Bank Street Development
4836 Bank Street
Ottawa, Ontario
Acoustical Report

Prepared for Leitrim Home Hardware
by IBI Group

May 10, 2019

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1 Introduction

IBI Group was retained to conduct an Acoustical Study to examine potential impacts of noise created by the proposed Bank Street commercial development on proposed off-site residential properties, and to recommend noise mitigation, if required, based on criteria set by the Ministry of the Environment, Conservation and Parks (MECP) and the City of Ottawa.

The proposed development is located at 4836 Bank Street, Ottawa, Ontario, and will include four commercial buildings and a drive-thru building. Refer to Figure 1 in Appendix A for a plan of the development.

2 Background and Noise Criteria

The MECP noise guideline NPC-300 "Stationary and Transportation Sources – Approval and Planning" was used to establish the noise criteria for this study. The primary noise sources that may impact the proposed off-site sensitive receivers are stationary noise sources in the form of on-site operational equipment.

2.1 Area Classification

Given the subject site and environs are located in an acoustical environment typical of a major population center it is assumed that the area is classified as a "Class 1" area (urban) as defined by the MECP. In a Class 1 area the ambient or background sound level is dominated by the urban hum.

2.2 Stationary Noise Level Criteria

The MECP has established stationary noise level criteria for new residential development and this is documented in NPC-300 Section B6 and B7. Table 1 summarizes the noise criteria for the MECP area classifications and time periods.

Table 1 – MECP Stationary Noise Level Criteria

TIME PERIOD	LOCATION	CLASS 1	CLASS 2	CLASS 3	CLASS 4
0700 – 1900	Outdoor Living Area	**50 dBA**	50 dBA	45 dBA	55 dBA
1900 – 2300	Outdoor Living Area	**50 dBA**	45 dBA	40 dBA	55 dBA
0700 – 1900	Plane of Window	**50 dBA**	50 dBA	45 dBA	60 dBA
1900 – 2300	Plane of Window	**50 dBA**	50 dBA	40 dBA	60 dBA
2300 – 0700	Plane of Window	**45 dBA**	45 dBA	40 dBA	55 dBA

2.3 Noise Receiver Locations

To assist in noise modelling, noise sensitive receiver locations were identified. These receiver locations were located at worst case locations (most exposed) for both daytime and nighttime traffic noise.

The residential receiver locations are located 1.5m in height (first floor window) and 4.5m (second floor windows) and at 3m increments for additional storeys to represent the worst case daytime and nighttime receiver locations. The receiver locations are shown in Figure 1 in Appendix A.

Table 2 identifies the receiver locations adjacent to the proposed development.

Table 2 – On-Site Receiver Locations

RECEIVER	LOCATION	DISTANCE TO SITE
A	West of Building D (Future Residential Development)	30m
B	Northwest of Building D (Future Residential Development	45m
C	West of Building A (Future 5-Storey Building)	45m
D	Southwest of Drive-Thru Building (Future Townhouse Block)	45m

2.4 Stationary Noise Sources

For stationary noise modeling, Cadna A v2019, which is produced by DataKustik was used for the stationary noise assessment. This software is recognized in the industry for noise modeling and utilizes ISO 9613-2.

Proposed on-site rooftop HVAC equipment and a drive-through speaker will create new stationary noise sources. The following off-site noise sources and noise levels from the equipment were identified:

- **Building A:** Six (6) 10-Ton AC Units at 92 dBA (each);
- **Building B:** One (1) Make-Up Air Unit at 87 dBA, and one (1) Cooling Tower at 97 dBA;
- **Building C:** Two (2) 8-Ton AC Units at 92 dBA (each) and one (1) drive-through speaker at 75 dBA;
- **Building D:** Two (2) 15-Ton AC Units at 94 dBA (each); and
- **Drive-Thru Building:** Four (4) 8-Ton AC Units at 92 dBA (each).

The AC and cooling units are assumed to operate 45 minutes per hour during daytime hours and 30 minutes per hour during nighttime hours. The make-up air unit is assumed to operate in steady-state. The drive-through speaker is assumed to operate 30 minutes per hour during daytime and nighttime hours. Equipment data sheets are included in Appendix A.

3 Results

3.1 Stationary Noise

The noise modelling program Cadna A was used to predict the noise levels produced by the proposed on-site operations. The results are summarized in Table 3 and Table 4 for daytime and nighttime noise levels respectively as experienced at off-site receivers produced by on-site stationary sources. The results of the Cadna A output for all receiver locations are provided in Appendix B.

Table 3 – Predicted Unattenuated Noise Levels from On-site Stationary Sources Daytime (dBA)

RECEIVER	FLOOR				
	1	2	3	4	5
Receiver A	52.0	52.9	-	-	-
Receiver B	51.0	54.4	-	-	-
Receiver C	53.0	54.1	55.5	55.6	55.6
Receiver D	50.4	52.2	53.9	-	-

As shown in Table 3, the noise levels produced by the on-site HVAC equipment are above 50 dBA during daytime hours, and accordingly additional mitigation measures are required.

Table 4 – Predicted Unattenuated Noise Levels from On-site Stationary Sources Nighttime (dBA)

RECEIVER	FLOOR				
	1	2	3	4	5
Receiver A	50.2	51.1	-	-	-
Receiver B	49.2	52.6	-	-	-
Receiver C	51.2	52.4	53.8	53.9	53.9
Receiver D	48.6	50.4	52.2	-	-

As shown in Table 4, the noise levels produced by the on-site HVAC equipment are above 45 dBA during nighttime hours, and accordingly additional mitigation measures are required.

To reduce noise levels to the required levels, a 2.5m high barrier will be required around the HVAC equipment on top of Building A, Building D, and the Drive-Thru Building to break the line of sight between the on-site rooftop equipment and the off-site sensitive receivers. The locations of the proposed barriers are shown in Figure 1 in Appendix A. The attenuated noise levels are shown in Table 5 and Table 6 for daytime and nighttime noise levels respectively.

Table 5 – Predicted Attenuated Noise Levels from On-site Stationary Sources Daytime with Mitigation (dBA)

RECEIVER	FLOOR				
	1	2	3	4	5
Receiver A	43.2	44.5	-	-	-
Receiver B	43.5	45.4	-	-	-
Receiver C	41.5	42.6	43.8	45.0	46.2
Receiver D	40.2	42.9	43.9	-	-

Table 6 – Predicted Attenuated Noise Levels from On-site Stationary Sources Nighttime with Mitigation (dBA)

RECEIVER	FLOOR				
	1	2	3	4	5
Receiver A	41.6	42.9	-	-	-
Receiver B	41.8	43.7	-	-	-
Receiver C	39.8	40.9	42.2	43.4	44.5
Receiver D	38.5	41.2	42.2	-	-

As shown, noise levels are within criteria with the implementation of the noise barrier.

The modelling results for on-site daytime, on-site nighttime, attenuated on-site daytime, and attenuated on-site nighttime stationary noise levels are shown on Figures 2 through 5, respectively in Appendix B.

4 Recommendations

Physical noise mitigation in the form of noise barriers will be required to bring the proposed commercial units within this development into compliance with the MECP noise criteria. The following specific recommendation is provided:

Recommendation #1 (Noise Mitigation)

Due to the exceedance of the MECP noise criteria for both daytime and nighttime noise levels due to the proposed development's on-site stationary noise sources, it is recommended that 2.5m high barriers be placed on the rooftop of Building A, Building D, and the Drive-Thru Building to break the line of sight between on-site stationary noise sources and the off-site residential receivers to the north and west. The locations of the proposed barriers are shown in Figure 1 in Appendix A.

Based on the preceding we conclude that the proposed development can be developed with appropriate noise mitigation to satisfy MECP noise level criteria.

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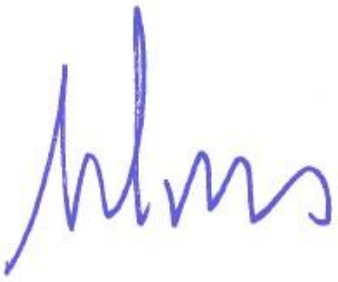
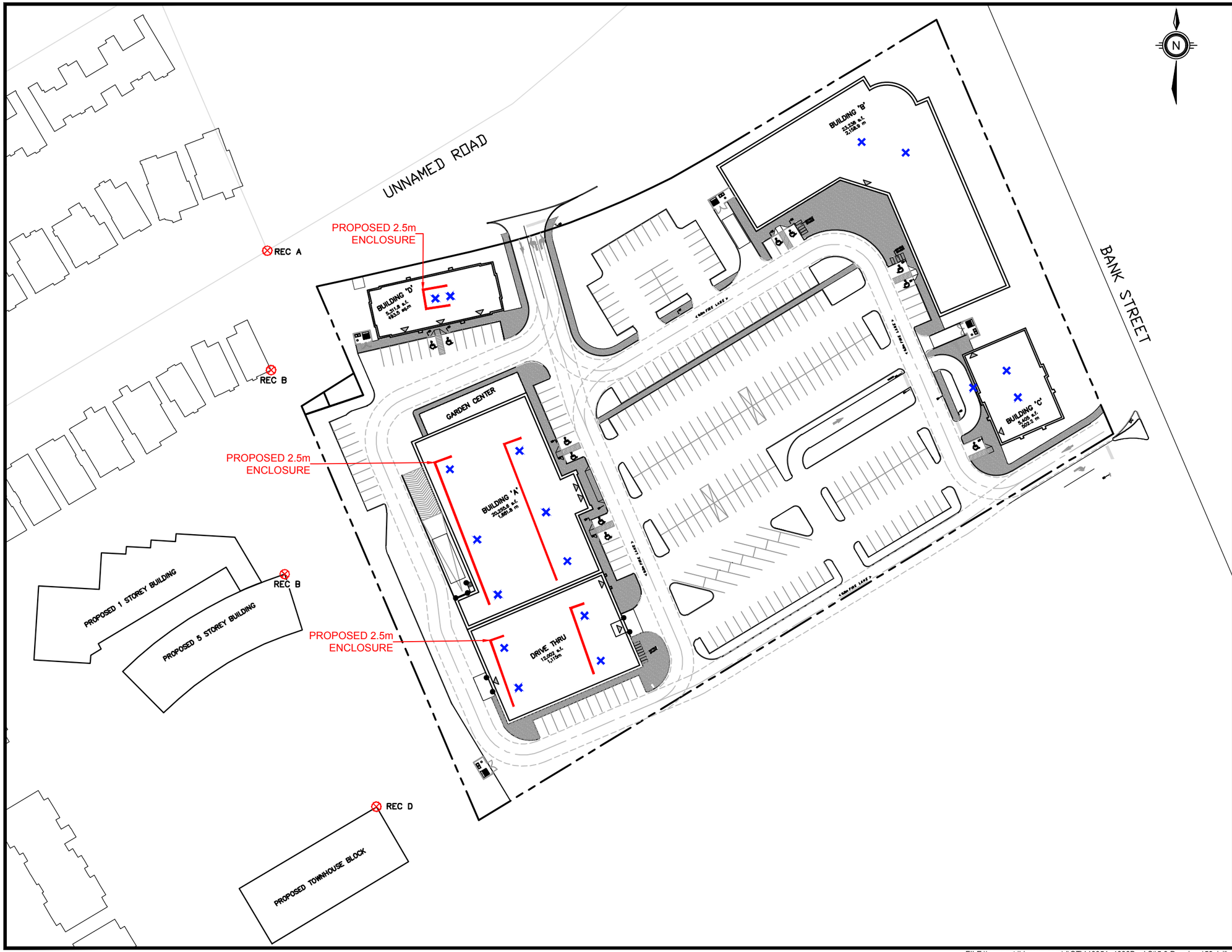
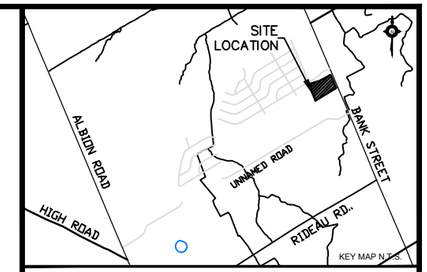


John Perks, MBA, P.Eng
Associate Director, Practice Lead, Infrastructure

Andy Kroess, M.Eng., P.Eng.
Engineer

Appendix A – Noise Information Plan





LEGEND

REC A ⊗ STATIONARY NOISE RECEIVER LOCATION

× STATIONARY NOISE SOURCE

PROPOSED NOISE ENCLOSURE

IBI GROUP
101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255 fax 519 585 2269
ibigroup.com

SCALE:	1:1000
DATE:	April 2019
PROJECT No.:	119351

4836 BANK STREET
BANK STREET DEVELOPMENT
CITY OF OTTAWA

Leitrim Home Hardware
4836 Bank Street
Ottawa, Ontario

FIGURE 1
NOISE INFORMATION PLAN

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Mechanical Data – 4836 Bank Street, Ottawa

Building A

1-Storey, Six 10 Ton AC Units

	Sound							
	Sound Power (db)							
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	96	93	85	77	77	73	63	60
Discharge	96	95	88	82	83	78	71	67
Radiated	86	88	87	86	84	83	81	79

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Power (dB)	99.2	97.6	91.6	87.8	86.9	84.5	81.4	79.3

Drive-Thru

1-Storey, Four 8 Ton AC Units

	Sound							
	Sound Power (db)							
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	95	93	85	77	78	74	66	62
Discharge	95	94	87	81	82	77	70	66
Radiated	86	88	87	86	84	83	81	79

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Power (dB)	98.2	97.1	91.2	87.5	86.7	84.3	81.4	79.2

Building B

4-Storey, One Make-Up Air Unit, One Cooling Tower

BUILDING 'B', MAKE UP AIR

UNIT CONSTRUCTION:

CASING METAL:	18 ga	INSULATION DEPTH:	1 in
LINER METAL:	Partial Solid Liner	INSULATION DENSITY	1.5 lbs /cu.ft.

SOUND SOURCE DATA:

Blower	Make	Type	Size	Qty	Total CFM	TSP ("wc)	Speed (rpm)	BHP (hp)		Sound Power Data 63	125	250	500	1000	2000	4000	8000
S/A	Lau	FC DIDW	15/15	1	4100	2.9	1152	3.23	Inlet	91	91	87	83	83	82	79	78
									Outlet	91	91	87	83	83	82	79	78

OTHER SOURCE SOUND DATA:

Other Sources	Make	Model/Size	Qty	Operating condition	63	125	250	500	1000	2000	4000	8000
Compressor	Emerson	ZP36K5E	3		62.2	52.1	59.4	64.7	65.7	63.2	64.3	51.9
Cond. Fan	LAU	0.75	2	82dBA	78.9	83.5	78.2	78.3	79.3	72.5	65	50.6

UNIT S/A OUTLET:

CENTER FREQUENCY (Hz)	63	125	250	500	1000	2000	4000	8000	A-weighted
SOUND POWER Lw (dB)	86.6	85.7	78.9	72.6	70.8	68.4	66.5	65.0	77.8

UNIT O/A INLET:

CENTER FREQUENCY (Hz)	63	125	250	500	1000	2000	4000	8000	A-weighted
SOUND POWER Lw (dB)	91.0	88.8	81.7	75.3	73.2	71.7	68.9	67.4	80.5

UNIT CASING *:

CENTER FREQUENCY (Hz)	63	125	250	500	1000	2000	4000	8000	A-weighted
SOUND POWER Lw (dB)	85.4	87.4	81.9	81.7	82.6	76.2	71.6	66.9	85.6

* Unit casing sound includes casing breakout and sound sources outside the air streams only. Sound from openings are not included in unit casing sound.

Note:

Unit sound data are calculated for the specified unit construction and operating condition as shown above.

Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Sound Power (dB)	**93.1**	**92.2**	**85.8**	**83.0**	**83.3**	**78.1**	**74.2**	**71.3**

BUILDING 'B', COOLING TOWER

1 Cell Data

Band	Sound Pressure Level (dB) End 5.0 ft (1.5m)	End 50.0 ft (15.2m)	Motor Side 5.0 ft (1.5m)	Motor Side 50.0 ft (15.2m)	Opp End 5.0 ft (1.5m)	Opp End 50.0 ft (15.2m)	Opp Mtr. Side 5.0 ft (1.5m)	Opp Mtr. Side 50.0 ft (15.2m)	Top 5.0 ft (1.5m)	Top 50.0 ft (15.2m)	Sound Power Level (db)
63 HZ	74	67	74	67	74	67	74	67	75	58	98
125 HZ	70	62	70	62	70	62	70	62	76	62	94
250 HZ	65	55	65	55	65	55	65	55	69	60	88
500 HZ	72	55	72	55	72	55	72	55	68	57	88
1 KHZ	71	57	71	58	71	57	71	58	68	56	89
2 KHZ	70	53	70	56	70	53	70	56	65	55	87
4 KHZ	72	53	72	54	72	53	72	54	65	54	86
8 KHZ	74	51	74	54	74	51	74	54	66	53	85
Calc dBA	79	62	79	63	79	62	79	63	74	63	94

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Power (dB)	98.0	94.0	88.0	88.0	89.0	87.0	86.0	85.0

Building C

1-Storey, Two 8 Ton AC Units

	Sound							
	Sound Power (db)							
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	95	93	85	77	78	74	66	62
Discharge	95	94	87	81	82	77	70	66
Radiated	86	88	87	86	84	83	81	79

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Power (dB)	98.2	97.1	91.2	87.5	87.7	84.3	81.4	79.2

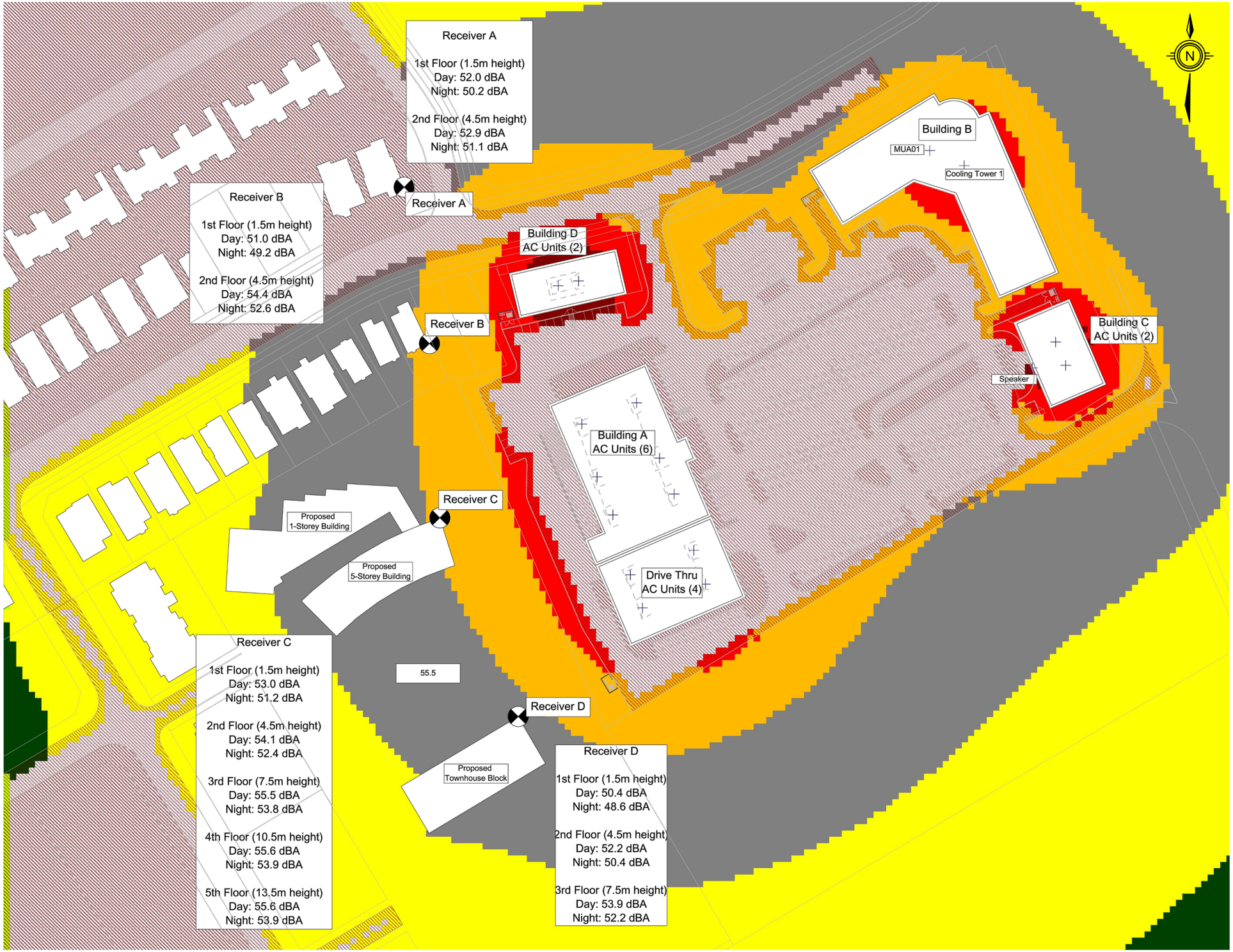
Building D

1-Storey, Two 15 Ton AC Units

	Sound							
	Sound Power (db)							
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	86	85	81	82	78	76	72	67
Discharge	86	86	84	86	82	80	77	72
Radiated	82	92	90	89	87	84	83	81

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Power (dB)	89.4	93.6	91.3	91.3	88.5	85.9	84.2	81.6

Appendix B – Cadna A Output



IBI GROUP
101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255 fax 519 585 2269
ibigroup.com

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4836 BANK STREET
OTTAWA ONTARIO

STATIONARY NOISE PLAN
ON-SITE DAYTIME NOISE

FIGURE 2

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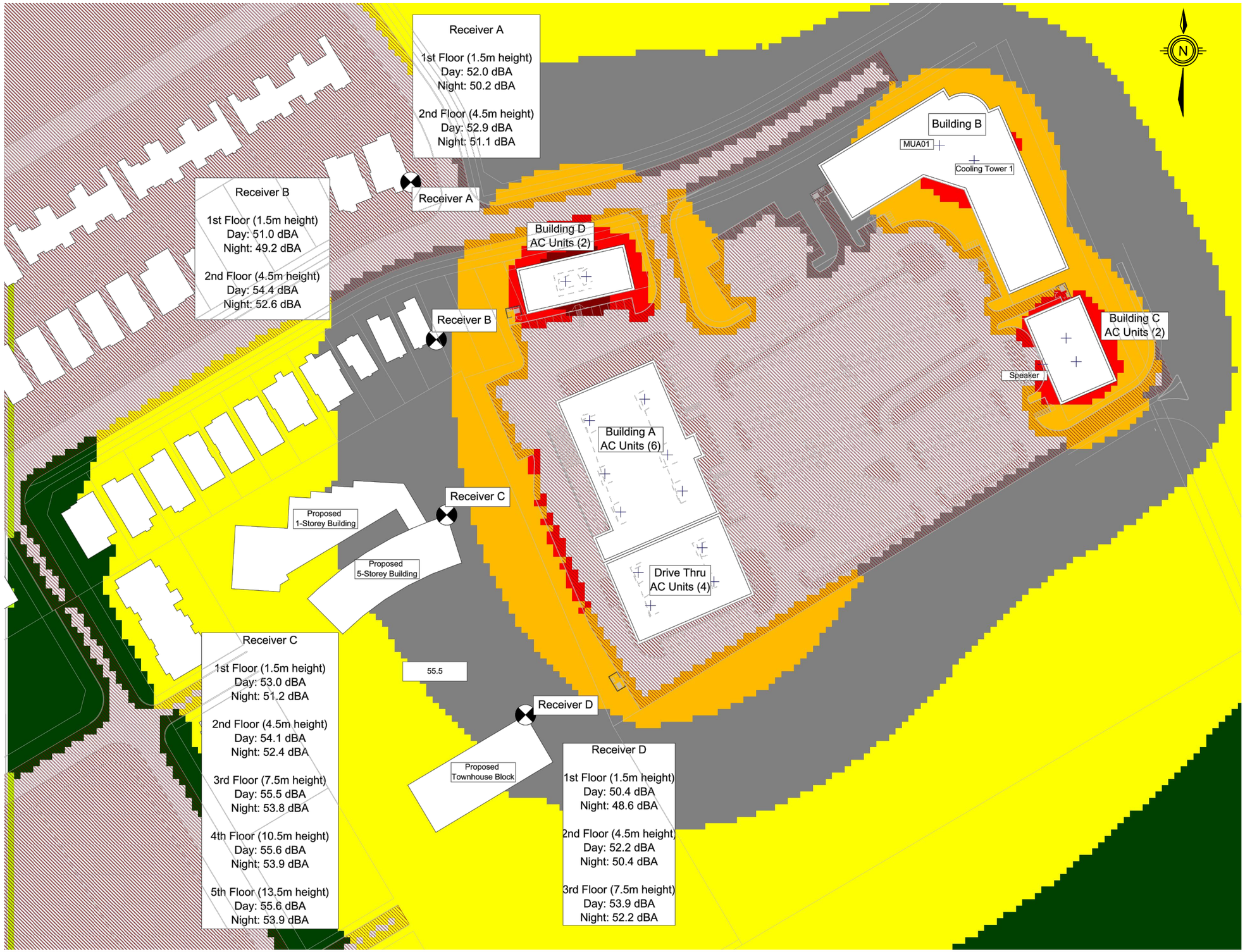

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OTTAWA ONTARIO

STATIONARY NOISE PLAN
ON-SITE NIGHTTIME NOISE

FIGURE 3

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tel 519 585 2255 fax 519 585 2269
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BANK STREET DEVELOPMENT
CITY OF OTTAWA

LEITRIM HOME HARDWARE
4836 BANK STREET
OTTAWA ONTARIO

STATIONARY NOISE PLAN
ON-SITE DAYTIME NOISE (ATTENUATED)

FIGURE 4

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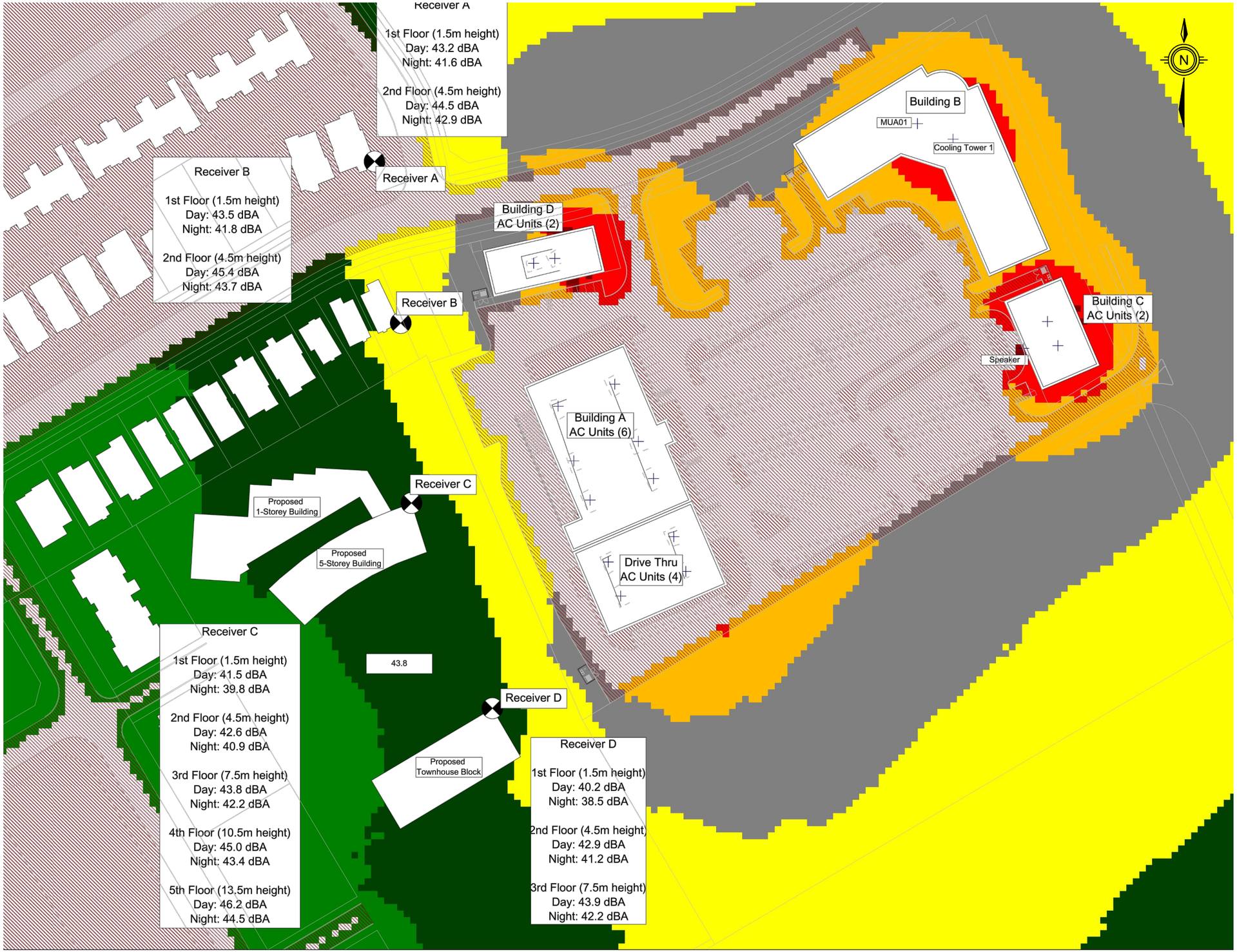

IBI GROUP
101 - 410 Albert Street
Waterloo ON N2L 3V3 Canada
tel 519 585 2255 fax 519 585 2269
ibigroup.com

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CITY OF OTTAWA

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4836 BANK STREET
OTTAWA ONTARIO

STATIONARY NOISE PLAN

ON-SITE NIGHTTIME NOISE (ATTENUATED)

FIGURE 5

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