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Axio Power Canada Inc./
SunEdison Canada

Noise Study Report

For

Napanee TS Taylor Kidd
Solar Energy Project

H335467
Rev. 1
May 11, 2012

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Project Report

May 11, 2012

Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Energy Project

Noise Study Report

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Executive Summary

This report presents the results of the noise assessment study required for Solar Facilities under Ontario Regulation 359/09 and 521/10, as part of the Renewable Energy Approval (REA) Process.

Axio Power Canada Inc./SunEdison Canada ("Axio") is proposing to develop a 10-Megawatt (MW) solar photovoltaic (PV) project Napanee TS Taylor Kidd Solar Energy Project (the "Project"). The Project is located on approximately 34 hectares (ha) of land on Part of Lots 27 and 28, Concession 1, Township of Loyalist (lower tier municipality), County of Lennox and Addington (upper tier municipality).

This Noise Assessment Report has been prepared based on the document entitled "Basic Comprehensive Certificates of Approval (Air) – User Guide" by the Ontario Ministry of the Environment (MOE, 2004). The sound pressure levels at the points of reception (POR) have been estimated using ISO 9613-2, implemented in the CADNA-A computer code. The performance limits used for verification of compliance correspond to the values for rural areas of 40 dBA. The results presented in this report are based on the best available information at this time. It is the intention that, in the detailed engineering phase of the project, certified noise data based on final plans and designs will confirm the conclusions of this noise study.

The results obtained in this study show that the sound pressure levels at POR, resulting from the Project operation, will not exceed MOE requirements for rural areas of 40 dBA.

1. Introduction

1.1 Project Description

Axio Power Canada Inc./SunEdison Canada ("Axio") is proposing to develop a 10-megawatt (MW) solar photovoltaic (PV) project titled Napanee TS Taylor Kidd Solar Energy Project (the "Project"). The Project Location[1] is situated on approximately 34 hectares (ha) of land on Part of Lots 27 and 28, Concession 1, Township of Loyalist (lower tier municipality), County of Lennox and Addington (upper tier municipality).

The Project is proposed to be constructed on privately owned land that is currently undeveloped and covered primarily by woodland vegetation. The Project Site is located immediately north of Taylor-Kidd Boulevard, approximately 5.4 km south of the Village of Odessa and 2.9 km west of the community of Amherstview.

The proposed Project is a renewable energy generation facility which will use solar photovoltaic technology to generate electricity. Electricity generated by solar photovoltaic panels will be converted from Direct Current (DC) to Alternating Current (AC) by inverter units which will also step-up the voltage to 27.6 kV. A main transformer, located in the substation, will step up the voltage from the inverter units to 44 kV prior to being transmitted to the existing local distribution line. In order to meet the Ontario Power Authority (OPA)'s Feed-In-Tariff (FIT) Program requirements, a specific percentage of equipment will be manufactured in Ontario.

The construction of the Project will begin once the Renewable Energy Approval (REA) has been obtained and a power purchase agreement is finalized with the OPA. The construction period is estimated to be approximately 6 months. Operationally, the anticipated lifespan of the Project will be 30 years.

1.2 Renewable Energy Approval Legislative Requirements

Ontario Regulation 359/09 and 521/10, made under the Environmental Protection Act identify the Renewable Energy Approval (REA) requirements for green energy projects in Ontario. As per Section 4 of the Ontario Regulation 359/09 and its amendment (Ontario Regulation 521/10), ground mounted solar facilities with a name plate capacity greater than 12 kilowatts (kW) are classified as a Class 3 solar facility, and therefore, require an REA.

Section 13 of the Ontario Regulation 359/09 requires proponents of Class 3 solar facilities to complete a Noise Study Report in accordance with Appendix A of the publication "Basic Comprehensive Certificates of Approval (Air) – User Guide, 2004" by the Ministry of the Environment (MOE, 2004).

The Noise Study Report is to include a general description of the facility, noise sources and points of reception (POR), assessment of compliance, as well as all the supporting information relevant to the Project. A draft of the Noise Study Report must be made available to the public, the local municipality and identified Aboriginal communities, at least 60 days prior to the final public consultation meeting in accordance with Ontario Regulation 359/09 and 521/10.

[1] "Project Location" in the context of this study is an area occupied by the Project infrastructure.

2. Facility Description

The Project will utilize photovoltaic (PV) panels installed on fixed racking structures mounted on the ground. The PV panels generate DC electricity which will be converted to AC electricity by inverter units. The Project layout is based on 10 inverter units (i.e., building enclosures), each one containing two inverters and one medium-voltage transformer, and one 27.6-kV/44-kV/10-MVA substation transformer. The 27.6-kV power, collected from the inverter units, will be stepped-up to 44 kV by the substation transformer prior to being transmitted to the existing local distribution line.

Since the panels will be ground-mounted and the total nameplate capacity is over 12 kW, the Project is considered to be a Class 3 Solar Facility, according to the classification presented in Ontario Regulation 521/10.

Table 2.1 General Project Description

Project Description	Ground-mounted Solar PV, Class 3
System Nameplate Capacity	10-MW AC
Local Distribution Company	Hydro One Networks Inc.

2.1 Project Location

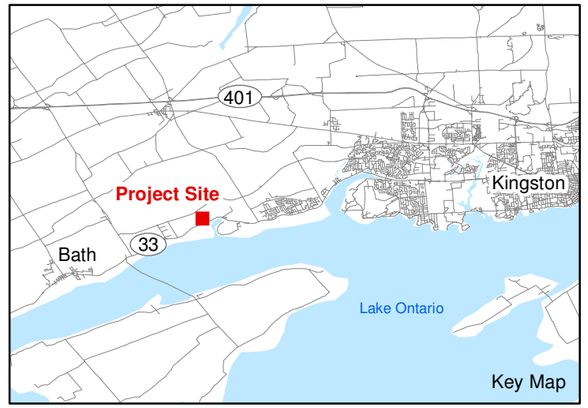
The Project Location consists of undeveloped land predominately covered by woodland vegetation and zoned for industrial purposes totalling approximately 34 hectares, located immediately north of Taylor-Kidd Boulevard, approximately 5.4 km south of the Village of Odessa and 2.9 km west of the community of Amherstview. A railway line is situated to the north of the Project. Figure 2.1 shows the site layout plan while the zoning designation plan (Figure A.1) and area location plan (Figure A.2) drawings are included in Appendix A. 109 points of reception are located within 1.2 km from the Project Site[2] boundary.

2.2 Acoustical Environment

The Project Location is surrounded by woodlands, although it is currently zoned industrial. The spot sound measurements taken around the site showed sound pressure levels somewhat above those typical of rural areas (>40 dBA). Traffic noise is perceived from Taylor Kidd Boulevard as well as Regional Road 33 (1 km to the south).

There are large industrial facilities located to the west (Bombardier Transportation) and south-west of the Project Site (Invista Polyester Plant), which contribute to the acoustical environment. A mineral processing facility is also located within 500 m from the project area (north-west). The facilities have railway access for loading-unloading of materials/goods, and the project is located next to the main railway lines (north). Consequently, train noise is perceptible in the area. No other industrial facilities or airports are found within 5 km of the site.

[2] "Project Site" in the context of this study is the complete area designated for the Project but not necessary occupied with the project infrastructure. Project Location is always contained within Project Site.



LEGEND

Existing Features

- Noise Receptor
- Representative Noise Receptor
- Railway
- Road
- Topographic Contour (5m interval)
- Transmission Line
- Watercourse
- Parcel
- Parrott's Bay Conservation Area
- Wetland

Proposed Project Components

- Project Location
- Project Site
- Inv# Inverter Unit
- SUB Substation Transformer
- Connection Point
- Access Roads
- Panel Layout
- Transmission Line

140 70 0 140 Meters

NORTH

Scale 1:7,500

Notes:
1. OBM and NRVIS data downloaded from LIO with permission.
2. Spatial referencing UTM NAD 83,
3. Air Photos obtained from Cataraqui Region Conservation Authority, flown in 2008, scale 1:2000.

Figure 2.1

Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Project
Site Layout Plan

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2.3 Life of Project

The expected life of the Project is 30 years. At that time (or earlier if the 20 year power purchase agreement is not extended), the Project will be decommissioned or refurbished depending on market conditions and/or technological changes.

2.4 Operating Hours

Solar PV facilities produce electricity during the daytime hours, when the sun rays are collected by the panels. After sunset, the facility will not receive solar radiation to generate any electricity. Under these conditions the inverters will not produce any noise and the transformers will be energized, but not in operation (no fans in operation).

2.5 Approach to the Study

The sound pressure levels at the POR were predicted using procedures from ISO 9613-2, which is a widely used and generally accepted standard for the evaluation of noise impact in environmental assessments. The sound power level for the inverter units was provided by the manufacturer while the sound power level for the substation transformer was estimated. The software package CADNA--A, which implements ISO-9613-2, was used to predict the noise levels at the closest POR. This numerical modeling software is able to simulate sound sources as well as sound mitigation measures taking into account atmospheric and ground attenuation. Some of the CADNA-A configurations used in the modeling are shown in Figure 2.2.

For modeling purposes, elevation contours and vegetation that blocks some of the POR from the sources were not included in the CADNA-A model. This conservative approach was applied in order to avoid including any barrier effects of ground surface or other temporary obstacles.

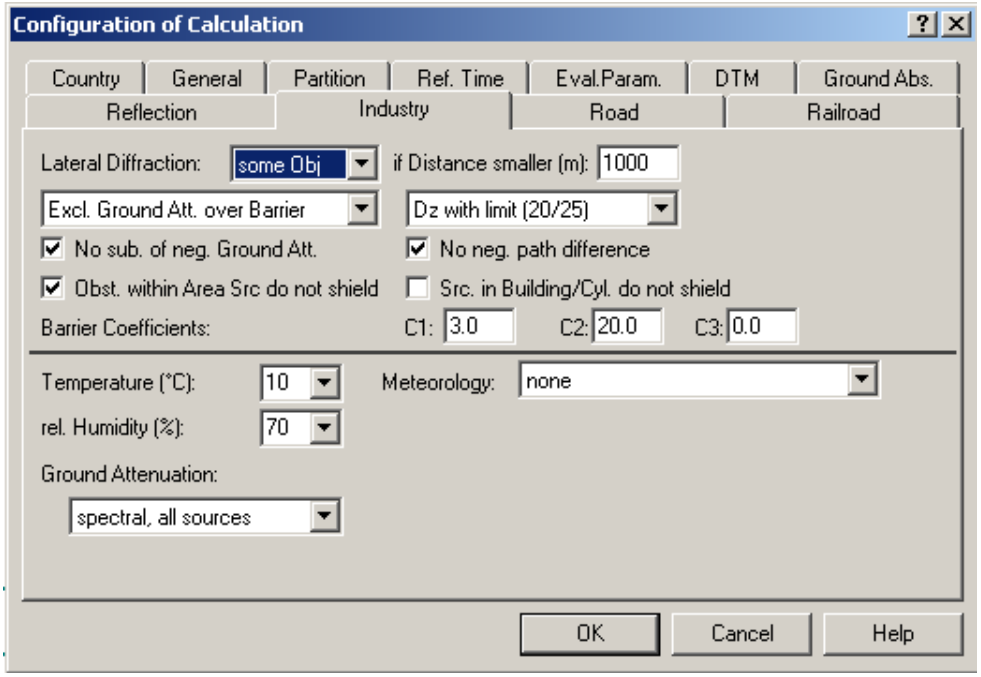

Figure 2.2 CADNA-A Configurations

3. Noise Sources

The main sources of noise from the Project will be 10 inverter units, each one containing two inverters and one medium-voltage transformer, and a substation containing the main step up transformer. Axio provided a layout of the solar PV facility (see Figure 2.1). The coordinates of each noise source are presented in Table B.1 of Appendix B.

All noise sources were modeled as non-directional point sources.

Switchgear and a small step-down transformer used for lighting, located at the substation, do not emit any significant noise and consequently have not been considered as sources of noise.

For the purpose of this study it is assumed that all inverters and transformers will be operating 24 hours at full capacity.

3.1 Substation Transformer

A step-up transformer that will step-up the 27.6-kV power to the 44 kV, required by the local distribution company, will be located in the substation. The transformer will be of oil-natural-air-forced (ONAF) type. The sound power levels resulting from the operation of the transformer were evaluated using data from NEMA TRI – 1993 (2000), and a 35-m^2 transformer surface area. This standard provides maximum sound level values for transformers, and manufacturers routinely meet this specification. Hence, the results based on NEMA may slightly overestimate the impact on POR since the actual transformer is expected to be quieter.

The NEMA levels were then converted into frequency spectra using empirical correlations for transformer noise (Crocker, 2007). This calculation is available in Figure B.1 of Appendix B.

Power transformers are considered by the MOE to be tonal noise sources. A 5-dB penalty was added to the sound power spectrum, as recommended by Publication NPC-104, “Sound Level Adjustments” for tonality. Table B.2 in Appendix B shows the frequency spectrum used to model the substation transformer. Also, typical dimensions for a 27-kV/44-kV/10-MVA transformer have been supplied by Magna Electric Corporation, as seen in Figure B.3. These dimensions are expected to be similar to the installed dimensions of the substation transformer.

3.2 Inverter Units

Axio will use ten SMA Sunny Central 1000MV (SC1000MV) inverter units in the Project. Each SC1000MV inverter unit comprises of two inverters and one medium voltage transformer contained in an e-house or enclosure (see Appendix B). The main sources of noise are the cooling/ventilation fans, the electrical components of the inverters and the medium-voltage transformer. It is assumed that the current configuration of the SC1000MV unit, as specified in Appendix B, will be modified, if required according the CADNA-A model, to have the following features: 1) all openings will be equipped with acoustical louvers (silencers); 2) all external walls will be soundproof (i.e., sound emissions through the walls will be significantly lower than the sound emissions through the louvers).

The installed capacity of each inverter unit is 1 MW. SMA provided third-octave noise data for the SC1000MV unit, which takes into account combined noise emissions from the two inverters and transformer (see Appendix B). The provided third octave spectrum was converted to a full octave

spectrum for use with CADNA-A model (calculations are available in Figure B.2 of Appendix B). A 5-dBA penalty was added to the frequency spectrum, as stipulated in Publication NPC-104, "Sound Level Adjustments," to allow for tonality. The frequency spectra used for SC1000MV units is shown in Table B.2, Appendix B.

Although for the modeling purposes it was assumed that the facility will operate 24 h at full capacity, in reality at night the facility will be idle. Under these conditions the inverters do not produce noise. The transformers are energized and make some magnetostrictive noise at a reduced level, but no cooling fans are in operation.

3.3 Noise Summary Table

A summary of the sound sources described above, including sound level, characteristics and proposed noise control measures, is presented in Table 3.1.

Table 3.1 Noise Source Summary (Day and Night Time)

Source ID	Description	Total Sound Power Level (dBA)	Source Location	Sound Characteristics	Noise Control Measures
Sub	27.6-kV/44-kV/10-MVA Substation transformer	90.8	O	S-T	U
Inv1	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv2	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv3	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv4	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv5	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv6	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv7	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv8	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv9	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S
Inv10	Sunny Central 1000MV inverter unit	102.2	O	S-T	E-S

Notes:
1. A 5-dBA penalty is included in this table.
2. Location: Inside building (I), Outside building (O).
3. Sound Characteristics: Steady (S), Tonal (T), Impulsive (I), Quasi-Steady Impulsive (QSI).
4. Noise Control: Silencer (S), Acoustic lining (A), Barrier (B), Lagging (L), Enclosure (E), Other (O), Uncontrolled (U).

3.4 Adjacent Solar Projects

To identify the adjacent solar projects Hatch's internal database of solar projects and MOE records available in http://www.ene.gov.on.ca/environment/en/subject/renewable_energy/projects/index.htm were searched (May 8, 2012).

There are no POR that are within 1 km of equipment in the Project and any adjacent project. As a result, there are no adjacent projects included in this study.

4. Points of Reception

The POR used in this study were initially identified from the OBM and high resolution aerial photography dated 2009 within 1.2-km distance from the Project Site boundary. Following this, the potential noise receptors located closest to the Project Location were then visually verified during a site visit held in September 2010. Based on this, a number of additional receptors (residential buildings) that were observed at the time of the inspection were added to the model.

The total number of POR considered in this study, within a 1.2-km distance from the Project Site boundary, is 109 (see Figure A.1 and Figure A.2 in Appendix A). Three of these noise receptors, identified in Table 4.1, were chosen as representative receptors for evaluating the noise contribution from each individual source (i.e., the substation and 10 inverters). These three receptors were chosen in order to represent sound pressure level contributions on different areas around the Project Location. The complete set of results for all 109 noise receptors is provided in Table 6.2, with corresponding noise maps from CADNA-A included in Appendix C. For this study, the POR elevation above ground is 4.5 m.

Table 4.1 Point of Reception Noise Impact from Individual Noise Sources of Napanee TS Taylor Kidd Solar Energy Project

Source ID	POR 1		POR 2		POR 4	
	Distance (m)	L_{eq} Sound Level (dBA)	Distance (m)	L_{eq} Sound Level (dBA)	Distance (m)	L_{eq} Sound Level (dBA)
Sub	293	30.0	774	20.6	822	20.0
Inv1	584	19.8	929	15.3	1393	11.2
Inv2	491	21.4	902	15.6	1306	11.9
Inv3	409	23.2	884	15.8	1228	12.5
Inv4	311	25.7	871	15.9	1131	13.3
Inv5	239	28.2	873	15.9	1057	14.0
Inv6	616	19.3	645	18.8	1201	12.7
Inv7	549	20.4	618	19.2	1105	13.6
Inv8	498	21.3	606	19.4	1021	14.3
Inv9	455	22.2	608	19.4	927	15.3
Inv10	428	22.7	626	19.1	846	16.2

5. Mitigation Measures

Mitigation for operation of the solar facility has been modeled and shown to be feasible in the form of soundproof (i.e., sound emissions through the walls will be significantly lower than the sound emissions through the louvers) enclosures with acoustical louvers on all openings for all inverter units. The Noise Reduction and Sound Transmission characteristics of the acoustical louvers considered in this study are presented in Table B.3 of Appendix B. Technical specifications of the proposed louvers are included in Appendix B as well.

6. Impact Assessment

The purpose of the acoustic assessment report is to demonstrate that the facility is in compliance with the noise performance limits. The Project will be located in a Class 3 Area, based on the classification defined in Publication NPC-232 by the MOE. Class 3 area means a rural area with an acoustical environment that is dominated by natural sounds, having little or no traffic, such as an agricultural area.

Table 6.1 shows the performance limits set by the MOE for Class 3 Areas, according to Publication NPC-232.

Table 6.1 Performance Limits (One-Hour L_{eq}) by Time of Day for Class 3 Areas

Time of Day	One Hour L_{eq} (dBA) Class 3 Area
07:00 to 19:00	45.0
19:00 to 23:00	40.0
23:00 to 07:00	40.0

The solar facility will be operating during the daylight hours, that is, between 07:00 and 19:00 during most days of the year. However, in the summer months the sun may shine before 07:00 or until past 19:00. As such, during the summer the facility will be operating at the time when the applicable performance limit changes from 45 dBA to 40 dBA. Also, the transformers remain energized at night. In order to account for this the study assumes that the facility will be operating 24 hours and compares the impact from the facility with the 40-dBA limit. In reality, the cooling fans will not be in operation at night.

For this study, the overall ground attenuation coefficient was estimated to be 0.7. Appendix D includes a list of all the parameters used in the CADNA-A model to predict the sound pressure levels at the POR.

The modelling does not consider the effect of the solar panels on the predicted sound pressure levels at the points of reception. The solar panels may act as barriers to further reduce noise at the POR.

6.1 Compliance with Performance Limits

Table 6.2 presents the predicted sound pressure levels for the POR. Sound pressure contours at 4.5 m and 1.5 m are available in Figure C.1 and Figure C.2. Appendix D includes a detailed calculation log of the representative POR with the highest Sound Pressure Level.

Effect of the noise emissions at the POR was also accessed by intersecting the 40-dBA sound pressure contours calculated at 1.5 m above ground with 30-m radius circles placed around the POR (Figure C.2). The results show that none of the 30-m radius zones are affected by the noise emissions.

Table 6.2 Calculated Sound Pressure Levels at POR (shaded rows correspond to representative POR)
Existing = Existing dwelling

ID	Description	Total Sound Pressure (dBA)	Performance Limit (dBA)	Height (m)	UTM Coordinates, NAD83 Zone 18		Min dist. to source (m)
					X (m)	Y (m)	
1	Existing	35.0	40.0	4.5	363386	4897369	239
2	Existing	28.6	40.0	4.5	364240	4897986	606
3	Existing	25.6	40.0	4.5	364448	4898146	860
4	Existing	25.3	40.0	4.5	364329	4896997	822
5	Existing	25.3	40.0	4.5	363857	4896702	797
6	Existing	25.1	40.0	4.5	363852	4896685	812
7	Existing	24.8	40.0	4.5	363817	4896648	841
8	Existing	24.5	40.0	4.5	364393	4896953	900
9	Existing	24.4	40.0	4.5	364410	4896960	910
10	Existing	24.3	40.0	4.5	364440	4896981	923
11	Existing	24.1	40.0	4.5	364480	4896999	948
12	Existing	24.1	40.0	4.5	364495	4897007	957
13	Existing	24.0	40.0	4.5	363880	4896575	926
14	Existing	23.9	40.0	4.5	364522	4897020	975
15	Existing	23.8	40.0	4.5	364546	4897032	988
16	Existing	23.8	40.0	4.5	363880	4896553	947
17	Existing	23.7	40.0	4.5	364579	4897063	998
18	Existing	23.7	40.0	4.5	364307	4896757	966
19	Existing	23.7	40.0	4.5	363898	4896543	961
20	Existing	23.6	40.0	4.5	364593	4897059	1012
21	Existing	23.6	40.0	4.5	363718	4896503	973
22	Existing	23.6	40.0	4.5	364325	4896757	978
23	Existing	23.4	40.0	4.5	364530	4896933	1025
24	Existing	23.4	40.0	4.5	364560	4896964	1035
25	Existing	23.4	40.0	4.5	364118	4896597	990
26	Existing	23.2	40.0	4.5	364599	4896988	1057
27	Existing	23.2	40.0	4.5	364183	4896607	1013
28	Existing	23.2	40.0	4.5	364218	4896626	1016
29	Existing	23.2	40.0	4.5	364043	4896532	1017
30	Existing	23.2	40.0	4.5	364278	4896657	1025
31	Existing	23.2	40.0	4.5	364127	4896569	1019
32	Existing	23.1	40.0	4.5	364264	4896645	1026
33	Existing	23.1	40.0	4.5	364103	4896552	1023
34	Existing	23.0	40.0	4.5	364565	4896911	1066
35	Existing	23.0	40.0	4.5	364489	4896821	1056
36	Existing	23.0	40.0	4.5	364503	4896835	1058
37	Existing	23.0	40.0	4.5	364463	4896793	1054
38	Existing	22.9	40.0	4.5	364528	4896847	1071
39	Existing	22.9	40.0	4.5	364485	4896794	1070

ID	Description	Total Sound Pressure (dBA)	Performance Limit (dBA)	Height (m)	UTM Coordinates, NAD83 Zone 18		Min dist. to source (m)
					X (m)	Y (m)	
40	Existing	22.9	40.0	4.5	364602	4896923	1092
41	Existing	22.8	40.0	4.5	364616	4896925	1103
42	Existing	22.8	40.0	4.5	364052	4896493	1057
43	Existing	22.8	40.0	4.5	364648	4896968	1108
44	Existing	22.7	40.0	4.5	364683	4897007	1116
45	Existing	22.6	40.0	4.5	363596	4896381	1095
46	Existing	22.6	40.0	4.5	363630	4896382	1093
47	Existing	22.6	40.0	4.5	364620	4896899	1120
48	Existing	22.5	40.0	4.5	363607	4896372	1103
49	Existing	22.5	40.0	4.5	364720	4897019	1141
50	Existing	22.4	40.0	4.5	364737	4897044	1143
51	Existing	22.4	40.0	4.5	363591	4896358	1118
52	Existing	22.4	40.0	4.5	363560	4896356	1123
53	Existing	22.3	40.0	4.5	363575	4896345	1132
54	Existing	22.1	40.0	4.5	362879	4896512	1230
55	Existing	22.2	40.0	4.5	364766	4897027	1177
56	Existing	21.9	40.0	4.5	362380	4896945	1260
57	Existing	22.1	40.0	4.5	364877	4897257	1188
58	Existing	22.1	40.0	4.5	364859	4897205	1187
59	Existing	22.1	40.0	4.5	364875	4897236	1192
60	Existing	21.9	40.0	4.5	363072	4896387	1236
61	Existing	21.8	40.0	4.5	362892	4896454	1276
62	Existing	21.9	40.0	4.5	364845	4897108	1210
63	Existing	21.9	40.0	4.5	363475	4896296	1192
64	Existing	21.6	40.0	4.5	362280	4897042	1303
65	Existing	21.9	40.0	4.5	364835	4897081	1213
66	Existing	21.9	40.0	4.5	364818	4897044	1214
67	Existing	21.8	40.0	4.5	364841	4897070	1223
68	Existing	21.8	40.0	4.5	363483	4896280	1207
69	Existing	21.7	40.0	4.5	364872	4897112	1233
70	Existing	21.7	40.0	4.5	364948	4897304	1243
71	Existing	21.7	40.0	4.5	364898	4897149	1243
72	Existing	21.7	40.0	4.5	363482	4896263	1224
73	Existing	21.6	40.0	4.5	363068	4896342	1277
74	Existing	21.6	40.0	4.5	364913	4897172	1249
75	Existing	21.5	40.0	4.5	364935	4897199	1261
76	Existing	21.4	40.0	4.5	363359	4896249	1261
77	Existing	21.4	40.0	4.5	365020	4897432	1290
78	Existing	21.4	40.0	4.5	364930	4897133	1279
79	Existing	21.3	40.0	4.5	364962	4897194	1288
80	Existing	21.3	40.0	4.5	363310	4896238	1285
81	Existing	21.2	40.0	4.5	365030	4897393	1305

ID	Description	Total Sound Pressure (dBA)	Performance Limit (dBA)	Height (m)	UTM Coordinates, NAD83 Zone 18		Min dist. to source (m)
					X (m)	Y (m)	
82	Existing	21.2	40.0	4.5	364979	4897205	1300
83	Existing	21.1	40.0	4.5	365008	4897249	1315
84	Existing	21.0	40.0	4.5	365047	4897341	1332
85	Existing	20.9	40.0	4.5	365033	4897242	1341
86	Existing	20.8	40.0	4.5	362610	4896475	1407
87	Existing	20.8	40.0	4.5	365051	4897248	1357
88	Existing	20.7	40.0	4.5	363232	4896176	1367
89	Existing	20.7	40.0	4.5	365078	4897259	1380
90	Existing	20.6	40.0	4.5	365110	4897365	1389
91	Existing	20.6	40.0	4.5	365100	4897294	1393
92	Existing	20.6	40.0	4.5	365097	4897268	1397
93	Existing	19.6	40.0	4.5	362957	4896077	1564
94	Existing	19.5	40.0	4.5	362538	4896282	1605
95	Existing	19.5	40.0	4.5	365102	4896844	1559
96	Existing	19.4	40.0	4.5	365113	4896861	1561
97	Existing	19.4	40.0	4.5	365130	4896879	1567
98	Existing	19.4	40.0	4.5	365144	4896897	1571
99	Existing	19.3	40.0	4.5	365161	4896914	1579
100	Existing	19.3	40.0	4.5	365183	4896946	1585
101	Existing	19.3	40.0	4.5	365193	4896964	1587
102	Existing	19.3	40.0	4.5	365175	4896926	1586
103	Existing	19.2	40.0	4.5	365220	4896989	1602
104	Existing	19.1	40.0	4.5	365237	4897010	1610
105	Existing	19.0	40.0	4.5	365264	4897039	1624
106	Existing	19.0	40.0	4.5	365275	4897052	1630
107	Existing	19.0	40.0	4.5	365261	4897016	1630
108	Existing	18.9	40.0	4.5	365298	4897062	1648
109	Existing	18.7	40.0	4.5	365330	4897073	1675

In order to account for the potential noise impacts to vacant lots surrounding the Project Location (i.e., those that could have an inhabited building constructed on the lot at a future date), a comparison was made between the Zoning Designation (Figure A.1 in Appendix A),the noise receptors, land parcels surrounding the Project Location and the noise contours shown in Figure C.1 and Figure C.2 in Appendix C. The results from the comparison are summarized in Table 6.3 below and show that the 40-dBA noise contour partially encroaches onto two parcels surrounding the Project Location.

Table 6.3 Parcels Partially Affected by the Project's noise emission

Parcels ID	PIN	Zoning	Description
PR01	451290207	Industrial	Contains existing noise receptor
PR02	451320058	Industrial	Contains no existing noise receptor(s)

The noise receptor located on parcel PR02 was included in the CADNA-A model and determined to be compliant with the MOE performance limits.

As described in 1.(4)4. of Ontario Regulation 521/10, a noise receptor on a vacant lot (where no building permit has been issued) is considered to be the location ". . . at which a building would reasonably be expected to be located, having regard to the existing zoning by-law and the typical building pattern in the area . . .". The results from the comparison show that two parcels surrounding the Project Location are partially affected by the Project's noise emission. However, none of the affected parcels is considered a vacant lot because both parcels are presently zoned industrial and, thus, future development on them for residential use is not presently permitted.

Based on the above, the results show that all POR are compliant with MOE guidelines based on the performance limits of 40 dBA.

7. Conclusions and Recommendations

For the Napanee TS Taylor Kidd Solar Energy Project, the sound pressure levels at the POR have been estimated using the CADNA-A model, based on ISO 9613-2. The performance limits used for comparison correspond to Class 3 areas, with a 40-dBA threshold. Mitigation for operation of the Project has been modeled and shown to be feasible.

Based on the results obtained in this study, it is concluded that the sound pressure levels at the POR, resulting from the Project operation, will be below MOE requirements for Class 3 areas of 40-dBA at all times.

8. Signatures

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PROVINCE OF ONTARIO

11 May 2012

Oleg Belashov, M.A.Sc., P.Eng.

9. References

Ontario Regulation 359/09. Environmental Protection Act. Renewable Energy Approvals Under Part V.0.1 of the Act.

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IEEE. 2006. C57.12.90-2006: Standard Test Code for Liquid-Immersed, Power and Regulating Transformers. pp 64 to 76.

Ministry of the Environment (MOE). 1997. Noise Assessment Criteria in Land Use Planning. Publication LU-131. Ontario Ministry of the Environment. 12 pp + Annex.

MOE. 1995. Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban). Publication NPC-205. Ontario Ministry of the Environment. 6 pp + Annex.

MOE. 1995. Sound Level Limits for Stationary Sources in Class 3 Areas (Rural). Publication NPC-232. Ontario Ministry of the Environment. 8 pp + Annex.

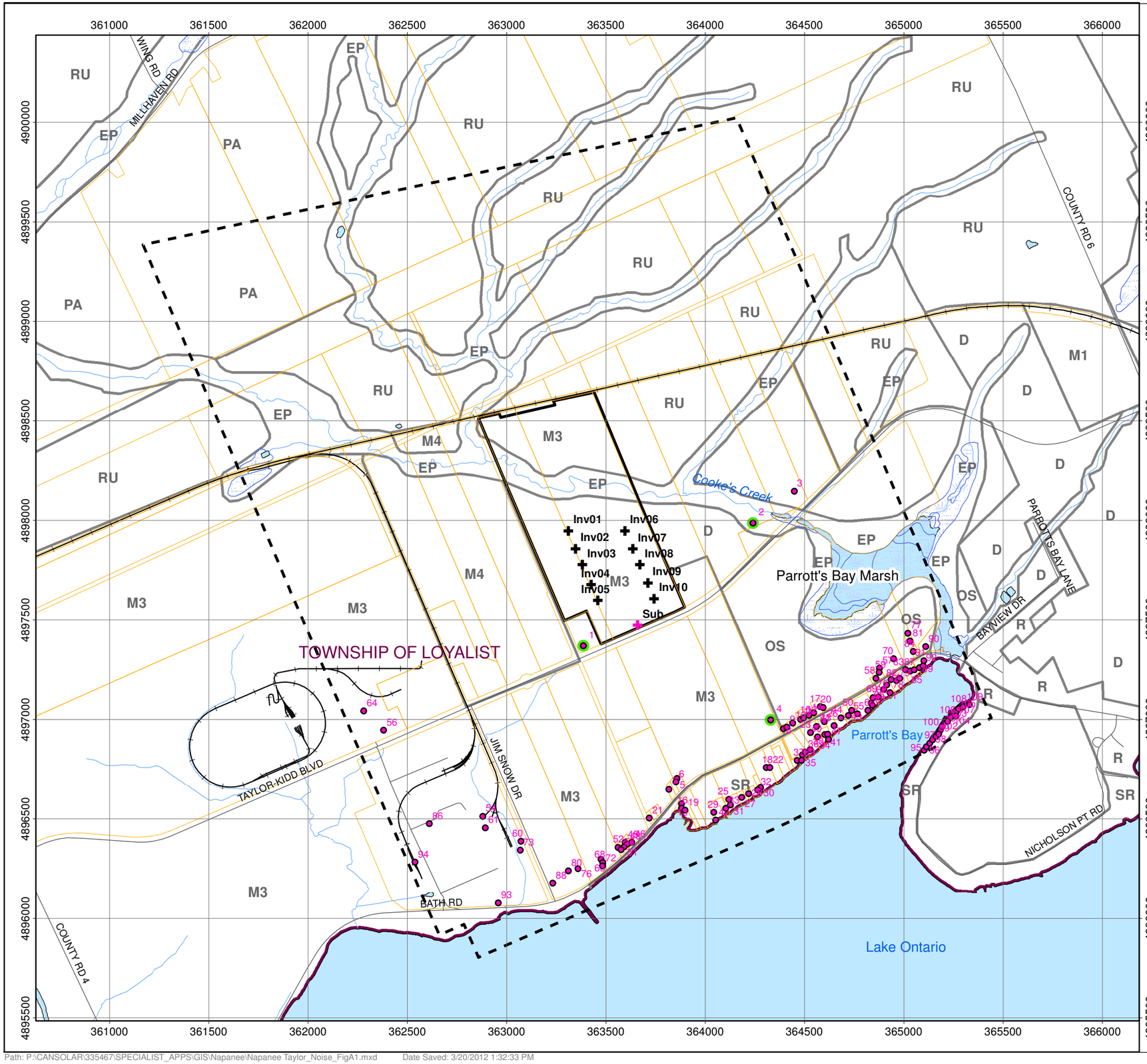
NEMA. 2000. Standards Publication No. TR 1-1993 (R2000): Transformers, Regulators and Reactors. National Electrical Manufacturers Association. 31 pp. (This reference probably not needed now).

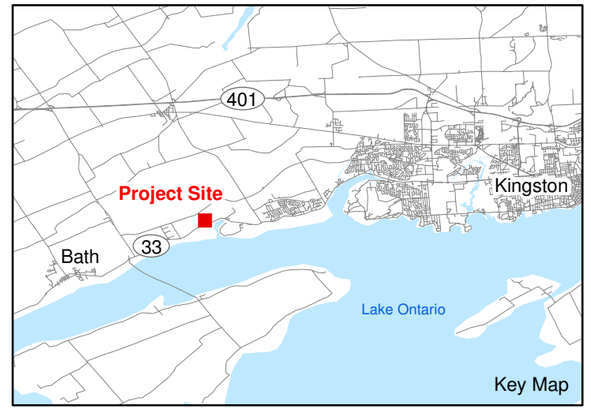
International Organization for Standardization (ISO). Standard 1996-1: Description, Measurement and Assessment of Environmental Noise – Part 1: Basic Quantities and Assessment Procedures.

International Organization for Standardization (ISO). Standard 1913-2:Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation.

Appendix A

Land Use Zoning Designation Plan, and Area Location Plan





Legend

- Inverter Unit (Inv#)
- Substation Transformer (Sub)
- Noise Receptor (#)
- Representative Noise Receptor (#)
- Road
- Railway
- Watercourse
- Parcel
- Waterbody
- Wetland
- Project Site
- 1200m Envelope
- Zone Boundary

Zones

A	Agriculture
D	Future Development
RU	Rural
R	Residential
SR	Shoreline Residential
M1	Light Industrial
M3	General Industrial
M4	Extractive Industrial
EP	Environmental Protection
OS	Open Space

0 0.25 0.5 1 Km

1:20,000

NORTH

Notes:
1. OBM and NRVIS data downloaded from LIO with permission.
2. Spatial referencing UTM NAD 83.
3. Land use information obtained from Loyalist Township, Schedule A, C, D, 2010.

Figure A.1
Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Project
Land Use Plan

HATCH

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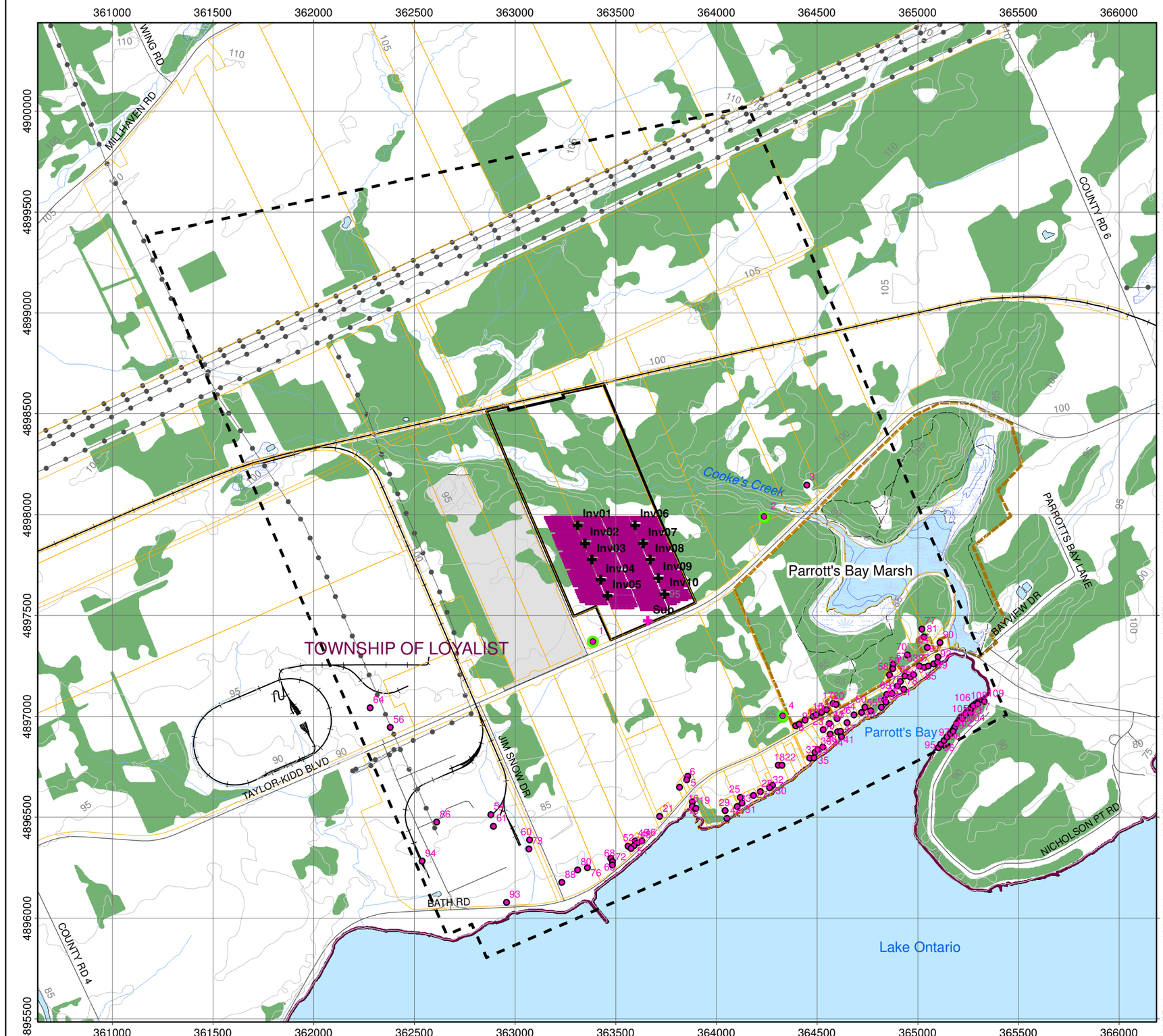

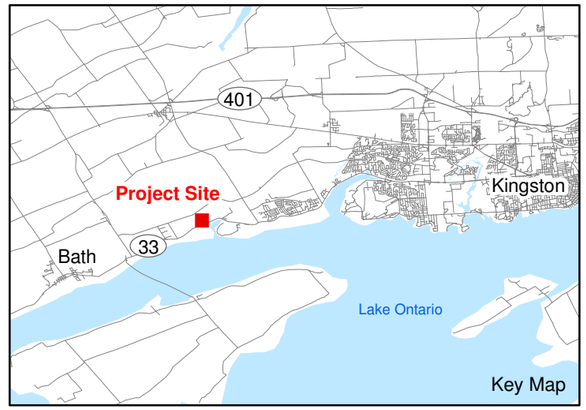

Legend

- Inverter Unit (Inv#)
- Substation Transformer (Sub)
- Noise Receptor (#)
- Representative Noise Receptor (#)
- 1200 m Envelope
- Existing Transmission Line
- Railway
- Road
- Solar PV Panels
- Topographic Contour (5m interval)
- Watercourse
- Authorized Aggregate Site
- Parcel
- Parrott's Bay Conservation Area
- Project Site
- Waterbody
- Wetland
- Wooded Area

400 200 0 400 Meters

NORTH

1:20,000

Notes:
1. OBM and NRVIS data downloaded from LIO with permission.
2. Spatial referencing UTM NAD 83.

Figure A.2
Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Project
Area Location Plan

HATCH

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Appendix B

Noise Sources

Table B.1 Point Sources Used in CADNA-A, Includes Tonality Penalty of 5.0-dBA.

Source ID	Description	Spectra ID	Total Sound Power Level - 24 Hours (dBA)	Correction - 24 Hours (dBA)	Height (m)	UTM Coordinates, NAD83 Zone18 (m)	
						X	Y
Sub	27.6-kV/44-kV/10-MVA Substation transformer	Transformer10MVA	90.8	5.0	3.0	363660	4897475
Inv1	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363312	4897949
Inv2	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363347	4897858
Inv3	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363381	4897778
Inv4	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363426	4897678
Inv5	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363459	4897597
Inv6	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363596	4897949
Inv7	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363636	4897858
Inv8	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363671	4897778
Inv9	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363711	4897688
Inv10	Sunny Central 1000MV inverter unit	SC1000MV	102.2	5.0	3.5	363742	4897607

Table B.2 Frequency Spectra Used for Modelling the Noise Sources, Not Including Tonality Penalty.

Spectra ID	Octave Spectrum (dBA)										
	31.5	63	125	250	500	1000	2000	4000	8000	A	lin
Transformer10MVA	43.0	62.2	74.3	76.8	82.2	79.4	75.6	70.4	61.3	85.8	94.4
SC1000MV		64.8	78.9	93	91.6	90.1	87.6	79.9	65.4	97.2	103.7

Table B.3 Noise Reduction and Sound Transmission Characteristics of the Acoustical Louvers.

Name	Octave Spectrum (dBA)								
	31.5	63	125	250	500	1000	2000	4000	8000
Greenheck Louver	0	10	10	12	16	23	18	0	0

SUNNY CENTRAL 800MV / 1000MV / 1250MV

SC 800MV-11 / SC 1000MV-11 / SC 1250MV-11

Efficient

- Without low-voltage transformer: greater plant efficiency due to direct connection to the medium-voltage grid

Turnkey Delivery

- With medium-voltage transformer and concrete substation for outdoor installation

Optional

- Medium-voltage switchgear systems for a flexible structure of large solar parks
- AC transfer station with measurement
- Medium-voltage transformers for other grid voltages (deviating from 20 kV)

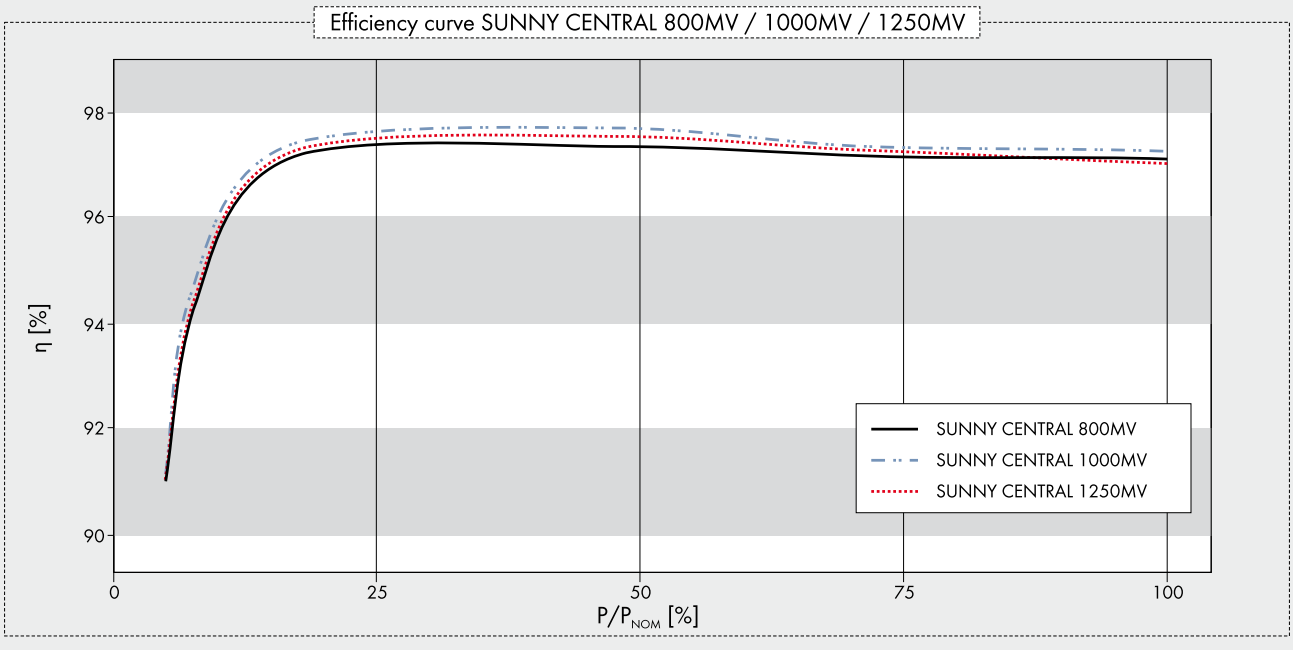
SUNNY CENTRAL for Direct medium-voltage feed-in 800MV / 1000MV / 1250MV

High-performance medium-voltage station

For even more power: Two powerful Sunny Central HE inverters are components of a medium-voltage station (MV) which feeds directly into a shared medium-voltage transformer. In this way, for example, two Sunny Central 630HE inverters are combined into a powerful Sunny Central 1250MV station. The advantage: By removing the need for the low-voltage transformer, the plant operator realizes greater yields and at the same time lower inverter costs. The Sunny Central MV is delivered as a "turnkey" concrete substation for outside installation. On top of that, the Sunny Central MV actively participates in grid management, and thereby fulfils all requirements of the Medium-Voltage Directive valid as of July 2010.

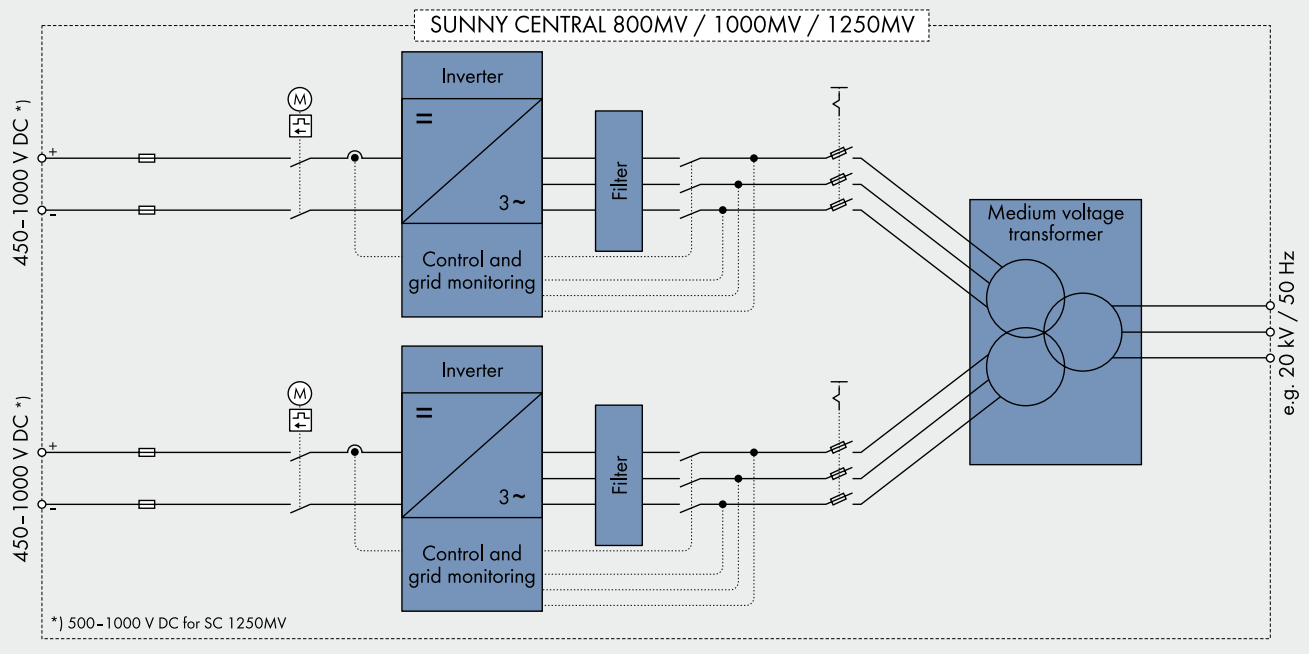
SUNNY CENTRAL 800MV / 1000MV / 1250MV

Technical data	Sunny Central 800MV	Sunny Central 1000MV	Sunny Central 1250MV
Input data			
Nominal DC power	816 kW	1018 kW	1284 kW
Max. DC power	900 kWp[1)]	1120 kWp[1)]	1410 kWp[1)]
MPP voltage range	450 V – 820 V [5)]	450 V – 820 V [5)]	500 V – 820 V [5) 7)]
Max. DC voltage	1000 V	1000 V	1000 V
Max. DC current	1986 A	2484 A	2844 A
Number of DC inputs	(16 + 16) + 4 DCHV	(16 + 16) + 4 DCHV	(16 + 16) + 4 DCHV
Output data			
Nominal AC power @ 45 °C	800 kVA	1000 kVA	1250 kVA
Continuous AC power @ 25 °C	880 kVA	1100 kVA	1400 kVA
Nominal AC voltage	20000 V	20000 V	20000 V
Nominal AC current	23.2 A	28.8 A	36.1 A
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Power factor (cos φ)		0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 3000 W [4)]	< 3000 W [4)]	< 3000 W [4)]
Standby consumption	< 180 W + 1100 W	< 180 W + 1100 W	< 180 W + 1350 W
External auxiliary supply voltage	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 20 A, 3-pole	B 20 A, 3-pole	B 20 A, 3-pole
Dimensions and weight			
Height	3620 mm	3620 mm	3620 mm
Width	5400 mm	5400 mm	5400 mm
Depth	3000 mm	3000 mm	3000 mm
Weight	35000 kg	35000 kg	35000 kg
Efficiency [2)]			
Max. efficiency	97.7 %	97.9 %	97.8 %
Euro-eta	97.3 %	97.5 %	97.4 %
Protection rating and ambient conditions			
Protection rating (as per EN 60529)	IP54	IP54	IP54
Operating temperature range	–20 °C ... +45 °C	–20 °C ... +45 °C	–20 °C ... +45 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	12400 m³/h	12400 m³/h	12400 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m

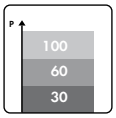


	Sunny Central 800MV	Sunny Central 1000MV	Sunny Central 1250MV
Features			
Display: text line / graphic	●/–	●/–	●/–
Ground fault monitoring	●	●	●
Heating	●	●	●
Emergency stop	●	●	●
Circuit breaker AC side	SI load disconnection switch	SI load disconnection switch	SI load disconnection switch
Circuit breaker DC side	Switch-disconnector with motor	Switch-disconnector with motor	Switch-disconnector with motor
Monitored overvoltage protectors AC / DC	●/●	●/●	●/●
Monitored overvoltage protectors for auxiliary supply	●	●	●
SCC (Sunny Central Control) interfaces			
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs	10 x A_{in} [3]	10 x A_{in} [3]	10 x A_{in} [3]
Overvoltage protection for analog inputs	O	O	O
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232
Electrically separated relay (ext. alert signal)	2	2	2
Certificates / listings			
EMC	EN 61000-6-2 EN 61000-6-4		
CE conformity	●	●	●
BDEW-MSRL / FGW / TR8 [6]	●	●	●
RD 1633 / 2000	●	●	●
Arrêté du 23/04/08	●	●	●
● standard features O optional features – not available			
Type designation	SC 800MV-11	SC 1000MV-11	SC 1250MV-11

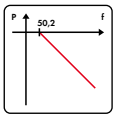
HE: High Efficiency, inverter without galvanic isolation for connection to a medium-voltage transformer (taking into account the SMA specification for the transformer)
1) Specifications apply to irradiation values below STC
2) Efficiency measured without an internal power supply at U_{DC} = 500 V
3) 2x inputs for the external nominal value specification for active power and reactive power, 1x external alarm input, 1x irradiation sensor, 1x pyranometer
4) Internal consumption at nominal power
5) At 1.05 $U_{AC, nom}$ and cos φ = 1
6) With limited dynamic grid support
7) At f_{grid} = 60 Hz: 510 V - 820 V
Please note: in certain countries the substations may differ from the substations shown in the images



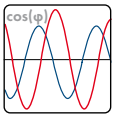
POWERFUL GRID MANAGEMENT FUNCTIONS



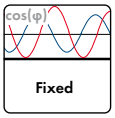
Remote controlled power reduction in case of grid overload
In order to avoid short-term grid overload, the grid operator presets a nominal active power value which the inverter will implement within 60 seconds. The nominal value is transmitted to the inverters via a ripple control receiver in combination with the SMA Power Reducer Box. Typical limit values are 100, 60, 30 or 0 per cent of the nominal power.



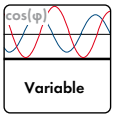
Frequency-dependent control of active power
As of a grid frequency of 50.2 Hz, the inverter automatically reduces the fed-in of active power according to a definable characteristic curve which thereby contributes to the stabilization of the grid frequency.



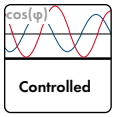
Static voltage support based on reactive power
To stabilize the grid voltage, SMA inverters feed reactive power (leading or lagging) into the grid. Three different modes are available:



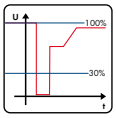
a) Fixed definition of the reactive power by the grid operator
The grid operator defines a fixed reactive power value or a fixed displacement factor between $\cos(\varphi)_{leading}$= 0.90 and $\cos(\varphi)_{lagging}$= 0.90.



b) Definition of a dynamic setpoint of the reactive power by the utility operator
The grid operator defines a dynamic displacement factor - any value between $\cos(\varphi)_{leading}$= 0.90 und $\cos(\varphi)_{lagging}$= 0.90. It is transmitted either through a communication unit the evaluation can e.g. be evaluated and processed by the SMA Power Reducer Box.



c) Control of the reactive power over a characteristic curve
The reactive power or the phase shift is controlled by a pre-defined characteristic curve – depending on the active power fed into the grid or the grid voltage.

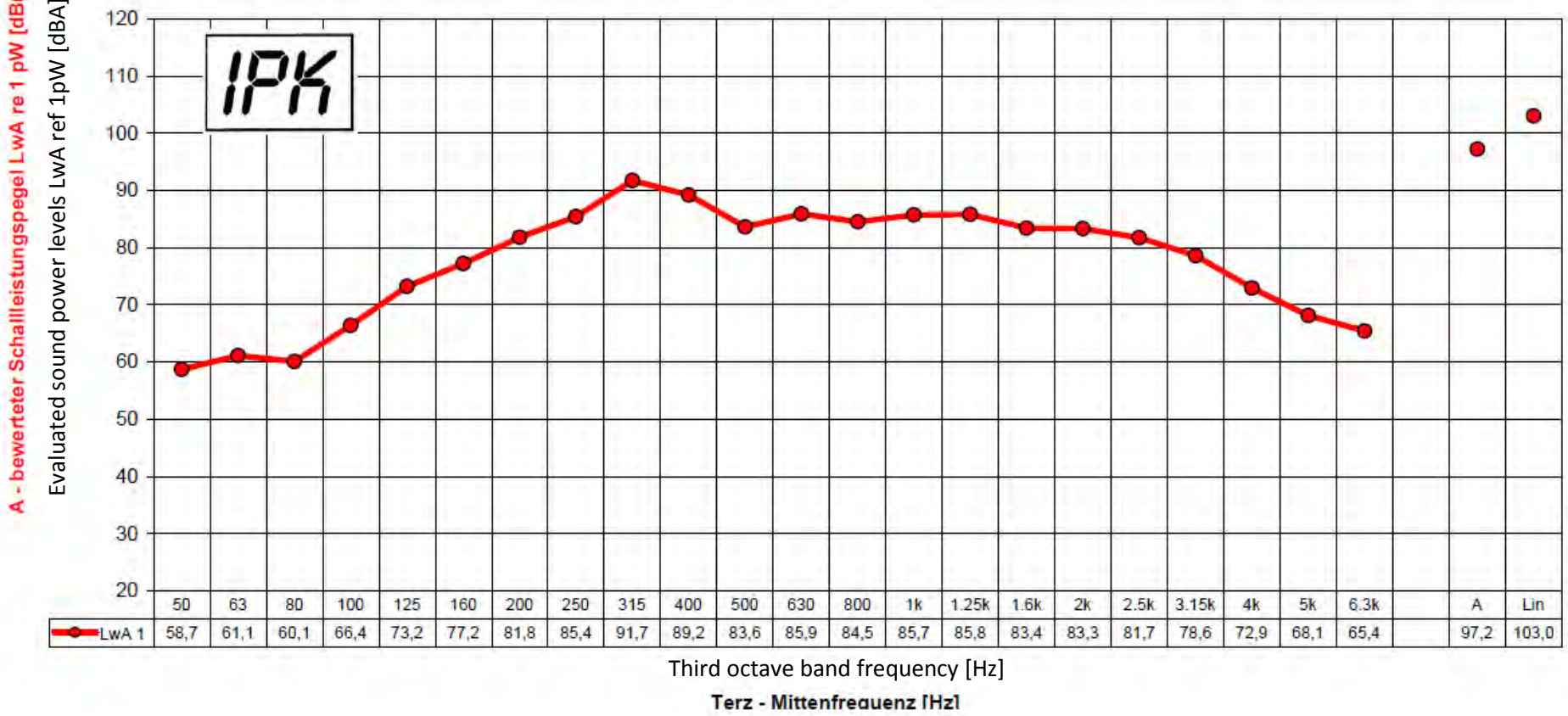


Limited Dynamic Grid Support
The inverter continues to feed to the grid after short term voltage drops – as long as the grid voltage is within a defined voltage window.

SMA Solar Technologie Umrichteranlage Sunny Central SC 1000MV
Betrieb bei Nennleistung und 50 Hz; 1000 KW

SMA Solar Technologies Inverter Unit Sunny Central SC 1000MV

Name Plate Capacity 1000 kW at 50 Hz



	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k		A	Lin
LwA 1	58,7	61,1	60,1	66,4	73,2	77,2	81,8	85,4	91,7	89,2	83,6	85,9	84,5	85,7	85,8	83,4	83,3	81,7	78,6	72,9	68,1	65,4		97,2	103,0

Third octave band frequency [Hz]

Terz - Mittenfrequenz [Hz]

Estimated Frequency Spectra for Transformers

Transformer - 44kV/10MVA

From Handbook of Noise and Vibration Control (Crocker, 2007, page 1335-1336, Eq. 18 and Table 20) and Beranek's old notes (page 7-19)

Average LpA	68 dBA	Based on NEMA TR1-1993 (R2000), Table 0-2
Estimated surface area	35 m^2	Can be assumed, 25% of change will produce a difference of 1 dB on Lw, try to estimate on the high side

Correction factors are in dB

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Notes
C1	-11.0	-5.0	-3.0	-8.0	-8.0	-14.0	-19.0	-24.0	-31.0	Outdoors, indoors in mechanical room over 140 m^3
C2	-11	-2	3	-2	-2	-11	-19	-24	-31	Indoors
C3	-11	-2	3	2	2	-4	-9	-14	-21	Serious Noise Problems

Sound Power Level calculated as Lw=Average LpA + 10*log(Estimated surface area) + C + 10

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dB]
C1 based [dB]	82.4	88.4	90.4	85.4	85.4	79.4	74.4	69.4	62.4	**94.5**
C2 based [dB]	82.4	91.4	96.4	91.4	91.4	82.4	74.4	69.4	62.4	**99.5**
C3 based [dB]	82.4	91.4	96.4	95.4	95.4	89.4	84.4	79.4	72.4	**101.5**

Resulting A-weighted sound power level

Freq. (Hz)	A-Weight	C1 based [dBA]	C2 based [dBA]	C2 based [dBA]
31	-39.4	43.0	52.0	57.0
63	-26.2	62.2	65.2	65.2
125	-16.1	74.3	80.3	80.3
250	-8.6	76.8	82.8	86.8
500	-3.2	82.2	88.2	92.2
1000	0	79.4	82.4	89.4
2000	1.2	75.6	75.6	85.6
4000	1	70.4	70.4	80.4
8000	-1.1	61.3	61.3	71.3
LwA [dBA]		**85.8**	**90.8**	**95.6**

Used in the study

Figure B.1 Sound Power Level Calculation for 44-kV/10-MVA Substation Transformer.

Third octave, as provided		
Freq #	Freq (Hz)	LwA (dBA)
1	25	
2	31.5	
3	40	
4	50	58.7
5	63	61.1
6	80	60.1
7	100	66.4
8	125	73.2
9	160	77.2
10	200	81.8
11	250	85.4
12	315	91.7
13	400	89.2
14	500	83.6
15	630	85.9
16	800	84.5
17	1000	85.7
18	1250	85.8
19	1600	83.4
20	2000	83.3
21	2500	81.7
22	3150	78.6
23	4000	72.9
24	5000	68.1
25	6300	65.4
26	8000	
27	10000	
	Total LwA	**97.2**

Full octave, as used in CADNA-A model		
Freq #	Freq (Hz)	LwA (dBA)
	31.5	
5	63	64.8
8	125	78.9
11	250	93.0
14	500	91.6
17	1000	90.1
20	2000	87.6
23	4000	79.9
26	8000	65.4
	Total LwA	**97.2**

$$\rightarrow 10\log\left(10^{\frac{58.7}{10}}+10^{\frac{61.1}{10}}+10^{\frac{60.1}{10}}\right)=64.8dBA$$

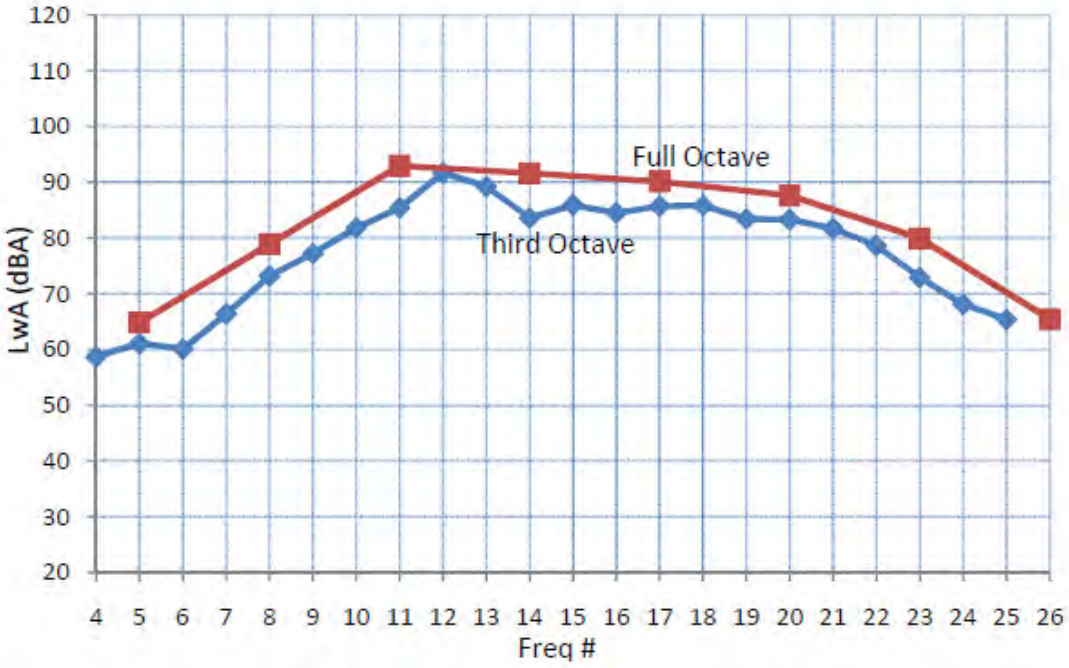


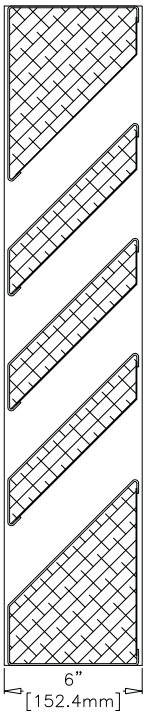
Figure B.2 Sound Power Level Calculation for SMA Sunny Central 1000MV, 100% LOAD.

GREENHECK AFJ-601

Acoustical Louver
J Blade

Application and Design

AFJ-601 is an acoustical weather louver designed to protect air intake and exhaust openings in building exterior walls. Design incorporates J style insulated acoustical blades and high free area to provide maximum resistance to sound transmission, rain and weather while providing minimum resistance to airflow. The AFJ-601 is an extremely efficient louver with **AMCA LICENSED PERFORMANCE DATA** enabling designers to select and apply with confidence.



amca CERTIFIED RATINGS
WATER PENETRATION
SOUND AND AIR PERFORMANCE
AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

Standard Construction

Frame . . . . . . Heavy gauge formed aluminum, 6 in. x 0.080 in. nominal wall thickness

Blades. . . . . . J style, heavy gauge formed aluminum, 0.080 in. nominal wall thickness, positioned at 45° on approximately 5 in. centers

Construction . . . Mechanically fastened

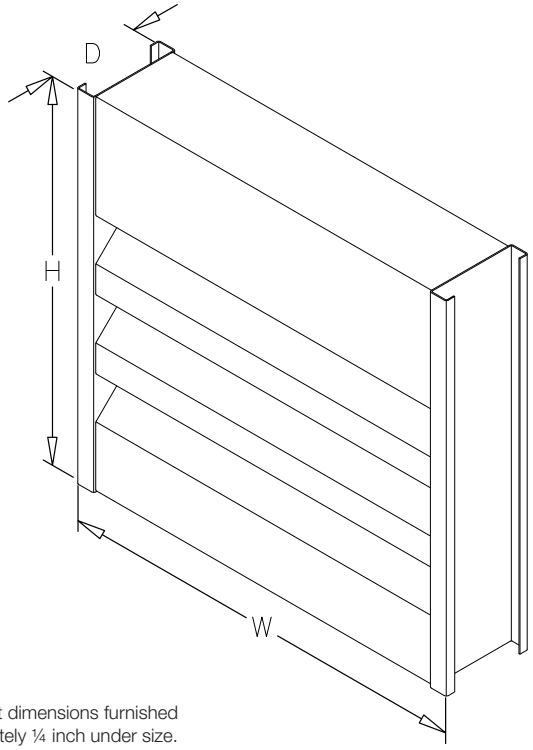
Acoustical Insulation . . . . . Fiberglass Insulation

Birdscreen. . . . . 3/4 in. x 0.051 flattened expanded aluminum in removable frame, inside mount (rear)

Finish. . . . . . Mill

Minimum Size . . 12 in. W x 15 in. H

Maximum Single Section Size . . . 60 in. W x 120 in. H



*Width and height dimensions furnished approximately ¼ inch under size.

Options *(at additional cost)*

- A variety of bird and insect screens
- Blank off panels
- Clip angles
- Extended sill
- Filter racks
- Flanged frame
- Galvanized steel frame and blade
- Security bars
- A variety of architectural finishes including:
  - Clear anodize
  - Integral color anodize
  - Baked enamel paint
  - Kynar paint

PERFORMANCE DATA

AFJ-601

J Blade Acoustical Louver
Formed Aluminum

Free Area Chart (Sq. ft.)

Louver Height Inches	Louver Width Inches								
	12	18	24	30	36	42	**48**	54	60
15	0.12	0.21	0.29	0.37	0.45	0.53	0.61	0.69	0.77
18	0.25	0.41	0.57	0.74	0.90	1.06	1.22	1.38	1.55
24	0.37	0.62	0.86	1.10	1.35	1.59	1.83	2.08	2.32
30	0.50	0.82	1.15	1.47	1.80	2.12	2.44	2.77	3.09
36	0.62	1.03	1.43	1.84	2.24	2.65	3.05	3.46	3.86
42	0.75	1.24	1.72	2.21	2.69	3.18	3.67	4.15	4.64
48	1.00	1.65	2.30	2.94	3.59	4.24	**4.89**	5.54	6.18
54	1.12	1.85	2.58	3.31	4.04	4.77	5.50	6.23	6.96
60	1.25	2.06	2.87	3.68	4.49	5.30	6.11	6.92	7.73
66	1.37	2.26	3.16	4.05	4.94	5.83	6.72	7.61	8.50
72	1.50	2.47	3.44	4.41	5.39	6.36	7.33	8.30	9.27
78	1.75	2.88	4.02	5.15	6.28	7.42	8.55	9.69	10.82
84	1.87	3.09	4.30	5.52	6.73	7.95	9.16	10.38	11.59
90	2.00	3.29	4.59	5.89	7.18	8.48	9.77	11.07	12.37
96	2.12	3.50	4.88	6.25	7.63	9.01	10.38	11.76	13.14
102	2.25	3.71	5.16	6.62	8.08	9.54	11.00	12.45	13.91
108	2.50	4.12	5.74	7.36	8.98	10.60	12.22	13.84	15.46
114	2.62	4.32	6.02	7.73	9.43	11.13	12.83	14.53	16.23
120	2.75	4.53	6.31	8.09	9.88	11.66	13.44	15.22	17.00

Greenheck Fan Corporation certifies that the AFJ-601 louvers shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to water penetration, air performance and sound ratings.

Sound Transmission Class

The Sound Transmission Class (STC) is a rating of the effectiveness of an assembly in isolating or reducing airborne sound transmission. STC is a single number that summarizes airborne sound transmission loss data. Assemblies with higher STC ratings are more efficient at reducing sound transmission. STC is determined in accordance with ASTM E413-04.

Transmission Loss

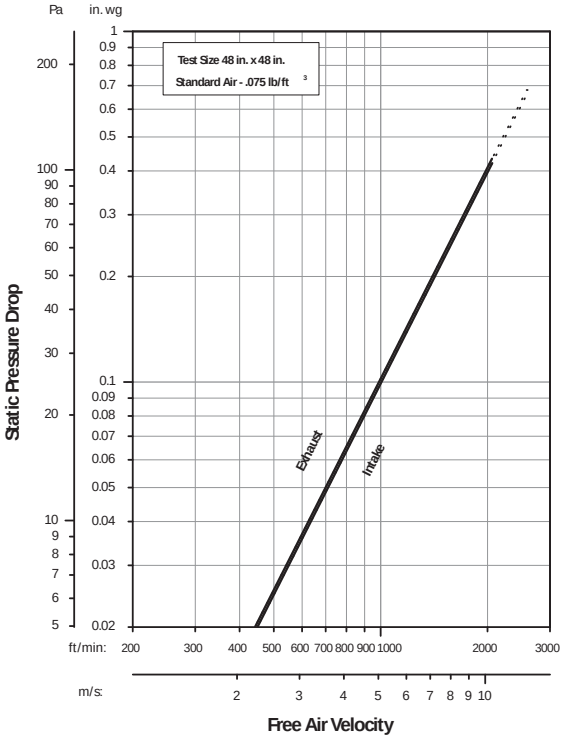
Transmission loss (TL) is a measurement of the reduction of sound power transmission (dB) through an assembly at a given frequency. The more sound power that is reduced, the greater the TL. TL is tested in accordance with ASTM E90-04.

Free Field Noise Reduction in Decibels

Free Field Noise Reduction is determined by adding 6 dB to the Transmission Loss.

Octave Band	2	3	4	5	6	7	STC
Frequency (Hz)	63	125	250	500	1000	2000	
Transmission Loss (dB)	4	4	6	10	17	12	10
Free Field Noise Reduction (dB)	10	10	12	16	23	18	

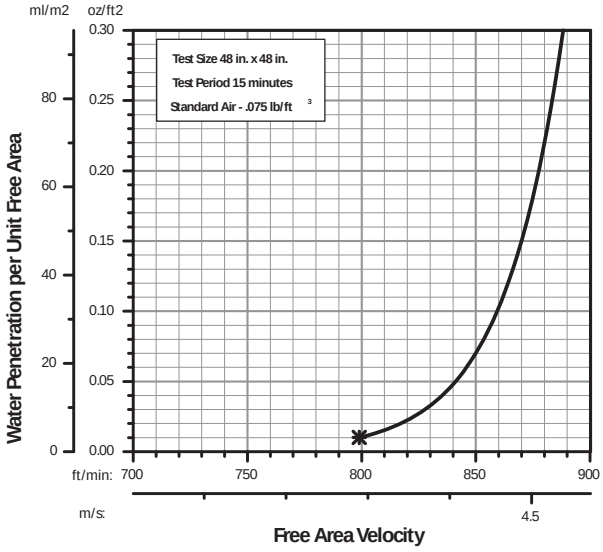
Airflow Resistance (Standard Air - .075 lb/ft³)



Model AFJ-601 resistance to airflow (pressure drop) varies depending on louver application (air intake or air exhaust). Free area velocities (shown) are higher than average velocity through the overall louver size. See louver selection information.

Water Penetration (Standard Air - .075 lb/ft³)

Test size 48 in. x 48 in. Test duration of 15 min.



The AMCA Water Penetration Test provides a method for comparing various louver models and designs as to their efficiency in resisting the penetration of rainfall under specific laboratory test conditions. The beginning point of water penetration is defined as that velocity where the water penetration curve projects through .01 oz. of water (penetration) per sq. ft. of louver free area. ***The beginning point of water penetration for Model AFJ-601 is 799 fpm free area velocity.** These performance ratings do not guarantee a louver to be weatherproof or stormproof and should be used in combination with other factors including good engineering judgement in selecting louvers.

INSTALLATION DETAILS

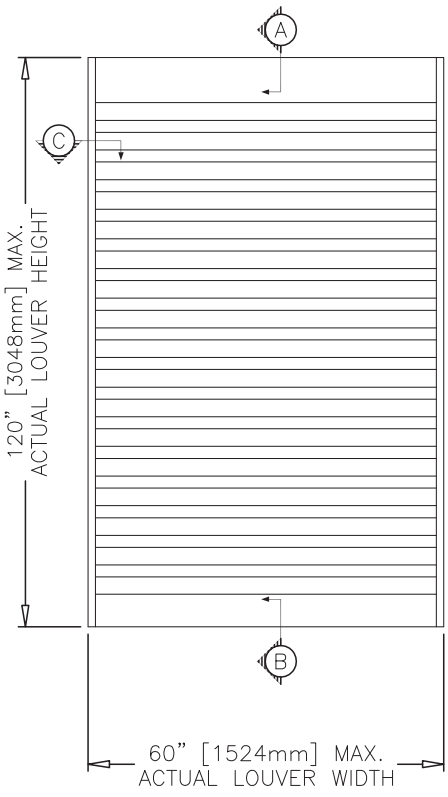
AFJ-601

J Blade Acoustical Louver
Formed Aluminum

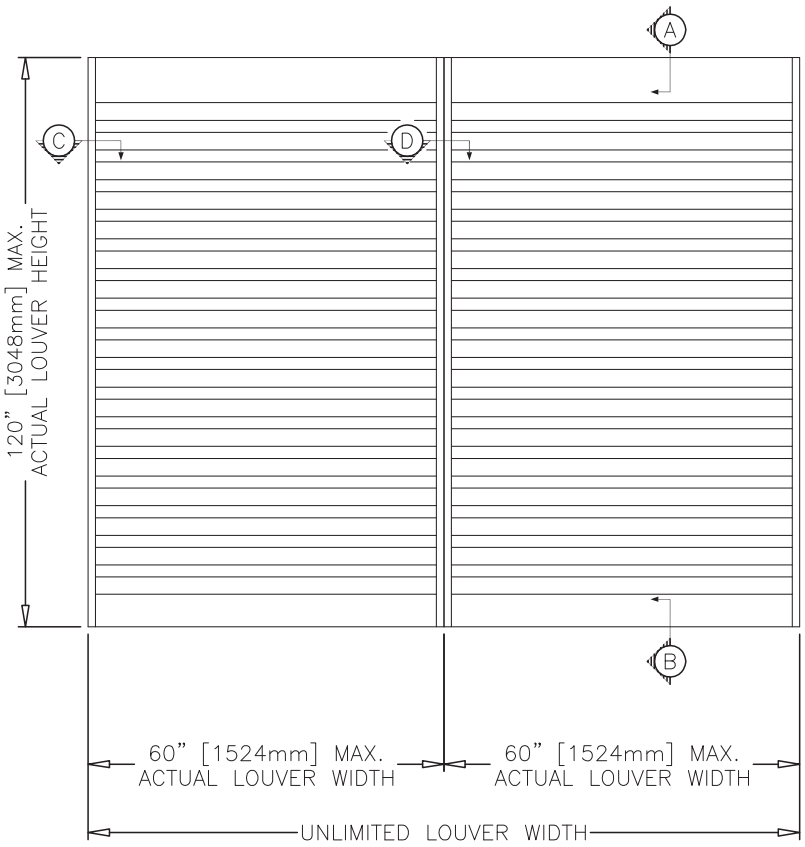
Maximum Size and Installation Information

Maximum single section size for model AFJ-601 is 60 in. W x 120 in. H. Larger openings require field assembly of multiple louver panels to make up the overall opening size. Individual louver panels are designed to withstand a 25 PSF wind-load (please consult Greenheck if the louvers must withstand higher wind-loads). Structural reinforcing members may be required to adequately support and install multiple louver panels within a large opening. Structural reinforcing members along with any associated installation hardware is not provided by Greenheck unless indicated otherwise by Greenheck. Additional information on louver installation may be found in AMCA Publication #501, Louver Application Manual.

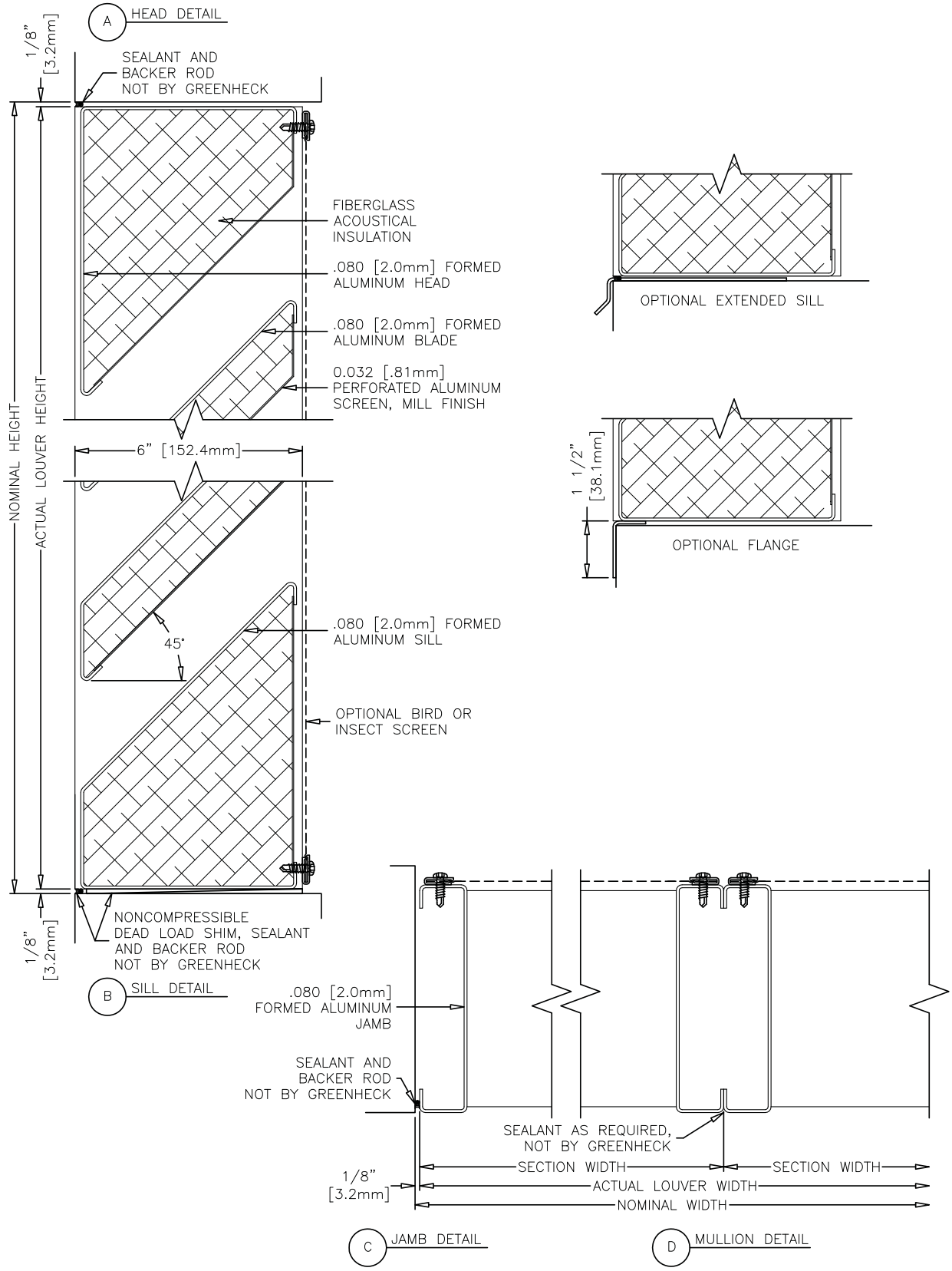
SINGLE SECTION



MULTIPLE SECTION W/ MULLION



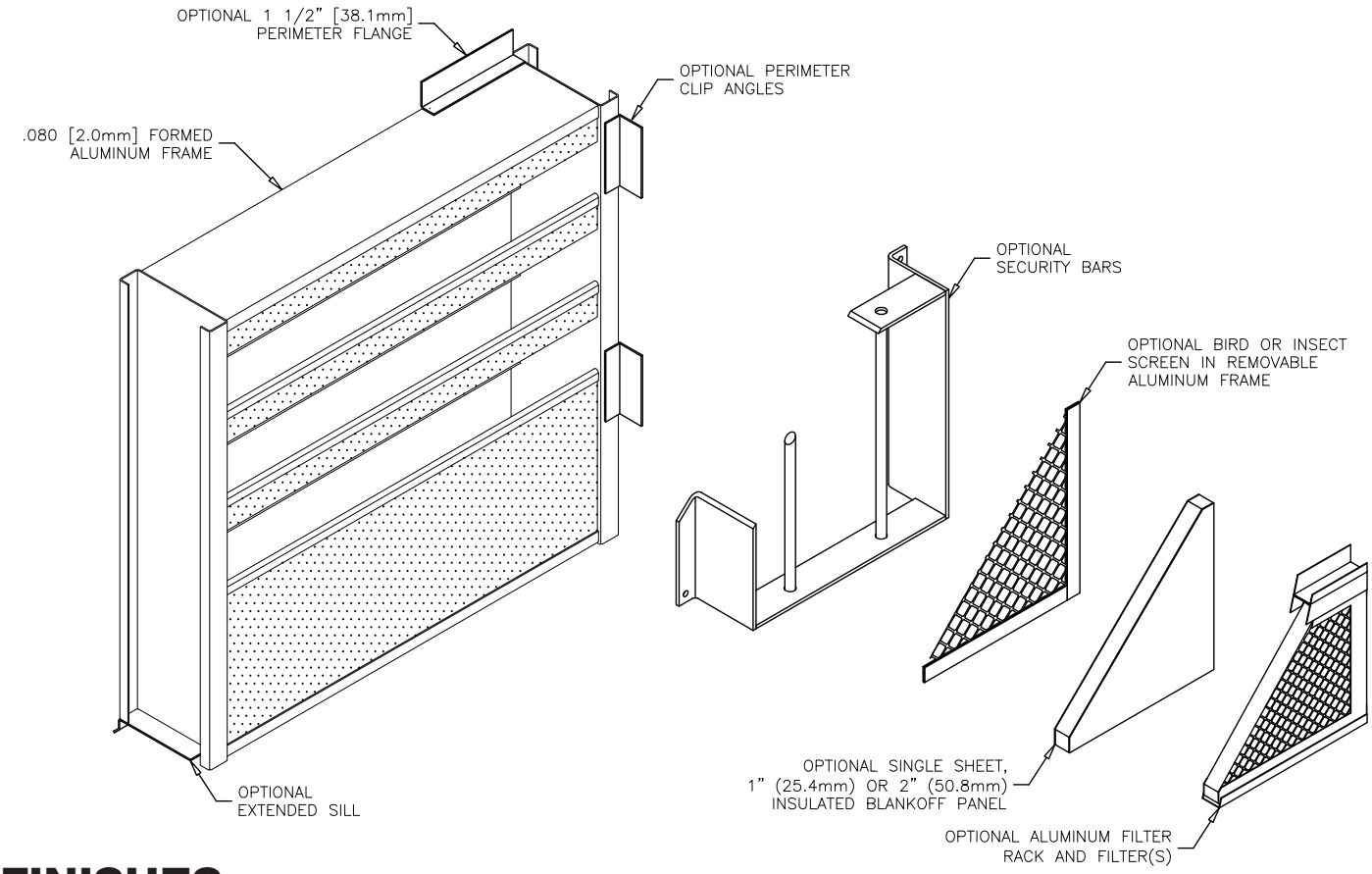
Minimum Single Section Size	Maximum Single Section Size
12 in. W x 15 in. H	60 in. W x 120 in. H


A HEAD DETAIL
1/8" [3.2mm]
SEALANT AND BACKER ROD NOT BY GREENHECK
FIBERGLASS ACOUSTICAL INSULATION
.080 [2.0mm] FORMED ALUMINUM HEAD
.080 [2.0mm] FORMED ALUMINUM BLADE
0.032 [.81mm] PERFORATED ALUMINUM SCREEN, MILL FINISH
NOMINAL HEIGHT
ACTUAL LOUVER HEIGHT
6" [152.4mm]
45°
.080 [2.0mm] FORMED ALUMINUM SILL
OPTIONAL BIRD OR INSECT SCREEN
NONCOMPRESSIBLE DEAD LOAD SHIM, SEALANT AND BACKER ROD NOT BY GREENHECK
1/8" [3.2mm]
B SILL DETAIL
OPTIONAL EXTENDED SILL
1 1/2" [38.1mm]
OPTIONAL FLANGE
.080 [2.0mm] FORMED ALUMINUM JAMB
SEALANT AND BACKER ROD NOT BY GREENHECK
SEALANT AS REQUIRED, NOT BY GREENHECK
SECTION WIDTH
SECTION WIDTH
1/8" [3.2mm]
ACTUAL LOUVER WIDTH
NOMINAL WIDTH
C JAMB DETAIL
D MULLION DETAIL

OPTION DRAWINGS

AFJ-601

J Blade Acoustical Louver
Formed Aluminum



FINISHES

Finish Type	Description/Application	Color Selection	Standard Warranty (Aluminum)
2-coat 70% KYNAR 500®/HYLAR 5000® AAMA 2605 – Dry film thickness 1.2 mil. (AKA: Duranar®, Fluoropon®, Trinar®, Flouropolymer, Polyvinylidene Fluoride, PVDF2)	***"Best."*** The premier finish for extruded aluminum. Tough, long-lasting coating has superior color retention and abrasive properties. Resists chalking, fading, chemical abrasion and weathering.	**Standard Colors:** Any of the 24 standard colors shown can be furnished in 70% or 50% KYNAR 500®/HYLAR 5000® or Baked Enamel. **2-Coat Mica:** Greenheck offers 9 standard 2-coat Mica colors. Other colors are available. Consult Greenheck for possible extra cost when selecting non-standard colors or special finishes.	10 Years (Consult Greenheck for availability of extended warranty)
2-coat 50% KYNAR 500®/HYLAR 5000® AAMA 2604 – Dry film thickness 1.2 mil. (AKA: Acroflur®, Acrynar®)	***"Better."*** Tough, long-lasting coating has excellent color retention and abrasive properties. Resists chalking, fading, chemical abrasion and weathering.		5 Years
Baked Enamel AAMA 2603 – Dry film thickness 0.8 mil. (AKA: Acrabond Plus®, Duracron®)	***"Good."*** Provides good adhesion and resistance to weathering, corrosion and chemical stain.		1 Year
Integral Color Anodize AA-M10C22A42 (>0.7 mil)	"Two-step" anodizing is produced by following the normal anodizing step with a second, colorfast process.	Light, Medium or Dark Bronze; Champagne; Black	5 years
Clear Anodize 215 R-1 AA-M10C22A41 (>0.7 mil)	Clear, colorless and hard oxide aluminum coating that resists weathering and chemical attack.	Clear	5 years
Clear Anodize 204 R-1 AA-M10C22A31 (0.4-0.7 mil)	Clear, colorless and hard oxide aluminum coating that resists weathering and chemical attack.	Clear	1 Year
Industrial coatings	Greenheck offers a number of industrial coatings such as Hi-Pro Polyester, Epoxy, and Permatector®. Consult a Greenheck Product Specialist for complete color and application information.		Consult Greenheck
Mill	Materials may be supplied in natural aluminum or galvanized steel finish when normal weathering is acceptable and there is no concern for color or color change.		n/a

Finishes meet or exceed AAMA 2605, AAMA 2604, and AAMA 2603 requirements. Please consult www.greenheck.com for complete information on standard and extended paint warranties. Paint finish warranties are not applicable to steel products.

GREENHECK®

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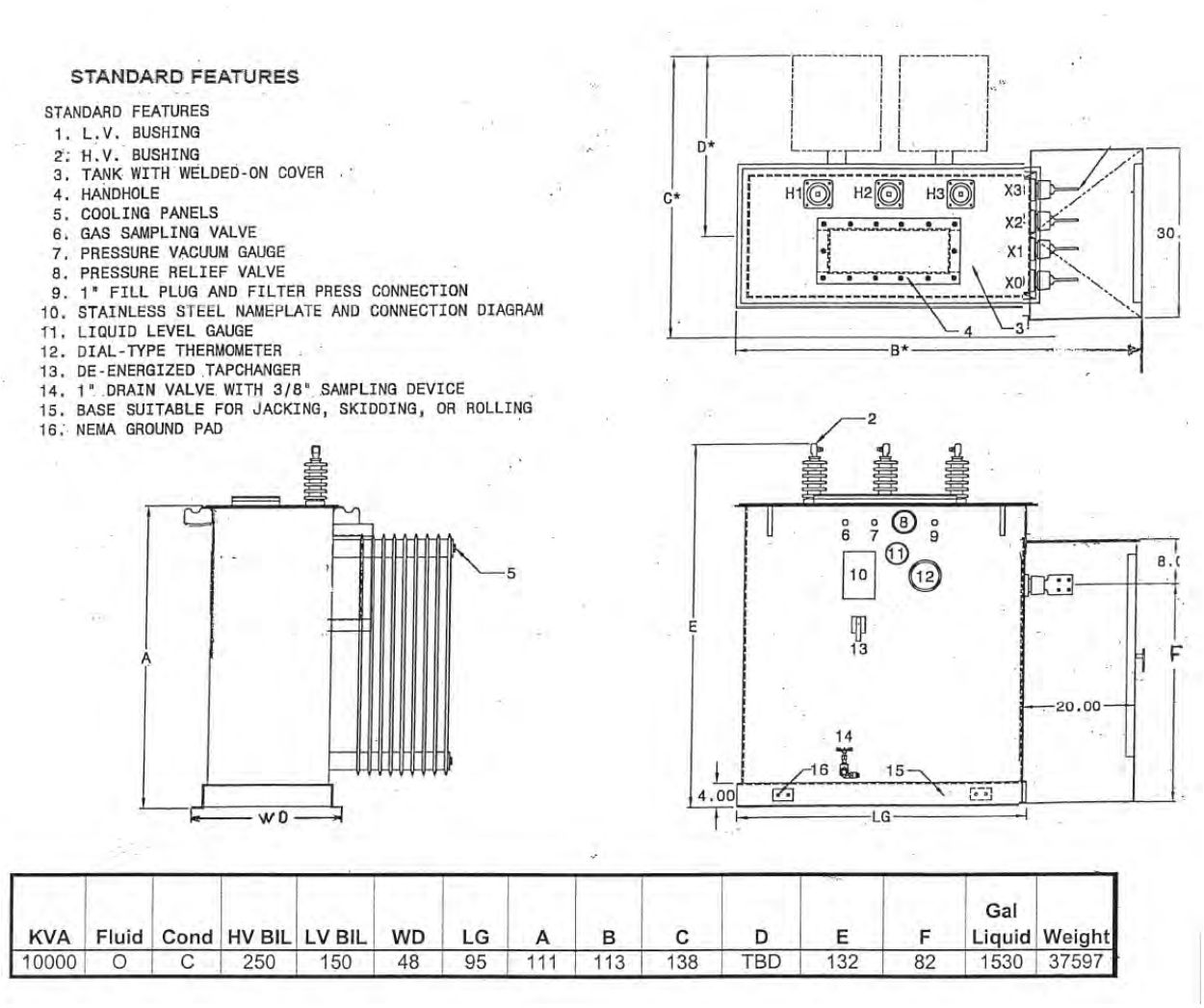
AFJ-601
August 2010 Rev. 1

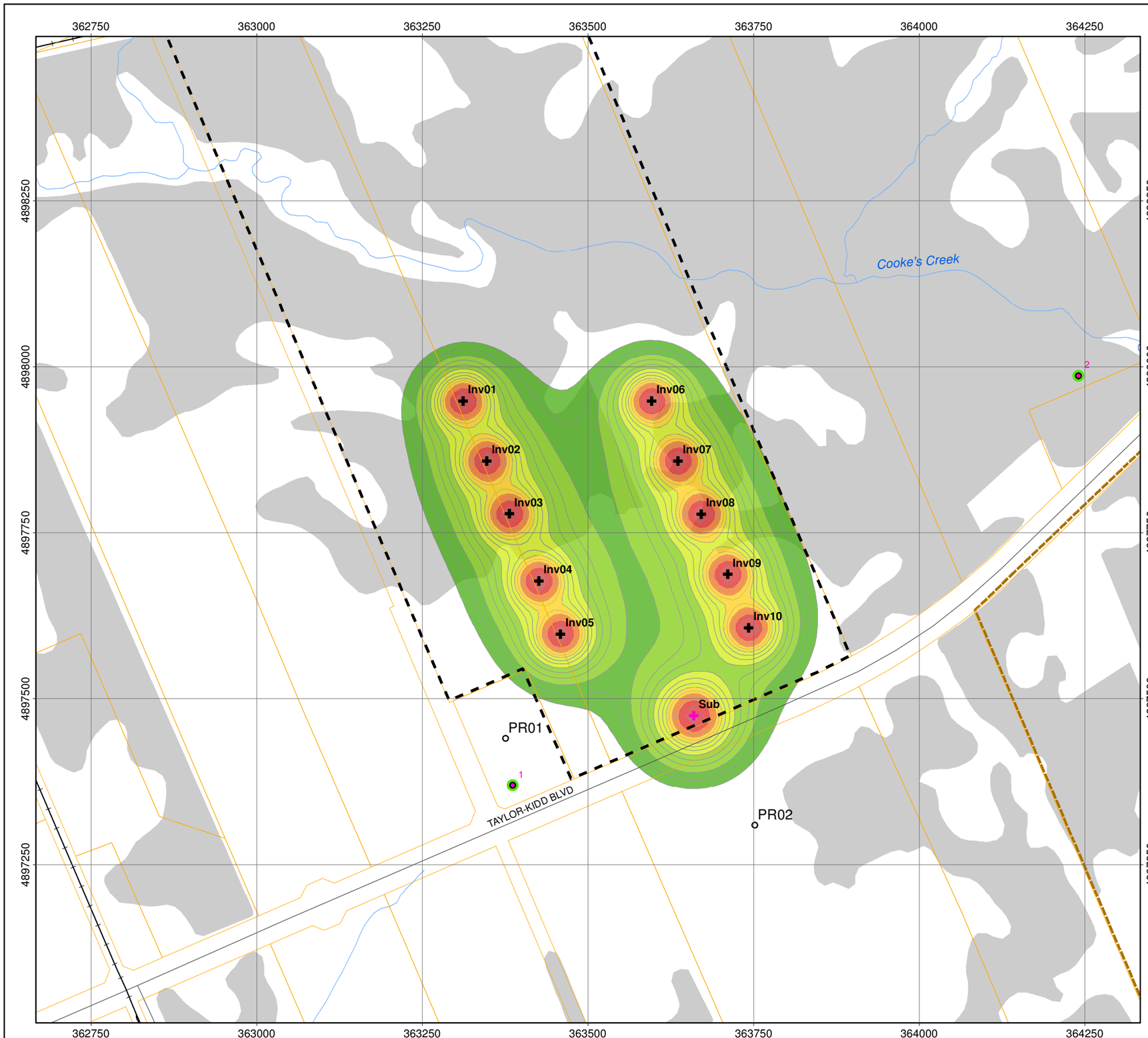


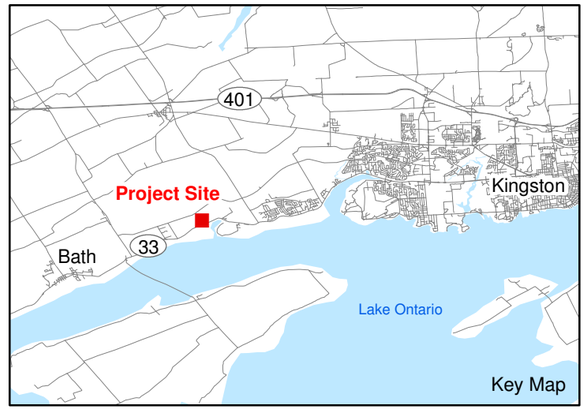
KVA	Fluid	Cond	HV BIL	LV BIL	WD	LG	A	B	C	D	E	F	Gal Liquid	Weight
10000	O	C	250	150	48	95	111	113	138	TBD	132	82	1530	37597

Figure B.3 Catalogue Dimensions (inches) of Substation Transformer, Obtained from Magna Electric Corporation.

Appendix C

Noise Map from CADNA-A





Legend

- PR## Parcel Identifier
- Inv# Inverter Unit
- Sub Substation Transformer
- # Noise Receptor
- # Representative Noise Receptor
- Railway
- Road
- Watercourse
- Parcel
- Parrott's Bay Conservation Area
- Project Site
- Wooded Area

Sound Pressure Level (dBA)

40.0 - 41.0 | 41.1 - 44.0 | 44.1 - 47.0 | 47.1 - 49.0 | 49.1 - 52.0 | > 52.1

0 50 100 200 300 Meters

NORTH

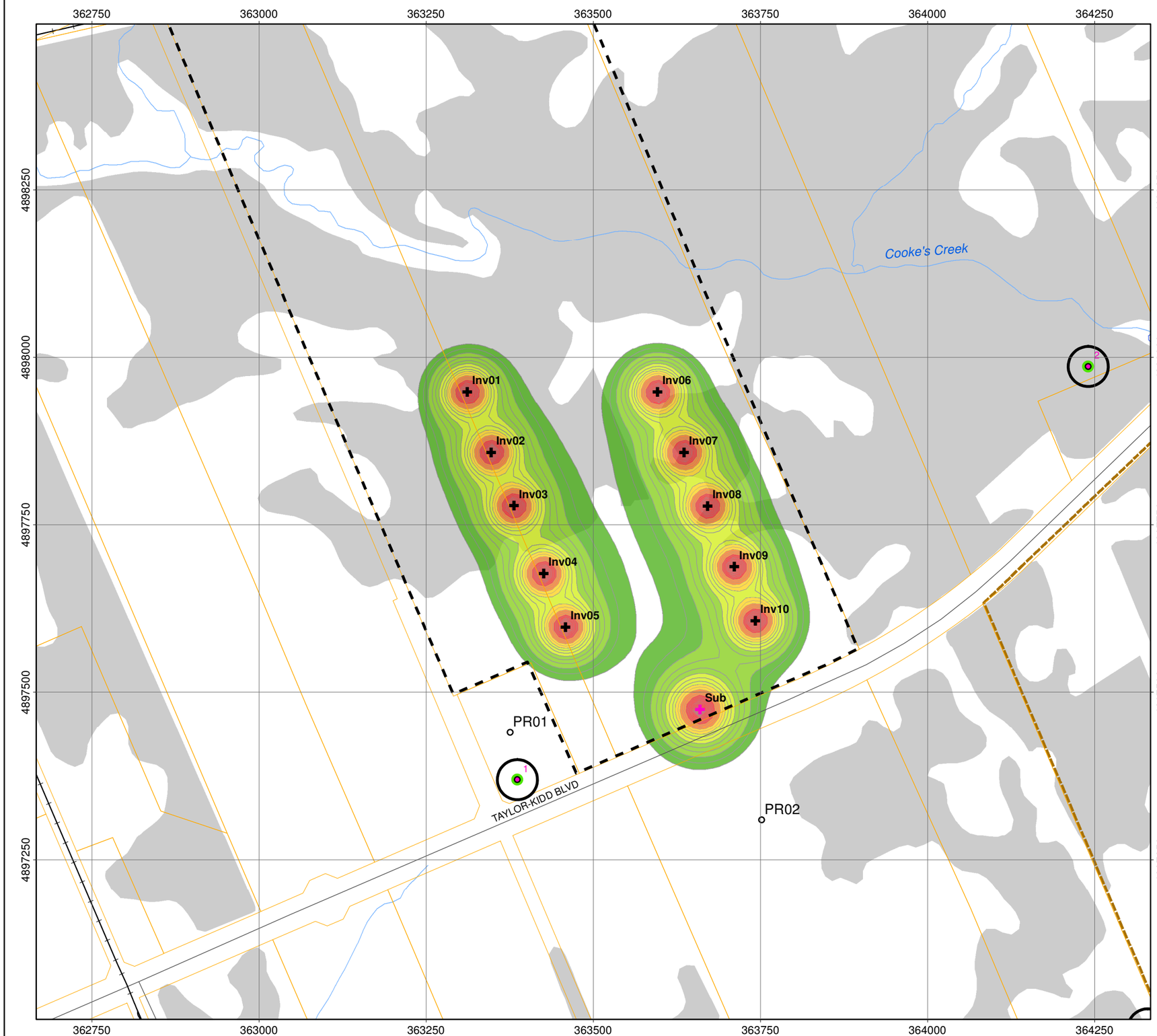
1:20,000

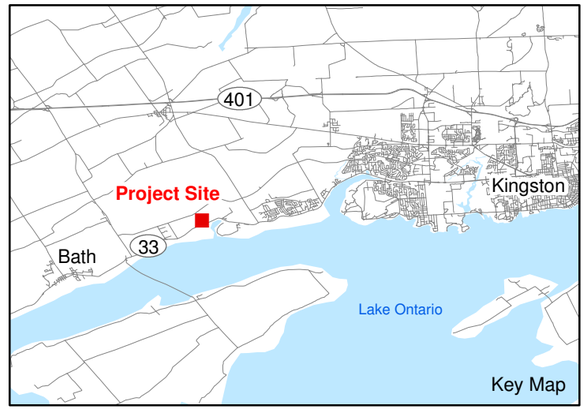
Notes:
1. OBM and NRVIS data downloaded from LIO with permission.
2. Spatial referencing UTM NAD 83.

Figure C.1
Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Project
Noise Contours at 4.5 m

HATCH

Path: P:\CANSOLAR\335467\SPECIALIST_APPS\GIS\Napanee\Napanee Taylor_Noise_FigC1.mxd Date Saved: 5/9/2012 1:46:23 PM





Legend

- PR## Parcel Identifier
- Inv# Inverter Unit
- Sub Substation Transformer
- # Noise Receptor
- # Representative Noise Receptor
- Railway
- Road
- Watercourse
- Parcel
- Parrott's Bay Conservation Area
- Project Site
- 30 m from Noise Receptor
- Wooded Area

Sound Pressure Level (dBA)

40.0 - 41.0	41.1 - 44.0	44.1 - 47.0	47.1 - 49.0	49.1 - 52.0	> 52.1

0 50 100 200 300 Meters

NORTH

1:20,000

Notes:
1. OBM and NRVIS data downloaded from LIO with permission.
2. Spatial referencing UTM NAD 83.

Figure C.2
Axio Power Canada Inc./SunEdison Canada
Napanee TS Taylor Kidd Solar Project
Noise Contours at 1.5 m

HATCH

Path: P:\CANSOLAR\335467\SPECIALIST_APPS\GIS\Napanee\Napanee Taylor_Noise_FigC2.mxd Date Saved: 5/9/2012 1:49:44 PM

Appendix D

CADNA-A Sample Calculations

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	3000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.70
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03)	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver
Name: Receptors - Existing
ID: 1.0
X: 363386.33
Y: 4897369.40
Z: 4.50

Point Source, ISO 9613, Name: "Sub", ID: "Sub"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363659.65	4897474.55	3.00	0	32	48.0	48.0	0.0	0.0	60.3	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	-8.7	-8.7
2	363659.65	4897474.55	3.00	0	63	67.2	67.2	0.0	0.0	60.3	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	10.5	10.5
3	363659.65	4897474.55	3.00	0	125	79.3	79.3	0.0	0.0	60.3	0.1	2.7	0.0	0.0	0.0	0.0	-0.0	16.1	16.1
4	363659.65	4897474.55	3.00	0	250	81.8	81.8	0.0	0.0	60.3	0.3	2.5	0.0	0.0	0.0	0.0	-0.0	18.6	18.6
5	363659.65	4897474.55	3.00	0	500	87.2	87.2	0.0	0.0	60.3	0.6	-1.0	0.0	0.0	0.0	0.0	-0.0	27.3	27.3
6	363659.65	4897474.55	3.00	0	1000	84.4	84.4	0.0	0.0	60.3	1.1	-1.1	0.0	0.0	0.0	0.0	-0.0	24.1	24.1
7	363659.65	4897474.55	3.00	0	2000	80.6	80.6	0.0	0.0	60.3	2.8	-1.1	0.0	0.0	0.0	0.0	-0.0	18.6	18.6
8	363659.65	4897474.55	3.00	0	4000	75.4	75.4	0.0	0.0	60.3	9.6	-1.1	0.0	0.0	0.0	0.0	-0.0	6.6	6.6
9	363659.65	4897474.55	3.00	0	8000	66.3	66.3	0.0	0.0	60.3	34.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-27.2	-27.2

Point Source, ISO 9613, Name: "Inv01", ID: "Inv01"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363311.65	4897948.61	3.50	0	63	59.8	59.8	0.0	0.0	66.3	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	-1.8	-1.8
2	363311.65	4897948.61	3.50	0	125	73.9	73.9	0.0	0.0	66.3	0.2	3.4	0.0	0.0	0.0	0.0	-0.0	3.9	3.9
3	363311.65	4897948.61	3.50	0	250	86.0	86.0	0.0	0.0	66.3	0.6	1.5	0.0	0.0	0.0	0.0	-0.0	17.5	17.5
4	363311.65	4897948.61	3.50	0	500	80.6	80.6	0.0	0.0	66.3	1.1	-1.4	0.0	0.0	0.0	0.0	-0.0	14.5	14.5
5	363311.65	4897948.61	3.50	0	1000	72.1	72.1	0.0	0.0	66.3	2.1	-1.4	0.0	0.0	0.0	0.0	-0.0	5.1	5.1
6	363311.65	4897948.61	3.50	0	2000	74.6	74.6	0.0	0.0	66.3	5.6	-1.4	0.0	0.0	0.0	0.0	-0.0	4.1	4.1
7	363311.65	4897948.61	3.50	0	4000	84.9	84.9	0.0	0.0	66.3	19.1	-1.4	0.0	0.0	0.0	0.0	-0.0	0.9	0.9
8	363311.65	4897948.61	3.50	0	8000	70.4	70.4	0.0	0.0	66.3	68.3	-1.4	0.0	0.0	0.0	0.0	-0.0	-62.8	-62.8

Point Source, ISO 9613, Name: "Inv02", ID: "Inv02"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363347.45	4897858.37	3.50	0	63	59.8	59.8	0.0	0.0	64.8	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	-0.5	-0.5
2	363347.45	4897858.37	3.50	0	125	73.9	73.9	0.0	0.0	64.8	0.2	3.3	0.0	0.0	0.0	0.0	-0.0	5.6	5.6
3	363347.45	4897858.37	3.50	0	250	86.0	86.0	0.0	0.0	64.8	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	19.1	19.1
4	363347.45	4897858.37	3.50	0	500	80.6	80.6	0.0	0.0	64.8	1.0	-1.3	0.0	0.0	0.0	0.0	-0.0	16.2	16.2
5	363347.45	4897858.37	3.50	0	1000	72.1	72.1	0.0	0.0	64.8	1.8	-1.4	0.0	0.0	0.0	0.0	-0.0	6.8	6.8
6	363347.45	4897858.37	3.50	0	2000	74.6	74.6	0.0	0.0	64.8	4.7	-1.4	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
7	363347.45	4897858.37	3.50	0	4000	84.9	84.9	0.0	0.0	64.8	16.1	-1.4	0.0	0.0	0.0	0.0	-0.0	5.4	5.4
8	363347.45	4897858.37	3.50	0	8000	70.4	70.4	0.0	0.0	64.8	57.3	-1.4	0.0	0.0	0.0	0.0	-0.0	-50.4	-50.4

Point Source, ISO 9613, Name: "Inv03", ID: "Inv03"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363381.49	4897778.47	3.50	0	63	59.8	59.8	0.0	0.0	63.2	0.1	-4.2	0.0	0.0	0.0	0.0	-0.0	0.8	0.8
2	363381.49	4897778.47	3.50	0	125	73.9	73.9	0.0	0.0	63.2	0.2	3.1	0.0	0.0	0.0	0.0	-0.0	7.4	7.4
3	363381.49	4897778.47	3.50	0	250	86.0	86.0	0.0	0.0	63.2	0.4	1.7	0.0	0.0	0.0	0.0	-0.0	20.6	20.6
4	363381.49	4897778.47	3.50	0	500	80.6	80.6	0.0	0.0	63.2	0.8	-1.2	0.0	0.0	0.0	0.0	-0.0	17.8	17.8
5	363381.49	4897778.47	3.50	0	1000	72.1	72.1	0.0	0.0	63.2	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	8.6	8.6
6	363381.49	4897778.47	3.50	0	2000	74.6	74.6	0.0	0.0	63.2	3.9	-1.3	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
7	363381.49	4897778.47	3.50	0	4000	84.9	84.9	0.0	0.0	63.2	13.4	-1.3	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
8	363381.49	4897778.47	3.50	0	8000	70.4	70.4	0.0	0.0	63.2	47.8	-1.3	0.0	0.0	0.0	0.0	-0.0	-39.4	-39.4

Point Source, ISO 9613, Name: "Inv04", ID: "Inv04"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363425.85	4897677.52	3.50	0	63	59.8	59.8	0.0	0.0	60.8	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	2.6	2.6
2	363425.85	4897677.52	3.50	0	125	73.9	73.9	0.0	0.0	60.8	0.1	3.0	0.0	0.0	0.0	0.0	-0.0	9.9	9.9
3	363425.85	4897677.52	3.50	0	250	86.0	86.0	0.0	0.0	60.8	0.3	1.9	0.0	0.0	0.0	0.0	-0.0	23.0	23.0
4	363425.85	4897677.52	3.50	0	500	80.6	80.6	0.0	0.0	60.8	0.6	-1.1	0.0	0.0	0.0	0.0	-0.0	20.2	20.2

Point Source, ISO 9613, Name: "Inv04", ID: "Inv04"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
5	363425.85	4897677.52	3.50	0	1000	72.1	72.1	0.0	0.0	60.8	1.1	-1.1	0.0	0.0	0.0	0.0	-0.0	11.2	11.2
6	363425.85	4897677.52	3.50	0	2000	74.6	74.6	0.0	0.0	60.8	3.0	-1.1	0.0	0.0	0.0	0.0	-0.0	11.9	11.9
7	363425.85	4897677.52	3.50	0	4000	84.9	84.9	0.0	0.0	60.8	10.2	-1.1	0.0	0.0	0.0	0.0	-0.0	15.0	15.0
8	363425.85	4897677.52	3.50	0	8000	70.4	70.4	0.0	0.0	60.8	36.3	-1.1	0.0	0.0	0.0	0.0	-0.0	-25.7	-25.7

Point Source, ISO 9613, Name: "Inv05", ID: "Inv05"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363458.72	4897597.41	3.50	0	63	59.8	59.8	0.0	0.0	58.6	0.0	-3.0	0.0	0.0	0.0	0.0	-0.0	4.2	4.2
2	363458.72	4897597.41	3.50	0	125	73.9	73.9	0.0	0.0	58.6	0.1	3.0	0.0	0.0	0.0	0.0	-0.0	12.2	12.2
3	363458.72	4897597.41	3.50	0	250	86.0	86.0	0.0	0.0	58.6	0.3	2.0	0.0	0.0	0.0	0.0	-0.0	25.1	25.1
4	363458.72	4897597.41	3.50	0	500	80.6	80.6	0.0	0.0	58.6	0.5	-0.9	0.0	0.0	0.0	0.0	-0.0	22.4	22.4
5	363458.72	4897597.41	3.50	0	1000	72.1	72.1	0.0	0.0	58.6	0.9	-0.9	0.0	0.0	0.0	0.0	-0.0	13.6	13.6
6	363458.72	4897597.41	3.50	0	2000	74.6	74.6	0.0	0.0	58.6	2.3	-0.9	0.0	0.0	0.0	0.0	-0.0	14.6	14.6
7	363458.72	4897597.41	3.50	0	4000	84.9	84.9	0.0	0.0	58.6	7.8	-0.9	0.0	0.0	0.0	0.0	-0.0	19.4	19.4
8	363458.72	4897597.41	3.50	0	8000	70.4	70.4	0.0	0.0	58.6	28.0	-0.9	0.0	0.0	0.0	0.0	-0.0	-15.2	-15.2

Point Source, ISO 9613, Name: "Inv06", ID: "Inv06"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363596.04	4897948.71	3.50	0	63	59.8	59.8	0.0	0.0	66.8	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	-2.2	-2.2
2	363596.04	4897948.71	3.50	0	125	73.9	73.9	0.0	0.0	66.8	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	3.4	3.4
3	363596.04	4897948.71	3.50	0	250	86.0	86.0	0.0	0.0	66.8	0.6	1.5	0.0	0.0	0.0	0.0	-0.0	17.0	17.0
4	363596.04	4897948.71	3.50	0	500	80.6	80.6	0.0	0.0	66.8	1.2	-1.4	0.0	0.0	0.0	0.0	-0.0	14.0	14.0
5	363596.04	4897948.71	3.50	0	1000	72.1	72.1	0.0	0.0	66.8	2.3	-1.5	0.0	0.0	0.0	0.0	-0.0	4.5	4.5
6	363596.04	4897948.71	3.50	0	2000	74.6	74.6	0.0	0.0	66.8	6.0	-1.5	0.0	0.0	0.0	0.0	-0.0	3.3	3.3
7	363596.04	4897948.71	3.50	0	4000	84.9	84.9	0.0	0.0	66.8	20.2	-1.5	0.0	0.0	0.0	0.0	-0.0	-0.6	-0.6
8	363596.04	4897948.71	3.50	0	8000	70.4	70.4	0.0	0.0	66.8	72.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-67.0	-67.0

Point Source, ISO 9613, Name: "Inv07", ID: "Inv07"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363635.77	4897858.27	3.50	0	63	59.8	59.8	0.0	0.0	65.8	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	-1.4	-1.4
2	363635.77	4897858.27	3.50	0	125	73.9	73.9	0.0	0.0	65.8	0.2	3.4	0.0	0.0	0.0	0.0	-0.0	4.5	4.5
3	363635.77	4897858.27	3.50	0	250	86.0	86.0	0.0	0.0	65.8	0.6	1.6	0.0	0.0	0.0	0.0	-0.0	18.1	18.1
4	363635.77	4897858.27	3.50	0	500	80.6	80.6	0.0	0.0	65.8	1.1	-1.4	0.0	0.0	0.0	0.0	-0.0	15.1	15.1
5	363635.77	4897858.27	3.50	0	1000	72.1	72.1	0.0	0.0	65.8	2.0	-1.4	0.0	0.0	0.0	0.0	-0.0	5.7	5.7
6	363635.77	4897858.27	3.50	0	2000	74.6	74.6	0.0	0.0	65.8	5.3	-1.4	0.0	0.0	0.0	0.0	-0.0	4.9	4.9
7	363635.77	4897858.27	3.50	0	4000	84.9	84.9	0.0	0.0	65.8	18.0	-1.4	0.0	0.0	0.0	0.0	-0.0	2.5	2.5
8	363635.77	4897858.27	3.50	0	8000	70.4	70.4	0.0	0.0	65.8	64.1	-1.4	0.0	0.0	0.0	0.0	-0.0	-58.1	-58.1

Point Source, ISO 9613, Name: "Inv08", ID: "Inv08"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363670.99	4897778.16	3.50	0	63	59.8	59.8	0.0	0.0	65.0	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	-0.7	-0.7
2	363670.99	4897778.16	3.50	0	125	73.9	73.9	0.0	0.0	65.0	0.2	3.3	0.0	0.0	0.0	0.0	-0.0	5.5	5.5
3	363670.99	4897778.16	3.50	0	250	86.0	86.0	0.0	0.0	65.0	0.5	1.6	0.0	0.0	0.0	0.0	-0.0	18.9	18.9
4	363670.99	4897778.16	3.50	0	500	80.6	80.6	0.0	0.0	65.0	1.0	-1.3	0.0	0.0	0.0	0.0	-0.0	16.0	16.0
5	363670.99	4897778.16	3.50	0	1000	72.1	72.1	0.0	0.0	65.0	1.8	-1.4	0.0	0.0	0.0	0.0	-0.0	6.7	6.7
6	363670.99	4897778.16	3.50	0	2000	74.6	74.6	0.0	0.0	65.0	4.8	-1.4	0.0	0.0	0.0	0.0	-0.0	6.2	6.2
7	363670.99	4897778.16	3.50	0	4000	84.9	84.9	0.0	0.0	65.0	16.3	-1.4	0.0	0.0	0.0	0.0	-0.0	5.0	5.0
8	363670.99	4897778.16	3.50	0	8000	70.4	70.4	0.0	0.0	65.0	58.2	-1.4	0.0	0.0	0.0	0.0	-0.0	-51.4	-51.4

Point Source, ISO 9613, Name: "Inv09", ID: "Inv09"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363710.92	4897687.56	3.50	0	63	59.8	59.8	0.0	0.0	64.1	0.1	-4.4	0.0	0.0	0.0	0.0	-0.0	0.0	0.0
2	363710.92	4897687.56	3.50	0	125	73.9	73.9	0.0	0.0	64.1	0.2	3.2	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
3	363710.92	4897687.56	3.50	0	250	86.0	86.0	0.0	0.0	64.1	0.5	1.7	0.0	0.0	0.0	0.0	-0.0	19.7	19.7
4	363710.92	4897687.56	3.50	0	500	80.6	80.6	0.0	0.0	64.1	0.9	-1.3	0.0	0.0	0.0	0.0	-0.0	16.9	16.9
5	363710.92	4897687.56	3.50	0	1000	72.1	72.1	0.0	0.0	64.1	1.7	-1.3	0.0	0.0	0.0	0.0	-0.0	7.6	7.6
6	363710.92	4897687.56	3.50	0	2000	74.6	74.6	0.0	0.0	64.1	4.4	-1.3	0.0	0.0	0.0	0.0	-0.0	7.4	7.4
7	363710.92	4897687.56	3.50	0	4000	84.9	84.9	0.0	0.0	64.1	14.9	-1.3	0.0	0.0	0.0	0.0	-0.0	7.2	7.2

Point Source, ISO 9613, Name: "Inv09", ID: "Inv09"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
8	363710.92	4897687.56	3.50	0	8000	70.4	70.4	0.0	0.0	64.1	53.1	-1.3	0.0	0.0	0.0	0.0	-0.0	-45.5	-45.5

Point Source, ISO 9613, Name: "Inv10", ID: "Inv10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)
1	363742.42	4897606.91	3.50	0	63	59.8	59.8	0.0	0.0	63.6	0.1	-4.3	0.0	0.0	0.0	0.0	-0.0	0.4	0.4
2	363742.42	4897606.91	3.50	0	125	73.9	73.9	0.0	0.0	63.6	0.2	3.1	0.0	0.0	0.0	0.0	-0.0	7.0	7.0
3	363742.42	4897606.91	3.50	0	250	86.0	86.0	0.0	0.0	63.6	0.5	1.7	0.0	0.0	0.0	0.0	-0.0	20.3	20.3
4	363742.42	4897606.91	3.50	0	500	80.6	80.6	0.0	0.0	63.6	0.8	-1.3	0.0	0.0	0.0	0.0	-0.0	17.4	17.4
5	363742.42	4897606.91	3.50	0	1000	72.1	72.1	0.0	0.0	63.6	1.6	-1.3	0.0	0.0	0.0	0.0	-0.0	8.2	8.2
6	363742.42	4897606.91	3.50	0	2000	74.6	74.6	0.0	0.0	63.6	4.1	-1.3	0.0	0.0	0.0	0.0	-0.0	8.1	8.1
7	363742.42	4897606.91	3.50	0	4000	84.9	84.9	0.0	0.0	63.6	14.0	-1.3	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
8	363742.42	4897606.91	3.50	0	8000	70.4	70.4	0.0	0.0	63.6	50.0	-1.3	0.0	0.0	0.0	0.0	-0.0	-42.0	-42.0

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