SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA21-001
REVISION 2

NOISE CONTROL FEASIBILITY STUDY
PROPOSED RESIDENTIAL SUBDIVISION
SUNDIAL HOMES (4TH LINE) LIMITED
TOWN OF MILTON

SUBMITTED TO:

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NOISE CONTROL FEASIBILITY STUDY-REVISION 2
PROPOSED RESIDENTIAL SUBDIVISION
SUNDIAL HOMES (4TH LINE) LIMITED
TOWN OF MILTON

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1.0 INTRODUCTION

1.1 The services of SS Wilson Associates (SSWA) were retained by Sundial Homes (4th Line) Limited to prepare a Noise Control Feasibility Study for the proposed development located at the north-west corner of Britannia Road and James Snow Parkway in the Town of Milton.

As advised by the study team, Block 306, referred to as 'Major Node' on the drawings, will be the subject of a future Site Plan application, and as such, has been excluded from this study.

The objective of this report is to support an application for Draft Plan Approval of the proposed development.

1.2 The site is bounded by the following land uses:

- to the north by future developments
- to the south by Britannia Road
- to the east by James Snow Parkway
- to the west by existing residential dwellings, and furthermore by 4th Line.

The location of the site is shown in Figure 1. Project north is illustrated in Figures 2 to 4.

1.3 Major features of the development are defined by the Draft Plan drawing prepared by KLM Planning Partners Inc., Project no. P-2181, dated February 7, 2023.

1.4

Figure 2a illustrates the general layout of the proposed development.

1.5 Major surface transportation noise sources (current and future) of concern to the development are:

1. James Snow Parkway
2. Britannia Road
3. 4th Line
4. Internal Collector Roads

1.6 There are no nearby stationary noise sources of concern for the proposed development.

1.7 The proposed development is located outside the 25 NEF/NEP contour lines prepared by Transport Canada; therefore, aircraft noise is not considered a problem.

1.8 The scope of this report is to define the minimum noise attenuation requirements for the control of outdoor and indoor environmental sound levels.

1.9 Revision 1 dated March 17, 2021 was based on the Draft Plan of Subdivision drawing prepared by KLM Planning Partners Inc., Project No. P-2181 Drawing no. 21:2, dated March 17, 2021, as well as Halton Region's comments dated February 2, 2022. The revisions made to the noise study were detailed in the accompanying cover letter, dated March 17, 2022.

1.10 This Revision 2 is based on the updated drawings referenced in Section 1.3 above. The details of the revisions are outlined in the accompanying cover letter dated March 1, 2023.

2.0 SUMMARY AND RECOMMENDATIONS

2.1 SUMMARY

Based on the analysis conducted in this investigation it is concluded that:

1. The unattenuated daytime sound levels in the Outdoor Living Areas (OLAs)[1] of some of the residential dwellings will exceed the recommended objective sound level. For these dwellings, outdoor noise control measures are required along with relevant warning clauses. All other dwellings on the development will have acceptable outdoor sound levels in their OLAs and, therefore, no outdoor noise control measures need be considered.

2. The Common Outdoor Living Area (Common OLA) for the proposed development to be located on Block 311, i.e., the 'Village Square', will have an acceptable sound level. Therefore, no outdoor noise control measures are required for this area.

3. As confirmed by the Proponent, the following are the assumed locations of the Outdoor Living Areas for the various dwelling types:
   - Single detached dwellings - conventional ground-floor backyards
   - Street Townhouses - conventional ground-floor rear yard amenities
   - Dual Frontage Townhouses- no outdoor amenity areas for the mid-block units (i.e., only sodded areas beside driveways), side yards for the end units only
   - Back-to-back Townhouses - no outdoor amenity areas

   In addition, there are no terraces/balconies greater than 4m in depth and therefore, are not subject to assessment as per MECP guidelines.

4. The unattenuated sound levels at the outside walls of some of the dwellings will exceed the recommended objective sound levels. Indoor noise controls are required for these dwellings along with relevant warning clauses. All other dwellings on the development will have acceptable indoor sound levels. Therefore, noise control measures are not required.

5. Although the projected sound levels are predicted to be above the sound level criteria outlined in Section 3, it is feasible to control sound levels within the outdoor and indoor areas of the proposed development to meet the stated criteria.

[1] At times, it may also be referred to as Outdoor Amenity Areas. The size of an OLA is subject to municipal standards and other project requirements (except when classified as a balcony along with other applicable MECP rules).

2.2 RECOMMENDATIONS

As unit numbers within townhouse blocks are not yet available, for the purposes of this report, unit numbers have been assigned to some of the blocks as illustrated in Figures 3a and 3b.

A summary of the minimum noise attenuation requirements is presented in Table 1. Detailed description is as follows:

1. Outdoor Noise Control Measures

- **Lots: 168, 169, 170 and 187**
- **Blocks: 290 (Unit 1), and 291 (Unit 4)**

a. Acoustical barriers should be constructed to shield the Outdoor Living Areas for the above-noted locations with the following details:

   (i) Barriers should be constructed along the alignments shown schematically in Figures 3a and 3b.
   (ii) The required barrier heights as shown in Figures 3a and 3b could be as high as 3.5m.
   (iii) Barriers may consist of an earth berm, a fence or a combination thereof. The fence component to be constructed of a durable material having approximately 20 kg/m^2 (Ξ 4 lb/ft^2) of surface area and be in a continuous line without openings or gaps.
   (iv) The Builder/Contractor should be required to seek approval, including shop drawing approvals of the detailed construction of the proposed barriers prior to its installation and the approval of the Engineer shall cover: material/wood species, construction details, support details, arrangements of the panels and exact locations on a development plan.

b. Since final grading plans are not available at this stage, the barrier heights are based on the assumption that the ground elevations at the road, the base of the barrier and the receiver are all equal. The ground elevations are all assumed to be 0m in this case until such time as the grading plans become available.

   Accordingly, a Detailed Noise Control Study should be undertaken prior to final approval of the specified locations requiring a barrier to define specific barrier alignments and heights based on the final grading plans.

   It is also the responsibility of the developer/builder responsible for final design and construction of the sound barriers to ensure that the correct barrier elevation details are secured from the Acoustical Engineer prior to planning and construction of the specified barriers.

As per the Region's direction, the following warning clause shall be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of all units adjacent to an acoustic barrier that is to be owned by the Region:

"A noise barrier has been constructed adjacent to this lot. The noise barrier will need to be maintained in good condition (pre-existing barrier height and material) by the property owner (Builder) until such time as the subdivision has been assumed by the local municipality. Once assumed, the ownership and future maintenance will become the responsibility of the Regional Municipality of Halton. Halton Region will require, from time-to-time access to this lot/block in order to maintain this noise barrier. An easement has been placed on this lot/block to permit maintenance access to the noise barrier."

2. Air Conditioning

- **Lots: 167 to 172, and 185 to 187**
- **Blocks: (all units inclusive): 278 to 281, 285, 286, 290, 291, 295, 298, 299 and 309**

The above noted properties should be equipped with central air conditioning systems with their condensing units to be located in noise insensitive locations, which can be placed on the ground floor or on elevated balconies/terraces. The sound levels of the outdoor condensing units should meet the MECP's the maximum sound level, L_{AS} of 50 dBA[2] at the neighbour's closest point(s) of reception, i.e., at their ground-based outdoor areas as well as the closest window on any floor level as outlined in MECP publication NPC-216 and other levels specified by the municipality. The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*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*".

Where the air conditioning units are bracket-mounted on walls or come in direct contact with the building structure, they should be mounted on neoprene/rubber isolation supports or pads that are rated to provide minimum 0.2" static deflection.

[2] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s). It should be noted that L_{AS} of 55 dBA is acceptable only for cases where the A/C unit is placed in a high ambient location (i.e. with a direct line of sight to a major roadway).

It is also our strong recommendation that the necessary detailed technical analysis be performed prior to submitting an application for Building Permit to optimize the required air conditioning unit noise rating/specification and their acceptable placements in order to meet the Provincial sound level standards at the closest receptors (i.e., a maximum sound level L_{AS} of 50 dBA[3] at the neighbour's closest point(s) of reception within their ground-based outdoor areas as well as at the closest window on any floor level) after taking into consideration the specific property design and proposed A/C unit location. Other A/C noise/vibration control measures, where required to meet the sound level criteria at the point(s) of reception, should also be identified and shown on the applicable permit drawings /specifications. Where the condensing units are bracket-mounted on walls, they should be mounted on neoprene/rubber isolation supports or pads that are rated to provide minimum 0.2" static deflection**.**

The Analysis Section in this study provides additional important details on the application of air conditioners.

3. Provision for Air Conditioning

- **Lots: 1, 23 to 35, 52, 58, 64, 70 to 77, 101, 114, 115, 140 to 166, 173 to 184, 202, 203, 212 to 225, 250, and 251**
- **Blocks: (all units inclusive): 188 to 194, 267, 268, 272 to 277, 282 to 284, 287 to 289, 292 to 294, 296, 297, 300 to 302, 307, and 308**

The above noted properties should be equipped with a ducted forced air heating system: furnace/fan, supply air plenum, and duct work. The components are to be appropriately situated and sized to accommodate future installation of central air conditioning systems. The provision for future air conditioning should also include the installation of the necessary rough-in work such as a floor drain for the condensate, appropriate electrical power supply, thermostat control wiring and a capped sleeve in the exterior wall for future refrigeration tubing in an approved location (Installation cost of the air conditioning system is an option to the developer/builder as they see fit).

Where the air conditioning units are bracket-mounted on walls or come in direct contact with the building structure, they should be mounted on neoprene/rubber isolation supports or pads that are rated to provide minimum 0.2" static deflection.

If the purchaser/occupant does not take the central air conditioning option, the

[3] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s). It should be noted that L_{AS} of 55 dBA is acceptable only for cases where the A/C unit is placed in a high ambient location (i.e. with a direct line of sight to a major roadway).

following clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"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 in low and medium density developments 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. This dwelling unit has been fitted to include a fan forced heating system, suitably sized ducts, plenum, electrical power wiring, thermostatic control wiring, a nearby floor drain, etc. Future installation of the air conditioning system should meet the Ministry of the Environment, Conservation and Parks criteria in Publication NPC-216 (a maximum sound level LAS of 50 dBA at the neighbour's closest point(s) of reception, i.e., at their ground-based outdoor areas as well as at the closest window on any floor level) and other applicable levels specified by the municipality."

4. <u>Warning Clause</u> *4

For Transportation Noise:

- **Lots: 1, 23 to 35, 52, 58, 64, 70 to 77, 101, 114, 115, 140 to 172, 173 to 187, 202, 203, 212 to 225, 250, and 251**
- **Blocks: (all units inclusive): 188 to 194, 267, 268, 272 to 302, 307 to 309**

The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"Purchasers/tenants are advised that this development and associated blocks/units are directly adjacent/in close proximity to a Regional road. Halton Regional roads are classified as major arterial roadways and as such: Serve mainly inter-regional and regional travel demands; May serve an Intensification Corridor; Accommodate all truck traffic; Accommodate higher order transit services and high occupancy vehicle lanes; Connect Urban Areas in different municipalities; Carry high volumes of traffic; Distribute traffic to and from Provincial Freeways and Highways; Accommodate active transportation. Truck traffic is permitted on all Regional roads and is one of the functions of the Regional road network. Therefore, despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic will interfere with some activities of the dwelling occupants, including any raised patio and/or balcony, as sound levels exceed the sound level limits of the Municipality and the Ministry of Environment, Conservation and Parks."

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*4 Reference should be made to Bulletin No. 91003, Environmental Warnings/Restrictions, Ontario Ministry of Consumer and Commercial Relations.

For Units with Balcony:

The following Warning Clause should be registered in all Development Agreements and Offers of Sale and Purchase or Lease of these properties having a balcony:

"*Purchasers/tenants are advised that despite the inclusion of noise control features within this development and within the dwellings, sound levels from increasing road traffic will continue to be of concern as the levels in the balcony exceed the Ministry of the Environment, Conservation and Parks criteria and that protected Common Outdoor Living Area meeting the Ministry sound level criteria has been provided within the development".*

For Nearby School:

- **Lots: 23 to 34, 141, 224, 225, 250, and 251**
- **Blocks: 267 (Unit 1), 268 (Unit 8), 302 to 305 (all units inclusive)**

The following Warning Clause should be registered in all Development Agreements and Offers of Sale and Purchase or Lease of these properties having a balcony:

"*Purchasers/tenants are advised that this dwelling unit is in proximity to a proposed Elementary School. Sound levels from the nearby school may at times be audible".*

5. <u>Building Acoustic Insulation</u>

- **Lots: 167 to 172, and 185 to 187**
- **Blocks: (all units inclusive): 188 to 194, 267, 268, 272 to 277, 282 to 284, 287 to 289, 292 to 294, 296, 297, 300 to 302, 307, and 308**

All exterior building components (walls, windows and doors) should meet the minimum Acoustic Insulation Factors (AIF) shown in Tables 3 and 4. All windows should be well fitted and weather-stripped.

It is also the responsibility of the developer/builder responsible for final design and construction of the subject dwellings to ensure that the correct windows, walls and doors acoustic specifications are secured from the Acoustical Engineer prior to planning and construction of the noted dwellings.

Typical Acoustic Insulation Factors (AIF) are shown in Tables 3 and 4. The Detailed Noise Control Study should provide complete and specific tabulations of AIFs for all properties affected.

6. Required Sections and Details

Typical cross sections should be prepared and submitted in due course by the Consulting Engineers responsible for preparation of the site grading and drainage plans based on the final approved elevations. The sections should typically include existing and proposed future dwelling grade elevations, source, receiver and barrier/berm ground elevations, berm slopes, drainage provisions, etc.

7. Implementation Procedures

The following is a summary of the generally recommended procedures for implementation as per the MECP requirements:

a) Prior to final approval of this development, a Detailed Noise Control Study, or an upgraded noise study should be required to take into consideration the following:
   - The proposed detailed grading plans
   - Possible proposed dwelling locations
   - The exact distances to all sources of concern
   - Final/approved sound barrier locations as well as barrier height-sound level alternatives
   - Other relevant conditions to noise in the Development Agreement

b) The Development Agreement(s) should include the details of all the necessary noise control measures and procedures as outlined herein this noise study to the satisfaction of all concerned parties.

c) Prior submission of the project plans for Building Permit, the Builder's plans, with respect to the units requiring noise control measures as referred to earlier, should be certified by an Acoustical Engineer as being in conformance with the recommendations of the Detailed Noise Control Study as approved and/or amended by the authorities having jurisdiction.

   The barrier certification should include approval of the sound barrier shop drawings (showing the barrier material/wood species, construction details, support details, arrangements of the panels and exact locations on a development plan, height, and material composition) if applicable.

d) Prior to their final inspection and release for occupancy, these dwellings should be certified by an Acoustical Engineer as being in compliance with the recommendations of the Detailed Noise Control Study.

e) For the partial lots shown in the north-east corner of the Draft Plan, i.e., Blocks 307 to 309, while it has been determined that any dwellings on these

lots will required air conditioning systems as a result of the environmental traffic noise, the details of the outdoor noise controls should be deferred to a later stage in the project once the details of the dwellings orientations have been finalized. It is recommended that a Detailed Noise Control Study for these lots be performed prior to the Building Permit stage.

Noise control measures may include one or a combination of measures with the intent of meeting the MECP and the OBC/ASHRAE requirements for noise as outlined in MECP Publication NPC-205 and the ASHRAE Guidelines. The guidelines in question deal with the transfer of the outdoor noise from the outside into the residential units, as well as the potential for transfer of the indoor equipment vibration and sound levels through the structure itself.

In view of the fact that municipal implementation procedures of the noise control measures recommended herein may differ, it is the responsibility of the developer/builder responsible for final design and construction of the subject structures/dwellings to ensure that the correct details related to the noise control measures referred in this report, such as sound barriers, building shell component specifications (windows, walls, doors, and others), air conditioning noise control technical requirements, etc. are secured from the Acoustical Engineer prior to planning and construction of the noted dwellings.

3.0 SOUND AND VIBRATION LEVEL CRITERIA

3.1 SURFACE TRANSPORTATION CRITERIA[5]

The surface transportation noise is based on the objective sound levels recommended by the Ministry of the Environment, Conservation and Parks (Ref: MECP Publication NPC-300 "Environmental Noise Guideline, Noise Assessment Criteria for Stationary Sources and for Land Use Planning, 2013") and applicable Regional/Municipal sound level standards and procedures for different land uses and spaces.

The following is a summary of the applicable sound level criteria for surface transportation sources for the shown time periods (day=d & night=n):

Sound Level Limits for Outdoor Living Areas (OLAs)

AREA & TIME PERIOD	$L_{Aeq(day)}$ ROAD AND RAIL (dBA)
Designated (Individual or common) Outdoor Living Areas (16 hr day, 07:00 - 23:00)	$L_{Aeq(day)}$ 55[6]

Indoor Sound Level Limits

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc. (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Living/dining, den areas of residences, hospitals. nursing homes, etc. (except schools or daycare centres) (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

[5] Road, rail and rolling stock traffic.
[6] It is recognized that the MECP sound level objective for new residential developments is 55dBA within the Outdoor Living Area. However, the MECP is on record of accepting sound levels in the OLAs of up to 60dBA with the use of the appropriate warning clauses.

Additional Supplementary (Best Management Practices) Sound Level Criteria Recommended for Other Uses

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
General offices, reception areas, retail stores, etc. (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 50	$L_{Aeq(day)}$ 45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semiprivate offices, conference rooms, reading rooms, etc. (Time period-day: 16 hr, 23:00 - 07:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters of hotels/motels (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

The criteria for acceptable outdoor and indoor sound levels are based on "free-field" predicted and/or measured sound levels at the applicable receiver locations, thus the effects of sound reflections and reverberant sound fields are not considered.

If the sound level is less than or equal to the sound level criteria, no control measures will be required.

The outdoor sound levels ***may*** exceed the outdoor sound level criterion by up to 5 decibels, provided that it can be demonstrated that it is not technically, economically or administratively feasible to achieve the criterion and that the occupants are informed of a potential disturbance due to the excess noise by means of a warning clause or cautionary note to be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease.

Central air conditioning is required when the daytime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(day)}$ 16 hrs of 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 60 dBA.

Forced air ventilation (with provision for future installation of a central air conditioning system) is required when the daytime sound level at the outside wall of any habitable room containing windows an exceeds $L_{Aeq(day)}$ 16 hrs of 55 dBA but is less than or equal to 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 50 dBA but is less than or equal to 60 dBA.

Application of Criteria

The following table summarizes the requirements for noise control measures for the various sound level ranges:

SOURCE OF NOISE	DAYTIME SOUND LEVEL $L_{Aeq(day)}$	NIGHTTIME SOUND LEVEL $L_{Aeq(night)}$	AIR CONDITIONING	FORCED AIR VENTILATION WITH PROVISION FOR FUTURE AIR COND.	WARNING CLAUSE	ACOUSTIC INSULATION
ROAD	<=55	<=50	-	-	-	-
	>55 & <=65	>50 & <=60	-	Yes	Yes "Type C"	-
	>65	>60	Yes	-	Yes "Type D"	Yes
RAIL	<=55	<=50	-	-	-	-
	>55 & <=60	>50 & <=55	-	Yes	Yes "Type C"	-
	>60 & <=65	>55 & <=60	-	Yes	Yes "Type C"	Yes
	>65	>60	Yes	-	Yes "Type D"	Yes

4.0 ANALYSIS

4.1 TRANSPORTATION SOURCES OF NOISE

The relevant road and traffic data were obtained from the Town of Milton and Halton Region and are summarized below:

- **James Snow Parkway**

Current No. of Lanes	2
Future No. of Lanes	6
Posted Speed Limit (assumed)	70km/hr.
Future Speed Limit	70km/hr.
Ultimate AADT	52,000vpd
Total Truck Percentage – Medium Truck Split – Heavy Truck Split	6% 3% 3%
Day (16 hrs.)/Night (8 hrs.) Split	90%/10%
Directional Traffic Split (assumed)	50%/50%
Road Gradient (assumed)	2%

- **Britannia Road**

Current No. of Lanes	2
Future No. of Lanes	6
Posted Speed Limit (assumed)	70km/hr.
Future Speed Limit	70km/hr.
Ultimate AADT	42,000vpd
Total Truck Percentage – Medium Truck Split – Heavy Truck Split	10% 5% 5%
Day (16 hrs.)/Night (8 hrs.) Split	90%/10%
Directional Traffic Split (assumed)	50%/50%
Road Gradient (assumed)	2%

In addition to the proposed road widening indicated in the table above, the alignment of the western half of Britannia Road between Fourth Line and James Snow Parkway will be shifted southward, away from the proposed development, and will cross Fourth Line at a more southerly point than the present alignment. The proposed road alignment is partially shown on the Draft Plan of Subdivision drawing.

- **4th Line**

Current No. of Lanes	2
Future No. of Lanes	2
Posted Speed Limit	60km/hr.
Future Speed Limit	50km/hr.
Future AADT (Year 2026) – Annual Growth Rate (assumed) – Number of Years of Growth (assumed)	4,760vpd 2.5% 10 years
Total Truck Percentage – Medium Truck Split (assumed) – Heavy Truck Split (assumed)	2% 1% 1%
Day (16 hrs.)/Night (8 hrs.) Split	90%/10%
Directional Traffic Split (assumed)	50% to 50%
Road Gradient (assumed)	2%
Current R.O.W.	20m
Future R.O.W.	20m

- **Future East/West Collector Road (Logan Drive)**

Future No. of Lanes	2
Future Posted Speed Limit	50km/hr.
Future AADT (Year 2026) – Annual Growth Rate (assumed) – Number of Years of Growth (assumed)	7,900vpd 2.5% 10 years
Total Truck Percentage (medium trucks)	2%
Day (16 hrs.)/Night (8 hrs.) Split (assumed)	90%/10%
Directional Traffic Split (assumed)	50% to 50%
Road Gradient	0.5 to 5%

- **Future North/South Collector Road (Trudeau Drive)**

Future No. of Lanes	2
Future Posted Speed Limit	50km/hr.
Future AADT – Annual Growth Rate (assumed) – Number of Years of Growth (assumed)	2,300vpd 2.5% 10 years
Total Truck Percentage (medium trucks)	2%
Day(16 hrs.)/Night(8 hrs.) Split (assumed)	90%/10%
Directional Traffic Split (assumed)	50% to 50%
Road Gradient	0.5 to 5%

Appendix A contains the relevant road traffic data used in this study.

4.2 OUTDOOR NOISE ENVIRONMENT

Sound level predictions were carried out based on MECP's ORNAMENT sound level prediction modeling procedures[7] (Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, 1989).

Overall sound levels at the OLAs of the selected representative receptor locations are shown in Table 2. Sample sound level calculations at representative receptor locations are presented in Appendix B.

In consideration of the calculations, it is concluded that for the following receptor locations, the unattenuated daytime sound levels in the designated OLAs will exceed 60 dBA, the maximum criteria levels allowed. Therefore, outdoor noise control measures are required for these properties:

- **Lot: 169, 170 and 187**
- **Blocks: 290 (Unit 1), and 291 (Unit 4)**

In communications between the study team and the Region, it has been advised that: "*While the Region prefers that the acoustic barriers target a noise level reduction closer to 55dBA, this would result in greater heights for the acoustic barriers. Therefore, the Region recommends that the heights for the recommended acoustic barriers fronting Britannia Road and James Snow Parkway be selected as to achieve a noise level reduction to 57 dBA, so long as the acoustic barrier height does not exceed 3.5m".*

As such, sound levels have been attenuated to 57 dBA, to a maximum of 3.5m high sound barriers. It should be noted that if the sound levels at the OLAs are attenuated to the MECP's objective sound level of 55 dBA, barrier heights of up to 4.4m will be required. Table 5 identifies the various barrier height alternatives to achieve sound levels between 55 and 60 dBA.

For the receptor locations along Collector Road/Street 1, the unattenuated daytime sound levels in the designated OLAs are predicted to below the Ministry's maximum allowable sound level limit of 60dBA, therefore, as per the MECP's guidelines, sound barriers are not required and a warning clause will suffice.

For the dual frontage townhouses, small outdoor amenity spaces are proposed for the front yards and alongside the driveways. Such areas will be minimal sodded areas for which sound barriers are not feasible. In consideration of the above, and the fact that these dwelling units will have balconies, assessments for the mid-block townhouse units were not undertaken.

[7] The MECP's noise prediction models ORNAMENT and STEAM have a limitation as to the minimum AADT value for 24-hour traffic volume (calculated for the daytime and nighttime hourly volume). When the AADT value is less than 40 vph, there is a neutral mathematical manipulation that can be used as long as the hourly traffic volume is not very low. The manipulation is implemented by multiplying the traffic volume by any reasonable factor (for example a factor of 10) and then by deducting 10 x log "factor" from the results (in this case, 10 x log 10=10).

The Common OLA for the proposed development, i.e., the 'Village Square', will have an acceptable sound level. Therefore, no outdoor noise control measures are required for this area.

In consideration of the calculations, it is concluded that for all other receptor locations, the unattenuated daytime sound levels in the designated OLAs will not exceed the objective level of L_{Aeq} 55dBA, therefore outdoor noise control measures are not required for these properties.

Barrier height calculations for the receptors of concern are included in Appendix B. Barrier alignments are as shown in Figures 3a and 3b.

4.3 INDOOR NOISE ENVIRONMENT

The criteria for indoor L_{Aeq} sound levels are based on projected L_{Aeq} levels at the outside face of the dwellings with appropriate assumptions for the differences between the outdoor and indoor sound levels. If the outside L_{Aeq} levels do not exceed the recommended objective sound levels, then the indoor L_{Aeq} levels will not be exceeded, assuming standard building construction and operable windows.

Overall daytime sound levels at the building facades are shown in Table 3 and the overall nighttime sound levels at the building facades are shown in Table 4.

In consideration of the estimated sound levels and by comparison to the acceptable indoor sound level criteria (Section 3) the following is concluded:

- The sound levels at the outside walls of the following receptors (within any habitable room on any floor) is predicted to exceed $L_{Aeq(day)}$ 65 dBA and/or $L_{Aeq(night)}$ 60 dBA respectively:

  - **Lots: 167 to 172, and 185 to 187**
  - **Blocks (all units inclusive): 278 to 281, 285, 286, 290, 291, 295, 298, 299 and 309**

  Therefore, central air conditioning is required.

- The daytime/nighttime noise environment at the outside walls of the following receptors (within any habitable room on any floor) is predicted to be in the range of $L_{Aeq\ day}$ 56-65 dBA and/or $L_{Aeq\ night}$ 51-60 dBA:

  - **Lots: 1, 23 to 35, 52, 58, 64, 70 to 77, 101, 114, 115, 140 to 166, 173 to 184, 202, 203, 212 to 225, 250, and 251**
  - **Blocks (all units inclusive): 188 to 194, 267, 268, 272 to 277, 282 to 284, 287 to 289, 292 to 294, 296, 297, 300 to 302, 307, and 308**

Forced-air heating system with provision for central air conditioning is therefore required.

All other receptors will have a sound level equal to or less than $L_{Aeq(day)}$ 55 dBA and/or $L_{Aeq(night)}$ 50 dBA and therefore no noise control measures need be considered. Typical Acoustic Insulation Factors (A.I.F.) are summarized in Tables 3 and 4.

For roadway noise, since the projected highest L_{Aeq} (day) sound level will be lower than or equal to 65 dBA and/or the projected highest L_{Aeq} (night) sound level will be lower than or equal to 60 dBA, the levels will not be of concern to warrant the use of special glazing or building components[8].

Additional Notes Regarding Air Conditioning Systems in Apartment Buildings

Based on the Sound Level Criteria and the established future sound levels, it was concluded that some of the dwelling units in the apartment building(s) within the proposed development may require air conditioning and/or provision for future installation of air conditioning.

There are several techniques available to air condition apartment units using either a system central to the entire building or alternatively each apartment unit would have its own central system including the indoor fan and the outdoor condensing unit.

As it is not the subject of this report to discuss the specifics of all systems that may be used, the following comments are offered, to assist the proponent, the Mechanical Engineer and the Contractor in appreciating the acoustical problems and concerns associated with some of the commonly available commercial air conditioning systems:

1. The location and the design of the central system (cooling tower, condensing unit, openings in mechanical rooms, etc.) are important elements that must be checked by the Mechanical Engineer in order to achieve the stated outdoor and indoor sound level criteria.
2. Air conditioning units central to each individual apartment unit must also be designed by the Mechanical Engineer to meet the objective sound levels. If split-systems are used, then the sound power level of the outdoor units should be selected to avoid impacting the outdoor living areas and the windows of habitable spaces. Other noise control measures available include quieter makes, the use of other forms of sound barriers, etc. If through the wall incremental units are used, then the selected incremental units should have the following features in order to reduce the transmission of high outside noise levels into the suites:

[8] Therefore, the highest daytime AIF will be equal to or lower than 32 and the highest nighttime AIF will be equal to or lower than 27 assuming 3 components.

a) The partition in the heating/cooling chassis should be of the acoustically sealed type (this partition separates the outdoor and indoor components).
b) The unit should preferably be of the insulated “double casing design”.
c) The interior of the unit should be acoustically lined.
d) The perimeter of the sleeve should be caulked all around with acoustical sealant.
e) The unit may be placed through the living room wall and acoustically lined ducts extended to the adjoining bedroom or dining room in accordance with manufacturers recommendations.

4.4 TYPICAL WINDOW / WALL CONSTRUCTION

As the detailed architectural plans for Building Permit submission are not available at this time, it is not possible to specify the window and wall details to meet the AIF requirements presented in Tables 3 and 4. Further detailed analysis should be undertaken based on the data presented in this Report to take into consideration the final room location, floor area, window type (operable or fixed), window size and orientation, etc. Such analysis is required by the MECP and the municipality prior to submission for building permits as part of their Certification process.

It must be pointed out that there are several factors affecting the final glass selection including:

1. Size of window.
2. Room dimensions.
3. Floor level and direction room faces.
4. Fixed or operable glass.
5. The number of building components.
6. Type of wall to be used.
7. Projected sound levels outside the window
8. The choice of “laminated” window glazing in one or two of the window panes.

For the calculation of type of windows required for each dwelling, a detailed description of each unit is required.

As an example, for a typical unit with daytime outdoor sound level of 72 dBA, the AIF value for the Living Room will be 34 assuming 3 components. If the window to floor ratio is 32%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the following:

Double Glazed: 3mm (13mm) 6mm; 6mm (13mm) 6mm LAMINATED

As an example, for a typical unit with nighttime outdoor sound level of 64 dBA, the AIF value for the bedrooms will be 31 assuming 3 components. If the window to floor ratio is 20%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the

following:

Double Glazed: 3mm (13mm) 3mm; 4mm (6mm) 4mm

The above window glazing construction is typical examples only. It is recommended that prior to the submission of the building plans for Building Permit that the detailed architectural drawings of the units requiring noise control measures, as referred to earlier, be examined by an Acoustical Engineer in order to advise the design consultant on the ***specific*** building components for noise control to suite the actual window construction details.

IMPORTANT NOTES TO THE WINDOW SUPPLIER/CONTRACTOR:

The Contractor should use the window glazing dimensions specified in this report. If the Contractor chooses to use, instead the minimum specified STC values herein in this report, then the Contractor MUST observe the following rules:

(1) The **specific** windows MUST be tested by an "accredited" acoustic laboratory that is "NVLAP" accredited, and
(2) The full STC test results shall be submitted to SS Wilson Associates for prior approval before installation.

4.5 Important Notes for the Residential Builder Regarding Windows

The results in this report provide information on the calculated Acoustic Insulation Factors (AIF) for windows based on typical assumed window and room dimensions.

To assist the Builder in appreciating the fact of whether the results presented herein require typical commercially available residential type windows, or special type windows, the following table[9] provides reasonably accurate information on whether such window(s) are standard industry window or not:

Acoustic Insulation Factor (AIF) in this report	35	34	33	32	31	30	29	28	27	26
Window to room floor area percentage NOT to be exceeded	10%	13%	16%	20%	25%	32%	40%	50%	63%	80%

If the above ratios are exceeded, several options are available to the builder including one or more of: reducing the size of the window, increasing the inter-pane air spacing, the use of thicker glazing, the use of "laminated" glazing (1 or 2 panes), etc.

[9] Based on a typical commercially available glazing: 3mm inside pane, 16mm inter-pane air space & 3mm exterior pane.

WORKED EXAMPLE 1:

- AIF shown in this study: 31
- Actual room floor area: 250 sq.ft.
- You selected a window area of: 45 sq.ft
- Your window/floor ratio: (45 divided by 250, then times 100) =18%
- Your result is less than above table value 25%; i.e. standard glazing unit

WORKED EXAMPLE 2:

- AIF shown in this study: 34
- Actual room floor area: 200 sq.ft.
- You selected a window area of: 50 sq.ft
- Your window/floor ratio: (50 divided by 200, then times 100) =25%
- Your result is more than above table value 13%; i.e. Non-standard (special) glazing unit

TABLES

TABLE 1
SUMMARY OF MINIMUM REQUIRED NOISE CONTROL MEASURES

RECEPTOR	SOUND BARRIER	CENTRAL AIR CONDITIONING	PROVISION FOR CENTRAL AIR CONDITIONING	WARNING CLAUSE(S) (AS PER BELOW)
LOT(S)				
1, 35, 52, 58, 64, 70 to 77, 101, 114, 115, 140, 142 to 166, 173 to 184, 202, 203, and 212 to 223	No	No	Yes	WC2, WC4
23 to 34, 141, 224, 225, 250, and 251	No	No	Yes	WC2, WC4, WC6
167, 171, 172, 185, 186	No	Yes	--	WC1, WC4
168 to 170, and 187	Yes	Yes	--	WC1, WC4, WC8
All Other Lots	No	No	No	--
BLOCK(S)				
272 to 277, 282 to 284, 287 to 289, 292 to 294, 296, 297, 300, 307, and 308 (all units inclusive)	No	No	Yes	WC2, WC4
267 (Unit 1), 268 (Unit 8), 302 (all units)	No	No	Yes	WC2, WC6
303 to 305 (all units inclusive)	No	No	No	WC6
278 to 281, 285, 286, 295, 298, 299, and 309 (all units inclusive)	No	Yes	--	WC1, WC4
290 (Unit 1), and 291 (Unit 4)	Yes	Yes	--	WC1, WC4, WC8
290 (Units 2 to 4), and 290 (Units 1 to 3)	No	Yes	--	WC1, WC4
All Other Blocks	No	No	No	--

LIST OF WARNING CLAUSES:

WC1: "*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*".

WC2: *"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 in low and medium density developments 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. This dwelling unit has been fitted to include a fan forced heating system, suitably sized ducts, plenum, electrical power wiring, thermostatic control wiring, a nearby floor drain, etc. Future installation of the air conditioning system should meet the Ministry of the Environment, Conservation and Parks criteria in Publication NPC-216 (a maximum sound level LAS of 50 dBA at the neighbour's closest point(s) of reception, i.e., at their ground-based outdoor areas as well as at the closest window on any floor level) and other applicable levels specified by the municipality."*

WC3: *"In order to achieve a suitable indoor noise environment, windows may have to remain closed; therefore, this dwelling unit has been equipped with a central air conditioning system".*

WC4: *"Purchasers/tenants are advised that this development and associated blocks/units are directly adjacent/in close proximity to a Regional road. Halton Regional roads are classified as major arterial roadways and as such: Serve mainly inter-regional and regional travel demands; May serve an Intensification Corridor; Accommodate all truck traffic; Accommodate higher order transit services and high occupancy vehicle lanes; Connect Urban Areas in different municipalities; Carry high volumes of traffic; Distribute traffic to and from Provincial Freeways and Highways; Accommodate active transportation. Truck traffic is permitted on all Regional roads, and is one of the functions of the Regional road network. Therefore, despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic will interfere with some activities of the dwelling occupants, including any raised patio and/or balcony, as sound levels exceed the sound level limits of the Municipality and the Ministry of Environment, Conservation and Parks."*

WC5: "*Purchasers/tenants are advised that despite the inclusion of noise control features within this development and within the dwellings, sound levels from increasing road traffic will continue to be of concern as the levels in the balcony exceed the Ministry of the Environment, Conservation and Parks criteria and that protected Common Outdoor Living Area meeting the Ministry sound level criteria has been provided within the development".*

WC6: "*Purchasers/tenants are advised that this dwelling unit is in proximity to a proposed Elementary School. Sound levels from the nearby school may at times be audible".*

WC7: "*Purchasers/tenants are advised that despite the inclusion of noise control features within the development area and within the building units, the sound levels from increasing road traffic may continue to be of concern, occasionally interfering with some activities of the dwelling occupants*".

WC8: *"A noise barrier has been constructed adjacent to this lot. The noise barrier will need to be maintained in good condition (pre-existing barrier height and material) by the property owner (Builder) until such time as the subdivision has been assumed by the local municipality. Once assumed, the ownership and future maintenance will become the responsibility of the Regional Municipality of Halton. Halton Region will require, from time to time access to this lot/block in order to maintain this noise barrier. An easement has been placed on this lot/block to permit maintenance access to the noise barrier."*

N6 Leq-AIF Master- 2019-05-16

SS WILSON ASSOCIATES

2023

2023-02-24 0:00

SUMMARY- OUTDOOR SOUND LEVEL CALCULATIONS

File Number : WA20-001 R2

Project Name : Sundial 4th Line Ltd

Description : Tow n of Milton

Description :

OUTDOORS

Table 2

(Using NRC/M OE Pocedures)

Any Heavy Rail Line ? No

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
LOT/BLOCK NO.	Lot 71	Lot 167	Lot 168	Lot 169	Lot 187	Block 291 (Unit 1)	B302 (Unit 1)	B311 (Village Square)	B302 (Unit 1)	B311 (Village Square)		
FACE/DIRECTION	South	West	West	West	West	East	West	Central	West	Central		
LOCATION	OLA	OLA	OLA	OLA	OLA	OLA	Common OLA	Common OLA	Common OLA	Common OLA		
Source 1: Roads	Road Traffic		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Outdoors	52.00	55.00	64.00	67.00	69.00	57.00	57.00	71.00	57.00	54.00		
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB												
Barrier Adjustment, dB			-7.00	-10.00	-12.00			-14.00				
Additional Adjustment, dB												
Sub-Total Leq, dBA	**52.00**	**55.00**	**57.00**	**57.00**	**57.00**	**57.00**	**57.00**	**57.00**	**57.00**	**54.00**		
Source 2:	Road Traffic		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Source 3:	Road Traffic		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Source 4:	Road Traffic		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Sub-Tot. 4 Sources Leq, dBA												
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq												
Overall Road and/or Rail and/or Stationary Sources, Leq (dBA)												
Aircraft Noise Only, NEF												
Additional Requirements	Barrier not required	Barrier not Required (Assumes attenuation fom L168, L169)	2.6m High Sound Barrier Required (Assumes attenuation from barriers on L169)	3.0m High Sound Barrier Required	3.0m High Sound Barrier Required	Barrier not required	Barrier not required	3.5m High Sound Barrier Required	Barrier not required	Barrier not required		

	N6 Leq-AIF Master- 2019-05-16		**SS WILSON ASSOCIATES**						(Using NRC/MOE Pocedures)				
2023-02-24 9:26	**Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**												
File Number :	WA20-001 R2				**DAYTIME**				NOTES				
Project Name :	Sundial 4th Line Ltd				**Table 2**								
Description :	Town of Milton												
Description :													
Record Number	1	2	3	4	5	6	7	8	9	10	11	12	
Consider Record	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	
LOTBLOCK NO.	Lot 71	Lot 179	Lot 184	Lot 185	Lot 251	Lot 279	Block 274	Block 277	Block 280	Block 281	Block 289		
FACE/ DIRECTION	North	East	East	East	North	East	East	East	East	East	North		
LOCATION	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade		
ROOM CLASSIFICATION	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining		
Manual Adjust. to Criterion,													
MOE Transportation Sources Daytime Leq Indoor Criteria, dBA	45	45	45	45	45	45	45	45	45	45	45		
Aircraft Indoor Criteria, NEF	5	5	5	5	5	5	5	5	5	5	5		
Source 1: Roads	**Road Traffic**		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS				
Leq Daytime	61.00	60.00	65.00	66.00	56.00	55.00	63.00	64.00	72.00	70.00	65.00		
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB													
Additional Adjustment, dB													
Sub-Total Leq, dBA	**61.00**	**60.00**	**65.00**	**66.00**	**56.00**	**55.00**	**63.00**	**64.00**	**72.00**	**70.00**	**65.00**		
Angular range of incidence Case(0,1,2,3)													
Adjusted AIF	23	22	27	28	18	17	25	26	34	32	27	36	
Source 2:	**Road Traffic**		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS				
Leq Daytime													
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB													
Additional Adjustment, dB													
Sub-Total Leq, dBA													
Angular range of incidence Case(0,1,2,3)													
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	
Source 3:	**Road Traffic**		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS				
Leq Daytime													
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB													
Additional Adjustment, dB													
Sub-Total Leq, dBA													
Angular range of incidence Case(0,1,2,3)													
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	
Source 4:	**Road Traffic**		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS				
Leq Daytime													
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180	180	180	180	180		
Partial exposure adjust., dB													
Additional Adjustment, dB													
Sub-Total Leq, dBA													
Angular range of incidence Case(0,1,2,3)													
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	
Sub-Tot. 4 Sources Leq, dBA													
Aircraft noise NEF/NEP													
Adjust.1													
Adjust.2													
Adjusted NEF/NEP													
Approx. Overall Combined Leq													
Assume 32% W/F ratio for Living/Dining rooms in the absence of specific data	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0		
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3	3	3	3	3	3		
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3	3	3	3	3	3		
AIF of 4 Sources	*23*	*22*	*27*	*28*	*18*	*17*	*25*	*26*	*34*	*32*	*27*		
Aircraft AIF													
Combined AIF	23	22	27	28	18	17	25	26	34	32	27		
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable		
Adjustment, dB/ AIF													
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Laminated	Laminated	Regular		
Other Adjustment (dB,AIF), Specify													
Final Adjusted AIF	23	22	27	28	18	17	25	26	31	29	27		
Minimum STC (Approx)	***24***	***23***	***28***	***29***	***19***	***18***	***26***	***27***	***32***	***30***	***28***		
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(13)6 6(13)6	3(6)5 6(6)5	3(6)3		
NOTES	Forced Air Required	Forced Air Required	Forced Air Required	Air Conditioning Required	Forced Air Required	No indoor requirements	Forced Air Required	Forced Air Required	Air Conditioning Required	Air Conditioning Required	Forced Air Required		

SS WILSON ASSOCIATES

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

WA20-001 R2

NOTES . . . . . **Sundial 4th Line Ltd**

. . . . . **Town of Milton**

. . . . . .

. . . . . **DAYTIME**

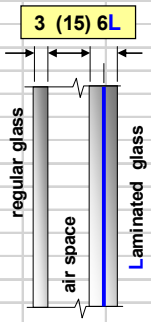
. . . . . **Table 2**

- Windows must be well-fitted weatherstripped units.
- The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

LOTBLOCK NO.	FACE/ DIRECTION	ROOM CLASSIFICATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives, mm			Triple Glazing Alternatives, mm	***Minimum STC (Approx)***
Lot 71	North	Living /Dining	Building Façade	Openable	Regular	23		3(6)3				***24***
Lot 179	East	Living /Dining	Building Façade	Openable	Regular	22		3(6)3				***23***
Lot 184	East	Living /Dining	Building Façade	Openable	Regular	27		3(6)3				***28***
Lot 185	East	Living /Dining	Building Façade	Openable	Regular	28		3(6)3				***29***
Lot 251	North	Living /Dining	Building Façade	Openable	Regular	18		3(6)3				***19***
Lot 279	East	Living /Dining	Building Façade	Openable	Regular	17		3(6)3				***18***
Block 274	East	Living /Dining	Building Façade	Openable	Regular	25		3(6)3				***26***
Block 277	East	Living /Dining	Building Façade	Openable	Regular	26		3(6)3				***27***
Block 280	East	Living /Dining	Building Façade	Openable	Laminated	34		3(13)6	6(13)6			***32***
Block 281	East	Living /Dining	Building Façade	Openable	Laminated	32		3(6)6	6(6)5			***30***
Block 289	North	Living /Dining	Building Façade	Openable	Regular	27		3(6)3				***28***

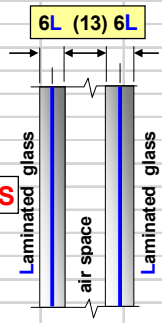
ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

Double Glazing- regular glass

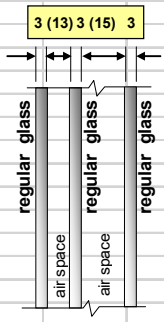


Double Glazing- *single laminated glass*

EXAMPLES



Double Glazing- *double laminated glass*



Triple Glazing- regular glass

	N6 Leq-AIF Master- 2019-05-16		SS WILSON ASSOCIATES						(Using NRC/MOE Pocedures)			
2023-02-24 9:26	Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS											
File Number :	WA20-001 R2				NIGHT TIME				NOTES			
Project Name :	Sundial 4th Line Ltd				Table 3							
Description :	Town of Milton											
Description :												
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
LOTBLOCK NO.	Lot 71	Lot 179	Lot 184	Lot 185	Lot 251	Lot 279	Block 274	Block 277	Block 280	Block 281	Block 289	
FACE/ DIRECTION	North	East	East	East	North	East	East	East	East	East	North	
.....	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	
ROOM CLASSIFICATION	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	
Manual Adjust. to Criterion,												
MOE Transportation Sources Night Leq Indoor Criteria, dBA	40	40	40	40	40	40	40	40	40	40	40	
Aircraft Indoor Criteria, NEF												
Source 1: Roads	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	54.00	54.00	58.00	59.00	49.00	49.00	52.00	58.00	62.00	64.00	58.00	
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180	180	
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**54.00**	**54.00**	**58.00**	**59.00**	**49.00**	**49.00**	**52.00**	**58.00**	**62.00**	**64.00**	**58.00**	
Angular range of incidence (0,12,3)												
Adjusted AIF	21	21	25	26	16	16	19	25	29	31	25	35
Source 2:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180	180	
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Source 3:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180	180	
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Source 4:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180	180	180	180	180	
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Sub-Tot. 4 Sources Leq, dBA												
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq												
Assume 20% W/F ratio for Living/Dining rooms in the absence of specific data	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3	3	3	3	3	3	
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3	3	3	3	3	3	
AIF of 4 Sources	*21*	*21*	*25*	*26*	*16*	*16*	*19*	*25*	*29*	*31*	*25*	
Aircraft AIF												
Combined AIF	21	21	25	26	16	16	19	25	29	31	25	
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	Openable	
Adjustment, dB/ AIF												
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	
Other Adjustment												
Final Adjusted AIF	21	21	25	26	16	16	19	25	29	31	25	
Minimum STC (Approx)	*20*	*20*	*24*	*25*	*15*	*15*	*18*	*24*	*28*	*30*	*24*	
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(13)3 4(6)4	3(6)3	
NOTES	Forced Air Required	Forced Air Required	Forced Air Required	Air Conditioning Required	Forced Air Required	No indoor requirements	Forced Air Required	Forced Air Required	Air Conditioning Required	Air Conditioning Required	Forced Air Required	

SS WILSON ASSOCIATES

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

WA20-001 R2

NOTES . . . . . .

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Sundial 4th Line Ltd

Town of Milton

NIGHT TIME

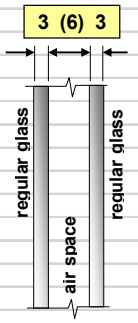
Table 3

- Windows must be well-fitted weatherstripped units.
- The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

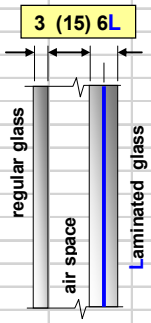
LOTBLOCK NO.	FACE/ DIRECTION	ROOM CLASSIFICATION	.....	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives, mm			Triple Glazing Alternatives, mm	***Minimum STC (Approx)***
Lot 71	North	Bedroom	Building Façade	Openable	Regular	21		3(6)3				***20***
Lot 179	East	Bedroom	Building Façade	Openable	Regular	21		3(6)3				***20***
Lot 184	East	Bedroom	Building Façade	Openable	Regular	25		3(6)3				***24***
Lot 185	East	Bedroom	Building Façade	Openable	Regular	26		3(6)3				***25***
Lot 251	North	Bedroom	Building Façade	Openable	Regular	16		3(6)3				***15***
Lot 279	East	Bedroom	Building Façade	Openable	Regular	16		3(6)3				***15***
Block 274	East	Bedroom	Building Façade	Openable	Regular	19		3(6)3				***18***
Block 277	East	Bedroom	Building Façade	Openable	Regular	25		3(6)3				***24***
Block 280	East	Bedroom	Building Façade	Openable	Regular	29		3(6)3				***28***
Block 281	East	Bedroom	Building Façade	Openable	Regular	31		3(13)3 4(6)4				***30***
Block 289	North	Bedroom	Building Façade	Openable	Regular	25		3(6)3				***24***

ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

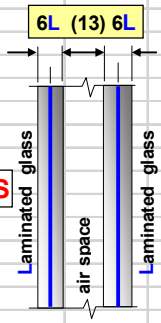
EXAMPLES



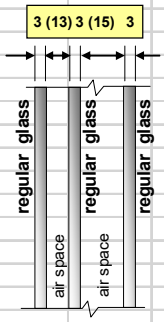
Double Glazing- regular glass



Double Glazing- *single laminated glass*



Double Glazing- *double laminated glass*



Triple Glazing- regular glass

TABLE 5
BARRIER HEIGHTS TO ACHIEVE L_{Aeq} 55 dBA IN OLAs

RECEPTOR	OLA Sound Level Without Barrier, $L_{Aeq(day)}$, dBA	BARRIER HEIGHT, m TO ACHIEVE THE FOLLOWING, $L_{Aeq(day)}$, dBA					
		60	59	58	57	56	55
Lot 168 (Assumes 3m barrier on Lot 169)	64	--	--	2.2	2.6	4.0	4.4
Lot 169	67	2.4	2.6	2.8	3.0	3.4	3.8
Lot 170	69	2.4	2.6	2.8	3.0	3.2	3.6
Lot 187	69	2.4	2.6	2.8	3.0	3.2	3.6
Block 290 (Unit 1)	69	2.8	3.0	3.4	3.5	4.0	4.4
Block 291 (Unit 4)	69	2.8	3.0	3.4	3.5	4.0	4.4

FIGURES

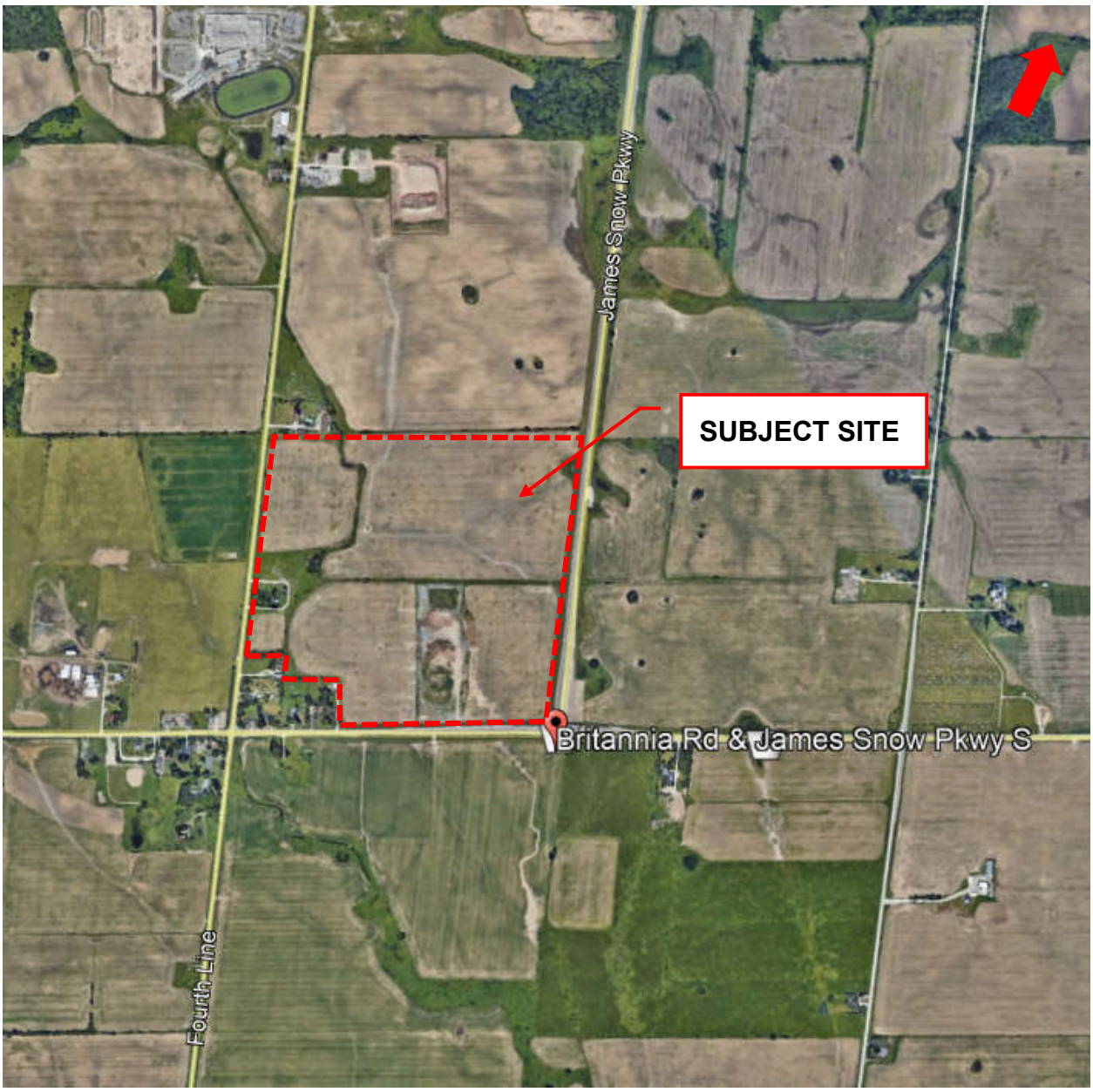


FIGURE 1
KEY PLAN

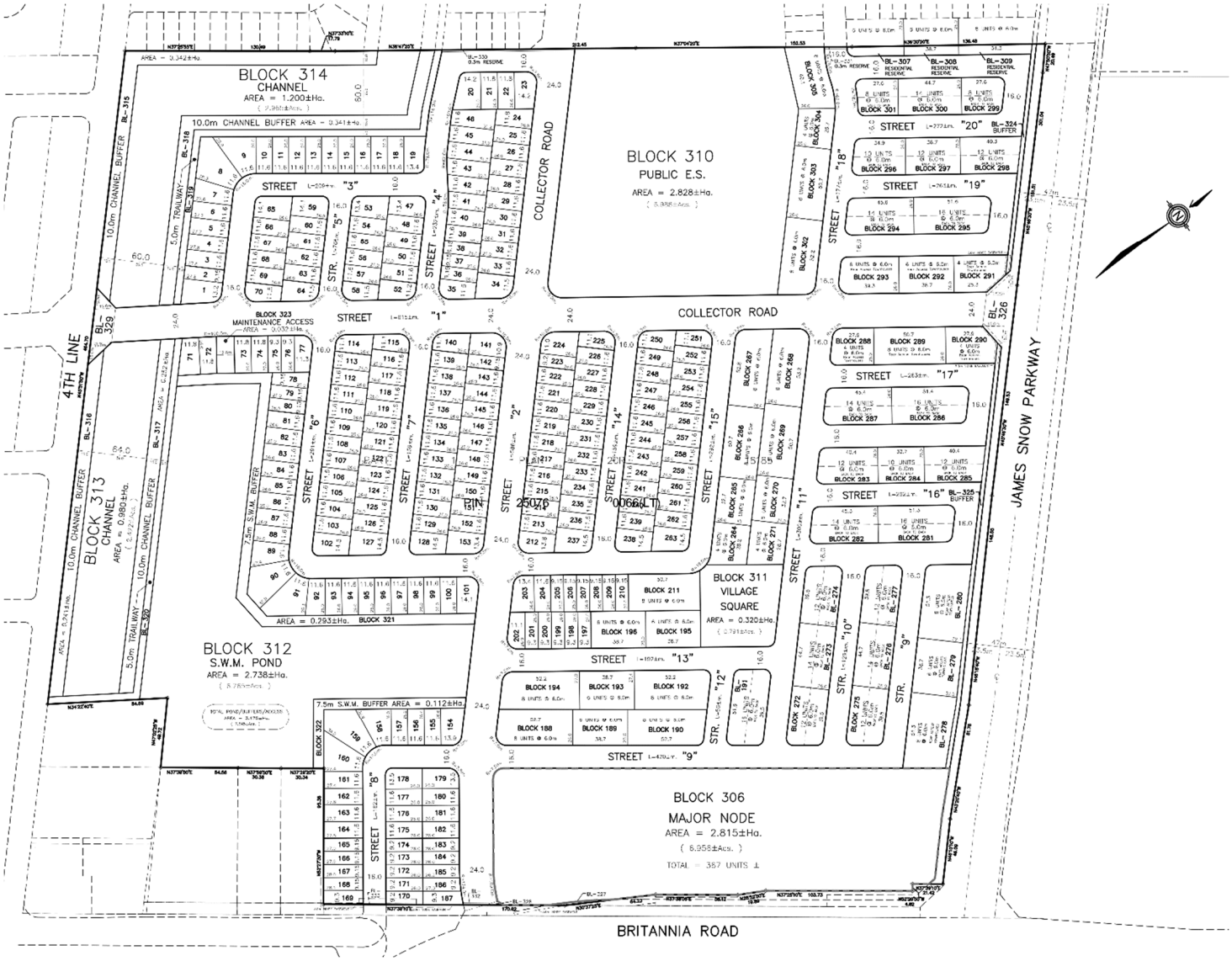


FIGURE 2
DRAFT PLAN OF SUBDIVISION

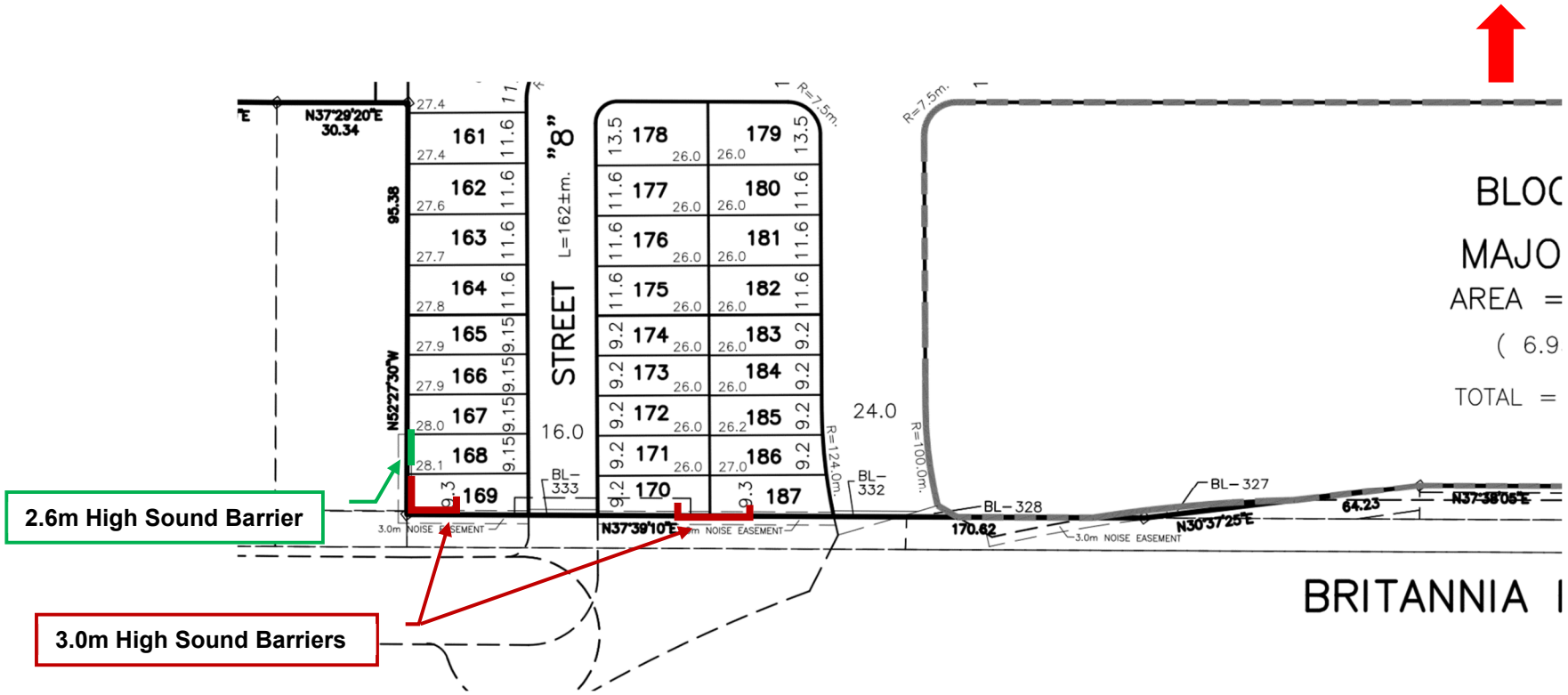


FIGURE 3a
SCHEMATIC SOUND BARRIER ALIGNMENTS

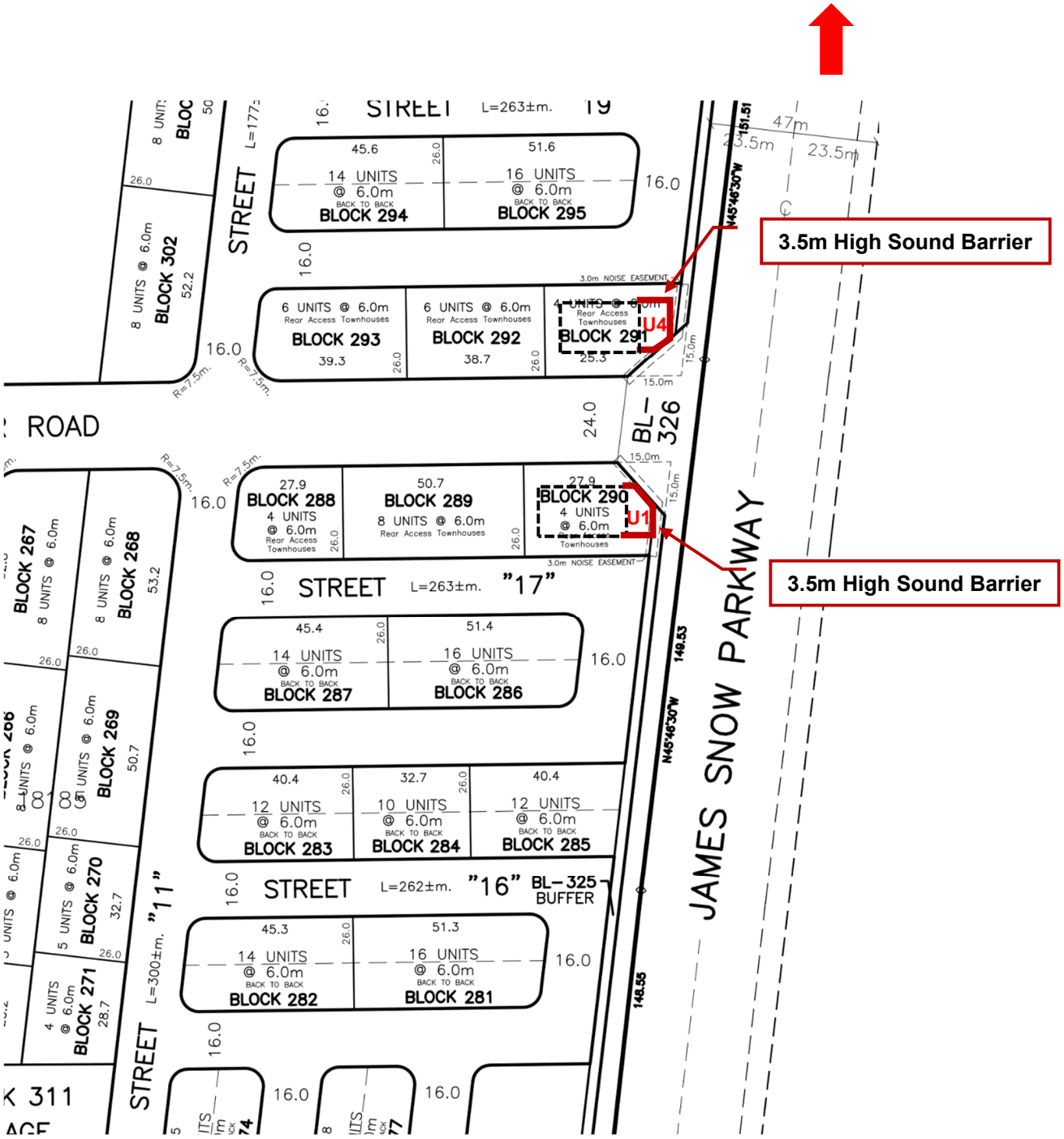


FIGURE 3b
SCHEMATIC SOUND BARRIER ALIGNMENTS

Legend

- Sound Barrier
- A/C
- Forced Air

FIGURE 4
SUMMARY OF MINIMUM INDOOR AND OUTDOOR ACOUSTIC REQUIREMENTS

APPENDIX A

ROAD TRAFFIC DATA

SS Wilson Associates

From: trafficdatarequests <trafficdatarequests@halton.ca>
Sent: Tuesday, February 16, 2021 3:50 PM
To: SS Wilson Associates
Subject: RE: Traffic Request - WA21-001

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Cheryl,

Hope you had a nice long weekend! I will see if we have ATR traffic data for Fourth Line.

Please find below assumptions to be used to guide the Noise Study in the area of Britannia Road and James Snow Parkway. Please consult with the Town of Milton for assumptions related to Fourth Line.

James Snow Parkway
Ultimate AADT: 52,000
Medium Truck:3%
Heavy Truck:3%
Speed: 70 km/h
Lanes:6 = 47m ROW

Britannia Road
Ultimate AADT: 42,000
Medium Trucks: 5%
Heavy Trucks: 5%
Speed: 70 km/h
Lanes: 6 = 47m ROW

Thanks, and best regards,

Shannon

From: SS Wilson Associates [mailto:engineering@SSWilsonAssociates.com]
Sent: Tuesday, February 16, 2021 1:16 PM
To: trafficdatarequests <trafficdatarequests@halton.ca>
Subject: RE: Traffic Request - WA21-001

Hi Shannon,

SS Wilson Associates

From: Michael.Turco@milton.ca
Sent: Thursday, February 18, 2021 11:40 AM
To: SS Wilson Associates
Subject: RE: Traffic Data Request - WA21-001

Hi Cheryl,

Please find requested available information for Fourth Line, north of Britannia Road below:

	Current	Ultimate / Future
ROW Width	Varies (generally 20m+)	Min. 20m
No. of Lanes	2 vehicle lanes (1 per direction)	2 vehicle lanes (1 per direction) and bike lanes on both sides
Roadway Gradient	Information not readily available	TBD – Standard is between 0.5% and 5.0%/6.0%
AADT	No recent traffic data available within the past 5 years	4760 veh/day*
Truck Percentage (Medium/Heavy)	No recent traffic data available within the past 5 years	2% (conservative estimate)
Posted Speed Limit (kph)	60 km/h	50 km/h (anticipated)
Day/Night Split	No recent traffic data available within the past 5 years	Not available
Directional Split	No recent traffic data available within the past 5 years	Not available

**Estimate based on an extrapolation of projected 2026 PM peak hour traffic volumes from the Boyne Secondary Plan Survey Area Road Network Assessment (2017)*

As a service to outside agencies and companies, the Town of Milton endeavours to provide current and archived engineering plans and information upon request. The recipient acknowledges that the Town does not ensure nor guarantee the accuracy of the information and they are accepted on an information only basis. The recipient agrees that all information provided is considered approximate only and it is the recipient's responsibility to verify accuracy.

Should you have any questions, please feel free to contact me.

Thank you,

Michael Turco, C.E.T., MITE
Transportation Planning Technologist
150 Mary Street, Milton ON,
905-878-7252 x2363
www.milton.ca

SS Wilson Associates

From: Michael.Turco@milton.ca
Sent: Friday, April 09, 2021 10:39 AM
To: SS Wilson Associates
Subject: RE: Traffic Data Request - WA21-001

Hi Cheryl,

As per your request, please see below ultimate traffic data estimates for the specified roadways.

	Logan Drive (east/west collector road)	Trudeau Drive (north/south collector road)
ROW Width	24m	24m
No. of Lanes	2 vehicle lanes (1 per direction), 2 parking lanes and bike lanes on both sides	2 vehicle lanes (1 per direction), 2 parking lanes and bike lanes on both sides
Roadway Gradient	TBD – Standard is between 0.5% and 5.0%	TBD – Standard is between 0.5% and 5.0%
AADT	7900 veh/day*	2300 veh/day*
Medium Truck % [1]	2% (conservative estimate)	2% (conservative estimate)
Heavy Truck % [2]	0%	0%
Posted Speed Limit (kph)	50 km/h (anticipated)	50 km/h (anticipated)
%Day/%Night Traffic Split[3]	N/A	N/A
Directional Split % NBL/%SBL or EBL% WBL	N/A	N/A

**Estimate based on an extrapolation of projected 2026 PM peak hour traffic volumes from the Boyne Secondary Plan Survey Area Road Network Assessment (2017)*

Please let me know if you have any questions.

Thank you,

Michael Turco, C.E.T., MITE
Transportation Planning Technologist
150 Mary Street, Milton ON,
905-878-7252 x2363
www.milton.ca

APPENDIX B

SAMPLE SOUND LEVEL CALCULATIONS

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2023 34:45:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: nl187ola.te Time Period: Day/Night 16/8 hours
Description: Lot 187-Sound Level at Outdoor Living Area

```
Road data, segment # 1: Britannia WB (day/night)
-----------------------------------------------
Car traffic volume  : 17010/1890  veh/TimePeriod  *
Medium truck volume :   945/105   veh/TimePeriod  *
Heavy truck volume  :   945/105   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  21000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Britannia WB (day/night)
-----------------------------------------------
Angle1   Angle2           : -30.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  37.00 / 37.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -30.00 deg   Angle2 : 70.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: Britannia EB (day/night)
-----------------------------------------------
Car traffic volume  : 17010/1890  veh/TimePeriod  *
Medium truck volume :   945/105   veh/TimePeriod  *
Heavy truck volume  :   945/105   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  21000
    Percentage of Annual Growth        :   0.00
```

```
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Britannia EB (day/night)
-----------------------------------------------
Angle1   Angle2           : -30.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  61.00 / 61.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -30.00 deg   Angle2 : 70.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Britannia WB     !     1.50 !    66.50 !    66.50 *
 2.Britannia EB     !     1.50 !    64.33 !    64.33 *
--------------------+---------+---------+---------
                      Total                  68.56 dBA

  * Bright Zone  !

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Britannia WB     !     1.50 !    59.97 !    59.97 *
 2.Britannia EB     !     1.50 !    57.80 !    57.80 *
--------------------+---------+---------+---------
                      Total                  62.03 dBA

  * Bright Zone  !
TOTAL Leq FROM ALL SOURCES (DAY): 68.56
                           (NIGHT): 62.03
```

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2023 34:45:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: nl187b55.te Time Period: Day/Night 16/8 hours
Description: Lot 187-Sound Level at OLA with Barrier

```
Road data, segment # 1: Britannia WB (day/night)
-----------------------------------------------
Car traffic volume  : 17010/1890  veh/TimePeriod  *
Medium truck volume :   945/105   veh/TimePeriod  *
Heavy truck volume  :   945/105   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  21000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Britannia WB (day/night)
-----------------------------------------------
Angle1   Angle2           : -30.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  37.00 / 37.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -30.00 deg   Angle2 : 70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: Britannia EB (day/night)
-----------------------------------------------
Car traffic volume  : 17010/1890  veh/TimePeriod  *
Medium truck volume :   945/105   veh/TimePeriod  *
Heavy truck volume  :   945/105   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  21000
```

```
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Britannia EB (day/night)
-----------------------------------------------
Angle1   Angle2           : -30.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  61.00 / 61.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -30.00 deg   Angle2 : 70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Britannia WB     !     1.50 !    55.18 !    55.18
 2.Britannia EB     !     1.50 !    53.21 !    53.21
--------------------+---------+---------+---------
                      Total                  57.32 dBA
Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Britannia WB     !     1.50 !    59.97 !    59.97 *
 2.Britannia EB     !     1.50 !    57.80 !    57.80 *
--------------------+---------+---------+---------
                      Total                  62.03 dBA

  * Bright Zone  !
TOTAL Leq FROM ALL SOURCES (DAY): 57.32
                           (NIGHT): 62.03
```