KINGSTON SOLAR LP
SOL-LUCE KINGSTON
SOLAR PV ENERGY PROJECT

NOISE STUDY REPORT

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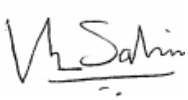
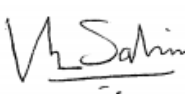
REV.	DATE	DETAILS OR PURPOSE OF REVISION	PREPARED	CHECKED	APPROVED
A	01/03/12	Issued for client review			
B	04/24/12	Issued for client review			
C	05/04/12	Final version			
D	08/05/12	Used for use.			
E	11/07/12	Incorporating adjacent solar projects and vacant lot receptors			
F	14/09/2012	Issued for use.			
G	13/11/2012	MOE's comments addressed.			

EXECUTIVE SUMMARY

AMEC Environment & Infrastructure, a Division of AMEC Americas Limited (AMEC), was retained by Kingston Solar LP (hereinafter referred to as the "Proponent") to prepare a Renewable Energy Approval (REA) application, as required under Ontario Regulation 359/09, for its proposed Sol-Luce Kingston Solar PV Energy Project in Kingston, Ontario (the Project). This *Noise Study Report* has been completed as a component of the REA application. The purpose of this study is to assess and document potential environmental noise impact of the proposed solar electricity generating project on neighbouring land uses that are considered as noise sensitive in accordance with the Ministry of the Environment (MOE) noise guidelines. This report presents the results of the noise study required for solar facilities under Ontario Regulation 359/09.

This *Noise Study Report* has been prepared in accordance with the MOE's, "Basic Comprehensive Certificates of Approval User Guide", Version 2.1, March 2011 and NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", dated October 1995 as required by Ontario Ministry of the Environment (MOE). This noise study has taken into account cumulative noise effect from the neighbouring solar projects within 2 km of the proposed Sol-Luce Kingston Solar PV Energy Project and considered vacant lots as surrogate receptors for noise assessment. To determine adjacent solar projects, a search of current and proposed projects was completed within 2 km of the Project's property lines. The search was based on the Proponent's knowledge of other projects proposed; reviewing MOE's Renewable Energy Project listing (http://www.ene.gov.on.ca/environment/en/subject/renewable_energy/projects/index.htm); and reviewing websites of developers known to be active in the City of Kingston, Loyalist Township; and the County of Lennox-Addington. This search identified three potential projects within 2 km of the Project's property lines: SunE Westbrook Solar Farm; Kingston Gardiner Highway 2 South Solar Project; and SkyPower MajesticLight Solar Project. Of these, only the SunE Westbrook Solar Farm and Kingston Gardiner Highway 2 South Solar Project have published Noise Study Reports that could be used in this assessment. There was no information available on the MajesticLight Solar Project and its status is unknown.

Kingston Solar LP is constructing a 100 MW AC solar power development in Eastern Ontario located in the City of Kingston and Loyalist Township. The Project is spread across portions of City of Kingston and Loyalist Township and would occupy approximately 261 hectares of land. The lands on which the solar panels would be located are privately owned and would be leased by Kingston Solar LP for the duration of the Project.

The Project is located in a Class 3 Area, based on the classification defined in Publication NPC-232 by the MOE. The Class 3 Area means a rural area with an acoustical environment that is dominated by natural sounds, having little or no traffic, such as an agricultural area. One hundred and twenty-three (123) representative points of reception, including forty-six (46) vacant lots, are identified in the vicinity of the proposed project and used

in the noise study. Vacant lots considered were those falling within the 35 dBA contour as discussed with the MOE.

Ninety-eight (98) significant noise sources from the proposed Sol-Luce Kingston Solar PV Energy Project, thirty-one (31) from the SunE Westbrook Solar Farm and eleven (11) from the Kingston Gardiner Hwy 2 South Solar Energy Project have been identified and considered for this noise study. These sources include one 110 MVA transformer for the substation and ninety-seven (97) Medium Voltage Power Platforms (MVPP) at the Sol-Luce Kingston Solar PV Energy Project; twenty (20) hut inverters, ten (10) hut transformers and one (1) substation transformer at the SunE Westbrook Solar Farm; and ten (10) inverters and one (1) substation transformer at the the Kingston Gardiner Hwy 2 South Solar Energy Project. Each MVPP at the Sol-Luce Kingston Solar PV Energy Project houses two (2) SC-500HE-US 500 kW or equivalent inverters inside an enclosure and one 1 MVA transformer located outdoor.

There are no significant sources of vibration at the site and therefore, a vibration assessment is not required for this project. Sound levels from the Project operations were modelled using Cadna/A, a computerized version of the ISO 9613 environmental noise propagation algorithms, produced by Datakustik GmbH. The predicted sound levels from the Project noise sources at the modeled points of reception (POR 001 through POR 123) are not expected to exceed the MOE NPC-232 guideline limits for Class 3 Areas. The sound pressure levels at the points of reception reported as part of this noise study represent the worst-case impact from the project with cumulative noise effect from the neighbouring solar farms within 2 km of the proposed Sol-Luce Kingston Solar PV Energy Project.

The project attributable noise at each point of reception is not expected to exceed the applicable guideline limits. Therefore, the Project will be in compliance with MOE NPC-232 guidelines with the layout used in this study. No additional noise mitigation is therefore required.

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1.0 INTRODUCTION

Kingston Solar LP (hereinafter referred to as the "Proponent") has retained AMEC Environment & Infrastructure, a Division of AMEC Americas Limited (AMEC) to prepare a Renewable Energy Approval (REA) application, as required under Ontario Regulation 359/09, for its proposed Sol-Luce Kingston Solar PV Energy Project (the Project) in Kingston, Ontario. This *Noise Study Report* is completed as a component of the REA application. This *Noise Study Report* has been prepared in accordance with the MOE's, "Basic Comprehensive Certificates of Approval User Guide", Version 2.1, March 2011 and NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", dated October 1995 as required by Ontario Ministry of the Environment (MOE).

The objective of this study is to assess and document potential environmental noise impact of the proposed photovoltaic electricity generating project on neighbouring land uses that are considered as noise sensitive in accordance with the Ministry of the Environment (MOE) noise guidelines. This report presents the results of the noise study required for solar facilities under Ontario Regulation 359/09 to support application for the Renewable Energy Approval (REA).

A glossary of commonly used noise terminologies can be found in **Appendix A**.

2.0 PROJECT DESCRIPTION AND LAYOUT

Kingston Solar LP is constructing a 100 MW solar power development in Eastern Ontario located in the City of Kingston and Loyalist Township. The Project is spread across portions of City of Kingston and Loyalist Township as shown in Figure 1 and would occupy approximately 261 hectares of land. The lands on which the solar panels would be located are privately owned and would be leased by Kingston Solar LP for the duration of the Project.

The proposed facility will convert solar energy into electricity to be fed into the Hydro One distribution grid. The electrical output of the Project will be collected and connected to an electrical substation capable of transforming the power from distribution voltage to a transmission voltage of 230 kV. The Project is designated as a Class 3 solar farm as defined by Section 4 of O.Reg. 359/09.

The new electric generating facility that will utilize photovoltaic (PV) panels installed on fixed racking structures, mounted on the ground. The PV panels generate DC electricity, which is converted to 200 Low Voltage AC electricity by the inverters at the Medium Voltage Power Platforms (MVPP). The 200 Low Voltage AC power is then transformed to 34.5 kV by a step-up transformer located at the MVPP. The 34.5-kV power is brought to a single central substation transformer to be stepped up to 230 kV for transmission to the nearby Hydro One transmission line.

Figure 1 shows the project location and project boundaries along with neighbouring solar projects within 2 km. The proposed schedule for the Project is to commence construction in 2013 with completion in 2014. The electrical substation will be located at south end of Property# 4. O&M building will be located on west of the substation on Property# 4.

The Project is spread over nineteen (19) private properties (e.g., P1 through P4, P6A, P7, P9, P10, P11A, P12, P14A, P14B, P14C, and P19 through P24) in the City of Kingston and Loyalist Township. The Project is bounded to the south by Westbrook Road and Highway 401, to the east by County Road 38 and farm lands, to the north by farm lands and to the west by farm lands and County Road 19. The zoning maps for the project site and surrounding areas are included in **Appendix B**. The project drawings and layouts are included in **Appendix C**.

The Project is composed of one (1) 110 MVA transformer for the substation and ninety-seven (97) Medium Voltage Power Platforms (MVPP), each of them houses two (2) SC-500HE-US 500 kW or equivalent inverters inside the enclosure and one 1 MVA transformer outdoor. The solar panels produce electricity during daytime only. After sunset, the facility will not receive solar radiation to generate any electricity. Under these conditions, the inverters will not produce noise, the transformers energized, but not in operation (no fans). An overall layout of site with noise sources and receptors is provided in Appendix C.

3.0 NOISE SOURCE SUMMARY

Two types of noise sources associated with the Project were identified: transformers and inverters. The inverters are located inside Medium Voltage Power Platform (MVPP) enclosure. There are ninety-seven (97) MVPPs proposed for this project, each houses two (2) SC-500HE-US 500 kW or equivalent inverters inside an enclosure and one (1) 1 MVA step-up transformer outdoor. A 110 MVA transformer is proposed for the substation. The layout of the site is provided in **Appendix C** and manufacturer's sound data for the MVPP is provided in **Appendix D**. Noise sources for the Project are shown in Figures 2 through 7 and are presented in Table 1.

3.1 Substation

The Project's electrical substation will be located south end of the PV panels on Property# 4 site. See layout in **Appendix C** for details. At this point, it is anticipated that the step-up power transformer located in the substation will have a maximum rating of 110 MVA. The proposed transformer cutsheet along with sound data is provided in **Appendix D**. For the purpose of evaluating the potential noise impacts of the transformer, the sound pressure levels in octave band were estimated to match the manufacturer's overall sound pressure level and converted to sound power level based on the transformer size. Conversion of sound pressure level to sound power level is included in **Appendix E**.

Power transformers are considered as tonal noise sources by the MOE. A 5-dB penalty is added to the sound power spectrum, as recommended by Publication MOE NPC-104, "Sound Level Adjustments" for tonality.

3.2 Medium Voltage Power Platforms (MVPP)

Ninety-seven (97) 1 MW rated SMA Medium Power Platforms are proposed for this project (see **Appendix D** for cutsheets). Fifty (50) of them are mitigated units. Each MVPP houses two (2) SC-500HE-US 500 kW or equivalent inverters inside an enclosure and one (1) 1 MVA step-up transformer outdoor. The unmitigated configuration consists of the MVPP enclosure assembly (both walls and roof), housing two 500 kW inverters, made of sandwich panels separating two 18 gauge steel sheets by 3-inch deep cavity filled with fibreglass insulation. Sound data provided for the unmitigated configuration includes two 500 kW inverters. The total sound power levels provided by the manufacturer include sound emanating from two inverters through the walls, roof, louvered doors and exhaust openings. However, they do not include noise contribution from the step-up transformer located outdoor. In the absence of manufacturer sound data for the step-up transformer associated with the MVPP, sound power levels were estimated from the Canadian Standard Association (CSA C227.4) based on the transformer capacity. The octave band spectrum were estimated to match the overall CSA sound pressure levels and converted to sound power levels based on the transformer size. The sound data for the enclosed inverters as provided by the manufacturer is added with the estimated spectral (to match the overall levels specified in CSA C227.4) sound data for one 1 MVA step-up transformer and used in the noise study.

The mitigated configuration of the MVPP enclosure includes perforated steel on the inner side of enclosure wall, instead of solid steel sheet. Additionally, each inverter exhaust is attached with an acoustically lined rectangular duct of 2 m in length. The acoustic lining inside the duct is 25 mm thick. Details of the mitigation are provided in the Sound Prediction Report for the MVPP units completed by HGC Engineering (see **Appendix D**), as provided by the manufacturer. The mitigated unit sound power levels provided by the manufacturer include sound emanating from two inverters through the walls, roof, louvered doors and exhaust openings. Estimated spectral sound data, to match the overall levels specified in CSA Standards, for one 1 MVA step-up transformer is added with the mitigated MVPP sound data for the noise study.

Each MVPP was modelled as single point source (combination of two enclosed inverters and one outdoor step-up transformer). A 5-dBA penalty was added to the frequency spectrum, as stipulated in Publication MOE NPC-104, "Sound Level Adjustments" to allow for tonality.

The "barrier effect" provided by the solar panels surrounding MVPPs has not been modelled, which means that the actual sound pressure levels at any Point of Reception (POR) may be lower than the predicted levels. The solar facility is not expected to operate during night-time and the inverters do not produce noise during night-time. However, the step-up transformers

will be energized and make some magnetostrictive noise at a reduced level. None of these assumptions should affect the conclusions of this study as AMEC has modelled the worst-case scenario.

The location of the substation transformer along with the noise barrier location is shown in Figure 5. The substation transformer and SMA MVPP technical specifications provided by the manufacturer are included in **Appendix D**. Noise calculations of transformers and MVPPs are included in **Appendix E**. A summary of the sound sources described above, including sound levels, characteristics and potential noise control measures is presented in Table 1.

3.3 Neighbouring Solar Projects (for Cumulative Noise Effect)

This noise study has taken into account cumulative noise effect from the neighbouring solar farms within 2 km of the proposed Sol-Luce Kingston Solar PV Energy Project. To determine adjacent solar projects, a search of current and proposed projects was completed within 2 km of the Project's property lines. The search was based on the Proponent's knowledge of other projects proposed; reviewing MOE's Renewable Energy Project listing (http://www.ene.gov.on.ca/environment/en/subject/renewable_energy/projects/index.htm); and reviewing websites of developers known to be active in the City of Kingston, Loyalist Township; and the County of Lennox-Addington. This search identified three potential projects within 2 km of the Project's property lines: SunE Westbrook Solar Farm; Kingston Gardiner Highway 2 South Solar Project; and SkyPower MajesticLight Solar Project. Of these, only the SunE Westbrook Solar Farm and Kingston Gardiner Highway 2 South Solar Project have published Noise Study Reports that could be used in this assessment. There was no information available on the MajesticLight Solar Project and its status is unknown.

Twenty (20) hut inverters, ten (10) hut transformers and one (1) substation transformer at the SunE Westbrook Solar Farm, and ten (10) inverters and one (1) substation transformer at the the Kingston Gardiner Hwy 2 South Solar Energy Project are included in the assessment. Sound power levels, location and heights for the noise sources are taken from the noise study report for the respective projects. Noise study reports for the SunE Westbrook Solar Farm and Kingston Gardiner Hwy 2 South Solar Energy Project are provided in **Appendix F**.

A 5-dB penalty is added to the sound power spectrum, as recommended by Publication MOE NPC-104, "Sound Level Adjustments" to allow for tonality.

A summary of the sound sources described above, including sound levels, characteristics and potential noise control measures is presented in Table 1.

Table 1: Noise Source Summary

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
Sol-luce Kingston Solar PV Energy Project								
MVPP_P1_U1	MVPP P1_U1	370621	4908990	2	94	O	S, T	U
MVPP_P1_U2	MVPP P1_U2	370577	4909119	2	85	O	S, T	A,E
MVPP_P1_U3	MVPP P1_U3	370538	4909228	2	85	O	S, T	A,E
MVPP_P2_1_U1	MVPP P2/1_U1	370203	4909423	2	85	O	S, T	A,E
MVPP_P3_U1	MVPP P3_U1	369993	4909219	2	85	O	S, T	A,E
MVPP_P3_U2	MVPP P3_U2	369978	4909070	2	85	O	S, T	A,E
MVPP_P3_U3	MVPP P3_U3	369982	4908911	2	85	O	S, T	A,E
MVPP_P3_U4	MVPP P3_U4	369987	4908772	2	85	O	S, T	A,E
MVPP_P3_U5	MVPP P3_U5	369993	4908622	2	85	O	S, T	A,E
MVPP_P3_U6	MVPP P3_U6	369999	4908483	2	85	O	S, T	A,E
MVPP_P4_U1	MVPP P4_U1	369372	4909404	2	94	O	S, T	U
MVPP_P4_U2	MVPP P4_U2	369379	4909265	2	85	O	S, T	A,E
MVPP_P4_U3	MVPP P4_U3	369386	4909135	2	85	O	S, T	A,E
MVPP_P4_U4	MVPP P4_U4	369392	4908996	2	85	O	S, T	A,E
MVPP_P4_U5	MVPP P4_U5	369399	4908857	2	85	O	S, T	A,E
MVPP_P6A_U1	MVPP P6A_U1	367784	4908543	2	85	O	S, T	A,E
MVPP_P6A_U2	MVPP P6A_U2	367677	4908275	2	85	O	S, T	A,E
MVPP_P6A_U3	MVPP P6A_U3	367885	4908345	2	85	O	S, T	A,E
MVPP_P7_9_10_U1	MVPP P7/9/10_U1	367060	4909157	2	94	O	S, T	U
MVPP_P7_9_10_U2	MVPP P7/9/10_U2	367065	4909018	2	94	O	S, T	U
MVPP_P7_9_10_U3	MVPP P7/9/10_U3	367071	4908869	2	94	O	S, T	U
MVPP_P7_9_10_U4	MVPP P7/9/10_U4	367077	4908730	2	94	O	S, T	U
MVPP_P11A_U1	MVPP P11A_U1	366918	4908601	2	94	O	S, T	U
MVPP_P11A_U2	MVPP P11A_U2	366926	4908402	2	94	O	S, T	U
MVPP_P11A_U3	MVPP P11A_U3	366933	4908214	2	85	O	S, T	A,E
MVPP_P12_U1	MVPP P12_U1	370075	4907387	2	94	O	S, T	U
MVPP_P12_U2	MVPP P12_U2	370078	4907278	2	94	O	S, T	U

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
MVPP_P12_U3	MVPP P12_U3	370083	4907119	2	94	O	S, T	U
MVPP_P12_U4	MVPP P12_U4	370219	4907387	2	94	O	S, T	U
MVPP_P12_U5	MVPP P12_U5	370225	4907188	2	94	O	S, T	U
MVPP_P12_U6	MVPP P12_U6	370229	4907069	2	85	O	S, T	A,E
MVPP_P12_U7	MVPP P12_U7	370234	4906930	2	85	O	S, T	A,E
MVPP_P14A_U1	MVPP P14A_U1	368309	4907326	2	94	O	S, T	U
MVPP_P14A_U2	MVPP P14A_U2	368304	4907445	2	94	O	S, T	U
MVPP_P14A_U3	MVPP P14A_U3	368299	4907574	2	85	O	S, T	A,E
MVPP_P14A_U4	MVPP P14A_U4	368293	4907714	2	85	O	S, T	A,E
MVPP_P14A_U5	MVPP P14A_U5	368289	4907792	2	85	O	S, T	A,E
MVPP_P14A_U6	MVPP P14A_U6	368284	4907912	2	85	O	S, T	A,E
MVPP_P14A_U7	MVPP P14A_U7	368506	4907096	2	94	O	S, T	U
MVPP_P14A_U8	MVPP P14A_U8	368502	4907216	2	94	O	S, T	U
MVPP_P14A_U9	MVPP P14A_U9	368498	4907315	2	94	O	S, T	U
MVPP_P14A_U10	MVPP P14A_U10	368494	4907445	2	94	O	S, T	U
MVPP_P14A_U11	MVPP P14A_U11	368489	4907574	2	85	O	S, T	A,E
MVPP_P14A_U12	MVPP P14A_U12	368484	4907713	2	85	O	S, T	A,E
MVPP_P14A_U13	MVPP P14A_U13	368482	4907792	2	85	O	S, T	A,E
MVPP_P14A_U14	MVPP P14A_U14	368478	4907912	2	85	O	S, T	A,E
MVPP_P14A_U15	MVPP P14A_U15	368689	4907107	2	94	O	S, T	U
MVPP_P14A_U16	MVPP P14A_U16	368685	4907246	2	94	O	S, T	U
MVPP_P14A_U17	MVPP P14A_U17	368680	4907395	2	94	O	S, T	U
MVPP_P14A_U18	MVPP P14A_U18	368675	4907534	2	85	O	S, T	A,E
MVPP_P14A_U19	MVPP P14A_U19	368670	4907674	2	85	O	S, T	A,E
MVPP_P14A_U20	MVPP P14A_U20	368664	4907824	2	85	O	S, T	A,E
MVPP_P14A_U21	MVPP P14A_U21	368660	4907953	2	85	O	S, T	A,E
MVPP_P14B_U1	MVPP P14B_U1	368116	4907445	2	94	O	S, T	U
MVPP_P14B_U2	MVPP P14B_U2	368110	4907564	2	94	O	S, T	U
MVPP_P14B_U3	MVPP P14B_U3	368105	4907693	2	85	O	S, T	A,E

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
MVPP_P14B_U4	MVPP P14B_U4	368102	4907772	2	85	O	S, T	A,E
MVPP_P14B_U5	MVPP P14B_U5	368096	4907901	2	85	O	S, T	A,E
MVPP_P14B_U6	MVPP P14B_U6	367924	4907655	2	85	O	S, T	A,E
MVPP_P14B_U7	MVPP P14B_U7	367918	4907784	2	85	O	S, T	A,E
MVPP_P14B_U8	MVPP P14B_U8	367912	4907952	2	85	O	S, T	A,E
MVPP_P14C_U1	MVPP P14C_U1	367645	4907280	2	94	O	S, T	U
MVPP_P14C_U2	MVPP P14C_U2	367641	4907400	2	94	O	S, T	U
MVPP_P14C_U3	MVPP P14C_U3	367636	4907501	2	94	O	S, T	U
MVPP_P14C_U4	MVPP P14C_U4	367783	4907471	2	94	O	S, T	U
MVPP_P19_20_U1	MVPP P19/20_U1	366019	4906494	2	94	O	S, T	U
MVPP_P19_U1	MVPP P19_U1	365997	4906621	2	85	O	S, T	A,E
MVPP_P19_U2	MVPP P19_U2	365954	4906721	2	85	O	S, T	A,E
MVPP_P19_U3	MVPP P19_U3	365906	4906830	2	85	O	S, T	A,E
MVPP_P19_U4	MVPP P19_U4	365796	4906591	2	94	O	S, T	U
MVPP_P19_U5	MVPP P19_U5	365748	4906701	2	85	O	S, T	A,E
MVPP_P20_U1	MVPP P20_U1	365521	4906738	2	94	O	S, T	U
MVPP_P21_U1	MVPP P21_U1	365072	4905332	2	85	O	S, T	A,E
MVPP_P21_U2	MVPP P21_U2	365012	4905471	2	85	O	S, T	A,E
MVPP_P21_U3	MVPP P21_U3	364960	4905590	2	94	O	S, T	U
MVPP_P21_U4	MVPP P21_U4	364888	4905799	2	94	O	S, T	U
MVPP_P21_U5	MVPP P21_U5	364850	4905889	2	94	O	S, T	U
MVPP_P21_U6	MVPP P21_U6	364807	4905988	2	94	O	S, T	U
MVPP_P21_U7	MVPP P21_U7	364764	4906087	2	94	O	S, T	U
MVPP_P21_U8	MVPP P21_U8	364722	4906187	2	85	O	S, T	A,E
MVPP_P21_U9	MVPP P21_U9	364667	4906316	2	85	O	S, T	A,E
MVPP_P22_U1	MVPP P22_U1	364908	4905312	2	94	O	S, T	U
MVPP_P22_U2	MVPP P22_U2	364845	4905461	2	94	O	S, T	U
MVPP_P22_U3	MVPP P22_U3	364757	4905640	2	94	O	S, T	U
MVPP_P22_U4	MVPP P22_U4	364685	4905809	2	94	O	S, T	U

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
MVPP_P22_U5	MVPP P22_U5	364626	4905948	2	85	O	S, T	A,E
MVPP_P22_U6	MVPP P22_U6	364479	4906107	2	85	O	S, T	A,E
MVPP_P23_U1	MVPP P23_U1	364702	4905253	2	94	O	S, T	U
MVPP_P23_U2	MVPP P23_U2	364647	4905382	2	94	O	S, T	U
MVPP_P23_U3	MVPP P23_U3	364591	4905511	2	94	O	S, T	U
MVPP_P23_U4	MVPP P23_U4	364536	4905640	2	94	O	S, T	U
MVPP_P23_U5	MVPP P23_U5	364473	4905789	2	94	O	S, T	U
MVPP_P23_U6	MVPP P23_U6	364418	4905918	2	85	O	S, T	A,E
MVPP_P23_U7	MVPP P23_U7	364363	4906049	2	85	O	S, T	A,E
MVPP_P24_U1	MVPP P24_U1	365119	4904975	2	94	O	S, T	U
MVPP_P24_U2	MVPP P24_U2	365141	4905113	2	85	O	S, T	A,E
MVPP_P24_U3	MVPP P24_U3	365345	4905015	2	94	O	S, T	U
TS	Transformer Station	369449	4908793	2.0	111	O	S, T	B
SunE Westbrook Solar Farm								
WB_H1T	Hut 1 Transformer	369688	4906178	1.8	78	O	S, T	U
WB_H1I1	Hut 1 Inverter 1	369687	4906173	2.5	89	O	S, T	E
WB_H1I2	Hut 1 Inverter 2	369689	4906173	2.5	89	O	S, T	E
WB_H2T	Hut 2 Transformer	369506	4906178	1.8	78	O	S, T	U
WB_H2I1	Hut 2 Inverter 1	369505	4906173	2.5	89	O	S, T	E
WB_H2I2	Hut 2 Inverter 2	369508	4906173	2.5	89	O	S, T	E
WB_H3T	Hut 3 Transformer	369325	4906178	1.8	78	O	S, T	U
WB_H3I1	Hut 3 Inverter 1	369323	4906173	2.5	89	O	S, T	E
WB_H3I2	Hut 3 Inverter 2	369326	4906173	2.5	89	O	S, T	E
WB_H4T	Hut 4 Transformer	369419	4906583	1.8	78	O	S, T	U
WB_H4I1	Hut 4 Inverter 1	369417	4906578	2.5	89	O	S, T	E
WB_H4I2	Hut 4 Inverter 2	369420	4906578	2.5	89	O	S, T	E
WB_H5T	Hut 5 Transformer	369876	4906583	1.8	78	O	S, T	U
WB_H5I1	Hut 5 Inverter 1	369875	4906578	2.5	89	O	S, T	E
WB_H5I2	Hut 5 Inverter 2	369877	4906578	2.5	89	O	S, T	E

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
WB_H6T	Hut 6 Transformer	369771	4906422	1.8	78	O	S, T	U
WB_H6I1	Hut 6 Inverter 1	369769	4906417	2.5	89	O	S, T	E
WB_H6I2	Hut 6 Inverter 2	369772	4906417	2.5	89	O	S, T	E
WB_H7T	Hut 7 Transformer	369724	4906583	1.8	78	O	S, T	U
WB_H7I1	Hut 7 Inverter 1	369722	4906578	2.5	89	O	S, T	E
WB_H7I2	Hut 7 Inverter 2	369725	4906578	2.5	89	O	S, T	E
WB_H8T	Hut 8 Transformer	369577	4906583	1.8	78	O	S, T	U
WB_H8I1	Hut 8 Inverter 1	369576	4906578	2.5	89	O	S, T	E
WB_H8I2	Hut 8 Inverter 2	369578	4906578	2.5	89	O	S, T	E
WB_H9T	Hut 9 Transformer	369383	4906392	1.8	78	O	S, T	U
WB_H9I1	Hut 9 Inverter 1	369382	4906388	2.5	89	O	S, T	E
WB_H9I2	Hut 9 Inverter 2	369385	4906388	2.5	89	O	S, T	E
WB_H10T	Hut 10 Transformer	369624	4906339	1.8	78	O	S, T	U
WB_H10I1	Hut 10 Inverter 1	369623	4906334	2.5	89	O	S, T	E
WB_H10I2	Hut 10 Inverter 2	369625	4906334	2.5	89	O	S, T	E
WB_ST	Substation Transformer	369703	4906057	2.5	89	O	S, T	U
KGH2_Sub	44-kV/10-MVA Substation transformer	366634	4903392	3	91	O	S, T	U
KGH2_Inv01	Sunny Central 1000MV inverter unit	366526	4903226	3.5	102	O	S, T	E, S
KGH2_Inv02	Sunny Central 1000MV inverter unit	366677	4903239	3.5	102	O	S, T	E, S
KGH2_Inv03	Sunny Central 1000MV inverter unit	366584	4903091	3.5	102	O	S, T	E, S
KGH2_Inv04	Sunny Central 1000MV inverter unit	366733	4903105	3.5	102	O	S, T	E, S
KGH2_Inv05	Sunny Central 1000MV inverter unit	366639	4902958	3.5	102	O	S, T	E, S

Source ID [1]	Source Description	UTM Coordinates		Source Height (m)	Sound Power Level [2] (dBA)	Source Location [3] (I or O)	Sound Characteristics [4] (S,Q,I,B,T,C)	Noise Control Measures [5] (S,A,B,L,E,O,U)
		Easting (m)	Northing (m)					
KGH2_Inv06	Sunny Central 1000MV inverter unit	366789	4902972	3.5	102	O	S, T	E, S
KGH2_Inv07	Sunny Central 1000MV inverter unit	366695	4902825	3.5	102	O	S, T	E, S
KGH2_Inv08	Sunny Central 1000MV inverter unit	366844	4902839	3.5	102	O	S, T	E, S
KGH2_Inv09	Sunny Central 1000MV inverter unit	366751	4902692	3.5	102	O	S, T	E, S
KGH2_Inv10	Sunny Central 1000MV inverter unit	366901	4902705	3.5	102	O	S, T	E, S

Notes to Table:

1. Source ID matches the identifiers used in the inverter layout.
2. Sound Power Level of Source, in dBA, including sound characteristic adjustments per NPC-104.
3. Source Location: O = Outside of building, including the roof, I = Inside of building
4. Sound Characteristic, per NPC-104
   S = Steady I = Impulsive T = Tonal
   Q = Quasi-Steady Impulsive B = Buzzing C = Cyclic
5. Noise Control Measures to Be Included
   S = Silencer/Muffler L = Lagging O = other
   A = Acoustic lining for the exhaust opening E = acoustic enclosure U = uncontrolled
   B = Barrier on south and west sides of the transformer station

4.0 MITIGATION MEASURES SUMMARY

The mitigation for operation of the Project has been modelled and considered to be feasible. The proposed mitigation for this project is: a) acoustic barriers on south and west sides of the substation transformer, and b) fifty (50) mitigated Medium Voltage Power Platform (MVPP) units as provided in the Sound Prediction Report for the MVPP units completed by HGC Engineering (see **Appendix D**). A combination of berms and barriers can also be used to mitigate the substation transformer noise impact on the PORs.

The minimum construction requirements for the proposed noise barrier for the substation transformer are presented in Table 2 (see Figure 5). Mitigated MVPPs are identified in Table 2a and noise barrier details for the substation transformer are provided in Table 2b.

Table 2a: Summary of Mitigation Measures (Inverters)

Source ID	Mitigation Description	Attenuation (dB)							
		63	125	250	500	1K	2K	4K	8K
MVPP_P1_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P1_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P2_1_U1	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U1	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U4	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P3_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P4_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P4_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter	5	8	13	18	18	18	18	18

Source ID	Mitigation Description	Attenuation (dB)							
		63	125	250	500	1K	2K	4K	8K
	exhausts								
MVPP_P4_U4	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P4_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P6A_U1	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P6A_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P6A_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P11A_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P12_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P12_U7	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U4	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U11	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U12	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U13	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U14	MVPP Acoustic Enclosure and 2m long lined duct for inverter	5	8	13	18	18	18	18	18

Source ID	Mitigation Description	Attenuation (dB)							
		63	125	250	500	1K	2K	4K	8K
	exhausts								
MVPP_P14A_U18	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U19	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U20	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14A_U21	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U4	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U7	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P14B_U8	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P19_U1	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P19_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P19_U3	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P19_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P21_U1	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P21_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter	5	8	13	18	18	18	18	18

Source ID	Mitigation Description	Attenuation (dB)							
		63	125	250	500	1K	2K	4K	8K
	exhausts								
MVPP_P21_U8	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P21_U9	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P22_U5	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P22_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P23_U6	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P23_U7	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18
MVPP_P24_U2	MVPP Acoustic Enclosure and 2m long lined duct for inverter exhausts	5	8	13	18	18	18	18	18

Note: The proposed mitigation listed above is for inverters only (i.e., inverters are inside the enclosure and transformers are located outdoors.

Table 2b: Noise Barrier Dimensions for the Substation

Mitigation ID	Location	Face Density (Kg/m2)	Approximate Length (m)	Approximate Height (m)	Maximum Distance From Source (m)	Starting UTM Coordinates		Ending UTM Coordinates	
						Easting (m)	Northing (m)	Easting (m)	Northing (m)
Barrier_1	South of substation	20	88	6	45	369406	4908761	369494	4908766
Barrier_2	West of substation	20	61	6	29	369406	4908761	369403	4908822

Note: Barrier-source distance is from the centre of the source

5.0 POINT OF RECEPTION (POR) SUMMARY

A total of one hundred and twenty-three (123) representative points of reception are identified in the area and are considered in this noise study. They include seventy-seven (77) existing houses and forty-six (46) vacant lots.

5.1 Existing Houses

Seventy-seven (77) existing houses surrounding the proposed Sol-Luce Kingston Solar PV Energy Project are identified and considered in this assessment. They are presented in Table 3 and shown in Figures 8 through 13. The receptor location considered for all houses are at 1.5 m above the grade and 30 m away from the house as they are the worse impact location.

5.2 Vacant Lots

Forty-six (46) vacant lots surrounding the proposed Sol-Luce Kingston Solar PV Energy Project are identified and considered in this assessment. They are presented in Table 3 and shown in Figures 8 through 13. The receptor location considered for all vacant lots are at 4.5 m above the grade as advised by the MOE. As agreed in discussion with the MOE, vacant lots considered in this assessment are only those which experience 35 dBA or higher noise levels from the Sol-Luce Kingston Solar PV Energy Project (see **Appendix G**).

Zoning maps for the site are included in **Appendix B**. UTM coordinates for all modelled receptors are provided in Table 3.

Table 3: Points of Reception Summary

POR ID [1]	Point of Reception Description	UTM Coordinate	
		Easting	Northing
POR001	House 01	363674	4905289
POR002	House 02	363794	4905429
POR003	House 03	364074	4905779
POR004	House 04	364166	4905882
POR005	House 05	364246	4906051
POR006	House 06	364328	4906180
POR007	House 07	364435	4906341
POR008	House 08	364423	4906517
POR009	House 09	364535	4906443
POR010	House 10	364496	4906731
POR011	House 11	364877	4906760
POR012	House 12	364575	4906916
POR013	House 13	365438	4906947
POR014	House 14	365824	4906970
POR015	House 15	365813	4907340
POR016	House 16	366006	4907398
POR017	House 17	366076	4906749
POR018	House 18	366177	4906667
POR019	Vacant Lot Receptor 01	366249	4906424
POR020	Vacant Lot Receptor 02	366287	4906347
POR021	House 19	366841	4906227
POR022	House 20	366774	4906090
POR023	House 21	366475	4906165
POR024	House 22	366036	4906191
POR025	House 23	366367	4906131
POR026	House 24	366282	4906105
POR027	House 25	366121	4906011
POR028	House 26	365896	4906109
POR029	Vacant Lot Receptor 03	365719	4905791
POR030	Vacant Lot Receptor 04	365618	4905717
POR031	Vacant Lot Receptor 05	365573	4905681
POR032	Vacant Lot Receptor 06	365636	4905676
POR033	Vacant Lot Receptor 07	365583	4905637
POR034	House 27	365333	4905535
POR035	Vacant Lot Receptor 08	365369	4905459
POR036	House 28	365290	4905358
POR037	House 29	365179	4904779
POR038	House 30	364852	4904498
POR039	House 31	364699	4904336
POR040	House 32	364673	4904024
POR041	House 33	364533	4904010
POR042	House 34	364334	4903986
POR043	House 35	364403	4904262
POR044	House 36	364210	4904183
POR045	House 37	364139	4904010

POR ID [1]	Point of Reception Description	UTM Coordinate	
		Easting	Northing
POR046	House 38	366749	4907702
POR047	Vacant Lot Receptor 09	366794	4907844
POR048	Vacant Lot Receptor 10	366917	4907854
POR049	House 39	366878	4907989
POR050	Vacant Lot Receptor 11	366765	4908063
POR051	House 40	366607	4908072
POR052	Vacant Lot Receptor 12	366663	4908145
POR053	House 41	366624	4908373
POR054	Vacant Lot Receptor 13	366705	4908451
POR055	House 42	366652	4908460
POR056	House 43	366655	4908543
POR057	Vacant Lot Receptor 14	366635	4908622
POR058	Vacant Lot Receptor 15	366624	4908749
POR059	House 44	366582	4908917
POR060	House 45	366648	4909043
POR061	Vacant Lot Receptor 16	367016	4910060
POR062	Vacant Lot Receptor 17	367266	4910349
POR063	Vacant Lot Receptor 18	367411	4910357
POR064	House 46	367120	4908246
POR065	House 47	367056	4908173
POR066	Vacant Lot Receptor 19	367428	4908096
POR067	House 48	367336	4907996
POR068	House 49	367424	4907955
POR069	House 50	367640	4907903
POR070	House 51	367636	4907974
POR071	House 52	367669	4908129
POR072	House 53	367948	4908749
POR073	House 54	368275	4908124
POR074	House 55	368313	4908138
POR075	Vacant Lot Receptor 20	368426	4908150
POR076	House 56	368477	4908346
POR077	House 57	368826	4908612
POR078	House 58	368762	4908115
POR079	Vacant Lot Receptor 21	368878	4908170
POR080	Vacant Lot Receptor 22 (WB V18)	369098	4908093
POR081	Vacant Lot Receptor 23 (WB V11)	369215	4908086
POR082	House 59	369362	4908338
POR083	Vacant Lot Receptor 24	369605	4908239
POR084	House 60	369758	4908368
POR085	House 61	369924	4908274
POR086	Vacant Lot Receptor 25 (WB V14)	369797	4908147
POR087	Vacant Lot Receptor 26 (WB V19)	369899	4908142
POR088	House 62	370056	4908282
POR089	House 63	370552	4908625
POR090	House 64	370697	4908843
POR091	House 65	370666	4909184

POR ID [1]	Point of Reception Description	UTM Coordinate	
		Easting	Northing
POR092	House 66	370365	4909176
POR093	House 67	370413	4909228
POR094	House 68	370488	4909382
POR095	House 69	370378	4909505
POR096	Vacant Lot Receptor 27	370422	4909603
POR097	Vacant Lot Receptor 28	370395	4909646
POR098	House 70 (WB R21)	370771	4907280
POR099	House 71 (WB R20)	370967	4907225
POR100	House 72 (WB R19)	370930	4907207
POR101	Vacant Lot Receptor 29 (WB V17)	370902	4907096
POR102	House 73 (WB R18)	370804	4907054
POR103	Vacant Lot Receptor 30 (WB V8)	370645	4906988
POR104	Vacant Lot Receptor 31 (WB V6)	370603	4907066
POR105	Vacant Lot Receptor 32 (WB V10)	370408	4906967
POR106	House 74 (WB V5)	370350	4906948
POR107	Vacant Lot Receptor 33 (WB V19)	370372	4906952
POR108	Vacant Lot Receptor 34 (WB V7)	370400	4906775
POR109	Vacant Lot Receptor 35 (WB V4)	370294	4906668
POR110	House 75 (WB Receptor 17)	370307	4906548
POR111	House 76 (WB R16)	370314	4906430
POR112	Vacant Lot Receptor 36 (WB V3)	369878	4906079
POR113	House 77 (WB R15)	369827	4906079
POR114	Vacant Lot Receptor 37	368966	4906833
POR115	Vacant Lot Receptor 38	368747	4906779
POR116	Vacant Lot Receptor 39	368537	4906762
POR117	Vacant Lot Receptor 40 (WB V2)	368508	4906042
POR118	Vacant Lot Receptor 41 (WB V1)	368414	4906049
POR119	Vacant Lot Receptor 42	367483	4906764
POR120	Vacant Lot Receptor 43	367133	4906729
POR121	Vacant Lot Receptor 44	367503	4906637
POR122	Vacant Lot Receptor 45	367326	4906616
POR123	Vacant Lot Receptor 46	367154	4906611

6.0 APPLICABLE GUIDELINES

The noise sources associated with the Project are classified as “stationary sources”, under the MOE definitions. As referenced in the MOE’s, “Basic Comprehensive Certificates of Approval User Guide” the applicable environmental noise guidelines are found in the MOE Publication NPC-205, *“Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)”and* NPC-232, *“Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)”.*

The Project is located in a Class 3 Area, based on the classification defined in Publication NPC-232 by the MOE. A Class 3 area is defined as one which is dominated by natural sounds, around the clock, where there is infrequent human activity and no clearly audible stationary

sources other than those being assessed. This is typical of a rural, agricultural area; rural, recreational (cottage, resort) area; wilderness area; or a community with minimal population.

The applicable MOE guideline states that one-hour sound exposures (L_{eq} (1hr)) from stationary noise sources in Class 3 (rural) areas shall not exceed that of the background, where the background is considered to be:

- The higher of 45 dBA or background noise, during daytime hours (0700 - 1900h); and
- The higher of 40 dBA, or background noise, during the early evening (1900 - 2300h) and nighttime (2300 - 0700h).

The Project will be operating during the daytime hours, 7:00 to 19:00 during most of the year. However, in the summer months, the sun may set past 21:00, although the inverters will be well below 100% loading conditions. This means that during the summer the Project will be operating at the time the applicable performance limit changes from 45 dBA to 40 dBA. During night-time hours the transformers are energized and therefore, the modelled sound pressure levels were compared to the lower limit of 40 dBA.

7.0 IMPACT ASSESSMENT

Offsite sound exposures due to the Project operations were modelled using Cadna/A, a computerized version of the ISO 9613 environmental noise propagation algorithms, produced by Datakustik GmbH. The modelling took into account the following factors:

- Source sound power level;
- Distance attenuation;
- Source-receptor geometry including heights and elevations;
- Surrounding topography;
- Ground and air (atmospheric) attenuation; and
- Meteorological effects on noise propagation.

The elevation contours for the project site were taken from the Ontario Base Maps (OBM). The assessment of predictable worst-case facility impacts was completed through modelling as the facility is yet to be built. The combined Leq (1 hour) dBA values for the worst-case scenario were predicted at points of reception POR001 through POR123 from the individual significant sources as summarized in Appendix H. Noise contours have also been generated for the worst-case operation, and are shown in Figures 14 through 19. Key parameters along with sample calculation for the worst impacted receptor are included in Appendix I.

The noise study summary is provided in Table 4. Predicted sound levels at each point of reception are not expected to exceed the night-time criteria. Therefore, the Project is expected to be in compliance with MOE NPC-232 guidelines as presently configured.

Table 4: Noise Study Summary

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
POR001	House 01	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes
		Night-time	33	No	40		Yes
POR002	House 02	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR003	House 03	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR004	House 04	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR005	House 05	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR006	House 06	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR007	House 07	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR008	House 08	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR009	House 09	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR010	House 10	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Night-time	31	No	40		Yes
POR011	House 11	Daytime	35	No	45	D	Yes
		Evening	35	No	40		Yes
		Night-time	35	No	40		Yes
POR012	House 12	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR013	House 13	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR014	House 14	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR015	House 15	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes
		Night-time	31	No	40		Yes
POR016	House 16	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes
		Night-time	31	No	40		Yes
POR017	House 17	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR018	House 18	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR019	Vacant Lot Receptor 01	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR020	Vacant Lot Receptor 02	Daytime	37	No	45	D	Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR021	House 19	Daytime	29	No	45	D	Yes
		Evening	29	No	40		Yes
		Night-time	29	No	40		Yes
POR022	House 20	Daytime	28	No	45	D	Yes
		Evening	28	No	40		Yes
		Night-time	28	No	40		Yes
POR023	House 21	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR024	House 22	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR025	House 23	Daytime	32	No	45	D	Yes
		Evening	32	No	40		Yes
		Night-time	32	No	40		Yes
POR026	House 24	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes
		Night-time	33	No	40		Yes
POR027	House 25	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR028	House 26	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR029	Vacant Lot Receptor 03	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
POR030	Vacant Lot Receptor 04	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR031	Vacant Lot Receptor 05	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR032	Vacant Lot Receptor 06	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR033	Vacant Lot Receptor 07	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR034	House 27	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR035	Vacant Lot Receptor 08	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR036	House 28	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR037	House 29	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR038	House 30	Daytime	35	No	45	D	Yes
		Evening	35	No	40		Yes
		Night-time	35	No	40		Yes
POR039	House 31	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Night-time	33	No	40		Yes
POR040	House 32	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes
		Night-time	31	No	40		Yes
POR041	House 33	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR042	House 34	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR043	House 35	Daytime	32	No	45	D	Yes
		Evening	32	No	40		Yes
		Night-time	32	No	40		Yes
POR044	House 36	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes
		Night-time	31	No	40		Yes
POR045	House 37	Daytime	29	No	45	D	Yes
		Evening	29	No	40		Yes
		Night-time	29	No	40		Yes
POR046	House 38	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR047	Vacant Lot Receptor 09	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR048	Vacant Lot Receptor 10	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR049	House 39	Daytime	37	No	45	D	Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR050	Vacant Lot Receptor 11	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR051	House 40	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR052	Vacant Lot Receptor 12	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR053	House 41	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR054	Vacant Lot Receptor 13	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR055	House 42	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR056	House 43	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR057	Vacant Lot Receptor 14	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR058	Vacant Lot Receptor 15	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
POR059	House 44	Daytime	32	No	45	D	Yes
		Evening	32	No	40		Yes
		Night-time	32	No	40		Yes
POR060	House 45	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes
		Night-time	33	No	40		Yes
POR061	Vacant Lot Receptor 16	Daytime	28	No	45	D	Yes
		Evening	28	No	40		Yes
		Night-time	28	No	40		Yes
POR062	Vacant Lot Receptor 17	Daytime	26	No	45	D	Yes
		Evening	26	No	40		Yes
		Night-time	26	No	40		Yes
POR063	Vacant Lot Receptor 18	Daytime	25	No	45	D	Yes
		Evening	25	No	40		Yes
		Night-time	25	No	40		Yes
POR064	House 46	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR065	House 47	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR066	Vacant Lot Receptor 19	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR067	House 48	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR068	House 49	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Night-time	38	No	40		Yes
POR069	House 50	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR070	House 51	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR071	House 52	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR072	House 53	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR073	House 54	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR074	House 55	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR075	Vacant Lot Receptor 20	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR076	House 56	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR077	House 57	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR078	House 58	Daytime	40	No	45	D	Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR079	Vacant Lot Receptor 21	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR080	Vacant Lot Receptor 22	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR081	Vacant Lot Receptor 23	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR082	House 59	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR083	Vacant Lot Receptor 24	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR084	House 60	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR085	House 61	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR086	Vacant Lot Receptor 25	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR087	Vacant Lot Receptor 26	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
POR088	House 62	Daytime	38	No	45	D	Yes
		Evening	38	No	40		Yes
		Night-time	38	No	40		Yes
POR089	House 63	Daytime	35	No	45	D	Yes
		Evening	35	No	40		Yes
		Night-time	35	No	40		Yes
POR090	House 64	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR091	House 65	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR092	House 66	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR093	House 67	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR094	House 68	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR095	House 69	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR096	Vacant Lot Receptor 27	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR097	Vacant Lot Receptor 28	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Night-time	36	No	40		Yes
POR098	House 70	Daytime	31	No	45	D	Yes
		Evening	31	No	40		Yes
		Night-time	31	No	40		Yes
POR099	House 71	Daytime	29	No	45	D	Yes
		Evening	29	No	40		Yes
		Night-time	29	No	40		Yes
POR100	House 72	Daytime	29	No	45	D	Yes
		Evening	29	No	40		Yes
		Night-time	29	No	40		Yes
POR101	Vacant Lot Receptor 29	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR102	House 73	Daytime	30	No	45	D	Yes
		Evening	30	No	40		Yes
		Night-time	30	No	40		Yes
POR103	Vacant Lot Receptor 30	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR104	Vacant Lot Receptor 31	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR105	Vacant Lot Receptor 32	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR106	House 74	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR107	Vacant Lot Receptor 33	Daytime	40	No	45	D	Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAl)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR108	Vacant Lot Receptor 34	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR109	Vacant Lot Receptor 35	Daytime	37	No	45	D	Yes
		Evening	37	No	40		Yes
		Night-time	37	No	40		Yes
POR110	House 75	Daytime	35	No	45	D	Yes
		Evening	35	No	40		Yes
		Night-time	35	No	40		Yes
POR111	House 76	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR112	Vacant Lot Receptor 36	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR113	House 77	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR114	Vacant Lot Receptor 37	Daytime	39	No	45	D	Yes
		Evening	39	No	40		Yes
		Night-time	39	No	40		Yes
POR115	Vacant Lot Receptor 38	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes
POR116	Vacant Lot Receptor 39	Daytime	40	No	45	D	Yes
		Evening	40	No	40		Yes
		Night-time	40	No	40		Yes

Point of Reception ID	Point of Reception Description	Time Period [1]	Total Sound Level at PoR [2] (dBA)	Verified by Acoustic Audit [3] (Yes/No)	Performance Limit [4] (dBA/dBAI)	Performance Limit Source [4] (C / M/ D)	Compliance with Performance Limit (Yes/No)
POR117	Vacant Lot Receptor 40	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes
		Night-time	33	No	40		Yes
POR118	Vacant Lot Receptor 41	Daytime	33	No	45	D	Yes
		Evening	33	No	40		Yes
		Night-time	33	No	40		Yes
POR119	Vacant Lot Receptor 42	Daytime	36	No	45	D	Yes
		Evening	36	No	40		Yes
		Night-time	36	No	40		Yes
POR120	Vacant Lot Receptor 43	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR121	Vacant Lot Receptor 44	Daytime	35	No	45	D	Yes
		Evening	35	No	40		Yes
		Night-time	35	No	40		Yes
POR122	Vacant Lot Receptor 45	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes
POR123	Vacant Lot Receptor 46	Daytime	34	No	45	D	Yes
		Evening	34	No	40		Yes
		Night-time	34	No	40		Yes

Notes :

1 Daytime occurs from 0700-1900h. Evening occurs from 1900h to 2300h. Night-time occurs from 2300-0700h
2 Worst-case cumulative sound level from all applicable sources operating.
3 Has an acoustic audit (as defined in Publication NPC-233) been conducted with source in place and operating?
4 Applicable worst-case NPC-205 / NPC-232 sound level limit.
5 Performance limit (aka guideline limit) based on following:
C = Calculated based on road traffic volumes in compliance with NPC-206 requirements.
M = Measured based on monitoring for a minimum 48 hour period, in accordance with NPC-233 requirements.
D = Default guideline minima per NCP-205 / NPC-232, as applicable (e.g., 50 dBA daytime for NPC-205)

Cumulative noise effect from Sol-luce Kinston Solar PV Energy Project and the neighbouring solar farms (SunE Westbrook Solar Farm and Kingston Gardiner Highway 2 South Solar Project) and their individual noise contributions were assessed and they are provided in a concordance table in Appendix J.

8.0 CONCLUSIONS

A Noise Study Report has been completed for the proposed Sol-Luce Kingston Solar PV Energy Project in Kingston, Ontario to support a Renewable Energy Approval (REA) application, as required under Ontario Regulation 359/09. As presently configured, the proposed project is expected to be in compliance with MOE NPC-232 guidelines and therefore no additional noise mitigation is required.

9.0 REFERENCES

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