Visual Resources Assessment
for the
North Star 2 Project

Imperial County, California

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Definition
AMSL	Above Mean Sea Level
BESS	Battery Electric Storage System
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
County	Imperial County
FAA	Federal Aviation Administration
HSAT	Horizontal Single Axis Tracker
KOP	Key Observation Point
MM	Mitigation Measure
MPH	Miles per hour
MW	Megawatt
PV	Photovoltaic
Project	North Star 2 Project
SR	State Route

1.0 INTRODUCTION

ZGlobal, through its wholly owned subsidiary North Star 2 SES, LLC (Applicant), is proposing development of the North Star 2 Solar Energy System (SES) and Battery Electric Storage System (BESS) (Proposed Project), approximately 14 miles east of the City of Brawley in Imperial County (County), California. ECORP Consulting, Inc., has been contracted to assess potential impacts to aesthetics and visual resources from construction and operation of the Proposed Project, and to assess potential glare-related safety hazards, and to document the results of both efforts in this report. The Visual Resources Impact Assessment discusses existing conditions on the Proposed Project site, applicable regulations, potential impacts, and the need for mitigation measures to reduce or avoid adverse impacts anticipated from implementation of the Proposed Project, as applicable. The glare hazard analysis consists of identifying locations that could experience glare conditions during project operations using a computer model, and assessing the potential severity of the hazard.

The Proposed Project includes a 130-megawatt (MW) solar field, consisting of solar photovoltaic (PV) modules mounted on Horizontal Single-Axis Tracker (HSAT) systems with mounting racks supported by driven piles, and a 175-MW BESS. The solar field consists of 289,900 modules on 9,660 strings, associated collector and inverter facilities. The Proposed Project would connect to the grid through an approximately 1.25-mile gen-tie line to the 230 kilovolts KN transmission line near the East Highland Canal. The projected lifespan of the Proposed Project is 20 years, and the project area will be restored to pre-project conditions following decommissioning.

The Proposed Project site consists of two separate parcels of 154 and 460 acres in size. It is located approximately 14 miles east of Brawley on approximately 614 acres of land between the East Highline Canal and Coachella Canal and abuts State Route 78 (SR78), also known as the Ben Hulse Highway, at its southern boundary. The site is currently vacant, undeveloped land, and is surrounded by open space on all sides.

The following figures are included:

- Figure 1 – Project and KOP Location
- Figure 2 – View from KOP 1

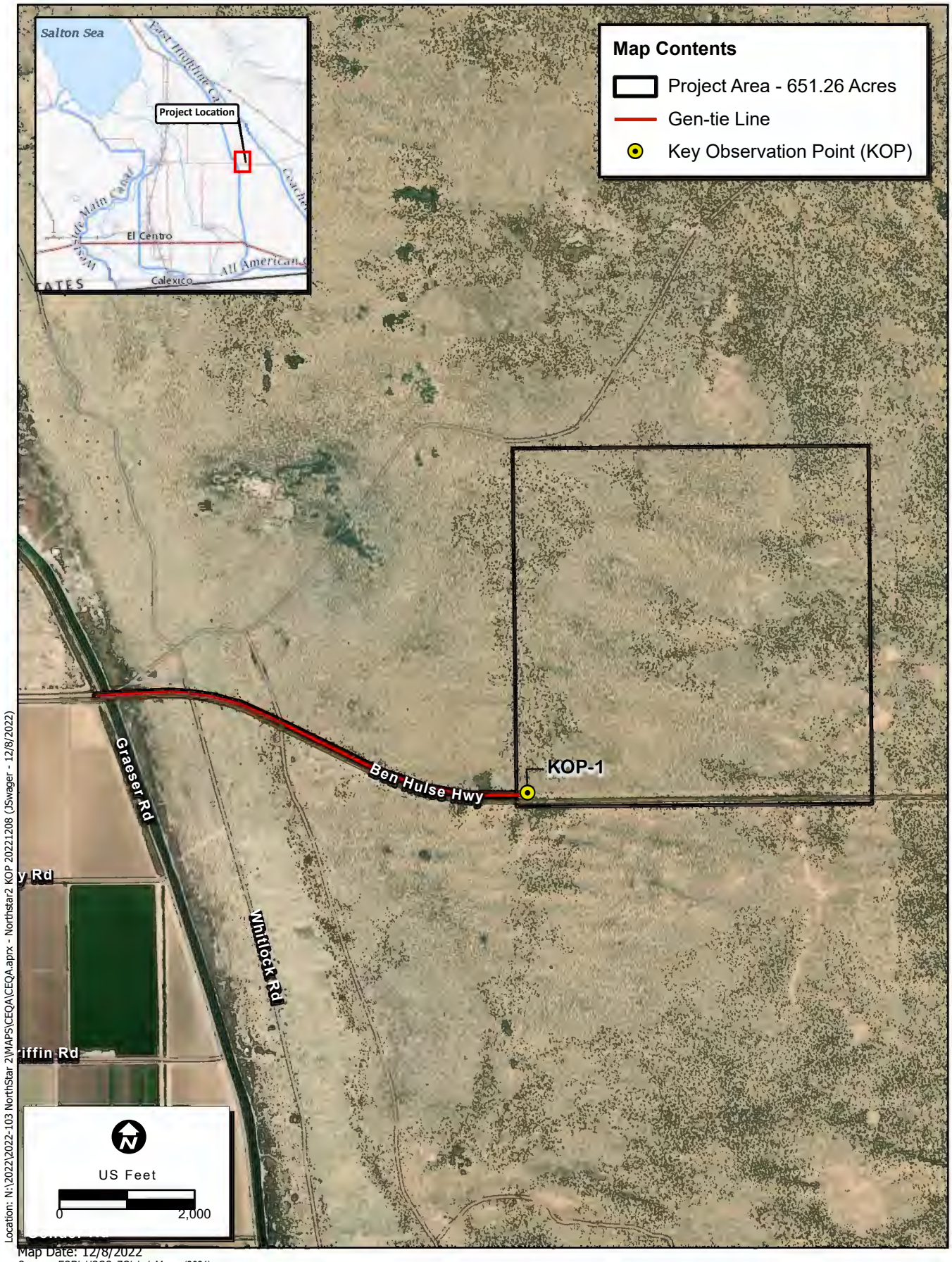

Figure 1. Project and KOP Locations

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Figure 2. View of Proposed Project from KOP 1
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2.0 AFFECTED ENVIRONMENT

Several state, regional, and local transportation-related standards and criteria apply to the Project and are discussed below in the Regulatory Setting section.

2.1 Regulatory Framework

2.1.1 Federal

No Federal laws or regulations apply to the Visual Resources Impact Assessment, though it includes an analysis following the BLM Visual Resources Inventory class system to describe the existing scenic values in the environment. The BLM's process is often applied to non-BLM visual assessments to provide Project proponents and authorizing agencies a consistent and translatable methodology for understanding visual impacts from proposed projects.

Visual resource inventory classes are assigned through the inventory process, based on several factors including type of users, amount of use, public interest, adjacent land uses, special areas, and other factors. Classes I and II are assigned to most valued resources, with Class I reserved for those areas where a management decision has been made previously to maintain a natural landscape. This includes areas such as national wilderness areas, the wild section of national wild and scenic rivers, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape. Classes II, III, and IV are assigned based on a combination of scenic quality, sensitivity level, and distance zones. This is accomplished by combining the three overlays for scenic quality, sensitivity levels, and distance zones, and using the guidelines to assign the proper class. Class III represents a moderate value, and Class IV is of least value. Inventory classes are informational in nature and provide the basis for considering visual values in the Resource Management Plan process. They do not establish management direction and should not be used as a basis for constraining or limiting surface disturbing activities.

2.1.2 State

Caltrans manages the California Scenic Highway Program. The goal of the program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to the scenic corridor.

2.1.3 Local

The Proposed Project site is under the Imperial County jurisdiction and subject to the County Development Code and General Plan guidelines. Section 92407.01 of the Development Code includes development criteria for facilities located within 0.5 mile of a designated scenic highway, however there are no designated scenic highways within 0.5mile of the Proposed Project site. The County General Plan does not specifically contain a visual element; however, it addresses related topics in the following General Plan Sections:

- Land Use Element;
- Circulation & Scenic Highways Element;

- Conservation and Open Space Element; and
- Renewable Energy and Transmission Element.

In addition, the Renewable Energy and Transmission Element (Imperial County 2015) includes specific goals, policies, and standards for renewable energy and, specifically, solar projects. Table 1 provides an analysis of the Proposed Project's consistency with the Conservation and Open Space, Land Use, and Circulation & Scenic Highway elements (Imperial County 2016).

Table 1. Project Consistency with the Conservation and Open Space, Land Use and Circulation & Scenic Highways

General Plan Policies	Consistency with General Plan	Analysis
Conservation and Open Space Element		
Goal 5: The aesthetic character of the region shall be protected and enhanced to provide a pleasing environment for residential, commercial, recreational, and tourist activity.	Yes	The Proposed Project would result in changes to the visual character of the Project site, which is currently characterized as desert landscape. However, the project site does not contain high levels of visual character or quality, and the project will be screened with a fence designed to blend with the landscape; therefore, the Proposed Project would not result in a significant deterioration in the visual character of the Proposed Project site or Project vicinity.
Objective 5.1: Encourage the preservation and enhancement of the natural beauty of the desert and mountain landscape.	Yes	See discussion above regarding Goal 5.
Goal 7: The aesthetic character of the region shall be protected and enhanced to provide a pleasing environment for residential, commercial, recreational, and tourist activity.	Yes	See discussion above regarding Goal 5. There is no residential or commercial development near the Proposed Project, and the project area is not used for recreational activities.
Land Use Element		
Goal 3: Achieve balanced economic and residential growth while preserving the unique natural, scenic, and agricultural resources of Imperial County.	Yes	See discussion below regarding Objective 4.3.
Objective 3.4: Protect/improve the aesthetics of Imperial County and its communities.	Yes	The Proposed Project would result in changes to the visual character of the Project site, which is currently characterized as a desert landscape. The Project site does not contain high levels of visual character or quality, and the project will be screened with a fence designed to blend with the landscape; therefore, the Project would not result in a significant deterioration in the

Table 1. Project Consistency with the Conservation and Open Space, Land Use and Circulation & Scenic Highways

General Plan Policies	Consistency with General Plan	Analysis
		visual character of the Project site or Project vicinity.
Circulation and Scenic Highways Element		
Objective 4.3: Protect areas of outstanding scenic beauty along any scenic highways and protect the aesthetics of those areas.	Yes	The Proposed Project is not sited in the vicinity of a designated scenic highway.
Objective 4.5: Develop standards for aesthetically valuable sites. Design review may be required so that structures, facilities, and activities are properly merged with the surrounding environment.	Yes	The Project has been designed to avoid impacts to scenic resources.
Policy 9 (b): The County shall emphasize protection of scenic highway resources in all County actions affecting land use.	Yes	There are no scenic highways in the Project vicinity.

Source: Imperial County General Plan Circulation and Scenic Highway Element, 2008; Land Use Element, 2015b; and Conservation and Open Space Element, 2016.

2.2 Regional Setting

The Proposed Project site is located approximately 14 miles east of Brawley in Imperial County, California and immediately north of State Route (SR) 78 and approximately 1 mile east of East Highline Canal (Figure 1). Geographically, the Proposed Project site is located within the Imperial Valley, which is part of the lower Colorado River Sonoran Desert Region, in the eastern central portion of Imperial County. The Project area consists of desert scrub habitat, and the Project site borders open space to the west, north and east, and Highway 78 (Ben Hulse Highway) to the south, which contributes contrast with the existing desert landscape. The closest active airport, the Brawley Municipal Airport, is approximately 14 miles west of the Proposed Project area.

2.3 Existing Visual Character of the Project Area

The East Highline Canal, which runs from the All-American Canal in the south to just south of the Niland Marina in the north, lies to the west of the Proposed Project site and is not visible from the site. There are no high-voltage electric transmission lines visible from the site. The overall character of the immediate landscape is agricultural to the west and natural open space to the north, east, and south. The Proposed Project vicinity is characterized by open and vast views with flat to undulating topography. There is desert landscape to the north, east, and south; smooth dirt and soft sand dunes that lead to distant mountain forms to the north and east; and agricultural cropland dominates the landscape to the west. The most notable natural features in the landscape are the textured dirt and sand with sparse desert vegetation on

the foreground, and soft, light tan, scenic sand dunes leading to mountain ranges in the background. The dark gray, subdued formations of the Chocolate Mountains approximately 13 miles to the east of the Proposed Project vicinity are approximately 2,000 feet above Mean Sea Level (AMSL) and are visible along the horizon for an approximately 25-mile stretch of SR 78 from just outside Brawley until they are blocked by the Mesquite Regional Landfill as the highway transitions into the mountain range; other portions of the mountain range are not prominent in the Project Area landscape given their distance from the project vicinity. The Algodones Dunes, including the Imperial Sand Dunes Recreation Area and North Algodones Dunes Wilderness Area, are approximately 11 miles east of the Proposed Project Area and are visible from the project area in the background at the base of the Chocolate Mountains. The dunes consist of gradually sloping sand dune formations that reach up to 400 feet AMSL. Agricultural development to the west of the Proposed Project (and west of the East Highline Canal) largely contributes to the human-made changes in the natural landscape in the general vicinity. Vegetation in the geometric agricultural fields is defined by distinct edges of exposed soils, with consistent groupings of bright yellow to dark green colors and a smooth, carpet-like texture. The vegetation to the north, east, and south is consistent and includes low-profile desert shrubs that are light khaki to dark brown.

The existing natural landscape is a valued resource because of its unspoiled nature and panoramic view, especially of the mountains and dunes in the background, which can be seen by motorists along much of the Ben Hulse Highway. The foreground view (see Figure 2), consisting of comparatively monotonous desert scrub habitat, is less valued because of the lack of distinguishing or interesting features, as evidenced by the lack of turnouts allowing motorists to stop and enjoy the view at the Proposed Project site. This foreground view is consistent for approximately 7 miles from the East Highline Canal to the Imperial Sand Dunes Recreation area, approximately 5 miles east of the Project site. Though not on federal land, the Project site would be given a Class III under the BLM's Visual Resources Inventory classification system, representing an overall moderate value.

2.4 Local Character

2.4.1 Scenic Highways

There are no State designated or eligible Scenic Highways in Imperial County. SR-78 is not a designated scenic route per the List of Officially Designated State Scenic Highways from California Department of Transportation (Caltrans. 2022).

2.4.2 Scenic Vistas

There are no Caltrans-designated vista points in the Project vicinity, nor any formal or informal turnouts along the highway near the project site.

2.4.3 Principal Viewpoints

There are no established viewpoints in the Proposed Project vicinity.

2.5 KOP Identification

One Key Observation Point (KOP), KOP 1, was identified to assess the level of visual change resulting from the Proposed Project on the existing environment (Figures 1 and 2):

KOP 1: **Southwest corner of the Proposed Project boundary, on SR 78.** This KOP is the view traveling east in a vehicle traveling at 60 miles per hour (MPH) on SR 78 at the southwest corner of the Proposed Project site. The view of the current environmental setting is generally characterized by broad, panoramic views of flat to undulating topography and horizontal terrain that is light khaki to light brown in color in the foreground and midground and dark-colored landforms in the background. The Proposed Project would be perceivable from this KOP based on viewer perspective (Figure 2). In the foreground area, a viewer would see the Proposed Project to the immediate left (northwest); vacant, undeveloped Sonoran Desert scrub to the right (southeast and east); and SR 78 directly ahead (to the east). In the mid-ground the viewer would see vacant, undeveloped Sonoran Desert Scrub. The viewer would see the Chocolate Mountains in the distant (greater than 10 miles) background. Additionally, the gen-tie would be perceivable, running adjacent to Highway 78 between the southwest corner of the Proposed Project to the transmission line to the west of East Highline Canal Road. Neither the East Highline Canal or transmission lines are visible from KOP 1.

The Proposed Project would be perceivable from this KOP based on viewer perspective. The gen-tie would be perceivable, running adjacent to SR 78 between the southwest corner of the Proposed Project to the transmission line to the west of East Highline Canal Road, and would be similar in form, line, color, and texture to the existing transmission lines along the canal. The Proposed Project would be surrounded by a six-foot chain link fence with slats.

3.0 METHODOLOGY

3.1 Introduction

The process of visual resource assessment provides a means for determining visual values and the possible effects of a proposed project on sensitive receptors (e.g., nearby residents, drivers and passengers, and pilots) from a KOP. The assessment is made based on various factors, including how a proposed project will impact adjacent land uses, public interest, and amount and type of use, etc.

ECORP's assessments of existing visual conditions are based on professional judgment. As discussed in Section 2.5, the analysis identified one KOP, KOP 1 (Figures 1 and 2). Aerial images and photographs were used to document and understand the existing landscape character and compare that with the Proposed Project. A modified version of BLM's contrast rating worksheet (Form 8400-4) was used to determine the contrast rating for the Proposed Project. A glare analysis was conducted to determine the potential for significant glint or glare from solar panels and other built-Project components that may affect residents, motorists, or airborne travelers.

3.2 Visual Character

A visual impact assessment is a process for describing the visual character of a project, determining the visibility of the project in the surrounding landscape, and describing the visual magnitude of the project when seen from various viewpoints. The process may include an evaluation of the visual contrast to a project within the existing landscape. Although it is a relatively straightforward and objective process, there may be differences in judgement. The process for assessing visual impacts is different than assigning social values to people and places affected by those visual impacts. For example, though people may agree that views within a designated National Park must be protected and a view of an active landfill does not, there is no objective process for making this determination (Palmer 2019).

3.3 Viewer Sensitivity

The consideration of viewer sensitivity is a critical component when assessing impact to visual resources. Both the Bureau of Land Management (BLM) and the US Forest Service conduct inventories on federal land when identifying visual resources, preparing visual resource management plans, and determining acceptable levels of change to visual impact. To determine sensitivity levels, the agencies consider objective factors such as amount of use, designation as a special area, and demonstrated public interest. In particular, the degree of public importance placed on landscapes viewed from travel ways and use areas are measures used to determine levels of concern.

Visual sensitivity varies with the types of users. Visual receptors most sensitive to change usually include residents at home, those engaged in outdoor recreation, or residents or visitors using public rights-of-ways where interest is focused on particular landscapes or views. Workers passing through an area on a regular basis may not be as sensitive to change compared to recreational sightseers who may be highly sensitive. Visual receptors less sensitive to change include, for example, people at their place of work where the setting is not important to the quality of working life, or people engaged in travel, recreational, or sporting activities where appreciation of landscape views is not involved. Travelers on roads usually fall into an intermediate category of moderate sensitivity to change. However, where travel involves recognized scenic routes, such as those through National Parks or Monuments, awareness of viewers is likely particularly high (Palmer 2019). Additional detail is provided in Section 2.1.1.

The Proposed Project is not located on federal land. However, because the process described above has become an industry standard it has been applied, generally, to this assessment.

3.4 Contrast Rating

Contrast is the difference in form, color, and light between elements and can be used to determine the degree to which a project or activity affects the visual quality of a landscape, depending on the visual contrasts created. Changes in contrast can affect viewer sensitivity. A higher degree of contrast creates a greater visual impact.

The federal BLM developed a contrast rating system for federal lands, which has become an industry standard. The rating system includes an analysis of the potential visual impact of a proposed project compared to the existing environmental setting, as seen from a KOP. To properly assess the contrasts

between the proposed and existing situation, it is necessary to break each down into basic features and elements, allowing for accurate identification of proposed features that may cause contrast (BLM 1986).

Features include:

- Landform/Water Features (e.g., roads, mining, gravel pits, landfills, water impoundments)
- Vegetative Features (e.g., timber harvests, grazing systems, vegetative manipulations)
- Structural Features (e.g., transmission lines, generation plants, oil and gas developments, recreation facilities, water tanks, buildings)

Degrees of contrast criteria, for elements, include:

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the
- characteristic landscape.
- Strong: If the element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Assessing contrast also includes consideration of:

- Form: Contrast in form results from changes in the shape and mass of landforms or structures. The degree of change depends on how dissimilar the introduced forms are to those continuing to exist in the landscape.
- Line: Contrasts in line results from changes in edge types and interruption or introduction of edges, bands, and silhouette lines. New lines may differ in their sub-elements (boldness, complexity, and orientation) from existing lines.
- Color: Changes in value and hue tend to create the greatest contrast. Other factors such as chroma, reflectivity, color temperature, also increase the contrast.
- Texture. Noticeable contrast in texture usually stems from differences in the grain, density, and internal contrast. Other factors such as irregularity and directional patterns of texture may affect the rating.

The following distances zones were used for evaluating impact on the existing setting from KOPs:

- Foreground – up to 0.5 miles
- Midground – 0.5 to 3 miles
- Background – 3 to 5 miles

3.5 Solar Panel Glare Potential

Glint and glare are unwanted reflections of the sun's rays from a reflective surface. This can present a nuisance and, under some circumstances, a safety hazard. Therefore, solar developments can receive objections due to potential impacts caused by glint and glare. The Federal Aviation Administration (FAA) defines glint as a momentary flash of light and can be experienced by an observer passing a solar panel such as a motorist, and glare as a continuous source of excessive brightness that can be experienced by a stationary observer located in the path of reflected sunlight from the face of a solar panel (FAA 2022).

As a continuous source of excessive brightness, glare can be hazardous for motorist, pilots, and other observers. When light reflects off a surface, it can become polarized and produce a blinding glare, or less severe effects such as ocular after-imaging. While all types of solar panels can cause solar glare, the intensity and duration depend on the design. Smooth glass solar panels and light-textured panels cause the most intense glare while deeply textured ones (e.g., matted, non-reflective) has less intense glare but can cause glare for longer periods.

A solar panel comprises numerous solar cells. A solar cell differs from a typical reflective surface in that its surface is microscopically irregular and designed to trap the rays of sunlight for the purposes of energy production. The intent of solar technology is to increase efficiency by absorbing as much light as possible (which further reduces reflection and glare). A common misconception about solar photovoltaic (PV) panels is that they inherently cause or create "too much" glare, posing a nuisance to sensitive receptors and a safety risk for pilots. In certain situations, the glass surfaces of solar PV systems can produce glint (a momentary flash of bright light) and glare (a reflection of bright light for a longer duration); however, light absorption, rather than reflection, is central to the function of a solar PV panel so that it may absorb solar radiation and convert it to electricity. Solar PV panels are constructed of dark-colored (usually blue or black) materials and are covered with anti-reflective coatings. Modern PV panels reflect as little as two percent of incoming sunlight, which is less than soil and wood shingles (Day 2018).

Despite their low potential to create glare, PV panels can reflect sunlight skyward toward the light source, creating a potential glare impact for aircraft in the area. The effect is similar to what a motorist experiences when the sun is low in the sky and the car passes between the sun and a glass-fronted building that has been treated with an anti-reflective coating. If the motorist is heading directly toward the building, the glare would be in the motorist's eyes. Otherwise, the motorist would have to rotate his or her head to observe the glare off to the side. Because aircraft typically travel at a higher rate of speed than vehicles, the effect is momentary, lasting only if the angle between the sun, water body, and aircraft is maintained. Unless an aircraft were descending at an angle sloped directly at the solar array with the sun directly behind the aircraft, any glare that might occur from solar panels would be below the pilot's horizon.

4.0 IMPACT ASSESSMENT

4.1 Thresholds of Significance

Except as provided in Public Resources Code Section 21099, a project would be considered to have a significant impact if it would meet any of the following criteria:

1. Have a substantial adverse effect on a scenic vista?

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

3. 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?

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

4.2 Contrast Rating Analysis

As described in section 2.5, one KOP (KOP 1) was identified for the Proposed Project (Figures 1 and 2). The view from KOP 1 is that seen from travelers on SR 78, going east. It is at the southwest corner of the Proposed Project and abuts the project boundary. The view from KOP 1 is currently characterized by broad, panoramic views of flat, consistent, and horizontal terrain in the foreground, midground and background. The terrain is smooth and consistent, with fine smooth soils. Additionally, irregular lines from shrubs and light brown-dark soils are found throughout the area. Based on viewer perspective, the Proposed Project, including the 1.2-mile gen-tie line, is perceivable from KOP 1.

The changes that affect contrast when compared to the current environmental setting and as viewed at KOP 1 are:

- Landforms – Currently, no structures exist in or near the project area. The Proposed Project would add structures (i.e., solar arrays, BESS, 1.25-mile gen-tie line) in the foreground and midground. Except for the gen-tie line, structures are expected to not exceed 10 feet in height. This would result in a strong change in contrast.

- Lines – Currently, lines in the existing setting are defined by irregular broken shrubs and the SR78 road surface. New lines would be generated by the thin, horizontal, regular edge for the solar arrays, geometric isolation (no other similar structures in the foreground, midground and background), rectangular battery storage units, and vertical and horizontal lines from the gen-tie line (transmission poles and sagging conductor wires). Addition of the new lines, particularly those from the vertical lines by the transmission poles of the gen-tie line and elevated lines from the conductor wires would be noticeable (in foreground and midground). This would result in a moderate change in contrast.

- Color – Currently, light brown/dark brown soils, light tan-brown desert shrubs dominate the view; The Proposed Project would add subdued gray to blue-black solar arrays, light gray earthtones from battery storage and muted reflective gray transmission line. The colors from the Proposed Project would blend in with the existing setting because of similar intensity of color. This would result in a weak change in contrast.
- Texture – Currently, smooth, consistent terrain with fine, smooth soils and smooth low laying clusters of shrubs. The Proposed Project would add non-reflective matte surfaces on solar arrays, BESS and gen-tie line. The addition of the gen-tie line would result in a moderate change in contrast.

The changes from the Proposed Project would result in a moderate to strong contrast when viewed from KOP 1.

The completed contrast rating form is provided in Appendix A.

4.3 Solar Glare Analysis

For the glare analysis, four receptors were evaluated for annual potential glare from the Proposed Project, with two showing potential for glare. Eastbound travelers on the Ben Hulse Highway, in the vicinity of the Proposed Project may experience 1,928 minutes (32.1 hours) of medium glare from mid-March to early October between approximately 5:30 and 6:00 am and mid-April to late August between approximately 6:00 and 7:00 pm, when the modules are fully rotated to the east and west, respectively. The duration of potential glare is between 1 and 15 minutes for stationary receptors, but would be experienced as a momentary glint for motorists. The second receptor, airborne travelers traveling from the nearest airport (Brawley Municipal Airport, approximately 14 miles west of the project) may experience medium momentary glint. During takeoff and landing procedures, airborne viewers (e.g., pilots) would be elevated in relation to the project area. The results for one flight path show the potential for medium glare experienced as a momentary glint for air travelers. This momentary glint on this flight path has potential to occur during a period of up to 233 minutes (3.9 hours) from early to late March, and for 1-8 minutes between mid-September and mid-October.

Eastbound travelers would not be driving directly into the glare created by the solar panels from the Proposed Project. They may experience momentary glint to the left when driving by. Airborne travelers would not be descending at an angle sloped directly at the solar array with the sun directly behind the aircraft, and therefore glare or glint would be below the pilot's horizon.

Results of the solar glare modeling are provided in Appendix B.

4.4 Impact Analysis

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

There are no designated scenic vistas in the Proposed Project vicinity.

Therefore, no impacts to scenic vistas would occur. No mitigation would be required.

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

There are no designated or eligible scenic highways in the Proposed Project vicinity.

The Proposed Project would result in changes to the visual character (line, color, and texture) of the Proposed Project site, which is currently characterized as desert landscape. The existing, natural landscape is a valued, important, beautiful, and scenic resource, including views of the Chocolate Mountains in the background. With the addition of structures (e.g., solar arrays, gen-tie line) to an area where there are currently none, the change in contrast in the foreground is strong. Contrast associated with the introduction of new lines with no similar comparisons (particularly the gen-tie line and the project fence) is strong; addition of new colors having similar color intensity results are a moderate contrast change; and addition of new textures results in a moderate contrast change. Sensitive viewers at KOP 1 are those traveling east on SR 78 who would therefore experience a moderate impact to visual resources because of the Proposed Project.

However, impacts to sensitive receptors from the Proposed Project would be temporary or lessened because:

- Viewers at KOP 1 would not be stationary. Eastbound travelers on SR 78 would pass the solar arrays for the Proposed Project within 1 minute and then be back to the existing desert and panoramic view.
- The project fence will largely block the view of the solar field components, while still allowing view of the Chocolate Mountains in the distance.
- The lifespan of the Proposed Project is 20 years, with full restoration after closure, addressing the moderate change in contrast from the Proposed Project in the long-term
- With the growing need to improve renewable resources, sensitive receptors are likely to consider the Proposed Project as an interesting technology to see, rather than objectionable.

This results in a less than significant impact. No mitigation would be required.

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?

See discussion under criterion 2, immediately above.

There are no public viewpoints in the Proposed Project site and it is not in an urbanized area.

Impacts under this criterion would be less than significant. No mitigation would be required.

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

The Project would not include any substantial source of nighttime light in the vicinity of the Project site. Any lighting required for safety and security within the Project site would be hooded and oriented downward so as not to spill over into adjacent parcels.

The glare analysis for the Proposed Project concluded that glint that may be experienced by eastbound travelers at KOP 1. Travelers on SR 78, traveling at a typical speed of 60 MPH, would experience glint for no more than one minute along the 1-mile-long southern project boundary during short periods at the beginning and the end of the day. Because aircraft typically travel at a higher rate of speed than vehicles, the effect is momentary, lasting only if the angle between the sun, water body, and aircraft is maintained. Unless an aircraft were descending at an angle sloped directly at the solar array with the sun directly behind the aircraft, any glare that might occur from solar panels would be below the pilot's horizon, and would at no time be as severe as the sun itself.

Given the brief period glare would be produced, these effects are considered less than significant. No mitigation is required.

4.5 Mitigation Measures

The analysis, in this section, shows less than significant impact for the four criteria. Therefore, no mitigation measures are required.

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LIST OF APPENDICES

APPENDIX A

Contrast Rating Worksheets

VISUAL CONTRAST RATING WORKSHEET NORTH STAR 1, KOP 1

Date: 12/27/2022

Project Name: North Star 2 SES and BESS	Key Observation Point Number: KOP1
Project Type: Solar Facility	Key Observation Point Name: SW corner of project, SR 78
Evaluator's Names: Marilyn Blume	Photo Number: Figure 2

CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Endless, broad, flat, vast open terrain	Sonoran Scrub	None
LINE	Irregular lines from shrubs throughout area Consistent line through project area from SR78	Irregular, broken shrubs in foreground	N/A
COLOR	Light brown-dark brown soils	Light brown/dark brown soils, light tan-brown desert shrubs	N/A
TEX-TURE	Smooth, consistent terrain; fine, smooth soils	Smooth, low laying clusters of shrubs	N/A

PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No perceived change	No perceived change	Thin, horizontal, regular edge for solar arrays Geometric isolation Rectangular battery storage Transmission interconnection
LINE	No perceived change	No perceived change	Horizontal line from solar array edge Horizontal and vertical lines from battery storage Horizontal line to transmission line
COLOR	No perceived change	No perceived change	Dark subdued grey to blue black solar arrays Light grey earthtones from battery storage Muted reflective grey transmission line
TEXTURE	No perceived change	No perceived change	Matte surfaces on solar arrays, BESS and gen-tie line

DEGREE OF CONSTRAST		FEATURES													
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None		
ELEMENTS	Form				X				X	X					
	Line				X				X		X				
	Color				X				X			X			
	Texture				X				X		X				

Recommended Mitigation Measures
Materials and surface treatments for structures and roads should repeat and/or blend with the existing form, line, color, and texture of the surrounding landscape. For example, if the project will be viewed against an earthen or other non-sky background, appropriately colored materials should be selected to help blend structures with the project's backdrop.

Unless safety or functional requirements preclude it, all structures should be color treated to reduce contrasts with existing landscape.

Materials, coatings, or paints that have little or no reflectivity should be used on structures. Semi-gloss finishes should be used rather than flat or gloss finishes. Substation equipment should be specified with a low-reflectivity, neutral finish. Insulators at substations should be non-reflective. The surfaces of substation structures should be given low reflectivity finishes with neutral colors to minimize the contrast of the structures with their backdrops. Security fence surrounding the substations should have a dulled, darkened finish to reduce contrast.

Electric transmission towers should be color treated to reduce contrasts with the existing landscape. Monopole towers should have a low-reflectivity treatment. Where transmission facilities using monopole towers are located within the same ROW or corridor, the color treatment should match the existing facilities within the ROW, unless they contrast with the visual backdrop.

Notes

APPENDIX B

Glare Analysis Report

FORGESOLAR GLARE ANALYSIS

Project: **North Star 2**

North Star 2 Project includes the construction of a 130-megawatt alternating current solar field, consisting of 289,800 tracker modules in 9,660 strings and associated collector and inverter facilities, and a 175 MW BESS, on approximately 614 acres of vacant land on two parcels in Imperial County, California

Site configuration: **Untitled**

Client: Zglobal

Created 12 Aug, 2022
Updated 09 Nov, 2022
Time-step 1 minute
Timezone offset UTC-8
Site ID 74021.13050
Category 100 MW to 1 GW
DNI peaks at 1,000.0 W/m^2
Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
Methodology V2

Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV2	SA tracking	SA tracking	233	3.9	1,928	32.1	359,800,000.0

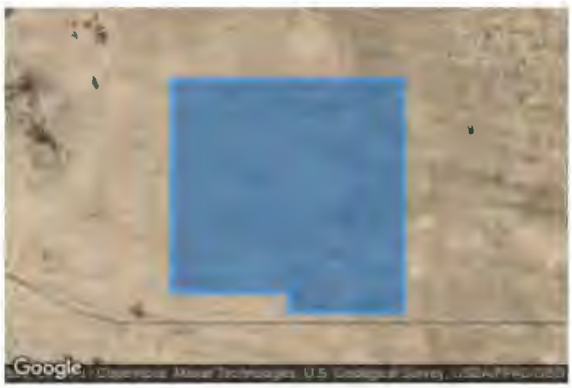
Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Ben Hulse Highway	0	0.0	1,928	32.1
Brawley - 26	0	0.0	0	0.0
Brawley - FP 8	233	3.9	0	0.0
OP 1	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 90.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: 130000.0 kW
Panel material: Light textured glass without 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	32.971181	-115.263937	72.42	1.00	73.42
2	32.971180	-115.271895	62.64	1.00	63.64
3	32.972307	-115.271896	70.10	1.00	71.10
4	32.972306	-115.279953	56.15	1.00	57.15
5	32.984648	-115.279957	47.46	1.00	48.46
6	32.984651	-115.263939	67.42	1.00	68.42

Route Receptors

Name: Ben Hulse Highway
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	32.975071	-115.300038	10.12	0.00	10.12
2	32.975071	-115.295232	30.74	0.00	30.74
3	32.970175	-115.283730	64.27	0.00	64.27
4	32.970175	-115.252831	70.83	0.00	70.83
5	32.970463	-115.211976	114.68	0.00	114.68
6	32.968159	-115.190347	114.16	0.00	114.16
7	32.973919	-115.182107	124.94	0.00	124.94

Flight Path Receptors

Name: Brawley - 26
Description:
Threshold height: 50 ft
Direction: 269.4°
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	32.992954	-115.511321	-135.33	50.00	-85.33
Two-mile	32.993266	-115.476812	-137.30	605.39	468.10

Name: Brawley - FP 8
Description:
Threshold height: 50 ft
Direction: 89.5°
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	-115.522511	-128.87	50.00	-78.87
Two-mile	32.992687	-115.557021	-118.44	593.00	474.56

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	32.981408	-115.326977	-13.91	0.00

Glare Analysis Results

Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV2	SA tracking	SA tracking	233	3.9	1,928	32.1	359,800,000.0

Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Ben Hulse Highway	0	0.0	1,928	32.1
Brawley - 26	0	0.0	0	0.0
Brawley - FP 8	233	3.9	0	0.0
OP 1	0	0.0	0	0.0

PV: PV2

potential temporary after-image

Receptor results ordered by category of glare

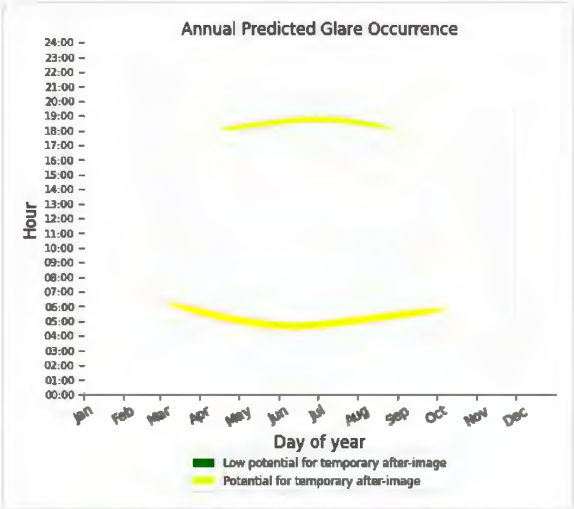
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Ben Hulse Highway	0	0.0	1,928	32.1
Brawley - FP 8	233	3.9	0	0.0
Brawley - 26	0	0.0	0	0.0
OP 1	0	0.0	0	0.0

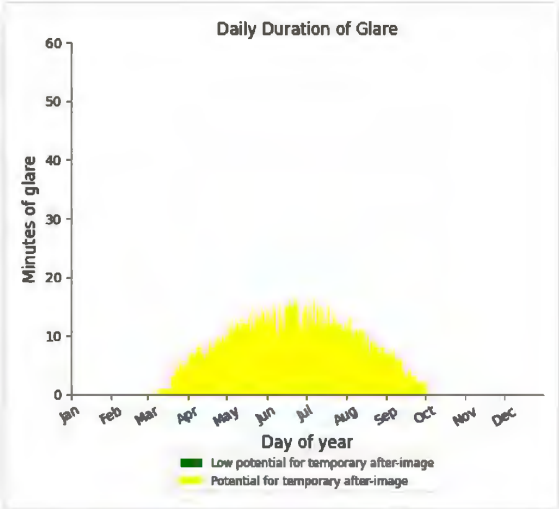
PV2 and Ben Hulse Highway

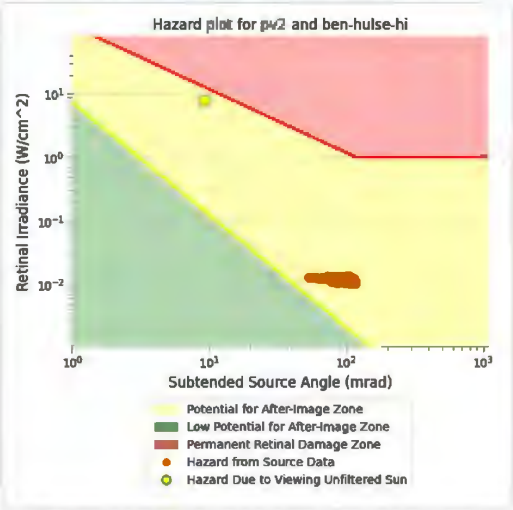
Receptor type: Route

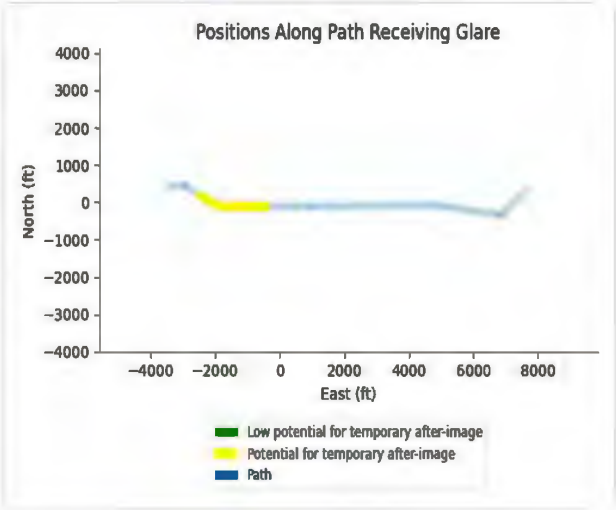
1,928 minutes of yellow glare

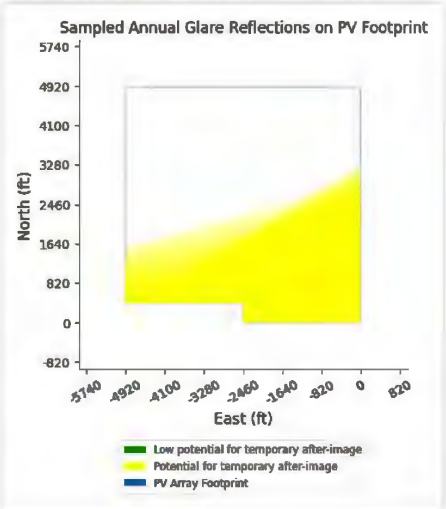
0 minutes of green glare





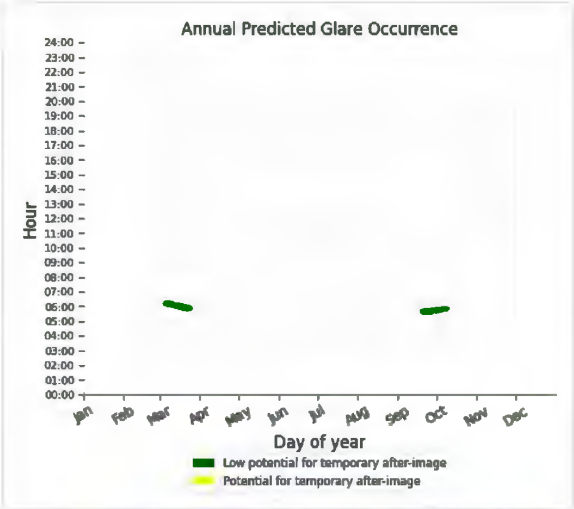


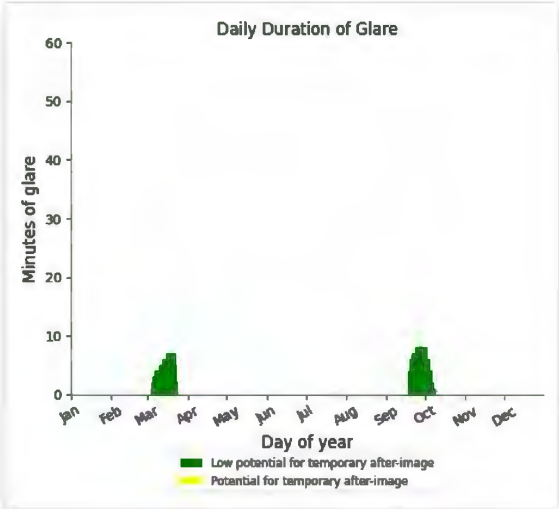


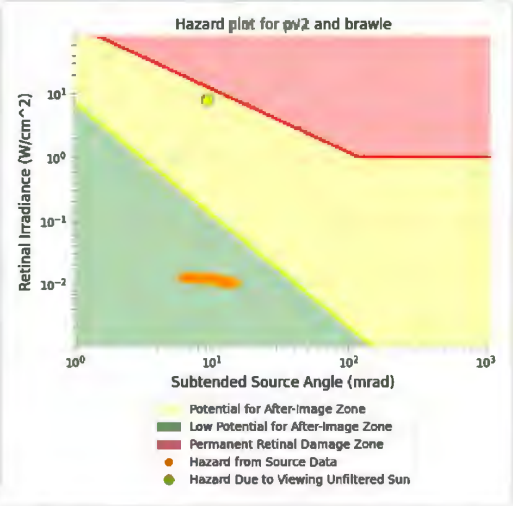


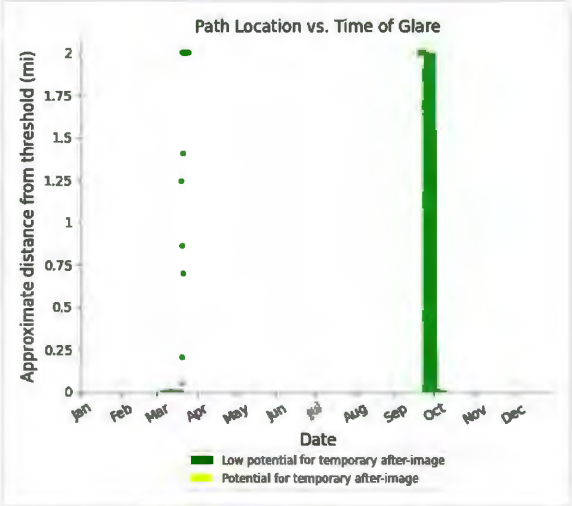
PV2 and Brawley - FP 8

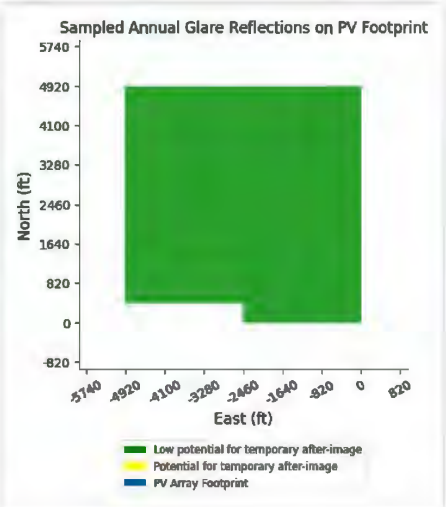
Receptor type: 2-mile Flight Path
0 minutes of yellow glare
233 minutes of green glare

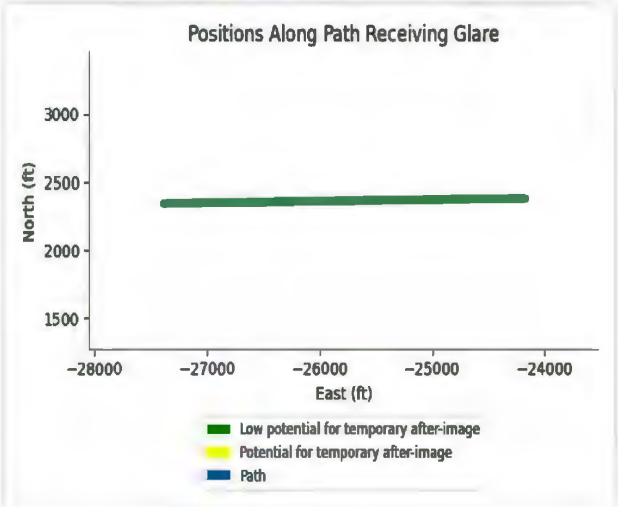












PV2 and Brawley - 26

Receptor type: 2-mile Flight Path

No glare found

PV2 and OP 1

Receptor type: Observation Point

No glare found

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.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 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. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
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.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
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.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

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