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Noise Feasibility Study
Milton North Business Park
James Snow Parkway & Esquesing Line
Milton, Ontario

Prepared for:

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1 INTRODUCTION & SUMMARY

Howe Gastmeier Chapnik Limited (HGC Engineering) was retained by Orlando Corporation to undertake a noise assessment for a proposed industrial development to be located north of James Snow Parkway, south of Sideroad No.5 and east of Esquesing Line in Milton. This study uses predictive analysis to assess the potential impact of the site on nearby residential receptors, with respect to the guidelines of the Ministry of Environment, Conservation and Parks (MECP).

The purpose of this study is to investigate the potential noise impact of a proposed general industrial development as part of the planning and approvals process. The analysis is based on criteria contained in the noise guidelines of the Ministry of Environment, Conservation and Parks (MECP), aerial photos and a site visit. The analysis includes assessment of the noise emissions of both the anticipated trucking activities and rooftop mechanical equipment with respect to the closest existing residences. The results of the analysis indicate the development is feasible at this site and can be within the limits of the MECP guidelines with the inclusion of noise control measures. The reader is referred to the main body of the report for assumptions and results of the analysis.

The acoustic recommendations may be subject to modifications if the site plan and/or grading is changed significantly, operating scenarios are significantly different to those assumed in the assessment or there is a significant increase in background sound levels.

2 SITE DESCRIPTION & NOISE SOURCES

The site is located north of James Snow Parkway, south of Sideroad No.5 and east of Esquesing Line in Milton, Ontario. An aerial photo showing the site and surrounding land uses is attached as Figure 1. The proposed concept plan dated August 24, 2021 is attached as Figure 2.

HGC Engineering visited the site in May 2020 to investigate the acoustic and topographic environment of the site. The area surrounding the subject site is best categorized as a Class 2 (Semi-Urban) acoustical environment, under MECP noise assessment guidelines where the daytime sound levels are dominated by human activities and road traffic. There are residential uses to the north, northwest and east of the site along Esquesing Line. To the south of the site are existing commercial/industrial facilities. An existing heritage house will be relocated to the southeast corner of the site.

The proposed development will consist of four industrial buildings which will typically be used for logistic warehousing and one cold-storage facility. For the cold-storage facility, the north side of the facility will be for general storage and the south side of the facility will be for cold storage. The primary sources of sound associated with a warehousing facility will be arriving, departing, and idling trucks and air conditioning condenser equipment associated with the proposed buildings. All facilities are assumed to operate during 24 hours per day.

3 CRITERIA

3.1 Criteria for Stationary (Industrial) Sources of Sound

MECP Guideline NPC-300 is the MECP guideline for use in investigating Land Use Compatibility issues with regard to noise. An industrial or commercial facility is classified in the MECP Guideline NPC-300 as a stationary source of sound (as compared to sources such as traffic or construction, for example) for noise assessment purposes. Stationary noise sources encompass the noise from all the activities and equipment within the property boundary of a facility including regular on-site truck traffic, material handling and mechanical equipment. In terms of background sound, the development is located in an urban acoustical environment which is characterized mainly by the sounds of road traffic and human activity.

Non-Impulsive Sources

NPC-300 is intended for use in the planning of both residential and commercial/industrial land uses and provides the acceptability limits for sound due to commercial operations in that regard. The facade of a residence (i.e., in the plane of a window), or any associated usable outdoor area is considered a sensitive point of reception (within 30 m of a dwelling façade). NPC-300 stipulates that the exclusionary non-impulsive sound level limit for a stationary noise source in an semi-urban Class 2 area is taken to be 50 dBA during daytime and evening hours (07:00 to 19:00 and 19:00 to 23:00), and 45 dBA during nighttime hours (23:00 to 07:00) at the plane of the windows of noise sensitive spaces. If the background sound levels due to road traffic exceed the exclusionary limits, then that background sound level becomes the criterion. The background sound level is defined as the sound level that occurs when the source under consideration is not operating and may include traffic noise and natural sounds.

Commercial activities such as the occasional movement of customer/employee vehicles and garbage collection are not of themselves considered to be significant noise sources in the MECP guidelines. Accordingly, these sources have not been considered in this study.

Nine existing residences near the site are considered to be the representative noise sensitive receptors (R1 to R9) in this study. R1 to R4 and R7 are 2-storey houses and R5, R6, R8 and R9 are 1-storey houses. Receptor locations are shown on Figures 3 to 5. Three of the four residences along Boston Church Road are owned by Orlando Corporation and will be removed as part of the future industrial developments.

The sound level limits apply at any point on the residential property and outside residential windows. Consequently, the most stringent receptor locations are the upper-storey windows at the rear façade of the dwellings which are shielded from the roadway but are most exposed to the activities of the proposed facility.

Impulsive Sources

Acceptability limits for frequently occurring sounds that are impulsive in character (such as those from coupling and decoupling of trailers) are also provided in NPC-300. The limit is determined in a similar fashion to non-impulsive sounds and the same limits apply in this case.

The table below summarizes the applicable sound level limits to which the operations of the proposed warehousing facility is assessed.

Table 1: Applicable Sound Level Limits, L_{EQ}/L_{LM} (dBA/dBAI)

Receptor	Sound Level Limits		
	Day (7:00 to 19:00)	Evening (19:00 to 23:00)	Night (23:00 to 7:00)
R1 to R9	50	50	45

Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors although there may be residual audibility during periods of low background sound.

4 ASSESSMENT METHODOLOGY

Predictive noise modelling was used to assess the potential noise impact of mechanical equipment and trucking activities at the residential receptors. The software used for this purpose (*Cadna-A 2021 Building: 183.5110*) is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as barriers. Existing topography for areas surrounding the site was obtained from Ontario Basic Mapping and proposed grades for the site were included in the model. Additional details are provided in Appendix A.

Tenant information for the general industrial buildings are currently unknown. However, it is understood that the buildings will likely be used for general warehousing. For general warehousing facilities, each of the main buildings would be ventilated passively and only the office areas would be provided with air conditioning. As a conservative analysis, rooftop units were also assumed for the main building. Information provided by the future tenant was used for the cold-storage facility.

The following information and assumptions were used in the analysis:

- The height of the general buildings is 11 m;
- The height of the cold-storage facility is 11 m for the office area, up to 32 m for the north building and up to 27 m for the south building;
- All facilities are assumed to operate 24 hours per day;
- Rooftop HVAC units for all buildings are shown as crosses on Figures 3 to 4.

Assumed daytime/evening worst-case hour scenario:

- 20 trucks arrive and depart the facility (40 truck trips) via the Boston Church Rd West 3 entrance;
- 5 trucks arrive and depart the facility (10 truck trips) via the Boston Church Rd West 4 entrance;
- 15 trucks arrive and depart the facility (30 truck trips) via the Boston Church Rd East 1 entrance;
- 45 trucks arrive and depart the facility (90 truck trips) via the new public road 'A' entrances;
- 2 electric trailer shunting tractors operating for 30 minutes moving trailers between loading area and parking areas at the cold-storage facility;
- Tractors are assumed to idle in the loading bay or parking area for 15 minutes as the trailers are dropped off on as shown as crosses on Figures 3 to 5;
- 30 trucks are assumed to be at the loading areas at the each of the north and south buildings of the cold-storage facility;
- 5 trucks with refrigerated units are assumed to be at the northwest staging area;
- Tractor ignitions are assumed to be off while in the staging parking area;
- The refrigerated units on trailers are conservatively assumed to be operating for the full hour while at the loading bays of the south building;
- All rooftop equipment operates continuously at full capacity during a daytime/evening hour.

Assumed nighttime worst-case hour scenario:

- 15 trucks arrive and depart the facility (30 truck trips) via the Boston Church Rd West 3 entrance;
- 7 trucks arrive and depart the facility (14 truck trips) via the Boston Church Rd West 4 entrance;
- 15 trucks arrive and depart the facility (30 truck trips) via the Boston Church Rd East 1 entrance;
- 40 trucks arrive and depart the facility (80 truck trips) via the new public road 'A' entrances;
- Tractors are assumed to idle in the loading bay or parking area for 15 minutes as the trailers are dropped off on as shown as crosses on Figures 3 to 5;

- 2 electric trailer shunting tractors operating for 30 minutes moving trailers between loading area and parking areas at the cold-storage facility;
- 30 trucks are assumed to be at the loading areas at the north and south buildings of the cold-storage facility;
- 5 trucks with refrigerated units are assumed to be at the northwest staging area;
- Tractor ignition assumed to be off in the staging parking area.
- The refrigerated units on trailers are conservatively assumed to be operating for the full hour while at the loading bays of the south building;
- Rooftop equipment operates continuously at 50% capacity during a nighttime hour.
- All rooftop cold-storage condenser units operate continuously at full capacity during a nighttime hour.

The sound power levels for non-impulsive sources measured from other facilities similar to this one were used in our analysis and are summarized in Table 2.

Table 2: Source Sound Power Levels (dB re 10-12 W)

Source	Octave Band Centre Frequency [Hz]								
	63	125	250	500	1k	2k	4k	8k	A
Truck, traveling on truck route	101	100	94	96	97	95	91	86	101
Truck, idle	96	91	88	88	91	90	81	70	97
Truck, refrigerated unit	111	104	95	94	92	90	84	76	98
HVAC unit, 10-ton	65	72	73	77	78	74	71	64	81
Cold-storage Condenser Unit	91	94	92	89	87	83	81	76	92

Impulsive noises are assessed separately from the non-impulsive sound sources. Two types of impulsive sounds are expected to be emitted from the facility: loading/unloading of trailers by forklifts and coupling/uncoupling of trucks to/from trailers. The multiple impulsive noises are combined to obtain a logarithmic mean impulse sound level (L_{LM}) of 110 dBAI. This was calculated based on measurements conducted by HGC Engineering for similar past projects. Impulsive sounds were modeled and distributing the assumed source sound power levels throughout the loading and parking area of the site. The impulsive sounds were assumed to be emitted during all daytime, evening and nighttime periods.

5 ASSESSMENT RESULTS AND RECOMMENDATIONS

5.1 Results

Non-Impulsive Sources

The predicted sound levels due to the trucking activities (arriving, idling and departing) and rooftop mechanical equipment at the representative receptors (R1 to R9) during a worst-case busiest hour operating scenario, are summarized in the following table and shown on Figures 3 and 4.

Table 3: Predicted Non-Impulsive Source Sound Levels at Residential Receptors during a Worst-case Operating Scenario hour (Without Mitigation), Leq (dBA)

Receptor	Criteria Day/Eve/Night (dBA)	Daytime OLA	Daytime/ Evening (dBA)	Nighttime (dBA)
R1 (1 storey-residence to the West)	50 / 50 / 45	46	48	47
R2 (1-Storey residence to the Northwest)	50 / 50 / 45	42	46	46
R3 (2-Storey residence to the North)	50 / 50 / 45	47	47	47
R4 (2-Storey residence to the North)	50 / 50 / 45	46	47	47
R5 (1-Storey residence to the East)	50 / 50 / 45	<40	42	41
R6 (1-Storey residence to the East)	50 / 50 / 45	<40	38	38
R7 (2-Storey residence to the East)	50 / 50 / 45	41	41	41
R8 (1-Storey residence to the West)	50 / 50 / 45	50	46	46
R9 (1-Storey residence to the Northwest)	50 / 50 / 45	<40	37	37

Impulsive Sources

The predicted impulsive sound levels are provided in Figure 5 and also summarized in Table 4.

Table 4: Predicted Impulsive Sound Levels at Residential Receptors (Without Mitigation), L_{LM} (dBAI)

Receptor	Criteria Day/Eve/Night (dBAI)	Predicted Impulsive Sound Levels (dBAI)
R1 (1 storey-residence to the West)	50 / 50 / 45	42
R2 (1-Storey residence to the Northwest)	50 / 50 / 45	42
R3 (2-Storey residence to the North)	50 / 50 / 45	44
R4 (2-Storey residence to the North)	50 / 50 / 45	45
R5 (1-Storey residence to the East)	50 / 50 / 45	39
R6 (1-Storey residence to the East)	50 / 50 / 45	<35
R7 (2-Storey residence to the East)	50 / 50 / 45	36
R8 (1-Storey residence to the West)	50 / 50 / 45	40
R9 (1-Storey residence to the Northwest)	50 / 50 / 45	<35

The results of this analysis indicate that the predicted sound levels due to trucking activities and mechanical equipment will meet MECP's applicable daytime limits at the residential receptors. The predicted sound levels due to trucking activities may exceed the MECP's applicable limits at the residential receptors during the nighttime hours. Noise control measures are required and provided in Section 5.1.

5.2 Recommendations

Calculations indicate that a 4.0 m high noise barrier (Noise Barrier #1), relative to proposed grades along the north property boundary as shown on Figure 6 will provide sufficient noise mitigation. A 2.5 m high noise barrier is required along the western lot line of R8 (Noise Barrier #2). A noise barrier can consist of an earth berm or a noise wall on top of an earth berm. The noise barrier be constructed from a variety of materials such as wood, metal, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks and has a solid construction, with a surface density of no less than 20 kg/m^2.

The predicted non-impulsive and impulsive sound levels with the inclusion of the noise barriers mentioned above are summarized in Tables 5 and 6 and shown on Figures 7 and 8.

Table 5: Predicted Non-Impulsive Source Sound Levels at Residential Receptors during a Worst-case Operating Scenario hour (With Mitigation), Leq (dBA)

Receptor	Criteria Day/Eve/Night (dBA)	Daytime OLA	Daytime/ Evening (dBA)	Nighttime (dBA)
R1 (1 storey-residence to the West)	50 / 50 / 45	45	45	45
R2 (1-Storey residence to the Northwest)	50 / 50 / 45	40	42	42
R3 (2-Storey residence to the North)	50 / 50 / 45	44	44	44
R4 (2-Storey residence to the North)	50 / 50 / 45	44	45	45
R5 (1-Storey residence to the East)	50 / 50 / 45	39	41	41
R6 (1-Storey residence to the East)	50 / 50 / 45	38	38	38
R7 (2-Storey residence to the East)	50 / 50 / 45	40	41	41
R8 (1-Storey residence to the West)	50 / 50 / 45	47	44	44
R9 (1-Storey residence to the Northwest)	50 / 50 / 45	38	37	37

Table 6: Predicted Impulsive Sound Levels at Residential Receptors (With Mitigation), L_{LM} (dBAI)

Receptor	Criteria Day/Eve/Night (dBAI)	Predicted Impulsive Sound Levels (dBAI)
R1 (1 storey-residence to the West)	50 / 50 / 45	41
R2 (1-Storey residence to the Northwest)	50 / 50 / 45	39
R3 (2-Storey residence to the North)	50 / 50 / 45	41
R4 (2-Storey residence to the North)	50 / 50 / 45	43
R5 (1-Storey residence to the East)	50 / 50 / 45	39
R6 (1-Storey residence to the East)	50 / 50 / 45	<35
R7 (2-Storey residence to the East)	50 / 50 / 45	<35
R8 (1-Storey residence to the West)	50 / 50 / 45	37
R9 (1-Storey residence to the Northwest)	50 / 50 / 45	<35

6 CONCLUSIONS AND RECOMMENDATIONS

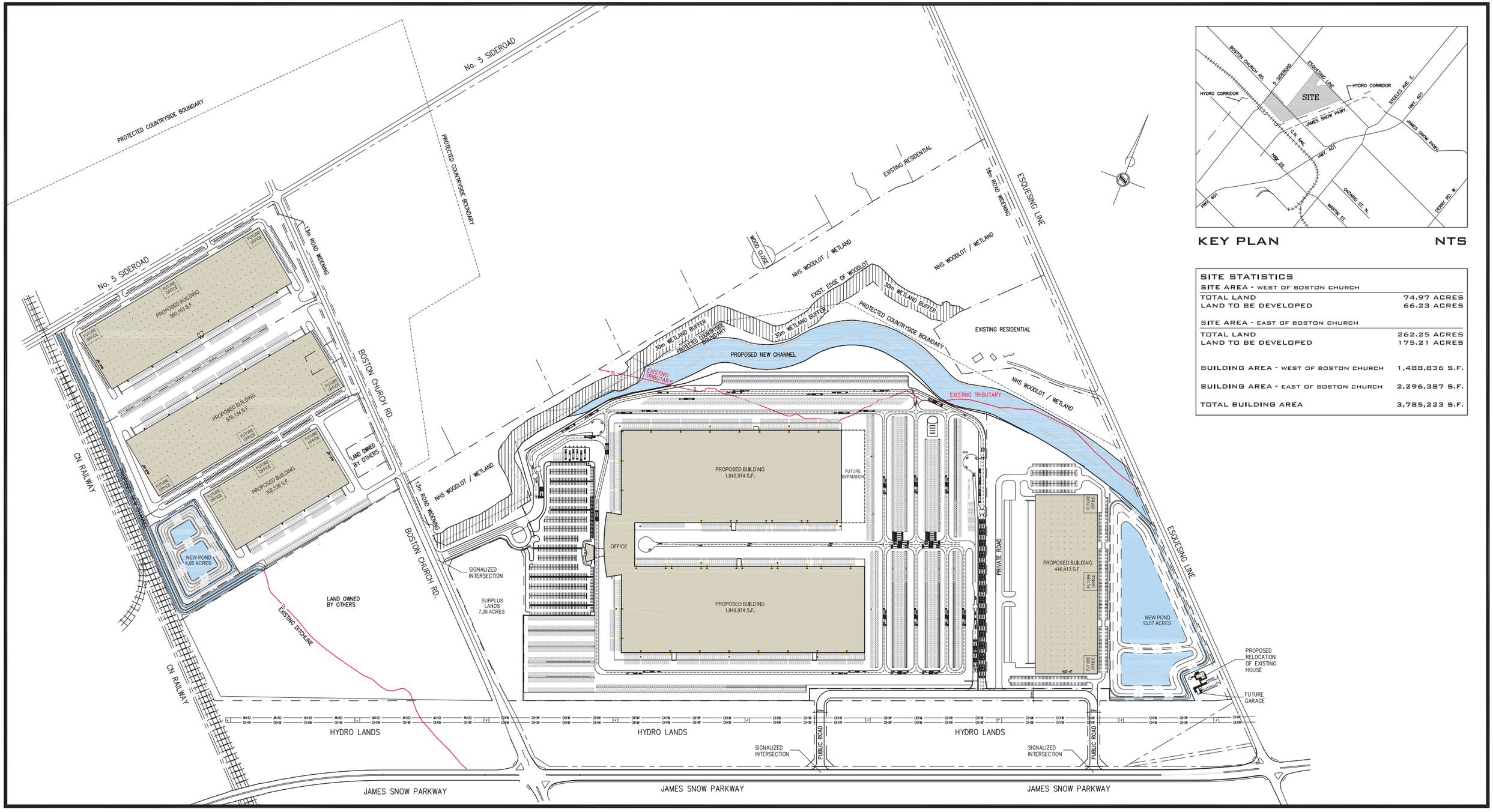
The acoustical analysis indicates that sound levels predicted under worst case operating scenarios and incorporating the noise control measures recommended herein, are expected to comply with the applicable MECP limits for non-impulsive and impulsive sounds at neighbouring receptors.

The acoustic recommendations may be subject to modifications if the site plan is changed significantly, operating scenarios are significantly different to those assumed in the assessment or there is a significant increase in background sound levels.

6.1 Implementation

1) Prior to the issuance of building permits for this development, a Professional Engineer qualified to provide acoustical engineering services in Ontario shall review the site, building plans, rooftop mechanical specification and grading plans to confirm that the assumptions are in accordance with the approved noise study and that the appropriate height and extent of the required noise barrier has been incorporated to meet MECP guidelines limits at adjacent receptors.

Figure 1: Aerial Photo



KEY PLAN NTS

SITE STATISTICS

SITE AREA - WEST OF BOSTON CHURCH	
TOTAL LAND	74.97 ACRES
LAND TO BE DEVELOPED	66.23 ACRES
SITE AREA - EAST OF BOSTON CHURCH	
TOTAL LAND	262.25 ACRES
LAND TO BE DEVELOPED	175.21 ACRES
BUILDING AREA - WEST OF BOSTON CHURCH	1,488,836 S.F.
BUILDING AREA - EAST OF BOSTON CHURCH	2,296,387 S.F.
TOTAL BUILDING AREA	3,785,223 S.F.

N

ORLANDO

Milton North Business Park

Milton, Ontario

CONCEPT PLAN

SCALE: 1:2500
DATE: AUG. 24, 2021

A-1

Figure 2: Concept Plan

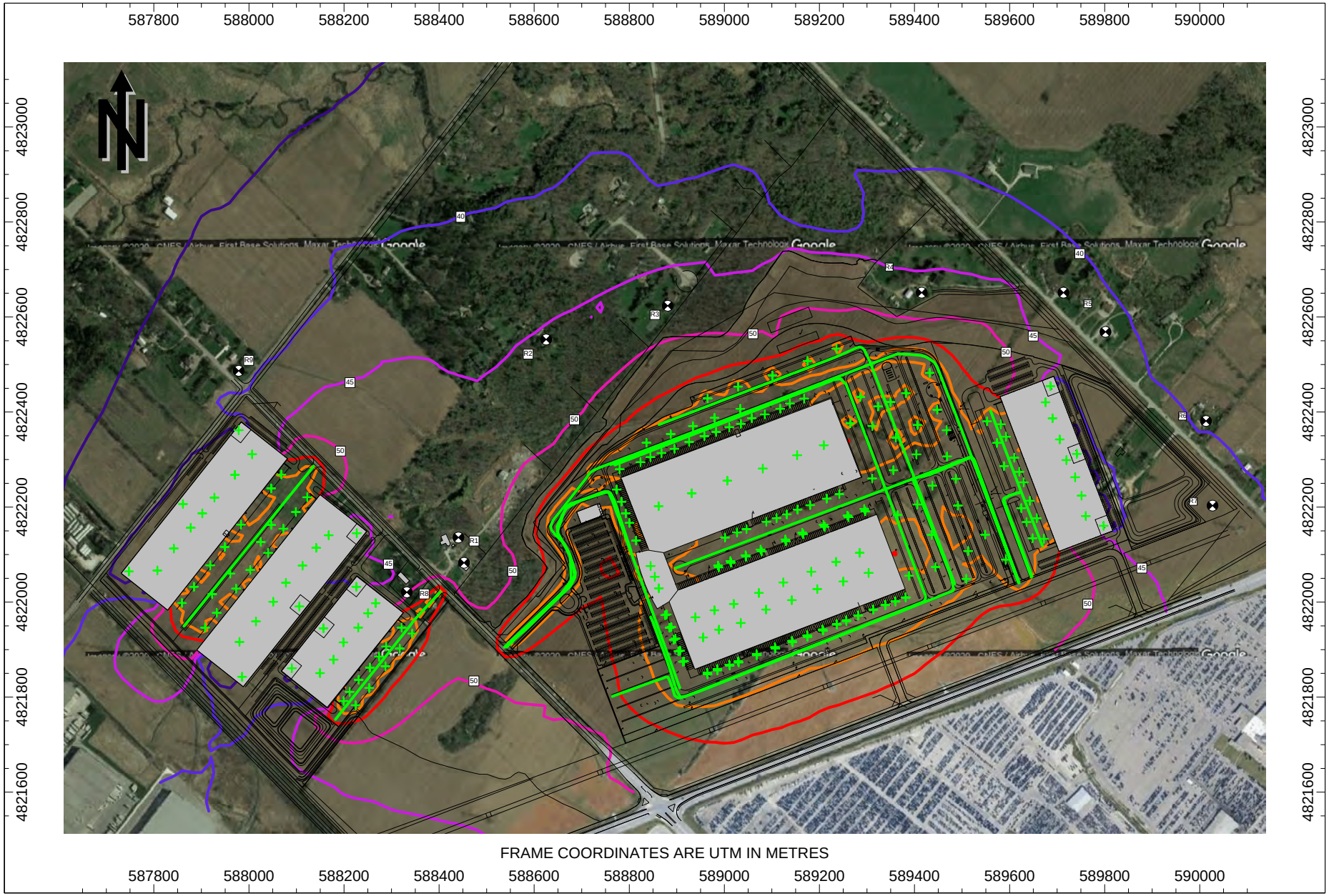


Figure 3: Predicted Daytime Hour Non-Impulsive Sources Sound Level Contours without Mitigation, LEQ1hr [dBA]

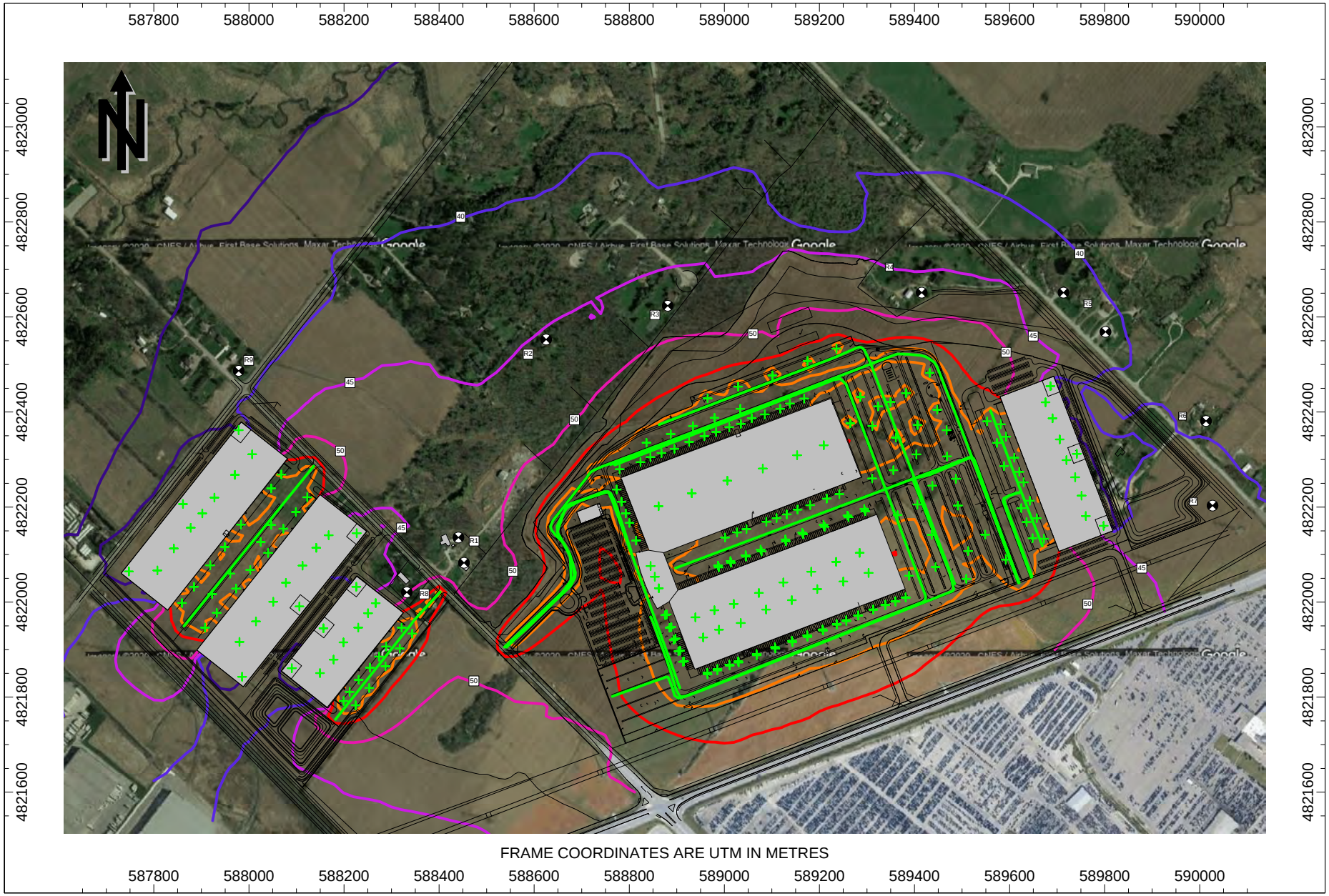


Figure 4: Predicted Nighttime Hour Non-Impulsive Sources Sound Level Contours without Mitigation, LEQ1hr [dBA]

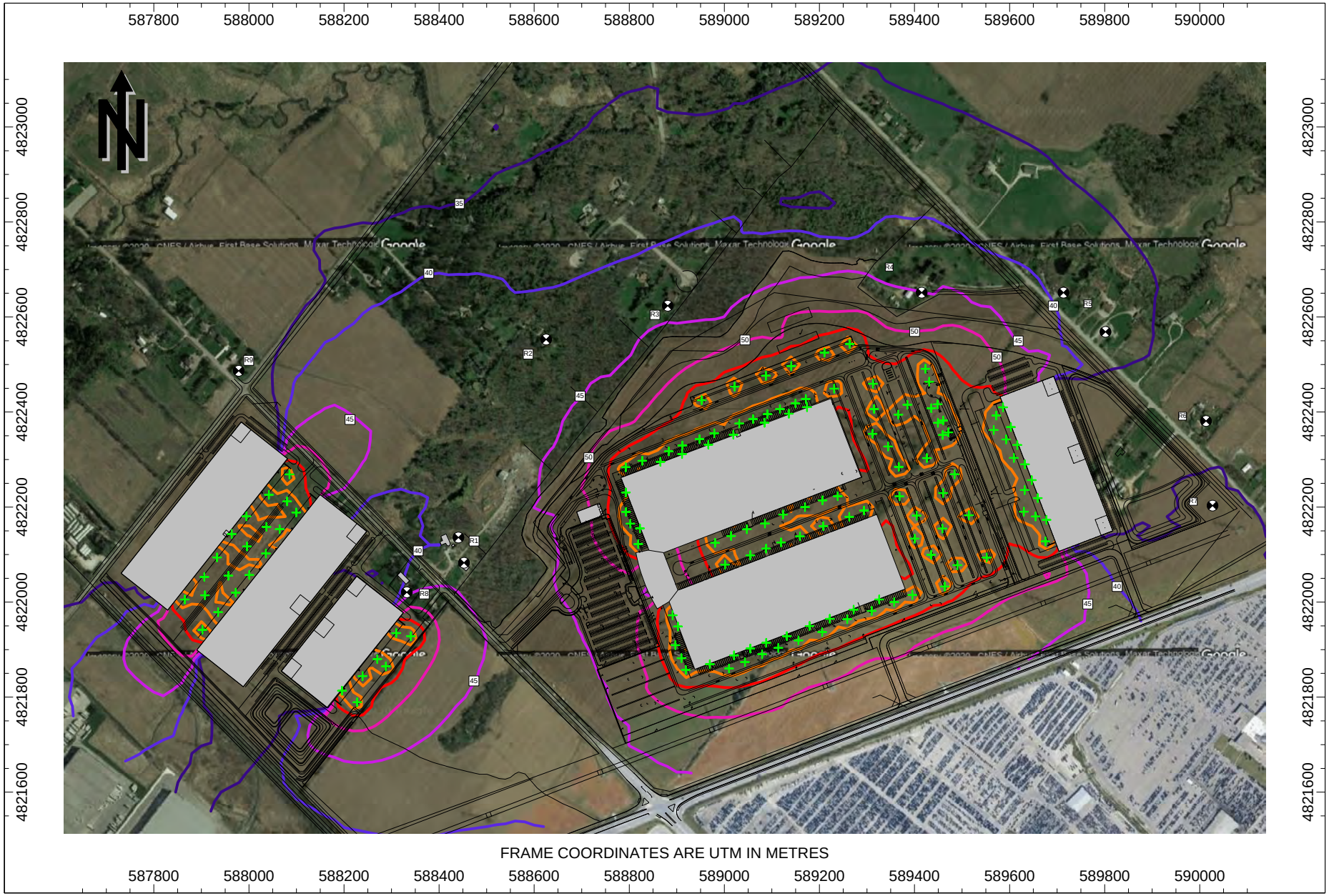


Figure 5: Predicted Impulsive Sources Sound Level Contours without Mitigation, LLM [dBAI]

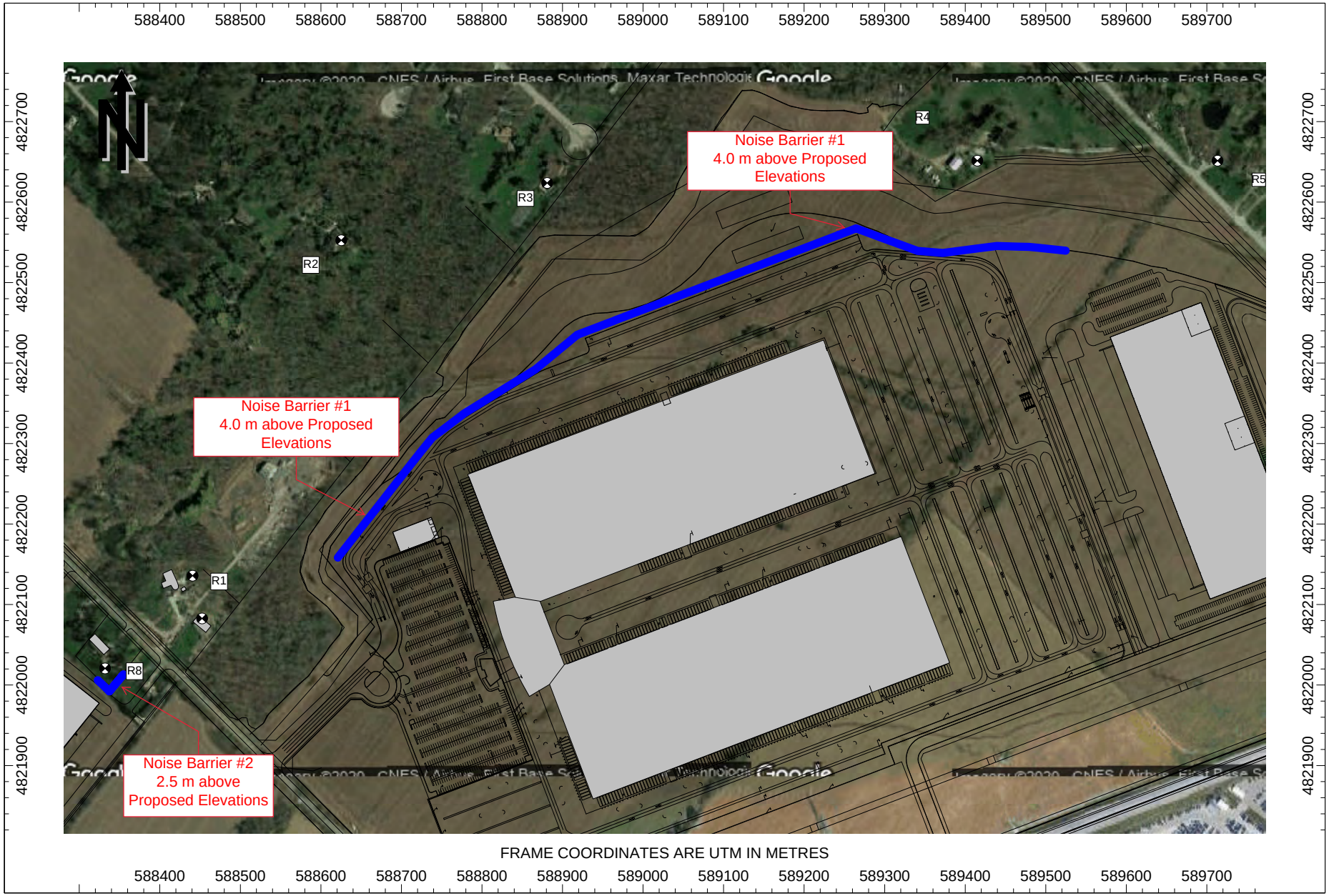


Figure 6: Noise Barrier Locations

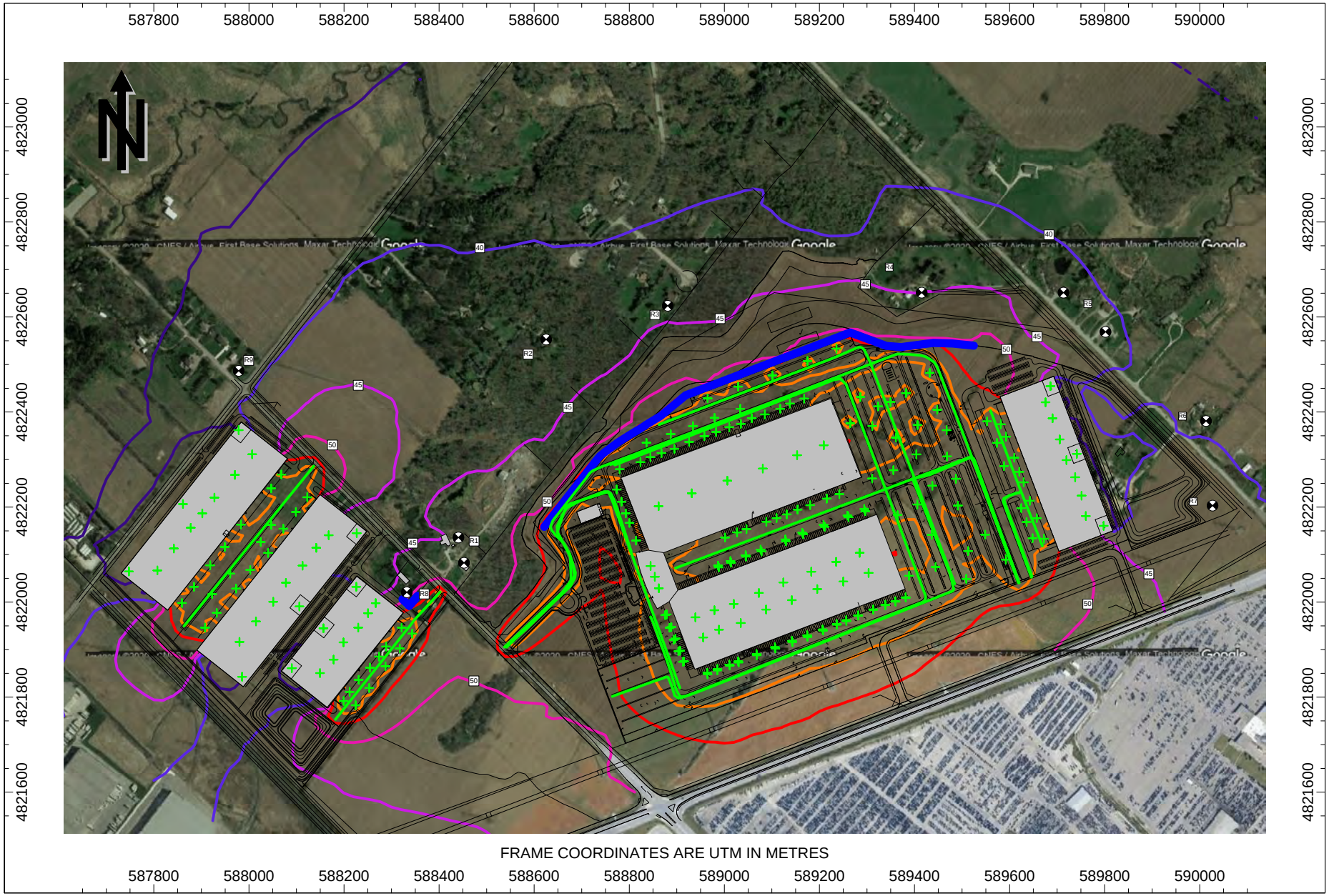


Figure 7: Predicted Nighttime Hour Non-Impulsive Sources Sound Level Contours with Mitigation, LEQ1hr [dBA]

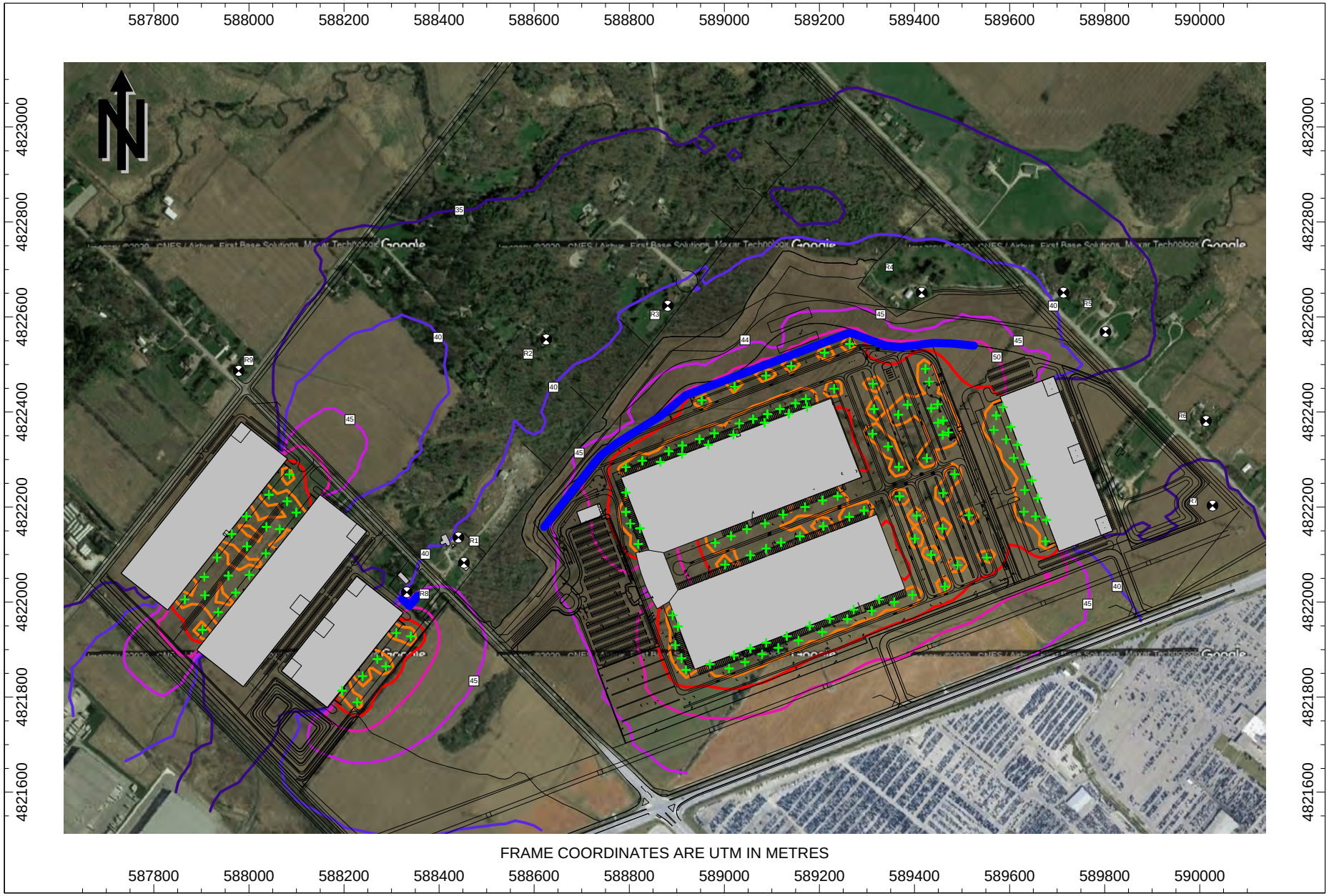


Figure 8: Predicted Impulsive Sources Sound Level Contours with Mitigation, LLM [dBAI]

APPENDIX A

Acoustical Modelling Assumptions

The predictive model used for this Assessment (*Cadna-A version 2021*) is based on methods from ISO Standard 9613-2.2 “Acoustics - Attenuation of Sound During Propagation Outdoors”, which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography). This modeling technique is acceptable to the MECP.

The subject site and surrounding area were modelled using existing topography and based on observations during the site visit. Existing woodlots to the north were included in the modelling as shown on the attached Figure D2. Ground attenuation was assumed to be spectral for all sources, with a ground factor (G) of 0.25 in paved areas in the development, 0.0 for pond and 0.9 in all other areas, representative of soft cover. The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The predictive modelling considered one order of reflection, the sufficiency of which was verified through an iterative convergence analysis, using successively increasing orders of reflection.

All mechanical sources, with the exception of on-site truck movements, were modeled as point sources of sound, shown as crosses in Figures 3 – 5, 7 and 8 and Figure A2. On-site truck movements were modeled as a line source that are shown as lines in the appropriate figures. Attenuation by the trailers were included for the trucks and refrigerated trucks parked in the northwest staging area and trailer parking area as the tractors will be facing south.

Figure A1: Foliage Areas Used In Acoustical Modelling
(Green Hatched Areas)

Figure A2: Noise Source Locations