

June 21, 2021

Joshua Chavez
Midwest Solar DevCo CEI, LLC
8800 N. Gainey Center Dr., Suite 250
Scottsdale, AZ 85258, USA

**Re: Posey Solar Project; Noise Evaluation Report
Posey County, IN
Project No. R0027286.00**

Dear Joshua:

Westwood Professional Services (Westwood) was authorized by Midwest Solar DevCo CEI, LLC to provide noise modeling for the Posey Solar Project in Posey County, Indiana. The purpose of this modeling is to determine noise levels generated from 94 inverter skid locations consisting of one inverter at each location, and one potential substation location in the central portion of the Project Area consisting of 1 main transformer. (see maps in Attachment A).

Predicted noise levels were determined using the Cadna-A noise propagation and modeling software. The Project Area falls within ANSI S12.9-13/Part 3 Category 5: Quiet Residential Areas with an assumed typical daytime ambient noise level of approximately 45.0 dBA. Due to the rural nature of the Site, Westwood modeled the inverters and transformer as point sources and determined the distance at which the noise generated by the project attenuated to match rural background noise levels.

According to manufacturer provided data, the Sungrow SG3150U inverters are expected to produce approximately 79 dBA measured at 1 meter from the noise source during peak production. The main power transformer located in the substation yard is expected to have a maximum sound level of 90 dB based on National Electrical Manufacturers Association (NEMA) Standard TR-1 (Attachment B). Since data sheets were not available for the proposed substation transformer, they were conservatively modeled to produce 90 dBA at 1 meter from the transformer. Predicted noise levels were determined using an aggregate of output levels from the transformer and inverters. The total distance from the noise generation sources until rural background noise levels are reestablished are discussed below.

The inverter locations throughout the Project Area reestablished rural background sound levels of 45 dBA on an average of 40 meters (~131 feet) from the location centers. Therefore, the inverter skids could be located at this distance from the property line while still reestablishing background sound levels at the property line.

The transformer within the substation yard reestablished rural background sound levels at a distance of 129 meters (~423 feet) from the transformer center. The substation transformer noise level attenuates to 60 dBA at approximately 25 meters (~82 feet) from the transformer center.

For both the inverter skids and the substation transformer, ambient levels are generally re-established within the project boundary, no discernable increase in sound levels are expected outside the project perimeter. The loudest noise sensitive receptor is located 263 meters southeast of the substation transformer and is modeled as experiencing a project noise contribution of 39.2 dBA. The predicted noise concentration zones and propagation model are shown on the attached Exhibits.

Based on the total predicted distances to reestablishing rural background sounds levels, the noise levels produced by the Posey Solar Facility is properly mitigated by the distances existing between noise sources and the Project Boundary and no impacts are expected from the facility on the surrounding area.

In performing its services, Westwood Professional Services used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

If you have any questions or wish to discuss any particular aspect of the project, please feel free to call Jeff Fine at (720) 586-8104. We look forward to being of continued service to you.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES, INC.

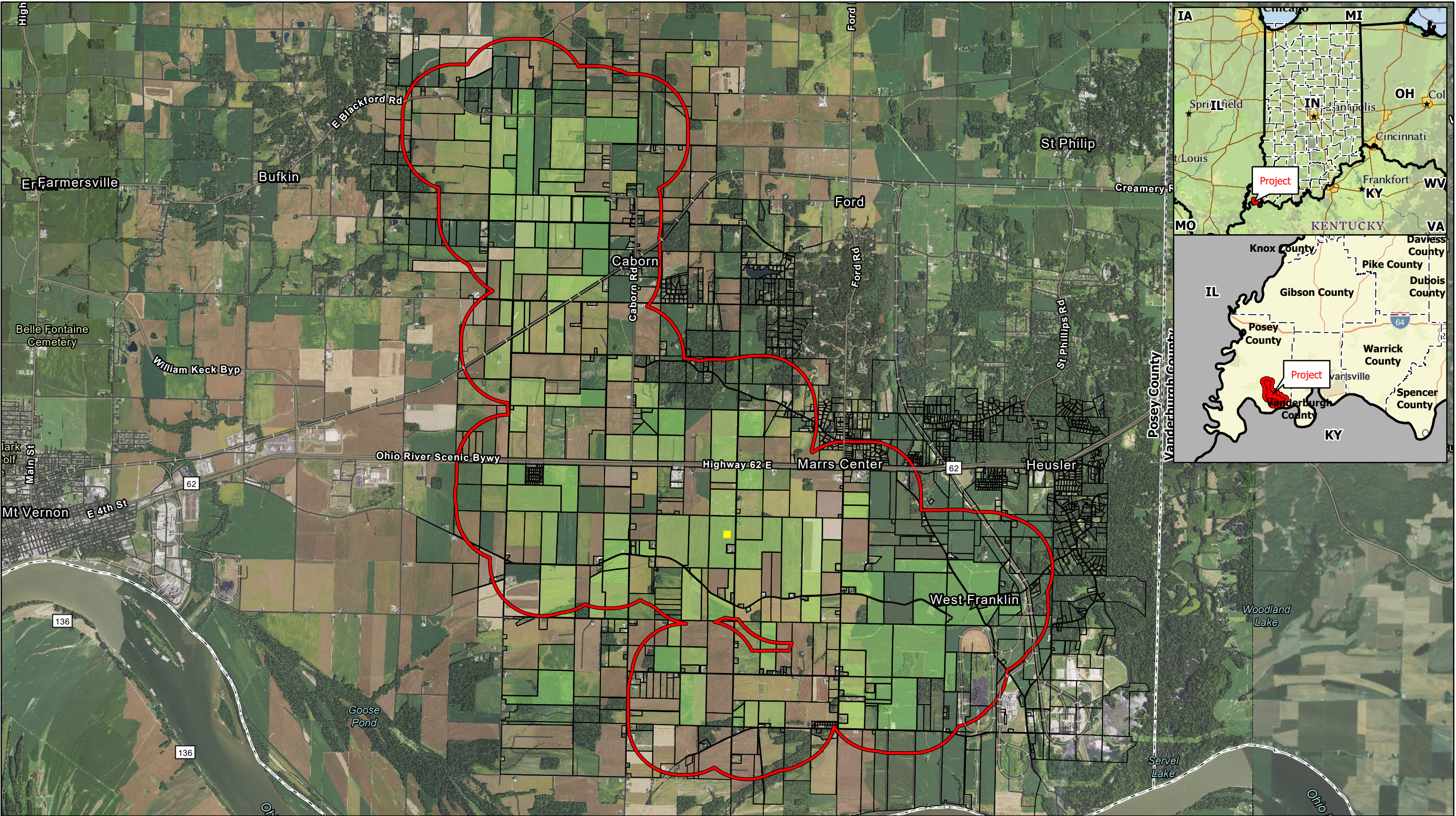


Jeff Fine
Energy Resource Manager

Attachment A: Maps

Attachment B: Equipment Specifications

Attachment C: Sound Levels of Non-Participant Residences within 1000 ft. of Infrastructure



Data Source(s): Westwood (2021); Esri WMS World Imagery, National Geographic, & World Streets Basemaps (Accessed 2021); USDA NAIP Posey County (2018); US Census Bureau (2020).

Westwood

Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com

Westwood Professional Services, Inc.

Legend

- Project Boundary
- Substation
- Participating Parcel
- Non-Participating Parcel
- Road
- County Boundary



0 4,600 Feet

Posey Solar Project

Posey County, Indiana

Project Overview

EXHIBIT 1

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Posey Noise Ex1 ProjectOverview - Ex01 ProjectOverview 18/2/2021 11:25 AM | BWH\aral



Data Source(s): Westwood (2021); Esri WMS
World Imagery Basemap (Accessed 2021); US
Census Bureau (2020).

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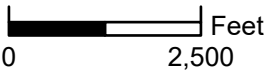
Legend

- Project Boundary
- Substation Boundary
- Participating Parcel
- Non-Participating Parcel
- Inverter Skid

- Substation Transformer
- Primary Dwelling on a Participating Parcel
- Primary Dwelling on an Adjoining Non-Participating Parcel
- Commercial Building

Decibel Level

- 45dBA
- 50dBA
- 55dBA
- 60dBA



Posey Solar Project

Posey County, Indiana

North Posey Noise Impact Assessment



Data Source(s): Westwood (2021); Esri WMS World Imagery Basemap (Accessed 2021); US Census Bureau (2020).

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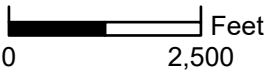
Legend

- Project Boundary
- Substation Boundary
- Participating Parcel
- Non-Participating Parcel
- Inverter Skid

- Substation Transformer
- Primary Dwelling on a Participating Parcel
- Primary Dwelling on an Adjoining Non-Participating Parcel
- Commercial Building

Decibel Level

- 45dBA
- 50dBA
- 55dBA
- 60dBA



Posey Solar Project

Posey County, Indiana

North Posey Noise Impact Assessment



Data Source(s): Westwood (2021); Esri WMS World Imagery Basemap (Accessed 2021); US Census Bureau (2020).

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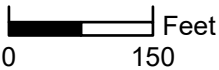
Westwood Professional Services, Inc.

Legend

- Project Boundary
- Substation Boundary
- Participating Parcel
- Non-Participating Parcel
- Inverter Skid

- Substation Transformer
- Primary Dwelling on a Participating Parcel
- Primary Dwelling on an Adjoining Parcel
- Commercial Building

- Decibel Level**
- 45dBA
 - 50dBA
 - 55dBA
 - 60dBA



Posey Solar Project
Posey County, Indiana
Substation Noise
Impact Assessment



Data Source(s): Westwood (2021); Esri WMS
World Imagery Basemap (Accessed 2021); US
Census Bureau (2020).

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Westwood Professional Services, Inc.

Legend



Inverter Skid
Boundary



Inverter Skid

Decibel Level

45dBA



50dBA



55dBA



60dBA



Feet

Posey Solar Project

Posey County, Indiana

Single Inverter Noise
Impact Assessment

EXHIBIT 5

Noise Test Report

TYPE TEST SHEET

This Type Test sheet shall be used to record the results of the type testing of Generating Unit			
Type Tested reference number		SG3150U	
Generating Unit technology		Grid-connected PV Inverter	
System supplier name		Sungrow Power Supply Co., Ltd.	
Address		No.1699 Xiyou Rd., New & High Technology Industrial Development Zone, Hefei, P.R. China	
Tel	+86 551 65327834	Fax	+86 551 6532 7800
E:mail	info@sungrow.cn	Web site	www.sungrowpower.com
Maximum export capacity, use separate sheet if more than one connection option.	N/A	kW single phase, single, split or three phase system	
		kW three phase	
	N/A	kW two phases in three phase system	
	N/A	kW two phases split phase system	
Compiled by		On behalf of	Sungrow Power Supply Co., Ltd.
		Test Date	2019-5-13
Note that testing can be done by the manufacturer of an individual component, by an external test house, or by the supplier of the complete system, or any combination of them as appropriate. Where parts of the testing are carried out by persons or organisations other than the supplier then the supplier shall keep copies of all test records and results supplied to them to verify that the testing has been carried out by people with sufficient technical competency to carry out the tests.			

The aim of this test is to determine the noise level when the PV Grid inverter in rated working condition

Used settings of the measurement device for Noise measurement

Measurement device	Date of measurement
AWA6228	2019-5-13

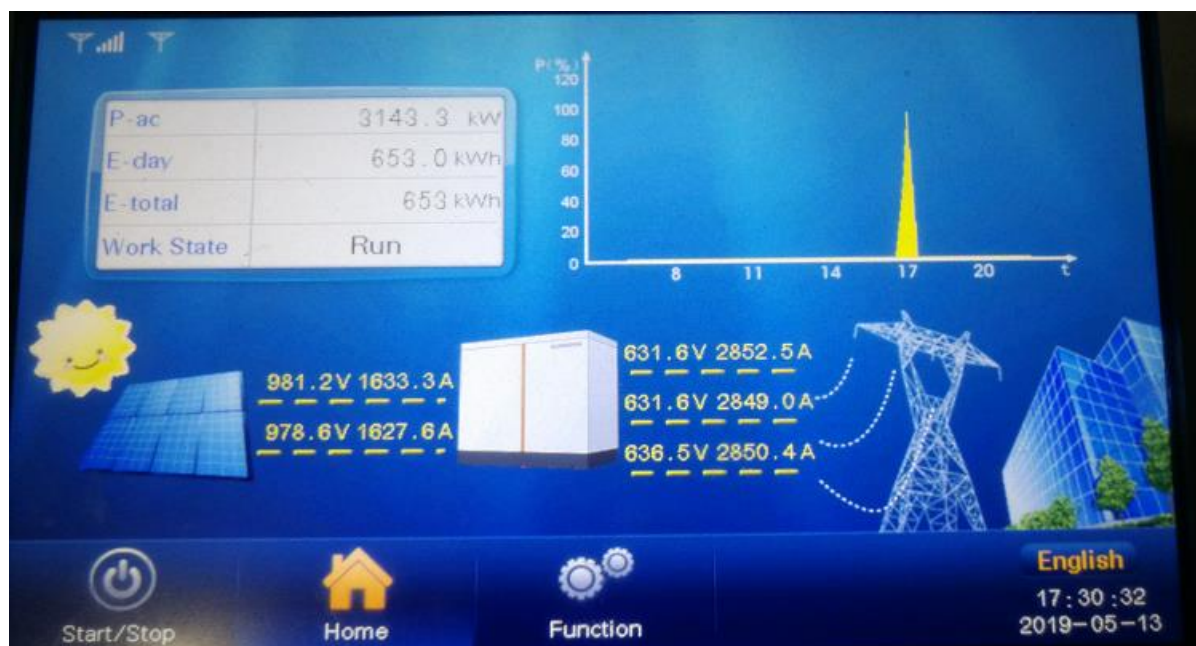
The condition s during testing are specified below:

PGU operation mode	Rated Working Condition
Voltage range	800-1300V
Grid frequency range	50Hz/ 45-55Hz
Distance	1m
Date	2019-5-13

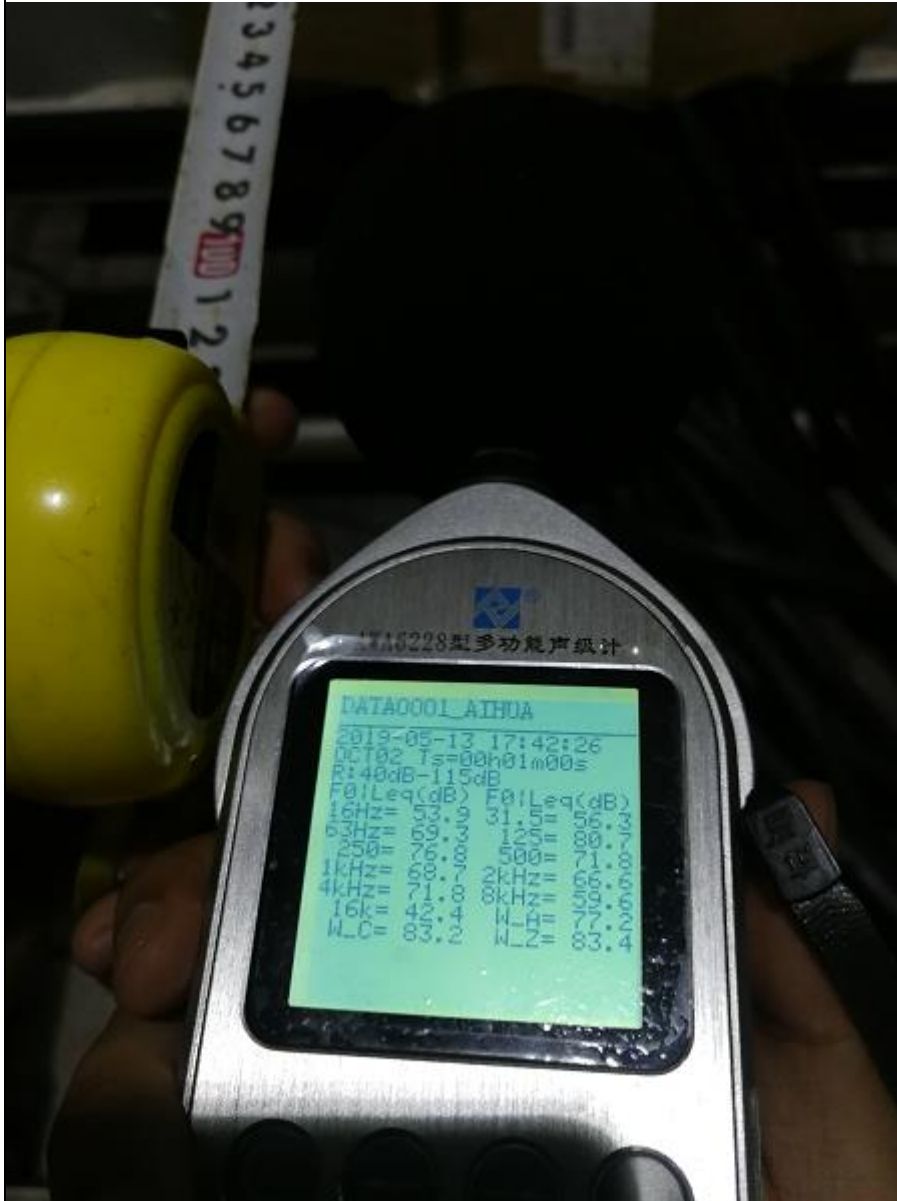
The system noise level please check the table below.

Orientation	Noise (dB)
Front	77.2
Behind	77.5
Left	78.1
Right	79

Photo:
Operation Condition:



Front Test :



Test Record

Frequency(Hz)	Noise(dB)	Frequency(Hz)	Noise(dB)
16	53.9	1k	68.7
31.5	56.3	2k	66.6
63	69.3	4k	71.8
125	80.7	8k	59.6
250	76.8	16k	42.4
500	71.8	W_A	77.2

Behind:



Test Record

Frequency(Hz)	Noise(dB)	Frequency(Hz)	Noise(dB)
16	55.9	1k	70.6
31.5	64.8	2k	68.3
63	69.5	4k	69.7
125	77.6	8k	59.6
250	77.4	16k	43.1
500	74.4	W_A	77.5

Left:



Test Record

Frequency(Hz)	Noise(dB)	Frequency(Hz)	Noise(dB)
16	56.3	1k	70.7
31.5	67.7	2k	68.4
63	69.7	4k	71.3
125	78.6	8k	62.5
250	78.8	16k	52.9
500	73.1	W_A	78.1

Right:



Test Record

Frequency(Hz)	Noise(dB)	Frequency(Hz)	Noise(dB)
16	57.1	1k	71.7
31.5	67.9	2k	69.6
63	72.7	4k	71.4
125	81.4	8k	63.9
250	78.4	16k	53.2
500	75.4	W_A	79.0

Sungrow Power Supply Co., Ltd.
Add: No. 1699 Xiyou Road, Hefei, China
Tel: +86 551 6532 7834
Email: info@sungrow.cn
Website: www.sungrowpower.com



Additional comments

ble 0-2 -IMMERSED POWER TRANSFORMERS

AUDIBLE SOUND LEVELS F1

Max BIL

Column 1 - Class*OA, Ow and FOW Ratings
Column 2 - Class*FA and FOA First stage Auxiliary Cooling**†
Column 3 - Straight FOA* Ratings, FA* FOA* Second-stage Auxiliary Cooling*†

Average Sound Level ††, Decibels	Equivalent Two-winding Rating Δ									1300 kV BIL and Above		
	350 kV BIL and Below			450, 550, 650 kV BIL			750 and 825 kV BIL			900 and 1050 kV BIL		
	1	2	3	1	2	3	1	2	3	1	2	3
57	700	...	...	...	...	...	...	...	...	...	...	...
58	1000	...	...	...	...	...	...	...	...	...	...	...
59	...	...	...	700	...	...	...	...	...	...	...	...
60	1500	...	...	1000	...	...	...	...	...	...	...	...
61	2000	...	...	...	...	...	...	...	...	...	...	...
62	2500	...	...	1500	...	...	...	...	...	...	...	...
63	3000	...	...	2000	...	...	...	...	...	...	...	...
64	4000	...	...	2500	...	...	...	...	...	...	...	...
65	5000	...	...	3000	...	...	...	...	...	...	...	...
66	6000	...	...	4000	...	...	...	...	...	...	...	...
67	7500	6250 ΔΔ	...	5000	3750 ΔΔ	...	4000	3125 ΔΔ	...	...	...	...
68	10000	7500	...	6000	5000	...	5000	3750	...	...	...	...
69	12500	9375	...	7500	6250	...	6000	5000	...	...	...	...
70	15000	12500	...	10000	7500	...	7500	6250	...	...	...	...
71	20000	16667	...	12500	9375	...	10000	7500	...	...	...	...
72	25000	20000	20800	15000	12500	...	12500	9375	...	...	...	...
73	30000	26667	25000	20000	16667	...	15000	12500	...	...	...	...
74	40000	33333	33333	25000	20000	20800	20000	16667	...	12500	...	...
75	50000	40000	41667	30000	26667	25000	25000	20000	16667	15000	...	...
76	60000	53333	50000	40000	33333	33333	30000	26667	20800	20000	15000	...
77	80000	66667	66667	50000	40000	41667	40000	33333	33333	25000	20000	16667
78	100000	80000	83333	60000	53333	50000	50000	40000	40000	33333	25000	20000
79	...	106667	100000	80000	66667	66667	60000	53333	50000	40000	33333	25000
80	...	133333	133333	100000	80000	83333	80000	66667	66667	50000	40000	33333
81	...	...	166667	...	106667	100000	100000	80000	83333	66667	50000	41667
82	...	...	200000	...	133333	133333	...	106667	100000	80000	66667	50000
83	...	...	250000	...	...	166667	...	133333	100000	80000	66667	50000
84	...	...	300000	...	...	200000	...	166667	133333	100000	80000	66667
85	...	...	400000	...	...	250000	...	200000	166667	133333	100000	80000
86	...	...	...	...	...	300000	...	250000	200000	166667	133333	100000
87	...	...	...	...	...	400000	...	300000	250000	200000	166667	133333
88	...	...	...	...	...	...	...	400000	300000	250000	200000	166667
89	...	...	...	...	...	...	...	...	400000	300000	250000	200000
90	...	...	...	...	...	...	...	...	...	400000	300000	250000
91	...	...	...	...	...	...	...	...	...	...	400000	300000

*Classes of cooling (see 2.6.1 of American National Standard C57.12.00-1988).

**First- and second-stage auxiliary cooling (see TR 1.0.02).

††For column 2 and 3 ratings, the sound levels are with the auxiliary cooling equipment in operation.

‡‡For intermediate kVA ratings, use the average sound level of the next larger kVA rating.

Δ The equivalent two-winding 55°C or 65°C rating is defined as one-half the sum of the kVA rating of all windings.

ΔΔ Sixty-seven decibels for all kVA ratings equal to this or smaller.

NAD 1983 UTM Zone 16N				
Receptor ID [Non-Participating Residences within 1,000 ft of proposed infrastructure]	Northing	Easting	Elevation (m)	Project Noise Contribution [dBA]
1	4205110.1	428175.4	133.7	24.3
2	4205092.9	428448.1	136.5	24.7
3	4205051.5	428160.4	133.7	25.7
4	4204570.3	430615.1	122.0	24.5
5	4204566.0	430742.6	121.9	20.7
6	4204408.8	429991.8	134.0	23.5
7	4204010.7	430038.2	130.6	23.5
8	4203844.6	430209.2	136.4	26
9	4203788.9	430094.5	130.1	28.1
10	4203286.2	428104.5	145.9	24.9
11	4203150.4	430066.2	139.7	32
12	4202391.8	430020.3	130.7	21.3
13	4202267.3	429081.3	118.4	28.7
14	4202161.3	429786.8	124.8	21.1
15	4201447.9	430394.7	138.5	18.5
16	4201425.9	429840.7	140.4	21.1
17	4201346.2	429767.6	139.4	22.5
18	4201283.1	430496.5	148.9	22
19	4201258.9	430650.9	143.1	18.6
20	4200981.7	430446.8	149.0	29.5
21	4200736.5	430432.7	134.7	24.5
22	4200725.2	432192.5	146.2	24.6
23	4200693.7	430376.6	136.9	26.2
24	4200683.4	430429.2	134.4	26.5
25	4200603.1	430928.3	126.5	25.6
26	4200514.8	430505.4	127.9	28.4
27	4200430.3	430441.3	124.6	27.1
28	4200363.9	430472.0	123.6	30.7
29	4200102.5	431355.5	121.4	30.9
30	4199754.5	432061.8	121.0	28.1
31	4199618.4	428794.8	117.8	29.5
32	4199606.9	431335.9	117.2	27.7
33	4199586.1	428998.2	117.8	30.1
34	4199562.2	428792.9	117.8	30.4
35	4199559.7	428995.5	117.8	30.6
36	4199557.4	428865.5	117.8	30.5
37	4199555.9	428837.0	117.8	30.5
38	4199555.7	428921.4	117.8	30.6
39	4199541.9	430418.1	117.8	27.6
40	4199532.1	428996.1	117.8	31.2
41	4199516.2	428893.7	117.8	31.3
42	4199513.2	428866.2	117.8	31.3
43	4199512.8	428834.8	117.8	31.3

44	4199510.4	428919.3	117.8	31.5
45	4199508.9	428953.6	117.8	31.6
46	4199508.2	428791.8	117.8	31.4
47	4199501.2	428996.4	117.8	31.8
48	4199490.6	433618.6	123.2	24.3
49	4199454.1	428789.4	117.8	32.5
50	4199452.3	428890.9	117.8	32.7
51	4199451.1	428919.4	117.8	32.8
52	4199448.1	428992.5	117.8	33.1
53	4199410.2	428875.2	117.8	33.6
54	4199410.1	428769.0	117.8	33.5
55	4199409.4	428822.2	117.8	33.5
56	4199409.4	428848.8	117.8	33.6
57	4199409.1	428984.9	117.8	34.2
58	4199408.1	428931.7	117.8	33.9
59	4199332.0	433617.8	121.6	25.4
60	4199155.2	432041.7	118.1	32.6
61	4198929.8	431078.9	117.8	32.9
62	4198895.5	433599.8	120.3	28
63	4198732.8	430416.1	117.8	30.4
64	4198459.1	435089.4	127.0	22
65	4198454.9	430417.4	118.1	30
66	4198426.0	430730.7	118.1	26.7
67	4198411.8	435206.0	127.5	19.8
68	4198363.2	431949.0	117.8	39.2
69	4198290.5	435256.9	127.1	21.3
70	4198251.7	435807.8	126.1	20.1
71	4198234.2	434046.6	118.4	26.7
72	4198233.2	435279.6	124.2	22
73	4198203.3	429921.4	117.8	25.8
74	4198198.1	430729.5	117.8	26
75	4198130.7	434010.8	118.0	28.6
76	4198130.0	433970.4	118.1	28.5
77	4198092.7	429843.8	118.1	23.2
78	4198074.5	431269.8	117.9	29.9
79	4197849.8	436103.3	124.1	17.9
80	4197818.0	436567.3	139.7	15
81	4197817.4	436114.9	125.2	17.8
82	4197775.2	433633.2	118.1	28.7
83	4197744.0	436280.9	133.7	14.9
84	4197741.7	436227.9	132.6	16.6
85	4197726.7	433655.4	117.8	27.4
86	4197717.4	433756.9	117.8	29.5
87	4197716.1	433721.3	117.8	28.6
88	4197710.1	436643.7	131.0	10.1
89	4197579.8	435737.4	125.1	23.1
90	4197328.4	435250.2	121.5	27.8

91	4196558.6	431528.4	115.9	23.3
92	4196552.2	431387.4	114.8	23.8
93	4196526.4	431178.6	114.8	23.9
94	4196514.8	433558.9	115.0	20.9
95	4196512.7	433597.7	115.1	21.4
96	4196464.6	433625.1	115.1	20.3
97	4196436.2	430977.0	114.8	23.5
98	4196436.1	431084.5	114.8	24.9
99	4196393.6	433540.0	115.1	19.9
100	4196377.2	431102.5	114.8	26.4
101	4196377.2	433395.1	114.8	19.8
102	4196296.7	434030.0	115.1	31.4
103	4196186.5	433615.3	114.8	18.6
104	4196018.5	432012.7	116.9	23.7
105	4195663.8	432400.7	115.0	30.1
106	4195580.4	432698.7	115.5	22.2