrier)
Reference angle  : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 58.97 + 0.00) = 58.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	0	0.66	68.48	0.00	-5.00	-4.51	0.00	0.00	0.00	58.97

Segment Leq : 58.97 dBA

Total Leq All Segments: 58.97 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 51.38 + 0.00) = 51.38 dBA

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

-85	0	0.66	60.88	0.00	-5.00	-4.51	0.00	0.00	0.00	51.38
-----	---	------	-------	------	-------	-------	------	------	------	-------

-----  
Segment Leq : 51.38 dBA

Total Leq All Segments: 51.38 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 58.97  
(NIGHT): 51.38

↑

↑

Filename: rec14.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 1-4

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

```
-----
Angle1  Angle2      : -85.00 deg   0.00 deg
Wood depth          :      0      (No woods.)
No of house rows   :      0 / 0
Surface            :      1      (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height     : 10.50 / 10.50 m
Topography         :      1      (Flat/gentle slope; no barrier)
Reference angle    :      0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 60.24 + 0.00) = 60.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	0	0.39	68.48	0.00	-4.18	-4.06	0.00	0.00	0.00	60.24

Segment Leq : 60.24 dBA



Total Leq All Segments: 60.24 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 52.64 + 0.00) = 52.64 dBA

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

-85	0	0.39	60.88	0.00	-4.18	-4.06	0.00	0.00	0.00	52.64
-----	---	------	-------	------	-------	-------	------	------	------	-------

-----  
Segment Leq : 52.64 dBA

Total Leq All Segments: 52.64 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 60.24  
(NIGHT): 52.64

↑

↑

Filename: rec21.te                      Time Period: Day/Night 16/8 hours  
 Description: Reception Point 2-1

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

```
-----
Angle1 Angle2 : -89.00 deg 87.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 63.33 + 0.00) = 63.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-89	87	0.66	68.48	0.00	-3.68	-1.47	0.00	0.00	0.00	63.33

Segment Leq : 63.33 dBA

Total Leq All Segments: 63.33 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 55.73 + 0.00) = 55.73 dBA

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

-89	87	0.66	60.88	0.00	-3.68	-1.47	0.00	0.00	0.00	55.73
-----	----	------	-------	------	-------	-------	------	------	------	-------

-----  
Segment Leq : 55.73 dBA

Total Leq All Segments: 55.73 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 63.33  
(NIGHT): 55.73

↑

↑

Filename: rec24.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 2-4

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

```
-----
Angle1  Angle2      : -89.00 deg   87.00 deg
Wood depth          :      0      (No woods.)
No of house rows   :      0 / 0
Surface            :      1      (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height    : 10.50 / 10.50 m
Topography         :      1      (Flat/gentle slope; no barrier)
Reference angle    :      0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 64.41 + 0.00) = 64.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-89	87	0.39	68.48	0.00	-3.08	-0.99	0.00	0.00	0.00	64.41

Segment Leq : 64.41 dBA

Total Leq All Segments: 64.41 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 56.81 + 0.00) = 56.81 dBA

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

-----  
-89 87 0.39 60.88 0.00 -3.08 -0.99 0.00 0.00 0.00 56.81  
-----

Segment Leq : 56.81 dBA

Total Leq All Segments: 56.81 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 64.41  
(NIGHT): 56.81

↑

↑

Filename: rec31.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 3-1

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

```
-----
Angle1  Angle2      : 0.00 deg  84.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height  : 1.50 / 1.50 m
Topography      : 1 (Flat/gentle slope; no barrier)
Reference angle  : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 58.96 + 0.00) = 58.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.66	68.48	0.00	-5.00	-4.52	0.00	0.00	0.00	58.96

Segment Leq : 58.96 dBA

Total Leq All Segments: 58.96 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 51.36 + 0.00) = 51.36 dBA

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

-----  
0 84 0.66 60.88 0.00 -5.00 -4.52 0.00 0.00 0.00 51.36  
-----

Segment Leq : 51.36 dBA

Total Leq All Segments: 51.36 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 58.96  
(NIGHT): 51.36

↑

↑



Filename: rec34.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 3-4

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

```
-----
Angle1 Angle2 : 0.00 deg 84.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 60.21 + 0.00) = 60.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.39	68.48	0.00	-4.18	-4.08	0.00	0.00	0.00	60.21

Segment Leq : 60.21 dBA

Total Leq All Segments: 60.21 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 52.62 + 0.00) = 52.62 dBA

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

-----  
0 84 0.39 60.88 0.00 -4.18 -4.08 0.00 0.00 0.00 52.62  
-----

Segment Leq : 52.62 dBA

Total Leq All Segments: 52.62 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 60.21  
(NIGHT): 52.62

↑

↑

Filename: rec41.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 4-1

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

```
-----
Angle1 Angle2 : -90.00 deg 0.00 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
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 55.33 + 0.00) = 55.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	68.48	0.00	-8.68	-4.47	0.00	0.00	0.00	55.33

Segment Leq : 55.33 dBA

Total Leq All Segments: 55.33 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 47.74 + 0.00) = 47.74 dBA

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

-90	0	0.66	60.88	0.00	-8.68	-4.47	0.00	0.00	0.00	47.74
-----	---	------	-------	------	-------	-------	------	------	------	-------

-----  
Segment Leq : 47.74 dBA

Total Leq All Segments: 47.74 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 55.33  
(NIGHT): 47.74

↑

↑

Filename: rec44.te                      Time Period: Day/Night 16/8 hours  
 Description: Reception Point 4-4

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

```
-----
Angle1 Angle2 : -90.00 deg 0.00 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 : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 57.24 + 0.00) = 57.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.39	68.48	0.00	-7.27	-3.97	0.00	0.00	0.00	57.24

Segment Leq : 57.24 dBA

Total Leq All Segments: 57.24 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 49.64 + 0.00) = 49.64 dBA

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

-----  
-90 0 0.39 60.88 0.00 -7.27 -3.97 0.00 0.00 0.00 49.64  
-----

Segment Leq : 49.64 dBA

Total Leq All Segments: 49.64 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 57.24  
(NIGHT): 49.64

↑

↑

Filename: rec51.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 5-1

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

```
-----
Angle1  Angle2      : -90.00 deg  31.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      0 / 0
Surface         :      1      (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height  :  1.50 / 1.50 m
Topography      :      1      (Flat/gentle slope; no barrier)
Reference angle  :      0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 55.10 + 0.00) = 55.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	31	0.66	68.48	0.00	-10.57	-2.81	0.00	0.00	0.00	55.10

Segment Leq : 55.10 dBA

Total Leq All Segments: 55.10 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 47.51 + 0.00) = 47.51 dBA

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

-90	31	0.66	60.88	0.00	-10.57	-2.81	0.00	0.00	0.00	47.51
-----	----	------	-------	------	--------	-------	------	------	------	-------

-----  
Segment Leq : 47.51 dBA

Total Leq All Segments: 47.51 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 55.10  
(NIGHT): 47.51

↑

↑



Filename: rec54.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 5-4

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

```
-----
Angle1 Angle2 : -90.00 deg 31.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 57.18 + 0.00) = 57.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	31	0.39	68.48	0.00	-8.85	-2.44	0.00	0.00	0.00	57.18

Segment Leq : 57.18 dBA

Total Leq All Segments: 57.18 dBA

↑

Results segment # 1: Navan (night)

-----

Source height = 1.50 m

ROAD (0.00 + 49.59 + 0.00) = 49.59 dBA

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

-----

-90	31	0.39	60.88	0.00	-8.85	-2.44	0.00	0.00	0.00	49.59
-----	----	------	-------	------	-------	-------	------	------	------	-------

-----

Segment Leq : 49.59 dBA

Total Leq All Segments: 49.59 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 57.18

(NIGHT): 49.59

↑

↑

Filename: rec61.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 6-1

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

```
-----
Angle1  Angle2      : -28.00 deg  0.00 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  :   1.50 / 1.50 m
Topography      :      1    (Flat/gentle slope; no barrier)
Reference angle  :     0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 46.61 + 0.00) = 46.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	0	0.66	68.48	0.00	-13.68	-8.20	0.00	0.00	0.00	46.61

Segment Leq : 46.61 dBA

Total Leq All Segments: 46.61 dBA

↑

Results segment # 1: Navan (night)

-----

Source height = 1.50 m

ROAD (0.00 + 39.01 + 0.00) = 39.01 dBA

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

-----

-28	0	0.66	60.88	0.00	-13.68	-8.20	0.00	0.00	0.00	39.01
-----	---	------	-------	------	--------	-------	------	------	------	-------

-----

Segment Leq : 39.01 dBA

Total Leq All Segments: 39.01 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 46.61

(NIGHT): 39.01

↑

↑

Filename: rec64.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 6-4

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

```
-----
Angle1 Angle2 : -28.00 deg 0.00 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 : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 48.88 + 0.00) = 48.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	0	0.39	68.48	0.00	-11.45	-8.15	0.00	0.00	0.00	48.88

Segment Leq : 48.88 dBA

Total Leq All Segments: 48.88 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 41.28 + 0.00) = 41.28 dBA

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

-----  
-28 0 0.39 60.88 0.00 -11.45 -8.15 0.00 0.00 0.00 41.28  
-----

Segment Leq : 41.28 dBA

Total Leq All Segments: 41.28 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 48.88  
(NIGHT): 41.28

↑

↑

Filename: rec71.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 7-1

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

```
-----
Angle1  Angle2      : -57.00 deg  -45.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      0 / 0
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
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 40.39 + 0.00) = 40.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	-45	0.66	68.48	0.00	-14.99	-13.10	0.00	0.00	0.00	40.39

Segment Leq : 40.39 dBA

Total Leq All Segments: 40.39 dBA

↑

Results segment # 1: Navan (night)

-----

Source height = 1.50 m

ROAD (0.00 + 32.80 + 0.00) = 32.80 dBA

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

-----

-57	-45	0.66	60.88	0.00	-14.99	-13.10	0.00	0.00	0.00	32.80
-----	-----	------	-------	------	--------	--------	------	------	------	-------

-----

Segment Leq : 32.80 dBA

Total Leq All Segments: 32.80 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 40.39

(NIGHT): 32.80

↑

↑



Filename: rec74.te                    Time Period: Day/Night 16/8 hours  
 Description: Reception Point 7-4

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

```
-----
Angle1 Angle2 : -57.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 120.00 / 120.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

↑  
 Results segment # 1: Navan (day)

Source height = 1.50 m

ROAD (0.00 + 43.37 + 0.00) = 43.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	-45	0.39	68.48	0.00	-12.55	-12.55	0.00	0.00	0.00	43.37

Segment Leq : 43.37 dBA

Total Leq All Segments: 43.37 dBA

↑

Results segment # 1: Navan (night)

-----  
Source height = 1.50 m

ROAD (0.00 + 35.78 + 0.00) = 35.78 dBA

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

-57	-45	0.39	60.88	0.00	-12.55	-12.55	0.00	0.00	0.00	35.78
-----	-----	------	-------	------	--------	--------	------	------	------	-------

-----  
Segment Leq : 35.78 dBA

Total Leq All Segments: 35.78 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 43.37  
(NIGHT): 35.78

↑

↑