Environmental Noise Feasibility Study

Mayfield West Phase 1 - Stage 2 Expansion

Proposed Official Plan Amendment

Town of Caledon

August 30, 2021 Project: 1210073

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Environmental Noise Feasibility Study

Mayfield West Phase I - Stage 2 Expansion

Proposed Official Plan Amendment

Town of Caledon

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study in support of the proposed residential development. The proposed development will consist of detached and townhouse residential dwellings along with blocks for storm water management, parks, green space and a block for medium density residential.

The noise sources considered in this study are road traffic, air traffic and stationary noise sources. There are no rail noise sources in the area that could impact the proposed development.

The sound levels on site have been determined and compared with the applicable Ministry of the Environment, Conservation and Parks (MECP), Region of Peel and Town of Caledon noise guideline limits to determine the need for noise mitigation.

To meet the noise guideline limits:

- Mandatory air conditioning to allow exterior windows to remain closed for noise control purposes is required for the dwellings adjacent to Hurontario Street and the majority of dwellings adjacent to Old School Road and/or Kennedy Road. The specific locations are shown on Figures 3A to 3D.
- The provision for adding air conditioning is required for the remaining dwellings adjacent to Old School Road and Kennedy Road and the indicated dwellings further into the interior of the development, as shown on Figures 3A to 3D.
- Exterior wall construction with a Sound Transmission Class (STC) of 54 and windows with ratings up to STC 31 are needed for the dwellings along Hurontario Street. STC 54 can be met using typical brick veneer exterior wall construction.
- Some dwellings along Old School Road and/or Kennedy Road need to have either upgraded exterior wall construction (STC 54) or upgraded windows with ratings up to STC 31, as shown on Figures 3A and 3D.

- For all other dwellings, exterior wall construction meeting STC 37 and exterior windows with ratings up to STC 27 are expected to be sufficient to meet the indoor noise criteria. These STC ratings can likely be achieved by using typical construction meeting the minimum (non-acoustical) requirements of the Ontario Building Code (OBC);
- The STC ratings above were calculated using assumed (typical) room dimensions and wall and window areas. Exterior wall and window STC requirements should be confirmed once detailed building plans are available;
- The minimum sound barrier height requirements are:
 - For the dwellings along Hurontario Street:
 - 4 m high for dwellings at P1 to P3;
 - 3.3 m high for dwellings at P29; and
 - 2.8 m high for dwellings at P30.
 - For the dwellings along Old School Road:
 - 2.2 to 2.9 m high for detached home dwellings with a side yard flanking onto Old School Road;
 - 1.8 m to 2.8 m high for the ends of blocks of detached dwellings facing towards Old School Road; and
 - 1.8 m high for the ends of blocks of rear lane townhouses.
 - For the dwellings along Kennedy Road:
 - 1.8 m high for the ends of blocks of dwellings (P24 & P26);
 - 2.4 m high for dwellings at P25;
 - 2.6 m high for the dwelling at P20 and 1.8 m high for the dwelling adjacent to P20.
 - See Figures 3A to 3C for the conceptual sound barrier locations.
- There are no outdoor spaces that qualify as outdoor living areas (OLAs) for the back-to-back towns at the P4 location shown on Figure 3A & 3B. Thus, no barriers are required.
- A Site Plan is not yet available for the proposed medium density block at the corner of Hurontario Street and Old School Road. This block must be designed to comply with the MECP transportation and stationary noise source guideline limits. Detailed noise studies of this block should be done as a condition of site plan approval or once a site plan for the block is available.

1.0 INTRODUCTION

VCL has been retained to prepare an Environmental Noise Feasibility Study for the proposed residential development in support of the Official Plan Amendment (OPA) application submission to the Town of Caledon and the Regional Municipality of Peel.

The potential sound levels from the environmental noise sources have been predicted on site and compared to the applicable MECP, Region of Peel and Town of Caledon noise guideline limits. Where sound level excesses above these guideline limits occur, noise mitigation measures have been recommended.

1.1 THE SITE AND SURROUNDING AREA

The site is located in the Town of Caledon and is bounded by:

- Hurontario Street (Highway 10) with some residential dwellings and agricultural land beyond to the west;
- Old School Road with some residential dwellings and agricultural land beyond to the north;
- Agricultural lands with the Brampton Fair Grounds beyond to the east; and
- Existing residential development and a school to the south.

Note that Kennedy Road runs north south through the middle of the site.

A Key Plan is included as Figure 1.

This report was prepared using the Preliminary Lotted Development Concept Plan, prepared by Gerrard Design, dated April 28, 2021. The Preliminary Lotted Development Concept Plan showing the dwelling types is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed development will consist of detached homes, back-to-back townhouses, rear lane towns, 3 storey townhouses, a medium density residential block, storm water management ponds, parks and green space. All dwellings are assumed to be two storeys in height, except for the 3 storey townhouses, which are three storeys in height.

It is assumed that all dwellings will have grade-level rear yard amenity space.

Since there is no site plan for the medium density block, specific noise control requirements cannot be determined at this time. General noise control requirements are outlined in Section 6.0. Specific noise control requirements can be determined as part of the Site Plan Approval process for this block.

2.0 NOISE SOURCES

There are a number of noise sources in the area that could impact the proposed residential development. These include both transportation and stationary sources of noise.

2.1 TRANSPORTATION NOISE SOURCES

2.1.1 Road Traffic

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The roadways with the potential to impact the site are Hurontario Street (Highway 10), Old School Road, and Kennedy Road. Traffic volumes on other surrounding roadways are anticipated to be low and are not expected to create a significant noise impact on the subject site.

The road traffic data correspondence is included as Appendix A and is summarized in Table 1.

BA Group, the traffic consultant retained for this project, provided information for Hurontario Street, Old School Road and Kennedy Road. Future (year 2033) peak hour turning movement count (TMC) data was provided accounting for the GTA West Highway (which results in higher traffic volumes). The 24-hour volume was calculated by adding the AM and PM peak hour volume and multiplying by 5. Future (year 2041) traffic volumes were calculated by escalating the 2033 volumes using an annual growth rate of 2%.

2.1.2 Hurontario Street (Highway 10)

Ultimate traffic volumes for Hurontario Street (Highway 10) were obtained from the Ministry of Transportation (MTO). Both ultimate AADT and SADT were provided. MTO indicated 10% of the total volume is truck traffic. It was assumed that the trucks would be 50% heavy trucks and 5% medium trucks. A day/night split of 85%/15% was assumed as is typical for provincial highways.

BA Group, the traffic consultant retained for this project, provided information for Hurontario Street stating that the volumes they are predicting for Hurontario are much higher than the ultimate traffic volumes provided by the MTO, primarily due to the Mayfield West Phase 2 development. Based on this information we have used data provided by BA Group for our calculations. The percentage of trucks and speed limits used in our analysis are those from MTO.

2.1.3 Old School Road & Kennedy Road

For Old School Road and Kennedy Road:

- Information provided by the BA Group was used to calculate the 24-volumes for Old School Road and Kennedy Road.
- The day/night split used in the analysis is 90%/10% (assumed), as is typical for well-travelled local roadways.
- Medium/Heavy truck volume percentages are assumed to 2.5%/2.5% of the total volume.

2.1.4 Aircraft Traffic

The site lies outside the NEF 25 contours for both Lester B. Pearson International Airport and The Brampton Flying Club Airport. Thus, in accordance with NPC-300 requirements, noise from aircraft has not been considered further.

2.1.5 Rail Traffic

There are no rail lines in the area. Thus, rail traffic has not been considered in this assessment.

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2.2 STATIONARY NOISE SOURCES

The only stationary noise source in the vicinity of the site with the potential to impact the proposed development is the Tony Pontes Public School located at 12872 Kennedy Road. The main noise source at this facility is the rooftop mechanical equipment. A noise assessment for the school was prepared as part of its approvals process. This proposed residential development was included in the assessment. Thus, the Tony Pontes Public School has not been included in this assessment since their noise emissions were required to comply with the MECP noise guideline limits at this proposed residential development.

Other stationary noise sources, such as the Brampton Fair Grounds, are far enough from the proposed development site to not be a concern acoustically.

ENVIRONMENTAL NOISE GUIDELINES

3.1 **MECP PUBLICATION NPC-300**

The applicable noise guidelines for new residential development are those in MECP Publication NPC-300. "Environmental Noise Guideline. Stationary and Transportation Sources – Approval and Planning".

The environmental noise guidelines of the MECP (Publication NPC-300) are discussed briefly below and summarized in Appendix B.

3.1.1 Transportation Noise Sources

3.1.1.1 Architectural Elements

In the daytime (0700 to 2300 hours), the indoor criterion for road noise is Lea, Day (1) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At nighttime (2300 to 0700 hours), the indoor criterion for road noise is L_{eq,Night}(2) of 45 dBA for sensitive spaces such as living/dining rooms and dens, and 40 dBA for bedrooms.

The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve the above indoor sound level limits.

3.1.1.2 Ventilation

When the daytime sound level (Leg Day) at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air conditioning is required. For daytime sound levels between 56 dBA and 65 dBA inclusive, there need only be the provision for adding air conditioning. A warning clause advising the occupant of the potential interference with some activities is also required. At nighttime, air conditioning is required when the sound level exceeds 60 dBA (Leg Night) at a noise sensitive window (provision for adding air conditioning is required when the sound level is greater than 50 dBA).

 $L_{eq Day} = 16$ -hour daytime (0700-2300) equivalent continuous sound level. (1)

L_{eq Night} = 8-hour nighttime (2300-0700) equivalent continuous sound level (2)

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3.1.1.3 Outdoors

For outdoor amenity areas ("Outdoor Living Areas" - OLA's), the guideline objective is 55 dBA $L_{eq\ Day}$, with an excess not exceeding 5 dBA considered acceptable if it is not feasible to achieve the 55 dBA objective for technical, economic or administrative reasons, provided warning clauses are registered on title. Note, a balcony is not considered an OLA, unless it is:

- the only OLA for the occupant;
- at least 4 m in depth; and
- unenclosed

3.2 REGION OF PEEL

The Region of Peel's noise guidelines are described in the "General Guidelines for the Preparation of Acoustical Reports in the Region of Peel" document. The Region of Peel noise guidelines are essentially the same as the MECP noise guidelines for transportation noise sources except that the nighttime sound level for triggering the air conditioning requirement is 1 dBA more stringent (i.e., less than) the sound level specified by the MECP, i.e., mandatory air conditioning for nighttime sound levels of 60 dBA or greater, and the provision for adding air conditioning for levels between 51 to 59 dBA inclusive.

The Peel guidelines also indicate a maximum desirable sound barrier height of 4.0 m (relative to roadway centreline) with a maximum acoustic fence height of 2.4 m, although a height no more than 2.0 m is preferred. To make up any additional height beyond that of the fence, a berm is to be used.

3.3 TOWN OF CALEDON

The Town of Caledon noise guidelines are described in the "Development Standards, Policies & Guidelines" document. The Town of Caledon's general policy is not to accept the 5 dBA excess above the 55 dBA objective in OLA's. However, an excess may be acceptable if unreasonably high sound barriers are needed to meet the 55 dBA objective.

The Town's maximum acoustic fence height is 2.4 m. Higher barriers can be provided by using a combination of an acoustic fence and a berm. The maximum permitted sound barrier height according to the Town's Development Standards is 4.8 m (2.4 m fence atop a 2.4 m berm).

Road traffic noise levels are to be determined using a minimum 20-year traffic forecast and a speed of 10 kph over the posted speed limit.

4.0 NOISE IMPACT ASSESSMENT

4.1 METHOD

The daytime and nighttime sound levels at the two and three-storey dwelling facades were calculated at heights of 4.5 m and 7.5 m above grade, respectively, representing the top storey plane of windows (the worst-case locations where the highest sound levels would occur). The sound levels in the rear yard OLA's were calculated at a height of 1.5 m above grade, 3 m from

the dwelling at a point aligned with the midpoint of the rear facade. The analysis points are consistent with the NPC-300 requirements.

Inherent screening of each building face due to its orientation to the noise source as well as screening provided by the subject development itself was taken into account. Screening from the existing dwellings at the development to the south was also included. Since site plans/building layouts are not available for the medium density block, screening from the medium density block was not included in the assessment.

4.2 RESULTS

The highest unmitigated daytime/nighttime sound levels of 75 dBA/70 dBA are predicted to occur at the west facades of the dwellings adjacent to Hurontario Street (Locations P1 and P4 on Figures 3A and 3B). The highest unmitigated daytime sound level in an OLA of 73 dBA is predicted to occur at the dwellings, represented by Location P1 on Figures 3A and 3B, adjacent to Hurontario Street.

Table 2 summarizes the predicted unmitigated daytime and nighttime sound level predictions.

Appendix C contains sample sound level calculation.

5.0 NOISE ABATEMENT REQUIREMENTS

The noise control measures can generally be classified into two categories which are interrelated, but which can be treated separately for the most part:

- a) The sound isolation performance of architectural elements to achieve the indoor noise guideline sound levels for transportation sources; and
- b) Design features to attenuate the sound levels in the OLA's.

Noise abatement requirements/recommendations are summarized in Table 3 and in the notes to Table 3.

5.1 INDOORS

5.1.1 Architectural Requirements

The indoor noise guideline sound levels can be achieved by using appropriate construction for exterior walls, windows, and doors. To determine the worst-case architectural sound isolation requirements for the dwellings, exterior wall and window areas were assumed to be 80% and 20%, respectively, of the associated floor area, on each facade of a corner room with both facades exposed directly or at an angle to the road traffic noise source(s).

The assessment shows that:

Exterior wall construction with STC ratings of up to 54 (e.g. brick veneer) and exterior windows
with STC ratings up to 31 are needed at the dwellings adjacent to Hurontario Street. The
locations of the dwellings are shown on Figures 3A and 3B.

- Either upgraded exterior wall construction (with STC ratings up to 54) _or exterior windows with STC ratings up to 31 are needed various dwellings as shown in Figures 3A, 3B, 3C & 3D and Table 3.
- At all other dwellings, exterior wall construction meeting STC 37 and exterior windows with ratings up to STC 27 will be sufficient to meet the indoor noise guideline limits.

It is expected that typical construction meeting the minimum non-acoustical requirements of the OBC will meet the STC 37 wall and STC 27 window requirements.

Upgraded windows that exceed the minimum non-acoustical requirements of the OBC will likely be required to achieve a rating of STC 30 or higher. Note, the window frames themselves must also be designed to ensure that the overall sound isolation performance for the entire window unit meets the sound isolation requirement. This must be confirmed by the window manufacturer through the submission of acoustical test data.

The final sound isolation requirements should be reviewed when detailed architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance. This is typically required by the Town at the time of building permit application.

5.1.2 Ventilation Requirements

The ventilation requirements are:

- Mandatory air conditioning is required for all dwellings adjacent to Hurontario Street, and the majority of dwellings adjacent to Old School Road and/or Kennedy Road. The specific locations are shown on Figures 3A to 3D.
- The provision for adding air conditioning is required for the remaining dwellings adjacent to Old School Road and Kennedy Road and the interior dwellings as shown on Figures 3A to 3D. This typically takes the form of a ducted, forced air heating system, suitably sized to accommodate air conditioning.

5.2 OUTDOORS

The sound barrier analysis was completed using the Concept Plan, dated April 28, 2021. Since these are preliminary plans, the final sound barrier requirements will need to be confirmed once final site plans and detailed grading information is available.

The unmitigated daytime sound levels at OLAs with a view to Hurontario Street, Old School Road and/or Kennedy Road are predicted to exceed the 55 dBA objective. Thus, sound barriers are required.

- To meet the 55 dBA objective, these sound barriers are needed:
 - > For the dwellings along Hurontario Street:
 - 3.3 m high for dwellings at P29; and
 - 2.8 m high for dwellings at P30.
 - For the dwellings along Old School Road:

- 2.2 to 2.9 m high for detached home dwellings with a side yard flanking onto Old School Road;
- 1.8 m to 2.8 m high for the ends of blocks of detached dwellings facing towards Old School Road; and
- 1.8 m high for the ends of blocks of rear lane townhouses.
- For the dwellings along Kennedy Road:
 - 1.8 m high for the ends of blocks of dwellings (P24 & P26);
 - 2.4 m high for dwellings at P25;
 - 2.6 m high for the dwelling at P20 and 1.8 m high for the dwelling adjacent to P20.
- See Figures 3A to 3C for the conceptual sound barrier locations.
- The 56 dBA sound level for the OLA at P4.1, near the corner of Hurontario Street and Old School Road, is slightly over the 55 dBA objective. A sound barrier could be constructed to meet the sound level objective, however once the proposed medium density block at this corner is constructed, these dwellings will benefit from the acoustical screening provided by the medium density buildings and the sound level due to road noise at these locations will be reduced and should meet the 55 dBA objective. The interim 1 dBA excess (which represents a future 2041 daytime sound level) is an insignificant excess above the 55 dBA objective.
- At the P1 to P3 OLA locations, a 4 m barrier results in a predicted 60 dBA sound level. To
 further reduce the sound level to 55 dBA, a 7 m high sound barrier would be required which
 is not practical. A 4 m high barrier and associated warning clauses, as detailed in Table 3, is
 recommended.
- At the back-to-back towns at P4, there will be no outdoor space that qualifies as an OLA. Thus, a sound barrier is not required.

Figures 3A to 3D shows the location of the sound barriers.

Notes on the sound barriers:

- For any lot that does not have a sound barrier, the unmitigated daytime OLA sound level is predicted to be at or below the 55 dBA objective.
- The analysis was completed using assumed level topography and should be updated once detailed grading information is available.
- The sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface weight of 20 kg/m².

6.0 MEDIUM DENSITY BLOCK

A Site Plan for the medium density block is currently not available. Specific mitigation measures have therefore not been established.

It is expected that residential dwellings in the medium density block would require mandatory air conditioning due to the proximity to the intersection of Hurontario Street and Old School Road. Upgraded facade construction (wall and/or windows) should also be anticipated.

It is anticipated that all balconies and terraces in the medium density block will be less than 4 m in depth and would therefore would not qualify as OLA's under the MECP guidelines. Thus, sound barriers would not be required. If larger balconies or terraces are included in the site design, the sound barrier requirements should be reviewed.

A detailed noise study of this block should be done as a condition of Site Plan Approval.

7.0 WARNING CLAUSES

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation.

Table 3 and the notes to Table 3 summarize the warning clauses for the site.

8.0 CONCLUSIONS

With the incorporation of the recommended noise mitigation measures, the applicable Town of Caledon, Peel Region and MECP noise guidelines can be met, and a suitable acoustical environment provided for the occupants.

The approvals and administrative procedures are available to ensure that the noise requirements are implemented.

9.0 REFERENCES

- PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.
- 2. Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J.D. Quirt, Division of Building Research, National Council of Canada, September 1985.
- 3. "Environmental Noise Assessment in Land-Use Planning 1987", Ontario Ministry of the Environment, February 1987, ISBN 0-7729-2804-5.
- 4. MECP Publication NPC-300, "Stationary and Transportation Sources Approval and Planning" Ontario Ministry of the Environment, August 2013.

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TABLE 1 ROAD TRAFFIC DATA

Roadway	Year 24-Hour		% Trucks		Speed Limit	Day/Night	
Roadway	Toai	Volume	Medium	Heavy	(kph) ⁽⁴⁾	Split (%)	
Hurontario Street Highway 10 ⁽¹⁾⁽²⁾	2033 (2041)	64 875 (76 011)	5	5	80	85/15	
Old School Road ⁽¹⁾⁽³⁾	2033 (2041)	11 200 (13 123)	2.5	2.5	70	90/10	
Kennedy Road ⁽¹⁾⁽³⁾	2033 (2041)	8 950 (10 486)	2.5	2.5	60	90/10	

Notes:

- (1) The 24-hour traffic volumes were calculated from the future (year 2033) peak hour traffic volumes with future GTA West Highway included, provided by BA Group. The AM & PM peak hour volumes were added and converted to 24-hour volumes using a factor of 5. Future (year 2041) volumes were calculated using a growth rate of 2%, compounded annually. The future (2041) volume is shown in brackets.
- (2) MTO indicated the percentage of trucks is 10%. We have assumed 5% for medium trucks and 5% for heavy trucks. Day/Night split is assumed.
- (3) Truck percentages and day/night assumed.
- (4) Posted speed limit shown. Vehicle speed 10 kph higher than the posted speed limit was used in the analysis, per Town of Caledon guidelines.

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS(1)

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq Day} (dBA)	L _{eq Night} (dBA)
P1 -	Hurontario Street	52	75	70
PT	TOTAL	-	75	75
D1 OLA	Hurontario Street	57	73	-
P1 OLA	TOTAL	-	73	-
P2 -	Hurontario Street	34	73	69
P2	TOTAL	-	73	69
D2 OLA	Hurontario Street	40	71	-
P2 OLA	TOTAL	-	71	-
Do	Hurontario Street	34	74	69
P3 -	TOTAL	-	74	69
DO OLA	Hurontario Street	37	71	-
P3 OLA	TOTAL	-	71	-
	Hurontario Street	53	74	70
P4	Old School Road	123	61	54
	TOTAL	-	75	70
	Hurontario Street	160	61	56
P4.1	Old School Road	91	57	50
	TOTAL	-	62	57
	Hurontario Street	178	53	-
P4.1 OLA	Old School Road	94	52	-
	TOTAL	-	56	-
Dr	Old School Road	29	64	57
P5 -	TOTAL	-	64	57
D5 01 4	Old School Road	46	50	-
P5 OLA	TOTAL	-	50	-
Do.	Old School Road	29	64	57
P6 -	TOTAL	-	64	57
DC OL A	Old School Road	46	46	-
P6 OLA	TOTAL	-	46	-
D7	Old School Road	29	64	57
P7	TOTAL	-	64	57
D7.01.4	Old School Road	46	50	-
P7 OLA	TOTAL	-	50	-

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS(1) (continued)

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq Day} (dBA)	Leq Night (dBA
D0	Old School Road	17	68	61
P8	TOTAL	-	68	61
Do OLA	Old School Road	25	64	-
P8 OLA	TOTAL	-	64	-
D0 1	Old School Road	45	55	49
P8.1	TOTAL	-	55	49
D0 4 OL A	Old School Road	43	55	-
P8.1 OLA	TOTAL	-	55	-
D0	Old School Road	17	68	61
P9	TOTAL	-	68	61
DO OLA	Old School Road	30	62	-
P9 OLA	TOTAL	-	62	-
D40	Old School Road	36	66	59
P10	TOTAL	-	66	59
D40 OLA	Old School Road	53	56	-
P10 OLA	TOTAL	-	56	-
D44	Old School Road	16	68	61
P11	TOTAL	-	68	61
D44 OLA	Old School Road	21	65	-
P11 OLA	TOTAL	-	65	-
D40	Old School Road	31	67	60
P12	TOTAL	-	67	60
D40 OLA	Old School Road	37	65	-
P12 OLA	TOTAL	-	65	-
D42	Old School Road	35	66	60
P13	TOTAL	-	66	60
D42 OLA	Old School Road	53	56	-
P13 OLA	TOTAL	-	56	-
D14	Old School Road	31	67	60
P14	TOTAL	-	67	60
D14 OL A	Old School Road	53	56	-
P14 OLA	TOTAL	-	56	-
D45	Old School Road	14	69	62
P15	TOTAL	-	69	62

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS(1) (continued)

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq Day} (dBA)	Leq Night (dBA
D45 OL A	Old School Road	21	65	-
P15 OLA	TOTAL	-	65	-
D45.4	Old School Road	33	60	53
P15.1	TOTAL	-	60	53
D.1.5.4.01.4	Old School Road	39	57	-
P15.1 OLA	TOTAL	-	57	-
D45.0	Old School Road	47	58	51
P15.2	TOTAL	-	58	51
D45 0 01 A	Old School Road	52	55	-
P15.2 OLA	TOTAL	-	55	-
	Old School Road	27	63	57
P16	Kennedy Road	15	66	60
	TOTAL	-	68	61
	Old School Road	44	43	-
P16 OLA	Kennedy Road	32	40	-
	TOTAL	-	45	-
	Old School Road	16	68	61
P17	Kennedy Road	22	63	56
	TOTAL	-	69	63
	Old School Road	33	42	-
P17 OLA	Kennedy Road	39	43	-
	TOTAL	-	45	-
_	Old School Road	16	68	61
P18	TOTAL	-	68	61
	Old School Road (-90 to 0)	33	45	-
P18 OLA	Old School Road (0 to 90)	33	60	-
	TOTAL	-	60	-
	Old School Road	16	68	61
P19	TOTAL	-	68	61
	Old School Road (-90 to 0)	33	45	-
P19 OLA	Old School Road (0 to 90)	33	60	-
- -	TOTAL	-	60	-
	Old School Road	43	58	52
P19.1	TOTAL	-	58	52
D40.4.6: :	Old School Road	44	57	-
P19.1 OLA	TOTAL	-	57	-

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS(1) (continued)

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq Day} (dBA)	Leq Night (dBA
D40.2	Old School Road	82	54	47
P19.2	TOTAL	-	54	47
D40 2 OL A	Old School Road	83	53	-
P19.2 OLA	TOTAL	-	53	-
	Old School Road	60	56	49
P20	Kennedy Road	12	68	61
	TOTAL	-	68	61
	Old School Road	57	56	-
P20 OLA	Kennedy Road	22	62	-
	TOTAL	-	63	-
DO4	Kennedy Road	15	66	60
P21	TOTAL	-	66	60
	Kennedy Road (-90 to 0)	32	58	-
P21 OLA	Kennedy Road (0 to 90)	32	43	-
	TOTAL	-	58	-
Doo	Kennedy Road	18	65	58
P22	TOTAL	-	65	58
	Kennedy Road (-90 to 0)	35	57	-
P22 OLA	Kennedy Road (0 to 90)	35	40	-
	TOTAL	-	57	-
Doo	Kennedy Road	15	66	60
P23	TOTAL	-	66	60
	Kennedy Road (-90 to 0)	34	57	-
P23 OLA	Kennedy Road (0 to 90)	34	46	-
	TOTAL	-	57	-
DOA	Kennedy Road	17	65	59
P24	TOTAL	-	65	59
	Kennedy Road (-90 to 0)	35	57	-
P24 OLA	Kennedy Road (0 to 90)	35	49	-
	TOTAL	-	57	-
D24.4	Kennedy Road	46	58	51
P24.1	TOTAL	-	58	51
D24.1.OL A	Kennedy Road	42	51	-
P24.1 OLA	TOTAL	-	51	-

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS(1) (continued)

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq Day} (dBA)	Leq Night (dBA)
Doc	Kennedy Road	12	68	61
P25	TOTAL	-	68	61
DOE OLA	Kennedy Road	22	62	-
P25 OLA	TOTAL	-	62	-
DOE 4	Kennedy Road	54	54	48
P25.1	TOTAL	-	54	48
DOE 4 OL 4	Kennedy Road	50	54	-
P25.1 OLA	TOTAL	-	54	-
Doo	Kennedy Road	18	65	58
P26	TOTAL	-	65	58
	Kennedy Road (-90 to 0)	36	48	-
P26 OLA	Kennedy Road (0 to 90)	36	52	-
	TOTAL	-	53	-
	Kennedy Road	51	54	48
P27	TOTAL	-	55	48
P27 OLA	Kennedy Road	47	55	-
	TOTAL	-	55	-
Doo	Old School Road	26	65	58
P28	TOTAL	-	65	58
D00 01 4	Old School Road	36	61	-
P28 OLA	TOTAL	-	61	-
	Old School Road	68	55	49
P28.1	TOTAL	-	55	49
D00 4 01 4	Old School Road	68	54	-
P28.1 OLA	TOTAL	-	54	-
	Hurontario Street	221	67	62
P29	TOTAL	-	67	62
D00 0/ :	Kennedy Road	218	67	-
P29 OLA	TOTAL	-	67	-
	Kennedy Road	271	64	60
P30	TOTAL	-	64	60
	Kennedy Road	268	64	-
P30 OLA	TOTAL	-	64	_

Notes:

(2) Distance indicated is from the centreline of the noise source to the facade or OLA.

⁽¹⁾ See Figures 3A to 3D.

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TABLE 3 MINIMUM NOISE ABATEMENT MEASURES

Location ⁽¹⁾	Air Conditioning ⁽²⁾	Exterior Wall ⁽³⁾	Exterior Window ⁽⁴⁾	Sound Barrier ⁽⁵⁾	Warning Clauses ⁽⁶⁾
P1-3: Dwellings along Hurontario Street (See Figures 3A & 3B)	Mandatory	STC 52	STC 31	4 m high (see Figures 3A & 3B for specific locations)	B + D + E
P4: Back-to-Back Town Dwellings along Hurontario Street (See Figures 3A & 3B)	Mandatory	STC 52	STC 31	None	D
P8, P9, P11, P15, P16, P17, P18, P19, P20, P25: Dwellings along Old School Road & Kennedy Road (See Figures 3A, 3C & 3D)	Mandatory	STC 38	STC 30	1.8 m - 2.9 m high (see Figures 3A, 3C, 3D for specific locations)	B+D+E
P10, P12, P13, P14: Dwellings along Old School Road (See Figures 3A & 3C)	Mandatory	Up to STC 37	Up to STC 27	2.8 – 3.2 m high (see Figures 3A & 3C for specific locations)	B + D + E
P21 & P23: Dwellings along Southwest side of Kennedy Road (See Figures 3A & 3D)	Mandatory	Up to STC 37	Up to STC 27	1.8 m high (see Figures 3A & 3C for specific locations)	B + D + E
P29: Dwellings along Hurontario Street behind storm water management pond (See Figures 3A & 3B)	Mandatory	Up to STC 37	Up to STC 27	3.3 m high (see Figures 3A & 3B for specific locations)	B+D+E
Dwellings behind P1 along Hurontario Street (See Figures 3A & 3B)	Mandatory	Up to STC 37	Up to STC 27	None	D
P16, P17: Dwellings along Old School Road & Kennedy Road (See Figures 3A & 3D)	Mandatory	STC 38	STC 30	None	D
P28: Dwelling along Old School Road (See Figures 3A & 3B)	Provision for adding	Up to STC 37	Up to STC 27	2.2 m high (see Figures 3A & 3B for specific locations)	B + C + E
P15.1, P19.1: Dwellings along Old School Road (See Figures 3A, 3C & 3D)	Provision for adding	Up to STC 37	Up to STC 27	1.8 m high (see Figures 3A, 3C & 3D for specific locations)	B + C + E
P22, P24, P26: Dwellings along northeast side of Kennedy Road (See Figures 3A & 3D)	Provision for adding	Up to STC 37	Up to STC 27	1.8 m high (see Figures 3A & 3D for specific locations)	B+C+E
P30: Dwellings along Hurontario Street behind storm water management pond (See Figures 3A & 3B)	Provision for adding	Up to STC 37	Up to STC 27	2.8 m high (see Figures 3A & 3B for specific locations)	B+C+E
Dwelling behind P20 along Kennedy Street	Provision for adding	Up to STC 37	Up to STC 27	1.8 m high (see Figures 3A & 3B for specific locations)	B + C + E

TABLE 3 MINIMUM NOISE ABATEMENT MEASURES (continued)

Location ⁽¹⁾	Air Conditioning ⁽²⁾	Exterior Wall ⁽³⁾	Exterior Window ⁽⁴⁾	Sound Barrier ⁽⁵⁾	Warning Clauses ⁽⁶⁾
Dwelling behind P25 along Kennedy Street	Provision for adding	Up to STC 37	Up to STC 27	2.4 m high (see Figures 3A & 3B for specific locations)	B + C + E
P5, P6, P7, P15.2: Dwellings along Old School Road (See Figures 3A 3B)	Provision for adding	Up to STC 37	Up to STC 27	None	С
P24.1: Dwelling along Kennedy (See Figures 3A 3B)	Provision for adding	Up to STC 37	Up to STC 27	None	С
P4.1: Dwellings along Old School Road (See Figures 3A & 3B)	Provision for adding	Up to STC 37	Up to STC 27	None	A + C
Dwellings along Hurontario Road behind P1-4 (See Figures 3A & 3B)	Provision for adding	Up to STC 37	Up to STC 27	None	С
Dwellings along Old School Road behind P8-15 (See Figures 3A & 3C)	Provision for adding	Up to STC 37	Up to STC 27	None	С
Dwellings along south west side of Kennedy Road behind P21 & P23 (See Figures 3A & 3D)	Provision for adding	Up to STC 37	Up to STC 27	None	С

Notes to Table 3 on following page.

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NOTES TO TABLE 3

- (1) See Figures 3A, 3B, 3C and 3D.
- (2) Where methods must be provided to allow windows to remain closed for noise control purposes, a commonly used technique is that of air conditioning.
- (3) STC Sound Transmission Class Rating (Reference ASTM E-413).
 - The requirements are based on the assumed percentages of wall and window area to associated floor area stated in Section 5.1.1 and should be reviewed once detailed floor plans are available.
- (4) STC Sound Transmission Class Rating (Reference ASTM E-413). A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.
 - The requirements were based on the assumed percentages of wall and window area to associated floor area stated in Section 5.1.1 and should be reviewed once detailed floor plans are available.
- (5) Sound barriers must be of solid construction with no gaps cracks or holes and must have a minimum surface density of 20 kg/m².
- (6) Standard example warning clauses to be registered on title and be included in Offers of Purchase and Sale for designated lots:
 - A. "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."
 - B. "Purchases/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 on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Ministry of the Environment, Conservation and Parks."
 - C. "This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Ministry of the Environment, Conservation and Parks."
 - D. "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."
 - E. "Purchasers/tenants are advised that a noise barrier wall is located at the rear/side of this property. The owner of this property also owns his/her section of the noise barrier wall. The noise barrier wall is not in public ownership. Monitoring, maintenance, inspection, repair and replacement of this noise barrier wall, including any associated costs, are the sole responsibility of the property owner. The Town of Caledon is in no way responsible for this noise barrier wall. Should this noise barrier wall fall, it is the property owner's responsibility to repair or replace his/her section of the wall, at his/her cost. If the property owner fails to maintain the noise barrier wall, the Town of Caledon will notify the requirement to repair in writing. If the property owner does not comply with the Town's request, the Town will correct the deficiency and bill the property owner accordingly."
- (7) Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.
- (8) All exterior doors shall be fully weather-stripped.





No.	Revision/Issue	Date

VALCOUSTICS Canada Ltd.

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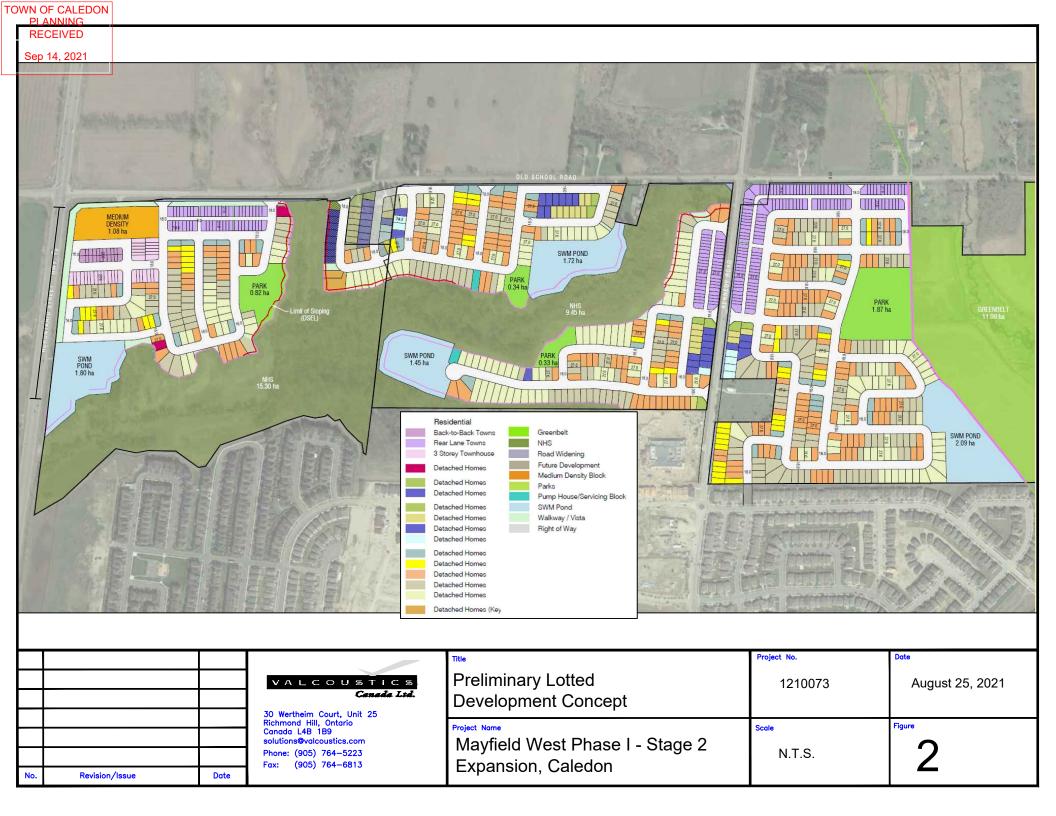
Phone: (905) 764-5223 Fax: (905) 764-6813

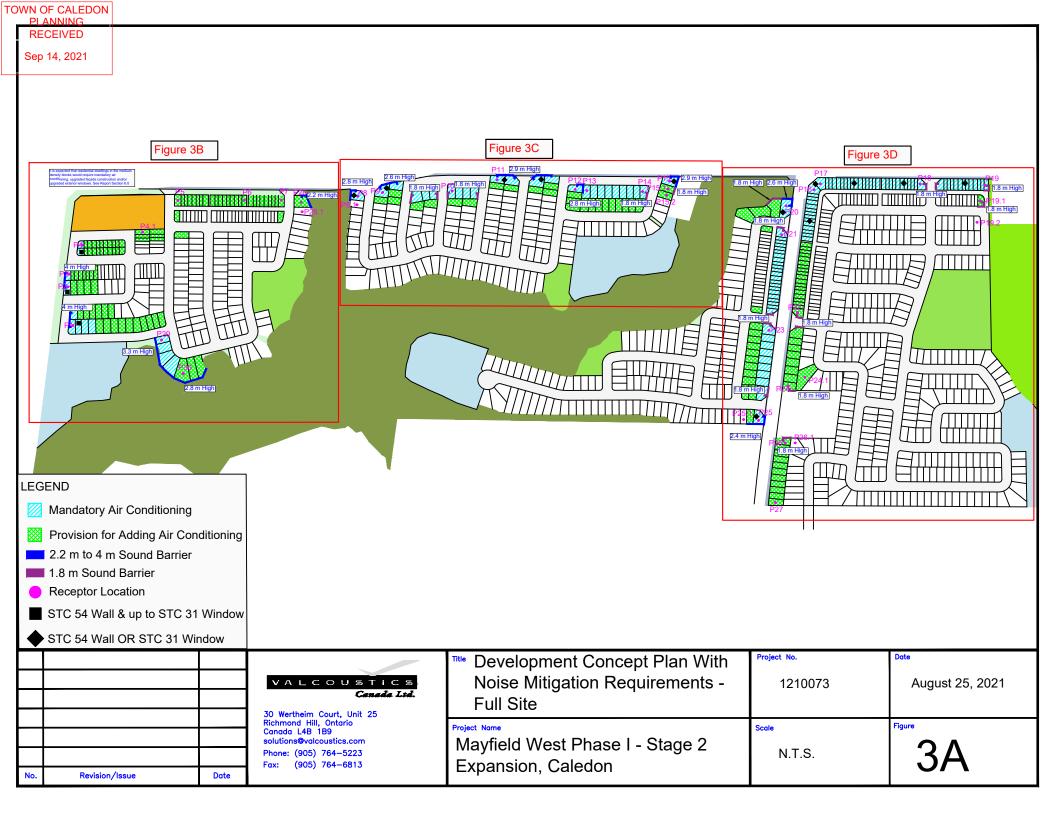
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Key Plan	1210
Project Name	Scale
Mayfield West Phase I - Stage 2 Expansion, Caledon	N.T.S

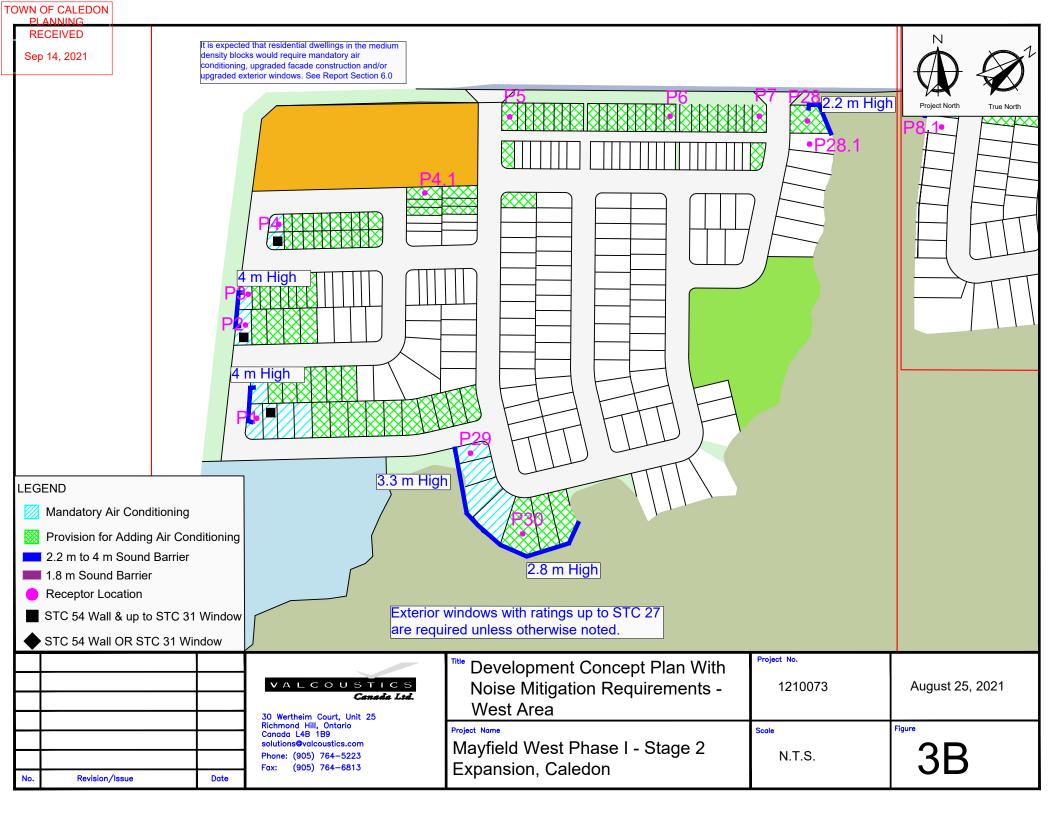
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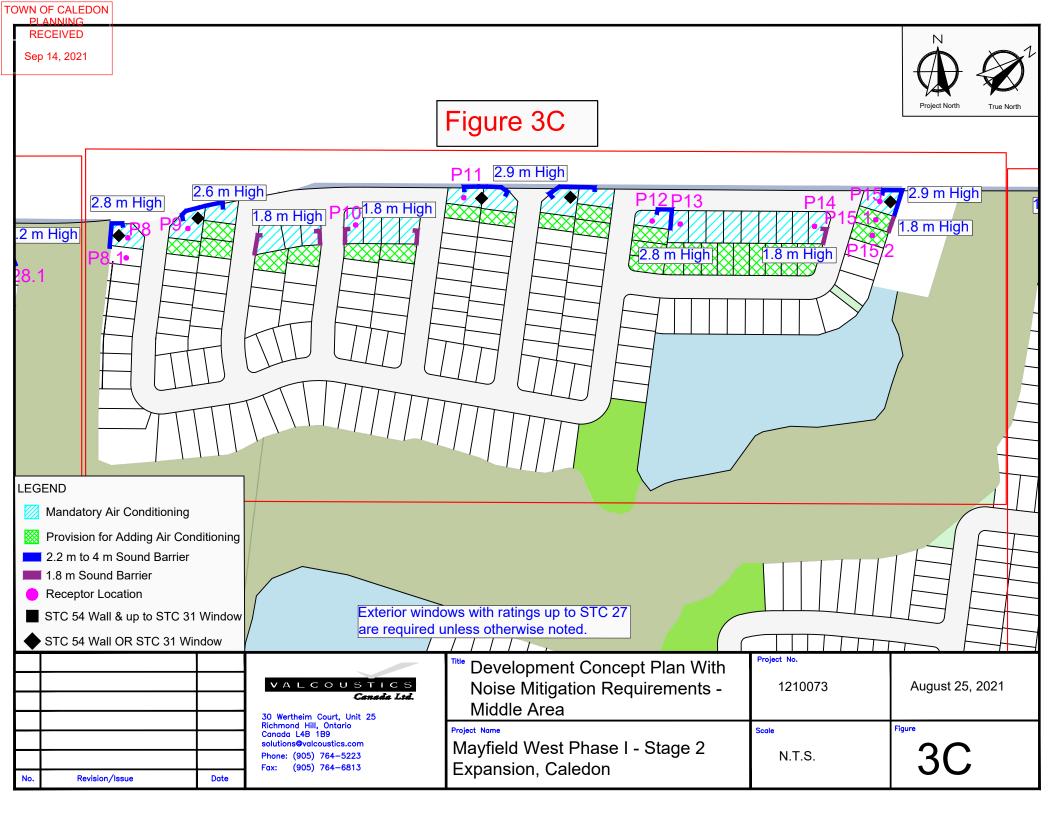
August 25, 2021

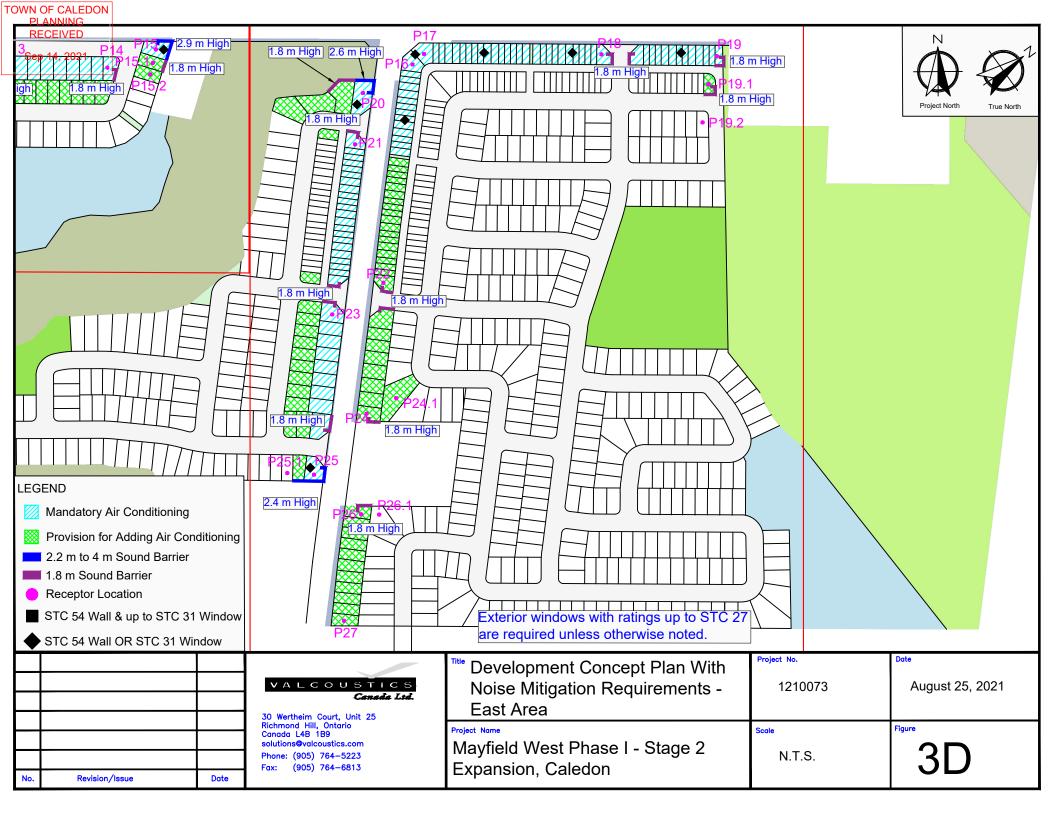
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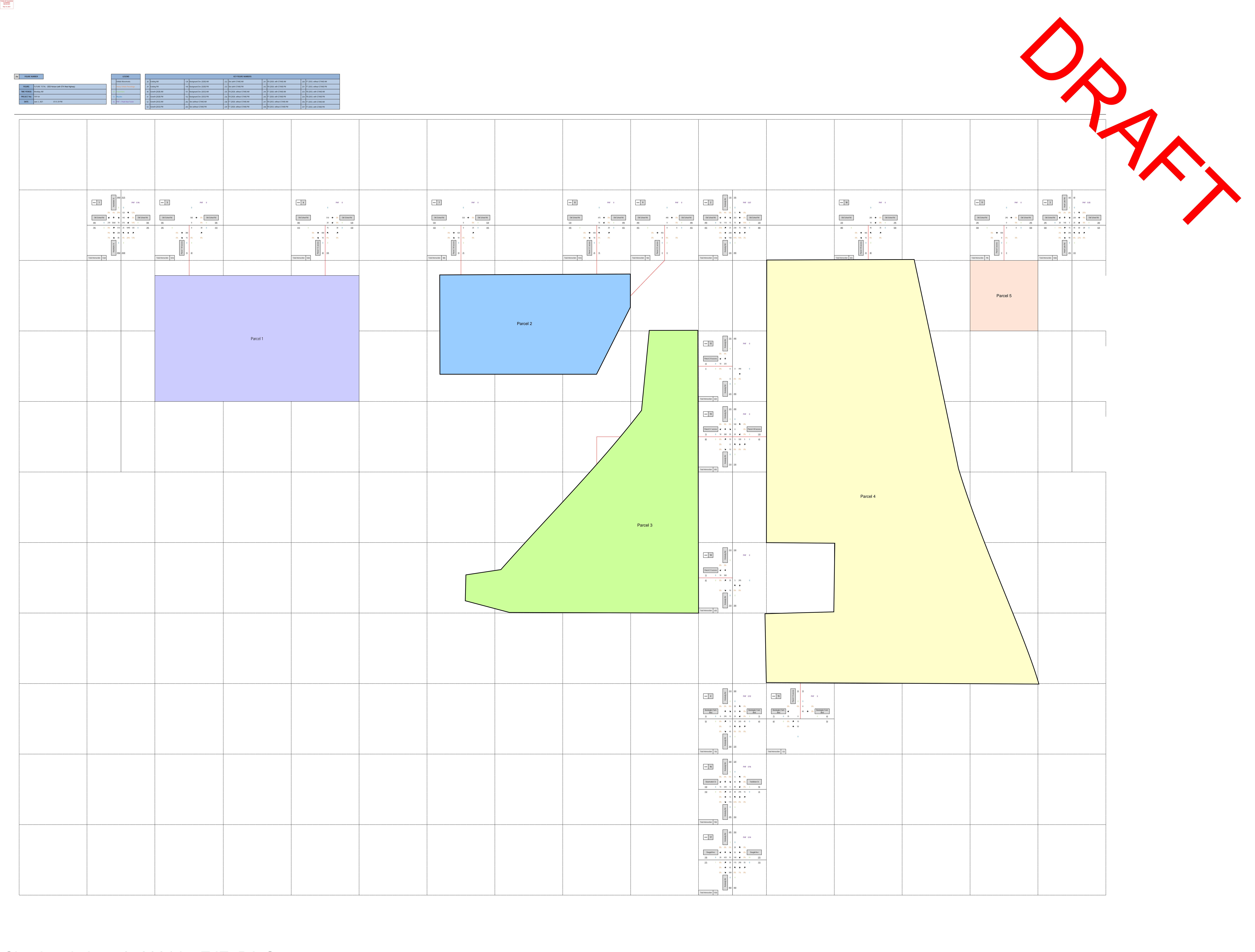


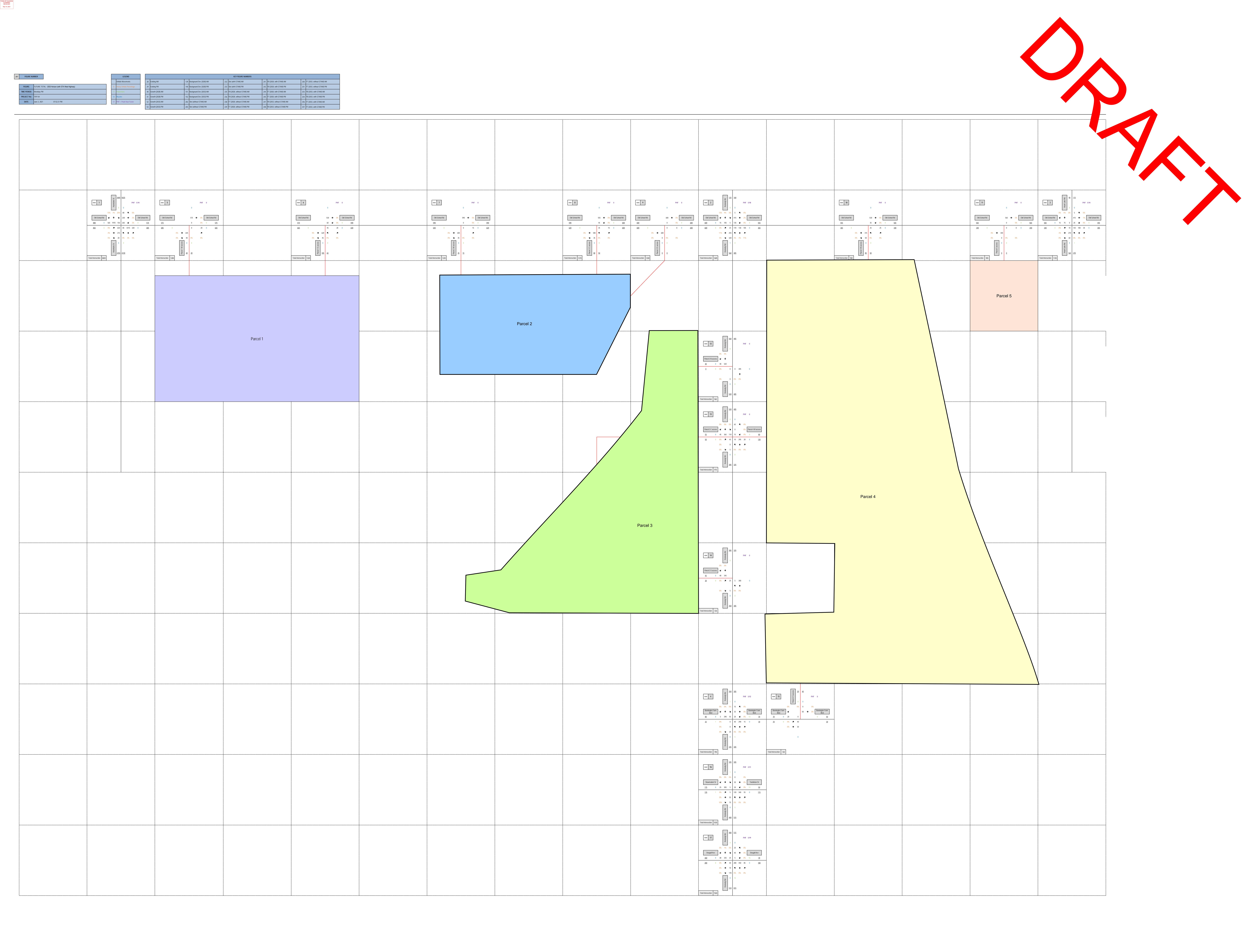


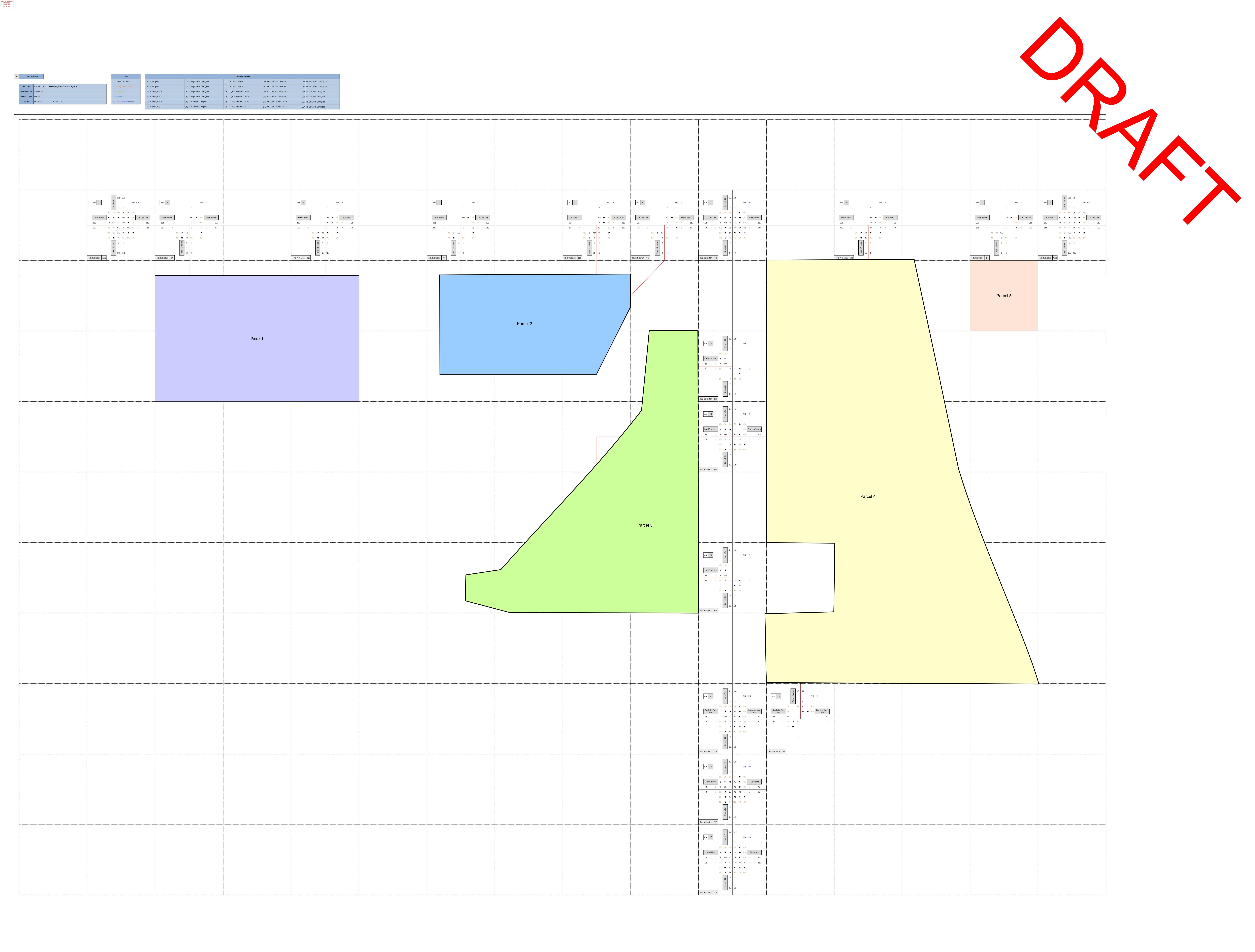


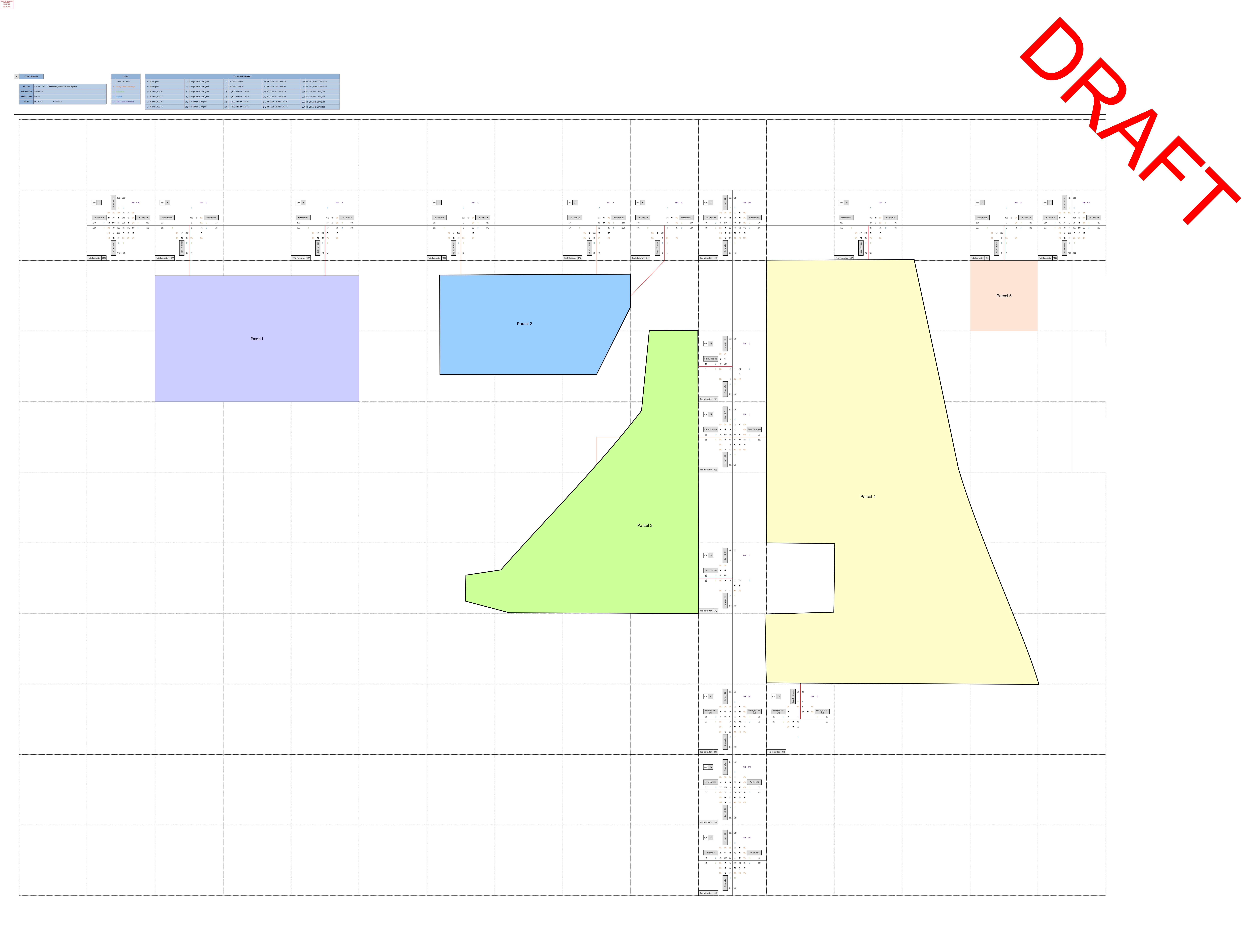


APPENDIX A ROAD TRAFFIC DATA









APPENDIX B ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

Reference: MECP Publication NPC-300, October 2013: "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning".

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road Rail Aircraft	07:00 to 23:00 07:00 to 23:00 24-hour period	45 dBA 40 dBA NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road Rail Aircraft	23:00 to 07:00 23:00 to 07:00 24-hour period	45 dBA 40 dBA NEF/NEP 5
Sleeping quarters	Road Rail Aircraft	07:00 to 23:00 07:00 to 23:00 24-hour period	45 dBA 40 dBA NEF/NEP 0
Sleeping quarters	Road Rail Aircraft	23:00 to 07:00 23:00 to 07:00 24-hour period	40 dBA 35 dBA NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30#
	Stationary Source Class 1 Area	07:00 to 19:00 ⁽¹⁾ 19:00 to 23:00 ⁽¹⁾	50° dBA 50° dBA
	Class 2 Area	07:00 to 19:00 ⁽²⁾ 19:00 to 23:00 ⁽²⁾	50* dBA 45* dBA
	Class 3 Area	07:00 to 19:00 ⁽³⁾ 19:00 to 23:00 ⁽³⁾	45* dBA 40* dBA
	Class 4 Area	07:00 to 19:00 ⁽⁴⁾ 19:00 to 23:00 ⁽⁴⁾	55° dBA 55° dBA

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SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of	Stationary Source		
Noise Sensitive Spaces	Class 1 Area	07:00 to 19:00 ⁽¹⁾	50* dBA
•		19:00 to 23:00 ⁽¹⁾	50* dBA
		23:00 to 07:00 ⁽¹⁾	45* dBA
	Class 2 Area	07:00 to 19:00 ⁽²⁾	50* dBA
		19:00 to 23:00 ⁽²⁾	50* dBA
		23:00 to 07:00 ⁽²⁾	45* dBA
	Class 3 Area	07:00 to 19:00 ⁽³⁾	45* dBA
		19:00 to 23:00 ⁽³⁾	45* dBA
		23:00 to 07:00 ⁽³⁾	40* dBA
	Class 4 Area	07:00 to 19:00 ⁽⁴⁾	60* dBA
		19:00 to 23:00 ⁽⁴⁾	60* dBA
		23:00 to 07:00 ⁽⁴⁾	55* dBA

may not apply to in-fill or re-development.

MECP Publication ISBN 0-7729-2804-5, 1987: "Environmental Noise Assessment Reference: in Land-Use Planning".

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	_	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

or the minimum hourly background sound exposure $L_{eq(1)}$, due to road traffic, if higher.

⁽¹⁾ Class 1 Area: Urban.

⁽²⁾ (3) (4) Class 2 Area: Urban during day; rural-like evening and night.

Class 3 Area: Rural.

Class 4 Area: Subject to land use planning authority's approval.

APPENDIX C
SAMPLE SOUND LEVEL CALCULATIONS

```
STAMSON 5.04 NORMAL REPORT
                                          Date: 19-07-2021 17:11:16
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT
                                Time Period: Day/Night 16/8 hours
Filename: p2.te
Description: P2 Plane of Window
Road data, segment # 1: Hurontario (day/night)
Car traffic volume : 58149/10262 veh/TimePeriod
Medium truck volume: 3230/570 veh/TimePeriod
Heavy truck volume: 3230/570 veh/TimePeriod
Posted speed limit: 90 km/h
Road gradient: 0 %
Road pavement: 1 (Typical asphalt or c
                                   veh/TimePeriod *
                         0 %
1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT): 64875
    Percentage of Annual Growth : 2.00
Number of Years of Growth : 8.00
                                        : 8.00
    Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 85.00
Data for Segment # 1: Hurontario (day/night)
Angle1 Angle2 : -90.00 deg Wood depth : -90.00 deg (No woods
Wood depth : 0 (No w
No of house rows : 0 / 0
Surface : 1 (Abso
Receiver source distance : 34.00 / 34.00 m
                                          (No woods.)
                                          (Absorptive ground surface)
Receiver height : 4.50 / 4.50 m
Topography
                                1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
Results segment # 1: Hurontario (day)
Source height = 1.50 \text{ m}
ROAD (0.00 + 73.06 + 0.00) = 73.06 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-
  -90 90 0.57 79.94 0.00 -5.58 -1.30 0.00 0.00 0.00 73.06
______
Segment Leq: 73.06 dBA
Total Leq All Segments: 73.06 dBA
Results segment # 1: Hurontario (night)
Source height = 1.50 m
ROAD (0.00 + 68.54 + 0.00) = 68.54 dBA
Anglel Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
  -90 90 0.57 75.42 0.00 -5.58 -1.30 0.00 0.00 0.00 68.54
Segment Leq: 68.54 dBA
Total Leg All Segments: 68.54 dBA
TOTAL Leg FROM ALL SOURCES (DAY): 73.06
```

(NIGHT): 68.54

```
STAMSON 5.04 NORMAL REPORT
                                                                                     Date: 11-08-2021 14:16:47
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT
Filename: p9 ola.te
                                                                   Time Period: Day/Night 16/8 hours
Description: P9 Outdoor Living Area Unmitigated
Road data, segment # 1: Old School (day/night)
Car traffic volume : 11220/1247 veh/TimePeriod *
Medium truck volume: 295/33 veh/TimePeriod *
Heavy truck volume: 295/33 veh/TimePeriod *
Posted speed limit: 80 km/h
Road gradient: 0 %
Road pavement: 1 (Typical asphalt or conditions)
                                                   0 %
1 (Typical asphalt or concrete)
 * Refers to calculated road volumes based on the following input:
         24 hr Traffic Volume (AADT or SADT): 11200
         Percentage of Annual Growth : Number of Years of Growth :
        Medium Truck % of Total Volume : 2.50
Heavy Truck % of Total Volume : 2.50
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Old School (day/night)
Angle1 Angle2 : -45.00 deg 90.00 deg Wood depth : 0 (No woods No of house rows : 0 / 0 (Absorptive Contraction of the contracti
                                                                                     (No woods.)
                                                                                       (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography
Topography
Reference angle
                                                                     1 (Flat/gentle slope; no barrier)
                                                       :
                                                              0.00
Results segment # 1: Old School (day)
Source height = 1.26 m
ROAD (0.00 + 62.41 + 0.00) = 62.41 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
 -45 90 0.66 69.70 0.00 -5.00 -2.29 0.00 0.00 0.00 62.41
 Segment Leq: 62.41 dBA
Total Leg All Segments: 62.41 dBA
Results segment # 1: Old School (night)
Source height = 1.26 \text{ m}
ROAD (0.00 + 55.90 + 0.00) = 55.90 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
    -45 90 0.66 63.18 0.00 -5.00 -2.29 0.00 0.00 0.00 55.90
 ______
Segment Leg: 55.90 dBA
Total Leg All Segments: 55.90 dBA
TOTAL Leg FROM ALL SOURCES (DAY): 62.41
                                                       (NIGHT): 55.90
```

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```
STAMSON 5.04 NORMAL REPORT
                                                      Date: 11-08-2021 14:20:12
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT
                                         Time Period: Day/Night 16/8 hours
Filename: p9 ola.te
Description: P9 Outdoor Living Area Mitigated
Road data, segment # 1: Old School (day/night)
Car traffic volume : 11220/1247 veh/TimePeriod *
Medium truck volume : 295/33 veh/TimePeriod *
Heavy truck volume : 295/33 veh/TimePeriod *
Posted speed limit : 80 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): 11200
     Percentage of Annual Growth : 2.00
Number of Years of Growth : 8.00
     Medium Truck % of Total Volume : 2.50
Heavy Truck % of Total Volume : 2.50
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Old School (day/night)
Angle1 Angle2 : -45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope;
Barrier angle1 : -45.00 deg Angle2 : 90.00 deg
Barrier receiver distance : 13.00 / 13.00 m
                                                       (Absorptive ground surface)
                                          2 (Flat/gentle slope; with barrier)
Barrier receiver distance : 13.00 / 13.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00
Results segment # 1: Old School (day)
Source height = 1.26 \text{ m}
Barrier height for grazing incidence
_____
Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Barrier Top (m)
        1.26 ! 1.50 !
                                              1.39 !
ROAD (0.00 + 55.33 + 0.00) = 55.33 \text{ dBA}
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
______
   -45 90 0.51 69.70 0.00 -4.55 -2.10 0.00 0.00 -7.72 55.33
Segment Leq: 55.33 dBA
Total Leg All Segments: 55.33 dBA
```

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Results segment # 1: Old School (night)

Source height = 1.26 m

Barrier height for grazing incidence

ROAD (0.00 + 48.81 + 0.00) = 48.81 dBA

Anglel Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-45 90 0.51 63.18 0.00 -4.55 -2.10 0.00 0.00 -7.72 48.81

Segment Leq: 48.81 dBA

Total Leq All Segments: 48.81 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.33

(NIGHT): 48.81