

Brockville Solar Project Renewable Energy Approval Modification Report

Final Report

June 3, 2025

Prepared for:
Brockville Solar Inc.
105 Commerce Valley Dr W Suite 410
Markham ON L3T 7W3

Prepared by:
Stantec Consulting Inc.
100-300 Hagey Blvd
Waterloo ON N2L 0A4

Project Number:
161414291



Limitations and Sign-off

The conclusions in the Report titled Brockville Solar Project are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Prepared by: _____
Signature

Jodi Moore, Dipl.
Environmental Consultant

Printed Name and Title

Reviewed by: _____ Approved by: _____
Signature Signature

Leslie Greener, B.Sc., EP
Senior Associate, Environmental
Assessment Planner
Business Center Practice Leader

Printed Name and Title

Mark Knight, MA, MCIP, RPP Principal
Environmental Planner
Business Center Practice Leader

Printed Name and Title



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1 Introduction

Brockville Solar Inc. received a Renewable Energy Approval (REA) (REA #0602-8RFLKT dated March 23, 2012) from the Ministry of the Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment (MOE), for the Brockville Solar Project (the Project). There have been three amendments to the original REA dated September 27, 2012, April 11, 2013, and March 18, 2021.

The Project is a Class 3 solar facility, which consists of a 10 MW solar farm located in the Township of Elizabethtown-Kitley, in the United Counties of Leeds and Grenville, Ontario. A location map for the Project is provided in Appendix A. There are 10 arrays of photovoltaic modules, access roads, inverters, intermediate transformer and main facility substation, with a 44-kV pole line connecting the Project to the existing Hydro One Networks Inc. distribution line along Old Red Road. The facility has been operational since February 2013.



2 Summary and Rationale for Technical Change

The proposed Technical change relates to the development of an updated stormwater management (SWM) plan and design. This will include providing an updated hydrologic model along with detailed stormwater management calculations and design to meet the water quantity requirements of the site and reduce the potential impact on the downstream system.

The site was constructed around 2013 with runoff conveyed uncontrolled, as existed in pre-construction conditions, to the downstream system via sheet flow and perimeter ditching. No formal SWM controls were implemented or required as part of the development of the site. It is understood that there were reports of flooding in the area downstream of the site along County Road 27 in the first few years after construction. It is noted that County Road 27 does not have any storm sewers or defined ditches or culverts in the immediate vicinity of the site and based on a review of historic aerial imagery and street view mapping, shows evidence of poor drainage conditions in the area. In response to this, a modified SWM design has been developed to mitigate runoff impacts through the use of shallow detention basins formed by berms and outlet controls. These features are located along the perimeter of the site and are entirely within the existing Project boundaries.

Two previous studies have been completed on the site to address the stormwater concerns. These studies include a preliminary SWM design (Dillon Consulting Ltd. 2012) and an updated, detailed SWM design (Wood Environment & Infrastructure Solutions 2020). The previously completed detailed SWM included large areas where bedrock was required to be excavated, and the design was deemed to be cost prohibitive.

To support the technical change, an updated SWM design completed by Stantec (Appendix D) will aim to reduce the use of any excavated materials by using a combination of berms and outlet controls to provide shallow detention basins that will provide on-site water quantity control for the Project.

Due to a technical REA Amendment being required for the SWM and based on MECP's guidance received via email on Sept 9, 2024, information regarding a proposed installation of a small back-up generator is included in this modification report. The installation of this small back-up generator would have not otherwise required a REA Amendment. This back-up generator will provide station service support in the event of a power outage where the Project does not receive power from the grid. The station service requires power for controls such as Heating Venting and Air Conditioning and Supervisory Control and Data Acquisition. In the event of a large power outage, there could be operational impacts for the Project. The facility's total maximum name plate capacity of 10 megawatts shall remain unchanged.

The original site plan can be found in Appendix B, followed by the revised site plan with the proposed changes in Appendix C.



3 Technical Change

The proposed technical change is an updated SWM design aimed to modify the approved stormwater management plan by reducing need for significant excavation and using a combination of berms and outlet controls to provide the required water quantity control for the Project. The proposed controls will all be along the perimeter of the site and in the Project Property Line. In addition, there will be the installation of a back-up generator to provide station service support in the event of a power outage where the Project does not receive power from the grid.



4 Results of Effects Assessment for the Project Modification

Ontario Regulation 359/09: Renewable Energy Approvals under Part V.0.1. of The Act (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 adverse environmental effects that would require additional mitigation or monitoring measures beyond those outlined in the REA documents due to the proposed modifications to the Project has been completed and is summarized below.

As summarized in the updated SWM Report (Appendix D), the revised design provides storm water quantity controls and erosion and sediment control and does not introduce new risks to surface water or soil resources. While water quality treatment is not required as the site is fully vegetated, the detention basis provide some passive sedimentation. Further the design of the SWM system avoids disruption to natural flow paths. Since no changes are proposed to grading outside the existing facility boundary, and soil disturbance is now limited to shallow earthworks within the Project Property line, these factors combined with ESC measures, limit the potential for erosion or degradation of surface water or soil quality and quantity.

An assessment of the potential noise impacts for the back-up generator was completed (Appendix E) and it was concluded that noise emissions from the back-up generator would meet the NPC-300 noise limits. An air assessment was not required by MECP (per MECP September 26, 2024). As such, no additional adverse environmental impacts are expected.



5 Potential Impacts to REA Technical Assessment and Studies

Brockville 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 SWM installations will be constructed, and as such, no new adverse environmental impacts are anticipated. The back-up generator had a noise assessment completed to review potential impacts and as a result, no adverse environmental impacts are anticipated. The requirement for an air assessment has been deemed exempt as per the meeting with MECP on September 26, 2024.

The updated SWM Report (Appendix D) incorporates current site conditions, updated design standards and revised hydrological modeling. The proposed SWM design provides quantity control measures, along with some tertiary quality treatment. Erosion and sediment control measures will also be employed to mitigate construction impacts until the site has been stabilized. As such, there is no potential for new adverse environmental impacts because of the Technical Change. Table 1 and Table 2 below outline any potential negative impacts on environmental components due to the Technical Change, any new mitigation and/or monitoring measures proposed (where applicable) and provide rationale supporting the conclusion that no adverse effects are anticipated.

Table 1 Assessment of Potential Negative Impacts on Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation/Monitoring Measures	Rationale
Air Quality	Back-up generator emissions	No additional measures required.	Air assessment was not triggered (per MECP meeting September 26, 2024).
Soil Quality	Soil stripping/grading; Erosion/sedimentation	No additional measures required.	Soil erosion and sedimentation are managed through standard erosion and sediment controls. No excess soils will be generated by the Project. No new contamination sources introduced.
Soil Quantity	Berms and shallow detention basins	No additional measures required.	Revised approach avoids large-scale excavation and reduces soil disturbance.
Groundwater	Groundwater interaction	No additional measures required.	The proposed SWM design is located on the surface above bedrock that is in close proximity to the surface greatly reduce any potential interaction with ground water and is not anticipated to affect groundwater quality or quantity.



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5 Potential Impacts to REA Technical Assessment and Studies
 June 3, 2025

Environmental Component	Potential Negative Environmental Impacts	Mitigation/Monitoring Measures	Rationale
Surface Water Quality	Contamination through sediment and erosion or runoff	No additional measures required.	Implementation of erosion and sediment controls during construction and passive sedimentation in the shallow detention basins reduce potential impacts to water quality.
Surface Water Quantity	Flooding	No additional measures required.	New SWM design provides attenuation of site water by controlling run-off rate to pre-development levels for the 2-year to 100-year storm events. Implementation of SWM addresses historic flooding.
Aquatic Habitat and Biota	Not applicable	No additional measures required.	No waterbodies or aquatic habitats located within 300m of the site.
Woodlands	Not applicable	No additional measures required.	No new clearing is proposed.
Wetlands	Not applicable	No additional measures required.	No mapped or observed wetlands within the Project Property line.
Wildlife Habitat	Not applicable	No additional measures required.	Addressed during original REA. Proposed changes remain in the Project Property Line and are not within or near any identified Significant Wildlife Habitat.
Wildlife	Construction noise	No additional measures required.	Proposed Technical changes remain in the Project Property Line. Noise and activity are considered minor and short-term.

Table 2 Assessment of Potential Negative Impacts on Socio-Economic Environmental Components

Environmental Component	Potential Negative Environmental Impacts	Mitigation/Monitoring Measures	Rationale
Noise	Addition of back-up generator	No additional measures required.	Noise assessment determined no adverse effects expected.
Public and Facility Safety	Not applicable	No additional measures required.	No public access or exposure to new safety hazards identified.
Change in Visual Landscape	Not applicable	No additional measures required.	All components are located behind existing visual screening features.
Property Values	Not applicable	No additional measures required.	No new land uses or nuisances that would



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Environmental Component	Potential Negative Environmental Impacts	Mitigation/Monitoring Measures	Rationale
			reasonably affect adjacent property values.
Availability of Resources	Not applicable	No additional measures required.	Technical change does not involve resource extraction or substantial material use.
Recreational Land Use	Not applicable.	No additional measures required.	Site is fully fenced and private. All construction activities are confined to the Project Property Line.
Infrastructure	Strain or changes to existing infrastructure.	No additional measures required.	Technical changes will not result in change to current infrastructure use. The proposed SWM design includes retention of water, to reduce flood risk to County Road 27, protecting local infrastructure.
Traffic	Congestion	No additional measures required.	Nominal and temporary traffic changes, limited to equipment delivery and construction vehicles. Regular traffic patterns anticipated once operational.
Archaeological and Heritage Resources	Not applicable.	No additional measures required.	Technical change components located within areas already assessed, and no potential for impact was determined.



6 Summary Of Revisions to the REA Technical Assessments

Table 3 identifies the REA technical assessment reports were modified from those submitted with the original REA application, which will be reviewed by the MECP to address the proposed Technical 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
Stormwater Management Report, 90% Design Submission	Described existing conditions, potential impacts, and mitigation measures.	Full replacement of the previous Stormwater Management Report, with the 90% Design Submission (Appendix D)
Acoustic Assessment Report	Described existing conditions, potential impacts, and mitigation measures.	A Noise Impact Review (Appendix E) was completed to assess the potential impact from the proposed emergency generator only. The Noise Impact Review will be appended and the original AAR (Hatch 2013) for the will remain applicable to the rest of the site.

As per Chapter 10, Section 3.1.1 of the Technical Guide to Renewable Energy Approvals, Table 4 identifies the original REA documents that were also reviewed in relation to the proposed Technical changes and deemed adequate without the need for updates. Based on the nature and location of the proposed SWM facilities and back-up generator, these documents do not require material updates, as the proposed modifications do not result in new or increased environmental effects, changes to Project infrastructure, or new construction activities outside of the already assessed and approved Project location.

Table 4 Summary of REA Documents with No Updates Required

REA Document	Rationale for No Update Required
Project Description Report	The overall project description remains unchanged. The proposed Technical changes do not alter the project type, capacity or location.
Consultation Report	Consultation requirements related to this modification will be addressed separately through direct notices and newspaper publication. The original consultation process remains valid.
Construction Plan Report	Construction methods and activities remain consistent with those in the original report. The new SWM features, and generator involve standard construction practices within the previously disturbed area.



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6 Summary Of Revisions to the REA Technical Assessments
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REA Document	Rationale for No Update Required
Design and Operations Report	While the acoustic design has been updated (Appendix E), the overall project design and operational characteristics remain unchanged.
Decommissioning Plan Report	The Technical Change does not alter the long-term decommissioning approach. The new elements can be removed using the same general procedures described in the original report.
Natural Heritage Assessment and Environmental Impact Study	No new natural features are impacted. The modified SWM design avoids excavation and remains within the previously assessed development area.
Heritage Assessment Report	Proposed Technical changes are within the previously assessed footprint and no additional impacts are expected.
Stage 1 and Stage 2 Archaeological Assessments	No ground disturbance is proposed in previously undisturbed or unassessed areas. The new SWM layout and generator placement are within areas already assessed and cleared for archaeological potential.
Water Assessment and Water Body Report	No waterbodies located within 300m of the Project location. The Technical Change does not expand beyond the original boundaries of the Site.



7 Consultation and Notification

Consultation regarding the proposed REA Amendment was undertaken with the MECP via email on July 16, 2024, July 22, 2024, August 6, 2024, August 29, 2024, September 12, 2024, September 17, 2024, September 23, 2024, and via teleconference on September 26, 2024. During the meeting, the requirements for the modification report for the proposed Technical change were discussed.

Through the emails noted above and the meeting held on September 26th, the proposed SWM design change and installation of a back-up generator was discussed. It has been understood that an amended SWM report would be required to discuss design changes. However, requirements for the generator were uncertain. During consultation, MECP confirmed that based on the proposed back-up generator installation an amendment to the existing REA is not required if no additional Technical changes are proposed. However, as the standby generator is considered auxiliary equipment at the facility it should be assessed, and the existing acoustic assessment report be updated if a proposed Technical change requiring an amendment is required. Stantec has prepared a revised Acoustic Assessment for the back-up generator that will be submitted in one package with a letter describing the assessment along with the original noise report, as requested by the MECP.

It was discussed that neither the SWM design nor the back-up generator would require an air emissions assessment, and therefore a revised air emissions and dispersion model was not prepared as per the direction of MECP.

A Notice of Project Change was prepared and distributed directly to the following stakeholders:

- All owners of land located near the Project location that are part of the Projects contact list,
- All stakeholders who provided contact information at any of the public meetings held during the original REA application process,
- Indigenous communities (Mohawk Council of Akwesasne, Alderville First Nation, High Land Waters Metis Council, Chartered Member of Metis Nation of Ontario (MNO),
- The Clerk of the Township of Elizabethtown-Kitley,
- The MECP Director,
- MECP Kingston District Office District Manager,
- Ministry of Tourism, Culture and Gaming and Ministry of Sport, and
- The Ministry of Natural Resources.

In addition, a Notification was published on the Project website at <https://engiena-wordpress-dev.azurewebsites.net/project-page/?project=brockville> (link: [Brockville - ENGIE North America](#)) and on two separate occasions in the Brockville Recorder and Times on June 10th, 2025 and June 17th, 2025.



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7 Consultation and Notification

June 3, 2025

The Distribution of the Notice to the stakeholders noted above and posting in the local newspaper along with posting on the Project website at <https://engiena-wordpress-dev.azurewebsites.net/project-page/?project=brockville> (link: [Brockville - ENGIE North America](#)) has addressed the notification requirements. A copy of the Notice of Project Change is available in Appendix F.

The original Natural Heritage Assessment (NHA) for the Project was reviewed and confirmed by the Ministry of Natural Resources (MNR) during the original REA process, and no new natural features or wildlife habitat impacts are anticipated due to the proposed modification. Based on this, no additional involvement or input from the MNR is warranted beyond the provision of notification. A copy of this report will be provided.

The proposed Technical changes, including the new stormwater management design and installation of a back-up generator, are entirely within the previously assessed and disturbed Project Property Line. These areas were covered under the Stage 1 and 2 Archaeological Assessments and Cultural Heritage Screening submitted with the original REA. No new ground disturbance is proposed in unassessed areas, and no impacts to archaeological or cultural heritage resources are anticipated. Accordingly, further engagement with the Ministry of Citizenship and Multiculturalism (MCM) is not required; however, a copy of this Modification Report will be shared with MCM for their information, in line with the Technical Guide to Renewable Energy Approvals.



8 Closure

The proposed Project changes have been assessed in accordance with O. Reg 359/09 and the MECP's Technical Guide¹. It has been determined that the proposed changes will not result in new adverse environmental impacts or require additional associated mitigation measures beyond those identified as part of the original REA Application submitted for the Project.

¹ Technical Guide to Renewable Energy Approvals. Ministry of the Environment, Conservation and Parks. Updated November 10, 2023. <https://www.ontario.ca/document/technical-guide-renewable-energy-approvals-0>

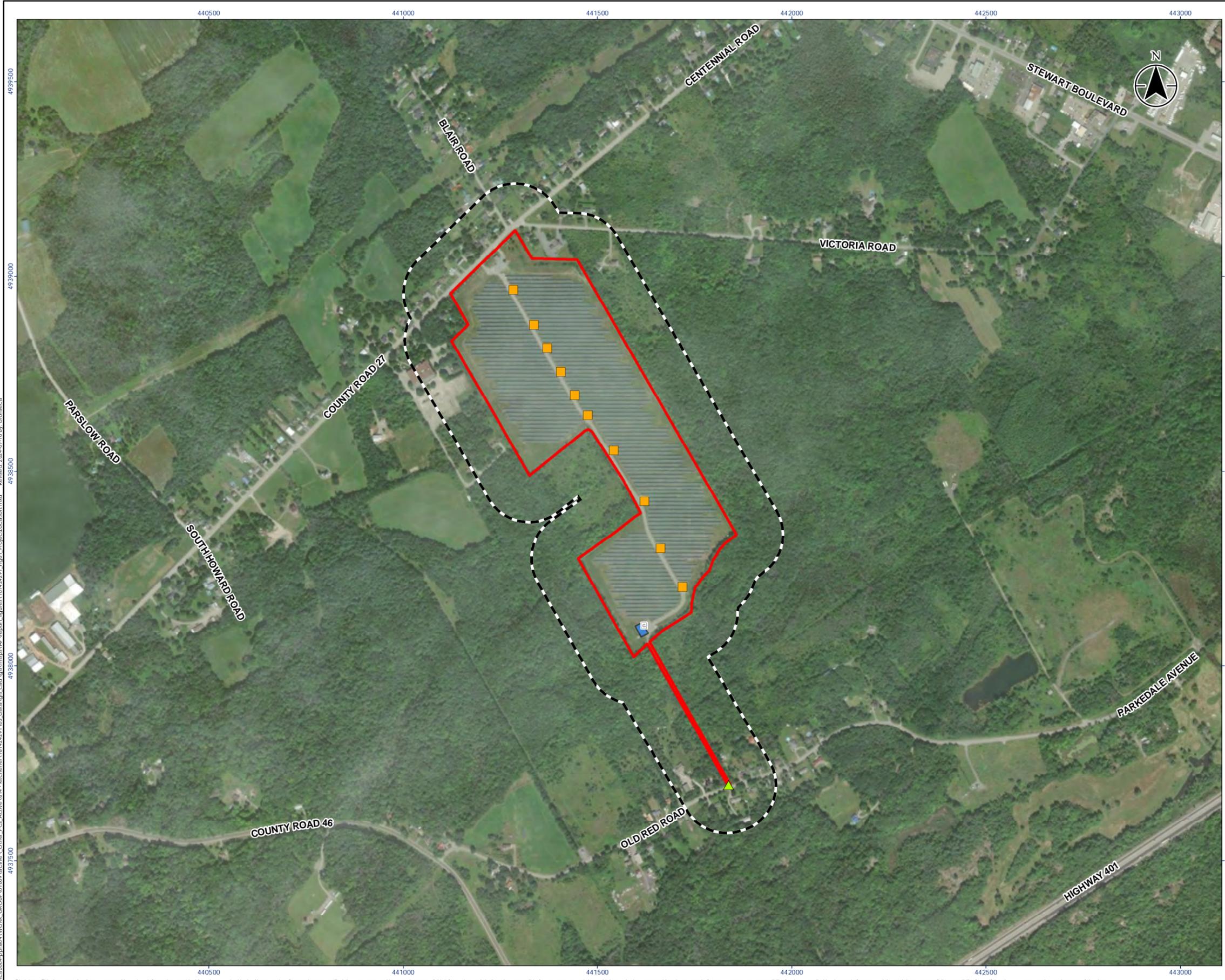


Appendices



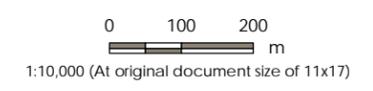
Appendix A Project Location





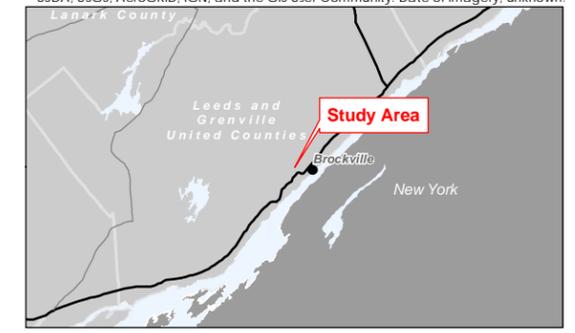
Legend

- Backup Generator Pad
- Interconnection Point
- Inverter Transformer Pad
- Site Boundary
- Study Area (120 m)
- Substation



Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
3. Locations of project components from Figure 1, Beckwith Solar Project and Brockville Solar Project, GEI Consultants Inc. should be considered approximate.
4. Orthoimagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Date of imagery, unknown.



Project Location 161414291 REV1
 Corporation of Elizabethtown-Kitley Prepared by BF on 2024-07-16
 Technical Review by AW on 2024-07-09

Client/Project
 Brockville Solar Inc.
 Brockville Solar Project

Figure No.
 1

Title
 Project Location

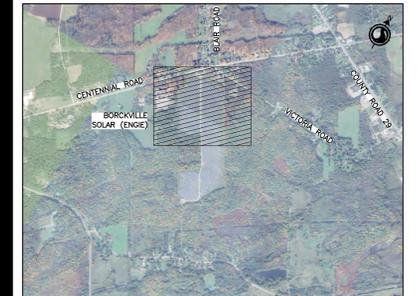
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 Revised: 2024-07-16 By: B. Broneca
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Appendix B Original Site Plan





Notes

- PRE-DEVELOPMENT TOPOGRAPHIC INFORMATION FROM SURVEY CONDUCTED BY COLLETT SURVEYING LTD. ON FEBRUARY 15, 2011. POST-DEVELOPMENT TOPOGRAPHIC INFORMATION FROM SURVEYS CONDUCTED BY COLLETT SURVEYING LTD. ON JULY 25, 2013 AND JANUARY 5, 2018.
- TOPOGRAPHIC DATA FOR AREAS OUTSIDE OF SITE BOUNDARY FROM LIDAR (EASTERN ONTARIO, 2021-2022).
- ELEVATIONS REFER TO THE CGD2013.
- EXISTING VEGETATION INFORMATION IS APPROXIMATE PROVIDED FROM AERIAL IMAGERY. CONTRACTOR TO CONFIRM ALL TREE & SHRUB LOCATION ON SITE.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
- 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.
- 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).
- IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENDOACH 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 THE OWNER AND CONTRACTOR, AND A COPY IS TO BE KEPT ON FILE ON SITE PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.
- THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY.
- THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/LEVELLED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
- CULVERTS ARE TO BE INSTALLED AS PER OPSD 802/010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
- ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED. MAX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
- CLEARANCE AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPS 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPS 205.
- GRAVING TO BE COMPLETED IN ACCORDANCE WITH OPS 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPS 1010.
- CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPS 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPS 805/010.
- RRIMP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPS 810.010 SECTION B-B.
- ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPS 804.
- ROCK SPILL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

NOT FOR CONSTRUCTION

Rev.	Description	By	Appd	YYYY.MM.DD
1.	ISSUED FOR REA APPROVAL	BWM	BW	2025.02.12
0.	60% Design Submission	ND	BW	2024.07.12

Revision/Issue

File Name:	Dwn.	Dign.	Chkd.	YYYY.MM.DD
161414291_c-ex_existing site condition	ND	BW	BW	2024.07.12

Permit/Seal



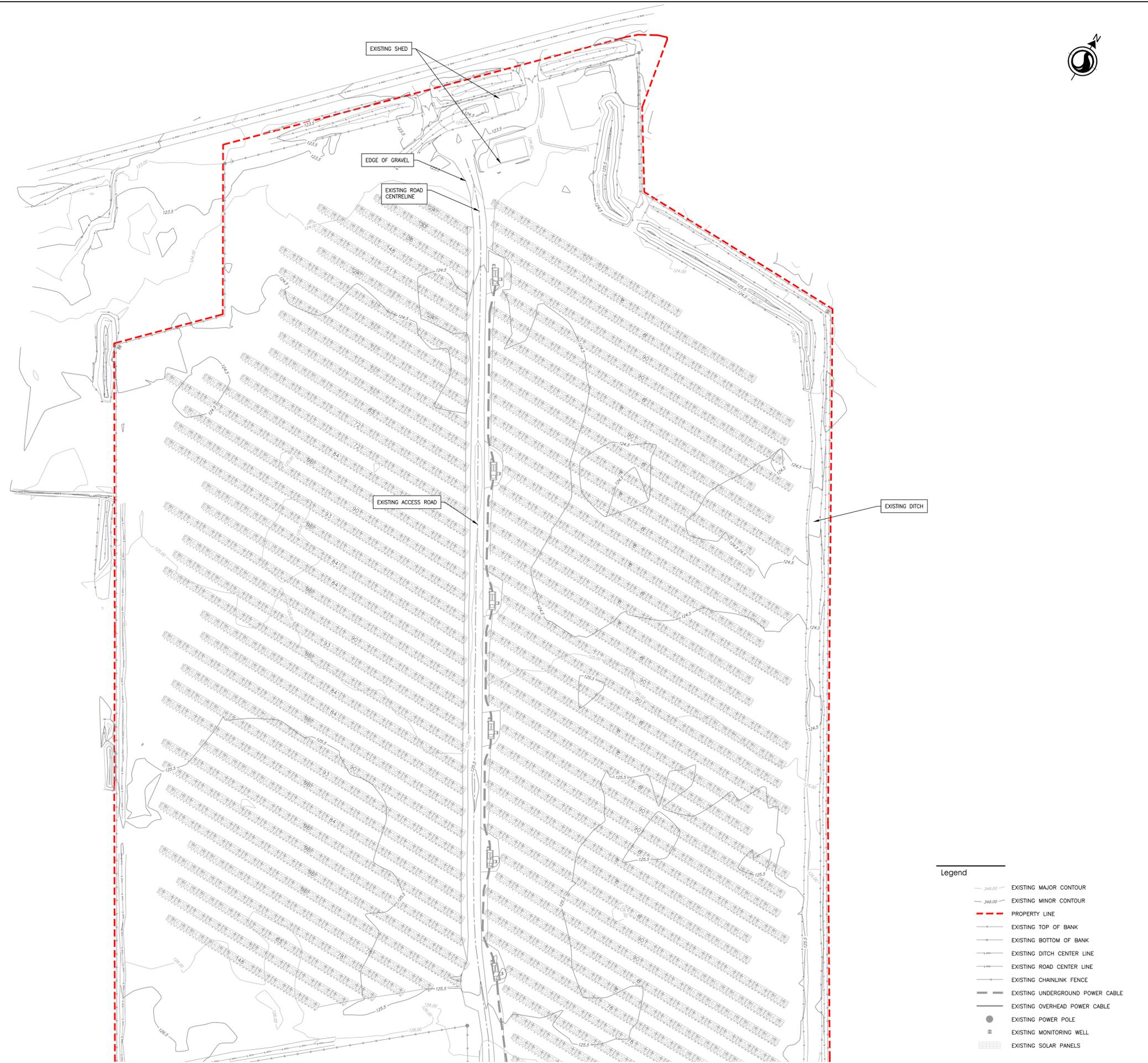
Client/Project
ENGIE (BROCKVILLE SOLAR INC.)

BROCKVILLE SOLAR SWM

BROCKVILLE, ON

Title
EXISTING SITE CONDITIONS PLAN NORTHERN

Project No. 161414291
Revision Sheet 1 of 02
Scale 1:1000
Drawing No. C-050



- Legend
- EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - PROPERTY LINE
 - EXISTING TOP OF BANK
 - EXISTING BOTTOM OF BANK
 - EXISTING DITCH CENTER LINE
 - EXISTING ROAD CENTER LINE
 - EXISTING CHAINLINK FENCE
 - EXISTING UNDERGROUND POWER CABLE
 - EXISTING OVERHEAD POWER CABLE
 - EXISTING POWER POLE
 - EXISTING MONITORING WELL
 - EXISTING SOLAR PANELS



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- CLEARANCE AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201. TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 205.
- GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
- CULVERT TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 805.010.
- RRIMP AT CULVERT OUTLETS SHALL BE IN ACCORDANCE WITH OPSD 810.010 SECTION B-B.
- ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
- ROCK SPILL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

NOT FOR CONSTRUCTION

Revision/Issue	By	Appd	YYYY.MM.DD
1. ISSUED FOR REA APPROVAL	BWM	BW	2025.02.12
0. 60% Design Submission	ND	BW	2024.07.12

File Name: 161414291_c-ex_existing site conditionND ND/BW BW 2024.07.12
Dwn. Dgn. Chkd. YYYY.MM.DD

Permit/Seal



Client/Project
ENGIE (BROCKVILLE SOLAR INC.)

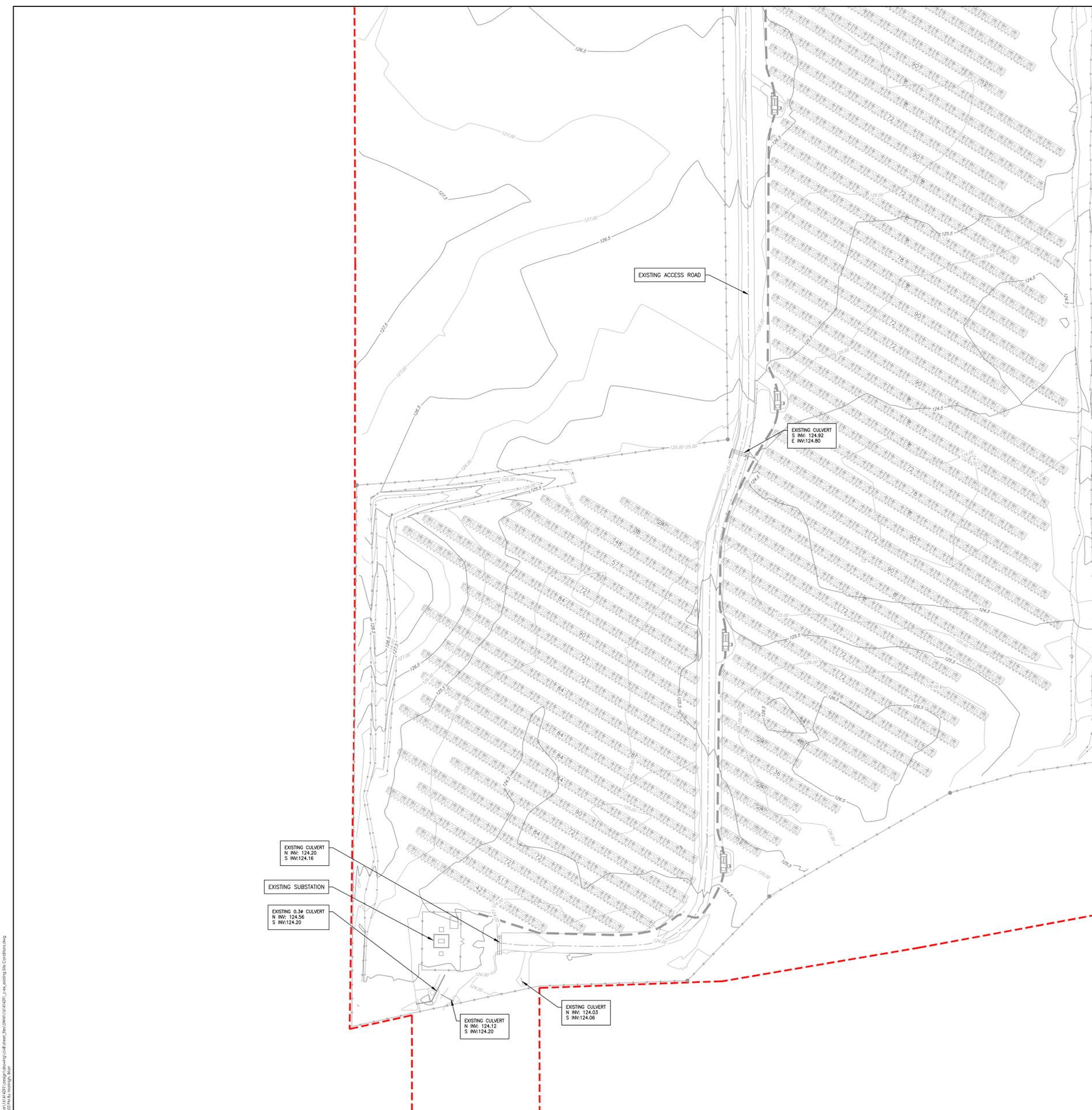
BROCKVILLE SOLAR SWM

BROCKVILLE, ON

Title
EXISTING SITE CONDITIONS PLAN SOUTHERN

Project No. 161414291 Scale 1:1000
Revision Sheet 1 of 02 Drawing No. 02 of 02

C-051



Legend

- 349.00 — EXISTING MAJOR CONTOUR
- 348.00 — EXISTING MINOR CONTOUR
- - - - - PROPERTY LINE
- — — — — EXISTING TOP OF BANK
- — — — — EXISTING BOTTOM OF BANK
- — — — — EXISTING DITCH CENTER LINE
- — — — — EXISTING ROAD CENTER LINE
- — — — — EXISTING CHAINLINK FENCE
- — — — — EXISTING UNDERGROUND POWER CABLE
- — — — — EXISTING OVERHEAD POWER CABLE
- EXISTING POWER POLE
- ⊗ EXISTING MONITORING WELL
- ▤ EXISTING SOLAR PANELS

Appendix C Revised Site Plan





Notes

- PRE-DEVELOPMENT TOPOGRAPHIC INFORMATION FROM SURVEY CONDUCTED BY COLLETT SURVEYING LTD. ON FEBRUARY 15, 2011. POST-DEVELOPMENT TOPOGRAPHIC INFORMATION FROM SURVEYS CONDUCTED BY COLLETT SURVEYING LTD. ON JULY 25, 2013 AND JANUARY 5, 2018.
- TOPOGRAPHIC DATA FOR AREAS OUTSIDE OF SITE BOUNDARY FROM LIDAR (EASTERN ONTARIO, 2021-2022).
- ELEVATIONS REFER TO THE CGD2013.
- EXISTING VEGETATION INFORMATION IS APPROXIMATE PROVIDED FROM AERIAL IMAGERY. CONTRACTOR TO CONFIRM ALL TREE & SHRUB LOCATION ON SITE.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS IN THIS SET PREPARED BY STANTEC CONSULTING LTD.
- 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.
- 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).
- IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENDOURCH 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 THE OWNER AND CONTRACTOR, AND A COPY IS TO BE KEPT ON FILE ON SITE PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.
- THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY.
- THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DRAINAGE AND MEASURES TO CONTROL WATER. THE SITE IS TO BE FINE GRADED/LEVELLED LEAVING THE SITE IN A NEAT APPEARANCE SUCH THAT POSITIVE DRAINAGE IS ACHIEVED EVERYWHERE PRIOR TO THE INSTALLATION OF SOLAR PANELS.
- CULVERTS ARE TO BE INSTALLED AS PER OPSD 802.010. SOIL TYPE TO BE CONFIRMED ON SITE FOR DETERMINATION OF TRENCH WIDTH.
- ALL AREAS WITHIN THE PROPOSED WORKS ARE TO BE RE-VEGETATED USING NATIVE TOPSOIL AND SEED. MAX AND APPLICATION RATE/METHOD TO BE SUBMITTED AND APPROVED BY OWNER PRIOR TO IMPLEMENTATION.
- CLEARANCE AND GRUBBING AND REMOVALS TO BE COMPLETED IN ACCORDANCE WITH OPSD 201.
- TEMPORARY EROSION CONTROL TO BE COMPLETED IN ACCORDANCE WITH OPSD 805.
- GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSD 206. GRANULAR MATERIAL TO BE USED IN ACCORDANCE WITH OPSD 1010.
- CULVERTS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 421. HEIGHT OF FILL TABLE FOR CSP CULVERTS TO COMPLY WITH OPSD 805.010.
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- ALL SEEDING TO BE COMPLETED IN ACCORDANCE WITH OPSD 804.
- ROCK SPOIL FROM PILE INSTALLATION TO BE REMOVED FROM GROUND SURFACE PRIOR TO GROUND PREPARATION FOR RESTORATION SEEDING.

NOT FOR CONSTRUCTION

1. ISSUED FOR REA APPROVAL	BWM	BW	2025.02.12
0. 60% Design Submission			

Revision/Issue By Appd YYYY.MM.DD

File Name: 161414291_c-gp_proposed grading	ND	ND/BW	BW	2024.07.12
	Dwn.	Dign.	Chkd.	YYYY.MM.DD

Permit/Seal



Client/Project
ENGIE (BROCKVILLE SOLAR INC.)

BROCKVILLE SOLAR SWM

BROCKVILLE, ON

Title
PROPOSED GRADING PLAN

Project No. 161414291	Scale 1:500	0 5 15 25m
Revision Sheet 1 02 of 02	Drawing No. C-401	

Legend

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPERTY LINE
- EXISTING TOP OF BANK
- EXISTING BOTTOM OF BANK
- EXISTING DITCH CENTER LINE
- EXISTING ROAD CENTER LINE
- EXISTING CHAINLINK FENCE
- EXISTING UNDERGROUND POWER CABLE
- EXISTING OVERHEAD POWER CABLE
- EXISTING MONITORING WELL
- EXISTING SOLAR PANELS
- PROPOSED CULVERT
- PROPOSED SIDE SLOPE 3:1 UNLESS OTHERWISE NOTED
- PROPOSED SWALE
- PROPOSED FLOW DIRECTION
- PROPOSED SPOT LEVEL
- SPOT LEVEL MATCH TO EXISTING
- PROPOSED SLOPE
- REMOVAL AREA
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 100-yr PONDING LIMIT
- RETENTION PONDING LIMIT
- PROPOSED ROAD MODIFICATION

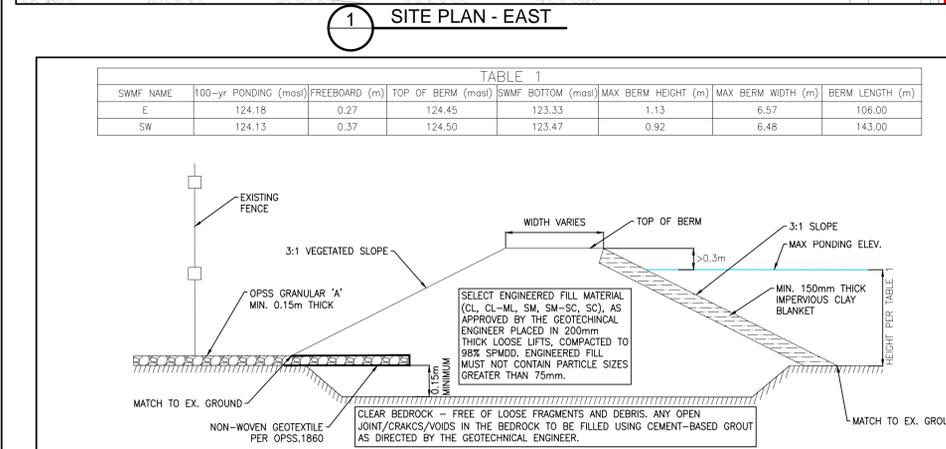
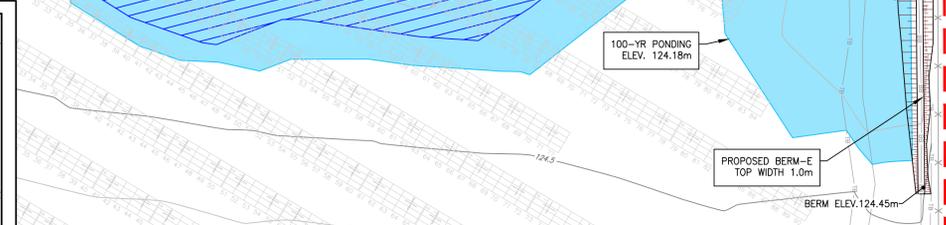
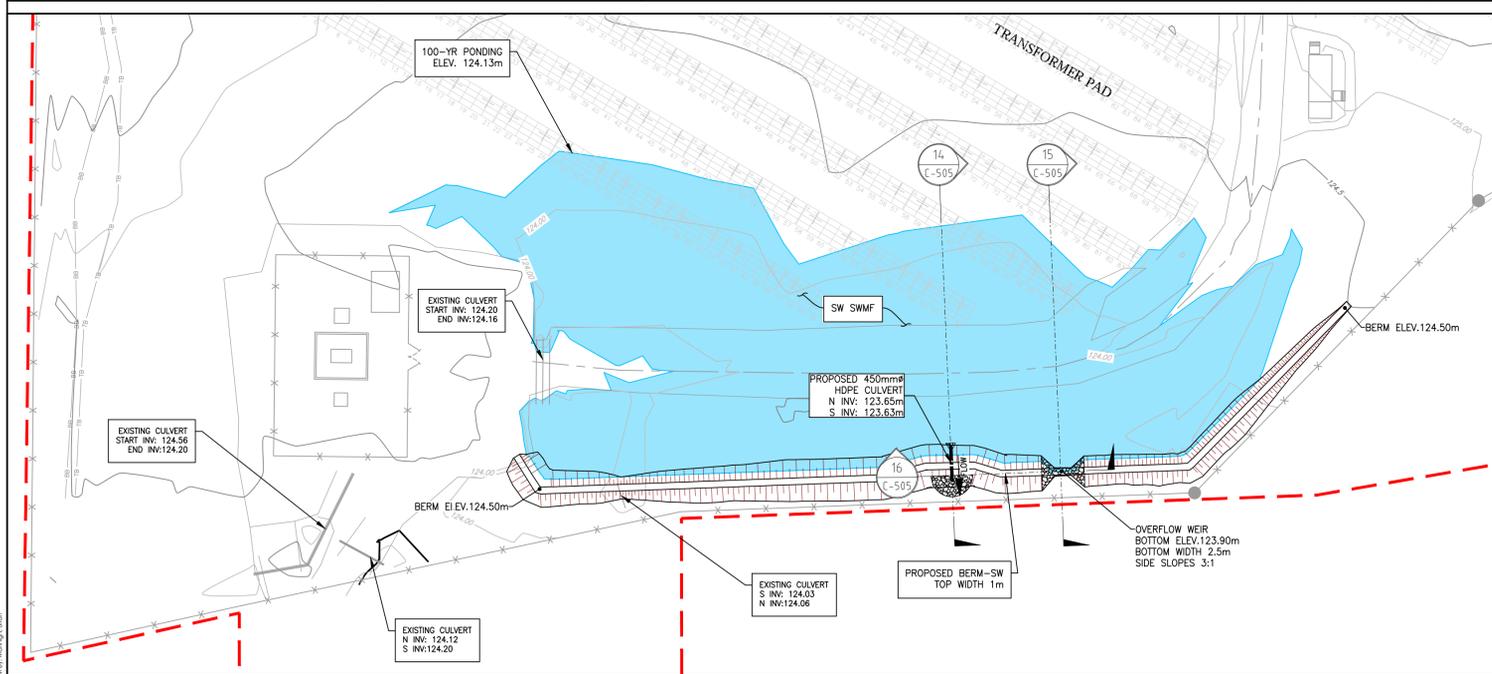
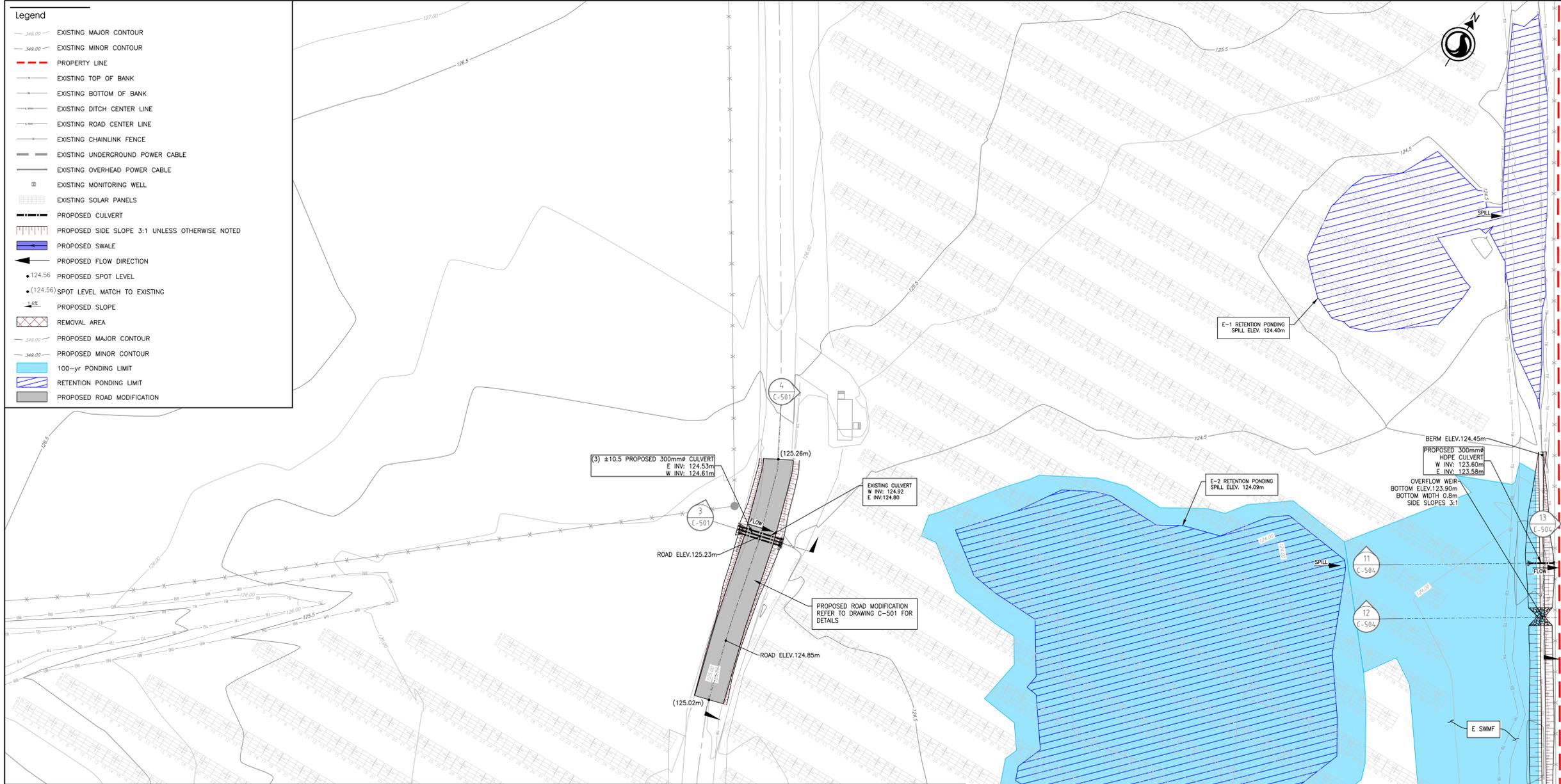


TABLE 1

SWMF NAME	100-yr PONDING (masl)	FREEBOARD (m)	TOP OF BERM (masl)	SWMF BOTTOM (masl)	MAX BERM HEIGHT (m)	MAX BERM WIDTH (m)	BERM LENGTH (m)
E	124.18	0.27	124.45	123.33	1.13	6.57	106.00
SW	124.13	0.37	124.50	123.47	0.92	6.48	143.00

Appendix D Stormwater Management Report



Brockville Solar Project Renewable Energy Approval Modification Report

Appendix D Stormwater Management Report

June 3, 2025

The Stormwater Management Report will be provided as a separate document.



Appendix E Acoustic Assessment Report and Emergency Back-up Generator Report





Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

May 26, 2025
Project/File: 161414291

David Arnott
Provincial Officer #827
Ontario Ministry of the Environment, Conservation, and Parks
Eastern Region
Phone: 613-549-4000 Ext: 2693

Dear David Arnott,

Reference: Brockville Solar Inc. REA Amendment – Facility Noise Impact – Steady State and Emergency Sources

Stantec Consulting Ltd. (Stantec) was retained by Brockville Solar Inc. to prepare a noise impact review for proposed upgrades at the Brockville Solar Project (the Project) located at 3551 County Road 27 in the Township of Elizabethtown-Kitley and the County of Leeds and Grenville, Ontario (the Site). The proposed upgrades will include the installation of a new emergency generator at the Site.

The Project currently operates under a Renewable Energy Approval (REA) #0602-8RFLKT, dated March 23, 2012. Hatch prepared the *Brockville Solar Project Noise Assessment Study*, dated March 11, 2013 (Hatch 2013), in support of the REA. The proposed project upgrades will not include any modifications to the existing equipment on the Site operating under REA #0602-8RFLKT. Per Brockville Solar Inc., all sources and receptors modelled in the Hatch Noise Assessment Study have remained at the same modelled locations and are expected to have the same noise emission levels.

Per the Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Noise Guideline NPC-300¹ (NPC-300), noise emissions from emergency equipment operating in non-emergency situations is assessed independently of all other stationary sources of noise, and the noise emissions are not required to be included with the overall noise assessment of a stationary source facility. As the only proposed change to the Project is the addition of an emergency generator, Stantec prepared a memo, *Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review*, dated December 2024 (Stantec 2024), which assessed the noise from the proposed emergency generator on the closest receptors independently of all other stationary sources of noise per MECP guideline NPC-300. The Stantec 2024 study concluded that proposed emergency generator upgrade to the Site is expected to meet the NPC-300 noise limits at all receptors to the Site during testing of the emergency generator.

The Hatch 2013 study is expected to remain applicable to the Site under non-emergency operations, and is provided in **Attachment A**. The Stantec 2024 study for the assessment of the emergency equipment operations at the Site is provided in **Attachment B**.

¹ Ontario Ministry of the Environment, Conservation and Parks, Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300, August 2013

Reference: Brockville Solar Inc. REA Amendment – Facility Noise Impact – Steady State and Emergency Sources

We trust that the above letter is satisfactory. Should you have any questions please contact the undersigned.

Regards,

Stantec Consulting Ltd.

Mohammed Salim MBA, P.Eng.
Associate / Senior Acoustics, Noise and Vibration Engineer
Phone: (905) 381-3287
Mohammed.Salim@stantec.com

Galen Wong M.A.Sc.
Acoustic, Noise and Vibration Specialist
Phone: (647) 293-9587
Galen.Wong@stantec.com

Attachments:

Attachment A Brockville Solar Project – Noise Assessment Study – Hatch 2013
Attachment B Brockville Solar Project – Energy Generator Noise Impact Review – Stantec 2024

Reference: Brockville Solar Inc. REA Amendment – Facility Noise Impact – Steady State and Emergency Sources

Attachment A Brockville Solar Project – Noise Assessment Study – Hatch 2013



Brockville Solar Inc.
Toronto, ON

Noise Assessment Study

Brockville Solar Project

H338230-1000-07-124-0008

Rev. 4

March 11, 2013

Disclaimer

This report has been prepared on behalf of Brockville Solar Inc. for submission to the Ontario Ministry of the Environment as part of the Renewable Energy Approval (REA) process. The content of this report is not intended for the use of, nor should it be relied upon by, any other person. Neither Brockville Solar Inc. nor any of its consultants, agents, employees, directors or officers has any liability whatsoever for any loss, damage or injury suffered by any third party arising out of, or in connection with, their use of this report.

Project Report

March 11, 2013

**Brockville Solar Inc
Brockville Solar Project**

Noise Assessment Study

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and Area Location Plan**

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Appendix C Noise Maps from CADNA-A

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Executive Summary

This report presents the results of the noise assessment study required for Solar Facilities under Ontario Regulation 359/09 and 521/10, as part of the Renewable Energy Approval (REA) Process. Brockville Solar Inc is proposing to develop a 10-Megawatt (MW) solar photovoltaic (PV) project called the Brockville Solar Project (the "Project"). The Project is located on approximately 39 hectares (ha) of land on Lot 19, Concession 2, in the Township of Elizabethtown - Kitley (lower municipality) and the United Counties of Leeds and Grenville (upper tier municipality), Ontario.

This Noise Assessment Study has been prepared based on the document entitled "Basic Comprehensive Certificates of Approval (Air) – User Guide" by the Ontario Ministry of the Environment (MOE, 2004). The sound pressure levels at the points of reception (POR) have been estimated using ISO 9613-2, implemented in the CADNA-A computer code. The performance limits used for verification of compliance correspond to the values for rural areas of 40 dBA. The results presented in this report are based on the best available information at this time.

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

1. Introduction

1.1 Project Description

Brockville Solar Inc is proposing to develop a 10-megawatt (MW) solar photovoltaic (PV) project titled Brockville Solar Project (the “Project”). The Project Location¹ is situated on approximately 39 hectares (ha) of land on Lot 19, Concession 2, in the Township of Elizabethtown - Kitley (lower municipality) and the United Counties of Leeds and Grenville (upper tier municipality), Ontario.

The Project is proposed to be constructed on currently unused, privately owned land. The Project Site is located just west of the city of Brockville. Nearby roads include County Road 27 to the north of the Project site, Victoria Road to the east, Lyn Road to the west and Old Red Road to the south.

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

1.2 Renewable Energy Approval Legislative Requirements

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

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

The Noise Study Report is to include a general description of the facility, noise sources, Noise Receptors, assessment of compliance, as well as all the supporting information relevant to the Project.

¹ “Project Location” in the context of this study is an area occupied by the Project infrastructure.

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2. Facility Description

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

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

Table 2.1 General Project Description

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

2.1 Project Location

The Project Location consists of agricultural land totalling approximately 39 hectares, located about 3 km north of the city of Brockville. Figure 2.2 shows the site layout plan while the zoning designation plan (Figure A.1) and area location plan (Figure A.2) drawings are included in Appendix A.

2.2 Acoustical Environment

The Project Location is surrounded primarily by forested areas with some farm land to the southwest, rural areas to the east and with Highway 401 to the south. The background noise levels are expected to be typical of rural areas (NPC-232 by the MOE, 1995). Some traffic noise is expected from both County Road 27 and Victoria Road.

There are no airports within 5 km of the Project site.

2.3 Life of Project

The expected life of the Project is approximately 35 years. At that time (or earlier if the 20-year power purchase agreement is not extended), the Project will be decommissioned or refurbished depending on market conditions and/or technological changes.

2.4 Operating Hours

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

2.5 Approach to the Study

The sound pressure levels at the POR were predicted using procedures from ISO 9613-2, which is a widely used and generally accepted standard for the evaluation of noise impact in environmental Assessments. The sound power level for the inverters was provided by the manufacturer while the

sound power level for the transformers was estimated. The software package CADNA-A, which implements ISO-9613-2, was used to predict the noise levels at the POR. This numerical modeling software is able to simulate sound sources as well as sound mitigation measures taking into account atmospheric and ground attenuation. Some of the CADNA-A configurations used in the modeling are shown in Figure 2.1. The height contours for the site were taken from the Ontario Base Maps (OBM).

For modeling purposes, the vegetation that blocks some of the POR from the sources has not been incorporated.

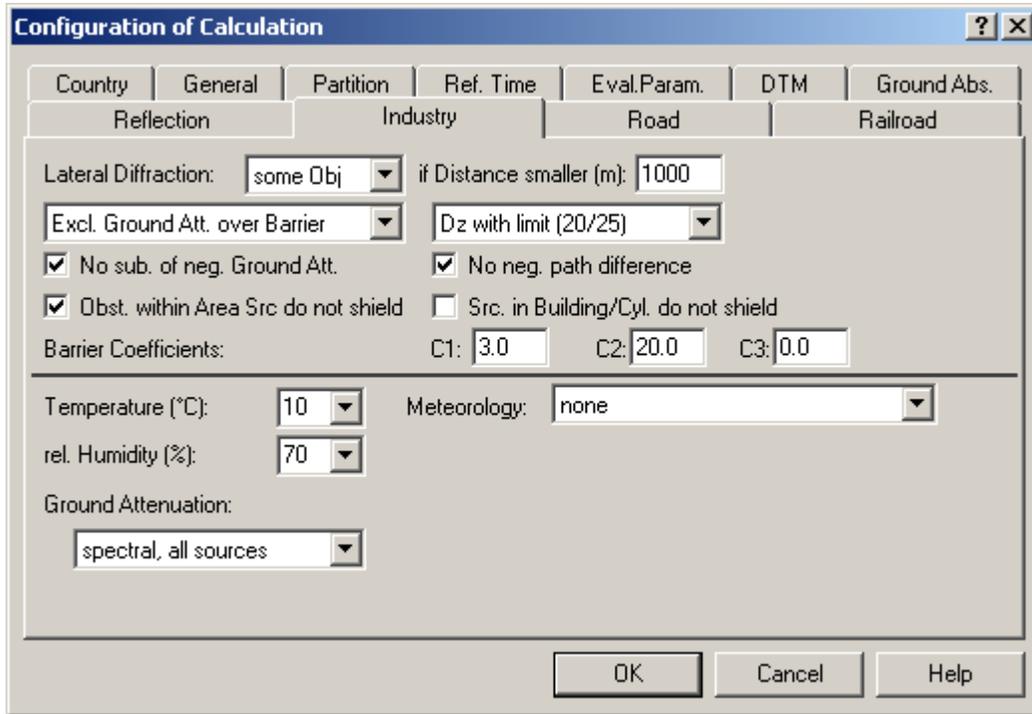
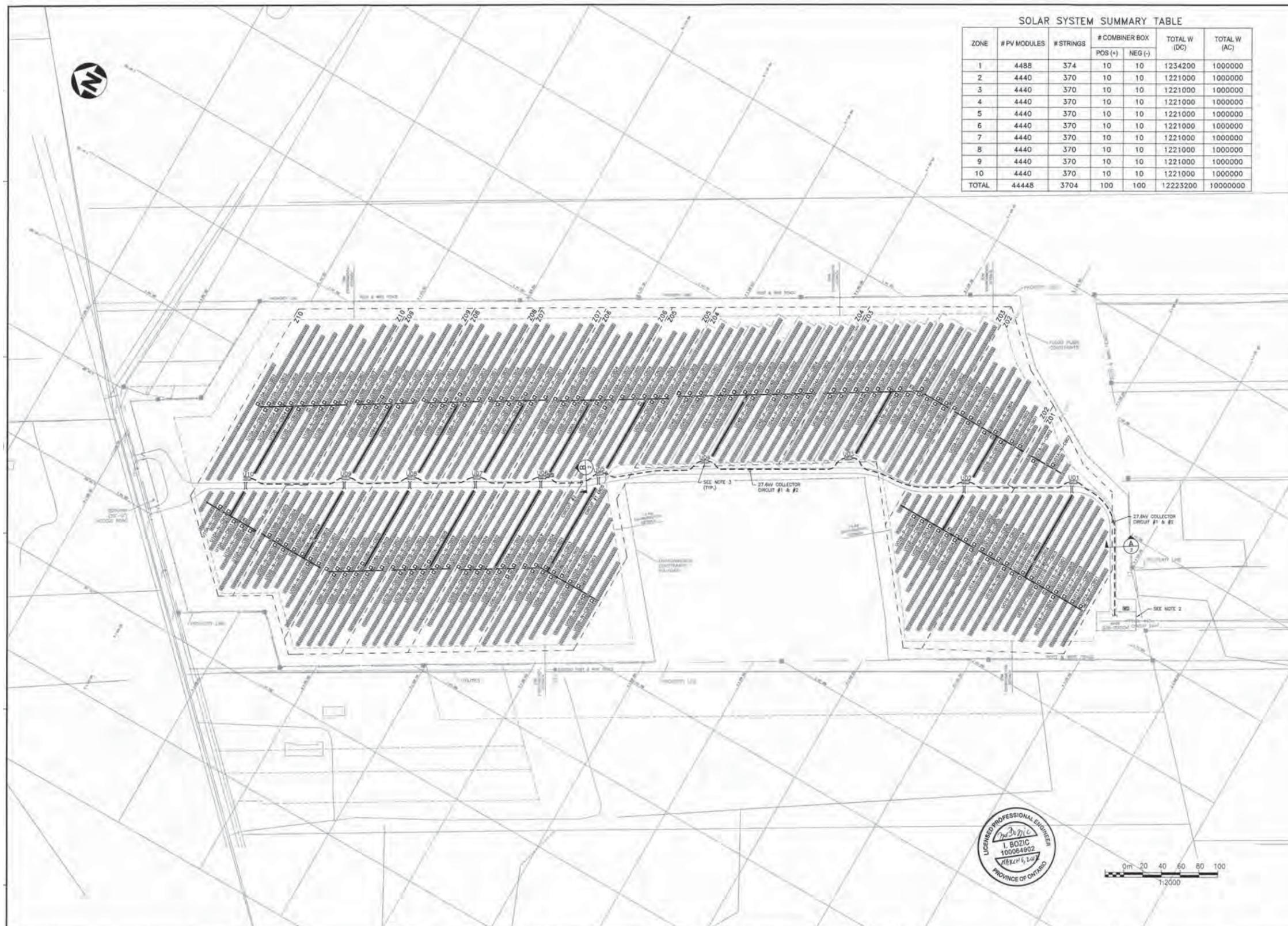


Figure 2.1 CADNA-A Configurations

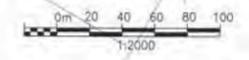


SOLAR SYSTEM SUMMARY TABLE

ZONE	# PV MODULES	# STRINGS	# COMBINER BOX		TOTAL W (DC)	TOTAL W (AC)
			POS (+)	NEG (-)		
1	4488	374	10	10	1234200	1000000
2	4440	370	10	10	1221000	1000000
3	4440	370	10	10	1221000	1000000
4	4440	370	10	10	1221000	1000000
5	4440	370	10	10	1221000	1000000
6	4440	370	10	10	1221000	1000000
7	4440	370	10	10	1221000	1000000
8	4440	370	10	10	1221000	1000000
9	4440	370	10	10	1221000	1000000
10	4440	370	10	10	1221000	1000000
TOTAL	44448	3704	100	100	12223200	10000000

- NOTES**
- FOR DETAILED ELECTRICAL EQUIPMENT LAYOUT REFER TO DWG. NO. 169913-0000-141-LYD-0010-001 TO 169913-0000-141-LYD-0010-005.
 - FOR SUBSTATION LAYOUT AND SECTION REFER TO DWG. NO. 169913-0000-141-LYD-0002-001.
 - FOR TYPICAL INVERTER STATION LAYOUT REFER TO DWG. NO. 169913-0000-141-LYD-0007-001.

- LEGEND**
- 1MW INVERTER STATION
 - SOLAR PANEL TABLE
 - DEVELOPMENT BOUNDARY
 - ACCESS ROAD
 - PROPERTY LINE
 - 1 MW ZONE
 - SECURITY FENCE
 - DC SMART COMBINER BOX
 - DC CABLE DUCT BANK ROAD CROSSING
 - CABLE TRAY (DC CABLES)
 - 27.6kV CABLE FOR COLLECTOR CIRCUITS IN UNDERGROUND DUCTS
 - WEATHER STATION
 - PV MODULE TEMPERATURE SENSOR



AMEC - BLACK & McDONALD
JOINT VENTURE

amc

CLIENT DWG. NO. 169913-0000-141-LYD-0001-001

DRAWING NO. 169913-0000-141-LYD-0001-001

REV. B

REV	DDMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP	APP	APP
B	02MAR12	ISSUED FOR ESA								
A	02MAR12	ISSUED FOR SQUAD CHECK								

REF	NUMBER	TITLE
6	LYD-0007-001	1MW INVERTER STATION LAYOUT
5	LYD-0002-001	44kV SUBSTATION LAYOUT AND SECTION
4	LYD-0010-001	ELEC. EQUIP. LAYOUT PV SOLAR FIELD SHEET 1-5
3	SLD-0001-001	ELECTRICAL SINGLE LINE DIAGRAM
2	DTL-0001-001	ELEC. EQUIP. INSTALLATION DETAILS & SECTIONS - SH. 1
1	LGN-0000-001	ELECTRICAL SYMBOLS LEGEND & GENERAL NOTES

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CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. 169913

ACTIVITY NO.

SCALE 1:2000

PACKAGE CODE

BY DSN IB JAN'12

DRN RS JAN'12

CHK MP JAN'12

APP SE JAN'12

AREA

SUBJECT

BROCKVILLE SOLAR PROJECT
OVERALL ELECTRICAL SITE LAYOUT

Figure 2.2 - Site Layout Plan

Blank back

3. Noise Source

The main sources of noise from the Project will be ten inverter clusters, each one containing two inverters and one medium-voltage transformer, and a substation containing the main step up transformer. Brockville Solar Inc provided a layout of the solar PV facility (see Figure 2.2). The coordinates of each noise source are presented in Table B.1 of Appendix B.

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

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

3.1 Substation Transformer

A step-up transformer that will step-up the 27.6-kV power to the 44 kV, required by the local distribution company, will be located in the substation. Since the transformer make and model has not been selected at this point, the sound power level resulting from the operation of the transformer was evaluated using data from NEMA TRI – 1993 (2000) and 31-m² transformer area. This standard provides maximum sound level values for transformers, and manufacturers routinely meet this specification. The NEMA levels were then converted into frequency spectra using empirical correlations for transformer noise (Crocker, 2007). This calculation as well as expected transformer dimensions are available in Figure B.1 of Appendix B.

Power transformers are considered by the MOE to be tonal noise sources. A 5-dB penalty was added to the sound power spectrum, as recommended by Publication NPC-104, “Sound Level Adjustments” for tonality. Table B.2 in Appendix B shows the frequency spectrum used to model the substation transformer.

3.2 Inverter Clusters

Brockville Solar Inc is planning to use inverters manufactured by Advanced Energy. Ten inverter clusters will be installed as part of the Project with each cluster containing two Advanced Energy Solaron 500 kW inverters for a total capacity of 1 MW (each cluster). Brockville Solar Inc provided third-octave noise data for the Solaron 500 kW inverter (Appendix B). The provided third octave spectrum was converted to a full octave spectrum and the contribution from both inverters within the same cluster was combined into a single sound power spectrum for use with CADNA-A model (calculations are available in Figure B.3 of Appendix B). A 5-dBA penalty was added to the frequency spectrum, as stipulated in Publication NPC-104, “Sound Level Adjustments,” to allow for tonality. The frequency spectrum used to model combined noise emission from the inverters located next to each other within the same cluster is shown in Table B.2 of Appendix B.

A 1-MVA transformer used to step up the 480-V power from the inverters to 27.6 kV will be located in close proximity to the inverters. Since the transformer make and model have not been selected at this point, although it is known that the transformer will be of dry type with forced ventilation, the sound power levels resulting from the operation of the transformer were evaluated using data from NEMA TR 1-1993 (R2000) and transformer surface areas of 18.5-m². The NEMA levels were then converted into frequency spectrum using empirical correlations for transformer noise (Crocker, 2007). These calculations are available in Figure B.2 of Appendix B. Power transformers are considered by the MOE to be tonal noise sources. A 5-dB penalty was added to the sound power

spectrum, as recommended by Publication NPC-104, “Sound Level Adjustments” for tonality. Table B.2 of Appendix B shows the frequency spectrum used to model the transformers located in the clusters.

3.3 Noise Summary Table

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

Table 3.1 Noise Source Summary for the Project.

Source ID	Description	Total Sound Power Level (dBA)	Source Location	Sound Characteristics	Noise Control Measures
Sub	27.6-kV/44-kV/10-MVA Substation transformer	93.3	O	S-T	U
Inverter1	Two Solaron 500 kW inverters at Cluster 1	91.7	O	S-T	E
Inverter2	Two Solaron 500 kW inverters at Cluster 2	91.7	O	S-T	E
Inverter3	Two Solaron 500 kW inverters at Cluster 3	91.7	O	S-T	E
Inverter4	Two Solaron 500 kW inverters at Cluster 4	91.7	O	S-T	E
Inverter5	Two Solaron 500 kW inverters at Cluster 5	91.7	O	S-T	E
Inverter6	Two Solaron 500 kW inverters at Cluster 6	91.7	O	S-T	U
Inverter7	Two Solaron 500 kW inverters at Cluster 7	91.7	O	S-T	U
Inverter8	Two Solaron 500 kW inverters at Cluster 8	91.7	O	S-T	U
Inverter9	Two Solaron 500 kW inverters at Cluster 9	91.7	O	S-T	U
Inverter10	Two Solaron 500 kW inverters at Cluster 10	91.7	O	S-T	U
Transformer1	480-V/27.6 kV/1-MVA Transformer at Cluster 1	88.1	O	S-T	U
Transformer2	480-V/27.6 kV/1-MVA Transformer at Cluster 2	88.1	O	S-T	U
Transformer3	480-V/27.6 kV/1-MVA Transformer at Cluster 3	88.1	O	S-T	U
Transformer4	480-V/27.6 kV/1-MVA Transformer at Cluster 4	88.1	O	S-T	U
Transformer5	480-V/27.6 kV/1-MVA Transformer at Cluster 5	88.1	O	S-T	U
Transformer6	480-V/27.6 kV/1-MVA Transformer at Cluster 6	88.1	O	S-T	U
Transformer7	480-V/27.6 kV/1-MVA Transformer at Cluster 7	88.1	O	S-T	U
Transformer8	480-V/27.6 kV/1-MVA Transformer at Cluster 8	88.1	O	S-T	U
Transformer9	480-V/27.6 kV/1-MVA Transformer at Cluster 9	88.1	O	S-T	U
Transformer10	480-V/27.6 kV/1-MVA Transformer at Cluster 10	88.1	O	S-T	U

Notes:

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

3.4 Adjacent Solar Projects

To identify the adjacent solar projects Hatch's internal database of solar projects and MOE records available in http://www.ene.gov.on.ca/environment/en/subject/renewable_energy/projects/index.htm were searched. (January 26, 2011)

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

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4. Point of Reception

The POR used in this study were initially identified from the OBM and Google Earth Pro imagery dated 2009 within 1-km distance from the Project Site² boundary. In addition, the potential noise receptors located closest to the Project Location were visually verified during a site visit held in September 2010. Following the visit, a number of additional receptors (residential buildings) that were observed at the time of the inspection were added to the model.

The POR 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 POR considered in this study, within a 1-km distance from the Project Site boundary is 287, including the vacant lots (Figure A.2 in Appendix A). Three of these noise receptors, identified in Table 4.1, were chosen as representative receptors for evaluating the noise contribution from each individual source. These three receptors were chosen in order to represent sound pressure level contributions on different areas around the Project Location. The complete set of results for all 287 noise receptors is provided in Table 6.2 with corresponding noise contour maps from CADNA-A included in Appendix C.

For this study, the elevation above ground used for the POR is 4.5 m. Also, noise compliance was verified within 30-m distance from any given POR located at 1.5 m above the ground level.

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 Point of Reception Noise Impact from Individual Noise Sources of Brockville Solar Project

Source ID	POR 1		POR 30		POR 67	
	Distance (m)	Leq Sound Level (dBA)	Distance (m)	Leq Sound Level (dBA)	Distance (m)	Leq Sound Level (dBA)
Sub	611	25.6	950	21.0	1061	19.8
Inverter1	401	19.9	268	23.7	146	29.4
Inverter2	323	22.0	262	23.9	234	25.0
Inverter3	282	23.3	280	23.3	298	22.7
Inverter4	252	24.3	314	22.3	365	20.8
Inverter5	241	24.7	358	21.0	432	19.2
Inverter6	250	31.2	400	26.8	491	24.8
Inverter7	307	29.3	484	24.9	599	22.7
Inverter8	412	26.5	620	22.4	750	20.4
Inverter9	510	24.4	753	20.3	885	18.6
Inverter10	606	22.6	854	18.9	991	17.3
Transformer1	396	23.2	266	26.9	150	32.1
Transformer2	320	25.2	262	27.1	238	27.9
Transformer3	279	26.5	282	26.4	303	25.7
Transformer4	251	27.4	316	25.3	369	23.9
Transformer5	242	27.8	361	24.1	437	22.3
Transformer6	253	27.4	403	23.0	496	21.0
Transformer7	310	25.5	489	21.1	604	19.0
Transformer8	416	22.7	625	18.7	755	16.7
Transformer9	513	20.7	756	16.7	888	15.0
Transformer10	611	18.9	858	15.3	996	13.7

5. Mitigation Measures

Mitigation for operation of the Brockville Solar Project has been modeled and shown to require enclosure of the inverters, at least in the following inverter clusters: Cluster 1, Cluster 2, Cluster 3, Cluster 4, and Cluster 5. Note that the medium-voltage transformers will be located outside of the enclosures, and no mitigation is needed for the transformers in order to reduce sound levels at the nearest points of reception below 40 dBA.

The enclosures shall provide at least the following insertion loss:

31.5Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
0 dB	1 dB	3 dB	6 dB	8 dB	8 dB	6 dB	6 dB	6 dB

A drawing showing the enclosure to be used on the project can be seen in Appendix B. The manufacturer will be required to provide an enclosure with the minimum insertion loss shown above, including acoustical lining and silenced air intakes and exhausts as required to meet the above insertion loss.

It is noted that the Project intends to use enclosures on all ten (10) inverter clusters, however in this study they were only applied at Clusters 1-5.

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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.

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

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

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

The solar facility will be operating during the daylight hours, that is, between 07:00 and 19:00 during most days of the year. However, in the summer months the sun may shine before 07:00 or until past 19:00. As such, during the summer the facility will be operating at the time when the applicable performance limit changes from 45 dBA to 40 dBA. Also, the transformers remain energized at night. In order to account for this the study assumes that the facility will be operating 24 hours and compares the impact from the facility with the 40-dBA limit. In reality, the facility will be idle at night.

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

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

6.1 Compliance With Performance Limits

Table 6.2 presents the predicted sound pressure levels for the POR 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. Appendix D includes a detailed calculation log of the representative POR with the highest Sound Pressure Level.

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

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 the Project

(Shaded rows correspond to representative POR)

Existing = Existing dwelling, Vacant = Vacant Lot.

The performance limit is 40.0 dBA. POR height is 4.5 m.

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
1	Existing	39.0	241	441232.7	4938568.7	129.5
2	Existing	37.0	331	441167.7	4938504.7	129.5
3	Existing	37.3	246	441115.2	4938761.9	129.5
4	Existing	33.7	390	441824.2	4937763.0	128.1
5	Existing	33.8	400	441897.3	4937808.9	127.0
6	Existing	33.5	407	441865.7	4937771.7	127.0
7	Existing	35.4	327	441035.7	4938739.9	129.5
8	Existing	33.3	428	441935.7	4937808.7	126.7
9	Existing	35.2	329	441024.4	4938758.5	128.8
10	Existing	32.7	432	441788.7	4937695.7	129.0
11	Existing	32.4	442	441681.7	4937654.7	129.5
12	Existing	32.4	443	441708.7	4937658.7	129.5
13	Existing	32.6	452	441873.7	4937721.7	126.8
14	Existing	31.9	468	441649.7	4937624.7	129.5
15	Existing	32.5	457	441895.7	4937730.7	126.2
16	Existing	31.7	479	441633.7	4937612.7	129.5
17	Existing	32.5	485	442002.4	4937801.4	125.9
18	Existing	32.3	482	441959.7	4937754.7	125.8
19	Existing	31.5	492	441702.7	4937606.7	129.5
20	Existing	31.8	485	441805.7	4937645.7	127.1
21	Existing	31.9	490	441884.7	4937682.7	126.4
22	Existing	32.1	510	442038.7	4937808.7	125.7
23	Existing	36.8	200	441091.7	4938899.7	127.0
24	Existing	27.2	657	440796.7	4938491.7	122.3
25	Existing	31.8	496	441901.7	4937686.7	126.0
26	Existing	32.2	498	442201.7	4938093.7	125.6
27	Existing	31.7	496	441856.7	4937658.7	126.7
28	Existing	32.1	512	442065.7	4937829.7	125.7
29	Existing	31.7	508	441940.7	4937701.7	125.1
30	Existing	36.8	262	441538.2	4939038.2	129.5
31	Existing	31.6	519	441957.7	4937702.7	125.0
32	Existing	30.9	528	441679.7	4937566.7	129.1
33	Existing	31.5	530	441985.7	4937712.7	124.9
34	Existing	31.3	536	441975.7	4937695.7	124.8
35	Existing	30.5	553	441632.7	4937538.7	129.5
36	Existing	31.3	541	441999.7	4937711.7	124.8
37	Existing	34.5	296	440995.7	4938883.7	124.9

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
38	Existing	34.1	324	440972.7	4938863.7	125.3
39	Existing	31.3	549	442030.7	4937733.7	124.9
40	Existing	33.6	355	440947.7	4938841.7	125.1
41	Existing	34.2	269	441017.7	4938908.7	124.5
42	Existing	33.8	290	440998.9	4938894.3	124.5
43	Existing	34.7	243	441039.7	4938928.7	124.5
44	Existing	31.2	563	442062.7	4937751.7	124.9
45	Existing	31.2	567	442074.6	4937760.0	124.9
46	Existing	30.5	413	440897.7	4938809.7	124.1
47	Existing	35.2	223	441057.7	4938952.7	124.5
48	Existing	26.0	770	440715.7	4938405.7	119.5
49	Existing	37.8	160	441392.0	4939081.8	129.5
50	Existing	30.1	582	441605.7	4937508.7	128.5
51	Existing	35.9	196	441084.7	4938977.7	124.6
52	Existing	30.9	388	440913.7	4938839.7	124.0
53	Existing	27.5	559	440798.7	4938681.7	120.5
54	Existing	36.5	177	441104.7	4938994.7	125.2
55	Existing	27.2	586	440779.7	4938661.7	120.6
56	Existing	36.9	163	441123.7	4939012.7	125.8
57	Existing	29.1	473	440846.7	4938776.7	123.6
58	Existing	27.0	609	440762.7	4938645.7	120.1
59	Existing	30.9	581	442212.7	4937901.7	124.8
60	Existing	26.8	630	440747.7	4938629.7	120.1
61	Existing	25.7	791	440685.7	4938416.7	119.5
62	Existing	37.1	154	441144.7	4939039.7	125.8
63	Existing	30.8	588	442227.7	4937912.7	124.7
64	Existing	37.4	144	441168.7	4939057.7	126.2
65	Existing	26.6	650	440732.7	4938615.7	119.9
66	Existing	37.5	148	441323.7	4939108.7	129.5
67	Existing	37.6	146	441313.7	4939108.7	129.5
68	Existing	37.3	145	441189.7	4939080.7	127.0
69	Existing	32.4	573	441898.7	4939042.7	128.8
70	Existing	29.0	443	440853.7	4938846.7	121.5
71	Existing	26.3	677	440708.7	4938603.7	119.5
72	Existing	24.4	763	441050.7	4937576.7	117.9
73	Existing	26.0	707	440692.7	4938573.7	119.5
74	Existing	24.3	774	441029.7	4937582.7	116.7
75	Existing	36.7	157	441189.7	4939095.7	127.0
76	Existing	36.9	154	441212.7	4939105.7	127.6
77	Existing	24.3	767	441069.7	4937550.7	118.1
78	Existing	30.2	627	442253.7	4937879.7	124.4
79	Existing	24.3	760	441094.7	4937535.7	119.2

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
80	Existing	24.2	773	441056.7	4937555.7	117.5
81	Existing	25.8	731	440673.7	4938557.7	119.5
82	Existing	24.1	805	440964.7	4937615.7	114.5
83	Existing	36.6	162	441233.7	4939122.7	128.0
84	Existing	28.9	442	440847.7	4938872.7	121.2
85	Existing	34.8	277	441470.7	4939167.7	129.5
86	Existing	25.6	751	440659.7	4938543.7	119.5
87	Existing	26.9	634	440711.7	4938686.7	119.5
88	Existing	36.1	176	441236.7	4939137.7	127.6
89	Existing	24.9	860	440621.7	4938388.7	120.9
90	Existing	35.9	179	441200.7	4939127.7	126.7
91	Existing	35.9	186	441269.7	4939152.7	128.1
92	Existing	25.4	774	440642.7	4938525.7	119.5
93	Existing	35.6	189	441215.7	4939144.7	126.7
94	Existing	28.8	662	442306.7	4937903.7	121.8
95	Existing	25.1	801	440622.7	4938504.7	119.5
96	Existing	35.2	205	441256.7	4939170.7	127.2
97	Existing	35.2	205	441215.7	4939161.7	126.2
98	Existing	25.0	819	440609.7	4938491.7	119.5
99	Existing	34.3	238	441094.7	4939116.7	124.5
100	Existing	26.2	699	440654.7	4938653.7	119.5
101	Existing	24.8	837	440596.7	4938477.7	119.5
102	Existing	34.5	243	441313.7	4939207.7	127.3
103	Existing	33.5	321	441459.7	4939232.7	129.2
104	Existing	30.7	715	442061.1	4939047.2	127.2
105	Existing	27.7	703	442358.7	4937917.7	119.7
106	Existing	31.3	615	441881.4	4939155.2	128.3
107	Existing	34.1	242	441143.8	4939166.8	124.5
108	Existing	25.0	806	440591.7	4938546.7	119.5
109	Existing	34.1	264	441335.7	4939224.7	127.2
110	Existing	27.6	708	442375.7	4937946.7	119.9
111	Existing	31.1	643	441923.4	4939140.2	127.8
112	Existing	34.2	242	441250.7	4939207.7	126.1
113	Existing	24.4	886	440560.7	4938442.7	119.9
114	Existing	24.4	880	440559.7	4938455.7	119.5
115	Existing	26.6	730	442160.0	4937607.3	118.8
116	Existing	33.6	288	441359.7	4939243.7	127.4
117	Existing	33.8	254	441167.3	4939194.7	124.5
118	Existing	24.3	910	440543.7	4938423.7	121.2
119	Existing	30.5	706	442009.7	4939117.7	127.1
120	Existing	33.3	310	441385.7	4939258.7	127.7
121	Existing	33.4	271	441159.3	4939210.1	124.5

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
122	Existing	30.5	700	441987.7	4939142.7	127.1
123	Existing	26.0	988	440521.7	4938306.7	122.9
124	Existing	32.7	276	441227.7	4939237.7	124.5
125	Existing	27.2	1047	440521.7	4938188.7	124.5
126	Existing	27.1	1053	440522.7	4938174.7	124.5
127	Existing	32.8	340	441411.7	4939280.7	127.6
128	Existing	24.4	955	440512.7	4938387.7	121.6
129	Existing	30.1	743	442047.7	4939125.7	126.7
130	Existing	27.1	1051	440506.7	4938206.7	124.5
131	Existing	32.5	361	441430.7	4939294.7	127.6
132	Existing	32.2	299	441141.7	4939231.7	123.6
133	Existing	26.9	1075	440508.7	4938153.7	124.5
134	Existing	32.5	301	441208.7	4939259.7	124.5
135	Existing	26.8	1093	440507.7	4938120.7	124.5
136	Existing	24.2	984	440492.7	4938364.7	121.7
137	Existing	31.3	311	441119.7	4939233.7	122.7
138	Existing	26.9	1064	440490.7	4938207.7	124.5
139	Existing	22.6	994	440727.7	4937639.7	113.9
140	Existing	26.3	1046	440479.7	4938263.7	123.3
141	Existing	32.0	392	441456.7	4939316.7	127.3
142	Existing	32.1	330	441201.7	4939287.7	124.5
143	Existing	29.4	813	442135.7	4939112.7	126.0
144	Existing	23.8	1006	440465.7	4938366.7	121.2
145	Existing	26.5	1072	440460.7	4938244.7	123.5
146	Existing	31.6	422	441481.7	4939337.7	126.8
147	Existing	31.6	410	441453.7	4939338.7	126.7
148	Existing	31.5	343	441187.7	4939297.7	124.3
149	Existing	29.2	820	442121.7	4939150.7	125.8
150	Existing	30.5	567	441710.7	4939335.7	126.6
151	Existing	31.2	442	441472.7	4939364.7	126.3
152	Existing	31.0	464	441509.7	4939369.7	125.8
153	Existing	25.5	1113	440428.7	4938216.7	123.0
154	Existing	23.1	1023	440429.7	4938395.7	120.3
155	Existing	28.7	884	442275.7	4939041.7	125.3
156	Existing	26.3	1129	440426.7	4938187.7	124.0
157	Existing	30.2	573	441689.7	4939367.7	126.2
158	Existing	29.2	388	441100.7	4939310.7	120.6
159	Existing	29.3	384	441164.7	4939333.7	122.5
160	Existing	25.2	1139	440410.7	4938196.7	123.0
161	Existing	30.6	491	441527.7	4939390.7	125.7
162	Existing	28.4	906	442289.7	4939061.7	125.0
163	Existing	30.5	500	441534.7	4939396.7	125.7

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
164	Existing	28.6	879	442184.7	4939158.7	125.2
165	Existing	28.6	400	441100.7	4939324.7	120.2
166	Existing	30.4	513	441553.7	4939400.7	125.8
167	Existing	28.6	889	442200.7	4939151.7	125.2
168	Existing	25.5	1157	440398.7	4938179.7	123.1
169	Existing	28.5	407	441153.7	4939353.7	121.6
170	Existing	23.1	1037	440393.7	4938428.7	119.4
171	Existing	29.9	577	441662.7	4939398.7	125.9
172	Existing	22.6	1085	440381.7	4938354.7	119.6
173	Existing	28.2	925	442286.7	4939097.7	124.6
175	Existing	27.8	433	441142.7	4939377.7	120.8
176	Existing	28.2	914	442203.7	4939197.7	124.8
177	Existing	22.9	916	442473.7	4937689.0	114.5
178	Existing	29.6	575	441600.7	4939443.7	125.6
179	Existing	27.5	452	441129.7	4939393.7	120.2
180	Existing	29.3	607	441629.7	4939462.7	125.2
181	Existing	27.7	476	441057.7	4939387.7	119.5
182	Existing	27.2	484	441008.7	4939367.7	118.4
183	Existing	27.2	474	441116.7	4939411.7	119.5
184	Existing	27.3	1020	442447.7	4939016.7	124.5
185	Existing	26.8	499	441105.7	4939434.7	119.5
186	Existing	27.1	1035	442457.7	4939029.7	124.5
187	Existing	26.6	510	441171.7	4939465.7	120.2
188	Existing	28.6	663	441669.7	4939503.7	124.5
189	Existing	22.4	984	442662.7	4937933.7	114.5
190	Existing	28.4	722	441782.7	4939484.7	124.5
191	Existing	26.2	547	441087.7	4939478.7	119.5
192	Existing	26.6	1083	442520.7	4939021.7	124.5
193	Existing	28.0	755	441795.7	4939518.7	124.5
195	Existing	27.8	778	441833.7	4939513.7	124.5
196	Existing	26.4	561	441020.7	4939464.7	118.5
197	Existing	26.6	1082	442467.7	4939108.7	124.5
198	Existing	26.5	1097	442532.7	4939028.7	124.5
201	Existing	27.5	806	441843.7	4939542.7	124.5
203	Existing	25.5	595	440982.7	4939482.7	116.6
204	Existing	25.5	595	441002.7	4939493.7	117.5
205	Existing	25.6	592	441058.7	4939515.7	118.7
206	Existing	26.1	1130	442584.7	4939007.7	124.5
209	Existing	25.3	610	440960.7	4939486.7	115.4
210	Existing	25.3	601	441076.7	4939532.7	118.3
211	Existing	26.0	1139	442583.7	4939027.7	124.5
212	Existing	26.1	1134	442536.7	4939093.7	124.5

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
213	Existing	25.3	614	441048.7	4939535.7	118.1
214	Existing	25.2	624	440981.7	4939514.7	116.2
215	Existing	25.9	1157	442619.7	4939002.7	124.5
216	Existing	27.0	845	441868.7	4939572.7	124.0
217	Existing	27.2	804	441782.7	4939594.7	124.3
218	Existing	25.9	1158	442559.7	4939101.7	124.5
221	Existing	25.7	871	441888.7	4939589.7	123.5
224	Existing	24.4	674	440917.7	4939535.7	113.6
225	Existing	25.1	872	441837.7	4939636.7	122.9
227	Existing	24.3	686	441090.7	4939626.7	116.4
228	Existing	24.2	691	441062.7	4939622.7	115.8
229	Existing	23.8	930	441933.7	4939628.7	122.3
232	Existing	23.1	961	441956.7	4939648.7	121.6
236	Existing	22.8	856	441680.7	4939723.7	120.2
238	Existing	23.1	946	441900.7	4939680.7	121.8
239	Existing	22.5	930	441842.7	4939707.7	120.7
240	Existing	23.6	747	441078.7	4939686.7	115.6
242	Existing	22.6	896	441752.7	4939728.7	120.4
243	Existing	22.4	994	441983.7	4939668.7	121.1
244	Existing	22.5	965	441915.7	4939692.7	121.4
246	Existing	22.5	892	441720.7	4939742.7	119.9
248	Existing	22.1	989	441935.7	4939706.7	120.9
249	Existing	22.0	1023	442004.7	4939688.7	120.8
250	Existing	22.1	925	441765.7	4939753.7	119.6
253	Existing	21.8	1052	442026.7	4939707.7	120.6
255	Existing	21.7	1007	441902.7	4939758.7	119.8
257	Existing	21.7	1041	441976.7	4939740.7	120.1
259	Existing	21.5	1084	442052.7	4939727.7	120.4
261	Existing	21.5	1069	441998.7	4939757.7	119.9
263	Existing	21.5	1107	442084.7	4939727.7	120.5
264	Existing	21.4	1050	441944.7	4939779.7	119.5
267	Existing	21.3	1111	442074.7	4939742.7	120.2
269	Existing	21.3	1092	442017.7	4939772.7	119.7
270	Existing	21.3	1151	442151.7	4939718.7	120.7
271	Existing	21.5	1172	442197.7	4939696.7	120.8
272	Existing	21.3	1139	442122.7	4939732.7	120.5
273	Existing	21.2	1166	442180.7	4939706.7	120.7
277	Existing	21.9	873	441203.7	4939836.7	116.1
280	Existing	21.7	888	441171.7	4939848.7	115.6
283	Existing	21.0	1074	441900.7	4939843.7	119.3
284	Existing	20.9	1075	441882.7	4939856.7	119.0
285	Existing	20.9	1074	441855.7	4939873.7	118.6

POR ID	Description	Total Sound Pressure (dBA)	Minimum Distance to Source (m)	Coordinates (NAD 83 – Zone 18)		Elevation [m]
				X	Y	
286	Existing	20.8	1069	441817.7	4939890.7	118.1
287	Existing	21.0	1068	441795.7	4939901.7	117.8
289	Existing	20.9	1069	441775.7	4939913.7	117.7
291	Existing	20.9	1069	441753.7	4939925.7	117.6
301	Existing	20.4	1147	441951.7	4939896.7	118.7
304	Existing	20.4	1132	441894.7	4939917.7	118.2
310	Existing	20.4	1129	441869.7	4939929.7	117.9
312	Existing	21.1	1057	441607.7	4939971.7	117.6
314	Existing	20.4	1126	441847.7	4939939.7	117.6
320	Existing	20.5	1125	441814.7	4939956.7	117.2
322	Existing	21.0	1065	441588.7	4939986.7	117.5
324	Existing	20.9	1079	441633.7	4939986.7	117.4
325	Existing	21.0	1065	441562.7	4939993.7	117.4
338	Existing	20.6	1101	441520.7	4940041.7	116.9
339	Existing	20.5	1106	441499.7	4940050.7	116.7
340	Existing	20.5	1083	441314.7	4940049.7	115.8
341	Existing	20.5	1110	441477.7	4940059.7	116.6
347	Existing	20.4	1116	441456.7	4940068.7	116.5
349	Existing	20.3	1124	441432.7	4940080.7	116.3
352	Existing	20.0	1130	441411.7	4940089.7	116.1
360	Existing	19.8	1151	441367.7	4940114.7	115.5
363	Existing	19.7	1150	441337.7	4940115.7	115.3
364	Existing	30.0	588	441463.6	4937522.6	129.5
362	Existing	28.3	731	441273.0	4937444.3	124.5
365	Existing	26.8	726	441233.6	4937472.5	123.8
366	Existing	22.0	1095	440254.5	4938583.3	113.7
367	Existing	28.0	435	441085.7	4939355.9	119.5
368	Existing	21.9	1143	442226.4	4939607.1	121.7
369	Existing	30.0	548	441583.9	4939422.5	125.8
370	Existing	28.2	705	441704.3	4939530.0	124.5
371	Existing	27.6	761	441744.1	4939569.9	124.5
372	Existing	29.7	783	442092.8	4939126.8	126.3
373	Vacant	26.4	741	442317.9	4937770.7	118.4
374	Vacant	21.1	1044	441392.3	4937070.4	113.2
375	Vacant	33.0	412	441740.6	4937699.4	129.5
376	Vacant	31.0	524	441529.2	4937574.3	129.5
377	Vacant	29.3	651	441333.4	4937504.0	126.9
378	Vacant	31.6	490	441758.2	4937623.1	127.8
379	Vacant	31.1	567	442191.7	4937894.6	125.0
380	Vacant	32.4	485	442090.1	4937894.4	125.9

7. Conclusions and Recommendations

For the Brockville Solar Project, the sound pressure levels at the POR have been estimated using the CADNA-A model, based on ISO 9613-2. Mitigation for operation of the Project has been modeled and shown to be feasible.

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

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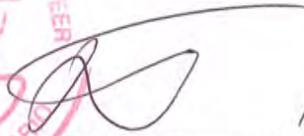
8. Signatures

Report Prepared by



Auret Basson, MEng, EIT
abasson@hatch.ca
905-374-0701, Ext. 5311

Report Reviewed and Approved by

Mar 4, 2015

Oleg Belashov, M.A.Sc, P.Eng.
obelashov@hatch.ca
905-374-0701, Ext. 5269

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9. References

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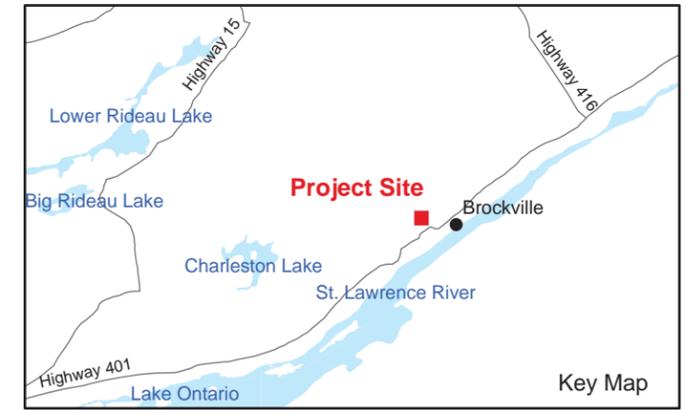
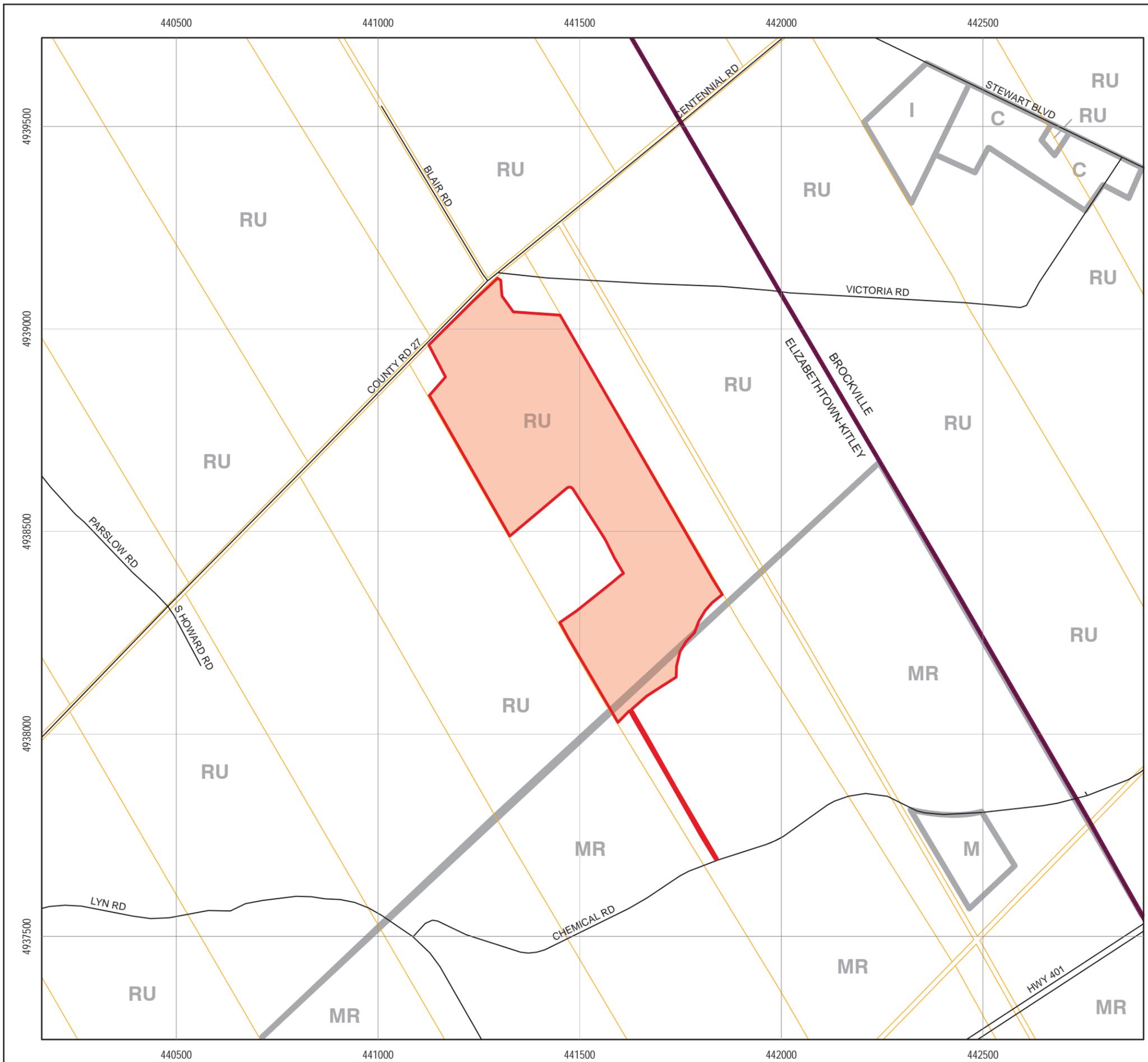
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Appendix A
Land Use Zoning Designation Plan
and Area Location Plan



- Zones
- RU Rural
 - MR Mineral Resource
 - M Industrial
 - I Institutional
 - C Commercial

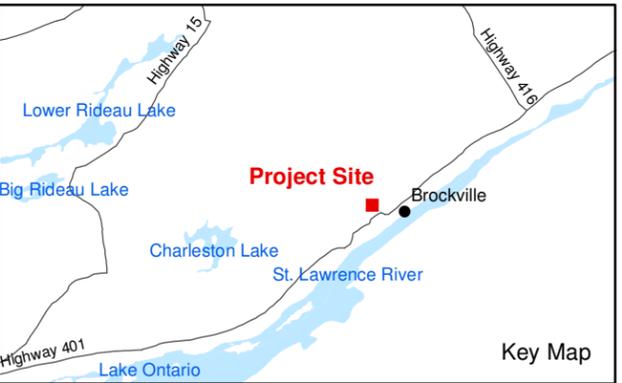
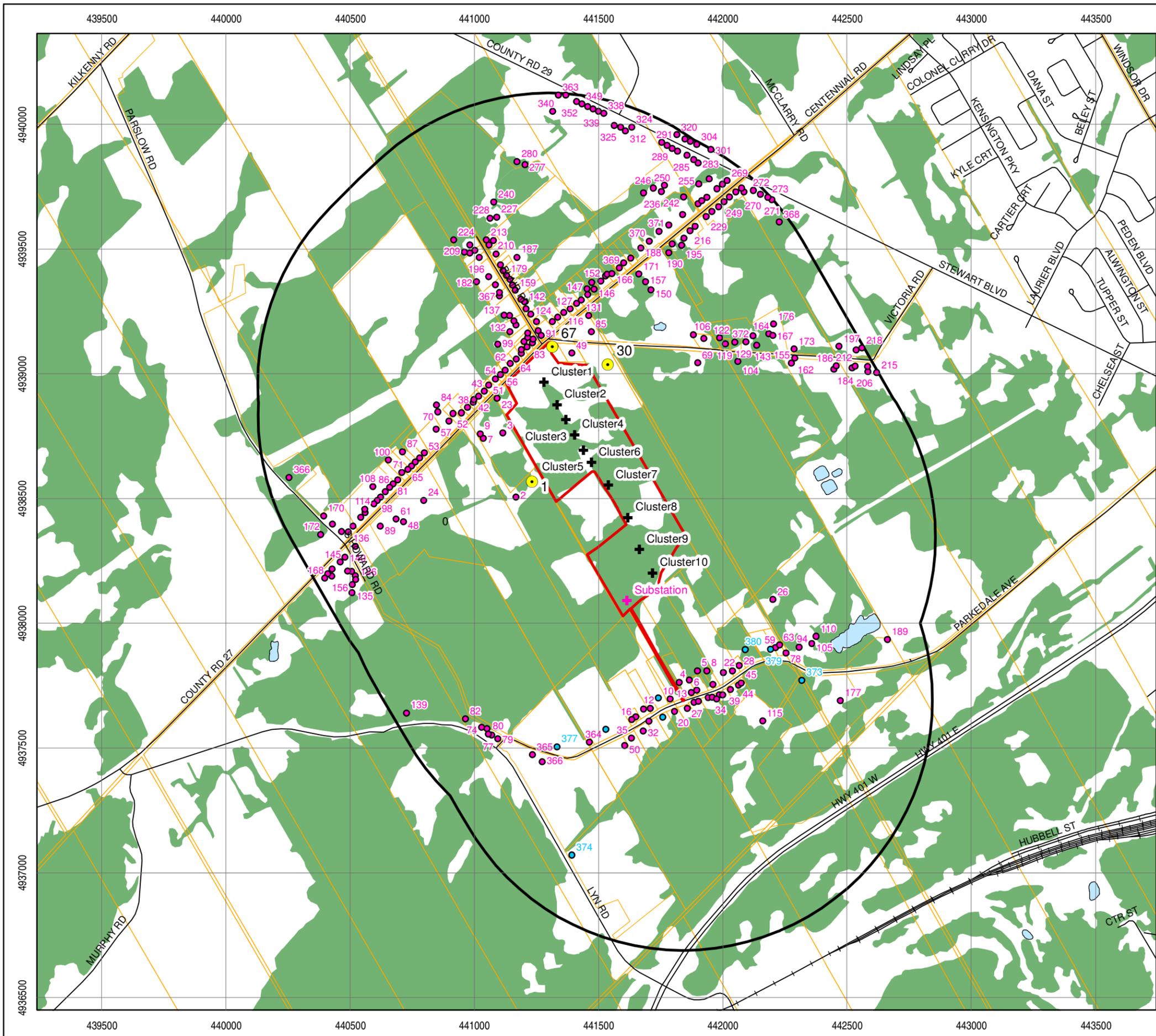
Project Location



0 100 200 400 Metres

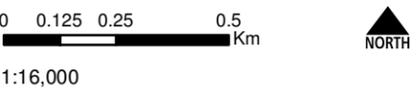
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Source: Zoning By Law for Township of Elizabethtown-Kitley, Schedule A3 and Brockville Plate A.



- Legend**
- Cluster #
 - + Inverter Cluster
 - Substation
 - + Substation Transformer
 - # Noise Receptor - Existing
 - # Noise Receptor - Vacant
 - # Representative Noise Receptor
 - Railway
 - Road
 - Topographic Contour (5m Interval)
 - Parcel
 - Project Location
 - 1000 m from Project Location
 - Waterbody
 - Wooded Area

Notes:
 1. Produced by Hatch under license from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2011.
 2. Spatial referencing UTM NAD 83.
 3. Due to scale limitations, the three-part inverter unit is represented as a single point.



Appendix B

Noise Sources

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

Source ID	Description	Spectra ID	Total sound power level (dBA)	Correction (dBA)	Height (m)	Coordinates (m) – NAD87 – Zone 18		
						X	Y	Z
Sub	27.6-kV/44-kV/10-MVA Substation transformer	Subs_Trans_10MVA	93.3	5.0	3.2	441614	4938091	128.2
Inverter1	Two Solaron 500 kW inverters at Cluster 1	Solaron500_X2	91.7	5.0	2.2	441280	4938967	127.2
Inverter2	Two Solaron 500 kW inverters at Cluster 2	Solaron500_X2	91.7	5.0	2.2	441333	4938876	127.2
Inverter3	Two Solaron 500 kW inverters at Cluster 3	Solaron500_X2	91.7	5.0	2.2	441368	4938816	127.2
Inverter4	Two Solaron 500 kW inverters at Cluster 4	Solaron500_X2	91.7	5.0	2.2	441403	4938755	127.2
Inverter5	Two Solaron 500 kW inverters at Cluster 5	Solaron500_X2	91.7	5.0	2.2	441438	4938695	127.2
Inverter6	Two Solaron 500 kW inverters at Cluster 6	Solaron500_X2	91.7	5.0	2.2	441471	4938644	127.2
Inverter7	Two Solaron 500 kW inverters at Cluster 7	Solaron500_X2	91.7	5.0	2.2	441539	4938554	127.2
Inverter8	Two Solaron 500 kW inverters at Cluster 8	Solaron500_X2	91.7	5.0	2.2	441618	4938423	127.2
Inverter9	Two Solaron 500 kW inverters at Cluster 9	Solaron500_X2	91.7	5.0	2.2	441663	4938296	127.2
Inverter10	Two Solaron 500 kW inverters at Cluster 10	Solaron500_X2	91.7	5.0	2.2	441716	4938203	127.2
Transformer1	480-V/27.6 kV/1-MVA Transformer at Cluster 1	Transf_1MVA	88.1	5.0	1.7	441283	4938962	126.7
Transformer2	480-V/27.6 kV/1-MVA Transformer at Cluster 2	Transf_1MVA	88.1	5.0	1.7	441336	4938872	126.7
Transformer3	480-V/27.6 kV/1-MVA Transformer at Cluster 3	Transf_1MVA	88.1	5.0	1.7	441371	4938811	126.7
Transformer4	480-V/27.6 kV/1-MVA Transformer at Cluster 4	Transf_1MVA	88.1	5.0	1.7	441406	4938751	126.7
Transformer5	480-V/27.6 kV/1-MVA Transformer at Cluster 5	Transf_1MVA	88.1	5.0	1.7	441441	4938691	126.7
Transformer6	480-V/27.6 kV/1-MVA Transformer at Cluster 6	Transf_1MVA	88.1	5.0	1.7	441475	4938640	126.7
Transformer7	480-V/27.6 kV/1-MVA Transformer at Cluster 7	Transf_1MVA	88.1	5.0	1.7	441542	4938549	126.7
Transformer8	480-V/27.6 kV/1-MVA Transformer at Cluster 8	Transf_1MVA	88.1	5.0	1.7	441621	4938419	126.7
Transformer9	480-V/27.6 kV/1-MVA Transformer at Cluster 9	Transf_1MVA	88.1	5.0	1.7	441665	4938293	126.7
Transformer10	480-V/27.6 kV/1-MVA Transformer at Cluster 10	Transf_1MVA	88.1	5.0	1.7	441719	4938199	126.7

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

Spectra ID	Octave Spectrum (dB)									Total (dBA)
	31.5	63	125	250	500	1000	2000	4000	8000	
Subs Tran 10MVA	84.9	90.9	92.9	87.9	87.9	81.9	76.9	71.9	64.9	88.3
Transf 1MVA	79.7	85.7	87.7	82.7	82.7	76.7	71.7	66.7	59.7	83.1
Solaron500 X2	47.2	86.4	92.6	84.8	84.0	81.0	76.1	73.3	78.3	86.7

Table B.3 Minimum Insertion Loss Requirement for the Enclosures

Name	Insertion Loss (dB)								
	31.5	63	125	250	500	1000	2000	4000	8000 Hz
Enclosure	0	1	3	6	8	8	6	6	6 dB



PVPowered™ solaron® siteguard®

Solaron® 500 kW PV Inverter

500 kW PV inverter with high efficiency and better BoS for utility-scale, grid-tied photovoltaic installations

Achieve higher, faster PV system ROI and better BoS optimization with Advanced Energy's Solaron® 500 kW inverter. The durable Solaron® 500 inverter is ideally suited for utility-scale or large commercial installations. In addition to innovative, high-power, high-efficiency technology, you receive advanced monitoring and control capabilities to provide greater performance insight. An optional Remote PV Tie (RPT™) accessory can cut your BoS costs even further, and our SafeGuard® program offers proactive service that goes far beyond the standard warranty.

Benefits

- Increase system ROI
- Reduce balance-of-system (BoS) costs
- Achieve higher energy harvests
- Monitor and control with flexible, integrated communications
- Rely on worldwide service and support

Features

- 500 kW, high-power, transformerless, bipolar design
- Largest core engine in North America—with the industry's smallest footprint and lightest weight in its class
- 97.5% CEC efficiency
- Integrated IDS™ data monitoring and communications
- Grid integration controls
- Remote PV Tie (RPT™) accessory
- Over three decades of experience in solar PV industry
- 24/7/365 global service and support



Increase ROI with High Efficiency and Better BoS Optimization

The Solaron 500 kW PV inverter is ideally suited for utility-scale or large commercial PV installations. Higher power and 97.5% CEC efficiency translate to immediate out-of-pocket savings and greater returns on your investment—faster and at higher levels than previously possible.

Our field-proven, bipolar, transformerless PV architecture efficiently and reliably converts raw, solar DC power to high-quality AC grid electricity. The Solaron inverter has the largest core engine in North America—yet the industry's smallest footprint and lightest weight in its class. This innovative technology provides better balance-of-system (BoS) optimization, which means you can install fewer panels in your PV system for the same energy harvest. Or, alternatively, higher total system efficiency can contribute to years of higher kWh returns.

Control and Monitor Your System

To assist utilities with grid stability, the Solaron 500 comes with a suite of grid integration controls including active and reactive power (VAR and power factor) set point control, remote on/off capability, and ramp rate control.

A secure, integrated LCD and keypad provide unit operating data and interconnection set points on the front of the inverter cabinet. In addition, the on-board Integrated Data System (IDS™) software --included at no additional charge --provides Internet connectivity and collects and stores a wide range of real-time data, including detailed unit configuration monitoring and control information.

Connect to any Solaron inverter with your web browser to view a suite of built-in graphical representations of minute-by-minute temperature, current, and voltage data --or gather data in Modbus® or CSV format to configure your own custom data and analysis reports.

IDS software also provides connectivity to many third-party data services like SEEDS™, Draker Labs, and DECK Monitoring.

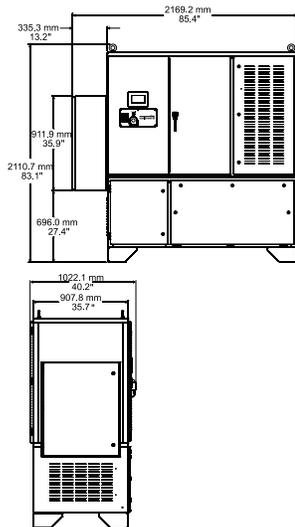
Cut PV System Wiring Costs with Remote PV Tie (RPT™) Accessory

With the addition of an AE Solaron Remote PV Tie (RPT™) accessory, you can further reduce BoS installation costs and achieve even higher system efficiency. The RPT accessory reduces large-diameter copper cables as well as I²R losses for up to 4% more power output during operation. The RPT also offers flexibility in system design and inverter installation for large, utility-scale solar farms.

Rely on Our Worldwide Service and Support

The Solaron inverter is durable, robust, and reliable for ongoing, low-maintenance operation. If needed, AE's worldwide service organization is available 24/7/365 for support. We also offer proactive services, including extended warranties (up to 20 years) and SafeGuard® service programs to help you maximize uptime and power generation. Our highly trained specialists can perform routine system queries, remote testing and diagnostics, and annual on-site inspections, all at a nominal cost.

Solaron 500 kW Dimensional Drawing



Solaron 500 kW Summary Specifications

Physical	
Dimensions	83.1" (H) x 89.5" (W) x 40.1" (D) 211 cm (H) x 227 cm (W) 102 cm (D) Dimensions include cabinet handles and connection box.
Weight	3760 lb (1705.5 kg) unit weight 4100 lb (1859.7 kg) shipping weight
Enclosure	Outdoor ready cabinet design: Environmentally base coating, Electrostatically applied paint, Sturdy corrosion resistance steel construction, Full lift-rated eye bolts
Environmental Rating	NEMA 3R with NEMA 4 electronics cabinet
Connector and Cable Specifications	
Output Power Connectors	4 x 500 MCM wires (Cu or Al)
Input Power Connectors	4 x 500 MCM wires (Cu or Al)
Optional AC/DC Switchgear	Configurable AC and DC switches, fused DC master combiner
User Display	Front panel LCD and keypad; security lock-outs; emergency shutdown button
Electrical	
Output Power	
Max Power	500 kW at 480 VAC
Voltage Range	432 to 528 VAC, 3 Φ, 60 Hz, grounded Wye connection
Frequency	60 Hz
Line Power Factor	> 0.99 typical
AC Current Distortion/THD	<2% typical
AC Line Current	600 Arms typical 667 Arms continuous current output rating (configurable)
Peak Efficiency	98.6%
CEC Efficiency	97.5%
Input Power	
Array Configuration	Separable bipolar using standard PV modules
Voltage	± 330 to ± 600 VDC
MPP DC Current	750 ADC max
Open-Circuit Wake-Up Voltage	± 425 VDC default (configurable)
Standby Tare Losses	< 100 W
MPPT Window	± 330 to ± 550 VDC
Utility Power Capabilities	
Active Power Range	0 kW to 500 kW; remotely adjustable set point
Reactive Power Range	0.90 leading to 0.90 lagging 526kVA maximum
Over-Voltage Response	110% ≤ VAC < 120%: 0.16 to 5.0 sec adjustable
Ramp Rate (on)	20%/s maximum; adjustable at 0.1% increments
Inverter On/Off	Remotely controllable
Frequency Tolerance	f ≥ 60.5 Hz: adjustable; instantaneous (< 10 cycles) f ≤ 59.3 Hz: adjustable; trip delay 0.16 to 540 sec f ≤ 57.0 Hz: adjustable; instantaneous (< 10 cycles)
Factory-Installed Communication Interfaces	
	RS-232, RS-422, and RS-485 Ethernet, PCMCIA expansion slot Modbus/TCP and Modbus/RTU
Data Storage	10 years / 2 GB SD card (upgradeable)
Data Monitoring	SEEDS™ data monitoring (optional); DC sub-array monitoring (optional); IDS™ compatible with various 3rd party services
Environmental	
Ambient Operating Temperature	-4°F to 122°F (-20°C to 50°C) -31°F to 122°F (-35°C to 50°C) Cold weather option
Storage Temperature	-22°F to 158°F (-30°C to 70°C)
Relative Operating Humidity	0% to 95% non-condensing
Atmospheric Pressure	778 to 1060 mbar (78 to 106 kPa)
Elevation	6562' (2000 m) max
Cooling Systems	Combination air and liquid cooling (self-contained system)
Regulatory	
Directives and Standards	NRTL certified to UL 1741-2005 by CSA International IEEE 519, 929, 1547/1547.1 NEC Article 690 (compatible) CEC eligible – 97.5%

Specifications are subject to change without notice.



Advanced Energy Industries, Inc. • 20720 Brinson Blvd. PO Box 7348 • Bend, OR 97708 U.S.A.
T: 877.312.3832 • sales.support@aei.com • <http://www.advanced-energy/solarenergy>
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VIBRO-ACOUSTIC CONSULTANTS

490 POST STREET • SUITE 1427
SAN FRANCISCO • CA • 94102 • USA
TEL / FAX: (+1) 415-693-0424 / 1398
<http://www.va-consult.com>

Inverter Sound Power Level Testing
Advanced Energy Industries, Fort Collins, CO

Prepared by: Tyler Rynberg, PE
Vibro-Acoustic Consultants
tyler@va-consult.com

Date: 14 April 2010

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1. Background

Advanced Energy Industries (AEI) wishes to document the sound power levels generated by the Solaron 500, a 500 kW inverter. AEI has requested that the testing of the fuel cell be performed per the ISO 3744-1994 Standard. We visited the AEI facility on Thursday, 1 April 2010, to perform the testing.

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.

2. Description of Inverter

The device under test was designated as Solaron 500 model number 3159500-0000 A1 (with 3R enclosure), a 500 kW inverter, manufactured by AEI in March 2010. The inverter had a serial number of 750385 F/R A1. The inverter was 1.83m wide x 0.97m deep x 2m high.

The inverter was mounted on a rigid wood platform constructed using 2x4 studs and rigid foam. The platform raised the inverter 0.2m off the floor. The reference box established for the inverter had the following dimensions: L1 = 1.83m, L2 = 0.97m, L3 = 2.21m.

The inverter was supplied DC input voltage by power generation equipment located in an adjacent room.

3. General Methodology

We measured the sound pressure levels generated by the inverter per the ISO 3744-1994 Standard. During the measurements, we collected the overall un-weighted equivalent continuous sound level (L_{EQ}), as well as the un-weighted 1/3-octave band spectra from both the inverter and ambient conditions. The measurement duration at each microphone position was 60 seconds.

To measure the inverter, we established a parallelepiped measurement surface 1 meter from the reference box. The resultant measurement surface had the following dimensions: L1 = 3.83m, L2 = 2.97m, L3 = 3.21m, and totaled 55.01 square meters. We used 9 microphone positions, per Figure C2 of the ISO 3744-1994 Standard. For all 9 positions, the fixed microphone position technique was used.

We tested four operating configurations of the inverter. As an exploratory test, we also measured a fifth configuration at only one microphone position. The tested configurations are shown in the following table:

Configuration	Input Voltage	Output Power	Blower Setting
1	790V	100% (500kW)	Maximum
2	850V	100% (500kW)	Maximum
3	730~745V ¹	100% (500kW)	Maximum
4	790V	50% (250kW)	Maximum
5	850V	50% (250kW)	Maximum

¹During this measurement, the voltage regulator was not operating properly. The input voltage was observed to oscillate between 730V and 745V.

We understand from our discussions with AEI personnel that the operating conditions tested are representative of a real-world installation.

4. Data Collection

4.1 Measurement System Parameters

We measured the sound power levels using our standard testing suite:

<u>Instrument</u>	<u>Make / Model</u>	<u>Identification</u>
Microphone Calibrator	Bruel & Kjaer 4231	S/N 2292439
Noise Meter	Norsonic N-140	S/N 1403581
Microphone Preamplifier	Norsonic N-1209	S/N 12749
Microphone	Norsonic N-1225	S/N 96063

The noise meter was calibrated to 94 dB at 1 kHz before and after the measurements. The microphone windscreen was used. The Norsonic N-140 has an internal correction filter to correct for the effects of the windscreen.

4.2 Measurement Locations and Site Conditions

We collected data in the Solaron testing lab adjacent to the main fabrication area at the AEI facility in Fort Collins, CO. The testing lab measured approximately 13.41m x 19.51m x 3.35m. The floor is an exposed concrete slab; three of the walls are constructed using vinyl-faced gypsum board on stud-framing; the remaining wall was open to the main fabrication area; the ceiling is a suspended grid containing vinyl-faced gypsum board panels. The testing area contains several workstations and other inverters. The inverter was placed near the center of the testing lab space, at least 5.5m from any of the lab walls. No workstations or other inverters were located within 4m of the inverter. However, the top of the inverter was only 1.14m below the suspended gypsum board ceiling. In an effort to reduce the effects of the ceiling on the measurements, several ceiling tiles above the

inverter were removed. This roof deck is approximately 2.8m above the suspended ceiling, providing a vertical clearance of 3.9m.

The temperature in the fabrication area was estimated to be 22°C. The relative humidity was typical of an indoor air-conditioned environment.

4.3 Qualification of Acoustical Environment

Ambient Noise Correction Factor K_1

In the majority of 1/3 octave bands, the ambient noise levels were greater than 6 dB below the test conditions. In the 50~80Hz, 630Hz, and 2~6.3kHz 1/3 octave bands, the ambient noise was frequently only 1~4 dB below the test conditions. Generally, the “middle” four measurement positions had a greater signal-to-noise ratio than the “top” five positions.

Acoustical Correction Factor K_2

The reflecting plane extended a minimum of 4.5m from the measurement surface in all directions, which meets the ISO-3744 Standard for the 50 Hz lower boundary of the presented data. The reflecting plane was concrete slab-on-grade and was estimated to have an absorption coefficient of 0.05 or less in the frequency bands of interest.

The Approximate Method was used to determine the environmental correction factor, K_2 . Our calculations show that the highest value for K_2 is 9.6 dB and occurs in the 500Hz octave band. The environment does not meet the ISO-3744 Standard requirement of $K_2 < 2$ dB. The following table presents the calculated octave band K_2 values:

Calculated K_2	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
	5.2 dB	4.6 dB	6.8 dB	9.6 dB	9.3 dB	8.6 dB	7.1 dB	6.2 dB

While the values for K_2 exceed the ISO Standard in all octave bands, the Standard allows for compliance by using a maximum correction factor of 2 dB. Values for which the correction factor is limited to 2 dB therefore represent a “worst-case” or upper boundary for the actual performance of the device under test.

4.4 Data Presentation

Data are presented in Tables 1~7. For each configuration, we present the overall A-weighted (L_{WA}) and the un-weighted 1/3 octave band sound power levels in decibels referenced to 1x10⁻¹² W. We also present the overall A-weighted (dBA) and the un-weighted 1/3 octave band sound pressure levels in decibels referenced to 20 μPa for each configuration.

5. Discussion

Non-Compliance Sound Pressure Levels

The noise generated in the 50~80Hz, 630Hz, and 2~6.3kHz 1/3 octave bands do not exceed the ambient conditions by the minimum 6 dB required by the ISO-3744 Standard. The published levels in these bands should be considered to be the upper boundary of the exact level – the true level is likely to be lower in level than the calculated values. The overall sound power level, L_{wA}, does meet the requirements of the ISO-3744 Standard, in terms of ambient noise. However, the acoustical environment does not meet the ISO-3744 Standard in any of the 1/3 octave bands. Therefore, the published levels in all of the bands, including the overall L_{wA}, should be considered as the upper boundary of the actual level.

Configurations

There was no significant difference in sound power level between the configurations. The only statistically important variation was the amplitude of a 9kHz tone, which was highest with Configuration 2. This tone could be a sub-harmonic of the switching circuitry, which runs at 18kHz.

Noise Modeling

In all of the configurations tested, the relatively broadband noise from the blower dominated the noise character. There is also significant tonality at the 160 Hz band from the blower. The directionality in the noise generation appears to be modest, with all four sides fitting within a 2 dB window. The relatively uniform directivity is due to the presence of air inlets or outlets on all four sides as well as at the bottom of the inverter. As there are no openings in the top of the inverter, the levels at the top typically measured 7 dB lower than the sides of the unit.

With the configurations tested, we would model the unit as a box with uniform directivity at an elevation of approximately 1m.

. . .

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 tyler@va-consult.com.

Sincerely,



Tyler Rynberg, PE

Vibro-Acoustic Consultants

Table 1: AEI Solaron 500 Sound Power Measurements – Calculated Sound Power Levels in dB, re: 1×10^{-12} W

Configuration	LwA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
1	83.5	77.5	81.0	77.0	80.0	84.0	87.5	79.0	75.5	77.0	76.0	77.5	73.0	74.0	74.0	71.0	70.0	68.0	65.0	64.5	64.5	63.0	58.5	67.5	66.5
2	84.0	77.5	80.5	77.0	80.0	84.0	87.5	78.5	75.5	76.5	76.0	78.0	73.5	74.0	74.0	71.0	70.0	68.0	66.0	66.0	65.5	65.0	62.5	72.0	72.0
3	83.5	77.0	80.5	76.5	80.0	83.5	87.5	78.5	75.5	76.5	77.5	78.0	73.5	74.5	74.0	71.5	72.0	69.5	66.5	65.5	64.5	63.0	58.0	63.0	61.5
4	83.0	77.0	77.0	76.5	80.0	83.5	87.5	78.5	73.5	76.5	76.0	77.5	73.5	74.0	74.0	71.0	70.0	67.5	65.0	64.5	64.5	63.0	58.0	61.5	61.5

*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

Table 2: AEI Solaron 500 Configuration 1 – Measured Sound Pressure Level at 1m in dB, re: $20 \mu\text{Pa}$

Mic Position	dBA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
Front	67.7	61.0	69.0	61.0	63.9	68.4	75.2	61.7	57.2	59.5	58.5	59.7	55.9	58.1	57.7	56.1	54.5	51.3	49.5	49.5	48.9	48.1	43.6	52.2	51.1
Left	66.1	59.0	61.1	61.9	65.0	67.4	66.0	59.1	61.0	60.4	61.5	61.9	57.3	56.7	56.4	53.2	52.5	50.3	47.9	46.6	45.8	42.8	39.3	49.3	46.5
Rear	67.8	61.0	65.5	60.1	62.4	65.9	68.3	64.4	59.9	59.4	59.3	59.9	57.3	58.9	60.1	56.3	55.4	52.2	50.7	49.5	49.6	48.7	44.0	54.3	54.7
Right	67.7	58.2	65.6	57.1	63.1	68.7	75.0	66.6	58.9	63.5	58.2	60.8	57.0	56.7	57.1	54.1	52.6	50.2	47.5	46.9	46.9	47.0	41.5	51.9	51.3
Front Top	64.3	60.6	59.4	59.2	61.2	66.7	67.9	56.7	56.2	56.9	57.7	59.5	54.3	55.3	54.5	51.9	51.2	49.3	46.7	45.8	45.5	43.0	39.1	48.2	43.7
Left Top	63.9	60.7	60.6	59.6	59.8	63.0	62.6	55.7	54.2	58.3	56.9	59.7	55.2	55.8	55.0	52.3	50.4	49.3	46.2	45.1	45.0	42.5	38.0	46.7	42.9
Rear Top	64.8	59.5	60.1	57.4	62.5	65.8	62.6	55.8	56.8	58.9	59.3	60.7	55.9	55.1	56.5	52.7	52.2	50.7	46.6	45.9	46.6	45.1	39.7	47.2	43.3
Right Top	64.9	59.8	60.3	56.9	63.4	67.5	67.5	59.4	54.3	56.8	56.3	60.1	55.0	55.4	56.1	52.7	52.7	51.0	47.9	47.2	47.0	46.1	40.9	45.5	43.8
Top	62.3	60.6	59.6	58.3	60.9	64.3	67.7	59.1	57.5	55.8	56.6	56.4	52.5	52.3	52.3	49.9	48.4	49.5	44.4	43.3	46.3	42.7	35.8	41.3	38.5

*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

Table 3: AEI Solaron 500 Configuration 2 – Measured Sound Pressure Level at 1m in dB, re: 20µPa

Mic Position	dBA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
Front	68.3	60.9	67.3	61.5	64.2	66.2	74.7	61.9	57.4	59.1	58.8	61.4	56.7	58.7	57.8	55.8	54.8	51.6	50.7	50.6	49.8	49.4	47.5	57.4	57.6
Left	66.7	58.7	61.1	62.0	65.0	67.5	65.7	58.8	62.6	59.5	62.1	62.1	56.9	57.3	56.7	53.3	52.3	50.3	48.9	48.4	47.4	45.4	44.6	53.9	48.5
Rear	68.1	61.0	65.1	60.2	62.3	64.7	67.4	63.1	58.2	59.0	59.8	60.1	57.7	59.1	59.9	55.9	55.2	52.1	51.3	51.1	50.3	50.6	48.4	57.1	59.5
Right	68.1	58.3	65.5	57.0	63.0	68.5	74.6	66.5	59.6	63.3	58.2	61.0	56.9	56.6	56.8	54.0	52.6	50.3	49.1	49.2	48.3	48.9	46.6	56.9	57.1
Front Top	64.7	60.8	59.2	58.8	61.2	67.0	68.4	56.6	55.7	56.6	57.7	59.9	53.9	55.4	55.0	52.6	51.3	49.6	47.7	47.4	46.2	44.9	43.0	51.8	49.3
Left Top	64.6	59.9	60.7	59.3	58.8	62.2	65.7	57.4	56.0	57.2	57.4	60.6	56.5	54.7	54.7	52.4	50.4	49.5	47.1	47.5	47.0	45.8	43.3	53.0	50.3
Rear Top	65.1	60.2	59.9	57.2	61.8	65.4	62.0	56.9	56.6	59.2	59.2	60.1	56.1	56.1	55.5	52.9	52.4	50.5	48.0	47.6	47.8	46.8	42.9	50.2	49.8
Right Top	65.1	59.5	59.7	56.8	63.7	67.1	68.1	60.1	54.2	57.3	56.3	59.9	55.2	55.5	55.5	52.7	52.9	50.4	48.5	48.4	47.5	47.3	44.2	51.4	49.2
Top	62.5	60.1	58.8	58.2	61.3	63.9	67.6	59.0	56.3	56.2	56.6	57.0	52.5	51.9	52.5	50.3	48.8	49.3	45.1	44.3	46.4	43.5	38.8	48.2	44.7

*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

Table 4: AEI Solaron 500 Configuration 3 – Measured Sound Pressure Level at 1m in dB, re: 20µPa

Mic Position	dBA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
Front	68.0	60.8	67.6	61.4	64.0	68.3	74.8	62.0	57.2	58.7	58.4	60.9	57.0	58.7	58.1	56.2	57.5	52.4	50.9	50.2	48.9	47.6	43.0	48.6	46.1
Left	67.0	58.5	61.2	61.6	64.7	67.1	66.3	59.0	62.3	60.7	63.9	63.5	56.6	56.5	56.7	53.7	54.8	52.5	49.3	47.6	45.8	42.8	38.7	45.2	43.7
Rear	67.9	61.2	65.8	60.2	62.3	64.4	67.4	63.1	58.7	58.6	60.0	60.4	58.0	60.2	59.9	56.4	56.2	55.3	51.3	50.6	49.5	49.0	43.8	49.4	49.0
Right	67.3	58.6	66.1	57.5	62.3	68.2	74.1	66.2	59.6	62.8	58.7	59.5	57.1	57.1	57.0	54.1	53.7	51.5	50.1	48.4	46.9	47.0	41.5	48.0	47.0
Front Top	65.1	60.2	58.7	59.0	61.5	67.3	68.5	56.6	55.8	57.7	59.4	59.9	55.0	55.5	55.1	53.9	53.6	50.9	48.2	46.5	45.3	43.1	38.2	42.9	39.7
Left Top	64.8	59.7	60.3	58.9	58.1	61.9	65.4	58.0	55.6	58.1	58.5	59.8	55.3	55.9	55.2	53.3	55.4	51.0	47.3	46.1	45.6	42.9	37.5	42.6	39.6
Rear Top	65.5	58.5	58.9	55.3	61.3	64.2	61.1	55.3	58.4	59.0	60.0	61.5	56.6	56.8	56.5	53.3	54.1	51.8	48.3	46.5	47.2	46.5	39.3	42.5	39.3
Right Top	65.6	59.0	60.4	56.6	63.1	66.4	67.6	58.9	52.9	58.4	58.9	61.2	55.2	56.1	56.2	54.3	54.3	52.1	48.8	47.5	47.0	46.1	40.9	43.2	40.1
Top	62.7	59.5	58.5	57.7	61.3	64.6	67.6	58.8	56.1	56.3	56.8	57.2	53.2	52.5	53.1	50.3	49.7	50.1	45.1	43.7	45.7	42.4	35.0	37.1	33.7

*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

Table 5: AEI Solaron 500 Configuration 4 – Measured Sound Pressure Level at 1m in dB, re: 20µPa

Mic Position	dBA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
Front	67.5	59.6	62.3	61.0	64.0	68.2	75.2	61.9	55.6	58.9	58.2	60.3	56.0	58.0	57.9	55.8	54.7	51.2	49.1	49.2	49.1	47.8	43.1	46.9	47.5
Left	65.6	57.9	59.9	61.9	64.9	67.1	66.3	58.2	56.8	59.4	61.2	61.3	56.9	56.7	56.1	53.2	52.5	50.2	47.5	46.4	45.8	42.4	38.7	45.5	43.8
Rear	67.0	60.3	61.2	60.0	62.0	64.4	67.6	63.8	59.3	58.2	59.1	59.8	56.8	58.8	59.7	55.9	55.0	51.6	50.1	49.4	49.4	48.5	43.5	47.2	48.8
Right	66.8	56.4	59.8	56.6	62.2	67.6	73.8	65.8	57.7	63.7	58.8	58.8	57.1	56.1	57.0	53.8	52.3	49.7	46.7	46.9	46.8	46.6	41.1	46.3	46.2
Front Top	64.1	60.8	58.7	58.7	61.1	65.5	68.1	56.0	54.7	57.0	57.8	59.5	54.8	56.1	54.7	51.8	50.2	49.1	46.1	45.7	45.3	42.7	37.8	41.4	39.5
Left Top	64.0	59.2	58.6	59.1	58.3	62.1	65.6	57.9	55.7	57.6	57.3	60.1	55.5	55.6	54.7	52.1	50.8	49.0	45.7	45.1	45.7	42.9	37.6	42.7	40.0
Rear Top	64.8	59.8	59.0	58.0	63.1	66.3	63.4	56.7	54.3	57.2	58.1	60.8	56.1	55.5	56.8	53.9	51.8	50.2	46.6	45.7	47.0	46.0	39.4	40.5	38.9
Right Top	65.0	59.8	57.9	57.6	64.4	67.4	68.1	60.3	53.4	57.2	55.4	59.9	57.1	55.6	55.9	54.2	52.9	50.2	47.6	47.0	46.8	46.1	40.5	41.7	40.9
Top	62.3	60.3	58.4	58.4	61.1	63.0	67.1	59.7	53.3	56.1	56.8	57.5	53.0	52.8	53.0	49.6	47.6	49.5	44.2	43.0	45.9	42.3	34.9	35.3	34.3

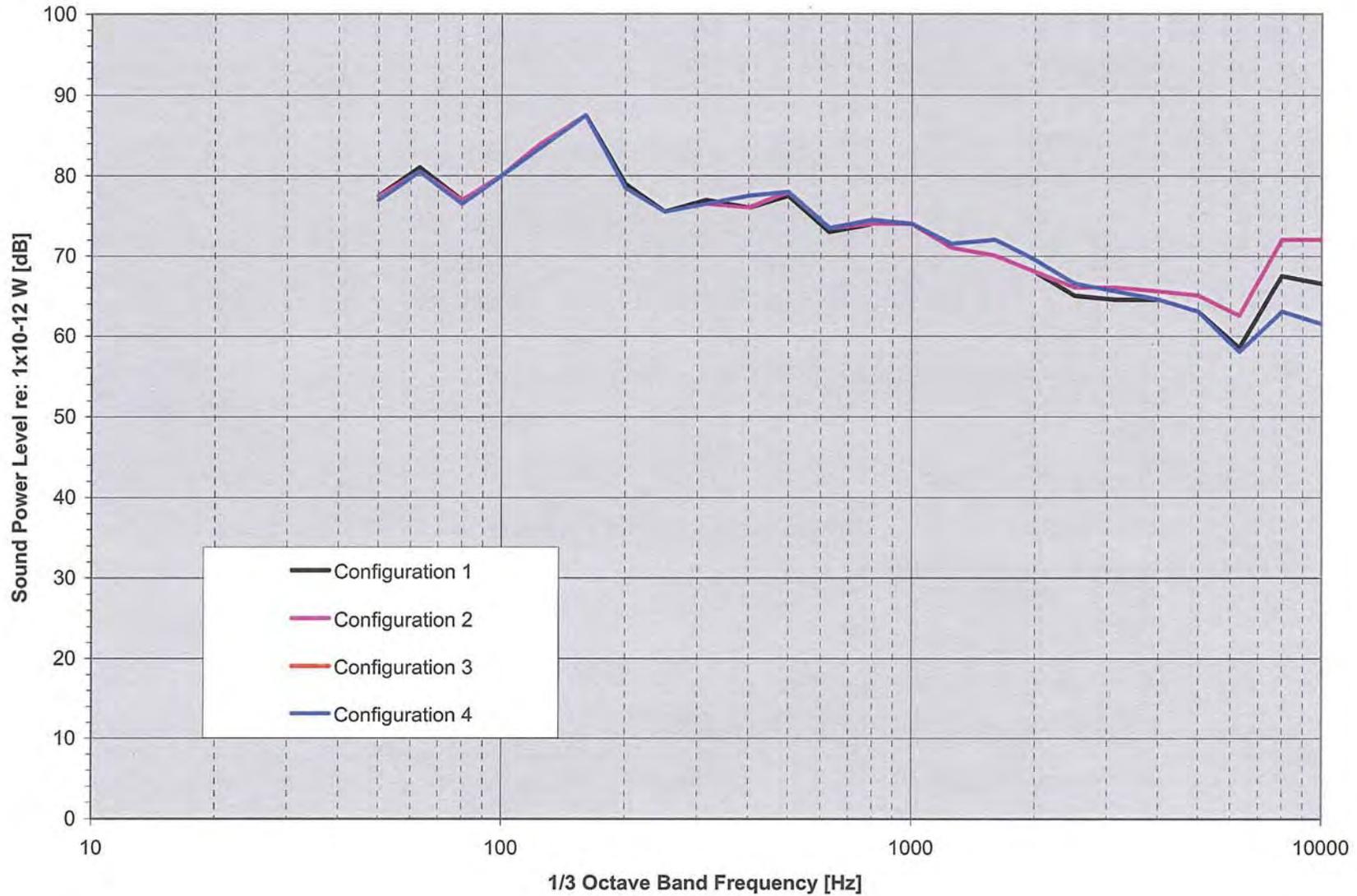
*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

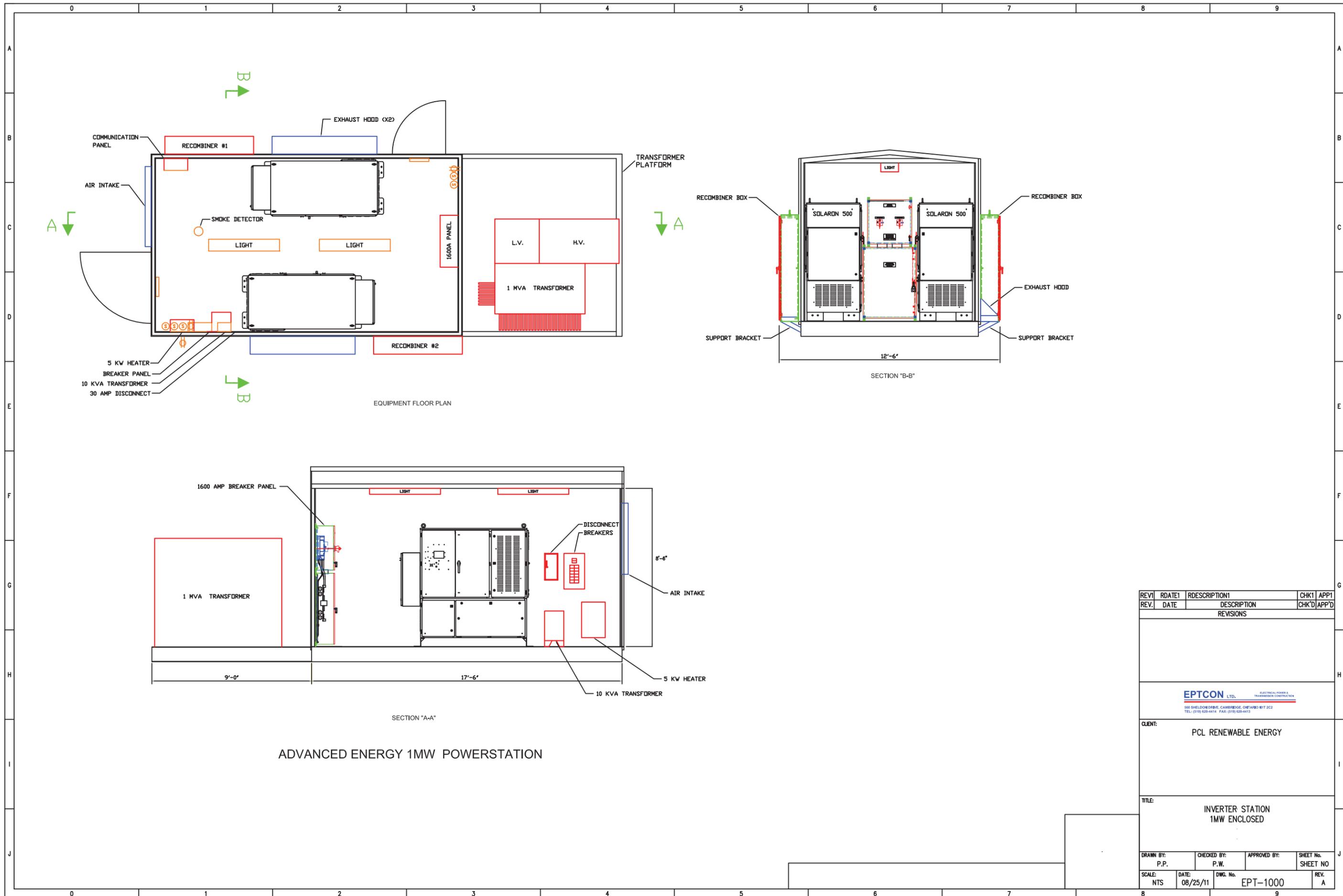
Table 6: AEI Solaron 500 Configuration 5 – Measured Sound Pressure Level at 1m in dB, re: 20µPa

Mic Position	dBA	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
Front	67.4	60.5	63.3	61.3	63.9	68.1	74.6	61.9	56.2	58.9	58.5	61.2	56.1	58.2	57.4	55.8	54.8	51.5	49.2	48.8	48.6	47.5	42.6	45.6	45.3

*The testing environment did not meet the requirements in the ISO-3744 Standard. The presented data in all 1/3 octave bands should be considered as the upper boundary of the exact sound power levels.

Table 7: AEI Solaron 500 – 1/3 Octave Band Sound Power Levels in dB, re: 1×10^{-12} W





ADVANCED ENERGY 1MW POWERSTATION

REV#	RDATE1	RDESCRIPTION1	CHK1	APP1
REV.	DATE	DESCRIPTION	CHK'D	APP'D
REVISIONS				
 <small>ELECTRICAL POWER & TRANSMISSION CONSTRUCTION</small> <small>550 SHELDON DRIVE, CAMBRIDGE, ONTARIO N1T 2C2</small> <small>TEL: (519) 620-4414 FAX: (519) 620-4413</small>				
CLIENT: PCL RENEWABLE ENERGY				
TITLE: INVERTER STATION 1MW ENCLOSED				
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET No.	
P.P.	P.W.		SHEET NO	
SCALE:	DATE:	DWG. No.	REV.	
NTS	08/25/11	EPT-1000	A	

Estimated Frequency Spectra for Transformers

Transformer - 44kV/10MVA

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

Average LpA 71 dBA Based on NEMA TR1-1993 (R2000), Table 0-2
 Estimated surface area 31 m² Estimate of the area based on transformers with similar capacity (see figure below)

Correction factors are in dB

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

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

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dB]
C1 based [dB]	84.9	90.9	92.9	87.9	87.9	81.9	76.9	71.9	64.9	97.0
C2 based [dB]	84.9	93.9	98.9	93.9	93.9	84.9	76.9	71.9	64.9	102.0
C3 based [dB]	84.9	93.9	98.9	97.9	97.9	91.9	86.9	81.9	74.9	104.0

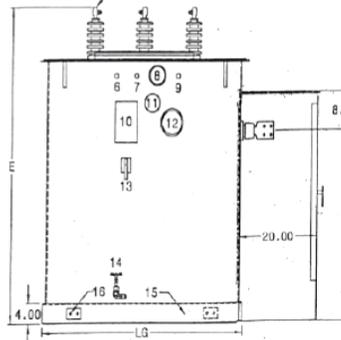
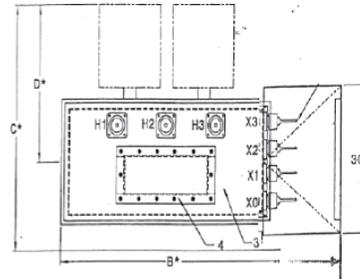
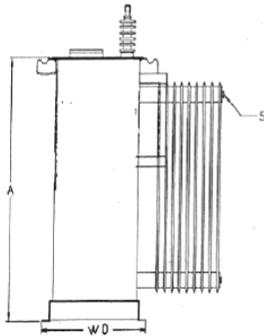
Resulting A-weighted sound power level

Freq. (Hz)	A-Weight	C1 based [dBA]	C2 based [dBA]	C2 based [dBA]
31	-39.4	45.5	54.5	59.5
63	-26.2	64.7	67.7	67.7
125	-16.1	76.8	82.8	82.8
250	-8.6	79.3	85.3	89.3
500	-3.2	84.7	90.7	94.7
1000	0	81.9	84.9	91.9
2000	1.2	78.1	78.1	88.1
4000	1	72.9	72.9	82.9
8000	-1.1	63.8	63.8	73.8
LwA [dBA]		88.3	93.2	98.1

Used in the study

STANDARD FEATURES

- STANDARD FEATURES
1. L.V. BUSHING
 2. H.V. BUSHING
 3. TANK WITH WELDED-ON COVER
 4. HANDHOLE
 5. COOLING PANELS
 6. GAS SAMPLING VALVE
 7. PRESSURE VACUUM GAUGE
 8. PRESSURE RELIEF VALVE
 9. 1" FILL PLUG AND FILTER PRESS CONNECTION
 10. STAINLESS STEEL NAMEPLATE AND CONNECTION DIAGRAM
 11. LIQUID LEVEL GAUGE
 12. DIAL-TYPE THERMOMETER
 13. DE-ENERGIZED TAPCHANGER
 14. 1" DRAIN VALVE WITH 3/8" SAMPLING DEVICE
 15. BASE SUITABLE FOR JACKING, SKIDDING, OR ROLLING
 16. NEMA GROUND PAD



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

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

Estimated Frequency Spectra for Transformers

Transformer - 1MVA

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

Average LpA 68 dBA Based on NEMA TR1-1993 (R2000), Dry-Type, Forced-Air Cooled
 Estimated surface area 18.5 m² Based on catalog information for GE 3 Phase transformer

Correction factors are in dB

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

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

Freq. (Hz)	31	63	125	250	500	1000	2000	4000	8000	Combined [dB]
C1 based [dB]	79.7	85.7	87.7	82.7	82.7	76.7	71.7	66.7	59.7	91.7
C2 based [dB]	79.7	88.7	93.7	88.7	88.7	79.7	71.7	66.7	59.7	96.8
C3 based [dB]	79.7	88.7	93.7	92.7	92.7	86.7	81.7	76.7	69.7	98.8

Resulting A-weighted sound power level

Freq. (Hz)	A-Weight	C1 based [dBA]	C2 based [dBA]	C2 based [dBA]
31	-39.4	40.3	49.3	54.3
63	-26.2	59.5	62.5	62.5
125	-16.1	71.6	77.6	77.6
250	-8.6	74.1	80.1	84.1
500	-3.2	79.5	85.5	89.5
1000	0	76.7	79.7	86.7
2000	1.2	72.9	72.9	82.9
4000	1	67.7	67.7	77.7
8000	-1.1	58.6	58.6	68.6
LwA [dBA]		83.0	88.0	92.8

Used in the study

Figure B.2 Sound Power Level Calculation for 27.6 kV/1 MVA Transformer

**TOTAL PWL FOR AEI Solaron 500
Inverter Sound Power Level Testing - AEI
Vibro - Acoustic Consultants, April 2010**

Third Octave	
Freq (Hz)	LwA (dB)
25	
31.5	
40	
50	77.5
63	80.5
80	77
100	80
125	84
160	87.5
200	78.5
250	75.5
315	76.5
400	76
500	78
630	73.5
800	74
1000	74
1250	71
1600	70
2000	68
2500	66
3150	66
4000	65.5
5000	65
6300	62.5
8000	72
10000	72

Full Octave 1 Inverter	
Freq (Hz)	LwA (dB)
31.5	4.8
63	83.4
125	89.6
250	81.8
500	81.0
1000	78.0
2000	73.1
4000	70.3
8000	75.2
Total Lw	91.9

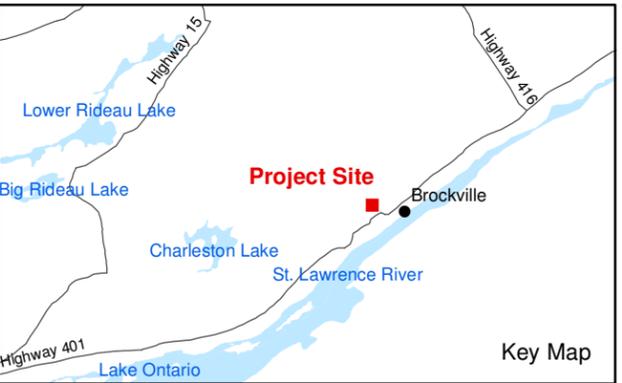
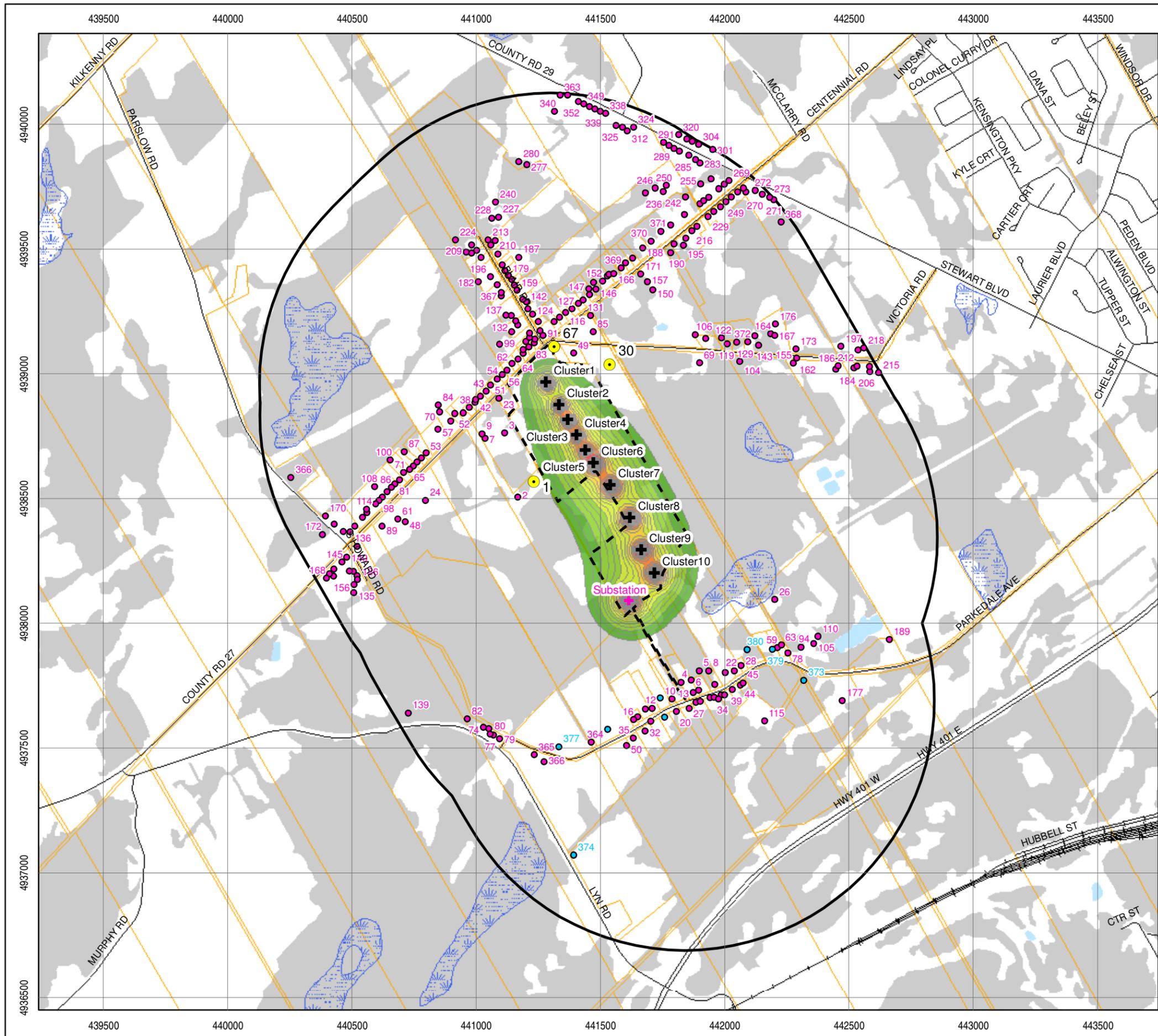
A_WEIGHTED

Full Octave	1 Inverter	2 Inverters
Freq (Hz)	LwA (dBA)	LwA (dBA)
31.5	4.8	7.8
63	57.2	60.2
125	73.5	76.5
250	73.2	76.2
500	77.8	80.8
1000	78.0	81.0
2000	74.3	77.3
4000	71.3	74.3
8000	74.1	77.2
Total LwA	83.7	86.7

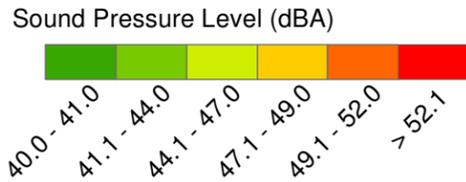
Figure B.3 Sound Power Level Calculation for Advanced Energy Solaron 500 kW.

Appendix C

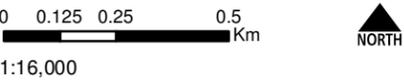
Noise Maps from CADNA-A



- Legend**
- Cluster #
 - + Inverter Cluster
 - SUB Substation Transformer
 - # Noise Receptor - Existing
 - # Noise Receptor - Vacant
 - # Representative Noise Receptor
 - +— Railway
 - Road
 - ▭ Parcel
 - - - Project Location
 - ▭ 1000 m from Project Location
 - ▭ Waterbody
 - ▭ Wetland
 - ▭ Wooded Area

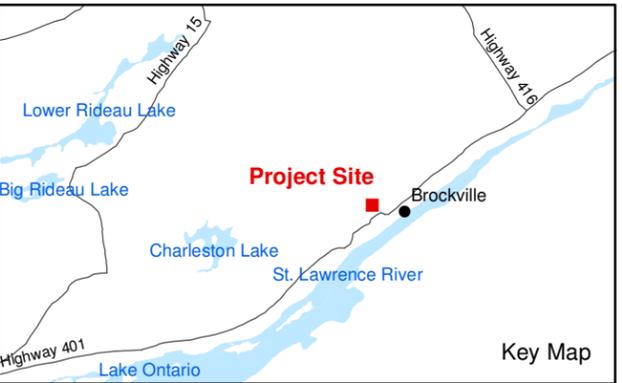
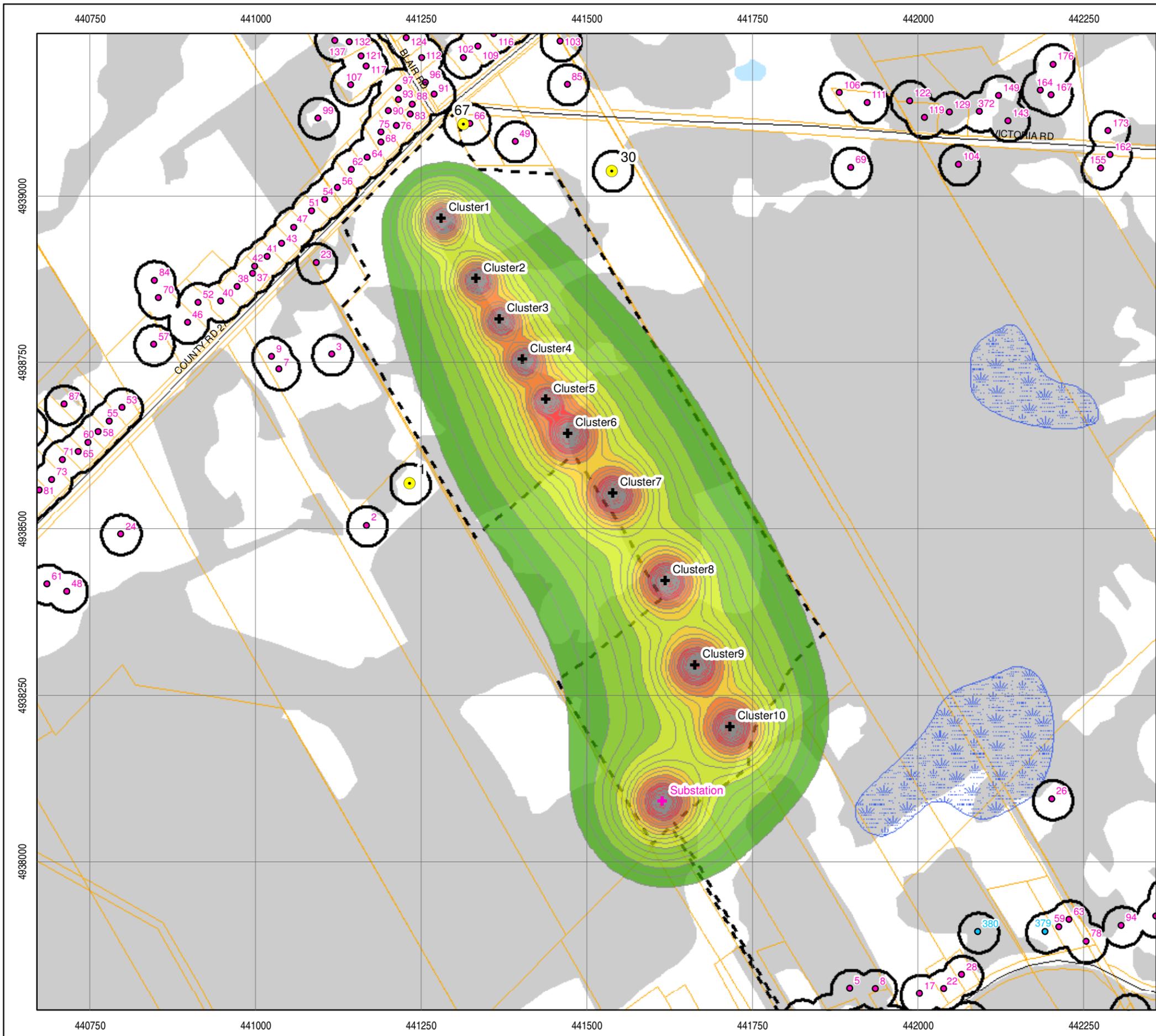


Notes:
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 2. Spatial referencing UTM NAD 83.

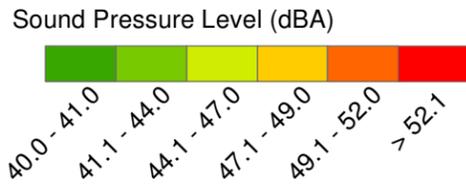


Brockville Solar Inc.
 Brockville Solar Project
Noise Contours at 4.5 m

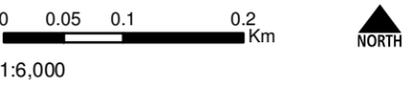
Figure C.1



- Legend**
- Cluster #
 - + Inverter Cluster
 - SUB Substation Transformer
 - Noise Receptor - Existing
 - # Noise Receptor - Vacant
 - Representative Noise Receptor
 - Road
 - ▭ Parcel
 - - - Project Location
 - ▭ 30 m from Noise Receptor
 - Waterbody
 - Wetland
 - Wooded Area



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



Appendix D

CADNA-A Sample Calculations

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rcvr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	
	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.70
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03)	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver

Name: 9DEC1100001

ID: 1.000000

X: 441232.74

Y: 4938568.72

Z: 129.50

Point Source, ISO 9613, Name: "Substation", ID: "Substation"

Nr.	X (m)	Y (m)	Z (m)	Refl.	Freq. (Hz)	LxT dB(A)	LxN dB(A)	K0 (dB)	Dc (dB)	Adiv (dB)	Aatm (dB)	Agr (dB)	Afol (dB)	Ahous (dB)	Abar (dB)	Cmet (dB)	RL (dB)	LrT dB(A)	LrN dB(A)
1	441613.91	4938091.01	128.20	0	32	50.5	50.5	0.0	0.0	66.7	0.0	-4.9	0.0	0.0	0.0	0.0	-0.0	-11.4	-11.4
2	441613.91	4938091.01	128.20	0	63	69.7	69.7	0.0	0.0	66.7	0.1	-4.9	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
3	441613.91	4938091.01	128.20	0	125	81.8	81.8	0.0	0.0	66.7	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	11.4	11.4
4	441613.91	4938091.01	128.20	0	250	84.3	84.3	0.0	0.0	66.7	0.6	1.9	0.0	0.0	0.0	0.0	-0.0	15.0	15.0
5	441613.91	4938091.01	128.20	0	500	89.7	89.7	0.0	0.0	66.7	1.2	-1.4	0.0	0.0	0.0	0.0	-0.0	23.2	23.2
6	441613.91	4938091.01	128.20	0	1000	86.9	86.9	0.0	0.0	66.7	2.2	-1.5	0.0	0.0	0.0	0.0	-0.0	19.4	19.4
7	441613.91	4938091.01	128.20	0	2000	83.1	83.1	0.0	0.0	66.7	5.9	-1.5	0.0	0.0	0.0	0.0	-0.0	11.9	11.9
8	441613.91	4938091.01	128.20	0	4000	77.9	77.9	0.0	0.0	66.7	20.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-7.4	-7.4
9	441613.91	4938091.01	128.20	0	8000	68.8	68.8	0.0	0.0	66.7	71.4	-1.5	0.0	0.0	0.0	0.0	-0.0	-67.9	-67.9

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter1"

Nr.	X (m)	Y (m)	Z (m)	Refl.	Freq. (Hz)	LxT dB(A)	LxN dB(A)	K0 (dB)	Dc (dB)	Adiv (dB)	Aatm (dB)	Agr (dB)	Afol (dB)	Ahous (dB)	Abar (dB)	Cmet (dB)	RL (dB)	LrT dB(A)	LrN dB(A)
1	441280.00	4938967.00	127.20	0	32	12.8	12.8	0.0	0.0	63.1	0.0	-4.5	0.0	0.0	0.0	0.0	-0.0	-45.8	-45.8
2	441280.00	4938967.00	127.20	0	63	64.2	64.2	0.0	0.0	63.1	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	5.6	5.6
3	441280.00	4938967.00	127.20	0	125	78.5	78.5	0.0	0.0	63.1	0.2	2.7	0.0	0.0	0.0	0.0	-0.0	12.6	12.6
4	441280.00	4938967.00	127.20	0	250	75.2	75.2	0.0	0.0	63.1	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	8.2	8.2
5	441280.00	4938967.00	127.20	0	500	77.8	77.8	0.0	0.0	63.1	0.8	-0.3	0.0	0.0	0.0	0.0	-0.0	14.3	14.3
6	441280.00	4938967.00	127.20	0	1000	78.0	78.0	0.0	0.0	63.1	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	14.8	14.8
7	441280.00	4938967.00	127.20	0	2000	76.3	76.3	0.0	0.0	63.1	3.9	-1.4	0.0	0.0	0.0	0.0	-0.0	10.7	10.7
8	441280.00	4938967.00	127.20	0	4000	73.3	73.3	0.0	0.0	63.1	13.1	-1.4	0.0	0.0	0.0	0.0	-0.0	-1.6	-1.6
9	441280.00	4938967.00	127.20	0	8000	76.2	76.2	0.0	0.0	63.1	46.9	-1.4	0.0	0.0	0.0	0.0	-0.0	-32.4	-32.4

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter2"

Nr.	X (m)	Y (m)	Z (m)	Refl.	Freq. (Hz)	LxT dB(A)	LxN dB(A)	K0 (dB)	Dc (dB)	Adiv (dB)	Aatm (dB)	Agr (dB)	Afol (dB)	Ahous (dB)	Abar (dB)	Cmet (dB)	RL (dB)	LrT dB(A)	LrN dB(A)
1	441333.00	4938876.00	127.20	0	32	12.8	12.8	0.0	0.0	61.2	0.0	-4.1	0.0	0.0	0.0	0.0	-0.0	-44.3	-44.3
2	441333.00	4938876.00	127.20	0	63	64.2	64.2	0.0	0.0	61.2	0.0	-4.1	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
3	441333.00	4938876.00	127.20	0	125	78.5	78.5	0.0	0.0	61.2	0.1	2.4	0.0	0.0	0.0	0.0	-0.0	14.8	14.8
4	441333.00	4938876.00	127.20	0	250	75.2	75.2	0.0	0.0	61.2	0.3	3.6	0.0	0.0	0.0	0.0	-0.0	10.1	10.1
5	441333.00	4938876.00	127.20	0	500	77.8	77.8	0.0	0.0	61.2	0.6	-0.2	0.0	0.0	0.0	0.0	-0.0	16.2	16.2
6	441333.00	4938876.00	127.20	0	1000	78.0	78.0	0.0	0.0	61.2	1.2	-1.2	0.0	0.0	0.0	0.0	-0.0	16.8	16.8
7	441333.00	4938876.00	127.20	0	2000	76.3	76.3	0.0	0.0	61.2	3.1	-1.2	0.0	0.0	0.0	0.0	-0.0	13.2	13.2
8	441333.00	4938876.00	127.20	0	4000	73.3	73.3	0.0	0.0	61.2	10.6	-1.2	0.0	0.0	0.0	0.0	-0.0	2.8	2.8
9	441333.00	4938876.00	127.20	0	8000	76.2	76.2	0.0	0.0	61.2	37.8	-1.2	0.0	0.0	0.0	0.0	-0.0	-21.5	-21.5

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter3"

Nr.	X (m)	Y (m)	Z (m)	Refl.	Freq. (Hz)	LxT dB(A)	LxN dB(A)	K0 (dB)	Dc (dB)	Adiv (dB)	Aatm (dB)	Agr (dB)	Afol (dB)	Ahous (dB)	Abar (dB)	Cmet (dB)	RL (dB)	LrT dB(A)	LrN dB(A)
1	441368.00	4938816.00	127.20	0	32	12.8	12.8	0.0	0.0	60.0	0.0	-3.9	0.0	0.0	0.0	0.0	-0.0	-43.3	-43.3
2	441368.00	4938816.00	127.20	0	63	64.2	64.2	0.0	0.0	60.0	0.0	-3.9	0.0	0.0	0.0	0.0	-0.0	8.0	8.0
3	441368.00	4938816.00	127.20	0	125	78.5	78.5	0.0	0.0	60.0	0.1	2.3	0.0	0.0	0.0	0.0	-0.0	16.1	16.1
4	441368.00	4938816.00	127.20	0	250	75.2	75.2	0.0	0.0	60.0	0.3	3.7	0.0	0.0	0.0	0.0	-0.0	11.2	11.2
5	441368.00	4938816.00	127.20	0	500	77.8	77.8	0.0	0.0	60.0	0.5	-0.1	0.0	0.0	0.0	0.0	-0.0	17.4	17.4
6	441368.00	4938816.00	127.20	0	1000	78.0	78.0	0.0	0.0	60.0	1.0	-1.1	0.0	0.0	0.0	0.0	-0.0	18.1	18.1
7	441368.00	4938816.00	127.20	0	2000	76.3	76.3	0.0	0.0	60.0	2.7	-1.2	0.0	0.0	0.0	0.0	-0.0	14.7	14.7
8	441368.00	4938816.00	127.20	0	4000	73.3	73.3	0.0	0.0	60.0	9.2	-1.2	0.0	0.0	0.0	0.0	-0.0	5.2	5.2
9	441368.00	4938816.00	127.20	0	8000	76.2	76.2	0.0	0.0	60.0	32.9	-1.2	0.0	0.0	0.0	0.0	-0.0	-15.6	-15.6

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter4"

Nr.	X (m)	Y (m)	Z (m)	Refl.	Freq. (Hz)	LxT dB(A)	LxN dB(A)	K0 (dB)	Dc (dB)	Adiv (dB)	Aatm (dB)	Agr (dB)	Afol (dB)	Ahous (dB)	Abar (dB)	Cmet (dB)	RL (dB)	LrT dB(A)	LrN dB(A)
1	441403.00	4938755.00	127.20	0	32	12.8	12.8	0.0	0.0	59.0	0.0	-3.6	0.0	0.0	0.0	0.0	-0.0	-42.6	-42.6

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter4"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
2	441403.00	4938755.00	127.20	0	63	64.2	64.2	0.0	0.0	59.0	0.0	-3.6	0.0	0.0	0.0	0.0	-0.0	8.7	8.7
3	441403.00	4938755.00	127.20	0	125	78.5	78.5	0.0	0.0	59.0	0.1	2.3	0.0	0.0	0.0	0.0	-0.0	17.1	17.1
4	441403.00	4938755.00	127.20	0	250	75.2	75.2	0.0	0.0	59.0	0.3	3.8	0.0	0.0	0.0	0.0	-0.0	12.1	12.1
5	441403.00	4938755.00	127.20	0	500	77.8	77.8	0.0	0.0	59.0	0.5	-0.0	0.0	0.0	0.0	0.0	-0.0	18.3	18.3
6	441403.00	4938755.00	127.20	0	1000	78.0	78.0	0.0	0.0	59.0	0.9	-1.0	0.0	0.0	0.0	0.0	-0.0	19.1	19.1
7	441403.00	4938755.00	127.20	0	2000	76.3	76.3	0.0	0.0	59.0	2.4	-1.1	0.0	0.0	0.0	0.0	-0.0	15.9	15.9
8	441403.00	4938755.00	127.20	0	4000	73.3	73.3	0.0	0.0	59.0	8.3	-1.1	0.0	0.0	0.0	0.0	-0.0	7.1	7.1
9	441403.00	4938755.00	127.20	0	8000	76.2	76.2	0.0	0.0	59.0	29.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-11.3	-11.3

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter5"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441438.00	4938695.00	127.20	0	32	12.8	12.8	0.0	0.0	58.6	0.0	-3.5	0.0	0.0	0.0	0.0	-0.0	-42.3	-42.3
2	441438.00	4938695.00	127.20	0	63	64.2	64.2	0.0	0.0	58.6	0.0	-3.5	0.0	0.0	0.0	0.0	-0.0	9.0	9.0
3	441438.00	4938695.00	127.20	0	125	78.5	78.5	0.0	0.0	58.6	0.1	2.3	0.0	0.0	0.0	0.0	-0.0	17.5	17.5
4	441438.00	4938695.00	127.20	0	250	75.2	75.2	0.0	0.0	58.6	0.3	3.8	0.0	0.0	0.0	0.0	-0.0	12.5	12.5
5	441438.00	4938695.00	127.20	0	500	77.8	77.8	0.0	0.0	58.6	0.5	0.0	0.0	0.0	0.0	0.0	-0.0	18.7	18.7
6	441438.00	4938695.00	127.20	0	1000	78.0	78.0	0.0	0.0	58.6	0.9	-1.0	0.0	0.0	0.0	0.0	-0.0	19.5	19.5
7	441438.00	4938695.00	127.20	0	2000	76.3	76.3	0.0	0.0	58.6	2.3	-1.1	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
8	441438.00	4938695.00	127.20	0	4000	73.3	73.3	0.0	0.0	58.6	7.9	-1.1	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
9	441438.00	4938695.00	127.20	0	8000	76.2	76.2	0.0	0.0	58.6	28.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-9.6	-9.6

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter6"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441471.00	4938644.00	127.20	0	32	12.8	12.8	0.0	0.0	58.9	0.0	-3.6	0.0	0.0	0.0	0.0	-0.0	-42.6	-42.6
2	441471.00	4938644.00	127.20	0	63	65.2	65.2	0.0	0.0	58.9	0.0	-3.6	0.0	0.0	0.0	0.0	-0.0	9.8	9.8
3	441471.00	4938644.00	127.20	0	125	81.5	81.5	0.0	0.0	58.9	0.1	2.3	0.0	0.0	0.0	0.0	-0.0	20.2	20.2
4	441471.00	4938644.00	127.20	0	250	81.2	81.2	0.0	0.0	58.9	0.3	3.8	0.0	0.0	0.0	0.0	-0.0	18.2	18.2
5	441471.00	4938644.00	127.20	0	500	85.8	85.8	0.0	0.0	58.9	0.5	-0.0	0.0	0.0	0.0	0.0	-0.0	26.4	26.4
6	441471.00	4938644.00	127.20	0	1000	86.0	86.0	0.0	0.0	58.9	0.9	-1.0	0.0	0.0	0.0	0.0	-0.0	27.2	27.2
7	441471.00	4938644.00	127.20	0	2000	82.3	82.3	0.0	0.0	58.9	2.4	-1.1	0.0	0.0	0.0	0.0	-0.0	22.0	22.0
8	441471.00	4938644.00	127.20	0	4000	79.3	79.3	0.0	0.0	58.9	8.2	-1.1	0.0	0.0	0.0	0.0	-0.0	13.2	13.2
9	441471.00	4938644.00	127.20	0	8000	82.2	82.2	0.0	0.0	58.9	29.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-4.9	-4.9

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter7"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441539.00	4938554.00	127.20	0	32	12.8	12.8	0.0	0.0	60.7	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-43.9	-43.9
2	441539.00	4938554.00	127.20	0	63	65.2	65.2	0.0	0.0	60.7	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	8.5	8.5
3	441539.00	4938554.00	127.20	0	125	81.5	81.5	0.0	0.0	60.7	0.1	2.4	0.0	0.0	0.0	0.0	-0.0	18.3	18.3
4	441539.00	4938554.00	127.20	0	250	81.2	81.2	0.0	0.0	60.7	0.3	3.6	0.0	0.0	0.0	0.0	-0.0	16.5	16.5
5	441539.00	4938554.00	127.20	0	500	85.8	85.8	0.0	0.0	60.7	0.6	-0.2	0.0	0.0	0.0	0.0	-0.0	24.6	24.6
6	441539.00	4938554.00	127.20	0	1000	86.0	86.0	0.0	0.0	60.7	1.1	-1.2	0.0	0.0	0.0	0.0	-0.0	25.3	25.3
7	441539.00	4938554.00	127.20	0	2000	82.3	82.3	0.0	0.0	60.7	3.0	-1.2	0.0	0.0	0.0	0.0	-0.0	19.8	19.8
8	441539.00	4938554.00	127.20	0	4000	79.3	79.3	0.0	0.0	60.7	10.1	-1.2	0.0	0.0	0.0	0.0	-0.0	9.7	9.7
9	441539.00	4938554.00	127.20	0	8000	82.2	82.2	0.0	0.0	60.7	35.8	-1.2	0.0	0.0	0.0	0.0	-0.0	-13.2	-13.2

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter8"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441618.00	4938423.00	127.20	0	32	12.8	12.8	0.0	0.0	63.3	0.0	-4.5	0.0	0.0	0.0	0.0	-0.0	-46.0	-46.0
2	441618.00	4938423.00	127.20	0	63	65.2	65.2	0.0	0.0	63.3	0.1	-4.5	0.0	0.0	0.0	0.0	-0.0	6.4	6.4
3	441618.00	4938423.00	127.20	0	125	81.5	81.5	0.0	0.0	63.3	0.2	2.7	0.0	0.0	0.0	0.0	-0.0	15.3	15.3
4	441618.00	4938423.00	127.20	0	250	81.2	81.2	0.0	0.0	63.3	0.4	3.5	0.0	0.0	0.0	0.0	-0.0	14.0	14.0
5	441618.00	4938423.00	127.20	0	500	85.8	85.8	0.0	0.0	63.3	0.8	-0.3	0.0	0.0	0.0	0.0	-0.0	22.0	22.0
6	441618.00	4938423.00	127.20	0	1000	86.0	86.0	0.0	0.0	63.3	1.5	-1.3	0.0	0.0	0.0	0.0	-0.0	22.5	22.5
7	441618.00	4938423.00	127.20	0	2000	82.3	82.3	0.0	0.0	63.3	4.0	-1.4	0.0	0.0	0.0	0.0	-0.0	16.4	16.4
8	441618.00	4938423.00	127.20	0	4000	79.3	79.3	0.0	0.0	63.3	13.5	-1.4	0.0	0.0	0.0	0.0	-0.0	3.9	3.9
9	441618.00	4938423.00	127.20	0	8000	82.2	82.2	0.0	0.0	63.3	48.1	-1.4	0.0	0.0	0.0	0.0	-0.0	-27.9	-27.9

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter9"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441663.00	4938295.61	127.20	0	32	12.8	12.8	0.0	0.0	65.1	0.0	-4.8	0.0	0.0	0.0	0.0	-0.0	-47.5	-47.5
2	441663.00	4938295.61	127.20	0	63	65.2	65.2	0.0	0.0	65.1	0.1	-4.8	0.0	0.0	0.0	0.0	-0.0	4.8	4.8
3	441663.00	4938295.61	127.20	0	125	81.5	81.5	0.0	0.0	65.1	0.2	3.1	0.0	0.0	0.0	0.0	-0.0	13.1	13.1
4	441663.00	4938295.61	127.20	0	250	81.2	81.2	0.0	0.0	65.1	0.5	3.4	0.0	0.0	0.0	0.0	-0.0	12.1	12.1
5	441663.00	4938295.61	127.20	0	500	85.8	85.8	0.0	0.0	65.1	1.0	-0.4	0.0	0.0	0.0	0.0	-0.0	20.1	20.1
6	441663.00	4938295.61	127.20	0	1000	86.0	86.0	0.0	0.0	65.1	1.9	-1.4	0.0	0.0	0.0	0.0	-0.0	20.4	20.4
7	441663.00	4938295.61	127.20	0	2000	82.3	82.3	0.0	0.0	65.1	4.9	-1.5	0.0	0.0	0.0	0.0	-0.0	13.7	13.7
8	441663.00	4938295.61	127.20	0	4000	79.3	79.3	0.0	0.0	65.1	16.7	-1.5	0.0	0.0	0.0	0.0	-0.0	-1.1	-1.1
9	441663.00	4938295.61	127.20	0	8000	82.2	82.2	0.0	0.0	65.1	59.6	-1.5	0.0	0.0	0.0	0.0	-0.0	-41.1	-41.1

Point Source, ISO 9613, Name: "(untitled)", ID: "inverter10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441716.00	4938203.00	127.20	0	32	12.8	12.8	0.0	0.0	66.6	0.0	-5.0	0.0	0.0	0.0	0.0	-0.0	-48.9	-48.9
2	441716.00	4938203.00	127.20	0	63	65.2	65.2	0.0	0.0	66.6	0.1	-5.0	0.0	0.0	0.0	0.0	-0.0	3.5	3.5
3	441716.00	4938203.00	127.20	0	125	81.5	81.5	0.0	0.0	66.6	0.3	3.4	0.0	0.0	0.0	0.0	-0.0	11.2	11.2
4	441716.00	4938203.00	127.20	0	250	81.2	81.2	0.0	0.0	66.6	0.6	3.4	0.0	0.0	0.0	0.0	-0.0	10.6	10.6
5	441716.00	4938203.00	127.20	0	500	85.8	85.8	0.0	0.0	66.6	1.2	-0.4	0.0	0.0	0.0	0.0	-0.0	18.4	18.4
6	441716.00	4938203.00	127.20	0	1000	86.0	86.0	0.0	0.0	66.6	2.2	-1.5	0.0	0.0	0.0	0.0	-0.0	18.6	18.6
7	441716.00	4938203.00	127.20	0	2000	82.3	82.3	0.0	0.0	66.6	5.9	-1.5	0.0	0.0	0.0	0.0	-0.0	11.3	11.3
8	441716.00	4938203.00	127.20	0	4000	79.3	79.3	0.0	0.0	66.6	19.9	-1.5	0.0	0.0	0.0	0.0	-0.0	-5.7	-5.7
9	441716.00	4938203.00	127.20	0	8000	82.2	82.2	0.0	0.0	66.6	70.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-53.8	-53.8

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer1"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441283.00	4938962.00	126.70	0	32	45.3	45.3	0.0	0.0	63.0	0.0	-4.6	0.0	0.0	0.0	0.0	-0.0	-13.1	-13.1
2	441283.00	4938962.00	126.70	0	63	64.5	64.5	0.0	0.0	63.0	0.1	-4.6	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
3	441283.00	4938962.00	126.70	0	125	76.6	76.6	0.0	0.0	63.0	0.2	2.5	0.0	0.0	0.0	0.0	-0.0	10.9	10.9
4	441283.00	4938962.00	126.70	0	250	79.1	79.1	0.0	0.0	63.0	0.4	4.2	0.0	0.0	0.0	0.0	-0.0	11.5	11.5
5	441283.00	4938962.00	126.70	0	500	84.5	84.5	0.0	0.0	63.0	0.8	1.2	0.0	0.0	0.0	0.0	-0.0	19.6	19.6
6	441283.00	4938962.00	126.70	0	1000	81.7	81.7	0.0	0.0	63.0	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	18.4	18.4
7	441283.00	4938962.00	126.70	0	2000	77.9	77.9	0.0	0.0	63.0	3.8	-1.4	0.0	0.0	0.0	0.0	-0.0	12.5	12.5
8	441283.00	4938962.00	126.70	0	4000	72.7	72.7	0.0	0.0	63.0	13.0	-1.4	0.0	0.0	0.0	0.0	-0.0	-1.9	-1.9
9	441283.00	4938962.00	126.70	0	8000	63.6	63.6	0.0	0.0	63.0	46.3	-1.4	0.0	0.0	0.0	0.0	-0.0	-44.3	-44.3

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer2"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441336.00	4938872.00	126.70	0	32	45.3	45.3	0.0	0.0	61.1	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	-11.6	-11.6
2	441336.00	4938872.00	126.70	0	63	64.5	64.5	0.0	0.0	61.1	0.0	-4.3	0.0	0.0	0.0	0.0	-0.0	7.6	7.6
3	441336.00	4938872.00	126.70	0	125	76.6	76.6	0.0	0.0	61.1	0.1	2.3	0.0	0.0	0.0	0.0	-0.0	13.1	13.1
4	441336.00	4938872.00	126.70	0	250	79.1	79.1	0.0	0.0	61.1	0.3	4.3	0.0	0.0	0.0	0.0	-0.0	13.3	13.3
5	441336.00	4938872.00	126.70	0	500	84.5	84.5	0.0	0.0	61.1	0.6	1.3	0.0	0.0	0.0	0.0	-0.0	21.5	21.5
6	441336.00	4938872.00	126.70	0	1000	81.7	81.7	0.0	0.0	61.1	1.2	-1.0	0.0	0.0	0.0	0.0	-0.0	20.4	20.4
7	441336.00	4938872.00	126.70	0	2000	77.9	77.9	0.0	0.0	61.1	3.1	-1.3	0.0	0.0	0.0	0.0	-0.0	15.0	15.0
8	441336.00	4938872.00	126.70	0	4000	72.7	72.7	0.0	0.0	61.1	10.5	-1.3	0.0	0.0	0.0	0.0	-0.0	2.4	2.4
9	441336.00	4938872.00	126.70	0	8000	63.6	63.6	0.0	0.0	61.1	37.4	-1.3	0.0	0.0	0.0	0.0	-0.0	-33.7	-33.7

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer3"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441371.00	4938811.00	126.70	0	32	45.3	45.3	0.0	0.0	59.9	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	-10.6	-10.6
2	441371.00	4938811.00	126.70	0	63	64.5	64.5	0.0	0.0	59.9	0.0	-4.0	0.0	0.0	0.0	0.0	-0.0	8.6	8.6
3	441371.00	4938811.00	126.70	0	125	76.6	76.6	0.0	0.0	59.9	0.1	2.1	0.0	0.0	0.0	0.0	-0.0	14.5	14.5
4	441371.00	4938811.00	126.70	0	250	79.1	79.1	0.0	0.0	59.9	0.3	4.4	0.0	0.0	0.0	0.0	-0.0	14.5	14.5
5	441371.00	4938811.00	126.70	0	500	84.5	84.5	0.0	0.0	59.9	0.5	1.4	0.0	0.0	0.0	0.0	-0.0	22.7	22.7
6	441371.00	4938811.00	126.70	0	1000	81.7	81.7	0.0	0.0	59.9	1.0	-0.9	0.0	0.0	0.0	0.0	-0.0	21.7	21.7
7	441371.00	4938811.00	126.70	0	2000	77.9	77.9	0.0	0.0	59.9	2.7	-1.2	0.0	0.0	0.0	0.0	-0.0	16.5	16.5
8	441371.00	4938811.00	126.70	0	4000	72.7	72.7	0.0	0.0	59.9	9.1	-1.2	0.0	0.0	0.0	0.0	-0.0	4.8	4.8
9	441371.00	4938811.00	126.70	0	8000	63.6	63.6	0.0	0.0	59.9	32.6	-1.2	0.0	0.0	0.0	0.0	-0.0	-27.7	-27.7

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer4"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441406.00	4938751.00	126.70	0	32	45.3	45.3	0.0	0.0	59.0	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-9.9	-9.9
2	441406.00	4938751.00	126.70	0	63	64.5	64.5	0.0	0.0	59.0	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
3	441406.00	4938751.00	126.70	0	125	76.6	76.6	0.0	0.0	59.0	0.1	2.1	0.0	0.0	0.0	0.0	-0.0	15.4	15.4
4	441406.00	4938751.00	126.70	0	250	79.1	79.1	0.0	0.0	59.0	0.3	4.4	0.0	0.0	0.0	0.0	-0.0	15.4	15.4
5	441406.00	4938751.00	126.70	0	500	84.5	84.5	0.0	0.0	59.0	0.5	1.4	0.0	0.0	0.0	0.0	-0.0	23.6	23.6
6	441406.00	4938751.00	126.70	0	1000	81.7	81.7	0.0	0.0	59.0	0.9	-0.9	0.0	0.0	0.0	0.0	-0.0	22.7	22.7
7	441406.00	4938751.00	126.70	0	2000	77.9	77.9	0.0	0.0	59.0	2.4	-1.1	0.0	0.0	0.0	0.0	-0.0	17.6	17.6
8	441406.00	4938751.00	126.70	0	4000	72.7	72.7	0.0	0.0	59.0	8.2	-1.1	0.0	0.0	0.0	0.0	-0.0	6.6	6.6
9	441406.00	4938751.00	126.70	0	8000	63.6	63.6	0.0	0.0	59.0	29.4	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.7	-23.7

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer5"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441441.00	4938691.00	126.70	0	32	45.3	45.3	0.0	0.0	58.7	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	-9.7	-9.7
2	441441.00	4938691.00	126.70	0	63	64.5	64.5	0.0	0.0	58.7	0.0	-3.7	0.0	0.0	0.0	0.0	-0.0	9.5	9.5
3	441441.00	4938691.00	126.70	0	125	76.6	76.6	0.0	0.0	58.7	0.1	2.0	0.0	0.0	0.0	0.0	-0.0	15.8	15.8
4	441441.00	4938691.00	126.70	0	250	79.1	79.1	0.0	0.0	58.7	0.3	4.5	0.0	0.0	0.0	0.0	-0.0	15.7	15.7
5	441441.00	4938691.00	126.70	0	500	84.5	84.5	0.0	0.0	58.7	0.5	1.5	0.0	0.0	0.0	0.0	-0.0	23.9	23.9
6	441441.00	4938691.00	126.70	0	1000	81.7	81.7	0.0	0.0	58.7	0.9	-0.9	0.0	0.0	0.0	0.0	-0.0	23.0	23.0
7	441441.00	4938691.00	126.70	0	2000	77.9	77.9	0.0	0.0	58.7	2.3	-1.1	0.0	0.0	0.0	0.0	-0.0	18.0	18.0
8	441441.00	4938691.00	126.70	0	4000	72.7	72.7	0.0	0.0	58.7	7.9	-1.1	0.0	0.0	0.0	0.0	-0.0	7.2	7.2
9	441441.00	4938691.00	126.70	0	8000	63.6	63.6	0.0	0.0	58.7	28.2	-1.1	0.0	0.0	0.0	0.0	-0.0	-22.2	-22.2

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer6"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441475.00	4938640.00	126.70	0	32	45.3	45.3	0.0	0.0	59.0	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	-10.0	-10.0
2	441475.00	4938640.00	126.70	0	63	64.5	64.5	0.0	0.0	59.0	0.0	-3.8	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
3	441475.00	4938640.00	126.70	0	125	76.6	76.6	0.0	0.0	59.0	0.1	2.1	0.0	0.0	0.0	0.0	-0.0	15.4	15.4
4	441475.00	4938640.00	126.70	0	250	79.1	79.1	0.0	0.0	59.0	0.3	4.4	0.0	0.0	0.0	0.0	-0.0	15.4	15.4
5	441475.00	4938640.00	126.70	0	500	84.5	84.5	0.0	0.0	59.0	0.5	1.4	0.0	0.0	0.0	0.0	-0.0	23.5	23.5
6	441475.00	4938640.00	126.70	0	1000	81.7	81.7	0.0	0.0	59.0	0.9	-0.9	0.0	0.0	0.0	0.0	-0.0	22.6	22.6
7	441475.00	4938640.00	126.70	0	2000	77.9	77.9	0.0	0.0	59.0	2.4	-1.1	0.0	0.0	0.0	0.0	-0.0	17.6	17.6
8	441475.00	4938640.00	126.70	0	4000	72.7	72.7	0.0	0.0	59.0	8.3	-1.1	0.0	0.0	0.0	0.0	-0.0	6.5	6.5
9	441475.00	4938640.00	126.70	0	8000	63.6	63.6	0.0	0.0	59.0	29.5	-1.1	0.0	0.0	0.0	0.0	-0.0	-23.8	-23.8

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer7"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441542.00	4938549.00	126.70	0	32	45.3	45.3	0.0	0.0	60.8	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	-11.3	-11.3
2	441542.00	4938549.00	126.70	0	63	64.5	64.5	0.0	0.0	60.8	0.0	-4.2	0.0	0.0	0.0	0.0	-0.0	7.8	7.8
3	441542.00	4938549.00	126.70	0	125	76.6	76.6	0.0	0.0	60.8	0.1	2.2	0.0	0.0	0.0	0.0	-0.0	13.4	13.4
4	441542.00	4938549.00	126.70	0	250	79.1	79.1	0.0	0.0	60.8	0.3	4.3	0.0	0.0	0.0	0.0	-0.0	13.6	13.6
5	441542.00	4938549.00	126.70	0	500	84.5	84.5	0.0	0.0	60.8	0.6	1.3	0.0	0.0	0.0	0.0	-0.0	21.8	21.8
6	441542.00	4938549.00	126.70	0	1000	81.7	81.7	0.0	0.0	60.8	1.1	-1.0	0.0	0.0	0.0	0.0	-0.0	20.7	20.7
7	441542.00	4938549.00	126.70	0	2000	77.9	77.9	0.0	0.0	60.8	3.0	-1.3	0.0	0.0	0.0	0.0	-0.0	15.3	15.3
8	441542.00	4938549.00	126.70	0	4000	72.7	72.7	0.0	0.0	60.8	10.2	-1.3	0.0	0.0	0.0	0.0	-0.0	3.0	3.0
9	441542.00	4938549.00	126.70	0	8000	63.6	63.6	0.0	0.0	60.8	36.2	-1.3	0.0	0.0	0.0	0.0	-0.0	-32.2	-32.2

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer8"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441621.00	4938419.00	126.70	0	32	45.3	45.3	0.0	0.0	63.4	0.0	-4.7	0.0	0.0	0.0	0.0	-0.0	-13.4	-13.4
2	441621.00	4938419.00	126.70	0	63	64.5	64.5	0.0	0.0	63.4	0.1	-4.7	0.0	0.0	0.0	0.0	-0.0	5.7	5.7
3	441621.00	4938419.00	126.70	0	125	76.6	76.6	0.0	0.0	63.4	0.2	2.6	0.0	0.0	0.0	0.0	-0.0	10.4	10.4
4	441621.00	4938419.00	126.70	0	250	79.1	79.1	0.0	0.0	63.4	0.4	4.2	0.0	0.0	0.0	0.0	-0.0	11.1	11.1
5	441621.00	4938419.00	126.70	0	500	84.5	84.5	0.0	0.0	63.4	0.8	1.2	0.0	0.0	0.0	0.0	-0.0	19.1	19.1
6	441621.00	4938419.00	126.70	0	1000	81.7	81.7	0.0	0.0	63.4	1.5	-1.1	0.0	0.0	0.0	0.0	-0.0	17.9	17.9
7	441621.00	4938419.00	126.70	0	2000	77.9	77.9	0.0	0.0	63.4	4.0	-1.4	0.0	0.0	0.0	0.0	-0.0	11.9	11.9
8	441621.00	4938419.00	126.70	0	4000	72.7	72.7	0.0	0.0	63.4	13.6	-1.4	0.0	0.0	0.0	0.0	-0.0	-2.9	-2.9
9	441621.00	4938419.00	126.70	0	8000	63.6	63.6	0.0	0.0	63.4	48.6	-1.4	0.0	0.0	0.0	0.0	-0.0	-47.0	-47.0

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer9"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441664.78	4938292.62	126.70	0	32	45.3	45.3	0.0	0.0	65.2	0.0	-4.9	0.0	0.0	0.0	0.0	-0.0	-15.0	-15.0
2	441664.78	4938292.62	126.70	0	63	64.5	64.5	0.0	0.0	65.2	0.1	-4.9	0.0	0.0	0.0	0.0	-0.0	4.1	4.1
3	441664.78	4938292.62	126.70	0	125	76.6	76.6	0.0	0.0	65.2	0.2	3.1	0.0	0.0	0.0	0.0	-0.0	8.1	8.1
4	441664.78	4938292.62	126.70	0	250	79.1	79.1	0.0	0.0	65.2	0.5	4.1	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
5	441664.78	4938292.62	126.70	0	500	84.5	84.5	0.0	0.0	65.2	1.0	1.1	0.0	0.0	0.0	0.0	-0.0	17.2	17.2
6	441664.78	4938292.62	126.70	0	1000	81.7	81.7	0.0	0.0	65.2	1.9	-1.2	0.0	0.0	0.0	0.0	-0.0	15.8	15.8
7	441664.78	4938292.62	126.70	0	2000	77.9	77.9	0.0	0.0	65.2	5.0	-1.5	0.0	0.0	0.0	0.0	-0.0	9.2	9.2
8	441664.78	4938292.62	126.70	0	4000	72.7	72.7	0.0	0.0	65.2	16.8	-1.5	0.0	0.0	0.0	0.0	-0.0	-7.8	-7.8
9	441664.78	4938292.62	126.70	0	8000	63.6	63.6	0.0	0.0	65.2	59.9	-1.5	0.0	0.0	0.0	0.0	-0.0	-60.0	-60.0

Point Source, ISO 9613, Name: "(untitled)", ID: "transformer10"																			
Nr.	X	Y	Z	Refl.	Freq.	LxT	LxN	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	LrT	LrN
	(m)	(m)	(m)		(Hz)	dB(A)	dB(A)	(dB)	(dB)	(dB)	(dB)	dB(A)	dB(A)						
1	441719.00	4938199.00	126.70	0	32	45.3	45.3	0.0	0.0	66.7	0.0	-5.1	0.0	0.0	0.0	0.0	-0.0	-16.4	-16.4
2	441719.00	4938199.00	126.70	0	63	64.5	64.5	0.0	0.0	66.7	0.1	-5.1	0.0	0.0	0.0	0.0	-0.0	2.8	2.8
3	441719.00	4938199.00	126.70	0	125	76.6	76.6	0.0	0.0	66.7	0.3	3.5	0.0	0.0	0.0	0.0	-0.0	6.1	6.1
4	441719.00	4938199.00	126.70	0	250	79.1	79.1	0.0	0.0	66.7	0.6	4.1	0.0	0.0	0.0	0.0	-0.0	7.7	7.7
5	441719.00	4938199.00	126.70	0	500	84.5	84.5	0.0	0.0	66.7	1.2	1.1	0.0	0.0	0.0	0.0	-0.0	15.5	15.5
6	441719.00	4938199.00	126.70	0	1000	81.7	81.7	0.0	0.0	66.7	2.2	-1.3	0.0	0.0	0.0	0.0	-0.0	14.0	14.0
7	441719.00	4938199.00	126.70	0	2000	77.9	77.9	0.0	0.0	66.7	5.9	-1.5	0.0	0.0	0.0	0.0	-0.0	6.8	6.8
8	441719.00	4938199.00	126.70	0	4000	72.7	72.7	0.0	0.0	66.7	20.0	-1.5	0.0	0.0	0.0	0.0	-0.0	-12.5	-12.5
9	441719.00	4938199.00	126.70	0	8000	63.6	63.6	0.0	0.0	66.7	71.4	-1.5	0.0	0.0	0.0	0.0	-0.0	-73.0	-73.0

Reference: Brockville Solar Inc. REA Amendment – Facility Noise Impact – Steady State and Emergency Sources

Attachment B Brockville Solar Project – Energy Generator Noise Impact Review – Stantec 2024

To: ENGIE Canada Inc. From: Galen Wong
Stantec
Project/File: 161424291 Date: December 6, 2024

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Introduction

Brockville Solar Inc. has proposed upgrades to the Brockville Solar Project (the Project), located at 3551 County Road 27 in the Township of Elizabethtown-Kitley and the County of Leeds and Grenville, Ontario (the Site). The proposed upgrades will include the installation of a new emergency generator at the Site, near the existing Substation building. The Project currently operates under a Renewable Energy Approval (REA) (REA #0602-8RFLKT, dated March 23, 2012), with a Noise Assessment Study prepared by Hatch, dated March 11, 2013 (Hatch 2013).

The Project is located just west of the City of Brockville. To the north of the Site is County Road 27 (CR 27). Several residential single-family dwellings are located along CR 27 across the street from the Site. To the east, south and west of the Site are forested areas. Residential dwellings are located to the south along Old Red Road. The Substation building for the Site is located at the southwest corner of the Site, approximately 1 km south of County Road 27. The Site, the proposed generator location and the surrounding area features are shown in Figure 1 in Attachment A.

The proposed emergency generator is a 150 kW 347/600V 3Ph diesel generator with a sound enclosure. The generator is expected to be tested monthly for approximately 60 minutes per test at no load conditions during the daytime (07:00-19:00) periods only. Testing of the emergency generator at full load conditions is expected to be infrequent and may occur up to once per year for a maximum of 60 minutes per test.

Per the Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Noise Guideline NPC-300¹ (NPC-300), noise from emergency equipment operating in non-emergency situations is assessed independently of all other stationary sources of noise, and the noise emissions are not required to be included with the overall noise assessment of a stationary source facility. As the only proposed change to the Project is the addition of an emergency generator, this Noise Impact Review assesses noise from the proposed emergency generator on the closest receptors. The Hatch 2013 study is expected to remain applicable to the remainder of the Site.

This Noise Impact Review was performed to evaluate generator noise impact on the nearby noise-sensitive receptors to the Project. This memo summarizes the modelling approach and the results of the noise impact review, along with the applicable noise limits.

¹ Ontario Ministry of the Environment, Conservation and Parks, Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300, August 2013

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Noise Guidelines

MECP NPC-300 provides the applicable assessment criteria for the Project in terms of the A-weighted one-hour equivalent sound level (L_{eq-1hr}). It establishes the applicable sound level limit(s) at the receptors, as the higher of the background sound level or MECP exclusionary limit. The background sound level is defined as the lowest hourly sound level established by monitoring performed over a minimum period of 48 hours.

The MECP exclusionary sound level limits vary on the local acoustic environment and the time period being assessed (i.e., daytime, evening and nighttime). Based on a review of the aerial of the Project site and surrounding area, the existing acoustic environment in the study area is representative of a Class 3 area which is described in the NPC-300 as a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic.

The sound level limit for the emergency equipment testing is 5 dB greater than the established limit(s) for regular operations. As such, while the Class 3 sound level limit is typically 45 dBA during the daytime period at both the plane of window and outdoor receptor locations, 50 dBA is considered for the Project emergency generator testing.

The exclusionary limits for the generator testing operations for the Project are presented in Table 1. As the generator is expected to be tested during the daytime period (07:00 – 19:00) only, the daytime limits are presented in the table.

Table 1 MECP Noise Criteria for Emergency Generator Testing – Class 3 Area

Time Period	Exclusion Limits (L_{eq-1hr} , dBA)	
	Plane of Window Receptor	Outdoor Receptor
Daytime (07:00 – 19:00)	50	50
Source: MECP NPC-300, Table B-1, B-2 and Section B7.3		

As background noise levels in the area surrounding the Project have not been measured or reviewed, the exclusionary limits are used for this assessment.

Noise Points of Reception

In accordance with MECP NPC-300, Project noise is assessed at points of reception (PORs) located on properties that contain one or more of the following buildings:

- Permanent, seasonal, or rental residences
- Hotels, motels and campgrounds
- Schools, universities, libraries and daycare centres
- Hospitals and clinics, nursing/retirement homes
- Churches and places of worship.

Based on a review of aerial imagery and the Hatch 2013 study for the Project, seven (7) representative Plane of Window (POW) PORs surrounding the Project, located to the north, south and northwest of the site were identified and included in this assessment. Receptors at the Outdoor PORs were not considered further in this assessment as sound levels at these locations due to the emergency generator operations

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

were found to be the same or lower than that at the POW PORs. The receptor heights are set at 1.5 m for 1-storey dwellings and 4.5 m for 2-storey dwellings.

Other noise-sensitive receptors considered in the Hatch 2013 study are located further away from the Project and the impact at those receptors is expected to be lower than that at the assessed receptors. The receptors considered in this assessment are summarized in Table 2 and shown in Figure 1.

Table 2 Points of Reception

POR ID	POR Description	Receptor Height (m)
POR01	2501 Victoria Road, north of Project, 2 storey dwelling	4.5
POR02	2503 Victoria Road, north of Project, 1 storey Church	1.5
POR03	2509 Victoria Road, north of Project, 2 storey dwelling	4.5
POR04	2544 Old Red Road, south of Project, 2 storey dwelling (assumed)	4.5
POR05	2534 Old Red Road, south of Project, 2 storey dwelling (assumed)	4.5
POR06	3541 County Road 27, northwest of Project, 2 storey dwelling (assumed)	4.5
POR07	3543 County Road 27, northwest of Project, 2 storey dwelling (assumed)	4.5

Emergency Generator Noise

The Project noise source considered in this assessment consists of a 150 kW 347/600V 3Ph diesel generator with a sound enclosure. The proposed generator is a Sommers Model DGVSW 150 or similar unit. The manufacturer sound level specification with the sound enclosure is noted to meet 69 dBA at 7 metres (m) from the enclosure. Manufacturer sound data for the generator is presented in Attachment B. As no octave band sound data was available for the proposed generator, the octave band sound levels of a similar unit were used based on data from the Stantec database, normalized to meet 69 dBA at 7m. During the worst-case predictable operation, the generator is expected to be tested under no load conditions for a full hour during daytime (07:00-19:00) periods only.

Noise Model

A predictive analysis was performed using the commercially available software package CADNA/A, a computerized version of the algorithms contained in the ISO 9613-2 Standard, Attenuation of Sound During Propagation Outdoors². This model accounts geometrical divergence (distance attenuation), source directivity and orientation, barrier effects, ground effects and atmospheric absorption. The model also considers a downwind condition, in which for the purpose of analysis the wind direction is always oriented from the source location towards each receptor.

Topography of the site was not included in the model as the area between the Project and nearby receptors is generally flat.

Within the study area, the ground surfaces between the source and receptor are predominantly covered in vegetation which are acoustically absorptive, while the Site itself includes a large array of solar panels that are acoustically reflective; as such, the overall ground absorption coefficient is modelled as moderately absorptive ($G=0.7$). Two orders of reflection are considered in the model.

² International Standards Organization, ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors, 1996

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Typical Ontario meteorological values were used to initialize several parameters in the model. These included a temperature of 10 degrees Celsius and a relative humidity of 70%.

Noise Modelling Results

The predicted noise levels at the nearby PORs as a result of the Project generator testing are summarized in Table 3. Figure 2 presents the noise contours for the proposed emergency generator at 4.5 m height, representative of a 2nd storey window height.

Table 3 Acoustic Assessment Summary Table

POR ID	POR Description	Predicted Sound Level (Leq-1hr, dBA)	Sound Level Limit (Leq-1hr, dBA)	Compliance with Limit (Y/N)
POR01	2501 Victoria Road, dwelling 2 nd storey window	20	50	Y
POR02	2503 Victoria Road, Church 1 st storey window	18	50	Y
POR03	2509 Victoria Road, dwelling 2 nd storey window	21	50	Y
POR04	2544 Old Red Road, dwelling 2 nd storey window	29	50	Y
POR05	2534 Old Red Road, dwelling 2 nd storey window	30	50	Y
POR06	3541 County Road 27, dwelling 2 nd storey window	25	50	Y
POR07	3543 County Road 27, dwelling 2 nd storey window	25	50	Y

The Project is expected to be in compliance with the NPC-300 sound level limits at all modelled receptors during testing of the proposed emergency generator (Sommers Model DGVSW 150 with a sound enclosure) or an equivalent unit. No additional noise mitigation is required.

Conclusions

Brockville Solar Inc. has proposed an upgrade to the Brockville Solar Project consisting of the installation of an emergency generator. The sole proposed change to noise generating sources at the Brockville Solar Facility is the addition of a new emergency generator. As the emergency generators are to be assessed independently from the rest of the Project noise sources as per the MECP Environmental Noise Guideline NPC-300, this Noise Impact Review assesses impact from the proposed emergency generator only. The original AAR (Hatch 2013) for the Project is expected to remain applicable to the rest of the site.

The proposed emergency generator is a 150 kW 347/600V 3Ph diesel generator with a sound enclosure expected to meet 69 dBA at 7 m from the unit. The generator is expected to be tested monthly at no-load conditions during daytime (07:00-19:00) periods only.

Based on this assessment, the Project is expected to be in compliance with the NPC-300 sound level limits at all modelled receptors during testing of the proposed emergency generator (Sommers Model DGVSW 150 with a sound enclosure) or an equivalent unit. No additional noise mitigation is required.

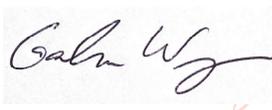
Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Closure

The memo was prepared for the exclusive use of the Brockville Solar Inc. and its representatives. Any reliance on this document by any third party is strictly prohibited. The opinions in the document are based on the conditions and information existing at the time the document was prepared and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Sincerely,

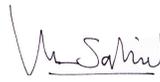
STANTEC CONSULTING LTD.



Digitally signed by Wong,
Galen
Date: 2024.12.09 12:54:25
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Galen Wong M.A.Sc.

Acoustics, Noise and Vibration Specialist
Phone: (613) 725-3138
Mobile: (647) 293-9587
Galen.Wong@stantec.com



Digitally signed by Salim,
Mohammed
Date: 2024.12.09 10:39:36
-05'00'

Mohammed Salim MBA, P.Eng.

Associate / Senior Acoustics, Noise and Vibration Engineer
Phone: (905) 381-3287
Mobile: (647) 680-4162
Mohammed.Salim@stantec.com

Attachments:

- Attachment A Figures and Table
Figure 1 – Project Location, Surrounding Area and Receptor Locations
Figure 2 – Project Generator Noise Contours at 4.5m Height
Attachment B Manufacturer Noise Data for Generator

December 6, 2024
Brockville Solar Inc.

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Attachment A Figures

Figure 1: Project Location, Surrounding Area and Receptor Locations

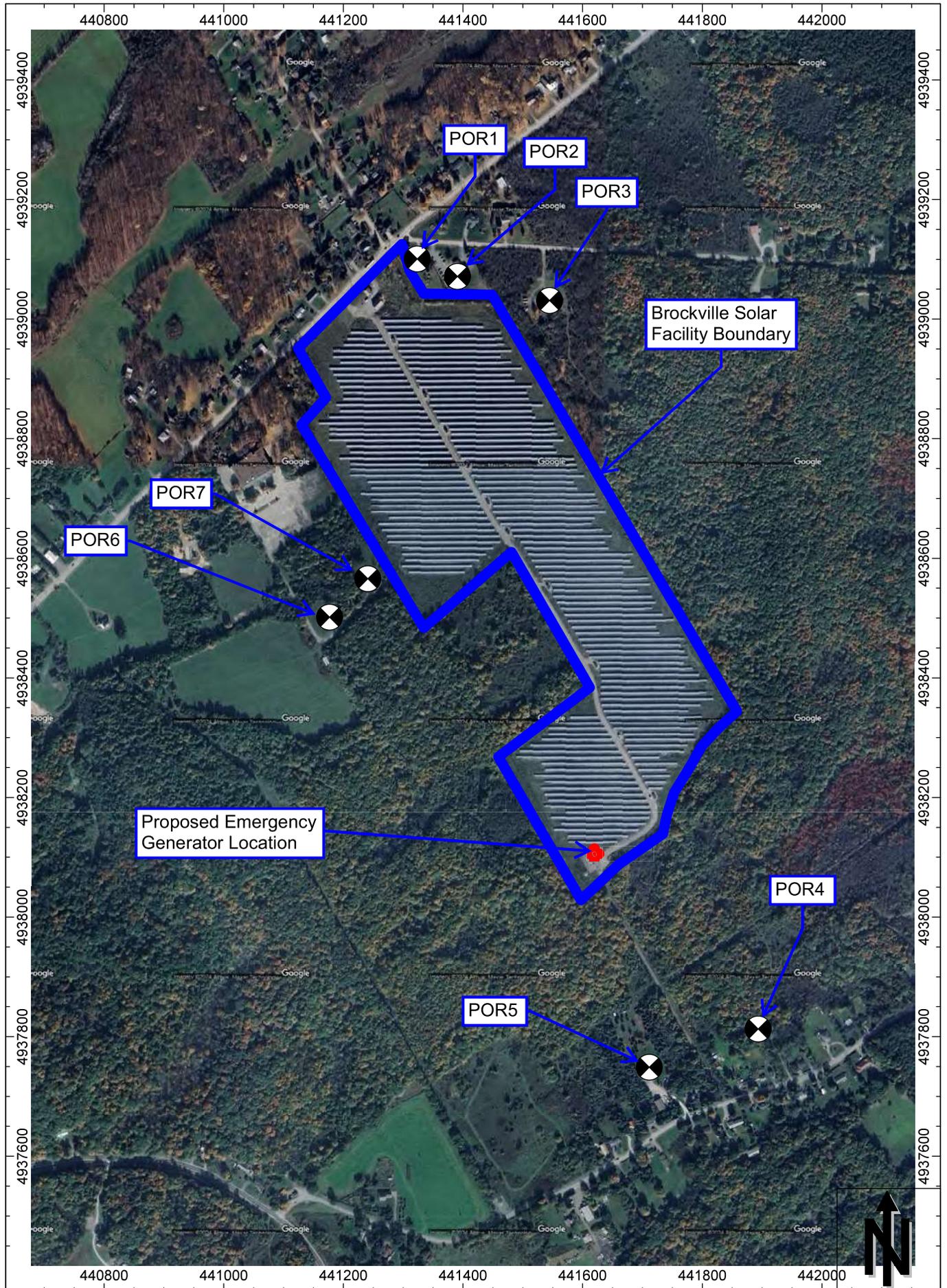
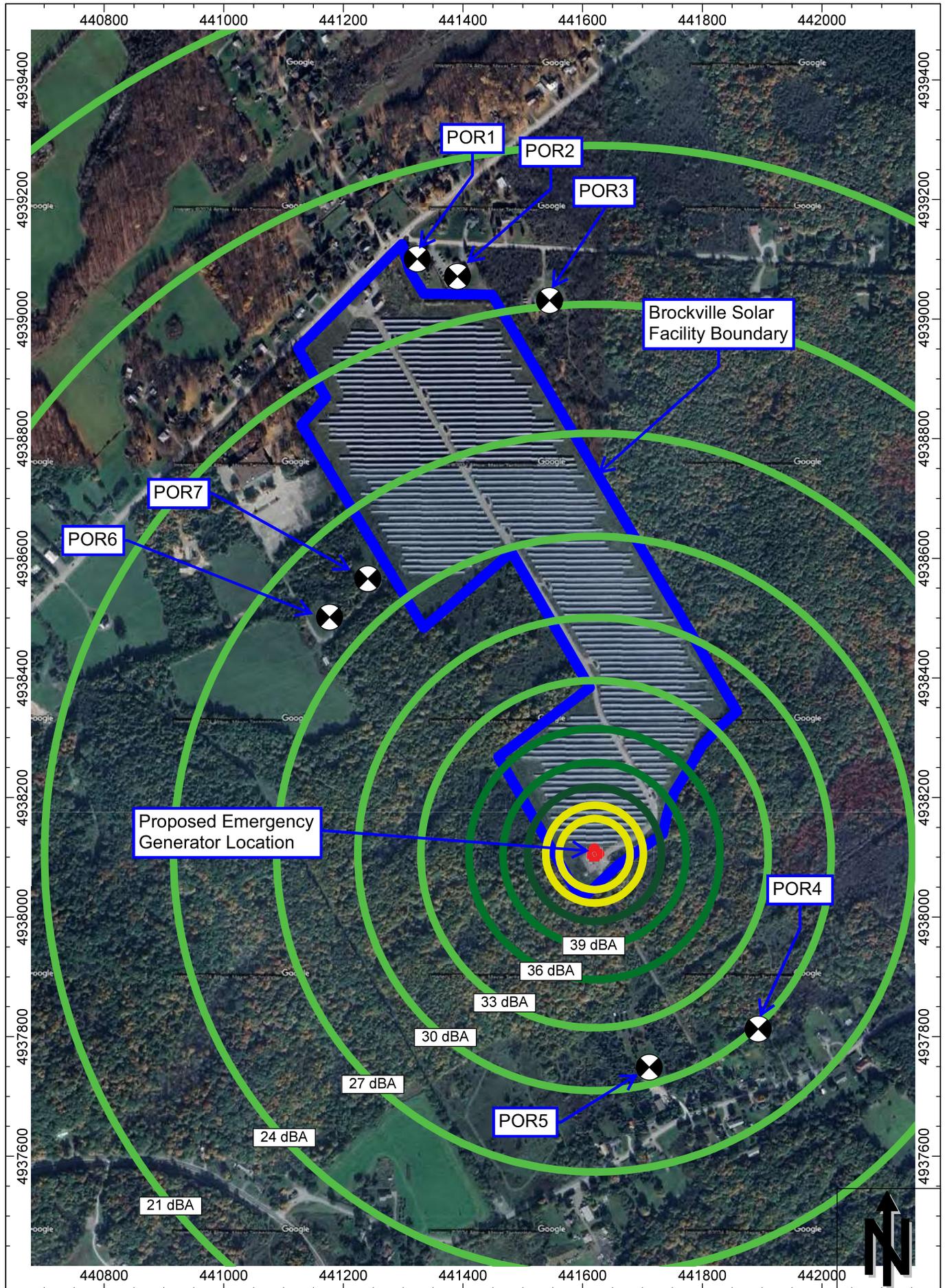


Figure 2: Project Generator Noise Contours at 4.5m Height



December 6, 2024
Brockville Solar Inc.

Reference: Brockville Solar Inc. Brockville Solar Facility Emergency Generator Noise Impact Review

Attachment B Manufacturer Noise Data for Generator

SOMMERS

Generator Systems

 3YR or 3000Hr Limited Parts, Travel & Labour warranty

60Hz VOLVO TAD 751 GE Tier 3

DGVSW 150 ST T3

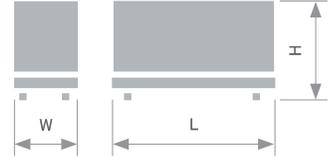


Measures:

L: 3410 mm H: 1902 mm
W: 1162 mm

Weight (dry):

5049 lbs / 2290 kg



60Hz



Diesel



Water cooled



Soundproofed



1800 RPM



CSA Approved or Equivalent

1 Genset General Description

> Soundproof genset with automatic startup, control card allows automatic, manual or signal start-up.

General Technical Data			
Engine	VOLVO TAD 751 GE		
Alternators	240/120V	Wdg. -06	STAMFORD UCI274G-w06
	208/120V	Wdg. 311	STAMFORD UCI274F
	600/347V	Wdg. 17	STAMFORD UCI274F
Performance Class	G3		
Frequency	60Hz		
Control Panel	240/120V	DSE 7320 MKII	
	208/120V	DSE 7320 MKII	
	600/347V	DSE 7320 MKII	
Noise level (dBA@7m)	69		

Voltage (v)	PRP (kW)	ESP (kW)	PRP/ESP (A)
240/120V	132	146	550/608
208/120V	137	151	475/522
600/347V	138	152	166/183

PRP: Continuous power ("Prime Power") ISO 8528-1 standard.
ESP: Emergency power ("Emergency Standby Power") ISO8528-1 standard.

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Sommers Motor Generator Sales Ltd.
www.sommersgen.com
1-800-690-2396

Head Office
70 Packham Ave.
Stratford, ON. N4Z 0A6

Atlantic Canada
551 Ferdinand Boulevard
Dieppe, NB E1A 7G1

Appendix F Notice of Project Change



NOTICE OF PROPOSED CHANGE

Brockville Solar Project

REA Applicant: Brockville Solar Inc.

Project Location: The Brockville property is located on Lot 19, Concession 2 in the geographical Township of Elizabethtown-Kitley, Ontario.

Project Description:

Brockville Solar Inc. has been operating the 10 megawatt Brockville Solar Project since construction was completed in 2013, in accordance with Renewable Energy Approval (REA) Number 0602- 8RFLKT. The project generates electricity using solar panels on fixed, ground-mounted racking structures. Direct current generated by the solar panels is converted to alternating current by onsite inverters and stepped up to a voltage of 44 kilovolts before connecting with the existing Hydro One Networks Inc.

distribution line along Old Red Road. The project also includes internal access roads, a control building and site fencing.

Proposed Change:

Brockville Solar Inc. is proposing to modify the approved stormwater management plan by reducing need for significant excavation and using a combination of berms and outlet controls to provide the required water quantity control for the project. These will all be located within the perimeter of the site and within Project Property Line. There will also be the installation of a back up generator which will provide station service support in the event of a power outage where the Project does not receive power from the grid. This will be within the Project Property Line. An amendment to the REA is required to permit construction and operation of the updated stormwater management design.

Documents for Public Inspection:

Modification Document has been prepared to provide additional information on the proposed project change. Copies of the supporting modification documents are available on the Project website [Brockville - ENGIE North America](#) and can be provided upon request.

Project Contacts

For more information on the proposed project change or to discuss any comments or concerns please contact:

ENGIE
Carolyn Edwards, Environmental Manager
410-105 Commerce Valley Drive W
Markham, ON L3T 7W3
Tel: 416-503-0933 ext. 243
Email: carolyn.edwards@engie.com

Stantec Consulting Ltd.
Leslie Greener, Senior Associate,
Environmental Assessment Planner
100-300 Hagey Blvd.
Waterloo, ON N2L 0A4
Tel: 226-979-7646
Email: leslie.greener@stantec.com

