VISUAL IMPACT ASSESSMENT FOR THE BRAWLEY SOLAR PROJECT IMPERIAL COUNTY, CALIFORNIA

Prepared for:

ORNI 30, LLC
6140 Pulmas Street
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Prepared by:

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August 2021

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SECTION 1.0 – INTRODUCTION

Chambers Group, Inc. (Chambers Group) was retained by ORNI 30, LLC (ORNI) to prepare this technical report assessing the current surrounding conditions and to describe potential changes to the landscape resulting from the Brawley Solar Energy Facility (Project) development. The Project would be located on six privately owned parcels covering approximately 227 acres in Brawley, Imperial County (Figure 1).

The 40 Megawatt (MW)/160 Megawatt hour (MWh) photovoltaic (PV) solar farm and 40 MW/160 MWh battery energy storage system (BESS) would consist of 3.2-foot by 6.5-foot photovoltaic (PV) modules (or panels) on single-axis horizontal trackers in blocks that each hold 3,809 PV panels in 28 strings. The panels would be oriented from east to west for maximum exposure and the foundation would be designed based on soil conditions. The PV panels are made of a poly-crystalline silicon semiconductor material encapsulated in glass. A 20-foot wide road with an all-weather surface would surround the panels, and the entire site would be surrounded by a 6-foot tall chain link fence topped with three strands of barbed wire.

The proposed Project substation would be a new 92/12 kV unstaffed, automated, low-profile substation. The dimensions of the fenced substation would be approximately 300 feet by 175 feet. The enclosed substation footprint would encompass approximately 1.2 acres of the Project parcel and be located immediately southwest of the solar field.

The Project would connect to a switchyard located in the southeast corner Project site and then be routed through the BESS building for energy storage. Power would then be transferred to the North Brawley Geothermal Power Plant substation via a 1.8mile-long double circuit 13.8 and 92 kV gen-tie line with 66-foot-high poles to interconnect to the Imperial Irrigation District (IID) at the North Brawley 1 substation located at Hovley Road and Andre Road, southwest of the Project site. The transmission line would span the New River. A 12-inch diameter conduit railroad undercrossing would connect the PV arrays from the western side of the railroad tracks to the inverters on the eastern side.

SECTION 2.0 – EXISTING CONDITIONS

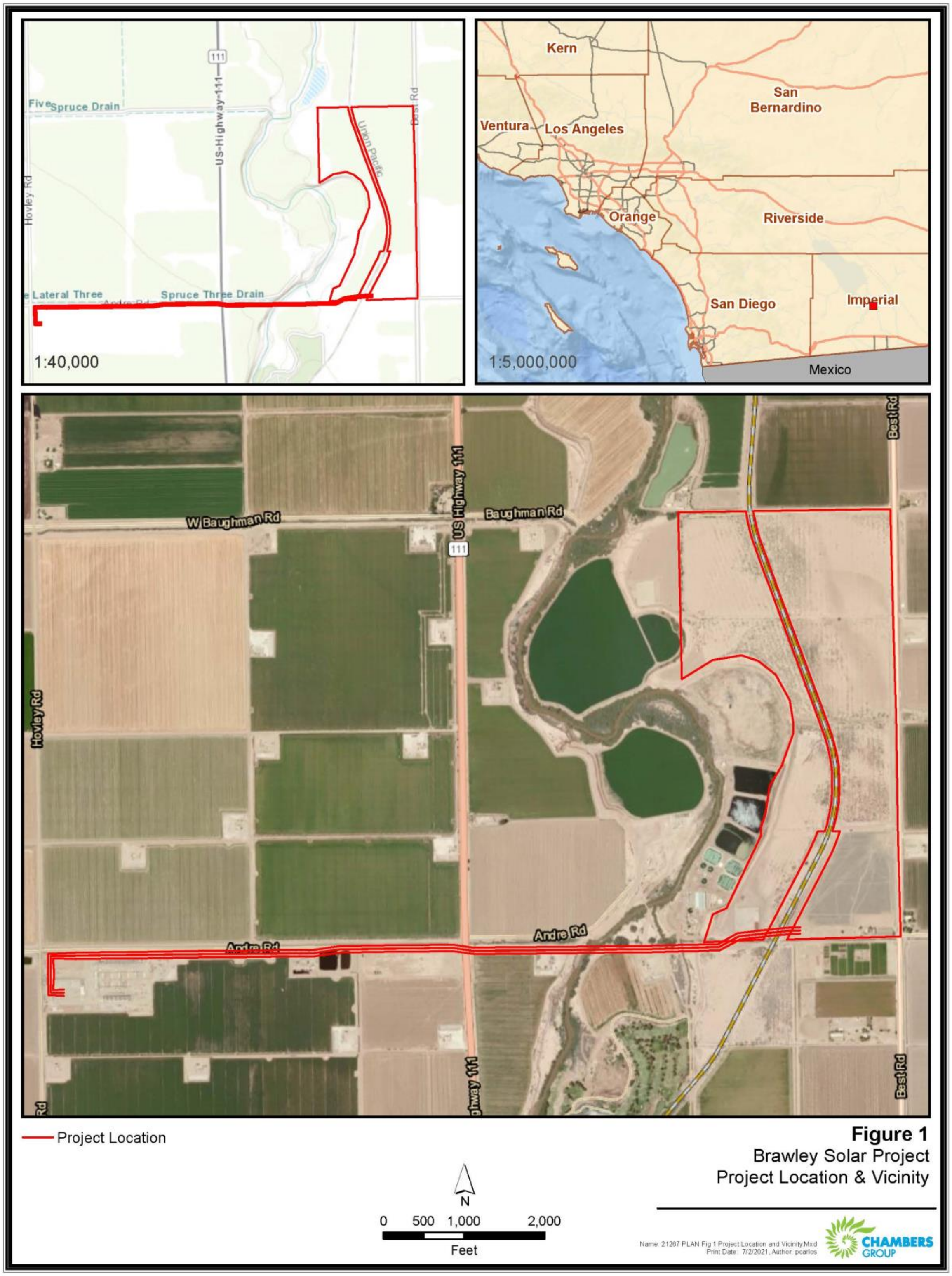
The Project is located at 5003 Best Ave, Brawley, California on six privately owned parcels: Assessor's Parcel Numbers (APNs) 037-140-020, 037-140-021, 037-140-022, 037-140-023, and 037-140-006 (Project site) as shown in Figure 1. Imperial County identifies the land use of the Project site as Agriculture and zoning as General Agricultural (A-2-G; County 2020). Currently the Project site contains alfalfa fields within different levels of harvest. North and east of the Project site is undeveloped agricultural land.

The Project site is approximately one mile north from the City of Brawley's jurisdictional limit. Brawley is relatively central within the agricultural portion of the Imperial Valley, which extends from the southeastern portion of the Salton Sea to the United States and Mexico border. Beyond miles of agricultural land, the 45-mile-long and 20-mile-wide Salton Sea lies northwest of the Project site. The elevation at the Project site is approximately 145 feet below mean sea level. With elevations extending to 277 feet below sea level, the Salton Sea sits comparatively lower in the landscape than the Project site, as does much of the agricultural land to the immediate west and south. To the north and east of the Project site are the Chocolate Mountains, which extend to heights of more than 2,000 feet above mean sea level.

Because of this gradual downward slope from east to west, areas to the north and east of the Project site would be more likely to have views of the Project where not impeded by natural or built features. Viewers in this area are associated with residences and land uses. North of the Project site is agricultural land. Along the eastern edge of the Project site there are two residences and agricultural land. South of the Project site is a mixture of agricultural land and dirt lots used for staging activities. The City of Brawley Wastewater Treatment Plant is located along the western edge of the Project site.

Views in this area are expansive and are generally characterized by sparse development framed by topographical features. Low-profile, weedy plants, such as Quail Brush Scrub and Bush Seepweed, are widespread on undeveloped and unfarmed lands, and ruderal vegetation is along waterways associated with IID canals (Chambers 2021). Individual residences, transmission lines, transportation corridors (including roads and railroads), and agricultural equipment are discernable in the foreground (within 0.25 mile) and middle ground (0.25 to 3-5 miles away) views throughout the area. They are identifiable by their vapor plumes. These views to the west from the Project site are backdropped by the Coyote Mountains and Fish Creek Mountains. Views to the east are backdropped by the Chocolate Mountains.

Figure 1: Project Location and Vicinity Map



SECTION 3.0 – METHODOLOGY

A comparison of the Project site's existing conditions and the change to the landscape with implementation of the Project is based on the production of visual simulations. As a part of this process, Chambers Group reviewed aerial imagery to identify where the Project would potentially be visible from visually sensitive areas and selected preliminary viewpoints for site photography. Field surveys were conducted by POWER Engineers, Inc. (POWER) on March 4, 2021 to photo-document existing visual conditions and views toward the Project site. A representative subset of photographed viewpoints was selected as Key Observation Points (KOPs), which collectively serve as the basis for this assessment. This selection was done in coordination with ORNI and the County. Assessments of existing visual conditions were made based on professional judgment that took into consideration sensitive receptors and sensitive viewing areas in the Project area. The locations of the four KOPs in relation to the Project site are presented in Appendix A.

During the field survey, the view from each KOP was photographed using a 35-millimeter, 30-megapixel, full-frame, single lens reflex camera equipped with a 50-millimeter fixed focal length lens. This configuration is the industry accepted standard for approximating the field of vision in a static view of the human eye. The camera positioning was determined with a sub-meter, differentially corrected global positioning system (GPS). The camera was positioned at eye-level for each photograph.

The site photos were used to generate a rendering of the existing conditions and a proposed visualization of the implemented Project. The visual simulations provide clear before-and-after images of the location, scale, and visual appearance of the features affected by and associated with the Project. The simulations were developed through an objective analytical and computer-modeling process and are accurate within the constraints of the available site and alternative data (3-dimensional computer model was created using a combination of AutoCAD files and geographic information system [GIS] layers and exported to Autodesk's 3-dimensional Studio Max for production). Design data — consisting of engineering drawings, elevations, site and topographical contour plans, concept diagrams, and reference pictures — were used as a platform from which digital models were created. In cases where detailed design data were unavailable, more general descriptions about alternative facilities and their locations were used to prepare the digital models.

SECTION 4.0 – DESCRIPTION OF POTENTIAL VISUAL EFFECTS

This section describes views from each KOP, first under existing conditions, and then with the proposed Project simulated. The visual simulations illustrate the location, scale, and conceptual appearance of the Project, as seen from each KOP. These visual simulations allow for comparison of pre-Project and post-Project conditions as discussed qualitatively below. See Figure 1 in Appendix A for KOP locations shown in the Viewpoint Map, as well as existing and simulated images included in Viewpoint 1, 2, 3, and 4.

4.1 VIEW FROM NORTH (N)BEST AVENUE (AVE) (KOP 1)

4.1.1 Existing View

KOP 1 is located along N Best Ave, at the northeast corner of the Project site. The view from KOP 1 is to the southwest, toward the proposed Project's solar arrays (Viewpoint 1). This viewpoint represents views from an identifiable point along the most proximate roadway, where topography allows visibility of the Project site. Additionally, the viewpoint represents the residents located at 5210 N Best Ave in Brawley, CA. The view is characterized by flat agricultural land to the west, south, and east with the nearby residence to the northeast. The Coyote Mountains and Fish Creek Mountains are visible far off to the south. The view of the Project site is mostly unobstructed except for utility poles traveling along the western side of N Best Road.

4.1.2 View with Project

Viewpoint 1 shows the view from KOP 1 with the proposed Project simulated. The solar arrays and the security fencing would be the most prominently visible portion of the Project from this location. As conceptually shown in the simulation, the Project would appear as a comparatively dark, horizontal bar across the majority of the view. The overall effect shown in Viewpoint 1 is the relatively small degree of contrast the Project would have with its broader surroundings, which includes views of the Coyote Mountains and Fish Creek Mountains. Solar arrays would not substantially obscure the mountain skyline from this vantage point.

4.2 VIEW FROM N BEST AVE AND WARD ROAD (KOP 2)

4.2.1 Existing View

KOP 2 is located at the intersection of N Best Ave and Ward Road, at the southeast corner of the Project site. The view from KOP 2 is to the northwest, toward the proposed Project's solar arrays, BESS, and substation (Viewpoint 2). This viewpoint represents views from an identifiable point along the most proximate roadway, where topography allows visibility of the Project site. Additionally, the viewpoint represents the residents located at 5000 N Best Ave and 5002 N Best Road in Brawley, CA. The view is characterized by flat agricultural land to the north; an abandoned residence and fenced corral to the west; a vacant dirt lot to the south; and the nearby residences to the northeast. Vegetation along the New River is visible to the west and the Chocolate Mountains are visible far off to the north and west. The view of the Project site is partially obstructed by vegetation along the old corral and utility poles traveling along the western side of N Best Road.

4.2.2 View with Project

Viewpoint 2 shows the view from KOP 2 with the proposed Project simulated. The solar arrays and the security fencing would be the most prominently visible portion of the Project from this location. With demolition of the abandoned residence and corral, the Project's BESS and substation are also visible from KOP 2 to the west. As conceptually shown in the simulation, the Project would appear as a generally uniform dark line across the view. The overall effect shown in Viewpoint 2 is the relatively small degree of contrast the Project would have with its broader surroundings, which include views of the Chocolate Mountains. The BESS, substation, and solar arrays would not substantially obscure the mountain skyline from this vantage point.

4.3 VIEW FROM NORTH END OF DEL RIO COUNTRY CLUB AND GOLF COURSE (KOP 3)

4.3.1 Existing View

KOP 3 is located along the Union Pacific railroad tracks on the northwest end of Del Rio Country Club and Golf Course, approximately 0.25 mile from the Project site. The view from KOP 3 is to the north, toward the proposed Project's solar arrays, BESS, substation, and gen-tie line. This viewpoint represents golfers and staff at Del Rio Country Club, where topography allows views of the Project site, as well as views from the Union Pacific railway line. The view is characterized by flat, undeveloped land with sparse vegetation to the north and northeast, agricultural land to the east, and the landscaped golf course to the west. The railroad tracks travel north through the middle of the view, with the Chocolate Mountain Range visible far off to the north. The view of the Project site is unobstructed.

4.3.2 View with Project

Viewpoint 3 shows the view from KOP 3 with the proposed Project simulated. The gen-tie structures would be the most prominently visible portion of the Project from this location. As conceptually shown in the simulation, the gen-tie structures would be visible in the center of the view, traveling from east to west approximately 1.75 miles. While appearing as new and highly visible features, the transmission structures would relate to the numerous lines visible throughout the landscape. They would also occupy a relatively narrow portion of the view to the north from KOP 3.

The substation for the proposed Project has not yet been designed. However, the facility shown in Viewpoint 3 is an approximation based on representative examples of substations of similar size and in similar environments. As simulated, the substation would be partially visible in views from KOP 3, alongside the solar arrays, which would appear as a comparatively dark, horizontal bar across a portion of the view's middle ground. Aside from the relatively narrow gen-tie structures, no Project component would substantially obscure or appear above the mountain skyline from this vantage point.

4.4 VIEW FROM STATE ROUTE (SR) 111 AND ANDRE ROAD (KOP 4)

4.4.1 Existing View

KOP 4 is located at the corner of SR 111 and Andre Road, along the gen-tie line route. The view from KOP 4 is to the east, toward the proposed Project's gen-tie line, BESS, substation, and solar arrays. This viewpoint represents views from an identifiable point along a well-traveled roadway in the County, where topography allows visibility of the Project site. The view is characterized by mainly flat agricultural land to the north and south. The City of Brawley Wastewater Treatment Plant is within the northern portion of the view and a dirt access road leads to an industrial dirt lot with pipelines directly east of the view. The Chocolate Mountain Range is visible far off to the east. The view of the Project site is partially obstructed by the City of Brawley Wastewater Treatment Plant, utility poles, and small amounts of vegetation in the foreground.

4.4.2 View with Project

Viewpoint 4 shows the view from KOP 4 with the proposed Project simulated. The gen-tie structures would be the most prominently visible portion of the Project from this location. As conceptually shown in the simulation, the gen-tie structures would be visible in the southern portion of the view, traveling from east to west approximately 0.5 mile. While appearing as new and highly visible features, the transmission structures would relate to the numerous lines visible throughout the landscape. They would also occupy a relatively narrow portion of the view to the south from KOP 4.

As simulated, views of the substation and BESS would be visible in the distance from KOP 4. These structures would relate to the nearby industrial features in the landscape, including the nearby pipelines. The solar arrays would appear as a comparatively dark, horizontal bar across the remainder of the view. No Project component would substantially obscure or appear above the mountain skyline from this vantage point.

SECTION 5.0 – GLARE ANALYSIS

The Federal Aviation Administration (FAA) has expressed concern for glare resulting from PV systems potentially causing distractions to pilots. For this reason, the FAA has asked solar developers to perform a glare hazard analysis to evaluate and document potential occurrences of glare. Proposed solar operations were studied by POWER Engineers (POWER) for two landing approaches at the Brawley Municipal Airport. In addition to airport operations, POWER analyzed potential glare that would cause distraction to nearby motorists and structures. The Project's Glare Hazard Analysis is included in Appendix B of this document.

As detailed in Appendix B, POWER identified and analyzed the following sensitive viewers for glare:

- Brawley Municipal Airport – 2-mile final approaches analyzed at 3% slope
    - Runway 8 Final Approach:
        - Distance from Project: 1.57 miles
        - Heading: 90 degrees true
        - Runway Elevation: -128.88 feet
        - Final Approach Slope: 3.0 degrees
    - Runway 26 Final Approach:
        - Distance from Project: 1.55 miles
        - Heading: 275 degrees true
        - Runway Elevation: -134.77 feet
        - Final Approach Slope: 3.0 degrees
- Structures – Single point analysis was completed for nearby residences and structures.
    - An aerial survey using Google Earth was completed to identify residences/structures within one mile of the project boundary.
    - Distance from Project: Up to one mile
    - Viewer Height: 10 feet above grade
- Major Roadways - Roadways were analyzed up to one mile from the project location at a viewer height of 10 feet to account for worse-case scenario truck traffic.
    - N. Best Avenue
    - Highway 111
    - Ward Road
    - Rutherford Road

POWER used GlareGauge licensed by ForgeSolar. The GlareGauge uses Solar Glare Hazard Analysis Tool technology and is a web-based glare assessment tool allowing input of viewer position, solar facility location, solar technology, and elevation data. The GlareGauge provides a quantified assessment of when and where glare may occur throughout the year from a solar installation, as well as identifying the potential effects on the human eye when glare does occur. Glare was analyzed at one-minute intervals throughout the entire year to determine when and where glare may be visible to residences, motorists, and pilots. The GlareGauge meets FAA glare analysis requirements.

After review of the GlareGauge tool analysis, POWER found no potential glare reported from the proposed solar operations due to the orientation of the PV panels, the 5 degree stow angle and the distance from sensitive viewers to the Project. When the sun is lowest in the sky, nearing sunrise and sunset, the 5 degree stow angle redirects potential glare up and away from sensitive viewers. Based on these findings, it was concluded that the Brawley Solar Energy Facility Project will have low potential for glare impact on airport operations and will not cause distraction to nearby residences or motorists.

POWER's independent analysis using the GlareGauge concluded the following:

- Brawley Municipal Airport – Runways 8 and 26 reported no Glare.
- Structures – Nearby residences and structures reported no Glare.
- Motorists – Two-way route receptors reported no Glare.

A detailed description of the GlareGauge Analysis Report is in Appendix B.

SECTION 6.0 – PRELIMINARY CEQA ANALYSIS

This technical report will inform the Project's eventual evaluation of potential environmental effects in order to satisfy the California Environmental Quality Act (CEQA). There are four CEQA criteria for Aesthetics. Each is presented here as a question, with preliminary assessments of impact to visual resources provided.

1. Would the Project have a substantial adverse effect on a scenic vista?

Less than Significant Impact. Scenic vistas are typically expansive views from elevated areas. They may or may not be part of a designated scenic overlook or other area providing a static vista view of a landscape. There are no designated scenic vistas in the Project vicinity. According to the County General Plan, the closest scenic resource is the Salton Sea approximately 11 miles northwest of the Project site (County 2015). Views from elevated areas near the Project site could be considered scenic vistas given the expansiveness of the views and distance one can see under favorable conditions. As described above for the view of the Project from all KOPs, the Project would not have a substantial adverse effect on such views. Rather, it would be absorbed into the natural and built features that comprise the existing landscape. Therefore, less than significant impacts to scenic vistas would occur.

2. Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. There are no designated or eligible state scenic highways in the Project vicinity. The nearest road segment among those identified by Imperial County as "having potential as state-designated scenic highways" is the portion of SR 111 from Bombay Beach to the Imperial County/Riverside County boundary. The Project site is approximately 25 miles south of Bombay Beach. Therefore, no impacts to scenic resources within any state scenic highways would occur.

3. Would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less than Significant Impact. The existing visual character in views of the Project would not be substantially altered based primarily on the proximity of viewpoints to the Project site. The views from KOPs 1 and 2 show the Project's solar arrays and the security fencing most prominently, which would appear as a comparatively dark, horizontal bar across the view. The overall effect of the Project from these KOPs is relatively small degree of contrast the Project would have with its broader surroundings and a small interruption of views of the surrounding mountains. In the view from KOPs 3 and 4, new transmission structures that would be part of the Project's interconnection would appear large in scale; however, the structures would be comparable in size and appearance to other structures visible throughout the surrounding landscape, including multiple existing transmission lines. As previously described, the Project would not substantially degrade the existing visual character or quality of views from this distance; rather it would appear absorbed into the broader landscape that already includes agricultural development, electricity transmission, geothermal power plants, and the City of Brawley Wastewater Treatment Plant. These effects would be less than significant.

4. Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less than Significant Impact. The Project would not include any source of nighttime lighting and therefore would not be a source of substantial light in the area outside of the Project site. POWER produced a Glare Hazard Analysis for the Project (Appendix B). It concluded that sensitive viewers near the Project, including residences, a nearby golf course, major roadways, and approach slopes associated with the Brawley Municipal Airport, would experience no glare effects from the Project. These effects would be less than significant.

SECTION 7.0 – CONCLUSIONS

The Brawley Solar Energy Facility would result in the construction of solar arrays, a substation, a BESS, and a gen-tie line on a currently undeveloped site just east of the SR 111 corridor. In views from publicly accessible locations, the proposed Project would be visible and identifiable, though it would not substantially alter existing visual character (see discussion above). Further, such views of the Project would be limited in duration for drivers along SR 111. In most views, much or all of the Project would be absorbed into the broader landscape. The majority of this portion of the Imperial Valley is dedicated to agricultural and power production and transmission. The Project would appear consistent with existing patterns of croplands, geothermal facilities, utility infrastructure, and other mechanized or industrial-appearing development.

SECTION 8.0 – REFERENCES

Chambers Group, Inc. (Chambers)

2021 Biological Technical Report for the Brawley Solar Project.

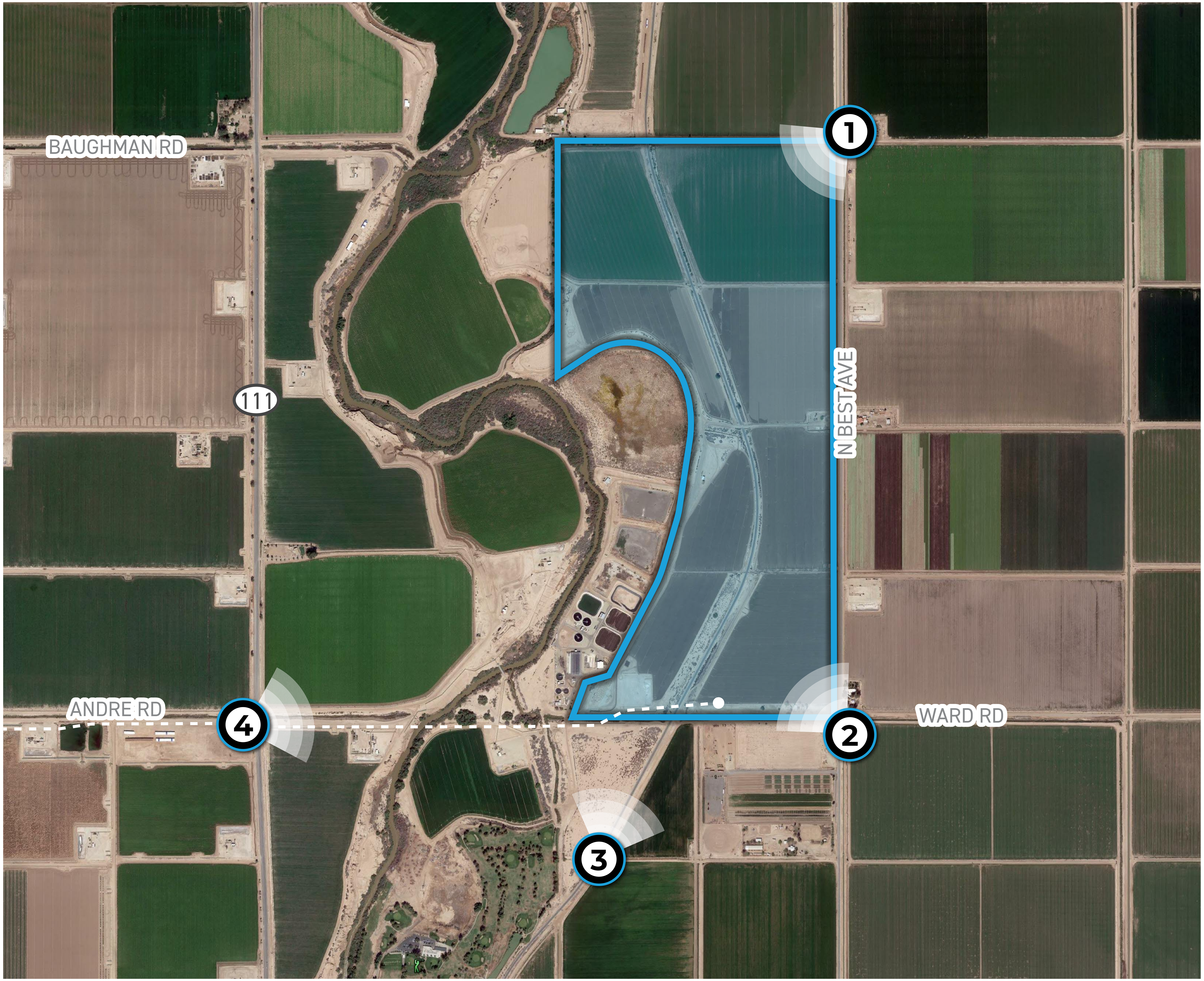
County of Imperial (County)

2008 Imperial County General Plan – Circulation and Scenic Highways Element. Available online: https://www.icpds.com/assets/planning/circulation-scenic-highway-element-2008.pdf

APPENDIX A – VISUAL SIMULATIONS

BRAWLEY SOLAR ENERGY FACILITY

VIEWPOINT MAP



1 PHOTO VIEWPOINT

LARGE MAP VIEW-AREA

PROJECT AREA

CHAMBERS GROUP

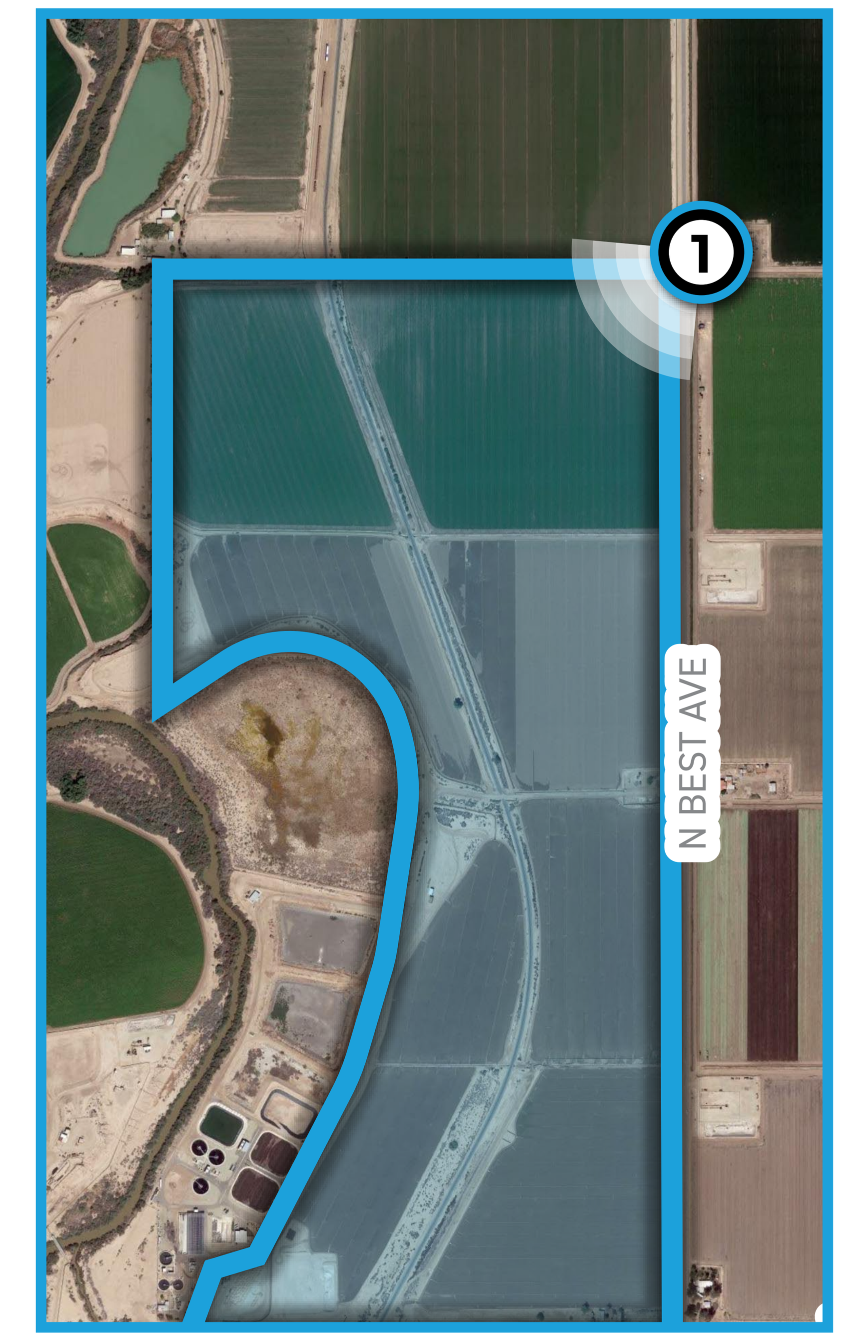
BRAWLEY SOLAR
ENERGY FACILITY

VIEWPOINT 1

DATE: 03/04/2021

TIME: 1:46 PM

DIRECTION: SOUTHWEST



1 PHOTO VIEWPOINT

PROJECT AREA

CHAMBERS GROUP

BRAWLEY SOLAR ENERGY FACILITY

VIEWPOINT 2

DATE: 03/04/2021

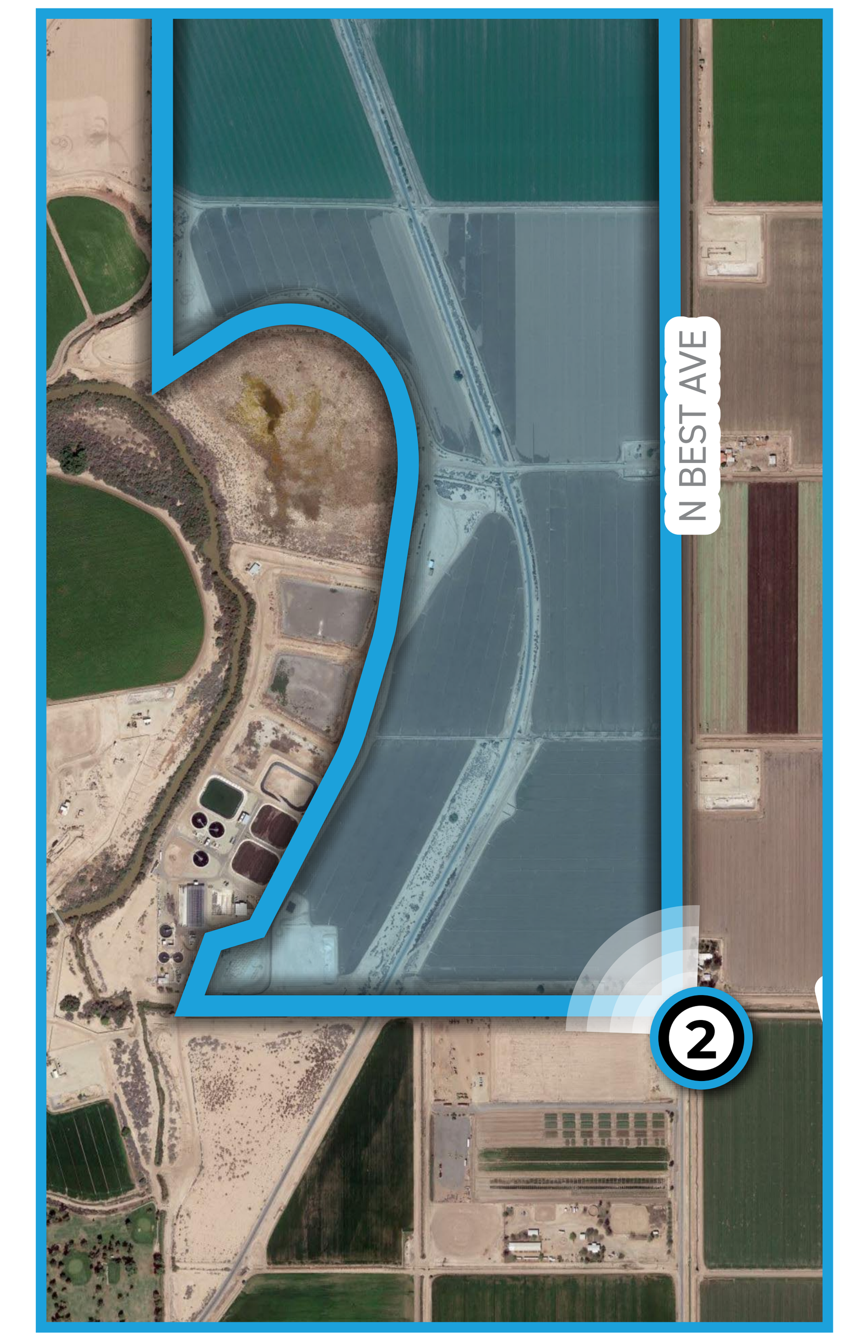
TIME: 1:17 PM

DIRECTION: NORTHWEST

EXISTING CONDITIONS

PROPOSED CONDITIONS

PHOTO SIMULATIONS ARE FOR DEMONSTRATION PURPOSES ONLY. FINAL DESIGN IS SUBJECT TO CHANGE PENDING PUBLIC, UTILITY, AND REGULATORY REVIEW.



1 PHOTO VIEWPOINT

PROJECT AREA

CHAMBERS GROUP

BRAWLEY SOLAR ENERGY FACILITY

VIEWPOINT 3

DATE: 03/04/2021

TIME: 1:23 PM

DIRECTION: NORTH

1 PHOTO VIEWPOINT

PROJECT AREA

CHAMBERS GROUP

EXISTING CONDITIONS

PROPOSED CONDITIONS

PHOTO SIMULATIONS ARE FOR DEMONSTRATION PURPOSES ONLY. FINAL DESIGN IS SUBJECT TO CHANGE PENDING PUBLIC, UTILITY, AND REGULATORY REVIEW.

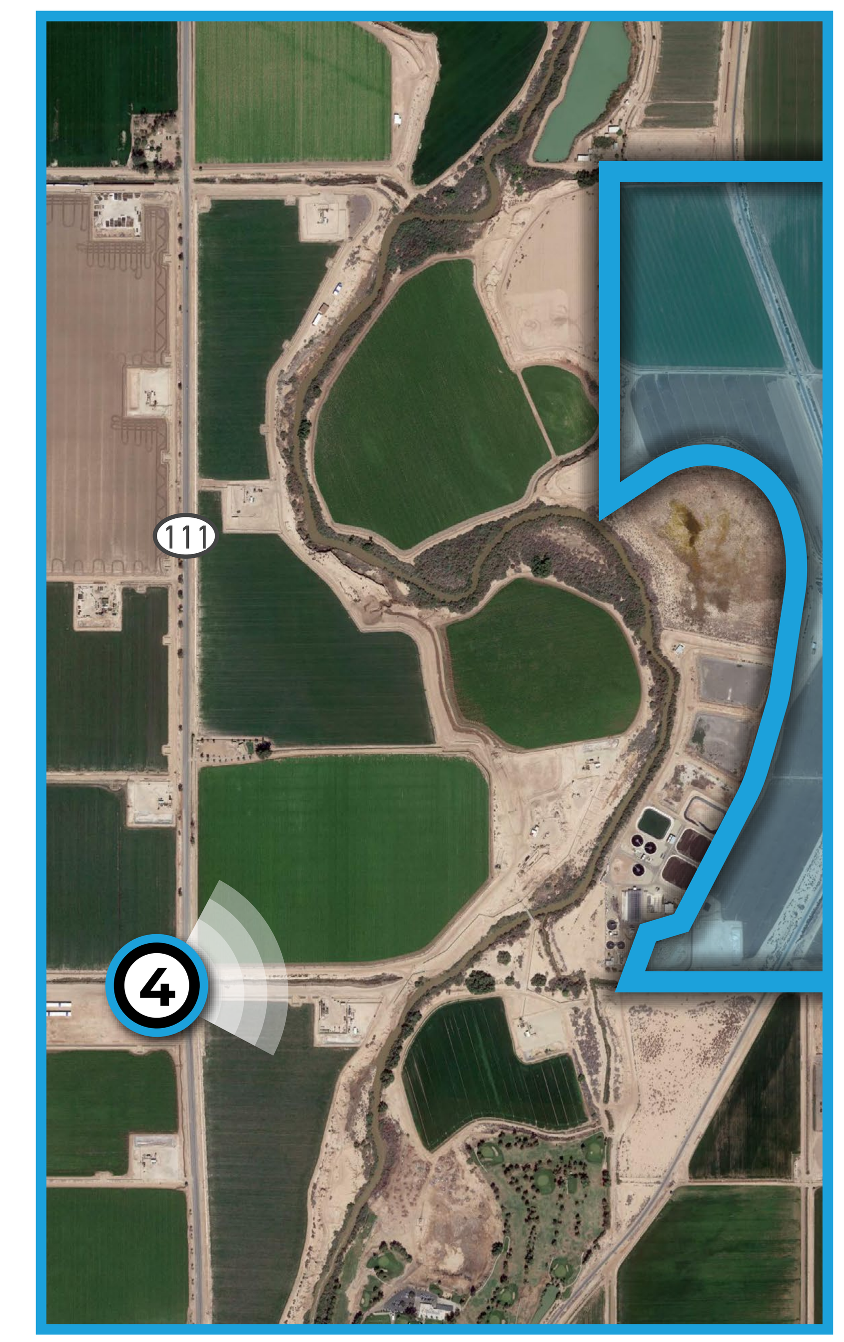
BRAWLEY SOLAR ENERGY FACILITY

VIEWPOINT 4

DATE: 03/04/2021

TIME: 2:05 PM

DIRECTION: EAST



1 PHOTO VIEWPOINT

PROJECT AREA

CHAMBERS GROUP

APPENDIX B – GLARE HAZARD ANALYSIS

POWER ENGINEERS, INC.
2041 SOUTH COBALT POINT WAY
MERIDIAN, ID 83642 USA

PHONE 208-288-6100
FAX 208-288-6199

April 26, 2021

Victoria Boyd
Chambers Group
5 Hutton Center Drive Suite 750
Santa Ana, CA 92707

Subject: Glare analysis for the Brawley Solar Energy Facility in Brawley, Imperial County, California

Dear Ms. Boyd:

At your request, POWER Engineers Inc. (POWER) has evaluated the proposed Brawley Solar Energy Facility (Project) to ensure Federal Aviation Administration (FAA) compliance regarding hazardous solar glare in or around airports. POWER has also evaluated any potential glare that could cause distraction to nearby structures and motorists. This technical memo describes our findings.

Project Description – The proposed Project located in Brawley, California and will utilize single-axis tracking photovoltaic solar technology and produce up to 40 megawatts (MW) of energy (See Appendix A). This Glare Study was commissioned by Chambers Group and prepared for Imperial County, Brawley Municipal Airport officials and the FAA. Specifically, this study does the following:

- Identifies any sensitive viewers near the Project including residences, other structures, a nearby golf course, major roadways and approach slopes associated with the Brawley Municipal Airport.
- Characterizes typical glare behavior experienced from the solar project throughout the day and year.
- Evaluates when and where glare may be visible to structures, motorists and pilots on final approach.

Sensitive Viewers – The FAA has expressed concern for glare resulting from PV systems potentially causing distractions to pilots. For this reason, the FAA has asked solar developers to perform a glare hazard analysis to evaluate and document potential occurrences of glare. Proposed solar operations were studied for two landing approaches at the Brawley Municipal Airport. In addition to airport operations, POWER analyzed potential glare that would cause distraction to nearby motorists and structures (See Appendix A). POWER identified and analyzed the following sensitive viewers:

- **Brawley Municipal Airport** – 2-mile final approaches analyzed at 3% slope
  - **Runway 8 Final Approach**:

- Distance from Project: 1.57 miles
- Heading: 90 degrees true
- Runway Elevation: -128.88 feet
- Final Approach Slope: 3.0 degrees

    - **Runway 26 Final Approach**:
        - Distance from Project: 1.55 miles
        - Heading: 275 degrees true
        - Runway Elevation: -134.77 feet
        - Final Approach Slope: 3.0 degrees

- **Structures** – Single point analysis was completed for nearby residences and structures.
    - An aerial survey using Google Earth was completed to identify residences/structures within one mile of the project boundary.
    - Distance from Project: Up to one mile
    - Viewer Height: 10 feet above grade
- **Major Roadways** - Roadways were analyzed up to one mile from the project location at a viewer height of 10 feet to account for worse-case scenario truck traffic.
    - N. Best Avenue
    - Highway 111
    - Ward Road
    - Rutherford Road

Solar Technology – The Project proposes the use of single-axis tracking PV panels rotating around a north/south axis. Single-axis trackers are designed to maximize solar efficiency by tracking the east-west position of the sun throughout the day. Panels will utilize back-tracking after reaching the maximum tracking angle to reduce shading of adjacent panels (See Appendix B). Details of the solar technologies were provided by the Chambers Group and are described below:

- Tracking: Single-axis Tracking
- Tracking Axis Orientation: 180 due south
- Maximum Tracking Angle: ± 52 Degrees
- Stow Angle: ± 5 Degrees
- Coating/Texture: Smooth glass with anti-reflective (AR) coating
- Mount Height: 5 feet above grade

Glare Analysis – POWER used GlareGauge licensed by ForgeSolar. The GlareGauge uses Solar Glare Hazard Analysis Tool technology and is a web-based glare assessment tool allowing input of viewer position, solar facility location, solar technology, and elevation data. The GlareGauge provides a quantified assessment of when and where glare may occur throughout the year from a solar installation, as well as identifying the potential effects on the human eye when glare does occur. Glare was analyzed at one-minute intervals throughout the entire year to determine when and where glare may be visible to residences, motorists, and pilots. The GlareGauge meets FAA glare analysis requirements.

Results – After review of the Glare Gauge tool analysis, POWER found no potential glare reported from the proposed solar operations due to the orientation of the PV panels, the 5 degree stow angle and the distance from sensitive viewers to the Project. When the sun is lowest in the sky, nearing sunrise and sunset, the 5 degree stow angle redirects potential glare up and away from sensitive viewers. Based on these findings, it is POWER's professional opinion that the proposed Brawley Solar Energy Facility Project will have low potential for glare impact on airport operations and will not cause distraction to nearby residences or motorists.

POWER's independent analysis using the GlareGauge concluded the following:

- Brawley Municipal Airport – Runways 8 and 26 reported no Glare.
- Structures – Nearby residences and structures reported no Glare.
- Motorists – Two-way route receptors reported no Glare.

For a detailed description of the GlareGauge analysis report please see Appendices C.

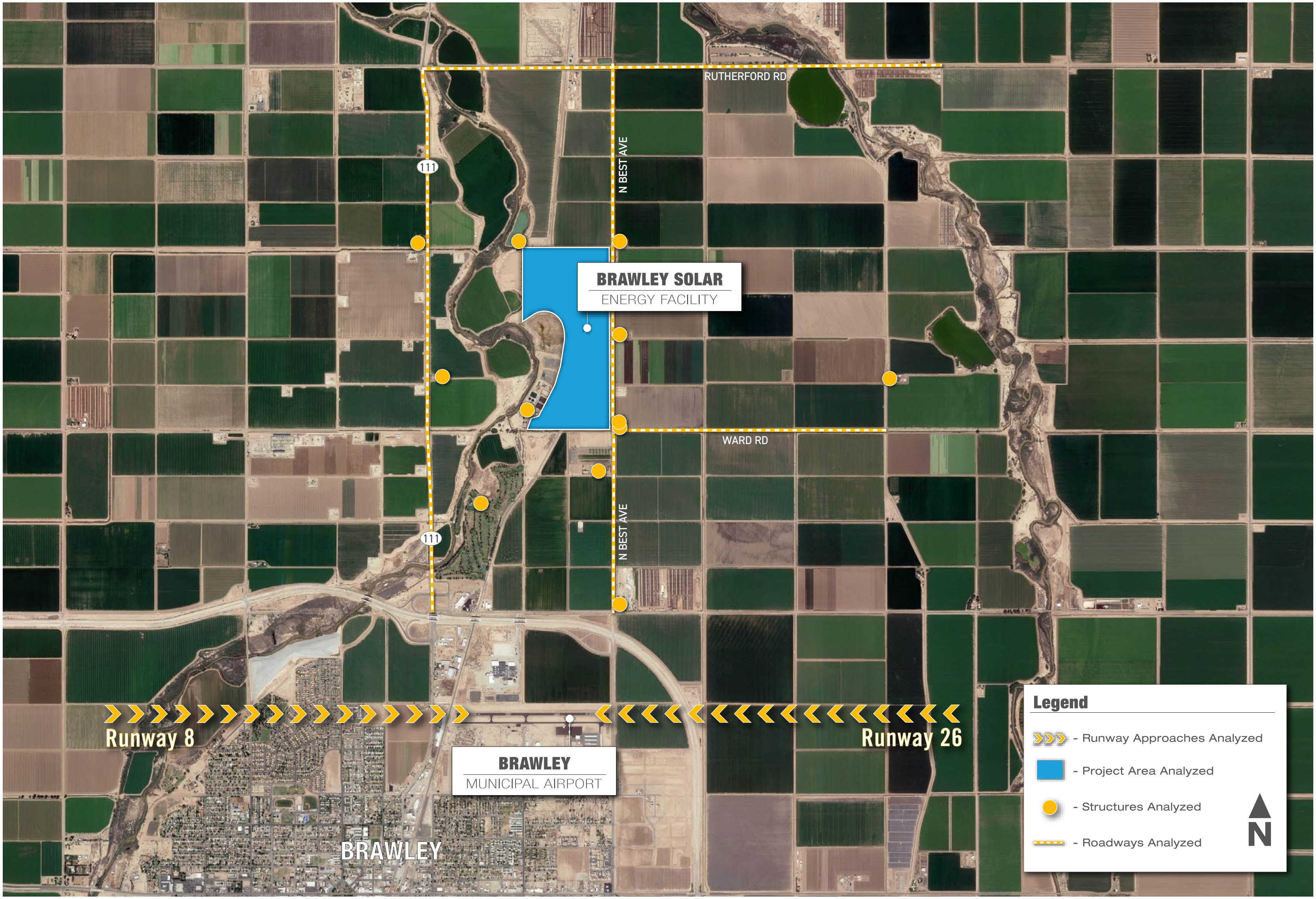
Please let me know if you have any questions as I would be happy to discuss.

Sincerely,

Visualization Specialist III

Enclosure: Appendix A – Project Location
Appendix B – Solar Behavior
Appendix C – GlareGauge output glare analysis

APPENDIX A PROJECT LOCATION



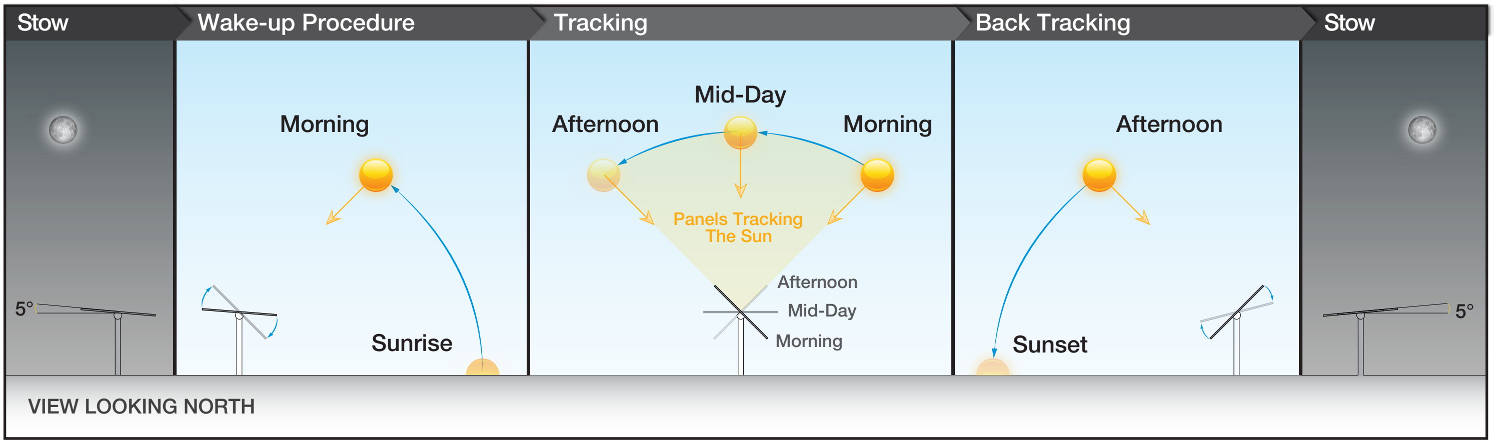
Prepared By,
POWER ENGINEERS

Brawley Solar Energy Facility Glare Analysis

Project Location - Appendix A

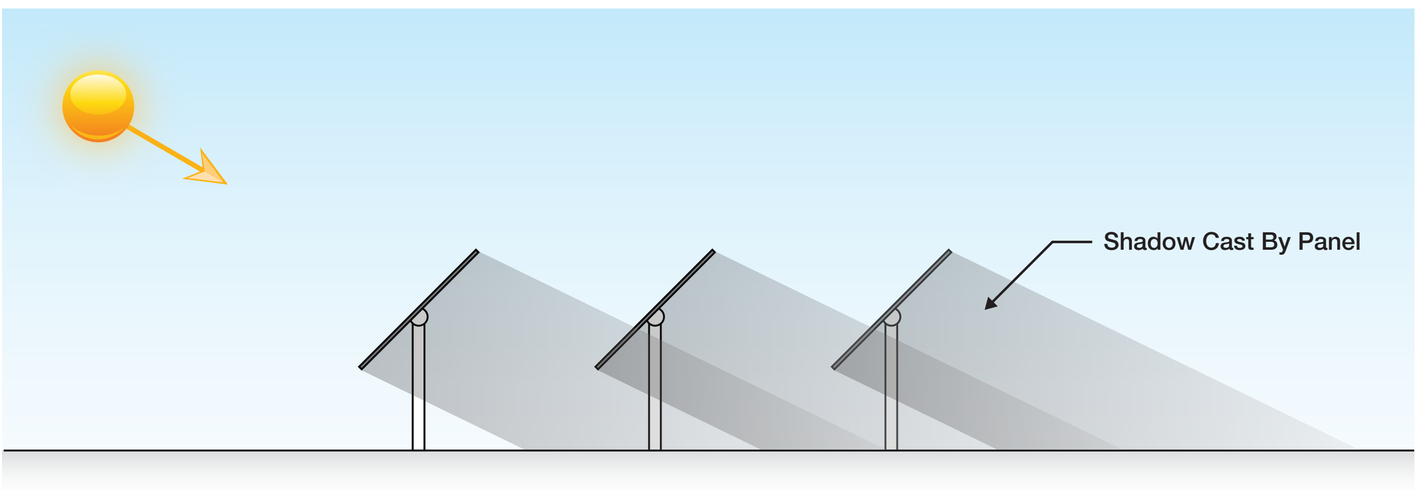
APPENDIX B SOLAR BEHAVIOR

Single Axis Tracker Behavior

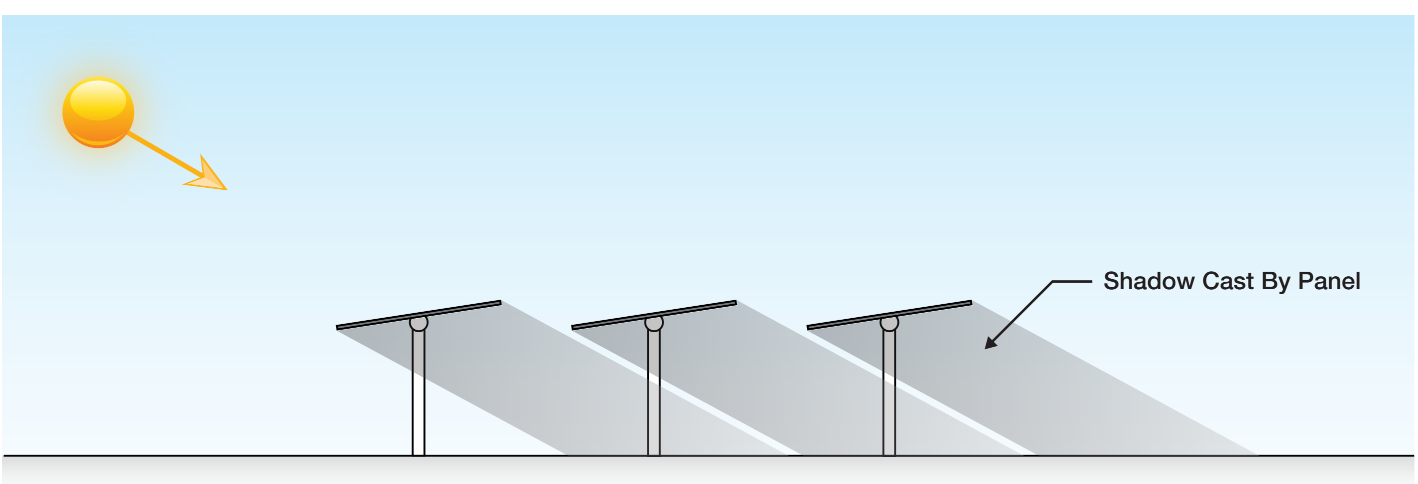


Back Tracking Procedures

Panels *without* Back Tracking



Panels *with* Back Tracking



APPENDIX C GLAREGAUGE OUTPUT GLARE ANALYSIS

FORGESOLAR GLARE ANALYSIS

Project: **Brawley Solar**
Site configuration: **Brawley PV**
Analysis conducted by Andy Stephens (andy.stephens@powereng.com) at 22:23 on 19 Apr, 2021.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
2-mile flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

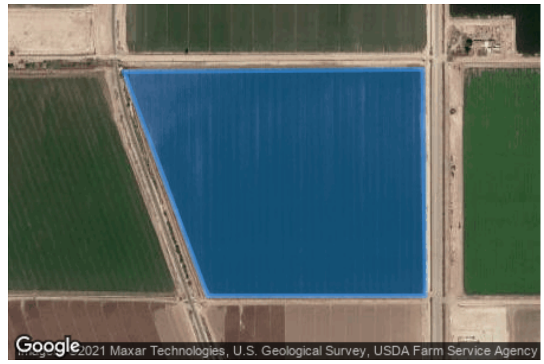
DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 52670.9444

PV Array(s)

Name: PV array 1
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.029958	-115.517802	-150.79	5.00	-145.79
2	33.029922	-115.515249	-148.76	5.00	-143.76
3	33.026522	-115.513876	-145.70	5.00	-140.70
4	33.026540	-115.517910	-151.93	5.00	-146.93

Name: PV array 2
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.029940	-115.514949	-147.15	5.00	-142.15
2	33.029976	-115.509520	-145.94	5.00	-140.94
3	33.026540	-115.509477	-144.50	5.00	-139.50
4	33.026540	-115.513425	-145.34	5.00	-140.34

Name: PV array 3
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.026414	-115.517717	-159.64	5.00	-154.64
2	33.026414	-115.513811	-145.48	5.00	-140.48
3	33.022933	-115.512341	-144.59	5.00	-139.59
4	33.022951	-115.513296	-147.35	5.00	-142.35
5	33.024273	-115.513747	-143.95	5.00	-138.95
6	33.025119	-115.515142	-149.87	5.00	-144.87
7	33.025119	-115.517759	-147.43	5.00	-142.43

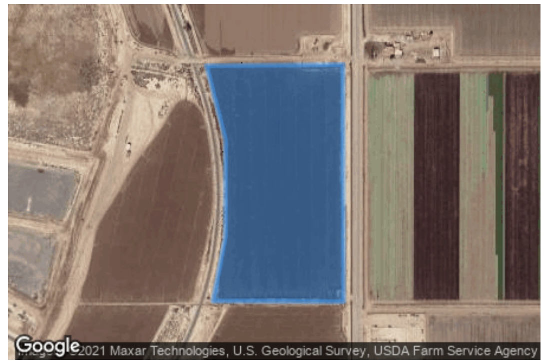
Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.026378	-115.513361	-146.34	5.00	-141.34
2	33.026396	-115.509477	-144.66	5.00	-139.66
3	33.022942	-115.509498	-143.54	5.00	-138.54
4	33.022906	-115.512030	-144.23	5.00	-139.23

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.022861	-115.513328	-148.32	5.00	-143.32
2	33.022834	-115.512331	-144.08	5.00	-139.08
3	33.021593	-115.511912	-146.10	5.00	-141.10
4	33.020279	-115.511891	-146.57	5.00	-141.57
5	33.019227	-115.512202	-144.98	5.00	-139.98
6	33.019236	-115.514401	-147.82	5.00	-142.82

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.022816	-115.511987	-144.06	5.00	-139.06
2	33.022834	-115.509509	-142.79	5.00	-137.79
3	33.019236	-115.509498	-143.10	5.00	-138.10
4	33.019245	-115.511869	-145.02	5.00	-140.02
5	33.020225	-115.511644	-146.05	5.00	-141.05
6	33.021691	-115.511644	-146.73	5.00	-141.73

Name: PV array 7
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.019173	-115.514434	-148.52	5.00	-143.52
2	33.019155	-115.512223	-144.95	5.00	-139.95
3	33.016609	-115.513811	-145.07	5.00	-140.07
4	33.016591	-115.516097	-146.79	5.00	-141.79

Name: PV array 8
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 5.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.019119	-115.511966	-144.60	5.00	-139.60
2	33.019146	-115.509509	-143.18	5.00	-138.18
3	33.015790	-115.509498	-140.29	5.00	-135.29
4	33.015763	-115.513929	-144.40	5.00	-139.40

Flight Path Receptor(s)

Name: FP 26
Description:
Threshold height: 50 ft
Direction: 270.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	32.992949	-115.511036	-134.19	50.00	-84.19
Two-mile	32.992954	-115.476524	-139.45	608.72	469.27

Name: FP 8
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	32.992931	-115.522773	-128.04	50.00	-78.04
Two-mile	32.992931	-115.557285	-119.14	594.56	475.42

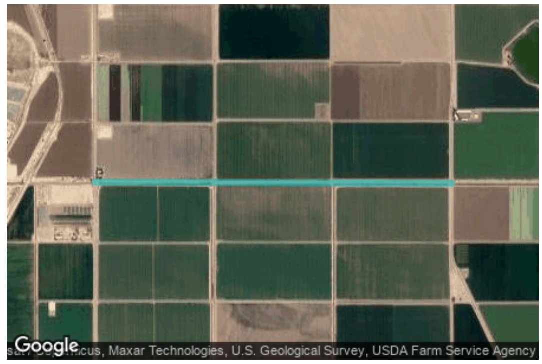
Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	33.030343	-115.508550	-144.90	10.00
OP 2	2	33.023028	-115.508671	-141.97	10.00
OP 3	3	33.015918	-115.508889	-141.68	10.00
OP 4	4	33.016206	-115.508985	-136.22	10.00
OP 5	5	33.012222	-115.510718	-132.70	10.00
OP 6	6	33.016879	-115.516500	-165.03	10.00
OP 7	7	33.019725	-115.525648	-140.27	10.00
OP 8	8	33.030390	-115.527614	-144.83	10.00
OP 9	9	33.001207	-115.508821	-129.38	10.00
OP 10	10	33.019487	-115.483043	-137.60	10.00
OP 11	11	33.030237	-115.517849	-149.57	10.00
OP 12	12	33.009611	-115.521644	-130.02	10.00

Route Receptor(s)

Name: Route 2
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.015524	-115.483415	-138.71	10.00	-128.71
2	33.015615	-115.509284	-142.13	10.00	-132.13

Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.044565	-115.527346	-161.18	10.00	-151.18
2	33.043630	-115.527389	-159.66	10.00	-149.66
3	33.043018	-115.527303	-157.99	10.00	-147.99
4	33.041831	-115.526981	-158.52	10.00	-148.51
5	33.040860	-115.526917	-156.83	10.00	-146.83
6	33.027924	-115.526836	-149.21	10.00	-139.21
7	33.015671	-115.526847	-142.44	10.00	-132.44
8	33.010274	-115.526584	-138.38	10.00	-128.38
9	33.007710	-115.526552	-148.29	10.00	-138.29
10	33.004426	-115.526509	-165.15	10.00	-155.15
11	33.000994	-115.526430	-133.10	10.00	-123.10
12	32.999906	-115.526452	-132.98	10.00	-122.98

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.044574	-115.527519	-160.65	10.00	-150.64
2	33.044485	-115.521446	-164.99	10.00	-154.99
3	33.044485	-115.509001	-151.38	10.00	-141.37
4	33.044507	-115.501104	-149.43	10.00	-139.43
5	33.044579	-115.500171	-150.41	10.00	-140.41
6	33.044603	-115.479221	-146.50	10.00	-136.50

Name: Route 4
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.044443	-115.509272	-151.53	10.00	-141.53
2	33.039923	-115.509262	-150.45	10.00	-140.45
3	33.030728	-115.509247	-148.05	10.00	-138.05
4	33.026435	-115.509240	-145.11	10.00	-135.11
5	33.022358	-115.509239	-143.95	10.00	-133.95
6	33.016137	-115.509232	-139.34	10.00	-129.34
7	33.015714	-115.509248	-140.20	10.00	-130.20
8	33.015294	-115.509293	-141.75	10.00	-131.75
9	33.001013	-115.509288	-133.83	10.00	-123.83
10	33.000860	-115.509293	-136.04	10.00	-126.04

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	0	0	-
PV array 5	SA tracking	SA tracking	0	0	-
PV array 6	SA tracking	SA tracking	0	0	-
PV array 7	SA tracking	SA tracking	0	0	-
PV array 8	SA tracking	SA tracking	0	0	-

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Results for: PV array 1

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 3

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 7

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare

0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 8

Receptor	Green Glare (min)	Yellow Glare (min)
FP 26	0	0
FP 8	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 2	0	0
Route 3	0	0
Route 4	0	0
Route 4	0	0

Flight Path: FP 26

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 2

0 minutes of yellow glare
0 minutes of green glare

Route: Route 3

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Route: Route 4

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.