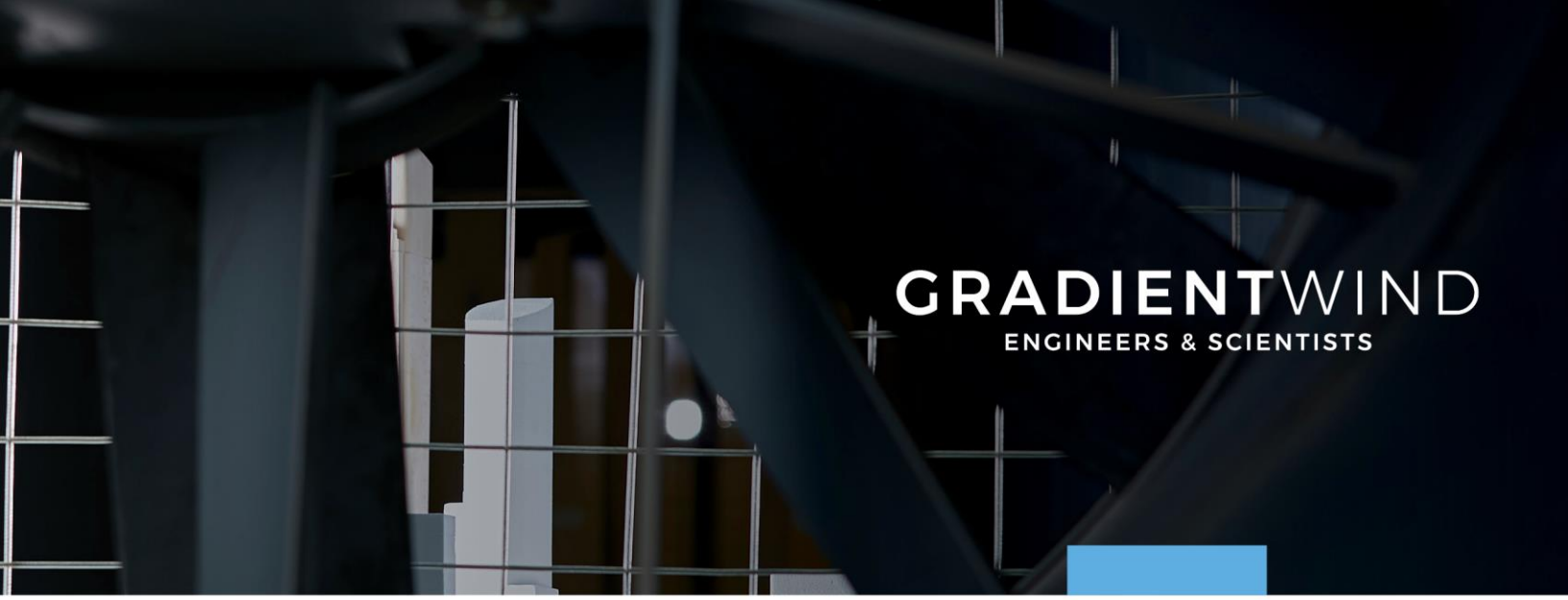

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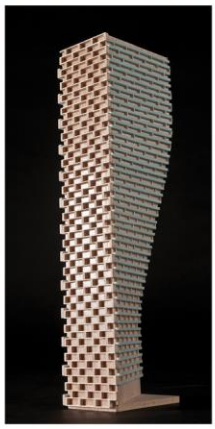
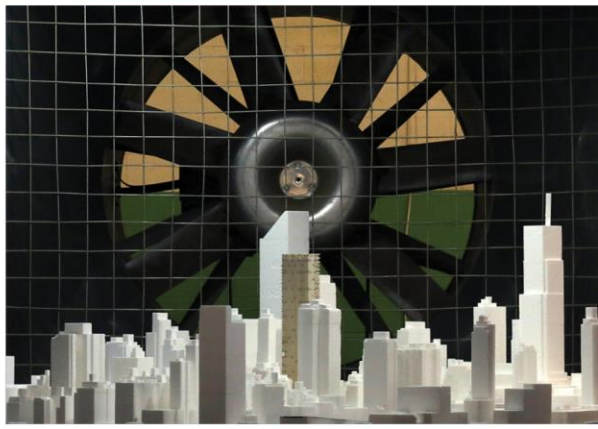
ROADWAY TRAFFIC NOISE ASSESSMENT

375 Kingston Road
Pickering, Ontario

Report: 21-243-Traffic Noise





February 11, 2025

PREPARED FOR

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PREPARED BY

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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of an Official Plan Amendment (OPA), Zoning By-Law Amendment (ZBA) and Site Plan Application for the proposed Phase 1 & 2 mixed-use developments located at 375-421 Kingston Road in Pickering, Ontario. The study site is situated at the southeast corner of the intersection of Kingston Road and Rougemount Drive, with Highway 401 running along the southern boundary of the site. The proposed development comprises Phases 1 and 2, which are aligned east-west, respectively, along Kingston Road, with a parkland dedication east of Phase 1. Phase 1 comprises 31- and 32-storey towers, aligned east-west, respectively, atop a shared 3-storey podium of trapezoidal planform with the tower bases aligned transverse to Kingston Road. Similarly, Phase 2 consists of 33- and 34-storey towers, aligned east-west, atop a shared 3-storey podium of trapezoidal planform with the tower bases aligned transverse to Kingston Road. 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); (ii) noise level criteria as specified by the MECP NPC-300 guidelines; (iii) future vehicular traffic volumes corresponding to traffic volumes obtained from MTO and the City of Pickering; and (iv) architectural drawings provided by Studio JCI in November 2024.

The results of the current analysis indicate that noise levels will range between 62 and 77 dBA during the daytime period (07:00-23:00) and between 57 and 69 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 77 dBA) occurs at the south façade of Tower 1A, which is nearest to Highway 401.

Upgraded building components will be required where noise levels exceed 65 dBA. Results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Type D warning clause will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels at all the outdoor living areas (OLA) exceed the ENCG criterion of 60 dBA as outlined in section 4.2.1. An acoustic barrier study was conducted to reduce the noise levels to or below 60 dBA. Our noise barrier investigation showed that the noise levels at the outdoor living areas (OLA) could be reduced to

below the 60 dBA criterion with a 1.5 m tall barrier surrounding the perimeter. A Type B Warning Clause will be required to be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Off-site stationary noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. The building will be designed to comply with the NPC-300 sound level limits. The site also benefits by having high levels of background noise due to its proximity to Highway 401.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 375 Kingston Road Corporation in care of Decade Capital to undertake a roadway traffic noise assessment in support of an Official Plan Amendment (OPA), Zoning By-Law Amendment (ZBA) and Site Plan Application for the proposed Phase 1 & 2 mixed-use developments located at 375-421 Kingston Road in Pickering, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP)[1] guidelines. Noise calculations were based on architectural drawings provided by Studio JCI in November 2024, with future traffic volumes corresponding to traffic volumes obtained from MTO and the City of Pickering.

2. TERMS OF REFERENCE

The focus of this traffic noise assessment is the proposed mixed-use development located at 375-421 Kingston Road in Pickering, Ontario. The study site is situated at the southeast corner of the intersection of Kingston Road and Rougemount Drive, with Highway 401 running along the southern boundary of the site.

The proposed development comprises Phases 1 and 2, which are aligned east-west, respectively (relative to project north), along Kingston Road, with a parkland dedication east of Phase 1. Proposed laneways provide access to the loading areas, surface parking, and the ramps to the two levels of underground and two levels of above-ground parking: Laneway A runs along the south elevation of Phase 1 and transitions to Evelyn Avenue to the southeast, Laneway B runs south of Phase 2 and connects to Rougemount Drive to the southwest, and Laneway C separates the Phase 1 and 2 buildings while connecting Kingston Road to the north with Laneways A and B to the south.

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

Phase 1 comprises 31- and 32-storey towers, aligned east-west, respectively, atop a shared 3-storey podium of trapezoidal planform with the tower bases aligned transverse to Kingston Road. Similarly, Phase 2 consists of 33- and 34-storey towers, aligned east-west, atop a shared 3-storey podium of trapezoidal planform with the tower bases aligned transverse to Kingston Road.

For Phase 1, the approximately U-shaped ground floor, open to the south, comprises a central north residential lobby and retail spaces at the northeast corner and along the west elevation all fronting Kingston Road, loading areas to the southeast and southwest, and building support services in the remaining spaces. The floorplate extends at Level 2 covering the south elevation opening below, and Levels 2 and 3 are reserved for internal parking. The floorplate generally sets back to the base of the towers at Level 4 accommodating outdoor amenities, indoor amenities to the north, and residential spaces elsewhere. The west tower further sets back from the northwest to the tower's typical floorplate at Level 5. The residential floorplate rises uniformly to the full height, with setbacks from the south side of the east tower at Level 31 and the west tower at Level 32, featuring private terraces. A mechanical penthouse completes each tower.

The configuration of Phase 2 is generally similar to Phase 1, except that the residential lobby is located at the northwest corner fronting Kingston Road and commercial space is also accessible from Rougemount Drive along the west elevation. Additionally, the east and west tower floorplates of Phase 2 set back from the south side at Levels 33 and 34, respectively.

The subject site's surroundings comprise low-rise massing from the north clockwise to the northeast, mostly the open exposure of Highway 401 from the northeast clockwise to the southeast, a mix of the open exposure of Highway 401 and low-rise massing from the southeast clockwise to the southwest, and mostly low-rise massing for the remaining compass directions. The major sources of roadway noise are Highway 401 to the south and Kingston Road to the north.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study building produced by local roadway traffic, (ii) determine whether exterior noise levels exceed the allowable limits specified by the MECP Noise Control Guidelines – NPC-300 as outlined in Section 4.2 of this report, and (iii) explore potential noise mitigation options, 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 vehicular 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 NPC-300 guidelines specify that the recommended indoor noise limit ranges (that are relevant to this study) are 50, 45 and 40 dBA for retail space, living rooms, and sleeping quarters, respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA

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[2]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[3]. 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 normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation[4].

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, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Furthermore, noise levels at the OLA should not exceed 60 dBA if mitigation can be technically and administratively achieved.

[2] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[3] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[4] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Theoretical Roadway Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program Predictor-Lima which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. This computer program can represent three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing.

Roadway traffic noise calculations were performed by treating each roadway segment as a separate line source of noise, and by using existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks.
- The day/night split was taken to be 92%/8% respectively for all streets.
- Ground surfaces were taken to be absorptive due to the presence of grass, however, reflective surfaces such as roads and parking lots were included in the calculation model.
- Topography was assumed to be a flat/gentle slope.
- Noise receptors were strategically placed at 18 locations around the study area (see Figure 2).

4.2.3 Roadway Traffic Volumes

The NPC-300 guidelines dictate 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 AADT values provided by the MTO and the City of Pickering from previous years. These AADT. Values are then projected 10 years into the future from the year of this report with an assumed growth rate of 2%. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Kingston Road	4-Lane Major Arterial Undivided	60	**23,126**
Highway 401	Freeway	100	**352,829**

5. ROADWAY TRAFFIC NOISE RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receiver Height Above Grade (m)	Receptor Location	Predictor Noise Level (dBA)	
			Day	Night
1	100	POW –North Façade – Tower 1A - Level 31	66	59
2	100	POW – East Façade – Tower 1A - Level 31	72	65
3	100	POW – South Façade – Tower 1A - Level 31	77	69
4	100	POW – West Façade – Tower 1A - Level 31	72	64
5	13.5	OLA – Phase 1 – Level 4 Public Green Space	64	**N/A***
6	101	POW – North Façade – Tower 1B - Level 32	66	58
7	101	POW – East Façade – Tower 1B - Level 32	71	63
8	101	POW – South Façade – Tower 1B - Level 32	76	69
9	101	POW – West Façade – Tower 1B - Level 32	71	63
10	106	POW – North Façade – Tower 2B - Level 33	65	58
11	106	POW – East Façade – Tower 2B - Level 33	70	63
12	106	POW – South Façade – Tower 2B - Level 33	76	68
13	106	POW – West Façade – Tower 2B - Level 33	70	63
14	15.5	OLA – Phase 2 – Level 4 Public Green Space	62	**N/A***
15	109	POW – North Façade – Tower 2A - Level 34	64	57
16	109	POW – East Façade – Tower 2A - Level 34	71	64
17	109	POW – South Façade – Tower 2A - Level 34	76	68
18	109	POW – West Façade – Tower 2A - Level 34	71	64

*Nighttime noise levels are not considered as per NPC-300

The results of the current analysis indicate that noise levels will range between 62 and 77 dBA during the daytime period (07:00-23:00) and between 57 and 69 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 77 dBA) occurs at the south façade of Tower 1A, which is nearest to Highway 401.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels + safety factor). The STC requirements for the windows are summarized in Table 4 below for various units within the development (see Figure 3):

TABLE 4: STC & VENTILATION REQUIREMENTS

Location	Façade	Floor Number	Min. Window STC (Bedroom/Living Room/Retail)	Exterior Wall STC*	Warning Clauses	Ventilation
Tower 1A	East & West	1-31	28/30/33	50	Yes	A/C
Tower 1A	South	1-31	36/36/36	50	Yes	A/C
Tower 1A	North	1-31	30/30/30	50	Yes	A/C
Tower 1B	East & West	1-32	28/30/33	50	Yes	A/C
Tower 1B	South	1-32	36/36/36	50	Yes	A/C
Tower 1B	North	1-32	30/30/30	50	Yes	A/C
Tower 2A	East & West	1-34	28/30/33	50	Yes	A/C
Tower 2A	South	1-34	36/36/36	50	Yes	A/C
Tower 2A	North	1-34	30/30/30	50	Yes	A/C
Tower 2B	East & West	1-33	28/30/33	50	Yes	A/C
Tower 2B	South	1-33	36/36/36	50	Yes	A/C
Tower 2B	North	1-33	30/30/30	50	Yes	A/C

- **Exterior Walls**

(i) Exterior wall components on the south façade will require a minimum STC of 50, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[5]

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 50 for the wall component, where a punch window and wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. Several manufacturers and various combinations of window components will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, 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 in all Lease, Purchase and Sale Agreements.

5.3 Noise Barrier Calculation

Noise levels at both the Level 4 public green spaces are expected to exceed 55 dBA during the daytime period without a noise barrier. If these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA where technically and administratively feasible. Further analysis investigated the noise-mitigating impact of raising the perimeter guards from 1.5 m to 2.5 m above the walking surface (see Table 5). The results of the investigation proved noise levels can be reduced to 55 dBA or below with an appropriate barrier height. The preferred barrier heights for the amenity spaces are associated with the noise levels in **bold** font. Noise levels at the Phase 1 Level 4

[5] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

OLA can be reduced to 60 dBA by implementing a 1.5m tall barrier surrounding the perimeter. Noise levels at the Phase 2 Level 4 OLA can be reduced to 58 dBA by implementing a 1.5 m tall barrier surrounding the perimeter. Figure 4 illustrates the barrier requirements.

TABLE 5: RESULTS OF NOISE BARRIER INVESTIGATION

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	Daytime L_{eq} Noise Levels (dBA)			
			No Barrier	With 1.5 m Barrier	With 2.0 m Barrier	With 2.5 m Barrier
5	13.5	OLA – Phase 1 Level 4 Public Green Space	64	**60**	59	58
14	15.5	OLA – Phase 2 Level 4 Public Green Space	62	**58**	57	56

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 62 and 77 dBA during the daytime period (07:00-23:00) and between 57 and 69 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 77 dBA) occurs at the south façade of Tower 1A, which is nearest to Highway 401. Figures 5 and 6 illustrate daytime and nighttime noise contours throughout the site 4.5 m above grade.

Upgraded building components will be required where noise levels exceed 65 dBA as illustrated in Figure 3. Results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Type D warning clause will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized 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."*

Noise levels at all the outdoor living areas (OLA) exceed the ENCG criterion of 60 dBA as outlined in section 4.2.1. An acoustic barrier study was conducted to reduce the noise levels to or below 60 dBA. Our noise barrier investigation showed that the noise levels at the outdoor living areas (OLA) could be reduced to below the 60 dBA criterion with a 1.5 m tall barrier surrounding the perimeter as shown in Figure 4. A Type B Warning Clause will be required to be placed on all Lease, Purchase and Sale Agreements, as summarized below:

Type B

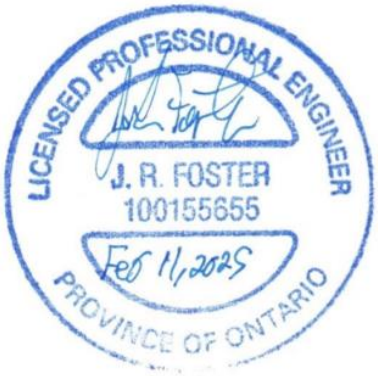
> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

Off-site stationary noise impacts can generally be minimized by judicious selection and placement of the equipment. Where necessary, noise screens and silencers can be placed into the design. The building will be designed to comply with the NPC-300 sound level limits. The site also benefits by having high levels of background noise due to its proximity to Highway 401.

This concludes our traffic noise 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.



Benjamin Page, AdvDip.
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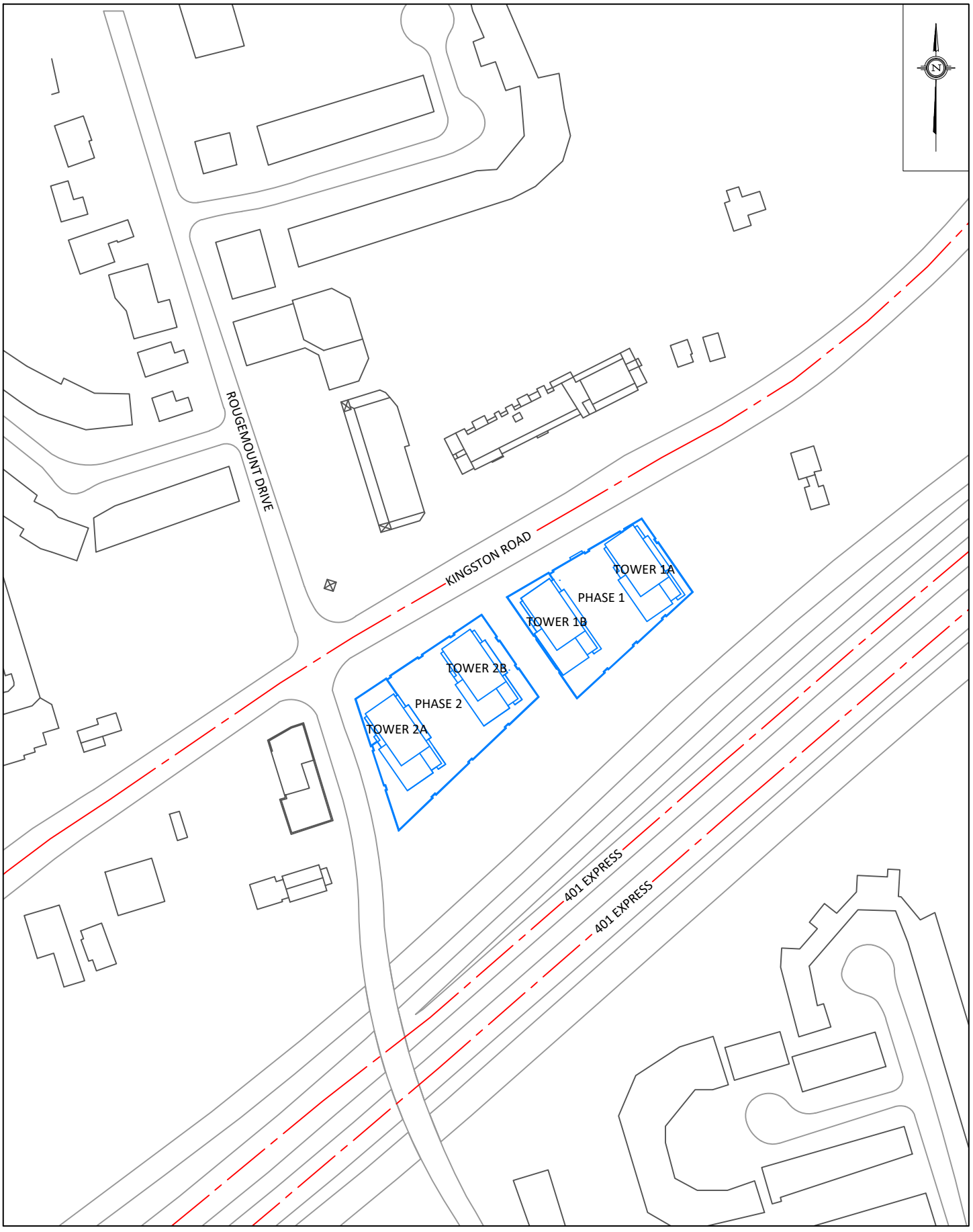
Principal

Gradient Wind File 21-243-Traffic Noise



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PROJECT	375 KINGSTON ROAD, PICKERING, ONTARIO TRANSPORTATION NOISE STUDY
SCALE	1:2500
DRAWING NO.	21-243-NOISE-FIG1
DATE	FEBRUARY 11, 2025
DRAWN BY	B.P.

DESCRIPTION

FIGURE 1:
PROPOSED SITE PLAN AND SURROUNDING CONTEXT

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SCALE	1:1000
DRAWING NO.	21-243-NOISE-FIG2
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DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

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SCALE	1:1000
DRAWING NO.	21-243-NOISE-FIG3
DATE	FEBRUARY 11, 2025
DRAWN BY	B.P.
DESCRIPTION	FIGURE 3: STC REQUIREMENTS

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SCALE	1:1000
DRAWING NO.	21-243-NOISE-FIG4
DATE	FEBRUARY 11, 2025
DRAWN BY	B.P.
DESCRIPTION	FIGURE 4: BARRIER LOCATIONS

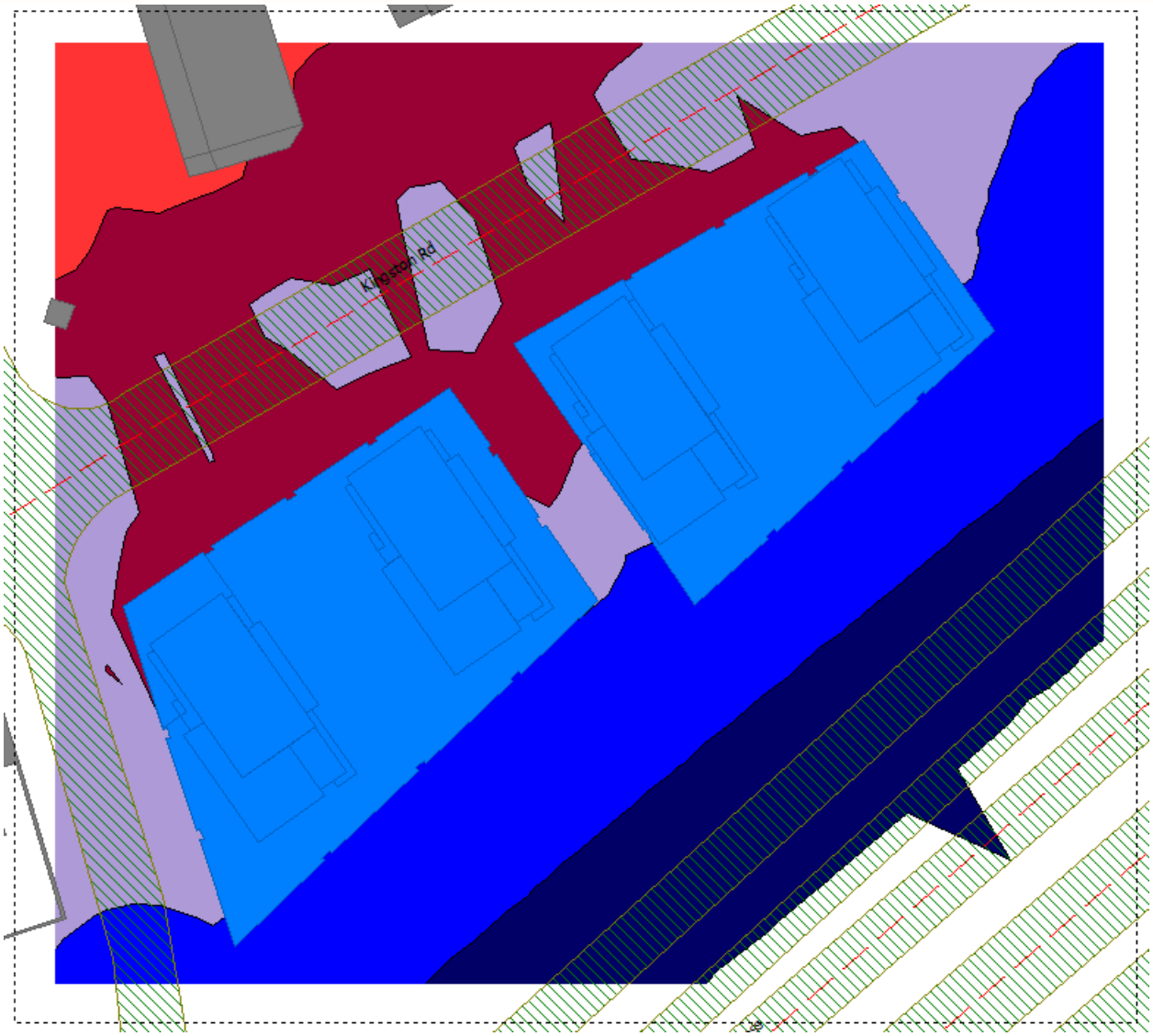

FIGURE 5: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)

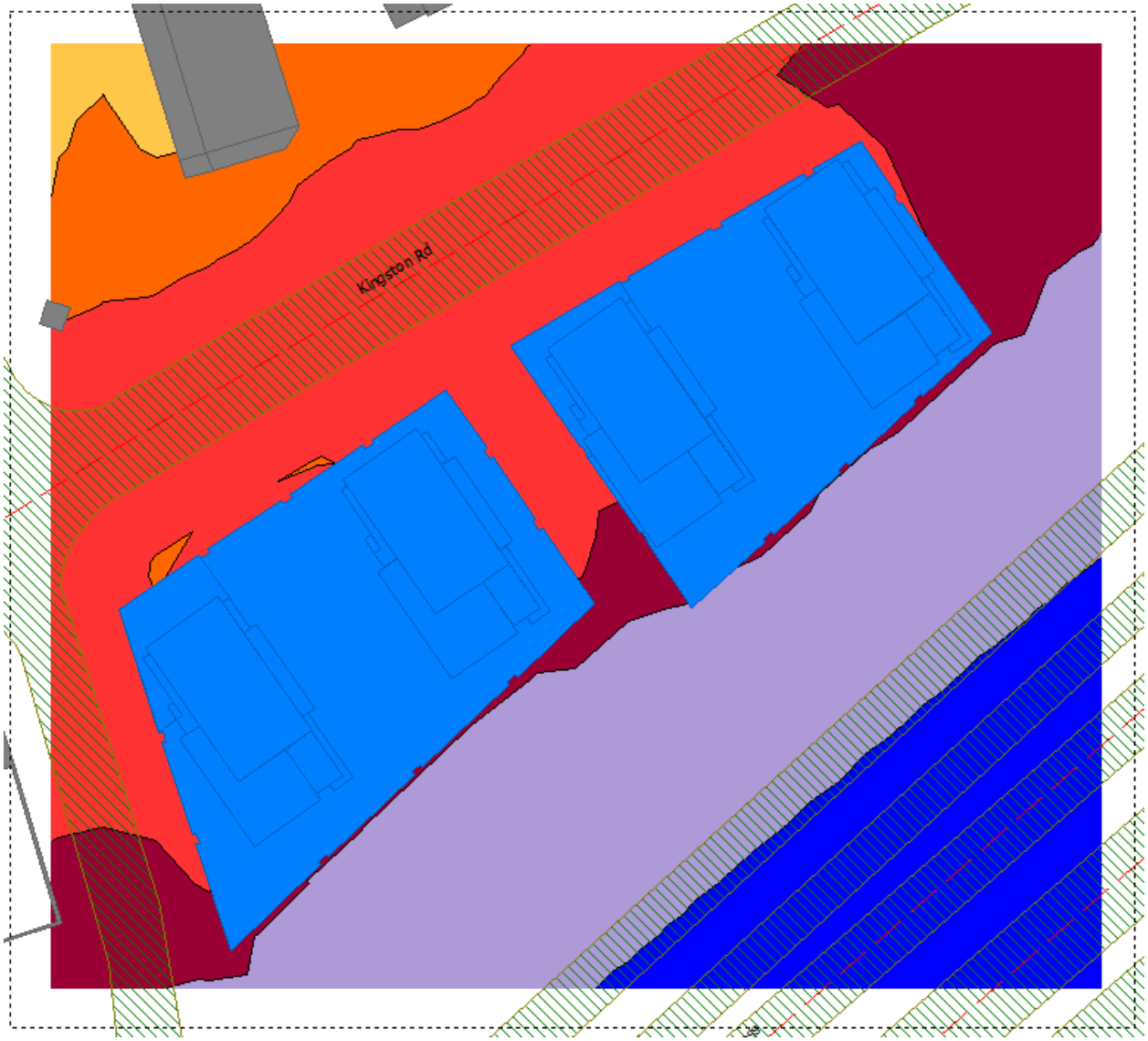

FIGURE 6: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)