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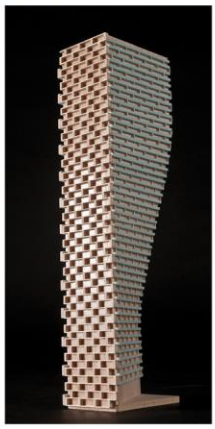
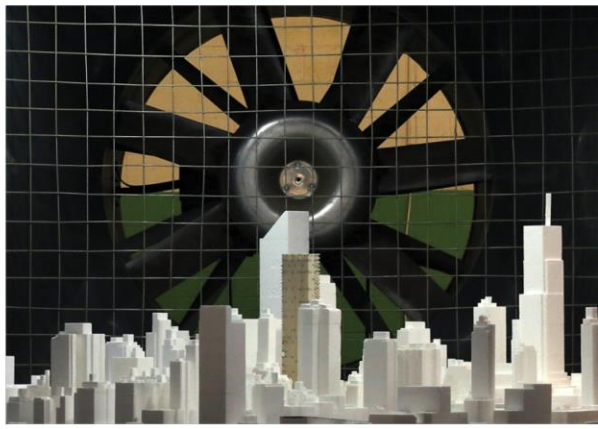
ROADWAY TRAFFIC & AIRCRAFT NOISE FEASIBILITY ASSESSMENT

3930 & 3960 Riverside Drive
Ottawa, Ontario

GRADIENT WIND REPORT: 18-039 – Roadway Traffic & Aircraft Noise





December 22, 2022

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EXECUTIVE SUMMARY

This report describes a roadway traffic and aircraft noise feasibility assessment in support of a Zoning-By-law Amendment (ZBA) and Draft Plan of Subdivision applications for the property located at 3930 and 3960 Riverside Drive in Ottawa, Ontario. The proposed development comprises 77 serviced for-sale residential lots, containing both single-family homes and townhomes, and 4 lots for future midrise residential buildings.

The major sources of noise include: Riverside Drive, Hunt Club Road, and the Ottawa Macdonald-Cartier International Airport. The development resides within the Airport Vicinity Development Zone between the Airport Operating Influencing Zone (i.e., Noise Exposure Forecast (NEF) or Noise Prediction Forecast (NEP) 30 contour) and the NEF 25 contour. Figure 1 illustrates the site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings provided by Hobin Architecture, dated November 2022.

Noise levels at the lots reserved for townhomes and single-family homes are below 65 dBA, assuming massing of the midrise buildings are not present. Therefore, standard building components in compliance with the Ontario Building Code are sufficient to attenuate noise when windows are closed. Results also indicate that select lots where noise levels range between 55 dBA and 65dBA will require forced air heating with provisions for air conditioning, as summarized in Section 6. Furthermore, noise barrier will be required for rear yards where noise levels exceed 55 dBA. Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements for all buildings.

Noise levels at buildings T1-T4 exceed the 65dBA criterion; therefore, upgraded building component with higher Sound Transmission Class (STC) ratings will be required at select facades. Furthermore, air conditioning, or a similar mechanical system, will be required to keep a comfortable indoor living environment when windows are open. Warning Clauses will also be required be placed on all Lease,

Purchase and Sale Agreements for all buildings. If the podium roofs were to be used as an outdoor amenity space, noise barriers protecting these areas will be required.

For aircraft fly-overs, sound exposure will approach the NEF/ NEP 30 which is equivalent to a 24 hour L_{eq} of 62 dBA outside the buildings. The noise inside the dwellings would need to be reduced to 32 dBA for bedrooms and 37 dBA for indoor living rooms. Typical commercial windows with STC rating of 35 is expected to be sufficient to attenuate aircraft noise. A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each of the midrise buildings. For the townhomes and single-family homes, prescribed measures for aircraft noise should be followed as outlined in the ENCG Part 6.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed midrise blocks on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment. Stationary noise studies for the townhomes and single-family homes are not required, as associated mechanical equipment are small air conditioning units.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by St. Mary's Lands Corporation, care of Taggart Realty Management, to undertake a roadway traffic and aircraft noise feasibility assessment for the property located at 3930 and 3960 Riverside Drive in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local roadway traffic and aircraft overpass.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on architectural drawings provided by Hobin Architecture, dated December 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications. Assessment of aircraft noise has been assessed based on its proximity to the airport and the nearest Noise Exposure Forecast contour line, as per Annex 10 in the City of Ottawa's Official Plan (OP).

2. TERMS OF REFERENCE

The subject site is located at 3930 and 3960 Riverside Drive in Ottawa; situated on a parcel of land at the northwest intersection of Riverside Drive and Hunt Club Road, bordered by Uplands Riverside Park to the north, Riverside Drive to the east, Hunt Club Road to the south, and the Rideau River and green space to the west. Figure 1 illustrates the site plan with surrounding context. Appendix A illustrates the complete community site plan.

The proposed development comprises four residential towers topped with mechanical penthouse (MPH) levels, T1, T2, T3, and T4, situated from the east clockwise to the south of the subject site, respectively, single homes to the west and at the northwest corner, and townhomes throughout the remainder of the subject site. Parks are situated at the northwest and at the northeast corner of the subject site. A laneway situated along the east side of the subject site provides access from Riverside Drive to the internal

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

laneways serving the subject site; a central east-west laneway, which includes a round-a-bout situated to the southwest of T1, and a continuous laneway encompassing central townhouses.

T1 comprises a 17-storey residential building inclusive of a four-storey podium. The building steps back from the north clockwise to the southwest corner at Level 5 to accommodate an amenity terrace. The MPH level is also served by an amenity terrace.

T2 comprises a 14-storey residential building inclusive of a five-storey podium. The building steps back from the northwest corner clockwise to the south at Level 6 to accommodate an amenity terrace. The MPH level is also served by an amenity terrace.

T3 comprises an 11-storey residential building inclusive of a five-storey podium. The building steps back from the north clockwise to the southwest corner at Level 6 to accommodate an amenity terrace. The MPH level is also served by an amenity terrace.

T4 comprises a nine-storey residential building inclusive of a five-storey podium. The building steps back from the east clockwise to the northwest corner at Level 6 to accommodate an amenity terrace. The MPH level is also served by an amenity terrace.

With regard to stationary noise impacts, a stationary noise study is recommended for the midrise blocks during the detailed design once mechanical plans for the proposed buildings become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed midrise builidngs on surrounding noise sensitive areas, and the development itself. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway and aircraft traffic, and (ii) ensure that interior noise do not exceed the

allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic by that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

The ENCG specifies that surface transportation noise (road and rail) and airport noise should be evaluated separately. The overall building attenuation parameters are then combined. Section 4.2 and 4.3 addresses the methodology for the evaluation of roadway/railway and aircraft noise, respectively.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for retail space, living rooms and sleeping quarters, respectively, for roadway traffic as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

Type of Space	Time Period	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[6].

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[7] which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Class	Speed Limit (km/h)	Traffic Volumes
Hunt Club Road	4-Lane Urban Arterial-Divided (4-UAD)	80	**35,000**
Riverside Drive	4-Lane Urban Arterial-Divided (4-UAD)	80	**35,000**

4.2.3 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs: Predictor-Lima and STAMSON 5.04. To provide a general understanding of noise across the site, the employed software program was Predictor-Lima, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This computer program is capable of representing three-dimensional surface and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid was placed across the subject site, along with a number of discrete receptors at key sensitive areas. Although this program is useful for outputting noise contours, it is not the approved calculation method for roadway predictions by the City of Ottawa. Therefore, the results were confirmed by performing discrete noise calculations with the MECP computerized noise assessment program, STAMSON 5.04, at two sample receptor locations. Appendix B includes the STAMSON 5.04 input and output data.

[7] City of Ottawa Transportation Master Plan, November 2013

Roadway noise calculations were performed by treating each road segment as a separate line source of noise, and by using existing buildings as noise barriers. In addition to the traffic volumes summarized in Table 1, theoretical noise predictions were based on the following parameters:

- The day/night split was taken to be 92%/8% respectively for all streets.
- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be flat/gentle slope surrounding the subject site.
- For select sources where appropriate, the receptors considered the proposed buildings and surrounding, existing buildings as barriers, partially or fully obstructing exposure to the source.

4.3 Aircraft Traffic Noise

4.3.1 Criteria for Aircraft Noise

As per the City of Ottawa, the ENCG[8] establishes the sound level criteria for aircraft noise with reference to the Ottawa Macdonald Cartier International Airport located near the intersection of Hunt Club Road and Limebank Road. There are four vicinity zones surrounding the Ottawa Macdonald Cartier International Airport that indicate the intensity of the noise levels within the area illustrated in the Annex 10 - Land Use Constraints Due to Aircraft Noise[9]. Noise generated from aircraft traffic is represented as Effective Perceived Noise Levels (EPNL), a unit of noise measurement that accounts for variations in the human perception of pure tones and noise duration. Plotted EPNL around airports are represented by Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) contours which represent the current and future operations of the airport.

The NEF / NEP (NEP) contour lines define the region around the airport exposed to various levels of aircraft noise impacting noise sensitive areas, ranging from low to high outdoor noise levels. The Ottawa Airport Vicinity Development Zone is the furthest zone around the airport. Beyond NEF/NEP 25, aircraft noise is considered insignificant. The Airport Operating Influencing Zone (AOIZ) is the region representing 30 NEF/NEP contour where the noise levels have increased and will cause noise disruption to noise sensitive

[8] City of Ottawa Environmental Noise Control Guidelines, January 2016
[9] City of Ottawa Official Plan – Annex 10 (Land Use Constraints Due to Aircraft Noise)

developments. No new noise sensitive development is allowed with in the AOIZ except for infill development. For infill developments residing within the Airport Operating Influencing Zone (AOIZ), the ENCG inquires that a noise assessment is to be performed to ensure that noise mitigation measures are incorporated into the building design[10]. The composite line noise contour NEF/NEP 35 illustrates the area closest to the airport and is where the highest noise levels occur. Within this region, new developments are not permitted to be constructed in the outlined vicinity.

According to accepted research[11], Health and Welfare Canada states that people continuously exposed to NEF/NEP values less than 35 will not suffer adverse physical or psychological effects. Sociological surveys[12] have indicated that negative community reactions to noise levels may start at about 25 NEF/NEP. Table 3 identifies the sound level criteria for relevant indoor spaces exposed to aircraft noise. Where developments are within the AOIZ, building components must be designed to achieve the indoor criteria outlined in Table 3.

TABLE 3: INDOOR AIRCRAFT SOUND LEVEL CRITERIA[13]

Type of Space	NEF/NEP	L_{eq} (dBA)
General offices, reception areas, retail stores, etc.	15	47
Individual or semi-private offices, conference rooms, etc.	10	42
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, Sleeping quarters of hotels/motels	5	37
Sleeping quarters of **residences**, hospitals, nursing/retirement homes, etc.	0	32

[10] City of Ottawa Official Plan
[11] CMHC, Road & Rail Noise: Effects on Housing
[12] Noise in Urban and Suburban Areas. Bolt, Beanik and Newman, Inc., Washington, January 1967
[13] City of Ottawa Environmental Noise Control Guidelines, January 2016

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

Noise levels at lots occupied by single family homes and townhomes were assessed without consideration of the residential buildings T1-T4. Eight receptors were placed around the study site, as seen in Figure 2. In this scenario, noise levels at the building facades will range between 45 and 63 dBA during the daytime period (07:00-23:00) and between 40 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (63 dBA) occurs at the south facade of Unit 68, which is nearest and most exposed to Hunt Club Road. Figures 3 and 4 illustrate daytime and nighttime noise contours throughout the site 4.5 m above grade. Table 4 (below) shows the noise levels at discrete receptors R1-R8 representing the townhome and single-family homes (low-rise).

TABLE 4: EXTERIOR ROADWAY NOISE LEVELS AT LOW RISE DEVELPMENT

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
R1	4.5	POW – Townhome, Unit 68 – South Façade	63	56
R2	4.5	POW –Townhome, Unit 68 – East Façade	59	51
R3	4.5	POW – Townhome, Unit 68 – West Façade	63	55
R4	4.5	POW – Single Family Home – Unit 56 – South Façade	61	53
R5	4.5	POW – Single Family Home – Unit 56 – East Façade	60	53
R6	1.5	OLA – Unit 56 Rear Yard	56	N/A
R7	1.5	OLA – Unit 74 Rear Yard	56	N/A
R8	1.5	OLA – Unit 68 Rear Yard	60	N/A

The noise levels predicted due to roadway traffic do not exceed to criteria listed in Section 4.2 for building components. As such, standard building components in compliance with Ontario Building Standards will be sufficient to attenuate noise levels when windows are closed. At units where noise levels fall between 55dBA and 65dBA, forced air heating with provision for air conditioning will be required. According to the results, units 1-6, 12-19, 25-77, will have this requirement.

Regarding OLAs, noise control measures as described below (subscribing to Table 2.3a in the ENCG and listed in order of preference) will be required to reduce the L_{eq} to 55 dBA at some receptors:

- Distance setback with soft ground
- Insertion of noise insensitive land uses between the source and sensitive points of reception
- Orientation of buildings to provide sheltered zones in rear yards
- Shared outdoor amenity areas
- Earth berms (sound barriers)
- Acoustic barriers

Examining the noise control measures listed above, these conclusions consider the possibility that not all of the proposed buildings will be oriented to provide screening elements for outdoor living areas against roadway traffic sources. Distance setback, insertion of non-noise sensitive land uses, and building orientation to provide sheltered zones in rear yards may not be feasible. It is also not feasible to have shared outdoor amenity areas for this development with respect to rear yards, as this would have a significant impact on marketability. Therefore, the most feasible measures are insertion of earth berms or acoustic wall barriers between the sensitive rear yards and sources of transportation noise. Both options have the ability to reduce OLA noise levels to below 55 dBA. Potential noise barrier locations can be seen in Figure 5. Actual noise barrier locations will be addressed at a future stage.

The noise levels of T1-T4 at select locations can be seen in Table 5. Receptor locations can be seen in Figure 6. Noise levels at the building facades will range between 60 and 70 dBA during the daytime period (07:00-23:00) and between 58 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the east façade of T2, which is nearest and most exposed to Riverside Drive. Figures 7 and 8 illustrate daytime and nighttime noise contours throughout the site 4.5 m above grade.

TABLE 5: EXTERIOR ROADWAY NOISE LEVELS AT MID RISE DEVELOPMENT

Receptor Number	Absolute Receptor Height (m)	Receptor Location	Noise Level (dBA)	
			Day	Night
R9	13.5	POW – T4 – Podium, West façade	65	58
R10	13.5	POW – T4 – Podium, South façade	68	60
R11	1.5*	OLA – T4 – Potential Level 6 Amenity Area	60	N/A
R12	25.5	POW – T2 –East Façade	70	62
R13	1.5*	OLA – T1 – Potential Level 6 Amenity Area	66	N/A

Upgraded building components, including STC rated glazing elements and exterior walls, will be required at selected facades nearest to arterial roadways where noise levels due to roadway traffic exceed 65 dBA, as discussed in Section 4.2.1. Results also indicate that all four buildings will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required to be placed on all Lease, Purchase, and Sale Agreements. Specific noise control measures can be developed once the design of the buildings has progressed sufficiently, typically at the time of the site plan control application.

The results indicate that noise levels at the potential podium amenity areas are expected to be above 55 dBA. As such, noise mitigation in these areas will be required. Potential noise barrier locations for outdoor amenity areas associated with T1-T4 can be seen in Figure 9.

5.1.1 Correlation Calculations

Table 6 shows a comparison between the calculated noise levels using Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±1-3dBA. Appendix B includes the STAMSON 5.04 input and output data. Figure 10 shows the STAMSON parameters used in the calculations.

TABLE 6: RESULT CORRELATION BETWEEN PREDICTOR AND STAMSON

Receptor Number	Receptor Location	Height above Grade (m)	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R3	POW – Townhome, Unit 68 – West Façade	4.5	66	58	63	56
R9	POW – T4 – Podium, West façade	13.5	68	60	65	58

5.1.2 Aircraft Traffic Noise Levels

The site is situated up against the NEF/ NEP 30 contour which has an equivalent 24-hour L_{eq} of 62 dBA outside the buildings. Location of the study site in relation to the aircraft noise composite lines can be seen in Figure 11. The noise inside the dwellings would need to be reduced to 32 dBA for bedrooms and 37 dBA for indoor living rooms. Typical commercial windows with STC rating of 35 is expected to be sufficient to attenuate aircraft noise. A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each building.

6. CONCLUSIONS AND RECOMMENDATIONS

Noise levels at the lots reserved for townhomes and single-family homes are below 65 dBA, assuming that the massing for the mid-rise buildings is not present. Therefore, standard building components in compliance with the Ontario Building Code are sufficient to attenuate noise when windows are closed. Due to the limited information available at the time of the study, which was prepared for a ZBA and Plan of Subdivision applications submission, detailed STC calculations could not be performed at this time. A detailed review of the window and wall assemblies should be performed by a qualified engineer with expertise in acoustics during the detailed design stage of each building.

Results also indicate that units 1-6, 12-19, 25-77 will require forced air heating with provisions for air conditioning. Furthermore, noise barrier will be required for rear yards where noise levels exceed 55 dBA, as seen in Figure 5. Warning Clause Type C will also be required be placed on all Lease, Purchase and Sale Agreements for the above-mentioned lots.

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."*

Noise levels at buildings T1-T4 exceed the 65 dBA criterion; therefore, upgraded building component with higher Sound Transmission Class (STC) ratings will be required at select facades. If the podium roofs were to be used as an outdoor amenity space, noise barriers protecting these areas will be required. Furthermore, air conditioning, or a similar mechanical system, will be required to keep a comfortable indoor living environment when windows are open. Warning Clause Type D will also be required be placed on all Lease, Purchase and Sale Agreements for all buildings, as seen below:

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."*

For aircraft fly-overs, sound exposure will approach the NEF/ NEP 30 which is equivalent to a 24 hour L_{eq} of 62 dBA outside the buildings. The noise inside the dwellings would need to be reduced to 32 dBA for bedrooms and 37 dBA for indoor living rooms. Typical commercial windows with STC rating of 35 is expected to be sufficient to attenuate aircraft noise. A detailed noise assessment will be required at the time of site plan approval to determine specific noise control measures for each of the midrise buildings. For the townhomes and single-family homes, prescribed measures for aircraft noise should be followed

as outlined in the ENCG Part 6. Due to aircraft noise the following warning clause will be required on all Lease, Purchase and Sale Agreements for all buildings:

> *Purchasers/building occupants are forewarned that this property/dwelling unit is located in a noise sensitive area due to its proximity to Ottawa Macdonald-Cartier International Airport. In order to reduce the impact of aircraft noise in the indoor spaces, the unit has been designed and built to meet provincial standards for noise control by the use of components and building systems that provide sound attenuation. In addition to the building components (i.e. walls, windows, doors, ceiling-roof), since the benefit of sound attenuation is lost when windows or doors are left open, this unit has been fitted with a forced air heating system, all components of which are sized to accommodate the future installation of central air conditioning-by the owner/occupant.*
>
> *Despite the inclusion of noise control features within the dwelling unit, noise due to aircraft operations may continue to interfere with some indoor activities and with outdoor activities, particularly during the summer months. The purchaser/building occupant is further advised that the Airport is open and operates 24 hours a day, and that changes to operations or expansion of the airport facilities, including the construction of new runways, may affect the living environment of the residents of this property/area.*
>
> *The Ottawa Macdonald-Cartier International Airport Authority, its acoustical consultants and the City of Ottawa are not responsible if, regardless of the implementation of noise control features, the purchaser/occupant of this dwelling finds that the noise levels due to aircraft operations continue to be of concern or are offensive.*

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed block become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed block on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level located on the high roof, noise levels on the surrounding noise sensitive

properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

This concludes our noise assessment. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

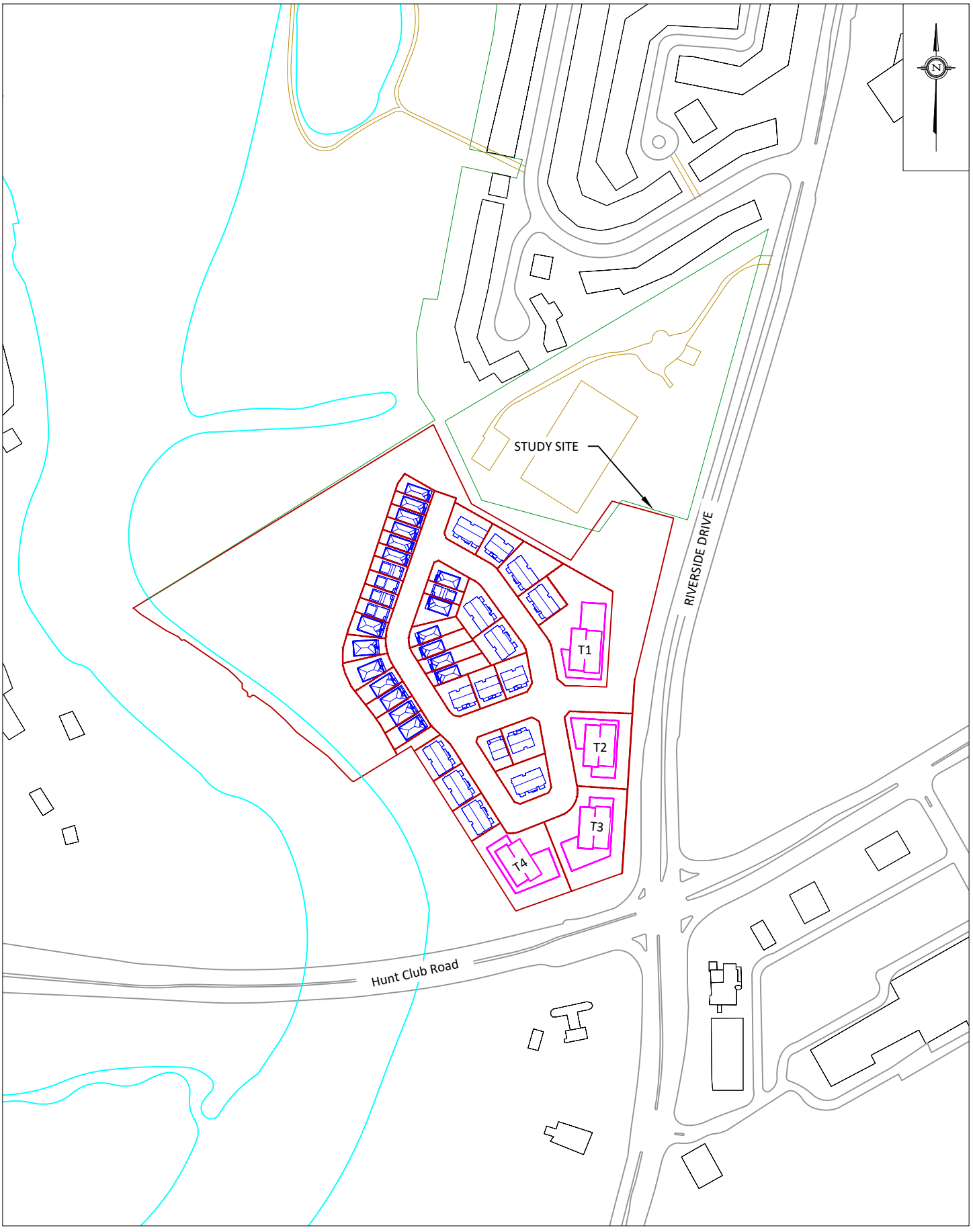
Sincerely,

Gradient Wind Engineering Inc.

Essraa Alqassab, BASc
Junior Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

GW18-039 -Traffic & Aircraft Noise



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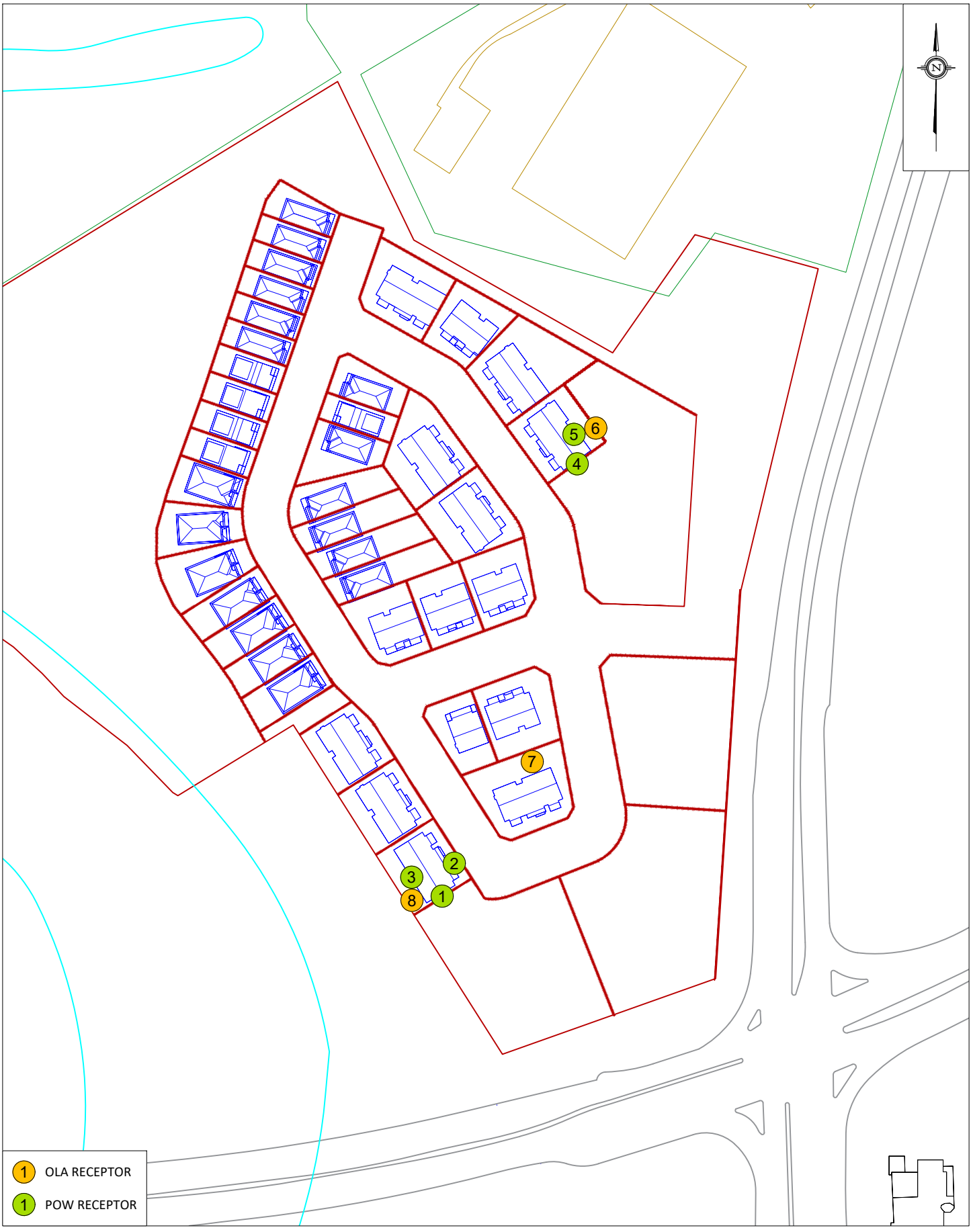
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:4000 (APPROX.)	DRAWING NO.	GW18-039-1
DATE	DECEMBER 8, 2022	DRAWN BY	E.A.

DESCRIPTION

FIGURE 1:
COMPLETE SITE PLAN AND SURROUNDING CONTEXT



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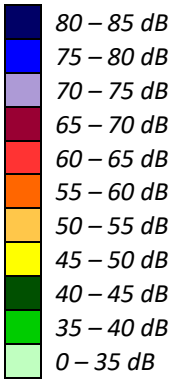
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW18-039-2
DATE	DECEMBER 8, 2022	DRAWN BY	E.A.

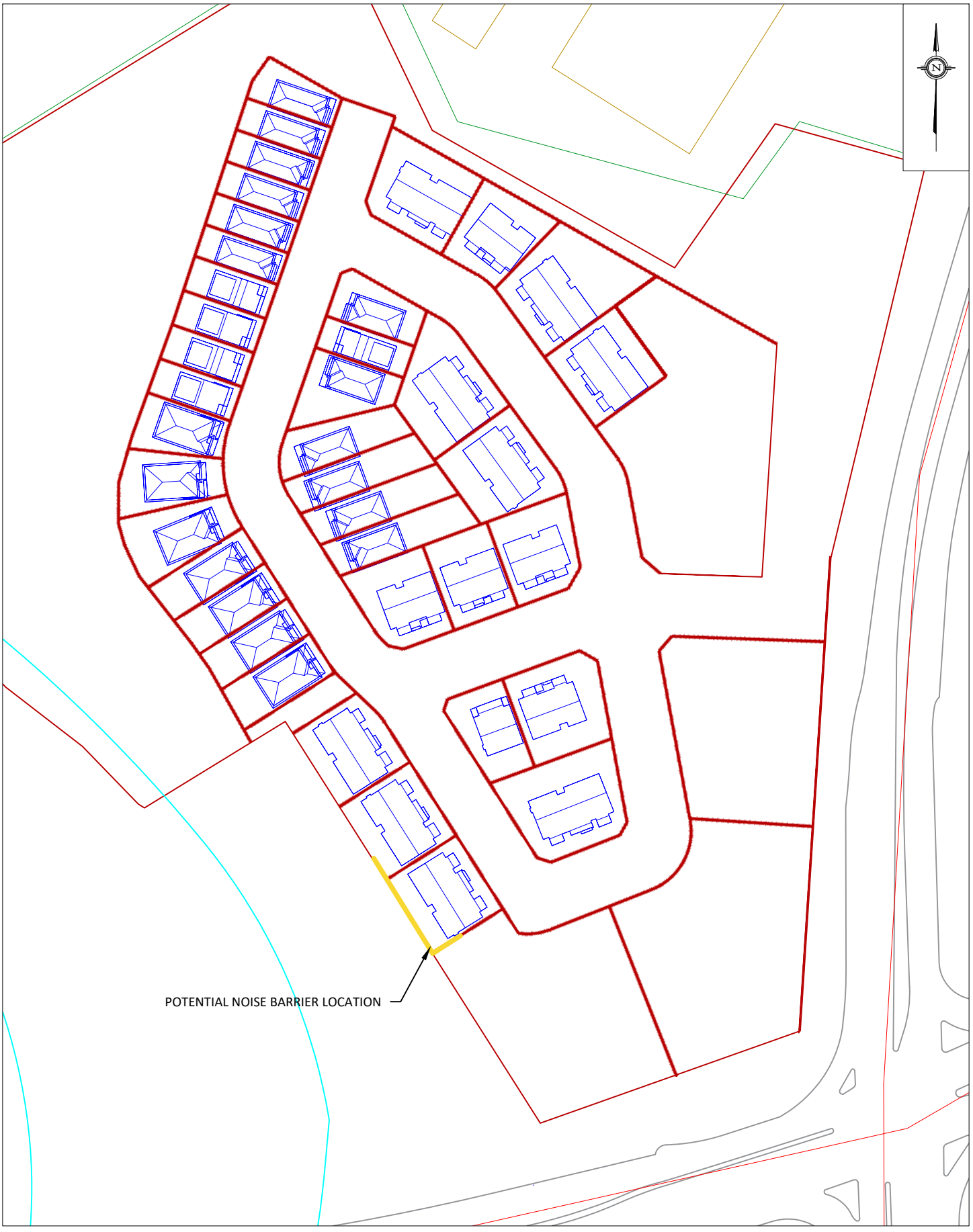
FIGURE 2:
RECEPTOR LOCATIONS- WITHOUT T1-T4

FIGURE 3: DAYTIME TRAFFIC NOISE CONTOURS, LOW-RISE ONLY (4.5 M ABOVE GRADE)

80 – 85 dB
75 – 80 dB
70 – 75 dB
65 – 70 dB
60 – 65 dB
55 – 60 dB
50 – 55 dB
45 – 50 dB
40 – 45 dB
35 – 40 dB
0 – 35 dB

FIGURE 4: NIGHTTIME TRAFFIC NOISE CONTOURS, LOW-RISE ONLY (4.5 M ABOVE GRADE)





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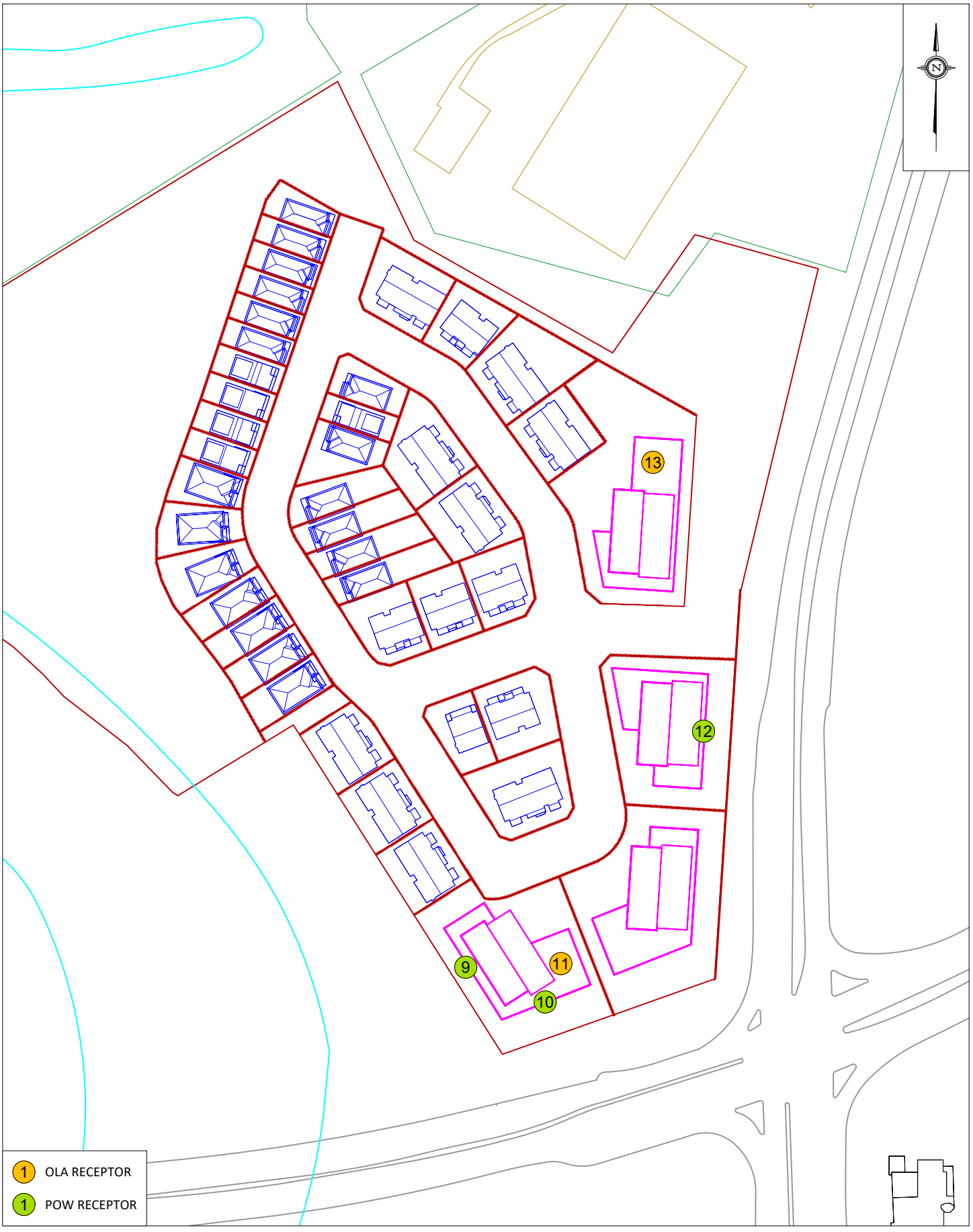
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW18-039-5
DATE	DECEMBER 8, 2022	DRAWN BY	E.A.

FIGURE 5:
POTENTIAL NOISE BARRIER LOCATION - REAR YARDS



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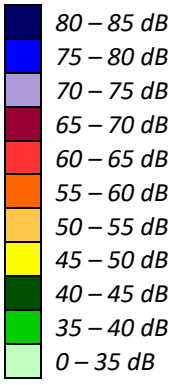
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW18-039-6
DATE	DECEMBER 8, 2022
DRAWN BY	E.A.

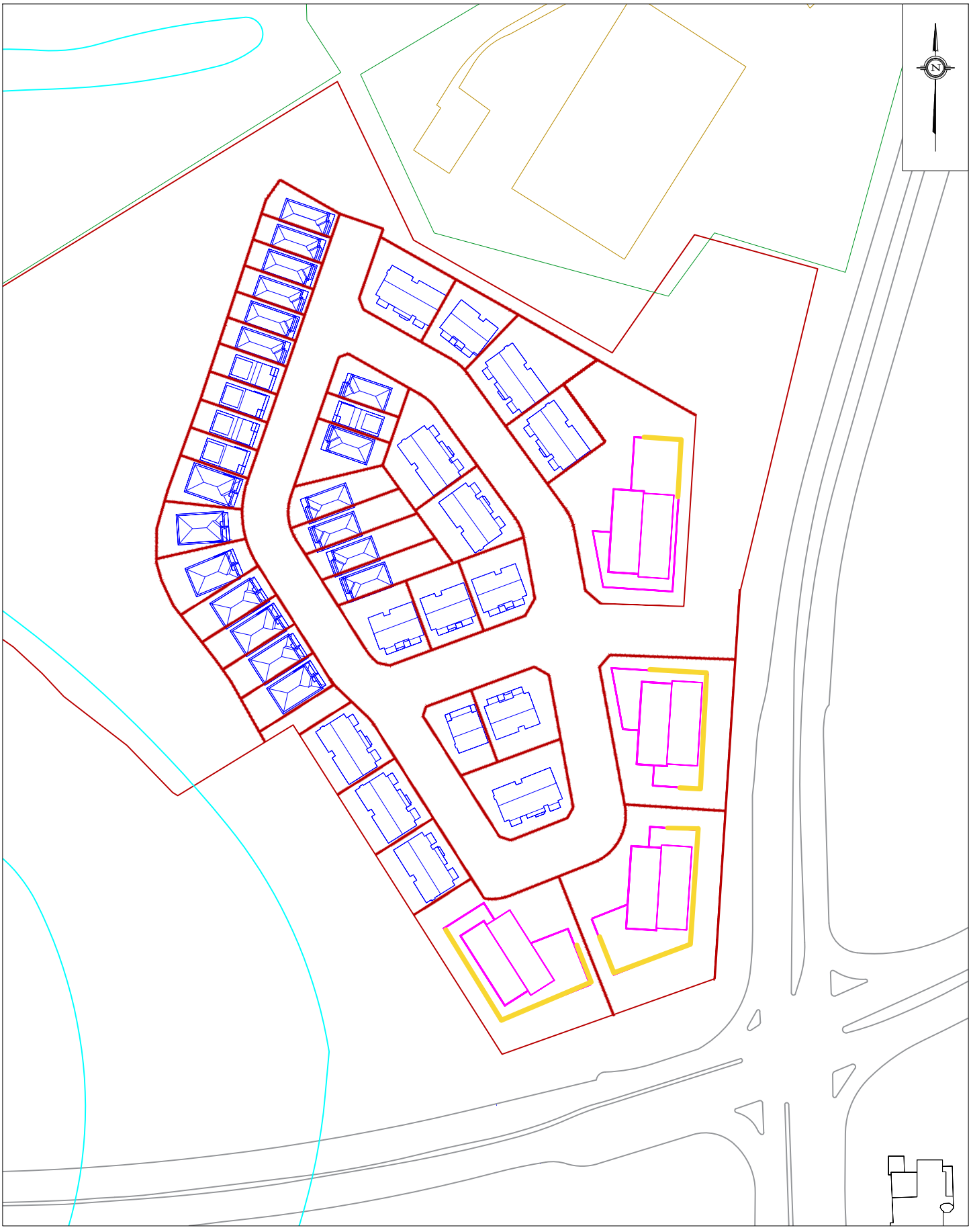
DESCRIPTION

FIGURE 6:
RECEPTOR LOCATIONS - T1-T4

FIGURE 7: DAYTTIME TRAFFIC NOISE CONTOURS, WITH MID-RISE (4.5 M ABOVE GRADE)

FIGURE 8: NIGHTTIME TRAFFIC NOISE CONTOURS, WITH MID-RISE (4.5 M ABOVE GRADE)





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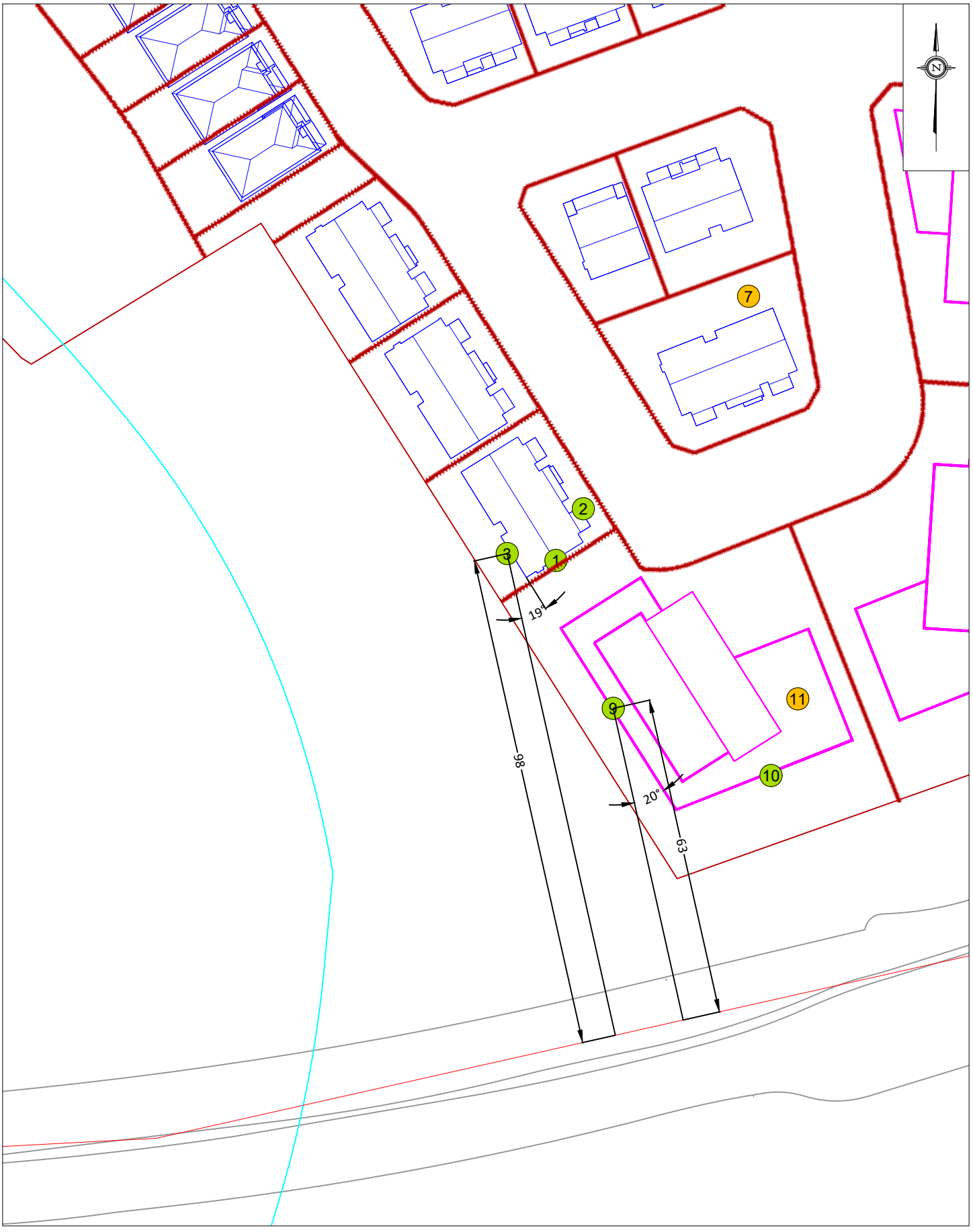
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW18-039-9
DATE	DECEMBER 8, 2022	DRAWN BY	E.A.

DESCRIPTION

FIGURE 9:
POTENTIAL NOISE BARRIERS-ROOFTOP AMENITY AREAS ASSOCIATED WITH T1-T4



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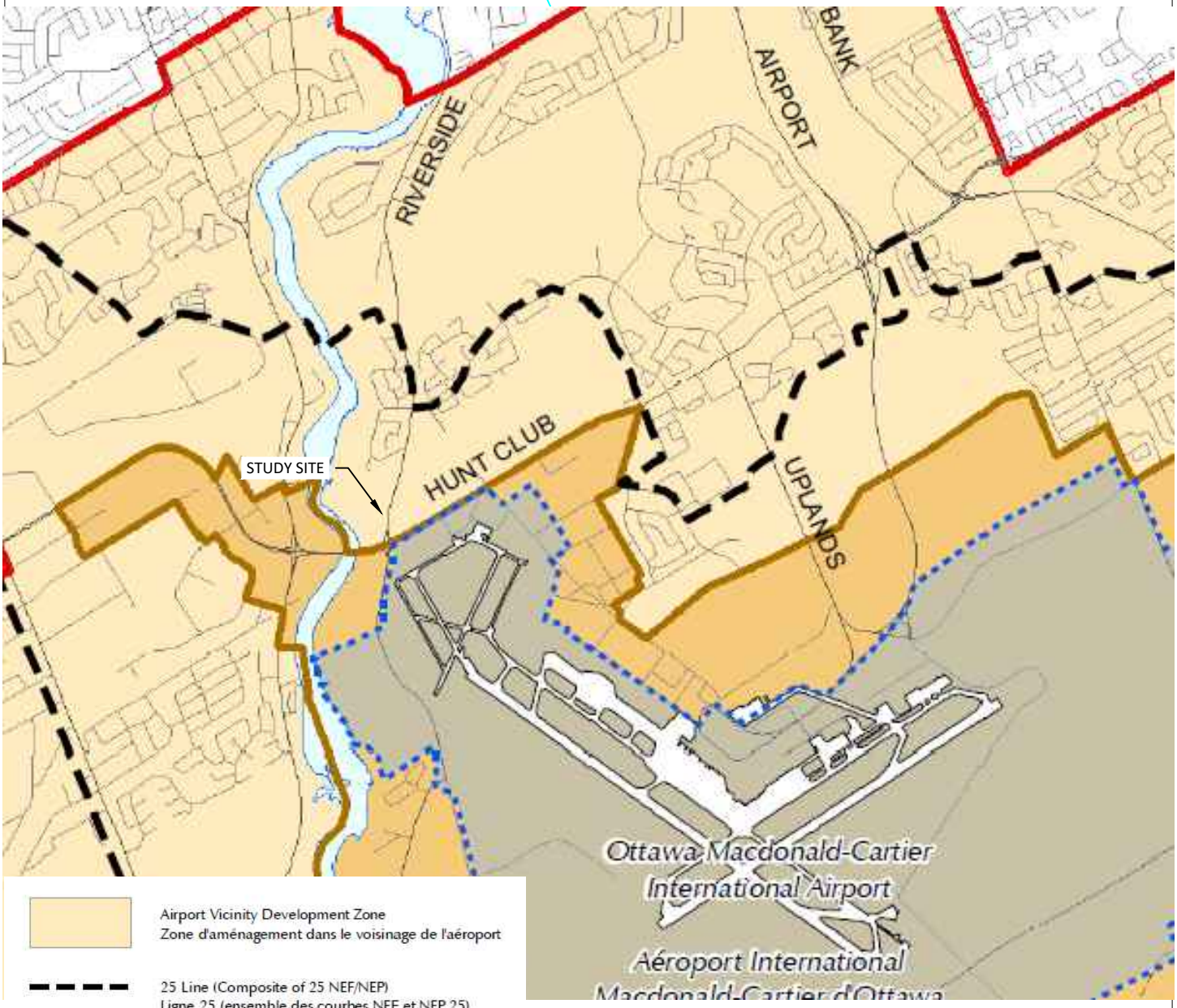
PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW18-039-10
DATE	DECEMBER 8, 2022
DRAWN BY	E.A.
DESCRIPTION	FIGURE 10: STAMSON PARAMETERS



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PROJECT	3930 & 3960 RIVERSIDE DRIVE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	N/A	DRAWING NO. GW18-039-11	FIGURE 11: OTTAWA NEF CONTOURS
DATE	DECEMBER 8, 2022	DRAWN BY E.A.	

APPENDIX A

3930 & 3960 RIVERSIDE DRIVE, OTTAWA - SITE PLAN

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RIDEAU RIVER AND CANAL

LARGE SINGLES

EASEMENT

PARK
.380 Ha

TOWNS

TOWNS

TOWNS

TOWNS

AREA 'A'
SCHEDULE 251

T4
APARTMENT
9 FLOORS
9,289m²

T3
APARTMENT
11 FLOORS
11,502m²

5 STOREY PODIUM

T2
APARTMENT
14 FLOORS
13,323m²

5 STOREY PODIUM

T1
APARTMENT
17 FLOORS
15,340m²

4 STOREY PODIUM

PARK
.380 Ha

UPLANDS RIVERSIDE PARK

HUNT CLUB

RIVERSIDE DRIVE

RIVERSIDE DRIVE

RIVERSIDE DRIVE

FUTURE TRAFFIC SIGNAL

RIVERSIDE DRIVE

20 40 60 80 100 200ft
0 10 20 30 40 50 60m

TAGGART REALTY MANAGEMENT

HUNT CLUB RD. and RIVERSIDE DR.

NEW RESIDENTIAL COMMUNITY SITEPLAN

SCALE 1:750

December 12, 2022

HOBIN
ARCHITECTURE

APPENDIX B

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

```
STAMSON 5.0         NORMAL REPORT         Date: 09-12-2022 14:56:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te                 Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Huntclub (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Huntclub (day/night)
-------------------------------------------
Angle1   Angle2           : -19.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  98.00 / 98.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 65.84 + 0.00) = 65.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -19     90    0.00  76.17   0.00  -8.15  -2.18   0.00   0.00   0.00
65.84
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 65.84 dBA

Total Leq All Segments: 65.84 dBA


Results segment # 1: Huntclub (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.24 + 0.00) = 58.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -19     90   0.00  68.57   0.00  -8.15  -2.18   0.00   0.00   0.00
58.24
-------------------------------------------------------------------------------
--

Segment Leq : 58.24 dBA

Total Leq All Segments: 58.24 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.84
                           (NIGHT): 58.24
```

```
STAMSON 5.0        NORMAL REPORT        Date: 09-12-2022 14:55:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Huntclub (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Huntclub (day/night)
----------------------------------------------
Angle1   Angle2           : -20.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  63.00 / 63.00  m
Receiver height           :  13.50 / 13.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 67.80 + 0.00) = 67.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -20     90    0.00  76.17   0.00  -6.23  -2.14   0.00   0.00   0.00
67.80
```

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

Segment Leq : 67.80 dBA

Total Leq All Segments: 67.80 dBA


Results segment # 1: Huntclub (night)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.20 + 0.00) = 60.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -20     90   0.00  68.57   0.00  -6.23  -2.14   0.00   0.00   0.00
60.20
-------------------------------------------------------------------------------
--

Segment Leq : 60.20 dBA

Total Leq All Segments: 60.20 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.80
                           (NIGHT): 60.20
```