

Noise Feasibility Study

Proposed Industrial/Office Development

15374 & 15450 Woodbine Avenue

Whitchurch Stouffville, Ontario

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Environmental Noise Study, Proposed Industrial/Office Development,
15374 & 15450 Woodbine Avenue, Whitchurch-Stouffville, Ontario

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1 Introduction and Summary

HGC Engineering was retained by Galatia Lane Estates Inc. to conduct a noise feasibility study for a proposed industrial/office development located at 15374 & 15450 Woodbine Avenue in Whitchurch-Stouffville, Ontario. The proposed development will consist of a one-storey warehousing/industrial building with loading docks at the east side of the building, an office at the north end, and employee parking at the west. The study is required by the Town as part of the planning and approvals process specifically for a Site Plan application.

The analysis is based on a review of the proposed site plan, a site visit, aerial imagery, and sound level data from HGC Engineering past project files of similar facilities. A computer model of the site and the nearby area was created, using acoustical modelling software, to predict the sound levels at the nearby noise sensitive receptors. The predicted sound levels were compared to the guidelines of the Ministry of Environment, Conservation and Parks (MECP) and the Town of Whitchurch-Stouffville.

The results of the analysis show that the proposed development is feasible. Sound emissions of the proposed warehousing facility will be within the applicable noise guideline limits of the MECP at the nearby noise-sensitive receptors and mitigation is not required.

2 Site Description

Figure 1 is a key plan indicating the location of the proposed site. The site is located on the west side of Woodbine Avenue, east of Highway 404 and north of Aurora Road. Figure 2 shows the site plan by Natale Architect Inc., last revised April 24, 2023. The proposed facility will consist of a warehouse/light industrial building with office space, and loading docks at the east side of the building and employee car parking at the west side of the building. The proposed industrial development will host both warehouse and office tenants and is assumed to operate 24/7.

HGC Engineering personnel visited the site on March 19, 2023 to make observations of the surrounding acoustical environment. The site is currently vacant and the area around the site are mostly flat. Zoning information for the site and the surrounding property is provided in Appendix A. The site area is zoned for development. There are existing commercial and residential buildings to



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the south of the facility and south of Aurora Road. To the east of the site and across Woodbine Avenue are existing two-storey detached residential dwellings. To the west of the site is Highway 404 located approximately 50 m west of the site's westerly property line.

The nearby noise sensitive receptors are the existing residential dwellings to the east and south (designated as [R1] through [R3]). Locations of the noise sensitive receptors [R1] through [R3] are shown in Figures 5 and 6.

3 Noise Level Criteria

3.1 Criteria Governing Stationary Noise Sources

The MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning" is the guideline for use in investigation Land Use Compatibility issues with regard to noise. An industrial or commercial facility is classified in MECP guidelines as a stationary source of sound (as opposed to sources such as traffic or construction, for example) for noise assessment purposes. The proposed development is located in a semi-urban acoustical environment classified as Class 2 according to MECP guidelines, which can be characterized by the background sound level being dominated by traffic and human activity during the daytime, and low background sound levels defined by natural environment during the evening and nighttime.

The façade of a residence, or any associated usable outdoor area, is considered a noise sensitive point of reception.

The MECP guideline categorize sounds from industry into two different types: non-impulsive and impulsive. Non-impulsive sounds are steady or slowly varying in nature, such as those produced by vehicles, motors, and most other mechanical equipment. Impulse sounds are instantaneous or short-duration pressure pulses, such as those generated by metal-on-metal impacts. These two sorts of sounds are assessed separately under MECP guidelines. Non-impulsive sound pressure levels are denoted by units of dBA, and impulsive sound pressure levels are denoted by units of dBAI.

NPC-300 stipulates that the exclusionary minimum sound level limit for a stationary noise source at the plane of window of a noise sensitive space in a Class 2 area is 50 dBA / dBAI during daytime (07:00 to 19:00) and evening (19:00 to 23:00) hours, and 45 dBA / dBAI during nighttime hours

(23:00 to 07:00). For outdoor living areas (OLAs), the limit is 50 dBA and 45 dBA during daytime and evening hours for non-impulsive sounds, respectively, and is 50 dBAI during daytime and evening hours for impulsive sounds. If the background sound levels due to road traffic exceed the exclusionary minimum limits, then the background sound level becomes the criterion. The background sound level is defined as the sound level that is present when the stationary source under consideration is not operating, and may include traffic noise and natural sounds.

Commercial activities such as the occasional movement of customer vehicles, occasional deliveries, and garbage collection are not of themselves considered to be significant noise sources in the MECF guidelines. Accordingly, these sources have not been considered in this study. Noise from safety equipment (e.g. back-up beepers) are also exempt from consideration. Frequent truck movements at a warehouse or busy shipping/receiving docks at an industry must generally be assessed, and thus are included in the analysis.

The MECF guidelines stipulate that the sound level impact during a “predicable worst case hour” be considered. This is defined to be an hour when a typically busy “planned and predictable mode of operation” occurs at the subject facility, coincident with a period of minimal background sound. Compliance with MECF criteria generally results in acceptable levels of sound at noise sensitive receptors although there may still be residual audibility during periods of low background sound.

3.2 Stationary Noise Level Criteria at the Nearby Receptors

Background sound levels were observed to be as low as the minimum exclusionary limits during the site visit. As such, the minimum exclusionary limits have been adopted. The results of the minimum sound levels and recommended criteria during daytime/evening and nighttime are shown below in Table I.

Table I: Applicable Non-Impulsive and Impulsive Noise Level Criteria at Receptors
[L_{EQ-1hr} dBA / L_{LM} dBAI]

Receptor	Description	Façade			Outdoor Living Area (OLA)	
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)
R1	Two-storey dwelling	50	50	45	50	45*
R2	Two-storey dwelling					
R3	Two-storey dwelling					

Note: * Sound level criteria at an OLA during evening hours is 45 dBA for non-impulsive sounds and 50 dBAI for impulsive sounds.

4 Stationary Source Assessment

Predictive noise modelling was used to assess the sound impact of the proposed warehouse/light industrial development, which include rooftop mechanical units and trucking activities, at the most critically impacted façades of the existing noise sensitive receptors surrounding the site. The analysis is based on a review of the proposed site plan, assumed rooftop mechanical equipment, manufacturer's sound data, and sound level data from HGC Engineering past project files of similar warehousing/light industrial facilities.

MECP guidelines stipulate that an assessment to be representative of the predictable worst-case scenario in any hour. HGC Engineering has observed and measured sounds associated with similar warehousing and light industrial facilities and typical rooftop mechanical units in the past. The source sound levels associated with the facility are listed below in Table II.

Table II: Source Sound Power Levels [dB re 10-12 W]

Source	Octave Band Centre Frequency [Hz]								Overall
	63	125	250	500	1k	2k	4k	8k	
Rooftop 5 Ton HVAC Unit	--	67	72	77	76	73	68	61	80 [dBA]
Rooftop Exhaust Fan	78	75	79	69	64	63	58	54	75 [dBA]
Forklift	99	95	91	91	91	88	82	76	95 [dBA]
Trailer Truck Movement (each)	101	100	94	96	97	95	91	86	101 [dBA]
Medium Truck Movement (each)	108	90	92	90	94	91	84	77	97 [dBA]
Trailer Truck Idling	96	91	88	88	91	90	81	70	95 [dBA]
Medium Truck Idling	91	87	89	84	91	88	79	71	94 [dBA]
Trailer Coupling/Decoupling (Impulsive)	116	115	115	114	117	111	107	102	123 [dBAI]
Trailer Loading/Unloading by Forklift (Impulsive)	106	110	109	98	89	84	78	82	103 [dBAI]

4.1 Stationary Source Noise Predictions

The above data were inputted into a predictive computer model. The software used for this purpose (*Cadna-A, Version 2023, build 195.5312*) 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 and buildings.

The following information and assumptions were used in the analysis.

- Trucks access the site area via the north driveway, and load/unload materials at the loading docks. Tractor trailers are assumed to load/unload at the loading docks, and medium trucks were assumed to load/unload at the south loading bays.
- A forklift may operate in the loading areas.
- Office portions of the building are air conditioned, with some ventilation equipment provided for the light industrial and warehouse area.
- The noise sources were assumed to be located as shown in Figures 3 and 4. The green crosses represent idling vehicles, rooftop mechanical equipment, and truck loading/unloading impulses. The green lines represent truck movements. The green hatched area represents outdoor forklift activities and the impulses associated with forklifts entering and exiting docked trailers.

In this impact assessment, we have considered typical worst-case (busiest hour) scenarios for each time period to be as follows:

Assumed daytime/evening worst-case scenario for non-impulsive sources:

- All rooftop equipment operating continuously at full capacity.
- 6 tractor trailers and 3 medium trucks accessing the site in an hour.
- 6 tractor trailers and 1 medium truck engines idling in the loading area for 5 minutes.
- One forklift operating in the loading area grounds for 30 minutes out of an hour.

Assumed nighttime worst-case scenario for non-impulsive sources:

- All rooftop equipment operating continuously at half capacity to account for lowered nighttime ambient temperatures.
- 6 tractor trailers and 2 medium trucks accessing the site in an hour.
- 6 tractor trailers and 1 medium truck engines idling in the loading area for 5 minutes.
- One forklift operating in the loading area grounds for 15 minutes out of an hour.

Assumed worst-case scenario for impulsive noise sources:

- Trailer trucks and medium trucks load and unload at the loading docks/bays using forklifts.
- Trailer trucks will couple/decouple to leave/pickup trailers at the site 4 times in an hour.

4.2 Results

The sound levels due to stationary noise sources associated with proposed development at the existing nearby noise sensitive receptors are summarized in Table III, and are presented in Figures 5 and 6.

Table III: Predicted Sound Levels from the Proposed Facility on Nearby Noise Sensitive Receptors, [dBA / dBAI]

	Non-Impulsive, [dBA]		Impulsive, [dBAI]	Criteria (Day / Eve / Night)	Meets Criteria?
	Day/Eve (07:00 – 23:00)	Night (23:00 – 07:00)	Day/Eve/Night		
R1	36	35	38	50 / 50 / 45	Y
R1 OLA	37	--	38	50 / 45* / --	Y
R2	34	34	39	50 / 50 / 45	Y
R2 OLA	35	--	39	50 / 45* / --	Y
R3	34	33	40	50 / 50 / 45	Y
R3 OLA	34	--	40	50 / 45* / --	Y

Note: * Sound level criteria at an OLA during evening hours is 45 dBA for non-impulsive sounds and 50 dBAI for impulsive sounds.

The results indicate that the predicted sound levels due to the operation of the proposed warehouse/light industrial facility will be within MECP limits at the façades of the existing nearby noise-sensitive receptors during a worst-case operational scenario. No mitigation is required.

5 Conclusion

In summary, HGC Engineering has predicted the sound levels at the nearby noise sensitive receptors due to the proposed development, reviewed the site plan, reviewed typical sound data for rooftop units and trucking activities including loading/unloading, and performed calculations to determine the impact at the existing nearby noise-sensitive receptors with respect to MECP guidelines.

The sound emissions of the proposed industrial development are predicted to be within MECP limits at the most potentially impacted nearby points of reception.

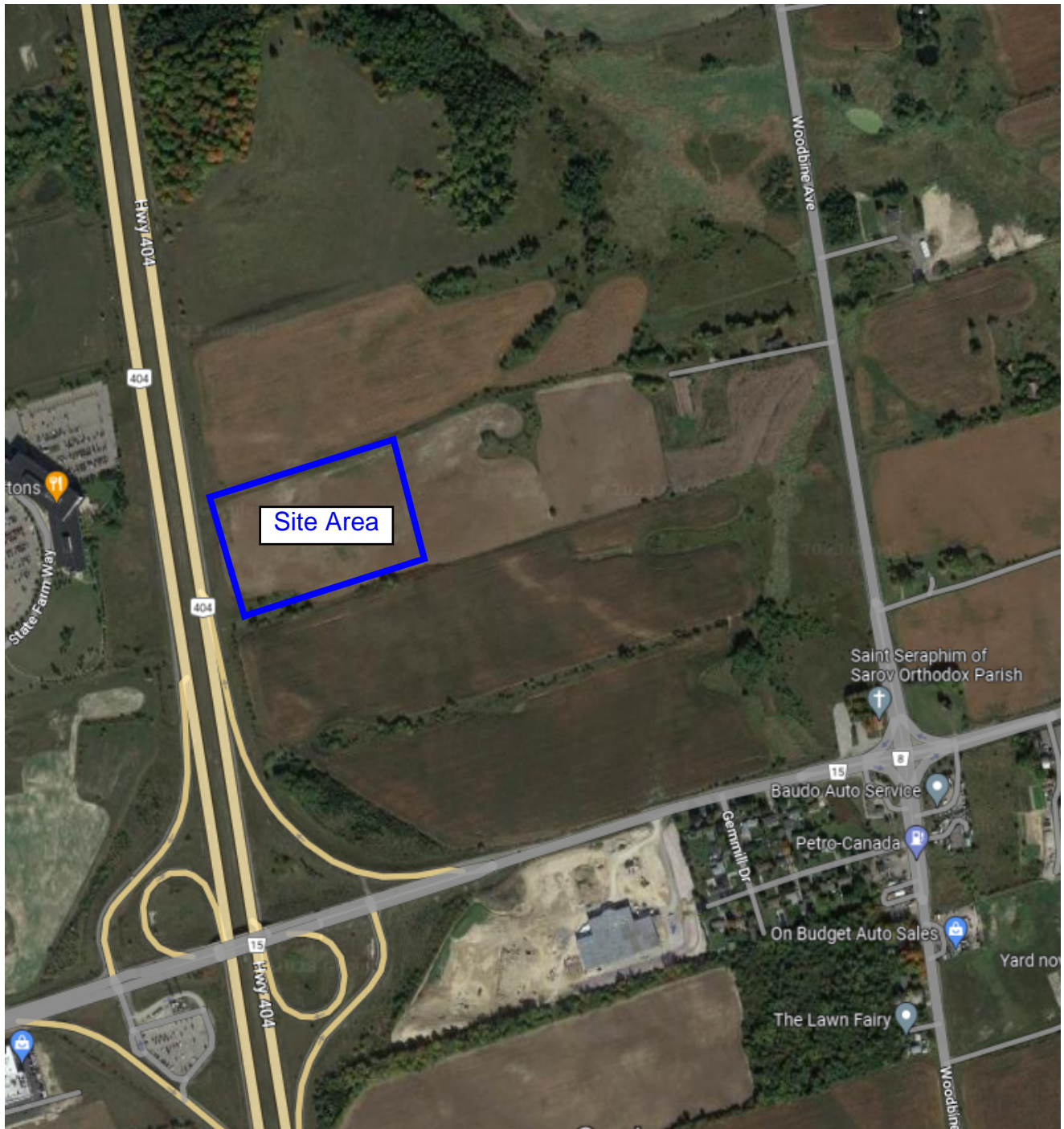


Figure 1: Key Plan



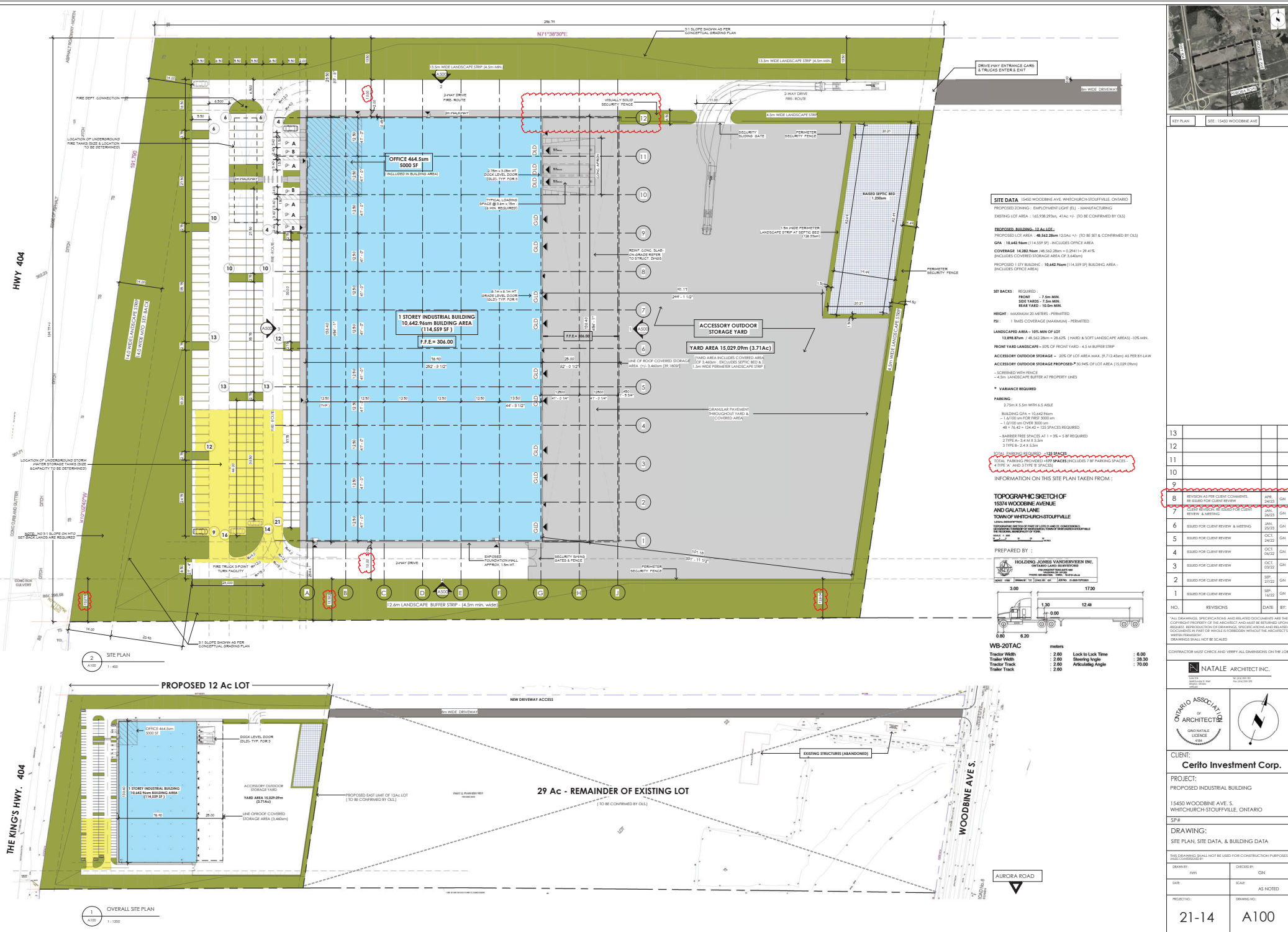
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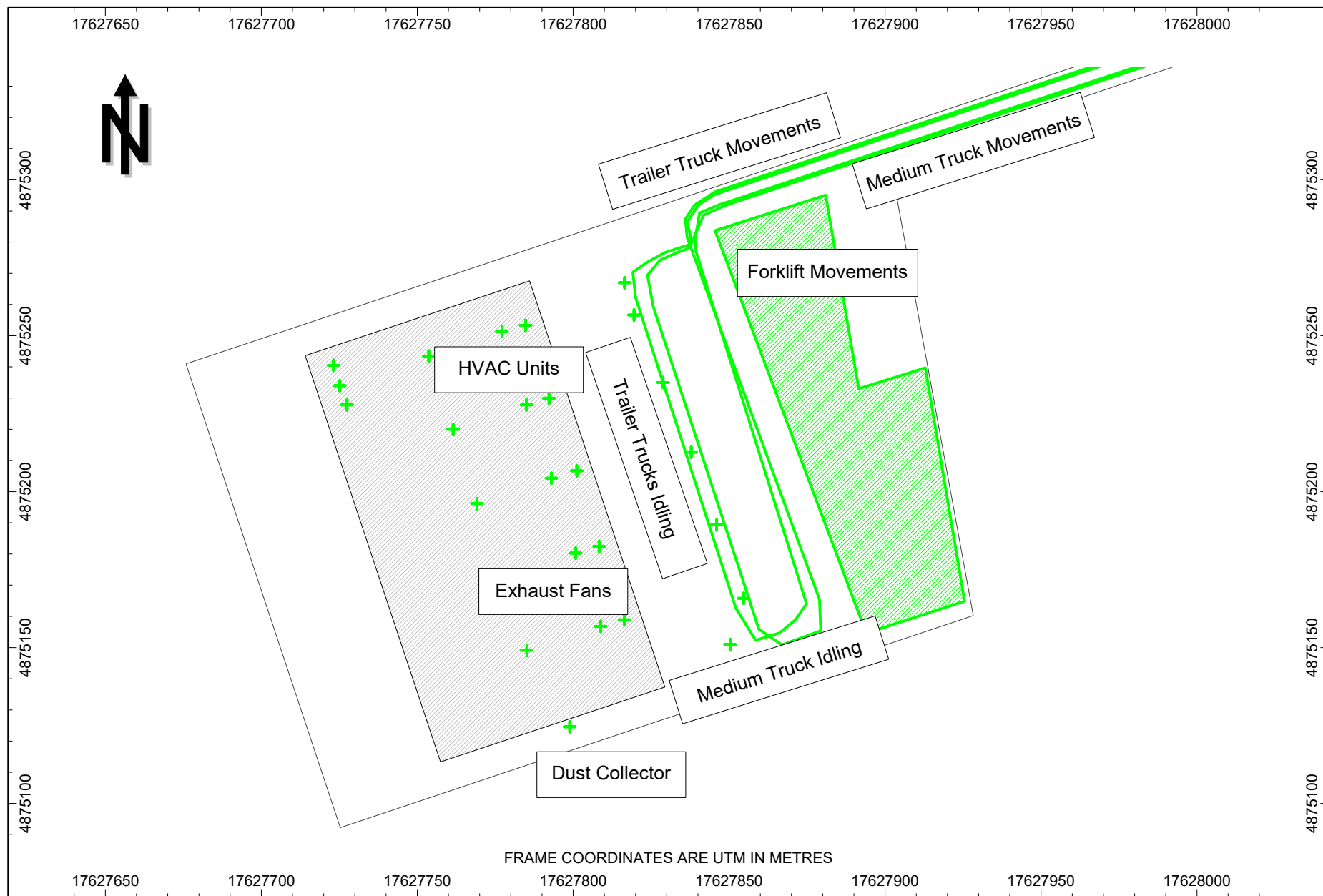


Figure 3: Noise Source Locations, Non-Impulsive



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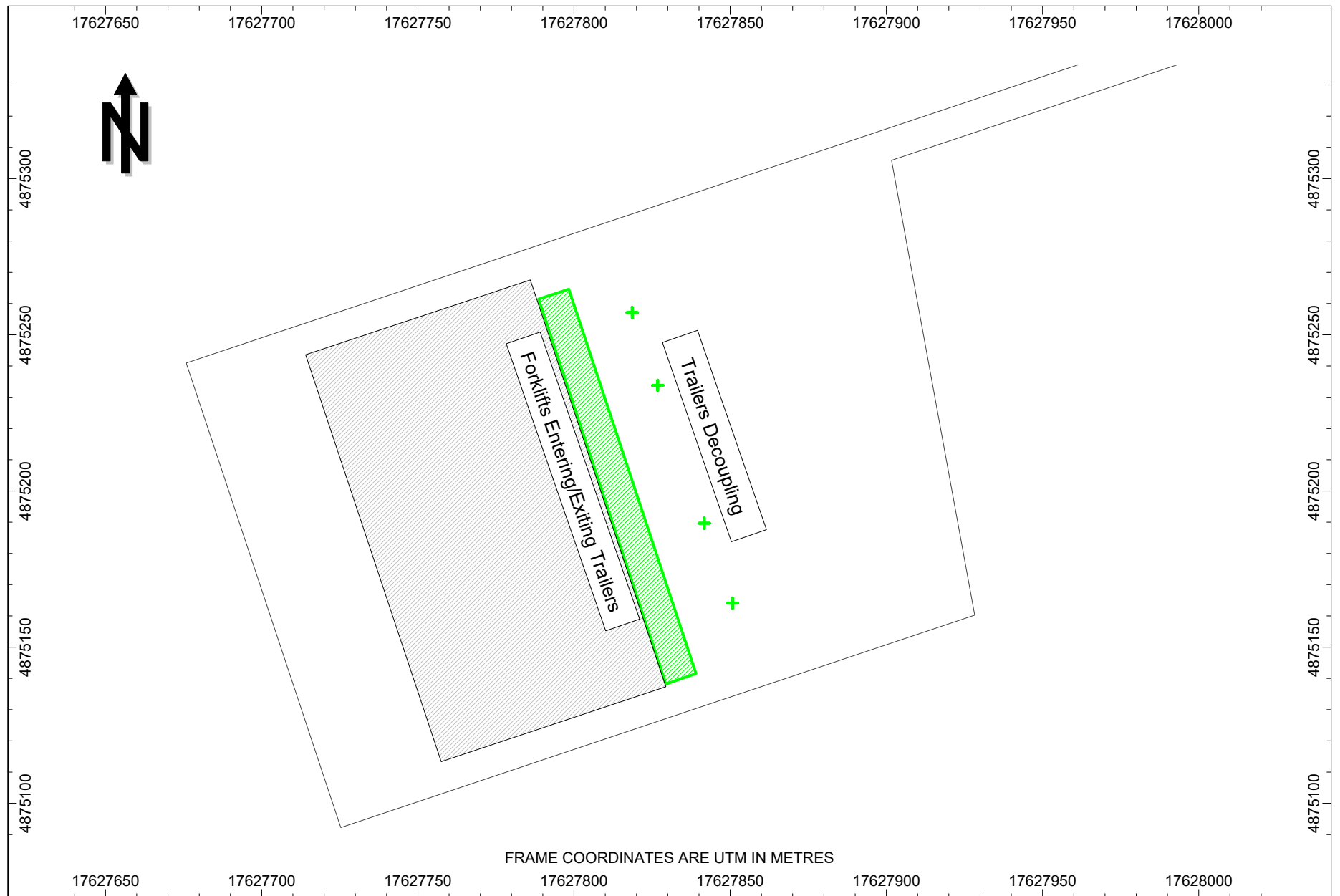


Figure 4: Noise Source Locations, Impulsive



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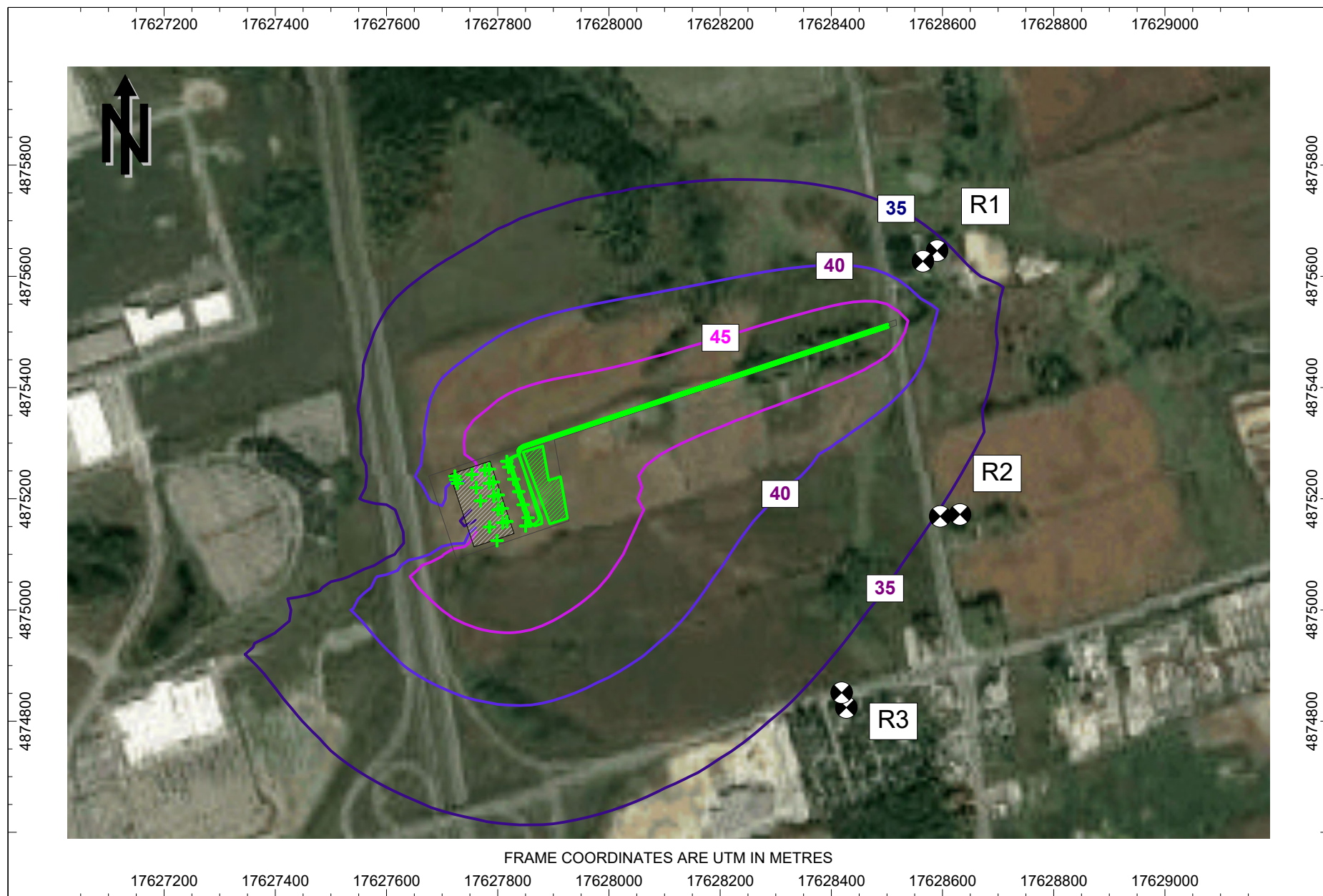


Figure 5: Non-Impulsive Sound Level Contours, L_{eq} [dBA]



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Figure 6: Impulsive Sound Level Contours, LLM [dBAI]



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APPENDIX A

Zoning Information



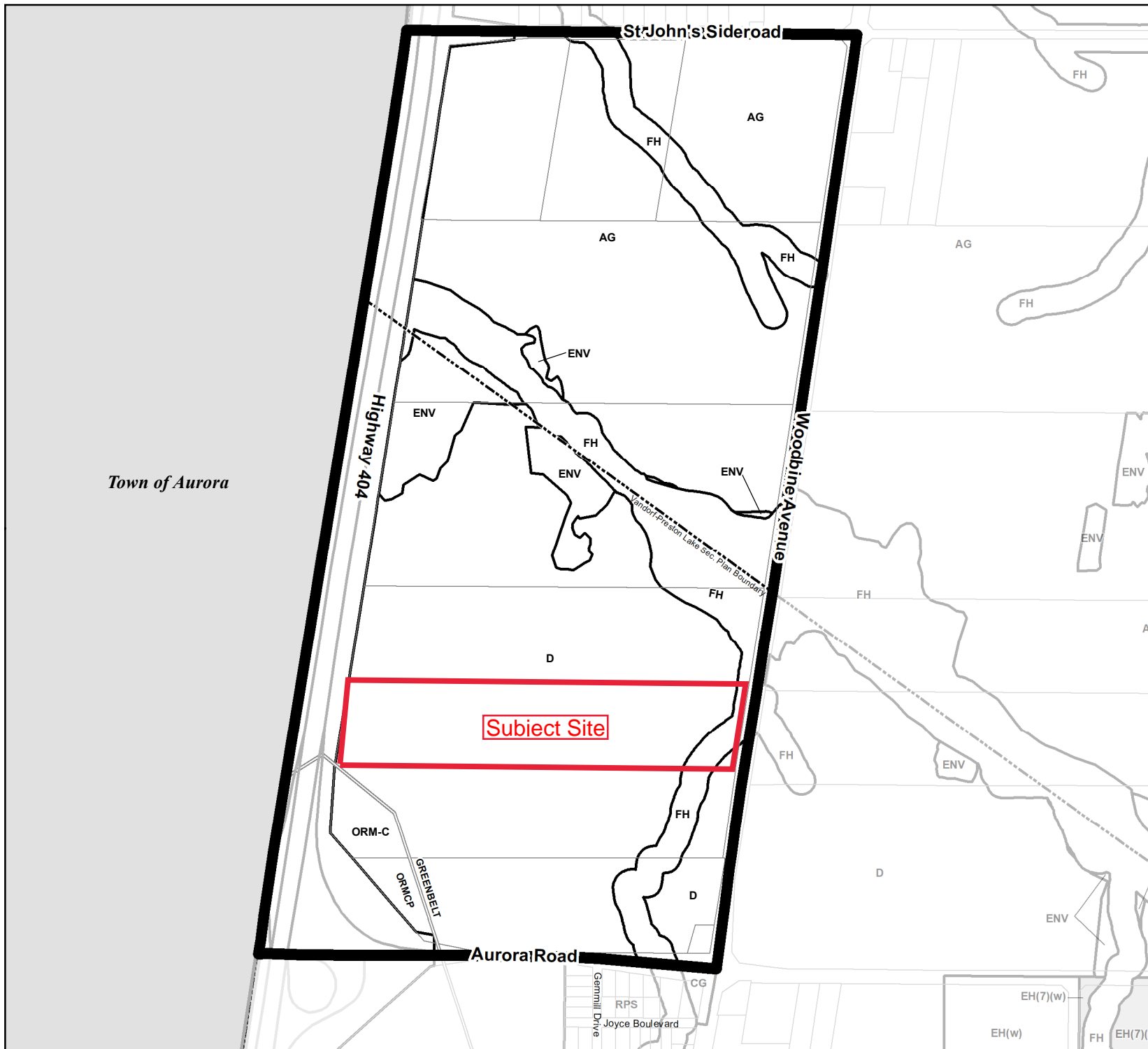
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23	24	25	26	27	28	29
30	31	32	33	34	35	36
37	38	39	40	41	42	
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57						

ZONE DESCRIPTION

Section 4

AG - Agricultural
 ENV - Environmental
 FH - Flood Hazard
 ORM-C - Oak Ridges Moraine Countryside
 ORM-L - Oak Ridges Moraine Linkage
 ORM-NC - Oak Ridges Moraine Natural Core

Section 5

RPS - Residential Private Services
 RV - Residential Village
 R1 - Residential 1
 R2 - Residential 2
 R3 - Residential 3
 R4 - Residential 4
 RM1 - Residential Multiple 1
 RM2 - Residential Multiple 2

Section 5A

RN1 - New Residential 1
 RN2 - New Residential 2
 RN3 - New Residential 3
 RN4 - New Residential 4
 RN5 - New Residential 5

Section 6

CM1 - Downtown Mixed Commercial
 CM2 - Western Approach Mixed Commercial
 CMB - Commercial Residential Mixed - Ballantrae
 CG - General Commercial
 CL - Local Commercial
 CV - Village Commercial
 CR - Recreational Commercial

Section 7

EBP/EBP-G - Employment Business Park / - Gormley
 EH/EH-G - Employment Heavy / - Gormley
 EL/EL-G - Employment Light / - Gormley
 ED - Employment Disposal
 EX - Employment Extraction

Section 8

I - Institutional
 OS - Open Space
 D - Development Reserve

Section 2

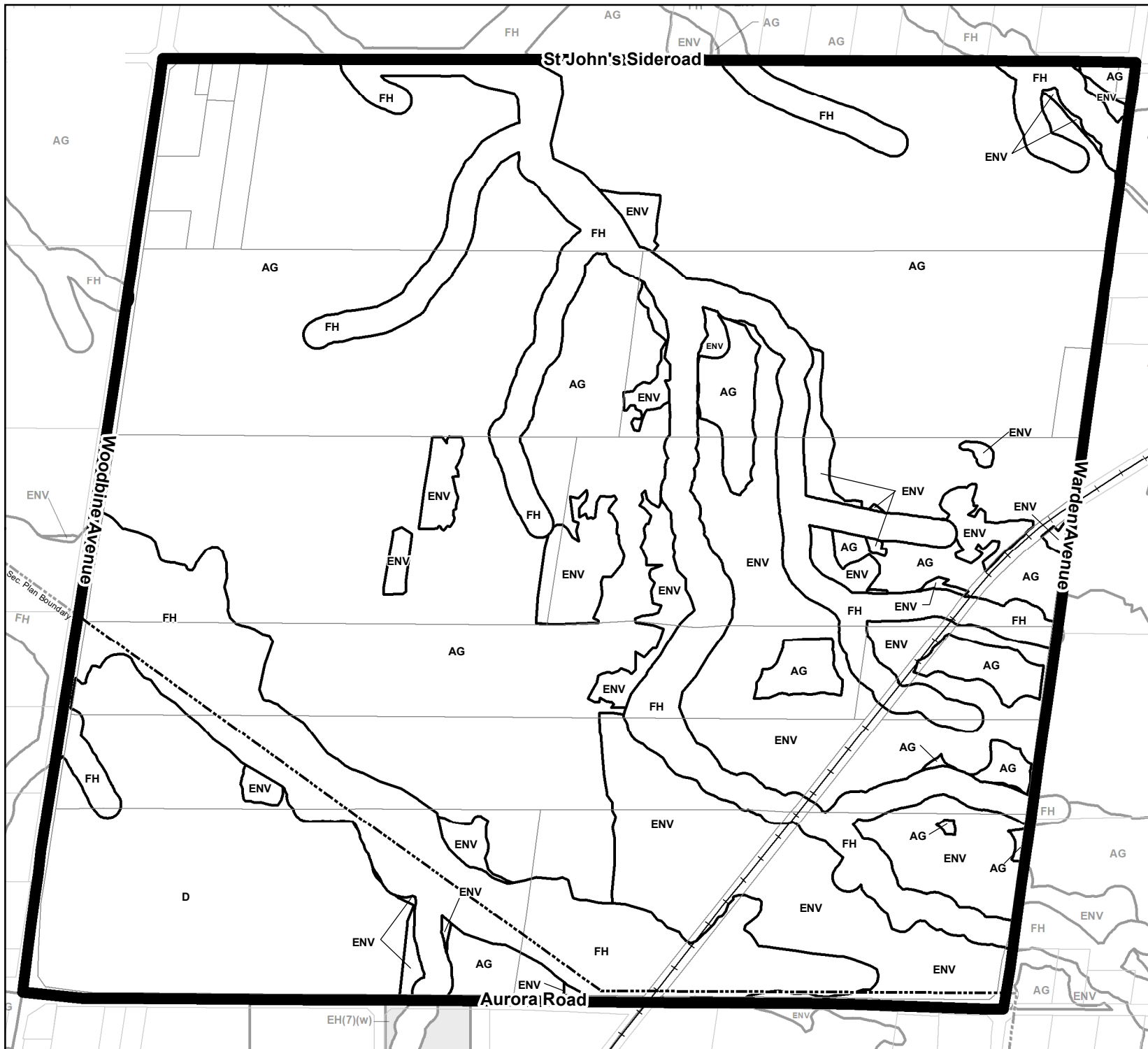
h - Holding Symbol
 f - Flood Vulnerable
 t - Temporary Use
 w - Water Restriction
 WDA - Waste Disposal Area

0 50 100 200 300 400 m

Town of Whitchurch-Stouffville
 Zoning By-law 2010-001-ZO
 Revised: November 2021



SCHEDULE 16



	2	3	4	5	6	7	8
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	37	38	39	40	41	42	
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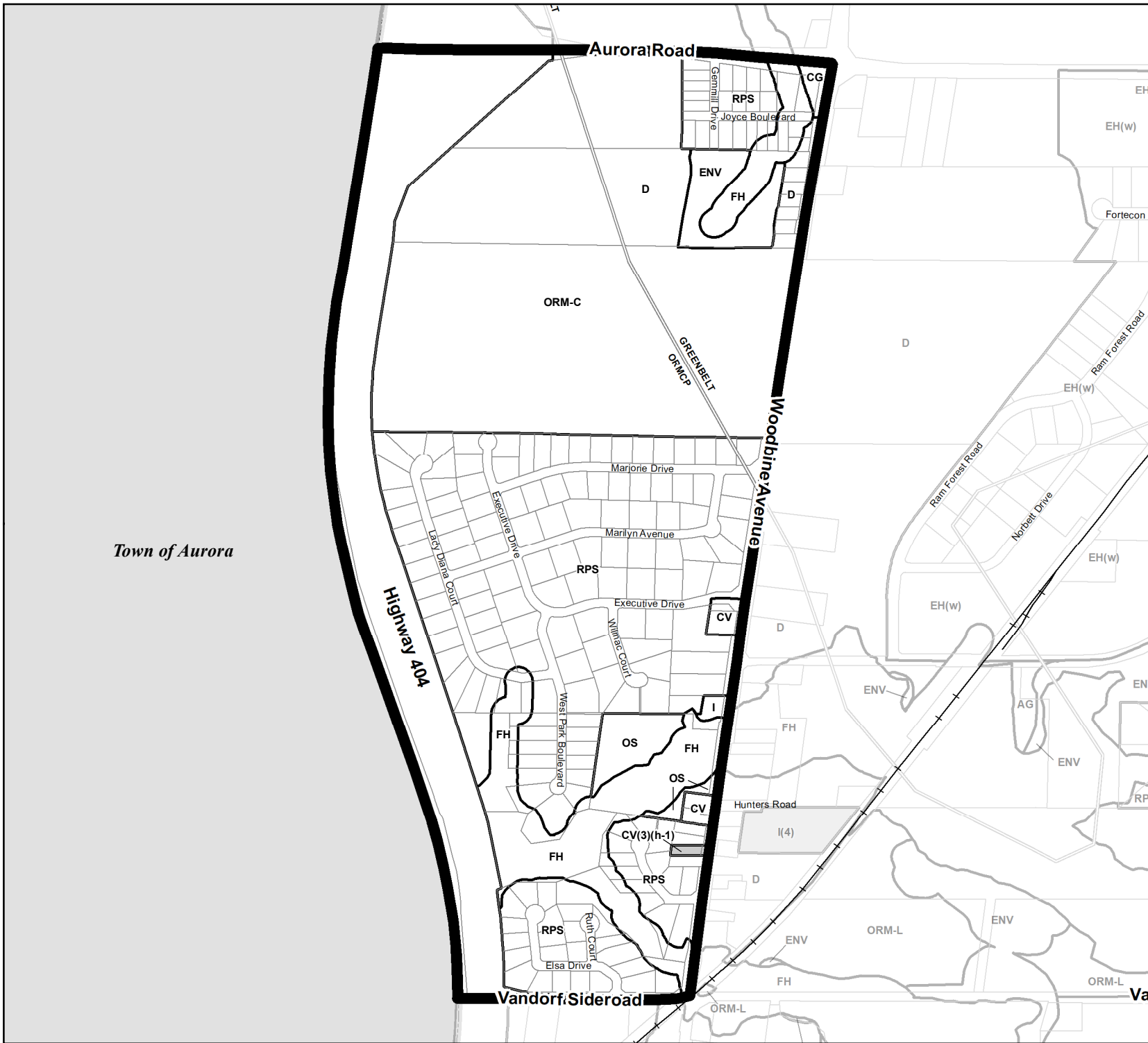
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SCHEDULE 17



2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	32	33	34	35	36
37	38	39	40	41	42	
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SCHEDULE 23