FREEFIELD LTD.

Ottawa, Ontario, Canada

ENVIRONMENTAL NOISE IMPACT ASSESSMENT FOR THE PROPOSED COMMERCIAL DEVELOPMENT AT 6111 HAZELDEAN ROAD

CITY OF OTTAWA

Prepared for

Grant Castle Corp.

Prepared by

Freefield Ltd.

8th September 2025

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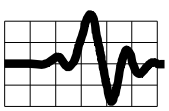

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1.0 Introduction

Freefield Ltd. has been retained by Grant Castle Corp. to undertake an environmental noise impact assessment, in relation to satisfying the City of Ottawa Environmental Noise Control Guidelines (ENCG) requirements for stationary noise sources, for the proposed commercial development to be located at 6111 Hazeldean Road, City of Ottawa, Ontario.

This report describes an assessment of noise impacts from from the proposed mechanical equipment associated with the facility at noise sensitive points of reception in the surrounding urban environment with recommendations for noise mitigations measures where necessary to meet the City of Ottawa and Ministry of Environment, Conservation and Parks, MECP, requirements.

This assessment has been carried out in accordance with City of Ottawa *Environmental Noise Control Guidelines, January 2013* (ENCG)[1] *and* MECP Document: NPC-300, *Stationary and Transportation Sources – Approval and Planning*, August 2013.[2] by Freefield Ltd.

The analysis was based on information received electronically from LRL Engineering.

The noise assessment methodology is summarised below:

- Identification of noise sensitive receptors in the vicinity of the facility. Potential noise sensitive receptors include residences, motels, places of worship, schools, hospitals and vacant land zoned for potential noise sensitive use.

- Determination of the City of Ottawa[1] and MECP[2] sound level limits which will apply at each of the noise sensitive receptors.

- Identification of the sources of noise that will arise from equipment operations. In the current study, the strengths of the various noise sources were obtained from manufacturers data and acoustic formula.

- Based on the strengths of the individual noise sources, noise levels due to operations are predicted at nearby noise sensitive receptors using a prediction procedure which is favoured by the City of Ottawa[1] and MECP[2]. The City of Ottawa[1] and MECP[2] methodology requires that compliance be assessed under predictable "worst case" conditions for normal operations.

- Assessment of compliance of the noise impacts from the proposed equipment operations with City of Ottawa and MECP sound level limits. Where appropriate, mitigation measures are recommended such that compliance is achieved at all receptors.

Note that this assessment considers all noise sources associated with the development. The facility is not a significant source of vibration therefore a vibration assessment is not required.

Surrounding Lands, Acoustic Environment and Critical Receptors

Directions in this report correspond to site north as shown on Figure 1.

The proposed commercial development is to be located on the north side of Hazeldean Road approximately 250 m east of the intersection with Stittsville Main Street, in the suburb of Stittsville now in the City of Ottawa, Ontario, as shown in Figure 1 and 2.

The legal description of the site is as follows:

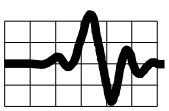
6111 Hazeldean Road,
City of Ottawa, Ontario

A location plan showing the site with respect to the surrounding area is provided in Figure 1. A site layout plan showing the facility's detailed arrangement and source locations is provided in Figure 2. A land use zoning map is provided in Appendix 1.

The commercial development is to be located on land zoned Arterial Mainstreet (AM9) as shown on the Zoning Map, Appendix 1.

To the north of the site, the land is zoned Residential Third Density (R3YY). This land is predominantly occupied by existing two storey attached residences with a number of single family detached residences located to the north east. The closest existing residences in this direction have been selected as noise sensitive receptors in the following assessment.

To the east of the site the land is zoned Arterial Mainstreet (AM9). This land is occupied by the various commercial / retail premises including a Giant Tiger, LCBO, Royal Bank of Canada and others and is referred as the Jackson Trails Centre. There are no noise sensitive points of reception immediately east of the site. Further east, on the east side of Stittsville Main Street, a number of existing residential apartment buildings existing on land zoned Arterial Main street (AM9). The closest existing residences in this direction have been selected as a noise sensitive receptor in the following assessment.



To the south of the site the land is zoned Arterial Mainstreet (AM9) with a small pocket of land zoned Open space (O1) located in a south easterly direction at the intersection of Stittsville Main Street and Hazeldean Road. An existing retirement residence lies in this direction with a number of vacant lots, zoned for potential noise sensitive use, located immediately south of the site on the south side of Hazeldean Road. The closest existing residences and vacant land zoned for potential noise sensitive use in this direction have been selected as noise sensitive receptors in the following assessment.

Immediately east of the site the land zoned Open space (O1). Further west the land is zoned Arterial Main Street (AM). This land is currently vacant. As per Part 10, City of Ottawa Zoning By-Law, permitted development on this vacant lot includes potential noise sensitive uses including residential accommodation. As such a noise sensitive receptor has been included on this vacant lot in the following assessment.

Where receptors have been located on vacant lots zoned for potential noise sensitive use the location selected for assessment is consistent with the existing pattern of development in the area as per MECP requirements.

The noise sensitive receptors, which have been selected for detailed analysis, are shown in Figure 1. These were selected as being the receptors most likely impacted by noise from the proposed showroom facility. Other noise sensitive receptors are at greater distances and will be less affected by noise from the facility's operations. Table 1 lists the noise sensitive points of reception selected for analysis.

The site and surrounding land are relatively flat with no significant changes in elevation.

2.0 Facility Description

The proposed commercial development consists of nine (9) mixed use commercial units, housed in a one (1) storey building rising to approximately 16 feet (4.9 m) above grade.

Detailed design and final selection of mechanical equipment is yet to be completed, however, based on discussions with client it is understood operations generating noise emissions into the surrounding environment will include:

- Rooftop mechanical equipment associated with heating, ventilation and air conditioning (HVAC) the interior of the building, with one unit dedicated per commercial unit i.e. nine units in total,
- In addition, kitchen exhausts, associated with food preparation, will be located at commercial units 1, 5 and 9. Three in total.

Refer to Figure 2 for detailed site plan of the proposed development showing the location of the significant sources.

The main entries to the site, as shown in Figure 2, are via the Main Access Road which connects to Hazeldean Road.

Hours of Operation

This report considers potential operations at the development over the City of Ottawa and MECP defined daytime period of 7am to 7pm (07:00 to 19:00), evening period of 7pm to 11pm (19:00 to 23:00) and nighttime period 11pm to 7am (23:00 to 07:00).

Daytime Operations (07:00 – 19:00) - During the daytime period, all significant noise sources are assumed to be in operation.

Evening Operations (19:00 – 23:00) - During the evening period, all significant noise sources are assumed to be in operation.

Night Operations (23:00 – 07:00) – During the nighttime period, all significant noise sources are assumed to be in operation. It is assumed that during the nighttime period HVAC equipment will operate at fifty percent capacity.

3.0 Noise Source Summary

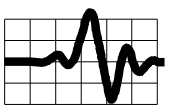
The following noise sources have been used to model noise generated by on-site operations. In brackets are the shortened names of the noise sources as used in the acoustic model. The characteristics of these sources, as used in acoustic modelling, are summarized in Table 2.

- Two (2) 7.5 Ton HVAC Roof Top Units (RTU_2), associated with commercial units one and nine, located on the roof of the proposed building (Source: TRANE_YSC090A_7.5T)
- Seven (7) 2.5 Ton HVAC Roof Top Units (RTU_2), associated with commercial units two to eight, located on the roof of the proposed building (Source: TRANE_YSC036A_3T)
- Three kitchen exhausts, associated with commercial units one, five and nine, exhausting through the roof of the proposed building (Source: KEX)

The strengths of all noise sources, i.e. the sound powers shown in Table 2 and A2.2 and used in this analysis, are based on manufacturers' data for HVAC equipment and acoustic calculations based on assumed capacity and fan arrangement for the kitchen exhaust/s.

There will be a number of insignificant noise sources including vents and small exhaust fans and aadditional equipment located inside the insulated building. Due to the proposed size and / or internal location of this equipment, it is assumed that noise impacts from this equipment will be insignificant at nearby receptors.

The locations of the significant noise sources included in this assessment are shown on Figure 3.



4.0 Points of Reception

The critical noise sensitive points of reception, which have been selected for detailed analysis, are shown in Figure 1. These were selected as being the points of reception in the surrounding environment most likely impacted by noise from the facility. Other noise sensitive points of reception are at greater distances and will be less affected by noise from the operations of equipment. Table 1 lists the noise sensitive points of reception selected for analysis.

The nine points of reception selected for analysis, POR 1 to POR 9, are listed in Table 1 and shown in Figure 1.

As per MECP Guideline NPC-300, two points of reception (POR) apply at each receptor.

> POW – Plane of window (POW) points of reception are located on the dwelling or noise sensitive building, typically 1.5 m above ground for single storey dwellings, and 4.5 m above ground for two storey dwellings. For buildings above two stories the height of the upper floor plane of window location has been selected.
>
> OPR – Outdoor Point of Reception, an area on the property of the residence. For large properties, the OPR point of reception can be up to 30 m from the dwelling at a height of 1.5 m above ground.

Where receptors have been located on vacant land zoned for potential noise sensitive use i.e. a possible future residence located on land zoned Arterial Main Street, the locations selected for assessment are consistent with the existing pattern of development in the area.

5.0 Assessment Criteria, Performance Limits

Sound level limits as specified in the City of Ottawa ENCG[1] and MECP guideline NPC-300[2], depend on the acoustical classification of the area as Class 1, 2, 3 or 4.

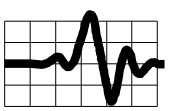
> **Class 1 area** 'an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as urban hum.'
>
> **Class 2 area** 'an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas: sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours); and, low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours).'
>
> **Class 3 area** 'a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as: a small community; agricultural area; a rural resort area such as a cottage or resort area; or, a wilderness area. '
>
> **Class 4 area** 'an area or specific site that would otherwise be defined as Class 1 or 2 and which: is an area intended for development with new noise sensitive land use(s) that are not yet built; is in proximity to existing, lawfully established stationary source(s); and, has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process. Additionally, areas with existing noise sensitive land use(s) cannot be classified as Class 4 areas.'

Due to the relatively high levels of road traffic on Hazeldean Road background sound levels in the environment are dominated by traffic noise and other urban noise such as snow clearing on a 24-hour basis. As such the area in which POR 1 to POR 9 are located is classified as Class 1 Area (Urban).

For a Class 1 Area (Urban) the applicable outdoor sound level limits at noise sensitive receptors, based on 1-hour equivalent sound levels, $L_{EQ,}$ are either the exclusion noise limits given in Table 3 and Table 4, or higher limits if established by an assessment of background noise.

A background noise assessment was carried out based on MECP methodology[3-5] at point of reception, POR 3 Plane of Window (POW) location, facing Hazeldean Road, based on traffic data obtained from the City of Ottawa for Hazeldean Road at the intersection with Stittsville Main Street. The results of this analysis are presented in Appendix 4.

This analysis indicated elevated sound levels, above the Class 1 area exclusion limits, at POR 3 POW location, located on the south side of Hazeldean Road, during the lowest volume hour during the proposed periods of operation.



For all other receptors, the levels given in the Tables 3 and 4 are taken as the sound level limits at all points of reception for the purpose of this assessment according to their location in a Class 1 Area.

Sound levels are assessed in terms of the 1-hour equivalent sound level, L_{eq}, effectively the average sound level over each hour. All sound levels are A-weighted, A-weighting being a frequency weighting with represents sensitivity of human hearing to sounds of differing frequencies.

6.0 Impact Assessment

Noise levels have been predicted at the critical receptors using "worst case" assumptions under normal operations and using the ISO sound propagation methodology[4], as implemented in the sound prediction software Cadna-A, version 2025. The ISO methodology, which is favored by the City of Ottawa and the MECP, provides a conservative (i.e. high) estimate of the noise level at each receptor taking into account adverse wind and meteorological conditions.

The estimation method includes the following.

- Distance attenuation is based on spherical spreading.
- Atmospheric attenuation.
- Ground attenuations, as appropriate.
- Barrier attenuation, as appropriate.

In order to consider cases of worst noise impacts, the following two scenarios have been modeled. In general, the worst-case impacts are those which occur when all equipment is in operation concurrently. The following two worst case scenarios are presented in this report.

Scenario 1: *Worst case, all equipment in operation concurrently* ***Before Mitigation*** *– Day and Evening (07:00 – 23:00) and Nighttime (23:00 – 07:00) Period of operation. Refer to 4.1 and 4.2 for predicted noise impacts.*

Scenario 2: *Worst case, all equipment in operation concurrently* ***After Mitigation*** *– Day and Evening (07:00 – 23:00) and Nighttime (23:00 – 07:00) Period of operation. Refer to Figure 5.1 and 5.2 for predicted noise impacts.*

Noise impacts at critical points of reception have been completed for daytime and evening *(07:00 – 23:00)* and nighttime (23:00 – 07:00) periods. The analyzed scenarios are for worst case conditions and modes of operation of equipment.

In Table 5 and 6, estimated noise levels at the points of reception for the worst-case scenarios, before and after mitigation, are compared with the applicable sound level limits. The sound level limits applicable are the lowest sound level limits that apply at each point of reception for the period of operation. More detailed estimates, for all sources, are contained in Appendix 2, with Tables A2.5.1, A2.5.2, A2.6.1 and A2.6.2 providing a summary of predicted noise impacts at each receptor for the individual sources.

Statement of Compliance

It is concluded that, with the recommended mitigation measures detailed in Section 7.0, noise impacts from operations at the proposed commercial development will be in compliance with City of Ottawa ENCG[1] and MECP Environmental Noise Guidelines[3] for the proposed daytime and evening, 7 am to 11 pm (07:00 to 23:00) and nighttime (23:00 – 07:00) period of operation.

7.0 Mitigation Measures

It was found that noise impacts from the proposed equipment operations was critical at nearby noise sensitive points of reception. To achieve compliance the following mitigation measures, apply:

7.1. Noise barriers are required as follows:

a. A 2.1 m high barrier, Barrier 1, is to be provided around the proposed rooftop equipment (RTU_1 to RTU_9) as shown in Figure 7 and 8. Barrier 1 is to shield noise impacts in a north, east and westerly direction from each mechanical unit as shown in Figure 7.

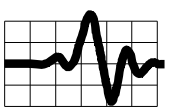
b. The noise barriers shall be continuous and with no gaps. The barrier shall have a minimum surface density of 20 kg/m2, or alternatively be a commercial noise barrier which meets the requirements of CAN/CSA-Z107-9.00 (R2004) Standard for Certification of Noise Barriers (Reaffirmed 2004). Examples of suitable barriers are as follow:

   i. Framed exterior walls with exterior cladding to meet the minimum surface density requirements as noted above. It is recommended the assembly of framed exterior walls with exterior cladding be reviewed by a qualified acoustical consultant prior to construction.
   ii. Commercial noise barriers such as the Kinetics Noise Control, Noise Block Barrier Wall or similar.

7.2. The kitchen exhausts are to be fitted with an exhaust silencer that meets the minimum insertion loss requirements listed in Table 7. The silencer is to be located inside the building or as close as possible to where the exhaust exits the building with the duct material between the silencer and the roof of the building constructed of 16-gauge weather resistant metal. The silencers shall have a high transmission loss casing.

7.3. Due to the preliminary stage of the design, it is recommended that the final selection and location of all mechanical equipment be reviewed by a qualified acoustical consultant during the detailed design phase of the project and prior to construction. Noise mitigation measures shall be reviewed, and altered if necessary, to ensure that City of Ottawa and MECP sound level limits are met at all points of reception.

7.4. If a new process is introduced to the site, then this process shall be assessed by a qualified acoustical consultant prior to installation. Noise mitigation measures shall be reviewed, and altered if necessary, to ensure that City of Ottawa and MECP sound level limits are met at all points of reception.



8.0 Conclusion

A noise impact assessment of stationary noise source impacts has been conducted according to the City of Ottawa and MECP guidelines.

Noise generated from on-site equipment operations at the proposed commercial development have been predicted at critical noise sensitive locations in the surrounding environment.

Noise impacts have been estimated for worst case conditions according to City of Ottawa and MECP guidelines.

It has been found that noise levels at the proposed facility will be in compliance with the City of Ottawa and MECP sound level limits providing the recommendations as specified in this report are followed.

Professional Engineers Ontario
8th September 2025

Limited Engineering Licensee

Name: M. A. WELLS
Number: 100542557
Limitations: Environmental acoustic assessments and recommendations to mitigate noise and vibration; acoustical engineering services for land-use planning, architectural and building acoustics, industrial acoustics, and occupational health and safety audits.

Association of Professional Engineers of Ontario

Michael Wells,
Limited Engineering Licensee, Professional Engineers Ontario, Registered Architect of NSW,
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Member, Canadian Acoustical Society, Member, Australian Acoustical Society (M.A.A.S.)

References

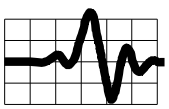
1. City of Ottawa *Environmental Noise Control Guidelines, January 2016*.

2. Ministry of Environment Publication NPC-300, *Environmental Noise Guideline Stationary and Transportation Sources - Approval and Planning*, August 2013.

3. Ministry of Environment, *Sample Application Package, Basic Comprehensive Certificate of Approval (Air and Noise)*, July 2009.

4. International Standards Organization, *Acoustics - Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation*, ISO 9613-2: 1996(E).

5. City of Ottawa *"Official Plan - Annex 10*", 2011.



TABLES

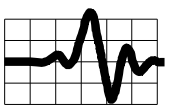


Table 2: Points of Reception

Point of Reception (POR)	Description
POR 1	Residence 135 Bandelier Way (2 stories)
POR 2	Residence 1119 Stittsville Main Street (2.5 stories)
POR 3	Retirement Residence 6130 Hazeldean Road (5 stories)
POR 4	Vacant lot zoned for potential noise sensitive use 6176 Hazeldean Road (2 stories)
POR 5	Vacant land zoned for potential noise sensitive use 6171 Hazeldean Road (2 stories)
POR 6	Residence 169 Bandelier Way (2 stories) (also represents 171 Bandelier Way)
POR 7	Residence 167 Bandelier Way (2 stories) (also represents 159 - 165 Bandelier Way)
POR 8	Residence 157 Bandelier Way (2 stories) (also represents 149 - 155 Bandelier Way)
POR 9	Residence 147 Bandelier Way (2 stories) (also represents 139 to 145 Bandelier Way)

For assessment purposes, points of reception, (POR), have been taken as upper floor windows, POW, (1.5 m above grade for single storey and 4.5 m above grade to represent two storey residences) and Outdoor Point of Reception, OPR, (1.5 m above grade) in acoustic calculations. POR's located on vacant land have been assessed at 2 stories in height.

Table 2: Noise Source Summary Table

Source ID	Source Description	Sound Power (dBA)	Source Location Height (m)	Sound Character-istics	Noise Control Measures
RTU_1_* (Commercial Units 1 and 9)	TRANE 7.5 Ton Unit (Model: YSC036A)	90	1*	Steady, non-tonal, non-directional noise source	As noted in section 7.0
RTU_2_* (Commercial Units 2 to 8)	TRANE 2.5 Ton Unit (Model: YSC036A)	83	1*	Steady, non-tonal, non-directional noise source	As noted in section 7.0
KEX_1 KEX_2 KEX_3 (Commercial Units 1, 5 and 9)	Kitchen Exhaust	89.7 (62.6)**	1*	Steady, non-tonal, directional noise source	As noted in section 7.0

*Height measured above roof level.
**Includes attenuation provided by the recommended silencer as noted in Section 7.0 and Table 7.

Table 3: Exclusion Limit Values for One-Hour Equivalent Sound Level (Leq, dBA) at Outdoor Points of Reception*

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	**50**	50	45	55
19:00 – 23:00	**50**	45	40	55

Table 4: Exclusion Limit Values for One-Hour Equivalent Sound Level (Leq, dBA) at Plane of Window of Noise Sensitive Spaces*

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	**50**	50	45	60
19:00 – 23:00	**50**	50	40	60
23:00 – 07:00	45	45	40	55

*Sound level limits are based on 1-hour equivalent sound levels.

Table 5: Acoustic Assessment Summary Table – Before Mitigation

Point of Reception ID	POR Description	Location	Scenario 1 Estimated Sound Level Daytime and Evening Period[1] (Worst Case) (dBA)	Performance Limit* Daytime and Evening Period (dBA)	Scenario 1 Estimated Sound Level Nighttime Period[1] (Worst Case) (dBA)	Performance Limit* Nighttime Period (dBA)	Compliance with Performance Limit (Yes/No)
POR 1	Residence	POW	49	50	47.7	45	No
		OPR	48.1	50	47.2	45	No
POR 2	Residence	POW	37	50	35.6	45	Yes
		OPR	37.1	50	35.6	45	Yes
POR 3	Residence	POW	43	66.4	41.6	45	Yes
		OPR	19.1	50	17.7	45	Yes
POR 4	Vacant Lot	POW	45.3	50	43.9	45	Yes
		OPR	44.9	50	43.5	45	Yes
POR 5	Vacant Lot	POW	51.7	50	50.4	45	Yes
		OPR	50.5	50	49.4	45	Yes
POR 6	Residence	POW	60.7	50	59.4	45	No
		OPR	60.5	50	60.1	45	No
POR 7	Residence	POW	61.7	50	60.4	45	No
		OPR	60.8	50	60.5	45	No
POR 8	Residence	POW	58.8	50	57.9	45	No
		OPR	58.6	50	58.3	45	No
POR 9	Residence	POW	53	50	51.9	45	No
		OPR	51.7	50	51.1	45	No

1. Refer to Tables A2.5.1 and A2.5.2, Appendix 2 for detailed sound level estimates by source.

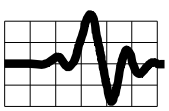


Table 6: Acoustic Assessment Summary Table – After Mitigation

Point of Reception ID	POR Description	Location	Scenario 1 Estimated Sound Level Daytime and Evening Period[1] (Worst Case) (dBA)	Performance Limit* Daytime and Evening Period (dBA)	Scenario 1 Estimated Sound Level Nighttime Period[1] (Worst Case) (dBA)	Performance Limit* Nighttime Period (dBA)	Compliance with Performance Limit (Yes/No)
POR 1	Residence	POW	38.3	50	35.3	45	No
		OPR	37.4	50	34.4	45	No
POR 2	Residence	POW	32.8	50	29.8	45	Yes
		OPR	33.4	50	30.4	45	Yes
POR 3	Residence	POW	40.3	66.4	37.3	45	Yes
		OPR	16.7	50	13.7	45	Yes
POR 4	Vacant Lot	POW	42.8	50	39.8	45	Yes
		OPR	42.3	50	39.3	45	Yes
POR 5	Vacant Lot	POW	47.6	50	44.6	45	No
		OPR	43.2	50	40.2	45	No
POR 6	Residence	POW	46.1	50	43.2	45	No
		OPR	44.5	50	41.7	45	No
POR 7	Residence	POW	46.9	50	44	45	No
		OPR	44.9	50	42.2	45	No
POR 8	Residence	POW	44	50	41.1	45	No
		OPR	41.5	50	38.9	45	No
POR 9	Residence	POW	40	50	37.1	45	No
		OPR	36.8	50	33.9	45	No

1. Refer to Tables A2.6.1 and A2.6.2, Appendix 2 for detailed sound level estimates by source.

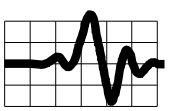


Table 7: Minimum Insertion Loss for Kitchen Exhaust Silencer

Name	Octave Band Centre Frequency, Hz Minimum Dynamic Insertion Loss (dB)								Rw
	63	125	250	500	1000	2000	4000	8000	
Silencer to be installed at the Kitchen exhaust[2] (Source: KEX)	10	30	38	30	25	20	20	20	24

Notes:

1. Octave Band Centre Frequency, Hz, with minimum dynamic insertion loss in dB or dBA units re 10-12 Watts. Alternative levels at each frequency band permissible providing the overall insertion loss meets the overall insertion loss (Rw) as noted above and is not tonal in character.

Figures

Contents

Figure 1: Area Plan Showing Site Boundary and Points of Reception

Figure 2: Site Plan

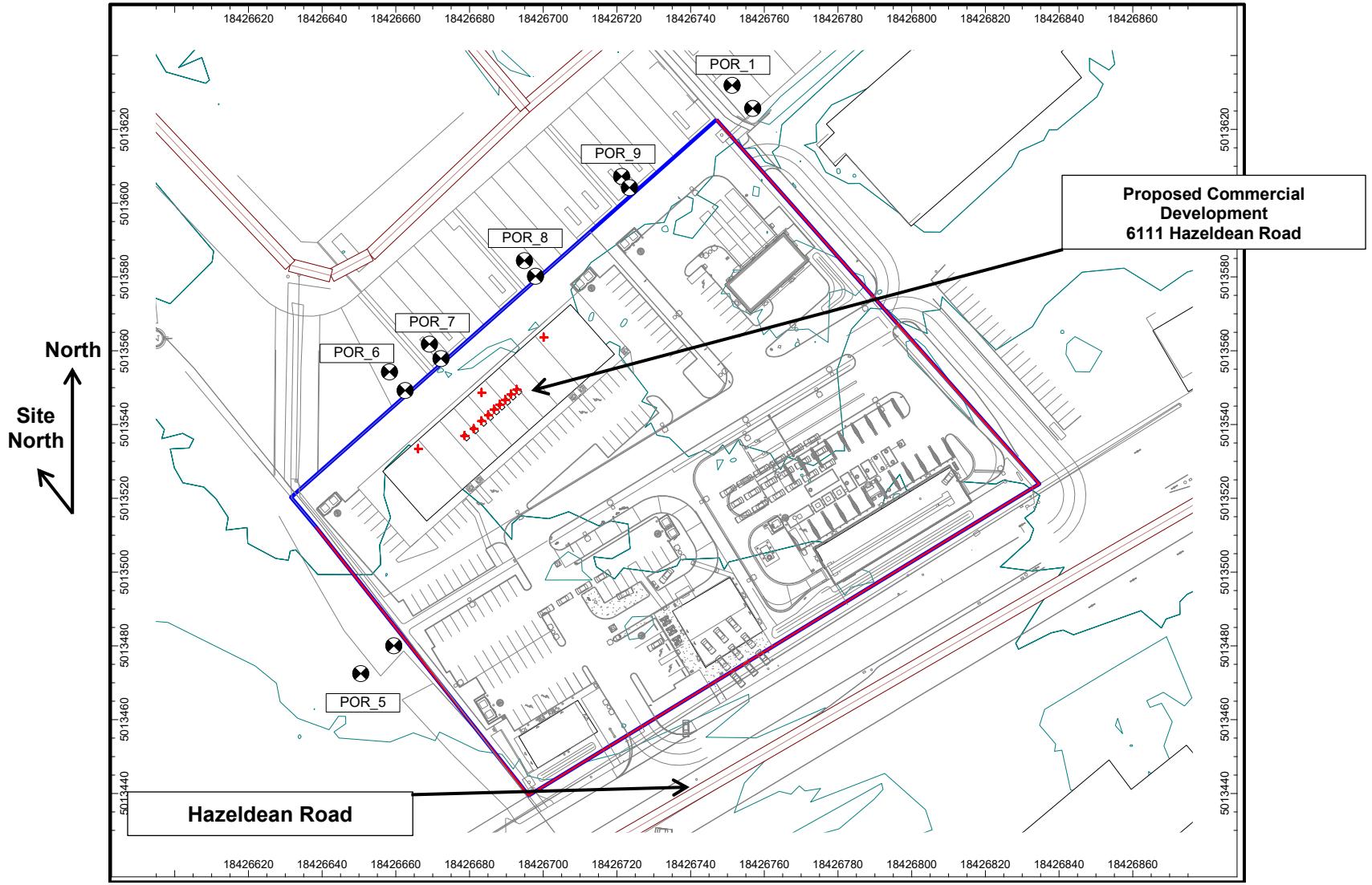


Figure 3: Detailed Plan at Commercial Development showing Source Locations

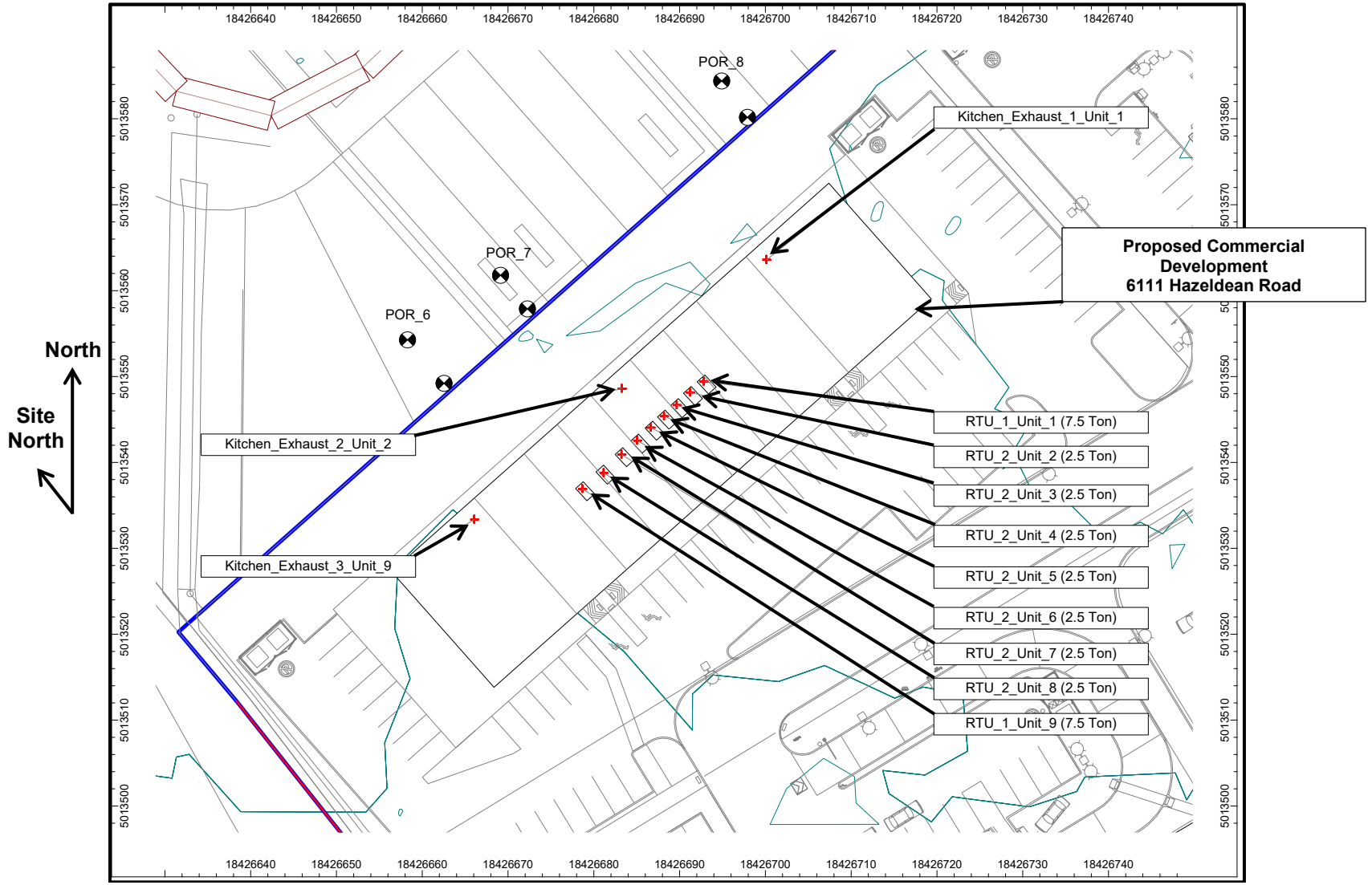


Figure 4.1: Scenario 1: Worst Case, All equipment in operation – Before Mitigation, Day and Evening Period (07:00 – 23:00); Noise Contours: (Noise levels at 4.5 m)

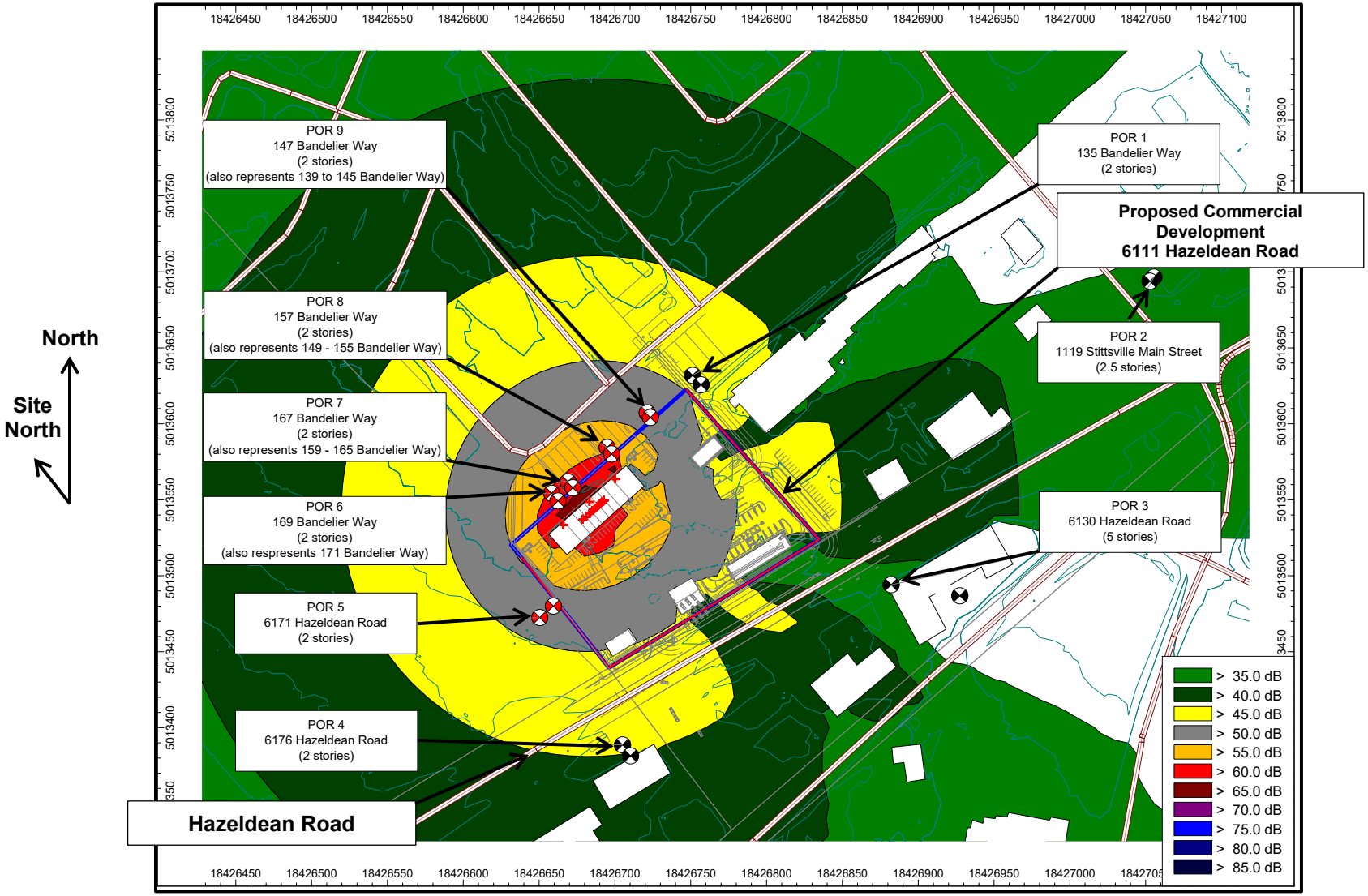


Figure 4.2: Scenario 1: Worst Case, All equipment in operation – Before Mitigation, Nighttime Period (23:00 – 07:00); Noise Contours: (Noise levels at 4.5 m)

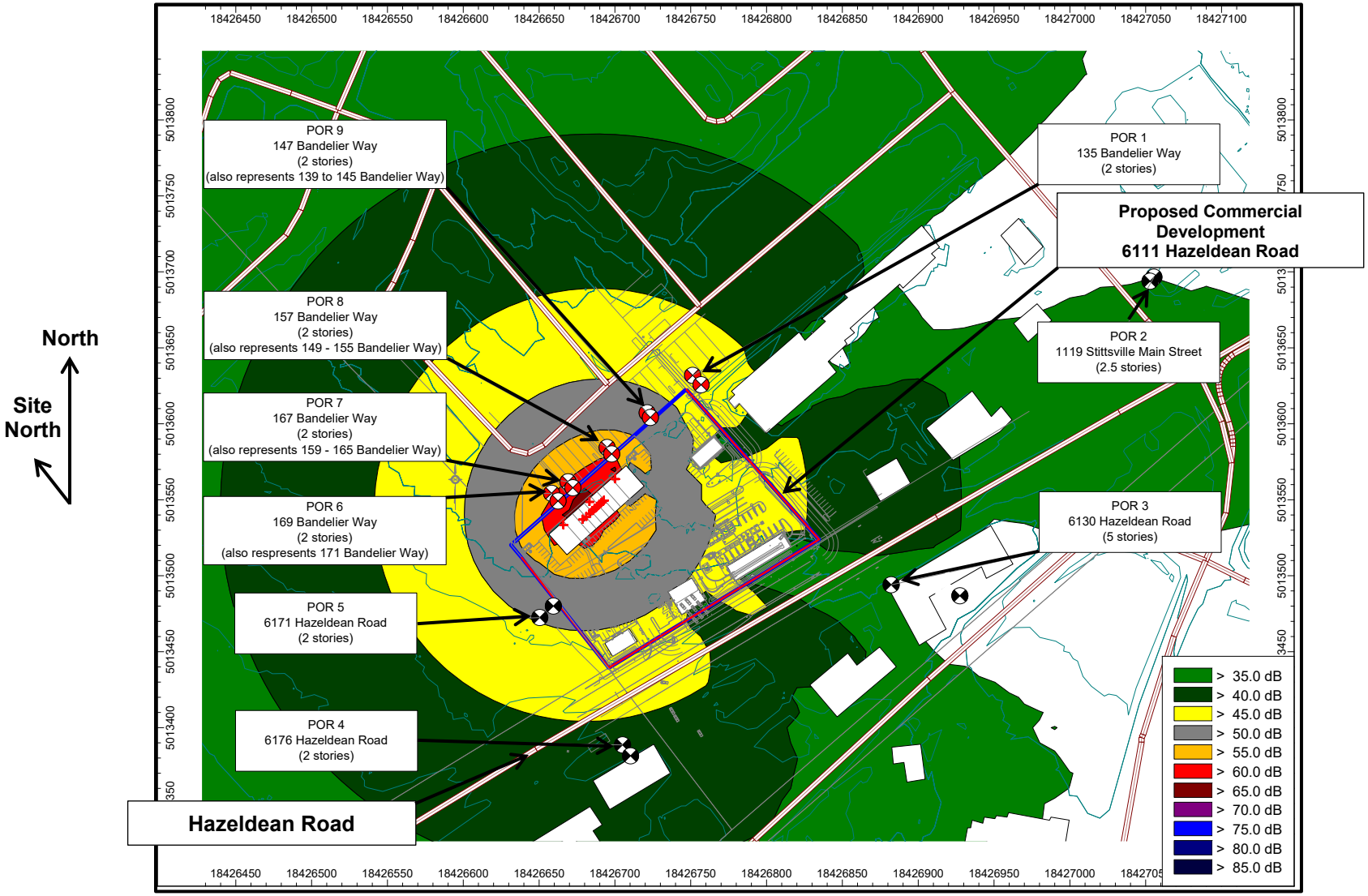


Figure 5.1: Scenario 1: Worst Case, All equipment in operation – After Mitigation, Day and Evening Period (07:00 – 23:00); Noise Contours: (Noise levels at 4.5 m)

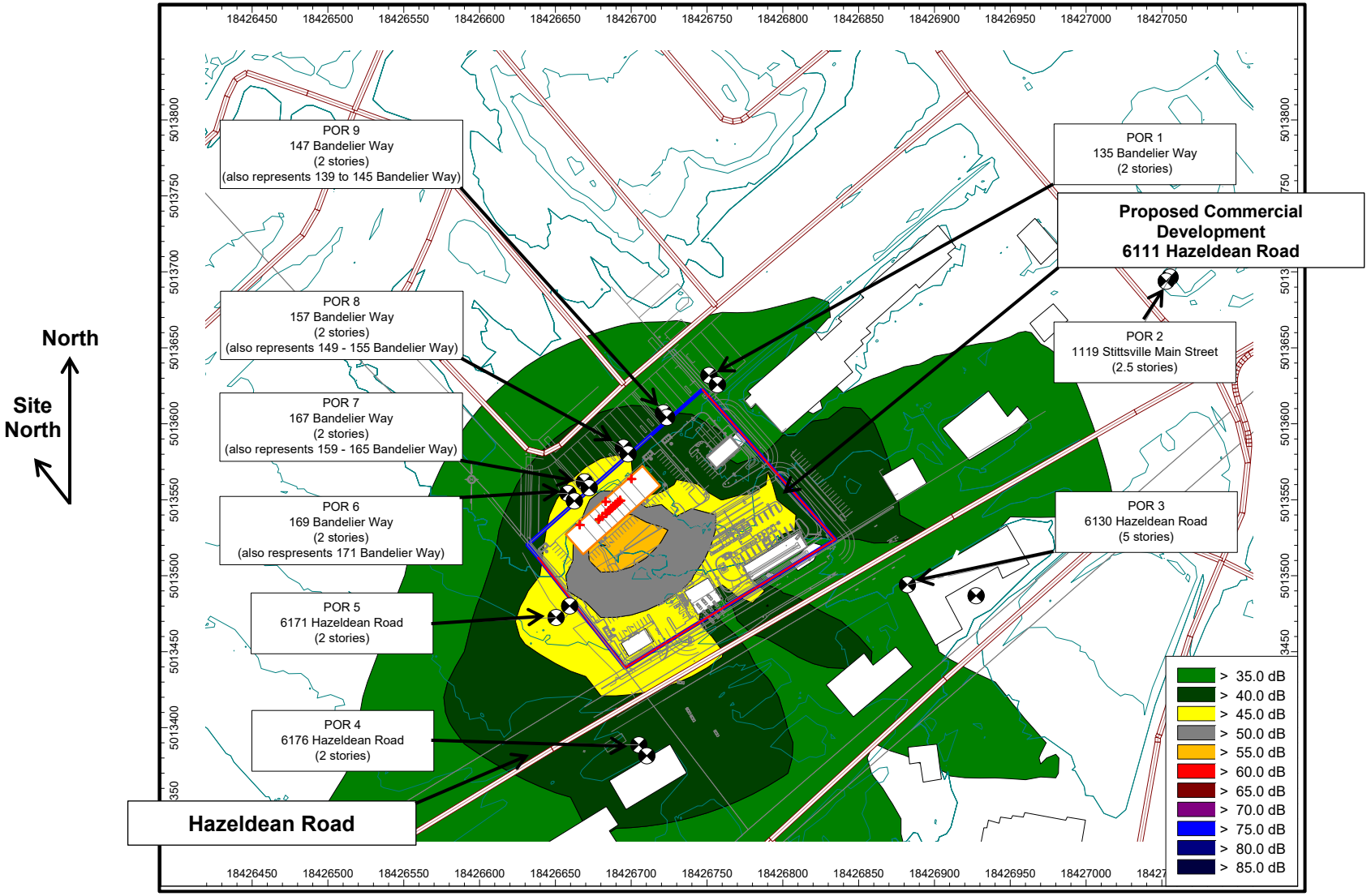


Figure 5.2: Scenario 1: Worst Case, All equipment in operation – After Mitigation, Nighttime Period (23:00 – 07:00); Noise Contours: (Noise levels at 4.5 m)

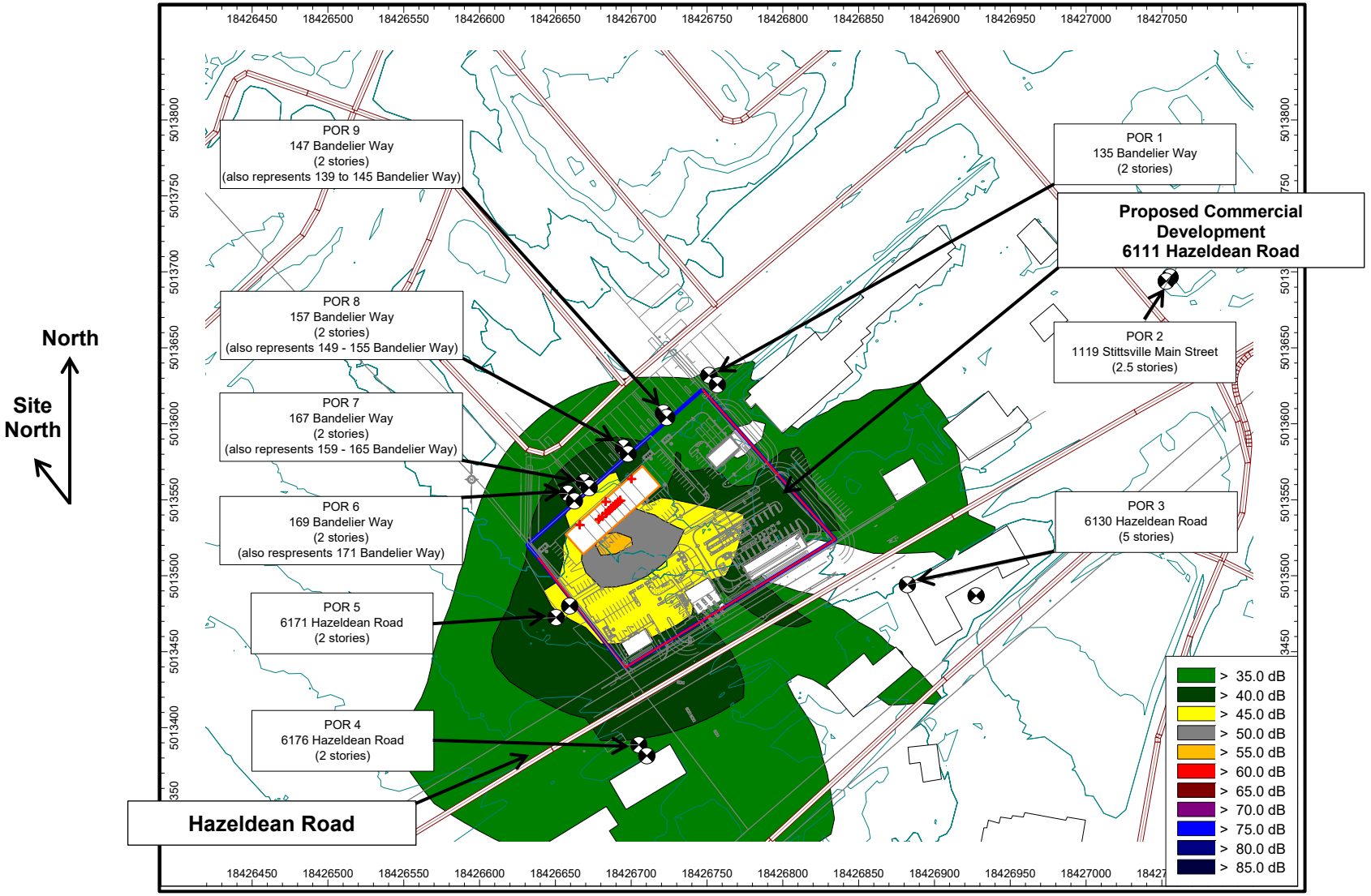
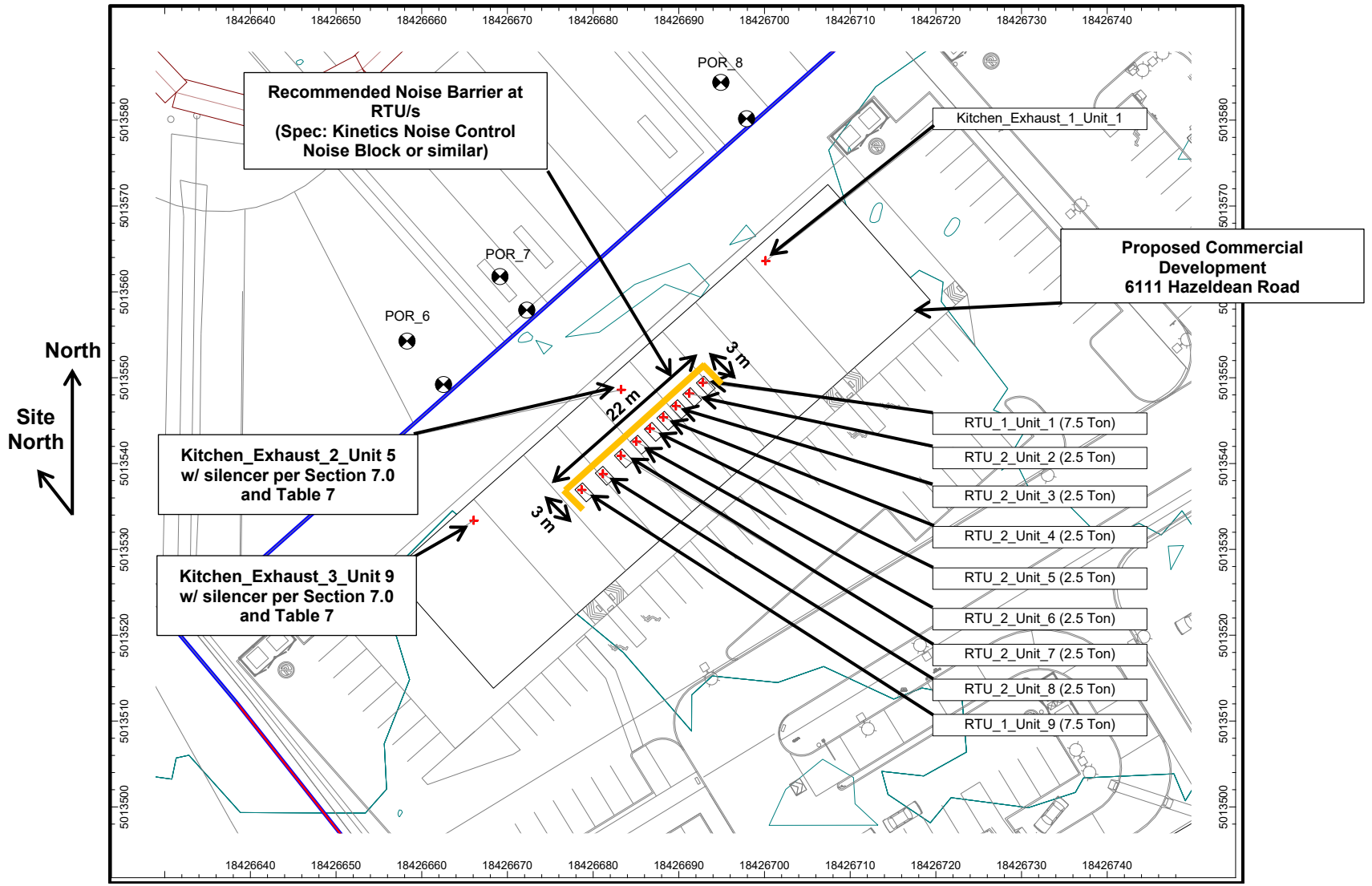


Figure 6: Detailed Plan at Commercial Development showing Recommended Noise Mitigation (Silencers and Noise Barriers)



Appendix 1

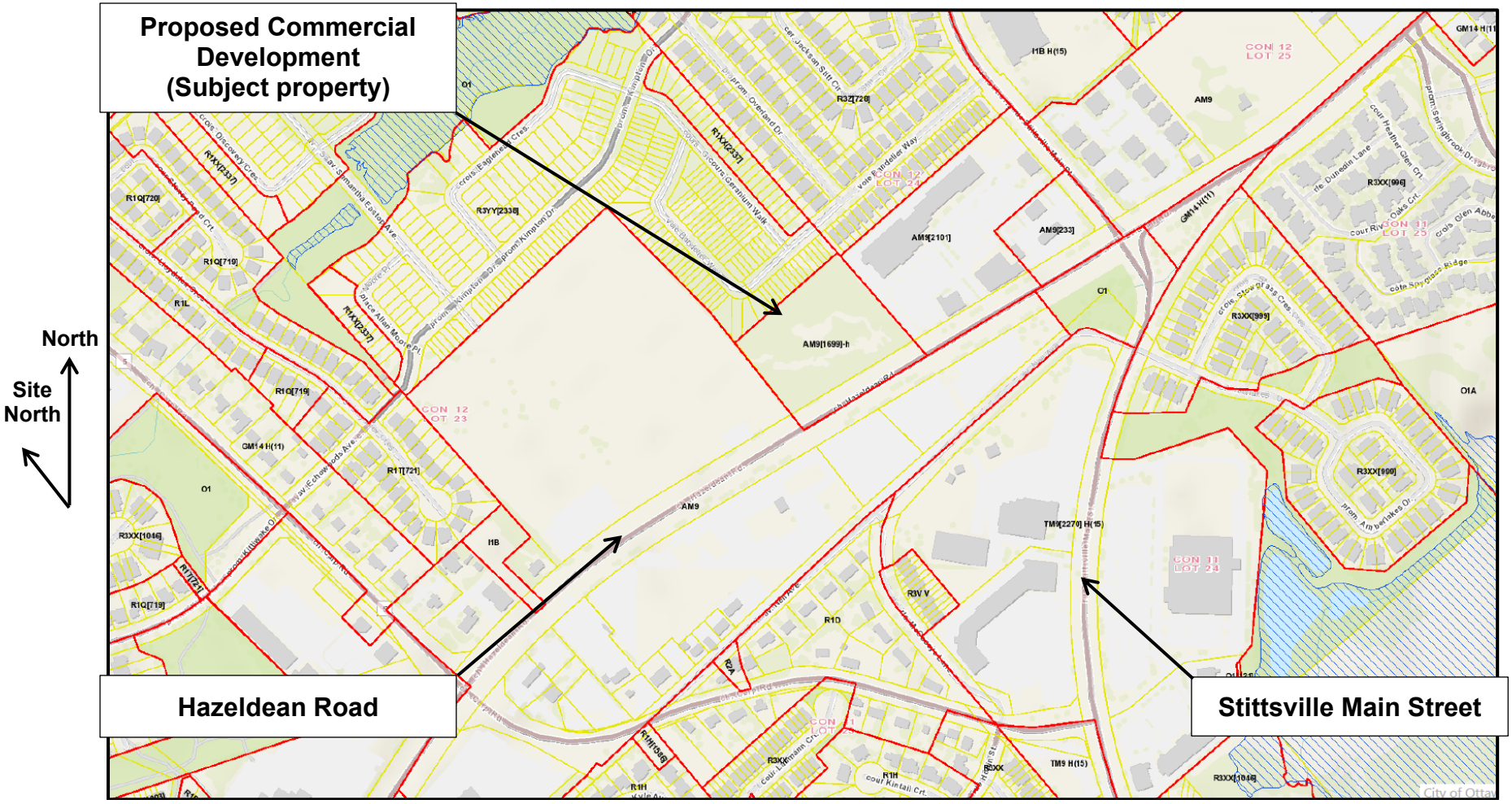
Zoning Plan and Land Use Designations

Contents:

Legend for Land Use Designations:

AM	-	Arterial Main Street Zone
I2	-	Major Institutional Zone
R2	-	Residential Second Density Zone
R3	-	Residential Third Density Zone
R4	-	Residential Fourth Density Zone
R10	-	Residential Tenth Density Zone
O1	-	Parks and Open Space Zone

Figure A1.1 - Zoning Plan - City of Ottawa Zoning Bylaw 2008 – 250 (source: geoOttawa)



Appendix 2
Acoustic Modelling Details

Modeling Notes:

1. Acoustic model developed uses Cadna-A software, Version 2025.
2. Sound propagation is modeled according to ISO 9613-2: 1996(E).
3. The whole of the site area is modeled as reflective with an absorption coefficient of 0.0, a conservative assumption.
4. MECP favoured conservative modelling assumptions are used, that is, 'no subtraction of negative ground attenuation' and 'no negative path differences'.

Contents:

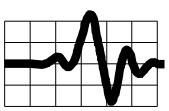


Table A2.1 Calculation Configuration

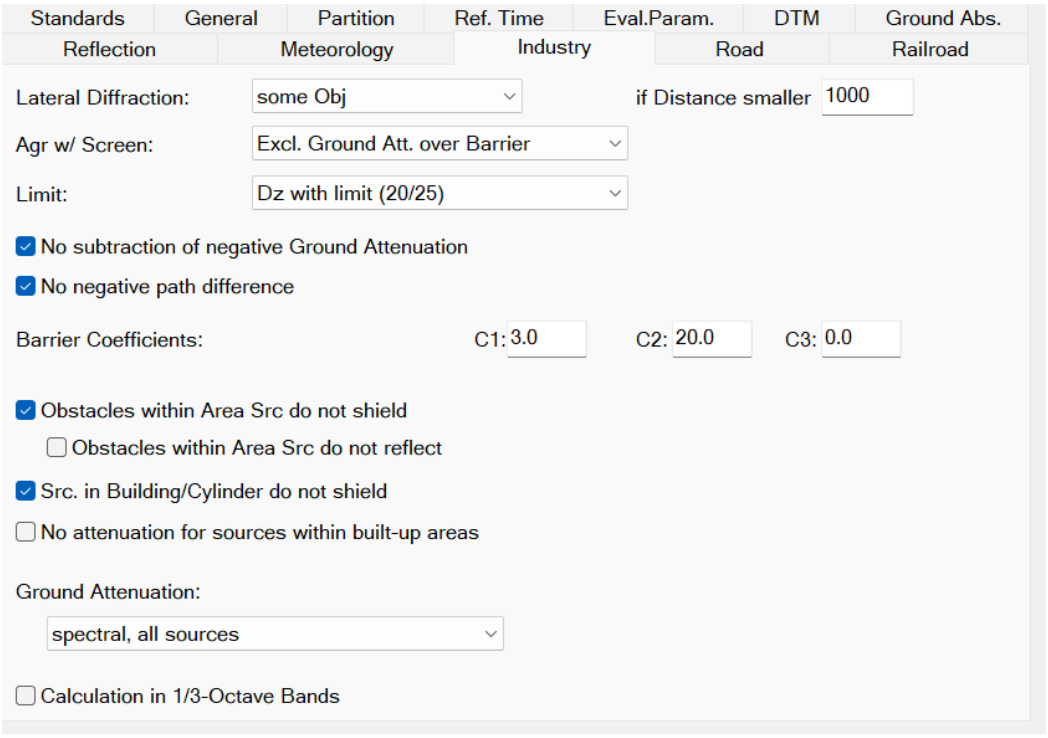


Table A2.2 Point of Reception Location Table

ID	Height	Coordinates		
		X	Y	Z
	(m)	(m)	(m)	(m)
POR_1_POW	4.5	18426751	5013632	120.18
POR_1_OPR	1.5	18426757	5013626	117.41
POR_2_POW	6	18427055	5013697	121
POR_2_OPR	1.5	18427053	5013694	116.5
POR_3_POW	13.5	18426882	5013494	129.5
POR_3_OPR	1.5	18426928	5013487	117.5
POR_4_POW	4.5	18426705	5013389	122.5
POR_4_OPR	1.5	18426710	5013381	119.5
POR_5_POW	4.5	18426650	5013472	121.19
POR_5_OPR	1.5	18426659	5013480	117.95
POR_6_POW	4.5	18426658	5013554	120.05
POR_6_OPR	1.5	18426663	5013549	117.04
POR_7_POW	4.5	18426669	5013562	119.5
POR_7_OPR	1.5	18426672	5013558	116.5
POR_8_POW	4.5	18426695	5013584	119.5
POR_8_OPR	1.5	18426698	5013580	116.5
POR_9_POW	4.5	18426721	5013607	119.5
POR_9_OPR	1.5	18426723	5013604	116.5

Table A2.3 Point Sources

ID	Result. PWL			Lw / Li		Attenuation	Operating Time			Direct.	Height	Coordinates		
	Day	Evening	Night	Type	Value		Day	Special	Night			X	Y	Z
	(dBA)	(dBA)	(dBA)				(min)	(min)	(min)		(m)	(m)	(m)	(m)
KEX_1_Unit_1	62.6	62.6	62.6	Lw	KEX	Silex_Silencer_Model_JB_6				Chimney (VDI 3733 (1996))	1	18426700.1	5013563.58	121.15
KEX_2_Unit_2	62.6	62.6	62.6	Lw	KEX	Silex_Silencer_Model_JB_6				Chimney (VDI 3733 (1996))	1	18426683.3	5013548.59	121.15
KEX_3_Unit_9	62.6	62.6	62.6	Lw	KEX	Silex_Silencer_Model_JB_6				Chimney (VDI 3733 (1996))	1	18426666.1	5013533.35	121.15
RTU_1_Unit_1	90	90	90	Lw	TRANE_YSC090A_7.5T		60	60	30	(none)	1	18426692.8	5013549.42	120.95
RTU_2_Unit_2	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426691.2	5013548.14	120.95
RTU_2_Unit_3	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426689.7	5013546.67	120.95
RTU_2_Unit_4	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426688.2	5013545.37	120.95
RTU_2_Unit_5	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426686.6	5013544.05	120.95
RTU_2_Unit_6	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426685.1	5013542.53	120.95
RTU_2_Unit_7	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426683.2	5013540.9	120.95
RTU_2_Unit_8	83	83	83	Lw	TRANE_YSC036A_3T		60	60	30	(none)	1	18426681.1	5013538.78	120.95
RTU_1_Unit_9	90	90	90	Lw	TRANE_YSC090A_7.5T		60	60	30	(none)	1	18426678.7	5013536.92	120.95

*Height measured from finished roof level.

Table A2.4 Noise Source Library

ID	Type	Octave Spectrum (dB)											Source
		31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
TRANE_YSC036A_3T	Lw		86.4	83.4	81.4	80.4	78.4	74.4	69.4	68.4	83	90.1	Trane Eng. Submittal - Manufacturers Sound Data
TRANE_YSC090A_7.5T	Lw		92.1	95.1	91.1	88.1	84.1	80.1	75.1	68.1	90	98.6	Trane Eng. Submittal - Manufacturers Sound Data
KEX	Lw	78.5	80.5	82.5	91.5	90.5	80.5	76.5	72.5	65.5	89.7	94.9	R. D. Bruce & C. T. Moritz, 10000CFM

Table A2.5.1 Scenario 1 - Point of Reception Impacts by Source, Before Mitigation, Day and Evening (07:00 – 23:00)

	Partial Level Day and Evening (07:00 – 23:00)																	
ID	POR_1_POW	POR_1_OPR	POR_2_POW	POR_2_OPR	POR_3_POW	POR_3_OPR	POR_4_POW	POR_4_OPR	POR_5_POW	POR_5_OPR	POR_6_POW	POR_6_OPR	POR_7_POW	POR_7_OPR	POR_8_POW	POR_8_OPR	POR_9_POW	POR_9_OPR
KEX_1_Unit_1	42.8	42.9	29.3	26.8	35.3	10.5	36.3	36	41.1	38.1	48.9	49.4	51.7	52.4	55	56.8	47.8	48.1
KEX_2_Unit_2	40.7	40.8	28.9	28.2	34.8	10.6	37.1	36.6	43.1	39.4	53.4	55.1	55.9	58.1	50	50.7	44.6	44.7
KEX_3_Unit_9	39	39.1	28.7	29.8	34.2	10.8	37.7	37.3	45.5	46.9	54.6	57.2	52.5	53.4	46.1	46.4	42.1	42.2
RTU_1_Unit_1_S2	41.5	41.6	29.2	30.3	35.4	11.9	37.3	36.8	42.8	40.6	51	45.9	53.4	47.1	51	44.4	45.6	41.6
RTU_2_Unit_2_S2	34.1	32.1	21.6	22.7	28	3.5	30	29.6	35.8	32.2	44.3	38.8	46.5	39.5	43.5	36.3	38.1	32.1
RTU_2_Unit_3_S2	33.9	31.6	21.6	17.9	27.9	3.5	30.1	29.7	36	32.4	44.6	39.1	46.7	39.6	43.1	35.9	37.9	31.7
RTU_2_Unit_4_S2	33.8	29.1	21.6	22.7	27.9	3.5	30.2	29.7	36.2	32.7	44.9	39.5	46.8	39.8	42.8	35.6	37.6	33.5
RTU_2_Unit_5_S2	33.6	28.9	21.6	17.9	27.8	3.5	30.2	29.8	36.4	32.9	45.2	39.9	46.9	40	42.4	35.3	37.4	33.3
RTU_2_Unit_6_S2	33.4	28.7	21.5	22.6	27.8	3.5	30.3	29.9	36.6	35	45.5	40.1	46.8	39.9	42	36.9	37.1	33.1
RTU_2_Unit_7_S2	33.2	28.5	21.5	22.6	27.7	3.5	30.4	29.9	36.9	36.1	45.8	40.5	46.8	39.8	41.6	36.5	36.8	32.8
RTU_2_Unit_8_S2	33	28.2	21.5	22.5	27.6	3.6	30.5	30	37.3	38.6	46	40.6	46.5	39.3	41.1	36	36.5	30.5
RTU_1_Unit_9_S2	40	35.2	28.9	30	34.9	12	37.9	37.4	44.8	41.4	53.4	48.9	53.4	47.2	47.8	43.2	43.4	39.7
Total	49	48.1	37	37.1	43	19.1	45.3	44.9	51.7	50.5	60.7	60.5	61.7	60.8	58.8	58.6	53	51.7

Table A2.5.2 Scenario 1 - Point of Reception Impacts by Source, Before Mitigation, Nighttime (23:00 – 07:00)

	Partial Level Day and Evening (07:00 – 23:00)																	
ID	POR_1_POW	POR_1_OPR	POR_2_POW	POR_2_OPR	POR_3_POW	POR_3_OPR	POR_4_POW	POR_4_OPR	POR_5_POW	POR_5_OPR	POR_6_POW	POR_6_OPR	POR_7_POW	POR_7_OPR	POR_8_POW	POR_8_OPR	POR_9_POW	POR_9_OPR
KEX_1_Unit_1	42.8	42.9	29.3	26.8	35.3	10.5	36.3	36	41.1	38.1	48.9	49.4	51.7	52.4	55	56.8	47.8	48.1
KEX_2_Unit_2	40.7	40.8	28.9	28.2	34.8	10.6	37.1	36.6	43.1	39.4	53.4	55.1	55.9	58.1	50	50.7	44.6	44.7
KEX_3_Unit_9	39	39.1	28.7	29.8	34.2	10.8	37.7	37.3	45.5	46.9	54.6	57.2	52.5	53.4	46.1	46.4	42.1	42.2
RTU_1_Unit_1_S2	38.5	38.6	26.1	27.2	32.4	8.9	34.2	33.8	39.8	37.6	48	42.8	50.4	44	48	41.4	42.6	38.6
RTU_2_Unit_2_S2	31.1	29.1	18.6	19.7	25	0.5	27	26.6	32.8	29.2	41.2	35.7	43.5	36.5	40.5	33.3	35.1	29.1
RTU_2_Unit_3_S2	30.9	28.6	18.6	14.9	24.9	0.5	27.1	26.6	33	29.4	41.6	36.1	43.7	36.6	40.1	32.9	34.9	28.7
RTU_2_Unit_4_S2	30.7	26.1	18.6	19.7	24.9	0.5	27.2	26.7	33.2	29.7	41.9	36.4	43.8	36.8	39.7	32.6	34.6	30.5
RTU_2_Unit_5_S2	30.6	25.9	18.6	14.9	24.8	0.5	27.2	26.8	33.4	29.9	42.2	36.9	43.9	37	39.4	32.3	34.4	30.3
RTU_2_Unit_6_S2	30.4	25.7	18.5	19.6	24.8	0.5	27.3	26.8	33.6	32	42.5	37.1	43.8	36.8	39	33.9	34.1	30.1
RTU_2_Unit_7_S2	30.2	25.5	18.5	19.6	24.7	0.5	27.4	26.9	33.9	33.1	42.7	37.5	43.8	36.8	38.6	33.5	33.8	29.8
RTU_2_Unit_8_S2	30	25.2	18.5	19.5	24.6	0.5	27.5	27	34.2	35.6	43	37.6	43.5	36.3	38.1	33	33.5	27.5
RTU_1_Unit_9_S2	37	32.2	25.9	27	31.9	9	34.9	34.4	41.8	38.4	50.3	45.9	50.4	44.2	44.8	40.1	40.4	36.7
Total	47.7	47.2	35.6	35.6	41.6	17.7	43.9	43.5	50.4	49.4	59.4	60.1	60.4	60.5	57.9	58.3	51.9	51.1

Table A2.6.1 Scenario 2 - Point of Reception Impacts by Source, After Mitigation, Day and Evening (07:00 – 23:00)

	Partial Level Day and Evening (07:00 – 23:00)																	
ID	POR_1 _POW	POR_1 _OPR	POR_2 _POW	POR_2 _OPR	POR_3 _POW	POR_3 _OPR	POR_4 _POW	POR_4 _OPR	POR_5 _POW	POR_5 _OPR	POR_6 _POW	POR_6 _OPR	POR_7 _POW	POR_7 _OPR	POR_8 _POW	POR_8 _OPR	POR_9 _POW	POR_9 _OPR
KEX_1_Unit_1	15.2	15.3	0.7	-2	7.3	-17.2	8.4	8	8.7	7.7	21.5	22	24.4	25.1	27.7	29.6	20.4	20.7
KEX_2_Unit_2	13	13.1	0.4	-0.4	0.7	-18.6	2.1	1.2	10.4	5.6	26.1	27.9	28.6	30.8	22.7	23.3	17.1	17.2
KEX_3_Unit_9	11.2	11.3	-3.7	-3.2	6.1	-17.1	9.9	9.4	18	19.5	27.4	29.9	25.1	26.1	18.7	19	14.5	14.6
RTU_1_Unit_1_S 2	32.2	32.3	22.7	23.8	35.4	11.9	37.3	36.8	42.8	40.6	40.4	40.6	42.1	42.1	40.9	39.9	35.8	34.2
RTU_2_Unit_2_S 2	25.8	25.2	18.2	19.3	28	3.5	30	29.6	35.8	32.2	32.1	32.5	33.7	33.9	32.2	31.6	29	24.5
RTU_2_Unit_3_S 2	26.6	25.8	21.6	17.9	27.9	3.5	30.1	29.7	36	32.4	32.3	32.8	33.8	34	31.7	31.4	28.7	27.7
RTU_2_Unit_4_S 2	26.7	25.6	21.6	22.7	27.9	3.5	30.2	29.7	36.2	32.7	32.5	33	33.7	34	31.3	31.1	28.4	27.5
RTU_2_Unit_5_S 2	26.2	25.7	21.6	17.9	27.8	3.5	30.2	29.8	36.4	32.9	32.5	33.2	33.7	34	31	30.7	28	27.2
RTU_2_Unit_6_S 2	26.1	25.7	21.5	22.6	27.8	3.5	30.3	29.9	36.6	35	32.7	33.5	33.6	34.1	30.8	30.5	27.9	27.1
RTU_2_Unit_7_S 2	25.8	25.5	21.5	22.6	27.7	3.5	30.4	29.9	36.9	36.1	33.2	33.7	33.7	34	30.4	30.2	27.6	26.9
RTU_2_Unit_8_S 2	25.9	25.5	21.5	22.5	27.6	3.6	30.5	30	37.3	38.6	33.7	34.1	33.8	34	30.3	30	27.6	26.9
RTU_1_Unit_9_S 2	33.2	32.9	28.9	30	34.9	12	37.9	37.4	38.3	40.2	41.9	42.3	41.7	41.9	37.7	37.6	35	34.4
Total	38.3	38	32.8	33.4	40.3	16.7	42.8	42.3	47.6	46.4	46.1	46.6	46.9	47.1	44.5	44	40.7	39.6

Table A2.6.2 Scenario 1 - Point of Reception Impacts by Source, After Mitigation, Nighttime (23:00 – 07:00)

	Partial Level Day and Evening (07:00 – 23:00)																	
ID	POR_1 _POW	POR_1 _OPR	POR_2 _POW	POR_2 _OPR	POR_3 _POW	POR_3 _OPR	POR_4 _POW	POR_4 _OPR	POR_5 _POW	POR_5 _OPR	POR_6 _POW	POR_6 _OPR	POR_7 _POW	POR_7 _OPR	POR_8 _POW	POR_8 _OPR	POR_9 _POW	POR_9 _OPR
KEX_1_Unit_1	15.2	15.3	0.7	-2	7.3	-17.2	8.4	8	8.7	7.7	21.5	22	24.4	25.1	27.7	29.6	20.4	20.7
KEX_2_Unit_2	13	13.1	0.4	-0.4	0.7	-18.6	2.1	1.2	10.4	5.6	26.1	27.9	28.6	30.8	22.7	23.3	17.1	17.2
KEX_3_Unit_9	11.2	11.3	-3.7	-3.2	6.1	-17.1	9.9	9.4	18	19.5	27.4	29.9	25.1	26.1	18.7	19	14.5	14.6
RTU_1_Unit_1_S 2	29.2	29.3	19.7	20.8	32.4	8.9	34.2	33.8	39.8	37.6	37.4	37.6	39.1	39.1	37.9	36.9	32.8	31.2
RTU_2_Unit_2_S 2	22.8	22.2	15.2	16.3	25	0.5	27	26.6	32.8	29.2	29.1	29.5	30.6	30.9	29.2	28.6	26	21.5
RTU_2_Unit_3_S 2	23.6	22.8	18.6	14.9	24.9	0.5	27.1	26.6	33	29.4	29.3	29.8	30.7	31	28.7	28.4	25.7	24.6
RTU_2_Unit_4_S 2	23.7	22.6	18.6	19.7	24.9	0.5	27.2	26.7	33.2	29.7	29.5	30	30.7	31	28.3	28.1	25.3	24.4
RTU_2_Unit_5_S 2	23.2	22.7	18.6	14.9	24.8	0.5	27.2	26.8	33.4	29.9	29.5	30.2	30.6	31	27.9	27.7	24.9	24.2
RTU_2_Unit_6_S 2	23.1	22.7	18.5	19.6	24.8	0.5	27.3	26.8	33.6	32	29.7	30.5	30.6	31.1	27.8	27.5	24.9	24.1
RTU_2_Unit_7_S 2	22.8	22.5	18.5	19.6	24.7	0.5	27.4	26.9	33.9	33.1	30.2	30.6	30.7	31	27.4	27.2	24.6	23.9
RTU_2_Unit_8_S 2	22.9	22.5	18.5	19.5	24.6	0.5	27.5	27	34.2	35.6	30.7	31.1	30.8	31	27.3	27	24.6	23.9
RTU_1_Unit_9_S 2	30.2	29.9	25.9	27	31.9	9	34.9	34.4	35.3	37.2	38.9	39.3	38.7	38.9	34.7	34.6	32	31.4
Total	35.3	35	29.8	30.4	37.3	13.7	39.8	39.3	44.6	43.4	43.2	43.7	44	44.3	41.6	41.2	37.8	36.7

Table A2.7 Sample Calculations – Scenario 2 (Daytime)

Receiver
Name: POR_1
ID: POR_1_POW
X: 18426751.28 m
Y: 5013631.90 m
Z: 120.18 m

Point Source, ISO 9613, Name: "RTU_1_Unit_1 (7 Ton Unit)", ID: "RTU_1_Unit_1_S2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2	18426692.80	5013549.42	120.95	0	D	63	65.9	0.0	0.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	4.0	0.0	0.0	13.7
2	18426692.80	5013549.42	120.95	0	D	125	79.0	0.0	0.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	5.4	0.0	0.0	25.4
2	18426692.80	5013549.42	120.95	0	D	250	82.5	0.0	0.0	0.0	0.0	51.1	0.1	-3.0	0.0	0.0	7.3	0.0	0.0	27.0
2	18426692.80	5013549.42	120.95	0	D	500	84.9	0.0	0.0	0.0	0.0	51.1	0.2	-3.0	0.0	0.0	9.6	0.0	0.0	27.0
2	18426692.80	5013549.42	120.95	0	D	1000	84.1	0.0	0.0	0.0	0.0	51.1	0.4	-3.0	0.0	0.0	12.1	0.0	0.0	23.5
2	18426692.80	5013549.42	120.95	0	D	2000	81.3	0.0	0.0	0.0	0.0	51.1	1.0	-3.0	0.0	0.0	14.9	0.0	0.0	17.3
2	18426692.80	5013549.42	120.95	0	D	4000	76.1	0.0	0.0	0.0	0.0	51.1	3.3	-3.0	0.0	0.0	17.8	0.0	0.0	6.9
2	18426692.80	5013549.42	120.95	0	D	8000	67.0	0.0	0.0	0.0	0.0	51.1	11.8	-3.0	0.0	0.0	19.1	0.0	0.0	-12.0
2	18426692.80	5013549.42	120.95	0	N	63	65.9	0.0	-3.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	4.0	0.0	0.0	10.7
2	18426692.80	5013549.42	120.95	0	N	125	79.0	0.0	-3.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	5.4	0.0	0.0	22.4
2	18426692.80	5013549.42	120.95	0	N	250	82.5	0.0	-3.0	0.0	0.0	51.1	0.1	-3.0	0.0	0.0	7.3	0.0	0.0	24.0
2	18426692.80	5013549.42	120.95	0	N	500	84.9	0.0	-3.0	0.0	0.0	51.1	0.2	-3.0	0.0	0.0	9.6	0.0	0.0	24.0
2	18426692.80	5013549.42	120.95	0	N	1000	84.1	0.0	-3.0	0.0	0.0	51.1	0.4	-3.0	0.0	0.0	12.1	0.0	0.0	20.5
2	18426692.80	5013549.42	120.95	0	N	2000	81.3	0.0	-3.0	0.0	0.0	51.1	1.0	-3.0	0.0	0.0	14.9	0.0	0.0	14.3
2	18426692.80	5013549.42	120.95	0	N	4000	76.1	0.0	-3.0	0.0	0.0	51.1	3.3	-3.0	0.0	0.0	17.8	0.0	0.0	3.9
2	18426692.80	5013549.42	120.95	0	N	8000	67.0	0.0	-3.0	0.0	0.0	51.1	11.8	-3.0	0.0	0.0	19.1	0.0	0.0	-15.1
2	18426692.80	5013549.42	120.95	0	E	63	65.9	0.0	0.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	4.0	0.0	0.0	13.7
2	18426692.80	5013549.42	120.95	0	E	125	79.0	0.0	0.0	0.0	0.0	51.1	0.0	-3.0	0.0	0.0	5.4	0.0	0.0	25.4
2	18426692.80	5013549.42	120.95	0	E	250	82.5	0.0	0.0	0.0	0.0	51.1	0.1	-3.0	0.0	0.0	7.3	0.0	0.0	27.0
2	18426692.80	5013549.42	120.95	0	E	500	84.9	0.0	0.0	0.0	0.0	51.1	0.2	-3.0	0.0	0.0	9.6	0.0	0.0	27.0
2	18426692.80	5013549.42	120.95	0	E	1000	84.1	0.0	0.0	0.0	0.0	51.1	0.4	-3.0	0.0	0.0	12.1	0.0	0.0	23.5
2	18426692.80	5013549.42	120.95	0	E	2000	81.3	0.0	0.0	0.0	0.0	51.1	1.0	-3.0	0.0	0.0	14.9	0.0	0.0	17.3
2	18426692.80	5013549.42	120.95	0	E	4000	76.1	0.0	0.0	0.0	0.0	51.1	3.3	-3.0	0.0	0.0	17.8	0.0	0.0	6.9
2	18426692.80	5013549.42	120.95	0	E	8000	67.0	0.0	0.0	0.0	0.0	51.1	11.8	-3.0	0.0	0.0	19.1	0.0	0.0	-12.0

Point Source, ISO 9613, Name: "RTU_1_Unit_9 (7 Ton Unit)", ID: "RTU_1_Unit_9_S2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
35	18426678.65	5013536.92	120.95	0	D	63	65.9	0.0	0.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	3.1	0.0	0.0	13.2
35	18426678.65	5013536.92	120.95	0	D	125	79.0	0.0	0.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	4.2	0.0	0.0	25.2
35	18426678.65	5013536.92	120.95	0	D	250	82.5	0.0	0.0	0.0	0.0	52.6	0.1	-3.0	0.0	0.0	5.4	0.0	0.0	27.4
35	18426678.65	5013536.92	120.95	0	D	500	84.9	0.0	0.0	0.0	0.0	52.6	0.2	-3.0	0.0	0.0	6.8	0.0	0.0	28.4
35	18426678.65	5013536.92	120.95	0	D	1000	84.1	0.0	0.0	0.0	0.0	52.6	0.4	-3.0	0.0	0.0	8.4	0.0	0.0	25.7
35	18426678.65	5013536.92	120.95	0	D	2000	81.3	0.0	0.0	0.0	0.0	52.6	1.2	-3.0	0.0	0.0	10.5	0.0	0.0	20.1
35	18426678.65	5013536.92	120.95	0	D	4000	76.1	0.0	0.0	0.0	0.0	52.6	3.9	-3.0	0.0	0.0	12.9	0.0	0.0	9.7
35	18426678.65	5013536.92	120.95	0	D	8000	67.0	0.0	0.0	0.0	0.0	52.6	14.0	-3.0	0.0	0.0	15.6	0.0	0.0	-12.2
35	18426678.65	5013536.92	120.95	0	N	63	65.9	0.0	-3.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	3.1	0.0	0.0	10.2
35	18426678.65	5013536.92	120.95	0	N	125	79.0	0.0	-3.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	4.2	0.0	0.0	22.2
35	18426678.65	5013536.92	120.95	0	N	250	82.5	0.0	-3.0	0.0	0.0	52.6	0.1	-3.0	0.0	0.0	5.4	0.0	0.0	24.4
35	18426678.65	5013536.92	120.95	0	N	500	84.9	0.0	-3.0	0.0	0.0	52.6	0.2	-3.0	0.0	0.0	6.8	0.0	0.0	25.3
35	18426678.65	5013536.92	120.95	0	N	1000	84.1	0.0	-3.0	0.0	0.0	52.6	0.4	-3.0	0.0	0.0	8.4	0.0	0.0	22.7
35	18426678.65	5013536.92	120.95	0	N	2000	81.3	0.0	-3.0	0.0	0.0	52.6	1.2	-3.0	0.0	0.0	10.5	0.0	0.0	17.1
35	18426678.65	5013536.92	120.95	0	N	4000	76.1	0.0	-3.0	0.0	0.0	52.6	3.9	-3.0	0.0	0.0	12.9	0.0	0.0	6.7
35	18426678.65	5013536.92	120.95	0	N	8000	67.0	0.0	-3.0	0.0	0.0	52.6	14.0	-3.0	0.0	0.0	15.6	0.0	0.0	-15.2
35	18426678.65	5013536.92	120.95	0	E	63	65.9	0.0	0.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	3.1	0.0	0.0	13.2
35	18426678.65	5013536.92	120.95	0	E	125	79.0	0.0	0.0	0.0	0.0	52.6	0.0	-3.0	0.0	0.0	4.2	0.0	0.0	25.2
35	18426678.65	5013536.92	120.95	0	E	250	82.5	0.0	0.0	0.0	0.0	52.6	0.1	-3.0	0.0	0.0	5.4	0.0	0.0	27.4
35	18426678.65	5013536.92	120.95	0	E	500	84.9	0.0	0.0	0.0	0.0	52.6	0.2	-3.0	0.0	0.0	6.8	0.0	0.0	28.4
35	18426678.65	5013536.92	120.95	0	E	1000	84.1	0.0	0.0	0.0	0.0	52.6	0.4	-3.0	0.0	0.0	8.4	0.0	0.0	25.7
35	18426678.65	5013536.92	120.95	0	E	2000	81.3	0.0	0.0	0.0	0.0	52.6	1.2	-3.0	0.0	0.0	10.5	0.0	0.0	20.1
35	18426678.65	5013536.92	120.95	0	E	4000	76.1	0.0	0.0	0.0	0.0	52.6	3.9	-3.0	0.0	0.0	12.9	0.0	0.0	9.7
35	18426678.65	5013536.92	120.95	0	E	8000	67.0	0.0	0.0	0.0	0.0	52.6	14.0	-3.0	0.0	0.0	15.6	0.0	0.0	-12.2

Appendix 3

Manufacturers Data

TRANE

Performance Data

Table 127. Outdoor Sound Power Level - dB (ref. 10 - 12 Watts)

	Unit Model	Octave Center Frequency								Overall
Tons	Number	63	125	250	500	1000	2000	4000	8000	dBA
3	T/YSC036A	86	83	81	80	78	74	69	68	83
	T/YHC033A	86	83	81	80	78	74	69	68	83
4	T/YSC048A3,A4,AW	90	84	78	77	76	72	70	68	82
	T/YHC043A	92	86	83	82	81	75	72	69	85
5	T/YSC060A	94	87	83	82	79	75	73	69	84
	T/YHC063A	94	87	82	81	78	74	72	69	84
6	T/YSC072A	90	94	90	87	83	78	74	67	88
	T/YHC072A	91	95	90	87	84	79	75	68	89
7½	T/YSC090A	92	95	91	88	84	80	75	68	90
	T/YSC092A	89	93	88	85	81	76	72	66	87
	T/YHC092A	92	96	92	89	85	80	76	69	91
8½	T/YSC102A	88	92	87	84	80	75	72	65	86
	T/YHC102A	91	95	90	87	84	79	75	68	89
10	T/YSC120A	91	88	84	82	81	76	73	67	86
	T/YHC120A	94	89	87	85	84	78	75	69	88

Tests follow ARI270-95.
* Indicates both standard and high efficiency units and both ReliaTel and Electromechanical controls.

Appendix 4

Background Traffic Noise Analysis

This appendix presents the results of an analysis of background noise from road traffic on Hazeldean Road at receptors in the vicinity of the proposed Commercial Development.

Noise generated by road traffic is predicted using STAMSON, a traffic noise model developed by the MECP. STAMSON considers such factors as distance from the road, height, nature of the intervening buildings and terrain, ground absorption, and noise barriers, if present.

The results of the background noise level calculations are presented in Table A4.1 below. Samples of the outputs of the STAMSON software are also provided.

Traffic data used in this analysis was based on a traffic count data provided by the City of Ottawa which contain annual average daily traffic (AADT) volume information for Hazeldean Road at the intersection with Stittsville Main Street collected on the 23rd March 2016. An excerpt of this data is presented below containing the relevant traffic data used in this analysis.

In order to consider the lowest background noise occurring in each hour during the period of time the facility will be in operation (07:00 to 20:00) to justify higher sound level limits than the exclusion sound level limits noted in the ENCG, hourly traffic volumes were calculated based methodology contained RWDI AIR Inc. Publication, "Typical Hourly Traffic Distribution for Noise Modelling", Vol. 36 No. 3 (2008) which outline applicable distribution factors to apply to Ontario AADT traffic volumes in order to calculate hourly traffic volumes for use in noise modelling. The estimated split was based on City of Ottawa Environmental Noise Control Guidelines which includes a split used for Medium Trucks to Heavy Trucks of 7% and 5% respectively. The results of this analysis are presented in Table A4.1 below at the selected points of reception.

Contents:

Table A4.1: Background Sound Level at Receptors Impacted by Noise from Road Traffic on Hazeldean Road during the proposed daytime and early evening period of operation (07:00 to 20:00).

Point of Reception Reception	Lowest Sound Level Limit 1-hour L_{AEQ} dBA (Daytime and Early Evening Period, 07:00 – 20:00)
POR 3 (Plane of Window)	66.4

Table A4.2: Traffic Volumes – Hazeldean Road East Bound

Hazeldean Road - AADT Traffic Volumes from City of Ottawa, Stittsville Main Street @ Hazeldean Road 23rd March 2016. Posted Speed Limit: 60 km/h

Hour Beginning	Distribution Factor[3]	Total Vehicles Count no.	Estimated split[2]		
			Cars no.	Medium Trucks no.	Heavy Trucks no.
0:00	0.87	48			
1:00	0.49	27			
2:00	0.36	20			
3:00	0.3	17			
4:00	0.36	20			
5:00	0.95	53			
6:00	2.75	152			
7:00[1]	**5.05**	**280**	**246**	**20**	**14**
8:00	6.55	363			
9:00	5.62	311			
10:00	5.5	305			
11:00	6.04	335			
12:00	6.48	359			
13:00	6.26	347			
14:00	6.6	366			
15:00	7.41	411			
16:00	7.82	433			
17:00	7.65	424			
18:00	6.27	347			
19:00	5.12	284			
20:00	4.09	227			
21:00	3.41	189			
22:00	2.41	134			
23:00	1.67	93			
Total	100	5540			

Notes:

1. Minimum Hourly Traffic Volume during the proposed period of operation occurs between 07:00 to 08:00.
2. Estimated split for vehicle type based on provincially accepted methodology. Split used for Medium Trucks to Heavy Trucks is 7% and 5% respectively. Traffic volumes presented above rounded up, where applicable, for use in traffic noise modelling software (STAMSON). Heavy Truck traffic was excluded from calculations to account for the potential of site related truck traffic included in count.
3. Distribution factor based on RWDI AIR Inc. Publication, "Typical Hourly Traffic Distribution for Noise Modelling", Vol. 36 No. 3 (2008).

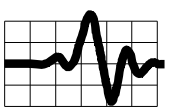


Table A4.3: Traffic Volumes – Hazeldean Road West Bound

Hazeldean Road - AADT Traffic Volumes from City of Ottawa, Stittsville Main Street @ Hazeldean Road 23rd March 2016. Posted Speed Limit: 60 km/h

Hour Beginning	Distribution Factor[3]	Total Vehicles Count no.	Estimated split[2]		
			Cars no.	Medium Trucks no.	Heavy Trucks no.
0:00	0.87	62			
1:00	0.49	35			
2:00	0.36	25			
3:00	0.3	21			
4:00	0.36	25			
5:00	0.95	67			
6:00	2.75	195			
7:00[1]	**5.05**	**357**	**314**	**25**	**18**
8:00	6.55	464			
9:00	5.62	398			
10:00	5.5	389			
11:00	6.04	427			
12:00	6.48	459			
13:00	6.26	443			
14:00	6.6	467			
15:00	7.41	524			
16:00	7.82	553			
17:00	7.65	541			
18:00	6.27	444			
19:00	5.12	362			
20:00	4.09	289			
21:00	3.41	241			
22:00	2.41	171			
23:00	1.67	118			
Total	100	7077			

Notes:

1. Minimum Hourly Traffic Volume during the proposed period of operation occurs between 07:00 to 08:00.
2. Estimated split for vehicle type based on provincially accepted methodology. Split used for Medium Trucks to Heavy Trucks is 7% and 5% respectively. Traffic volumes presented above rounded up, where applicable, for use in traffic noise modelling software (STAMSON). Heavy Truck traffic was excluded from calculations to account for the potential of site related truck traffic included in count.
3. Distribution factor based on RWDI AIR Inc. Publication, "Typical Hourly Traffic Distribution for Noise Modelling", Vol. 36 No. 3 (2008).

Traffic Data:

Transportation Services - Traffic Services

Turning Movement Count - Study Results

STITTSVILLE MAIN ST @ HAZELDEAN RD

Survey Date: Wednesday, March 23, 2016 **WO No:** 35821

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, March 23, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 2

Eastbound: 14 Westbound: 2

AADT Factor

1.00

	STITTSVILLE MAIN ST									HAZELDEAN RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	19	24	262	**305**	156	41	91	**288**	**593**	41	332	15	**388**	112	199	30	**341**	**729**	**1322**
08:00 09:00	29	41	262	**332**	197	61	98	**356**	**688**	59	311	20	**390**	238	226	97	**561**	**951**	**1639**
09:00 10:00	41	41	251	**333**	118	46	40	**204**	**537**	19	261	16	**296**	188	247	61	**496**	**792**	**1329**
11:30 12:30	60	66	306	**432**	122	84	32	**238**	**670**	38	261	29	**328**	355	326	104	**785**	**1113**	**1783**
12:30 13:30	61	51	359	**471**	111	85	38	**234**	**705**	34	271	24	**329**	332	355	92	**779**	**1108**	**1813**
15:00 16:00	76	67	369	**512**	173	130	43	**346**	**858**	64	280	29	**373**	404	484	95	**983**	**1356**	**2214**
16:00 17:00	75	104	351	**530**	151	138	50	**339**	**869**	94	316	35	**445**	443	580	190	**1213**	**1658**	**2527**
17:00 18:00	79	116	353	**548**	181	158	59	**398**	**946**	94	359	27	**480**	432	578	190	**1200**	**1680**	**2626**
Sub Total	440	510	2513	**3463**	1209	743	451	**2403**	**5866**	443	2391	195	**3029**	2504	2995	859	**6358**	**9387**	**15253**
UTurns	0			**0**	2			**2**	**2**	14			**14**	2			**2**	**16**	**18**
Total	440	510	2513	**3463**	1211	743	451	**2405**	**5868**	457	2391	195	**3043**	2506	2995	859	**6360**	**9403**	**15271**
EQ 12Hr	612	709	3493	**4814**	1683	1033	627	**3343**	**8157**	635	3323	271	**4229**	3483	4163	1194	**8840**	**13069**	**21226**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	612	709	3493	**4814**	1683	1033	627	**3343**	**8157**	635	3323	271	**4229**	3483	4163	1194	**8840**	**13069**	**21226**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1.00**					
AVG 24Hr	802	929	4576	**6307**	2205	1353	821	**4379**	**10686**	832	4353	355	**5540**	4563	5454	1564	**11581**	**17121**	**27807**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

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Sample outputs from STAMSON

STAMSON 5.0 NORMAL REPORT Date: 20-01-2021 12:09:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3d.te Time Period: 1 hours
Description: POR 3 (Plane of Window) 180 Degrees Exposure

Road data, segment # 1: Hazeldean E

Car traffic volume : 246 veh/TimePeriod
Medium truck volume : 20 veh/TimePeriod
Heavy truck volume : 14 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hazeldean E

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

Road data, segment # 2: Hazeldean W

Car traffic volume : 314 veh/TimePeriod
Medium truck volume : 25 veh/TimePeriod
Heavy truck volume : 18 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Hazeldean W

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.50 m
Receiver height : 13.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hazeldean E

Source height = 1.50 m

ROAD (0.00 + 63.88 + 0.00) = 63.88 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 65.13 0.00 -1.25 0.00 0.00 0.00 0.00 63.88

Segment Leq : 63.88 dBA

Results segment # 2: Hazeldean W

Source height = 1.50 m

ROAD (0.00 + 62.83 + 0.00) = 62.83 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 66.19 0.00 -3.36 0.00 0.00 0.00 0.00 62.83

Segment Leq : 62.83 dBA

Total Leq All Segments: 66.40 dBA

TOTAL Leq FROM ALL SOURCES: 66.40

RESUME: MICHAEL WELLS

QUALIFICATIONS:

Limited Engineering Licensee*, Professional Engineers Ontario

*Limitation: Environmental acoustic assessments and recommendations to mitigate noise and vibration; acoustical engineering services for land-use planning, architectural and building acoustics, industrial acoustics, and occupational health and safety audits.

Registered Architect of NSW, Australia, Registration Number: 8111

B. Architecture (Hons), University of Sydney, 2002

B.Sc. Architecture, University of Sydney, 1999

Member, Canadian Acoustical Association

Member, Australian Acoustical Society (M.A.A.S.)

KEY COMPETENCIES:

- Environmental noise and vibration assessments, Environmental Compliance Approval (ECA). Noise assessment for land use planning.
- Noise impact assessments and acoustic audits for the Aggregates Industry.
- Architectural and building acoustics, acoustics of office spaces, meeting rooms, auditoriums and studios, noise and vibration control of building mechanical services.
- Industrial noise and vibration assessment and control.
- Transportation noise and vibration.
- Noise and vibration aspects of Occupational Health and Safety (OH&S)

PROFESSIONAL EXPERIENCE:

Michael Wells is a Limited Engineering Licensee, Professional Engineers Ontario, in the field of acoustic engineering as described above. He is also a professional Architect registered in NSW, Australia. Michael. He has more than 10 years of experience in Canada in the measurement, analysis and control of noise and vibration. Michael is a founding Director of Freefield Ltd., incorporated in 2017, which provides consulting services in architectural, building, industrial, transportation and environmental acoustics and vibration. Prior to establishing Freefield Ltd., he worked for the Ontario acoustic consulting firm Hugh Williamson Associates Inc. Previously, Michael worked in Sydney, Australia, specializing in the design of institutional, commercial and residential projects. He is the former Director of Architectural Workshops Australia and Vision Blue Pty Ltd. He has more than 19 years of experience as a consultant.

CLIENT LIST:

Michael Wells has provided consulting services to large and small clients including National Research Council, R. W. Tomlinson, Thomas Cavanagh Construction Limited, G. Tackaberry & Sons Construction, Miller Paving, Heidelberg Materials Canada Limited, J. L. Richards & Associates, Barry Padolsky Associates, Atkinson Schroeter Design Group and the Government of Canada.