Hamilton Transit

BUS MAINTENANCE & STORAGE FACILITY

Appendix D
Noise

January 3, 2020

Prepared for

Hamilton

Prepared by

IBI GROUP

Final

Hamilton Transit Facility
80 Brant Street
City of Hamilton
Acoustical Report

Prepared for City of Hamilton
by IBI Group

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1 Introduction

IBI Group was retained by City of Hamilton to complete a final Acoustical Report to analyze the potential impacts of environmental noise generated by the proposed Hamilton Transit Facility located at 80 Brant Street in the City of Hamilton.

The property is bounded by existing residential, commercial, and industrial development to the north, south, east, and west. The site location and layout is shown on the Noise Information Plans in Appendix A.

This report documents the acoustical analysis, findings, and recommendations required to support the development from an acoustical perspective, and to propose any mitigation measures needed to bring noise levels emitted from the site into compliance with Ministry of Environment, Conservation and Parks (MECP) guidelines.

2 Background and Noise Criteria

The MECP noise guideline NPC-300 "Stationary and Transportation Sources – Approval and Planning" was used to determine the criteria considered for this study. The primary noise sources that may impact existing off-site sensitive receivers are on-site stationary noise sources (e.g., HVAC equipment, bus traffic, tools and equipment, emergency generators, etc.).

A sensitive noise receptor can be located in one of four area classes as defined by the MECP. These classifications are defined by the MECP as follows (Section A5 of NPC 300):

a) "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."

b) "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).

c) "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 recreational area such as a cottage or a resort area; or
- A wilderness area.

d) "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.

On review of the above descriptions and the area surrounding the subject site, it is determined that the classification of the development area would be Class 1 given that it is located within an established urban area in the City of Hamilton.

The MECP criteria for noise levels resulting from stationary noise sources are summarized in Table 1.

Table 1 – 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

The MECP has also specified noise criteria for emergency generators that operate during non-emergency times such as testing and maintenance. The noise level criterion is 5 dBA greater than those for stationary noise listed in Table 1 above. Further, the noise emissions from emergency equipment are to be assessed independent of the other stationary noise sources.

3 Noise Prediction Methods and Noise Data

The industry-recognized noise modeling software “Cadna A v2019 MR1” by DataKustik that utilizes ISO 9613-2 analyzed the stationary noise model of the subject site.

3.1 On-Site Noise

The site will include a transit facility building, bus driving lanes, vehicular parking areas, and landscaped areas. The Noise Information Plan in Appendix A shows the site layout and the location of noise sources. The output included in Appendix B shows the locations of the off-site receivers.

The following provides a preliminary summary of the equipment proposed to service the transit facility site. The noise levels represent those provided by the manufacturer for each specified source, or represent typical published conservative values.

Table 2 – Noise Sources (On-Site)

LOCATION	MAKE	MODEL	SOUND POWER LEVEL (DBA)	UNIT #	QUANTITY
HVAC					
Electric Fans (EF)					
To Be Confirmed					
Air-Handling Units (AHU)					
Roof	MAFNA Air Technologies Inc.		91	AHU-1	9
Roof	MAFNA Air Technologies Inc.		91	AHU-2	4
Roof	MAFNA Air Technologies Inc.		100	AHU-3	1
Roof	MAFNA Air Technologies Inc.		100	AHU-4	1
Roof	MAFNA Air Technologies Inc.		91	AHU-5	1
Roof	MAFNA Air Technologies Inc.		98	AHU-6	1
Office Air-Conditioning Units (AC)					
Roof	Johnson Controls		92	AC 1-1	1
Roof	Johnson Controls		92	AC 1-2	1
Roof	Johnson Controls		92	AC 1-3	1
Roof	Johnson Controls		92	AC 1-4	1
Roof	Johnson Controls		92	AC 1-5	1
Roof	Johnson Controls		92	AC 1-6	1
On-Site Equipment					
Compressors East of Building	Various	Various	101	COMP 1,2	2
Buses					
Throughout Site	Various	Various	75	Line source	193 AM 217 PM
Emergency Generators					
West of Building	Various	Various	98	GEN 1,2,3,4,5	5

The locations of the HVAC units on the roof are shown on Figure 1 in Appendix A. The following "worst-case" operational data were used in the noise modelling:

- Rooftop AHU units will operate in steady-state during the daytime and nighttime;
- Two compressors located at the east side of the building, operating for 30 minutes per hour during daytime and nighttime;
- All office rooftop AC units and all electric fan (EF) units are assumed to be operating in steady-state;
- Bus traffic, 193 vehicles leaving in the AM, 217 vehicles returning in the PM, modelled as a line source travelling at 20 km/hour. Bus diesel engine noise level (typical) at 75 dBA. The travel routes of the buses are shown on Figure 1 in Appendix A;
- Bus brake testing, assumes 13 vehicles/day, modelled as a line sources travelling maximum 30 km/hour. Noise level adjusted to 85 dBA to account for additional brake noise. The travel route of the bus testing is shown on Figure 1 in Appendix A;
- Other incidental noise sources (idling buses inside building, delivery vehicles, etc.) would not be significant compared to the outdoor noise and are not included in the modelling; and
- Five emergency generators operating 30 minutes per hour with testing once per month during daytime hours (note that the emergency generators are modelled as a stand-alone scenario).

3.2 Receiver Locations

To facilitate analysis and description, various sensitive receiver locations were identified. All receivers were located at the worst-case locations, which is typically the most exposed residential lot and building surface, for both daytime and nighttime noise. As all receivers are two storey residential buildings, the receiver locations are situated flush with the building façade on each floor of the building to represent the outside of bedroom and living room windows.

In terms of Outdoor Living Areas (OLAs) receiver locations, all are considered to be located at the most exposed building location and coincide with the building façade receiver locations. Note, if noise levels exceed the maximum allowed levels, on-site mitigation must be provided to protect the entire property from noise impacts, not only at the specific receiver locations.

Table 3 identifies the various existing off-site receiver locations that correspond with Noise Information Plan in Appendix A.

Table 3 –Receiver Locations (Off-Site)

RECEIVER	LOCATION	REPRESENTS
Receiver A	13 Dickson Street	Façade Floors 1-2, OLA
Receiver B	21 McKinstry Street	Façade Floors 1-2, OLA
Receiver C	429 Wentworth Street North	Façade Floors 1-2, OLA
Receiver D	27 Munroe Street	Façade Floors 1-2, OLA
Receiver E	64 Munroe Street	Façade Floors 1-2, OLA
Receiver F	22 Imperial Street	Façade Floors 1-2, OLA
Receiver G	247 Gibson Avenue	Façade Floors 1-2, OLA

4 Results

The noise modelling program “Cadna A v2019 MR1 by DataKustik, was used to predict the Stationary Noise Levels from the on-site noise sources.

4.1 On-Site Noise Sources

Daytime and nighttime noise levels produced by the on-site noise sources as received by the existing off-site residential receivers are summarized in Table 4.

Table 4 –Predicted Unattenuated Noise Levels (Off-Site)

RECEIVER	DAYTIME	NIGHTTIME
Receiver A	49.2	48.8
Receiver B	48.7	48.4
Receiver C	38.3	38.1
Receiver D	42.2	42.2
Receiver E	46.4	46.3
Receiver F	41.4	41.3
Receiver G	43.5	43.4

As shown in Table 4, the noise levels produced by the proposed on-site noise sources do not exceed the 50 dBA daytime.

The nighttime noise levels produced by the proposed on-site noise sources exceed 45 dBA at the existing off-site residential receivers and accordingly noise mitigation is required for rooftop HVAC units.

Acoustic barriers should be a minimum of 2.0m high to fully screen each HVAC unit, and be constructed with no holes or gaps, with a material of minimum density of 20 kg/m^2. The attenuated daytime and nighttime noise levels are provided in Table 5, and confirm that nighttime noise levels will be below 45 dBA.

Table 5 –Predicted Attenuated Noise Levels (Off-Site)

RECEIVER	DAYTIME	NIGHTTIME
Receiver A	45.0	44.8
Receiver B	44.7	44.5
Receiver C	37.9	37.7
Receiver D	40.6	40.5
Receiver E	44.5	44.4
Receiver F	40.8	40.7
Receiver G	43.4	43.3

4.2 Emergency Generator Noise Sources

Cadna A was used to predict the noise levels produced by the proposed on-site emergency generator testing as received by the existing off-site residential receivers. The results are summarized in Table 6.

Table 6 –Emergency Generator Predicted Unattenuated Noise Levels (Off-Site)

RECEIVER	DAYTIME
Receiver A	38.7
Receiver B	25.6
Receiver C	42.3
Receiver D	50.5
Receiver E	52.5
Receiver F	14.4
Receiver G	26.2

As shown in Table 6, the noise levels produced by the five proposed emergency generators while in operation during testing (assumed to be during daytime hours) do not exceed 55 dBA at each existing off-site receiver location and accordingly noise mitigation is not required.

5 Recommendations

As demonstrated in this report, noise mitigation will be required to bring on-site noise sources within this development into compliance with the MECP noise criteria. Screening of the rooftop HVAC equipment will be required to mitigate nighttime noise on off-site receivers. Acoustic barriers should be a minimum of 2.0m high to fully screen each HVAC unit, and be constructed with no holes or gaps, with a material of minimum density of 20 kg/m^2.

Based on the preceding we conclude that this development has been designed appropriately to address noise impacts from the on-site stationary noise sources provided that mitigation measures are provided.

* * * * * * * * * * * * * * * *

Yours truly

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Appendix A – Noise Information Plan

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SCALE	NTS
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80 BRANT STREET
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NOISE INFORMATION PLAN

FIGURE 1

FILE: \\canoast.ibigroup.com\u\TW\115096_Hamilton-Transit\10.0 Reports\Noise\115096N LAYOUT: FIG1 CTB: Rowpens-v2.ctb SAVED BY: Tiffany.Chan, 2019-Jun-26 10:02 AM

Appendix B – Cadna A Output

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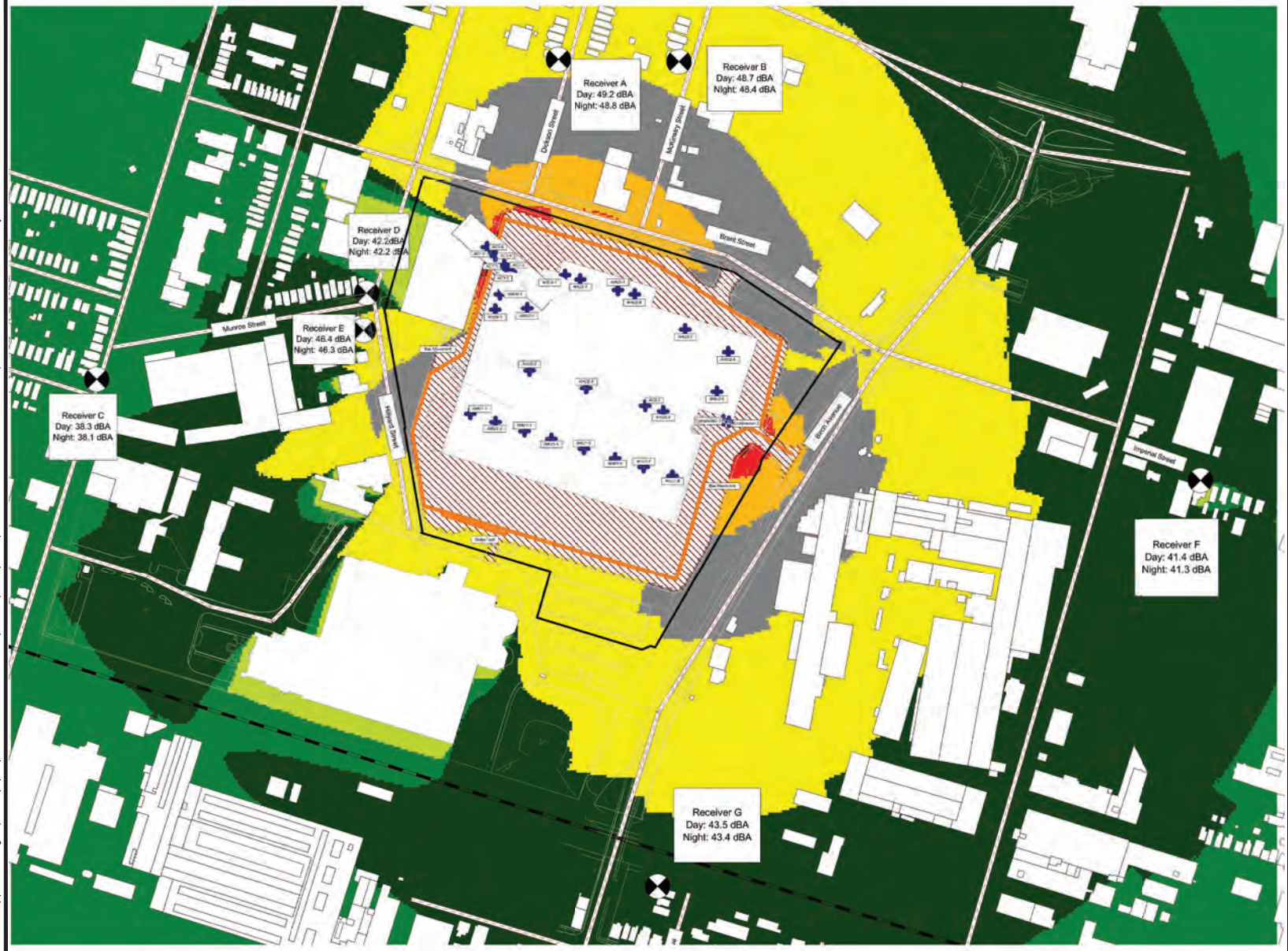

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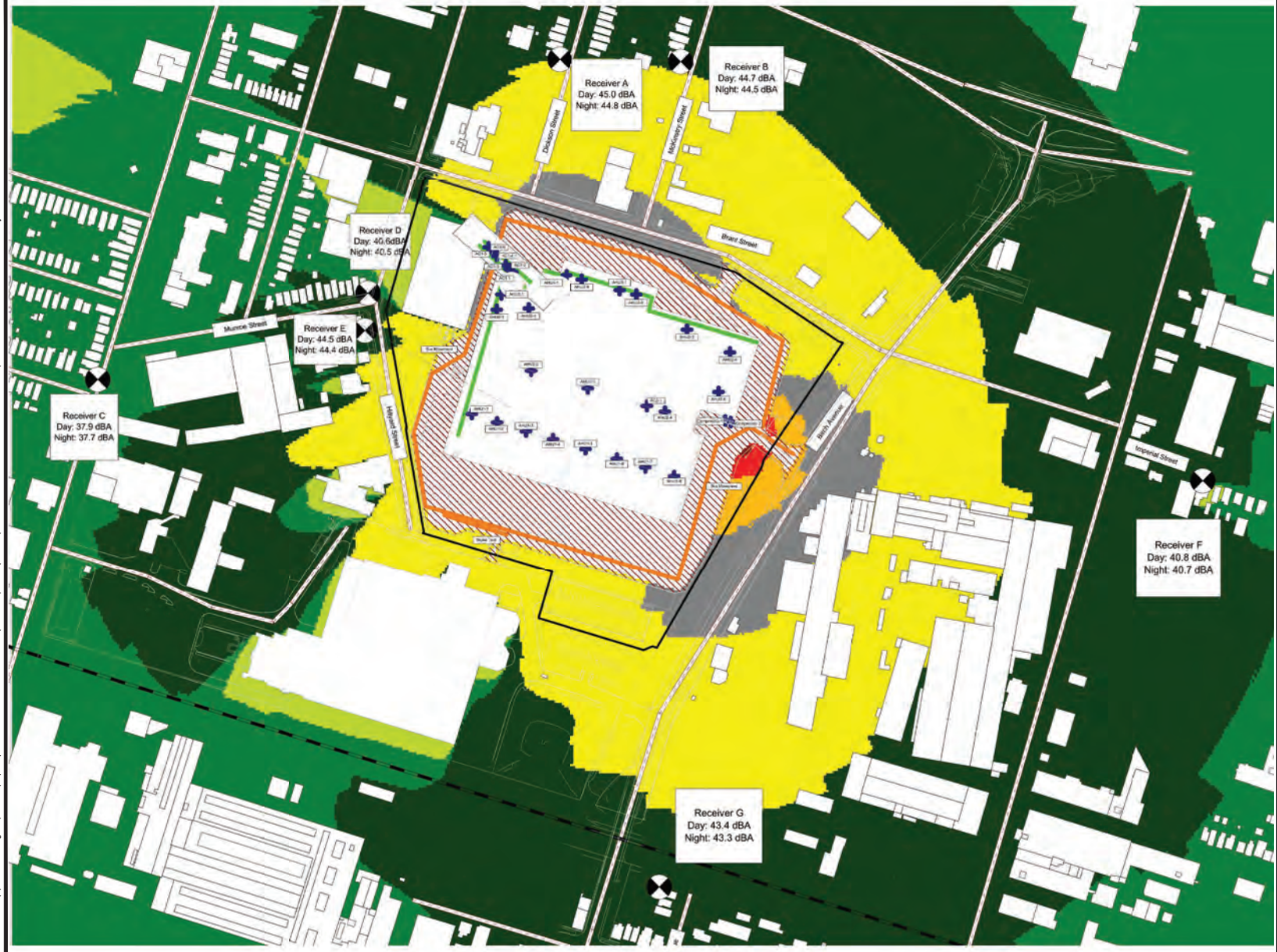
ON-SITE NOISE SOURCES

FIGURE 2



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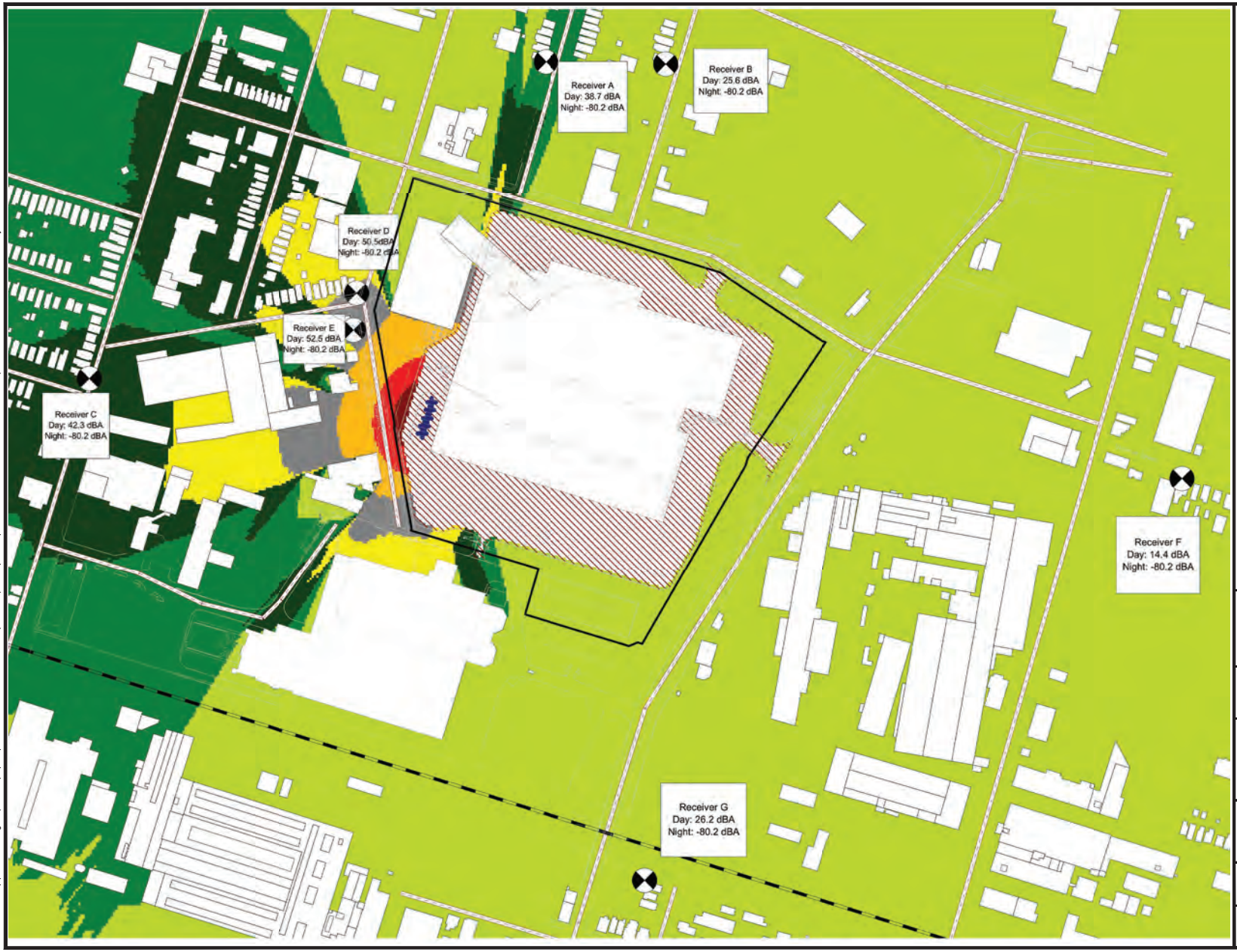
ON-SITE NOISE SOURCES ATTENUATED

FIGURE 3

FILE: \\caneast.ibigroup.com\V\TW\115096_Hamilton-Transit\10.0 Reports\Noise\115096N LAYOUT:FIG3 CTB: Rowpens-v2.ctb SAVED BY:Tiffany.Chan, 2019-Jun-26 10:28 AM



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EMERGENCY GENERATORS

FIGURE 4

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