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Acoustic Assessment Report
Silvercreek Solar Park Transformer Station
Aylmer, Ontario

Prepared for

Silvercreek Solar Park Inc.
49588 Vienna Line
Aylmer, Ontario
N5H 2R2

Prepared by

Petr Chocensky, PhD, (Civ.Eng.)

Reviewed by,

Ian Bonsma, P.Eng

LICENSED PROFESSIONAL ENGINEER
I. R. BONSMA
100100550
May 9, 2012
PROVINCE OF ONTARIO

May 9, 2012

VERSION CONTROL

Silvercreek Solar Park Transformer Station, Aylmer, Ontario

Ver.	Date	Version Description	Prepared By
1	9-May-2012	Original Acoustic Assessment Report supporting an application for a Environmental Compliance Approval	P. Chocensky

EXECUTIVE SUMMARY

Silvercreek Solar Park Inc. retained HGC Engineering to undertake an Acoustic Assessment of their proposed solar facility transformer station in Aylmer, Ontario. The study is required in support of an application for an Environmental Compliance Approval from the Ontario Ministry of The Environment ("MOE"). The assessment considers all acoustically significant sound sources currently proposed for use at the facility.

Sound emissions from the transformer station were based on established prediction methods for the transformers. The source sound levels were used as input to a predictive acoustical model to quantify the environmental sound emissions associated with the facility. Acoustic assessment criteria were established in accordance with the sound level limits in MOE guideline NPC-205.

The predictive analysis indicates that the sound emissions of the facility will be well within the sound level limits as set out in MOE guideline NPC-205 during normal 'predictable worst case' operations at all identified noise sensitive receptors.

TABLE OF CONTENTS

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: Silvercreek Solar Park Inc.

Company Address: 49588 Vienna Line

Aylmer, Ontario N5H 2R2

Location of Facility: 10545 Imperial Road

Aylmer, Ontario N5H 2R3

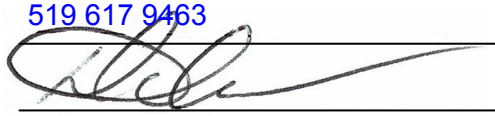
The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document “Information to be Submitted for Approval of Stationary Source of Sound” (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:

Name: Dave Moerman

Representing: Silvercreek Solar Park Inc.

Phone Number: 519 617 9463

Signature: 

Date: May 9, 2012

Technical Contact:

Name: Petr Chocensky, PhD, (Civ. Eng.)

Representing: HGC Engineering

Phone Number: 905-826-4044

Signature: 

Date: May 9, 2012

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

	Required Information		
		Submitted	Explanation/Reference
1.0	**Introduction** (Project Background and Overview)	☒ Yes	Section 1
2.0	**Facility Description**		
	2.1 Operating hours of facility and significant Noise Sources	☒ Yes	Section 2
	2.2 Site Plan identifying all significant Noise Sources	☒ Yes	Figure 3
3.0	**Noise Source Summary**		
	3.1 ***Noise Source Summary Table***	☒ Yes	Appendix A
	3.2 Source noise emissions specifications	☒ Yes	Appendix A
	3.3 Source power/capacity ratings	☒ Yes	Appendix A
	3.4 Noise control equipment description and acoustical specifications	☐ Yes	N/A
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 ***Point of Reception Noise Impact Table***	☒ Yes	Appendix A
	4.2 Point(s) of Reception (POR) list and description	☒ Yes	Section 4
	4.3 Land-use Zoning Plan	☒ Yes	Appendix B
	4.4 Scaled Area Location Plan	☒ Yes	Figure 1
	4.5 Procedure used to assess noise impacts at each POR	☒ Yes	Appendix D
	4.6 List of parameters/assumptions used in calculations	☒ Yes	Appendix D
5.0	**Acoustic Assessment Summary**		
	5.1 ***Acoustic Assessment Summary Table***	☒ Yes	Appendix A
	5.2 Rationale for selecting applicable noise guideline limits	☒ Yes	Appendix E
	5.3 Predictable Worst Case Impacts Operating Scenario	☒ Yes	Figure 4
6.0	**Conclusions**		
	6.1 Statement of compliance with selected noise performance limits	☒ Yes	Section 7
7.0	**Appendices** (provide details such as)	☒ Yes	
	Listing of Insignificant Noise Sources	☐ Yes	N/A
	Manufacturer's Noise Specifications	☒ Yes	Appendix C
	Calculations	☒ Yes	Appendices F & G
	Instrumentation	☐ Yes	N/A
	Meteorology during Sound Level Measurements	☐ Yes	N/A
	Raw Data from Measurements	☐ Yes	N/A
	Drawings (Facility / Equipment)	☒ Yes	Figure 3, Appendix C

1 INTRODUCTION

The Silvercreek Solar Park ("Silvercreek") Transformer Station is proposed to be located at 10545 Imperial Road in Aylmer, Ontario. A scaled location map of the surrounding area is included as Figure 1. The transformer station will be a part of a solar facility proposed to be developed by Silvercreek in a separate location, approximately 10 km to the south of Aylmer. Sound emissions from the main solar facility are subject to a separate Acoustic Assessment Report by HGC Engineering.

The purpose of this assessment is to evaluate the sound emissions of the transformer station under a predictable worst case operating scenario, which is defined as an hour when typical full operation of the stationary sources under consideration could coincide with an hour of low background sound.

This report has been prepared in accordance with the Ontario Ministry of The Environment ("MOE") guideline documents NPC-233 "Information to be Submitted for Approval of Stationary Sources of Sound", dated October 1995 [Ref. 1], and "Supporting Information for the Preparation of an Acoustic Assessment Report", dated November 2003 [Ref. 2].

Zoning maps identifying the land uses surrounding the subject facility, obtained from the Town of Aylmer and the Township of Malahide, are included as Appendix B. The lands to the west, south and east of the Silvercreek Transformer Station are zoned primarily for industrial use. Agriculturally zoned lands are located to the north of the facility. The nearest lands zoned for residential use are to the south, approximately 700 metres from the transformer station. Two hundred and six points of reception have been considered in this assessment in order to represent the existing residential dwellings and vacant lots, which permit noise-sensitive use, within 1000 m of the proposed equipment at the solar facility, labelled as locations R001 through R206 in Figure 2.

During the site visit by HGC Engineering on September 6, 2011, the background sound in the vicinity of the site was dominated by road traffic. The area is best characterized as a "Class 2" semi-urban area, under MOE noise assessment guidelines.

2 FACILITY DESCRIPTION

The Solarcreek Transformer Station will be a typical 10 MV transformer used to step-up the voltage of the electrical energy generated by solar panels at the main site, which is proposed to be located in separate location to the south of the Town of Aylmer.

The transformer station will operate 24 hours per day, 7 days per week.

3 SOUND SOURCE SUMMARY

The source representing the proposed transformer station is included in a Sound Source Summary, which is included as Table A1 in Appendix A, in the standard format required by the MOE. An identification number NS-01 has been assigned to the source representing the transformer station. The transformer location is depicted in Figure 3.

The type and/or model of the transformer has not been selected at this stage of the project. Therefore, sound levels from the transformer station were predicted utilizing standard engineering texts [Ref. 3]. These calculations are included in Appendix C.

The sound power level for the transformer station was input to a predictive computer model (see Appendix D) to quantify the sound emissions of the site during a predictable worst case hour of operation. For the purposes of this assessment, the transformer station was assumed to operate 24 hours per day, seven days per week.

4 POINT OF RECEPTION SUMMARY

The two hundred and six receptors chosen to represent the noise sensitive receptors and vacant lots surrounding the site are shown as locations R001 through R206 in Figure 2.

Each dwelling was assumed to be a two-storey structure, with the respective points of reception representing an upper storey window. In general, upper storey windows are the most potentially impacted point on the properties since they are most exposed to elevated sources at the subject site and benefit least from ground absorption. Where vacant lots were identified, the future

location of the assumed dwelling was taken to be a location that would reasonably be expected to contain the dwelling based on the typical building pattern. The selected points of reception are described briefly in Table A3, the Acoustic Assessment Summary Table.

5 ASSESSMENT CRITERIA

The area surrounding the facility is a "Semi-urban" (Class 2) acoustical environment. Accordingly, the relevant document for defining the applicable sound level limits is MOE guideline NPC-205 [Ref. 4]. The details by which the applicable sound level limit was established for the assessment of this facility are provided in Appendix E. For the purposes of this assessment the applicable sound level criteria at all neighbouring receptors is 45 dBA. This limit is included in Table A3 of Appendix A.

Some types of sound have a special quality which may tend to increase their audibility and potential for disturbance or annoyance. For tonal sound, the MOE guideline NPC-104 [Ref. 5] stipulates that a penalty of 5 dBA is to be added to the measured source level. A tonal sound is defined as one which has a "pronounced audible tonal quality such as a whine, screech, buzz or hum". A/C transformers typically exhibit a humming character at twice the line frequency (120 Hz) and harmonics thereof, as a result of magnetostrictive forces in the windings and semiconductors. In the subsequent analysis, a tonal penalty has been applied to the sound of the subject transformer station.

6 IMPACT ASSESSMENT

The predictive analysis indicates that the sound levels of the subject transformer will be in the range of 15 to 36 dBA at all key points of reception, which is well within the applicable limit.

The results of the analysis are summarized in Table A3 and are shown graphically in Figure 4. Details of the prediction methods are summarized in Appendix D, and sample calculation results are included as Appendices F and G.

7 CONCLUSIONS

The acoustical analysis indicates that the predicted sound levels of the transformer station will be within the applicable sound level limits specified in MOE guideline NPC-205, during all hours of the day and night, under typical "predictable worst case" operating conditions at all identified off-site receptor locations.

REFERENCES

1. Ontario Ministry of Environment Publication NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound,* October, 1995.
2. Ontario Ministry of Environment Guide, *Supporting Information for the Preparation of an Acoustic Assessment Report*, November 2003.
3. Crocker, Malcolm, J., Sound *Power Level Predictions for Industrial Machinery*, In Encyclopedia of Acoustics (Vol. 2, pp. 1049 - 1057), John Wiley & Sons, Inc., 1997.
4. Ontario Ministry of the Environment Publication NPC-205, *Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)*, October, 1995.
5. Ontario Ministry of the Environment Publication NPC-104, *Sound Level Adjustments*, August, 1978.
6. International Organization for Standardization, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation*, ISO-9613-2, Switzerland, 1996.
7. Google Maps Aerial Imagery, Internet Application: *maps.google.com*

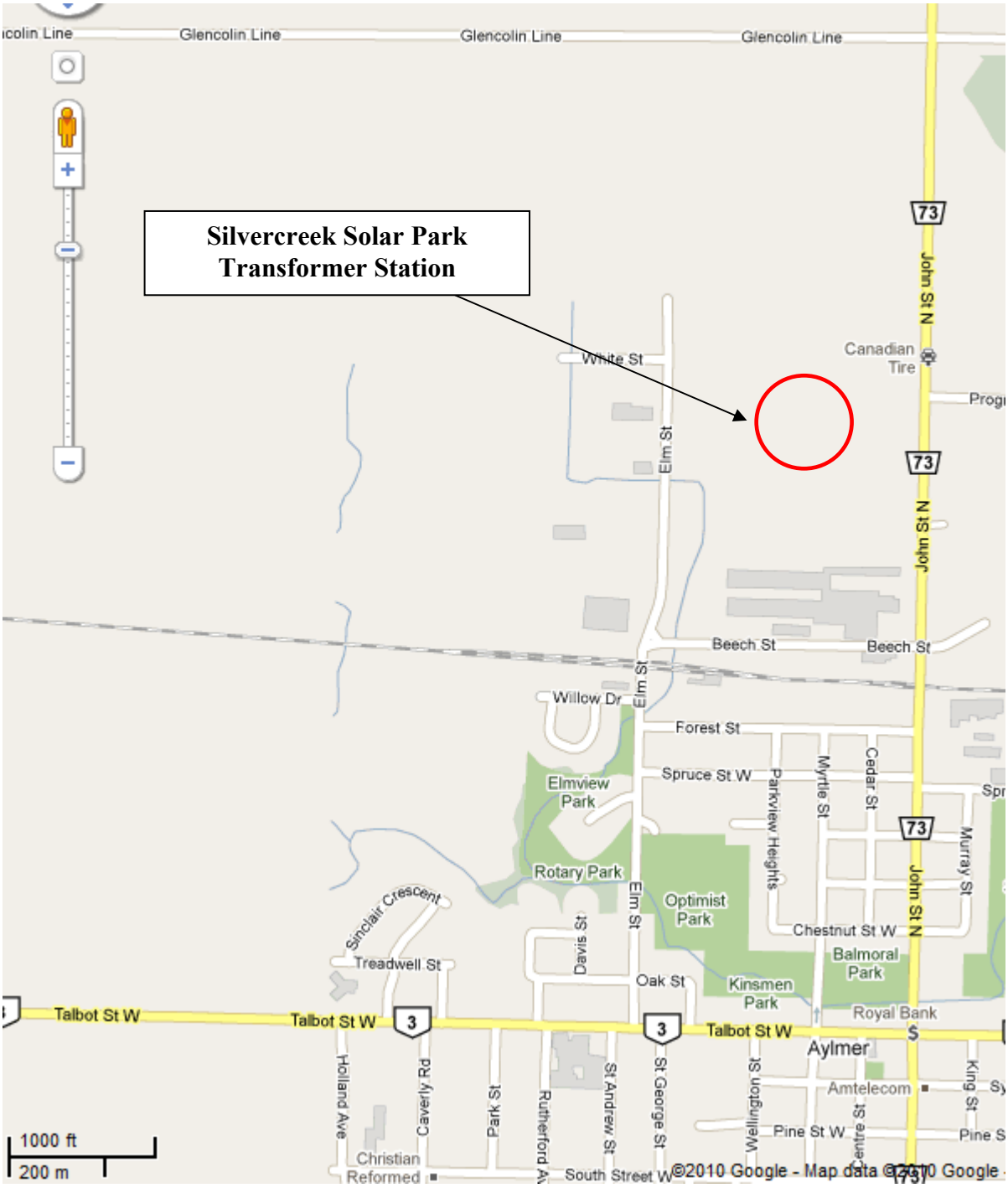


Figure 1: Location Map

Figure 2: Locations of Points of Reception

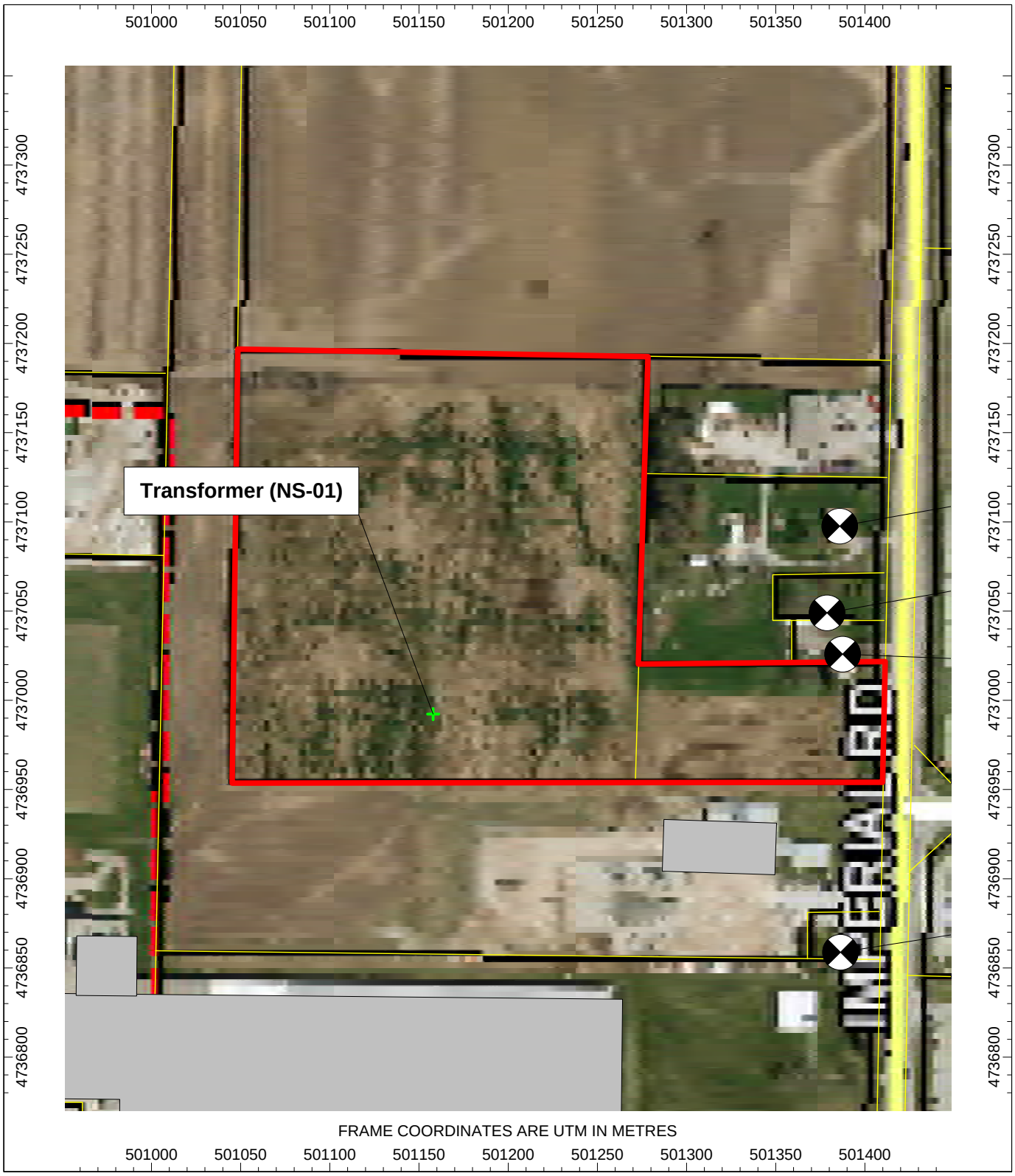


Figure 3: Location of Transformer Station

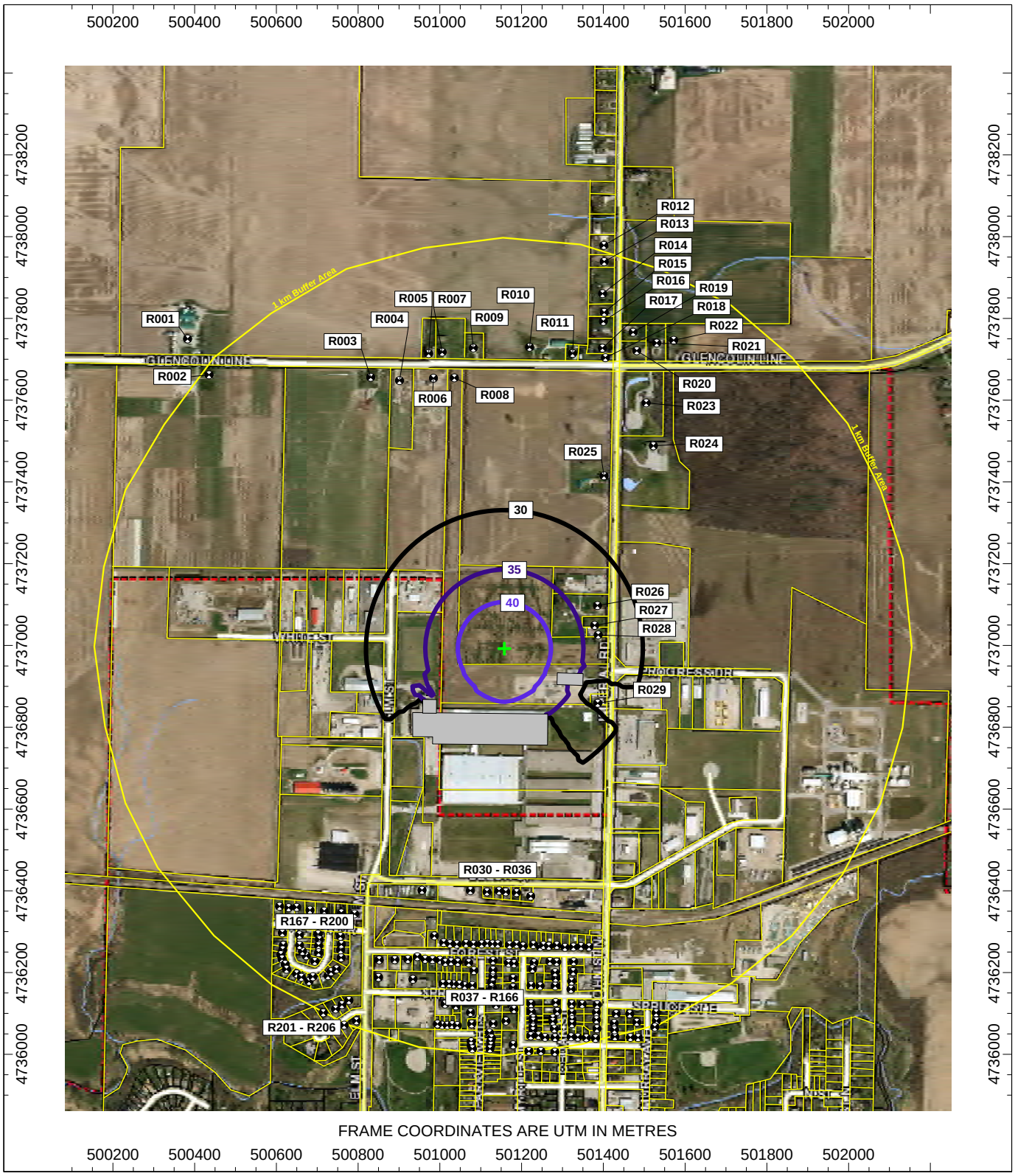


Figure 4: Predicted Sound Level Contours Leq (dBA) at 4.5 m Above Grade

APPENDIX A
Acoustic Assessment Summary Tables

VERSION CONTROL

Silvercreek Solar Park Transformer Station, Aylmer, Ontario

Tables Ver.	Date	Issued as Part of AAR?	Version Description	Prepared By
1.0	9-May-2012	Y	Original version of tables as part of Ver. 1 of Acoustic Assessment Report	P. Chocensky

Table A1: Noise Source Summary Table

Source ID	Source Description	UTM Coordinates [m]		Sound Power Level [dBA re 10^-12 W]	Source Location	Sound Characteristic	Noise Control Measure
		X	Y				
NS-01	Transformer	501158	4736992	93	O	T	U

Legend

Sound Characteristics
S: Steady
Q: Quasi-steady impulsive
I: Impulsive
B: Buzzing
T: Tonal (includes + 5 dB penalty)
C: Cyclically varying
O: Occasional

Noise Control Measures
S: Silencer, Acoustic Louvre, Muffler
A: Acoustic Lining, Plenum
B: Barrier, Berm, Screening
L: Lagging (Acoustical Wrapping)
E: Acoustic Enclosure
O: Other
U: Currently Uncontrolled

Source Location
O: Outdoors
I: Indoors

Table A2: Point of Reception Noise Impact Table

Source ID	Source Name	Point of Reception									
		R001		R002		R003		R004		R005	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	1084	18	985	19	740	22	703	23	745	22

Source ID	Source Name	Point of Reception									
		R006		R007		R008		R009		R010	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	683	23	741	22	673	23	739	22	740	22

Source ID	Source Name	Point of Reception									
		R011		R012		R013		R014		R015	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	741	22	1016	19	977	19	901	20	858	21

Source ID	Source Name	Point of Reception									
		R016		R017		R018		R019		R020	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	836	21	773	22	753	22	835	21	797	22

Source ID	Source Name	Point of Reception									
		R021		R022		R023		R024		R025	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	835	21	860	21	694	23	615	24	488	27

Source ID	Source Name	Point of Reception									
		R026		R027		R028		R029		R030	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	251	33	228	34	232	33	265	28	625	20

Source ID	Source Name	Point of Reception									
		R031		R032		R033		R034		R035	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	598	20	597	20	593	20	595	20	598	20

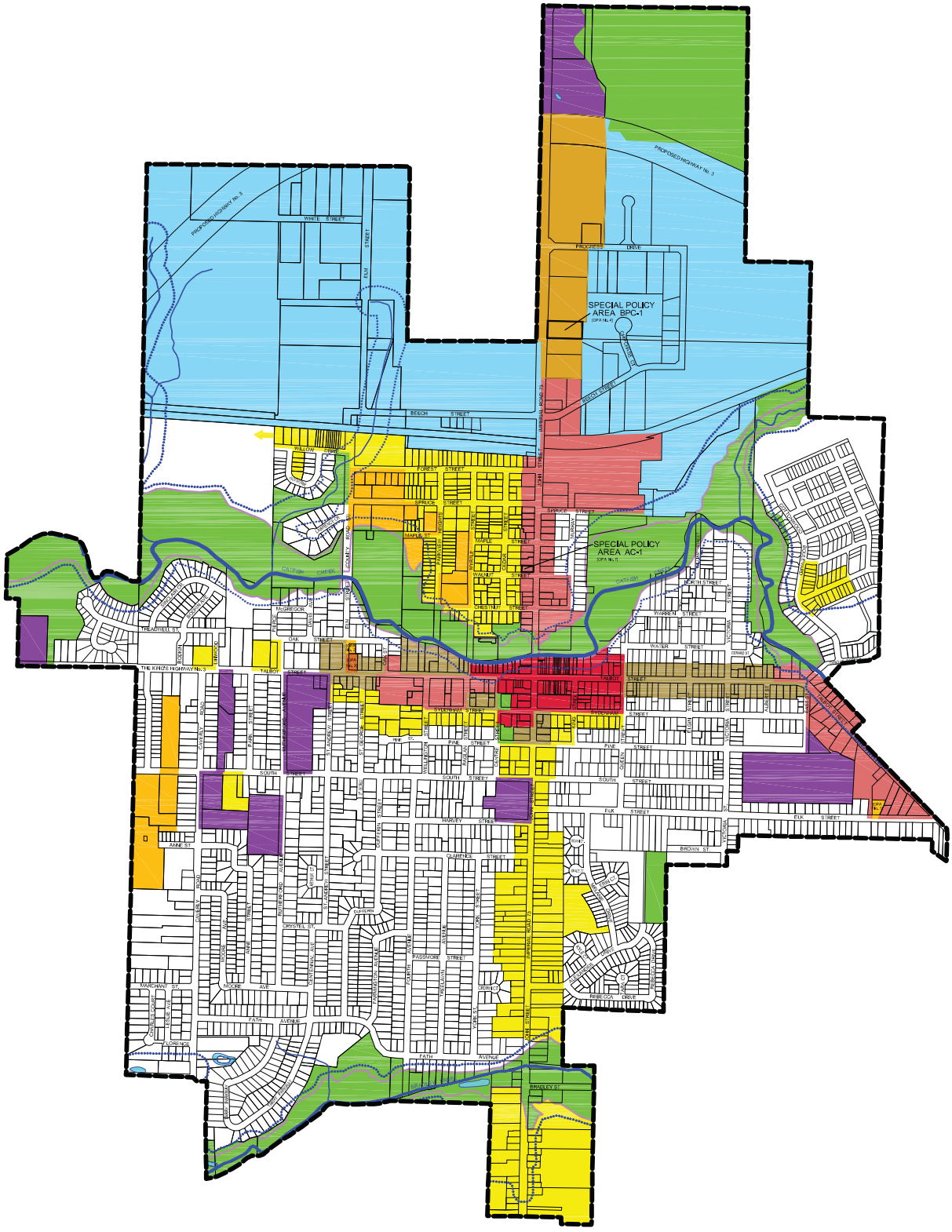
Source ID	Source Name	Point of Reception			
		R036		R037 - R206	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Transformer	609	20	>720	<20

Note: Reported sound levels include all adjustment factors (time weighting, tonal penalty), as applicable.

Table A3: Acoustic Assessment Summary Table

Point of Reception	Point of Reception Description	UTM Coordinates [m]		Sound Level at Point of Reception, LEQ [dBA]	Verified by Acoustic Audit	Performance Limit, LEQ [dBA]	Compliance with Performance Limit
		X	Y				
R001	Residential Dwelling	500383	4737750	18	No	45	Yes
R002	Residential Dwelling	500435	4737662	19	No	45	Yes
R003	Residential Dwelling	500831	4737656	22	No	45	Yes
R004	Residential Dwelling	500901	4737648	23	No	45	Yes
R005	Residential Dwelling	500973	4737714	22	No	45	Yes
R006	Residential Dwelling	500984	4737654	23	No	45	Yes
R007	Residential Dwelling	501006	4737717	22	No	45	Yes
R008	Residential Dwelling	501035	4737654	23	No	45	Yes
R009	Residential Dwelling	501082	4737727	22	No	45	Yes
R010	Residential Dwelling	501220	4737729	22	No	45	Yes
R011	Residential Dwelling	501325	4737714	22	No	45	Yes
R012	Residential Dwelling	501401	4737979	19	No	45	Yes
R013	Residential Dwelling	501402	4737939	19	No	45	Yes
R014	Residential Dwelling	501398	4737861	20	No	45	Yes
R015	Residential Dwelling	501402	4737815	21	No	45	Yes
R016	Residential Dwelling	501400	4737793	21	No	45	Yes
R017	Residential Dwelling	501398	4737727	22	No	45	Yes
R018	Residential Dwelling	501405	4737704	22	No	45	Yes
R019	Residential Dwelling	501473	4737766	21	No	45	Yes
R020	Residential Dwelling	501482	4737721	22	No	45	Yes
R021	Residential Dwelling	501531	4737740	21	No	45	Yes
R022	Residential Dwelling	501572	4737747	21	No	45	Yes
R023	Institutional Facility	501505	4737593	23	No	45	Yes
R024	Institutional Facility	501522	4737488	24	No	45	Yes
R025	Residential Dwelling	501402	4737415	27	No	45	Yes
R026	Residential Dwelling	501386	4737098	33	No	45	Yes
R027	Residential Dwelling	501379	4737049	34	No	45	Yes
R028	Residential Dwelling	501387	4737026	33	No	45	Yes
R029	Residential Dwelling	501386	4736859	28	No	45	Yes
R030	Residential Dwelling	500956	4736401	20	No	45	Yes
R031	Residential Dwelling	501075	4736401	20	No	45	Yes
R032	Residential Dwelling	501115	4736397	20	No	45	Yes
R033	Residential Dwelling	501145	4736400	20	No	45	Yes
R034	Residential Dwelling	501161	4736397	20	No	45	Yes
R035	Residential Dwelling	501188	4736396	20	No	45	Yes
R036	Residential Dwelling	501222	4736387	20	No	45	Yes
R037 - R206	Residential Dwellings and Vacant Lots	Available upon request		<20	No	45	Yes

APPENDIX B
Zoning Maps



TOWN OF AYLMER
OFFICIAL PLAN

SCHEDULE "A"

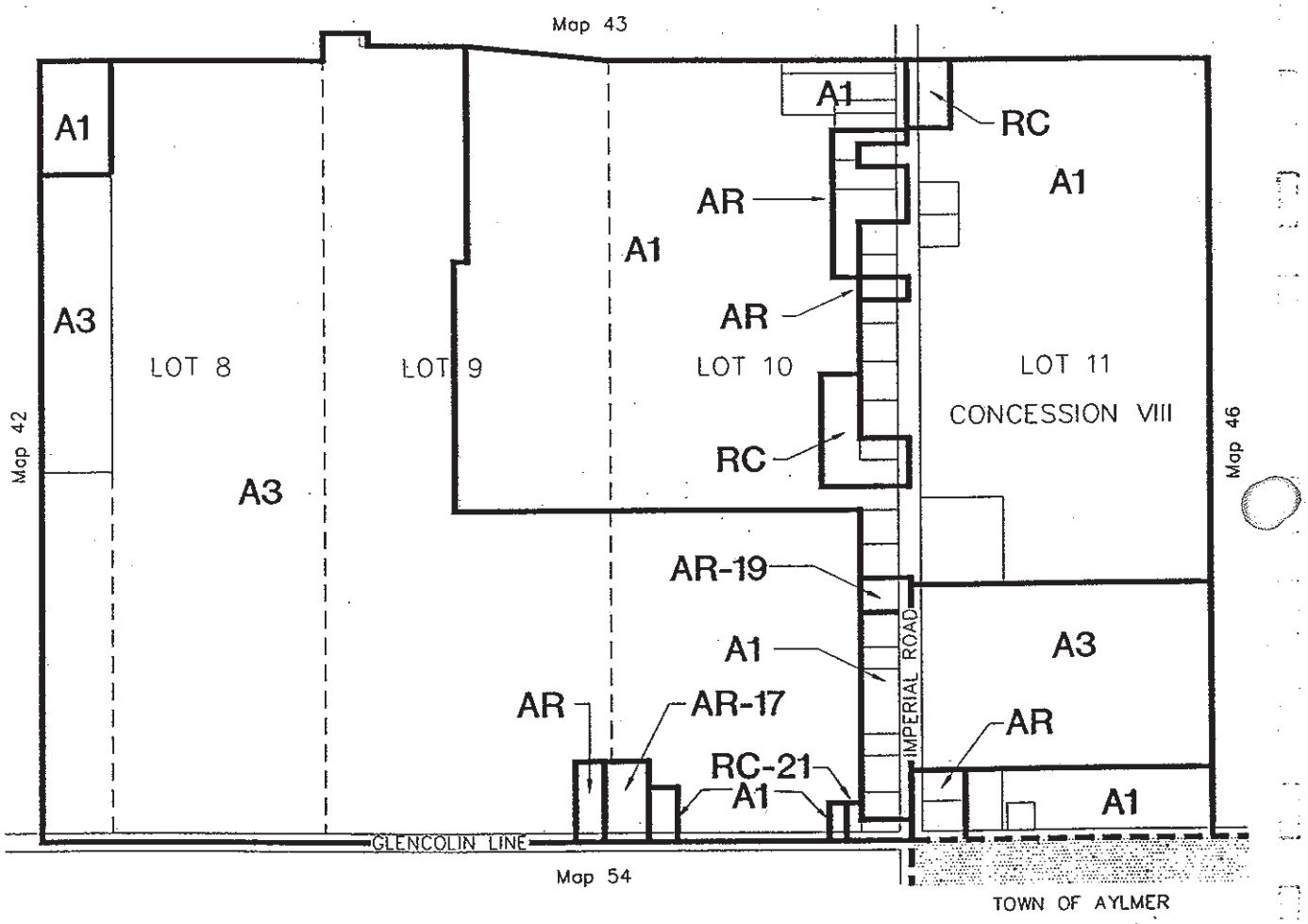
LAND USE PLAN

Base mapping provided by the Town of Aylmer
CCCA Regulation Limit and Flood Line mapping provided by the Catfish Creek Conservation Authority, 2006

LEGEND

- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- CORE COMMERCIAL
- ARTERIAL COMMERCIAL
- NEIGHBOURHOOD COMMERCIAL
- BUSINESS PARK COMMERCIAL
- OFFICE RESIDENTIAL
- INSTITUTIONAL
- INDUSTRIAL
- PARKS AND OPEN SPACE
- MUNICIPAL BOUNDARY
- FLOOD LINE
- CCCA REGULATION LIMIT
- WATER

mbpc
Meridith • Brown
planning consultants



TOWNSHIP OF MALAHIDE

SCHEDULE 'A'

N

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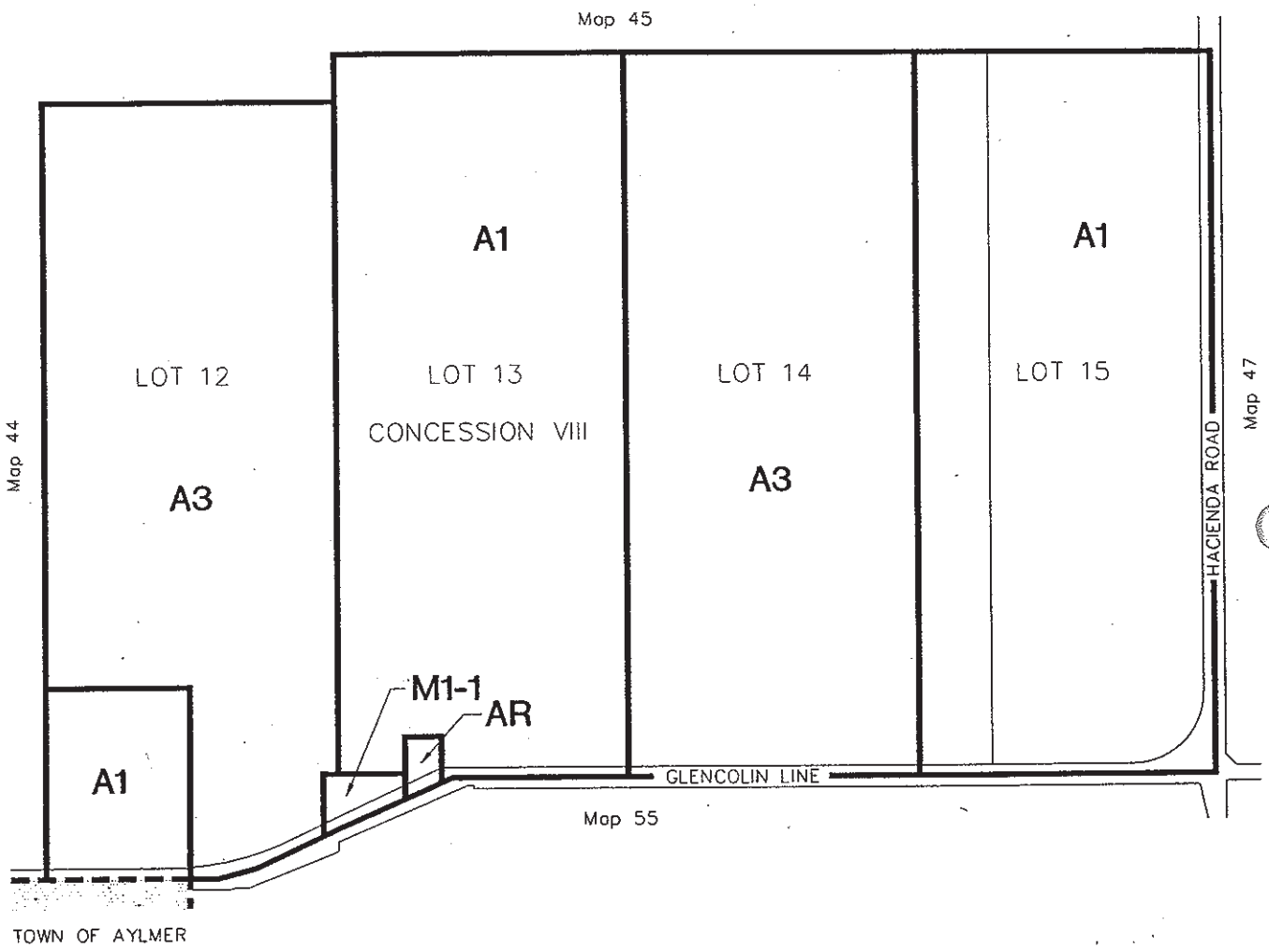

TOWNSHIP OF MALAHIDE

SCHEDULE 'A'

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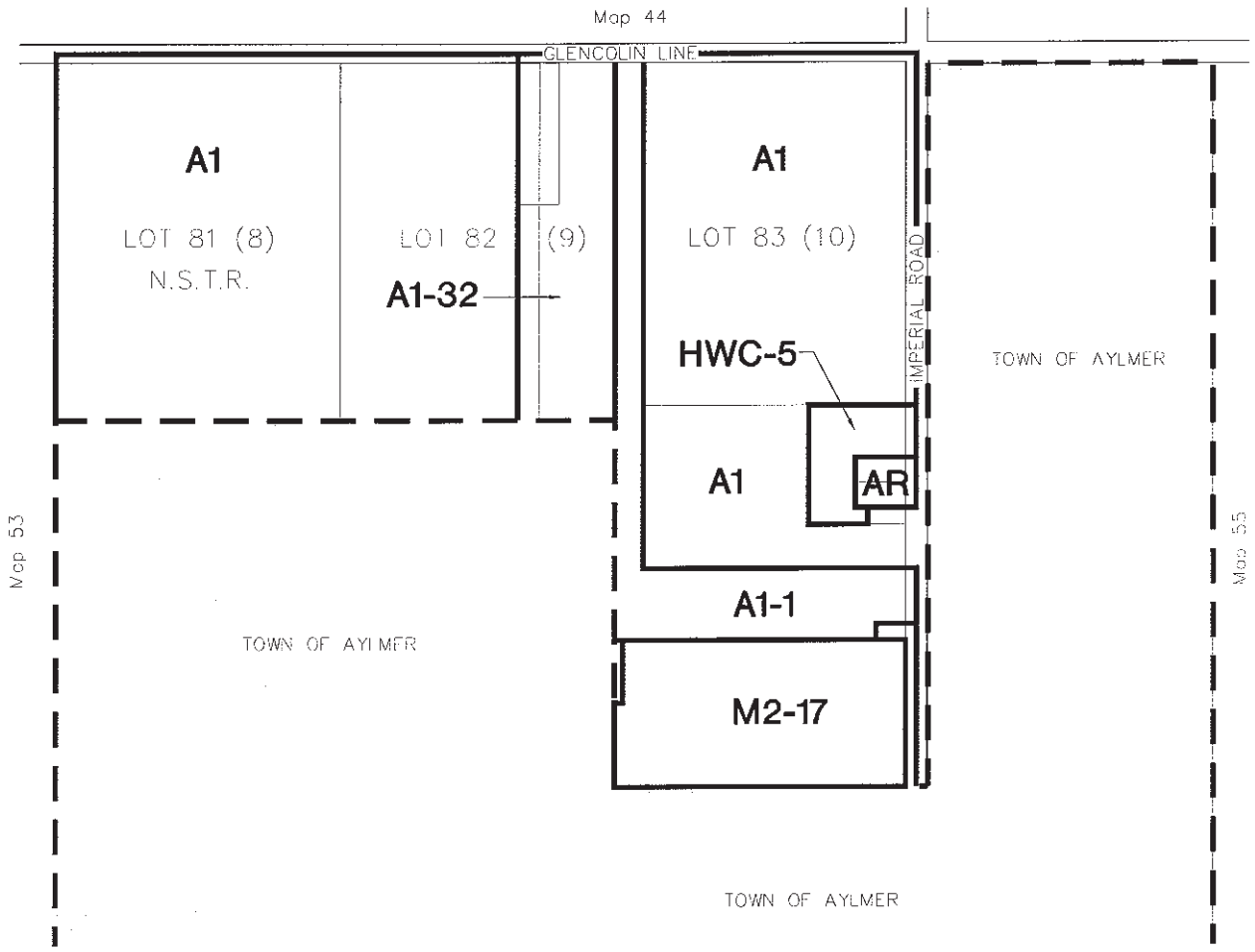

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SCHEDULE 'A'

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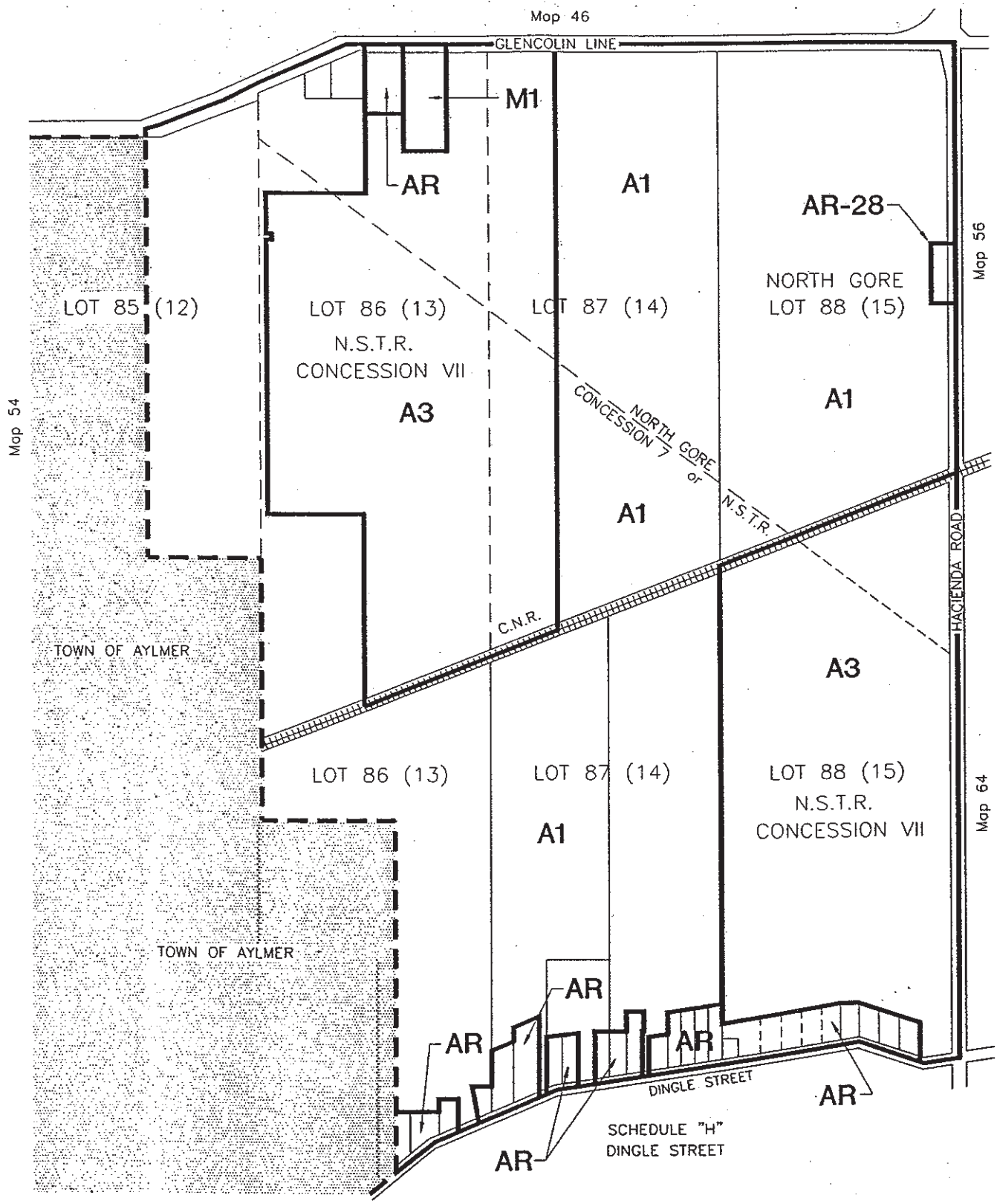

TOWNSHIP OF MALAHIDE

SCHEDULE 'A'

N

0 250m 500m

Scale 1 : 10,000

55

SECTION 3 ZONES AND ZONING MAP

3.1 ESTABLISHMENT OF ZONES

For the purposes of this By-law, the maps hereto attached as Schedule "A" (Maps 1 to 130 inclusive), Schedule "B", Schedule "C", Schedule "D" (Maps D1 to D4 inclusive), Schedules "E", Schedule "F" (Maps F1 to F4 inclusive), Schedule "G", Schedule "H", Schedule "I", Schedule "J", Schedule "K", Schedule "L", Schedule "M", and Schedule "N" (Maps N1 to N14 inclusive), shall be referred to as the "Zoning Maps" for the Township of Malahide and the zoning maps shall be divided into one or more of the following zones:

ZONE	SYMBOL
Agricultural	A1
Special Agricultural	A2
Agriculture Residential	AR
Hamlet Residential	HR
Village Residential	VR
Mobile Home Park	MH
Recreation Residential	RR
Rural Commercial	RC
Highway Commercial	HWC
Hamlet Commercial	HC
Village General Commercial	VC1
Village Local Commercial	VC2
Local Enterprise	LE
Farm Industrial	M1
Rural Industrial	M2
Village Industrial	M3
Extractive Industrial	M4
Institutional	I
Lakeshore Recreation	LR
Open Space	OS
Floodway	FW
Flood Fringe	FF
Hazard Land	HL
Temporary	T

3.2 USE OF ZONE SYMBOLS

The symbols listed in Section 3.1 shall be used to refer to land, buildings, and structures and the uses thereof permitted by this By-law in the said zones, and wherever in this By-law the "Zone" is used, preceded by any of the said symbols, such zones shall mean any area within the Municipality delineated on the zoning map and designated thereon by the said symbol.

APPENDIX C
Equipment Sound Data

Transformer 10 MV

NEMA (Nr)									71	MV:	10
										10*logS:	16.5
Correction	3	5	0	0	-6	-11	-16	-23			
Lw	90.5	92.5	87.5	87.5	81.5	76.5	71.5	64.5	87.9		

NEMA value extracted from "*NEMA Standards Publication No. TR 1-1993, Transformers, Regulators nad Reactors,* National Electrical Manufacturers Association, 2000."
Sound predictions according to "Crocker, Malcolm, J., *Sound Power Level Predictions for Industrial Machinery* , In Encyclopedia of Acoustics (Vol. 2, pp. 1049 - 1057), John Wiley & Sons, Inc., 1997."

APPENDIX D
Details of Predictive Acoustical Modeling

The predictive model used for this Assessment (*Cadna-A version 4.2.141*) is based on the methods from ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors" [Ref. 6], which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This modeling technique is acceptable to the MOE.

The subject site and surrounding area were modelled as flat ground based on observations made during the September 6, 2011 site visit. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 0.7 in all areas. The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The predictive modelling considered one order of reflection, with both on-site and off-site shielding/reflections afforded by buildings, walls, etc., with spectral absorptive characteristics applied to structures as appropriate.

The transformer was modeled as a point source of sound and is shown as a cross in Figures 3 and 4.

APPENDIX E
Acoustic Assessment Criteria

The MOE noise assessment guidelines draw a distinction between sound produced by traffic sources and that produced by industrial or commercial activities, which are classified as *stationary sources of sound*. In essence, the sound from the stationary sources is evaluated against (i.e. compared to) the typical background sound at any potentially impacted, sound-sensitive points of reception (e.g., residences). Background sound is considered to include road traffic sound and other typical sounds, but excludes the sound of the facility under assessment. MOE Publication NPC-205, "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)," is a guideline for developing applicable sound level limits. In general, the acceptability limits for stationary sources are site dependent, and are based on the existing ambient background sound levels in the area of the subject site.

Publication NPC-205 stipulates that the sound level limit for a stationary source which operates during both daytime and nighttime hours in a semi-urban environment is the greater of the minimum one-hour energy-equivalent (L_{EQ}) background sound level, or the exclusionary minimum limit of 45 dBA. The MOE guidelines also stipulate that the noise assessment shall consider a *predictable worst-case hour*, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound.

The characteristic background sound level can be determined through automated long-term measurement, or by predictive analysis based on road traffic volume counts, in cases where the background sound is dominated by road traffic. Based on observations and measurements in the vicinity of the subject site during the visit on September 6, 2011, the background sound levels are likely to fall below the exclusionary minimum limit during some hours of day and night. Therefore, for the purpose of this assessment, the exclusionary minimum sound level limit of 45 dBA applies at all identified receptor locations.

APPENDIX F
Sample Calculation Results - Condensed, Overall dBA Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. Lx is the A-weighted, one-hour energy-equivalent (or logarithmic-mean impulse) source sound power level, which includes the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. Lr is the A-weighted, one-hour energy-equivalent (or logarithmic-mean impulse) sound level at the point of reception. The results are presented in terms of overall A-weighted results, at the most impacted off-site point of reception.

R001	Residential Dwelling	500383	4737750	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	71.7	0	0.0	0.3	0.0	2.7	0.0	0.0	0.0	0.0	18

R002	Residential Dwelling	500435	4737662	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	70.9	0	0.0	0.3	0.0	2.5	0.0	0.0	0.0	0.0	19

R003	Residential Dwelling	500831	4737656	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.4	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R004	Residential Dwelling	500901	4737648	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.0	0	0.0	0.2	0.0	1.9	0.0	0.0	0.0	0.0	23

R005	Residential Dwelling	500973	4737714	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.5	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R006	Residential Dwelling	500984	4737654	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	67.7	0	0.0	0.2	0.0	1.9	0.0	0.0	0.0	0.0	23

R007	Residential Dwelling	501006	4737718	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.4	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R008	Residential Dwelling	501035	4737655	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	67.6	0	0.0	0.2	0.0	1.9	0.0	0.0	0.0	0.0	23

R009	Residential Dwelling	501082	4737728	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.4	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R010	Residential Dwelling	501220	4737730	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.4	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R011	Residential Dwelling	501325	4737714	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	68.4	0	0.0	0.2	0.0	2.0	0.0	0.0	0.0	0.0	22

R012	Residential Dwelling	501401	4737979	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	71.1	0	0.0	0.3	0.0	2.6	0.0	0.0	0.0	0.0	19

R013	Residential Dwelling	501402	4737939	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	70.8	0	0.0	0.3	0.0	2.5	0.0	0.0	0.0	0.0	19

R014	Residential Dwelling	501398	4737861	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetN	ReflN	Lr
NS-01	Transformer Station	501158	4736993	2.0	93	70.1	0	0.0	0.3	0.0	2.3	0.0	0.0	0.0	0.0	20

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

APPENDIX G
Sample Calculation Results – Octave Band Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. Lx is the A-weighted, one-hour energy-equivalent (or logarithmic-mean impulse) source sound power level, which includes the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. Lr is the A-weighted, one-hour energy-equivalent (or logarithmic-mean impulse) sound level at the point of reception. The results are presented in terms of full octave band sound levels, at the most impacted off-site point of reception.

R028	Residential Dwelling		501387	4737026	4.5												
Src ID	Src Name	Band	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	Lr	Band
NS-01	Transformer	63	501158	4736993	2.0	69	58.3	0	0.0	-3.5	0.0	0.0	0.0	0.0	0.0	0.0	14	63
NS-01	Transformer	125	501158	4736993	2.0	81	58.3	0	0.0	2.2	0.0	0.1	0.0	0.0	0.0	0.0	21	125
NS-01	Transformer	250	501158	4736993	2.0	84	58.3	0	0.0	4.1	0.0	0.2	0.0	0.0	0.0	0.0	21	250
NS-01	Transformer	500	501158	4736993	2.0	89	58.3	0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	30	500
NS-01	Transformer	1000	501158	4736993	2.0	87	58.3	0	0.0	-1.0	0.0	0.9	0.0	0.0	0.0	0.0	28	1000
NS-01	Transformer	2000	501158	4736993	2.0	83	58.3	0	0.0	-1.0	0.0	2.2	0.0	0.0	0.0	0.0	23	2000
NS-01	Transformer	4000	501158	4736993	2.0	78	58.3	0	0.0	-1.0	0.0	7.6	0.0	0.0	0.0	0.0	13	4000
NS-01	Transformer	8000	501158	4736993	2.0	68	58.3	0	0.0	-1.0	0.0	27.1	0.0	0.0	0.0	0.0	--	8000

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl