## Appendix E

# NOISE ANALYSIS REPORT

**Barrelhead Solar, LLC**

Wayne County, Kentucky

COPPERHEAD
ENVIRONMENTAL CONSULTING

# Acoustical Analysis for the Proposed Barrelhead Solar Project Wayne County, Kentucky

Prepared for:

Barrelhead Solar, LLC

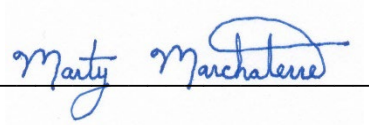
12 August 2025

COPPERHEAD ENVIRONMENTAL CONSULTING, INC.
P.O. BOX 73 ■ 471 MAIN STREET ■ PAINT LICK, KENTUCKY 40461
(859) 925-9012 OFFICE (859) 925-9816 FAX

www.copperheadconsulting.com

**Prepared By:**

**Copperhead Environmental Consulting, Inc.**
**PO Box 73**
**471 Main Street**
**Paint Lick, KY 40461**



**Marty Marchaterre**
**Senior Environmental Planner**

**August 12, 2025**

# TABLE OF CONTENTS

# LIST OF TABLES



# LIST OF FIGURES



**Appendices**

# INTRODUCTION

Barrelhead Solar, LLC (the Applicant) proposes to construct a solar energy facility (the Project in Wayne County. The Project would be situated on approximately 307 acres and is located on KY 1009 and Massingale Road, southwest of the city of Monticello, Kentucky (Figure 1).

The Project is an approximately 54 megawatt (MW) solar facility that would generate electricity using photovoltaic solar panels. It would include solar panel arrays, inverter boxes, a utility interconnection substation, transformer, and overhead and underground electrical conveyance lines.

# EXISTING LAND USE AND SITE CONDITIONS

According to the National Land Cover Database (NLCD) for Wayne County, the Project Area currently consists of agricultural fields/cultivated crops and pasture (Figure 2). Historically, the Project Area has been used for agriculture. Land uses on adjacent properties include agriculture, scattered wood lots, and rural residences.

# EXISTING SOUND CONDITIONS

## Nearest Sensitive Receptors

Sound-sensitive receptors are generally defined as locations where people reside or where the presence of unwanted sound may adversely affect the existing land use. Typically, sound-sensitive land uses include residences, hospitals, places of worship, libraries, performance spaces, offices, and schools, as well as nature preserves, recreational areas, and parks.

Receptors adjacent to the Project Area are nearby residences located primarily along KY 1009, Massingale/Pleasant Ridge Road, and Happy Top Road (Figure 3). Non-residential receptors include a church, cemeteries, agricultural buildings, and the Alpha Post Office (Figure 4). A total of 58 receptors, which are primarily residences (52), were identified within 2,000 feet of the Project Area boundary.

The nearest receptor to a proposed solar array is the Buncan Cemetery (NR-05) located on KY 1009, approximately 161 feet from the nearest array. The Buncan Cemetery is also the closest receptor to a proposed inverter pad, approximately 463 feet away. The nearest receptor is approximately 1,616 feet from the proposed substation (R-24). Table 1 displays the distance from each receptor to the nearest proposed solar infrastructure.

**Table 1. Residential (R) and Non-Residential (NR) Receptors within 2000-ft of the Project Area, Distances to the Nearest Infrastructure Components.**

| Receptor ID | Distance to Project Area Boundary (feet) | Distance to Nearest Array (feet) | Distance to Substation (feet) | Distance to Nearest Inverter (feet) |
|---|---|---|---|---|
| R-01 | 1,689 | 1,750 | 4,793 | 2,458 |
| R-02 | 414 | 502 | 4,088 | 930 |
| R-03 | 168 | 252 | 3,851 | 744 |
| R-04 | 98 | 205 | 3,646 | 908 |
| R-05 | 95 | 182 | 3,723 | 542 |
| R-06 | 814 | 940 | 4,178 | 1,274 |
| R-07 | 470 | 534 | 3,140 | 1,099 |
| R-08 | 309 | 372 | 2,952 | 840 |
| R-09 | 190 | 277 | 3,570 | 986 |
| R-10 | 257 | 353 | 3,280 | 1,086 |
| R-11 | 593 | 750 | 3,549 | 1,493 |
| R-12 | 1,087 | 1,192 | 3,438 | 1,893 |
| R-13 | 1,258 | 1,384 | 3,199 | 2,020 |
| R-14 | 307 | 442 | 2,044 | 758 |
| R-15 | 78 | 214 | 1,854 | 529 |
| R-16 | 1,668 | 2,032 | 3,623 | 2,701 |
| R-17 | 182 | 293 | 1,630 | 739 |
| R-18 | 951 | 1,068 | 2,383 | 1,407 |
| R-19 | 998 | 1,431 | 3,214 | 2,172 |
| R-20 | 1,403 | 1,456 | 2,683 | 1,664 |
| R-21 | 1,517 | 1,981 | 3,902 | 2,740 |
| R-22 | 608 | 664 | 1,757 | 761 |
| R-23 | 701 | 741 | 1,780 | 898 |
| R-24 | 547 | 592 | 1,616 | 842 |
| R-25 | 1,855 | 2,245 | 4,175 | 2,969 |
| R-26 | 954 | 1,131 | 2,430 | 1,434 |
| R-27 | 1,380 | 1,546 | 3,011 | 1,913 |
| R-28 | 1,005 | 1,170 | 2,421 | 1,480 |
| R-29 | 1,629 | 1,796 | 3,211 | 2,148 |
| R-30 | 1,340 | 1,506 | 2,745 | 1,815 |
| R-31 | 1,490 | 1,676 | 2,994 | 1,987 |
| R-32 | 1,315 | 1,480 | 2,685 | 1,792 |
| R-33 | 960 | 1,145 | 1,812 | 1,789 |
| R-34 | 1,297 | 1,465 | 2,627 | 1,779 |
| R-35 | 1,300 | 1,476 | 2,562 | 1,789 |
| R-36 | 1,209 | 1,437 | 2,435 | 1,803 |

| Receptor ID | Distance to Project Area Boundary (feet) | Distance to Nearest Array (feet) | Distance to Substation (feet) | Distance to Nearest Inverter (feet) |
|---|---|---|---|---|
| R-37 | 1,540 | 1,706 | 2,894 | 2,019 |
| R-38 | 1,876 | 2,050 | 3,414 | 2,386 |
| R-39 | 1,810 | 1,992 | 3,255 | 2,295 |
| R-40 | 1,284 | 1,478 | 2,348 | 1,994 |
| R-41 | 1,345 | 1,562 | 2,522 | 1,991 |
| R-42 | 1,478 | 1,708 | 2,706 | 2,050 |
| R-43 | 1,516 | 1,718 | 2,603 | 2,205 |
| R-44 | 1,562 | 1,757 | 2,607 | 2,264 |
| R-45 | 1,623 | 1,811 | 2,620 | 2,339 |
| R-46 | 1,569 | 1,785 | 2,454 | 2,396 |
| R-47 | 1,926 | 2,151 | 3,126 | 2,518 |
| R-48 | 1,905 | 2,090 | 2,754 | 2,740 |
| R-49 | 1,912 | 2,108 | 2,935 | 2,609 |
| R-50 | 1,959 | 2,170 | 3,074 | 2,614 |
| R-51 | 1,946 | 2,209 | 2,906 | 2,728 |
| R-52 | 2,011 | 2,248 | 2,983 | 2,756 |
| NR-01 | 1,170 | 1,248 | 4,705 | 1,587 |
| NR-02 | 1,984 | 2,082 | 4,771 | 2,819 |
| NR-03 | 1,816 | 1,914 | 4,600 | 2,671 |
| NR-04 | 75 | 208 | 3,357 | 525 |
| NR-05 | 56 | 161 | 3,291 | 463 |
| NR-06 | 1,905 | 2,086 | 3,343 | 2,389 |

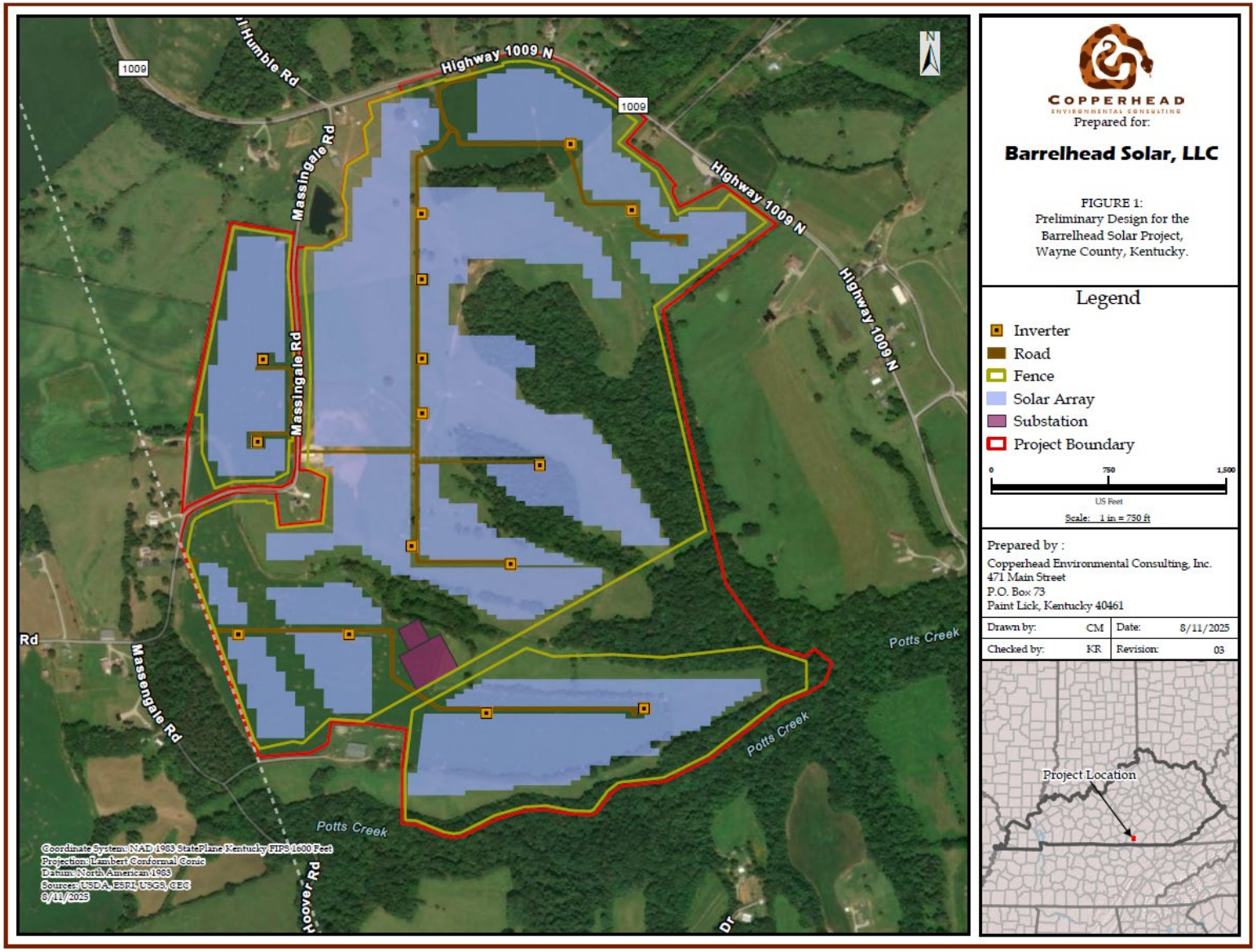



**Figure 1. Project location and preliminary design plans.**

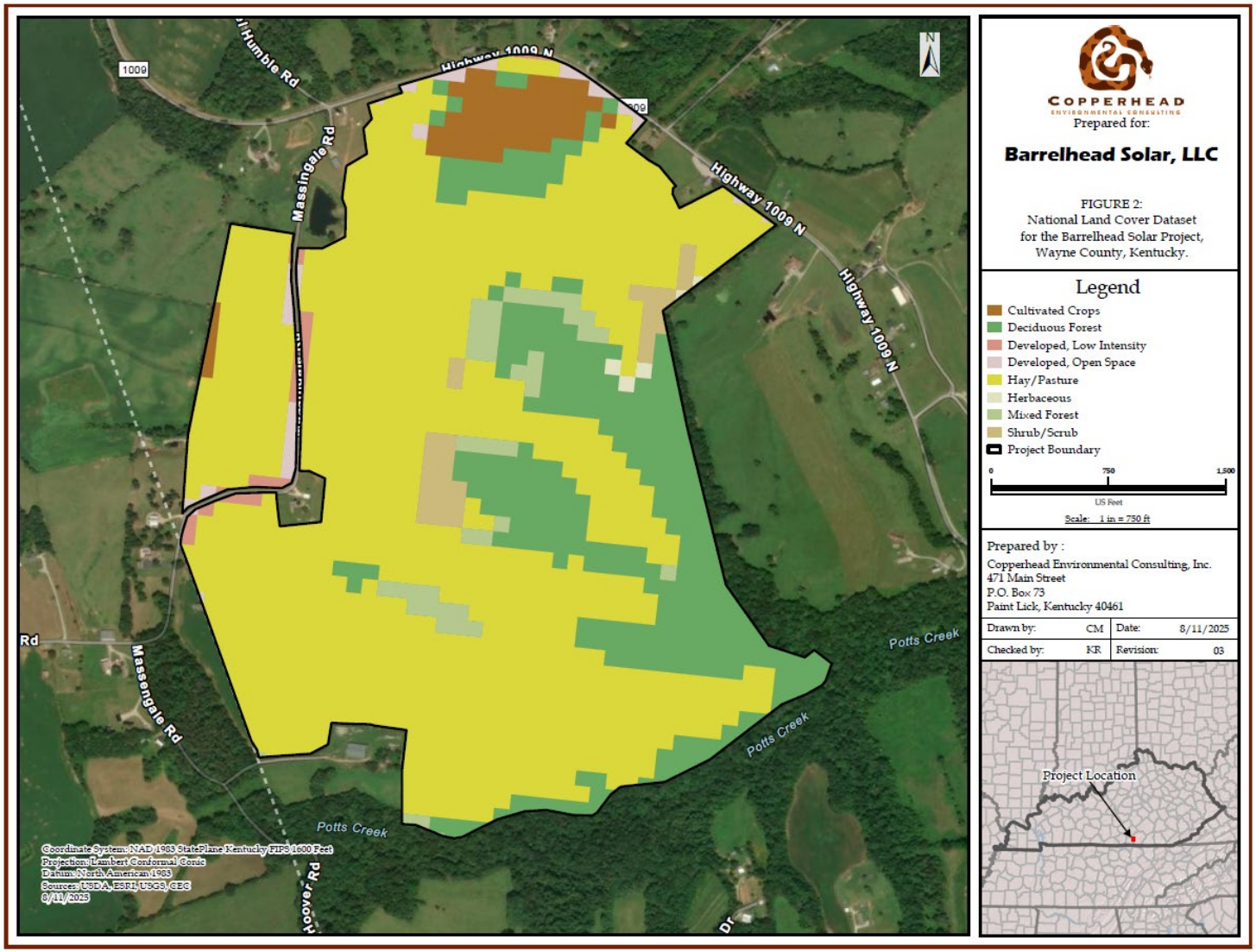



**Figure 2. Land cover types within the Project Area.**

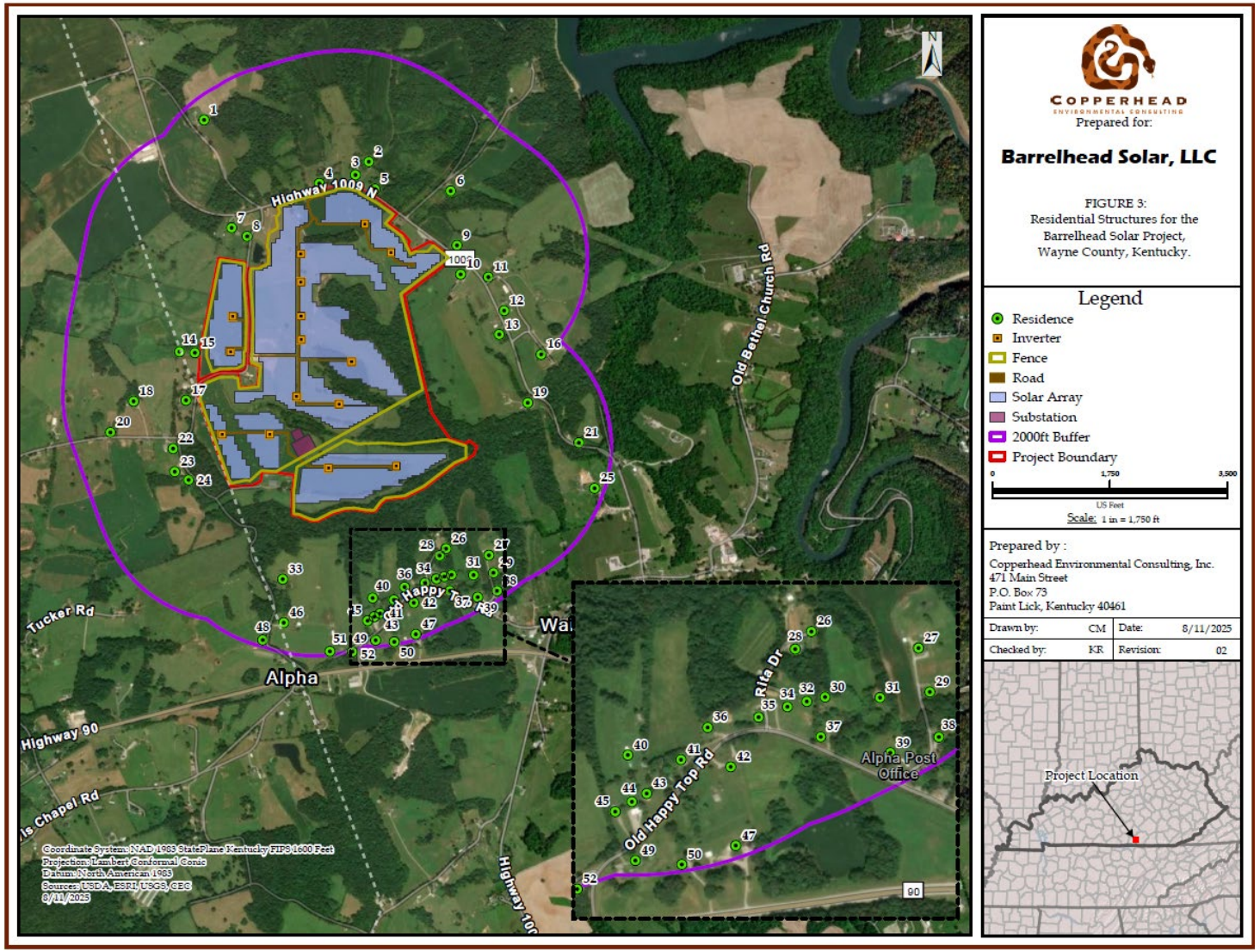



**Figure 3. Residential receptors within 2,000 ft of the Project Area.**

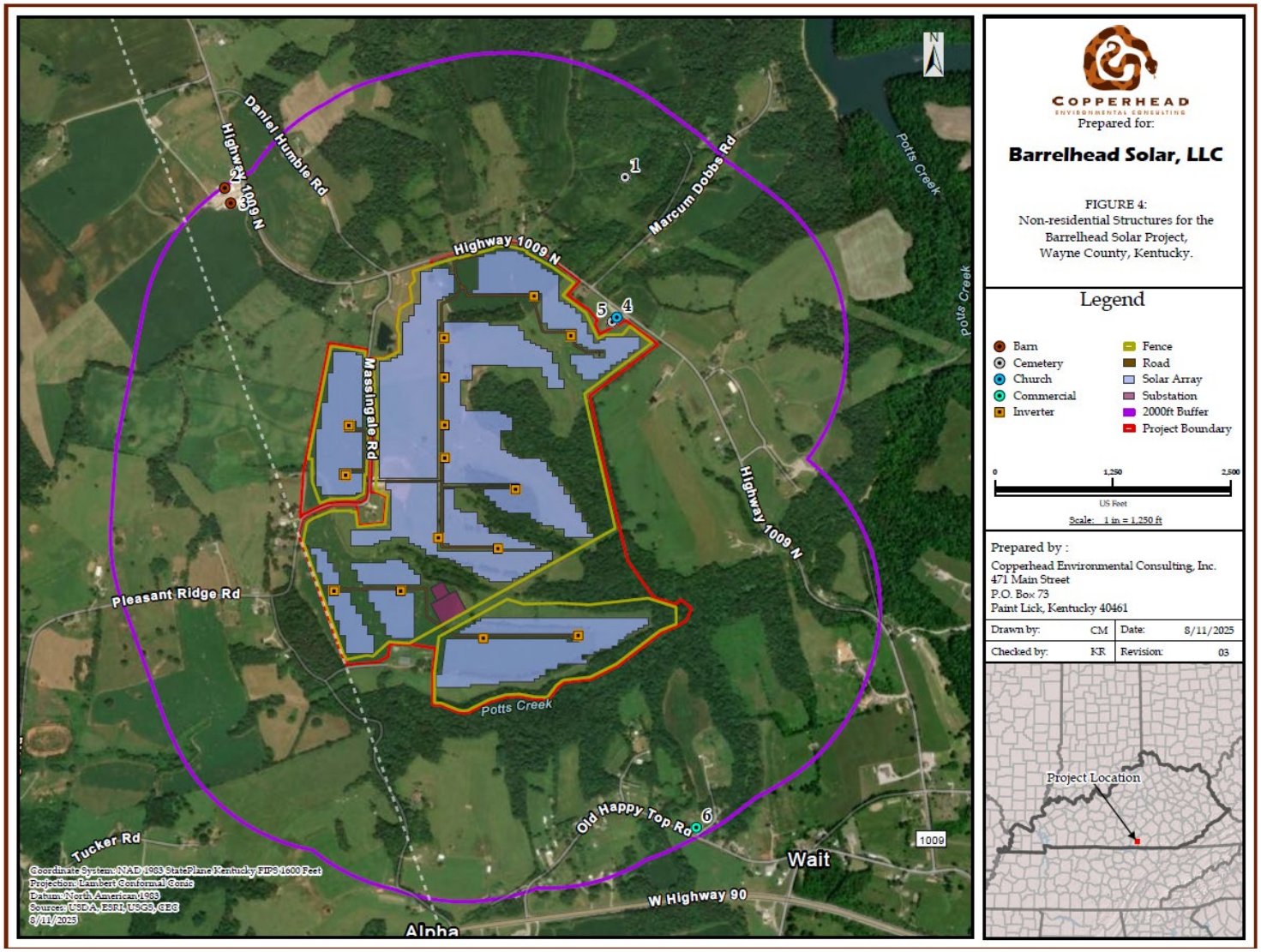



**Figure 4. Non-residential receptors within 2,000 ft of the Project Area.**

## Existing Sound from Surrounding Areas

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (Ldn). Ldn is the community noise metric recommended by the US Environmental Protection Agency (USEPA) and has been adopted by most federal agencies (USEPA 1974). A Ldn of 65 A-weighted decibels (dBA) is the most common level for noise planning purposes and represents a compromise between community impact and the need for activities such as construction. The A-weighting network measures sound in a similar fashion to how a person perceives or hears sound, thus achieving a strong correlation with how people perceive acceptable and unacceptable sound levels.

Areas exposed to a Ldn above 65 dBA are generally not considered suitable for residential use. A Ldn of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974). For reference, approximate sound levels (measured in dBA) of common activities/situations are provided in Table 1.

**Table 2. Sound Levels of Common Activities/Situations.**

| Activity/Event | dBA |
|---|---|
| Lowest audible sound to person with average hearing | 0 |
| Quiet rural, nighttime (outdoors) | 25 |
| Crickets, distant frogs | 30 |
| Birds, distant dog bark | 40 |
| Quiet urban, nighttime (outdoors) | 45 |
| Large business office (indoors) | 60 |
| Normal speech at 3 feet (indoors) | 60-70 |
| Noisy urban area, daytime (outdoors) | 75 |
| Food blender at 3 feet | 85 |
| Gas lawn mower at 3 feet | 100 |

| Activity/Event | dBA |
|---|---|
| Jet flyover at 1,000 feet | 110 |

Source: Caltrans 2013.

Local conditions such as traffic, topography, and wind can alter background sound conditions. In general, the Ldn sound levels for outdoor quiet rural nighttime conditions are approximately 25 dBA (EPA 1974). Sound levels attenuate (or diminish) at a rate of approximately 6 dBA per doubling of distance from an outdoor point source due to the geometric spreading of the sound waves. The inverse square law is used to estimate noise levels at different distances.

## Existing Project Site Area Sound

The Project is within an agricultural, rural-residential, and undeveloped area of Wayne County. Ambient sound at the Project Area consists mainly of agricultural sounds, such as noise from farm machinery; natural sounds, such as from wind and wildlife; and moderate traffic sounds. Sound levels of these types generally range from 45 to 55 dBA (USDOT 2015).

Typical sounds produced from farming and agriculture activities surrounding the Project Area include trucks, all-terrain vehicles (ATVs), tractors, and other farming equipment. The adjacent farms produce sound similar to those within the Project Area. Table 3 lists the sound level of common agricultural sounds.

**Table 3. Decibel Ratings of Common Agricultural Sounds.**

| Decibel | Sound |
|---|---|
| 30 | Crickets, distant frogs, whisper |
| 40 | Kitten meowing, songbirds, distant dog bark |
| 50 | Refrigerator running, babbling stream, quiet empty barn |
| 60 | Average conversation level |
| 70 | Chicken coop, busy restaurant. At this level, noise may begin to affect your hearing if exposed over a long period of time. |
| 80 | Tractor idling, barn cleaner, conveyors, elevators. These noises can damage hearing if exposed for more than eight continuous hours. |
| 90 | Tractor at 50 percent load, blower, compressor, combine. As noise levels increase, the "safe" exposure time decreases, damage can occur in less than eight hours. |

| Decibel | Sound |
|---|---|
| 100 | Tractor at 80 percent load, pig squeal, power tools. Even two hours of exposure can be dangerous. With each 5-decibel increase, the "safe time" is cut in half. |
| 120 | Tractor at full load, bad muffler, old chain saw. The danger is immediate. |
| 140 | Gunshot, backfire, dynamite blast. Any length of exposure time is dangerous. At this level, the noise may cause pain in the ear. |

Source: Texas A&M 2012.

Roadway traffic contributes to noise within the Project Area. Portions of the Project Area are bounded by two-lane roadways that receive local traffic (i.e., cars, trucks, and tractor trucks with trailering equipment). Based on Kentucky Transportation Cabinet traffic count data (accessed July 18, 2025), the average annual daily traffic (AADT) on KY 1009 north and east of the Project Area was approximately 253 vehicles in 2022. Roadway traffic noise levels typically range from 70 to 80 dBA at approximately 50 feet and peak during normal business hours.

# CONSTRUCTION SOUND CONDITIONS

Wayne County does not have a noise ordinance. The Applicant is not aware of any solar-specific United States Standards for sound mitigation during project construction or operation. Common practice is to treat solar projects like any other source of sound, applying existing laws that govern noise pollution from all sources in the applicable jurisdiction (MAREC 2021). The following sections describe Project-related noise conditions, their timing and duration, and sound levels at nearby sensitive receptors.

## Construction Timing

Construction activity would be limited to the hours of 7am – 7pm, Monday through Saturday, over a period of approximately 8 – 12 months. Construction activities that create a higher level of noise, such as pile driving, will be limited to 8am – 5pm, Monday through Friday. Non-noise-causing and non-construction activities can take place between 6am and 10pm, Monday through Sunday, including field visits, arrival, departure, planning, meetings, mowing, surveying, etc.

Most construction equipment would not operate for the entire construction period, but would be phased in and out according to the progress of construction. Because construction would be limited to daytime hours, there would be no effect on ambient noise levels at night

## Equipment and Machinery

Construction would use equipment typical for site development (i.e., backhoes, generators, pile drivers, and flatbed trucks). Equipment would be spread out over the entire site, with some

equipment operating along the perimeter of the site while the rest of the equipment may be located from several hundred to several thousand feet from the perimeter.

The U.S. Department of Transportation Federal Highway Administration (FHWA) publishes noise levels for typical construction equipment as shown in the table below.

**Table 4. Sound Levels for Common Construction Equipment**.

| Equipment Type | Typical Sound Level (dBA) at 50 Feet |
|---|---|
| Backhoe | 80 |
| Chainsaw | 85-115 |
| Crane (Mobile) | 85 |
| Dozer | 85 |
| Dump Truck | 84 |
| Generator | 81 |
| Grader | 85 |
| Front End Loader | 80-85 |
| Pickup Truck | 55 |
| Pile Driver | 90-95 |
| Pneumatic Tool | 85 |
| Pump | 76 |
| Roller | 74 |
| Scraper | 89 |
| Shovel | 82 |
| Spike Driver | 77 |
| Tractor | 84 |
| Truck (Flatbed) | 80-90 |
| Welder/Torch | 73 |

Source: FHWA Construction Noise Handbook, August 2006. Table based on US EPA Report and measured data.

The most common method of installing the support posts for the solar panels is to drive them into the ground. This pile-driving procedure produces a repetitive, metallic impact sound. Individual piles take only a few minutes to be driven into the ground. Pile driving is short-lived and will take approximately six months to complete. This would occur at the earlier stages of construction, typically in the second or third month.

While standard construction pile drivers are estimated to produce between 90 to 95 dBA at a distance of 50 feet, the specialty pile drivers used for solar panel installation produce less noise, and the piles supporting solar panels will be driven primarily into soil. Based on a common type of pile driver used to install solar panel support posts (e.g., Vermeer Pile Driver - PD 10), the anticipated sound level is 84 dBA at 50 feet (Vermeer 2012). The nearest receptor is NR-05, which is approximately 161 feet from the nearest solar panel array. At this distance, temporary and intermittent construction sound levels would be approximately 74 dBA when a pile driver is used to install the piles/posts for the nearest solar panel array tracking system. This sound level is temporary and will decrease within hours as sections of the array are completed and the pile driver moves further away.

Only limited concrete pouring is anticipated for the Project. Base slabs for the inverters and other electrical equipment will be precast and dropped in place. The transformer base at the substation may be poured concrete. During this time, a concrete pump truck will be needed. A concrete pump truck typically generates a sound of approximately 82 dBA at 50 feet. At the nearest receptor (1,616 feet from the substation), the sound level is estimated to be 52 dBA intermittently for a day or two.

### Assembly of Solar Panel Array and Construction of Facilities

Solar panels will be manufactured off site and shipped to the site ready for installation. Assembly of the solar panel array tracking system, the installation of solar panels, inverters and other electrical equipment associated with the solar facility and substation would likely employ typical manual hand tools and power tools. These assembly operations would occur several hundred feet to thousands of feet inside the property boundary. The anticipated duration of the sound generated by power equipment would be short.

### Roadway Sound During Construction

During construction, it is anticipated that there would be a temporary increase in traffic volume from commuting construction workers (up to 150 workers during peak phases), the delivery of construction equipment and material, and the delivery of solar panel components and equipment. Worker commutes with passenger vehicles and trucks would occur daily, with traffic peaks in the morning and afternoon, whereas deliveries of equipment would occur on trailers, flatbeds, or other large vehicles periodically throughout the construction process at various times of day. Based upon FHWA sound levels, the sound contributed by construction vehicles such as

flatbed trucks, light passenger cars and trucks falls within acceptable ranges because the sound is of short duration.

## Construction Noise Summary

Table 5 displays a summary of anticipated maximum on-site construction sound levels at each of the residential and non-residential receptors identified in Figures 3 and 4.

**Table 5. Selected Maximum Anticipated Construction Sound Levels at each Receptor.**

| Receptor ID | Receptor Type | Distance to Nearest Array (feet) | Pile Driving – 84 dBA at 50 feet (dBA) | Distance to Substation (feet) | Concrete Pouring – 82 dBA at 50 feet (dBA) |
|---|---|---|---|---|---|
| R-01 | Residential | 1,750 | 53 | 4,793 | 42 |
| R-02 | Residential | 502 | 64 | 4,088 | 44 |
| R-03 | Residential | 252 | 70 | 3,851 | 44 |
| R-04 | Residential | 205 | 72 | 3,646 | 45 |
| R-05 | Residential | 182 | 72 | 3,723 | 45 |
| R-06 | Residential | 940 | 58 | 4,178 | 44 |
| R-07 | Residential | 534 | 63 | 3,140 | 46 |
| R-08 | Residential | 372 | 67 | 2,952 | 47 |
| R-09 | Residential | 277 | 69 | 3,570 | 45 |
| R-10 | Residential | 353 | 67 | 3,280 | 46 |
| R-11 | Residential | 750 | 60 | 3,549 | 45 |
| R-12 | Residential | 1,192 | 56 | 3,438 | 45 |
| R-13 | Residential | 1,384 | 55 | 3,199 | 46 |
| R-14 | Residential | 442 | 65 | 2,044 | 50 |
| R-15 | Residential | 214 | 71 | 1,854 | 51 |
| R-16 | Residential | 2,032 | 52 | 3,623 | 45 |
| R-17 | Residential | 293 | 69 | 1,630 | 52 |
| R-18 | Residential | 1,068 | 57 | 2,383 | 48 |
| R-19 | Residential | 1,431 | 55 | 3,214 | 46 |
| R-20 | Residential | 1,456 | 55 | 2,683 | 47 |
| R-21 | Residential | 1,981 | 52 | 3,902 | 44 |
| R-22 | Residential | 664 | 62 | 1,757 | 51 |
| R-23 | Residential | 741 | 61 | 1,780 | 51 |
| R-24 | Residential | 592 | 63 | 1,616 | 52 |
| R-25 | Residential | 2,245 | 51 | 4,175 | 44 |
| R-26 | Residential | 1,131 | 57 | 2,430 | 48 |
| R-27 | Residential | 1,546 | 54 | 3,011 | 46 |
| R-28 | Residential | 1,170 | 57 | 2,421 | 48 |
| R-29 | Residential | 1,796 | 53 | 3,211 | 46 |

| Receptor ID | Receptor Type | Distance to Nearest Array (feet) | Pile Driving – 84 dBA at 50 feet (dBA) | Distance to Substation (feet) | Concrete Pouring – 82 dBA at 50 feet (dBA) |
|---|---|---|---|---|---|
| R-30 | Residential | 1,506 | 54 | 2,745 | 47 |
| R-31 | Residential | 1,676 | 53 | 2,994 | 46 |
| R-32 | Residential | 1,480 | 55 | 2,685 | 47 |
| R-33 | Residential | 1,145 | 57 | 1,812 | 51 |
| R-34 | Residential | 1,465 | 55 | 2,627 | 48 |
| R-35 | Residential | 1,476 | 55 | 2,562 | 48 |
| R-36 | Residential | 1,437 | 55 | 2,435 | 48 |
| R-37 | Residential | 1,706 | 53 | 2,894 | 47 |
| R-38 | Residential | 2,050 | 52 | 3,414 | 45 |
| R-39 | Residential | 1,992 | 52 | 3,255 | 46 |
| R-40 | Residential | 1,478 | 55 | 2,348 | 49 |
| R-41 | Residential | 1,562 | 54 | 2,522 | 48 |
| R-42 | Residential | 1,708 | 53 | 2,706 | 47 |
| R-43 | Residential | 1,718 | 53 | 2,603 | 48 |
| R-44 | Residential | 1,757 | 53 | 2,607 | 48 |
| R-45 | Residential | 1,811 | 53 | 2,620 | 48 |
| R-46 | Residential | 1,785 | 53 | 2,454 | 48 |
| R-47 | Residential | 2,151 | 51 | 3,126 | 46 |
| R-48 | Residential | 2,090 | 52 | 2,754 | 47 |
| R-49 | Residential | 2,108 | 52 | 2,935 | 47 |
| R-50 | Residential | 2,170 | 51 | 3,074 | 46 |
| R-51 | Residential | 2,209 | 51 | 2,906 | 47 |
| R-52 | Residential | 2,248 | 51 | 2,983 | 46 |
| NR-01 | Clark-Coop Cemetery | 1,248 | 56 | 4,705 | 43 |
| NR-02 | Agricultural | 2,082 | 52 | 4,771 | 43 |
| NR-03 | Agricultural | 1,914 | 52 | 4,600 | 43 |
| NR-04 | Fairview Church | 208 | 72 | 3,357 | 45 |
| NR-05 | Buncan Cemetery | 161 | 74 | 3,291 | 45 |
| NR-06 | Alpha Post Office | 2,086 | 52 | 3,343 | 45 |

# OPERATIONAL SOUND CONDITIONS

This section describes the sound conditions during Project operation. Sound power levels for Project equipment were obtained from vendor/manufacturer data and are based on preliminary design.

## Solar Panel Array

The solar panel array associated with the Project includes single-axis fixed panels (module) distributed evenly across the site. There are expected to be 97,552 Canadian Solar CS7N-720TB-AG modules or similar. Since the panels would be fixed (non-tracking), they would not emit any noise during operation, and there would be no impact on nearby receptors.

## Inverters

Inverters convert the DC power generated by the solar panels to AC power. Inverters generate the highest sound during sunny days. Because they do not operate at night, the sound produced is minimal and typically a result of cooling fans (Kaliski et al. 2020). The Project includes approximately 15 photovoltaic inverters, expected to be Sungrow SG-4400UD-MV-US inverters or similar. The data sheet provided by Sungrow does not identify actual measured levels of sound produced by the specified inverter. Inverter sound levels can vary widely, from 25 dBA to more than 80 dBA. A review of Sungrow inverters indicates that they are designed to operate more quietly compared to other available inverters. Although it is likely to be lower, a conservative estimate of 80 dBA produced by an inverter at 3 feet was determined to be sufficient for this analysis. The sound produced by an inverter is described as a hum and has roughly the same sound level as a household refrigerator. A study of solar power facility acoustics in Massachusetts found that at 150 feet from an inverter pad, sound levels approached background levels (Guldberg 2012). While there are multiple inverters planned for the Project, sound levels were estimated for the nearest inverter to each receptor instead of calculating the average distance and average sound level of all of the inverters, which would likely discount the noise experienced from the nearest inverter.

The nearest inverter is approximately 463 feet from NR-05, which is the Buncan Cemetery. The approximate level of noise at this location from the nearest inverter is 35 dBA, which is lower than the average conversation level of 60 dBA (see Table 3).

## Transformer

The main transformer at the substation is anticipated to be a 69kV/34.5kV 40/53/66 MVA transformer. Per National Electronic Manufacturers Association (NEMA) ST-20 standards, it is estimated that the transformer at a substation would generate sound levels of approximately 50 dBA at 3.2 feet (Schneider Electric 2020). Sound from transformers is produced by alternating current flux in the core that causes it to vibrate, and is characterized as a discrete low frequency

hum. Because the transformer is relatively quiet and the nearest receptor to the substation is over 1,000 feet away (R-24), it is anticipated that the transformer would not be audible to any receptors. Values in Table 6 are negative because they indicate that the sound would be below the threshold of human hearing.

## Operational Noise Summary

Table 6 displays a summary of estimated maximum on-site operational sound levels at each of the residential and non-residential receptors identified in Figures 3 and 4.

**Table 6. Maximum Anticipated Operational Sound Levels at each Sensitive Receptor.**

| Receptor ID | Receptor Type | Distance to Nearest Inverter (feet) | Inverters – 80 dBA at 3 feet (dBA) | Distance to Substation (feet) | Substation – 50 dBA at 3.2 feet (dBA)[1] |
|---|---|---|---|---|---|
| R-01 | Residential | 2,458 | 22 | 4,793 | -14 |
| R-02 | Residential | 930 | 30 | 4,088 | -12 |
| R-03 | Residential | 744 | 32 | 3,851 | -12 |
| R-04 | Residential | 908 | 30 | 3,646 | -11 |
| R-05 | Residential | 542 | 35 | 3,723 | -11 |
| R-06 | Residential | 1,274 | 27 | 4,178 | -12 |
| R-07 | Residential | 1,099 | 29 | 3,140 | -10 |
| R-08 | Residential | 840 | 31 | 2,952 | -9 |
| R-09 | Residential | 986 | 30 | 3,570 | -11 |
| R-10 | Residential | 1,086 | 29 | 3,280 | -10 |
| R-11 | Residential | 1,493 | 26 | 3,549 | -11 |
| R-12 | Residential | 1,893 | 24 | 3,438 | -11 |

[1] Negative values indicate sounds below the threshold of human hearing based on the approximate sound level generated by the transformer and the distance of each receptor to the transformer.

| Receptor ID | Receptor Type | Distance to Nearest Inverter (feet) | Inverters – 80 dBA at 3 feet (dBA) | Distance to Substation (feet) | Substation – 50 dBA at 3.2 feet (dBA)[1] |
|---|---|---|---|---|---|
| R-13 | Residential | 2,020 | 23 | 3,199 | -10 |
| R-14 | Residential | 758 | 32 | 2,044 | -6 |
| R-15 | Residential | 529 | 35 | 1,854 | -5 |
| R-16 | Residential | 2,701 | 21 | 3,623 | -11 |
| R-17 | Residential | 739 | 32 | 1,630 | -4 |
| R-18 | Residential | 1,407 | 27 | 2,383 | -7 |
| R-19 | Residential | 2,172 | 23 | 3,214 | -10 |
| R-20 | Residential | 1,664 | 25 | 2,683 | -8 |
| R-21 | Residential | 2,740 | 21 | 3,902 | -12 |
| R-22 | Residential | 761 | 32 | 1,757 | -5 |
| R-23 | Residential | 898 | 30 | 1,780 | -5 |
| R-24 | Residential | 842 | 31 | 1,616 | -4 |
| R-25 | Residential | 2,969 | 20 | 4,175 | -12 |
| R-26 | Residential | 1,434 | 26 | 2,430 | -8 |
| R-27 | Residential | 1,913 | 24 | 3,011 | -9 |

| Receptor ID | Receptor Type | Distance to Nearest Inverter (feet) | Inverters – 80 dBA at 3 feet (dBA) | Distance to Substation (feet) | Substation – 50 dBA at 3.2 feet (dBA)[1] |
|---|---|---|---|---|---|
| R-28 | Residential | 1,480 | 26 | 2,421 | -8 |
| R-29 | Residential | 2,148 | 23 | 3,211 | -10 |
| R-30 | Residential | 1,815 | 24 | 2,745 | -9 |
| R-31 | Residential | 1,987 | 24 | 2,994 | -9 |
| R-32 | Residential | 1,792 | 24 | 2,685 | -8 |
| R-33 | Residential | 1,789 | 24 | 1,812 | -5 |
| R-34 | Residential | 1,779 | 25 | 2,627 | -8 |
| R-35 | Residential | 1,789 | 24 | 2,562 | -8 |
| R-36 | Residential | 1,803 | 24 | 2,435 | -8 |
| R-37 | Residential | 2,019 | 23 | 2,894 | -9 |
| R-38 | Residential | 2,386 | 22 | 3,414 | -11 |
| R-39 | Residential | 2,295 | 22 | 3,255 | -10 |
| R-40 | Residential | 1,994 | 24 | 2,348 | -7 |
| R-41 | Residential | 1,991 | 24 | 2,522 | -8 |
| R-42 | Residential | 2,050 | 23 | 2,706 | -9 |

| Receptor ID | Receptor Type | Distance to Nearest Inverter (feet) | Inverters – 80 dBA at 3 feet (dBA) | Distance to Substation (feet) | Substation – 50 dBA at 3.2 feet (dBA)[1] |
|---|---|---|---|---|---|
| R-43 | Residential | 2,205 | 23 | 2,603 | -8 |
| R-44 | Residential | 2,264 | 22 | 2,607 | -8 |
| R-45 | Residential | 2,339 | 22 | 2,620 | -8 |
| R-46 | Residential | 2,396 | 22 | 2,454 | -8 |
| R-47 | Residential | 2,518 | 22 | 3,126 | -10 |
| R-48 | Residential | 2,740 | 21 | 2,754 | -9 |
| R-49 | Residential | 2,609 | 21 | 2,935 | -9 |
| R-50 | Residential | 2,614 | 21 | 3,074 | -10 |
| R-51 | Residential | 2,728 | 21 | 2,906 | -9 |
| R-52 | Residential | 2,756 | 21 | 2,983 | -9 |
| NR-01 | Clark-Coop Cemetery | 1,587 | 26 | 4,705 | -13 |
| NR-02 | Agricultural | 2,819 | 21 | 4,771 | -13 |
| NR-03 | Agricultural | 2,671 | 21 | 4,600 | -13 |
| NR-04 | Fairview Church | 525 | 35 | 3,357 | -10 |
| NR-05 | Buncan Cemetery | 463 | 36 | 3,291 | -10 |

| Receptor ID | Receptor Type | Distance to Nearest Inverter (feet) | Inverters – 80 dBA at 3 feet (dBA) | Distance to Substation (feet) | Substation – 50 dBA at 3.2 feet (dBA)[1] |
|---|---|---|---|---|---|
| NR-06 | Alpha Post Office | 2,389 | 22 | 3,343 | -10 |

# MAINTENANCE SOUND CONDITIONS

## Vehicular Traffic

Traffic associated with project maintenance will include occasional light duty trucks an average of 2 or 3 days per week, for staff responsible for maintaining vegetation or performing maintenance or repairs. For vegetation management, periodic truck traffic will occur to deliver and move sheep as part of solar grazing activities or for transporting mowing equipment.

In addition, work may be conducted at night up to 50 days a year. While workers are not anticipated onsite on most weekends, it remains a possibility in the event of the need for timely repairs, or groundskeeping dictated by weather. Employees are anticipated to use mid- or full-sized trucks and would have less contribution to traffic noise than a typical single-family home.

## Maintenance Activities

Typical maintenance activities include minor repair and maintenance on the solar panels, tracking systems, electrical wiring, or maintenance/inspections of the inverters/transformer. It is anticipated that trimming and mowing would be performed approximately 20-30 times per year, depending on vegetation growth rate. Periodic mowing would produce sound levels comparable to roadway traffic in the surrounding area, although at less frequent intervals. The Applicant anticipates primarily using sheep and solar grazing to maintain vegetation. It is anticipated that the Project will generate less noise during vegetation management than the average solar project.

# MITIGATION MEASURES

The Applicant would implement the following measures during and after the construction phase to reduce and minimize noise impacts.

- Construction activities, processes, and deliveries will be limited to the hours between 7:00 am and 7:00 pm, Monday through Saturday; construction activities that create a higher level of noise, such as pile-driving, will be limited to 8 a.m. to 5 p.m. local time, Monday through Friday. Non-noise-causing and non-construction activities can take place on the site between 6 a.m. and 10 p.m. local time, Monday through Sunday, including field visits, arrival, departure, planning, meetings, mowing, surveying, etc.
- Based on previous experience constructing solar projects, the Applicant believes that noise concerns resulting from pile driving activities are most effectively managed through limiting pile driving activities within a certain radius to certain hours during the day to avoid potentially impacting nearby receptors. To this end, the Applicant proposes to limit pile driving activities within 1,000 feet of potentially impacted receptors to a reduced period.

- If the pile-driving activity occurs within 1,500 feet of a noise-sensitive receptor, the Applicant would implement a construction method that will suppress the noise generated during the pile-driving process (i.e., semi-tractor and canvas method, sound blankets on fencing surrounding the solar site, or any other comparable method). The Applicant may forego using noise suppression measures if it employs a panel installation method that does not use pile driving, so long as that method does not create noise levels similar to pile driving.
- The Applicant plans to notify residents and businesses within 2,400 feet of the project boundary about the construction plan, the noise potential, any mitigation plans, and its Complaint Resolution Program, at least one month prior to the start of construction.
- The Applicant would place panels, inverters, and substation equipment consistent with the distances to noise receptors to which it has committed in its maps and site plans.

## CONCLUSION

The Project would impact sensitive receptors primarily during construction. This includes both residential and non-residential receptors within 2,000 feet of the Project Area. Common sources of construction noise include equipment, such as delivery trucks, backhoes, pile drivers, chain saws, bush hogs, or other large mowers for clearing, that produce maximum sound levels of up to approximately 85 dBA at 50 feet. Construction activities will occur over approximately 8 – 12 months between the hours of 7am and 7pm Monday through Saturday, although activities that create a higher level of noise, such as pile driving, will be limited to 8am – 5pm, Monday through Friday. Construction impacts would be temporary and intermittent, as most equipment would be phased in and out according to the progress of the Project. At times, construction activities will be audible to nearby residences or other sensitive receptors; however, not all equipment will be operating at the same time, and activities will be temporary in duration and spread throughout the Project area.

Pile driving during solar array installation is anticipated to produce the greatest sound level for an extended period (approximately six months). Standard solar pile drivers are estimated to produce 84 dBA at a distance of 50 feet (Vermeer 2012). Pile driving may temporarily generate sound levels of 74 dBA at the nearest receptor, a residence, but only for 1 or 2 days when the closest array is being installed; when other arrays are installed, the sound level would be lower. These sound levels represent a worst-case scenario; actual sound levels would likely be lower due to attenuation from vegetation and topography. Construction sounds at a solar project are comparable to other common construction activities that require pile driving due to their temporary and intermittent nature (MAREC 2021).

Overall, construction-related noise impacts would be temporary and intermittent, and would not contribute to a significant sound increase when compared to sound currently occurring on or near the site (i.e., the operation of farming equipment for agricultural activities and crop harvesting as well as moderate traffic on the nearby roads).

During operation, the ambient sound environment would return to existing levels. The moving parts of the solar panel arrays would produce minimal sound. The transformer at the substation would not produce sound at level above the threshold for human hearing because of the relatively low level of sound it is expected to produce and the distance away of each receptor. In addition, nighttime operation will result in lower sound emissions, as power would not be generated and therefore the solar inverters and substation transformer will be operating in stand-by mode. As a result, impacts of Project operation are anticipated to be minimal to negligible.

Light truck vehicle noise from maintenance employees commuting to the site or driving on the site would be negligible in the context of existing local traffic levels and sounds. Maintenance activities such as periodic mowing of vegetation surrounding the solar panels would produce sound levels comparable to those of agricultural operations in and near the Project Area. Periodic mowing would produce sound levels comparable to roadway traffic in the surrounding area, although at less frequent intervals. The Applicant anticipates primarily using sheep and solar grazing to maintain vegetation and therefore, the Project will generate less noise during vegetation management than the average solar project. As a result, impacts of Project maintenance are anticipated to be negligible.

# LITERATURE CITED

California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September 2013. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf

Ditch Witch. 2021. RT45 Ride-on Trencher. 2021.

Dobson and Ryan. 2000. Trees & Shrubs for Noise Control. Trees in Focus: Practical Care and Management. Arboricultural Advisory and Information Service. 2000.

ESRI GeoServer Web Map Service, National Land Cover Database (NLCD)_2016 Land Cover L48. (Accessed December 23, 2020).

Federal Highways Administration (FHWA). 2006. FHWA Construction Noise Handbook. FHWA-HEP-06-015. 2006.

Guldberg, Peter H. Tech Environmental, Inc. Prepared for the Massachusetts Clean Energy Center. Study of Acoustic and EMF Levels from Solar Photovoltaic Projects. December 17, 2012.

Kaliski, Kenneth, Issac Old, and Eddie Duncan. 2020. An overview of sound from commercial photovoltaic facilities. Available at https://rsginc.com/wp-content/uploads/2021/04/Kaliski-et-al-2020-An-overview-of-sound-from-commercial-photovolteic-facilities.pdf. Accessed July 2025.

Kentucky Transportation Cabinet. Interactive Statewide Traffic Counts Map. https://maps.kytc.ky.gov/trafficcounts/ (Accessed January 17, 2025).

Kimley-Horn. 2020. Maroon Solar, LLC Noise Impact Assessment – Project Construction. 2020.

Mid-Atlantic Renewable Energy Coalition (MAREC). 2021. Industry standards and best practices related to mitigation of sound and visual impact at solar facilities. February 15, 2021.

Schneider Electric. 2020. Schneider Electric Frequently Asked Questions: What is the Standard Sound Level (in dB) of Transformers of Various kVA Ratings. https://www.se.com/us/en/faqs/FA120629/

Texas A&M. 2012 Hearing Loss Protection for Agricultural Workers. David W. Smith, AgriLife Extension.

U.S. Department of Transportation (USDOT). 2011. "Construction Noise Handbook." Federal Highway Administration. Available at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook07.cf.

USDOT. 2015. "Construction Noise Handbook." US Department of Transportation, Federal Highway Administration. (Accessed December 21, 2020). https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.

U.S. Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With An Adequate Margin of Safety. March 1974. Prepared By the U.S. Environmental Protection Agency Office of Noise Abatement and Control. Available at: https://www.nonoise.org/library/levels/levels.htm#levelsof (Accessed December 22, 2020).

Vermeer. 2012. Vermeer PD10 Pile Driver Operator's Manual. 2012.

# Appendix A

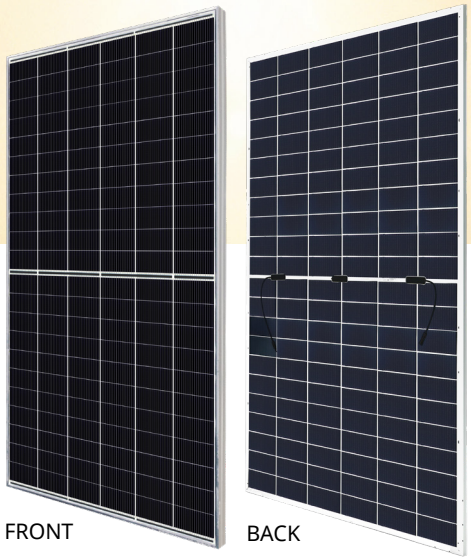
## Equipment Specifications

# TOPBiHiKu7

## N-type Bifacial TOPCon Technology

## 690 W ~ 720 W

## CS7N-690|695|700|705|710|715|720TB-AG




### MORE POWER

720 W — Module power up to 720 W
Module efficiency up to 23.2 %

EXTRA POWER — Up to 85% Power Bifaciality,
more power from the back side

Excellent anti-LeTID & anti-PID performance.
Low power degradation, high energy yield

Lower temperature coefficient (Pmax): -0.29%/°C,
increases energy yield in hot climate

Lower LCOE & system cost

### MORE RELIABLE

Tested up to ice ball of 35 mm diameter
according to IEC 61215 standard

Minimizes micro-crack impacts

Heavy snow load up to 5400 Pa,
wind load up to 2400 Pa*

**12 Years** **Enhanced Product Warranty on Materials and Workmanship***

**30 Years** **Linear Power Performance Warranty***

**1st year power degradation no more than 1%**
**Subsequent annual power degradation no more than 0.4%**

*According to the applicable Canadian Solar Limited Warranty Statement.

### MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001: 2015 / Quality management system
ISO 14001: 2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety
IEC 62941: 2019 / Photovoltaic module manufacturing quality system

### PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730 / CE / INMETRO / MCS / UKCA / CGC
CEC listed (US California) / FSEC (US Florida)
UL 61730 / IEC 61701 / IEC 62716 / IEC 60068-2-68
UNI 9177 Reaction to Fire: Class 1 / Take-e-way

* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

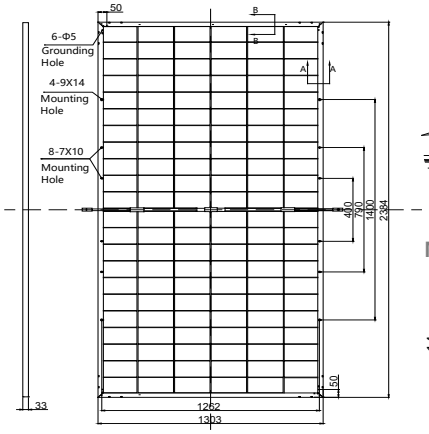
**CSI Solar Co., Ltd.** is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 23 years, it has successfully delivered over 125 GW of premium-quality solar modules across the world.

* For detailed information, please refer to the Installation Manual.

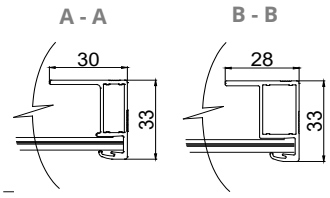
**CSI Solar Co., Ltd.**
199 Lushan Road, SND, Suzhou, Jiangsu, China, 215129, www.csisolar.com, support@csisolar.com

## ENGINEERING DRAWING (mm)

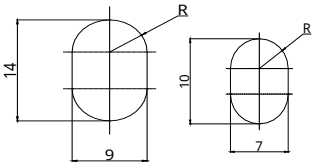
### Rear View



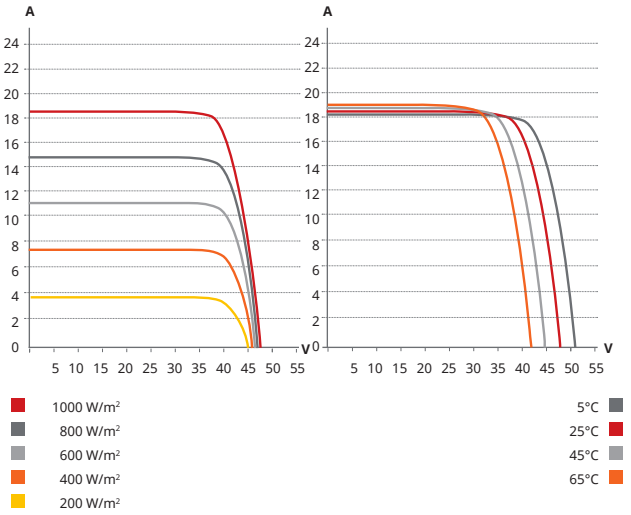

### Frame Cross Section




### Mounting Hole




## CS7N-695TB-AG / I-V CURVES




## ELECTRICAL DATA | STC*

| | Nominal Max. Power (Pmax) | Opt. Operating Voltage (Vmp) | Opt. Operating Current (Imp) | Open Circuit Voltage (Voc) | Short Circuit Current (Isc) | Module Efficiency |
|---|---|---|---|---|---|---|
| CS7N-690TB-AG | 690 W | 39.6 V | 17.43 A | 47.5 V | 18.39 A | 22.2% |
| Bifacial Gain** 5% | 725 W | 39.6 V | 18.30 A | 47.5 V | 19.31 A | 23.3% |
| Bifacial Gain** 10% | 759 W | 39.6 V | 19.17 A | 47.5 V | 20.23 A | 24.4% |
| Bifacial Gain** 20% | 828 W | 39.6 V | 20.92 A | 47.5 V | 22.07 A | 26.7% |
| CS7N-695TB-AG | 695 W | 39.8 V | 17.47 A | 47.7 V | 18.44 A | 22.4% |
| Bifacial Gain** 5% | 730 W | 39.8 V | 18.34 A | 47.7 V | 19.36 A | 23.5% |
| Bifacial Gain** 10% | 765 W | 39.8 V | 19.22 A | 47.7 V | 20.28 A | 24.6% |
| Bifacial Gain** 20% | 834 W | 39.8 V | 20.96 A | 47.7 V | 22.13 A | 26.8% |
| CS7N-700TB-AG | 700 W | 40.0 V | 17.51 A | 47.9 V | 18.49 A | 22.5% |
| Bifacial Gain** 5% | 735 W | 40.0 V | 18.39 A | 47.9 V | 19.41 A | 23.7% |
| Bifacial Gain** 10% | 770 W | 40.0 V | 19.26 A | 47.9 V | 20.34 A | 24.8% |
| Bifacial Gain** 20% | 840 W | 40.0 V | 21.01 A | 47.9 V | 22.19 A | 27.0% |
| CS7N-705TB-AG | 705 W | 40.2 V | 17.55 A | 48.1 V | 18.54 A | 22.7% |
| Bifacial Gain** 5% | 740 W | 40.2 V | 18.43 A | 48.1 V | 19.47 A | 23.8% |
| Bifacial Gain** 10% | 776 W | 40.2 V | 19.31 A | 48.1 V | 20.39 A | 25.0% |
| Bifacial Gain** 20% | 846 W | 40.2 V | 21.06 A | 48.1 V | 22.25 A | 27.2% |
| CS7N-710TB-AG | 710 W | 40.4 V | 17.59 A | 48.3 V | 18.59 A | 22.9% |
| Bifacial Gain** 5% | 746 W | 40.4 V | 18.47 A | 48.3 V | 19.52 A | 24.0% |
| Bifacial Gain** 10% | 781 W | 40.4 V | 19.35 A | 48.3 V | 20.45 A | 25.1% |
| Bifacial Gain** 20% | 852 W | 40.4 V | 21.11 A | 48.3 V | 22.31 A | 27.4% |
| CS7N-715TB-AG | 715 W | 40.6 V | 17.63 A | 48.5 V | 18.64 A | 23.0% |
| Bifacial Gain** 5% | 751 W | 40.6 V | 18.51 A | 48.5 V | 19.57 A | 24.2% |
| Bifacial Gain** 10% | 787 W | 40.6 V | 19.39 A | 48.5 V | 20.50 A | 25.3% |
| Bifacial Gain** 20% | 858 W | 40.6 V | 21.16 A | 48.5 V | 22.37 A | 27.6% |
| CS7N-720TB-AG | 720 W | 40.8 V | 17.67 A | 48.7 V | 18.69 A | 23.2% |
| Bifacial Gain** 5% | 756 W | 40.8 V | 18.55 A | 48.7 V | 19.62 A | 24.3% |
| Bifacial Gain** 10% | 792 W | 40.8 V | 19.44 A | 48.7 V | 20.56 A | 25.5% |
| Bifacial Gain** 20% | 864 W | 40.8 V | 21.20 A | 48.7 V | 22.43 A | 27.8% |

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.
** Bifacial Gain: The additional gain from the back side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

## ELECTRICAL DATA | NMOT*

| | Nominal Max. Power (Pmax) | Opt. Operating Voltage (Vmp) | Opt. Operating Current (Imp) | Open Circuit Voltage (Voc) | Short Circuit Current (Isc) |
|---|---|---|---|---|---|
| CS7N-690TB-AG | 522 W | 37.4 V | 13.94 A | 45.0 V | 14.83 A |
| CS7N-695TB-AG | 526 W | 37.6 V | 13.97 A | 45.2 V | 14.87 A |
| CS7N-700TB-AG | 529 W | 37.8 V | 14.00 A | 45.4 V | 14.91 A |
| CS7N-705TB-AG | 533 W | 38.0 V | 14.03 A | 45.5 V | 14.95 A |
| CS7N-710TB-AG | 537 W | 38.2 V | 14.06 A | 45.7 V | 14.99 A |
| CS7N-715TB-AG | 541 W | 38.4 V | 14.09 A | 45.9 V | 15.03 A |
| CS7N-720TB-AG | 544 W | 38.6 V | 14.12 A | 46.1 V | 15.07 A |

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## MECHANICAL DATA

| Specification | Data |
|---|---|
| Cell Type | TOPCon cells |
| Cell Arrangement | 132 [2 x (11 x 6) ] |
| Dimensions | 2384 × 1303 × 33 mm (93.9 × 51.3 × 1.30 in) |
| Weight | 37.8 kg (83.3 lbs) |
| Front Glass | 2.0 mm heat strengthened glass with anti-reflective coating |
| Back Glass | 2.0 mm heat strengthened glass |
| Frame | Anodized aluminium alloy |
| J-Box | IP68, 3 bypass diodes |
| Cable | 4.0 mm² (IEC), 12 AWG (UL) |
| Cable Length (Including Connector) | 360 mm (14.2 in) (+) / 200 mm (7.9 in) (-) or customized length* |
| Connector | T6 or MC4-EVO2 or MC4-EVO2A |
| Per Pallet | 33 pieces |
| Per Container (40' HQ) | 594 pieces or 495 pieces (only for US & Canada) |

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

## ELECTRICAL DATA

| | |
|---|---|
| Operating Temperature | -40°C ~ +85°C |
| Max. System Voltage | 1500 V (IEC/UL) |
| Module Fire Performance | TYPE 29 (UL 61730) or CLASS C (IEC61730) |
| Max. Series Fuse Rating | 35 A |
| Protection Class | Class II |
| Power Tolerance | 0 ~ + 10 W |
| Power Bifaciality* | 80 % |

* Power Bifaciality = $Pmax_{rear}$ / $Pmax_{front}$, both $Pmax_{rear}$ and $Pmax_{front}$ are tested under STC, Bifaciality Tolerance: ± 5 %

## TEMPERATURE CHARACTERISTICS

| Specification | Data |
|---|---|
| Temperature Coefficient (Pmax) | -0.29 % / °C |
| Temperature Coefficient (Voc) | -0.25 % / °C |
| Temperature Coefficient (Isc) | 0.05 % / °C |
| Nominal Module Operating Temperature | 41 ± 3°C |

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice.
Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

## PARTNER SECTION

**CSI Solar Co., Ltd.**
199 Lushan Road, SND, Suzhou, Jiangsu, China, 215129, www.csisolar.com, support@csisolar.com

# SG4400UD-MV-US

## Turnkey Station for 1500 Vdc System MV Transformer Integrated

### HIGH YIELD

- Advanced three-level technology, max. inverter efficiency 98.9 %
- Full power operation at 40 ℃ (104 ℉)
- Effective cooling, wide operation temperature

### EASY O&M

- Integrated current, voltage and MV parameters monitoring function for online analysis and trouble shooting
- Modular design, easy for maintenance

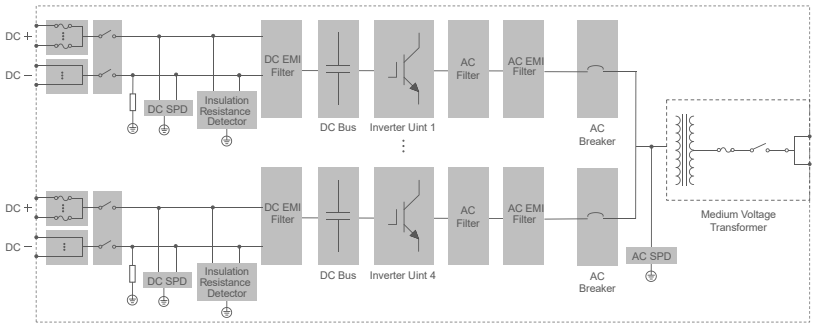
### SAVED INVESTMENT

- Low transportation and installation cost due to 20-foot container size design
- DC 1500V system, low system cost
- Integrated MV transformer and LV auxiliary power supply
- Q at night optional

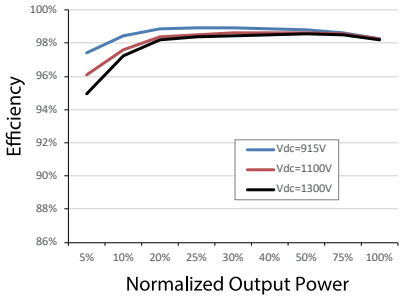
### GRID SUPPORT

- Compliance with standards:UL 1741,UL 1741 SA/SB, IEEE 1547, Rule 21 and NEC code
- Low / High voltage ride through (L/HVRT), L/HFRT, soft start / stop
- Active & reactive power control and power ramp rate control

### CIRCUIT DIAGRAM




### EFFICIENCY CURVE




NA

SUNGROW
Clean power for all

| Type Designation | SG4400UD-MV-US |
|---|---|
| **Input (DC)** | |
| Max. PV input voltage | 1500 V |
| Min. PV input voltage / Start-up input voltage | 915 V / 955 V |
| Available DC fuse sizes | 250 A, 315 A, 400A, 450 A, 500 A, 630 A |
| MPP voltage range | 915 V – 1500 V |
| Full power MPP voltage range@40℃ | 915 V - 1337 V* |
| No. of independent MPP inputs | 4 |
| No. of DC inputs | 28 inputs negative grounding<br>( optional: 24 inputs floating ) |
| Max. PV input current | 4 * 1226 A |
| Max. DC short-circuit current | 4 * 3528 A |
| PV array configuration | Negative grounding or floating |
| **Output (AC)** | |
| AC output power | 4400 kVA @ 40 ℃ ( 104 ℉ ) ** ( Optional: 4400 kVA @ 45 ℃( 113 ℉ ) ) ** |
| Nominal grid frequency / Grid frequency range | 60 Hz / 57 Hz – 63 Hz |
| Harmonic THD | < 3 % ( at nominal power ) |
| Power factor at nominal power / Ajustable power factor | > 0.99 / 0.8 leading - 0.8 lagging |
| **Efficiency** | |
| Inverter Max. efficiency | 98.9 % |
| Inverter CEC efficiency | 98.5 % |
| **Transformer** | |
| Transformer rated power | 4400 kVA |
| Transformer Max. power | 4400 kVA |
| LV / MV voltage | 0.645 kV / 34.5 kV |
| Transformer vector | Dy 1 ( Optional: Dy 11, Yny 0 ) |
| Transformer cooling type | KNAN ( Optional: ONAN ) |
| **Protection** | |
| DC input protection | Load switch + fuse |
| Inverter output protection | Circuit breaker |
| AC MV output protection | Load switch + fuse |
| Surge protection | DC Type II / AC Type II |
| Grid monitoring / Ground fault monitoring | Yes / Yes |
| Insulation monitoring | Yes |
| Overheat protection | Yes |
| **General Data** | |
| Dimensions ( W * H * D ) | 6058 mm * 2896 mm * 2438 mm 238.5'' * 114.0'' * 96.0'' |
| Weight | ≤ 36376 lbs |
| Degree of protection | NEMA 4X ( Electronic for Inverter ) / NEMA 3R ( Others ) |
| Auxiliary power supply | 5 kVA, 120 Vac ; Optional : 35 kVA 480 Vac + 5 kVA 120 Vac |
| Operating ambient temperature range<br>(It refers to the inverter only and the ambient temperature is 1m around the inverter.) | -35 ℃ - 60 ℃ ( > 45 ℃ derating ) / optional: -40 ℃ - 60 ℃ ( > 45 ℃ derating )<br>-31 ℉ - 140 ℉ ( > 113 ℉ derating ) / optional: -40 ℉ - 140 ℉ ( > 113 ℉ derating ) |
| Allowable relative humidity range | 0 % - 100 % |
| Cooling method | Temperature controlled forced air cooling |
| Max. Operating altitude | 1000 m ( Standard ) / > 1000 m ( Customized )<br>( 3280.8 ft ( Standard ) / > 3280.8 ft ( Customized ) ) |
| Display | LED Indicators , WLAN + WebHMI |
| Night reactive power function | Optional |
| DC-Coupled storage interface | Optional |
| Charging power from the grid | Optional |
| Communication | Standard: RS485, Ethernet; |
| Compliance | UL1741, UL62109-1,CSA C22.2 No.107.1-16, IEEE1547-2018, IEEE1547.1-2020, UL1741 SA/SB, California Rule21, HECO SRD V2.0, NEC 2020,PRC-024 |
| Grid support | Q at night function (optional), L/HVRT, L/HFRT, Active & reactive power control and power ramp rate control, Volt-var, Frequency-watt |

*Full power MPP range is temperature dependent, check the characteristic curve of the inverter for more information.
**For sustained operation above 40°C, an optional 60 °C temperature rise transformer is recommended.