HGC ENGINEERING

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

Noise Impact Study
Proposed Senior's Apartment, Phase 2 and 3
20 Cedarow Court
Stittsville, Ontario

Prepared for:

Nautical Lands Group
700 Finley Ave, Unit 4, Ajax
ON, L1S 3Z2

Prepared by

Harry Cai, PEng

Reviewed by

Sheeba Paul, MEng, PEng

December 21, 2022

HGC Project No: 01900412

Table of Contents

1 Introduction and Summary

HGC Engineering was retained by Nautical Lands Group to conduct a noise feasibility study for Phase 2 and 3 of a proposed retirement facility located at 20 Cedarow Court in Stittsville, Ottawa, Ontario. Lands surrounding the subject site are existing residential and commercial uses. The site will consist of a six-storey residential building. The study is required by the City of Ottawa as part of the planning and approvals process.

This report is an update of the previous report, titled "Noise Feasibility Study, Proposed Retirement Facility, Phase 2, 20 Cedarow Court, Stittsville, Ontario" dated November 12, 2019 to include detailed floor plans, elevations, and mechanical drawings.

The primary source of noise was determined to be road traffic on Hazeldean Road. Ultimate road traffic data was obtained from the City of Ottawa and was used to predict future traffic sound levels at the proposed building façades and outdoor living areas. The predicted sound levels were compared to the guidelines of the Ministry of Environment, Conservation and Parks (MECP) and the City of Ottawa to develop noise control recommendations.

The results of the study indicate that the proposed development is feasible with the noise control measures described in this report. Central air conditioning is required for all dwelling units in the building. Upgraded glazing construction will be required for the façade facing Hazeldean Road to provide acoustical insulation for indoor spaces. Noise warning clauses are also required for affected units to inform future occupants and owners of the building of the traffic noise impact, to address sound level excesses, and the proximity to commercial facilities.

An assessment of the potential noise impact from the rooftop mechanical equipment of the proposed building at existing residences was conducted. The results indicate that the potential noise from the rooftop mechanical equipment will be within the MECP guidelines at the nearby residences.

An assessment of the noise impact from existing commercial facilities on the proposed development was also conducted. Activities associated with Stittsville Car Wash, Auto Searchers Ltd, and other rooftop mechanical equipment on neighbouring buildings were included in a computational acoustical model to predict the sound levels at the closest façades of the proposed retirement facility. The results indicate that the sound emission of the existing commercial facilities, specifically the car

wash, has the potential to exceed the applicable noise limits of the MECP at the windows of the ground level suite closest to the car wash facility. Due to high background sound levels from Hazeldean Road, the remaining façades or ground level areas are not expected to experience sound level excesses. Noise mitigation in the form of an acoustical barrier constructed along southwest property line is required to address these excesses. Alternatively, architectural modifications to the southwest façade is required to address these excesses, such that no windows to noise sensitive spaces are located at the ground level suite closest to the car wash facility.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located on the north side of Hazeldean Road at 20 Cedarow Court, Stittsville, Ontario. The proposed development will consist of a six-storey residential development with a courtyard amenity area. There are interior amenity spaces located at the middle of the proposed building. Figure 2 shows the site plan, dated August 19, 2022, with prediction locations.

HGC Engineering personnel visited the site on August 14th, 2019 to make observations of the acoustical environment. During the site visit, it was noted that the primary source of noise impacting the site was road traffic noise from Hazeldean Road. The site area is currently vacant. To the northeast of the site is a five-storey retirement living facility, referred to as Phase I. Areas around the site area are flat. West of the site are commercial facilities on Cedarow Court, which includes Stittsville Car Wash, a coin operated car washing facility with six wash bays and 2 vacuums that operate 24 hours a day, and Auto Searchers Ltd., a used car dealer with 4 auto repair bay doors operating during the daytime hours only. Rooftop HVAC units are also observed on adjacent commercial and industrial buildings. These have been included in the analysis in Section 8. Detached residential houses are present north and south of the site area.

3 Noise Level Criteria

3.1 Road Traffic Noise

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", release date October 21, 2013, and are listed in Table I below.

The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Road Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road	Nighttime L_{EQ}(8 hour) Road
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms/Retirement Homes	45 dBA	45 dBA
Inside Bedrooms/Sleeping Quarters of Retirement Homes	45 dBA	40 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur. Small balconies are not considered OLAs for the purposes of assessment. Terraces greater than 4 m in depth (measured perpendicular to the building façade) are considered to be OLAs.

The guidelines in the MECP publication allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically, and administratively practical. The minimum acceptable barrier wall height is 2.2 m for a flat grade case in the City of Ottawa, and the maximum acoustic fence height in the City of Ottawa is 2.5 m unless approved by the City, with a maximum combined berm and fence height of 4.5 m. In the case that the guideline criterion of 55 dBA cannot be met, it must be demonstrated to the City of Ottawa that it is not technically or economically feasible to meet the 55 dBA criterion with a warning clause.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of

51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

Warning clauses to notify future residents of possible noise excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road traffic.

3.2 Criteria Governing Stationary Noise Sources

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 an urban acoustical environment classified as Class I according to MECP guidelines, which can be characterized by the background sound level being dominated by traffic and human activity.

The façade of a residence, or any associated usable outdoor area, is considered a sensitive point of reception. NPC-300 stipulates that the exclusionary minimum sound level limit for a stationary noise source in an urban Class 1 area is 50 dBA during daytime (07:00 to 19:00) and evening (19:00 to 23:00) hours, and 45 dBA during nighttime hours (23:00 to 07:00). 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 MECP 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. Trucking activities have not been included in this assessment since they will occur on an infrequent basis.

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

4 Traffic Sound Level Assessment

4.1 Road Traffic Data

Ultimate traffic data was obtained from the City of Ottawa Environmental Noise Control Guidelines dated January 2016, along with ultimate commercial vehicle and day/night split percentages. The data from the guidelines is provided in Appendix A. Traffic data for Hazeldean Road was also obtained from the City of Ottawa in the form of hourly turning movement counts and AADT traffic values for comparison, and is provided in Appendix A. The higher and more conservative ultimate traffic volumes were used in the analysis. A posted speed limit of 60 km/h was used. A commercial vehicle percentage of 7 % for medium trucks and 5 % for heavy trucks was applied. A day/night split of 92/8 % was used. Table II summarizes the traffic volume data used in this study.

Table II: Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Hazeldean Road	Daytime	28 336	2 254	1 610	32 200
	Nighttime	2 464	196	140	2 800
	Total	**30 800**	**2450**	**1 750**	**35 000**

4.2 Road Traffic Noise Predictions

To assess the levels of road traffic noise which will impact the study area in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix B.

Predictions of the traffic sound levels were chosen around the proposed retirement building to obtain an appropriate representation of future sound levels at various façades. Sound levels were predicted at the plane of the 6th storey bedroom and/or living/dining room windows during daytime and

nighttime hours to investigate ventilation and façade construction requirements. Figure 2 shows the site plan with prediction locations. The results of these predictions are summarized in Table III.

Table III: Predicted Road Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime – in the OLA $L_{EQ-16\ hr}$	Daytime – at the Façade $L_{EQ-16\ hr}$	Nighttime – at the Facade $L_{EQ-8\ hr}$
A	Façade facing Hazeldean Road	--	72	64
B	Façade facing Cedarow Court	--	68	60
C	Façade facing Phase I	--	68	60
D	Courtyard Amenity Space	<55	--	--

5 Traffic Noise Recommendations

The sound level predictions indicate that the future traffic sound levels at façades with exposure to Hazeldean Road will exceed MECP guidelines. The following discussion outlines the recommendations for acoustic barrier requirements, ventilation requirements, upgraded building façade construction, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

The site plan indicates a common outdoor amenity space situated behind the proposed building and shielded from Hazeldean Road. This area has been analyzed as an outdoor living area (OLA) under MECP guidelines. The predicted daytime sound level in the courtyard amenity space is less than the MECP's limit of 55 dBA, and physical mitigation is not required.

The units have private balconies less than 4 m in depth, which are not considered OLA's under MECP guidelines and are exempt from traffic noise assessment.

5.2 Indoor Living Areas and Ventilation Requirements

Air Conditioning

The predicted future sound levels outside the windows of the façades with exposure to Hazeldean Road will be greater than 60 dBA during nighttime hours and/or 65 dBA during daytime hours. To address these excesses, these units need to be equipped with central air conditioning systems so that windows may remain closed. It is expected that all units will have central air conditioning.

Acceptable units are those housed in their own closet with an access door for maintenance. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300, as applicable.

5.3 Building Façade Constructions

The predicted sound levels at the building façades with exposure to Hazeldean Road will exceed 65 dBA during daytime and/or 60 dBA during nighttime. MECP guidelines stipulate that in such cases, building components including windows, walls, and doors be designed so that the indoor sound levels comply with the noise criteria in Table I.

Calculations were performed to determine the acoustical insulation factors to maintain indoor sound levels within MECP guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, and the anticipated area ratios of the facade components (walls, windows and doors) and the floor area of the adjacent room.

Exterior Doors

There are glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas of the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air infiltration to the minimum achievable levels.

Acoustical Requirements for Glazing

The required building components are selected based on the acoustical insulation factor (AIF) value for road and traffic. A summary of the minimum sound transmission class (STC) requirements is given in Table IV, for the retirement building façades, based on the possibility of sound entering the building through windows, doors and walls. Detailed floor plans and building elevations, dated August 19, 2022, were reviewed. A window to floor ratio of up to 20% for living/dining room and 57% for bedrooms were measured to determine window STC ratings to mitigate road traffic noise levels.

Table IV: Minimum STC Requirements

Prediction Location	Description	Space	STC Glazing Requirements
A	Façade facing Hazeldean Road	Living/Dining	STC-30
		Bedroom	STC-31
B, C	Façades flanking Hazeldean Road	Living/Dining	OBC
		Bedroom	OBC
--	Northwest façade	Living/Dining	OBC
		Bedroom	OBC

Notes: OBC – Ontario Building Code

The glazing requirements can be met using fairly standard sealed units. Operable sections, including doors and operable windows, must be well-fitted and weather-stripped in order to achieve the upper range of target STC values. If floor plans and building elevations are changed significantly, an acoustical consultant should provide revised glazing recommendations.

6 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all dwelling units with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table IX.

Suggested wording for future dwellings with sound level in excess of the MECP criteria has been provided is given below.

Type A:

> Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria.

Suggest wording for future dwellings which will have central air conditioning units to be installed is given below.

Type B:

> This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwelling units in close proximity to institutional and commercial buildings is given below.

Type C:

> Purchasers are advised that due to the proximity of the existing commercial buildings, sound levels from the facilities may be at times be audible.

These sample clauses are provided by the MECP as examples, and can be modified by the Municipality as required.

7 Impact of the Proposed Building on Adjacent Sensitive Receptors

A preliminary noise impact assessment of stationary noise sources associated with the proposed senior's apartment building and the impact at neighbouring existing noise sensitive receptors has been conducted. The proposed building will have rooftop mechanical equipment on the roof which are considered to be stationary noise sources. The existing Phase I and future Phase IV developments, along with existing 2-storey residences close to the development, are considered to be noise sensitive receptors.

7.1 Sound Level Criteria at Sensitive Receptors

Minimum background sound levels can be determined through prediction of road traffic volumes at the hour of lowest volume where the background noise is dominated by traffic noise. Where it can be demonstrated that the hourly background sound levels are greater than the exclusionary limit, the criterion becomes the minimum predicted one-hour L_{EQ} sound level during each respective period of the day. At locations of the existing residences, since the background sound levels are low, the exclusionary limit of 50/45 will apply.

7.2 Stationary Source Noise Predictions

Predictive noise modelling was used to assess the sound impact of stationary noise sources of proposed building at the most critically impacted façades of existing residential buildings in accordance to MECP guidelines. The noise prediction model was constructed based on a review of the proposed site plan, satellite photos, and estimates of sound emission levels of sources (taken from similar past HGC Engineering project files) from the rooftop mechanical equipment on the proposed

Phase II building. The model and location of proposed rooftop units were based on the HVAC Specification drawings for by Jain Consulting dated August 22, 2022, provided by Nautical Lands Group.

MECP guidelines stipulate that an assessment to be representative of the predicable worst case scenario in any hour. HGC Engineering has observed and measured sound associated with similar mechanical units in the past, along with manufacturer's data. The source sound levels associated with the Phase II rooftop mechanic units are listed below in Table V.

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

Source	Octave Band Centre Frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
Rooftop Cooling Tower Intake	86	82	80	82	81	79	77	74
Rooftop Cooling Tower Outlet	83	85	84	86	82	80	75	74
Rooftop Makeup Air Unit	84	86	86	80	72	70	65	60

The above data were inputted into a predictive computer model using the software Cadna/A. The software used for this purpose (*Cadna-A version 2022, build: 189.5221*) 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.

The following information and assumptions were used in the analysis.

- Sound data for the rooftop Evapco cooling towers and Engineered Air make up air units were obtained for similar units, originally obtained from Evapco and Engineered Air personnel, respectively.
- The locations of the noise sources and adjacent noise sensitive receptors are shown in Figure 3.

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:

- Rooftop mechanical equipment operated for 60 minutes in an hour.

Assumed nighttime worst-case scenario:

- Rooftop mechanical equipment run for 30 minutes in an hour.

7.3 Results

The sound levels due to stationary noise sources associated with the proposed building and the impact at neighbouring sensitive receptors are summarized in Table VI.

Table VI: Predicted Sound Levels at Adjacent Residential Receptors [dBA]

Prediction Location	Description	Day/Eve (07:00 – 23:00)	Nighttime (23:00 – 07:00)	Criteria (Daytime / Nighttime)
R1	2nd Storey window of residence northwest of site area	32	<30	50 / 45
R1_OLA	Outdoor living area of R1	<30	--	
R2	2nd Storey window of residence southeast of site area	32	<30	
R2_OLA	Outdoor living area of R2	31	--	
R3	5th Storey Phase I building façade facing proposed building	42	40	
R4	Future Phase IV building façade west of proposed building	43	40	

The results of the calculations indicate that the predicted sound levels due to the operation of the rooftop mechanical equipment of the proposed retirement facility are within MECP limits at the façades and outdoor living areas of adjacent sensitive receptors during a worst case operational scenario. Mitigation strategies are not required.

8 Impact of the Existing Stationary Noise Sources on Proposed Retirement Building

A preliminary noise impact assessment of stationary noise sources associated with the adjacent commercial uses (specifically the Stittsville Car Wash, a coin operated car wash, and Auto Searchers Ltd.) at the façades of the proposed retirement facility has been conducted. These facilities, along with rooftop equipment of other businesses, were analysed as stationary noise sources. Sensitive receptor locations associated with the proposed retirement facility façades facing the commercial uses on Cedarow Court were assessed.

8.1 Sound Level Criteria at Sensitive Receptors

Minimum background sound levels can be determined through prediction of road traffic volumes at the hour of lowest volume where the background noise is dominated by traffic noise. Where it can be demonstrated that the hourly background sound levels are greater than the exclusionary limit, the criterion becomes the minimum predicted one-hour L_{EQ} sound level during each respective period of the day. At locations where the background sound levels are low, the exclusionary limit of 50 dBA during daytime/evening and 45 dBA during nighttime will apply.

Because background sound in the vicinity of the proposed development is dominated by road traffic due to Hazeldean Road, it is appropriate to predict hourly background sound from road traffic volumes in order to determine applicable limits for impact of stationary noise sources.

Minimum background sound levels were calculated using the basic road element included in Cadna/A, which follows the German guideline RLS-90 for road traffic noise predictions. Hourly daytime traffic data was interpolated from available data obtained from the City of Ottawa. The minimum daytime and nighttime traffic volumes was interpolated using the data provided by the City of Ottawa road traffic data and AADT traffic curve provided by the U.S. Federal Highway Administration, The minimum daytime traffic volume occurs at 10 am to 11 am, the minimum evening traffic volume occurs at 10 pm to 11 pm, and the minimum nighttime traffic volume occurs at 4 am to 5 am. An existing commercial vehicle percentage of 4 % was calculated from the data from the City of Ottawa and was applied, along with a posted speed limit of 60 km/h. The minimum background sound levels due to Hazeldean Road were calculated at the proposed building façades using STAMSON 5.04, and the results were found to reasonably match with the Cadna/A predictions.

The background sound levels due to road traffic can exceed the exclusionary limits at the façades with exposure to Hazeldean Road at certain locations. As such, the higher of the background sound level and the exclusionary limits were used as the sound level criteria, evaluated case-by-case at various receptor locations distributed along the façades. The applicable noise limits for the southwest façade facing commercial facilities on Cedarow Court are shown in Figures 4a/b/c, since that façade is most critically impacted by existing stationary noise.

8.2 Stationary Source Noise Predictions

Predictive noise modelling was used to assess the sound impact of existing commercial facilities at the most critically impacted façades of the proposed building in accordance to MECP guidelines. The noise prediction model was constructed based on a review of the proposed site plan, satellite photos, and estimates of sound emission levels of sources (taken from similar past HGC Engineering project files) coming from the adjacent commercial spaces to the west of the site, including a car wash, a auto-repair shop, and manufacturer's data for the rooftop HVAC units of the Phase I development. The model and location of rooftop HVAC units of Phase I were based on the HVAC Specification drawings by M&E Engineering dated September 1st, 2016.

Some types of sound have a special quality which may tend to increase their audibility and potential for disturbance or annoyance. For tonal sounds, the MECP guidelines stipulate that a penalty of 5 dBA is to be added to the measured source level. A tonal sound is defined as one which has a "pronounced audible tonal quality such as a whine, screech, buzz or hum". Some vacuum cleaners can produce such a hum. Therefore, a 5 dBA penalty has been applied to the vacuum sound sources associated with the car wash throughout this assessment.

MECP guidelines stipulate that an assessment to be representative of the predicable worst case scenario in any hour. All observable rooftop mechanical equipment, auto repair bays and car wash facilities are assumed to be operational. HGC Engineering has observed and measured sound associated with similar mechanical units, repair bays, and car wash facilities in the past. The source sound levels associated with the commercial facilities are listed below in Table VII.

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

Source	Octave Band Centre Frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
Coin Operated Car Wash Bay Door+	85	76	75	77	76	79	81	83
Vacuum*	91	79	92	87	89	94	95	93
Auto Repair Bay	80	79	82	84	87	85	85	88
Air Chisel	77	81	83	86	88	91	94	91
Kitchen Exhaust Fan	84	84	78	82	75	71	72	63
York 10-Ton HVAC – Phase I	100	92	92	89	86	81	77	71
York 4-Ton HVAC – Phase I	85	81	80	78	75	70	67	71
York 5-Ton HVAC – Phase I	87	88	82	78	75	72	68	71

* Includes a 5 dBA tonal penalty.
\+ Includes full cycle (soak, soap, jet spray, tire cleaner).

The above data were inputted into a predictive computer model using the software Cadna/A. The following information and assumptions were used in the analysis. The noise sources are shown as green crosses and lines on Figure 5.

- The height of HVAC equipment on the roof was assumed to be 1.5 m.
- The height of the car wash vacuums was assumed to be 1.0 m.
- The height of the car wash bay was assumed to be 3.0 m.
- The height of the auto repair bay door was assumed to be 3.0 m.

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

Assumed daytime worst-case scenario:

- Rooftop mechanical equipment operates for 60 minutes out of an hour.
- All 6 car wash bays of the car wash include active for 30 minutes each.
- Both vacuums operate for 15 minutes each.
- Sound from the automotive bay doors, including the use of an air tool, compressor and heater were assumed to operate for 10 minutes; and from an air chisel for 10 minutes.

Assumed evening worst-case scenario:

- Rooftop mechanical equipment operates for 60 minutes out of an hour.
- All 6 car wash bays of the car wash include active for 20 minutes each.
- Both vacuums operate for 15 minutes each.
- All auto repair bays closed and inactive (outside of business hours).

Assumed nighttime worst-case scenario:

- Rooftop mechanical equipment operate for 30 minutes;
- All 6 car wash bays include washing activities for 5 minutes each.
- Both vacuums operate for 5 minutes each.
- All auto repair bays closed and inactive (outside of business hours).

8.3 Results

The unmitigated daytime and nighttime sound levels due to stationary noise sources associated with the surrounding existing stationary noise sources are summarized in Table VIII, showing the maximum sound level at each façade. As per the MECP guidelines, the criteria for both OLA and façade sound levels used in the assessment is the background sound level when the stationary sources are not operating, since these are higher than the MECP minimum exclusionary limits.

Table VIII: Predicted Sound Levels from the Existing Commercial Sites on the Proposed Retirement Facility [dBA], Without Mitigation

Description	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	Criteria (Day/Eve/Night)	Meets Criteria?
Façade facing Cedarow Ct	55	53	47	53 / 50 / 45	N
Façade facing Hazeldean Rd	34	<30	<30	67 / 64 / 57	Y
Façade facing Phase I	47	47	44	52 / 50 / 45	Y
Façade facing parking lot	37	36	31	50 / 50 / 45	Y

The results of the calculations indicate that the predicted sound levels due to the operation of the car wash during a worst-case scenario are likely to exceed the criteria at the southwest façade of the proposed building facing Cedarow Court, specifically at the ground level unit that is closest to the car wash facility. Sound level excesses at the southwest façade are shown in Figures 6/a/b/c. The lower floors of the southwest façade do not benefit from elevated sound level criteria to shielding from road traffic noise by the adjacent commercial buildings and the proposed retirement building itself.

It is noted that the southwest corner unit close to the car wash facility, which is impacted by noise from the car wash facility, is used as a garbage room, which is not a noise sensitive area, and is thus excluded in this assessment.

8.4 Discussion and Recommendation with Regard to Stationary Noise Sources

Sound levels at the ground floor unit closest to the car wash facility at the façade facing Cedarow Court may exceed the MECP criteria due to the operation of the existing commercial activities,

specifically the coin operated car wash. Options for mitigation include property line barriers to protect the ground level windows and ground level patios, and/or architectural features to be incorporated into the design of individual units. To address the excesses, two options for mitigation are presented:

Option 1: Noise Barrier

An acoustic barrier 2.2 m in height and 10 m in length is recommended along the southwest property line, shown in Figure 7. This acoustic barrier will reduce sound levels at the ground floor windows to levels acceptable to the MECP guidelines.

Acoustic barriers can be any combination of an earth berm with an acoustic wall on top. The minimum barrier height in the City of Ottawa is 2.2 m, and the maximum height is 2.5 m unless approved by the City. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. The walls may be constructed from a variety of materials such as wood, brick, glass, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks within or below its extent.

The following warning clause should be provided to inform the tenants and building owners of the acoustic barrier.Warning Clause Type D:

> That the acoustical berm and/or barrier as installed, shall be maintained, repaired or repaired by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards, and having the same colour and appearance of the original.

This sample clause is provided by the MECP as an example and can be modified by the Municipality as required.

Option 2: Architectural Modifications

Alternatively, the ground floor unit closest to the car wash (Suite 108, Phase III) should not have windows to noise-sensitive spaces. In accordance with MECP noise guidelines, noise sensitive spaces include the following: bedrooms, living/dining rooms, eat-in kitchens, and dens.

9 Summary and Recommendations

The following list and Table IX summarize the recommendations made in this report.

For transportation noise sources

1. Central air conditioning will be required for all Phase II dwelling units.

2. Upgraded building constructions are required for the façades with exposure to Hazeldean Road as noted in Table IV.

3. The use of warning clauses in the property and tenancy agreements is recommended to inform future residents of traffic noise issues.

For stationary noise sources

Option 1:

4. An acoustic barrier 2.2 m in height is required along the southwest property line parallel to the façade facing Cedarow Court as shown in Figure 7.
5. An additional noise warning clause is required to inform future occupants of the presence of existing commercial facilities and the installation of the barrier.

Option 2:

6. Architectural design for ground level suite closest to the car wash facility (Suite 108 of Phase III), such that no windows to noise sensitive spaces are on the southwest façade that face towards the car wash facility. When updated detailed floor plans and building elevations are available, no windows to sensitive spaces for that façade should be verified.

Table IX: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Description	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Upgraded Building Constructions
A	Façade facing Hazeldean Road	--	Central A/C	A, B, C	LR/DR: STC-30 BR: STC-31
B	Façade facing Cedarow Court	**	Central A/C	A, B, C, D***	OBC
C	Façade facing Phase I	--	Central A/C	A, B, C	OBC
D	Courtyard amenity space	--	--	--	--

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.
** Acoustic barrier may be required to address stationary noise excess. See section 8.4 for barrier recommendations. Alternatively, architectural modification is required such that the ground level suite closest to the car was facility does not have windows to noise sensitive spaces
*** Warning clause D is required if a barrier is provided.
LR/DR : Living Room/Dining Room, BR: Bedroom
OBC – Ontario Building Code

9.1 Implementation

To ensure that the noise control recommendations outlined above are properly implemented, it is recommended that:

1. Prior to the issuance of building permits for this development, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated, installed, and constructed.

Limitations

This report was prepared by HGC Engineering solely for the client to whom it is addressed and is to be used exclusively for the purposes set out in the report. Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and has relied in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

Any use, reliance or decisions made based on this report by any third party are the responsibilities of such third parties. HGC Engineering accepts no responsibility for damages, if any, suffered by any third party that may arise through the use, reliance or decisions made based on this report. If a third party requires reliance on this report, written authorization from HGC Engineering must be sought and granted. HGC Engineering disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

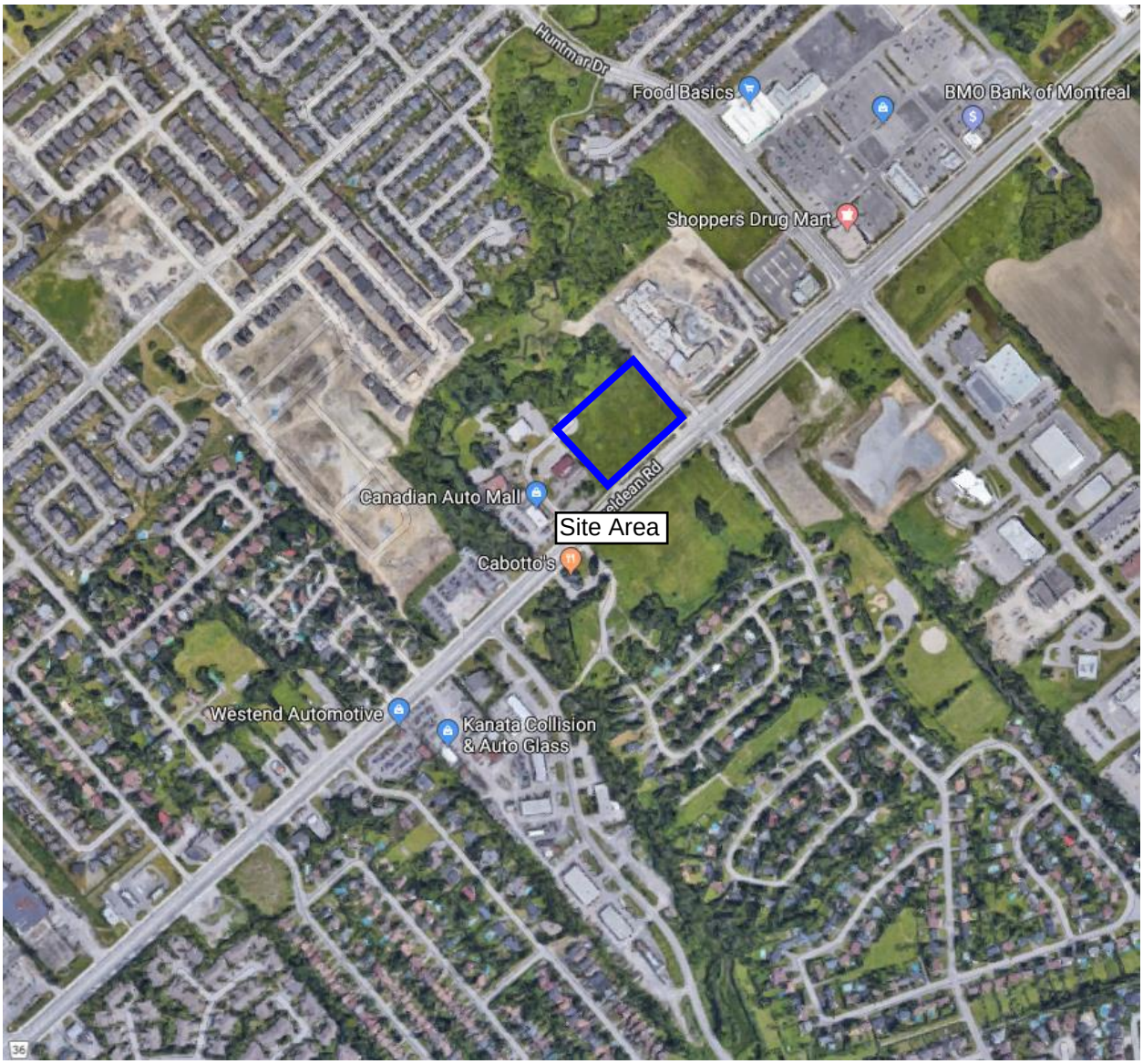


Figure 1: Key Plan

Wellings of Stittsville - Phase 2 3
20 Cedarow Court, Stittsville, ON

UNIT TYPES AND BARRIER-FREE UNITS DISTRIBUTION CHART

Project No. 19-1764
Rev.2, 10 June 2022
Issued for Client Review

BARRIER-FREE UNIT COUNT - Phase 2 & 3

	LEVEL 01		LEVEL 02		LEVEL 03		LEVEL 04		LEVEL 05		LEVEL 06		TOTAL NUMBER OF UNIT TYPES	TOTAL NUMBER OF BARRIER-FREE UNITS	% OF BARRIER-FREE UNITS	REMARKS	REV
	Total Number of Unit Types	Number of Barrier-Free Units	Number of Unit Types	Number of Barrier-Free Units	Number of Unit Types	Number of Barrier-Free Units	Number of Unit Types	Number of Barrier-Free Units	Number of Unit Types	Number of Barrier-Free Units	Number of Unit Types	Number of Barrier-Free Units					
STUDIO	0	0	6	2	9	2	9	2	5	2	5	2	34	10	29%		2
1 BED	22	0	39	6	41	7	43	9	45	7	45	7	235	36	15%		2
1 BED+D	2	1	3	1	3	1	3	0	3	0	3	0	17	3	18%		2
2 BED	4	2	10	2	10	2	8	2	8	2	8	1	48	11	23%		2
2 BED+D	0	0	2	1	2	1	2	1	2	0	2	0	10	3	30%		2
Totals	28	3	60	12	65	13	65	14	63	11	63	10	344	63	18%		2
END OF SCHEDULE																	

CITY OF OTTAWA GROSS FLOOR AREAS &AMENITY AREAS(2&3)

Level	Area	City GFA	Amenity Area	Communal Amenity Area	Commercial
LEVEL 01	1801.58 m²	1801.58 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 01	160.24 m²	0.00 m²	160.24 m²	0.00 m²	0.00 m²
LEVEL 01	3182.96 m²	0.00 m²	0.00 m²	3182.96 m²	0.00 m²
LEVEL 01	950.85 m²	0.00 m²	0.00 m²	0.00 m²	950.85 m²
LEVEL 02	3640.94 m²	3640.94 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 02	315.00 m²	0.00 m²	315.00 m²	0.00 m²	0.00 m²
LEVEL 02	124.77 m²	0.00 m²	0.00 m²	124.77 m²	0.00 m²
LEVEL 03	3875.75 m²	3875.75 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 03	373.83 m²	0.00 m²	373.83 m²	0.00 m²	0.00 m²
LEVEL 04	3812.63 m²	3812.63 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 04	375.40 m²	0.00 m²	375.40 m²	0.00 m²	0.00 m²
LEVEL 05	3518.63 m²	3518.63 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 05	558.52 m²	0.00 m²	558.52 m²	0.00 m²	0.00 m²
LEVEL 06	3526.92 m²	3526.92 m²	0.00 m²	0.00 m²	0.00 m²
LEVEL 06	460.12 m²	0.00 m²	460.12 m²	0.00 m²	0.00 m²
Grand total	26678.13 m²	20176.45 m²	2243.10 m²	3307.73 m²	950.85 m²

SITE PLAN LEGEND

NOTE: REFER TO LANDSCAPE PLAN FOR ALL EXTERIOR FINISHES AND PLANTING DETAILS.

- PROPERTY LINE
- FIRE ROUTE
- SIDEWALK
- WALKABLE PAVERS
- F.H. FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION / SIAMESE CONNECTION
- BOLLARD
- ENTRANCE
- EXIT
- 105.23 EXISTING GRADE
- SC EMERGENCY SCUPPER
- TYPE-1 FIRE ROUTE SIGNAGE - TYPE-1
- TYPE-2X FIRE ROUTE SIGNAGE - TYPE-2(A/B)
- 2600 W x 5200 L TYPICAL MOTOR VEHICLE PARKING SPACE
- 2400 W x 5200 L REDUCED IN SIZE MOTOR VEHICLE PARKING SPACE
- SMALL CARS 2400 W x 4600 L REDUCED IN SIZE MOTOR VEHICLE PARKING SPACE FOR SMALL CARS
- 2600 W x 6700 L TYPICAL PARALLEL MOTOR VEHICLE PARKING SPACE
- 3500 W x 7000 L STANDARD SIZE VEHICLE LOADING SPACE
- TYPE A 3400 W x 5200 L TYPE A "VAN ACCESSIBLE" MOTOR VEHICLE PARKING SPACE WITH 1500 ACCESS AISLE
- TYPE B 2400 W x 5200 L TYPE B ACCESSIBLE MOTOR VEHICLE PARKING SPACE WITH 1500 ACCESS AISLE
- V VISITOR - MOTOR VEHICLE PARKING SPACE
- C COMMERCIAL - MOTOR VEHICLE PARKING SPACE

PROJECT INFORMATION

LEGAL DESCRIPTION:
PART OF LOT 27, CONCESSION 12
GEOGRAPHICAL TOWNSHIP OF GOULBOURN
CITY OF OTTAWA
PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
FIELD WORK COMPLETED JANUARY 10, 2019

ZONING: AM(6[474]

PHASE 2/3 RESIDENTIAL UNITS: 344

SITE AREA: 23235.8 SQ.M

PROJECT TEAM

PROJECT NAME	WELLINGS OF STITTSVILLE PHASE 2-4 5731 HAZELDEAN ROAD STITTSVILLE, ON K2S 1T1
OWNER / APPLICANT	NAUTICAL LANDS GROUP 2962 CARP ROAD OTTAWA, ONTARIO K0J 1L0
ARCHITECT	CHMIEL ARCHITECTS 109 BANK STREET, SUITE 200, OTTAWA, ONTARIO K1P 5N5
ENGINEERS	STANTEC (CIVIL) 1331 CLYDE AVENUE, SUITE 400 OTTAWA, ON K2C 3G4 JAIN CONSULTANTS (M&E) 7405 E DANBRO CRESCENT MISSASSAUGA, ON L5N 6P8 MCINTOSH-PERRY (STRUCTURAL) 115 WALGREEN ROAD CARP, ON K0A 1L0
SURVEYOR	ANNIS O'SULLIVAN VOLLEBEKK LTD. 14 CONCOURSE GATE SUITE 500 NEPEAN, ON K2E 7S8
LANDSCAPE	LEVSTEK CONSULTANTS 5871 HUGH CRESCENT OTTAWA, ONTARIO K0A 2W0

Zoning Information: AM9 [474]
City of Ottawa Consolidated Zoning By-law 2008-250
Proposed Mixed-Use Building (Senior's Residential & Commercial)

Zone Provisions	Required	Proposed
Arterial Mainstreet Zone & Subzones (Sections 185-186)		
Minimum Lot area (m²)	No minimum	24319.217
Minimum Lot Width (m)	No minimum	150.02
Minimum Front Yard Setback (m) - Non-residential or Mixed-use Building	No minimum	3.316 (abutting Hazeldean Road)
A minimum of 30% of the lot width (m) within 5 metres of the front lot line, must be occupied by building walls	45.006 (30%)	108.6 (72.4%)
Minimum Corner Side Yard Setback (m) - Non-residential or Mixed-use Building	No minimum	Varies (abutting Wellings Private)
Minimum Corner Side Yard Setback (m) - Residential use Building	3	N/A
Minimum Interior Side Yard Setback (m) - all other cases	No minimum	4.18
Minimum Rear Yard Setback (m) - For a Residential use building	7.5	N/A
Minimum Rear Yard Setback (m) - all other cases	**No minimum**	**50.727**
Minimum Poole Creek Setback - 15m from top of bank or 30m from normal highwater mark and/or the geotechnical hazard, whichever is greater	30	**54.242**
Maximum Building Height (m)	15	21.15
Maximum Floor Space Index - all other cases	None	N/A
Minimum Landscaped Area along lot line for Non-residential or Mixed-use Building (m) - at rear lot line abutting a non-residential zone	5	Varies
Minimum Landscaped Area along lot line for Non-residential or Mixed-use Building (m) - all other cases	No minimum	Varies
Parking Requirements (Section 100-114)		
Minimum Parking Space Rates (Section 101) (Area C)		
Senior's Dwelling Units - 0.25 per dwelling unit (Phase 2,3 - 344 Dwelling Units)	86 - 10% = **77**	**240** (37 Surface, 203 U/G Parking)
Senior's Dwelling Units in a Mixed-use Building - 0.25 per dwelling unit (Phase 2 - 182 Dwelling Units)	*46 - 10% = 41*	*x*
Senior's Dwelling Units in a Mixed-use Building - 0.25 per dwelling unit (Phase 3 - 162 Dwelling Units)	*40 - 10% = 36*	*x*
Commercial - Bar - 6 per 100 sq.m. of GFA (Phase 2 - 160 sq.m. Bar)	**10**	**10** (Surface)
Commercial - Personal Service Business - 3.4 per 100 sq.m. of GFA (Phase 2 - 116 sq.m. Salon/ Spa)	**4**	**4** (Surface)
Commercial - Restaurant - 10 per 100 sq.m. of GFA (Phase 2 - 434 sq.m. Private Room, Dining, Kitchen, Storage, Refrigerator, Bistro)	**43**	**43** (Surface)
Commercial - Outdoor Commercial Patios (Section 85) - No additional parking is required	–	–
Minimum Parking Space Rates (Section 101(6)) (Area C)		
Despite Subsection (1): (c) where all parking spaces provided or required for a permitted land use are located below grade in the same building as that land use, the parking required by Table 101 for that land use may be reduced by the lesser of: **(i) 10 per cent of the required parking spaces**; or (ii) 20 parking spaces. (By-law 2016-249)	-9	-9
Subtotal	**134** (77 = 2-Type A, 2-Type B) (57 = 1-Type A, 2-Type B)	**297** (203 U/G Parking = 3-Type A, 4-Type B) (37 Surface = 1-Type A, 2-Type B) (57 Surface = 1-Type A, 2-Type B)
Minimum Visitor Parking Space Rates (Section 102) (Area C)		
Senior's Dwelling Units in a Mixed-use Building - 0.2 per dwelling unit (Phase 2,3 - 344 Dwelling Units)	**69**	**69** (69 Surface)
Senior's Dwelling Units in a Mixed-use Building - 0.2 per dwelling unit (Phase 2 - 182 Dwelling Units)	*36*	*36*
Senior's Dwelling Units in a Mixed-use Building - 0.2 per dwelling unit (Phase 3 - 162 Dwelling Units)	*33*	*33*
Subtotal	**66 + 3 Accessible** (1-Type A, 2-Type B)	**66 + 3 Accessible** (Surface 1-Type A, 2-Type B)
TOTAL	**203**	**366**
Parking Space Provisions (Section 106)		
Maximum Reduced Size Parking Spaces (except visitor and parallel parking spaces) - 40% of required spaces may be reduced to a minimum size of 2.4m x 4.6m	54	34 (Type R1 2.4 x 5.2)
Aisle and Driveway Provisions (Section 107)		
Minimum width of a driveway providing access to a Parking Lot or Parking Garage (m) - Single Traffic Lane;	3	3
Minimum width of a driveway providing access to a Parking Lot and Parking Garage for Apartment Dwelling for 20 or more parking spaces (m) - Double Traffic Lane	6	6.7
Maximum width of a driveway providing access to a Parking Lot and Parking Garage for Apartment Dwelling for 20 or more parking spaces (m) - Double Traffic Lane	6.7	6.7
Minimum aisle width providing access to parking spaces in a Parking Lot or Parking Garage serving parking spaces angled at between 71 and 90 degrees (m)	6.7	6
Minimum aisle width providing access to parking spaces in a Parking Lot or Parking Garage accessory to a residential use and aisle serving parking spaces angled at between 56 and 90 degrees (m)	6	6
Landscaping Provisions for Parking Lots (Section 110)		
Minimum width of landscaped buffer of a parking lot (m) - Abutting a street	3	4.2 (abutting Wellings Private)
Minimum width of landscaped buffer of a parking lot (m) - Not abutting a street (For a parking lot containing more than 10 but fewer than 100 spaces)	1.5	3.34 (abutting Phase 3) Varies (abutting Rear Yard) 5.29 (abutting Interior Side Yard)
Minimum Landscaped Area of Parking Lot	15%	
Minimum Bicycle Parking Rates and Provisions (Section 111)		
Senior's Dwelling Unit - 0.25 per dwelling unit (Phase 2,3 - 344 Dwelling Units)	86	**86** (26 Surface, 60 U/G Parking)
Senior's Dwelling Unit - 0.25 per dwelling unit (Phase 2 - 182 Dwelling Units)	*46*	*46* (13 Surface, 33 U/G Parking)
Senior's Dwelling Unit - 0.25 per dwelling unit (Phase 3 - 162 Dwelling Units)	*40*	*40* (13 Surface, 27 U/G Parking)
Commercial - Bar - 1 per 1500 sq.m. of GFA (Phase 2 - 160 sq.m. Bar)	1	1 Surface
Commercial - Personal Service Business - 1 per 500 sq.m. of GFA (Phase 2 - 116 sq.m. Salon/ Spa)	1	1 Surface
Commercial - Restaurant - 1 per 250 sq.m. of GFA (Phase 2 - 434 sq.m. Private Room, Dining, Kitchen, Storage, Refrigerator, Bistro)	2	2 Surface
TOTAL	**90**	**90** (30 Surface, 60 U/G Parking)
Minimum Loading Space Rates and Provisions (Section 113)		
Residential Uses;	None	2 (1 Shared)
All other Non-Residential; Uses - 0 per 350 - 999 sq.m. of GFA (Phase 2 - 819 sq.m. Commercial Uses)	0	1 Shared
Minimum Width of Driveway accessing Loading Space (m) - Double Traffic Lane	6	6.7
Minimum Width of Aisle accessing Loading Space angled at between 60 to 90 degrees (m)	9	9
Minimum Vertical Clearance for Loading Space (m)	4.2	5.7
Amenity Area (Section 137)		
Minimum Total Amenity Area (sq.m) - 6 sq.m per dwelling unit	2064	5551
Minimum Communal Amenity Area (sq.m) - 50% of Total Amenity Area	1032	3308
Accessible Parking (City of Ottawa Accessibility Design Standards, Section 3.1)		
Minimum Number of Accessible Spaces	10 (4-Type A, 6-Type B)	15 (6-Type A, 9-Type B)

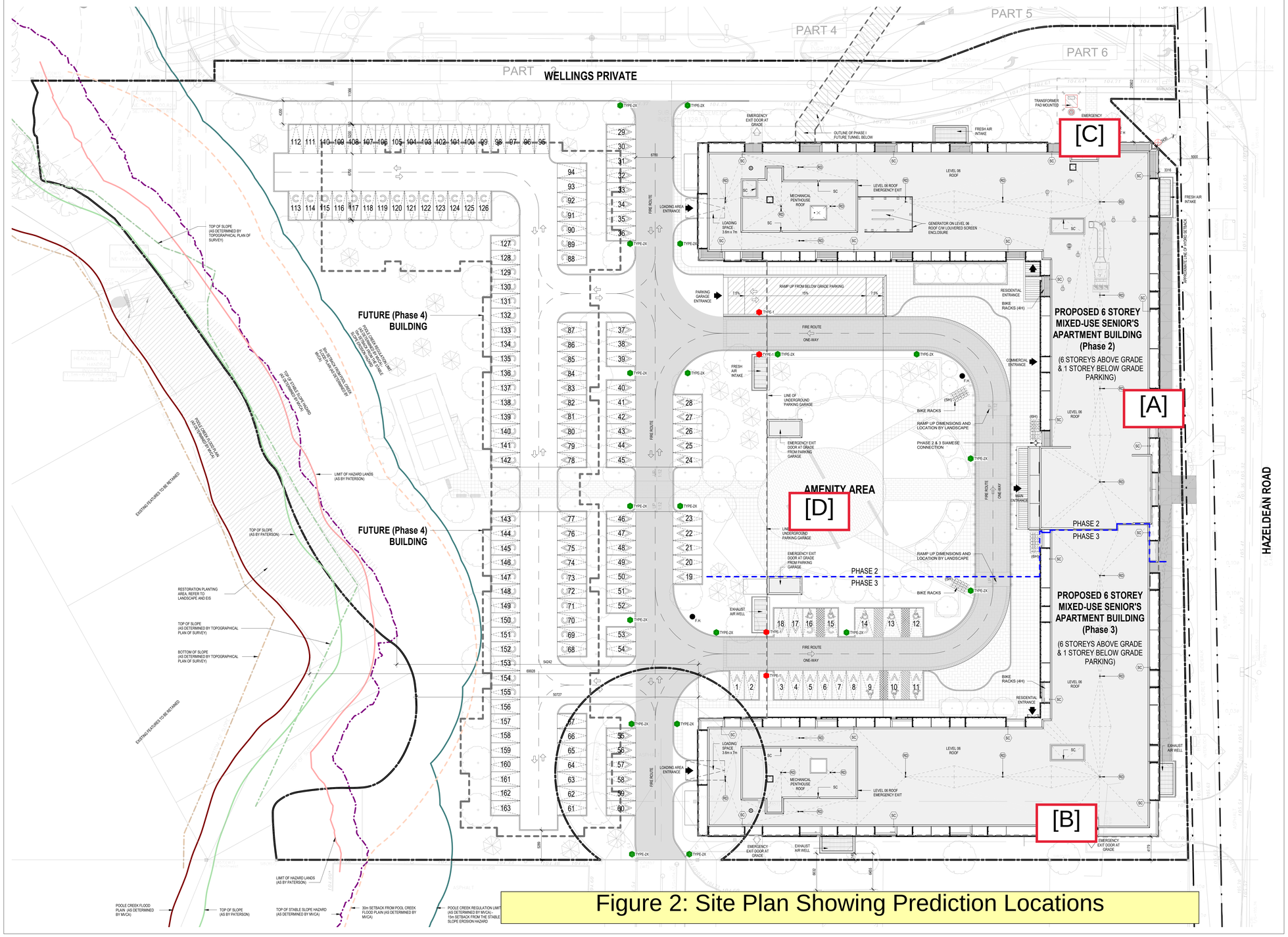


Figure 2: Site Plan Showing Prediction Locations

1 SP-01 SITE PLAN
SCALE1 : 250

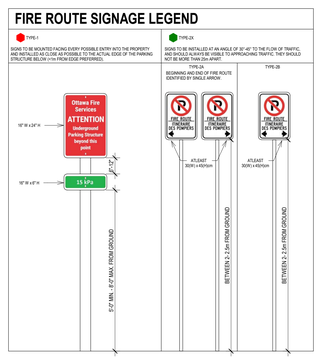
FIRE ROUTE SIGNAGE LEGEND

TYPE-1
SIGNS TO BE MOUNTED FACING EVERY POSSIBLE ENTRY INTO THE PROPERTY AND INSTALLED AS CLOSE AS POSSIBLE TO THE ACTUAL EDGE OF THE PARKING STRUCTURE BELOW (<1m FROM EDGE PREFERRED).

TYPE-2X
SIGNS TO BE INSTALLED AT AN ANGLE OF 30°-45° TO THE FLOW OF TRAFFIC AND SHOULD ALWAYS BE VISIBLE TO APPROACHING TRAFFIC. THEY SHOULD NOT BE MORE THAN 20m APART.

TYPE-2A
BEGINNING AND END OF FIRE ROUTE IDENTIFIED BY SINGLE ARROW.

TYPE-2B



NOTE: THIS DRAWING IS THE PROPERTY OF THE ARCHITECT AND MAY NOT BE REPRODUCED OR USED WITHOUT THE EXPRESSED CONSENT OF THE ARCHITECT. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY OMISSIONS OR DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.

DONOT SCALE THE DRAWINGS

RELEASE / REVISION RECORD

No.	Description	Date
1	Issued for Coordination	21-05-19
2	Issued for Coordination	21-06-09
3	Issued for SPA Coordination	21-07-26
4	Issued for SPA Coordination	21-08-06
5	Issued for Coordination	21-11-04
6	Issued for Coordination	21-12-08
7	Issued for Building Permit	21-12-20
8	Issued for Consultant Coordination	22-06-17
9	Issued for Consultant Coordination	22-06-27
10	Issued for Consultant Coordination	22-07-25
11	Issued for Internal Review	22-08-12
12	Issued for M&E Tender	22-08-19

TRUE NORTH

PROJECT NORTH

MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT

chmielarchitects
200 - 109 Bank Street
Ottawa ON K1P 5N5
t (613) 234-3585
f (613) 234-6224

WELLINGS OF STITTSVILLE PHASE 2 & 3

20 CEDARON COURT, STITTSVILLE, ON

PROJECT NO.	DRAWN
19-1764	MA/MD
SCALE	CHECKED
As indicated	RC

DRAWING TITLE
SITE PLAN

DRAWING NO.
SP-01

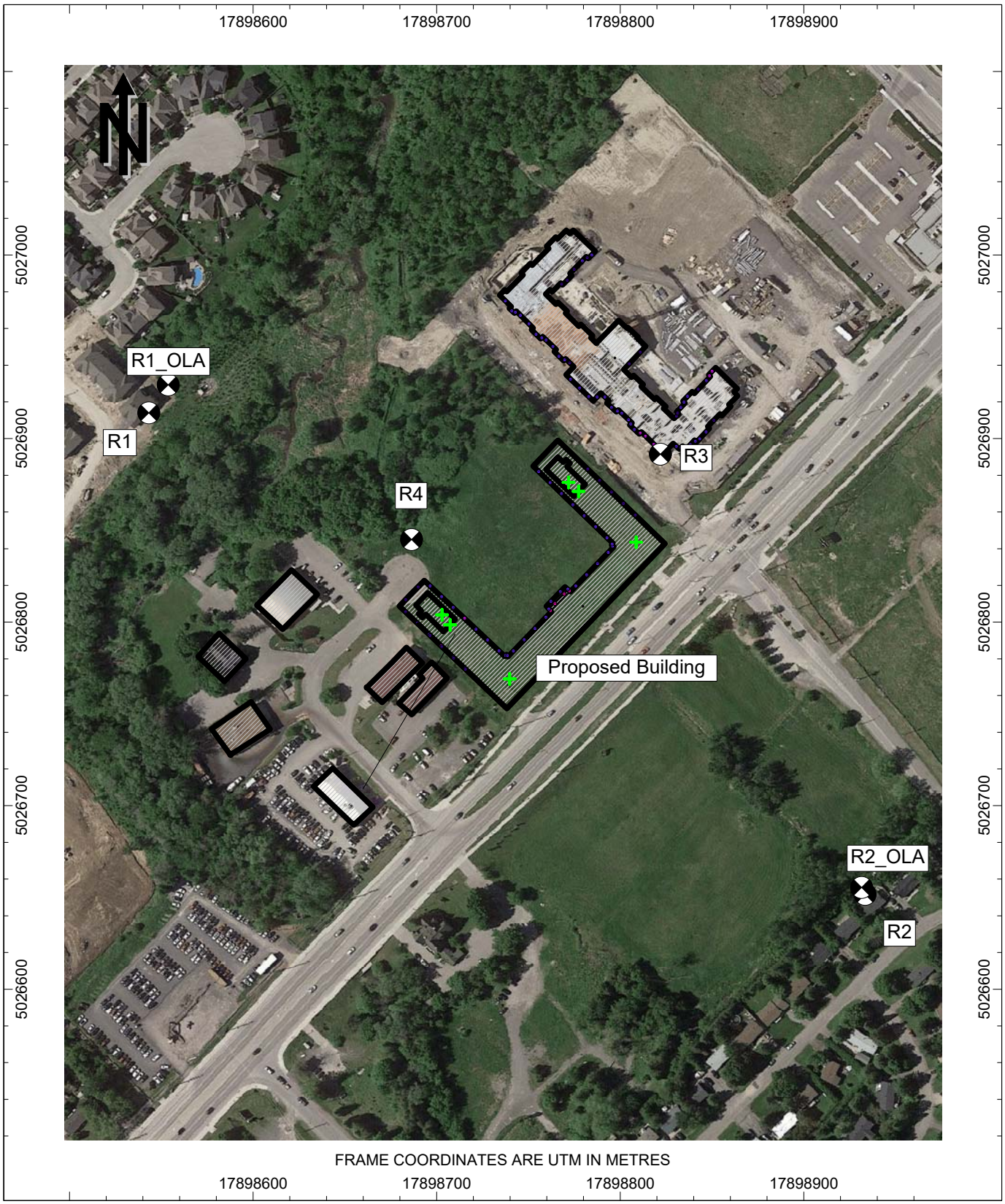


Figure 3: Proposed Stationary Noise Source & Adjacent Noise Sensitive Receptor Locations

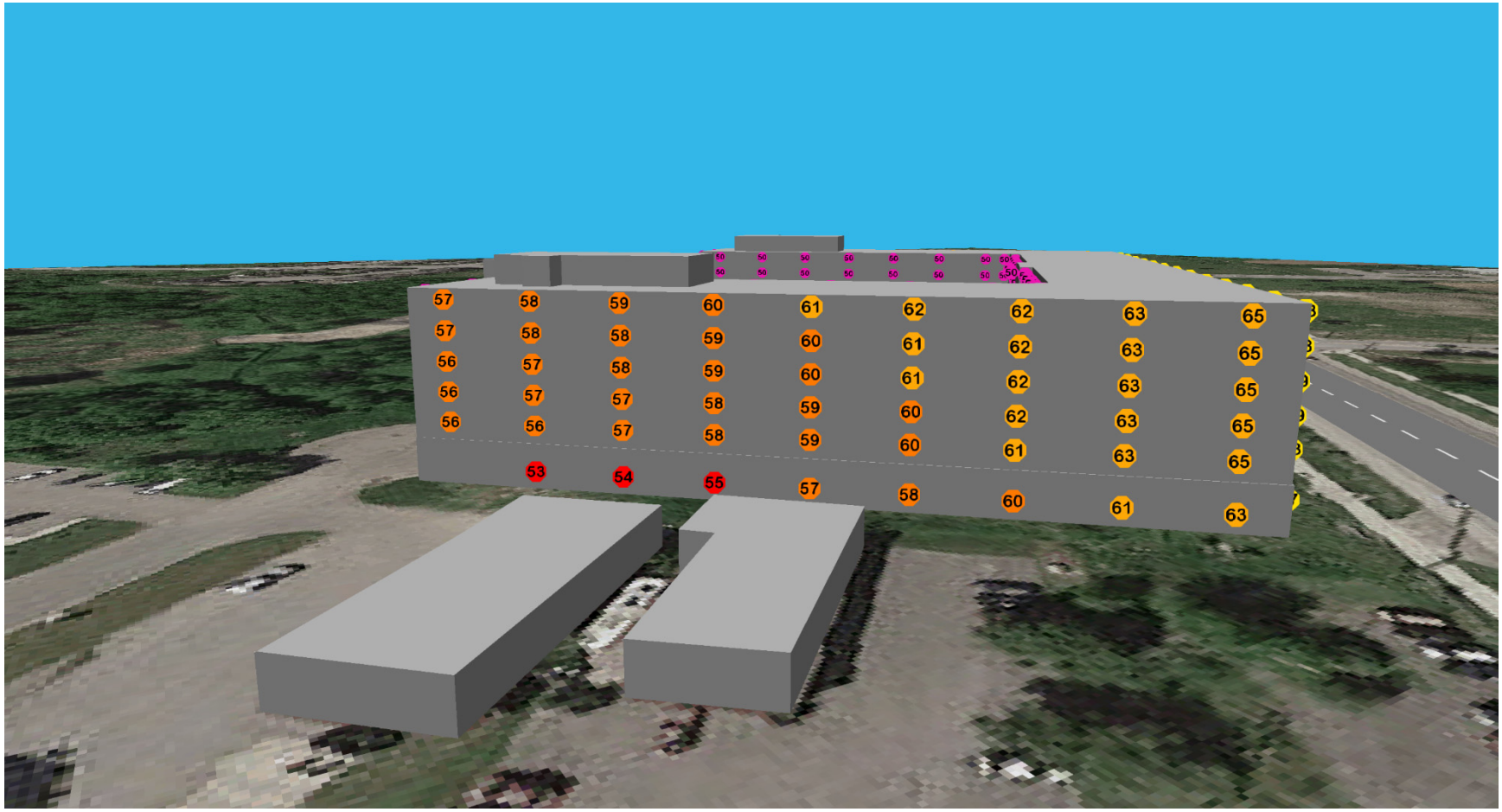


Figure 4a: Sound Level Criteria for Assessing Existing Stationary Noise, Daytime, Leq [dBA]

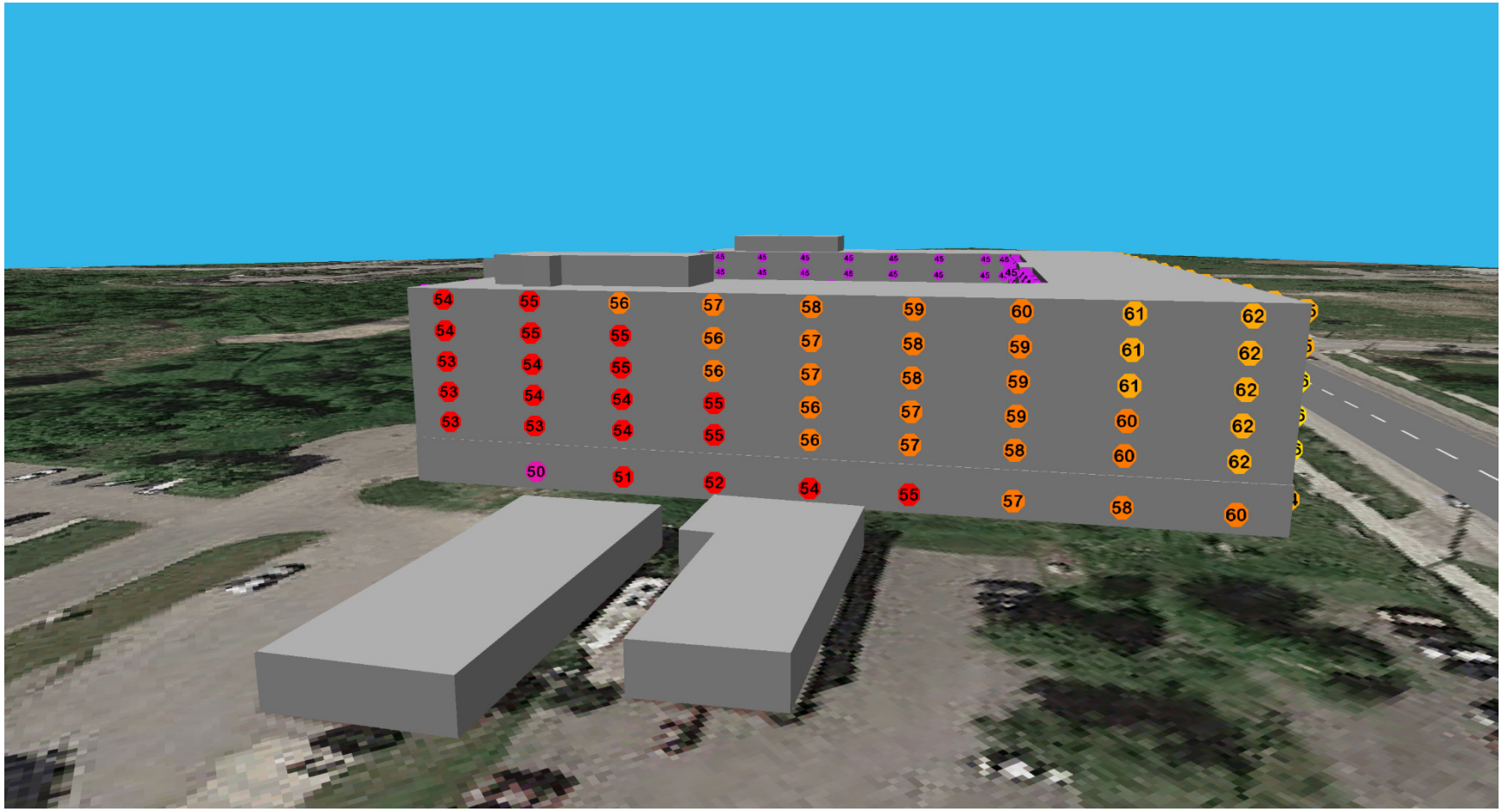


Figure 4b: Sound Level Criteria for Assessing Existing Stationary Noise, Evening, Leq [dBA]

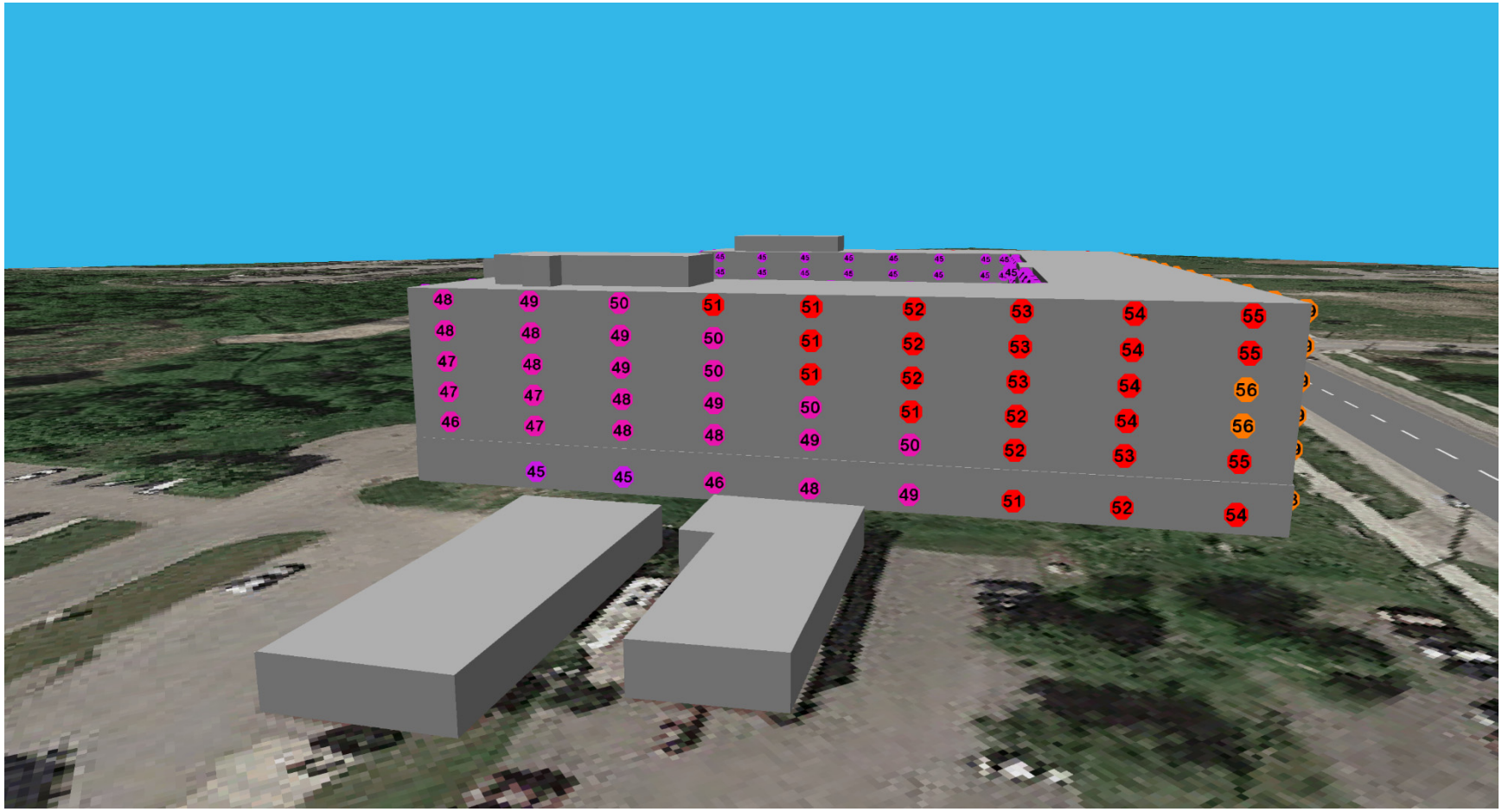


Figure 4c: Sound Level Criteria for Assessing Existing Stationary Noise, Nighttime, Leq [dBA]

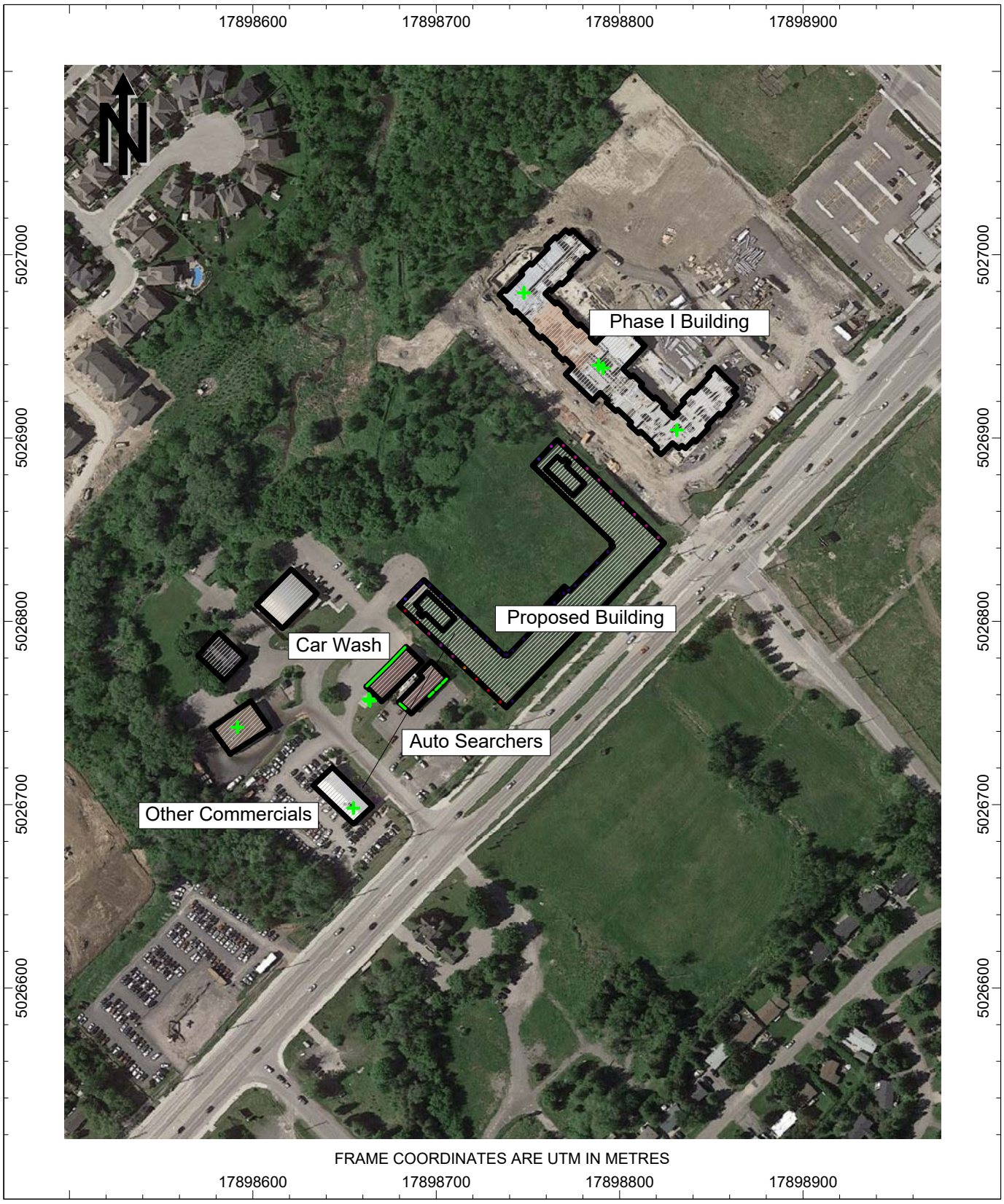


Figure 5: Existing Stationary Noise Source Locations

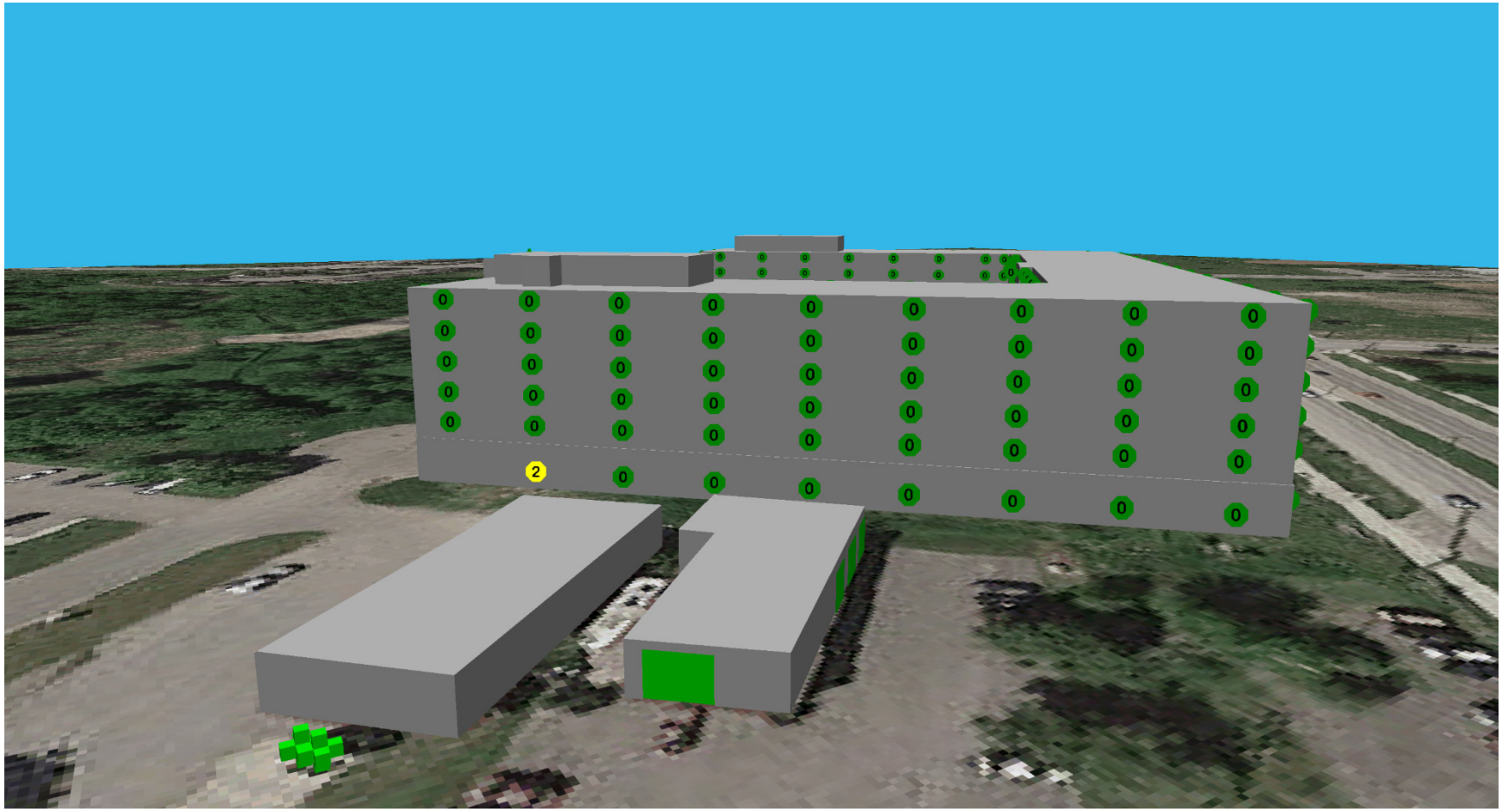


Figure 6a: Stationary Noise Excesses at Southwest Façade, Daytime, Leq [dBA]

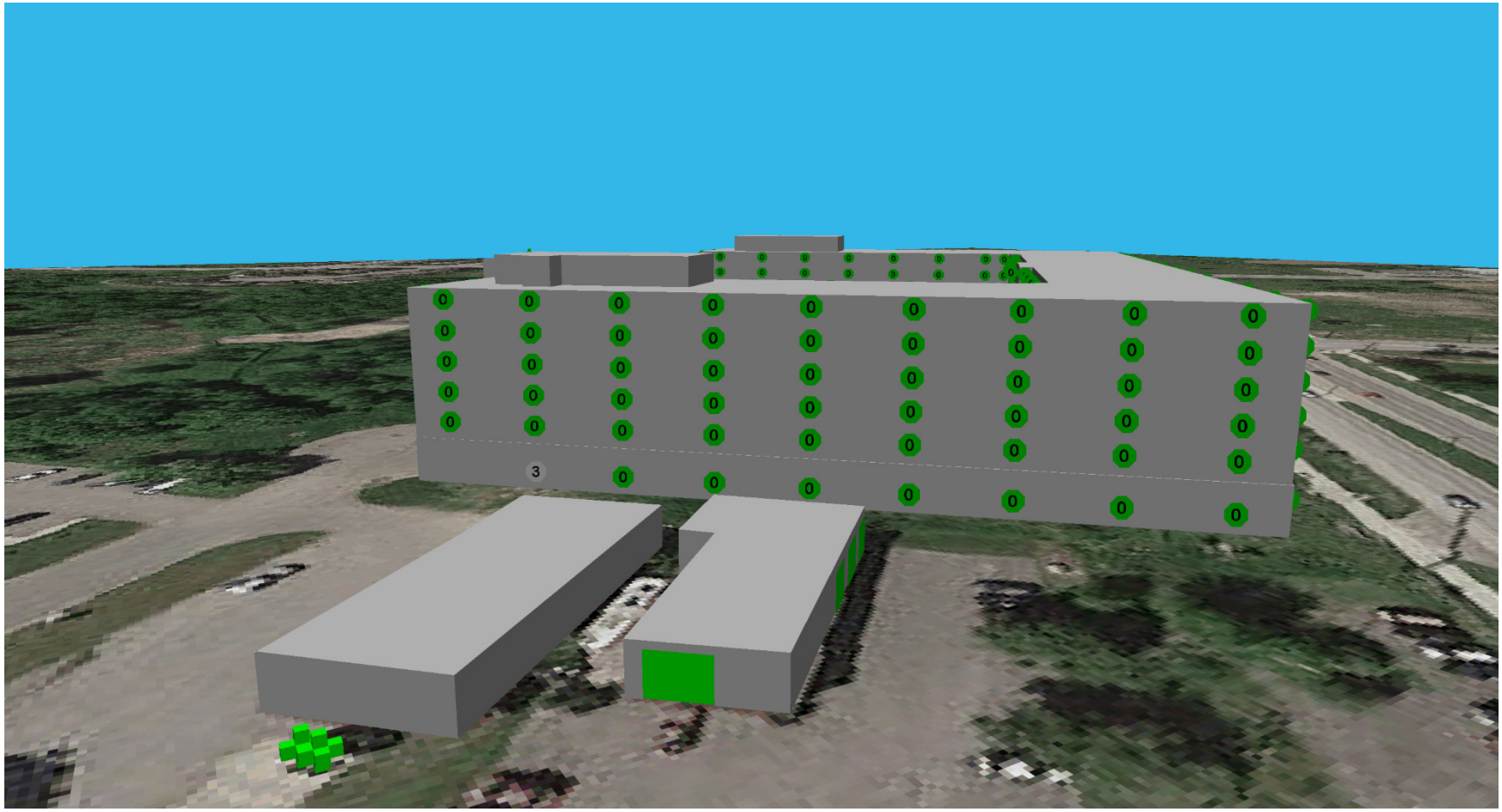


Figure 6b: Stationary Noise Excesses at Southwest Façade, Evening, Leq [dBA]

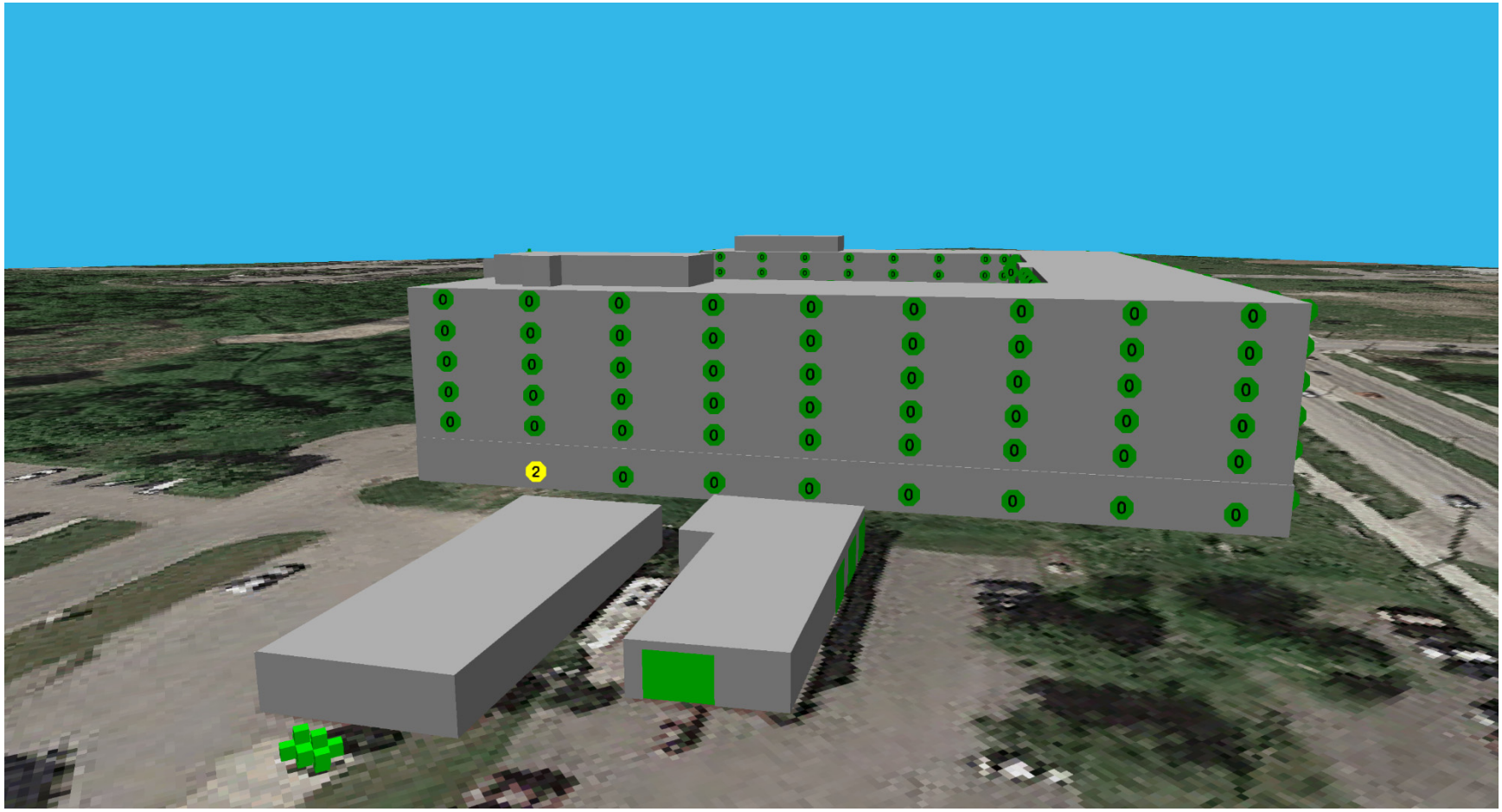


Figure 6c: Stationary Noise Excesses at Southwest Façade, Nighttime, Leq [dBA]

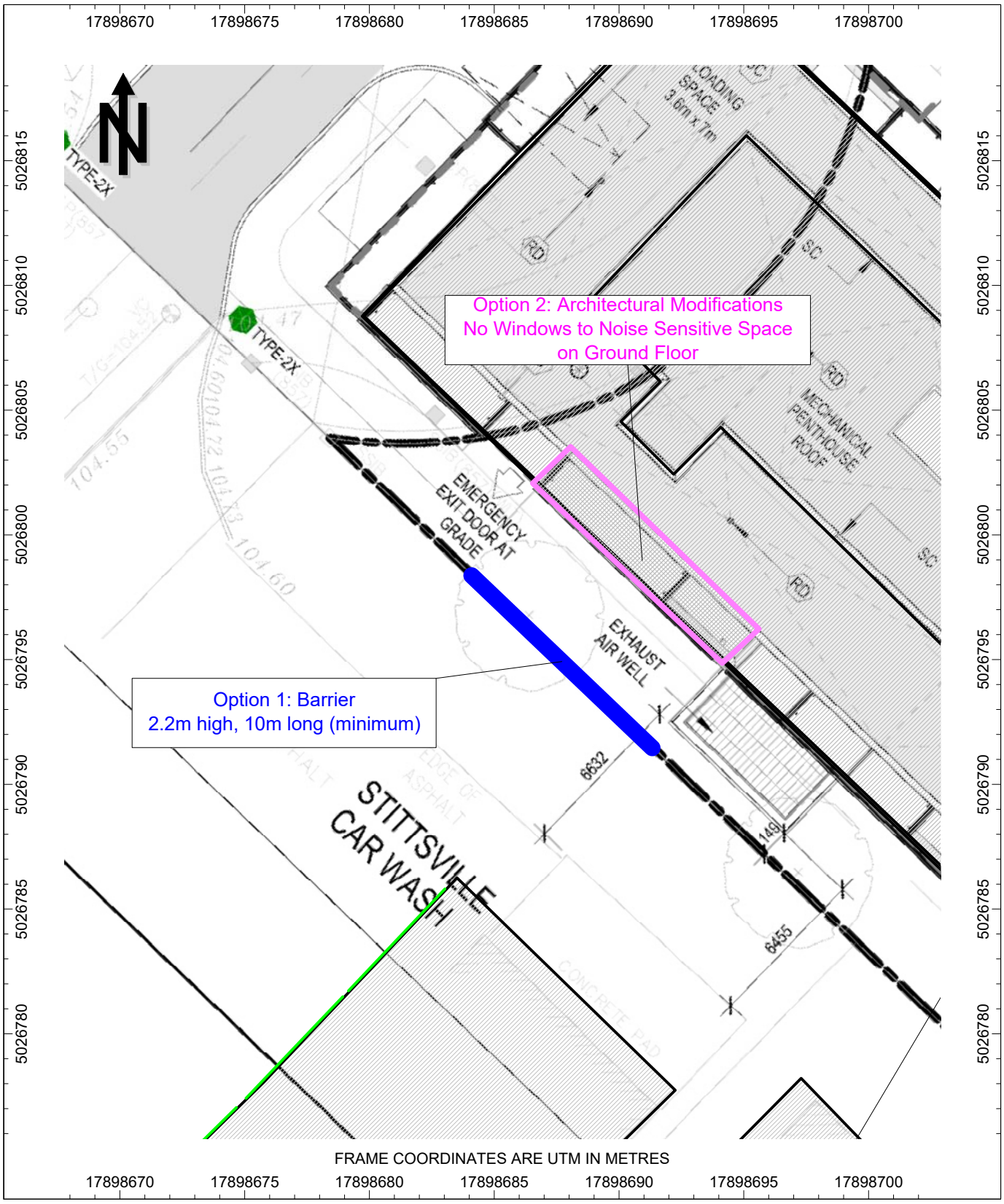


Figure 7: Mitigation Options for Existing Stationary Noise

Appendix A

Road Traffic Information

Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions

Table B1 Traffic And Road Parameters To Be Used For Sound Level Predictions

Row Width (m)	Implied Roadway Class	AADT Vehicles/Day	Posted Speed Km/Hr	Day/Night Split %	Medium Trucks %	Heavy Trucks % [1]
NA [2]	Freeway, Queensway, Highway	18,333 per lane	100	92/8	7	5
37.5-44.5	6-Lane Urban Arterial-Divided (6 UAD)	50,000	50-80	92/8	7	5
34-37.5	4-Lane Urban Arterial-Divided (4-UAD)	35,000	50-80	92/8	7	5
23-34	4-Lane Urban Arterial-Undivided (4-UAU)	30,000	50-80	92/8	7	5
23-34	4-Lane Major Collector (4-UMCU)	24,000	40-60	92/8	7	5
30-35.5	2-Lane Rural Arterial (2-RAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Urban Arterial (2-UAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Major Collector (2-UMCU)	12,000	40-60	92/8	7	5
30-35.5	2-Lane Outer Rural Arterial (near the extremities of the City) (2-RAU)	10,000	50-80	92/8	7	5
20-30	2-Lane Urban Collector (2-UCU)	8,000	40-50	92/8	7	5

[1] The MOE Vehicle Classification definitions should be used to estimate automobiles, medium trucks and heavy trucks.

[2] The number of lanes is determined by the future mature state of the roadway.

Transportation Services - Traffic Services

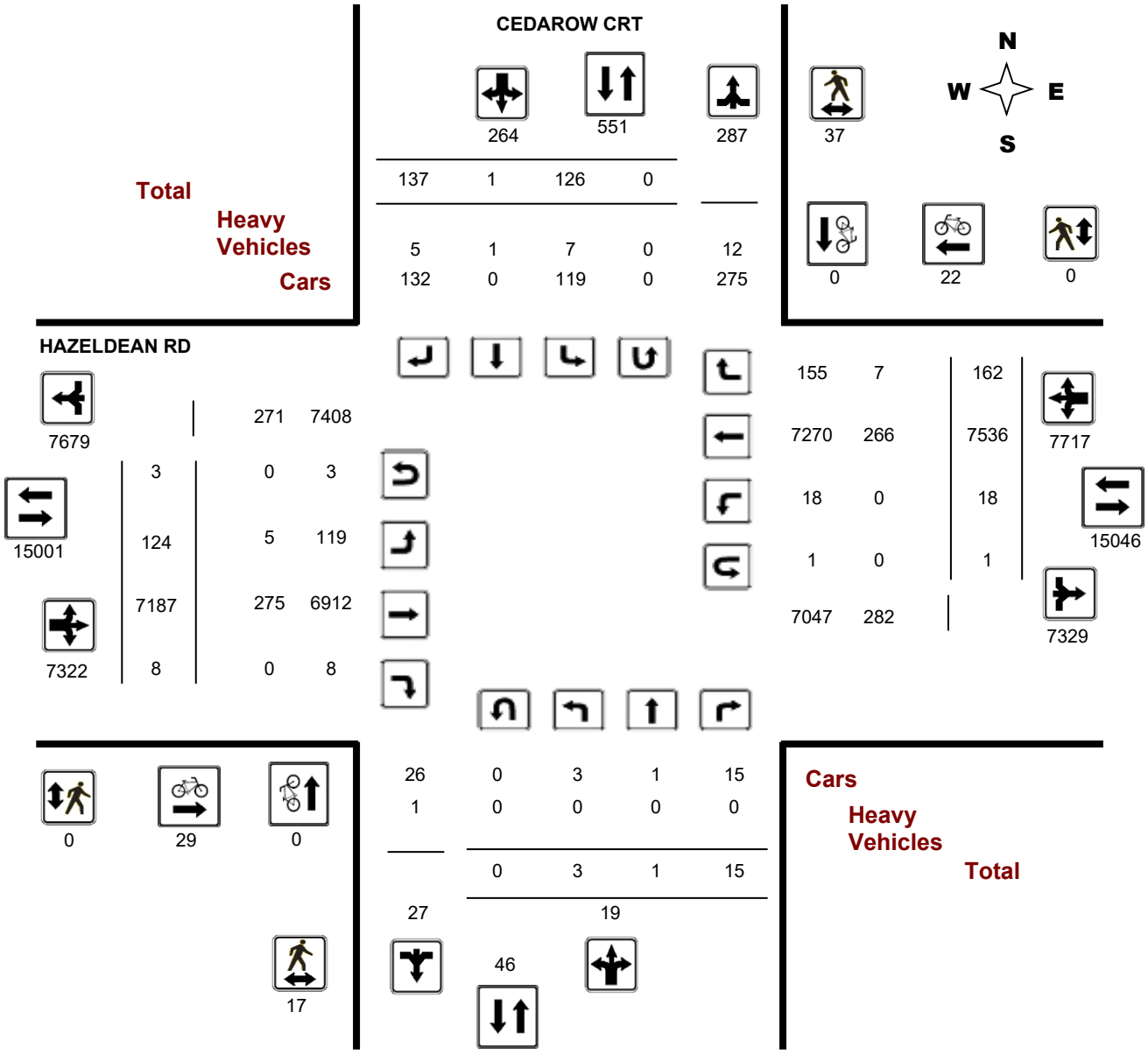
Turning Movement Count - Full Study Diagram

CEDAROW CRT @ HAZELDEAN RD

Survey Date: Thursday, August 01, 2019

WO#: 38616

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 38616

Turning Movement Count - Full Study Summary Report

CEDAROW CRT @ HAZELDEAN RD

Survey Date: Thursday, August 01, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 3 Westbound: 1

AADT Factor .90

Full Study

	CEDAROW CRT									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	0	1	1	**2**	3	0	5	**8**	**10**	12	769	0	**781**	0	427	6	**433**	**1214**	**1224**
08:00 09:00	1	0	0	**1**	4	0	6	**10**	**11**	13	908	1	**922**	2	530	16	**548**	**1470**	**1481**
09:00 10:00	1	0	1	**2**	10	1	12	**23**	**25**	16	843	1	**860**	0	624	21	**645**	**1505**	**1530**
11:30 12:30	0	0	0	**0**	21	0	16	**37**	**37**	11	931	2	**944**	5	1045	31	**1081**	**2025**	**2062**
12:30 13:30	1	0	2	**3**	28	0	18	**46**	**49**	15	997	0	**1012**	1	990	24	**1015**	**2027**	**2076**
15:00 16:00	0	0	5	**5**	18	0	28	**46**	**51**	15	922	0	**937**	1	1190	29	**1220**	**2157**	**2208**
16:00 17:00	0	0	3	**3**	19	0	21	**40**	**43**	22	929	1	**952**	4	1438	14	**1456**	**2408**	**2451**
17:00 18:00	0	0	3	**3**	23	0	31	**54**	**57**	20	888	3	**911**	5	1292	21	**1318**	**2229**	**2286**
Sub Total	3	1	15	**19**	126	1	137	**264**	**283**	124	7187	8	**7319**	18	7536	162	**7716**	**15035**	**15318**
U Turns				**0**				**0**	**0**				**3**				**1**	**4**	**4**
Total	3	1	15	**19**	126	1	137	**264**	**283**	124	7187	8	**7322**	18	7536	162	**7717**	**15039**	**15322**
EQ 12Hr	4	1	21	**26**	175	1	190	**367**	**393**	172	9990	11	**10178**	25	10475	225	**10727**	**20905**	**21298**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	4	1	19	**24**	158	1	171	**330**	**354**	155	8991	10	**9160**	23	9428	203	**9654**	**18814**	**19168**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	5	2	25	**31**	206	2	225	**433**	**464**	203	11778	13	**11999**	29	12350	265	**12647**	**24646**	**25110**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

Appendix B

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 21-12-2022 11:32:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
Description: Pred. Loc. [A], facade facing Hazeldean

Road data, segment # 1: Hazeldean Rd (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Hazeldean Rd (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 23.00 / 23.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hazeldean Rd (day)

Source height = 1.50 m

ROAD (0.00 + 71.82 + 0.00) = 71.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.68	0.00	-1.86	0.00	0.00	0.00	0.00	71.82

Segment Leq : 71.82 dBA

Total Leq All Segments: 71.82 dBA

Results segment # 1: Hazeldean Rd (night)

Source height = 1.50 m

ROAD (0.00 + 64.22 + 0.00) = 64.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-1.86	0.00	0.00	0.00	0.00	64.22

Segment Leq : 64.22 dBA

Total Leq All Segments: 64.22 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.82
(NIGHT): 64.22

STAMSON 5.0 NORMAL REPORT Date: 21-12-2022 11:32:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d_ola.te Time Period: 16 hours
Description: Pred. Loc. [D], Courtyard Amenity Space

Road data, segment # 1: Hazeldean Rd

Car traffic volume : 28336 veh/TimePeriod *
Medium truck volume : 2254 veh/TimePeriod *
Heavy truck volume : 1610 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hazeldean Rd

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hazeldean Rd

Source height = 1.50 m

ROAD (0.00 + 52.42 + 0.00) = 52.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.68	0.00	-12.07	-1.46	0.00	-7.73	0.00	52.42

Segment Leq : 52.42 dBA

Total Leq All Segments: 52.42 dBA

TOTAL Leq FROM ALL SOURCES: 52.42