

6th Line Municipal Class Environmental Assessment

County Road 27 to St John's Road
Town of Innisfil, ON

September 6, 2016

APPENDIX E: NOISE IMPACT REPORT



August 2016

NOISE IMPACT REPORT

Class Environmental Assessment for 6th Line from County Road 27 to St. John's Road Innisfil, Ontario

Submitted to:

Cheryl Murray, P.E.
HDR Inc.
100 York Blvd., Suite 300
Richmond Hill, Ontario
L4B 1J8

REPORT

Report Number: 1413283

Distribution:

1 e-copy - HDR Inc.
1 e-copy - Golder Associates Ltd.





Table of Contents

1.0 INTRODUCTION	1
2.0 PROJECT DESCRIPTION	2
2.1 Existing Conditions	2
2.2 Proposed Future Conditions	2
3.0 DESCRIPTION OF TECHNICAL TERMS	3
4.0 ASSESSMENT CRITERIA	4
4.1 Noise Sensitive Areas.....	4
4.2 Environmental Protection Requirements	5
4.3 Noise Sensitive Areas Identification.....	6
5.0 TRAFFIC NOISE IMPACT ASSESSMENT	9
5.1 Assessment Methodology.....	9
5.2 Noise Prediction Algorithms and Techniques	10
6.0 RESULTS	12
6.1 Determination of Potential Noise Impacts.....	12
6.2 Mitigation Investigation	13
7.0 ENVIRONMENTAL PROTECTION REQUIREMENT NOISE (EPR)-2	14
7.1 Construction Equipment and Activities	14
7.2 Noise Complaints Process.....	14
7.3 Applicable By-Laws	15
8.0 CONCLUSIONS	16

TABLES

Table 1: Applicable Noise Criteria	4
Table 2: Mitigation Effort Required for the Projected Noise Level with the Proposed Improvements above the Ambient	5
Table 3: Description of NSAs around the Project	6
Table 4: Summary of total traffic volumes used for this study	10
Table 5: Summary of Predicted Noise Levels ($L_{eq 24 \text{ hours}}$) at OLAs.....	12



NOISE IMPACT 6TH LINE, INNISFIL CLASS EA

FIGURES

Figure 1: Key Plan

Figure 2: Zoning Plan

Figure 3a & 3b: Noise Sensitive Areas

Figure 4: Outdoor Living Areas Assessed

APPENDICES

APPENDIX A

TNM Inputs Summary



1.0 INTRODUCTION

The Town of Innisfil (Town) retained HDR Inc. (HDR) as the Project Manager Consultant to complete the Municipal Class Environmental Assessment (EA) and Preliminary Design Study for 6th Line from County Road 27 to St. John's Road, in the Town of Innisfil, County of Simcoe, Ontario (the Project). HDR retained Golder Associates Ltd. (Golder) to assess the potential noise impact of the Project.

The Project has been further subdivided into two parts for the noise impact assessment. These two parts are referred to as; Part A, which extends approximately 3 km in length from 20th Sideroad to St. John's Road, and Part B, which extends approximately 12 km in length from County Road 27 to 20th Sideroad. The Project limits and Parts are shown on the Key Plan, Figure 1.

This report provides a summary of the noise impact assessment for the Project on the identified neighbouring sensitive receptors. The report also identifies; the applicable municipal noise by-law, describes a noise complaint process for construction activities, and provides a general discussion regarding noise arising from construction activities.



2.0 PROJECT DESCRIPTION

Currently 6th Line is a 2-lane road with a posted speed of 80 km/h. Based on predicted future uses, the segment of roadway between 20th Sideroad to St. John's Road (Part A, approximately 3 km in length, and south of the planned Sleeping Lion Development) is anticipated to have future urbanized characteristics, while the segment from County Road 27 to 20th Sideroad (Part B, approximately 12 km in length, with mostly agricultural properties) will operate as a rural section.

Based on the recommendations from the 2013 Transportation Master Plan, and additional assessment conducted through this EA study, the Town is proposing to widen 6th Line, between 20th Sideroad and St. John's Road, from a 20 m 2-lane local rural road to a 26-30 m wide 4-lane *urban major collector road*, and proposing to reconstruct 6th Line, between County Road 27 and 20th Sideroad, from a 20 m 2-lane local rural road to a 2-lane *rural arterial road* with paved shoulders and 30 m right-of-way protection.

Figure 1 illustrates the Project (including Parts A and B) and study area developed for completing the noise study. The study area includes up to 500 m from the 6th Line centreline.

2.1 Existing Conditions

Currently, 6th Line is an east-west local road located in Innisfil, Ontario. It generally extends from County Road 27 at its west end, to St. John's Road at its east end. The surrounding land uses adjacent to both Part A and B are primarily agricultural and residential uses with a proposed future residential development north of Part A (Sleeping Lion). Figure 2 provides the land use information around the Project area.

At the time of the study, none of the existing adjacent uses were understood to be protected by purpose-built acoustic barriers. However, a noise and vibration feasibility study (NVFS), prepared by J.E. Coulter (Coulter 2014), for the proposed Sleeping Lion residential development north of 6th Line near St John's Road provides recommendations for acoustic barriers to be installed for the protection of certain areas. This NVFS is further discussed in Section 4.3. Some of the existing residences may have features such as privacy fencing or dense foliage on their properties between their home and 6th Line; however the detailed analysis of the acoustic performance of these features is beyond the scope of this study, and can be considered during the subsequent detailed design stages, if required. In excluding the acoustic effect of these features the analysis in this noise study can be considered conservative. It should be noted the acoustic shielding provided by the homes themselves has been considered in determining the exposure of residential outdoor areas, where appropriate.

2.2 Proposed Future Conditions

For the purposes of this noise study, it is understood the future proposed condition includes the widening of the existing alignment of 6th Line from two lanes to four lanes in Part A, while maintaining a single lane in each direction in Part B. The anticipated change in traffic levels for the horizon of year 2031 was provided by HDR via email on March 23rd, 2015.



3.0 DESCRIPTION OF TECHNICAL TERMS

To help understand the analysis and recommendations made in this report, the following is a brief discussion of technical noise terms.

Sound pressure level is expressed on a logarithmic scale in units of decibels (dB). Since the scale is logarithmic, a sound that is twice the sound pressure level as another will be three decibels (3 dB) higher.

The noise data and analysis in this report have been given in terms of frequency distribution. The levels are grouped into octave bands. Typically, the centre frequencies for each octave band are 31.5, 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hertz (Hz). The human ear responds to the pressure variations in the atmosphere that reach the ear drum. These pressure variations are composed of different frequencies that give each sound we hear its unique character.

It is common practice to sum sound levels over the entire audible spectrum (i.e., 20 Hz to 20 kHz) to give an overall sound level. However, to approximate the hearing response of humans, each octave band measured has a weighting applied to it. The resulting "A-weighted" sound level is often used as a criterion to indicate a maximum allowable sound level. In general, low frequencies are weighted higher, as human hearing is less sensitive to low frequency sound.

Environmental noise levels vary over time, and are described using an overall sound level as the L_{eq} , or energy averaged sound level. The L_{eq} is the equivalent continuous sound level, which in a stated time, and at a stated location, has the same energy as the time varying noise level. It is common practice to measure L_{eq} sound levels in order to obtain a representative average sound level.



4.0 ASSESSMENT CRITERIA

Two guidance documents can be applicable for providing criteria for the assessment of noise from road traffic for this Project. These documents are summarized in Table 1 below.

Table 1: Applicable Noise Criteria

Governing Body	Guidance Document	Intended Use	Location of Assessment	Criterion to consider mitigation ¹
Ontario Ministry of Environment and Climate Change (MOECC)	NPC-300 – Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning Publication (August 2013)	Permitting of stationary sources (i.e., industry) or land use planning (i.e., residential development)	Outdoor Living Area (OLA)	>55 dBA Daytime traffic only (i.e., 7:00 to 23:00) ²
Ontario Ministry of Transportation (MTO)	Environmental Guide for Noise (October 2006)	Roadways	Outdoor Living Area (OLA)	≥65 dBA, or ≥5 dB increase with the Project; 55 dBA target where feasible (24 hour average) ²

Notes:

¹: Calculated noise levels based on projected future traffic counts (i.e., 10 years into the future, or ultimate traffic count where appropriate).

²: Values represent average levels established over the given period.

The MTO Noise Guide has been applied in this assessment, with OLA(s) identified as per MOECC NPC-300 (i.e., at a height of 1.5 m, rather than the MTO’s 1.2 m). A greater receptor height typically correlates with higher predicted and measured noise levels and is therefore slightly more conservative. A 1.5 m receptor height is also more commonly used in other guidance documents in other jurisdictions as a representative height for at-grade receptors.

4.1 Noise Sensitive Areas

The MTO Noise Guide defines Noise Sensitive Area(s) (NSA(s)) as one of the following land uses, with an OLA associated with them:

- private homes such as single family residences (owned or rental);
- townhouses (owned or rental);
- multiple unit buildings, such as apartments with OLAs for use by all occupants; and
- hospitals, nursing homes for the aged, where there are OLAs for the patients.



Land uses by themselves that do not qualify as NSAs include the following:

- apartment balconies above ground floor;
- churches;
- cemeteries;
- parks and picnic areas which are not inherently part of a NSA;
- all commercial; and
- all industrial.

4.2 Environmental Protection Requirements

The MTO Noise Guide provides requirements for noise assessments and mitigation relating to the construction of new or the expansion of existing Provincial Highways. These requirements have been summarized into the following two Environmental Protection Requirement(s) (EPR(s)) for noise according to the *MTO Environmental Protection Requirements Section 6* and the MTO Noise Guide and are summarized below:

NOISE-1 *During design of a new or modified highway, a noise assessment by a qualified acoustical specialist is required for the Most Exposed Side and the OLAs of Noise Sensitive Areas. As an initial screening, future sound levels shall be assessed with and without the proposed improvements for the Most Exposed Side. The objective for outdoor sound levels is to achieve the future predicted ambient that would occur without the proposed highway. The significance of a noise impact will be quantified by using this objective in addition to the change in sound level above the ambient (i.e., the future sound level without the proposed improvements is compared to the future sound level with the proposed improvement).*

The determination of the provision of mitigation is based on the analysis of the predicted noise level at the OLAs.

Table 2 below, which is a copy of Table 2.1 of the MTO Noise Guide, summarizes the criteria for the requirement of noise mitigation efforts:

Table 2: Mitigation Effort Required for the Projected Noise Level with the Proposed Improvements above the Ambient

Change in Noise Level Above Ambient / Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
<5 dBA change & <65 dBA	None
≥ 5 dBA change OR ≥ 65 dBA	Investigate noise control measures on right-of-way. Introduce noise control measures within right-of-way and mitigate to ambient if technically, economically and administratively feasible. Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers.



NOISE-2 Highway construction shall be undertaken in a manner to minimize noise levels and identify a process for dealing with public complaints during construction. Pile driving and blasting operations shall be in accordance with Ontario Provincial Standard Specifications (OPSS 120) and Ministry of the Environment Publication NPC-119.

4.3 Noise Sensitive Areas Identification

Particular NSAs were selected that were representative of; the acoustic environment within the study area (i.e., 500 m from the 6th Line centreline) and the potential impact due to the Project. From these NSAs, NSAs with outdoor areas directly exposed to noise levels from 6th Line (i.e., OLAs identified for homes with rear yards exposed to 6th Line) were identified. Table 3 summarizes the NSAs identified within the study area and whether they are exposed to traffic along 6th Line, as shown in Figures 3a and 3b. In addition, Table 3 provides a description of the NSA, approximate distance from NSA to the 6th Line centreline and approximate UTM coordinates. As per the MTO Noise Guide, NSAs with OLAs identified as having direct exposure to traffic along 6th Line are carried forward for further assessment.

The OLAs do not include the proposed Sleeping Lion residential development to be located north of Part A as the residential development has had a NVFS completed in support of the development that provides details for noise controls to be implemented by the developer prior to occupancy. Golder understands a detailed noise and vibration assessment would have or will be completed in support of the approval process for the residential development. Accordingly, a detailed review of the Sleeping Lion development NVFS was not completed as part of this Class EA noise study. However, Golder carried out a cursory review of the details of the Sleeping Lion development NVFS that indicates traffic levels were assessed for year 2026 with an annual increase between 20 to 25%. This is roughly in-line with the expected yearly increase applied in this Class EA noise study. Mitigation in the form of acoustic barriers has been suggested in the Sleeping Lion development NVFS, with no mitigated levels presented in excess of 55 dBA; however, mitigated levels are not presented for all potential receptors for which mitigation is recommended. The increase in traffic between 2026 and 2031 would be expected to result in an increase in predicted noise levels; however as noise levels have not been presented for all mitigated OLAs, the 10-year design durability, in accordance with NPC-300, should be verified for the acoustic mitigation measures presented. In addition, as it is currently expected Part A will be widened to four lanes, it may be prudent for the noise calculations prepared for the NVFS be revisited to consider the future widening.

Table 3: Description of NSAs around the Project

Noise Sensitive Area (NSA) ID	Description	OLA with Exposure to Traffic Along 6 th Line? (Yes / No) ¹	Approximate Distance to Centreline of 6 th Line (m)	Approximate UTM coordinates (Zone 17)	
				Eastin g (m)	Northing (m)
R01	Residence with OLA exposed to 6 th Line	Yes	258	602341	4900806
R02	Residence with OLA exposed to 6 th Line	Yes	304	602429	4900261
R03	Residence with OLA exposed to 6 th Line	Yes	300	602442	4900884



NOISE IMPACT 6TH LINE, INNISFIL CLASS EA

Noise Sensitive Area (NSA) ID	Description	OLA with Exposure to Traffic Along 6 th Line? (Yes / No) ¹	Approximate Distance to Centreline of 6 th Line (m)	Approximate UTM coordinates (Zone 17)	
				Eastin g (m)	Northing (m)
R04	Residence with OLA exposed to 6 th Line	Yes	295	602539	4900289
R05	Residence with OLA exposed to 6 th Line	Yes	34	603340	4900902
R06	Residence with OLA exposed to 6 th Line	Yes	124	603531	4900797
R07	Residence with OLA exposed to 6 th Line	Yes	185	603779	4901204
R08	Residence fronting onto 6 th Line	No	37	604005	4901045
R09	Residence fronting onto 6 th Line	No	35	604090	4901149
R10	Residence fronting onto 6 th Line	No	34	604121	4901159
R11	Residence fronting onto 6 th Line	No	33	604158	4901169
R12	Residence fronting onto 6 th Line	No	29	604479	4901271
R13	Residence fronting onto 6 th Line	No	39	605063	4901397
R14	Residence fronting onto 6 th Line	No	29	605186	4901509
R15	Residence fronting onto 6 th Line	No	19	605196	4901462
R16	Residence with OLA exposed to 6 th Line	Yes	183	605260	4901696
R17	Residence fronting onto 6 th Line	No	34	605557	4901568
R18	Residence with OLA exposed to 6 th Line	Yes	136	605620	4901768
R19	Residence with OLA exposed to 6 th Line	Yes	92	605644	4901535
R20	Residence with OLA exposed to 6 th Line	Yes	277	606284	4902131
R21	Residence fronting onto 6 th Line	No	52	606518	4901971
R22	Residence with OLA exposed to 6 th Line	Yes	53	606825	4902073
R23	Residence with OLA exposed to 6 th Line	Yes	245	606901	4901784
R24	Residence fronting onto 6 th Line	No	29	607116	4902082
R25	Residence fronting onto 6 th Line	No	60	607235	4902215
R26	Residence with OLA exposed to 6 th Line	Yes	191	607381	4902401
R27	Residence with OLA exposed to 6 th Line	Yes	199	607465	4902018
R28	Residence with OLA exposed to 6 th Line	Yes	197	608187	4902258



NOISE IMPACT 6TH LINE, INNISFIL CLASS EA

Noise Sensitive Area (NSA) ID	Description	OLA with Exposure to Traffic Along 6 th Line? (Yes / No) ¹	Approximate Distance to Centreline of 6 th Line (m)	Approximate UTM coordinates (Zone 17)	
				Eastin g (m)	Northing (m)
R29	Residence with OLA exposed to 6 th Line	Yes	258	608276	4902768
R30	Residence with OLA exposed to 6 th Line	Yes	159	608330	4902681
R31	Residence with OLA exposed to 6 th Line	Yes	393	608628	4902199
R32	Residence with OLA exposed to 6 th Line	Yes	63	608862	4902756
R33	Residence fronting onto 6 th Line	No	42	609140	4902827
R34	Residence with OLA exposed to 6 th Line	Yes	408	609249	4902388
R35	Residence fronting onto 6 th Line	No	63	609392	4902936
R36	Residence fronting onto 6 th Line	No	32	609415	4902843
R37	Residence fronting onto 6 th Line	No	85	609794	4903126
R38	Residence with OLA exposed to 6 th Line	Yes	58	609952	4903161
R39	Residence with OLA exposed to 6 th Line	Yes	197	610292	4903420
R40	Residence with OLA exposed to 6 th Line	Yes	143	611002	4903604
R41	Residence fronting onto 6 th Line	No	25	611099	4903513
R42	Residence with OLA exposed to 6 th Line	Yes	112	611122	4903376
R43	Residence fronting onto 6 th Line	No	49	611342	4903618
R44	Residence fronting onto 6 th Line	No	91	611863	4903836
R45	Residence fronting onto 6 th Line	No	56	611911	4903816
R46	Residence fronting onto 6 th Line	No	41	611918	4903716
R47	Residence with OLA exposed to 6 th Line	Yes	102	612104	4903931
R48	Residence with OLA exposed to 6 th Line	Yes	84	612203	4903945
R49	Residence fronting onto 6 th Line	No	32	612222	4903830
R50	Residence fronting onto 6 th Line	No	38	612279	4903842
R51	Residence fronting onto 6 th Line	No	60	612310	4903955
R52	Residence with OLA exposed to 6 th Line	Yes	144	612462	4904096
R53	Residence with OLA exposed to 6 th Line	Yes	279	612502	4903663



NOISE IMPACT 6TH LINE, INNISFIL CLASS EA

Noise Sensitive Area (NSA) ID	Description	OLA with Exposure to Traffic Along 6 th Line? (Yes / No) ¹	Approximate Distance to Centreline of 6 th Line (m)	Approximate UTM coordinates (Zone 17)	
				Eastin g (m)	Northing (m)
R54	Residence with OLA exposed to 6 th Line	Yes	205	613269	4903999
R55	Residence with OLA exposed to 6 th Line	Yes	49	613736	4904320
R56	Residence fronting onto 6 th Line	No	65	613770	4904452
R57	Residence fronting onto 6 th Line	No	29	614211	4904500
R58	Residence fronting onto 6 th Line	No	59	614551	4904578
R59	Residence fronting onto 6 th Line	No	30	614739	4904733
R60	Residence with OLA exposed to 6 th Line	Yes	53	614848	4904681
R61	Residence with OLA exposed to 6 th Line	Yes	77	616586	4905389
R62	Residence fronting onto 6 th Line	No	35	616621	4905283
R63	Residence fronting onto 6 th Line	No	24	616645	4905353
R64	Residence fronting onto 6 th Line	No	48	616586	4905389
R65	Residence fronting onto 6 th Line	No	43	616621	4905283
R66	Residence fronting onto 6 th Line	No	44	616645	4905353
R67	Residence fronting onto 6 th Line	No	42	616670	4905286
R68	Residence with OLA exposed to 6 th Line	Yes	23	616697	4905300
R69	Residence fronting onto 6 th Line	No	36	616730	4905309

Note:

¹: As per the MTO Noise Guide, the NSA is carried forward for further assessment if the associated OLA has direct exposure to traffic along 6th Line. These NSA with OLAs with direct exposure are identified with a 'Yes'.

5.0 TRAFFIC NOISE IMPACT ASSESSMENT

5.1 Assessment Methodology

The noise levels were predicted for the proposed conditions of both Part A and Part B as well as with the existing conditions at the selected OLAs. OLAs at NSAs within the first row, adjacent to 6th Line, and within the study area (i.e., up to 500 m from the roadway centerline) were considered. In line with the MTO Noise Guide, the OLA has been defined as being in the rear yard of the homes under assessment. Consequently, homes fronting directly on to 6th Line are not considered to have OLAs directly exposed to 6th Line traffic noise, as shown in Figures 3a and 3b.

Table 4 provides the summary of traffic volumes used in the analysis and presented in this report. Total traffic volumes were provided by HDR as Annual Average Daily Traffic (AADT) values for both 2015 and 2031.



The breakdown of heavy and medium trucks was based on the provided percentage of commercial vehicles (%COMM). Half of the %COMM was assumed to be made up of heavy vehicles with the remaining half consisting of medium vehicles. The centreline of the road was provided in digital shape file format, while speed limits were based on the same digital format supported by visible signage in recent online photography. In line with information used in the Coulter 2014 NVFS, the speed limit for Part A has been assumed to decrease to 60 km/h by 2031.

Table 4: Summary of total traffic volumes used for this study

Section of 6 th Line	AADT ₂₀₁₅	%COMM ₂₀₁₅ ¹	2015 Speed Limit (km/h)	AADT ₂₀₃₁	%COMM ₂₀₁₅ ¹	2031 Speed Limit (km/h)
Part A from St. John's Road to 20 th Sideroad	800	4%	80	17,100	5%	60
Part B from County Road 27 to 20 th Sideroad	300	3%	80	11,300	5%	80

Note:

¹: Half of commercial vehicles were considered to be heavy vehicles, with the remaining half being medium vehicles.

The assessment of existing and future noise levels from road traffic was limited to traffic along 6th Line. Traffic from other roadways was not explicitly considered in this noise study. Road traffic noise from other roadways can be considered during the detailed design stage, if required.

5.2 Noise Prediction Algorithms and Techniques

As per the MTO Noise Guide, the STAMINA 2.0 algorithm, as implemented in the United States Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.5 software, was used to predict noise levels at NSAs with exposed OLAs for existing and future proposed conditions. Based on the increase in traffic volume between 2015 and 2031, the noise level increase was anticipated to be greater than 5 dB; the MTO Noise Guide recommends the use of STAMINA in such a case. All noise predictions were carried out at a receptor height of 1.5 m for the OLA. If an increase in noise levels greater than 5 dB or projected noise levels greater than 65 dBA were predicted at the OLA, investigation of mitigation was considered.

In addition to including traffic volumes and respective traffic breakdowns for the relevant roadways, the following additional inputs were considered for modelling in TNM:

- perpendicular distance between the roadway and the OLA;
- based on an analysis of available terrain contours, generally flat land between road and receptor;
- pavement type of “average” acoustic absorption for the roadway;
- acoustically soft surface between roadway and the receptor (i.e., hard versus soft ground);
- generally flat road grades;
- current and future posted speed limits for the roadway Parts, and;



- current and proposed widths of the roadway Parts.

Following a conservative approach, the prediction modelling did not consider potential attenuation due to the presence of any woodlots or existing privacy fencing between the roadway and OLA.

This study considers traffic to be predominantly free-flowing along 6th Line and does not include specific inputs for vehicles accelerating or decelerating. A more comprehensive assessment approach can be used at the detailed design stage, which can include certain acoustic effects of traffic flow controls.



6.0 RESULTS

6.1 Determination of Potential Noise Impacts

Table 5 presents the summary of the potential noise impact results at the OLAs carried forward for assessment (i.e., NSAs directly exposed to noise levels from 6th Line). The results presented are based on the analysis carried out using the TNM prediction model, for which input data has been summarized in Figure 4 and Appendix A. For these OLAs within the study area, a change in noise level of over 5 dB is realized between the existing 2015 conditions and 2031. It should be noted the predicted noise levels are expected to exceed the province’s target level of 55 dBA at only a limited number of OLAs.

Table 5: Summary of Predicted Noise Levels ($L_{eq\ 24\ hours}$) at OLAs with Direct Exposure to Traffic Along 6th Line

OLA ID	Approximate Distance to Centreline of Roadway (m)	Predicted 2015 Noise Level (dBA)	Expected Change in Noise Level between 2015 and 2031 (dB)	Predicted 2031 Noise Level (dBA)
R01	258	25	+13	38
R02	304	23	+13	36
R03	300	25	+13	38
R04	295	24	+13	37
R05	34	46	+14	60
R06	124	35	+12	47
R07	185	31	+13	44
R16	183	31	+13	44
R18	136	34	+12	46
R19	92	37	+13	50
R20	277	28	+12	40
R22	53	42	+13	55
R23	245	29	+12	41
R26	191	31	+12	43
R27	199	30	+13	43
R28	197	31	+12	43
R29	258	28	+13	41
R30	159	32	+13	45
R31	393	25	+13	38
R32	63	41	+13	54
R34	408	25	+13	38
R38	58	41	+14	55
R39	197	31	+12	43
R40	143	33	+13	46



OLA ID	Approximate Distance to Centreline of Roadway (m)	Predicted 2015 Noise Level (dBA)	Expected Change in Noise Level between 2015 and 2031 (dB)	Predicted 2031 Noise Level (dBA)
R42	112	35	+13	48
R47	102	36	+13	49
R48	84	38	+13	51
R52	144	33	+13	46
R53	279	28	+12	40
R54	205	30	+13	43
R55	49	43	+13	56
R60	53	48	+9	57
R61	77	43	+10	53
R68	23	52	+10	62

6.2 Mitigation Investigation

The MTO's noise level limit criterion of 65 dBA has not been exceeded at any OLAs; however the projected increase in noise level for all OLAs within the study area is expected to be in excess of the 5 dB increase criterion. Therefore, the consideration of mitigation such as an acoustic barrier is warranted per the MTO Noise Guide, if it is technically feasible. Assessing an acoustic barrier's technical feasibility generally requires the consideration of a number of factors, including the ability to provide a continuous barrier, roadside safety, aesthetics, barrier design and acoustical performance.

An effective acoustic barrier is continuous along the required length, without surface gaps / breaks in construction and with the required height to break the line-of-sight between source and receptor. Residences along the 6th Line corridor largely have driveway access from the roadway. As a consequence, it is expected any acoustic barrier specified within the Project right-of-way would require to have a surface gap / break to allow for this access to continue having safe and acceptable sightlines for drivers. As any installed acoustic barrier would require a significant number of surface gaps / breaks along the required length, the acoustical performance of an installed barrier would be limited. As such, an acoustic barrier is not expected to be technically feasible for this Project.

As well, the predicted future noise levels between 2015 and 2031 for most of OLAs are below the province's target noise level (i.e., 55 dBA in outdoor areas), with six OLAs exposed to predicted 24-hour average levels in excess of 55 dBA. As the province's target level of 55 dBA is not exceeded at most OLAs in the study area and the provision of a continuous acoustic barrier along 6th Line is not expected to be technically feasible, mitigation is not recommended as a component of the Project.



7.0 ENVIRONMENTAL PROTECTION REQUIREMENT NOISE (EPR)-2

The construction phase of any project is typically considered temporary or short term relative to the entire life cycle of a project. The following is a summary of the items to be considered relating to construction noise according to the MTO Noise Guide.

7.1 Construction Equipment and Activities

As construction noise could impact receptors in the vicinity of the Project, some general recommendations to assist in minimizing noise impacts due to the Project's construction equipment and activities are provided below:

- All construction equipment should be properly maintained according to manufacturer's recommendations and be in accordance MOECC Model Municipal Noise Control by-law (i.e., NPC-115), where appropriate.
- If any of the construction activities involve Piling or Blasting, they should to be carried out in accordance with OPSS 120 and MOECC NPC-119.
- Construction equipment and/or activities typically known to be of annoyance (e.g., piling) should consider one of the following:
 - limit operating time within the daytime period when ambient noise levels are expected to be higher;
 - maintain an acceptable setback distance from the identified nearby NSAs, where practical;
 - carry out additional noise studies or monitoring program to verify and document noise levels;
 - implement temporary noise barriers or other localized noise mitigation measures (where practical); and,
 - investigate other alternative construction equipment or processes to complete the task.

7.2 Noise Complaints Process

A process for dealing with noise complaints during the construction phase should be considered. Noise complaints are usually received directly from the complainant or a municipal by-law officer. Note that compliance with noise guidelines or regulations does not ensure noise complaints will not occur. The following is a general recommended process dealing with noise complaints based on Golder's past project experiences:

- Identify an individual or group on the Project (Site Supervisor, Health and Safety representative, etc.) to handle the noise complaints and someone that can be easily contacted.
- Document the noise complaint. Include the date, time and the individual's contact information from whom the noise complaint was received. Specific information such as the location, duration, time and type of sound heard (steady, impulsive, etc.) should be included as it will assist in the investigation process. Be aware of any time constraints put in place by the municipality for the noise complaint to be addressed.
- Investigate the noise complaint and identify the source of the noise complaint. Document the investigation.
- If the noise complaint is justified, in that excessive noise levels were generated, minimize or eliminate the source of the noise complaint. Document the action taken.
- Follow up with the complainant and provide the results of the noise complaint investigation.



7.3 Applicable By-Laws

Golder reviewed applicable by-law to investigate the requirements for a noise by-law exemption for proposed Project activities. Generally, each regulating jurisdiction has a by-law dealing with noise, with often slightly differing by-law requirements. The jurisdiction with by-law authority in the vicinity of the Project is the Town of Innisfil.

Through an initial review of the Town's By-law No. 051-06, construction projects are subject to a noise curfew between the hours of 20:00 to 07:00 on Monday through Friday in residential areas with no operation of heavy equipment on Saturdays, Sundays or Statutory Holidays. Noise from construction activities are subject to a curfew from 20:00 to 07:00 all days of the week in agricultural and commercial areas. There is no curfew for industrial locations. An initial review of available information demonstrates some exemptions have occurred for construction activities within the Town in the recent past. Further discussion between the Town and relevant parties regarding noise by-law exemptions may be required for exemptions.



8.0 CONCLUSIONS

This report provides a summary of the noise impact assessment for the Project on the neighbouring sensitive receptors and identifies; the applicable municipal noise by-law, describes a noise complaint process for construction activities, and provides a general discussion regarding noise arising from construction activities.

The following are the conclusions from the assessment of the Project:

- The MTO's noise level limit criterion of 65 dBA has not been exceeded at any OLAs within the study area; however, due to a projected increase in the traffic volume, the noise levels within the study area are projected to increase by more than 5 dB. As a result, mitigation was considered. Six OLAs are exposed to predicted 24-hour average levels in excess of the province's target of 55 dBA. Further, the provision of a continuous acoustic barrier is not expected to be technically feasible as an acoustic barrier with the required surface gap / break to provide safe access to residences is not expected to provide the recommended acoustical performance. Mitigation is therefore not recommended as a component of the Project.
- An outline regarding construction noise, a noise complaint process and the applicable noise by-law during the construction phase of the Project has been provided. Based on a review of available information, an exemption for the applicable by-law may be required and may be possible, as has been the case for other construction projects in the Town.



Report Signature Page

GOLDER ASSOCIATES LTD.

A handwritten signature in blue ink, appearing to read "Ryan Trinh".

Ryan Trinh, B.A.Sc.
Acoustics, Noise and Vibration Specialist

A handwritten signature in blue ink, appearing to read "Joe Tomaselli".

Joe Tomaselli, M.Eng., P.Eng.
Associate / Acoustics, Noise and Vibration Engineer

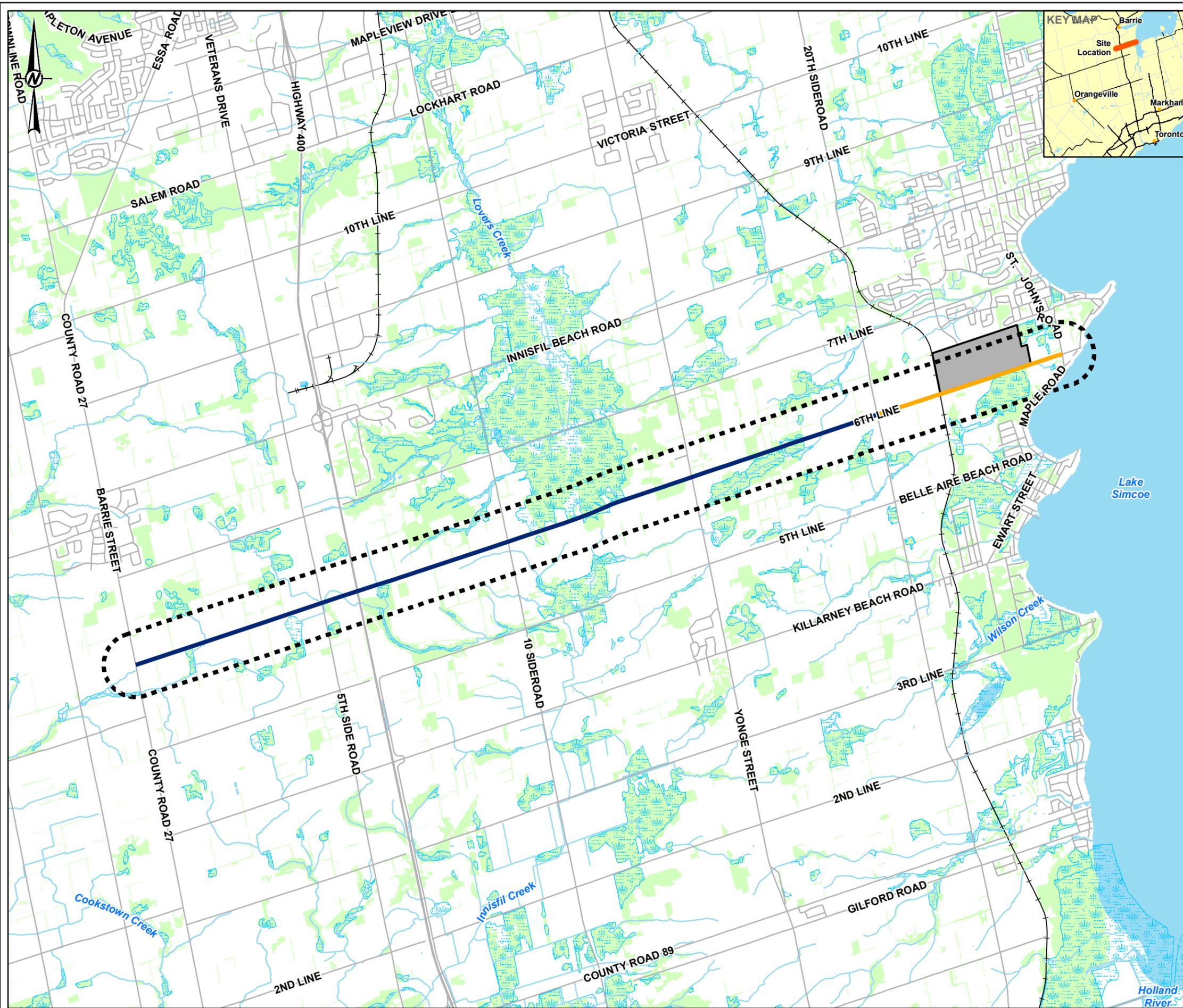
RT/PRN/JT/mp

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

\\golder.gds\gal\whitby\active_2014\1181- geotechnical & pavement\14-13283 town of innisfil - 6th class ea\noise assessment\reporting\final\1413283 rpt hdr 6th line innisfil noise impact 25aug16.docx



FIGURES



- LEGEND**
- PART A ROAD SEGMENT
 - PART B ROAD SEGMENT
 - ROAD
 - +— RAILWAY
 - WATERCOURSE
 - WATERBODY
 - WETLAND
 - WOODED AREA
 - FUTURE DEVELOPMENT
 - PART A & B ROAD SEGMENT 500M BUFFER



REFERENCE(S)
 BASE DATA - MNR LIO, OBTAINED 2015
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
 ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEEN'S PRINTER 2015
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
 HDR CORPORATION

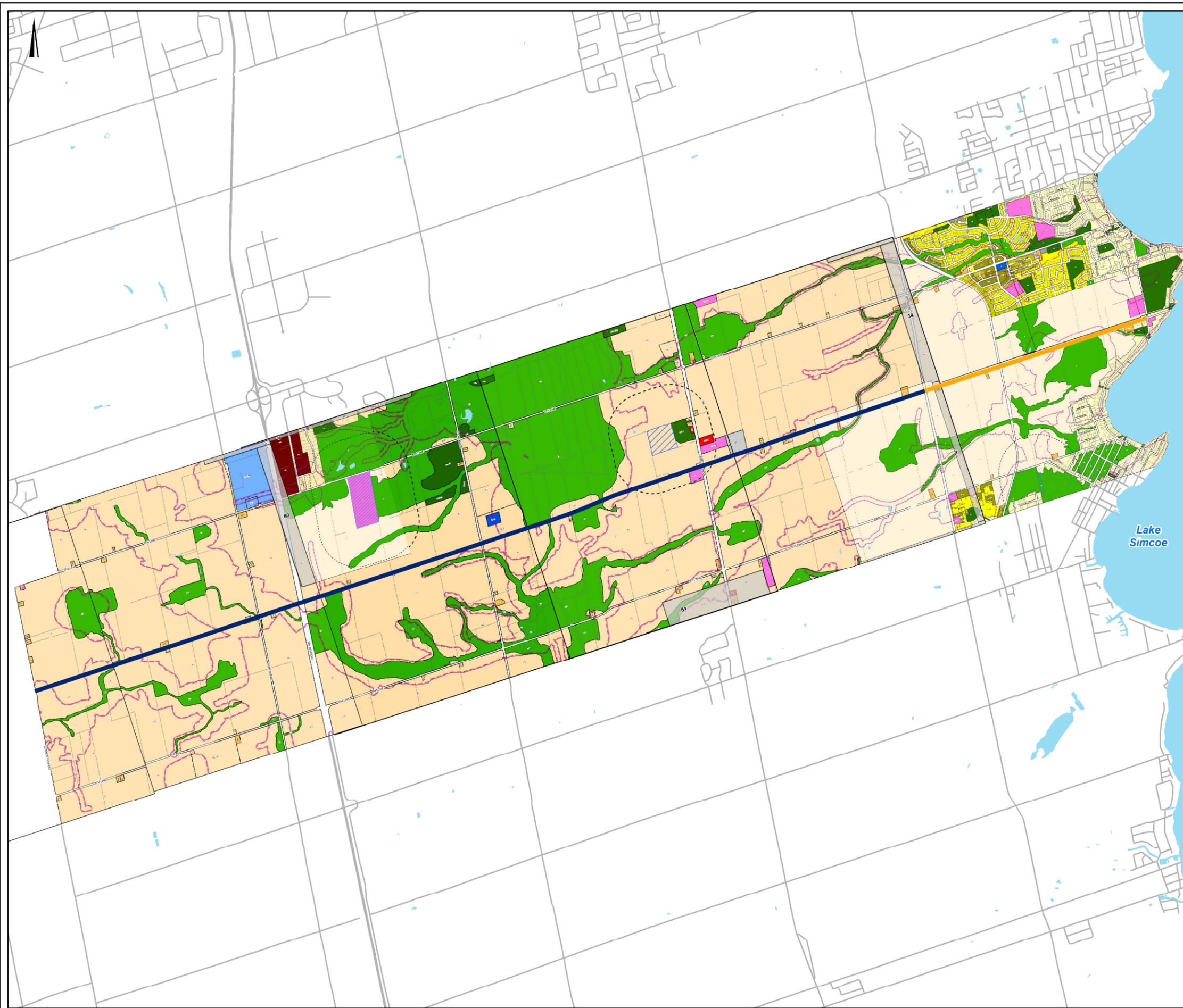
PROJECT
 NOISE IMPACT REPORT FOR CLASS ENVIRONMENTAL
 ASSESSMENT – 6TH LINE

TITLE
 KEY PLAN

CONSULTANT	DATE
DESIGNED	ME
PREPARED	ME
REVIEWED	RT
APPROVED	JT

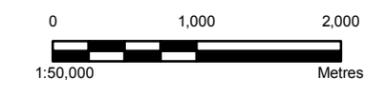
S:\Client\HDR_Corporate\mfm\08_PRC\1413283\04_PRC\0001_Net\1413283-0001-RN-0001.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



- LEGEND**
- PART A ROAD SEGMENT
 - PART B ROAD SEGMENT
 - ROAD
 - WATERBODY
- ZONING**
- | | |
|--|---|
| RE Residential Estate | RSC Residential Special Community |
| RR Residential Rural | RT Residential Townhouse |
| R1 Residential 1 | RA Residential Apartment |
| R1A Residential 1A | CN Commercial Neighbourhood |
| R2 Residential 2 | CV Commercial Village |
| R3 Residential 3 | CH Commercial Highway |
| RS Residential Semi Detached | CT Commercial Tourist |
| CBP Commercial Business Park | IE Industrial Extraction |
| MU1 Mixed Use 1 - Alcona | CS Community Service |
| MU2 Mixed Use 2 - Alcona | OS Open Space |
| MU4 Mixed Use 4 - Lefroy | EP Environmental Protection |
| MU5 Mixed Use 5 - Cookstown | AG Agricultural General |
| IG Industrial General | ASC Agricultural Specialty Crop |
| IBP Industrial Business Park | AR Agricultural Rural |
| | FD Future Development |

- WASTE DISPOSAL ASSESSMENT AREA
- WASTE DISPOSAL SITE
- HAZARD LANDS



REFERENCE(S)
 BASE DATA - MNR LIO, OBTAINED 2015
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
 ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2015
 ZONING - TOWN OF INNISFIL COMPREHENSIVE ZONING BY-LAW 080-13 (COUNCIL ADOPTED),
 JULY 10, 2013
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
HDR CORPORATION

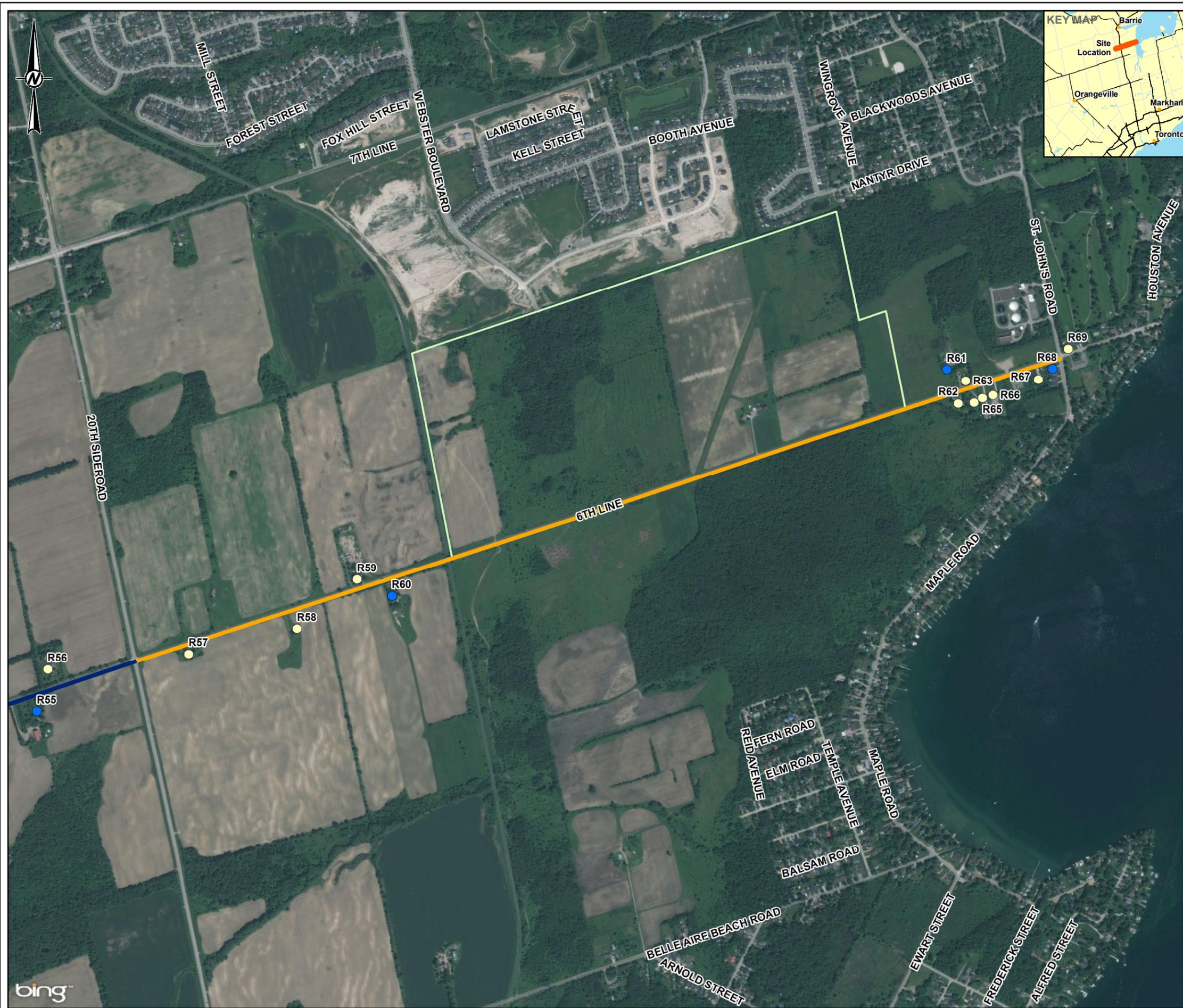
PROJECT
**NOISE IMPACT REPORT FOR CLASS ENVIRONMENTAL
 ASSESSMENT – 6TH LINE**

TITLE
ZONING PLAN

CONSULTANT	YYYY-MM-DD	2016-08-25
Golder Associates	DESIGNED	ME
	PREPARED	ME
	REVIEWED	RT
	APPROVED	JT

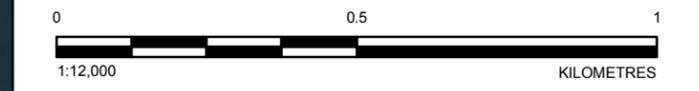
S:\Client\HDR_Corporate\Innisfil\08_PRC\1413283\140_PROD\0001_Net\1413283_0001_RN_0002.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



LEGEND

- NSA
- NSA WITH OLA
- EXPOSED TO TRAFFIC ALONG 6TH LINE
- PART A ROAD SEGMENT
- PART B ROAD SEGMENT
- FUTURE DEVELOPMENT



NOTE(S)
 NSA - NOISE SENSITIVE AREA
 OLA - OUTDOOR LIVING AREA

REFERENCE(S)
 BASE DATA - MNR LIO, OBTAINED 2015
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
 ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEEN'S PRINTER 2015
 IMAGERY: BING MAPS © 2015 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
 HDR CORPORATION

PROJECT
 NOISE IMPACT REPORT FOR CLASS ENVIRONMENTAL
 ASSESSMENT – 6TH LINE

TITLE
 NOISE SENSITIVE AREAS
 PART A ROAD SEGMENT

CONSULTANT	DATE
YYYY-MM-DD	2016-08-25
DESIGNED	ME
PREPARED	ME
REVIEWED	RT
APPROVED	JT

S:\Client\HDR_Corporate\env\mra\08_PRC\1413283\140_PROD\06001_Note\1413283_001-EN-0003.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm





LEGEND

- NSA
- NSA WITH OLA
- PART A ROAD SEGMENT
- PART B ROAD SEGMENT

NOTE(S)
 NSA - NOISE SENSITIVE AREA
 OLA - OUTDOOR LIVING AREA

REFERENCE(S)
 BASE DATA - MNR LIO, OBTAINED 2015
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
 ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEEN'S PRINTER 2018
 IMAGERY: BING MAPS © 2015 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
 HDR CORPORATION

PROJECT
 NOISE IMPACT REPORT FOR CLASS ENVIRONMENTAL
 ASSESSMENT – 6TH LINE

TITLE
 NOISE SENSITIVE AREAS
 PART B ROAD SEGMENT

CONSULTANT	DATE
YYYY-MM-DD	2016-08-25
DESIGNED	ME
PREPARED	ME
REVIEWED	RT
APPROVED	JT

PROJECT NO. 1413283

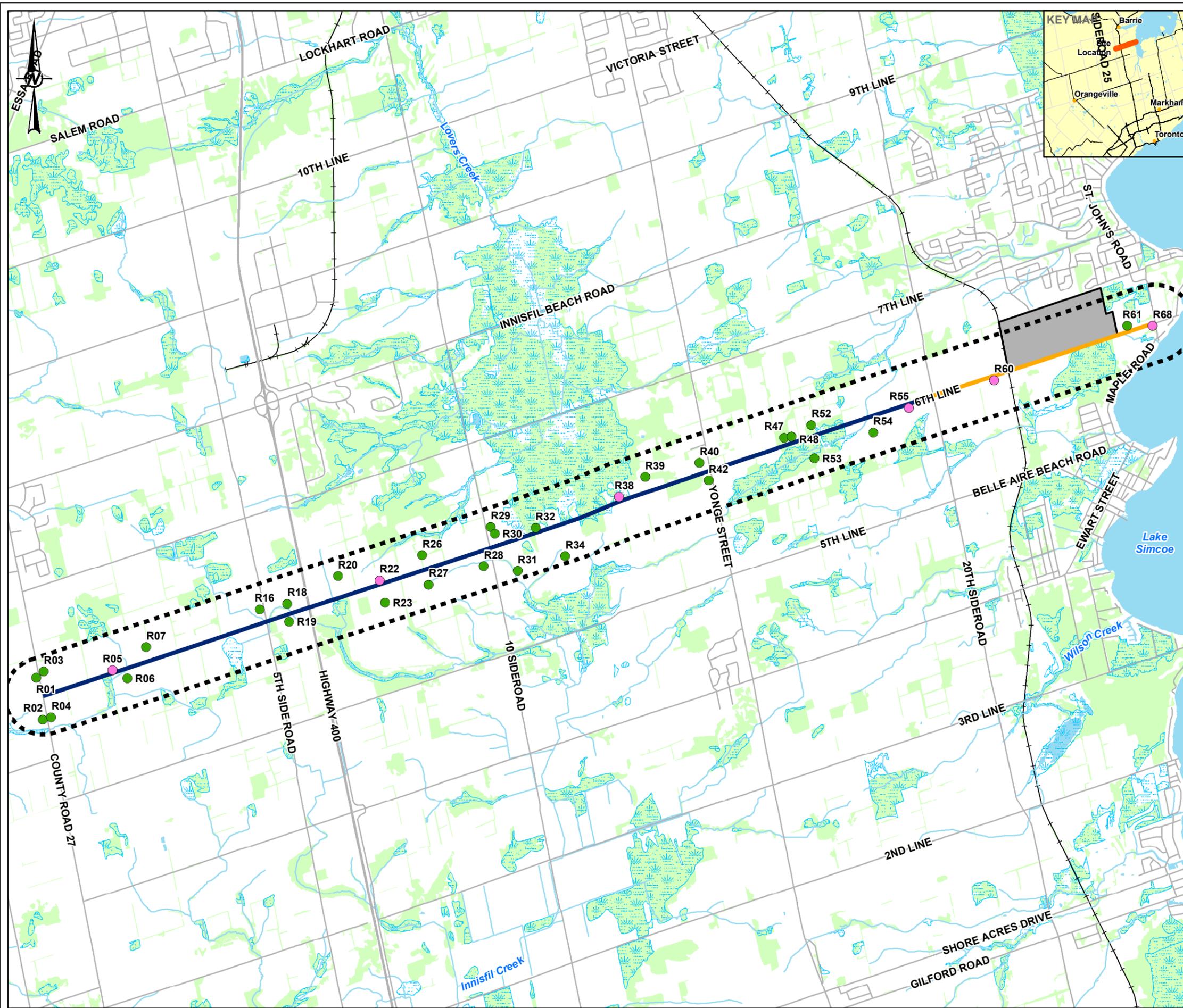
CONTROL -

REV. 2

FIGURE 3b

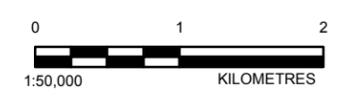
S:\Client\HDR_Corporate\m\m\1413283\1413283_001_Noise\1413283_001_RN_0004.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm



LEGEND

- OLA BELOW 55 dBA
- OLA BETWEEN 55 AND 65 dBA
- PART A ROAD SEGMENT
- PART B ROAD SEGMENT
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- WOODED AREA
- FUTURE DEVELOPMENT
- PART A & B ROAD SEGMENT 500M BUFFER



NOTE(S)
 NSA - NOISE SENSITIVE AREA
 OLA - OUTDOOR LIVING AREA

REFERENCE(S)
 BASE DATA - MNR LIO, OBTAINED 2015
 PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
 ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEEN'S PRINTER 2015
 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
 HDR CORPORATION

PROJECT
 NOISE IMPACT REPORT FOR CLASS ENVIRONMENTAL
 ASSESSMENT – 6TH LINE

TITLE
 OUTDOOR LIVING AREAS ASSESSED

CONSULTANT	YYYY-MM-DD	2016-08-25
DESIGNED	ME	
PREPARED	ME	
REVIEWED	RT	
APPROVED	JT	

S:\Client\HDR_Corporate\Innisfil\06_P\PROJ\1413283\140_PROD\0001_Net\1413283-0001-EN-0008.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



APPENDIX A

TNM Inputs Summary

INPUT: ROADWAYS

6th Line

HDR Golder Associates				7 July 2015 TNM 2.5			Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA				
INPUT: ROADWAYS PROJECT/CONTRACT: RUN:				6th Line 2031 Condition							
Roadway Name	Width	Points Name	No.	Coordinates (pavement)			Flow Control			Segment	On Struct?
	m			X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	
				m	m	m		km/h	%		
PartB	6.0	County Rd	1	614,047.5	4,904,477.0	0.00				Average	
		point2	2	613,174.4	4,904,183.0	0.00				Average	
		point3	9	612,665.1	4,904,014.0	0.00				Average	
		point4	10	612,528.4	4,903,966.0	0.00				Average	
		point5	11	612,030.9	4,903,798.5	0.00				Average	
		point6	12	611,904.4	4,903,754.0	0.00				Average	
		point7	13	611,727.7	4,903,695.0	0.00				Average	
		point8	14	611,535.1	4,903,633.0	0.00				Average	
		point9	15	611,341.0	4,903,566.0	0.00				Average	
		point10	16	610,981.1	4,903,446.5	0.00				Average	
		point11	17	610,800.4	4,903,383.0	0.00				Average	
		point12	18	610,743.1	4,903,366.0	0.00				Average	
		point13	19	610,513.9	4,903,287.0	0.00				Average	
		point14	20	610,257.0	4,903,200.5	0.00				Average	
		point15	21	610,012.9	4,903,121.5	0.00				Average	
		point16	22	609,980.6	4,903,110.0	0.00				Average	
		point17	23	609,876.6	4,903,068.5	0.00				Average	
		point18	24	609,594.4	4,902,949.0	0.00				Average	
		point19	25	609,424.8	4,902,880.5	0.00				Average	
		point20	26	609,154.3	4,902,787.0	0.00				Average	
		point21	27	608,578.3	4,902,596.5	0.00				Average	
		point22	28	608,024.1	4,902,411.0	0.00				Average	
		point23	29	606,419.3	4,901,884.0	0.00				Average	
		point24	30	606,322.2	4,901,852.5	0.00				Average	
		point25	31	606,172.4	4,901,806.5	0.00				Average	

INPUT: ROADWAYS

6th Line

		point26	32	605,923.4	4,901,724.0	0.00				Average	
		point27	33	605,898.0	4,901,718.0	0.00				Average	
		point28	34	605,895.4	4,901,715.0	0.00				Average	
		point29	35	605,610.0	4,901,621.5	0.00				Average	
		point30	36	604,432.1	4,901,225.0	0.00				Average	
		point31	37	603,678.2	4,900,976.0	0.00				Average	
		point32	38	603,356.3	4,900,871.0	0.00				Average	
		20 Sideroad	39	602,431.4	4,900,565.0	0.00					
PartA	12.0	20 Sideroad	3	617,253.4	4,905,527.0	0.00				Average	
		point2	4	616,852.6	4,905,395.5	0.00				Average	
		point3	6	616,178.2	4,905,175.5	0.00				Average	
		point4	7	615,504.6	4,904,950.5	0.00				Average	
		St John's	8	614,047.4	4,904,477.0	0.00					

INPUT: TRAFFIC FOR LAeq1h Volumes

6th Line

HDR
Golder Associates

7 July 2015
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes

PROJECT/CONTRACT:

6th Line

RUN:

2031 Condition

Roadway Name	Points Name	No.	Segment		MTrucks		HTrucks		Buses		Motorcycles	
			Autos		V	S	V	S	V	S	V	S
			V	S	V	S	V	S	V	S	V	S
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h
PartB	County Road 2	1	447	80	12	80	12	80	0	0	0	0
	point2	2	447	80	12	80	12	80	0	0	0	0
	point3	9	447	80	12	80	12	80	0	0	0	0
	point4	10	447	80	12	80	12	80	0	0	0	0
	point5	11	447	80	12	80	12	80	0	0	0	0
	point6	12	447	80	12	80	12	80	0	0	0	0
	point7	13	447	80	12	80	12	80	0	0	0	0
	point8	14	447	80	12	80	12	80	0	0	0	0
	point9	15	447	80	12	80	12	80	0	0	0	0
	point10	16	447	80	12	80	12	80	0	0	0	0
	point11	17	447	80	12	80	12	80	0	0	0	0
	point12	18	447	80	12	80	12	80	0	0	0	0
	point13	19	447	80	12	80	12	80	0	0	0	0
	point14	20	447	80	12	80	12	80	0	0	0	0
	point15	21	447	80	12	80	12	80	0	0	0	0
	point16	22	447	80	12	80	12	80	0	0	0	0
	point17	23	447	80	12	80	12	80	0	0	0	0
	point18	24	447	80	12	80	12	80	0	0	0	0
	point19	25	447	80	12	80	12	80	0	0	0	0
	point20	26	447	80	12	80	12	80	0	0	0	0
	point21	27	447	80	12	80	12	80	0	0	0	0
	point22	28	447	80	12	80	12	80	0	0	0	0
	point23	29	447	80	12	80	12	80	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

6th Line

	point24	30	447	80	12	80	12	80	0	0	0	0
	point25	31	447	80	12	80	12	80	0	0	0	0
	point26	32	447	80	12	80	12	80	0	0	0	0
	point27	33	447	80	12	80	12	80	0	0	0	0
	point28	34	447	80	12	80	12	80	0	0	0	0
	point29	35	447	80	12	80	12	80	0	0	0	0
	point30	36	447	80	12	80	12	80	0	0	0	0
	point31	37	447	80	12	80	12	80	0	0	0	0
	point32	38	447	80	12	80	12	80	0	0	0	0
	20 Sideroad	39										
PartA	20 Sideroad	3	677	60	18	60	18	60	0	0	0	0
	point2	4	677	60	18	60	18	60	0	0	0	0
	point3	6	677	60	18	60	18	60	0	0	0	0
	point4	7	677	60	18	60	18	60	0	0	0	0
	St John's Roa	8										

INPUT: TRAFFIC FOR LAeq1h Volumes

6th Line

HDR Golder Associates		25 August 2016 TNM 2.5											
INPUT: TRAFFIC FOR LAeq1h Volumes PROJECT/CONTRACT: RUN:		6th Line 2015 Condition											
Roadway	Points												
Name	Name	No.	Segment		MTrucks		HTrucks		Buses		Motorcycles		
			Autos		V	S	V	S	V	S	V	S	
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	
PartB	County Road 2	1	12	80	1	80	1	80	0	0	0	0	
	point2	2	12	80	1	80	1	80	0	0	0	0	
	point3	9	12	80	1	80	1	80	0	0	0	0	
	point4	10	12	80	1	80	1	80	0	0	0	0	
	point5	11	12	80	1	80	1	80	0	0	0	0	
	point6	12	12	80	1	80	1	80	0	0	0	0	
	point7	13	12	80	1	80	1	80	0	0	0	0	
	point8	14	12	80	1	80	1	80	0	0	0	0	
	point9	15	12	80	1	80	1	80	0	0	0	0	
	point10	16	12	80	1	80	1	80	0	0	0	0	
	point11	17	12	80	1	80	1	80	0	0	0	0	
	point12	18	12	80	1	80	1	80	0	0	0	0	
	point13	19	12	80	1	80	1	80	0	0	0	0	
	point14	20	12	80	1	80	1	80	0	0	0	0	
	point15	21	12	80	1	80	1	80	0	0	0	0	
	point16	22	12	80	1	80	1	80	0	0	0	0	
	point17	23	12	80	1	80	1	80	0	0	0	0	
	point18	24	12	80	1	80	1	80	0	0	0	0	
	point19	25	12	80	1	80	1	80	0	0	0	0	
	point20	26	12	80	1	80	1	80	0	0	0	0	
	point21	27	12	80	1	80	1	80	0	0	0	0	
	point22	28	12	80	1	80	1	80	0	0	0	0	
	point23	29	12	80	1	80	1	80	0	0	0	0	

INPUT: TRAFFIC FOR LAeq1h Volumes

6th Line

	point24	30	12	80	1	80	1	80	0	0	0	0
	point25	31	12	80	1	80	1	80	0	0	0	0
	point26	32	12	80	1	80	1	80	0	0	0	0
	point27	33	12	80	1	80	1	80	0	0	0	0
	point28	34	12	80	1	80	1	80	0	0	0	0
	point29	35	12	80	1	80	1	80	0	0	0	0
	point30	36	12	80	1	80	1	80	0	0	0	0
	point31	37	12	80	1	80	1	80	0	0	0	0
	point32	38	12	80	1	80	1	80	0	0	0	0
	20 Sideroad	39										
PartA	20 Sideroad	3	32	80	1	80	1	80	0	0	0	0
	point2	4	32	80	1	80	1	80	0	0	0	0
	point3	6	32	80	1	80	1	80	0	0	0	0
	point4	7	32	80	1	80	1	80	0	0	0	0
	St John's Roa	8										

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario, L5N 7K2
Canada
T: +1 (905) 567 4444

