Environmental Noise Control Study
Proposed Residential Development

211-231 Bank Street and 178 Nepean Street
Ottawa, Ontario

Prepared for Smart Living Properties

Report PG6491-1 dated December 14, 2022

City of Ottawa File Numbers:
D02-02-22-0127 and D07-12-22- 0188

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Smart Living Properties to conduct an environmental noise control study for the proposed residential development to be located at 211-231 Bank Street and 178 Nepean Street, 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 Proposed Development

It is understood that the proposed development will consist of a nine-storey residential building. The building will consist of 245 units and rise 30 metres above grade. Associated walkways are further anticipated. Outdoor living areas – balcony terraces, rooftop terrace, and exterior amenity area are identified on the proposed site plan.

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

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 City of Ottawa's Official Plan 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:

Table 1 – Noise Level Limit for Outdoor Living Areas

Time Period	L_{eq} Level (dBA)
Daytime, 7:00-23:00	55

- Standard taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas – Road and Rail

Table 2 – Noise Level Limits for Indoor Living Areas

Type of Space	Time Period	L_{eq} Level (dBA)	
		Road	Rail
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 **residences**, hospitals, nursing/retirement homes, schools, day-care centres	Daytime 7:00-23:00	45	40
Living/dining/den areas of **residences**, 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 **residences**, 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 dBA < Leq ≤ 60 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 (Leq > 60 dBA), noise control measures are required to reduce Leq 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 of 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:

Table 3 – Warning Clauses for Outdoor Living Areas

Leq (dBA)	Warning Clause	Description
55 dBA < $L_{eq(16)}$ ≤ 60 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 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."

- Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300

Table 4 – Warning Clauses for Indoor Living Areas		
Leq (dBA)	**Warning Clause**	**Description**
55 dBA < $L_{eq(16)}$ ≤ 65 dBA 50 dBA < $L_{eq(8)}$ ≤ 60 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 dBA < $L_{eq(16)}$ 60 dBA < $L_{eq(8)}$	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."
➢ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - 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.

The subject site is not in proximity to existing or approved stationary sources of noise. 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 Nepean Street followed by commercial buildings, residential dwellings, and Gloucester Street, to the east by parking areas, commercial buildings, and residential dwellings, to the south by Lisgar Street followed by commercial buildings, residential dwellings, and Cooper Street, and to the west by Bank Street followed by commercial buildings. Nepean Street, Gloucester Street, Lisgar Street, Cooper Street, and Bank Street are identified within the 100 m radius of proposed development.

Based on the City of Ottawa's Official Plan, Schedule E, Bank Street is considered a 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 Bank Street to the west of the proposed development.

All noise sources are presented in Drawing PG6491-3 - Site Geometry 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 classification. 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 5 – Traffic and Road Parameters

Segment	Roadway Classification	AADT Veh/Day	Speed Limit (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Bank Street	2-UAU	15000	50	92/8	7	5
➢ Data obtained from the City of Ottawa document ENCG						

Three (3) levels of reception points were selected for this analysis. The following elevations were selected from the heights provided on the survey plan for the subject building.

Table 6 – Elevations of Reception Points			
Floor Number	**Elevation at Centre of Window (m)**	**Floor Use**	**Daytime / Nighttime Analysis**
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Nineth Floor	28.5	Living Area/Bedroom	Daytime / Nighttime
Rooftop Terrace	31.5	--	Outdoor Living Area

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. Outdoor living areas – balcony terraces, rooftop terrace, and exterior amenity area are anticipated at the proposed development.

One receptor (REC 4) was selected in the centre of rooftop terrace at an elevation of 31.5 m. It should be noted that balcony terraces have widths less than 4.0 m and therefore were not analyzed as per City of Ottawa standards. An exterior amenity area was identified on the 4th floor at the eastern elevation of proposed building. Due to the surrounding exterior walls of the proposed building, there is no direct line of sight to surface transportation noise source and therefore is not included in this study. Reception points are detailed on Drawing PG6491-2 - 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 PG6491-3A to 3G - 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 of the building facade are considered, as stipulated by the ENGC.

The subject site is gently levelled and at grade with the neighbouring roads within the 100 m radius.

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

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.

Table 7: Exterior Noise Levels due to Roadway Traffic Sources

Reception Point	Height Above Grade (m)	Receptor Location	Daytime $L_{eq(16)}$ (dBA)	Nighttime $L_{eq(8)}$ (dBA)
REC 1-1	1.5	Western Elevation, 1st Floor	67	59
REC 1-9	28.5	Western Elevation, 9th Floor	68	61
REC 2-1	1.5	Southern Elevation, 1st Floor	62	54
REC 2-9	28.5	Southern Elevation, 9th Floor	64	56
REC 3-1	1.5	Northern Elevation, 1st Floor	62	54
REC 3-9	28.5	Northern Elevation, 9th Floor	64	56
REC 4	31.5	Rooftop Terrace	48	--

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

Terraces are anticipated at the balconies and the rooftop of the proposed building. One (1) receptor point (REC 4) was selected at the rooftop of the building. It should be noted that an outdoor living area located at the balconies were initially identified for analysis. However, upon review the balcony terraces are too narrow to be considered an outdoor living area and therefore are not included in this analysis.

It is assumed that the balcony terraces will only be utilized as outdoor living area provided that the proposed building is constructed. Utilizing the exteriors of proposed building as noise barriers, the proposed Leq(16) at the rooftop terrace will be 48 dBA, which is below the 55 dBA threshold value specified by the ENCG. Therefore, no noise attenuation measures are required.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicate that the noise levels at proposed building will range between 62 dBA and 68 dBA during the daytime period (07:00-23:00) and between 54 dBA and 61 dBA during the nighttime period (23:00-7:00). The noise levels on the northern, western, and southern elevations of proposed building will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. It is also noted that the noise levels on the western elevation will exceed 65 dBA. Therefore, units on the northern, western, and southern elevations of this building should be supplied with a central air conditioning unit, along with the warning clause Type D, as outlined in Table 3.

This building does exceed the 65 dBA threshold for noise on the western elevation. Therefore, an analysis of the building materials will be required. However, at this time the building materials and exterior wall construction details have not been finalized. Therefore, a review of the proposed building materials on the western elevation will need to be completed.

Proposed Construction Specifications

It is understood that typical window and wall details are proposed for the residential buildings. The effectiveness of the noise insulation can be expressed as the Acoustical Insulation Factor (AIF), calculated as follows:

$$AIF = L_{eq(16)(Exterior)} - L_{eq(16)(Interior)} + 10\log_{10}(N) + 2 \text{ dBA}$$

Where:

$L_{eq(16)(Exterior)}$ = Calculated value at the window pane
$L_{eq(16)(Interior)}$ = 45 dBA
N = number of components in the room

No floor plans or detailed design drawings were provided for this portion of the review. A conservative approach is to assume that there are 2 components per room. Therefore, the AIF would need to be at least 28 dBA.

A conversion from AIF to a Standard Transmission Class (STC) rating will require the knowledge of room dimensions in addition to the wall and window dimensions. However, a conservative approach would be to increase the AIF factor by 3. **Therefore, provided the building materials of either the windows and/or exterior walls have an STC rating of 31 or higher, this would be a sufficient noise attenuation device.**

A review of industry standards for construction material indicates that, as long as the exterior cladding of the western elevation consist of brick or concrete panels and that all windows consist of double pane glass, these materials have an STC rating of greater than 31 and are considered acceptable. If alternative materials are to be utilized on the western elevation, then a review will need to be completed once design details are finalized.

7.0 Summary of Findings

The subject site is located at 211-231 Bank Street and 178 Nepean Street, in the City of Ottawa. It is understood that the proposed development will consist of a nine-storey residential building that will rise 30 metres above grade. There is a single source of surface transportation noise to the proposed development: Bank Street.

Several tiered balcony terraces, rooftop terrace, and exterior amenity area are anticipated for this building. Only rooftop terrace was defined as an outdoor living area and was selected for analysis. Utilizing the exteriors of proposed residential building as noise barriers, the results of STAMSON modeling indicate that the noise level at the rooftop terrace is expected to be 48 dBA, during the daytime period, which is below the 55 dBA threshold value specified by the ENCG. Therefore, further noise attenuation measure is not required.

Several reception points were selected for the surface transportation noise analysis, consisting of the centre of first level and top level. The results of STAMSON modeling indicate that the northern, western, and southern elevations of the proposed building are expected to exceed the 55 dBA threshold specified by the ENCG. It is also noted that the noise level on the western elevation will exceed 65 dBA. Therefore, the installation of a central air conditioning unit, along with a warning clause Type D, will be required for the units on the northern, western, and southern elevations of proposed building. A review of industry standards for construction material indicates that, provided the exterior claddings of the western elevation consist of brick or concrete panels and that all windows consist of double pane glass, these materials have an STC rating of greater than 31 and are considered acceptable.

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

> " 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."

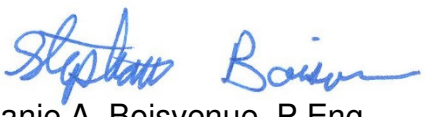
8.0 Statement of Limitations

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 Smart Living Properties 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.

December 14, 2022



Yolanda Tang, M.A.Sc. Stephanie A. Boisvenue, P.Eng.

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APPENDIX 1

Table 8 - Summary of Reception Points and Geometry

Drawing PG6491-1 - Site Plan

Drawing PG6491-2 - Receptor Location Plan

Drawing PG6491-3 - Site Geometry

Drawing PG6491-3A - Site Geometry - REC 1-1

Drawing PG6491-3B - Site Geometry - REC 1-9

Drawing PG6491-3C - Site Geometry - REC 2-1

Drawing PG6491-3D - Site Geometry - REC 2-9

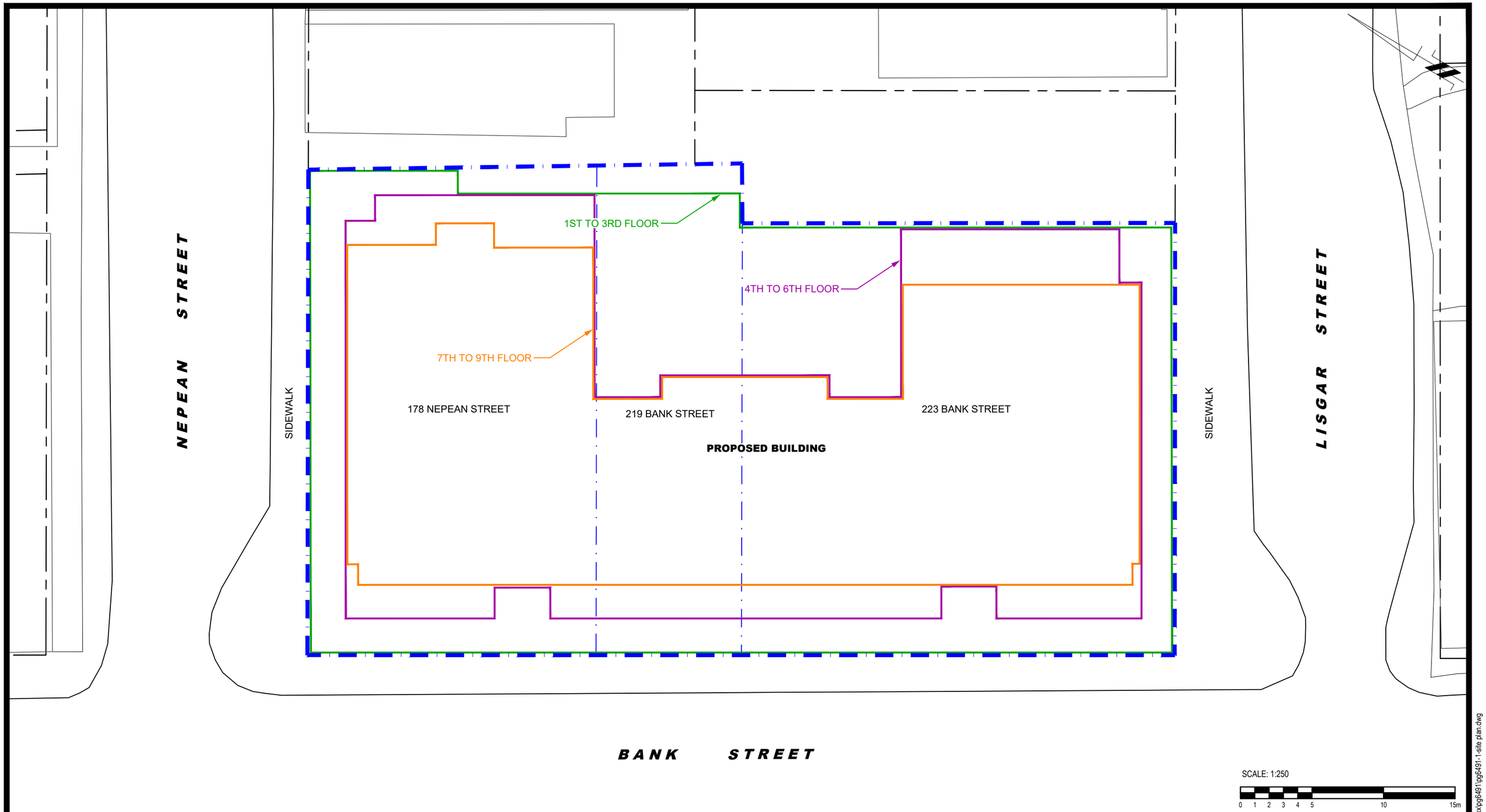
Drawing PG6491-3E - Site Geometry - REC 3-1

Drawing PG6491-3F - Site Geometry - REC 3-9

Drawing PG6491-3G - Site Geometry - REC 4

Table 8 - Summary of Reception Points and Geometry
211-231 Bank Street and 178 Nepean Street

Point of Reception	Location	Leq Day (dBA)	Bank Street					
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)
REC 1-1	Western Elevation, 1st Floor	67	15	1.5	15.1	-88, 88	n/a	n/a
REC 1-9	Western Elevation, 9th Floor	68	15	28.5	32.2	-86, 86	n/a	n/a
REC 2-1	Southern Elevation, 1st Floor	62	20	1.5	20.1	-80, 0	n/a	n/a
REC 2-9	Southern Elevation, 9th Floor	64	20	28.5	34.8	-80, 0	n/a	n/a
REC 3-1	Northern Elevation, 1st Floor	62	20	1.5	n/a	0, 79	n/a	n/a
REC 3-9	Northern Elevation, 9th Floor	64	20	28.5	n/a	0, 79	n/a	n/a
REC 4	Rooftop Terrace	48	20	31.5	n/a	-83, 84	n/a	n/a



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NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
211-231 BANK STREET AND 178 NEPEAN STREET

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:250	Date: 11/2022
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Checked by: YT	Dwg. No.: PG6491-1
Approved by: SB	Revision No.:

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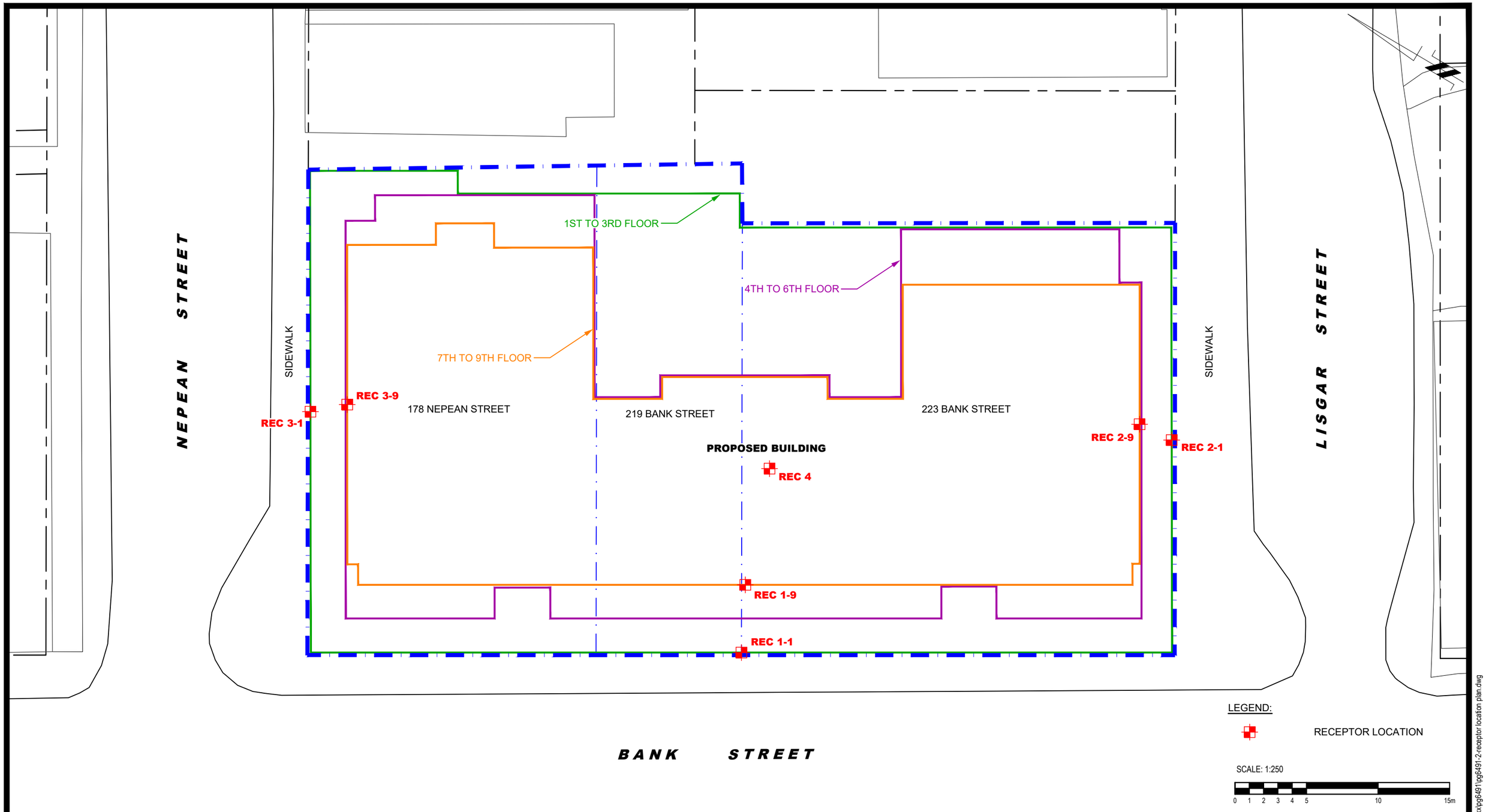

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RECEPTOR LOCATION PLAN

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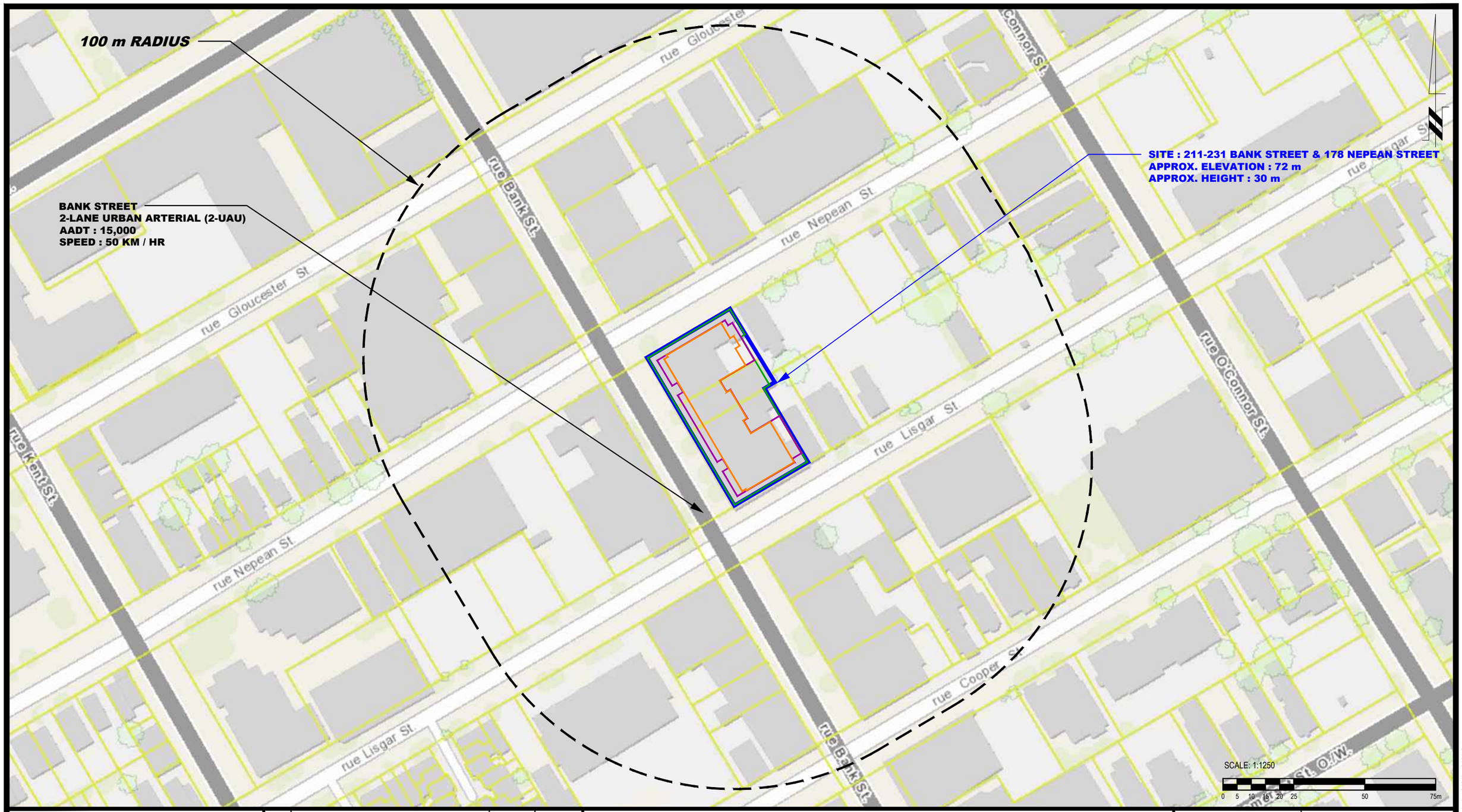

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SITE GEOMETRY

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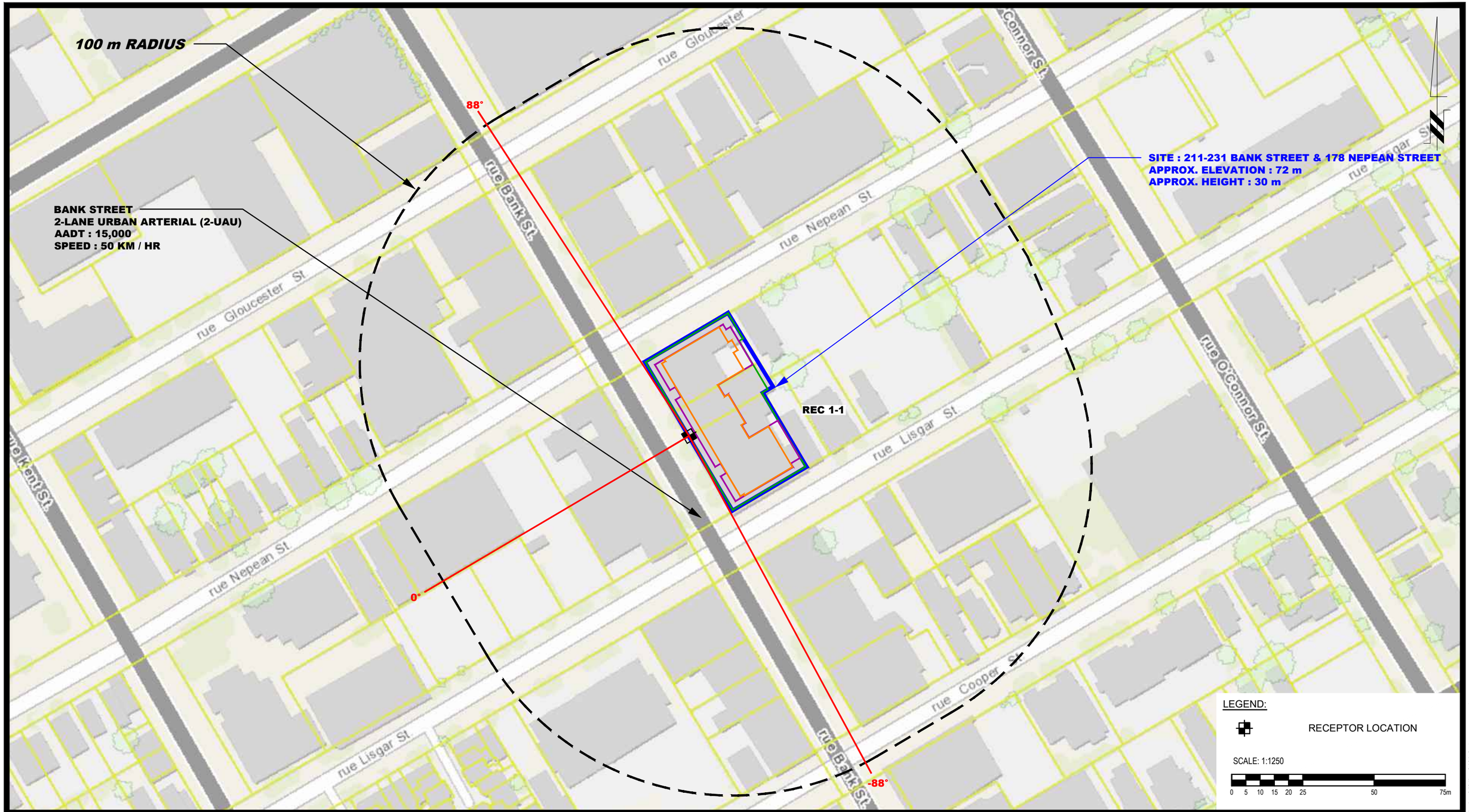

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Title:

SITE GEOMETRY - REC 1-1

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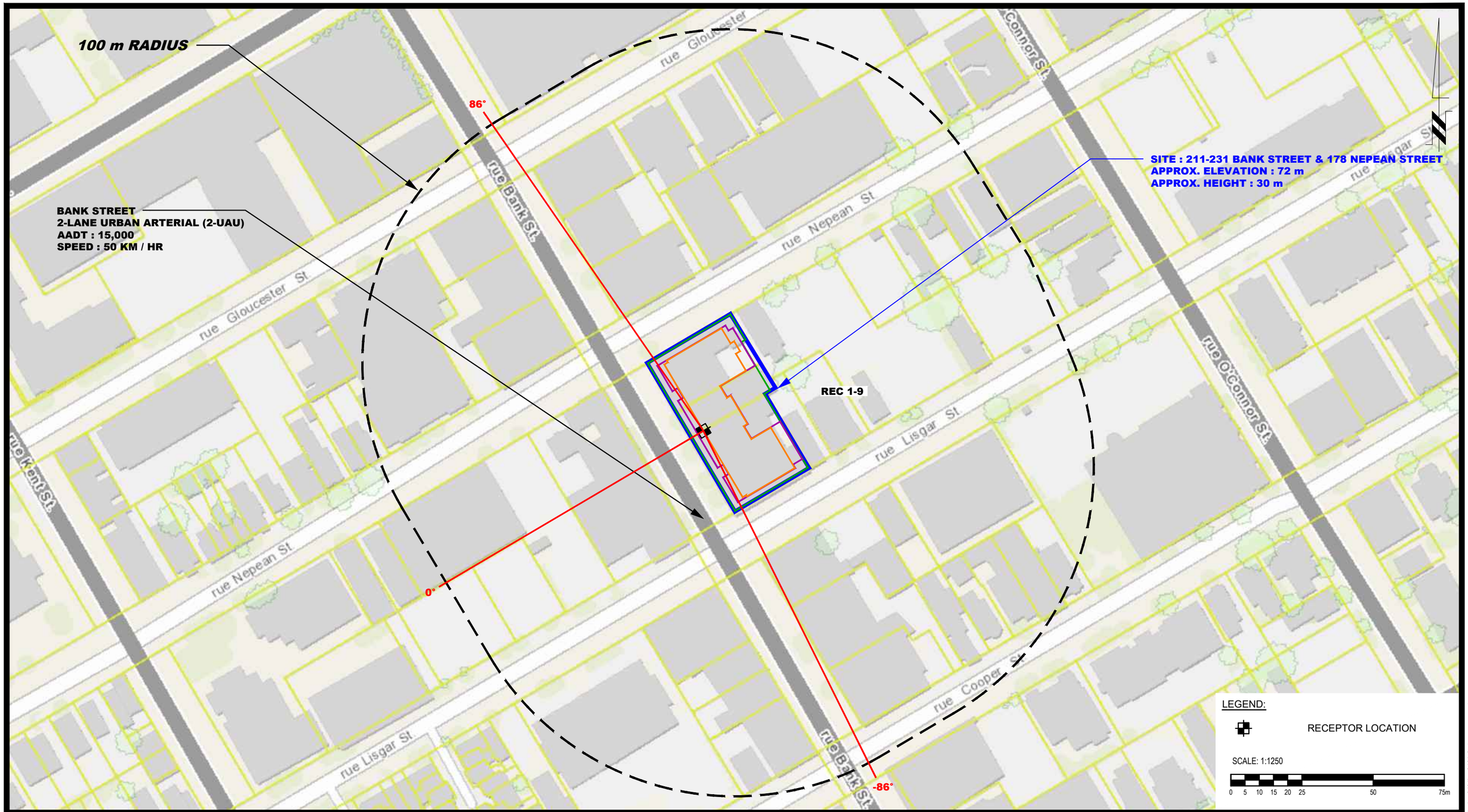

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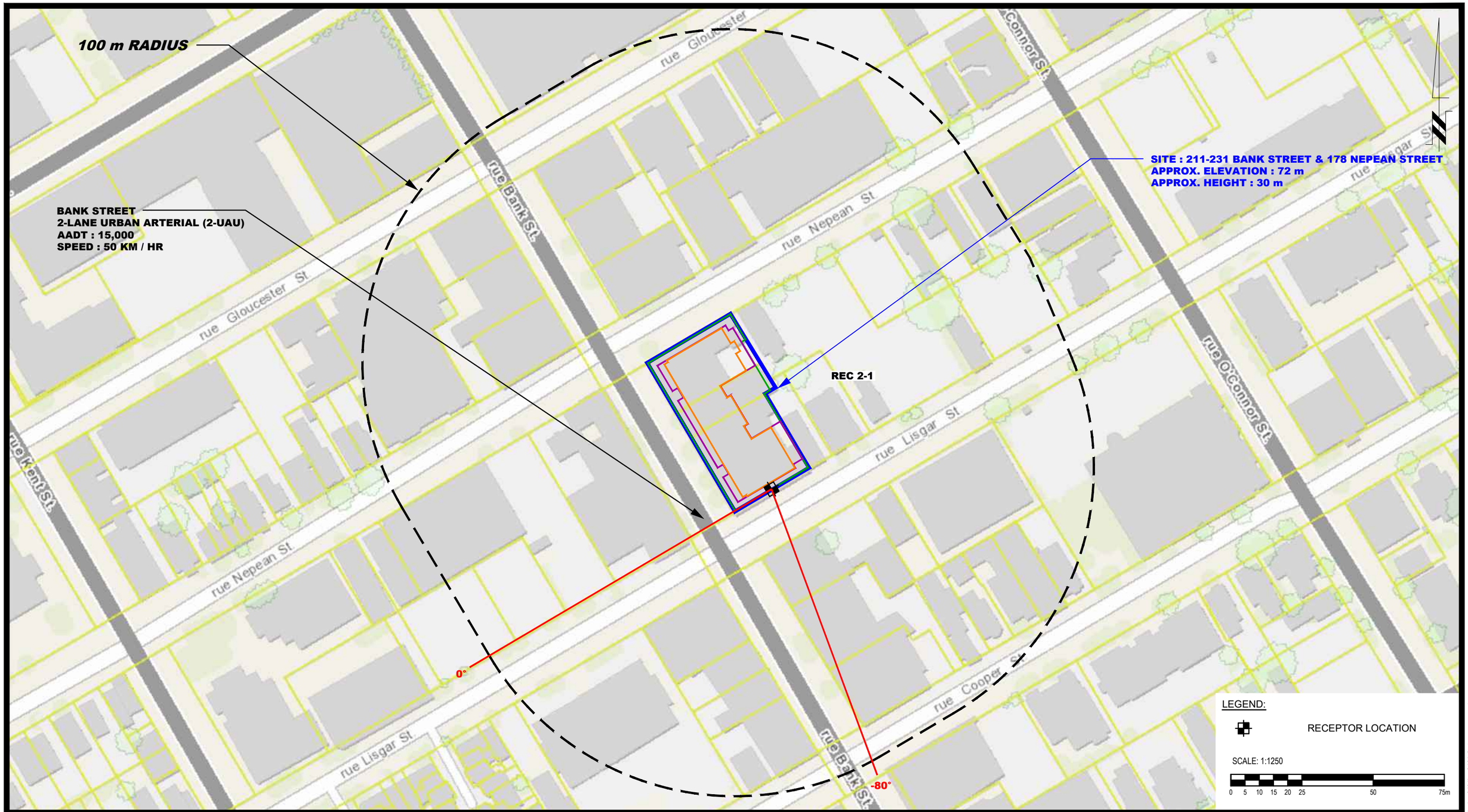

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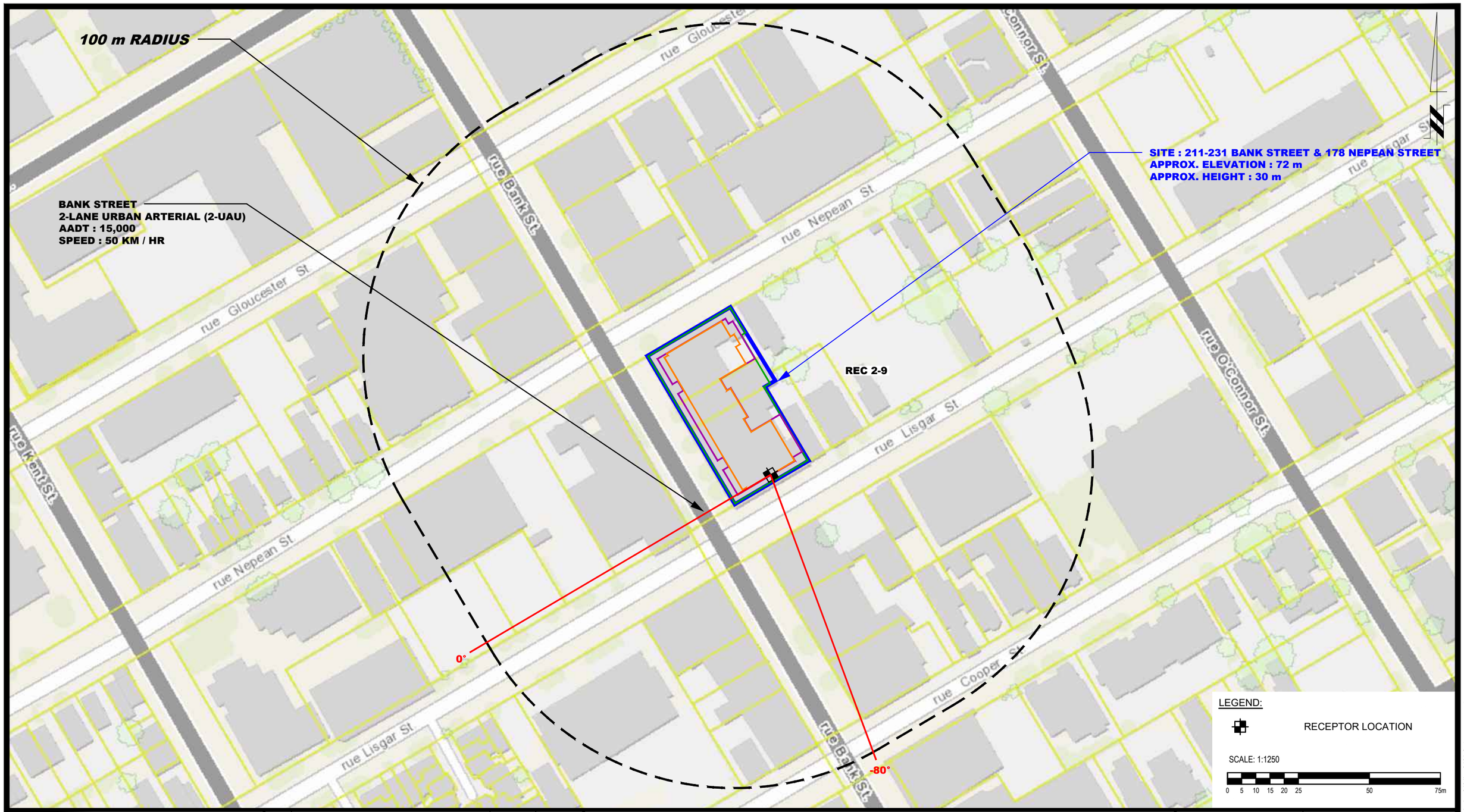

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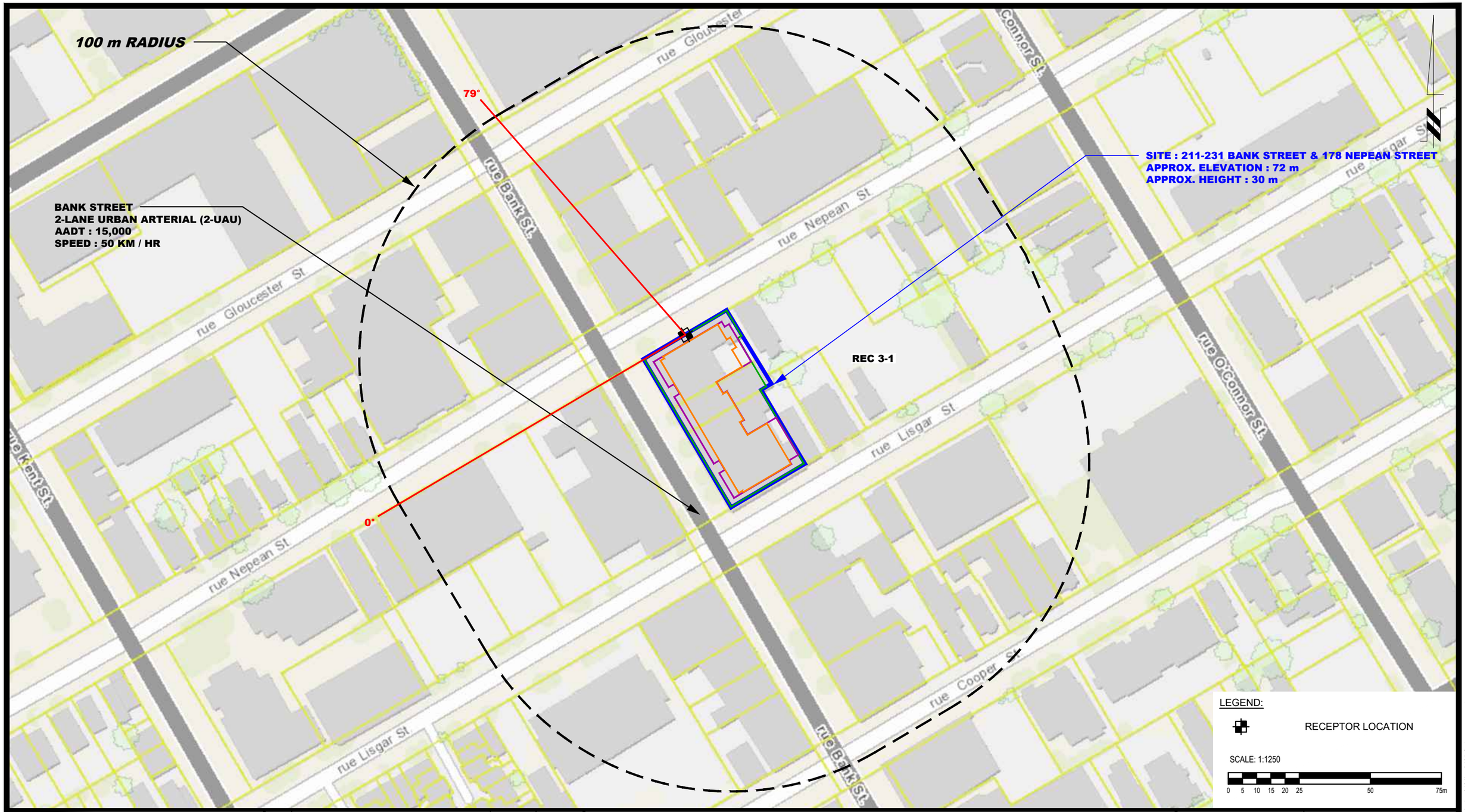

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SMART LIVING PROPERTIES

NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
211-231 BANK STREET AND 178 NEPEAN STREET

OTTAWA, ONTARIO

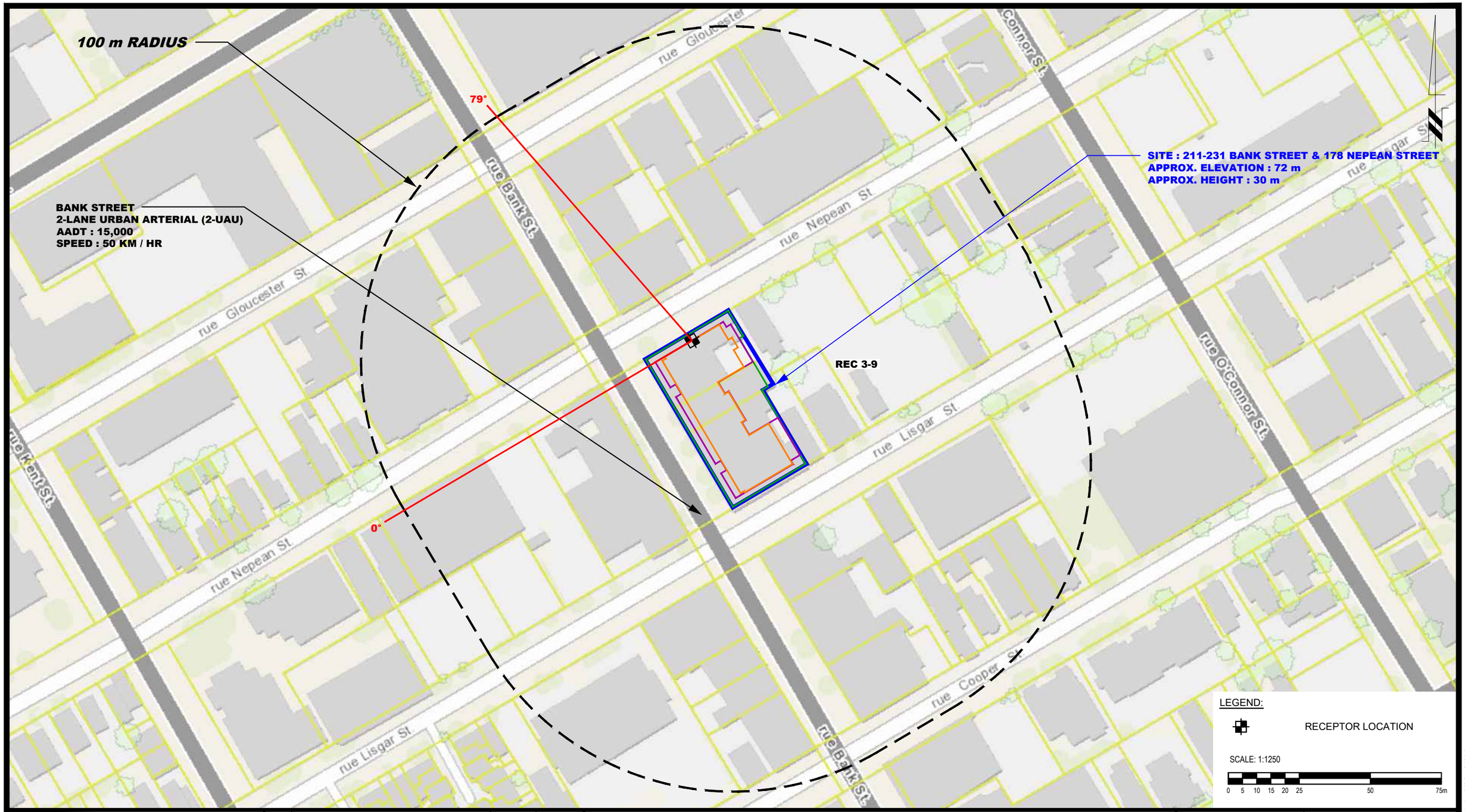
Title:

SITE GEOMETRY - REC 3-1

Scale: 1:1250	Date: 11/2022
Drawn by: YA	Report No.: PG6491-1
Checked by: YT	Dwg. No.: PG6491-3E
Approved by: SB	Revision No.:

11x17

p:\autocad drawings\geotechnical\pg64xx\pg6491\pg6491-3-site geometry.dwg



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

NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
211-231 BANK STREET AND 178 NEPEAN STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 3-9

Scale: 1:1250	Date: 11/2022
Drawn by: YA	Report No.: PG6491-1
Checked by: YT	Dwg. No.: PG6491-3F
Approved by: SB	Revision No.:

11x17

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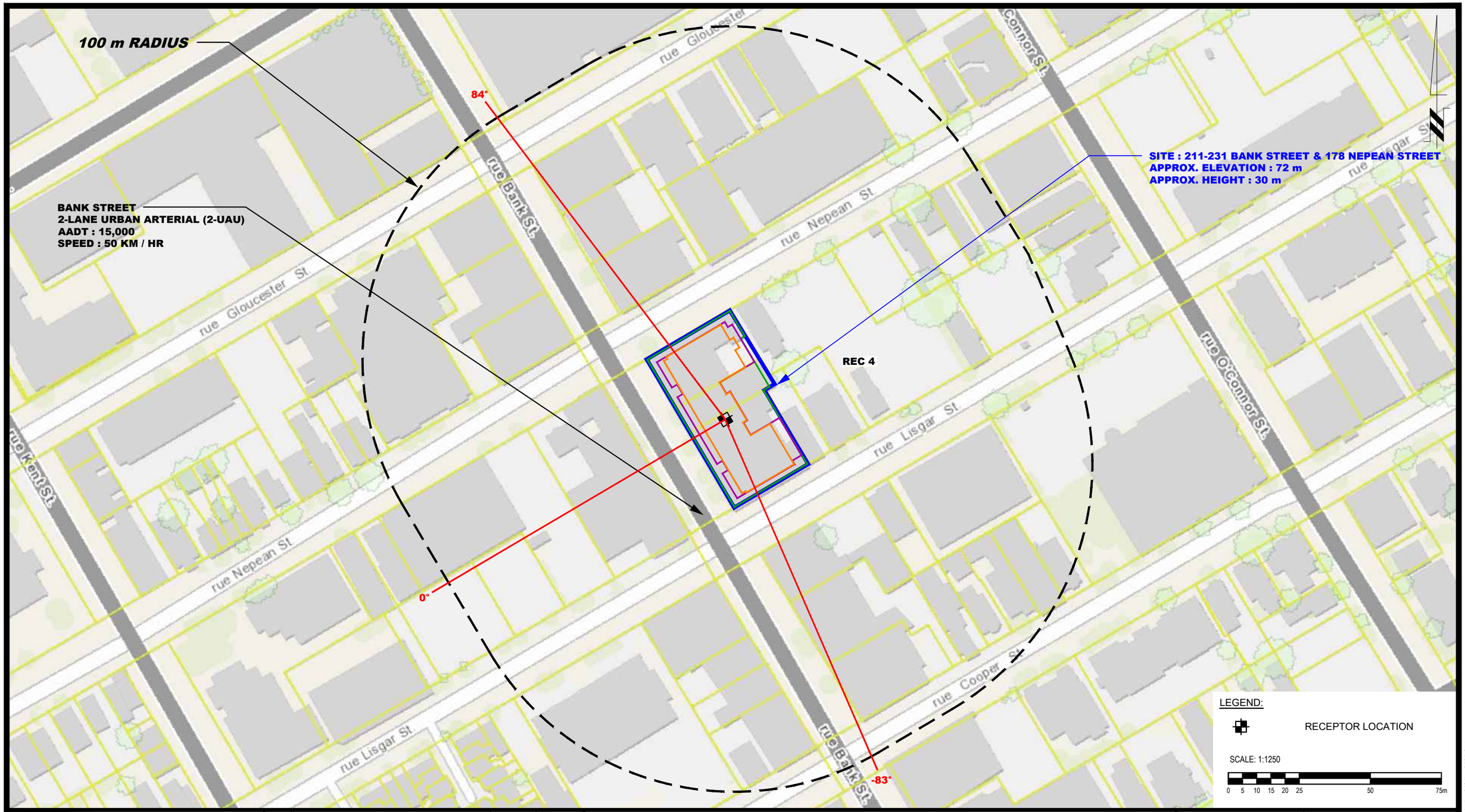

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
211-231 BANK STREET AND 178 NEPEAN STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4

Scale: 1:1250	Date: 11/2022
Drawn by: YA	Report No.: PG6491-1
Checked by: YT	Dwg. No.: PG6491-3G
Approved by: SB	Revision No.:

11x17

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 15:51:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -88.00 deg 88.00 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

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 67.01 + 0.00) = 67.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-88	88	0.66	68.48	0.00	0.00	-1.47	0.00	0.00	0.00	67.01

Segment Leq : 67.01 dBA

Total Leq All Segments: 67.01 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 59.42 + 0.00) = 59.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-88	88	0.66	60.88	0.00	0.00	-1.47	0.00	0.00	0.00	59.42

Segment Leq : 59.42 dBA

Total Leq All Segments: 59.42 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 67.01
(NIGHT): 59.42

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 15:54:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec19.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 1-9

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

Angle1 Angle2 : -86.00 deg 86.00 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 : 28.50 / 28.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 68.28 + 0.00) = 68.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	86	0.00	68.48	0.00	0.00	-0.20	0.00	0.00	0.00	68.28

Segment Leq : 68.28 dBA

Total Leq All Segments: 68.28 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 60.69 + 0.00) = 60.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	86	0.00	60.88	0.00	0.00	-0.20	0.00	0.00	0.00	60.69

Segment Leq : 60.69 dBA

Total Leq All Segments: 60.69 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 68.28
(NIGHT): 60.69

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 15:56:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -80.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 61.81 + 0.00) = 61.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	0	0.66	68.48	0.00	-2.07	-4.60	0.00	0.00	0.00	61.81

Segment Leq : 61.81 dBA

Total Leq All Segments: 61.81 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 54.21 + 0.00) = 54.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	0	0.66	60.88	0.00	-2.07	-4.60	0.00	0.00	0.00	54.21

Segment Leq : 54.21 dBA

Total Leq All Segments: 54.21 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 61.81
(NIGHT): 54.21

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 15:58:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec29.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 2-9

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

Angle1 Angle2 : -80.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 28.50 / 28.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 63.71 + 0.00) = 63.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	0	0.00	68.48	0.00	-1.25	-3.52	0.00	0.00	0.00	63.71

Segment Leq : 63.71 dBA

Total Leq All Segments: 63.71 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 56.11 + 0.00) = 56.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	0	0.00	60.88	0.00	-1.25	-3.52	0.00	0.00	0.00	56.11

Segment Leq : 56.11 dBA

Total Leq All Segments: 56.11 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 63.71
(NIGHT): 56.11

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 16:01:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 0.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 61.79 + 0.00) = 61.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.66	68.48	0.00	-2.07	-4.62	0.00	0.00	0.00	61.79

Segment Leq : 61.79 dBA

Total Leq All Segments: 61.79 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 54.19 + 0.00) = 54.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.66	60.88	0.00	-2.07	-4.62	0.00	0.00	0.00	54.19

Segment Leq : 54.19 dBA

Total Leq All Segments: 54.19 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 61.79
(NIGHT): 54.19

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 16:02:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec39.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3-9

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

Angle1 Angle2 : 0.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 28.50 / 28.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank St (day)

Source height = 1.50 m

ROAD (0.00 + 63.65 + 0.00) = 63.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.00	68.48	0.00	-1.25	-3.58	0.00	0.00	0.00	63.65

Segment Leq : 63.65 dBA

Total Leq All Segments: 63.65 dBA

↟
Results segment # 1: Bank St (night)

Source height = 1.50 m

ROAD (0.00 + 56.06 + 0.00) = 56.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.00	60.88	0.00	-1.25	-3.58	0.00	0.00	0.00	56.06

Segment Leq : 56.06 dBA

Total Leq All Segments: 56.06 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 63.65
(NIGHT): 56.06
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 16:05:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec4.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 4

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

Angle1 Angle2 : -83.00 deg 84.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 31.50 / 31.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -83.00 deg Angle2 : 84.00 deg
Barrier height : 30.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 72.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

↑
Results segment # 1: Bank St (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       31.50 !       16.50 !        88.50

ROAD (0.00 + 47.54 + 0.00) = 47.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -83     84   0.00  68.48   0.00  -1.25  -0.33   0.00   0.00 -19.37  47.54
-------------------------------------------------------------------------------

Segment Leq : 47.54 dBA

Total Leq All Segments: 47.54 dBA

↟
Results segment # 1: Bank St (night)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       31.50 !       16.50 !        88.50

ROAD (0.00 + 39.94 + 0.00) = 39.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -83     84   0.00  60.88   0.00  -1.25  -0.33   0.00   0.00 -19.37  39.94
-------------------------------------------------------------------------------

Segment Leq : 39.94 dBA

Total Leq All Segments: 39.94 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 47.54
                          (NIGHT): 39.94
↟
↟
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