Cornwall Solar Project
Renewable Energy Approval
Modification Report

FINAL REPORT

October 16, 2020

Prepared for:

Liberty Power
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Oakville ON L6J 2X1

Prepared by:

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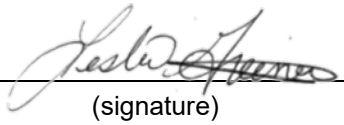
Reviewed by 
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Senior Project Manage

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1.0 INTRODUCTION

Cornwall Solar Inc., a subsidiary of Liberty Power received a Renewable Energy Approval (REA #3195-92JKTY dated January 15, 2013) and an Amendment to the Renewable Energy Approval (EBR Registry #012-3158 dated December 17, 2014), from the Ministry of the Environment, Conservation and Parks (MECP) for the Cornwall Solar Project (the Project). A 10-megawatt (MW) solar photovoltaic (PV) facility was constructed on approximately 24.7 hectares (ha) of land on Park Lots 5. 6 and 7, Concession 5, Indian Lands Charlottenburgh, designated as Park 1 and 2 on Reference Plan 14R5859, within the Township of South Glengarry (lower tier municipality), in the United Counties of Stormont, Dundas and Glengarry (upper tier municipality). The facility has been operational since March 27, 2014.

2.0 SUMMARY AND RATIONALE FOR MINOR MODIFICATION

The proposed Project change entails replacing the existing ten intermediate transformers with ten new intermediate transformers in the same locations to address an existing maintenance issue. The proposed replacement transformers will be installed on concrete slab-on-grade, which will not be replaced. The facility's total maximum name plate capacity of 10 megawatt shall remain unchanged.

3.0 PROJECT DESIGN CHANGE (MINOR) – REPLACEMENT OF GROUND MOUNTED TRANSFORMERS

The proposed Project change entails replacing the existing ten intermediate transformers with ten new intermediate transformers in the same location to address an existing maintenance issue. The proposed replacement transformers will be installed on concrete slab-on-grade, which will not be replaced. The facility's total maximum name plate capacity of 10 megawatt shall remain unchanged.

The proposed layout and placement of transformers is provided in **Appendix A**.

Liberty Power has prepared an application to amend the REA to account for the replacement of the intermediate transformers which is designated as a Project Design Change.

4.0 RESULTS OF EFFECTS ASSESSMENT FOR THE PROJECT MODIFICATION

O. Reg. 359/09 requires that any adverse environmental effects that may result from construction, installation, operation and maintenance activities be described. The term “environment” in O. Reg. 359/09 has the same meaning as in the *Environmental Protection Act*, and includes the natural, physical, cultural, and socio-economic environment.

A screening to identify any new environmental effects that would require additional mitigation or monitoring measures beyond those outlined in the REA documents because of the proposed modifications to the Project has been completed.

The installation of the new intermediate transformers will be completed in the same manner as the original installation, Since this installation method has been previous reviewed as part of the REA application and the work will be completed within the previously assessed areas, no new environmental impacts are expected.

5.0 POTENTIAL IMPACTS TO REA TECHNICAL ASSESSMENT AND STUDIES

Liberty Power, on behalf of Cornwall Solar Inc., has previously completed all the required REA technical assessments (including the Natural Heritage Assessment, Noise Assessment as well as Stage 1 and Stage 2 Archeological Assessments) for the Project which includes the area where the proposed installations will be, and as such, the installation of the new intermediate transformers has been deemed to have no adverse effects on the result of the REA assessment.

Table 1 and 2 below outline the potential negative impacts on environmental components due to the minor Project change and any new mitigation and/or monitoring measures proposed (where applicable). Note: there is no potential for negative environmental impacts because of the minor Project change.

Table 1: Potential Negative Impacts on Natural Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation Measures	Monitoring Requirements
Air Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Soil Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Soil Quantity	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Groundwater	No additional negative impact.	No additional mitigation required.	No new monitoring required.

Table 1: Potential Negative Impacts on Natural Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation Measures	Monitoring Requirements
Surface Water Quality	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Surface Water Quantity	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Aquatic Habitat and Biota	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Woodlands	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wetlands	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wildlife Habitat	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Wildlife	No additional negative impact.	No additional mitigation required.	No new monitoring required.

Table 2: Potential Negative Impacts on Socio-Economic Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation Measures	Monitoring Requirements
Noise	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Public and Facility Safety	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Change in Visual Landscape	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Property Values	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Availability of Resources	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Recreational Land Use	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Infrastructure	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Traffic	No additional negative impact.	No additional mitigation required.	No new monitoring required.
Archaeological and Heritage Resources	No additional negative impact.	No additional mitigation required.	No new monitoring required.

6.0 SUMMARY OF REVISIONS TO THE REA TECHNICAL ASSESSMENTS

Table 3 identifies the amendments to the REA technical assessments submitted with the original REA application and reviewed by the MECP that are required to address the proposed Project change. Any changes to the reports have been addressed by issuance of this Modification Report and its appendices.

Table 3: Summary of Revisions to the REA Supporting Documents

Report	Original Text	Revised Text
Noise Assessment Report	Described existing conditions, potential impacts and mitigation measures.	Full replacement of the previous Noise Report.

A copy of the Cornwall Solar Project Noise Assessment Study Report, dated April 3, 2020 is provided in **Appendix B**.

7.0 CONSULTATION AND NOTIFICATION

Consultation regarding the proposed modification was undertaken with the MECP via email on July 28th, 2020 and September 18th, 2020.

A copy of this Modification Report has been provided to the Ministry of Natural Resources and Forestry (MNRF) and the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) for their information. As there are no unassessed areas, and no new impacts, we do not anticipate the need for new confirmation letters from these ministries.

A copy of this Modification Report will be placed on the Project website – www.cornwallsolarproject.com

The Notice of Proposed Change to an Approved Renewable Energy Project will be mailed out to all Project stakeholders notifying them of the proposed minor Project Design Change and directing them to review the Modification Report available on the Project website. In addition, the notice shall be distributed to the public in accordance with Section 32.3(1) of O. Reg. 359/09. A copy of the notices is presented in **Appendix C**.

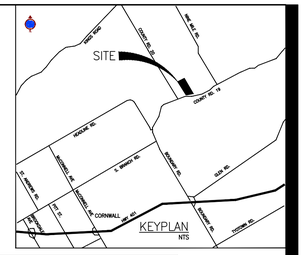
8.0 CLOSURE

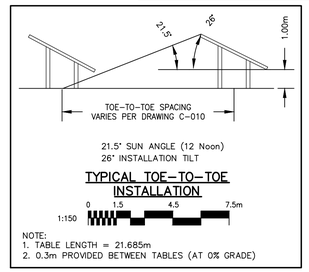
The proposed modifications have been adequately assessed in accordance with O. Reg. 359/09 and the MECP's Technical Guide. It has been determined that the modifications will not result in new negative environmental effects or require additional associated mitigation measures beyond those identified as part of the original REA Application submitted for the Project.

APPENDIX A
Site Layout

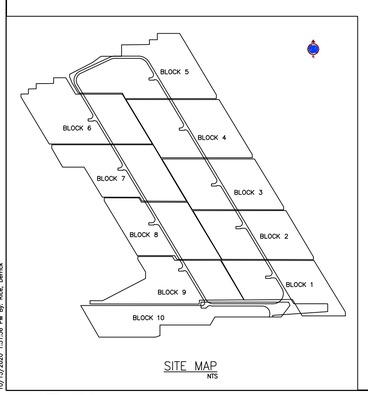
THE GOOD(S) AND/OR SERVICE(S) SHALL BE EITHER PRODUCED, SOURCED OR PROVIDED IN THE PROVINCE OF ONTARIO OR PERFORMED BY RESIDENTS OF ONTARIO TO MEET OR EXCEED THE MINIMUM REQUIRED DOMESTIC CONTENT LEVEL PRESCRIBED IN THE FEED-IN TARIFF (FIT) PROGRAM RULES (E.G. 60% FOR A SOLAR PROJECT > 10KW) AND IN ACCORDANCE WITH THE "DOMESTIC CONTENT GRIDS" IN EXHIBIT D OF THE PROJECT OWNER'S FIT CONTRACT AND AMENDMENTS THEREOF. THE SUPPLIER SHALL PROVIDE A FIT CERTIFICATE OF DOMESTIC CONTENT FOR THE GOODS AND SERVICES PROVIDED.

N





SYSTEM SIZE				
BLOCK	# OF MODULES	WATTAGE	DC MW	NUMBER OF TABLES
1	4312	290	1.250	98
2	4312	290	1.250	98
3	4268	290	1.238	97
4	4268	295	1.259	97
5	4268	295	1.259	97
6	4268	295	1.259	97
7	4268	295	1.259	97
8	4312	290	1.250	98
9	4268	295	1.259	97
10	4268	295	1.259	97
TOTAL	42812		12.544	973.00



SITE MAP
NTS

Stantec

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Notes

A. GENERAL:

1. BENCHMARK: ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM MTO VERTICAL CONTROL MONUMENT B19708525 HAVING AN ELEVATION OF 55.752.
2. TOPOGRAPHICAL SURVEY AND LEGAL PLAN PROVIDED BY STANTEC RECEIVED MAY 2012.
3. GEOTECHNICAL INVESTIGATION PROVIDED BY STANTEC, DATED JUNE 1, 2012.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SITE LAYOUT PLAN (C-010), THE CLEARING, GRUBBING AND FENCING PLAN (C-050), THE SITE ACCESS PROFILES (C-201 TO C-203), AND THE SITE GRADING & EROSION CONTROL PLAN (C-401 TO C-404), PREPARED BY STANTEC CONSULTING LTD.
5. THE CONTRACTOR MUST CHECK AND VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
6. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
7. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENCROACH ONTO PRIVATE LANDS TO UNDERTAKE ANY WORKS, HE/SHE MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO STANTEC, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.
8. THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO THE TOWNSHIP OF SOUTH GLENGARRY STANDARDS.
9. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/LEVELED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
10. CONSTRUCTION TURNING RADIUS LIMITS IDENTIFY AREAS WHERE ADDITIONAL ROAD WIDTH IS REQUIRED TO ALLOW FOR ADEQUATE CLEARANCE FOR CONSTRUCTION VEHICLES.
11. CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010.
12. ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED.
13. CLEARING AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSS 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSS 577.
14. GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSS 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSS 1010.
15. CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSS 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 805.010.

Legend

- PROPERTY LINE
- SETBACK TO PV ARRAY
- BLOCK LIMITS (TYP.)
- ACCESS ROAD
- RACK OF 4 X 11 PV MODULES
- FENCE
- MV STATION
- CULVERT
- PROPOSED TREE SCREENING

Revision	By	Appd.	YY.MM.DD
F. O&M BUILDING	MHH	MAN	14.09.23
E. UPDATED TABLE LAYOUT IN BLOCK 9	MHH	MAN	13.08.15
D. UPDATED TABLE LAYOUT IN BLOCK 9	MHH	MAN	13.05.01
C. ISSUED FOR CONSTRUCTION	MHH	MAN	13.03.08
B. FINAL EQUIPMENT LOCATIONS	DK	MPV	13.01.07
Issued	**By**	**Appd.**	**YY.MM.DD**
File Name: 161011117_CS-SP.dwg	MHH Dwn.	MAN Chkd.	MHH Dsgn.	12.09.27 YY.MM.DD

Permit-Seal

Client/Project
LIBERTY POWER

CORNWALL SOLAR
Cornwall, ON Canada

Title
SITE PLAN LAYOUT
NOON SHADING AND 26° INSTALLATION TILT

Project No.	Scale	Drawing No.	Sheet	Revision
161011117	1:1250 (0 12.5 37.5 62.5m)	C-010		F

\\Cd1220-001\work_group\01603\active\161011117\design\drawing\civil\sheet_files\161011117_CS-SP.dwg
10/15/2020 1:51:56 PM By: Rice, Derrick

ORIGINAL SHEET – ARCH D

APPENDIX B
Noise Assessment Study Report

Cornwall Solar Inc.

Cornwall Solar Project

Noise Assessment Study Report

April **03, 2020**

Algonquin
POWER INVESTED.

Cornwall Solar Inc.
Oakville, ON

Noise Assessment Study Report

Cornwall Solar Project

H336742-2000-07-124-0009
Rev. 4
April 03, 2020

Revision History

Revision Number	Date	Change
00	2012-11-16	
01	2012-11-23	- Changed Cornwall Solar inverters design to enclosed inverters. Updated SPL calculations accordingly.
02	2013-03-06	- Added one ventilation exhaust fan as a noise source to each inverter cluster. - Updated inverter make and model from Sunny Central 500HE-US to Xantrex GT500 MVX – updates made to its SWLs accordingly.
03	2013-06-10	- Changed Cornwall Solar facility substation transformer model to a different design. - Removed substation transformer sound barrier as it is no longer needed.
04	2020-02-25	- Updated Cornwall Solar 1 MVA pad mounted transformers Lw calculations using newly provided transformer dimensions from WEG.

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. Cornwall Solar Inc. is proposing to develop a 10-megawatt (MW) solar photovoltaic (PV) project titled Cornwall Solar Project (the "Project"). The Project will be located on an approximately 25 hectares (ha) of land within the Township of South Glengarry, United Counties of Stormont, Dundas and Glengarry, Ontario.

This Noise Assessment Study 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 CadnaA 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 following commissioning of the facility, community noise emissions will be validated with measurements to confirm the conclusions of this noise impact assessment study.

The results obtained in this study show that the sound pressure levels at the Noise Receptors resulting from the project operation will not exceed MOE requirements of 40 dB for rural areas.

Project Report

February 20, 2020

Cornwall Solar Inc.
Cornwall Solar Project

Noise Assessment Study Report

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1. Introduction

1.1 Project Description

Cornwall Solar Inc. is proposing to develop a 10-megawatt (10 MW) solar photovoltaic (PV) project titled Cornwall Solar Project (the "Project").

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 clusters which will also step up the voltage to 34.5 kV. A main transformer, located in the substation, will step up the voltage from the clusters to 44 kV prior to being transmitted to the existing local distribution line.

The construction of the Project will begin once the Renewable Energy Approval (REA) has been obtained and the Notice to Proceed has been obtained from the OPA. The anticipated operational lifespan of the Project is 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 these regulations, 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 Assessment 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 Assessment Study Report is to include a general description of the facility, sources, Noise Receptors, assessment of compliance, as well as all the supporting information relevant to the Project.

2. Facility Description

The Project will use 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 inverters. The Project layout is based on ten inverter clusters each one containing two inverters and one 200-V/34.5-kV/1MVA medium transformer, as well as a 34.5-kV/44-kV/10-MVA substation transformer. The 34.5-kV power, collected from the inverter clusters, 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[1] will be located on approximately 25 ha of land, located about 8 km north of Cornwall. Figure A.1 in Appendix A shows the zoning designation plan while Figure A.3 presents the Project Area Location Plan. Figure A.2 displays adjacent solar projects.

2.2 Acoustical Environment

The Project will be surrounded by farmland with some forested areas to the northwest. The background noise levels are expected to be typical of rural areas, classified as a Class 3 based on Publication NPC-232 by the MOE. Some traffic noise is expected from Regional Road 19, passing south of the Project, mainly during day hours. Cornwall town is located about 8 km south of the proposed location.

2.3 Life of Project

The expected life of the Project is 30 years. The manufacturer's warranty on the PV modules is 25 years and the expected life of solar power plants of this type is typically 35 to 40 years. At that time (or earlier if the 20-yr 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 day hours, when the sun rays are collected by the panels. After sunset the facility will not receive solar radiation; therefore, no electricity will be produced. 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.

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

The sound power level for the inverters was provided by the manufacturer while the sound power level for the transformers was estimated using NEMA TR-1 standards.

The software package CadnaA, which implements ISO-9613-2, was used to predict the noise levels at the Points of Reception. 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 CadnaA configurations used in the modeling are shown in Figure 2-A.

Elevation contours were not included in the model. This conservative approach was applied in order to avoid including any barrier effects of ground surface obstacles. For modeling purposes, the vegetation that blocks some of the POR from the sources has not been incorporated.

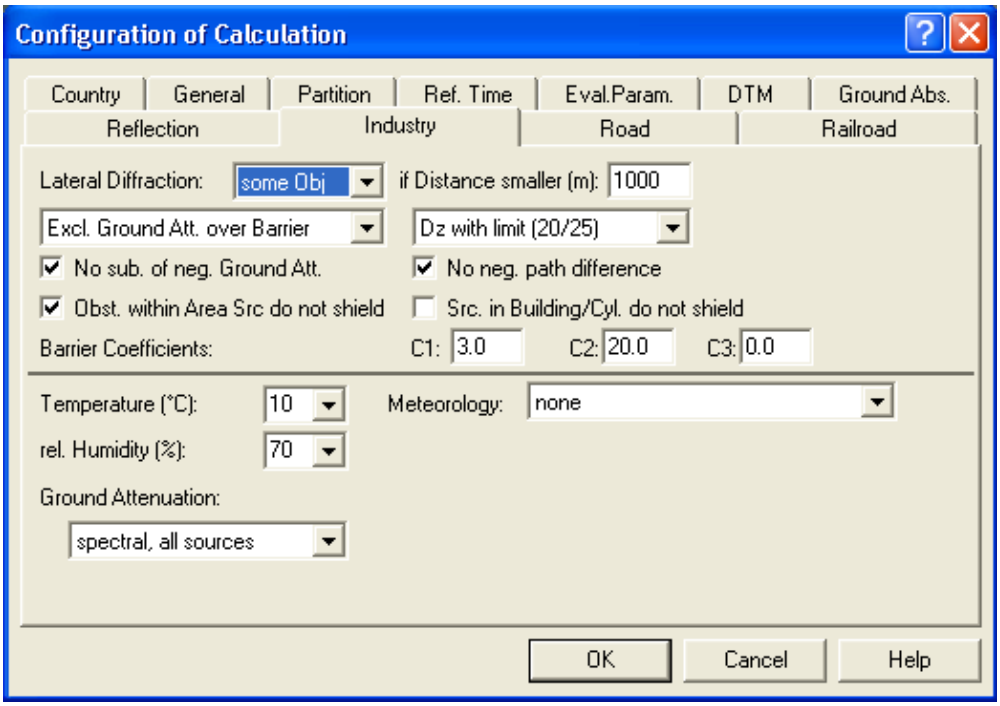

Figure 2-A CadnaA Configurations

3. Noise Sources

The main sources of noise from the Project will be ten inverter clusters, each one containing two inverters, one ventilation exhaust fan, and one medium-voltage transformer, as well as a substation containing the main step-up transformer. The Project layout is provided in Figure A.3. The coordinates of each modelled noise source are presented in Table B.1 and of Appendix B.

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

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

3.1 Substation Transformer

A 10-MVA step-up transformer that will step up the 34.5-kV power to 44 kV, required by the local distribution company, will be located in the substation. The transformer, manufactured by ABB, will be of ONAF (oil natural air forced) type with guaranteed characteristic sound pressure of 63.0 dBA, as shown with additional transformer specifications in Appendix B. The transformer sound pressure level dissipation surface area, needed for sound power calculation, was estimated based on dimensions taken from the transformer drawing provided by ABB and included in Appendix B. The provided characteristic sound pressure was converted into frequency spectra using empirical correlations for transformer noise (Crocker) and 41.9-m^2 surface area. This calculation is available in Figure B.2 of Appendix B. The transformer configurations are expected to be similar to those shown in Appendix B. Noise source height representing the transformer was assumed at 3.5 m above ground level (includes 0.5-m high concrete foundation).

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.3 in Appendix B shows the frequency spectrum used to model the substation transformer.

3.2 Inverter Clusters

Cornwall Solar Inc. is planning to use inverters manufactured by Schneider Electric. Ten inverter clusters will be installed as part of the Project. Each cluster comprises of two GT500 MVX inverters inside an enclosure, one ventilation exhaust fan, and one 208-V/34.5-kV/1-MVA medium voltage transformer supplied by WEG. Both the ventilation fan and 208-V/34.5-kV/1-MVA transformer will be located outside the enclosure. Schematic cluster arrangement can be found in Appendix B.

Nominal output capacity of GT500 MVX inverter is 500 kW. Cornwall Solar Inc. provided one third octave band sound power for the GT500 MVX inverter. Appendix B includes technical description of the inverter, sound power measurement report, and one third octave band to full octave band conversion calculation (Figure B.1). The two enclosed inverters were modeled as a single noise source with recommended minimum enclosure transmission loss. 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 spectrum used to model combined noise emission from two inverters is shown in Table B.3 of Appendix B. Noise source height representing the inverter installation was assumed at 2.3 m above ground level.

To step up the 208 V from the inverters to 34.5-kV, 1-MVA medium voltage transformers will be located in close proximity to the inverters outside the enclosure. The transformer is an ONAN (oil natural air natural) type, a conservative estimate of sound power level was based on the data from NEMA TRI – 1993 (2000) and transformer dimensions as provided by WEG – shown in Appendix B. This standard provides

maximum characteristic sound pressure values for transformers and manufacturers routinely meet this specification. The NEMA level was then converted into frequency spectra using empirical correlations for transformer noise (Crocker). This calculation is available in Figure B.3 of Appendix B. Noise source height representing the transformer was assumed at 2.0 m above ground level. 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.3 in Appendix B shows the frequency spectrum used to model the cluster medium-voltage transformer.

To provide an adequate ventilation inside the enclosure an exhaust fan will be mounted on one of the walls. CWB-101-4 exhaust fan manufactured by Greenheck was selected for the application. Sound power level of the fan was provided by Greenheck and can be found in Appendix B along with other technical data on the fan. Although fans in general are not considered tonal noise sources 5-dB was conservatively added to the provided sound power in the study. Noise source height representing the fan was assumed at 2.0 m above ground level.

Although for the modeling purposes it was assumed that the facility will operate 24 hours at full capacity, in reality at night the facility will be idle. Under these conditions the inverters do not produce noise. The transformers (at the substation and clusters) 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 power level, characteristics and proposed noise control measures, is presented in Table 3.1.

Table 3.1 Noise Source Summary for Cornwall Solar Project

Source ID	Description	Total Sound Power Level (dBA)	Source Location	Sound Characteristics	Noise Control Measures
CW_Fan01	CWB-101-4 exhaust fan at CW_Cluster01	78.2	O	S	U
CW_Fan02	CWB-101-4 exhaust fan at CW_Cluster02	78.2	O	S	U
CW_Fan03	CWB-101-4 exhaust fan at CW_Cluster03	78.2	O	S	U
CW_Fan04	CWB-101-4 exhaust fan at CW_Cluster04	78.2	O	S	U
CW_Fan05	CWB-101-4 exhaust fan at CW_Cluster05	78.2	O	S	U
CW_Fan06	CWB-101-4 exhaust fan at CW_Cluster06	78.2	O	S	U
CW_Fan07	CWB-101-4 exhaust fan at CW_Cluster07	78.2	O	S	U
CW_Fan08	CWB-101-4 exhaust fan at CW_Cluster08	78.2	O	S	U
CW_Fan09	CWB-101-4 exhaust fan at CW_Cluster09	78.2	O	S	U
CW_Fan10	CWB-101-4 exhaust fan at CW_Cluster10	78.2	O	S	U
CW_Inv01	Two Schneider Electric GT500 MVX inverters at CW_Cluster01	83.8	O	S-T	E
CW_Inv02	Two Schneider Electric GT500 MVX inverters at CW_Cluster02	83.8	O	S-T	E
CW_Inv03	Two Schneider Electric GT500 MVX inverters at CW_Cluster03	83.8	O	S-T	E
CW_Inv04	Two Schneider Electric GT500 MVX inverters at CW_Cluster04	83.8	O	S-T	E

Source ID	Description	Total Sound Power Level (dBA)	Source Location	Sound Characteristics	Noise Control Measures
CW_Inv05	Two Schneider Electric GT500 MVX inverters at CW_Cluster05	83.8	O	S-T	E
CW_Inv06	Two Schneider Electric GT500 MVX inverters at CW_Cluster06	83.8	O	S-T	E
CW_Inv07	Two Schneider Electric GT500 MVX inverters at CW_Cluster07	83.8	O	S-T	E
CW_Inv08	Two Schneider Electric GT500 MVX inverters at CW_Cluster08	83.8	O	S-T	E
CW_Inv09	Two Schneider Electric GT500 MVX inverters at CW_Cluster09	83.8	O	S-T	E
CW_Inv10	Two Schneider Electric GT500 MVX inverters at CW_Cluster10	83.8	O	S-T	E
CW_Sub	34.5-kV/44-kV/10-MVA substation transformer	86.6	O	S-T	U
CW_Trans01	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster01	78.3	O	S-T	U
CW_Trans02	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster02	78.3	O	S-T	U
CW_Trans03	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster03	78.3	O	S-T	U
CW_Trans04	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster04	78.3	O	S-T	U
CW_Trans05	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster05	78.3	O	S-T	U
CW_Trans06	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster06	78.3	O	S-T	U
CW_Trans07	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster07	78.3	O	S-T	U
CW_Trans08	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster08	78.3	O	S-T	U
CW_Trans09	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster09	78.3	O	S-T	U
CW_Trans10	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster10	78.3	O	S-T	U

Notes:
1. A 5-dBA penalty and enclosure (E) attenuation are 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 (June 3, 2013).

There are two solar projects (Figure A.2) within 1 km of the Cornwall Solar Project Noise Receptors: Glendale Solar Project owned by Northland Power Inc; and South Glengarry St. Lawrence-1 Solar Farm owned by Penn Energy Renewable Limited. Noise sources from these two projects were taken into account in the study. Coordinates and sound properties of these noise sources were taken from the respective noise assessment study reports and are listed in Table B.3 of Appendix B.

4. Noise Receptors and Points of Reception

The Noise Receptors used in this study were identified from the OBM and Google Earth Pro aerial imagery (June 2007) within 1-km distance from the Project Site[2] boundary, and also from information provided by Cornwall Solar Inc. based on visual observations of the Project Site surroundings.

The Noise Receptors corresponding to the vacant lots were added based on parcel information provided by First Base Solutions (Teranet Data) and located according to the requirements outlined in Ontario Regulation 359/09, and its amendment (Ontario Regulation 521/10).

The total number of Noise Receptors within a 1-km distance from the Project Site of Cornwall Solar Project boundary is 86, including the vacant lots. Points of reception were placed at the Noise Receptors according to the following rules:

1) All existing Noise Receptors were modeled by POR located at the point on the façade where sound pressure level is a maximum at 4.5 m above ground height.

2) All existing Noise Receptors were also modeled by POR located at the point on the 30-m envelope placed around the façade where sound pressure level is a maximum at 1.5 m above ground height.

3) All vacant lot Noise Receptors were modeled by POR placed in the center of the assumed future building structures located at 4.5 m above ground height.

4) All vacant lot Noise Receptors were also modeled by POR located at the point on the 30-m circle placed around the center of the assumed future building structure where sound pressure level is a maximum at 1.5 m above ground height.

Ten of these POR, identified in Table 4.1 and Table 4.2, were chosen as representative for evaluating the noise contribution from each individual source. These ten POR were chosen in order to represent sound pressure level contributions on different areas around the Project Location. The complete set of results for all POR used to model 86 Noise Receptors is provided in Table 6.2. Coordinates of the Noise Receptor footprint centers are provided in Table C.1.

[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.

Table 4.1 1.5-m Case – Point of Reception Noise Impact from Individual Noise Sources of Cornwall Solar Project

Source ID	Noise Receptor ID									
	R007		R034		R037		R038		R039	
	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]
CW_Fan01	692.6	5	219.1	17.2	125.5	22.5	214.5	17.4	197.9	18.2
CW_Fan02	741.7	4.2	260	15.5	250.4	15.9	332.4	13	292	14.3
CW_Fan03	792.6	3.4	333	13	356.7	12.3	434.2	10.2	383.9	11.5
CW_Fan04	876	2.2	450.4	9.8	497.6	8.7	571.7	7.2	514.6	8.3
CW_Fan05	966.1	1.1	566.9	7.3	626.9	6.1	699.6	4.9	639.1	5.9
CW_Fan06	1078	-0.3	517.1	8.3	630.1	6.1	733.1	4.3	690	5
CW_Fan07	1000.5	0.6	391.8	11.3	506.6	8.5	616.7	6.3	580.8	7
CW_Fan08	933.2	1.5	257.3	15.6	377.6	11.7	499.2	8.7	476.1	9.2
CW_Fan09	878.6	2.2	139.8	21.5	262	15.4	397.1	11.2	391.1	11.3
CW_Fan10	849.3	2.6	67.1	28.6	183.3	18.9	331.5	13	345.1	12.6
CW_Inv01	695.4	9.2	216.2	20.8	124.7	26	215.8	20.9	200.2	21.6
CW_Inv02	744.3	8.5	257.5	19.2	250	19.5	333.3	16.7	293.6	17.9
CW_Inv03	795	7.8	331.1	16.8	356.4	16.1	434.9	14.1	385.1	15.3
CW_Inv04	878.2	6.7	448.9	13.8	497.3	12.7	572.2	11.3	515.5	12.4
CW_Inv05	968	5.7	565.7	11.4	626.6	10.3	700	9.2	639.8	10.1
CW_Inv06	1080.1	4.5	516.7	12.3	630.6	10.3	734.1	8.7	691.3	9.3
CW_Inv07	1002.9	5.3	391.3	15.1	507.3	12.5	617.8	10.5	582.4	11.1
CW_Inv08	935.8	6.1	256.6	19.2	378.5	15.5	500.7	12.7	478	13.1
CW_Inv09	881.4	6.7	138.5	25	263.4	19	399.1	14.9	393.5	15.1
CW_Inv10	852.1	7.1	64.5	33.2	185.3	22.3	333.8	16.7	347.8	16.3
CW_Sub	635	16.5	268.7	25	71	37.4	107	33.4	126.9	31.8
CW_Trans01	690.8	6.6	219.9	18.1	123.2	23.4	211.5	18.5	195.4	19.2
CW_Trans02	739.5	5.8	259.3	16.6	247.8	17	329.4	14.3	289.1	15.5
CW_Trans03	790.1	5.1	331.6	14.2	354	13.5	431.2	11.6	380.9	12.8
CW_Trans04	873.3	4	448.5	11.2	494.9	10.1	568.8	8.7	511.6	9.8
CW_Trans05	963.4	2.9	564.7	8.7	624.1	7.7	696.7	6.5	636.1	7.5
CW_Trans06	1075.4	1.6	514.5	9.7	627.1	7.6	730.1	6	687	6.6
CW_Trans07	998.1	2.5	389.2	12.6	503.6	10	613.7	7.9	577.9	8.5
CW_Trans08	931	3.3	254.8	16.7	374.6	13	496.3	10.1	473.3	10.6
CW_Trans09	876.6	3.9	137.7	22.4	259	16.6	394.3	12.5	388.6	12.6
CW_Trans10	847.6	4.3	66.8	29.2	180.6	19.9	329	14.3	343.2	13.9

Table 4.2 4.5-m Case – Point of Reception Noise Impact from Individual Noise Sources of Cornwall Solar Project

Source ID	Noise Receptor ID									
	R007		R034		R037		R038		R039	
	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]	Dist [m]	Sound Pressure Contribution [dBA]
CW_Fan01	696.1	6.9	247.6	17.2	138.7	22.7	219.8	18.3	222.7	18.1
CW_Fan02	750	6.1	280.3	16	258	16.8	338.1	14.2	321	14.7
CW_Fan03	804.3	5.3	346.6	14	362.9	13.5	440.1	11.6	413.8	12.3
CW_Fan04	891.3	4.2	458.1	11.2	502.8	10.3	577.7	8.9	544.6	9.5
CW_Fan05	983.9	3.1	571	9	631.5	7.9	705.6	6.8	669	7.3
CW_Fan06	1092.8	2	512.7	10.1	626.9	8	738.8	6.3	719.6	6.5
CW_Fan07	1012.9	2.8	388.8	12.9	502.2	10.3	622.1	8.1	609.8	8.3
CW_Fan08	942.2	3.6	256.9	16.8	370.6	13.3	504.4	10.3	503.5	10.3
CW_Fan09	884	4.3	147.3	22.1	251.1	17	401.7	12.6	415.5	12.2
CW_Fan10	851.6	4.7	91.4	26.7	166.3	20.9	335.2	14.3	365.2	13.5
CW_Inv01	698.9	11.6	244.7	21.4	137.3	26.8	221.1	22.3	224.9	22.1
CW_Inv02	752.5	10.9	277.7	20.3	257.2	21	339	18.5	322.5	19
CW_Inv03	806.7	10.2	344.5	18.4	362.4	17.9	440.7	16.1	414.9	16.6
CW_Inv04	893.4	9.1	456.5	15.8	502.4	14.8	578.2	13.5	545.5	14.1
CW_Inv05	985.8	8.1	569.7	13.6	631.1	12.6	706	11.5	669.7	12.1
CW_Inv06	1095	7	512.2	14.7	627.3	12.7	739.8	11.1	720.9	11.3
CW_Inv07	1015.2	7.8	388.1	17.3	502.7	14.8	623.3	12.8	611.4	12.9
CW_Inv08	944.6	8.6	255.9	21	371.3	17.7	505.8	14.8	505.4	14.8
CW_Inv09	886.7	9.2	145.5	26.2	252.2	21.1	403.6	16.9	417.9	16.6
CW_Inv10	854.4	9.6	88.5	31.2	167.9	24.8	337.5	18.5	367.8	17.8
CW_Sub	634.3	18.6	299	25.6	100.7	35.6	111.6	34.7	141	32.5
CW_Trans01	694.2	8.4	248.6	18.2	136.7	23.7	216.8	19.4	220.1	19.3
CW_Trans02	747.8	7.6	279.9	17.1	255.5	18	335.2	15.5	318	16
CW_Trans03	801.8	6.9	345.5	15.2	360.4	14.8	437.1	13	410.7	13.6
CW_Trans04	888.6	5.8	456.3	12.6	500.2	11.7	574.7	10.3	541.6	10.9
CW_Trans05	981.1	4.7	569	10.4	628.8	9.4	702.7	8.2	666.1	8.8
CW_Trans06	1090.2	3.5	510.2	11.5	624	9.5	735.8	7.8	716.7	8
CW_Trans07	1010.4	4.4	386.3	14.2	499.3	11.7	619.2	9.5	606.9	9.7
CW_Trans08	939.9	5.2	254.6	18	367.6	14.6	501.4	11.7	500.7	11.7
CW_Trans09	881.9	5.8	145.8	23.1	248.1	18.2	398.8	13.9	413	13.5
CW_Trans10	849.8	6.2	91.8	27.4	163.4	22	332.7	15.6	363.1	14.8

5. Mitigation Measures

Mitigation for operation of the Cornwall Solar Project has been modelled and shown to be feasible in the form of enclosures at all inverters. The enclosure transmission loss must be at least as specified in the table below. Note that the exhaust fans and medium voltage transformer will be outside the enclosures.

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000
Transmission loss [dB]	0.0	9.0	7.0	7.0	11.0	18.0	19.0	14.0	13.0

The transmission loss above is based on the performance of Construction Specialties acoustical louver A8370. Technical information of the louver as well as its sound data can be found in Appendix B.

Currently, enclosures are planned to be installed at three inverter clusters of South Glengarry St. Lawrence-1 Solar Farm (Table B.2 and Table B.5), these enclosures were included in the noise model. No mitigation measure is planned at the Glendale Solar Project.

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, with little or no traffic noise, 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
19:00 to 23:00	40
23:00 to 07:00	40

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 until past 19:00, or before 07:00. 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. **Error! Reference source not found.** includes a list of all the parameters used in the CadnaA 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 Noise Receptors located within 1 km from the Project Site. Sound pressure contours at 4.5 m and 1.5 m are available in Figure C.1 and Figure C.2. **Error! Reference source not found.** includes a detailed calculation log of the representative POR with the highest sound pressure level.

Following MOE recommendations provided on October 26, 2012 (e-mail from Enoch Tse to Steve Hichinson, Algonquin Power), the cumulative contributions from neighbouring projects do not apply to receptors R042 and R088 since they are proponents of the South Glengarry Solar Project. This e-mail is included in Appendix C.

The results of this study show that all POR are compliant with MOE guidelines based on the 40-dBA performance limit.

Table 6.2 Calculated Sound Pressure Levels at POR within 1 km of Cornwall Solar Project

(Shaded rows correspond to representative POR)
Existing = Existing dwelling, Vacant = Vacant Lot.
The performance limit is 40.0 dBA.
*Since R042 and R088 are owned by the proponent of South Glengarry Solar Project contribution of this project has not been taken into account for these two Noise Receptors

Noise Receptor ID	Description	Point of Reception at 1.5 m								Point of Reception at 4.5 m							
		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source	
		X	Y	Cornwall	Glendale	South Glengarry	Total	Dist[m]	ID	X	Y	Cornwall	Glendale	South Glengarry	Total	Dist [m]	ID
R001	Existing	524552.4	4994435.2	31.5	14.9	35	36.7	167.1	CW_Sub	524566	4994424.2	32.7	17.5	36	37.7	176.4	CW_Sub
R002	Existing	524571.8	4994440.6	30.7	14.7	35.3	36.6	187.1	CW_Sub	524599.3	4994428.7	31.5	17.3	36.3	37.6	209.6	CW_Sub
R003	Existing	524770.5	4994513.2	25.2	13.6	37.8	38	398.6	CW_Sub	524773.7	4994483.3	27.2	16.4	38	38.4	392.3	CW_Sub
R004	Existing	524834.4	4994548.9	23.9	13.3	38.6	38.8	471.1	CW_Sub	524841	4994519.6	25.9	16	38.8	39	467.3	CW_Sub
R005	Existing	524879.2	4994575.5	23.1	13	39.1	39.2	522.7	CW_Sub	524887	4994546.5	25.1	15.8	39.2	39.4	519.6	CW_Sub
R006	Existing	524909.6	4994579.8	22.6	12.9	39	39.1	552.4	CW_Sub	524919.1	4994551.4	24.7	15.6	39.1	39.3	551.5	CW_Sub
R007	Existing	524978.7	4994628.7	21.4	12.1	39.8	39.9	635	CW_Sub	524989.4	4994600.6	23.6	14.8	39.8	39.9	634.3	CW_Sub
R008	Existing	525040.7	4994570.3	20.7	11.8	37.5	37.6	673	CW_Sub	525043.2	4994540.5	23	14.6	37.8	38	667.4	CW_Sub
R009	Existing	525072.5	4994572.5	20.3	11.7	37.1	37.2	704.1	CW_Sub	525091.3	4994549.2	22.4	13.8	37.4	37.6	716.2	CW_Sub
R010	Existing	525103.3	4994623.7	19.8	10.9	37.8	37.9	749.2	CW_Sub	525125.4	4994628.5	21.9	13.5	38.5	38.6	771.7	CW_Sub
R011	Existing	525167.7	4994678.5	19	8	37.6	37.6	828.7	CW_Sub	525193.4	4994663.2	21.1	10.6	37.8	37.9	847.3	CW_Sub
R012	Existing	525179.8	4994801.8	18.5	7.8	38.9	39	892.1	CW_Sub	525207.9	4994791.2	20.6	10.4	38.9	39	911.9	CW_Sub
R013	Existing	524936.7	4995364.4	17.6	9.1	39.5	39.6	1016.7	CW_Trans05	524953.1	4995389.5	19.8	11.7	39.5	39.5	1043.2	CW_Trans05
R014	Existing	523351.1	4994685.6	21.6	22.2	24.4	27.7	566	CW_Inv06	523321.1	4994686.2	23.5	25	25.7	29.6	595.5	CW_Inv06
R015	Vacant	523521.1	4994768.3	24.4	20.6	26.3	29.1	388.3	CW_Inv06	523491.1	4994768.6	25.9	23.4	27.4	30.6	418.2	CW_Inv06
R016	Existing	523572.2	4994480.6	24.8	21.2	25.8	29.1	448	CW_Inv07	523543.2	4994472.8	26.3	24	27	30.7	477.6	CW_Inv07
R017	Existing	523575.5	4994422.5	24.5	21.3	25.6	28.9	473.1	CW_Inv07	523548.7	4994408.9	26.1	24.1	26.8	30.5	503	CW_Inv07
R018	Existing	523644.6	4994586.7	26.8	20.3	27	30.3	327.6	CW_Inv06	523615.1	4994581.2	28	23.1	28.1	31.7	354.9	CW_Inv06

Noise Receptor ID	Description	Point of Reception at 1.5 m								Point of Reception at 4.5 m							
		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source	
		X	Y	Cornwall	Glendale	South Glengarry	Total	Dist[m]	ID	X	Y	Cornwall	Glendale	South Glengarry	Total	Dist [m]	ID
R019	Existing	523645.9	4994381.9	25.4	20.8	26	29.4	436	CW_Inv08	523618.4	4994369.9	26.9	23.6	27.2	30.9	466	CW_Inv08
R020	Existing	523646.3	4994217.2	23.9	21.1	25.1	28.4	523.6	CW_Inv08	523624.2	4994196.9	25.5	23.8	26.3	30.1	553.4	CW_Inv09
R021	Vacant	523666	4993456.5	16.7	20.2	20.5	24.2	1042.6	CW_Inv10	523660.4	4993427	18.9	22.7	22	26.3	1071.2	CW_Inv10
R022	Vacant	523694.1	4994136.6	23.7	20.8	25	28.2	526.2	CW_Inv09	523672.7	4994115.6	25.3	23.5	26.2	29.9	555.9	CW_Inv09
R023	Vacant	523692.7	4995312.4	21.5	17.4	28	29.2	561.3	CW_Inv05	523665.7	4995325.5	23.3	20.2	29	30.5	588.5	CW_Inv05
R024	Existing	523717.5	4994505.6	27.8	20	27.4	31	308.6	CW_Inv07	523691.8	4994490.1	29	22.8	28.4	32.2	338.6	CW_Inv07
R025	Existing	523720.5	4994285.6	25.7	20.4	26.1	29.5	422.8	CW_Inv08	523714.5	4994256.3	27.3	23	27.3	31.1	446	CW_Inv09
R026	Existing	523825.6	4994315.6	27.9	19.6	27.2	30.9	320.1	CW_Inv09	523804.2	4994294.2	29.1	22.3	28.3	32.2	348.8	CW_Inv09
R027	Existing	523786.2	4994181.1	25.4	20	26	29.3	425.1	CW_Inv10	523778	4994154.8	27	22.6	27.2	30.8	444.7	CW_Inv10
R028	Existing	523890.9	4994217.7	27.5	19.2	27.1	30.6	315.4	CW_Inv10	523869.4	4994196.7	28.7	21.9	28.2	31.9	344.4	CW_Inv10
R029	Existing	523900.4	4994316.8	29.4	19	27.9	31.9	253.8	CW_Inv09	523878.7	4994296.2	30.4	21.8	28.9	33.1	283.3	CW_Inv09
R030	Existing	523916.8	4994140.2	26.6	19	26.7	30	340.1	CW_Inv10	523898.2	4994116.7	27.9	21.8	27.8	31.4	369.7	CW_Inv10
R031	Existing	523959.3	4994060	25.6	18.8	26.3	29.4	373.8	CW_Inv10	523941.8	4994035.6	27.1	21.5	27.5	30.8	403.8	CW_Inv10
R032	Existing	523982.9	4994254.6	29.9	18.5	28.1	32.3	217.4	CW_Inv10	523961	4994234.2	30.7	21.3	29.1	33.3	246.9	CW_Inv10
R033	Vacant	524000.7	4994315.6	31.8	18.3	28.8	33.7	174.8	CW_Inv10	523977.8	4994296.2	32.3	21.1	29.8	34.4	202.9	CW_Inv10
R034	Existing	524134.8	4994315	37.3	17.4	29.9	38.1	64.5	CW_Inv10	524105.6	4994306.9	36.6	20.3	30.9	37.7	88.5	CW_Inv10
R035	Vacant	524152	4993764.9	21.8	17.3	24.8	27.1	606.4	CW_Trans10	524143.9	4993736	23.6	20	26.1	28.7	635.5	CW_Trans10
R036	Vacant	524227.7	4993554	19.1	16.6	23.3	25.3	818.9	CW_Trans10	524222.1	4993524.6	21.2	19.3	24.7	27.1	848	CW_Trans10
R037	Existing	524345.8	4994325	38.6	16.1	31.8	39.4	71	CW_Sub	524321.7	4994307.3	37.8	18.9	32.6	39	100.7	CW_Sub
R038	Existing	524499	4994342.8	34.6	15.2	33.1	36.9	107	CW_Sub	524502.2	4994337.7	35.9	17.9	34.2	38.2	111.6	CW_Sub
R039	Existing	524508.3	4994435	33.6	15.1	34.7	37.2	126.9	CW_Sub	524531.5	4994416	34.3	17.7	35.6	38.1	141	CW_Sub
R040	Existing	524794.5	4994417.6	24.8	13.6	35.5	35.9	400	CW_Sub	524766.2	4994393.5	27.3	16.5	36.1	36.7	369.8	CW_Sub
R041	Existing	524856.2	4994445.7	23.7	13.3	36	36.3	464.9	CW_Sub	524853.3	4994415.9	25.8	16	36.5	36.9	458.3	CW_Sub

Noise Receptor ID	Description	Point of Reception at 1.5 m								Point of Reception at 4.5 m							
		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source	
		X	Y	Cornwall	Glendale	South Glengarry	Total	Dist[m]	ID	X	Y	Cornwall	Glendale	South Glengarry	Total	Dist [m]	ID
R042	Existing	524936.5	4994620.5	22	12.7	*	40.1	593.1	CW_Sub	524947.8	4994592.7	24.2	15.4	*	40.1	592.7	CW_Sub
R043	Existing	524951.8	4994491.3	22.1	12.7	36.5	36.7	567.1	CW_Sub	524962	4994463.1	24.1	15	36.9	37.2	572.1	CW_Sub
R045	Existing	524981.6	4994520	21.6	12.2	37	37.1	602.6	CW_Sub	524990.7	4994491.4	23.7	14.9	37.3	37.5	605.3	CW_Sub
R046	Existing	525071.4	4994596.5	20.3	11.6	37.7	37.8	710.2	CW_Sub	525078.1	4994576.7	22.5	13.8	38.1	38.3	710.7	CW_Sub
R047	Existing	525095.3	4994482.9	20.1	11.1	35.1	35.3	706.9	CW_Sub	525124.6	4994489.1	22	13.7	36	36.2	736.8	CW_Sub
R048	Existing	525144.5	4994441.6	19.5	10.9	33.9	34.1	750.7	CW_Sub	525170.1	4994423.5	21.5	12.8	34.5	34.8	774.9	CW_Sub
R049	Vacant	525193.3	4994362.5	18.8	9.2	32.3	32.5	796.5	CW_Sub	525211.3	4994338.5	21	11.8	33	33.3	815.2	CW_Sub
R050	Existing	525210.1	4994495	18.7	8	34	34.1	822.2	CW_Sub	525236.7	4994481.2	20.8	10.6	34.6	34.8	846.7	CW_Sub
R051	Vacant	525280.6	4994224.4	17.6	7.7	29.9	30.1	896.4	CW_Sub	525298.1	4994200.1	19.8	8.9	30.8	31.1	918	CW_Sub
R052	Vacant	525278.5	4994742.6	17.6	5.8	35.9	36	955.5	CW_Sub	525306.2	4994731.1	19.8	5.6	36.3	36.4	976.9	CW_Sub
R053	Existing	525299	4994356.8	17.7	6.1	31.2	31.4	902.3	CW_Sub	525316.8	4994332.7	19.9	8.8	32.1	32.3	921	CW_Sub
R054	Existing	523026.6	4993972.6	16	27.9	19.7	28.8	1174.2	CW_Inv08	523056.6	4993971.4	18.8	29.8	21.6	30.7	1148.9	CW_Inv08
R055	Existing	523111.7	4993990.7	16.8	26.7	20.3	28	1091.7	CW_Inv08	523141.7	4993990.7	19.5	28.7	22.2	30	1066.1	CW_Inv08
R056	Existing	523131.2	4993998.6	17	26.5	20.4	27.8	1070.9	CW_Inv08	523161	4993994.9	19.7	28.5	22.3	29.8	1047.6	CW_Inv08
R057	Existing	523146.8	4994309.3	18.4	25.6	21.7	27.6	895.9	CW_Inv06	523168.1	4994284	21	27.9	23.4	29.8	891.7	CW_Inv06
R059	Existing	523163.9	4994126.6	17.9	25.9	21.1	27.7	979.5	CW_Inv07	523193.9	4994126.1	20.6	28	23	29.7	954.1	CW_Inv08
R060	Existing	523185	4994324	18.9	25.2	22	27.5	855.7	CW_Inv06	523213.4	4994333.6	21.6	27.2	23.9	29.6	826.6	CW_Inv06
R061	Existing	523325.8	4994635.8	21.3	22.6	24.1	27.6	600.9	CW_Inv06	523295.9	4994638	23.1	25.4	25.4	29.5	629.5	CW_Inv06
R062	Existing	523269	4994083.2	18.6	24.8	21.7	27.2	909.2	CW_Inv08	523298.4	4994077.2	21.3	26.9	23.5	29.3	887.4	CW_Inv08
R063	Existing	523308.8	4994003.2	18.6	24.4	21.6	26.9	921.1	CW_Inv08	523323.6	4993981.8	21	26.7	23.2	29	920.8	CW_Inv09
R064	Existing	523436.8	4994035.6	20	23.1	22.6	26.9	796	CW_Inv09	523394.6	4994006.4	21.7	26	23.8	28.9	847.3	CW_Inv09
R065	Existing	523433.8	4994128.6	20.6	23	23	27.1	746.3	CW_Inv08	523417.1	4994121.2	22.7	25.7	24.5	29.2	764.3	CW_Inv08
R066	Existing	523466.9	4993951.4	19.6	22.8	22.4	26.6	815.8	CW_Inv10	523451.1	4993925.9	21.6	25.4	23.7	28.6	842.6	CW_Inv10

Noise Receptor ID	Description	Point of Reception at 1.5 m								Point of Reception at 4.5 m							
		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source		UTM Coordinates NAD 83 Zone 18 [m]		Sound Pressure Contribution [dBA]				Nearest Project Source	
		X	Y	Cornwall	Glendale	South Glengarry	Total	Dist[m]	ID	X	Y	Cornwall	Glendale	South Glengarry	Total	Dist [m]	ID
R067	Existing	523465.2	4994172.6	21.3	22.7	23.5	27.3	695.6	CW_Inv08	523450.2	4994146.7	23.2	25.4	24.8	29.3	722.5	CW_Inv08
R068	Existing	523483.9	4994063.1	20.6	22.6	23.1	27	741.5	CW_Inv09	523468.3	4994037.5	22.6	25.3	24.4	29	768.3	CW_Inv09
R069	Existing	523528	4994083.6	21.3	22.2	23.5	27.2	693.2	CW_Inv09	523511.9	4994058.3	23.2	24.9	24.8	29.1	720.4	CW_Inv09
R070	Existing	523537	4994218.1	22.5	22	24.3	27.8	610.6	CW_Inv08	523514.7	4994198	24.2	24.7	25.5	29.6	640.3	CW_Inv08
R071	Existing	523537.6	4994088.3	21.4	22.1	23.6	27.2	682.6	CW_Inv09	523537.5	4994062.5	23.5	24.6	25	29.2	696.8	CW_Inv09
R072	Vacant	523610.7	4994101.6	22.3	21.5	24.2	27.6	614.3	CW_Inv09	523592.5	4994077.8	24.1	24.2	25.4	29.4	642.9	CW_Inv09
R073	Existing	524711.9	4994474.5	26.5	14	36.7	37.2	330.7	CW_Sub	524712	4994444.5	28.5	16.7	37.1	37.7	322.9	CW_Sub
R074	Existing	523633.9	4994275.9	24.3	21.1	25.3	28.7	497.9	CW_Inv08	523632.4	4994246	26.1	23.7	26.6	30.4	516.5	CW_Inv08
R075	Vacant	523194.1	4996002.1	12.8	16.1	20.9	22.6	1412	CW_Inv05	523176	4996026.1	15.2	18.7	22.4	24.5	1442	CW_Inv05
R076	Existing	524708.7	4994391.7	26.7	14.1	34.9	35.6	312.4	CW_Sub	524715.5	4994362.5	28.3	16.7	35.5	36.3	318.9	CW_Sub
R077	Vacant	523456.8	4996155.3	12.7	14.6	21.8	23	1409.1	CW_Fan05	523436.9	4996177.7	15.2	17.2	23.2	24.7	1437.8	CW_Fan05
R078	Existing	524557	4994352.1	31.4	14.9	33.6	35.7	161.7	CW_Sub	524576.7	4994338.4	32.2	17.5	34.6	36.6	183.5	CW_Sub
R079	Existing	525030.7	4994545.4	20.9	11.9	37.1	37.2	656.5	CW_Sub	525043.2	4994518.1	23	14.6	37.4	37.5	662.2	CW_Sub
R080	Existing	522944.9	4995810.3	12.7	17.9	20	22.5	1411.2	CW_Inv06	522927.1	4995834.4	15.2	20.4	21.5	24.5	1441	CW_Inv06
R081	Existing	524171.1	4993724.6	21.3	17.2	24.6	26.7	646.4	CW_Trans10	524165.9	4993695.1	23.1	19.8	25.8	28.4	675.9	CW_Trans10
R082	Existing	523643.3	4994581.3	26.7	20.4	27	30.3	331.9	CW_Inv06	523619.7	4994562.3	28	23.2	28	31.7	362.2	CW_Inv06
R083	Existing	523643.5	4996197.4	12.9	13.8	22.7	23.6	1382.2	CW_Fan05	523625.3	4996221.2	15.3	16.5	24	25.2	1410.3	CW_Fan05
R084	Vacant	522827.9	4995731.4	12.5	18.7	19.4	22.5	1440.3	CW_Inv06	522806.9	4995752.8	15	21.2	20.9	24.6	1470.2	CW_Inv06
R085	Existing	523374.9	4994674.8	22	22.1	24.6	27.9	544.6	CW_Inv06	523344.9	4994675.3	23.8	24.8	25.9	29.7	573.9	CW_Inv06
R086	Existing	525250.6	4994504	18.3	7.8	33.6	33.7	863.6	CW_Sub	525270.2	4994481.3	20.4	8.9	34.2	34.4	879.9	CW_Sub
R087	Vacant	523738.2	4996390.7	11.7	12.4	21.9	22.8	1546.7	CW_Fan05	523722.9	4996416.5	14.2	15.1	23.3	24.4	1575.1	CW_Fan05
R088	Existing	525054.8	4994861.9	19.6	10.9	*	44.7	818.9	CW_Sub	525084.3	4994856.3	21.7	12.8	*	43.8	839.6	CW_Sub

7. Conclusions and Recommendations

For the Cornwall Solar Project, the sound pressure levels at the Noise Receptors have been estimated using the CadnaA model, based on ISO 9613-2. Mitigation for operation of the Project has been modelled and shown to be feasible.

Based on the results obtained in this study, it is concluded that the sound pressure levels at the Noise Receptors, resulting from the Cornwall Solar Project operation, will be compliant with MOE requirements for Class 3 areas of 40 dBA at all times.

Signatures

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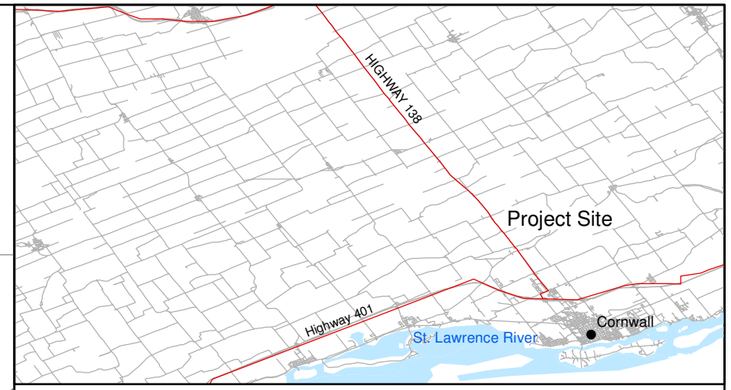
Appendix A
Land Use Zoning Designation Plan and Area Location Plan

522000
523000
524000
525000
4996000
4995000
4994000

AG
RU
GLEN FALLOCH RD
COUNTY RD 20
9 MILE RD
COUNTY RD 19
CASHION RD
COUNTY RD 44 HEADLINE RD
KINLOCH RD
ST RD

R087 R083 R077 R075 R080 R084 R013 R023 R015 R014 R035 R061 R018 R082 R016 R024 R017 R019 R060 R057 R074 R070 R020 R025 R026 R029 R033 R034 R037 R032 R028 R027 R059 R065 R067 R062 R022 R030 R069 R071 R031 R054 R055 R056 R063 R064 R068 R066 R035 R081 R036 R021 R088 R012 R052 R011 R010 R007 R046 R009 R006 R008 R079 R004 R003 R045 R043 R050 R086 R047 R048 R049 R053 R051 R001 R002 R073 R041 R040 R076 R038 R078

CW_Cluster5
CW_Cluster6
CW_Cluster4
CW_Cluster7
CW_Cluster3
CW_Cluster8
CW_Cluster2
CW_Cluster9
CW_Cluster1
CW_Cluster10
CW_Sub



Legend

- Cluster # — Inverter Cluster
- SUB — Substation Transformer
- # — Noise Receptor - Existing
- # — Noise Receptor - Vacant
- Road
- Cornwall Solar Project Site
- 1000 m from Project Site
- Waterbody
- Zone Boundary
- Parcel

AG Agricultural
RU Rural

Notes:
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2. Spatial referencing UTM NAD 83.

0 100 200 400 600 Metres

NORTH

1:13,000

Figure A.1

Cornwall Solar Inc.

Cornwall Solar Project
Land Use

HATCH

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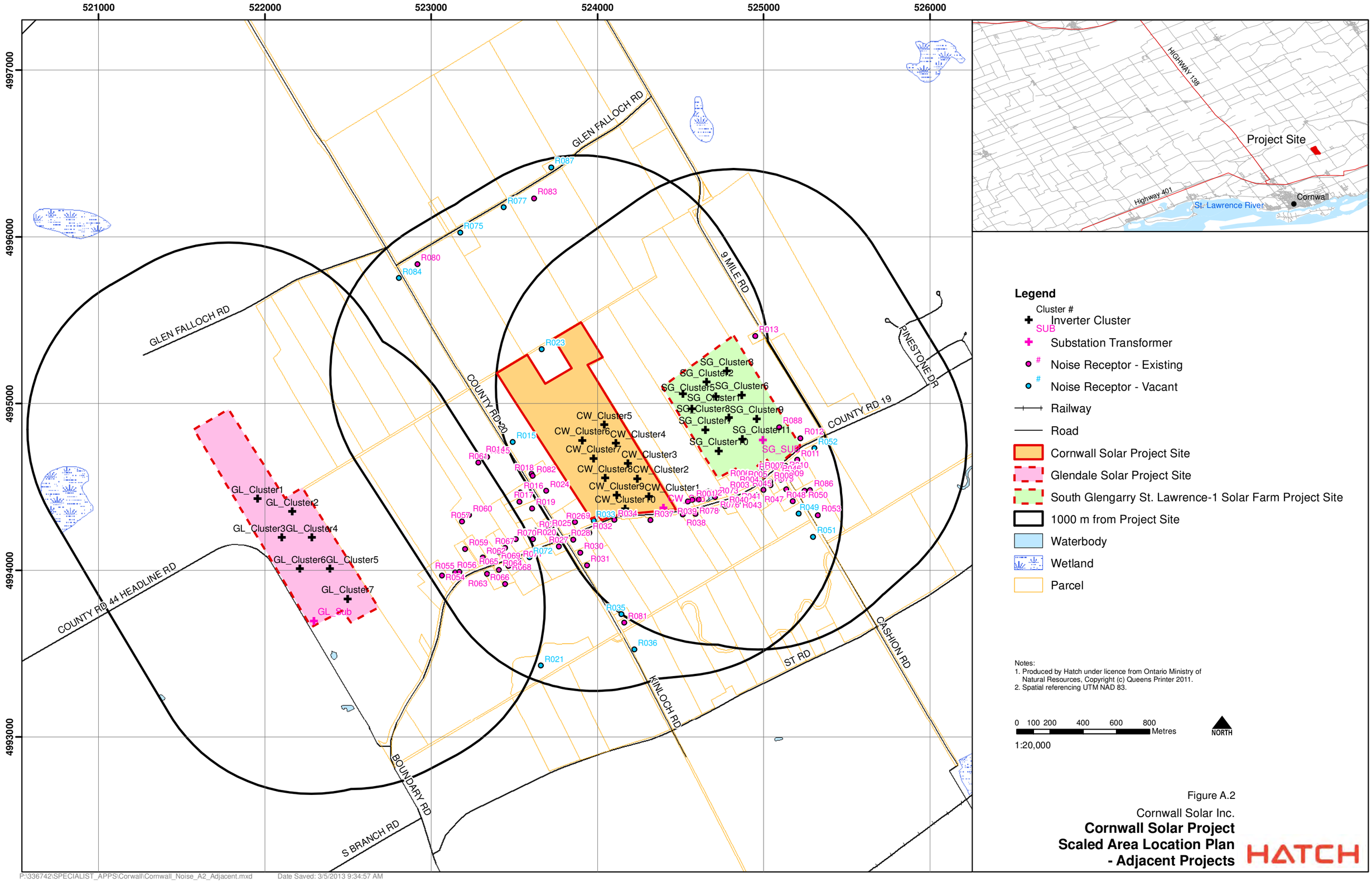

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Figure A.2

Cornwall Solar Inc.

Cornwall Solar Project
Scaled Area Location Plan
- Adjacent Projects

HATCH

523000 524000 525000

4996000 4995000 4994000

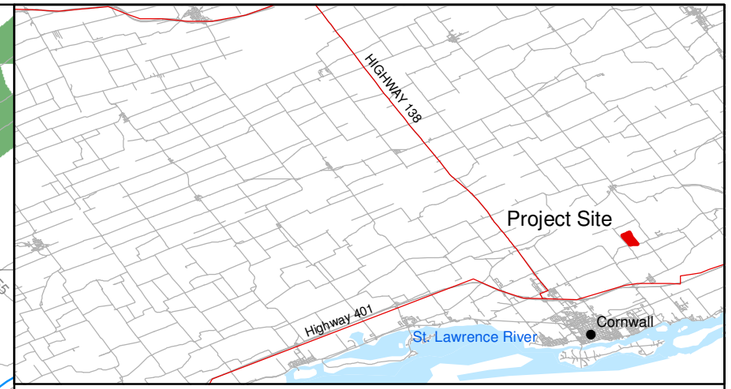
GLEN FALLOCH RD
GLEN FALLOCH RD
9 MILE RD
COUNTY RD 20
KINLOCH RD
CASHION RD
ST RD

R087 R083 R077 R075 R080 R084 R023 R013 R088 R012 R052 R011 R010 R007 R046 R009 R006 R008 R004 R079 R003 R045 R050 R086 R043 R073 R047 R048 R041 R040 R076 R049 R053 R051 R078 R038 R037 R034 R033 R029 R026 R032 R028 R025 R020 R070 R074 R027 R030 R031 R072 R071 R069 R067 R065 R062 R059 R063 R064 R068 R066 R054 R055 R056 R057 R060 R024 R016 R017 R019 R018 R082 R061 R014 R015 R035 R081 R036 R021

SG_Cluster1 SG_Cluster2 SG_Cluster3 SG_Cluster4 SG_Cluster5 SG_Cluster6 SG_Cluster7 SG_Cluster8 SG_Cluster9 SG_Cluster10 SG_Cluster11 SG_SUB

CW_Cluster1 CW_Cluster2 CW_Cluster3 CW_Cluster4 CW_Cluster5 CW_Cluster6 CW_Cluster7 CW_Cluster8 CW_Cluster9 CW_Cluster10 CW_SUB

GL_Cluster2 GL_Cluster4 GL_Cluster3 GL_Cluster6 GL_Cluster5 GL_Cluster7 GL_SUB



Legend

- Cluster #
- Inverter Cluster
- SUB — Substation Transformer
- # — Noise Receptor - Existing
- # — Noise Receptor - Vacant
- Road
- Railway
- Topographic Contour (5 m interval)
- Watercourse
- Inverter Enclosure (Not to Scale)
- Project Site
- 1000 m from Project Site
- South Glengarry St. Lawrence-1 Solar Farm Project Site
- Glendale Solar Project Site
- Parcel
- Waterbody
- Wetland
- Wooded Area

Notes:
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2. Spatial referencing UTM NAD 83.

0 100 200 400 600 Metres

NORTH

1:13,000

Figure A.3

Cornwall Solar Inc.

Cornwall Solar Project
Scaled Area Location Plan

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Appendix B
Noise Sources

Table B.1 Point Sources from Cornwall Solar Project Used in CadnaA, Includes 5.0-dBA Tonality Penalty and Enclosure Attenuation at the Inverters

Source ID	Description	Sound Power ID	Enclosure attenuation ID	Total sound power level (dBA)	Correction (dBA)	Height (m)	UTM Coordinates NAD 83, Zone 18	
							X	Y
CW_Fan01	CWB-101-4 exhaust fan at CW_Cluster01	Fan_CWB_101_4		78.2	5	2	524310.7	4994445.5
CW_Fan02	CWB-101-4 exhaust fan at CW_Cluster02	Fan_CWB_101_4		78.2	5	2	524240.9	4994552.3
CW_Fan03	CWB-101-4 exhaust fan at CW_Cluster03	Fan_CWB_101_4		78.2	5	2	524186.3	4994644
CW_Fan04	CWB-101-4 exhaust fan at CW_Cluster04	Fan_CWB_101_4		78.2	5	2	524113.4	4994764.9
CW_Fan05	CWB-101-4 exhaust fan at CW_Cluster05	Fan_CWB_101_4		78.2	5	2	524044.4	4994874.6
CW_Fan06	CWB-101-4 exhaust fan at CW_Cluster06	Fan_CWB_101_4		78.2	5	2	523911.6	4994781.5
CW_Fan07	CWB-101-4 exhaust fan at CW_Cluster07	Fan_CWB_101_4		78.2	5	2	523979.2	4994674.6
CW_Fan08	CWB-101-4 exhaust fan at CW_Cluster08	Fan_CWB_101_4		78.2	5	2	524048.2	4994557.3
CW_Fan09	CWB-101-4 exhaust fan at CW_Cluster09	Fan_CWB_101_4		78.2	5	2	524117.7	4994453.7
CW_Fan10	CWB-101-4 exhaust fan at CW_Cluster10	Fan_CWB_101_4		78.2	5	2	524168.8	4994372.8
CW_Inv01	Two Schneider Electric GT500 MVX inverters at CW_Cluster01	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524308.3	4994443.9
CW_Inv02	Two Schneider Electric GT500 MVX inverters at CW_Cluster02	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524238.5	4994550.7
CW_Inv03	Two Schneider Electric GT500 MVX inverters at CW_Cluster03	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524183.8	4994642.4
CW_Inv04	Two Schneider Electric GT500 MVX inverters at CW_Cluster04	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524110.9	4994763.3
CW_Inv05	Two Schneider Electric GT500 MVX inverters at CW_Cluster05	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524042	4994873
CW_Inv06	Two Schneider Electric GT500 MVX inverters at CW_Cluster06	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	523909.2	4994779.9
CW_Inv07	Two Schneider Electric GT500 MVX inverters at CW_Cluster07	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	523976.8	4994673
CW_Inv08	Two Schneider Electric GT500 MVX inverters at CW_Cluster08	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524045.8	4994555.7
CW_Inv09	Two Schneider Electric GT500 MVX inverters at CW_Cluster09	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524115.2	4994452.1

Source ID	Description	Sound Power ID	Enclosure attenuation ID	Total sound power level (dBA)	Correction (dBA)	Height (m)	UTM Coordinates NAD 83, Zone 18	
							X	Y
CW_Inv10	Two Schneider Electric GT500 MVX inverters at CW_Cluster10	Inv_X2_1.0MW_Xnrx_GT500	Louver_A8370	83.8	5	2.3	524166.4	4994371.2
CW_Sub	34.5-kV/44-kV/10-MVA substation transformer	Tr_34.5kV_44kV_10MVA		86.6	5	3.5	524396.8	4994374.4
CW_Trans 01	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster01	Tr_200V_34.5kV_1MVA		78.3	5	2	524313.1	4994443.7
CW_Trans 02	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster02	Tr_200V_34.5kV_1MVA		78.3	5	2	524243.3	4994550.5
CW_Trans 03	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster03	Tr_200V_34.5kV_1MVA		78.3	5	2	524188.7	4994642.2
CW_Trans 04	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster04	Tr_200V_34.5kV_1MVA		78.3	5	2	524115.8	4994763.1
CW_Trans 05	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster05	Tr_200V_34.5kV_1MVA		78.3	5	2	524046.8	4994872.8
CW_Trans 06	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster06	Tr_200V_34.5kV_1MVA		78.3	5	2	523914	4994779.7
CW_Trans 07	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster07	Tr_200V_34.5kV_1MVA		78.3	5	2	523981.6	4994672.8
CW_Trans 08	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster08	Tr_200V_34.5kV_1MVA		78.3	5	2	524050.6	4994555.5
CW_Trans 09	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster09	Tr_200V_34.5kV_1MVA		78.3	5	2	524120.1	4994451.9
CW_Trans 10	208-V/34.5-kV/1-MVA WEG transformer at CW_Cluster10	Tr_200V_34.5kV_1MVA		78.3	5	2	524171.2	4994371

Table B.2 Point Sources from Glendale Solar Project (GL) and South Glengarry St. Lawrence-1 Solar Farm (SG) Used in CadnaA, Includes 5.0-dBA Tonality Penalty and Enclosure Attenuation at the Inverters

Source ID	Description	Sound Power ID	Enclosure attenuation ID	Total sound power level (dBA)	Correction (dBA)	Height (m)	UTM Coordinates NAD 83, Zone 18	
							X	Y
GL_Inv1	Two Sunny Central 800CP at GL_Cluster1	GL_SMA_SC800CPX2		91.3	5	2.6	521955	4994431
GL_Inv2	Two Sunny Central 800CP at GL_Cluster2	GL_SMA_SC800CPX2		91.3	5	2.6	522162	4994354
GL_Inv3	Two Sunny Central 800CP at GL_Cluster3	GL_SMA_SC800CPX2		91.3	5	2.6	522100	4994199
GL_Inv4	Two Sunny Central 800CP at GL_Cluster4	GL_SMA_SC800CPX2		91.3	5	2.6	522281	4994199
GL_Inv5	Two Sunny Central 800CP at GL_Cluster5	GL_SMA_SC800CPX2		91.3	5	2.6	522390	4994010
GL_Inv6	Two Sunny Central 800CP at GL_Cluster6	GL_SMA_SC800CPX2		91.3	5	2.6	522209	4994010
GL_Inv7	Two Sunny Central 800CP at GL_Cluster7	GL_SMA_SC800CPX2		91.3	5	2.6	522498	4993829
GL_Sub	34.5-kV/44-kV/10-MVA substation transformer	GL_T44kV_10MVA		90.8	5	3.5	522294	4993696
GL_Trans1	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster1	GL_T34.5kV_1.6MVA		80.1	5	2.58	521950	4994431
GL_Trans2	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster2	GL_T34.5kV_1.6MVA		80.1	5	2.58	522157	4994354
GL_Trans3	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster3	GL_T34.5kV_1.6MVA		80.1	5	2.58	522095	4994199
GL_Trans4	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster4	GL_T34.5kV_1.6MVA		80.1	5	2.58	522276	4994199
GL_Trans5	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster5	GL_T34.5kV_1.6MVA		80.1	5	2.58	522384	4994010
GL_Trans6	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster6	GL_T34.5kV_1.6MVA		80.1	5	2.58	522203	4994010
GL_Trans7	360-V/34.5-kV/1.6-MVA transformer at GL_Cluster7	GL_T34.5kV_1.6MVA		80.1	5	2.58	522493	4993829
SG_NS_01	Two 500 kW inverters at SG_Cluster01	SG_Inv_1MW		96.5	5	2	524514	4995058
SG_NS_02	Two 500 kW inverters at SG_Cluster02	SG_Inv_1MW		96.5	5	2	524655	4995130
SG_NS_03	Two 500 kW inverters at SG_Cluster03	SG_Inv_1MW		96.5	5	2	524778	4995195
SG_NS_04	Two 500 kW inverters at SG_Cluster04	SG_Inv_1MW		96.5	5	2	524568	4994971
SG_NS_05	Two 500 kW inverters at SG_Cluster05	SG_Inv_1MW		96.5	5	2	524711	4995043
SG_NS_06	Two 500 kW inverters at SG_Cluster06	SG_Inv_1MW		96.5	5	2	524868	4995052
SG_NS_07	Two 500 kW inverters at SG_Cluster07	SG_Inv_1MW	SG_Louver	94.3	5	2	524649	4994843
SG_NS_08	Two 500 kW inverters at SG_Cluster08	SG_Inv_1MW		96.5	5	2	524790	4994916
SG_NS_09	Two 500 kW inverters at SG_Cluster09	SG_Inv_1MW		96.5	5	2	524958	4994910
SG_NS_10	Two 500 kW inverters at SG_Cluster10	SG_Inv_1MW	SG_Louver	94.3	5	2	524728	4994718
SG_NS_11	Two 500 kW inverters at SG_Cluster11	SG_Inv_1MW	SG_Louver	94.3	5	2	524871	4994790
SG_NS_12	1 MVA transformer at SG_Cluster01	SG_Trans_1MVA		77.4	5	1	524516	4995058

Source ID	Description	Sound Power ID	Enclosure attenuation ID	Total sound power level (dBA)	Correction (dBA)	Height (m)	UTM Coordinates NAD 83, Zone 18	
							X	Y
SG_NS_13	1 MVA transformer at SG_Cluster02	SG_Trans_1MVA		77.4	5	1	524657	4995130
SG_NS_14	1 MVA transformer at SG_Cluster03	SG_Trans_1MVA		77.4	5	1	524780	4995195
SG_NS_15	1 MVA transformer at SG_Cluster04	SG_Trans_1MVA		77.4	5	1	524570	4994971
SG_NS_16	1 MVA transformer at SG_Cluster05	SG_Trans_1MVA		77.4	5	1	524713	4995043
SG_NS_17	1 MVA transformer at SG_Cluster06	SG_Trans_1MVA		77.4	5	1	524870	4995052
SG_NS_18	1 MVA transformer at SG_Cluster07	SG_Trans_1MVA		77.4	5	1	524651	4994843
SG_NS_19	1 MVA transformer at SG_Cluster08	SG_Trans_1MVA		77.4	5	1	524792	4994916
SG_NS_20	1 MVA transformer at SG_Cluster09	SG_Trans_1MVA		77.4	5	1	524960	4994910
SG_NS_21	1 MVA transformer at SG_Cluster10	SG_Trans_1MVA		77.4	5	1	524730	4994718
SG_NS_22	1 MVA transformer at SG_Cluster11	SG_Trans_1MVA		77.4	5	1	524873	4994790
SG_NS_23	10 MVA substation transformer	SG_Trans_10MVA		88.9	5	2	524994	4994784
SG_NS_24	Inverter enclosure ventilation fan at SG_Cluster01	SG_Fan		73.2	0	2	524515	4995059
SG_NS_25	Inverter enclosure ventilation fan at SG_Cluster02	SG_Fan		73.2	0	2	524656	4995131
SG_NS_26	Inverter enclosure ventilation fan at SG_Cluster03	SG_Fan		73.2	0	2	524569	4994972
SG_NS_27	Inverter enclosure ventilation fan at SG_Cluster04	SG_Fan		73.2	0	2	524712	4995044
SG_NS_28	Inverter enclosure ventilation fan at SG_Cluster05	SG_Fan		73.2	0	2	524779	4995196
SG_NS_29	Inverter enclosure ventilation fan at SG_Cluster06	SG_Fan		73.2	0	2	524869	4995054
SG_NS_30	Inverter enclosure ventilation fan at SG_Cluster07	SG_Fan		73.2	0	2	524650	4994845
SG_NS_31	Inverter enclosure ventilation fan at SG_Cluster08	SG_Fan		73.2	0	2	524791	4994917
SG_NS_32	Inverter enclosure ventilation fan at SG_Cluster09	SG_Fan		73.2	0	2	524959	4994912
SG_NS_33	Inverter enclosure ventilation fan at SG_Cluster10	SG_Fan		73.2	0	2	524729	4994719
SG_NS_34	Inverter enclosure ventilation fan at SG_Cluster11	SG_Fan		73.2	0	2	524872	4994791

Table B.3 Frequency Spectra Used for Modelling the Noise Sources, Not Including Tonality Penalty

Spectra ID	Octave Spectrum (dB)										Total (dBA)
	Weight	31.5	63	125	250	500	1000	2000	4000	8000	
GL_SMA_SC800CPX2	A		63.1	73.9	80.5	82.3	78.7	74.1	65	72.7	86.3
GL_T27.6kV_1.6MVA	A	32.3	51.5	63.6	66.1	71.5	68.7	64.9	59.7	50.6	75.1
GL_T44kV_10MVA	A	43	62.2	74.3	76.8	82.2	79.4	75.6	70.4	61.3	85.8
SG_Fan			73	72	78	69	63	66	58	52	73.2
SG_Inv_1MW	A		55.5	73.2	80.5	82.4	86	81.8	76.9	87	91.5
SG_Trans_10MVA			86.5	88.5	83.5	83.5	77.5	72.5	67.5	60.5	83.9
SG_Trans_1MVA			75	77	72	72	66	61	56	49	72.4
Tr_200V_34.5kV_1MVA	A	30.5	49.7	61.8	64.3	69.7	66.9	63.1	57.9	48.8	73.3
Tr_34.5kV_44kV_10MVA	A	38.8	58	70.1	72.6	78	75.2	71.4	66.2	57.1	81.6
Inv_X2_1.0MW_Xnrx_GT500	A		55.5	73.2	80.5	82.4	86	81.8	76.9	87	91.5
Fan_CWB_101_4			73	72	78	69	63	66	58	52	73.2

Table B.4 Transmission Loss Used in CadnaA to Model Enclosures of Cornwall Solar Project

Spectra ID	Octave Spectrum (dB)									Rw
	31.5	63	125	250	500	1000	2000	4000	8000	
Louver_A8370	0.0	9.0	7.0	7.0	11.0	18.0	19.0	14.0	13.0	16.0

Table B.5 Transmission Loss Used in CadnaA to Model Enclosures of South Glengarry St. Lawrence-1 Solar Farm

Spectra ID	Octave Spectrum (dB)									Rw
	31.5	63	125	250	500	1000	2000	4000	8000	
SG_Louver	0.0	0.0	0.0	1.0	4.0	7.0	6.0	0.0	0.0	6.0

GT500 480, GT500 600, GT500 MVX

The GT500 is a Grid Tie Solar Inverter for large commercial and utility applications with a CEC efficiency of 96 percent. The GT500 features an industrial design for improved reliability. A two-section enclosure, with inverter and DC section in one cabinet and transformer and AC section in another, reduces installation time and simplifies site preparation requirements. This new inverter design also integrates high-quality Schneider Electric components, including AC and DC circuit breakers and a transformer.

GT500 480

GT500 MVX

> Features

- Ultra-efficient design with CEC efficiency of 97% (GT500 MVX version)
- Option to connect directly to medium voltage using a customer-supplied transformer or transformer supplied by Schneider Electric
- Integrated design with isolation transformer (480 V and 600 V only) in one unit
- Includes AC and DC disconnects
- Integrated ground fault detection and interruption
- Soft-start circuit to reduce nuisance trips (480 V and 600 V only)
- Sensitive components are protected from the environment while heat-generating components are in the cooling airflow
- Back and sides of unit designed for zero clearance installations to minimize inverter space requirements
- Wiring access points on bottom and sides of inverter
- Designed for forklift or sling transportation
- Zinc-primed and powder-coated steel enclosure for maximum corrosion resistance
- Designed to help maximize reliability with film-type capacitors and bus bars in the power path
- Bright fluorescent green vacuum display with UV cover for ease of reading in sunlight
- RS485/Modbus communications

> Options

- PV Box solution with multiple inverters and medium-voltage transformers
- Fused sub-array combiner integrated with the inverter enclosure
- Sub-array string monitoring
- Positive-ground configuration
- Remote monitoring and control options
- Preventive maintenance programs
- Warranty extensions and service contracts with uptime guarantees

Make the most of your energy℠

Schneider Electric™

Device short name	GT500 480	GT500 600	GT500 MVX
Electrical specifications			
Input (DC)			
Photovoltaic power	521 kW	521 kW	521 kW
Input voltage range, MPPT	310 to 480 V	310 to 480 V	310 to 480 V
Max. input voltage, open circuit	600 V	600 V	600 V
Max. input current	1,720 A	1,720 A	1,700 A
Output (AC)			
Nominal output power	500 kW	500 kW	500 kW
Output voltage	480 V	600 V	208 V (for direct connection to a medium-voltage isolation transformer)
Frequency	60 Hz	60 Hz	60 Hz
Nominal output current	610 A	490 A	1,400 A
Power factor	> 0.99	> 0.99	> 0.99 (+/- 0.9 adjustable)
Harmonic distortion	< 3% at rated power	< 3% at rated power	< 3% at rated power
Efficiency			
Peak	97.0%	97.0%	98% not including MV transformer
CEC weighted	96.0%	96.0%	97% not including MV transformer
General specifications			
Power consumption, night time	< 161 W	< 161 W	< 161 W
NEMA® degree of protection	Type 3R (outdoor rating)	Type 3R (outdoor rating)	Type 3R (outdoor rating)
Product weight	3,103 kg (6,840 lb)	3,103 kg (6,840 lb)	1,587 kg (3,499 lb)
Product dimensions (H × W × D)	224.0 × 463.8 × 108.7 cm (88.2 × 182.6 × 42.8 in)	224.0 × 463.8 × 108.7 cm (88.2 × 182.6 × 42.8 in)	224.6 × 228.6 × 126 cm (88.4 × 90.0 × 49.6 in)
Ambient air temperature for operation	-20 °C to 50 °C (-4 °F to 122 °F)		
Operating altitude	Up to 2,012 m (6,600 ft) without derating		
Relative humidity	0 to 95% non-condensing		
Part number	820-0076-01-01	820-0076-02-01	820-0150-01-01*
Features and options			
Type of cooling	Forced convection cooling		
Display type	Standard bright fluorescent green vacuum display		
Communication interface	Standard RS485/Modbus communications interface kit		
AC/DC disconnect	Standard and integrated within the inverter enclosure		
Ground fault detection/interruption	Standard and integrated within the inverter enclosure		
Sub-array combiner	Optional integrated with the inverter enclosure, 100 A, 150 A, or 200 A circuits		
Regulatory approvals			
Safety	CSA certified to UL 1741 Ed. 2, CSA 107.1-01		
Interconnect	IEEE 1547		

Specifications are subject to change without notice.
* Other options available upon request.

> For more information, visit www.schneider-electric.com.

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MEMORANDUM

DATE: 20 July 2009
TO: Tony Fuertsch **EMAIL:** Tony.Fuertsch@Xantrex.com
FROM: J. Byron Davis, VACC **EMAIL:** byron@va-consult.com
SUBJECT: Xantrex Power Inverter – Sound Power Measurements (00485)

Dear Tony,

We are pleased to submit this report regarding the recent testing of a Xantrex GT500 inverter.

Background

As we understand it, Xantrex has a client that requires detailed noise testing of the GT500, a 500kW power inverter for solar applications. Xantrex requested that we perform the noise testing to satisfy this and future client requests.

We visited Xantrex's facility in Livermore, CA on Wednesday 8 July 2009 to perform testing. The testing space was a large, high-bay warehouse-type setting, illustrated in Figure 1. The ceiling was lined with exposed fiberglass insulation, resulting in less reverberation than expected for this type of room. Adjacent equipment not included in the package included a DC power supply simulator and a large freestanding transformer. We chose to develop sound power data using the sound intensity method in order to minimize contamination from adjacent sources.

Since sound power is a property of the source being tested (rather than the cumulative result of multiple sources interacting with the environment), these data are applicable to many different installation conditions. In this document, we report the measured sound power levels and sound pressure levels and provide commentary on how we would insert this source into computer-based noise propagation models.

Test Conditions

We measured sound power using our standard testing suite:

Instrument	Make / Model	Identification
Signal Analyzer	Larson-Davis 3000	S/N 175
Intensity Probe	Gras I50AIC	S/N 6637
Paired Microphones	Gras 40AI	S/N 23083 & 23089
Paired Microphone Preamps	Gras 6AA	S/N 15082 & 15083
Residual Intensity Calibrator	Larson-Davis CAL291	S/N 156
SPL Calibrator	Bruel & Kjaer 4231	S/N 2292439

The instrument was calibrated in the field. We performed testing using the "rectangular prism" moving microphone method. Intensity and power data were computed by the Larson-Davis built-in intensity module. Temperature was estimated at about 25°C; barometric pressure was measured to be about 1005mbar. Background noise levels were modest and consistent. In the majority of 1/3 octave bands, the ambient condition (ex power supply and transformer) was 10dB or more below the test (forced) condition. In the lowest 1/3 octave bands of 50~80Hz and in the 250Hz and 400Hz bands, background levels were 3~8dB below the minimum-observed forced condition. No significant transients occurred during testing; however, irrelevant noise due to the DC power supply simulator changed somewhat with the different test configurations.

We measured the inverter under three input voltage conditions: 305V, 345V, and 408V. In all cases, the inverter was loaded to 100% at the given voltage. Our understanding is that the 408V@100% condition is the highest-load condition.

Xantrex requested data across the frequency spectrum from the 63Hz octave band through the 6.3kHz. It was anticipated that significant sound power would be present in the 6.3kHz band due to the internal electronics switching frequency within that band. We therefore performed the measurement twice for each voltage condition: the first (low-frequency) measurement was performed using the 100mm spacer between the probe microphones, while the second (high-frequency) measurement was performed using the 25mm spacer.

Data Reporting

Data were collected in 1/3 octave bands. We overlapped the data, taking our 50~200Hz data from the "long spacer" measurement and the 800Hz~10kHz data from the "short-spacer" measurement. Data from 250~630Hz were taken as the average of the "long-spacer" and "short-spacer" data sets. Data in the overlap regime of 250~630Hz differed by 1dB or less in each 1/3 octave band. To quantify directionality, we also present average sound pressure level data taken along the front, back, sides, and top of the unit.

We considered the good agreement in the 250~630Hz bands to be indicative of good data. In addition, the consistency of reported PWL (despite changing SPLs due to more-or-less noise being generated by the power supply and transformer) also give us confidence in the results.

The results are presented in Tables 1~4 in terms of sound power levels, PWL, in decibels referenced to 1×10^{-12}W and sound pressure levels, SPL, in decibels referenced to 20μPa. All figures are unweighted.

Discussion

From test condition to test condition, the data indicate very stable noise performance at most frequencies. This is consistent with our qualitative observation that cooling fan noise dominates in most frequency bands. As illustrated in Table 1, the reported sound power level is the same (to within 1dB) from 50Hz through the 3.15kHz band.

High frequency noise becomes considerably more apparent at higher input voltages. As the system voltage increases to 408V, a tone emerges in the 6.3kHz band. Xantrex staff speculate that this is due to the switching frequency of the internal DC-to-AC electronics.

The directionality in the noise generation appears to be modest. Fan noise is most prominent at the rear of the unit, at the intake for the cooling fans. Over the entire spectrum, SPLs measured at the rear of the unit were typically 3~5dB higher than at the front of the unit. This includes not only the broadband fan noise but the high-frequency switching noise, as well.

From the perspective of sound propagation modeling, we would consider modeling the unit as a box with one rear noise source at an elevation of about 42" (the elevation of the opening in the intake shroud) and a front noise source at an elevation of about 80" (the elevation of the opening along the top front of the unit for exhaust.

* * *

Please feel free to call if you have any questions; we may be reached in our San Francisco office by telephone at (+1) 415-693-0424 or via email at byron@va-consult.com.

Sincerely,

J. Byron Davis

Vibro-Acoustic Consultants

Figure 1: Xantrex GT500 Sound Power Measurements – July 2009
Photograph of test unit and surrounding area; the front of the unit is to the right

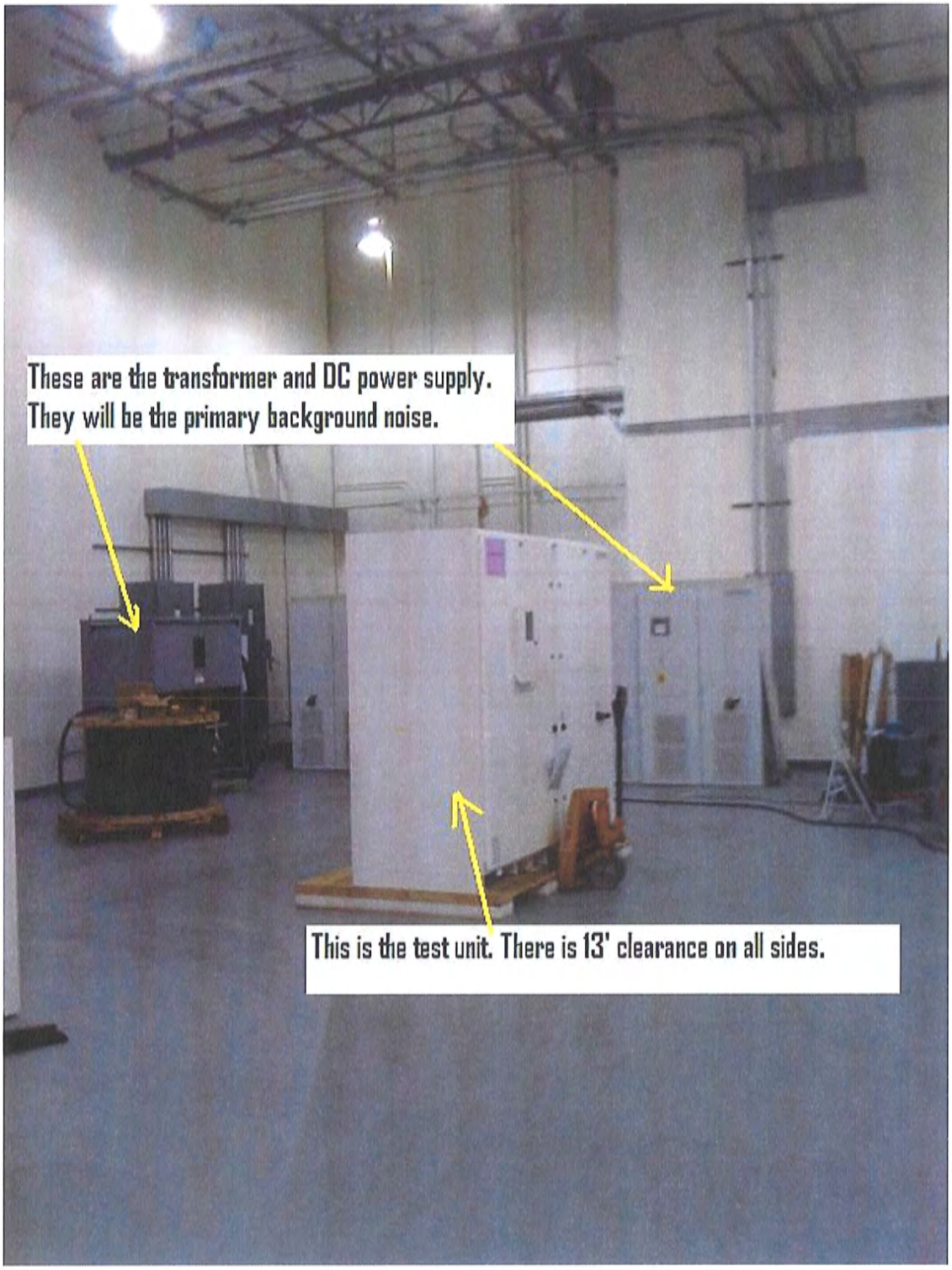

Figure 2: Xantrex GT500 Sound Power Measurements – July 2009
Schematic diagram of GT500 Inverter case outline, with dimensions indicated

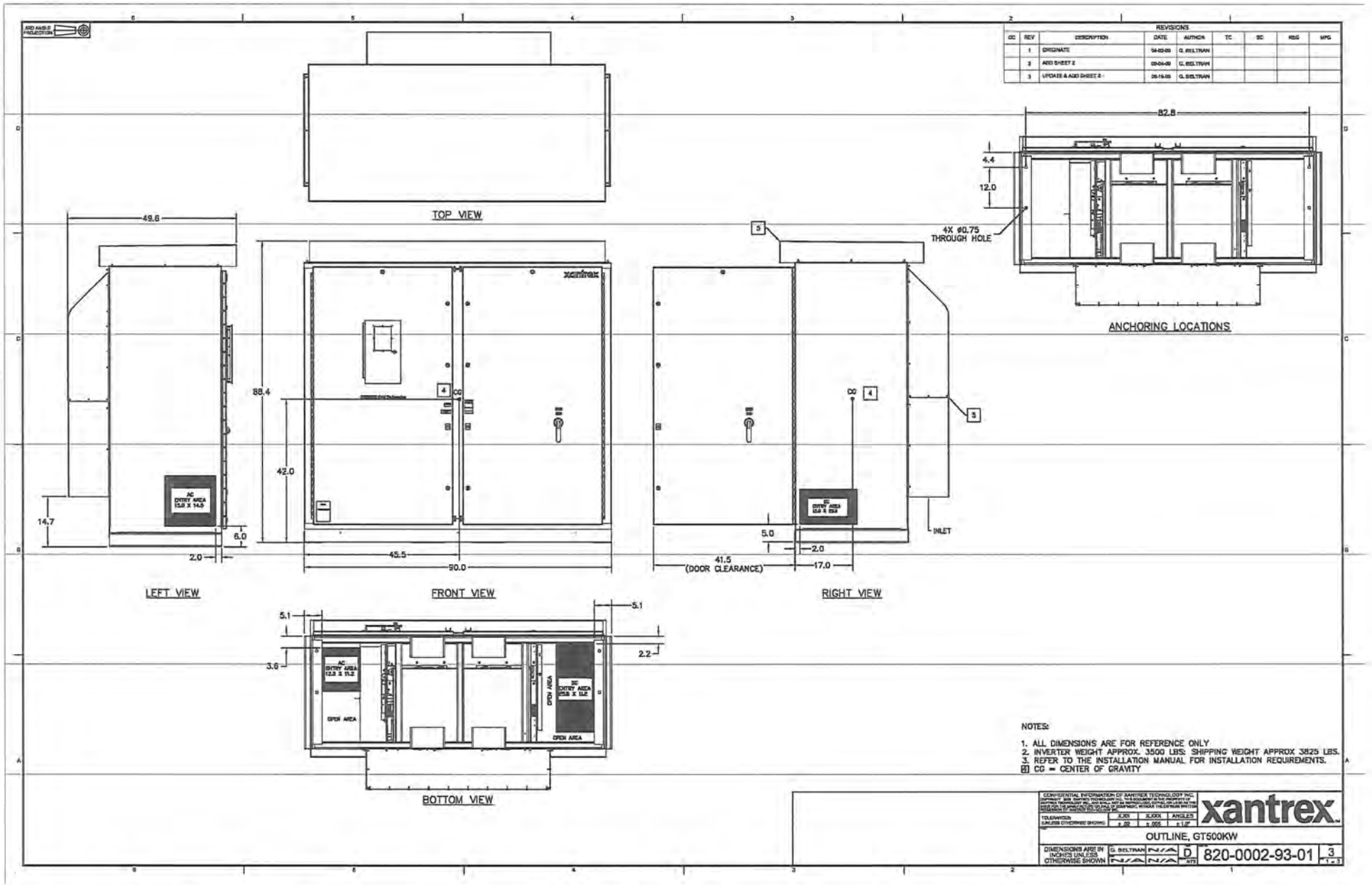

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Table 1: Xantrex GT500 Sound Power Measurements – Overall Sound Power Level Data, PWL in dB re: 1×10^{-12}W

1/3 octave band frequency -->	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	8k	10k
Total PWL, 305V, 100% Load	69	77	71	73	84	78	79	80	83	80	77	75	82	74	72	73	72	71	68	65	64	72	56	50
Total PWL, 345V, 100% Load	68	77	71	74	83	78	79	81	82	80	77	75	82	73	72	73	73	71	68	66	66	78	60	48
Total PWL, 480V, 100% Load	69	77	72	74	85	79	79	81	83	80	77	75	82	74	72	74	73	71	68	67	69	85	66	47

Table 2: Xantrex GT500 Sound Power Measurements – 305V/100% Load PWL in dB re: 1×10^{-12}W and SPL in dB re: 20µPa

1/3 octave band frequency -->	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	8k	10k
Total PWL, 305V, 100% Load	69	77	71	73	84	78	79	80	83	80	77	75	82	74	72	73	72	71	68	65	64	72	56	50
Average SPL, Front, 1.2m setback	52	62	55	57	71	63	65	67	68	66	62	62	66	58	57	56	55	55	53	51	52	63	50	39
Average SPL, Rear, 1.2m setback	59	65	59	61	73	66	67	69	71	67	66	65	68	63	61	63	62	61	60	57	56	66	54	46
Average SPL, Left, 1.2m setback	56	64	56	57	71	61	61	64	66	64	62	61	65	59	58	58	58	56	54	52	52	61	48	38
Average SPL, Right, 1.2m setback	56	64	56	57	73	61	63	66	68	65	63	62	66	60	59	59	59	58	56	54	53	62	50	41
Average SPL, Top, 1.2m setback	54	62	56	58	69	61	62	66	69	65	64	63	67	60	59	59	59	58	55	53	53	62	49	40
Average SPL, Front, 2.0m setback	53	61	56	59	69	62	64	66	68	65	61	61	64	58	57	56	56	55	54	52	53	63	53	44
Average SPL, Rear, 2.0m setback	60	64	60	64	75	67	67	68	69	67	64	64	68	62	59	61	61	60	59	57	57	67	58	49
Average SPL, Left, 2.0m setback	55	62	56	59	71	61	61	64	64	61	59	59	63	57	56	56	56	55	53	52	51	60	50	41
Average SPL, Right, 2.0m setback	56	62	55	60	70	60	62	64	67	63	62	63	65	60	59	59	58	57	56	54	53	61	52	44

Table 3: Xantrex GT500 Sound Power Measurements – 345V/100% Load PWL in dB re: 1×10^{-12}W and SPL in dB re: 20µPa

1/3 octave band frequency -->	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	8k	10k
Total PWL, 345V, 100% Load	68	77	71	74	83	78	79	81	82	80	77	75	82	73	72	73	73	71	68	66	66	78	60	48
Average SPL, Front, 1.2m setback	53	63	56	57	69	63	65	67	68	65	62	61	67	59	58	57	57	56	55	54	54	68	51	45
Average SPL, Rear, 1.2m setback	60	65	60	61	71	66	67	69	70	67	65	63	69	63	61	63	63	61	59	58	58	71	55	47
Average SPL, Left, 1.2m setback	56	64	56	58	69	61	61	64	65	63	61	60	66	59	58	58	58	57	55	54	53	66	50	41
Average SPL, Right, 1.2m setback	56	64	56	57	70	61	62	66	67	64	62	61	67	60	59	59	59	58	57	55	55	67	53	47
Average SPL, Top, 1.2m setback	54	62	56	59	67	62	62	67	68	65	63	62	68	60	59	59	59	58	56	54	54	67	51	43

Table 4: Xantrex GT500 Sound Power Measurements –408V/100% Load PWL in dB re: 1×10^{-12}W and SPL in dB re: 20µPa

1/3 octave band frequency -->	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	8k	10k
Total PWL, 480V, 100% Load	69	77	72	74	85	79	79	81	83	80	77	75	82	74	72	74	73	71	68	67	69	85	66	47
Average SPL, Front, 1.2m setback	54	63	56	57	71	63	65	67	68	65	63	63	67	60	59	59	58	57	56	56	59	77	58	47
Average SPL, Rear, 1.2m setback	60	66	60	62	73	67	67	69	72	67	65	66	69	63	62	64	63	62	60	60	62	80	64	51
Average SPL, Left, 1.2m setback	56	62	56	57	71	61	61	64	65	63	62	62	66	59	58	59	58	57	55	55	57	74	57	44
Average SPL, Right, 1.2m setback	56	63	56	57	72	61	63	67	68	65	63	65	67	61	59	60	60	60	59	58	59	75	59	49
Average SPL, Top, 1.2m setback	55	61	57	59	68	62	62	67	69	65	64	65	68	62	60	60	60	59	57	56	58	75	59	46
Average SPL, Rear, 2.0m setback	60	63	60	63	73	66	67	68	69	66	65	65	69	63	61	62	61	60	59	60	63	79	68	56

MODEL A8370

C/S 8″ (203.2 mm) STANDARD FIXED ACOUSTICAL LOUVER

AIRFLOW DATA

For a 4 Foot by 4 Foot Unit. *Tested with mill finish and no screen.*

- Free area = 3.68 ft^2
- Percent free area = 23.0%
- Free area velocity at point of beginning water penetration (@0.01 oz./ft^2 = 942 FPM (4.79 m/s)
- Maximum recommended air intake velocity = 742 FPM (3.77 m/s)
  Air volume @ 742 FPM free area velocity = 2731 CFM (1.29 m^3/s)
  Pressure drop @ 742 FPM intake velocity = 0.05 in. H_2O (12.4 Pa)
- Maximum recommended air exhaust velocity = 1750 FPM (8.89 m/s)
  Air volume @ 1750 FPM free area velocity = 6440 CFM (3.04 m^3/s)
  Pressure drop @ 1750 FPM exhaust velocity = 0.37 in. H_2O (91.9 Pa)

SUGGESTED SPECIFICATIONS:

GENERAL: Furnish and install where indicated on the drawings C/S 8″ (203.2 mm) STANDARD FIXED ACOUSTICAL LOUVER **MODEL A-8370** as manufactured by Construction Specialties, Inc. Cranford, New Jersey and Mississauga, Ontario. Complete details shall be submitted to the architect for approval prior to fabrication. Supplier must be a member of AMCA or BSRIA

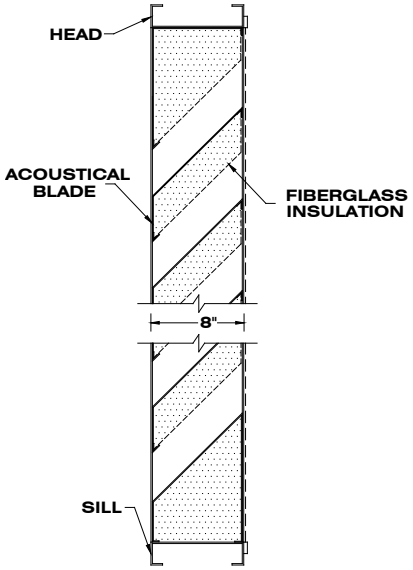
MATERIAL: Fixed blades and frame to be formed from 1100 series aluminum alloy. Interior acoustical material to be fiberglass insulation protected by a woven fire retardant (self-extinguishing) 100% polyester sheeting Material thickness shall be as follows: Heads, sills, jambs, mullion, and fixed blades to be: 0.081" (2.06 mm). All fasteners to be non-corrosive. All louvers to be furnished with 5/8″ (15.87 mm) flattened expanded mesh, aluminum bird screen with a .055″ (1.4 mm) thick extruded aluminum frame. Screens and screen frames to be standard mill finish.

STRUCTURAL DESIGN: Structural supports shall be designed and furnished by the louver manufacturer to carry a wind load of not less than_____ psf (Pascals). (Note: If this paragraph is omitted or if the design wind load is not specified, the louvers will be manufactured in self-supporting units up to a maximum of 5′ (1524 mm) wide by 8′ (2438 mm) high. Any additional structural supports required to adequately secure these units within the opening shall be the responsibility of others.)

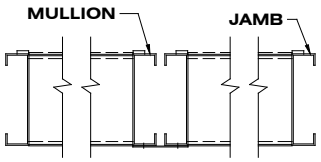
TEST DATA: The louver manufacturer shall submit test data from an accredited acoustical laboratory in accordance with ASTM Standard E90-90. The minimum acceptable performance through all octave bands is as follows: STC = 15

Frequency (hz):	63	125	250	500	1000	2000	4000	8000
Transmission Loss:	9	7	7	11	18	19	14	13
Noise Reduction:	15	13	13	17	24	25	20	19

FINISH: All louvers shall be finished with C/S Powder Coat, a coating to be 1.5 to 3 mil. thick full strength **100% resin Fluoropolymer coating. Finish to allow zero VOCs** to be emitted into facility of application. Finish to adhere to a 4H Hardness rating. All finishing procedures shall be one continuous operation in the plant of the manufacturer. **The coating shall meet or exceed all requirements of AAMA specification 2605-5** "Voluntary Specification for High Performance Organic Coatings on Architectural extrusions and Panels." The louver manufacturer shall supply an industry standard **20-year limited warranty against failure or excessive fading** of the Fluoropolymer Powder Coat finish. This limited warranty shall begin on the date of material shipment.



SECTION VIEW



PLAN VIEW

PERFORMANCE DATA MODEL A8370

Width in Inches and Meters

Height in Inches and Meters

	12	18	24	30	36	42	48	54	60
	0.30	0.46	0.61	0.76	0.91	1.07	1.22	1.37	1.52
18	**0.17**	**0.29**	**0.42**	**0.54**	**0.67**	**0.79**	**0.92**	**1.05**	**1.17**
0.46	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.11
24	**0.33**	**0.59**	**0.84**	**1.09**	**1.34**	**1.59**	**1.84**	**2.09**	**2.34**
0.61	0.03	0.05	0.08	0.10	0.12	0.15	0.17	0.19	0.22
30	**0.33**	**0.59**	**0.84**	**1.09**	**1.34**	**1.59**	**1.84**	**2.09**	**2.34**
0.76	0.03	0.05	0.08	0.10	0.12	0.15	0.17	0.19	0.22
36	**0.50**	**0.88**	**1.25**	**1.63**	**2.01**	**2.38**	**2.76**	**3.14**	**3.51**
0.91	0.05	0.08	0.12	0.15	0.19	0.22	0.26	0.29	0.33
42	**0.67**	**1.17**	**1.67**	**2.17**	**2.68**	**3.18**	**3.68**	**4.18**	**4.68**
1.07	0.06	0.11	0.16	0.20	0.25	0.30	0.34	0.39	0.43
48	**0.67**	**1.17**	**1.67**	**2.17**	**2.68**	**3.18**	**3.68**	**4.18**	**4.68**
1.22	0.06	0.11	0.16	0.20	0.25	0.30	0.34	0.39	0.43
54	**0.84**	**1.46**	**2.09**	**2.72**	**3.34**	**3.97**	**4.60**	**5.23**	**5.85**
1.37	0.08	0.14	0.19	0.25	0.31	0.37	0.43	0.49	0.54
60	**1.00**	**1.76**	**2.51**	**3.26**	**4.01**	**4.77**	**5.52**	**6.27**	**7.02**
1.52	0.09	0.16	0.23	0.30	0.37	0.44	0.51	0.58	0.65
66	**1.17**	**2.05**	**2.93**	**3.80**	**4.68**	**5.56**	**6.44**	**7.32**	**8.19**
1.68	0.11	0.19	0.27	0.35	0.43	0.52	0.60	0.68	0.76
72	**1.17**	**2.05**	**2.93**	**3.80**	**4.68**	**5.56**	**6.44**	**7.32**	**8.19**
1.83	0.11	0.19	0.27	0.35	0.43	0.52	0.60	0.68	0.76
78	**1.34**	**2.34**	**3.34**	**4.35**	**5.35**	**6.35**	**7.36**	**8.36**	**9.36**
1.98	0.12	0.22	0.31	0.40	0.50	0.59	0.68	0.78	0.87
84	**1.51**	**2.63**	**3.76**	**4.89**	**6.02**	**7.15**	**8.28**	**9.41**	**10.54**
2.13	0.14	0.24	0.35	0.45	0.56	0.66	0.77	0.87	0.98
90	**1.51**	**2.63**	**3.76**	**4.89**	**6.02**	**7.15**	**8.28**	**9.41**	**10.54**
2.29	0.14	0.24	0.35	0.45	0.56	0.66	0.77	0.87	0.98
96	**1.67**	**2.93**	**4.18**	**5.43**	**6.69**	**7.94**	**9.20**	**10.45**	**11.71**
2.44	0.16	0.27	0.39	0.50	0.62	0.74	0.85	0.97	1.09
102	**1.84**	**3.22**	**4.60**	**5.98**	**7.36**	**8.74**	**10.12**	**11.50**	**12.88**
2.59	0.17	0.30	0.43	0.56	0.68	0.81	0.94	1.07	1.20
108	**2.01**	**3.51**	**5.02**	**6.52**	**8.03**	**9.53**	**11.04**	**12.52**	**14.05**
2.74	0.19	0.33	0.47	0.61	0.75	0.89	1.03	1.16	1.31
114	**2.01**	**3.51**	**5.02**	**6.52**	**8.03**	**9.53**	**11.04**	**12.52**	**14.05**
2.90	0.19	0.33	0.47	0.61	0.75	0.89	1.03	1.16	1.31
120	**2.17**	**3.80**	**5.43**	**7.07**	**8.70**	**10.33**	**11.96**	**13.59**	**15.22**
3.05	0.20	0.35	0.50	0.66	0.81	0.96	1.11	1.26	1.41
126	**2.34**	**4.10**	**5.85**	**7.61**	**9.36**	**11.12**	**12.88**	**14.63**	**16.39**
3.20	0.22	0.38	0.54	0.71	0.87	1.03	1.20	1.36	1.52
132	**2.34**	**4.10**	**5.85**	**7.61**	**9.36**	**11.12**	**12.88**	**14.63**	**16.39**
3.35	0.22	0.38	0.54	0.71	0.87	1.03	1.20	1.36	1.52
138	**2.51**	**4.39**	**6.27**	**8.15**	**10.03**	**11.91**	**13.80**	**15.68**	**17.56**
3.51	0.23	0.41	0.58	0.76	0.93	1.11	1.28	1.46	1.63
144	**2.68**	**4.68**	**6.69**	**8.70**	**10.70**	**12.71**	**14.72**	**16.72**	**18.73**
3.66	0.25	0.43	0.62	0.81	0.99	1.18	1.37	1.55	1.74
150	**2.68**	**4.68**	**6.69**	**8.70**	**10.70**	**12.71**	**14.72**	**16.72**	**18.73**
3.81	0.25	0.43	0.62	0.81	0.99	1.18	1.37	1.55	1.74
156	**2.84**	**4.97**	**7.11**	**9.24**	**11.37**	**13.50**	**15.64**	**17.77**	**19.90**
3.96	0.26	0.46	0.66	0.86	1.06	1.25	1.45	1.65	1.85
162	**3.01**	**5.27**	**7.53**	**9.78**	**12.04**	**14.30**	**16.56**	**18.81**	**21.07**
4.11	0.28	0.49	0.70	0.91	1.12	1.33	1.54	1.75	1.96
168	**3.18**	**5.56**	**7.94**	**10.33**	**12.71**	**15.09**	**17.47**	**19.86**	**22.24**
4.27	0.30	0.52	0.74	0.96	1.18	1.40	1.62	1.85	2.07
174	**3.18**	**5.56**	**7.94**	**10.33**	**12.71**	**15.09**	**17.47**	**19.86**	**22.24**
4.42	0.30	0.52	0.74	0.96	1.18	1.40	1.62	1.85	2.07
180	**3.34**	**5.85**	**8.36**	**10.87**	**13.38**	**15.89**	**18.39**	**20.90**	**23.41**
4.57	0.31	0.54	0.78	1.01	1.24	1.48	1.71	1.94	2.17
186	**3.51**	**6.15**	**8.78**	**11.41**	**14.05**	**16.68**	**19.31**	**21.95**	**24.58**
4.72	0.33	0.57	0.82	1.06	1.31	1.55	1.79	2.04	2.28
192	**3.51**	**6.15**	**8.78**	**11.41**	**14.05**	**16.68**	**19.31**	**21.95**	**24.58**
4.88	0.33	0.57	0.82	1.06	1.31	1.55	1.79	2.04	2.28

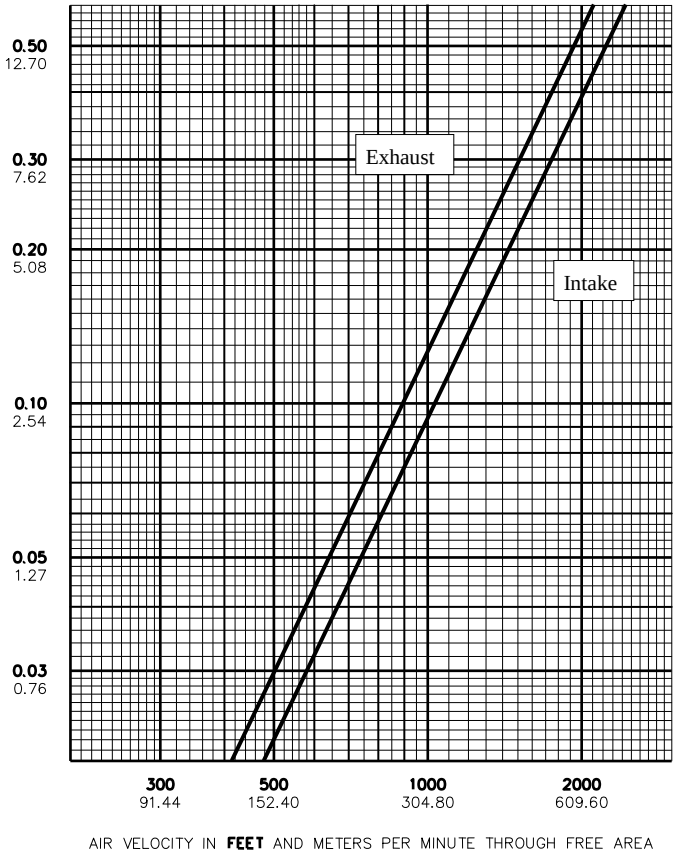
Upper Numerals English Units/Lower Numerals Metric Units

Water Penetration Statement

AMCA defines the point of beginning water penetration as the free area velocity at which the AMCA water test has yielded 0.01 or less ounces of water per square foot of louver free area during a 15-minute test period.

Tests on non-drainable louvers have shown that the point of beginning water penetration for 4 and 6 inch deep louvers usually occurs at between 600 and 800 FPM free area velocity. In addition, the total amounts of water penetration for non-drainable louvers significantly higher in comparison to drainable louvers when intake velocities exceed the 600 to 800 FPM range.

Because of these characteristics, C/S recommends that drainable blade louvers be used for air intake applications whenever water entrainment must be minimized. In addition, we suggest that non-drainable louver air intake velocities be held to 600 FPM through the free area. This will help to limit significant water penetration during times of average rain conditions.



For a 48″ X 48″ sized louver

Construction Specialties, Inc.
Manufacturing & Sales Location
www.c-sgroup.com

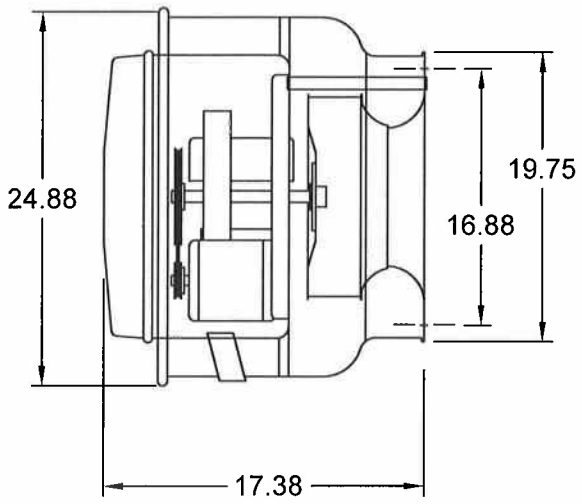
Cranford, New Jersey
49 Meeker Avenue 07016
Telephone: (800) 631-7379
Fax: (908) 272-2920

Mississauga, Ontario
895 Lakefront Promenade L5E 2C2
Telephone: (888) 895-8955
Fax: (905) 274-6241

A member of the C/S Group of Companies
For assistance with overseas requirements, call C/S International (908) 236-0800

GREENHECK
Building Value in Air.

Printed Date: 6/3/2010
Job: DEEPWELL - GT500MV
Product Type: Fan
Mark: EF-1



Model: CWB-101-4

Belt Drive Centrifugal Sidewall Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Birdscreen mounted to the discharge perimeter - Removable mounting plate - Ball bearing motors - Motor and drives isolated on shock mounts - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearing meet or exceed temperature rating of fan - Static free belts - Corrosion resistant fasteners

Options & Accessories:

UL/cUL 705 Listed - "Power Ventilators"
Switch, Nema-1, Toggle, Junction Box Mounted and Wired
Damper, WD-323-PB-12X12, Gravity Actuated (Shipped Loose)
Birdscreen, Galvanized

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Wall Opening (in)	Optional Damper (in)
1	61	69	12.5 x 12.5	12 x 12

Performance

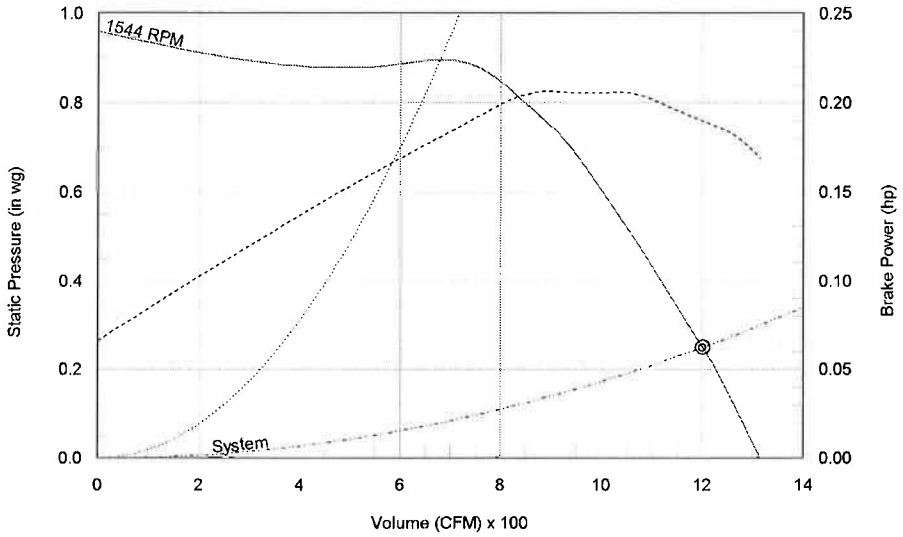
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
1,200	1,200	0.25	0.25	1,544	0.19	777	70

Motor

Motor Mounted	Size (hp)	V/C/P	Encl.	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/4	208/60/1	ODP	1725	1	3.2

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	73	72	78	69	63	66	58	52	73	62	11.2



RPM Curve
System Curve
Brake Power Curve
Do not select to the left of this surge curve
Desired operating point
Actual operating point

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

Notes:

All dimensions shown are in units of in.
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary, for sizing thermal overload, consult factory.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighed sound pressure level, based on 11.5 dB attenuation per Octave band at 5.0 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5.0 ft

CUSTOMER NOTE: N.P. DWG. IS FOR YOUR INFO & REVIEW. THE IMPEDANCE, MANUFACTURE DATE, AND ABB SERIAL NUMBER ARE LEFT BLANK SINCE DRAWING IS SUBMITTED PRIOR TO MANUFACTURING. THE ACTUAL VALUES ARE ENGRAVED ON THE NAMEPLATE AT TIME OF SHIPMENT. THIS DRAWING IS NOT SUBSEQUENTLY REVISED TO ADD TESTED VALUES.

SMALL POWER TRANSFORMERS
SOUTH BOSTON, VA.

VOLTS		THREE PHASE	FULL LOAD KVA	
HV	44000-	NATURAL ESTER FLUID INSULATED	6700	KNAN
LV	34500Y/19920	SUBSTATION TRANSFORMER	10000	KNAF
60 HERTZ		CLASS KNAN/KNAF INSULDUR INSULATION	65	°C RISE
			LITERS LIQUID	9195

INSTRUCTION BOOK: PC-1002 | MFR ID: 1LUS | SERIAL: BS41540 -#### | MANUFACTURE DATE: ##/##

FULL WAVE IMPULSE TEST LEVEL: H.V. 250 KV., L.V. 200 KV.

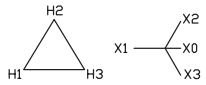
IMPEDANCE: IMP_VAL1 % AT 6700 KVA 44000 TO 34500Y VOLTS.

APPROX. WEIGHT IN KGS. CORE AND COILS: 19538 | CASE: 4922 | LIQUID: 8372 | TOTAL: 32832

MADE IN U.S.A. ABB INC. 1LUSBS41540N1

SOUND LEVEL: 63 dB | FAN POWER IN WATTS: 293.2

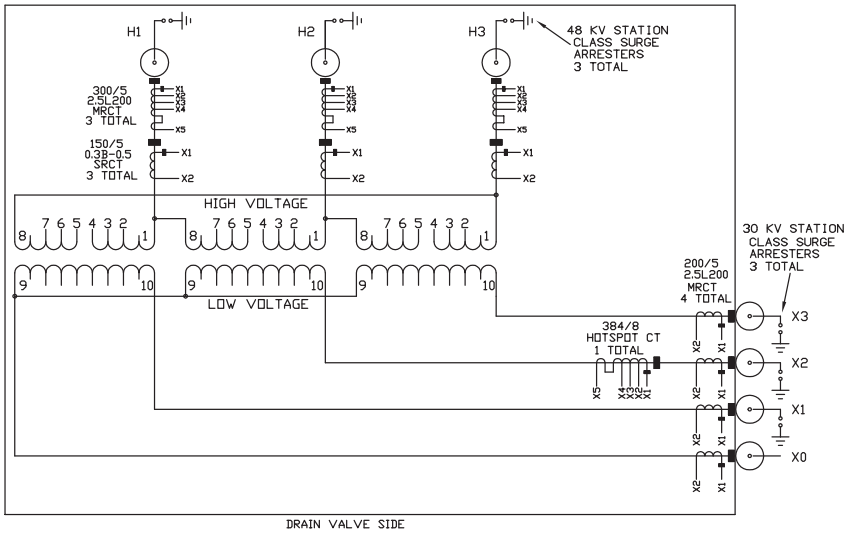
DYN1



"BUILT TO CSA C88-M90"

CONNECTIONS

WINDING	VOLTS	10000 KVA AMPERES	TAP CHANGER POS.	TAP CHANGER CONNECTS
HIGH VOLTAGE DELTA COPPER	46200	124.9	1	4 TO 5
	45100	128.0	2	3 TO 5
	44000	131.2	3	3 TO 6
	42900	134.5	4	2 TO 6
	41800	138.1	5	2 TO 7
LOW VOLTAGE WYE COPPER	34500	167.3		



THE OPERATING PRESSURE IS LIMITED BY THE SEALEDAIRE FLUID PRESERVATION SYSTEM, UNLESS REMOVED TO 6.5 PSI (44.8 kPA) POSITIVE AND 6.5 PSI (44.8 kPA) NEGATIVE.
THE TRANSFORMER TANK IS DESIGNED TO WITHSTAND A POSITIVE OR NEGATIVE PRESSURE OF 15 LBS. PSI (103.4 KPA).
THE 25°C LIQUID LEVEL IS 13.40 INCHES (340.3 MM) BELOW HIGHEST MANHOLE FLANGE.
LIQUID LEVEL CHANGES .54 INCH (13.7 MM) FOR EACH 10°C CHANGE IN AVERAGE LIQUID TEMPERATURE.
THE TRANSFORMER MUST NOT BE ENERGIZED FROM ANY VOLTAGE SOURCE WHEN TAP CHANGER IS OPERATED.
SUITABLE FOR OPERATION AT OR BELOW 3300 FEET (1005 METERS) ALTITUDE AT NAMEPLATE RATING.
AT THE TIME OF SHIPMENT THIS UNIT CONTAINED LESS THAN 1 PPM OF PCBS.

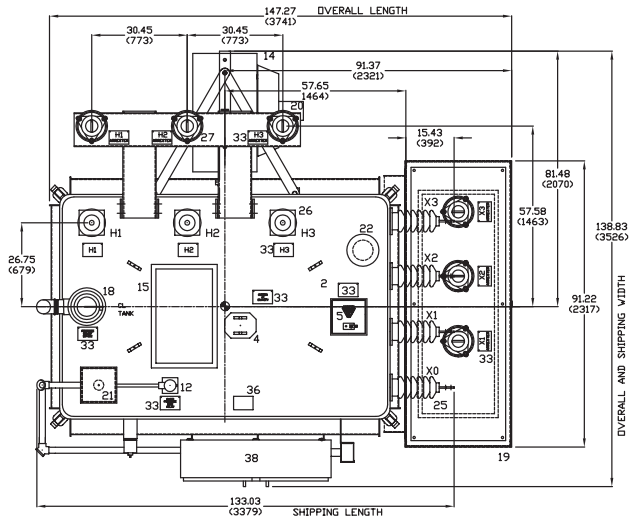
5/16 INCH HOLES FOR 190-32 X 3/16 SCREW
SIZE 6.25 INCHES X 10.0 INCHES AREA 62.5 SQUARE INCHES
DISTANCE BETWEEN CENTERS OF HOLES ON LONG EDGE 9 19/32 INCH ± 1/64 ON SHORT EDGE 5 27/32 INCH ± 1/64

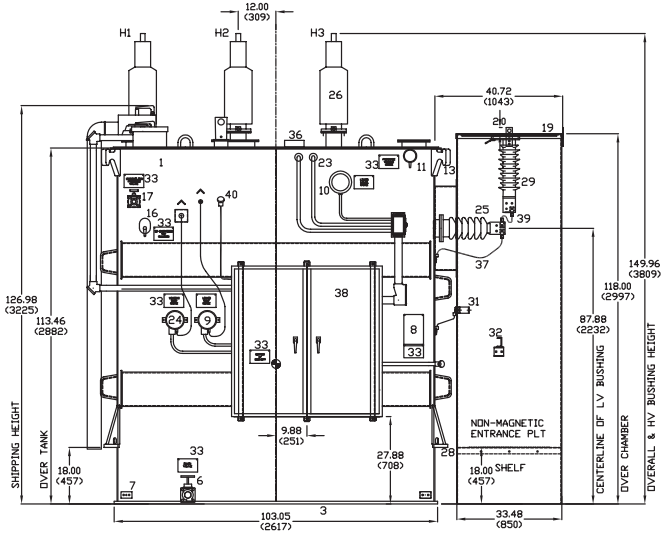
	1	2	3	
		UPDATED NAMEPLATE TO 6.7/10 MVA	ADDED 200/5 2.5L200 SRCT TO X1,X2,X3 ADDED SOUND LEVEL	
N.P.DRAFT.				
DRAFT.				
ENGINEER	J.Richardson	J.Richardson	J.Richardson	
DATE	03/04/13	03/04/13	04/03/13	

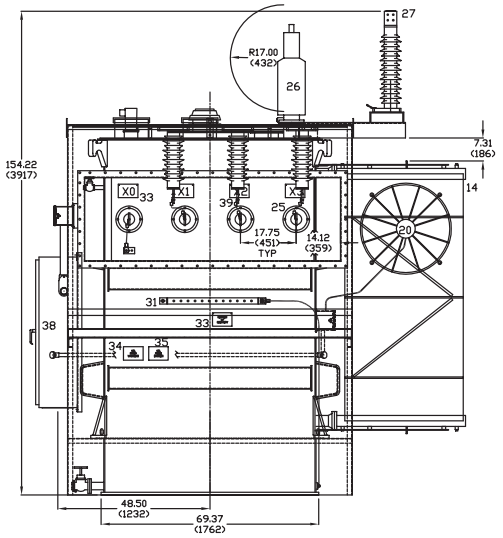
WESTBURNE ELECTRIC
CORNWALL SOLAR PROJECT
6700/10000
44000 DELTA HV - 34500 WYE LV

MFR. ID	SHOP ORDER
1LUS	BS41540
MFR. ID	DRAWING #
1LUS	BS41540N1

IT	CHANGE
2	CORRECTED KVA RATING TO 6700/10000 KVA J.RICHARDSON 4/22/13
3	REVISED PER CUSTOMER COMMENTS ADDED COOLER BRACING 30 DELETED ITEM 30 (ATC SPACE HEATER) J.RICHARDSON 5/9/13 M. CLARK 5/9/13
1	







NOTES:

ALL EXTERNAL HARDWARE IS STAINLESS STEEL WITH SILICON BRONZE NUTS.

CONDUIT IS GALVANIZED STEEL RIGID WITH SHORT RUNS OF FLEX.

NON-SKID SURFACE ON COVER

TANK BASE IS UNDERCOATED + 2 INCHES (51) UP THE SIDES.

ABB INC.
SMALL POWER TRANSFORMERS
SOUTH BOSTON, VIRGINIA U.S.A.

APPROXIMATE NET WEIGHTS

CORE AND COILS	43074 LBS.	(19538 KGS.)
TANK AND FITTINGS	10851 LBS.	(4922 KGS.)
LIQUID- NATURAL ESTER FLUID -2429 GAL. (9195 LITRES) -	18458 LBS.	(8372 KGS.)
TOTAL WEIGHT	72383 LBS.	(32832 KGS.)
APPROXIMATE TRANSFORMER SHIPPING WEIGHT	70430 LBS.	(31947 KGS.)
COOLER LIQUID TOTAL - 41 GAL. (155 LITRES) -	312 LBS.	(142 KGS.)
MAXIMUM COOLER ASSEMBLY WEIGHT EACH	1106 LBS.	(502 KGS.)
(COOLER WEIGHTS ARE INCLUDED IN TANK AND FITTINGS WEIGHT)		
(COOLER LIQUID WEIGHT IS INCLUDED IN LIQUID WEIGHT)		
LV CHAMBER WEIGHT	1297 LBS.	(588 KGS.)

ITEM

1 SEALED TANK - BRACED FOR 15 PSI (103 KPA) - COLOR ANSI 70
2 WELDED COVER WITH GASKET AND LIFTING LOOPS FOR LIFTING COVER ONLY.
3 BASE - DESIGNED FOR ROLLING PARALLEL TO CENTERLINES AND TYPICAL ANCHORING IS WELDED.
4 FALL ARREST MOUNTING BASE - FOR MANUFACTURING PURPOSES.
5 REMOVABLE EXTERNAL CORE GROUND LOCATED INSIDE ENCLOSURE.
6 2.0 (50.8) DRAIN VALVE/LOWER FILTER PRESS WITH .38 (9.65) SAMPLER.
7 METRIC STAINLESS STEEL GROUND PADS - 2 HOLE NEMA DRILLING - 04 TOTAL.
8 NAMEPLATE AND WARNING DECAL.
9 LIQUID TEMPERATURE GAUGE WITH ALARM CONTACTS.
10 MAGNETIC LIQUID LEVEL GAUGE WITH ALARM CONTACTS.
11 METRIC VACUUM PRESSURE GAUGE WITH AIR TEST VALVE AND SEALEDAIRE VALVE.
12 RAPID PRESSURE RISE RELAY WITH SEAL-IN RELAY PANEL.
13 STAINLESS STEEL LIFTING HOOK FOR LIFTING COMPLETE TRANSFORMER. THE TRANSFORMER IS DESIGNED FOR LIFTING WITH 4 VERTICAL SLINGS. THIS MAY REQUIRE THE USE OF A SPREADER OR LIFTING BEAM. IF VERTICAL SLINGS ARE NOT POSSIBLE, THE MINIMUM PERMISSIBLE SLING ANGLE RELATIVE TO HORIZONTAL IS 60 DEGREES.
14 REMOVABLE PANEL COOLERS WITH SHUT-OFF VALVES.

15 BOLTED MANHOLE - 30.00 X 18.00 (762 X 457) OPENING, WITH CORTITE GASKET.
16 DE-ENERGIZED TAP CHANGER - WITH .38 (9.7) HOLE FOR PADLOCKING.
17 1.0 (25.4) VALVE FOR UPPER FILTER PRESS CONNECTION.
18 RELIEF DEVICE WITH ALARMS AND 4 INCH (102) QUALITROL DIRECTIONAL SHIELD.
** 19 LV FREE STANDING AIR TERMINAL CHAMBER WITH NON-MAGNETIC ENTRANCE PLATE.
** 20 AIR BLAST FAN ENCLOSED IN SAFETY CAGE - 01 TOTAL.
21 JUNCTION BOX FOR CURRENT TRANSFORMER LEADS.
22 PROCESSING PORT FOR MANUFACTURING.
23 CURRENT TRANSFORMER FEED THROUGH - 2 TOTAL.
24 REMOTE HOT SPOT WINDING TEMPERATURE INDICATOR WITH ALARMS.
25 LV BUSHING STYLE 8D12241H01 17.75 (451) CL TO CL - SEE DETAIL 25
** 26 HV BUSHING STYLE 5028C99H05 30.44 (773) CL TO CL - SEE DETAIL 26
** 27 48 KV HV ARRESTERS - 3 TOTAL - STYLE NO. Q048SA039A.
28 JACKING PROVISIONS ON TANK FOR JACKING COMPLETE UNIT
** 29 30 KV LV ARRESTERS - 3 TOTAL - STYLE NO. Q030SA024A.
31 GROUND BAR LOCATED IN LV ATC.
32 FIBERGLASS CABLE SUPPORT.
33 STAINLESS STEEL ID TAGS - 27 TOTAL.
34 "MR. OUCH" WARNING DECAL (EXTERNAL)
35 "MR. OUCH" DANGER DECAL (INTERNAL)
36 DIGITAL IMPACT RECORDER
37 XO GROUND CABLE
38 CONTROL CABINET
39 ARRESTER TO BUSHING CABLE
40 10 OHM COPPER RTD

** ITEMS ARE REMOVED FOR SHIPMENT

RENEWAL PARTS FOR OUTLINE

A SPARE SET OF ALL GASKETS AND
1 OF EACH STYLE BUSHING IS RECOMMENDED FOR STOCK.
FOR PRICES CONTACT YOUR FIELD SALES OFFICE

ORDER RENEWAL PARTS BY STYLE NUMBER AS FOLLOWS:

STYLE NUMBER = OUTLINE NUMBER - ITEM NUMBER - QUANTITY.

EXAMPLE: BS4154001-26-1.

FOR GASKETS ONLY PLACE A 'G' IN FRONT OF OUTLINE NUMBER
EXAMPLE: GBS4154001-26-1. (ONE GASKET)
EXAMPLE: GBS4154001 (ALL GASKETS)

DESIGNATES CENTER OF GRAVITY COMPLETE		TEMP RISE	KNAN/KNAF KVA -
FROM GROUND IN FRONT VIEW	44.623(1133)	65° C	6700/10000
RIGHT OF CENTERLINE TOP VIEW	.062(2)		
ABOVE CENTERLINE TOP VIEW	.137(3)		
DESIGN IMPEDANCE 4.690 %			

WESTBURNE ELECTRIC
CORNWALL SOLAR PROJECT
6700/10000 KVA
44000 DELTA HV
34500 WYE LV

HV 250 KV BIL	LV 200 KV BIL				
APPARATUS SUBSTATION TRANSFORMER				CLASS KNAN/KNAF	OUTDOOR
60 HERTZ	6700 KVA		HV 44000-DELTA	LV 34500Y/19920	3 PH
DFTM Mark Clark	04/15/13	WIRING DIAGRAM	ILUSBS4154001	MFR. ID	DRAWING NUMBER
CHKD JRichardson	04/15/13	NAME PLATE	ILUSBS4154001	ILUS	BS4154001
APPD		INSTRUCTION BOOK	PC-1002		
SMALL POWER TRANSFORMER			DIMENSIONS IN INCHES-SCALE NTS		

WEG Transformers USA
One Pauwels Drive, Washington, MO 63090, USA
www.weg.net T: 1-636-239-9300 F: 1-636-239-9395

TECHNICAL SPECS

Date: 1/17/2020
Quotation Number: 95927501
Item Number: 10

Customer Line No.:	Cornwall Algonquin	**Quantity:**	10
Unit Price:	$	**Extended Price:**	

Three Phase Pad-Mount Transformer(s)

kVA Rating:	1000 kVA	**Model #:**	
	Mineral Oil Immersed	**Cooling Class:**	ONAN
		Frequency:	60 Hz
		Avg. Winding Temp.	65 °C
Primary Voltage:	34500 Delta volts	**Secondary Voltage:**	Dual Input 208Y/120 volts
Primary BIL Rating:	150 kV	**Secondary BIL Rating:**	30 kV
HV Winding Matl:	Copper	**LV Winding Matl:**	Copper

High Voltage Taps: B Taps - Two 2.5% Taps below Nominal and Two 2.5% Taps above Nominal

No Load Loss: 1435 Watts **Load Loss:** 8106 Watts **Total Loss:** 9541 Watts

Impedance: 5 %

Tank Enclosure:
Welded Cover w/(1) Handhole(s) - 14x24
Stainless Steel Exterior Hardware
Cabinet Depth: 30 Inches, Pentahead Security Bolts
Steel HV-LV Barrier

Bushings:
Loop Feed ANSI Minimum Dimensions
Dead Front Primary Terminations: Integral Non-Loadbreak Bushings 600Amp
Secondary Terminations: Epoxy Bushings w/Non-removable 6 & 12 hole, Spade Support

Protection:
PRCLF (38kV - 65A HiTech), Weak Link Cartridge (Curve #7 ABB)

Accessories:
Pressure Relief Valve Viat, Cover-Mounted Pressure Relief Device (), Drain valve w/Sampler
Liquid Level Gauge, Liquid Temperature Gauge, Pressure Vacuum Gauge

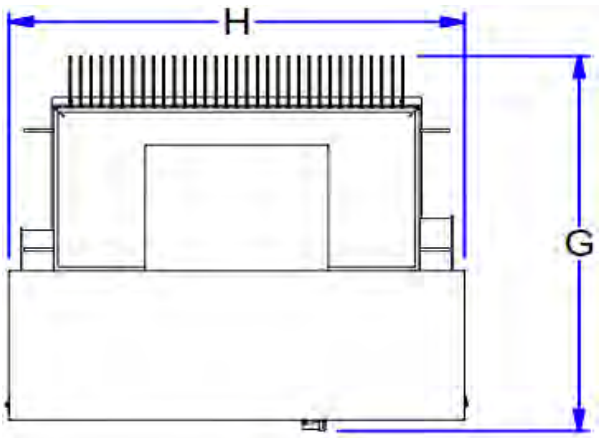
4-Winding Double Tier SOLARPAD: Stadium Style Stacked Core Construction with Semi-Round Windings, Reduced Flux Density, Electrostatic Winding Shields, Increased Cooling, Door Gasketing, Hold down anchoring (x4 holes), Isolated Core Ground, Nitrogen Blanket, Schrader Valve, UL Listed

-Drain Valve & Sampler in external lockable box
-Gauges and MV switch in external lockable enclosures
-Losses are at 20C core and 85C winding and are for reference. ANSI tolerances will apply to quoted losses.

Switching:
L.V. Neutral Bushing with Removable Grounding Strap, One ON/OFF Transformer Switch (300 Amps)

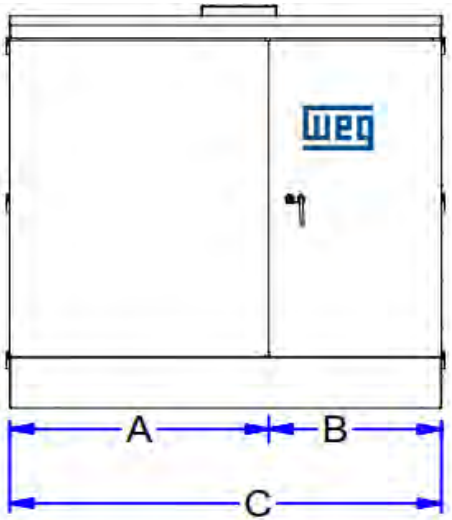
Paint Color:
GREEN (Munsell 7.0GY3.29/1.5), Touch-up Paint Spray Can,

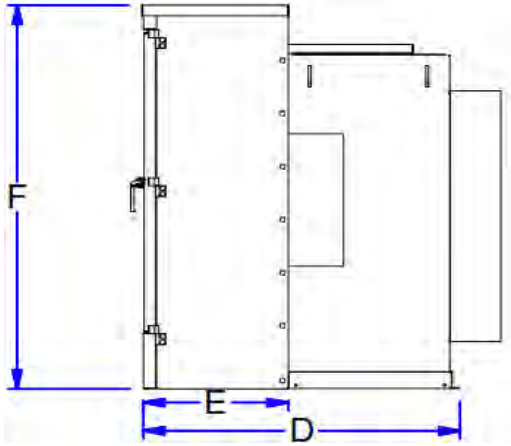
Standards:
Quoted in compliance with the latest applicable ANSI standards unless otherwise specified by the customer.



ITEM	KVA	A	B	C	D	E	F	G	H
0010	1000	41.62	32	73.62	58	30	79	70	73.62

0010: Weight 8,222 lbs; Volume 319 Gal

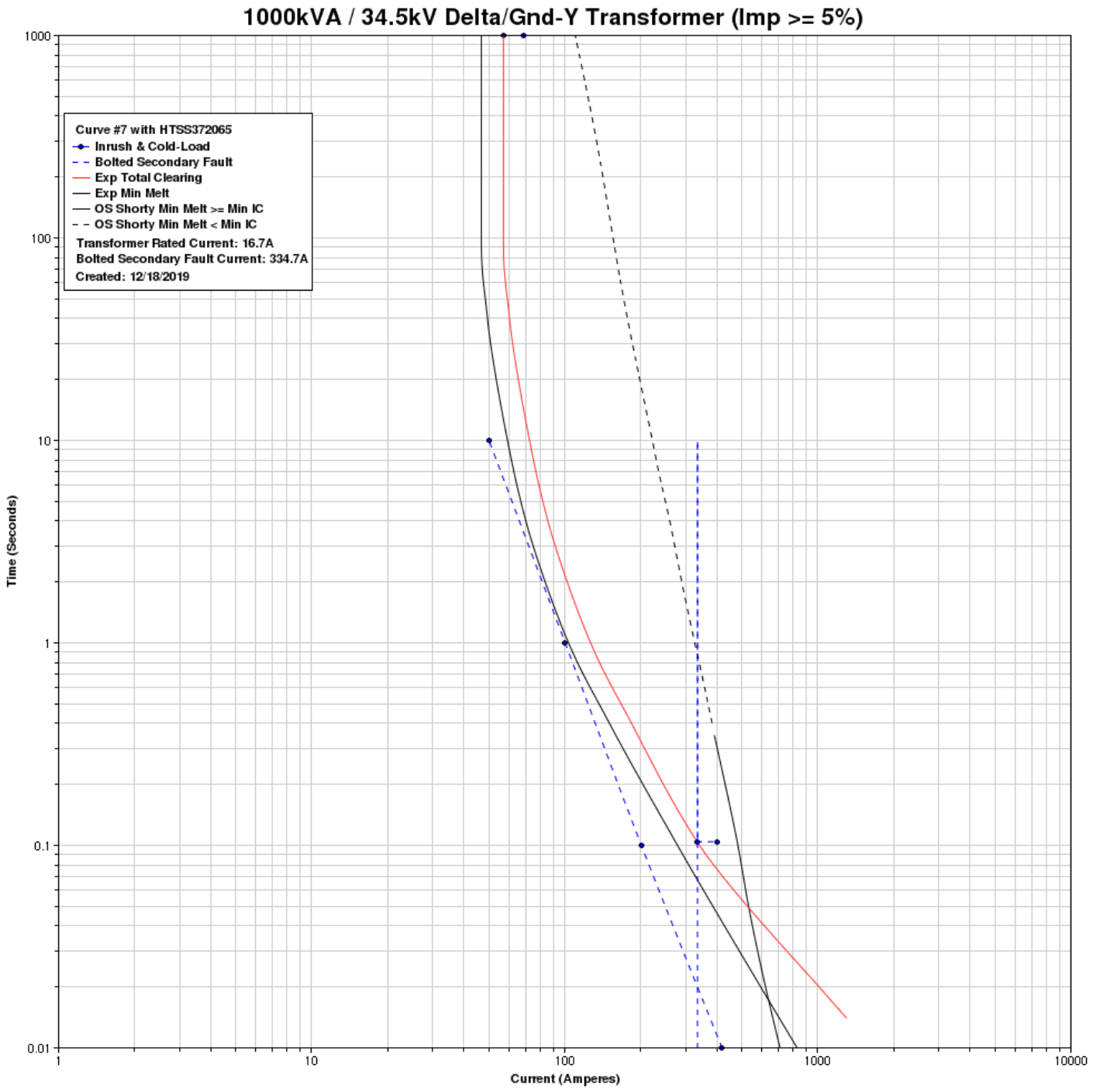




TITLE:	Cornwall Algonquin				
QUOTE DRAWING					
QUOTE NO:	495927501				
PRELIMINARY DIMENSIONS NOT FOR CONSTRUCTION					
DRAWN BY	REVISION	DATE	SCALE	UNITS	
JW	3	1/17/2020	NTS	IN	

Hi-Tech® FACT

Distribution Transformer Configuration		Recommendations
Phase	3 Phase	**Voltage:** 38 kV **Current:** 65 A
kVA	1000	**Hi-Tech Fuse Part#:** HTSS372065
kV	34.5	**Maximum I²T:** 12,100Amp²-Sec **Min IC:** 390A **Max IC:** 50kA
Transformer Rated Current:	16.7 A	**Expulsion Fuse:** Curve #7
Bolted Secondary Fault Current:	334.7 A	• *The expulsion fuses selected is based on expulsion fuse manufacturer recommendations*
Minimum Imp %	5	• *ABB Transformer Components*
Primary Connection	DELTA	
Secondary Connection	gndY	
Preferred Expulsion Fuse	ABB Weak Link	



Thomas&Betts
A Member of the ABB Group

Product/Design Testing:

WEG performs the routine tests as defined in the current IEEE standards C57.12.00 and C57.12.90, which include:

- **Winding resistance measurements (Section 5):** Of all windings on the rated voltage tap and at the tap extremes. Acceptance Criteria: Total Loss within tolerance.
- **Ratio test and phase relation (Section 6, 7):** On the rated voltage connection and on all tap connections. Acceptance Criteria: ±0.5% of Calculated Ratio.
- **No-load and excitation current (Section 8):** At 100% and 110% voltage and at rated frequency. Acceptance Criteria: +10% of Guaranteed NLL.
- **Impedance voltage and load loss (Section 9):** At rated current and frequency on the rated voltage connection and at the tap extremes. Acceptance Criteria: +6% of Guaranteed Total Losses ±7.5 of guaranteed %IZ.
- Low Frequency Test
    - **Applied Voltage (Section 10.6):** On rated voltage connection of primary and secondary windings. HV & LV Winding Test Voltage. Acceptance Criteria: See IEEE C57.12.90
    - **Induced Voltage (Section 10.7) - Class I Power Transformer Test:** On the rated voltage connection of primary & secondary windings. AC Level: 2 times rated voltage for 7200 cycles. Acceptance Criteria: See IEEE C57.12.90
- **Lightning Impulse Test (Section 10.4):** Quality Control test. One reduced wave followed by one full wave on HV phase terminals only. Chopped wave and switching impulse are not included. Acceptance Criteria: See IEEE C57.12.90
- **Auxiliary Wiring Dielectric** Test: Dielectric megger of 1000VDC to ground. Acceptance Criteria: See IEEE C57.12.90
- **Bushing Current Transformers:** Dielectric megger of 2500VDC to ground. Check of polarity and ratio of bushing current transformers. Acceptance Criteria: ±0.5% of Calculated Ratio
- **Standard Leak test of Fully Assembled Transformer (Section 8.2 of C57.12.00):** 5 psig of dry air (oil at ambient temperature) for 24 hours. Acceptance Criteria: No leaks.
- **Mechanical inspection:** Conformance to specs, standards and drawings, Check of layout, dimensions, clearances, etc., Check of nameplate data, Functional test of all accessories and auxiliary devices.

This proposal is based upon standard factory testing. These tests are the routine tests as defined by IEEE C57.12.00. Certified test reports can be provided at no additional charge, if requested.

Sound Power Level Calculation for Schneider Electric GT500 MVX inverter

Third octave, as provided by Vibro - Acoustics Consultants		
Freq #	Freq (Hz)	Lw (dB)
1	25	
2	31.5	
3	40	
4	50	69.0
5	63	77.0
6	80	72.0
7	100	74.0
8	125	85.0
9	160	79.0
10	200	79.0
11	250	81.0
12	315	83.0
13	400	80.0
14	500	77.0
15	630	75.0
16	800	82.0
17	1000	74.0
18	1250	72.0
19	1600	74.0
20	2000	73.0
21	2500	71.0
22	3150	68.0
23	4000	67.0
24	5000	69.0
25	6300	85.0
26	8000	66.0
27	10000	47.0
	Total Lw	**92.2**

Full octave, as used in CADNA-A model							
Freq #	Freq (Hz)	Lw, 1 inverter (dB)	A-Weight (dB)	LwA, 1 inverter (dBA)	LwA, 2 inverters (dBA)	LwA, 3 inverters (dBA)	LwA, 4 inverters (dBA)
	31.5		-39.4				
5	63	78.7	-26.2	52.5	55.5	57.3	58.5
8	125	86.2	-16.1	70.1	73.2	74.9	76.2
11	250	86.1	-8.6	77.5	80.5	82.2	83.5
14	500	82.6	-3.2	79.4	82.4	84.2	85.4
17	1000	83.0	0.0	83.0	86.0	87.8	89.0
20	2000	77.6	1.2	78.8	81.8	83.6	84.8
23	4000	72.8	1.0	73.8	76.9	78.6	79.9
26	8000	85.1	-1.1	84.0	87.0	88.7	90.0
	Total	**92.2**		**88.5**	**91.5**	**93.2**	**94.5**

Calculation example for 8000 Hz:

$$10\log\left(10^{\frac{85.0}{10}}+10^{\frac{66.0}{10}}+10^{\frac{47.0}{10}}\right)=85.1dB$$

$$85.1-1.1=84.0dBA$$

$$10\log\left(2*10^{\frac{84.0}{10}}\right)=87.0dBA$$

$$10\log\left(3*10^{\frac{84.0}{10}}\right)=88.7dBA$$

$$10\log\left(4*10^{\frac{84.0}{10}}\right)=90.0dBA$$

Figure B.1 Schneider Electric GT500 MVX inverter Sound Power Calculation

Estimated Frequency Spectra for Transformers
Substation Transformer - 10MVA - ONAF

From Handbook of Noise and Vibration Control (Crocker, 2007, page 1335-1336, Eq. 18 and Table 20)

Values Highlighted in Green are Used in This Study

Transformer Details:

Oil Immersed
10 MVA
ONAF Cooling Class
height 2.88 m
width 3.53 m
depth 3.74 m

Average LpA	63.0	dBA	Based on guaranteed characteristic sound pressure level provided by ABB
Estimated surface area	41.9	m^2	Based on provided transformer dimensions from ABB

Correction factors are in dB

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Notes
C1	-11	-5	-3	-8	-8	-14	-19	-24	-31	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]	78.2	84.2	86.2	81.2	81.2	75.2	70.2	65.2	58.2	**90.3**
C2 based [dB]	78.2	87.2	92.2	87.2	87.2	78.2	70.2	65.2	58.2	**95.3**
C3 based [dB]	78.2	87.2	92.2	91.2	91.2	85.2	80.2	75.2	68.2	**97.3**

Resulting A-weighted sound power level

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dBA]
dBA Reduction	**-39.4**	**-26.2**	**-16.1**	**-8.6**	**-3.2**	**0**	**1.2**	**1**	**-1.1**	
C1 based [dB]	38.8	58.0	70.1	72.6	78.0	75.2	71.4	66.2	57.1	**81.6**
C2 based [dB]	39	61	76	79	84	78	71	66	57	**86.6**
C3 based [dB]	39	61	76	83	88	85	81	76	67	**91.4**

Figure B.2 34.5-kV/44-kV/10-MVA Substation Transformer Sound Power Calculation

Values Highlighted in Green are Used in This Study

Transformer Details:

Oil Immersed
1000 kVA
ONAN Cooling Class

height	*79.00 in*	2.01 m
width	*73.62 in*	1.87 m
depth	*70 in*	1.78 m

Average LpA	58.0	dBA	Based on NEMA TR1-1993 (R2000), Table 0-2, immersed power transformers
Estimated surface area	19.5	m^2	Based on provided transformer dimensions from WEG

Correction Factors (dB)

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Notes
C1	-11	-5	-3	-8	-8	-14	-19	-24	-31	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: Lw = (Average LpA) + 10*log(Estimated Area) + C + 10 [From Crocker pg. 1335]

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dB]
C1 based [dB]	69.9	75.9	77.9	72.9	72.9	66.9	61.9	56.9	49.9	**81.9**
C2 based [dB]	69.9	78.9	83.9	78.9	78.9	69.9	61.9	56.9	49.9	**87.0**
C3 based [dB]	69.9	78.9	83.9	82.9	82.9	76.9	71.9	66.9	59.9	**89.0**

Resulting A-weighted Sound Power Level

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dBA]
dBA Reduction	**-39.4**	**-26.2**	**-16.1**	**-8.6**	**-3.2**	**0**	**1.2**	**1**	**-1.1**	
C1 based [dB]	30.5	49.7	61.8	64.3	69.7	66.9	63.1	57.9	48.8	**73.3**
C2 based [dB]	30	53	68	70	76	70	63	58	49	**78.2**
C3 based [dB]	30	53	68	74	80	77	73	68	59	**83.1**

Figure B.3 208-V/34.5-kV/1-MVA Cluster Transformer Sound Power Calculation

Appendix C
Noise Maps from CadnaA, Coordinates of the Noise Receptor Centers

Table C.1 Coordinates of the Noise Receptor Centers

ID	Description	UTM Coordinates NAD 83, Zone 18	
		X	Y
R001	Existing	524571.8	4994421.3
R002	Existing	524610.4	4994423.7
R003	Existing	524775.8	4994473.4
R004	Existing	524833.7	4994504.3
R005	Existing	524883.5	4994536.9
R006	Existing	524915.1	4994542.3
R007	Existing	524982.9	4994590.8
R008	Existing	525040.2	4994530.3
R009	Existing	525102.2	4994541.2
R010	Existing	525131.7	4994624.5
R011	Existing	525202.6	4994661.8
R012	Existing	525221.8	4994790.7
R013	Existing	524950.5	4995404.4
R014	Existing	523307.7	4994686.4
R015	Vacant	523491.1	4994768.6
R016	Existing	523536.3	4994466.5
R017	Existing	523532.2	4994410.6
R018	Existing	523603.9	4994577.2
R019	Existing	523608.0	4994369.7
R020	Existing	523613.4	4994186.9
R021	Vacant	523660.4	4993427.0
R022	Vacant	523672.7	4994115.6
R023	Vacant	523665.7	4995325.5
R024	Existing	523692.7	4994475.5
R025	Existing	523704.7	4994242.5
R026	Existing	523789.7	4994283.5
R027	Existing	523767.9	4994143.1
R028	Existing	523855.1	4994183.3
R029	Existing	523865.7	4994287.5
R030	Existing	523897.7	4994105.1
R031	Existing	523937.6	4994028.1
R032	Existing	523950.7	4994223.5
R033	Vacant	523977.8	4994296.2
R034	Existing	524102.0	4994301.3
R035	Vacant	524143.9	4993736.0
R036	Vacant	524222.1	4993524.6

ID	Description	UTM Coordinates NAD 83, Zone 18	
		X	Y
R037	Existing	524319.2	4994299.8
R038	Existing	524512.9	4994334.5
R039	Existing	524544.2	4994411.6
R040	Existing	524770.0	4994384.6
R041	Existing	524844.3	4994403.5
R042	Existing	524949.8	4994580.5
R043	Existing	524952.6	4994449.8
R045	Existing	524999.6	4994480.2
R046	Existing	525087.7	4994572.5
R047	Existing	525136.7	4994483.6
R048	Existing	525175.4	4994412.5
R049	Vacant	525211.3	4994338.5
R050	Existing	525246.3	4994476.7
R051	Vacant	525298.1	4994200.1
R052	Vacant	525306.2	4994731.1
R053	Existing	525326.5	4994328.9
R054	Existing	523065.3	4993968.7
R055	Existing	523146.0	4993986.0
R056	Existing	523171.2	4993990.6
R057	Existing	523186.3	4994291.5
R059	Existing	523205.4	4994127.3
R060	Existing	523228.9	4994330.1
R061	Existing	523284.3	4994644.4
R062	Existing	523311.6	4994077.0
R063	Existing	523337.6	4993978.6
R064	Existing	523408.2	4994002.4
R065	Existing	523408.7	4994108.6
R066	Existing	523444.7	4993917.6
R067	Existing	523445.6	4994133.8
R068	Existing	523464.7	4994025.6
R069	Existing	523503.7	4994046.6
R070	Existing	523509.7	4994186.6
R071	Existing	523531.6	4994057.8
R072	Vacant	523592.5	4994077.8
R073	Existing	524709.1	4994437.8
R074	Existing	523628.2	4994234.7
R075	Vacant	523176.0	4996026.1

ID	Description	UTM Coordinates NAD 83, Zone 18	
		X	Y
R076	Existing	524716.9	4994355.6
R077	Vacant	523436.9	4996177.7
R078	Existing	524590.2	4994337.1
R079	Existing	525042.0	4994510.2
R080	Existing	522918.6	4995836.3
R081	Existing	524162.0	4993684.7
R082	Existing	523611.9	4994564.9
R083	Existing	523619.6	4996230.5
R084	Vacant	522806.9	4995752.8
R085	Existing	523336.6	4994679.0
R086	Existing	525279.6	4994479.6
R087	Vacant	523722.9	4996416.5
R088	Existing	525094.4	4994856.7

From: Tse, Enoch (ENE) [mailto:Enoch.Tse@ontario.ca]
Sent: Friday, October 26, 2012 2:11 PM
To: Steven Hitchinson
Cc: Sean Fairfield; Zangeneh, Mahdi (ENE); Boucher, Noel; Colella, Nick (ENE)
Subject: RE: Cornwall Solar Project layout changes

Steven,

As per discussed, if a dwelling is the owner of a particular solar facility, then that dwelling does not need to be considered as a Point of Reception (POR) for that particular solar facility. But it is considered as a POR for the other adjacent solar facilities.

Enoch Tse, P.Eng.
Senior Noise Engineer
Approval Services Unit - Team 1
Environmental Approvals Branch

Ministry of the Environment
Operations Division
2 St. Clair Avenue West, Floor 12A
Toronto ON M4V 1L5
Tel: 416 212-4201 Fax: 416 314-8452
Toll Free: 1 800 461-6290
E-mail: enoch.tse@ontario.ca

From: Colella, Nick (ENE)
Sent: October 26, 2012 12:14 PM
To: Boucher, Noel
Cc: Sean Fairfield; Steven Hitchinson; Tse, Enoch (ENE); Zangeneh, Mahdi (ENE)
Subject: Cornwall Solar Project layout changes

Hi Noel,

This email is a follow up to our conversation yesterday and call earlier in the week. I understand that there are changes proposed for the Cornwall Solar Project, which require a revision of the Noise Report. With respect to the next steps regarding this project change, I will require the following:

- revised site plan
- revised noise report
- indication if, as a result of the project change, the overall impact at the receptors is (a) lower, (b) the same, (c) higher but insignificant, or (d) higher and significant (based on your determination)
- a description of whether the project changes will have any additional negative effects on the environment (e.g. additional impacts to water bodies, vegetation, noise, visuals etc.), outside of what has already been identified in the project documentation

Please note that the appropriate course of action regarding this project change will be determined based on our review of the information requested above. Generally speaking, this change will require submission of a Modification Document (I will advise on what should be included in this document). However, depending on our review of the requested information, we may also require you to provide notification of the project changes to the public, Aboriginal communities, and municipalities. Should it be determined that the overall noise/environmental impact is significant, we may require an additional public meeting.

Yesterday we spoke briefly about the issue where R42 was at 43dbA, without considering the Cornwall project (from my understanding, this is primarily because R42 was not assessed for the South Glengarry project). I have discussed this with the Noise Engineer for this file, Enoch Tse. Please contact Enoch with respect to this issue and he will provide guidance (contact info below).

Enoch Tse
416-212-4201
Enoch.Tse@ontario.ca

As always, please contact me if you have any questions.

Thanks
Nick

Nick Colella
Project Evaluator
Environmental Approvals Branch
Ministry of the Environment
2 St. Clair Ave. W., Floor 12A | Toronto, ON., M4V 1L5 |
T: 416-212-3691 | F: 416-314-8452 |
nick.colella@ontario.ca

523000 524000 525000

4996000 4995000 4994000

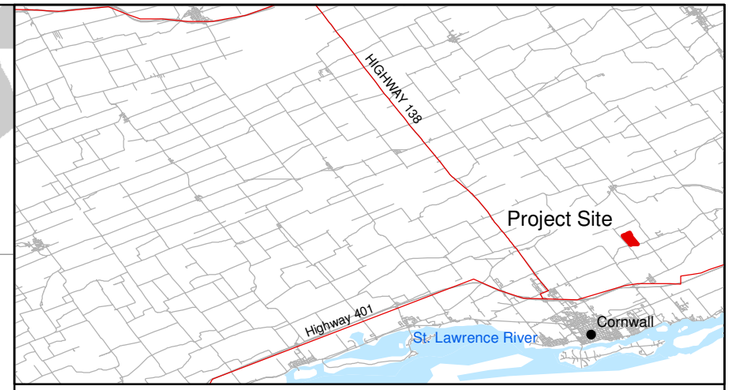
GLEN FALLOCH RD
GLEN FALLOCH RD
9 MILE RD
COUNTY RD 20
CASHION RD
KINLOCH RD
ST RD

R087 R083 R077 R075 R080 R084 R023 R013 R088 R012 R052 R011 R010 R007 R042 R046 R009 R006 R008 R079 R004 R003 R045 R050 R086 R043 R047 R048 R049 R053 R051 R041 R040 R076 R073 R038 R078 R037 R034 R033 R029 R026 R032 R028 R025 R020 R070 R074 R027 R030 R031 R072 R067 R065 R062 R059 R057 R060 R054 R055 R056 R063 R064 R068 R066 R069 R071 R035 R081 R036 R021 R015 R014 R061 R018 R082 R016 R024 R017 R019

SG_Cluster1 SG_Cluster2 SG_Cluster3 SG_Cluster4 SG_Cluster5 SG_Cluster6 SG_Cluster7 SG_Cluster8 SG_Cluster9 SG_Cluster10 SG_Cluster11 SG_SUB

CW_Cluster1 CW_Cluster2 CW_Cluster3 CW_Cluster4 CW_Cluster5 CW_Cluster6 CW_Cluster7 CW_Cluster8 CW_Cluster9 CW_Cluster10 CW_SUB

GL_Cluster2 GL_Cluster3 GL_Cluster4 GL_Cluster5 GL_Cluster6 GL_Cluster7 GL_SUB



Legend

- Cluster # — Inverter Cluster
- SUB — Substation Transformer
- # — Noise Receptor - Existing
- # — Noise Receptor - Vacant
- Road
- Project Site
- 1000 m from Project Site
- South Glengarry St. Lawrence-1 Solar Farm Project Site
- Glendale Solar Project Site
- Parcel
- Waterbody
- Wetland
- 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

Notes:
1. Produced by Hatch under licence from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2011.
2. Spatial referencing UTM NAD 83.

0 100 200 400 600 Metres

NORTH

1:13,000

Figure C.1.1

Cornwall Solar Inc.

Cornwall Solar Project
Noise Contours at 4.5 m

HATCH

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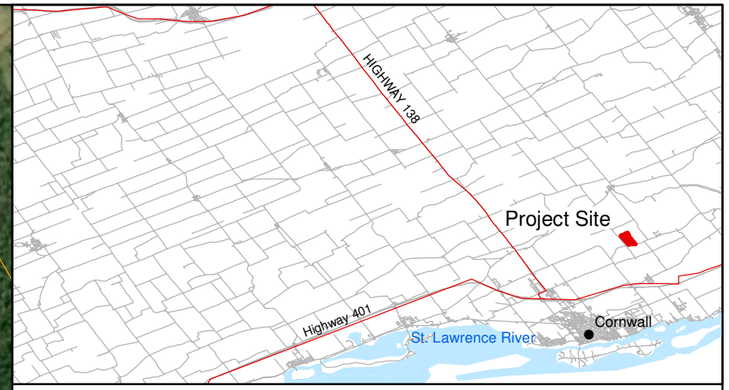
524000

525000

4995000



9 MILE RD

CASHION RD

COUNTY RD 19

SG_Cluster1
SG_Cluster2
SG_Cluster3
SG_Cluster4
SG_Cluster5
SG_Cluster6
SG_Cluster7
SG_Cluster8
SG_Cluster9
SG_Cluster10
SG_Cluster11
SG_SUB

CW_Cluster1
CW_Cluster2
CW_Cluster3
CW_Cluster4
CW_Cluster5
CW_Cluster6
CW_Cluster7
CW_Cluster8
CW_Cluster9
CW_Cluster10
CW_Sub

R001 R002 R003 R004 R005 R006 R007 R008 R009 R010 R011 R012 R013 R028 R029 R032 R033 R034 R037 R038 R039 R040 R041 R042 R043 R045 R046 R047 R048 R049 R073 R076 R078 R079 R086

Legend

Cluster #
Inverter Cluster
SUB
Substation Transformer
Noise Receptor - Existing
Noise Receptor - Vacant
Point of Reception
Noise Receptor Footprint
Road
South Glengarry St. Lawrence-1 Solar Farm Project Site
Project Site
Parcel

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

Notes:
1. Produced by Hatch under licence from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2012.
2. Spatial referencing UTM NAD 83.
3. Imagery obtained from Google Earth Pro, 2007.

0 50 100 200 Metres

NORTH

1:5,000

Figure C.1.2

Cornwall Solar Inc.

Cornwall Solar Project
Noise Contours at 4.5 m

HATCH

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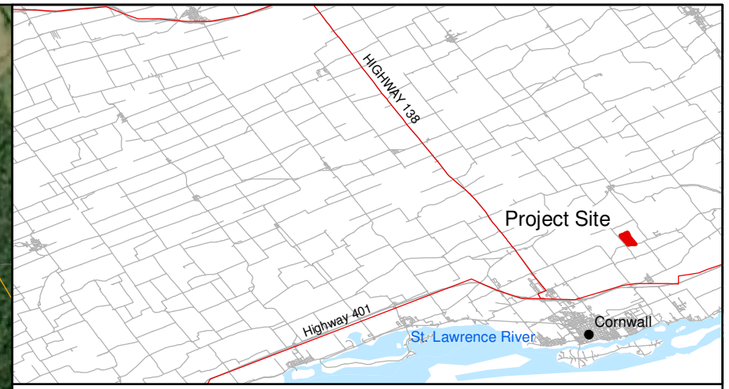
524000 524250 524500 524750 525000

4995250 4995000 4994750 4994500 4994250



Legend

- Cluster # — Inverter Cluster
- SUB — Substation Transformer
- # — Noise Receptor - Existing
- # — Noise Receptor - Vacant
- Point of Reception
- Road
- Noise Receptor Footprint
- 30 m from Noise Receptor Footprint
- South Glengarry St. Lawrence-1 Solar Farm Project Site
- 30 m from Noise Receptor
- Project Site
- Parcel

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

Notes:
1. Produced by Hatch under licence from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2011.
2. Spatial referencing UTM NAD 83.
3. Imagery obtained from Google Earth Pro, 2007.

0 50 100 200 Metres

NORTH

1:5,000

Figure C.2

Cornwall Solar Inc.

Cornwall Solar Project
Noise Contours at 1.5 m

HATCH

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APPENDIX C

Notice of a Proposed Change to an Approved Renewable Energy Project

NOTICE OF A PROPOSED CHANGE TO AN APPROVED RENEWABLE ENERGY PROJECT

Cornwall Solar Project

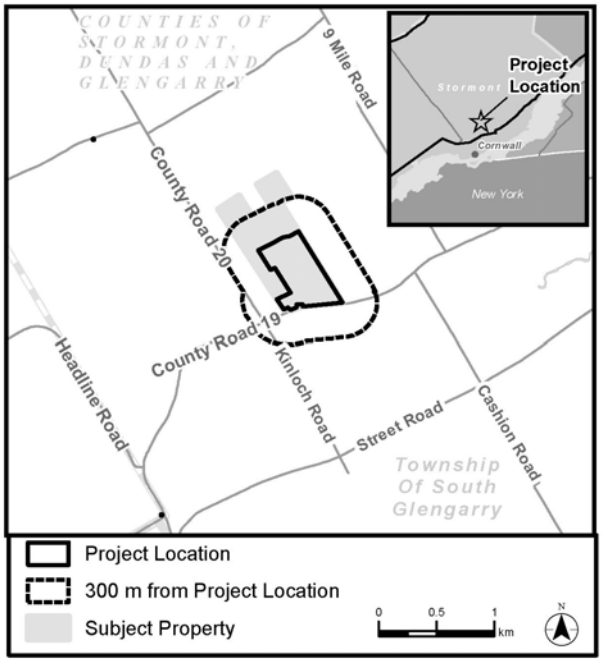
OPA Reference Number: FIT-F3SJUUQ

Project Location: The Project is located on Part of Lots 5, 6 and 7, Concession 5 within the Township of South Glengarry, United Counties of Stormont, Dundas and Glengarry.

Dated at: The Township of South Glengarry, United Counties of Stormont, Dundas and Glengarry on this the 16 day of October 2020.

Cornwall Solar Inc. (a subsidiary of Liberty Power) was issued a Renewable Energy Approval on January 15, 2013 and an Amendment to the Renewable Energy Approval on December 17, 2014 in respect of the Cornwall Solar Project. Information with respect to the decision on this Project can be viewed on the Environmental Registry by searching the following EBR Registry Numbers: 011-6841 and 012-3158.

Cornwall Solar Inc. is proposing to make a change to the Project and the Project itself is subject to the provisions of the Environmental Protection Act (the Act) Part V.0.1 and Ontario Regulation (359/09) (the Regulation). This Notice must be distributed in accordance with Section 32.2 of the Regulation. This notice is being distributed to make the public aware of the proposed change to the Project.



Project Description and Proposed Change:

Pursuant to the Act and the Regulation, the Project in respect of which the Renewable Energy Approval was issued, is a Class 3 Solar facility.

An application has been made to the Ministry of the Environment and Converstation and Parks to change the Project and alter the terms and conditions of the existing Renewable Energy Approval. The proposed change consists of replacing the existing intermediate transformers with new intermediate transformers in the same locations. If approved with this change, the facility's total maximum name plate capacity of 10MW shall remain unchanged. The Project location, taking the proposed change into account, is shown in the map provided.

Documents for Public Inspection:

Cornwall Solar Inc. has developed a Modification Report which summarizes the minor amendment and any revisions to the supporting documents as required. A copy of the Modification Report is currently available for public inspection on the Project website: http://www.cornwallsolarproject.com/home.html

Copies of the final REA documents also remain available on the Project website.

Project Contacts and Information:

To learn more about the Project, or to communicate questions or comments, please contact:

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Liberty Power
354 Davis Rd, Suite 100
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