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ACOUSTIC ASSESSMENT REPORT

SILVERCREEK SOLAR PARK FACILITY

Aylmer, Ontario

Prepared for:

Silvercreek Solar Park Inc.
49588 Vienna Line
Aylmer, Ontario

Prepared by

Ian Bonsma, PEng

Reviewed by

Corey Kinart, PEng

July 15, 2013

VERSION CONTROL

Silvercreek Solar Park Facility, 49588 Vienna Line, Aylmer, Ontario

Ver.	Date	Version Description	Prepared By
1	29-May-12	Original Acoustic Assessment Report supporting an application for a Renewable Energy Approval	P. Chocensky
2	29-Nov-12	Updated Acoustic Assessment Report to address revised Inverter locations	I. Bonsma
3	15-Jul-13	Updated Acoustic Assessment Report addressing revised source height.	I. Bonsma

EXECUTIVE SUMMARY

Silvercreek Solar Park Inc. retained HGC Engineering to undertake an Acoustic Assessment of their proposed solar facility in Aylmer, Ontario. The study is required in support of an application for a Renewable Energy Approval ("REA") from the Ontario Ministry of The Environment ("MOE"), under the Environmental Protection Act, pursuant to Ontario Regulation 359/09. The assessment considers all acoustically significant sound sources currently proposed for use at the facility.

Sound emissions from key items of proposed equipment were based on information provided by the manufacturer. 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-232. This assessment has been updated to reflect revised source heights for the inverter collection houses.

The predictive analysis indicates that the sound emissions of the facility, with the benefit of the noise control measures in Section 6, will be within the sound level limits as set out in MOE guideline NPC-232 during normal 'predictable worst case' operations at all identified noise sensitive receptors.

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Ministry of the Environment | Ministère de l'Environnement

Ontario

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: Silvercreek Solar Park Inc.

Company Address: 49588 Vienna Line

Aylmer, Ontario N5H 2R2

Location of Facility: Same as above

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: July 15 2013

Technical Contact:

Name: Ian Bonsma, PEng

Representing: HGC Engineering

Phone Number: 905-826-4044

Signature:

Date: July 15, 2013

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	Figures 4
6.0	**Conclusions**		
	6.1 Statement of compliance with selected noise performance limits	☒ Yes	Sections 6 & 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") facility is proposed to be located at 49588 Vienna Line in Aylmer, Ontario. A scaled location map of the surrounding area is included as Figure 1. The main transformer station for the Silvercreek site is proposed to be constructed in a separate location, approximately 10 km to the north, in the Town of Aylmer. This assessment therefore, addresses sound emissions from the main solar facility, while the transformer station sound emissions are subject to a separate Acoustic Assessment Report by HGC Engineering.

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 [1], and "Supporting Information for the Preparation of an Acoustic Assessment Report", dated November 2003 [2].

Zoning maps identifying the land uses surrounding the subject facility, obtained from the Township of Malahide, are included as Appendix B. The lands surrounding the Silvercreek facility are generally zoned for agricultural use. Forty-five 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, labeled as locations R01 through R45 in Figure 2. One house (marked as location O1 in Figure 2), located on the property/parcel of the project, is owned by the proponent and has not been included in this assessment pursuant to Ontario Regulation 359/09 [3].

The proposed site is rural in nature, both acoustically and in general character, with agricultural land uses widely in evidence, including scattered dwellings near the major roadways. Therefore, the area is best characterized as a "Class 3" rural area, under MOE noise assessment guidelines.

This report addresses an increased source height for the inverter collection houses.

2 FACILITY DESCRIPTION

The Silvercreek Solar Park is a proposed 10 MW solar electrical generation project. The farm will consist of numerous solar panels and up to eight collection houses. The primary sound sources

associated with the facility will be the collection houses which include a secondary transformer and two inverters. The inverters are power semiconductor devices which synthesize alternating current ("A/C") from the direct current produced by the solar panels. The primary transformer typically included for similar solar projects will be located at another site and is not part of this assessment. The solar panels themselves are passive, direct current devices and do not produce sound. They are thus not considered as sources in this assessment.

The inverter units will typically operate during hours when daylight is available. However, the transformers will be energized throughout the 24 hour period. Since daylight can occur during some hours of the nighttime period (19:00 – 7:00), the facility was assumed to operate fully during both daytime (7:00 – 19:00) and nighttime hours (19:00 – 7:00). The facility will operate 7 days per week.

3 SOUND SOURCE SUMMARY

A Sound Source Summary is included as Table A1 in Appendix A, which lists the sources associated with the facility, in the standard format required by the MOE. Each noise source has been assigned an identification number of the form NS-## (e.g. NS-01). Figure 3 shows the location of each source.

The site plan for the proposed development includes eight 1250 kW inverter collection houses which will be distributed throughout the site. Each inverter collection house (NS-01 through NS-08) will include two 625 kW inverters and a small 1.25 MVA transformer. Sound emissions of the inverter house installations are based on the manufacturer's sound data of a 1760 kW inverter collection house, included as Appendix C. The manufacturer indicates that both inverter installations have equivalent sound emissions, as both inverter units use the same main ventilation fans. A typical sound level spectrum for an inverter hut was utilized in these calculations.

The sound power levels for the inverter collection houses were 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, all sources at the facility were assumed to operate 24 hours per day, seven days per week.

4 POINT OF RECEPTION SUMMARY

The forty-five receptors chosen to represent the noise sensitive receptors and vacant lots surrounding the site are shown as locations R01 through R45 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 assumed future location of the dwelling was selected to be consistent with the typical building pattern in the area. The selected points of reception are described briefly in Table A3, the Acoustic Assessment Summary Table.

5 ASSESSMENT CRITERIA

The area surrounding the subject facility is a "Rural" (Class 3) acoustical environment. Accordingly, the relevant document for defining the applicable sound level limits is MOE guidelines NPC-232 [4]. The details by which the applicable sound level limits were established for the assessment of this facility are provided in Appendix E. For the purposes of this assessment, the applicable sound level criterion at all locations is 40 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, MOE guidelines [5] stipulate 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 and inverters 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 all sources.

6 NOISE CONTROL MEASURES

Ventilation air inlets and outlets of two inverter collection houses (NS-01 and NS-02) will be equipped with acoustic hoods providing the acoustical performance listed in Table 1, below.

Table 1 – Acoustic Hood Insertion Loss Specifications, [dB]

Source ID	Source Name	Octave Band Centre Frequency, [Hz]							
		63	125	250	500	1k	2k	4k	8k
NS-01, NS-02	Inverter Collection House Air Inlet and Outlet	0	0	1	4	7	6	0	0

7 IMPACT ASSESSMENT

The predictive analysis indicates that the sound levels of the subject facility will be in the range of 27 to 39 dBA, with the benefits of the noise control measures specified above, which is within the applicable MOE sound level limit at all points of reception.

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.

8 CONCLUSIONS

The acoustical analysis indicates that the predicted sound levels of the Silvercreek Solar Facility will be within the applicable sound level limits specified in MOE guideline NPC-232, during all hours of the day and night, under typical “predictable worst case” operating conditions at all identified off-site receptor locations, with the benefit of the noise control measures specified in Section 6.

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. Environmental Protection Act, *ONTARIO REGULATION 359/09*, Part 1, Section 1, Subsection (6), October 1, 2009.

4. Ontario Ministry of the Environment Publication NPC-232, *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)*, 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*

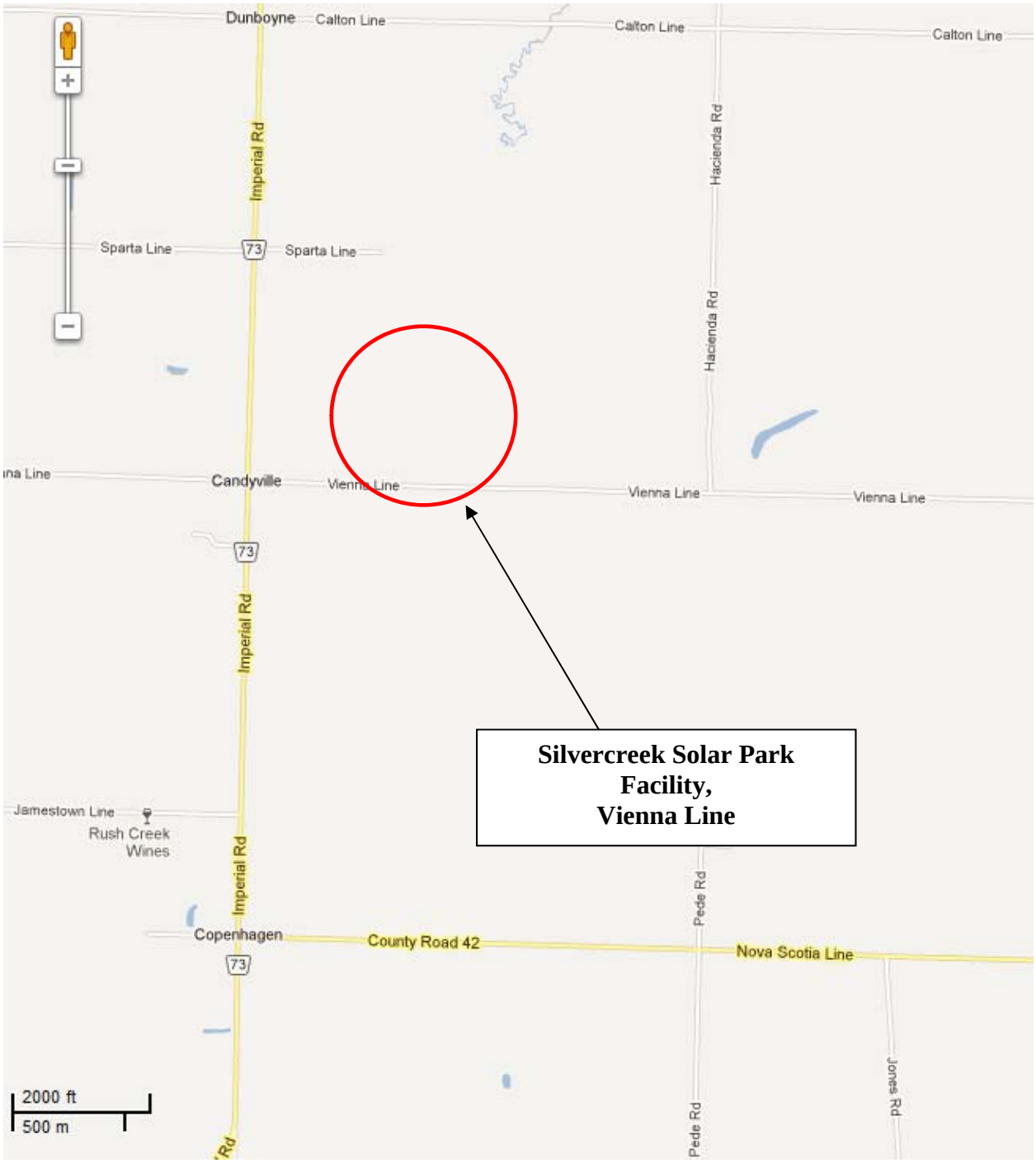


Figure 1: Location Map

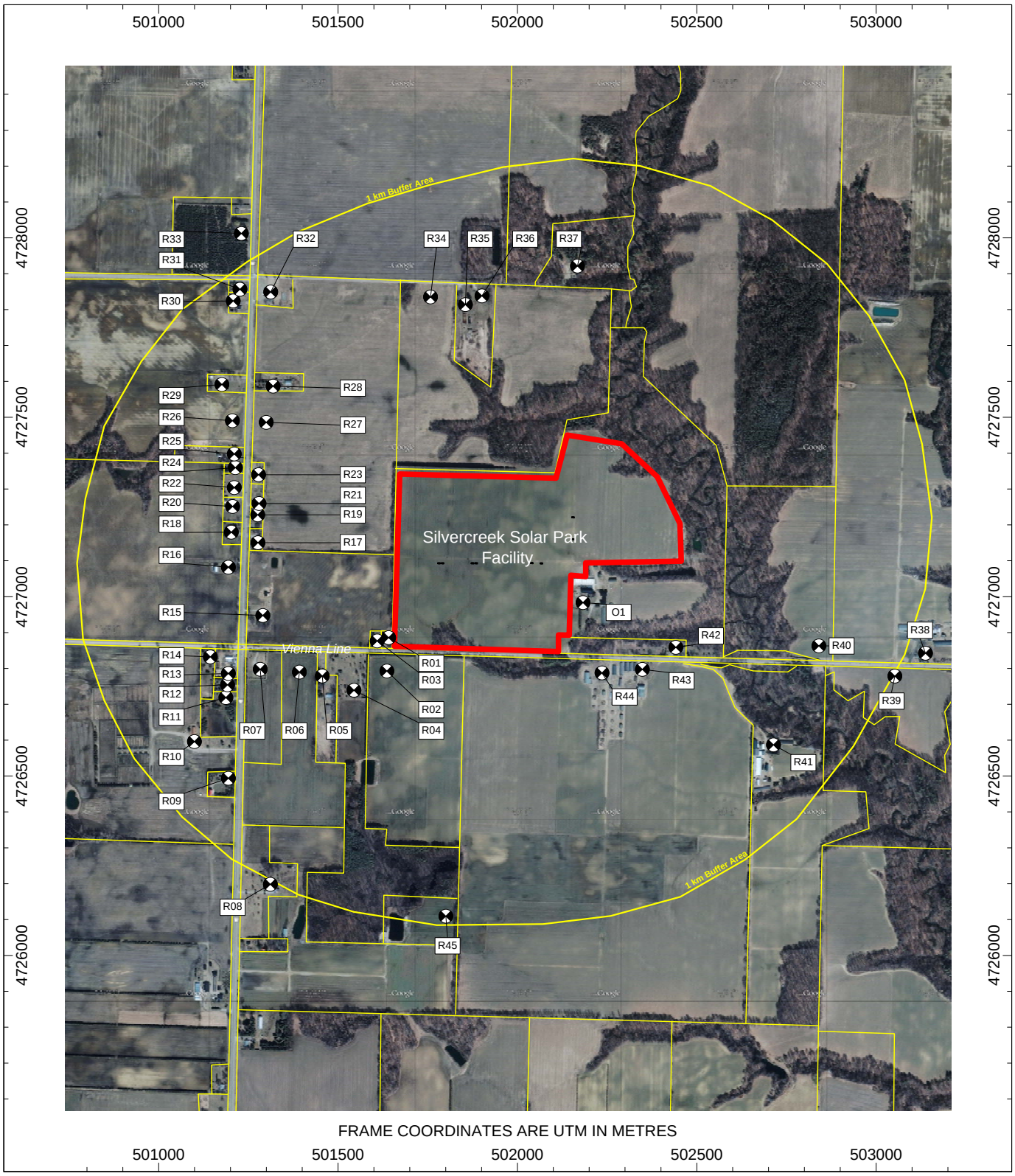


Figure 2: Location of Points of Reception
Proposed Silvercreek Solar Park

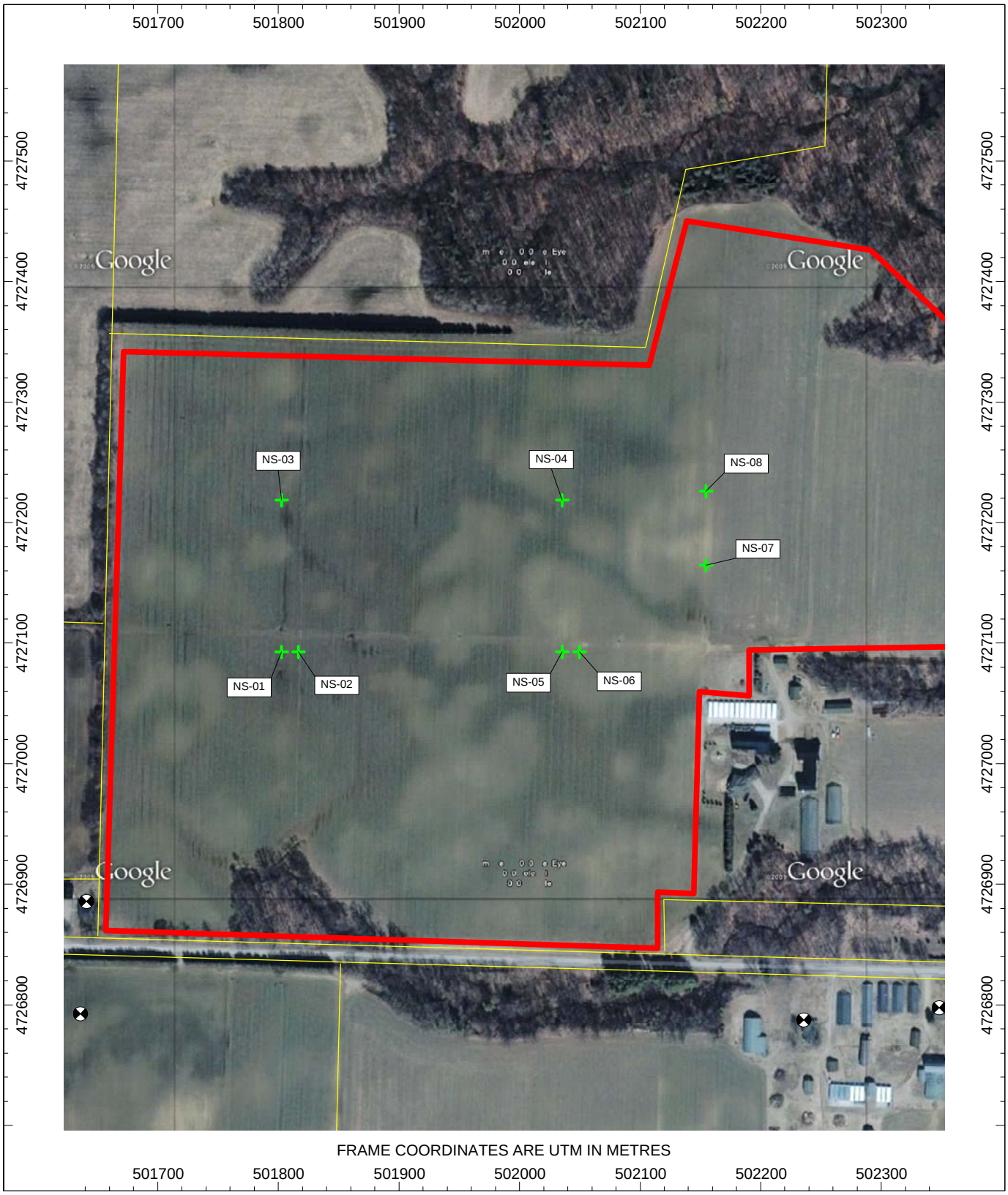


Figure 3: Location of Sound Sources
Proposed Silvercreek Solar Park

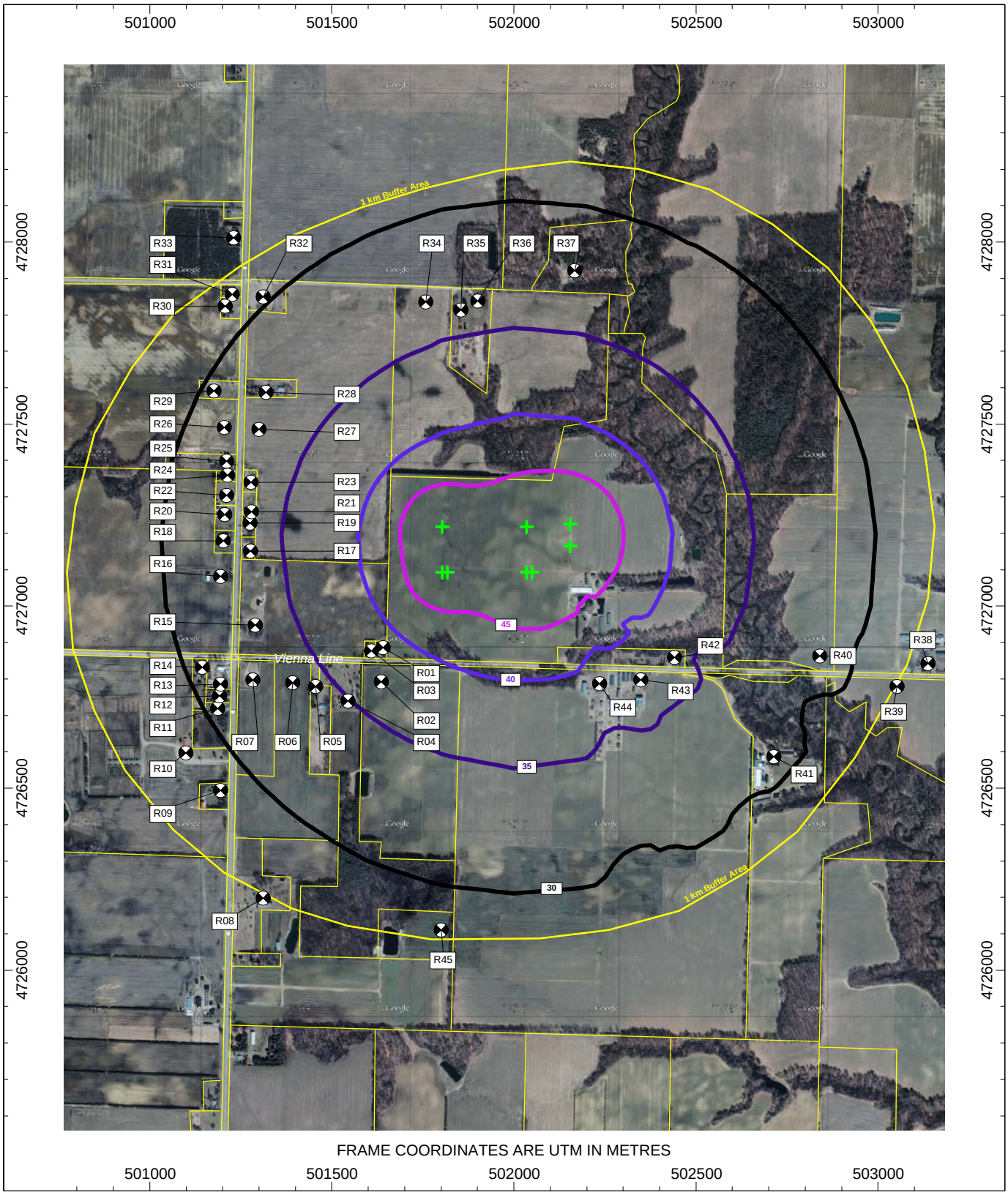


Figure 4: Predicted Sound Levels, Leq [dBA]
Proposed Silvercreek Solar Park
Sound Level Grid Calculated at 4.5m above grade

APPENDIX A

Acoustic Assessment Summary Tables

ACOUSTIC ASSESSMENT SUMMARY TABLES
VERSION CONTROL

Silvercreek Solar Park Facility, 49588 Vienna Line, Aylmer, Ontario

Ver.	Date	Issued as Part of AAR?	Version Description	Prepared By
1	29-May-12	Y	Original version of tables as part of Ver. 1 of the Acoustic Assessment Report	P. Chocensky
2	29-Nov-12	Y	Updated version of tables as part of Ver. 2 of the Acoustic Assessment Report	I. Bonsma
3	15-Jul-13	Y	Updated version of tables as part of Ver. 3 of the Acoustic Assessment Report	I. Bonsma

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	Inverter House 1	501802	4727093	97	O	T	S
NS-02	Inverter House 2	501817	4727093	97	O	T	S
NS-03	Inverter House 3	501802	4727218	97	O	T	U
NS-04	Inverter House 4	502035	4727218	97	O	T	U
NS-05	Inverter House 5	502035	4727093	97	O	T	U
NS-06	Inverter House 6	502050	4727093	97	O	T	U
NS-07	Inverter House 7	502154	4727165	97	O	T	U
NS-08	Inverter House 8	502154	4727226	97	O	T	U

Legend

Sound Characteristics
S: Steady
Q: Quasi-steady impulsive
I: Impulsive
B: Buzzing
T: Tonal (includes 5 dBA 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									
		R01		R02		R03		R04		R05	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	263	30	343	27	290	29	438	25	467	24
NS-02	Inverter House 2	272	30	350	27	300	29	446	25	478	24
NS-03	Inverter House 3	370	32	457	30	393	31	545	28	560	28
NS-04	Inverter House 4	516	28	584	27	546	28	686	25	727	25
NS-05	Inverter House 5	445	30	499	29	478	29	605	27	659	26
NS-06	Inverter House 6	458	30	511	29	491	29	616	27	671	26
NS-07	Inverter House 7	584	27	638	26	617	27	744	25	798	24
NS-08	Inverter House 8	616	27	676	26	648	26	781	24	830	23

Source ID	Source Name	Point of Reception									
		R06		R07		R08		R09		R10	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	510	24	598	22	1020	16	853	18	860	18
NS-02	Inverter House 2	521	23	610	22	1027	16	864	18	872	18
NS-03	Inverter House 3	593	27	669	26	1132	20	946	22	939	22
NS-04	Inverter House 4	773	24	862	23	1251	18	1110	20	1124	20
NS-05	Inverter House 5	711	25	808	24	1150	20	1032	21	1059	21
NS-06	Inverter House 6	724	25	821	23	1159	19	1044	21	1072	20
NS-07	Inverter House 7	849	23	946	22	1282	18	1171	19	1198	19
NS-08	Inverter House 8	878	23	971	22	1329	18	1208	19	1229	19

Source ID	Source Name	Point of Reception									
		R11		R12		R13		R14		R15	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	720	20	698	20	681	21	708	20	532	23
NS-02	Inverter House 2	732	20	711	20	694	20	721	20	546	23
NS-03	Inverter House 3	792	24	767	24	747	25	763	24	579	27
NS-04	Inverter House 4	984	21	963	22	946	22	971	22	793	24
NS-05	Inverter House 5	926	22	909	22	895	22	929	22	759	24
NS-06	Inverter House 6	940	22	922	22	909	22	942	22	773	24
NS-07	Inverter House 7	1065	20	1046	21	1032	21	1064	20	891	23
NS-08	Inverter House 8	1092	20	1072	20	1057	21	1085	20	908	22

Source ID	Source Name	Point of Reception									
		R16		R17		R18		R19		R20	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	608	22	529	23	606	22	544	23	617	22
NS-02	Inverter House 2	623	22	543	23	621	22	557	23	631	21
NS-03	Inverter House 3	623	26	530	28	601	27	526	28	597	27
NS-04	Inverter House 4	852	23	761	24	834	23	759	24	830	23
NS-05	Inverter House 5	841	23	761	24	837	23	771	24	844	23
NS-06	Inverter House 6	855	23	775	24	852	23	785	24	858	23
NS-07	Inverter House 7	964	22	878	23	952	22	881	23	952	22
NS-08	Inverter House 8	971	22	881	23	953	22	878	23	949	22

Source ID	Source Name	Point of Reception									
		R21		R22		R23		R24		R25	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	549	23	628	21	580	22	647	21	666	21
NS-02	Inverter House 2	562	23	642	21	593	22	660	21	679	21
NS-03	Inverter House 3	524	28	598	27	538	28	605	27	618	27
NS-04	Inverter House 4	756	24	829	23	767	24	834	23	844	23
NS-05	Inverter House 5	774	24	851	23	796	24	864	23	879	23
NS-06	Inverter House 6	788	24	865	23	810	24	877	23	893	23
NS-07	Inverter House 7	880	23	954	22	894	22	961	22	972	22
NS-08	Inverter House 8	875	23	947	22	884	23	950	22	959	22

Source ID	Source Name	Point of Reception									
		R26		R27		R28		R29		R30	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	718	20	638	21	691	20	801	19	943	17
NS-02	Inverter House 2	729	20	649	21	701	20	812	19	952	17
NS-03	Inverter House 3	656	26	569	27	608	27	729	25	849	23
NS-04	Inverter House 4	873	23	782	24	805	24	936	22	1025	21
NS-05	Inverter House 5	920	22	834	23	870	23	993	21	1105	20
NS-06	Inverter House 6	933	22	847	23	882	23	1006	21	1115	20
NS-07	Inverter House 7	1003	21	913	22	936	22	1067	20	1154	19
NS-08	Inverter House 8	985	21	893	22	910	22	1044	21	1120	20

Source ID	Source Name	Point of Reception									
		R31		R32		R33		R34		R35	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	957	17	902	18	1083	16	744	20	723	20
NS-02	Inverter House 2	965	17	909	17	1091	15	745	20	723	20
NS-03	Inverter House 3	860	23	799	24	978	21	619	27	598	27
NS-04	Inverter House 4	1030	21	959	22	1130	20	676	26	622	27
NS-05	Inverter House 5	1113	20	1046	21	1222	19	793	24	744	25
NS-06	Inverter House 6	1123	20	1056	21	1232	19	798	24	747	25
NS-07	Inverter House 7	1158	19	1085	20	1254	18	779	24	715	25
NS-08	Inverter House 8	1122	20	1048	21	1213	19	727	25	660	26

Source ID	Source Name	Point of Reception									
		R36		R37		R38		R39		R40	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	752	20	906	18	1359	9	1289	14	1063	16
NS-02	Inverter House 2	750	20	900	18	1344	9	1275	14	1049	16
NS-03	Inverter House 3	627	26	792	24	1387	17	1325	18	1097	20
NS-04	Inverter House 4	634	26	715	25	1165	19	1108	20	880	23
NS-05	Inverter House 5	758	24	839	23	1131	20	1064	20	837	23
NS-06	Inverter House 6	760	24	837	23	1117	20	1051	21	824	23
NS-07	Inverter House 7	720	25	757	24	1035	21	977	21	750	24
NS-08	Inverter House 8	662	26	696	25	1055	21	1003	21	776	24

Source ID	Source Name	Point of Reception									
		R41		R42		R43		R44		R45	
		Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]	Dist [m]	LEQ [dBA]
NS-01	Inverter House 1	1042	16	681	21	620	22	530	23	983	17
NS-02	Inverter House 2	1030	16	667	21	608	22	518	23	983	17
NS-03	Inverter House 3	1109	20	733	25	689	25	611	27	1109	20
NS-04	Inverter House 4	927	22	543	28	525	24	475	29	1134	20
NS-05	Inverter House 5	846	23	469	29	430	30	365	32	1011	21
NS-06	Inverter House 6	835	23	456	27	420	31	357	32	1014	21
NS-07	Inverter House 7	804	24	420	31	415	31	386	27	1113	20
NS-08	Inverter House 8	849	23	466	30	470	29	446	26	1171	19

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				
R01	Existing Dwelling	501641	4726886	38	No	40	Yes
R02	Vacant Lot	501636	4726793	37	No	40	Yes
R03	Existing Dwelling	501609	4726877	38	No	40	Yes
R04	Existing Dwelling	501544	4726739	35	No	40	Yes
R05	Existing Dwelling	501456	4726779	34	No	40	Yes
R06	Vacant Lot	501392	4726790	33	No	40	Yes
R07	Existing Dwelling	501283	4726798	32	No	40	Yes
R08	Existing Dwelling	501311	4726198	27	No	40	Yes
R09	Existing Dwelling	501194	4726494	29	No	40	Yes
R10	Existing Dwelling	501099	4726596	29	No	40	Yes
R11	Existing Dwelling	501187	4726719	30	No	40	Yes
R12	Existing Dwelling	501192	4726754	31	No	40	Yes
R13	Existing Dwelling	501194	4726786	31	No	40	Yes
R14	Existing Dwelling	501144	4726832	31	No	40	Yes
R15	Existing Dwelling	501290	4726948	33	No	40	Yes
R16	Existing Dwelling	501194	4727082	32	No	40	Yes
R17	Existing Dwelling	501277	4727150	33	No	40	Yes
R18	Existing Dwelling	501202	4727180	32	No	40	Yes
R19	Existing Dwelling	501276	4727228	33	No	40	Yes
R20	Existing Dwelling	501206	4727251	32	No	40	Yes
R21	Existing Dwelling	501280	4727260	33	No	40	Yes
R22	Existing Dwelling	501211	4727304	32	No	40	Yes
R23	Existing Dwelling	501278	4727340	33	No	40	Yes
R24	Existing Dwelling	501214	4727359	32	No	40	Yes
R25	Existing Dwelling	501211	4727398	32	No	40	Yes
R26	Vacant Lot	501205	4727491	31	No	40	Yes
R27	Vacant Lot	501300	4727486	33	No	40	Yes
R28	Existing Dwelling	501319	4727587	32	No	40	Yes
R29	Existing Dwelling	501176	4727591	30	No	40	Yes
R30	Existing Dwelling	501208	4727824	29	No	40	Yes
R31	Existing Dwelling	501226	4727857	29	No	40	Yes
R32	Existing Dwelling	501312	4727849	30	No	40	Yes
R33	Existing Dwelling	501230	4728012	28	No	40	Yes
R34	Vacant Lot	501758	4727835	33	No	40	Yes
R35	Existing Dwelling	501855	4727814	34	No	40	Yes
R36	Existing Dwelling	501901	4727838	34	No	40	Yes
R37	Existing Dwelling	502167	4727922	32	No	40	Yes
R38	Existing Dwelling	503138	4726842	28	No	40	Yes
R39	Vacant Lot	503052	4726779	28	No	40	Yes
R40	Vacant Lot	502841	4726863	31	No	40	Yes
R41	Existing Dwelling	502714	4726587	31	No	40	Yes
R42	Existing Dwelling	502441	4726859	37	No	40	Yes
R43	Existing Dwelling	502348	4726797	37	No	40	Yes
R44	Existing Dwelling	502236	4726787	38	No	40	Yes
R45	Vacant Lot	501800	4726110	29	No	40	Yes

APPENDIX B

Zoning Maps

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:

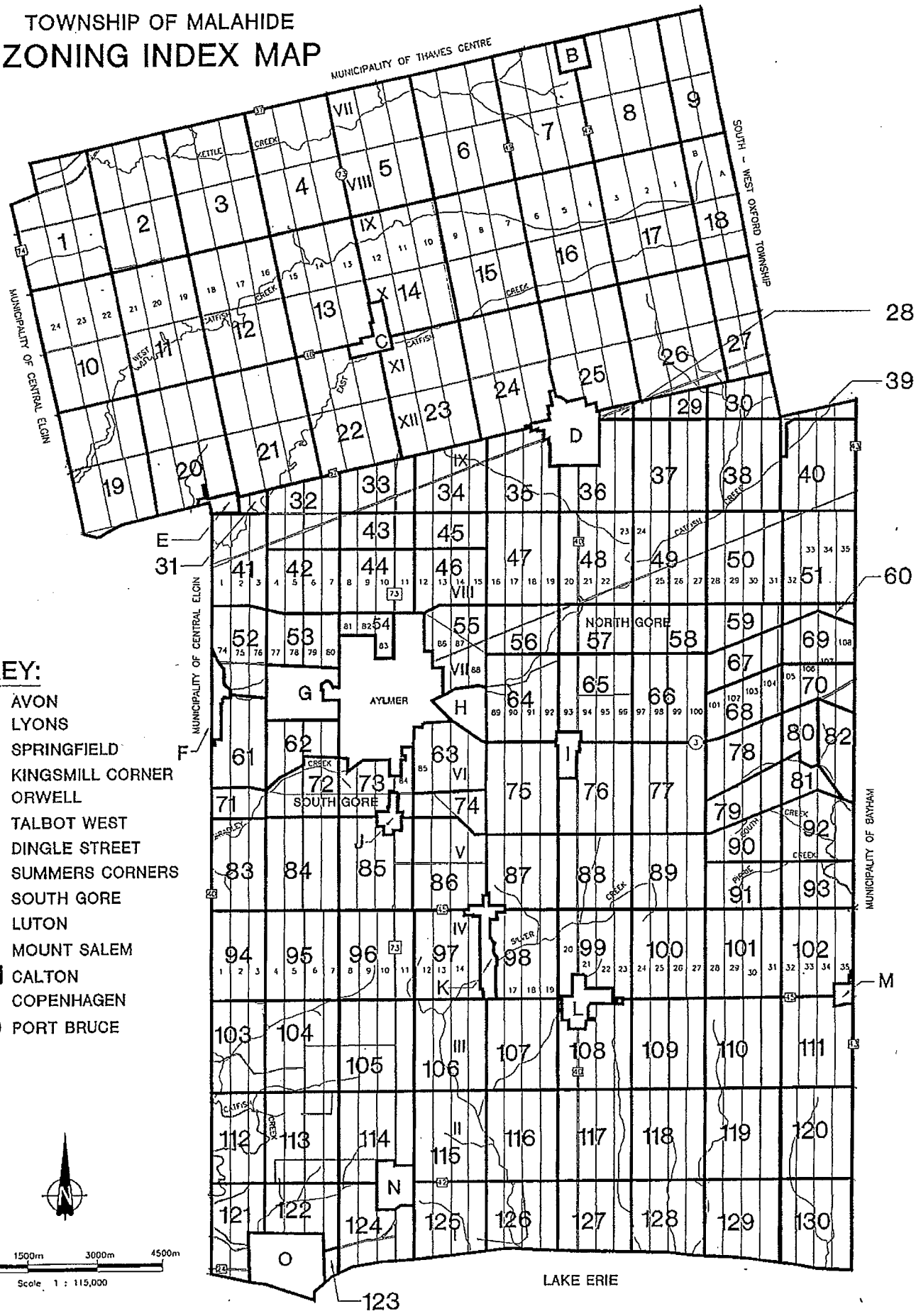
ZONE	SYMBOL
Agricultural	A1
Special Agricultural	A2
Agriculture Residential	AR
Hamlet Residential	HR
Village Residential	VR
Mobile Home Park	MH
Recreation Residential	RR
Rural Commercial	RC
Highway Commercial	HWC
Hamlet Commercial	HC
Village General Commercial	VC1
Village Local Commercial	VC2
Local Enterprise	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.

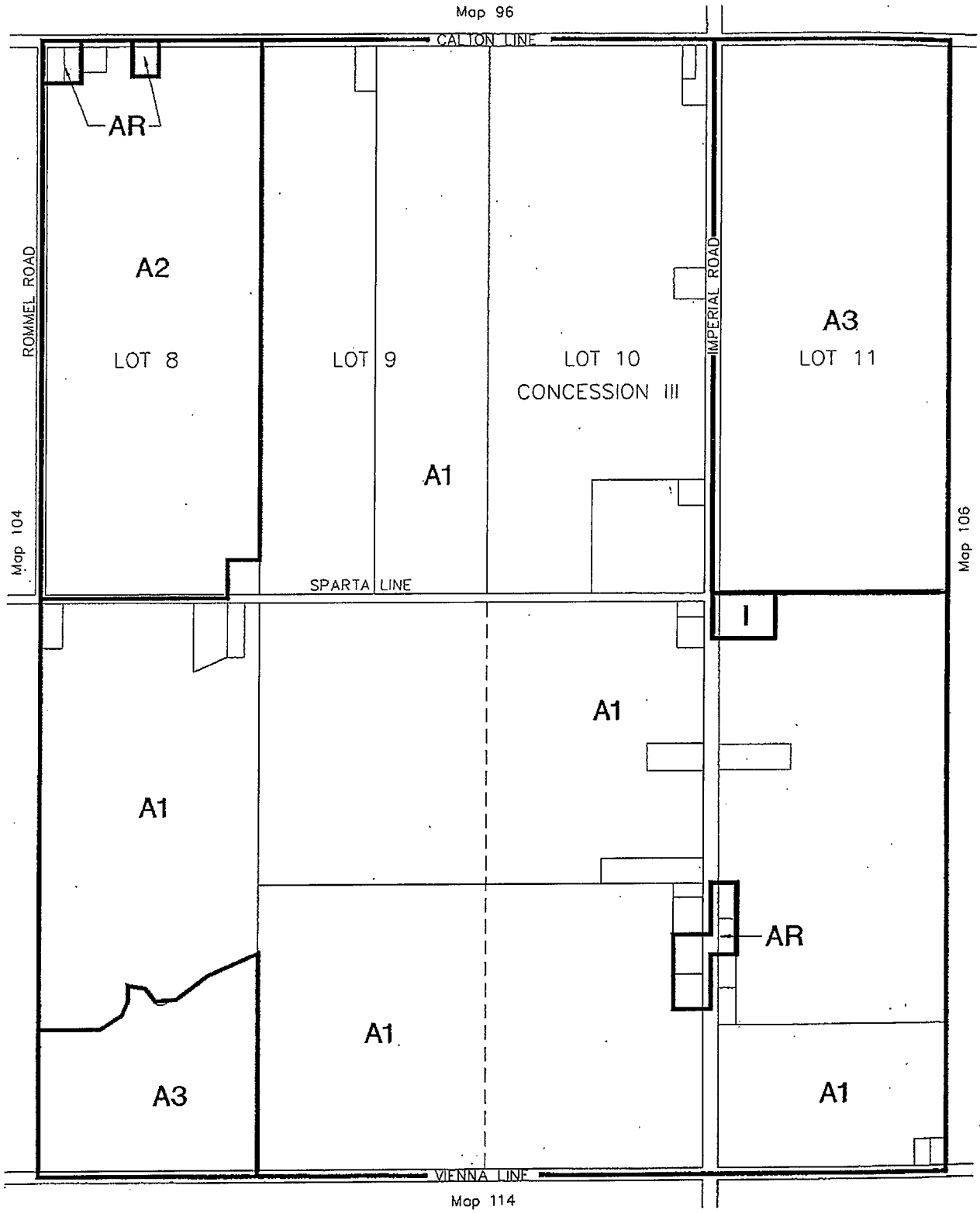
TOWNSHIP OF MALAHIDE

ZONING INDEX MAP



KEY:

- B AVON
- C LYONS
- D SPRINGFIELD
- E KINGSMILL CORNER
- F ORWELL
- G TALBOT WEST
- H DINGLE STREET
- I SUMMERS CORNERS
- J SOUTH GORE
- K LUTON
- L MOUNT SALEM
- M CALTON
- N COPENHAGEN
- O PORT BRUCE



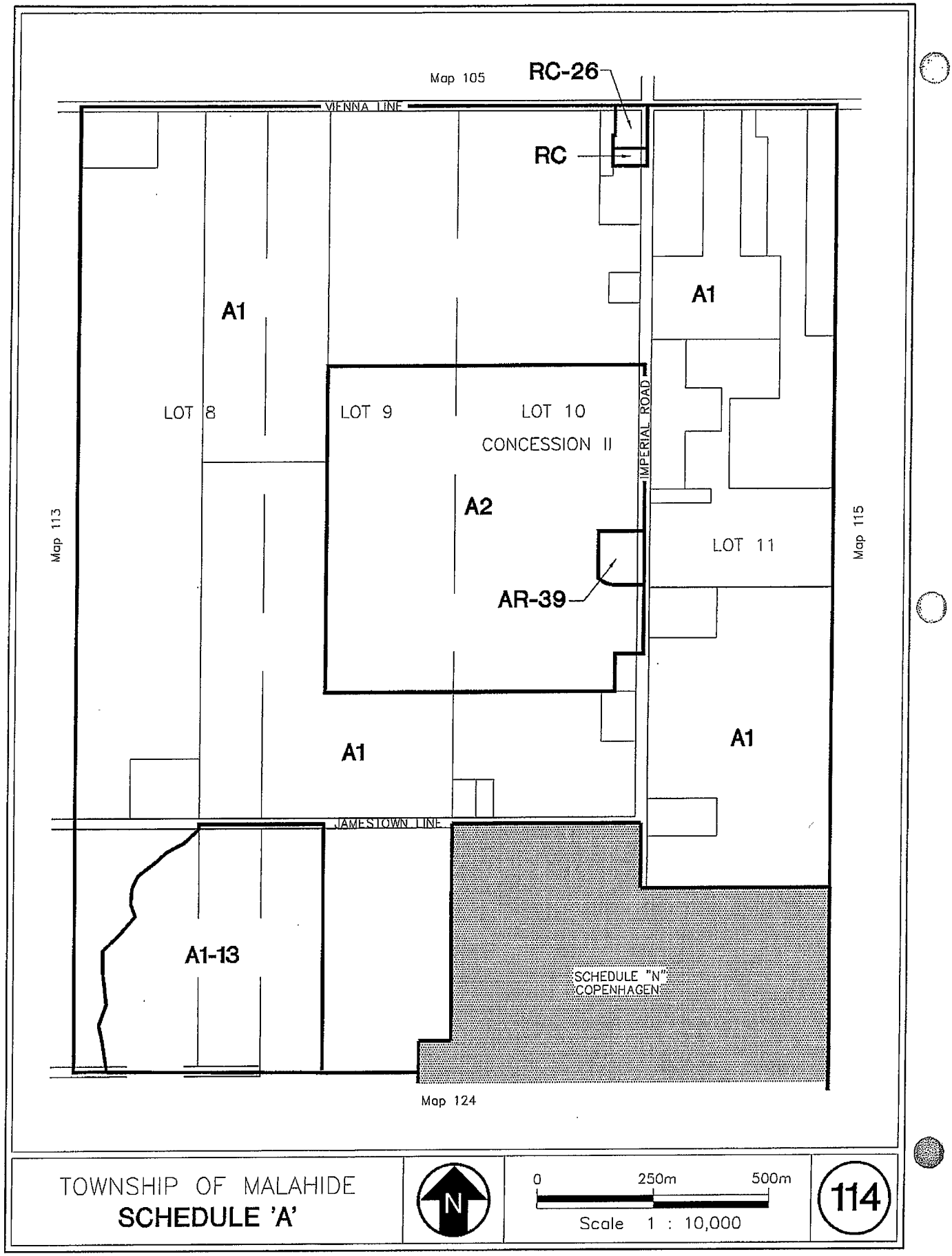
TOWNSHIP OF MALAHIDE
SCHEDULE 'A'

N

0 250m 500m

Scale 1 : 10,000

105



TOWNSHIP OF MALAHIDE

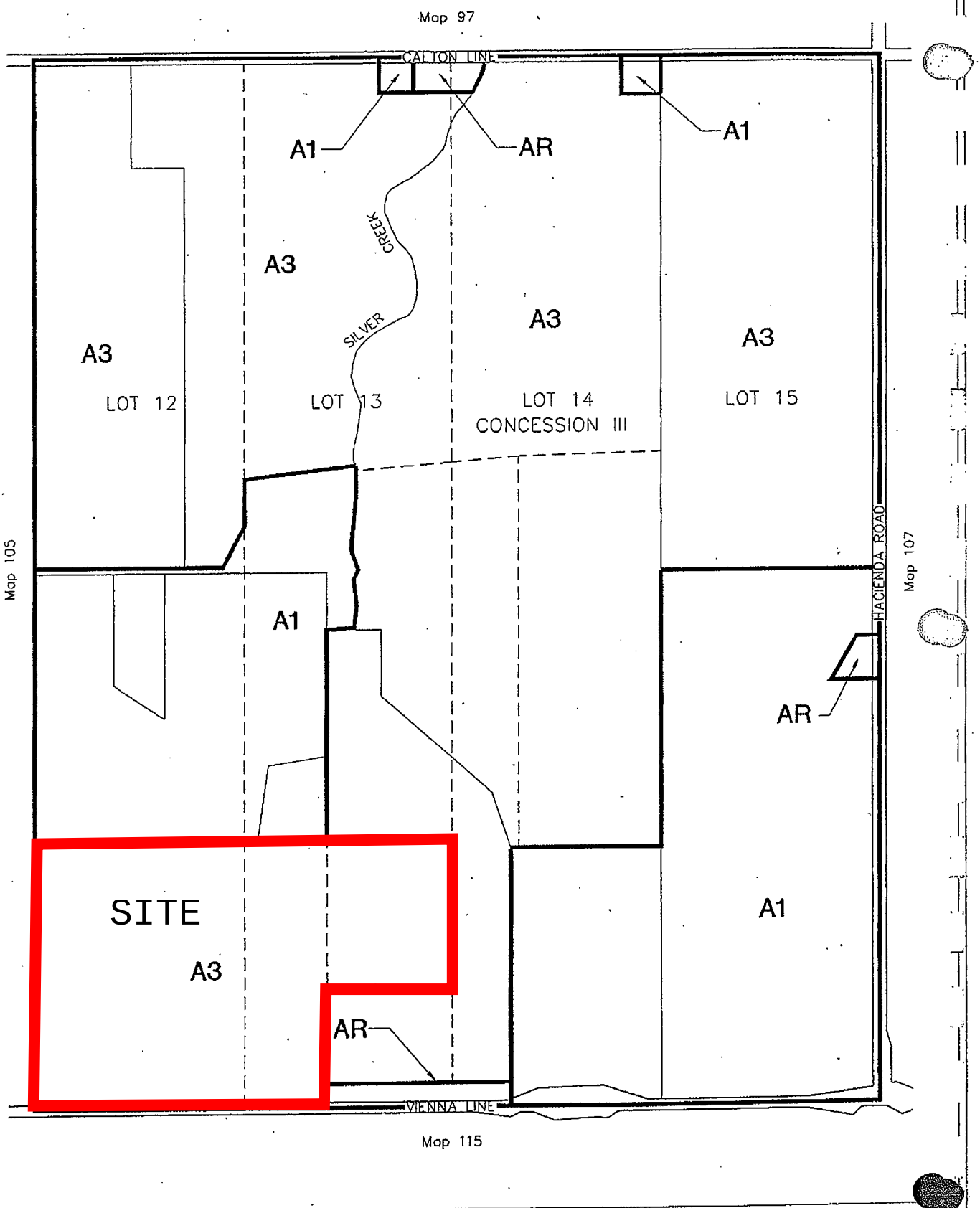
SCHEDULE 'A'

N

0 250m 500m

Scale 1 : 10,000

114



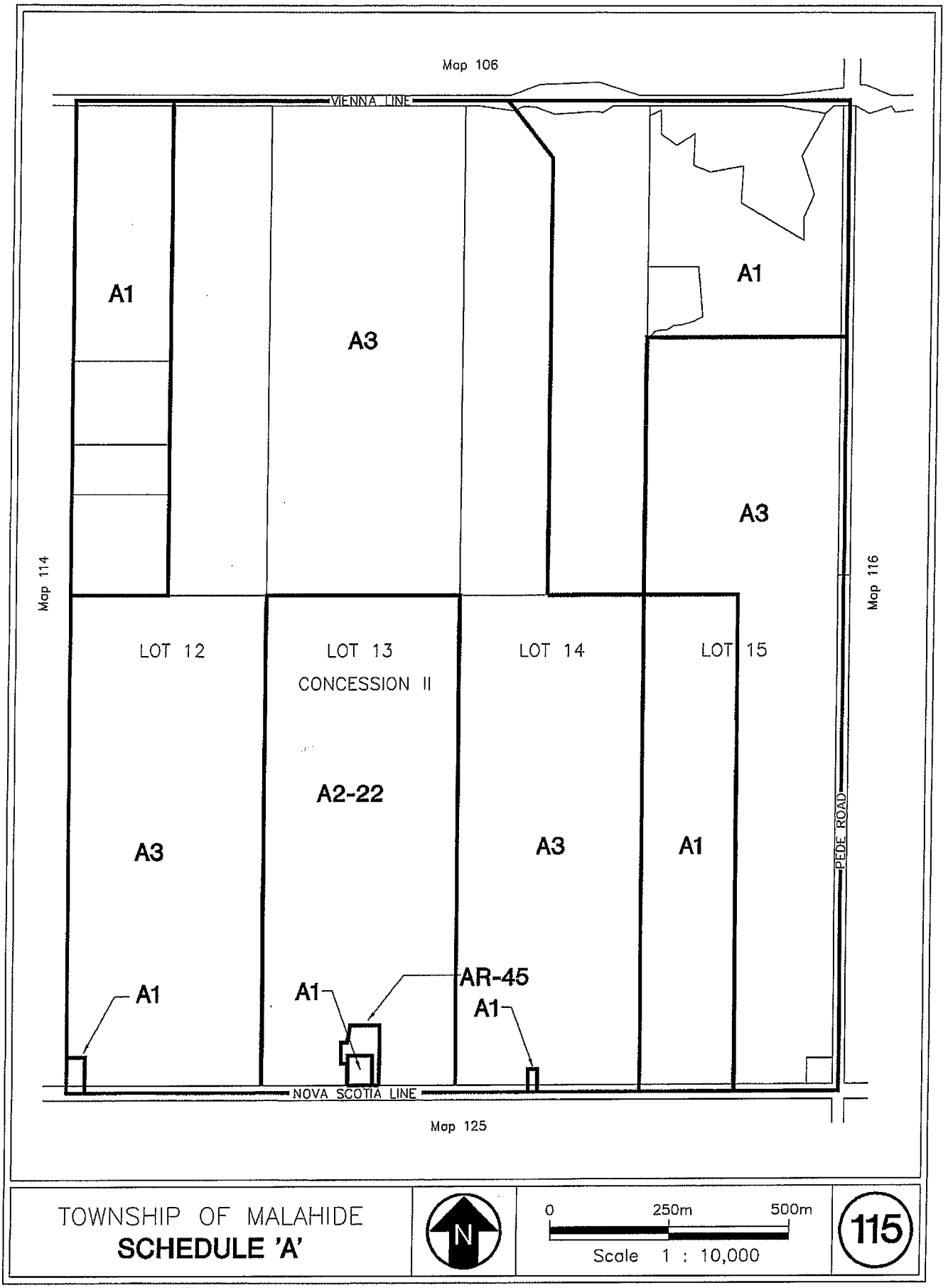
TOWNSHIP OF MALAHIDE
SCHEDULE 'A'

N

0 250m 500m

Scale 1 : 10,000

106



TOWNSHIP OF MALAHIDE
SCHEDULE 'A'

N

0 250m 500m

Scale 1 : 10,000

115

APPENDIX C

Equipment Sound Data

Test Report

1. Test Noise emission test	File name / designation TR_60100_MV-PP_TT_01_0412.docx
Project/device designation: MV-PP	**Corresponding test specification:** TS_60100_MV-PP_TT_01_4611.docx
Name of test technician: Frank Lachenit/Sebahattin Akyol/Frank VandeVeegate	**Measurement location / date:** Building 2, Denver / 2011-11-22 - 2011-12-09

EUT hardware:

Material / assembly / order number	Version:	S/N
SC-800-CP-10	A1	01851 90001
SC-800-CP-10	A1	01851 90000
Cooper MV transformer	0000YA 65X9BS	11590 01631

(Device type, serial number, hardware version of assemblies)

EUT software:

Firmware:	Version:
1.13.09.R / 1.15.01.R	

(Firmware OCU and DSP)

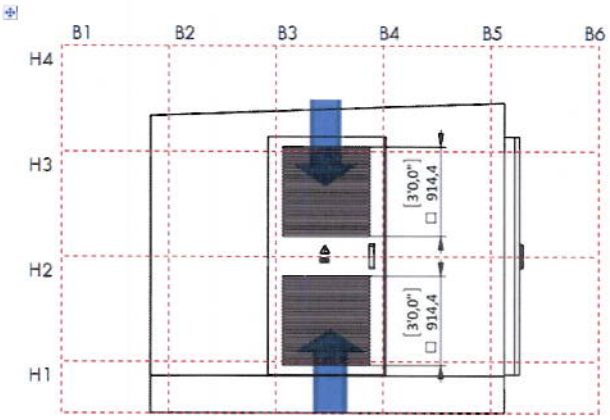
2 Equipment

Designation	Comment, measuring range, tolerance	Type / SMA inv. no.	Next calibration
ScopeCorder DL750		SMA-US-A 00016	2012-06
LEM HAX 2000-S current transformer		SMA-DE-A 00843	2012-11
LEM HAX 2000-S current transformer		SMA-DE-A 00844	2012-11
LEM HAX 2000-S current transformer		SMA-DE-A 00845	2012-11
Differential probe		SMA-US-A 00005	2012-06
Brüel & Kjaer hand-held analyzer type 2250		210.13162	Device is calibrated prior to use with calibrator 210.13163
Sound calibrator type 4231		210.13163	2013-11
Prepolarized free-field ½" microphone type 4189		2771953	2012-06

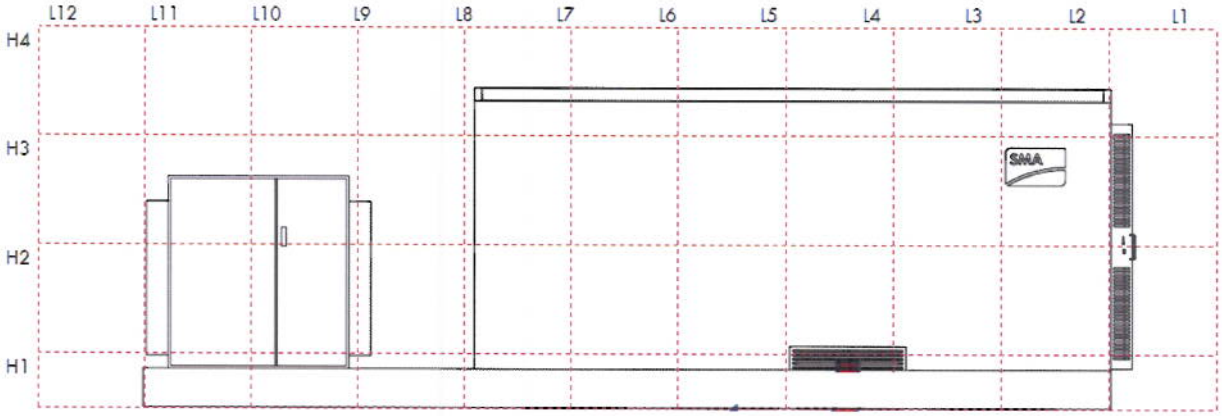
(Measurement range/tolerance may not apply to measurements with low requirements for accuracy)

3 Setup

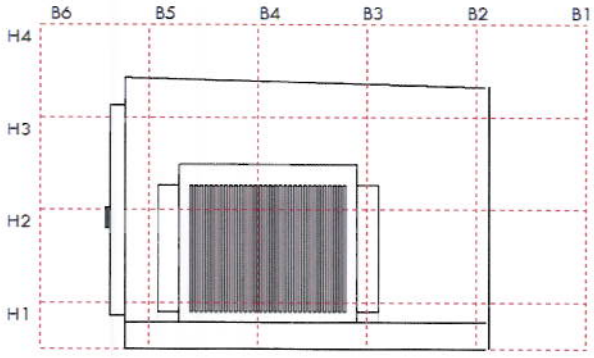
Front



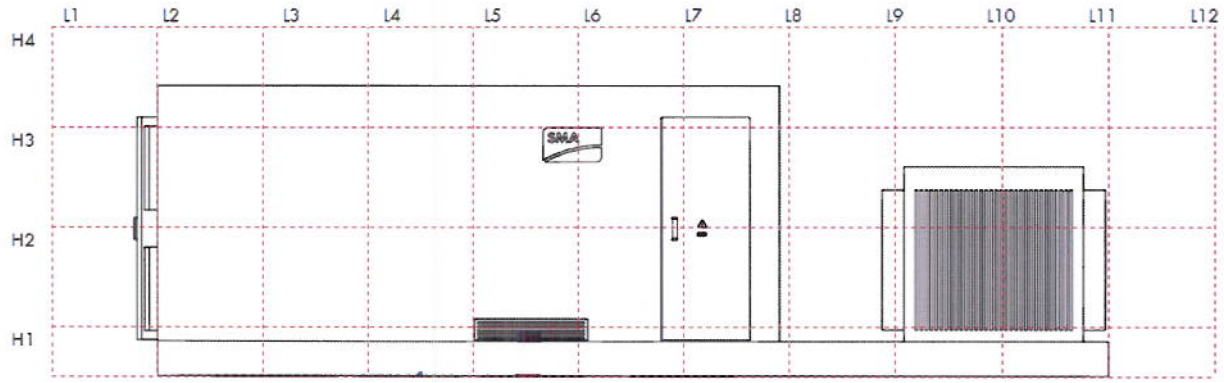
left



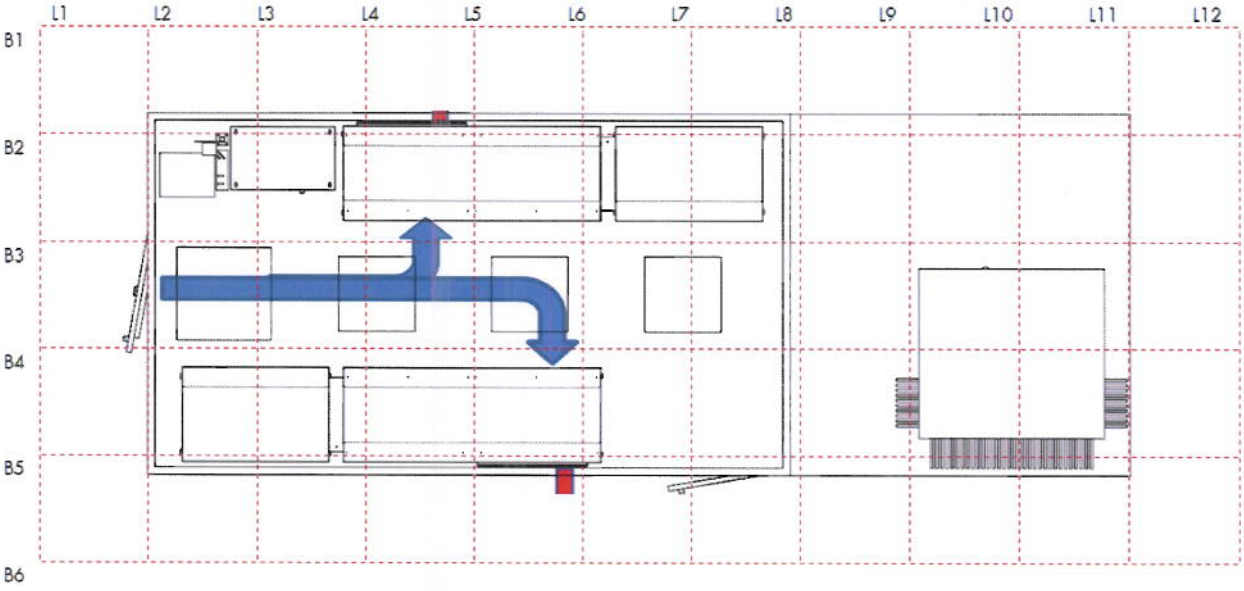
back



right



roof



(Setup: e.g., photos, circuitry, details)

4 Results

Operating conditions

P = 880kW; Udc = 820V; Tambient = 20°C

Calculated sound power Lwa:

$$L_{wa} = 91.98 dB$$

Furthermore, at representative measuring points the sound pressure level for one-third octave center frequencies was determined.

One-third octave center frequency (Hz)	sound pressure Level (dB_A)
63	44,7
125	47,9
250	53,5
500	56,2
1000	50,3
2000	49,9
4000	34,7
8000	20,6

The calculated sound power of this frequencies (only for information)

One-third octave center frequency (Hz)	sound power level (dB_A)
63	65.1
125	68.3
250	73.9
500	76.6
1000	70.7
2000	70.3
4000	55.2
8000	41.1

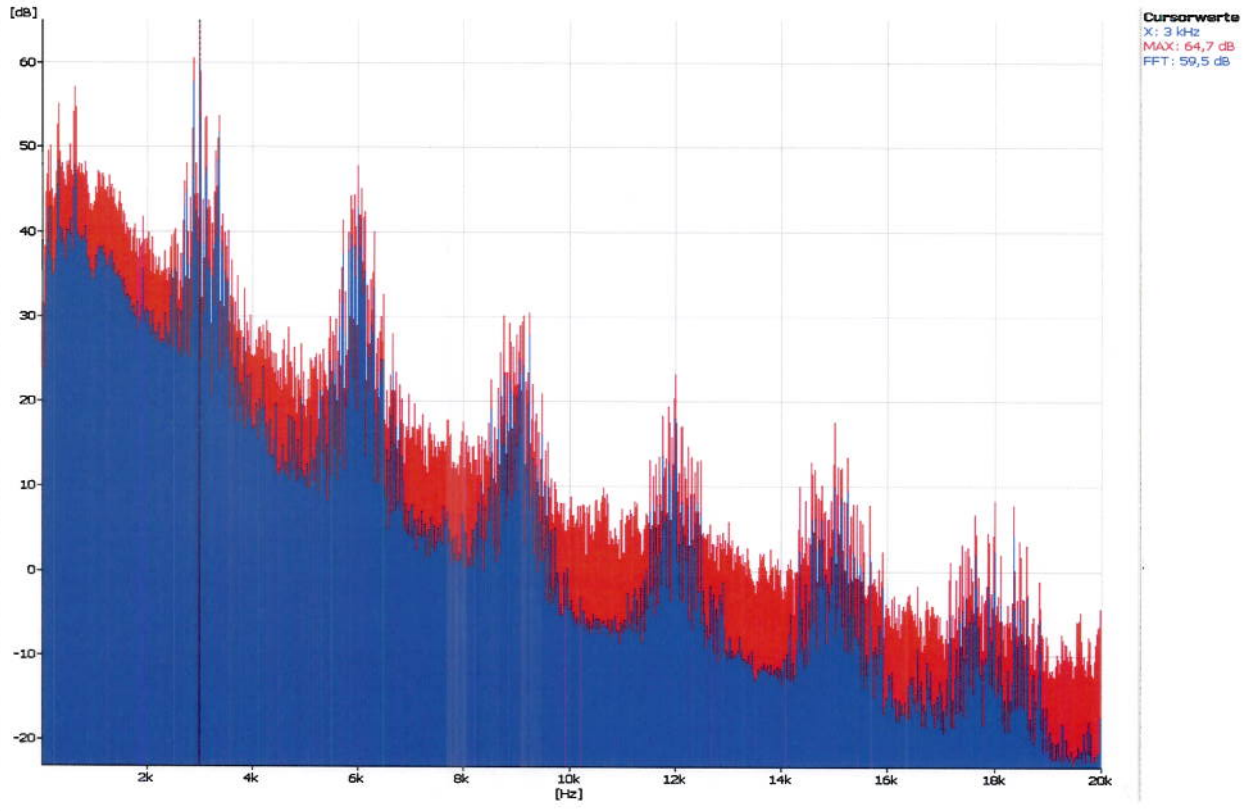
Here are examples of measured values and diagrams for the following measuring points:

Noise level within the frequency range: 20 Hz - 20 kHz			
Measurement	dB_{AHz}-Peak	L_{Aeq} [dBA]-RMS_{10sec}	Typical L_{Aeq} [dBA]
L1B4H2 (front)	64.7 / 3000Hz	70.7	68.14
L6B1H2 (left)	76.9 / 3000Hz	76.7	
L12B4H2 (back)	58.1 / 3000Hz	61.0	
L6B6H2 (right)	62.3 / 6000Hz	69.6	
L6B4H4 (roof)	58.3 / 3125Hz	62.7	

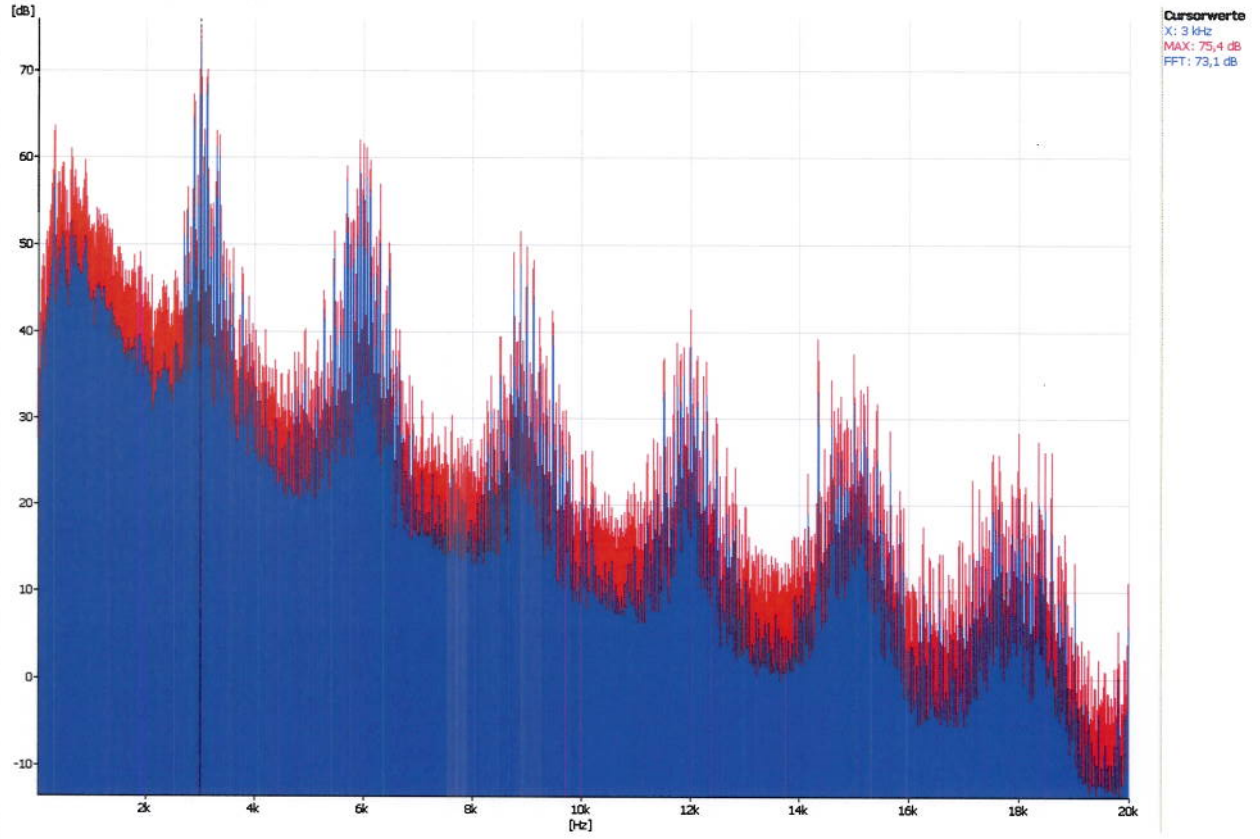
Charts

The following charts show the (FFT) spectra for the noise level measurement in the range from 20dBA to 100dBA at a frequency band width of 20 Hz to 20 kHz in the respective test item position and at a distance of 1m.

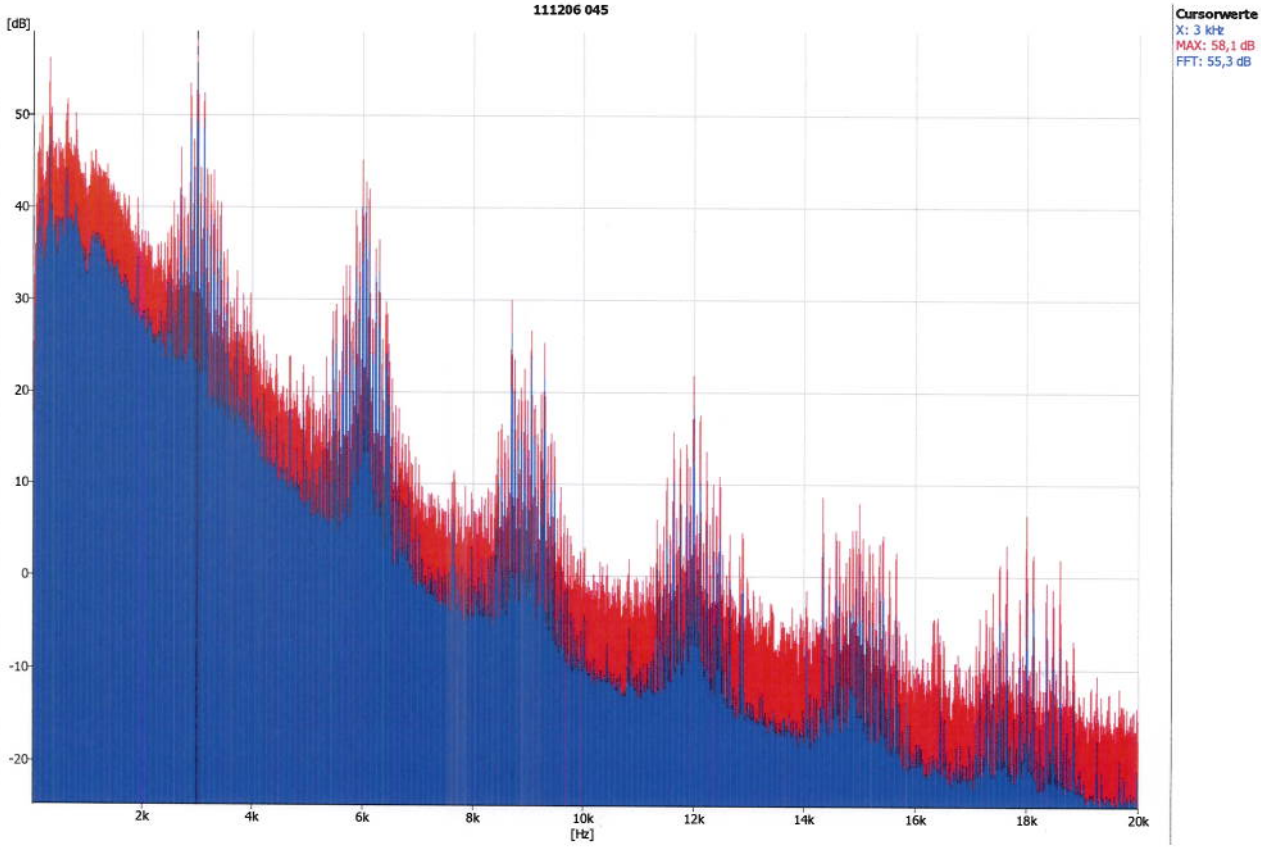
L1B4H2 (front)



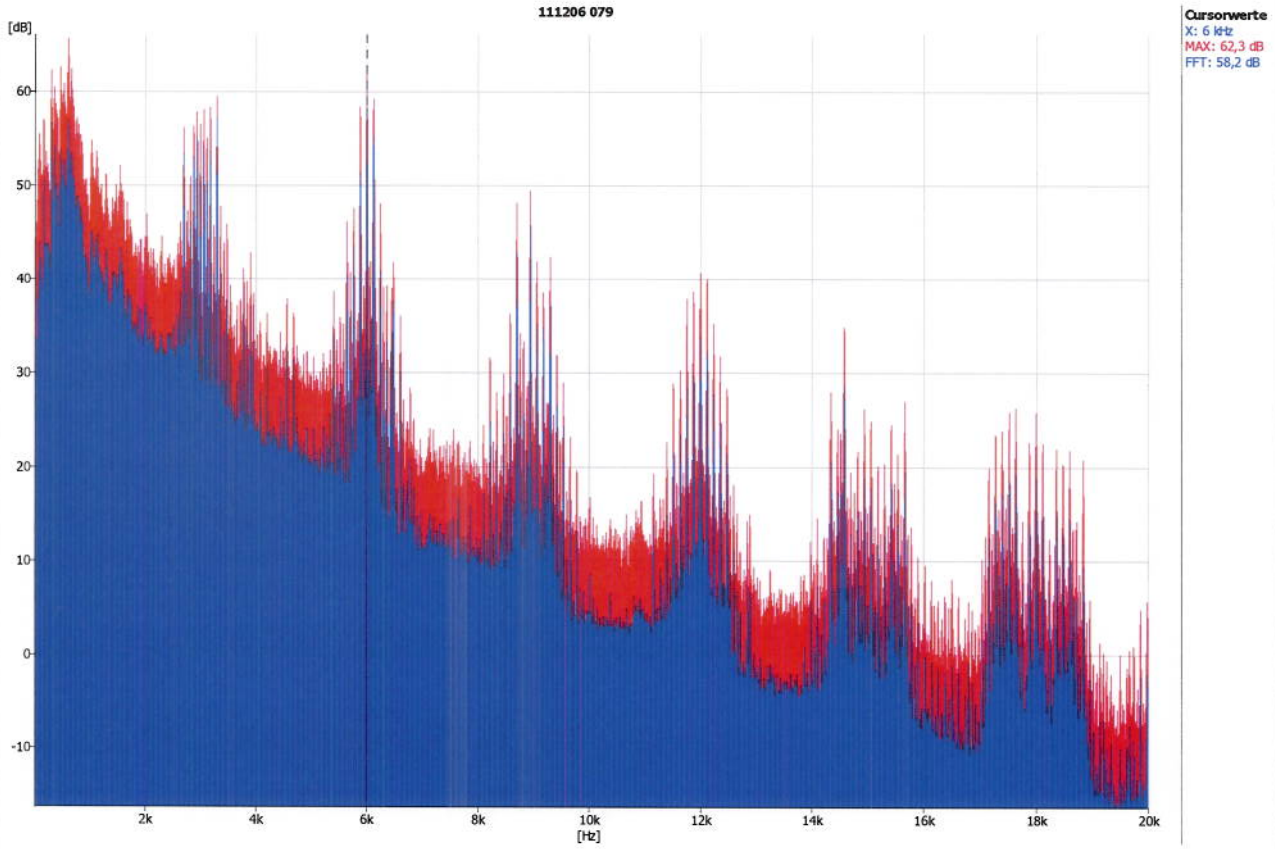
L6B1H2 (left)



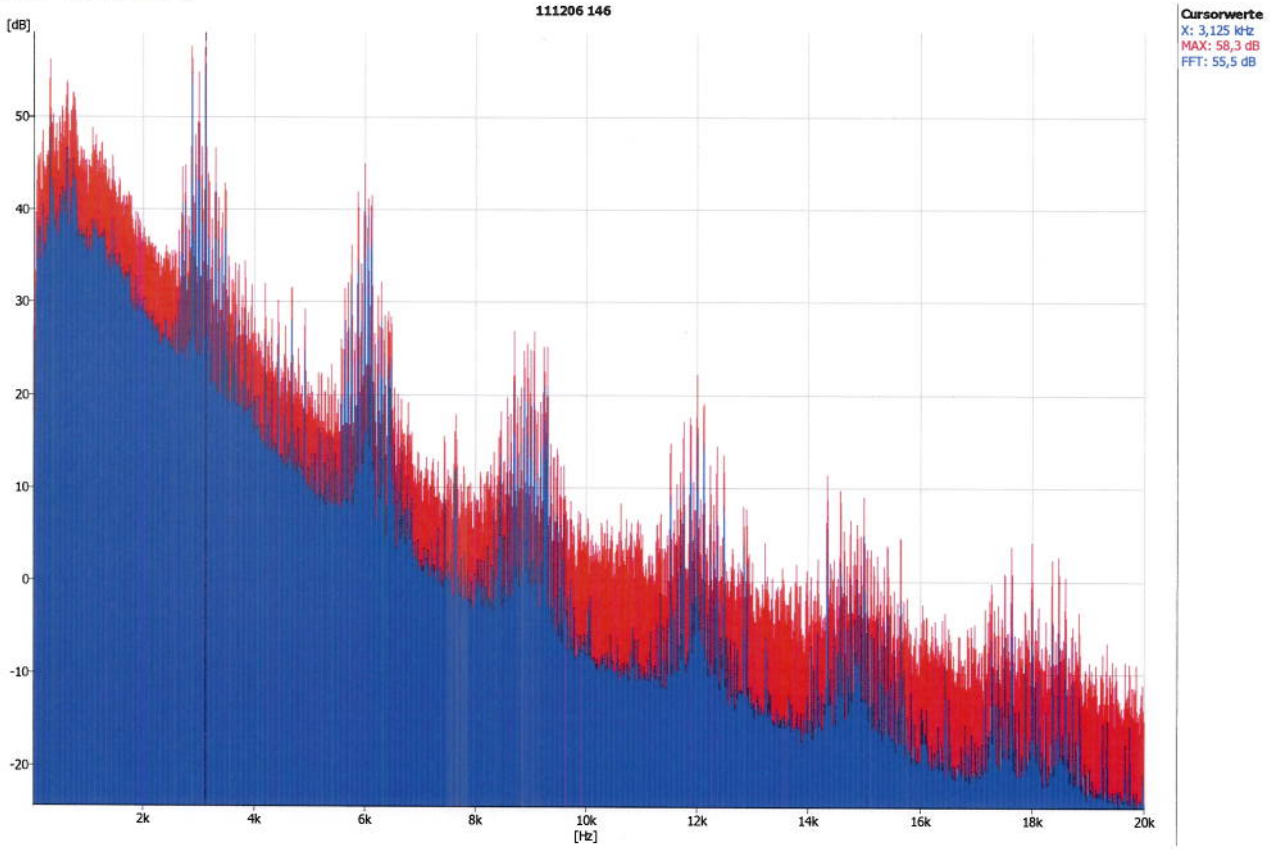
L12B4H2 (back)



L6B6H2 (right)



L6B4H4(roof)



(Deviations from the test plan, important information)

5 Acceptance Criterion Fulfilled?

YES	**X**
NO	

6 Errors / Deviations from Test Expectations:

(Test goals not achieved? Consequences. List of defects)

7 Error Processing:

(Description of possible/planned measures)

Jira number
Report of preceding test:
Report of subsequent test:

9 Approved by Review / Project Manager:

Date: 2012-02-16 Name: F. Cachat

Comment:

(Supplementary comments on restrictions, explanations)

APPENDIX D

Details of Predictive Acoustical Modelling

The predictive model used for this Assessment (*Cadna-A version 4.3.143*) is based on the methods from ISO Standard 9613-2.2 “Acoustics - Attenuation of Sound During Propagation Outdoors” [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 review of aerial imagery. 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. No credit has been assumed in the model for self-shielding of the sources on site by the arrays of solar panels themselves. In this regard the predictions are conservative (i.e. they may tend to overpredict the sound levels slightly).

All sources were modeled as point sources of sound and are shown as crosses 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-232, "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)," 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.

MOE Publication NPC-232 states that the sound level limit for a stationary source that operates during daytime and nighttime hours in a Class 3 (rural) environment is the lower of the minimum one-hour L_{EQ} ambient (background) sound level or the minimum one-hour ninetieth percentile L_{90} sound level plus 10 dB (i.e. L_{90} + 10 dB) at any potentially impacted residential point of reception. In addition, NPC-232 also states exclusionary minimum limits of 45 dBA during daytime hours (07:00 – 19:00) and 40 dBA during nighttime hours (19:00 – 07:00).

Based on the rural nature of the area surrounding the subject site, background sound levels are expected to fall below the exclusionary minimum limits stipulated in NPC-232 during the quietest hours of the day and night. Given that the equipment at the subject facility will be energized during the day and night with steady sound emissions when daylight conditions allow, the most stringent nighttime criterion of 40 dBA is the applicable sound level limit at all points of reception.

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.

Calculation Summary - dBA Format

R01	Existing Dwelling	501641	4726886	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Inverter House 1	501802	4727093	2.5	95	59.4	0	0.0	0.3	0.0	5.1	0.0	0.0	0.0	0.0	30
NS-02	Inverter House 2	501817	4727093	2.5	95	59.7	0	0.0	0.3	0.0	5.1	0.0	0.0	0.0	0.0	30
NS-03	Inverter House 3	501802	4727219	2.5	97	62.4	0	0.0	-0.6	0.0	3.5	0.0	0.0	0.0	0.0	32
NS-04	Inverter House 4	502035	4727219	2.5	97	65.3	0	0.0	-0.7	0.0	4.0	0.0	0.0	0.0	0.0	28
NS-05	Inverter House 5	502035	4727093	2.5	97	64.0	0	0.0	-0.7	0.0	3.8	0.0	0.0	0.0	0.0	30
NS-06	Inverter House 6	502050	4727093	2.5	97	64.2	0	0.0	-0.7	0.0	3.8	0.0	0.0	0.0	0.0	30
NS-07	Inverter House 7	502154	4727165	2.5	97	66.3	0	0.0	-0.7	0.0	4.2	0.0	0.0	0.0	0.0	27
NS-08	Inverter House 8	502155	4727226	2.5	97	66.8	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27

R03	Existing Dwelling	501609	4726877	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Inverter House 1	501802	4727093	2.5	95	60.3	0	0.0	0.3	0.0	5.2	0.0	0.0	0.0	0.0	29
NS-02	Inverter House 2	501817	4727093	2.5	95	60.5	0	0.0	0.2	0.0	5.3	0.0	0.0	0.0	0.0	29
NS-03	Inverter House 3	501802	4727219	2.5	97	62.9	0	0.0	-0.6	0.0	3.6	0.0	0.0	0.0	0.0	31
NS-04	Inverter House 4	502035	4727219	2.5	97	65.8	0	0.0	-0.7	0.0	4.1	0.0	0.0	0.0	0.0	28
NS-05	Inverter House 5	502035	4727093	2.5	97	64.6	0	0.0	-0.7	0.0	3.9	0.0	0.0	0.0	0.0	29
NS-06	Inverter House 6	502050	4727093	2.5	97	64.8	0	0.0	-0.7	0.0	3.9	0.0	0.0	0.0	0.0	29
NS-07	Inverter House 7	502154	4727165	2.5	97	66.8	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27
NS-08	Inverter House 8	502155	4727226	2.5	97	67.2	0	0.0	-0.7	0.0	4.4	0.0	0.0	0.0	0.0	26

R07	Existing Dwelling	501283	4726798	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Inverter House 1	501802	4727093	2.5	95	66.5	0	0.0	0.2	0.0	6.1	0.0	0.0	0.0	0.0	22
NS-02	Inverter House 2	501817	4727093	2.5	95	66.7	0	0.0	0.2	0.0	6.1	0.0	0.0	0.0	0.0	22
NS-03	Inverter House 3	501802	4727219	2.5	97	67.5	0	0.0	-0.7	0.0	4.5	0.0	0.0	0.0	0.0	26
NS-04	Inverter House 4	502035	4727219	2.5	97	69.7	0	0.0	-0.7	0.0	5.1	0.0	0.0	0.0	0.0	23
NS-05	Inverter House 5	502035	4727093	2.5	97	69.2	0	0.0	-0.7	0.0	4.9	0.0	0.0	0.0	0.0	24
NS-06	Inverter House 6	502050	4727093	2.5	97	69.3	0	0.0	-0.7	0.0	5.0	0.0	0.0	0.0	0.0	23
NS-07	Inverter House 7	502154	4727165	2.5	97	70.5	0	0.0	-0.7	0.0	5.3	0.0	0.0	0.0	0.0	22
NS-08	Inverter House 8	502155	4727226	2.5	97	70.8	0	0.0	-0.6	0.0	5.4	0.0	0.0	0.0	0.0	22

R08	Existing Dwelling	501311	4726199	4.5												
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Inverter House 1	501802	4727093	2.5	95	71.2	0	0.0	0.4	0.0	7.0	0.0	0.0	0.0	0.0	16
NS-02	Inverter House 2	501817	4727093	2.5	95	71.2	0	0.0	0.4	0.0	7.0	0.0	0.0	0.0	0.0	16
NS-03	Inverter House 3	501802	4727219	2.5	97	72.1	0	0.0	-0.6	0.0	5.9	0.0	0.0	0.0	0.0	20
NS-04	Inverter House 4	502035	4727219	2.5	97	72.9	0	0.0	-0.6	0.0	6.2	0.0	0.0	0.0	0.0	18
NS-05	Inverter House 5	502035	4727093	2.5	97	72.2	0	0.0	-0.6	0.0	5.9	0.0	0.0	0.0	0.0	20
NS-06	Inverter House 6	502050	4727093	2.5	97	72.3	0	0.0	-0.6	0.0	5.9	0.0	0.0	0.0	0.0	19
NS-07	Inverter House 7	502154	4727165	2.5	97	73.2	0	0.0	-0.6	0.0	6.2	0.0	0.0	0.0	0.0	18
NS-08	Inverter House 8	502155	4727226	2.5	97	73.5	0	0.0	-0.5	0.0	6.4	0.0	0.0	0.0	0.0	18

R17	Existing Dwelling	501277	4727151	4.5												
Src ID	Src Name	X	Y	Z	LxD	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD
NS-01	Inverter House 1	501802	4727093	2.5	95	65.5	0	0.0	0.2	0.0	5.9	0.0	0.0	0.0	0.0	23
NS-02	Inverter House 2	501817	4727093	2.5	95	65.7	0	0.0	0.2	0.0	5.9	0.0	0.0	0.0	0.0	23
NS-03	Inverter House 3	501802	4727219	2.5	97	65.5	0	0.0	-0.7	0.0	4.0	0.0	0.0	0.0	0.0	28
NS-04	Inverter House 4	502035	4727219	2.5	97	68.6	0	0.0	-0.7	0.0	4.8	0.0	0.0	0.0	0.0	24
NS-05	Inverter House 5	502035	4727093	2.5	97	68.6	0	0.0	-0.7	0.0	4.8	0.0	0.0	0.0	0.0	24
NS-06	Inverter House 6	502050	4727093	2.5	97	68.8	0	0.0	-0.7	0.0	4.8	0.0	0.0	0.0	0.0	24
NS-07	Inverter House 7	502154	4727165	2.5	97	69.9	0	0.0	-0.7	0.0	5.1	0.0	0.0	0.0	0.0	23
NS-08	Inverter House 8	502155	4727226	2.5	97	69.9	0	0.0	-0.7	0.0	5.2	0.0	0.0	0.0	0.0	23

R28	Existing Dwelling	501319	4727587	4.5												
Src ID	Src Name	X	Y	Z	LxD	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD
NS-01	Inverter House 1	501802	4727093	2.5	95	67.8	0	0.0	0.2	0.0	6.3	0.0	0.0	0.0	0.0	20
NS-02	Inverter House 2	501817	4727093	2.5	95	67.9	0	0.0	0.2	0.0	6.3	0.0	0.0	0.0	0.0	20
NS-03	Inverter House 3	501802	4727219	2.5	97	66.7	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27
NS-04	Inverter House 4	502035	4727219	2.5	97	69.1	0	0.0	-0.7	0.0	4.9	0.0	0.0	0.0	0.0	24
NS-05	Inverter House 5	502035	4727093	2.5	97	69.8	0	0.0	-0.7	0.0	5.1	0.0	0.0	0.0	0.0	23
NS-06	Inverter House 6	502050	4727093	2.5	97	69.9	0	0.0	-0.7	0.0	5.2	0.0	0.0	0.0	0.0	23
NS-07	Inverter House 7	502154	4727165	2.5	97	70.4	0	0.0	-0.7	0.0	5.3	0.0	0.0	0.0	0.0	22
NS-08	Inverter House 8	502155	4727226	2.5	97	70.2	0	0.0	-0.7	0.0	5.2	0.0	0.0	0.0	0.0	22

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

R35	Existing Dwelling	501855	4727814	4.5												
Src ID	Src Name	X	Y	Z	LxD	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD
NS-01	Inverter House 1	501802	4727093	2.5	95	68.2	0	0.0	0.3	0.0	6.4	0.0	0.0	0.0	0.0	20
NS-02	Inverter House 2	501817	4727093	2.5	95	68.2	0	0.0	0.3	0.0	6.4	0.0	0.0	0.0	0.0	20
NS-03	Inverter House 3	501802	4727219	2.5	97	66.5	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27
NS-04	Inverter House 4	502035	4727219	2.5	97	66.9	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27
NS-05	Inverter House 5	502035	4727093	2.5	97	68.4	0	0.0	-0.7	0.0	4.7	0.0	0.0	0.0	0.0	25
NS-06	Inverter House 6	502050	4727093	2.5	97	68.5	0	0.0	-0.7	0.0	4.7	0.0	0.0	0.0	0.0	25
NS-07	Inverter House 7	502154	4727165	2.5	97	68.1	0	0.0	-0.7	0.0	4.6	0.0	0.0	0.0	0.0	25
NS-08	Inverter House 8	502155	4727226	2.5	97	67.4	0	0.0	-0.7	0.0	4.5	0.0	0.0	0.0	0.0	26

R44	Existing Dwelling	502236	4726788	4.5												
Src ID	Src Name	X	Y	Z	LxD	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	ReflD	LrD
NS-01	Inverter House 1	501802	4727093	2.5	95	65.5	0	0.0	0.2	0.0	5.9	0.0	0.0	0.0	0.0	23
NS-02	Inverter House 2	501817	4727093	2.5	95	65.3	0	0.0	0.2	0.0	5.9	0.0	0.0	0.0	0.0	23
NS-03	Inverter House 3	501802	4727219	2.5	97	66.7	0	0.0	-0.7	0.0	4.3	0.0	0.0	0.0	0.0	27
NS-04	Inverter House 4	502035	4727219	2.5	97	64.5	0	0.0	-0.7	0.0	3.9	0.0	0.0	0.0	0.0	29
NS-05	Inverter House 5	502035	4727093	2.5	97	62.3	0	0.0	-0.6	0.0	3.5	0.0	0.0	0.0	0.0	32
NS-06	Inverter House 6	502050	4727093	2.5	97	62.1	0	0.0	-0.6	0.0	3.4	0.0	0.0	0.0	0.0	32
NS-07	Inverter House 7	502154	4727165	2.5	97	62.7	0	0.0	-0.2	3.6	3.6	0.0	0.0	0.0	0.0	27
NS-08	Inverter House 8	502155	4727226	2.5	97	64.0	0	0.0	-0.2	3.8	4.0	0.0	0.0	0.0	0.0	26

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.

Summary of Calculations - Octave Band Format

R01	Existing Dwelling		501641	4726886	4.5												
Src ID	Src Name	Band	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	Inverter House 1	63	501802	4727093	2.5	61	59.4	0	0.0	-3.6	0.0	0.0	0.0	0.0	0.0	0.0	5
NS-01	Inverter House 1	125	501802	4727093	2.5	79	59.4	0	0.0	2.5	0.0	0.1	0.0	0.0	0.0	0.0	17
NS-01	Inverter House 1	250	501802	4727093	2.5	85	59.4	0	0.0	3.3	0.0	0.3	0.0	0.0	0.0	0.0	22
NS-01	Inverter House 1	500	501802	4727093	2.5	84	59.4	0	0.0	-0.5	0.0	0.5	0.0	0.0	0.0	0.0	24
NS-01	Inverter House 1	1000	501802	4727093	2.5	84	59.4	0	0.0	-1.1	0.0	1.0	0.0	0.0	0.0	0.0	25
NS-01	Inverter House 1	2000	501802	4727093	2.5	83	59.4	0	0.0	-1.1	0.0	2.5	0.0	0.0	0.0	0.0	22
NS-01	Inverter House 1	4000	501802	4727093	2.5	82	59.4	0	0.0	-1.1	0.0	8.6	0.0	0.0	0.0	0.0	15
NS-01	Inverter House 1	8000	501802	4727093	2.5	92	59.4	0	0.0	-1.1	0.0	30.7	0.0	0.0	0.0	0.0	3
NS-02	Inverter House 2	63	501817	4727093	2.5	61	59.7	0	0.0	-3.7	0.0	0.0	0.0	0.0	0.0	0.0	5
NS-02	Inverter House 2	125	501817	4727093	2.5	79	59.7	0	0.0	2.5	0.0	0.1	0.0	0.0	0.0	0.0	16
NS-02	Inverter House 2	250	501817	4727093	2.5	85	59.7	0	0.0	3.3	0.0	0.3	0.0	0.0	0.0	0.0	22
NS-02	Inverter House 2	500	501817	4727093	2.5	84	59.7	0	0.0	-0.6	0.0	0.5	0.0	0.0	0.0	0.0	24
NS-02	Inverter House 2	1000	501817	4727093	2.5	84	59.7	0	0.0	-1.1	0.0	1.0	0.0	0.0	0.0	0.0	25
NS-02	Inverter House 2	2000	501817	4727093	2.5	83	59.7	0	0.0	-1.1	0.0	2.6	0.0	0.0	0.0	0.0	21
NS-02	Inverter House 2	4000	501817	4727093	2.5	82	59.7	0	0.0	-1.1	0.0	8.9	0.0	0.0	0.0	0.0	15
NS-02	Inverter House 2	8000	501817	4727093	2.5	92	59.7	0	0.0	-1.1	0.0	31.7	0.0	0.0	0.0	0.0	2
NS-03	Inverter House 3	63	501802	4727219	2.5	61	62.4	0	0.0	-4.3	0.0	0.1	0.0	0.0	0.0	0.0	3
NS-03	Inverter House 3	125	501802	4727219	2.5	79	62.4	0	0.0	2.7	0.0	0.2	0.0	0.0	0.0	0.0	13
NS-03	Inverter House 3	250	501802	4727219	2.5	86	62.4	0	0.0	3.1	0.0	0.4	0.0	0.0	0.0	0.0	20
NS-03	Inverter House 3	500	501802	4727219	2.5	88	62.4	0	0.0	-0.7	0.0	0.7	0.0	0.0	0.0	0.0	25
NS-03	Inverter House 3	1000	501802	4727219	2.5	91	62.4	0	0.0	-1.3	0.0	1.4	0.0	0.0	0.0	0.0	29
NS-03	Inverter House 3	2000	501802	4727219	2.5	89	62.4	0	0.0	-1.3	0.0	3.6	0.0	0.0	0.0	0.0	24
NS-03	Inverter House 3	4000	501802	4727219	2.5	82	62.4	0	0.0	-1.3	0.0	12.1	0.0	0.0	0.0	0.0	9
NS-03	Inverter House 3	8000	501802	4727219	2.5	92	62.4	0	0.0	-1.3	0.0	43.2	0.0	0.0	0.0	0.0	--
NS-04	Inverter House 4	63	502035	4727219	2.5	61	65.3	0	0.0	-4.8	0.0	0.1	0.0	0.0	0.0	0.0	0
NS-04	Inverter House 4	125	502035	4727219	2.5	79	65.3	0	0.0	3.1	0.0	0.2	0.0	0.0	0.0	0.0	10
NS-04	Inverter House 4	250	502035	4727219	2.5	86	65.3	0	0.0	3.0	0.0	0.5	0.0	0.0	0.0	0.0	17
NS-04	Inverter House 4	500	502035	4727219	2.5	88	65.3	0	0.0	-0.9	0.0	1.0	0.0	0.0	0.0	0.0	22
NS-04	Inverter House 4	1000	502035	4727219	2.5	91	65.3	0	0.0	-1.4	0.0	1.9	0.0	0.0	0.0	0.0	26
NS-04	Inverter House 4	2000	502035	4727219	2.5	89	65.3	0	0.0	-1.4	0.0	5.0	0.0	0.0	0.0	0.0	20
NS-04	Inverter House 4	4000	502035	4727219	2.5	82	65.3	0	0.0	-1.4	0.0	16.9	0.0	0.0	0.0	0.0	1
NS-04	Inverter House 4	8000	502035	4727219	2.5	92	65.3	0	0.0	-1.4	0.0	60.3	0.0	0.0	0.0	0.0	--
NS-05	Inverter House 5	63	502035	4727093	2.5	61	64.0	0	0.0	-4.6	0.0	0.1	0.0	0.0	0.0	0.0	1
NS-05	Inverter House 5	125	502035	4727093	2.5	79	64.0	0	0.0	2.9	0.0	0.2	0.0	0.0	0.0	0.0	11
NS-05	Inverter House 5	250	502035	4727093	2.5	86	64.0	0	0.0	3.0	0.0	0.5	0.0	0.0	0.0	0.0	18
NS-05	Inverter House 5	500	502035	4727093	2.5	88	64.0	0	0.0	-0.8	0.0	0.9	0.0	0.0	0.0	0.0	24
NS-05	Inverter House 5	1000	502035	4727093	2.5	91	64.0	0	0.0	-1.4	0.0	1.6	0.0	0.0	0.0	0.0	27
NS-05	Inverter House 5	2000	502035	4727093	2.5	89	64.0	0	0.0	-1.4	0.0	4.3	0.0	0.0	0.0	0.0	22
NS-05	Inverter House 5	4000	502035	4727093	2.5	82	64.0	0	0.0	-1.4	0.0	14.6	0.0	0.0	0.0	0.0	5
NS-05	Inverter House 5	8000	502035	4727093	2.5	92	64.0	0	0.0	-1.4	0.0	52.1	0.0	0.0	0.0	0.0	--
NS-06	Inverter House 6	63	502050	4727093	2.5	61	64.2	0	0.0	-4.6	0.0	0.1	0.0	0.0	0.0	0.0	1
NS-06	Inverter House 6	125	502050	4727093	2.5	79	64.2	0	0.0	2.9	0.0	0.2	0.0	0.0	0.0	0.0	11
NS-06	Inverter House 6	250	502050	4727093	2.5	86	64.2	0	0.0	3.0	0.0	0.5	0.0	0.0	0.0	0.0	18
NS-06	Inverter House 6	500	502050	4727093	2.5	88	64.2	0	0.0	-0.8	0.0	0.9	0.0	0.0	0.0	0.0	24
NS-06	Inverter House 6	1000	502050	4727093	2.5	91	64.2	0	0.0	-1.4	0.0	1.7	0.0	0.0	0.0	0.0	27
NS-06	Inverter House 6	2000	502050	4727093	2.5	89	64.2	0	0.0	-1.4	0.0	4.4	0.0	0.0	0.0	0.0	21
NS-06	Inverter House 6	4000	502050	4727093	2.5	82	64.2	0	0.0	-1.4	0.0	15.0	0.0	0.0	0.0	0.0	4
NS-06	Inverter House 6	8000	502050	4727093	2.5	92	64.2	0	0.0	-1.4	0.0	53.5	0.0	0.0	0.0	0.0	--
NS-07	Inverter House 7	63	502154	4727165	2.5	61	66.3	0	0.0	-4.9	0.0	0.1	0.0	0.0	0.0	0.0	--
NS-07	Inverter House 7	125	502154	4727165	2.5	79	66.3	0	0.0	3.4	0.0	0.2	0.0	0.0	0.0	0.0	9
NS-07	Inverter House 7	250	502154	4727165	2.5	86	66.3	0	0.0	2.9	0.0	0.6	0.0	0.0	0.0	0.0	16
NS-07	Inverter House 7	500	502154	4727165	2.5	88	66.3	0	0.0	-0.9	0.0	1.1	0.0	0.0	0.0	0.0	21
NS-07	Inverter House 7	1000	502154	4727165	2.5	91	66.3	0	0.0	-1.5	0.0	2.1	0.0	0.0	0.0	0.0	24
NS-07	Inverter House 7	2000	502154	4727165	2.5	89	66.3	0	0.0	-1.5	0.0	5.7	0.0	0.0	0.0	0.0	18
NS-07	Inverter House 7	4000	502154	4727165	2.5	82	66.3	0	0.0	-1.5	0.0	19.2	0.0	0.0	0.0	0.0	--
NS-07	Inverter House 7	8000	502154	4727165	2.5	92	66.3	0	0.0	-1.5	0.0	68.3	0.0	0.0	0.0	0.0	--
NS-08	Inverter House 8	63	502155	4727226	2.5	61	66.8	0	0.0	-5.0	0.0	0.1	0.0	0.0	0.0	0.0	--
NS-08	Inverter House 8	125	502155	4727226	2.5	79	66.8	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	8
NS-08	Inverter House 8	250	502155	4727226	2.5	86	66.8	0	0.0	2.9	0.0	0.6	0.0	0.0	0.0	0.0	16
NS-08	Inverter House 8	500	502155	4727226	2.5	88	66.8	0	0.0	-0.9	0.0	1.2	0.0	0.0	0.0	0.0	21
NS-08	Inverter House 8	1000	502155	4727226	2.5	91	66.8	0	0.0	-1.5	0.0	2.3	0.0	0.0	0.0	0.0	24
NS-08	Inverter House 8	2000	502155	4727226	2.5	89	66.8	0	0.0	-1.5	0.0	6.0	0.0	0.0	0.0	0.0	17
NS-08	Inverter House 8	4000	502155	4727226	2.5	82	66.8	0	0.0	-1.5	0.0	20.2	0.0	0.0	0.0	0.0	--
NS-08	Inverter House 8	8000	502155	4727226	2.5	92	66.8	0	0.0	-1.5	0.0	72.0	0.0	0.0	0.0	0.0	--

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