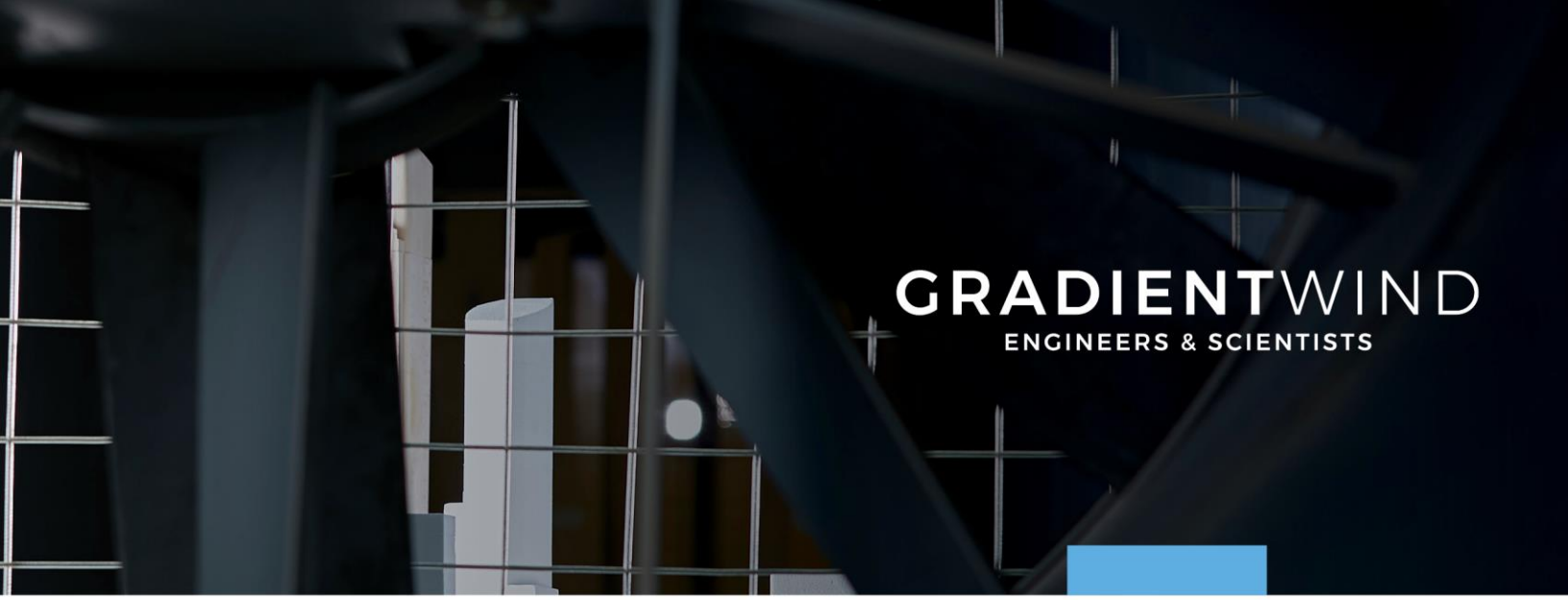

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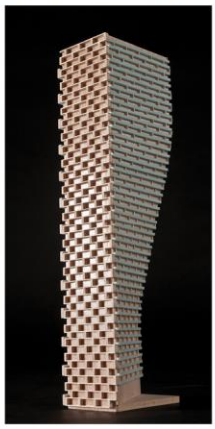
ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT

Creekside II
Richmond, Ontario

Report: 21-421–Roadway Traffic Noise



February 1, 2022

PREPARED FOR

1470424 Ontario Inc.
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PREPARED BY

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EXECUTIVE SUMMARY

This report describes a roadway traffic noise feasibility assessment undertaken for a proposed subdivision known as Creekside II located at the intersection of Eagleson Road and Perth Street in Richmond, Ontario. The proposed development comprises a site with 454 residential dwellings, a park, a stormwater management pond, and five new proposed local streets serving the subdivision labelled A through E. The residential units comprise a combination of single-detached houses (250 total), townhomes (130 total), and semi-detached houses (74 total), and are divided into nine spaces by the roads.

The major sources of traffic noise impacting the residential subdivision are Eagleson Road and Perth Street. The site is bordered by Eagleson Road to the east, existing commercial land and Perth Street to the south, existing agricultural land to the north and northwest, and the village of Richmond to the west. Figure 1 illustrates a complete site plan with the 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) plan of subdivision drawings prepared by Annis, O'Sullivan, Vollebekk Ltd.

The results of the current analysis indicate that noise levels will range between 56 and 68 dBA during the daytime period (07:00-23:00) and between 48 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the west blocks and lots of the proposed development, which are closest to Eagleson Road.

Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA. The area(s) (shown in Figure 4) with noise levels under 55 dBA (yellow and light orange) have no mitigation requirements. The area(s) with noise levels between 55 and 65 dBA (orange and light red) may require forced air heating with provision for central air conditioning. The area(s) with noise levels greater than 65 dBA (dark red and purple) may require central air conditioning and upgraded building components. Additionally, Warning Clauses will also be required to be placed on all Lease, Purchase and Sale Agreements.

Results of the roadway traffic noise calculations also indicate that outdoor living areas bordering and having direct exposure to traffic noise may require noise control measures. Mitigation measures are described in Section 0, with the aim to reduce the L_{eq} to 55 dBA or below where technically, economically and administratively feasible, or below 60 dBA where noise levels exceed 60 dBA. A detailed roadway traffic noise study will be required at the time of subdivision registration to determine specific noise control measures for the development.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 1470424 Ontario Inc. to undertake a roadway traffic noise feasibility assessment for a proposed subdivision development known as Creekside II located at the intersection of Eagleson Road and Perth Street in Richmond, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

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 plan of subdivision drawings prepared by Annis, O'Sullivan, Vollebekk Ltd., with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this environmental noise feasibility assessment is a proposed subdivision development known as Creekside II located at the intersection of Eagleson Road and Perth Street in Richmond, Ontario. The proposed development comprises a site with 454 residential dwellings, a park, a stormwater management pond, and five new proposed streets serving the subdivision labelled A through E. The residential units comprise a combination of single-detached houses (250 total), townhomes (130 total), and semi-detached houses (74 total), and are divided into nine spaces by the roads.

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

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway traffic, and (ii) explore potential noise mitigation where required.

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 of 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.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, 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) specify that predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended indoor sound levels. 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[3].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA but are less than 60 dBA, mitigation should be considered to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Where noise levels exceed 60 dBA noise mitigation is required. This is typically done with noise control measures outlined in Section 0. If these measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

As this is a preliminary assessment, noise control recommendations are of a general nature. Specific mitigation requirements would be the work of a future detailed noise study.

4.2.2 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using two programs: Predictor-Lima. To provide a general sense of noise across the site, the employed software program was *Predictor-Lima (TNM calculation)*, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5 to represent the roadway line sources. The TNM model is also being accepted in the updated Environmental Guide for Noise of Ontario, 2021 by the Ministry of Transportation (MTO)[4]. 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 study site, along with a number of discrete receptors at key sensitive areas. Figures 4 and 5 show the daytime and nighttime noise contours.

[3] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[4] Ministry of Transportation, Environmental Guide for Noise, 2021. Retrieved from https://prod-environmental-registry.s3.amazonaws.com/2021-08/Environmental%20Guide%20for%20Noise%20 2021%20%28Aug%202021%29.pdf

Roadway noise calculations were performed by treating each road segment as separate line sources of noise. 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 road segments.
- 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 modelled as lawn while the paved roads were modelled as hard ground.
- The study site was treated as having flat or gently sloping topography.
- No massing is considered as potential noise screening elements.
- Nine (9) receptors were strategically placed throughout the study area.

4.2.3 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[5] 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. Traffic volumes for the proposed Cumberland Transitway are based on Gradient Wind's experience with other developments in the area. Table 1 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 1: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Eagleson Road	2-Lane Rural Arterial (2-RAU)	80	**15,000**
Perth Street	2-Lane Rural Arterial (2-RAU)	60	**15,000**

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

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 2 below. The results of the current analysis indicate that noise levels will range between 56 and 68 dBA during the daytime period (07:00-23:00) and between 48 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the west blocks and lots of the proposed development, which are closest to Eagleson Road. Figures 4 and 5 illustrate daytime and nighttime noise contours throughout the site at a height of 1.5 m above grade.

TABLE 2: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor ID	Receptor Location	Receptor Height (m)	PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night
R1	Block 269 – West	1.5	68	61
R2	Block 260 – West	1.5	68	61
R3	Lot 12 – West	1.5	68	61
R4	Lot 250 – West	1.5	68	61
R5	Block 302 – West	1.5	65	58
R6	Block 295 – West	1.5	57	50
R7	Block 294 – West	1.5	58	51
R8	Block 293 – South	1.5	57	50
R9	Block 293 – South	1.5	56	48

5.1.1 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in the ENCG for potential outdoor living areas (OLA). Therefore, 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 of below 60 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 due to the requirements of the Community Development Plan. 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 noise, as mentioned in Section 5.1. By siding lots along the collector roadway, the extent of barriers are minimized. The use of earth berms or acoustic barriers will depend on the grading plan when it becomes available. Both options have the ability to reduce OLA noise levels to below 55 dBA. Potential noise barrier locations can be seen in Figure 3.

Regarding Figure 4, the area(s) with noise levels under 55 dBA (yellow and light orange) have no mitigation requirements. The area(s) with noise levels between 55 and 65 dBA (orange and light red) may require forced air heating with provision for central air conditioning. The area(s) with noise levels greater than 65 dBA (dark red and purple) may require central air conditioning and upgraded building components.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 56 and 68 dBA during the daytime period (07:00-23:00) and between 48 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs at the west blocks and lots of the proposed development, which are closest to Eagleson Road.

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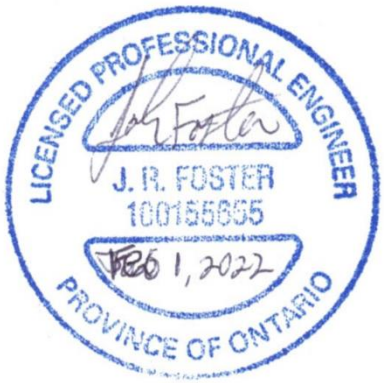
This concludes our environmental noise feasibility assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.



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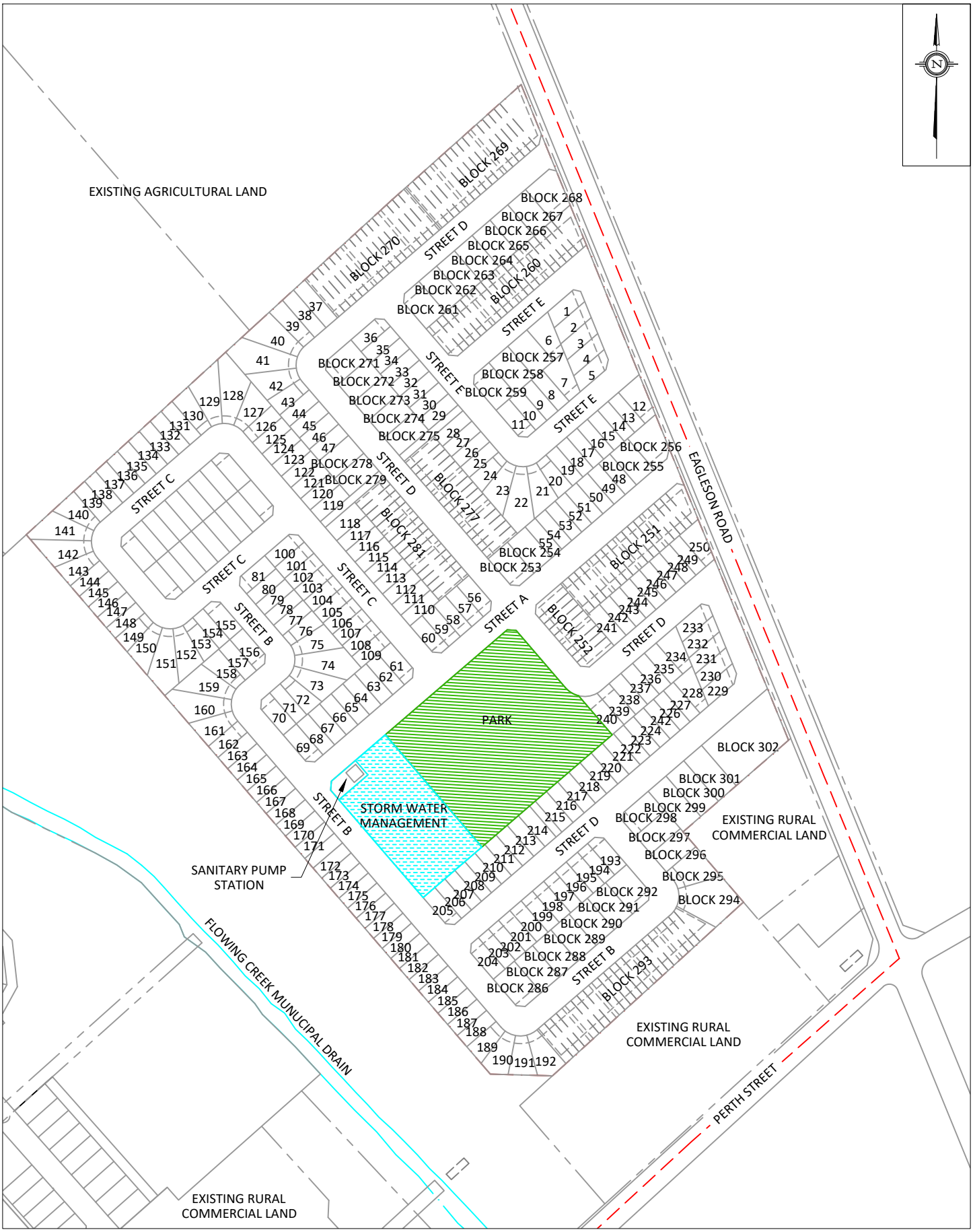
Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #21-421-Roadway Traffic Noise



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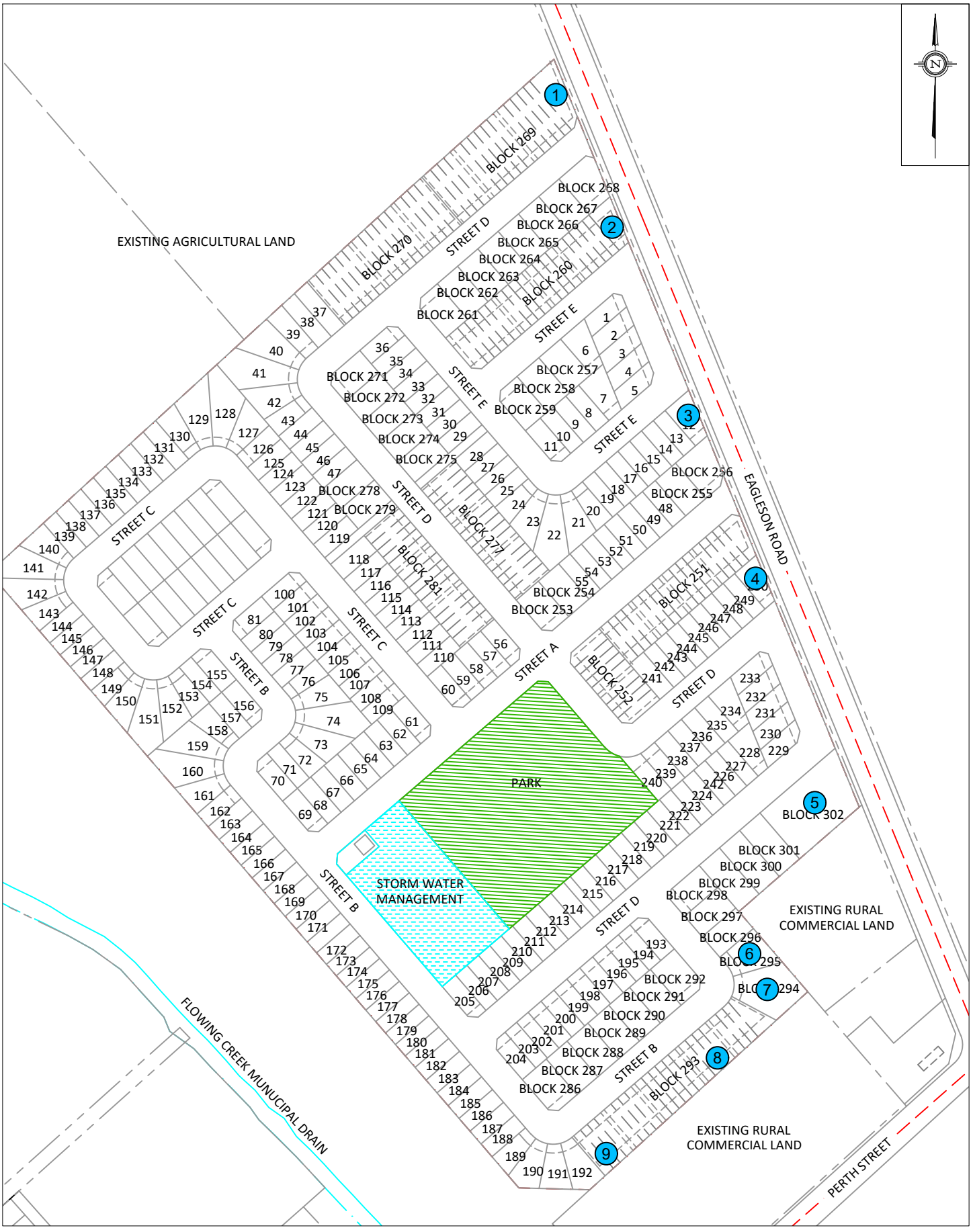
PROJECT	CREEKSIDE II, RICHMOND ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:4000 (APPROX.)	DRAWING NO.	GW21-421-1
DATE	DECEMBER 16, 2021	DRAWN BY	E.K.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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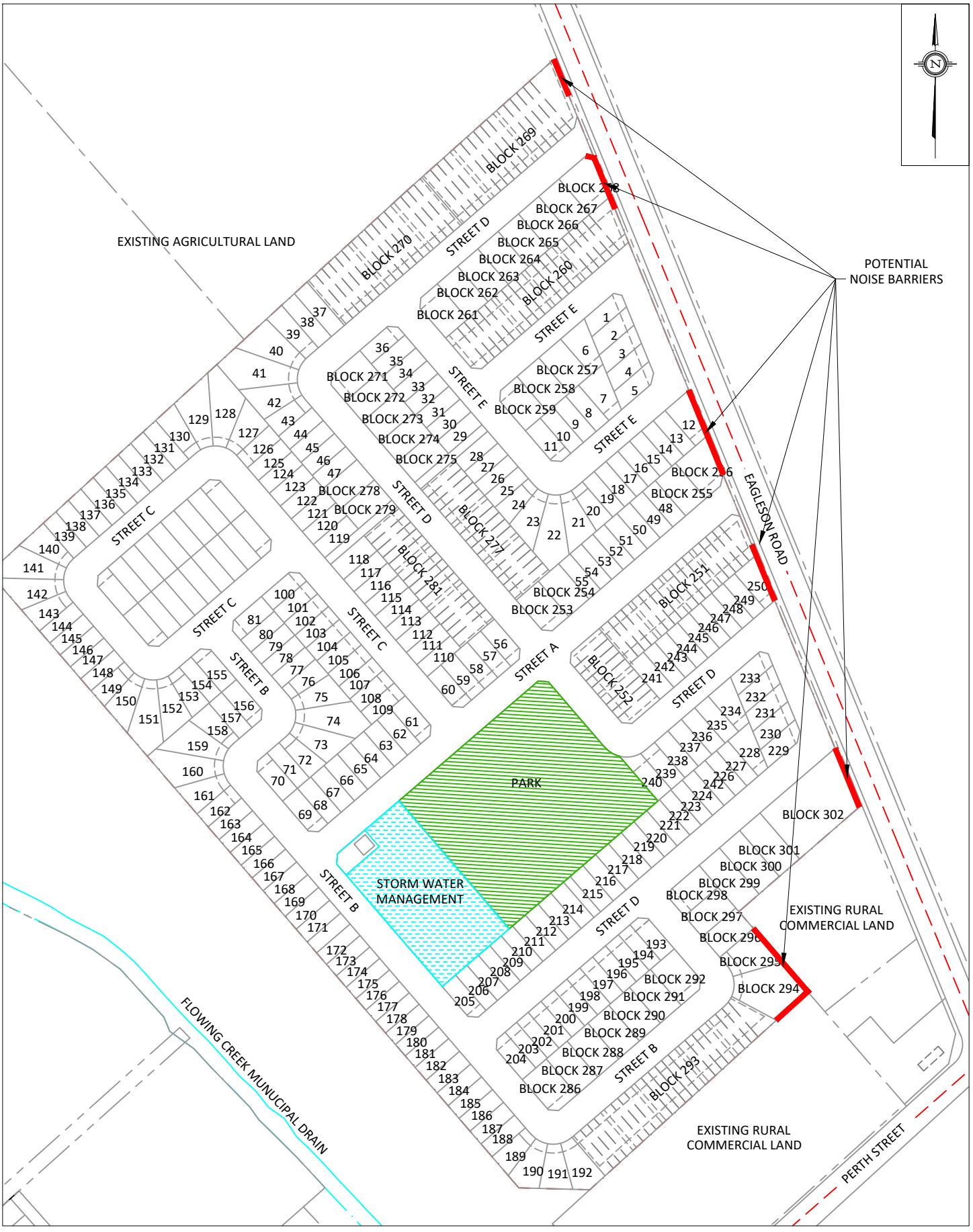
PROJECT	CREEKSIDE II, RICHMOND ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW21-421-2
DATE	DECEMBER 16, 2021	DRAWN BY	E.K.

FIGURE 2:
RECEPTOR LOCATIONS



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PROJECT	CREEKSIDE II, RICHMOND ROADWAY TRAFFIC NOISE FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW21-421-3
DATE	DECEMBER 16, 2021	DRAWN BY	E.K.

FIGURE 3:
POTENTIAL NOISE BARRIER LOCATIONS

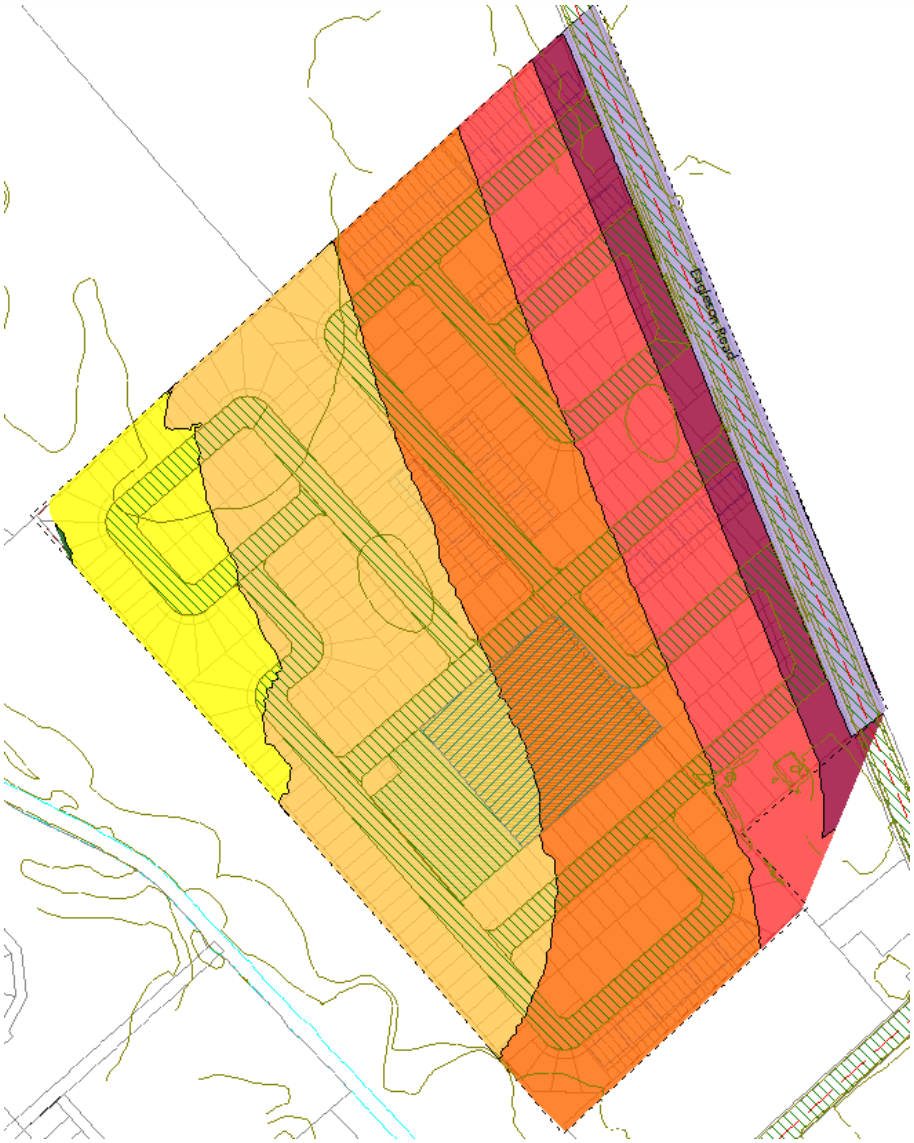

FIGURE 4: DAYTIME TRAFFIC NOISE CONTOURS (1.5 M ABOVE GRADE)

FIGURE 5: NIGHTTIME TRAFFIC NOISE CONTOURS (1.5 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