

Environmental Noise Report

Proposed Residential Development Kings Ridge 336 King Street East Town of Caledon (Bolton), Region of Peel

Prepared for 336 Kings Ridge Inc.

October 10, 2018 File: 17-044

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Summary

The proposed development consists of 16 four-storey townhouse dwellings to be constructed as two buildings on the south side of King Street East in the Town of Caledon (Bolton).

It is subject to noise from road sources. The sound levels were calculated at the noise sensitive receptors and compared to the applicable sound level limits.

To comply with the applicable sound level limits, mitigation in the form of sound barriers and the provision for adding central air conditioning is required for some units. See Figure 2 and Table 3 for a summary of the acoustical requirements.



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1 Introduction

Actinium Engineering Inc. was retained by 336 Kings Ridge Inc. to prepare an Environmental Noise Report to investigate the potential impact of noise on the proposed residential development to the satisfaction of the Town of Caledon (Bolton) and propose mitigation if required.

The proposed residential development is comprised of 16 four-storey units in two buildings. It is identified as:

Kings Ridge 336 King Street East Town of Caledon (Bolton) Region of Peel

The proposed development is bounded by King Street East to the north, existing residential development to the east and west and valleylands to the south. Nearby land uses include existing residential developments.

This report is based on a site plan received on October 10, 2018 and grading plan received on September 25, 2018.

A Key Plan and Site Plan are included in this report as Figures 1 and 2 respectively.



2 Noise Sources

The major noise sources with the potential to affect the proposed residential development are road sources. The proposed residential development is not affected by rail, aircraft, industrial & commercial sources.

2.1 Transportation Sources

The dominant transportation noise source is vehicle traffic on nearby roads.

See Table 1 for a summary of the traffic data used in the analysis. See Appendix A for correspondence regarding traffic.

2.1.1 Road

Road traffic data was obtained from the Region of Peel for King Street East.

For the analysis, ultimate traffic volumes were used.

2.1.2 Rail

There are no rail lines near this development.

2.1.3 Aircraft

The development is located outside of NEF/NEP 25 from the Toronto Pearson International Airport (TPIA) and Brampton Airport.

2.2 Stationary Sources

Potential stationary noise sources both within and outside of the development were investigated.

2.2.1 Within the Development

There are no acoustically significant stationary noise sources proposed within the development.



2.2.2 Outside the Development

Based on the site visit conducted by Actinium Engineering Inc. on May 9, 2018, no stationary sources were identified that are acoustically significant at the proposed development



3 Environmental Noise Criteria

The Ministry of the Environment and Climate Change (MOECC) guidelines presented in "updated final version #22) of their document "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning Publication NPC-300" dated August 2013 were used for this report. A summary of the guidelines is presented in Appendix B.

3.1 Transportation Sources

For transportation sources, NPC-300 provides outdoor sound level limits that apply to outdoor living areas and the outside façade of windows and/or doors as well as indoor sound level limits.

Where sound level limits are exceeded, warning clauses are required and depending on the exceedance mitigation is either recommended or required

3.1.1 Indoors

To allow control of indoor sound levels when sound level limits at facades containing noise-sensitive receptors are exceeded, the MOECC requires either a ducted heating system sized for the addition of central air conditioning if desired by the occupant (known as provision for central air conditioning) or central air conditioning installed before occupancy (known as mandatory central air conditioning). See Appendix B for the applicable sound level limits.

In addition to the ventilation requirements, upgraded architectural components (e.g. windows, doors and exterior walls) may be required to meet the applicable indoor sound level limits.

3.1.2 Outdoors

For outdoor living areas (OLA), if the MOECC specified sound level limits are exceeded by less than 5 dBA, mitigation should be considered, where the exceedance is greater than 5 dBA, mitigation is generally required to reduce the sound level to meet the guidelines. Mitigation is typically in the form of a berm and/or acoustic fence.



The MOECC defines the outdoor living area as a part of a noise sensitive land use that is intended and designed for the quiet enjoyment of the outdoor environment that is readily accessible from the building. OLA's include, but are not limited to:

- Backyards, front yards, gardens, terraces and patios;
- Balconies and elevated terraces with a minimum depth of 4 metres, provided that they are unenclosed and the only OLA for the occupant or they are a common OLA for a high-rise building

3.2 Stationary Sources

NPC-300 requires stationary sources to be analysed by considering the worst-case predictable hour. Continuous and impulsive noise sources are both required to be addressed as well as vibration (if sources creating substantial vibration such as punch-presses are present). Vibration guidelines are presented in NPC-207.

The MOECC provides guidance on what noise sources are considered stationary noise sources. Some noise sources are not stationary but are included (such as trucks moving around a commercial site), other noise sources are excluded (such as backup beepers as they are considered a safety device).

The MOECC guidelines require specific sound level limits to be met. Inaudibility is not required. With formal confirmation from the land use planning authority, it is possible to designate a new noise sensitive landuse as a Class 4 area which increases the sound level limits and provides additional mitigation options. Where the sound level limits are exceeded, warning clauses and mitigation are required. The MOECC prefers mitigation at the noise source when possible.

3.2.1 Indoors

For stationary sources, there are no MOECC indoor sound level limits and using upgraded building components and/or forced air ventilation is not allowed to mitigate noise from stationary sources. The notable exception to this is the possibility of utilizing air conditioning and enclosed noise buffers in a Class 4 area to eliminate the noise sensitive receptors.



3.2.2 Outdoors

For stationary noise sources, NPC-300 provides outdoor sound level limits that apply to outdoor living areas and the outside façade of windows and/or doors. Where sound level limits are exceeded, mitigation at source and/or sound barriers are typically the most effective solutions, however in certain situations, special building designs to eliminate noise sensitive receptors are allowed by the MOECC.

The sound level limits are set by the higher of the ambient sound level (normally due to road traffic, but in certain situations rail traffic and/or measurements may be used) and the exclusion limits included in NPC-300.

3.2.3 MOECC Approvals

The MOECC requires most industries to possess a valid Environmental Compliance Approval (ECA) or its precursor, a Certificate of Approval (C of A) to operate. These approvals address the acoustical impact of the industry at existing and zoned noise-sensitive lands. The industry must operate in compliance with this approval.

Where new noise-sensitive lands are zoned, it is the responsibility of the proponent of those lands to conduct analysis and provide mitigation if required so as to allow the industry to remain in compliance with their ECA.

3.2.4 MOECC Separation Guidelines

The MOECC produced Guideline D-6, Compatibility Between Industrial Facilities and Sensitive Land Uses, last revised in July 1995. This document identifies potential influence areas (inside which adverse impacts due to air and noise emissions may be experienced) as well as minimum separation distances between industrial and sensitive uses that should be respected for different classes of industry. See Table A below for these distances.



	Influence Distance (m)	Minimum Separation Distance (m)
Class I	70	20
Class II	300	70
Class III	1000	300

Table A – MOECC D-6 Recommended Distances by Industry Classification

It should be noted that complying with the above distances does not necessarily mean that compliance with the applicable sound level limits is assured.

3.3 Caledon By-laws & Guidelines

The Town of Caledon prepared a report outlining their development standards, polices and guidelines. With respect to noise, the generally follow the guidelines and procedures of the MOECC. The notable exceptions are that road traffic must be analyzed using a speed 10 km/h above the posted speed limit and the use of wood in noise barriers is prohibited.

A summary of the applicable Town of Caledon By-laws has been provided below. The full text of the by-laws should be consulted if further details are required.

By-laws 86-110 and 95-67 regulate noise. They deal with noise sources, not proposed sensitive receptors. With a few exceptions, the primary focus of the by-laws is to prohibit noises which are likely to disturb the inhabitants of the City. They contain prohibitions by time and place as well as numerical sound level limits for some sources.

Section 4.4 of the Zoning By-law (2006-50) outlines the required setback for air conditioner condenser units. In the rear or interior side yard, they can be no closer than 0.6m from any lot line. In an exterior side yard, the minimum exterior side yard requirement must be met.



Vibration is addressed in By-law 2008-31. Vibrations which are likely to disturb during specific time periods or create a public nuisance at any time are prohibited. No numerical limits are provided.

3.4 Region of Peel Guidelines

The Region of Peel generally follows the MOECC guidelines. They require air-cooled condenser units be in a noise insensitive area and have an AHRI sound level rating of 7.6 bels or less.



4 Noise Impact Assessment

4.1 Transportation Sources

The impact of the road traffic was calculated in terms of energy equivalent sound level (Leq) for both daytime and nighttime periods using the traffic noise prediction model produced by the MOECC (ORNAMENT). Topography, ground cover and screening have all been included in the analysis.

The worst-case façade receptor, Unit A-1 has predicted sound levels at the façade of 64 dBA and 58 dBA daytime and nighttime respectively.

The worst-case outdoor living area, Unit A-1 has a predicted daytime unmitigated sound level of 62 dBA.

Table 2 provides a summary of the calculated sound levels.

Where the predicted sound levels exceed the applicable sound level limits, mitigation and warning clauses are warranted. See Section 5.1 for details.

4.2 Stationary Sources

4.2.1 Within the Development

There are no stationary noise sources are proposed within the development.

4.2.2 Outside the Development

There are no acoustically significant stationary noise sources affecting the proposed development.



5 Noise Abatement Requirements

Figure 2 and Table 3 provide a summary of the acoustical requirements for the proposed development.

5.1 Transportation Sources

5.1.1 Indoors

As detailed architectural plans are not yet available, typical dwelling designs were used to predict the required architectural components. Based on these typical designs, the worst-case room will be a corner room on an upper floor with each face containing 55% and 25% of the associated room area for wall and window respectively.

The MOECC indoor criteria for road and rail traffic were used where applicable. The spectrum of the noise source was accounted for in the analysis.

The predicted worst-case STC rating of STC 35 for the exterior walls is met by standard construction. No upgraded wall construction is predicted to be required.

The predicted worst-case STC rating of STC 29 for the windows is met by standard windows. Upgraded windows are not predicted to be required.

For this site, no dwellings require mandatory central air conditioning.

Units within 50 m of the centreline of King Street East require the provision for adding central air conditioning.

Warning clauses should be incorporated in development agreements and offers of purchase and sale.

5.1.2 Outdoor Living Areas

Sound barriers are required for Units A-1 to A-3 and B-1 to B-3. With the proposed sound barriers, mitigated sound levels of 55 dBA or less are predicted. See Figure 2 for the location and heights of the proposed sound barriers.

Acoustically, sound barriers can be constructed of a berm and/or acoustic fence however given the space limitations of development, typically the use of berms is minimized.



Sound barriers should be continuous with no gaps and have a surface density of 20 kg/m² or more. Even small gaps within a sound barrier can substantially degrade the acoustic performance. If drainage is required under an acoustic fence, special designs are available to accommodate water flow while minimizing the acoustical impact. To avoid excessive noise going around the end of the barrier, the sound barrier should be constructed as shown on Figure 2. Other layouts are possible, but before construction, an acoustical engineer should review them to ensure they are acoustically effective.

Gates in an acoustic fence may have a small gap at the bottom and must have a surface density of more than 10 kg/m^2 . When gates are installed in an acoustic fence, they should be placed in a segment of the fence perpendicular to the road.

The Town of Caledon requires noise barrier walls to be constructed of concrete or vinyl panels. Wood panels are not acceptable. The maximum noise wall height is 2.4 m.

Where sound barriers are installed or where sound level limits will be exceeded without the addition of mitigation, warning clauses should be incorporated in development agreements and offers of purchase and sale.

5.2 Warning Clauses

Warning clauses are to be placed in development agreements and included in offers of purchase or sale and lease agreements. See Table 3 for a summary of the warning clauses required for each Lot/Block.

Type A is used where a sound level excess is predicted but no mitigation is installed, Type B is used where physical mitigation has been provided, Types C, D and E are self-explanatory, Type F is only used in designated Class 4 areas;

- 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 and Climate Change."
- B. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units,



sound levels due to increasing road traffic may on occasions 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 and Climate Change."

- 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 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 and Climate Change."
- 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 and Climate Change."
- E. "Purchasers/tenants are advised that due to the proximity of the adjacent industry, noise from the industry may at times be audible."
- F. "Purchasers/tenants are advised that sound levels due to the adjacent industry are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."
- G. "That the acoustical berm and/or barrier as installed, shall be maintained or repaired by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards, and having the same colour and appearance of the original."



The wording of A to F presented above is taken from sample warning clauses prepared by the MOECC, the municipality can modify them as required. The guidelines prepared by the Region of Peel in 2012 contain similar warning clauses. The wording of clause G is taken from the Peel guidelines.



6 Conclusion

With the incorporation of the required mitigation (see Figure 2 and Table 3), all noise-sensitive receptors within the development are predicted to comply with the applicable sound level limits. Where mitigation is required, warning clauses have been provided to notify future occupants.

Prior to the issuance of building permits, dwelling and sound barrier designs should be reviewed by an acoustical consultant to ensure compliance with the applicable guidelines and development agreements.

Prior to the issuance of occupancy permits, dwellings and sound barriers should be inspected to ensure that they were constructed as per the approved plans.

Respectfully submitted,

Actinium Engineering Inc.



JP ENR 17-044 101018.docx



7 References

American Society for Testing and Materials (ASTM) 2016, Standard E413 Classification for Rating Sound Insulation.

Ontario Ministry of the Environment (MOE) 1995, Guideline D-1 Land Use Compatibility.

Ontario Ministry of the Environment (MOE) 1995, Guideline D-6 Compatibility Between Industrial Facilities & Sensitive Land Uses.

Ontario Ministry of the Environment (MOE) 1978, Model Municipal Noise Control By-Law Final Report.

Ontario Ministry of the Environment (MOE) 1989, ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation.

Ontario Ministry of the Environment (MOE) 1983, Publication NPC-207 Impulse Vibration in Residential Buildings.

Ontario Ministry of the Environment (MOE) 2013, Publication NPC-300 Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning.

Region of Peel November 2012. General Guidelines for the Preparation of Acoustical Reports in the Region of Peel.

Town of Caledon 2012, By-law 86-110. A By-law to Control Noise.

Town of Caledon 2009, Development Standards, Policies & Guidelines.

Town of Caledon 2003, By-law 95-67 A By-law to Regulate Nuisances Resulting from Noise.

Town of Caledon 2017, By-law 2006-50 Town of Caledon Zoning By-law.



Table 1 – Summary of Road Traffic Information

Road	Ultimate AADT*	Day/Night Volume Split (%)	Medium/Heavy Trucks % (Day [Night])	Lanes	Gradient (%)	Posted Speed (km/h)
King Street East	16,200	89/11	2/1 [2/1.5]	2	3	50

* Annual Average Daily Traffic



Table 2 – Predicted Unmitigated Sound Levels OutdoorsDue to Transportation Sources

Unit	Location ¹ Source	Source	Distance (m)	Daytime Leq (dBA)		Nighttime Leq (dBA)	
				Separate	Combined	Separate	Combined
Unit A 1	Side Wall	KS ²	20		64		58
UIIIt A-1	Rear Yard	KS ²	22		62		
Unit A-2	Rear Yard	KS ²	27		60		
Unit A-3	Rear Yard	KS^2	32		58		
Unit A-4	Rear Yard	KS^2	37.5		57		
Unit B-1	Rear Yard	KS^2	23.5		61		

- 1 Wall location taken at 10.5 m above grade for the fourth floor of the dwellings. OLA location taken 3 m out from the centre of the rear wall, 1.5 m above grade.
- 2 King Street East



Table 3 – Minimum Noise Abatement Measures

Units	Air Conditioning ¹	Wall ²	Window ²	Sound Barrier ³	Warning Clauses⁴
Units A-1 to A-3 and B-1 to B-3	Provision	N/R	N/R	2.2 m	B, C, G
Units A-4 to A-6 and B-4 to B-6	Provision	N/R	N/R	No	В, С
All other Units	No Special Requirements				

Notes to Table 3

- Provision for air conditioning requires a dwelling designed for the addition of central air conditioning at the occupants' discretion. This typically involves the installation of a ducted heating system. For air-cooled condenser units, the AHRI sound rating must not exceed 7.6 bels. It must be at least 0.6 m from any lot line.
- Calculated using typical dwelling design. See Section 5.1.1 for details. When detailed architectural drawings are analyzed, these values may change. STC is the Sound Transmission Class.
 N/R denotes no requirements beyond standard construction.
- 3 See Figure 2 and Section 5.1.2 for further details.
- 4 Warning clauses are to be placed in development agreements and included in offers of purchase or sale and lease agreements. See Section 5.3 for details and suggested wording.



Table 4 – Predicted Mitigated Sound Levels Outdoors Due to Transportation Sources

Unit	Base of Source (m)	Base of Barrier (m)	Base of Receiver (m)	Sound Barrier Height (m)	Daytime Leq (dBA)
A-1	226.00	225.75	225.60	2.2^{1}	<55
A-2	226.00	225.75	225.60	2.2^{1}	<55
A-3	226.00	225.75	225.60	2.2^{1}	<55
A-4	226.00	225.75	225.60	2.2^{2}	<55
B-1	224.50	224.87	225.30	2.2^{1}	55
B-3	224.50	224.87	225.30	2.2^{1}	<55

1 2.2 m high acoustic fence

2 2.2 m high acoustic fence on adjacent units





Figure 1 – Key Plan





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Appendices



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Appendix A – Traffic Data





The Region of Peel is the proud recipient of the National Quality Institute Order of Excellence, Quality; the National Quality Institute Canada Award of Excellence Gold Award, Healthy Workplace; and a 2008 IPAC/Deloitte Public Sector Leadership Gold Award.

May 24, 2018

Jamie Paterson, Actinium Engineering Inc. RE: Request for Road Traffic Data King St E Bolton (Station 00900400)

Jamie:

As per your request, we are providing the following traffic data.

King Street East, west of Evans Ridge

	Existing	Planned		
24 Hour Traffic Volume	10,339	16,200		
# of Lanes	2	2		
Day/Night Split	89/11	89/11		
Day Trucks (% of Total Volume)	2% Medium 1% Heavy	2% Medium 1% Heavy		
Night Trucks (% of Total Volume)	2% Medium 1.5% Heavy	2% Medium 1.5% Heavy		
Right-of-Way Width	30 metres			
Posted Speed Limit	50 km/h			

If you require further assistance, please contact me at (905) 791-7800 ext. 8594

Regards,

Parshan Bahrami, EIT Transportation Planner, Infrastructure Planning & Design Transportation Division, Public Works, Region of Peel

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Public Works

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Appendix B – Environmental Noise Criteria



Tables C-1 to C-10 below are extracted from NPC-300 published by the Ontario Ministry of Environment and Climate Change.

Road and Rail

Table C-1 -Sound Level Limit for Outdoor Living Areas, Road and Rail

Time Period	Leq(16)(dBA)
16 hr, 07:00 - 23:00	55

Table C-2 – Indoor Sound Level Limits, Road and Rail

Type of Space	Time	Leq(dBA)		
Type of Space	Period	Road	Rail	
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 - 23:00	45	40	
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 - 07:00	45	40	
Cleaning quartere	07:00 - 23:00	45	40	
Sieepilig quarters	23:00 - 7:00	40	35	



Type of Space	Time	Leq (Time Period) (dBA)	
	renou	Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 - 23:00	50	45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 - 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 - 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 - 07:00	40	35

Table C-9 – Supplementary Indoor Sound Level Limits, Road and Rail

Plane of Window Ventilation Requirements

	Leq (Time Period) (dBA)			
Required Ventilation	Day 07:00 to 23:00	Night 23:00 to 07:00		
Provision for installation of central air conditioning in the future at the occupant's discretion	>55 to ≤65	>50 to ≤60		
Mandatory central air conditioning	>65	>60		



Aircraft

Table C-3 – Outdoor Aircraft Noise Limit

Time Period	NEF/NEP
24-hour	30

Table C-4 – Indoor Aircraft Noise Limit (Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
Living/dining/den areas of residences, hospitals, nursing homes, schools, nursing/retirement homes, daycare centres, etc.	5
Sleeping quarters	0

* The indoor NEF/NEP values in Table C-4 are used to determine the acoustical insulation requirements based on the NEF/NEP contour maps.



Table C-10 – Supplementary Indoor Aircraft Noise Limits (Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private office, conference rooms, etc.	10
Living/dining/den areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

The indoor NEF/NEP values listed in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.



Stationary Sources

Table C-5 – Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA), Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 - 19:00	50	50	45	55
19:00 - 23:00	50	45	40	55

Table C-6 - Exclusion Limit Values of One-Hour Equivalent Sound Level(Leq, dBA), Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 - 19:00	50	50	45	60
19:00 - 23:00	50	50	40	60
23:00 - 07:00	45	45	40	55



Time of Day	Actual Number of Impulses in Period of One- Hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
	9 or more	50	50	45	55
	7 to 8	55	55	50	60
07:00 - 23:00	5 to 6	60	60	55	65
	4	65	65	60	70
	3	70	70	65	75
	2	75	75	70	80
	1	80	80	75	85

Table C-7 – Exclusion Limit Values for Impulsive Sound Level (LLM, dBAI), Outdoor Points of Reception

Table C-8 - Exclusion Limit Values for Impulsive Sound Level (LLM, dBAI),Plane of Window – Noise Sensitive Spaces (Day/Night)

Actual Number of Impulses in Period of One-Hour	Class 1 Area (07:00-23:00)/ (23:00-07:00)	Class 2 Area (07:00-23:00)/ (23:00-07:00)	Class 3 Area (07:00-23:00)/ (23:00-07:00)	Class 4 Area (07:00-23:00)/ (23:00-07:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85



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Appendix C – Sample Calculations



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A1SW.TXT NORMAL REPORT Date: 03-06-2018 22:24:46 STAMSON 5.0 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Time Period: Day/Night 16/8 hours Filename: alsw.te Description: Unit A-1 Side Wall Road data, segment # 1: KingStE (day/night) Car traffic volume : 13985/1720 veh/TimePeriod Medium truck volume : 288/36 veh/TimePeriod Heavy truck volume : 288/36 veh/TimePeriod Heavy truck volume : 144/27 veh/TimePeriod Posted speed limit : 60 km/h Road gradient : 3 % Road pavement : 1 (Typical asphalt or concrete) Data for Segment # 1: KingStE (day/night)
 Angle1
 Angle2
 : -90.00 deg
 90.00 deg

 Wood depth
 :
 0
 (No woods.

 No of house rows
 :
 0 / 0

 Surface
 :
 1
 (Absorptiv)
 (No woods.) (Absorptive ground surface) Surrace:1(ADSorptive ground surface)Receiver source distance:20.00 / 20.00 mReceiver height:10.50 / 10.50 mTopography:1Reference angle:0.00 <u>c</u> Results segment # 1: KingStE (day) Source height = 1.00 m ROAD (0.00 + 63.81 + 0.00) = 63.81 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq ------90 90 0.41 66.55 0.00 -1.76 -0.99 0.00 0.00 0.00 63.81 -----Segment Leq : 63.81 dBA Total Leq All Segments: 63.81 dBA <u>ċ</u> Results segment # 1: KingStE (night) -----Source height = 1.11 m ROAD (0.00 + 58.43 + 0.00) - 58.43 dBA Anglel Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq ------90 90 0.40 61.16 0.00 -1.75 -0.98 0.00 0.00 0.00 58.43 -----Segment Leq : 58.43 dBA Total Leq All Segments: 58.43 dBA Ō TOTAL Leg FROM ALL SOURCES (DAY): 63.81 (NIGHT): 58.43



A10LA.TXT

Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume : 2.00 Heavy Truck % of Total Volume : 1.00 Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 1: KingStE (day/night)

Angle1 Angle2	:	-60.00	d	eg 90.00 deg
Wood depth	:	0		(No woods.)
No of house rows	:	0	1	0
Surface	:	1		(Absorptive ground surface)
Receiver source distance	:	22.00	1	22.00 m
Receiver height	:	1.50	/	4.50 m
Topography	:	1		(Flat/gentle slope; no barrier)
Reference angle	:	0.00		
4				
Poculto cogmont # 1, King	c+1	(daw)		

Results segment # 1: KingStE (day)

Source height = 1.00 m

ROAD (0.00 + 61.92 + 0.00) = 61.92 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -60 90 0.66 66.55 0.00 -2.76 -1.87 0.00 0.00 0.00 61.92

Segment Leq : 61.92 dBA

Total Leq All Segments: 61.92 dBA



A1BAR.TXT ALBAK.IXI STAMSON 5.0 NORMAL REPORT Date: 03-07-2018 35:15:05 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Time Period: Day/Night 16/8 hours Filename: a1ola.te Description: UNIT A-1 REAR YARD WITH 2.2 M ACOUSTIC FENCE Road data, segment # 1: KingStE (day/night) Car traffic volume : 13985/1729 veh/TimePeriod * Medium truck volume : 288/36 veh/TimePeriod * Heavy truck volume : 144/18 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 3 % Road pavement : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 16200 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume : 2.00 Heavy Truck % of Total Volume : 1.00 Day (16 hrs) % of Total Volume : 89.00 Data for Segment # 1: KingStE (day/night)

 Angle1
 Angle2
 : -60.00 deg
 90.00 deg

 Wood depth
 : 0
 (No woods.

 No of house rows
 : 0 / 0

 Surface
 : 1
 (Absorptive)

 (No woods.)

 surface
 :
 1
 (Absorptive ground surface)

 Receiver source distance
 :
 22.00 / 22.00 m

 Receiver height
 :
 1.50 / 4.50 m

 Topography
 :
 2
 (Flat/gentle slope; with barrier)

 Barrier angle1
 :
 -60.00 deg
 Angle2 : 90.00 deg

 Barrier height
 :
 2.20 m

 Barrier receiver distance
 :
 4.00 / 4.00 m

 Source elevation
 :
 22.0 e m

 (Absorptive ground surface) Source elevation: 226.00 mReceiver elevation: 225.60 mBarrier elevation: 225.75 mReference angle: 0.00 Results segment # 1: KingStE (day) Source height = 1.00 m Barrier height for grazing incidence Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.00 ! 1.50 ! 1 1.33 ! 227.08 ROAD (0.00 + 54.26 + 0.00) = 54.26 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -60 90 0.54 66.55 0.00 -2.57 -1.71 0.00 0.00 -8.01 54.26 ----

Segment Leq : 54.26 dBA

Total Leq All Segments: 54.26 dBA



Glossary

- **dBA** The A-weighted sound level as commonly written. It is technically correct (but less common) to use LA = x dB.
- **dBAI** The A-weighted impulsive sound level. It is technically correct (although less common) to use LAI = x dB.
- Daytime Includes the time from 07:00 to 23:00 as per the MOECC.
- **Decibel (dB)** A logarithmic number used to express the ratio between a level and a reference level
- A-Weighting A weighting network designed to be similar to the response of humans at low sound levels. Actinium Engineering follows the standard practice of using A-weighted sound levels regardless of sound level.
- **C-Weighting** A weighting network designed for higher sound levels than A-weighting. It can also be used to determine if the potential for a low-frequency noise problem exists by comparing the A and C weighted sound levels.
- **Equivalent Sound Level (Leq**_{time}) The energy-averaged sound level. The Leq is the constant sound level that would contain the same energy as the varying sound level during the analyzed time period.
- **Hertz (Hz)** The frequency of a sound (or centre frequency of a band). One hertz equals one cycle per second.
- **Impulsive Sound** A single or multiple sound pressure peak(s) with a rise time less than 200 ms and a total duration less than 200 ms.
- Nighttime Includes the time from 23:00 until 07:00.
- Noise Exposure Forecast/Prediction (NEF/NEP) Calculated values used to predict the impact of planes using an aerodrome on surrounding lands. NEF/NEP represent five/ten years in the future respectively. In practise, they are composited and the higher of the NEF/NEP is used to create the contour lines applicable to the aerodrome. Leq₂₄ is approximately NEF/NEP +32.



- **Octave** a range of frequencies whose upper frequency limit is twice that of its lower frequency limit. Also commonly divided into 1/3 octave bands to better characterize sources.
- **Root Mean Square (RMS)** Obtained by squaring the amplitude of the sound (or vibration) at each instant, calculating the average of these values and then taking the square root of this average.
- **Sound** Any pressure variation that the human ear can detect. Typically considered to be between 20 Hz and 20 KHz. In air sound propagates at 343 m/s.
- Sound Level See Sound Pressure Level
- **Sound Power Level (PWL or Lw)** Expressed in decibels as 10 times the logarithm of the ratio of the sound power and a reference power. The standard reference power of 1 pW is used by Actinium Engineering for all projects.
- **Sound Pressure** The difference between the pressure produced by a sound wave and the ambient pressure.
- **Sound Pressure Level (SPL or L)** Expressed in decibels as 20 times the logarithm of the ratio of the sound pressure and a reference pressure. The standard reference pressure of 20 µPa (the typical threshold of hearing) is used by Actinium Engineering for all projects.
- **Sound Transmission Class (STC)** An integer rating of how well a partition attenuates airborne sound. See ASTM E413 for further information.
- Vibration -Motion of a body or particles.
- **Vibration Acceleration Level (La)** Expressed in decibels as 20 times the logarithm of the ratio of the acceleration of interest and a reference acceleration. The standard reference acceleration of 1 µm/s² is used by Actinium Engineering for all projects.
- **Vibration Velocity Level (Lv)** Expressed in decibels as 20 times the logarithm of the ratio of the vibration velocity and a reference velocity. The standard reference velocity of 1 nm/s is used by Actinium Engineering for all projects.



- **Peak Particle Velocity (PPV)** The maximum speed of a particle as it is moved by a passing wave.
- **Z-Weighting** Zero frequency weighting as per ISO 61672. In encompasses the range from 10 Hz to 20 kHz \pm 1.5 dB. This has replaced the weightings previously known as flat or linear.

