thoroughbred solar

Attachment H
Glare Analysis

Exhibit 12 – Site Assessment Report

HALEY ALDRICH

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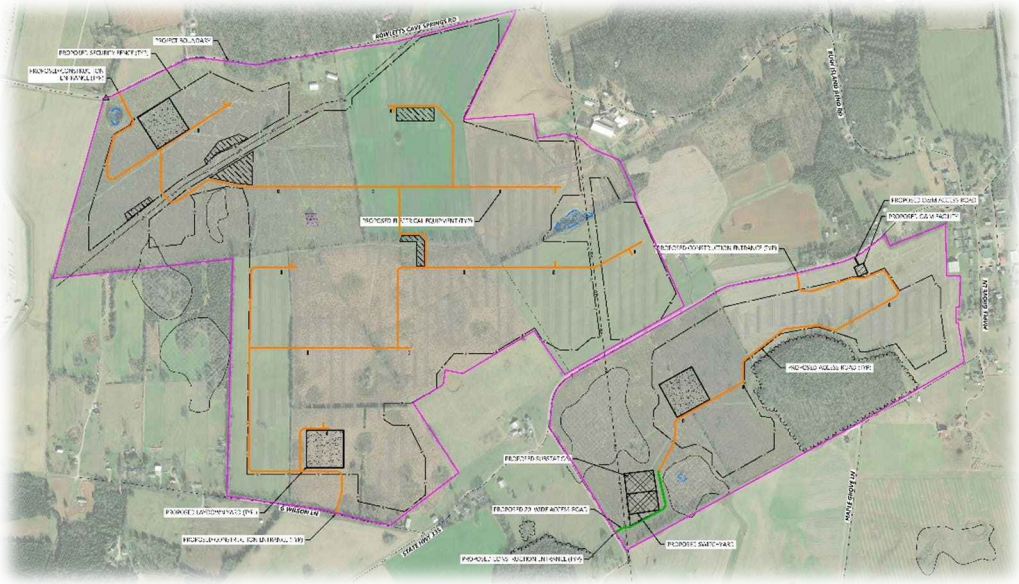
REPORT ON

THOROUGHBRED SOLAR
SOLAR GLARE ANALYSIS



by
Haley & Aldrich, Inc.

for
Thoroughbred Solar, LLC

File No. 0203928
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HALEY & ALDRICH, INC.
8899 GANDER CREEK DRIVE
MIAMISBURG, OH 45342
937.384.9940

SIGNATURE PAGE FOR

REPORT ON
THOROUGHBRED SOLAR
SOLAR GLARE ANALYSIS

PREPARED FOR
THOROUGHBRED SOLAR, LLC

PREPARED BY:

Robert Kallin
Senior Technical Specialist
Haley & Aldrich, Inc.

REVIEWED AND APPROVED BY:

Lynn Gresock
Principal Consultant
Haley & Aldrich, Inc.

Executive Summary

Haley & Aldrich was contracted by Thoroughbred Solar, LLC (Thoroughbred) to complete a solar glare analysis for the Thoroughbred Solar Project. The Project is a 50-megawatt solar photovoltaic (PV) facility proposed on approximately 530 acres in Hart County, Kentucky (the Project Area). The Project will encompass approximately 130,000 solar PV panels with a height of no more than 15 feet at maximum tilt. Panels will be grouped in arrays with 7-foot-tall agricultural-style security fencing around each area. The proposed PV panels are single-axis trackers that will be laid in a north-south orientation and will track the sun east to west throughout the course of the day.

The solar glare analysis was performed using ForgeSolar, a web-based software that provides an assessment on when and where glare is predicted to occur throughout the year. ForgeSolar's GlareGauge uses the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories and is compatible with the Federal Aviation Administration guidelines for glare analysis. Although the conservative SGHAT algorithms indicate that glare could result from the Project for nearby modeled receptor locations, modeled impacts are limited, and actual impacts are expected to be even less. For example, the model does not account for intervening terrain or vegetation that may obstruct views of certain panel areas, nor does it reflect reductions in impact associated with reductions in retinal irradiance associated with distance. Glare will not occur where the panels cannot be seen, and more distant indications of glare are much less likely to cause an adverse effect. No areas were identified for which glare is expected to be a significant concern.

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1. Background

1.1 PROJECT SUMMARY

Haley & Aldrich, Inc. (Haley & Aldrich) understands that the Thoroughbred Solar project (the Project) is a 50-megawatt (MW) solar photovoltaic (PV) facility proposed on approximately 530 acres in Hart County, Kentucky (the Project Area). The Project will encompass approximately 130,000 solar PV panels with a height of no more than 15 feet at maximum tilt. Panels will be grouped in arrays with 7-foot-tall agricultural-style security fencing around each area. The proposed PV panels are single-axis trackers that will be laid in a north-south orientation and will track the sun east to west throughout the course of the day. As PV panels are designed to absorb sunlight to generate electricity, the potential for glare is anticipated to be minimal; in addition, Thoroughbred Solar, LLC (Thoroughbred) proposes to install panels coated with an anti-reflective coating to further minimize the potential for glare. However, the analysis reflected in this report conservatively assumes that an anti-reflective coating is not used.

Although the conservative Solar Glare Hazard Analysis Tool (SGHAT) algorithms indicate that glare could result from the Project for nearby modeled receptor locations, modeled impacts are limited, and actual impacts are expected to be even less. For example, the model does not account for intervening terrain or vegetation that may obstruct views of certain panel areas, nor does it reflect reductions in impact associated with reductions in retinal irradiance associated with distance. Glare will not occur where the panels cannot be seen, and more distant indications of glare are much less likely to cause an adverse effect. Details on the methodology and results obtained are provided below.

1.2 SOLAR GLARE

Glare is defined as a continuous source of bright light and is a common phenomenon in our everyday lives. Both the sun and artificial light sources can cause glare either directly (such as from a sunset when driving westbound) or indirectly (such as from the sun's reflections from a lake or mirror). Potential concerns associated with glare may include:

- Safety impacts, such as the potential to disorient motorists when driving or pilots when taking off or landing; or
- Annoyance impacts, such as distraction, after-image in the viewer's vision, or temporary avoidance of a view due to the presence of reflected light.

PV panels, such as those proposed for the Project, are designed to convert as much sunlight as possible, and in most conditions, reflect very little light. Many PV panels include anti-reflective coatings to maximize energy absorption; Thoroughbred plans to use panels with such coatings. However, the front surfaces of PV modules are smooth, specular surfaces, which have the potential to reflect sunlight, like glass windows on a building. When the panels are at higher angles of tilt, unless the panels are specifically directed toward and visible by a viewer at those specific times, glare is not expected to pose a concern.

PV solar facilities with panels mounted on single-axis trackers, such as those planned for the Project, rotate throughout the day, following the course of the sun to optimize the capture of sunlight on their surface. In addition to producing more energy, this design has the added benefit of minimizing glare, as

high-tilt angles would only occur at certain times of the day. Modern PV modules reflect as little as two percent of incoming sunlight, about the same as water and less than soil or even wood shingles.[1]

The impact level from the glare is classified into three levels: green glare or low potential for after-image, yellow glare or potential for after-image, and red glare or potential for permanent eye damage (retinal burn). No red glare was indicated from the conservative modeling results. The extent of green and yellow glare, where modeled, is discussed below.

1.3 SOLAR GLARE ANALYSIS

Using ForgeSolar's GlareGauge software, which incorporates the SGHAT model, Haley & Aldrich completed an analysis to identify the potential for solar glare to result from the Project. Figure 1 shows the locations from which the potential for solar glare from the Project was analyzed (eight road segments, each on two-way roads, and an additional six observation points [OPs] representing specific nearby residences). The numbering convention used in the model for the various clusters of arrays is also shown on Figure 1. The topography contours of the area are depicted in Figure 2, allowing for a determination of whether intervening topography would mitigate or eliminate viewshed impacts. The location of vegetation with potential screening effects in the project area is depicted on Figure 3.

No public airports are proximate to the Project Area; the closest is over 15 miles to the south of the Project Area. As such, analysis of potential effects on airports was not conducted.

Each of the evaluated road segments and OPs is discussed below. Beginning with the conservative ForgeSolar results, each section considers additional factors that would further reduce glare potential (such as intervening topography, vegetation, and distance) in order to characterize glare potential in each location. The full ForgeSolar modeling output is provided in Appendix A.

[1] Solar Energy Industries Association (SEIA). Photovoltaics. https://www.seia.org/initiatives/photovoltaics.

2. Results

2.1 ROUTE RECEPTOR 1: G WILSON ROAD

This approximately 17-foot-wide road is located southwest of the Project Area and runs in an approximately east-west orientation. At its closest point, north of the G Wilson Road, panels are proposed approximately 170 feet north of the road. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 1.

TABLE 1 – Model Results for Route Receptor 1

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
5	2,600	--	--	--	May to August	5 to 6 am	10	Portions of the array are obstructed by topography; vegetation will screen other potential visibility

[a] Closest distance in feet between the route and panels.
[b] Approximate minutes
Note: Shaded cells indicate that the panels are not visible at this location due to topography (none for this route receptor)

The model indicates that only the central to southern half of Panel Area 5 was modeled with glare potential. The more distant portions of Panel Area 5 for which glare potential was modeled would not be visible from this road due to terrain (as shown on Figure 2). In addition, a relatively dense existing tree line extends along a large portion of G Wilson Road, which would shield the remaining portions of Panel Area 5 (as shown on Figure 3). Figure 3 also indicates where proposed additional landscaping and landscape enhancements are proposed to screen the panels from view. Based upon this existing and planned vegetation, impacts from glare are not expected to be experienced along this road segment.

2.2 ROUTE RECEPTOR 2: SOUTHERN PORTION OF KY-335

This approximately 18-foot-wide road bisects the Project and runs in a northeast-southwest orientation. At its closest point, panels are proposed approximately 300 feet north of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 2.

TABLE 2 – Model Results for Route Receptor 2

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	4,100	--	--	--	May to July	6 to 7 pm	20	Distance and vegetation screen visibility
3	3,600	May to July	6 to 7 pm	10	--	--	--	Distance and vegetation screen visibility
12	345	--	--	--	January to May and September to November	4 to 7 pm	5 to 20	Proposed vegetation screen visibility
13	1,070	April to May and August to October	6 to 7 pm	5 to 10	--	--	--	Portions of the array are not visible due to topography and distance, and vegetation will screen visibility

[a] Closest distance in feet between the route and panels.

[b] Approximate minutes

Note: Shaded cells indicate that the panels are not visible at this location due to topography (none for this route receptor)

From some portions of the road segment, topography blocks views of portions of Panel Area 13. Travelers along this road would be expected to be looking along a narrow field of vision, with little potential to see the very distant Panel Areas 2 and 3, which are set back considerably beyond Panel Area 12. Panel Areas 2, 3, and 13 indicate limited locations along the road from which glare potential was modeled. Modeling for Panel Areas 2 and 3 also indicates that only small narrow bands of panels have glare potential. The modeled glare for Panel Area 12 is for the southern portion of the panels. The planned landscape screening (shown on Figure 3) would obscure the panels from the road and eliminate or reduce the potential visibility of the limited modeled glare.

2.3 ROUTE RECEPTOR 3: CENTRAL PORTION OF KY-335

This approximately 18-foot-wide road bisects the Project and runs in a northeast-southwest orientation. At its closest point, panels are proposed approximately 180 feet south of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 3.

TABLE 3 – Model Results for Route Receptor 3

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	4,100	--	--	--	March to September	5 to 6 pm	5 to 20	View obstructed by topography
3	3,700	March to May and July to September	5 to 7 pm	10	--	--	--	View obstructed by topography
12	1,500	February to March and October to November	4 to 5 pm	5	January to March and October to December	3 to 6 pm	5 to 20	View obstructed by topography
13	1,600	February to March and September to November	4 to 6 pm	15 min	--	--	--	View obstructed by topography

[a] Closest distance in feet between the route and panels.

[b] Approximate minutes

Note: Shaded cells indicate that the panels are not visible at this location due to topography

Topographic features block the four Panel Areas for which glare potential was modeled (Panel Areas 2, 3, 12, and 13) from this portion of KY-335 (as shown in Figure 2). The landscape screening proposed (Figure 3) will further shield road uses from views of the panels, and thus, from glare potential.

2.4 ROUTE RECEPTOR 4: EASTERN PORTION OF KY-335

This approximately 18-foot-wide road bisects the Project and runs in a northeast-southwest orientation. At its closest point, panels are proposed approximately 160 feet south of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 4.

TABLE 4 – Model Results for Route Receptor 4

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	4,500	March and September	5 to 6 pm	3	March to September	5 to 7 pm	5 to 25	Distance and vegetation screen visibility
3	5,300	May to April and August to September	5 to 7 pm	10	--	--	--	View obstructed by topography
4	3,400	April to September	5 to 7 pm	5 to 10	April to September	5 to 7 pm	20	Distance and vegetation screen visibility
8	2,700	March and September	5 to 6 pm	5	--	--	--	View obstructed by topography
12	3,300	January to February and October to December	3 to 6 pm	10 to 15	February and October to November	4 to 5 pm	15	View obstructed by topography
13	3,100	February to March and October to November	5 to 6 pm	20	--	--	--	Distance and vegetation screen visibility

[a] Closest distance in feet between the route and panels.

[b] Approximate minutes.

Note: Shaded cells indicate that the panels are not visible at this location due to topography

Topographic features within the area make Panel Areas 3, 8, 12, and 13 likely not viewable from the roadway (as shown on Figure 2). Panel Area 2, which is at a considerable distance, is modeled to generate an extremely short duration of glare, which would be further screened by vegetation (Figure 3). Glare is projected within only one-third of Route Receptor 4 for Panel Area 4, and glare is projected within only half of Route Receptor 4 for Panel Area 13. Existing vegetation along that road segment will be enhanced with additional landscaping (as shown on Figure 3) to further minimize views of the panels, and thus, the potential for glare.

2.5 ROUTE RECEPTOR 5: MAPLE GROVE LANE

This approximately 12-foot-wide road runs along the southeastern edge of the Project and runs in a north-south orientation; it turns to extend in an east-west orientation along the southern boundary of the Project Area. At its closest point, panels are proposed approximately 150 feet north of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 5.

TABLE 5 – Model Results for Route Receptor 5

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	6,350	April to May and July to September	5 to 6 pm	5 to 10	April to September	5 to 7 pm	20	View obstructed by topography
3	6,700	April to May and August to September	5 to 7 pm	10	--	--	--	View obstructed by topography
4	4,900	May and July	6 to 7 pm	20	--	--	--	View obstructed by topography
12	3,300	February to March and September to October	5 to 6 pm	20	--	--	--	View obstructed by topography
13	4,600	March to April and September to October	5 to 7 pm	15	--	--	--	View obstructed by topography

[a] Closest distance in feet between the route and panels.

[b] Approximate minutes.

Note: Shaded cells indicate that the panels are not visible at this location due to topography

Topographic features within the area and the existing forested area make Panel Areas 2, 3, 4, 12, and 13 likely not visible from the roadway (as shown on Figure 2). The landscape screening proposed (Figure 3) will further shield road uses from views of the panels, and thus, from glare potential.

2.6 ROUTE RECEPTOR 6: WESTERN PORTION OF ROWLETTS CAVE SPRING ROAD

This approximately 17-foot-wide road runs along the northern portion of the Project and runs in an east-west orientation. At its closest point, panels are proposed approximately 500 feet south of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 6.

TABLE 6 – Model Results for Route Receptor 6

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	2,500	--	--	--	March to April and September	5 to 6 pm	10	Distance and vegetation screen visibility
3	3,700	February to March and October to November	4 to 6 pm	5 to 10	--	--	--	Distance and vegetation screen visibility
4	550	--	--	--	February to October	4 to 7 pm	20	Existing and proposed vegetation screen visibility
8	1,600	March and September to October	5 to 6 pm	5	January to March and September to December	3 to 6 pm	20	Distance and vegetation screen visibility
10	2,800	December	4 to 5 pm	5	--	--	--	Distance and vegetation screen visibility

[a] Closest distance in feet between the route and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography (none for this route receptor)

Only the central to easternmost portion of the route is projected to receive glare from the northern portion of Panel Area 2 and the entire portion of Panel Area 8. In fact, substantial existing vegetation exists along this portion of the road, which would block views of the distant Panel Areas 2 and 8 from this location.

Only limited portions of this road segment are projected to receive glare from Panel Areas 3 and 10. Panel Areas 3 and 10 are visually obstructed by the farm property with multiple buildings that sit between the road segment and the Project Area. The central to western portion of this road segment is projected to receive glare from Panel Area 4. Additional landscaping is planned as shown in Figure 3. This landscape screening of existing and proposed vegetation will further shield road uses from views of the panels, as shown on Figure 3.

2.7 ROUTE RECEPTOR 7: WESTERN PORTION OF ROWLETTS CAVE SPRING ROAD

This approximately 17-foot-wide road runs along the northern portion of the Project and runs in an east-west orientation. At its closest point, panels are proposed approximately 160 feet south of the roadway. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 7.

TABLE 7 – Model Results for Route Receptor 7

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	240	--	--	--	January to February and October to December	4 to 6 pm	20 to 30	Existing and proposed vegetation screen visibility
7	350	--	--	--	January to February and October to December	6 to 9 am	70	Existing and proposed vegetation screen visibility
8	590	February to March and September to November	6 to 7 am	5	January to March and September to December	5 to 9 am and 3 to 5 pm	30 to 40	Existing and proposed vegetation screen visibility
9	1,200	--	--	--	January to February and October to December	6 to 9 am	10 to 20	Distance and vegetation screen visibility
10	2,650	November to January	6 to 8 am	10	--	--	--	Distance and vegetation screen visibility
12	3,700	December	7 to 8 am	5	--	--	--	Distance and vegetation screen visibility

[a] Closest distance in feet between the route and panels.

[b] Approximate minutes.

Note: Shaded cells indicate that the panels are not visible at this location due to topography (none for this route receptor)

Only limited portions of Route Receptor 7 are projected to receive glare from the northeastern edge of Panel Area 2 and the northeastern corner of Panel Area 12. Limited portions of the route are also projected to receive glare for Panel Areas 9 and 10. For all of these locations, as can be seen on Figure 3, considerable existing vegetation will be augmented by landscape screening to mitigate potential glare effects.

The considerably long duration of glare predicted from Panel Area 7 is modeled to occur only from a short portion of the middle of this road segment. In addition, existing vegetation and/or landscape screening is proposed around the entire area between Panel Areas 7 and 8 and the roadway segment, as shown on Figure 3. The roadway segment is also oriented directly east-west, with the panels to the south. The route receptor is modeled with a view angle of 50 degrees right and left, a default value accepted by the Federal Aviation Administration. At these orientations, potential glare would enter from the edge of the field of view and would be reduced with small adjustments to the driver's field of view (e.g., focusing on the northern part of the roadway). Therefore, although this potential exists for glare,

significant viewer exposure is not expected. Note that drivers along this relatively straight road segment would have their eyes on the road, making it even less likely that views of the Project would result in a glare hazard. In Section 2.9, the model results from a residence looking toward the Project Area from north of Rowletts Creek Spring Road along this segment shows considerably lesser degrees of modeled impact.

2.8 ROUTE RECEPTOR 8: INTERSTATE 65

The Interstate 65 roadway is west of the Project Area, lying in a north-south orientation. At their closest point, panels are proposed approximately 1,200 feet from the roadway. No potential glare was projected for this roadway.

TABLE 8 – Model Results for Route Receptor 8

Panel Area	Distance from Road[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	1,100	--	--	--	May to July	4 to 5 am	10	View obstructed by topography

[a] Closest distance in feet between the route and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

Topographic features within the area and the existing forested area make Panel Area 2 likely not visible from the roadway (as shown on Figure 2). The landscape screening proposed (Figure 3) will further shield road uses from views of the panels, and thus, from glare potential.

2.9 OBSERVATION POINT 1: RESIDENCE NORTH OF ROWLETTS CAVE SPRINGS ROAD

This residence is located just north of the Rowletts Cave Spring Road. The property is located north of the northwestern portion of the Project Area. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 8.

TABLE 9 – Model Results for OP1

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
7	350	--	--	--	January to February and October to December	6 to 9 am	40	View obstructed by topography
8	1,800	--	--	--	January to February and October to December	6 to 9 pm	15	View obstructed by topography

[a] Closest distance in feet between the OP and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

Existing topographic features within the area make Panel Areas 7 and 8 likely not viewable from the residential home (as shown on Figure 2). The landscape screening proposed will be installed to soften views of the Project, even where glare is not predicted (Figure 3).

2.10 OBSERVATION POINT 2: RESIDENCE NORTH OF KY-335

The receptor point is located north of KY-335. At their closest point, panels would be located southeast of the residential house, at a distance of approximately 700 feet. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 9.

TABLE 10 – Model Results for OP2

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	4,000	--	--	--	March to September	5 to 7 pm	20	View obstructed by topography
3	4,700	March to April and September	5 to 7 pm	10	--	--	--	View obstructed by topography
4	2,500	--	--	--	May to July	6 to 7 pm	20	View obstructed by topography
12	3,050	January to February and November to December	4 to 5 pm	5	January to February and November to December	3 to 5 pm	15	View obstructed by topography
13	3,200	January to February and November to December	4 to 6 pm	20	--	--	--	View obstructed by topography

[a] Closest distance in feet between the OP and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

Panel Areas 2, 3, 4, 12, and 13 will be obstructed from view by topography from OP-2 (Figure 2). The landscape screening proposed will be installed to soften views of the Project, even where glare is not predicted (Figure 3).

2.11 OBSERVATION POINT 3: RESIDENCE ALONG MAPLE GROVE ROAD

The residence is located just west of Maple Grove Road. Panels are proposed west of the residence, set back a minimum of 240 feet. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 10.

TABLE 11 – Model Results for OP3

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	6,600	March to April and August to September	5 to 6 pm	5	March to May and August to September	5 to 6 pm	5 to 15	Distance and vegetation screen visibility
3	7,700	March to April and September	5 to 7 pm	10	--	--	--	View obstructed by topography
4	5,100	April to August	5 to 7 pm	10 to 15	April to August	5 to 7 pm	20	View obstructed by topography
8	5,500	March to April and September	6 pm	2	--	--	--	View obstructed by topography
12	5,600	January to March and October to November	4 to 6 pm	10	--	--	--	Partially obstructed by topography; Distance and vegetation screen visibility
13	5,750	February to March and October	4 to 6 pm	15	--	--	--	View obstructed by topography

[a] Closest distance in feet between the OP and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

Panel Areas 3, 4, 5, and 13 are blocked from visibility in this location by topography (Figure 2). Portions of Panel Area 12 is blocked by topography. Panel Areas 2 and 12 are also considerably distant from this viewer. Existing and proposed landscaping will further shield panel areas 2 and 12 from sight during which glare is predicted.

2.12 OBSERVATION POINT 4: RESIDENCE SOUTH OF MAPLE GROVE LANE

The residence is located south of the corner of Maple Grove Lane. At their closest point, panels are proposed approximately 620 feet north of the residence. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 11.

TABLE 12 – Model Results for OP4

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	7,000	April to May and July to August	5 to 6 pm	10	April to September	5 to 7 pm	25	View obstructed by topography
3	7,600	April and August to September	5 to 7 pm	10	--	--	--	View obstructed by topography
4	5,500	May to July	6 to 7 pm	20	--	--	--	View obstructed by topography
12	5,400	February to March and September to October	5 to 6 pm	20	--	--	--	View obstructed by topography
13	5,680	March and September	5 to 6 pm	12	--	--	--	View obstructed by topography

[a] Closest distance in feet between the OP and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

Topographic features within the area and the existing forested area make Panel Areas 2, 3, 4, 12, and 13 likely not viewable from the residence (Figure 2). The landscape screening proposed will be installed to soften views of the Project, even where glare is not predicted (Figure 3).

2.13 OBSERVATION POINT 5: RESIDENCE NORTH OF KY-335

The residence is located north of KY-335. At the closest point, panels are proposed approximately 750 feet to the west. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 12.

TABLE 13 – Model Results for OP5

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
2	3,700	--	--	--	May to July	6 to 7 pm	25	Distance and vegetation screen visibility
3	3,600	May to July	6 to 7 pm	10	--	--	--	Portion of the array that produces glare is topographically not visible
12	1,000	--	--	--	January to March and September to December	3 to 6 pm	10 to 20	Existing and proposed vegetation screen visibility

Panel Area	Distance from OP[a]	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration[b]	Time of Year	Time of Day	Modeled Duration[b]	
13	1,300	March to April and August to September	5 to 7 pm	10	--	--	--	Existing and proposed vegetation screen visibility

[a] Closest distance between the OP and panels.
[b] Approximate minutes
Note: Shaded cells indicate that the panels are not visible at this location due to topography

The majority of the Panel Areas for which glare was identified from this location are extremely distant. Views of portions of Panel Area 3 will be blocked by topography, with additional screening provided by proposed landscaping. The modeled glare resulting from Panel Area 2 is generated only by the southwestern tip of the panels. Landscape screening will also be intervening between the Panel Areas and OP-5 (see Figure 3). The portion of the very distant Panel Area 3 predicted to produce glare will be blocked by intervening topography (Figure 2). The landscape screening proposed will be installed to soften views of the Project, even where glare is not predicted (Figure 3).

2.14 OBSERVATION POINT 6: RESIDENCE SOUTH OF KY-335

The residence is located south of KY-335. At the closest point, panels are proposed approximately 500 feet northwest of the residential home. The model predicts some limited times when green and/or yellow glare are possible, as outlined in Table 13.

Table 14 – Model Results for OP6

Panel Area	Distance from OP	Green Glare			Yellow Glare			Comments
		Time of Year	Time of Day	Modeled Duration	Time of Year	Time of Day	Modeled Duration	
12	650	--	--	--	April and August to September	3 to 6 pm	15	Existing and proposed vegetation screen visibility

[a] Closest distance in feet between the OP and panels.
[b] Approximate minutes.
Note: Shaded cells indicate that the panels are not visible at this location due to topography

The modeled glare resulting from Panel Area 12, is generated only by the southern portion of the panels. The landscape screening proposed will be installed to soften views of the Project for Panel Area 12 (Figure 3).

3. Solar Glare Modeling Results

ForgeSolar's GlareGauge tool, which incorporates the SGHAT model, was used to assess the eight roadway segments and six observation points outlined above to identify the Project's potential to cause glare. The model indicated that the potential exists for glare to result from the Project from all locations. However, as detailed above, more detailed review indicates that little potential exists for glare to materially affect the Project surroundings. The model is intended to reflect extremely conservative results, including the following:

- Although use of an anti-reflective coating is expected, the model was run assuming this coating was not applied to model the maximum potential impacts.
- The model does not account for intervening topography that would block views of certain panel areas from a given modeled location. As discussed above for each of the segments and OPs, many of the locations where glare was predicted will not be visible or may be partially visible; in some instances, the partial visibility would shield viewers from the portion of the panels modeled as producing glare. If the panels cannot be seen from a given location, no glare effect would be experienced.
- The model also does not account for significant existing vegetation and proposed landscaping that would block views of certain panel areas from a given modeled location. As discussed above for each of the segments and OPs, a substantial amount of existing vegetation that will be retained exists that will block visibility of certain panel areas. In addition to the existing vegetation, the Project plans to incorporate a robust landscaping plan that will add vegetation where it may not currently exist and to augment other areas. While the landscaping is not intended to block views of the panels and would rather screen and soften views of the panels, vegetation can be further enhanced should experienced glare become an issue from a given location.
- Distance is also not a factor used in the model when calculating retinal irradiance. As noted in the sections above, several of the places where glare is predicted are quite distant from the viewing segment or OP. As distance increases from a potential location with glare effect, reflected light will diffuse and tend to become less concentrated and have a decreased characteristic of glare.
- Although the model accounts for the varying movement of the sun at certain times of the year (and the resulting movement of the panel angle to follow the sun), the model assumes that full sun is experienced throughout the year. Glare would only occur on sunny days.

Given the adjustments to the modeled results based on tangible factors that would block visibility, and the other factors noted above that are likely to reduce the potential for impact still further, glare is not expected to adversely influence traffic on nearby modeled roads or modeled OP locations. In the unlikely event that glare were to pose a concern from a given location, mitigation measures that could include enhanced landscaping would be considered.

\\haleyaldrich.com\share\CF\Projects\0203928\Visiblity-Glare\ForgeSolar Analysis_September 2022\Solar Glare Analysis_Thoroughbred_10-4-22.docx

FIGURES

OP 1
Route 7
Panel Area 4
Route 6
Panel Area 2
Panel Area 7
Panel Area 8
Panel Area 3
Panel Area 11
Panel Area 6
OP 2
Panel Area 5
OP 3
Route 4
Route 5
Panel Area 9
Panel Area 10
Route 3
Panel Area 14
Panel Area 1
OP 4
Panel Area 15
Panel Area 13
OP 5
Panel Area 12
Route 2
Route 1
OP 6

LEGEND

- Route Receptors
- Receptor Points
- Access Roads
- Array Trackers
- Proposed Fenceline
- Inverters
- Proposed Substation
- Proposed Switchyard
- Project Area

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: KENTUCKY GEOGRAPHY NETWORK DATE 2021

N

0 600 1,200
SCALE IN FEET

KY

KY

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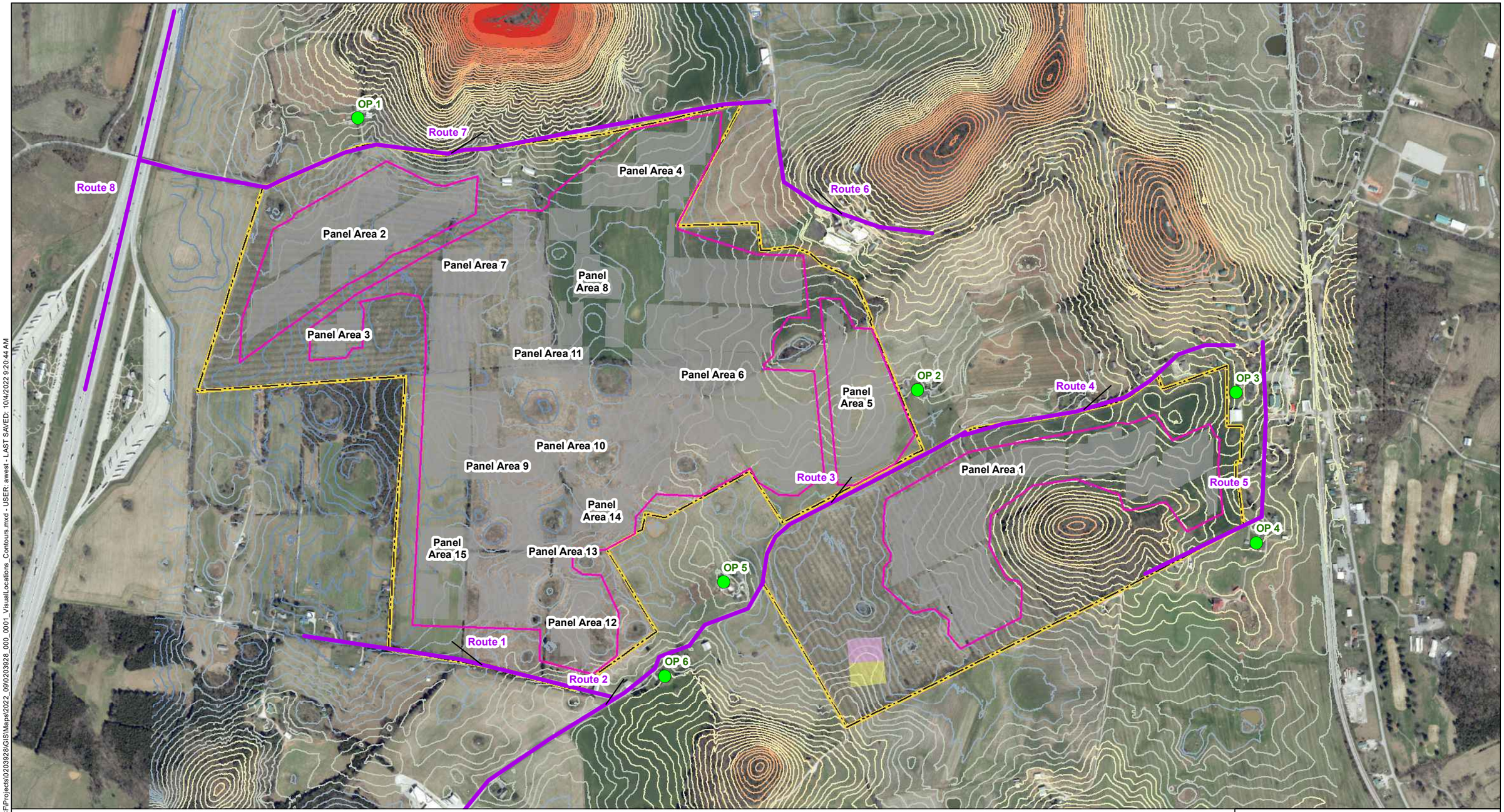
Figure 1
Location of Visual Route and Point Receptors

Thoroughbred Solar
Hart County, Kentucky

GIS FILE PATH: \\haleyaldrich.com\share\CPIProjects\0203928\GISMaps\2022_09\0203928_000_0001_VisualLocations.mxd - USER: awest - LAST SAVED: 10/4/2022 9:14:57 AM



LEGEND

- Route Receptors
- Receptor Points
- Array Trackers
- Proposed Fenceline
- Proposed Substation
- Proposed Switchyard
- Project Area

Contour

- 526 - 575
- 576 - 600
- 601 - 625
- 626 - 660
- 661 - 700
- 701 - 745
- 746 - 790
- 791 - 840
- 841 - 895

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: KENTUCKY GEOGRAPHY NETWORK DATE 2021

N

0 800 1,600
SCALE IN FEET

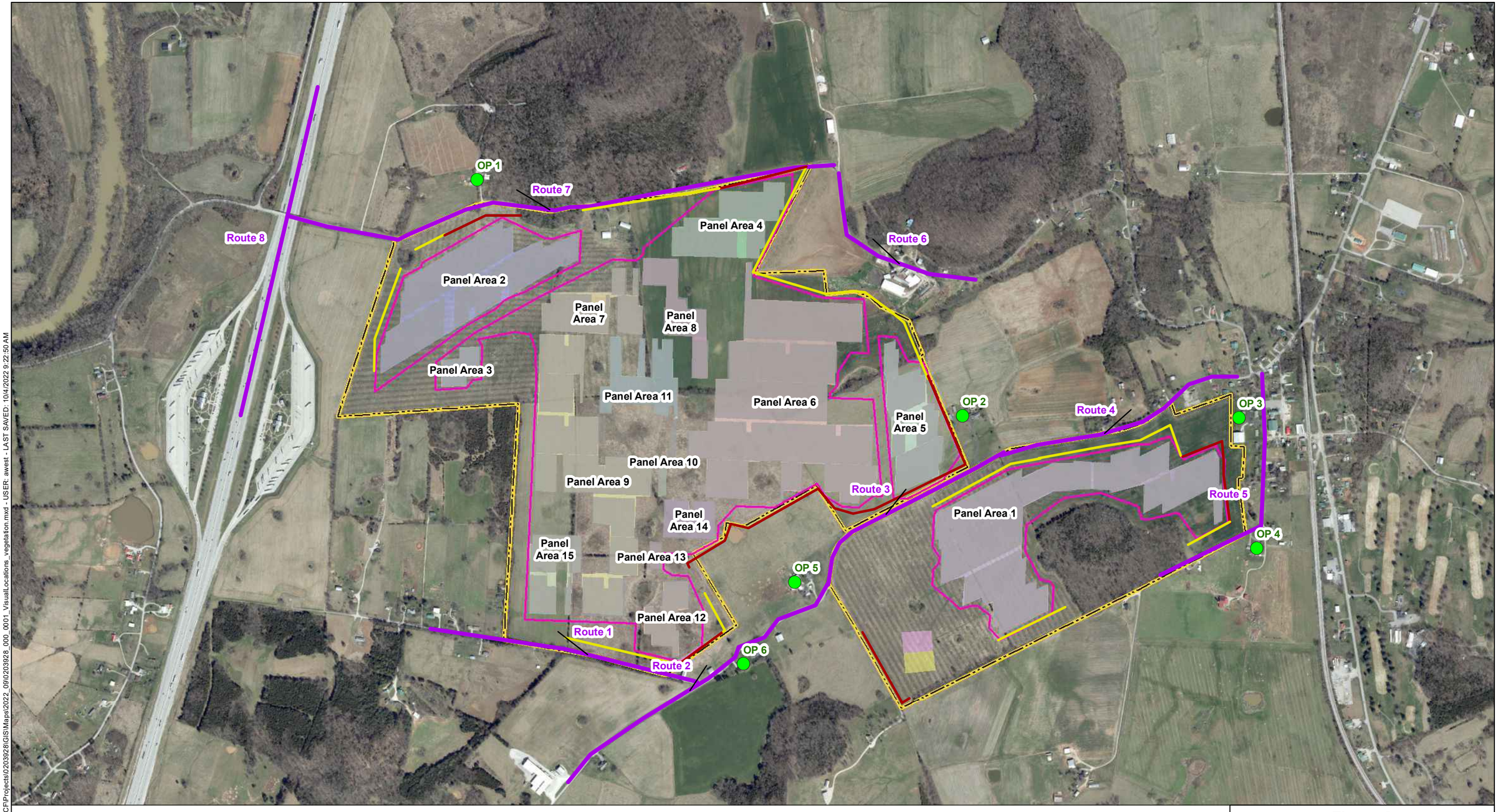
KY

HALEY ALDRICH

Figure 2
Location of Visual Route and Point Receptors with Contours

Thoroughbred Solar
Hart County, Kentucky

GIS FILE PATH: \\haleyaldrich.com\share\CFProjects\0203928\GIS\Maps\2022_09\0203928_000_0001_VisualLocations_Contours.mxd - USER: awest - LAST SAVED: 10/4/2022 9:20:44 AM



GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0203928\GIS\Maps\2022_09\0203928_000_0001_VisualLocations_vegetation.mxd - USER: awest - LAST SAVED: 10/4/2022 9:22:50 AM

LEGEND

- Route Receptors
- Heavy Screening
- Standard Screening
- Receptor Points
- Array Trackers
- Proposed Fenceline
- Proposed Substation
- Proposed Switchyard
- Project Area

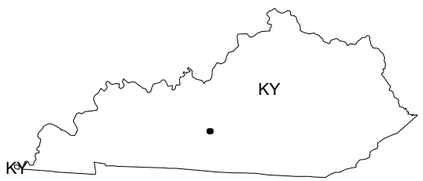
NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: KENTUCKY GEOGRAPHY NETWORK DATE 2021

No schools, hospitals or nursing homes are located within 2,000 feet of the solar panels

N

0 910 1,820
SCALE IN FEET



HALEY ALDRICH

Figure 3
Location of Visual Route and Point Receptors with Potential Screening Vegetation

Thoroughbred Solar
Hart County, Kentucky

APPENDIX A
ForgeSolar Glare Analysis

FORGESOLAR GLARE ANALYSIS

Project: **Thoroughbred Solar**
Site configuration: **2022 September Layout**

Created 08 Sep, 2022
Updated 09 Sep, 2022
Time-step 1 minute
Timezone offset UTC-6
Site ID 75482.11887
Category 10 MW to 100 MW
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
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 10	SA tracking	SA tracking	549	9.2	0	0.0	-
PV array 11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 12	SA tracking	SA tracking	3,434	57.2	7,150	119.2	-
PV array 13	SA tracking	SA tracking	5,404	90.1	0	0.0	-
PV array 14	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 15	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	1,100	18.3	16,728	278.8	-
PV array 3	SA tracking	SA tracking	5,193	86.5	0	0.0	-
PV array 4	SA tracking	SA tracking	3,288	54.8	10,675	177.9	-
PV array 5	SA tracking	SA tracking	0	0.0	734	12.2	-
PV array 6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 7	SA tracking	SA tracking	0	0.0	11,611	193.5	-
PV array 8	SA tracking	SA tracking	406	6.8	8,497	141.6	-
PV array 9	SA tracking	SA tracking	0	0.0	1,588	26.5	-

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
Route 1	0	0.0	734	12.2
Route 2	779	13.0	2,752	45.9
Route 3	2,416	40.3	3,396	56.6
Route 4	2,864	47.7	5,314	88.6
Route 5	2,901	48.4	1,248	20.8
Route 6	302	5.0	8,625	143.8
Route 7	870	14.5	17,629	293.8
Route 8	0	0.0	281	4.7

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 1	0	0.0	5,232	87.2
OP 2	1,888	31.5	4,235	70.6
OP 3	2,884	48.1	1,532	25.5
OP 4	3,167	52.8	1,986	33.1
OP 5	1,303	21.7	3,666	61.1
OP 6	0	0.0	353	5.9

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.233490	-85.902752	597.89	5.00	602.89
2	37.234197	-85.901226	620.52	5.00	625.52
3	37.234906	-85.901224	633.07	5.00	638.07
4	37.234765	-85.901605	624.55	5.00	629.55
5	37.235037	-85.901602	629.91	5.00	634.91
6	37.234875	-85.901979	621.86	5.00	626.86
7	37.235604	-85.902001	630.18	5.00	635.18
8	37.235553	-85.902120	626.26	5.00	631.26
9	37.236981	-85.902149	626.65	5.00	631.65
10	37.237399	-85.901205	641.43	5.00	646.43
11	37.237405	-85.900535	654.14	5.00	659.14
12	37.237476	-85.900532	652.59	5.00	657.59
13	37.237492	-85.899266	657.52	5.00	662.52
14	37.237394	-85.899265	659.12	5.00	664.12
15	37.237677	-85.898306	652.52	5.00	657.52
16	37.237735	-85.898146	650.28	5.00	655.28
17	37.237204	-85.898126	665.75	5.00	670.75
18	37.236898	-85.898104	673.53	5.00	678.53
19	37.237112	-85.897455	668.11	5.00	673.11
20	37.236912	-85.897444	672.71	5.00	677.71
21	37.237643	-85.895798	651.90	5.00	656.91
22	37.236940	-85.895767	657.15	5.00	662.15
23	37.236937	-85.895718	655.69	5.00	660.69
24	37.236661	-85.895710	655.84	5.00	660.84
25	37.236765	-85.895465	650.99	5.00	655.99
26	37.237498	-85.895487	645.74	5.00	650.74
27	37.237498	-85.895528	646.07	5.00	651.07
28	37.237763	-85.895540	651.40	5.00	656.40
29	37.237737	-85.895642	651.28	5.00	656.28
30	37.238512	-85.895657	654.39	5.00	659.39
31	37.238448	-85.895830	651.66	5.00	656.66
32	37.238656	-85.895826	651.76	5.00	656.76
33	37.238095	-85.897073	653.75	5.00	658.75
34	37.237802	-85.897058	658.55	5.00	663.55
35	37.237743	-85.897253	659.82	5.00	664.82
36	37.238019	-85.897270	656.86	5.00	661.86
37	37.238000	-85.897329	657.41	5.00	662.41
38	37.238852	-85.897348	642.03	5.00	647.03
39	37.238422	-85.898273	639.00	5.00	644.00
40	37.238689	-85.898271	640.66	5.00	645.66
41	37.238416	-85.899267	637.33	5.00	642.33
42	37.238220	-85.899262	639.94	5.00	644.94
43	37.238200	-85.900472	635.59	5.00	640.59
44	37.238120	-85.900471	637.98	5.00	642.98
45	37.238131	-85.901178	638.01	5.00	643.01
46	37.237676	-85.902185	620.22	5.00	625.22
47	37.237960	-85.902220	622.71	5.00	627.71
48	37.236700	-85.905000	598.03	5.00	603.04
49	37.235977	-85.904990	600.44	5.00	605.44
50	37.236014	-85.904901	600.75	5.00	605.75
51	37.235740	-85.904899	598.86	5.00	603.86
52	37.235781	-85.904789	601.47	5.00	606.47
53	37.234745	-85.904777	600.88	5.00	605.88
54	37.235125	-85.903973	606.74	5.00	611.75
55	37.234271	-85.903938	596.57	5.00	601.57
56	37.234534	-85.903377	598.48	5.00	603.48
57	37.234262	-85.903369	595.81	5.00	600.81
58	37.234419	-85.902987	604.53	5.00	609.53
59	37.233684	-85.902956	596.37	5.00	601.37

Name: PV array 10
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.236880	-85.914300	588.86	5.00	593.86
2	37.236876	-85.914062	586.96	5.00	591.97
3	37.237883	-85.914056	588.09	5.00	593.09
4	37.237887	-85.914321	585.24	5.00	590.24

Name: PV array 11
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.241066	-85.916109	588.77	5.00	593.77
2	37.241060	-85.915712	587.18	5.00	592.18
3	37.240017	-85.915686	587.79	5.00	592.79
4	37.240024	-85.915135	590.74	5.00	595.74
5	37.241062	-85.915142	584.58	5.00	589.58
6	37.241064	-85.914947	589.18	5.00	594.18
7	37.240026	-85.914948	592.17	5.00	597.17
8	37.240031	-85.914696	592.61	5.00	597.61
9	37.241064	-85.914712	594.30	5.00	599.30
10	37.241065	-85.914513	596.30	5.00	601.30
11	37.240768	-85.914509	594.52	5.00	599.52
12	37.240770	-85.914313	596.24	5.00	601.24
13	37.241071	-85.914314	598.14	5.00	603.14
14	37.241063	-85.914022	595.36	5.00	600.36
15	37.239989	-85.914012	590.85	5.00	595.85
16	37.239993	-85.913799	587.70	5.00	592.70
17	37.237904	-85.913791	588.27	5.00	593.27
18	37.237905	-85.913987	588.28	5.00	593.29
19	37.238614	-85.913979	584.43	5.00	589.43
20	37.238622	-85.913851	584.38	5.00	589.39
21	37.239310	-85.913880	586.38	5.00	591.38
22	37.239310	-85.914066	587.12	5.00	592.12
23	37.239025	-85.914062	586.06	5.00	591.06
24	37.239023	-85.914578	585.24	5.00	590.24
25	37.239307	-85.914577	589.39	5.00	594.39
26	37.239299	-85.915974	584.54	5.00	589.54
27	37.239019	-85.915974	586.27	5.00	591.27
28	37.239018	-85.916379	582.61	5.00	587.61
29	37.239743	-85.916374	580.71	5.00	585.71
30	37.239748	-85.916044	581.94	5.00	586.94
31	37.240326	-85.916041	587.47	5.00	592.47
32	37.240329	-85.916110	587.86	5.00	592.86

Name: PV array 12
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.233180	-85.914576	605.25	5.00	610.25
2	37.233179	-85.914290	605.23	5.00	610.23
3	37.232864	-85.914291	607.30	5.00	612.30
4	37.232869	-85.913654	612.25	5.00	617.25
5	37.232584	-85.913649	615.07	5.00	620.07
6	37.232580	-85.913457	617.75	5.00	622.75
7	37.233312	-85.913450	602.78	5.00	607.78
8	37.233318	-85.913565	604.78	5.00	609.78
9	37.233624	-85.913555	603.38	5.00	608.38
10	37.233620	-85.913499	602.23	5.00	607.23
11	37.233895	-85.913492	606.66	5.00	611.66
12	37.233903	-85.913183	604.37	5.00	609.37
13	37.234628	-85.913177	599.31	5.00	604.31
14	37.234634	-85.913956	599.40	5.00	604.40
15	37.234359	-85.913963	606.12	5.00	611.12
16	37.234359	-85.914031	604.62	5.00	609.62
17	37.233612	-85.914031	611.80	5.00	616.80
18	37.233617	-85.914321	608.46	5.00	613.46
19	37.233918	-85.914313	603.66	5.00	608.66
20	37.233911	-85.914563	599.84	5.00	604.84

Name: PV array 13
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.234912	-85.914500	598.89	5.00	603.89
2	37.234900	-85.914117	594.00	5.00	599.00
3	37.235629	-85.914120	580.55	5.00	585.55
4	37.235636	-85.914521	578.40	5.00	583.40

Name: PV array 14
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.236767	-85.914084	587.27	5.00	592.27
2	37.236766	-85.913330	590.89	5.00	595.89
3	37.236504	-85.913322	590.25	5.00	595.25
4	37.236508	-85.913121	593.23	5.00	598.23
5	37.236774	-85.913123	593.04	5.00	598.04
6	37.236772	-85.912386	601.28	5.00	606.28
7	37.235763	-85.912376	602.64	5.00	607.64
8	37.235776	-85.914088	578.33	5.00	583.33

Name: PV array 15
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.233612	-85.918510	578.83	5.00	583.83
2	37.235444	-85.918477	572.01	5.00	577.01
3	37.235440	-85.918418	572.77	5.00	577.77
4	37.235743	-85.918440	577.93	5.00	582.93
5	37.235734	-85.916830	580.24	5.00	585.24
6	37.235453	-85.916830	583.14	5.00	588.14
7	37.235461	-85.916771	582.03	5.00	587.03
8	37.234752	-85.916761	590.45	5.00	595.45
9	37.234756	-85.917072	586.87	5.00	591.87
10	37.233599	-85.917061	587.59	5.00	592.59
11	37.233599	-85.917303	587.14	5.00	592.14
12	37.234338	-85.917303	583.95	5.00	588.95
13	37.234342	-85.917179	584.74	5.00	589.74
14	37.235013	-85.917179	585.68	5.00	590.68
15	37.235017	-85.917662	583.41	5.00	588.41
16	37.234739	-85.917662	582.32	5.00	587.32
17	37.234744	-85.917930	581.01	5.00	586.01
18	37.234334	-85.917925	581.66	5.00	586.66
19	37.234342	-85.917587	583.34	5.00	588.34
20	37.233608	-85.917598	587.09	5.00	592.09

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.242083	-85.923110	588.60	5.00	593.60
2	37.242125	-85.923008	587.54	5.00	592.54
3	37.242418	-85.923015	588.57	5.00	593.57
4	37.244049	-85.919827	592.55	5.00	597.55
5	37.243805	-85.919815	586.03	5.00	591.03
6	37.243937	-85.919492	594.37	5.00	599.37
7	37.243078	-85.919498	571.46	5.00	576.46
8	37.243590	-85.918453	590.74	5.00	595.74
9	37.243369	-85.918450	582.81	5.00	587.81
10	37.243629	-85.917914	590.96	5.00	595.96
11	37.243639	-85.917898	591.31	5.00	596.31
12	37.243650	-85.917641	590.42	5.00	595.42
13	37.243814	-85.917278	592.36	5.00	597.36
14	37.243079	-85.917275	576.95	5.00	581.95
15	37.242904	-85.917682	572.84	5.00	577.84
16	37.242894	-85.917923	570.84	5.00	575.84
17	37.242041	-85.919510	558.95	5.00	563.95
18	37.242280	-85.919516	560.56	5.00	565.56
19	37.242162	-85.919846	564.36	5.00	569.36
20	37.241918	-85.919838	560.90	5.00	565.90
21	37.241511	-85.920593	566.48	5.00	571.48
22	37.241757	-85.920609	570.41	5.00	575.41
23	37.241672	-85.920851	567.99	5.00	572.99
24	37.241429	-85.920844	567.10	5.00	572.10
25	37.239879	-85.923698	580.30	5.00	585.30
26	37.240611	-85.923674	585.11	5.00	590.11
27	37.240677	-85.923515	583.01	5.00	588.01
28	37.240983	-85.923514	583.00	5.00	588.00
29	37.241195	-85.923116	584.96	5.00	589.96

Name: PV array 3
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.240597	-85.921095	573.80	5.00	578.80
2	37.240666	-85.920430	562.38	5.00	567.38
3	37.239938	-85.920411	564.74	5.00	569.74
4	37.239900	-85.920850	568.33	5.00	573.33
5	37.239623	-85.920834	563.01	5.00	568.01
6	37.239560	-85.921617	558.73	5.00	563.73
7	37.240289	-85.921647	565.10	5.00	570.10
8	37.240354	-85.921048	571.78	5.00	576.78

Name: PV array 4
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.245355	-85.910490	602.34	5.00	607.34
2	37.244631	-85.910486	598.58	5.00	603.58
3	37.244630	-85.910649	599.46	5.00	604.46
4	37.244352	-85.910657	597.94	5.00	602.94
5	37.244350	-85.911054	598.53	5.00	603.53
6	37.243585	-85.911085	591.95	5.00	596.95
7	37.243585	-85.911251	591.89	5.00	596.89
8	37.243296	-85.911249	589.80	5.00	594.80
9	37.243292	-85.914131	597.60	5.00	602.60
10	37.244101	-85.914149	610.40	5.00	615.40
11	37.244103	-85.913792	608.01	5.00	613.01
12	37.244309	-85.913801	612.03	5.00	617.03
13	37.244288	-85.912668	604.52	5.00	609.52
14	37.245061	-85.912642	615.00	5.00	620.00
15	37.245089	-85.911195	610.75	5.00	615.75
16	37.245342	-85.911191	613.74	5.00	618.74

Name: PV array 5
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.237145	-85.906379	597.99	5.00	602.99
2	37.237707	-85.905017	599.67	5.00	604.67
3	37.237995	-85.905011	601.44	5.00	606.44
4	37.238068	-85.904840	601.23	5.00	606.23
5	37.238770	-85.904856	605.28	5.00	610.28
6	37.238698	-85.905057	605.79	5.00	610.79
7	37.239451	-85.905076	613.56	5.00	618.56
8	37.239400	-85.905183	614.39	5.00	619.39
9	37.239667	-85.905188	620.21	5.00	625.21
10	37.239508	-85.905577	617.49	5.00	622.49
11	37.240370	-85.905586	625.04	5.00	630.04
12	37.240302	-85.905748	621.52	5.00	626.52
13	37.240571	-85.905746	622.25	5.00	627.25
14	37.240314	-85.906459	615.65	5.00	620.65
15	37.241037	-85.906478	616.66	5.00	621.66
16	37.241002	-85.906548	616.01	5.00	621.01
17	37.241287	-85.906561	619.79	5.00	624.79
18	37.241127	-85.906957	614.45	5.00	619.45
19	37.240409	-85.906924	609.97	5.00	614.97
20	37.240411	-85.906835	611.13	5.00	616.13
21	37.240202	-85.906834	612.18	5.00	617.18
22	37.240233	-85.906743	612.72	5.00	617.72
23	37.239484	-85.906731	617.26	5.00	622.26
24	37.239484	-85.906659	618.20	5.00	623.20
25	37.239198	-85.906651	621.58	5.00	626.58
26	37.239261	-85.906553	621.81	5.00	626.81
27	37.238135	-85.906522	617.49	5.00	622.49
28	37.238140	-85.906403	618.93	5.00	623.93

Name: PV array 6
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.237172	-85.908786	606.72	5.00	611.72
2	37.237177	-85.908230	604.35	5.00	609.35
3	37.236874	-85.908222	599.60	5.00	604.60
4	37.236884	-85.907585	596.86	5.00	601.86
5	37.237174	-85.907593	602.40	5.00	607.40
6	37.237165	-85.907076	597.34	5.00	602.34
7	37.237899	-85.907074	607.83	5.00	612.83
8	37.237895	-85.907237	607.59	5.00	612.59
9	37.238924	-85.907237	619.83	5.00	624.84
10	37.238917	-85.908798	625.46	5.00	630.46
11	37.240061	-85.908817	615.02	5.00	620.02
12	37.240058	-85.908560	609.47	5.00	614.47
13	37.240361	-85.908560	608.85	5.00	613.85
14	37.240361	-85.908510	607.95	5.00	612.95
15	37.241176	-85.908520	618.10	5.00	623.10
16	37.241186	-85.907703	616.07	5.00	621.07
17	37.241904	-85.907702	628.04	5.00	633.04
18	37.241906	-85.907764	628.26	5.00	633.26
19	37.242197	-85.907765	633.59	5.00	638.59
20	37.242188	-85.911479	589.49	5.00	594.49
21	37.243219	-85.911468	588.97	5.00	593.97
22	37.243220	-85.911593	589.53	5.00	594.53
23	37.242920	-85.911594	589.00	5.00	594.00
24	37.242920	-85.911673	588.76	5.00	593.76
25	37.242185	-85.911672	586.33	5.00	591.33
26	37.241173	-85.911668	590.69	5.00	595.69
27	37.241165	-85.912127	586.83	5.00	591.83
28	37.240020	-85.912122	592.60	5.00	597.60
29	37.240020	-85.912508	590.11	5.00	595.11
30	37.238870	-85.912497	584.56	5.00	589.56
31	37.238868	-85.912735	581.97	5.00	586.97
32	37.238636	-85.912729	587.42	5.00	592.42
33	37.238636	-85.913377	583.20	5.00	588.20
34	37.237898	-85.913370	585.57	5.00	590.57
35	37.237905	-85.912680	588.94	5.00	593.94
36	37.237589	-85.912680	591.24	5.00	596.24
37	37.237589	-85.912753	589.85	5.00	594.85
38	37.236883	-85.912733	597.71	5.00	602.71
39	37.236881	-85.911344	615.01	5.00	620.01
40	37.237920	-85.911338	602.55	5.00	607.55
41	37.237920	-85.910239	615.36	5.00	620.36
42	37.236881	-85.910227	603.50	5.00	608.50
43	37.236887	-85.910157	602.09	5.00	607.09
44	37.237175	-85.910157	605.15	5.00	610.15
45	37.237169	-85.909551	605.45	5.00	610.45
46	37.237929	-85.909568	612.87	5.00	617.87
47	37.237932	-85.908783	615.44	5.00	620.44

Name: PV array 7
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.241174	-85.918362	563.52	5.00	568.52
2	37.241883	-85.918368	557.79	5.00	562.79
3	37.241885	-85.918089	558.99	5.00	563.99
4	37.242174	-85.918083	561.12	5.00	566.12
5	37.242204	-85.916112	575.44	5.00	580.44
6	37.242908	-85.916114	579.01	5.00	584.01
7	37.242908	-85.915695	583.67	5.00	588.67
8	37.242210	-85.915679	581.65	5.00	586.65
9	37.242221	-85.915408	584.63	5.00	589.63
10	37.242921	-85.915433	578.85	5.00	583.85
11	37.242927	-85.915205	578.30	5.00	583.30
12	37.241862	-85.915178	587.68	5.00	592.68
13	37.241862	-85.915036	585.73	5.00	590.73
14	37.241159	-85.915017	590.61	5.00	595.61
15	37.241151	-85.915894	589.18	5.00	594.18
16	37.242178	-85.915910	578.73	5.00	583.73
17	37.242165	-85.916210	574.33	5.00	579.33
18	37.241153	-85.916208	587.58	5.00	592.58

Name: PV array 8
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.243206	-85.915094	593.19	5.00	598.19
2	37.243209	-85.913923	595.03	5.00	600.03
3	37.242159	-85.913907	590.15	5.00	595.15
4	37.242164	-85.913585	587.49	5.00	592.49
5	37.241868	-85.913576	595.36	5.00	600.36
6	37.241880	-85.912933	588.69	5.00	593.69
7	37.241370	-85.912911	592.47	5.00	597.47
8	37.241166	-85.912904	592.55	5.00	597.55
9	37.241170	-85.912772	590.01	5.00	595.01
10	37.240034	-85.912746	587.01	5.00	592.01
11	37.240030	-85.913334	584.74	5.00	589.74
12	37.241056	-85.913333	595.68	5.00	600.68
13	37.241158	-85.913335	597.26	5.00	602.26
14	37.241147	-85.914322	598.94	5.00	603.94
15	37.241845	-85.914340	589.34	5.00	594.34
16	37.241842	-85.914288	590.18	5.00	595.18
17	37.242458	-85.914273	590.72	5.00	595.72
18	37.242470	-85.915083	582.76	5.00	587.76

Name: PV array 9
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth 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	37.234637	-85.916680	591.03	5.00	596.03
2	37.233620	-85.916707	590.00	5.00	595.00
3	37.233603	-85.915307	600.34	5.00	605.34
4	37.234744	-85.915280	606.20	5.00	611.20
5	37.234727	-85.914942	604.13	5.00	609.13
6	37.235747	-85.914969	575.76	5.00	580.76
7	37.235747	-85.915109	579.47	5.00	584.48
8	37.236888	-85.915098	592.69	5.00	597.69
9	37.236896	-85.914551	587.79	5.00	592.79
10	37.237891	-85.914572	586.67	5.00	591.67
11	37.237908	-85.916096	584.27	5.00	589.27
12	37.237601	-85.916096	587.47	5.00	592.47
13	37.237605	-85.916353	585.34	5.00	590.34
14	37.237891	-85.916337	584.37	5.00	589.37
15	37.237896	-85.916412	584.39	5.00	589.39
16	37.238194	-85.916412	584.62	5.00	589.62
17	37.238194	-85.916364	584.62	5.00	589.62
18	37.238916	-85.916326	582.64	5.00	587.64
19	37.238916	-85.917260	581.23	5.00	586.23
20	37.240048	-85.917270	580.45	5.00	585.45
21	37.240048	-85.917067	582.89	5.00	587.89
22	37.239296	-85.917067	577.70	5.00	582.70
23	37.239301	-85.916954	578.87	5.00	583.87
24	37.241056	-85.916970	581.66	5.00	586.66
25	37.241047	-85.918456	563.56	5.00	568.56
26	37.239997	-85.918493	565.22	5.00	570.22
27	37.239988	-85.918440	565.27	5.00	570.27
28	37.238660	-85.918397	586.21	5.00	591.21
29	37.238677	-85.918445	584.46	5.00	589.46
30	37.236871	-85.918434	574.16	5.00	579.16
31	37.236867	-85.917710	575.36	5.00	580.36
32	37.237597	-85.917716	588.80	5.00	593.80
33	37.237597	-85.917775	587.47	5.00	592.47
34	37.237917	-85.917753	589.49	5.00	594.49
35	37.237896	-85.917506	591.03	5.00	596.03
36	37.237136	-85.917528	582.36	5.00	587.36
37	37.237136	-85.917458	582.81	5.00	587.81
38	37.236875	-85.917458	575.28	5.00	580.28
39	37.236880	-85.916471	582.44	5.00	587.44
40	37.236064	-85.916482	577.24	5.00	582.24
41	37.236081	-85.915806	585.75	5.00	590.76
42	37.235449	-85.915822	582.69	5.00	587.69
43	37.235453	-85.915865	582.31	5.00	587.31
44	37.234731	-85.915854	601.89	5.00	606.89
45	37.234629	-85.915801	604.12	5.00	609.12
46	37.234343	-85.915817	601.21	5.00	606.21
47	37.234351	-85.916010	596.61	5.00	601.61
48	37.234625	-85.916004	600.05	5.00	605.05

Route Receptors

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.231931	-85.912736	628.43	3.50	631.93
2	37.233186	-85.922070	577.03	3.50	580.53

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.229308	-85.916738	620.83	3.50	624.33
2	37.230478	-85.915333	625.03	3.50	628.53
3	37.232332	-85.911867	625.33	3.50	628.83
4	37.233032	-85.911213	622.43	3.50	625.93
5	37.233246	-85.910709	617.83	3.50	621.33
6	37.234006	-85.909367	610.13	3.50	613.63
7	37.234169	-85.908842	610.43	3.50	613.93
8	37.234664	-85.908563	603.63	3.50	607.13

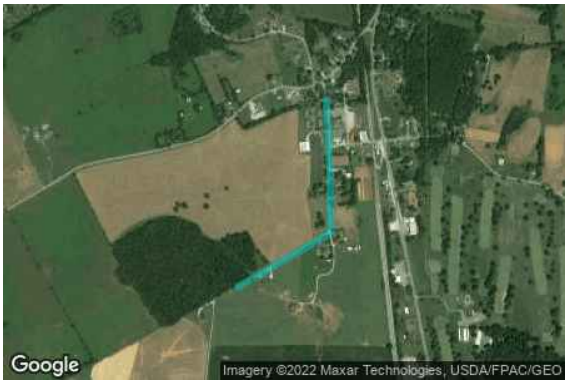
Name: Route 3
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.234766	-85.908552	602.73	3.50	606.23
2	37.235612	-85.908413	590.83	3.50	594.33
3	37.236116	-85.908016	594.43	3.50	597.93
4	37.238439	-85.902812	614.93	3.50	618.43

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.238499	-85.902683	616.53	3.50	620.03
2	37.239097	-85.899036	631.33	3.50	634.83
3	37.239413	-85.898027	641.43	3.50	644.93
4	37.240301	-85.896879	656.73	3.50	660.23
5	37.240669	-85.895795	667.33	3.50	670.83
6	37.240583	-85.894926	673.53	3.50	677.03

Name: Route 5
Path type: Two-way
Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.240310	-85.894315	664.63	3.50	668.13
2	37.238465	-85.894186	650.23	3.50	653.73
3	37.236673	-85.894165	644.93	3.50	648.43
4	37.235213	-85.897341	657.53	3.50	661.03

Name: Route 6
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.243012	-85.904027	682.43	3.50	685.93
2	37.242995	-85.905014	681.13	3.50	684.63
3	37.243627	-85.907503	650.93	3.50	654.43
4	37.243985	-85.908233	640.23	3.50	643.73
5	37.245847	-85.908705	599.33	3.50	602.83

Name: Route 7
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.245864	-85.909134	595.03	3.50	598.53
2	37.244566	-85.917824	669.13	3.50	672.63
3	37.244361	-85.918425	668.43	3.50	671.93
4	37.244634	-85.920550	609.03	3.50	612.53
5	37.243456	-85.923446	590.73	3.50	594.23
6	37.244139	-85.928274	570.13	3.50	573.63

Name: Route 8
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.246906	-85.926214	570.43	3.50	573.93
2	37.238861	-85.928017	578.83	3.50	582.33

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	37.245198	-85.920786	619.93	5.00
OP 2	2	37.239407	-85.904263	615.93	5.00
OP 3	3	37.239612	-85.894843	670.33	5.00
OP 4	4	37.236161	-85.894607	647.33	5.00
OP 5	5	37.234829	-85.909735	620.93	5.00
OP 6	6	37.232420	-85.911258	629.33	5.00

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
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 10	SA tracking	SA tracking	549	9.2	0	0.0	-
PV array 11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 12	SA tracking	SA tracking	3,434	57.2	7,150	119.2	-
PV array 13	SA tracking	SA tracking	5,404	90.1	0	0.0	-
PV array 14	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 15	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	1,100	18.3	16,728	278.8	-
PV array 3	SA tracking	SA tracking	5,193	86.5	0	0.0	-
PV array 4	SA tracking	SA tracking	3,288	54.8	10,675	177.9	-
PV array 5	SA tracking	SA tracking	0	0.0	734	12.2	-
PV array 6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 7	SA tracking	SA tracking	0	0.0	11,611	193.5	-
PV array 8	SA tracking	SA tracking	406	6.8	8,497	141.6	-
PV array 9	SA tracking	SA tracking	0	0.0	1,588	26.5	-

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
Route 1	0	0.0	734	12.2
Route 2	779	13.0	2,752	45.9
Route 3	2,416	40.3	3,396	56.6
Route 4	2,864	47.7	5,314	88.6
Route 5	2,901	48.4	1,248	20.8

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 6	302	5.0	8,625	143.8
Route 7	870	14.5	17,629	293.8
Route 8	0	0.0	281	4.7
OP 1	0	0.0	5,232	87.2
OP 2	1,888	31.5	4,235	70.6
OP 3	2,884	48.1	1,532	25.5
OP 4	3,167	52.8	1,986	33.1
OP 5	1,303	21.7	3,666	61.1
OP 6	0	0.0	353	5.9

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

PV array 1 and Route 1

Receptor type: Route

No glare found

PV array 1 and Route 2

Receptor type: Route

No glare found

PV array 1 and Route 3

Receptor type: Route
No glare found

PV array 1 and Route 4

Receptor type: Route
No glare found

PV array 1 and Route 5

Receptor type: Route
No glare found

PV array 1 and Route 6

Receptor type: Route
No glare found

PV array 1 and Route 7

Receptor type: Route
No glare found

PV array 1 and Route 8

Receptor type: Route
No glare found

PV array 1 and OP 1

Receptor type: Observation Point
No glare found

PV array 1 and OP 2

Receptor type: Observation Point
No glare found

PV array 1 and OP 3

Receptor type: Observation Point
No glare found

PV array 1 and OP 4

Receptor type: Observation Point
No glare found

PV array 1 and OP 5

Receptor type: Observation Point
No glare found

PV array 1 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 10 low potential for temporary after-image

Receptor results ordered by category of glare

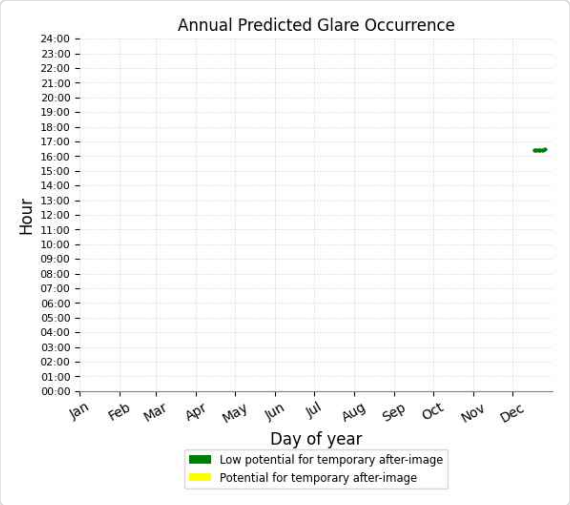
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 6	9	0.1	0	0.0
Route 7	540	9.0	0	0.0
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

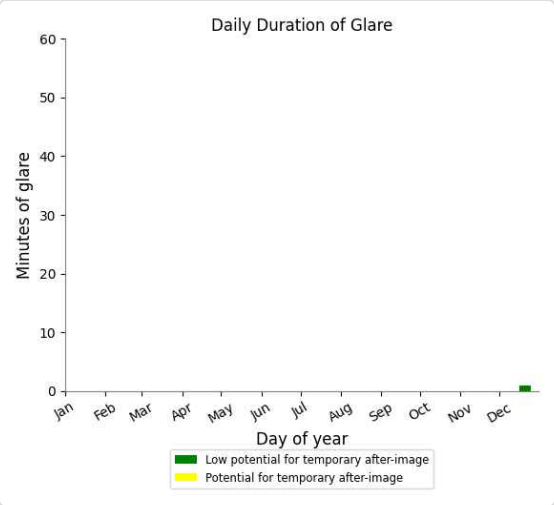
PV array 10 and Route 6

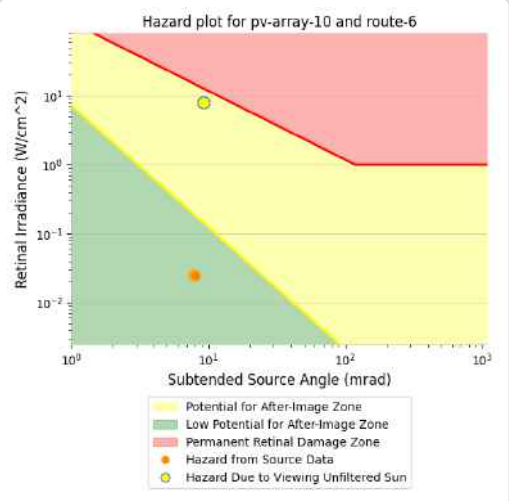
Receptor type: Route

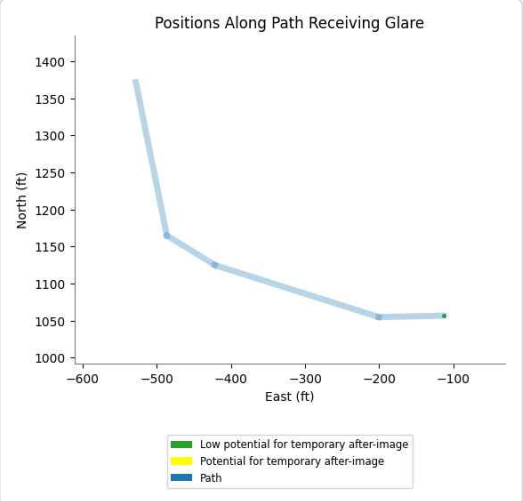
0 minutes of yellow glare

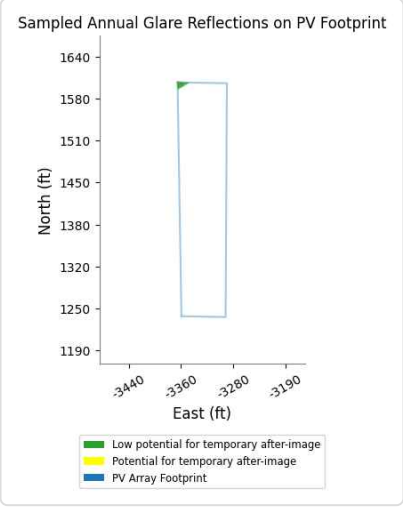
9 minutes of green glare









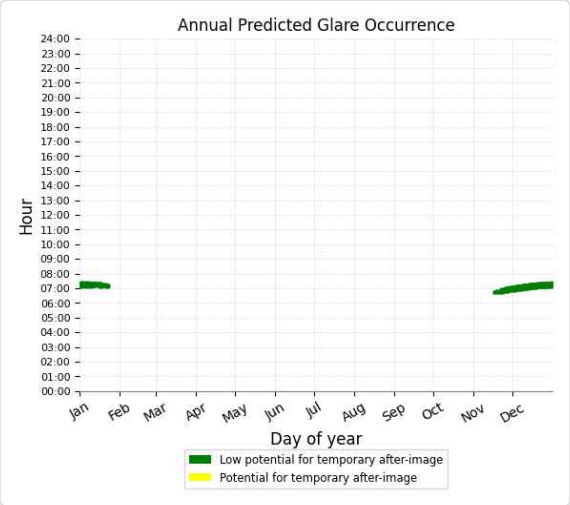


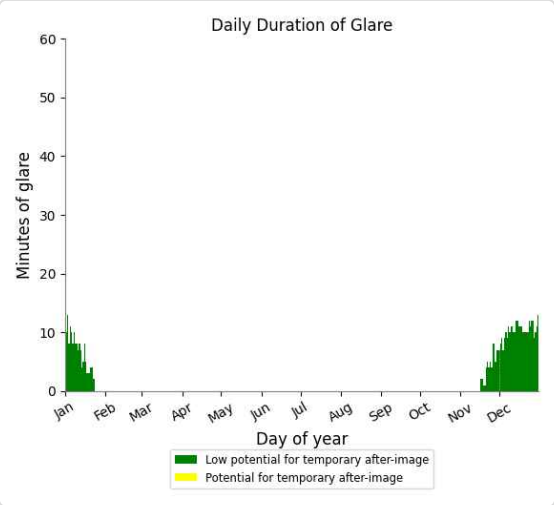
PV array 10 and Route 7

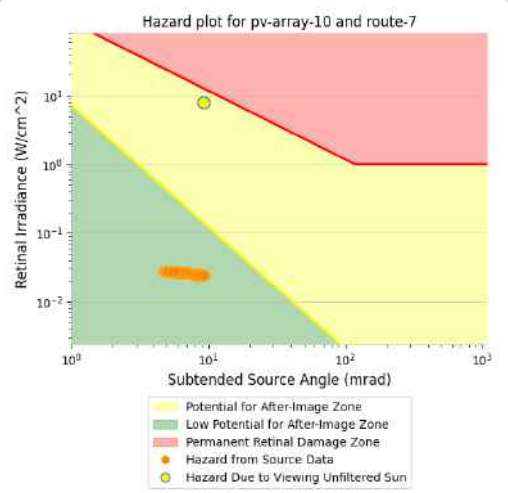
Receptor type: Route

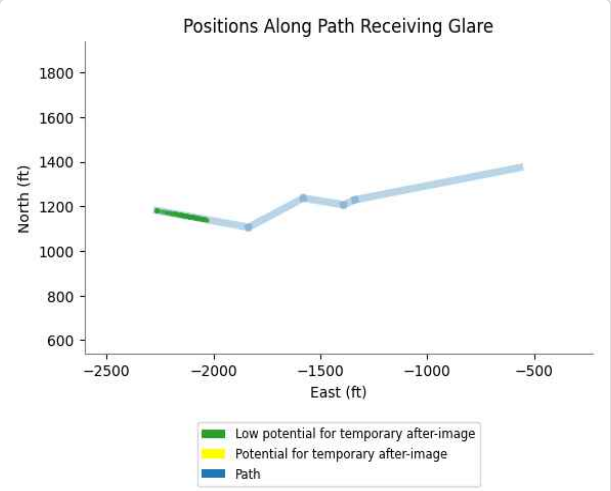
0 minutes of yellow glare

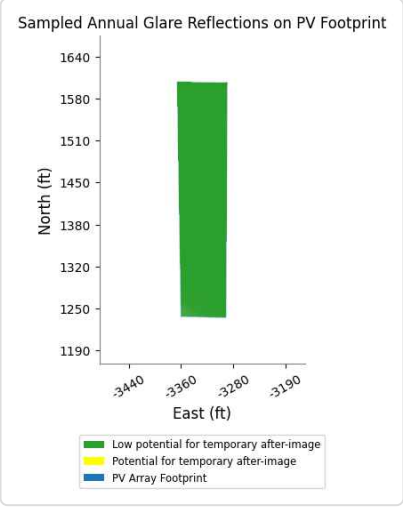
540 minutes of green glare











PV array 10 and Route 1

Receptor type: Route
No glare found

PV array 10 and Route 2

Receptor type: Route
No glare found

PV array 10 and Route 3

Receptor type: Route
No glare found

PV array 10 and Route 4

Receptor type: Route
No glare found

PV array 10 and Route 5

Receptor type: Route
No glare found

PV array 10 and Route 8

Receptor type: Route
No glare found

PV array 10 and OP 1

Receptor type: Observation Point
No glare found

PV array 10 and OP 2

Receptor type: Observation Point
No glare found

PV array 10 and OP 3

Receptor type: Observation Point
No glare found

PV array 10 and OP 4

Receptor type: Observation Point
No glare found

PV array 10 and OP 5

Receptor type: Observation Point
No glare found

PV array 10 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 11 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

PV array 11 and Route 1

Receptor type: Route
No glare found

PV array 11 and Route 2

Receptor type: Route
No glare found

PV array 11 and Route 3

Receptor type: Route
No glare found

PV array 11 and Route 4

Receptor type: Route
No glare found

PV array 11 and Route 5

Receptor type: Route
No glare found

PV array 11 and Route 6

Receptor type: Route
No glare found

PV array 11 and Route 7

Receptor type: Route
No glare found

PV array 11 and Route 8

Receptor type: Route
No glare found

PV array 11 and OP 1

Receptor type: Observation Point
No glare found

PV array 11 and OP 2

Receptor type: Observation Point
No glare found

PV array 11 and OP 3

Receptor type: Observation Point
No glare found

PV array 11 and OP 4

Receptor type: Observation Point
No glare found

PV array 11 and OP 5

Receptor type: Observation Point
No glare found

PV array 11 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 12 potential temporary after-image

Receptor results ordered by category of glare

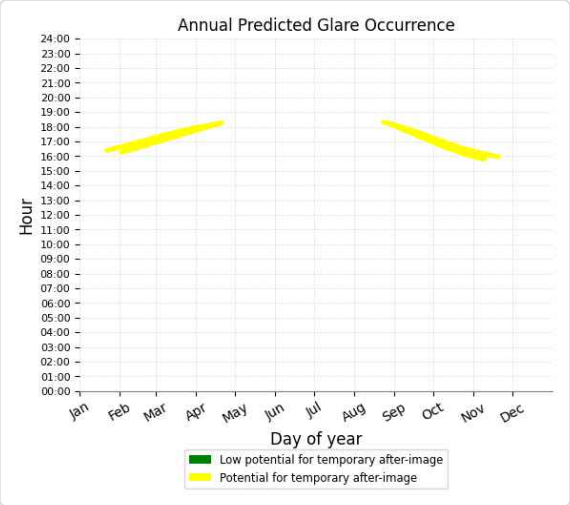
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 2	0	0.0	2,005	33.4
Route 3	30	0.5	1,526	25.4
Route 4	995	16.6	106	1.8
Route 5	863	14.4	0	0.0
Route 7	67	1.1	0	0.0
Route 1	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 2	309	5.2	734	12.2
OP 5	0	0.0	2,426	40.4
OP 6	0	0.0	353	5.9
OP 3	538	9.0	0	0.0
OP 4	632	10.5	0	0.0
OP 1	0	0.0	0	0.0

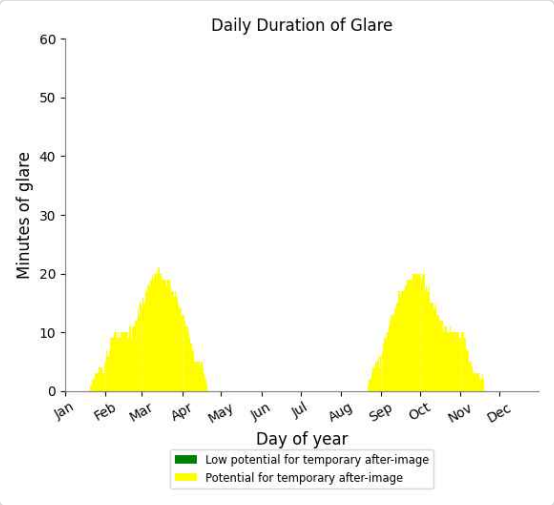
PV array 12 and Route 2

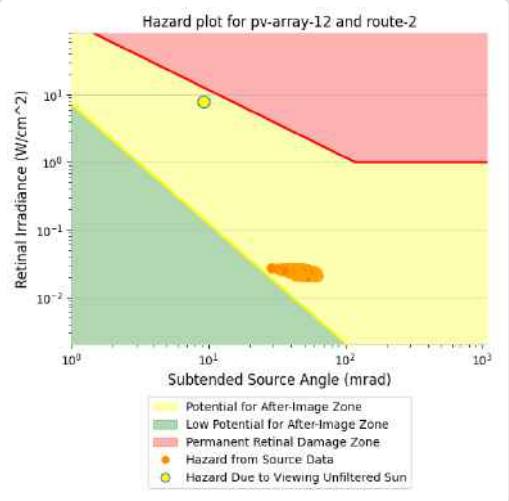
Receptor type: Route

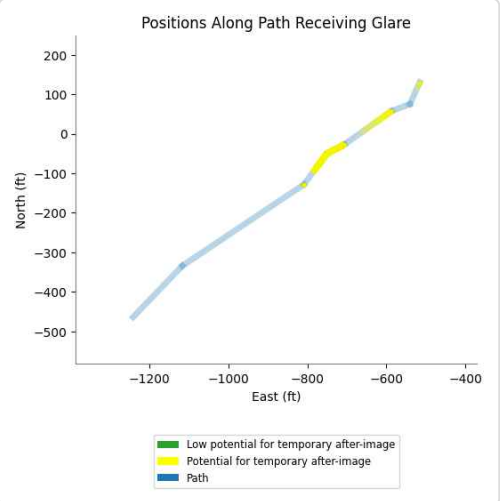
2,005 minutes of yellow glare

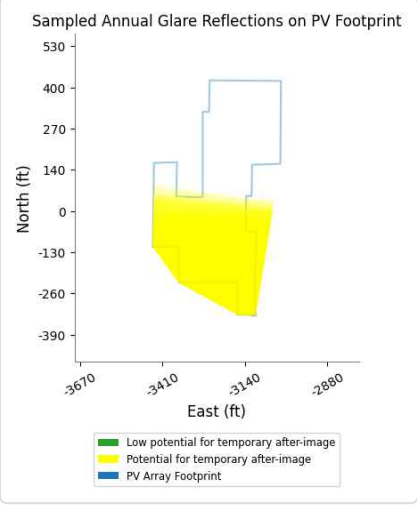
0 minutes of green glare









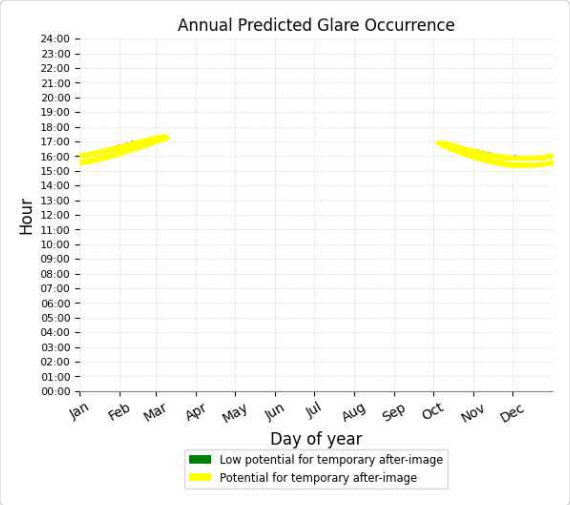


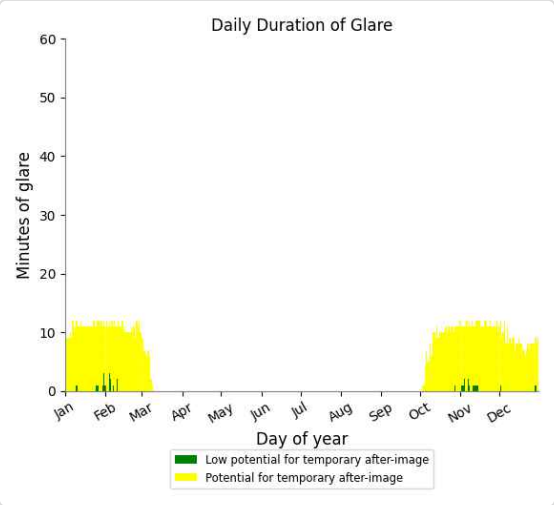
PV array 12 and Route 3

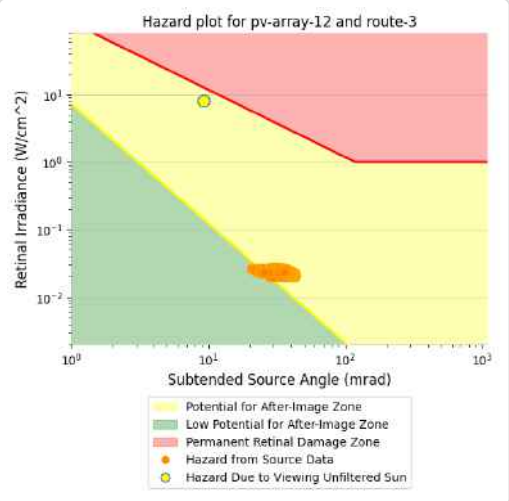
Receptor type: Route

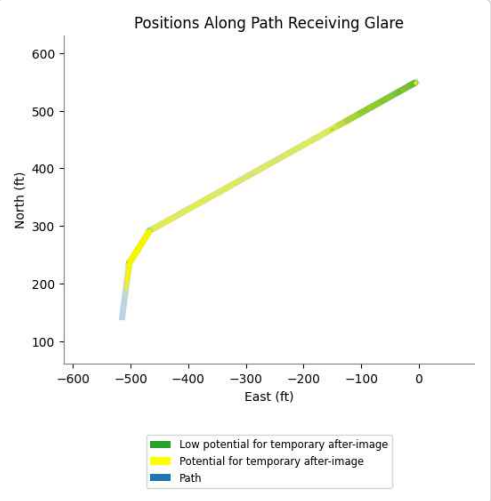
1,526 minutes of yellow glare

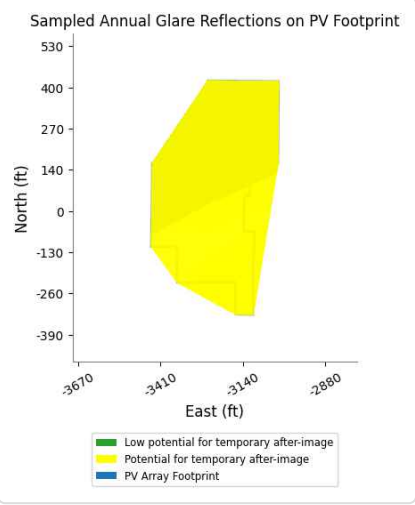
30 minutes of green glare





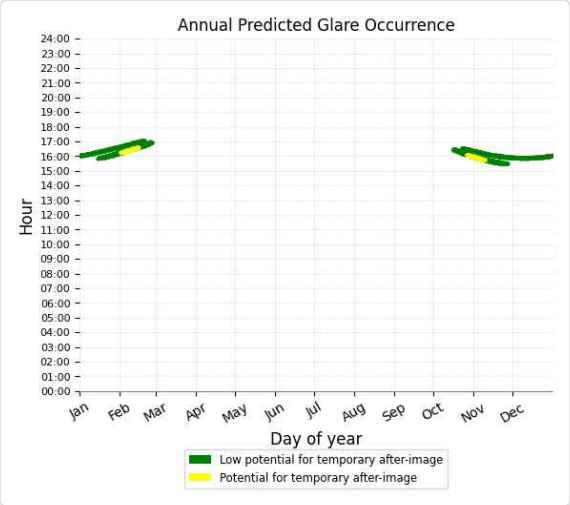


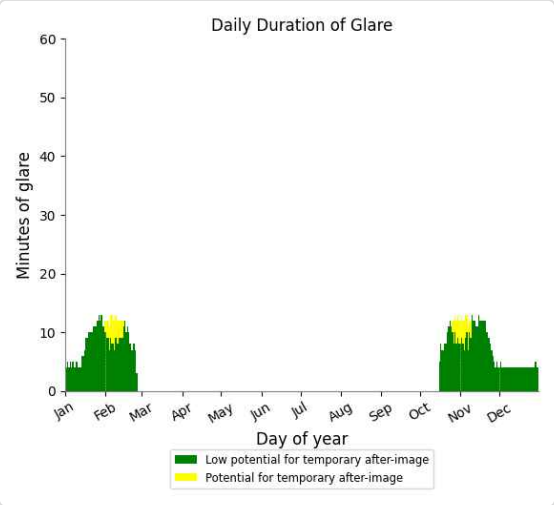


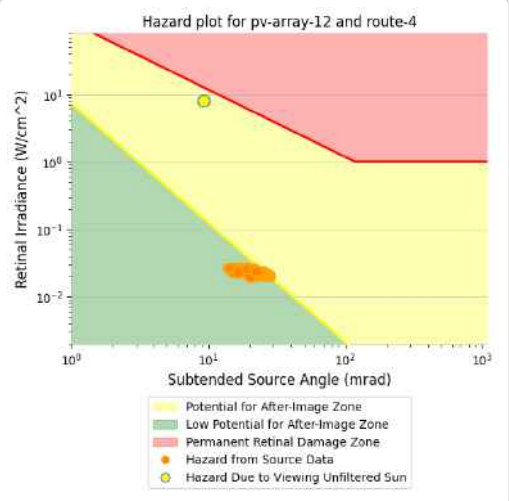


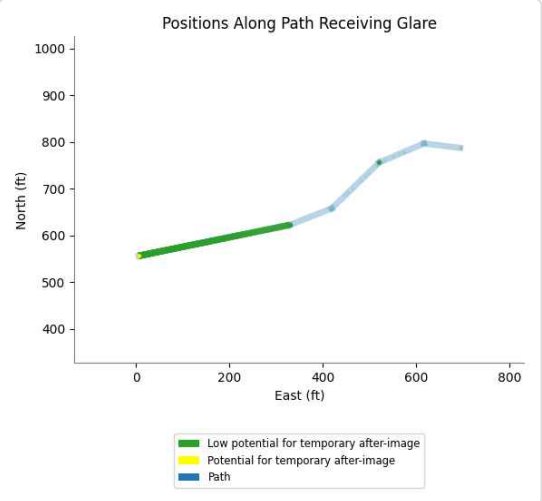
PV array 12 and Route 4

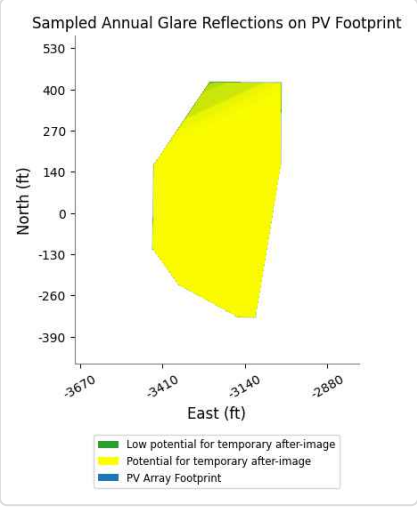
Receptor type: Route
106 minutes of yellow glare
995 minutes of green glare









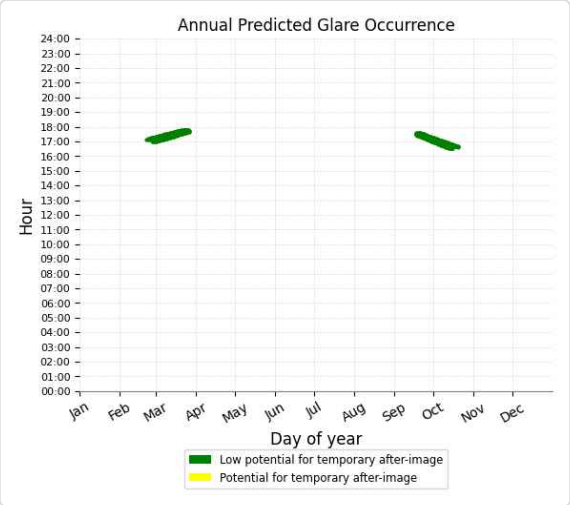


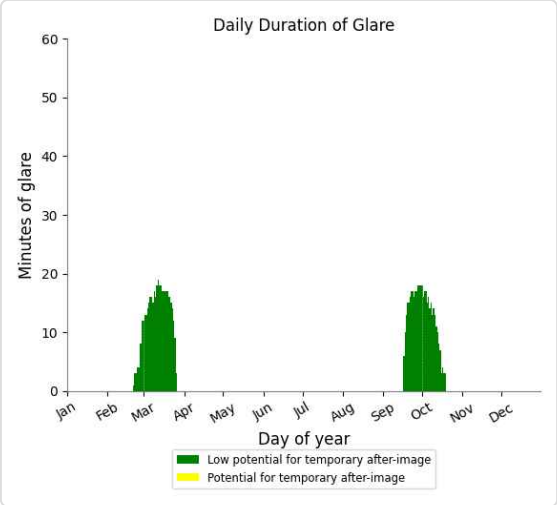
PV array 12 and Route 5

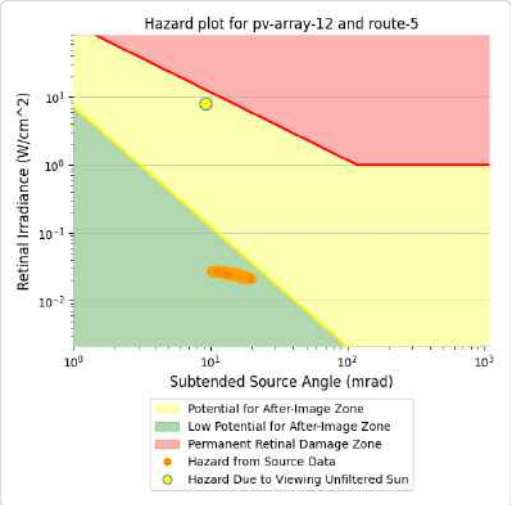
Receptor type: Route

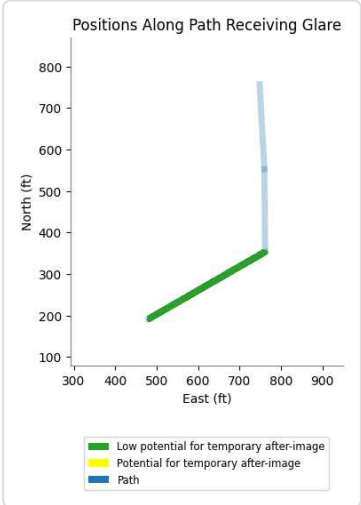
0 minutes of yellow glare

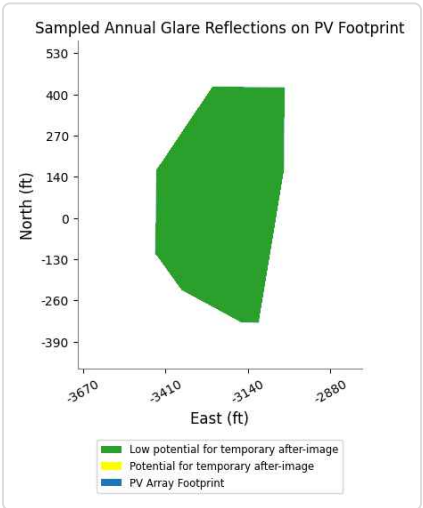
863 minutes of green glare





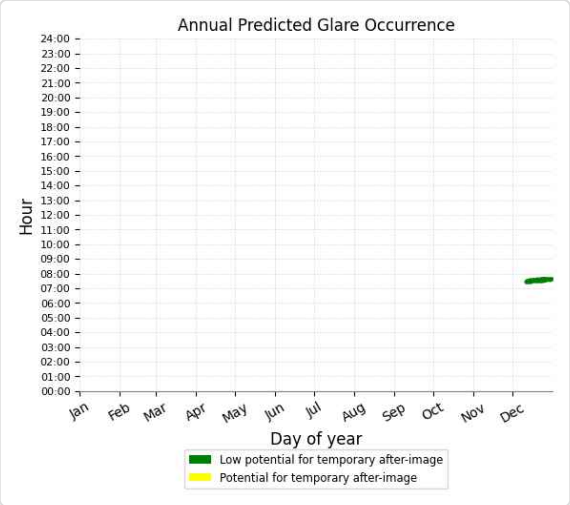


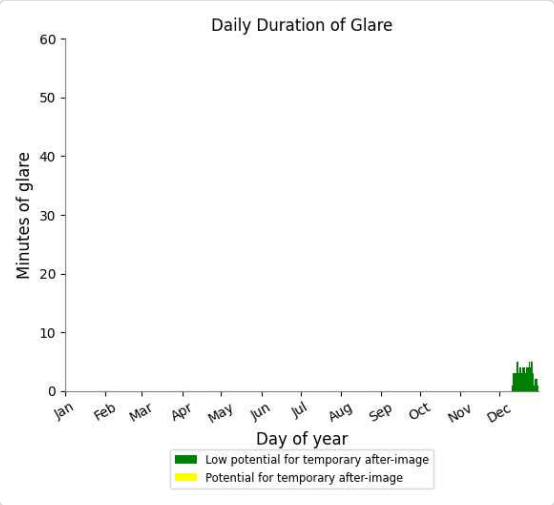


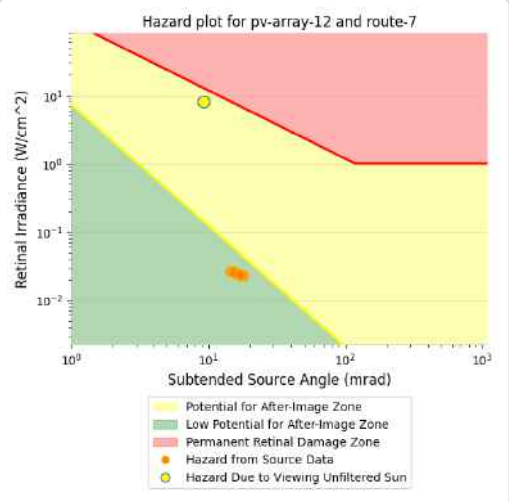


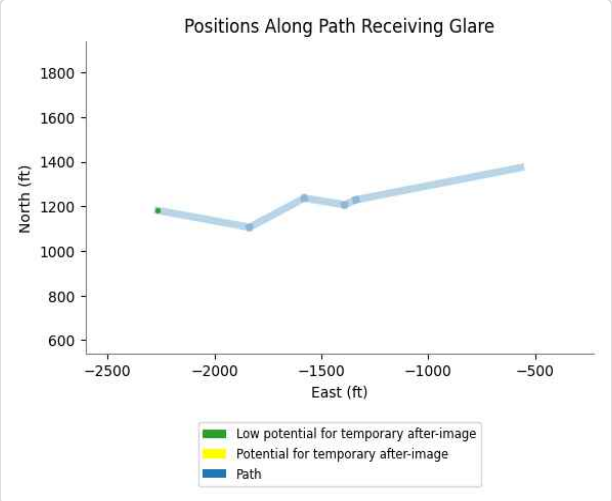
PV array 12 and Route 7

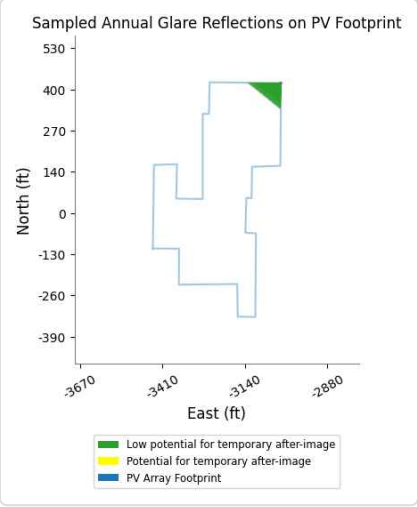
Receptor type: Route
0 minutes of yellow glare
67 minutes of green glare











PV array 12 and Route 1

Receptor type: Route

No glare found

PV array 12 and Route 6

Receptor type: Route

No glare found

PV array 12 and Route 8

Receptor type: Route

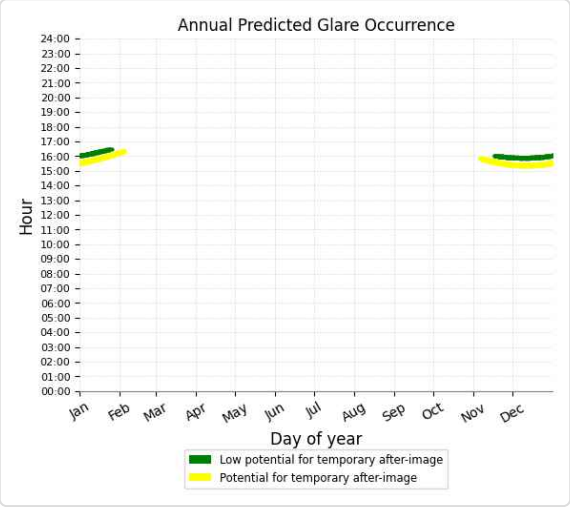
No glare found

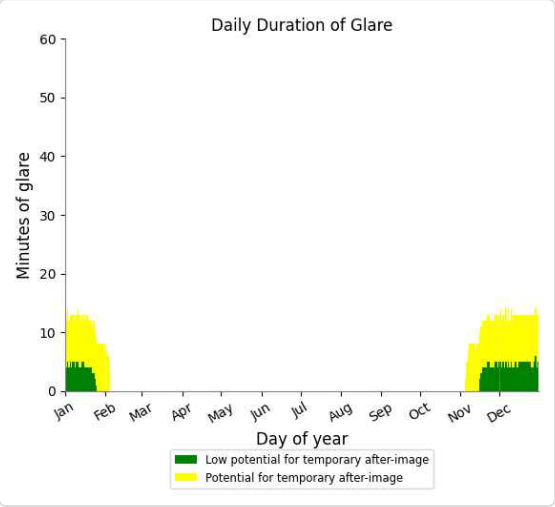
PV array 12 and OP 2

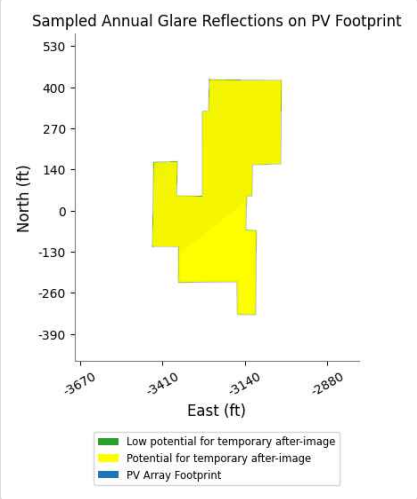
Receptor type: Observation Point

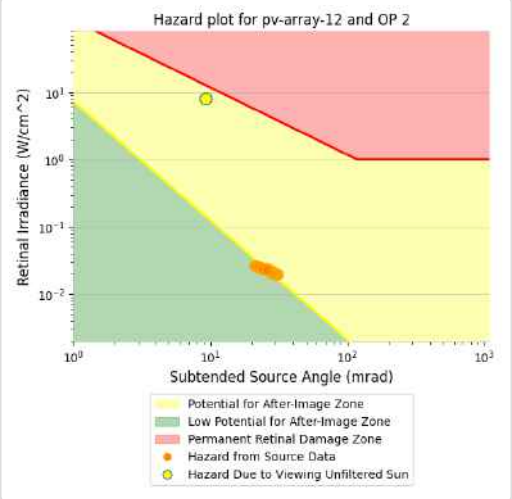
734 minutes of yellow glare

309 minutes of green glare



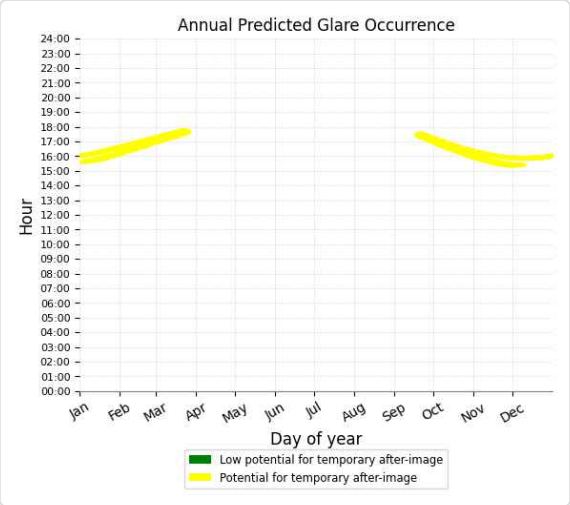


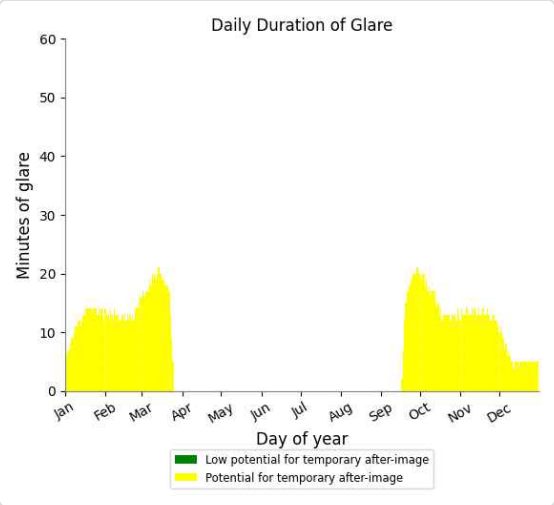


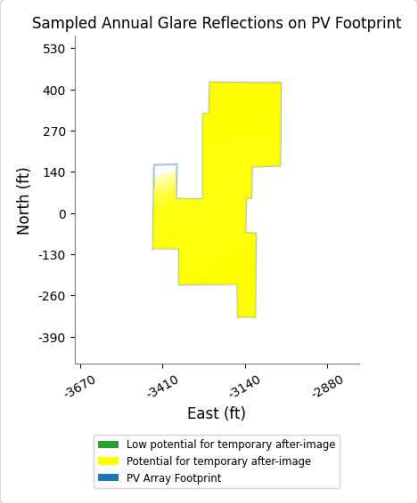


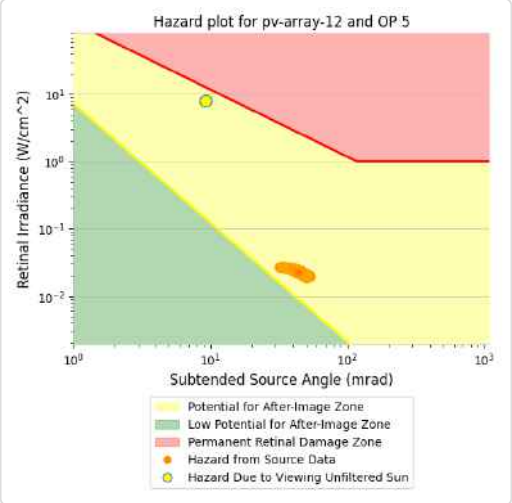
PV array 12 and OP 5

Receptor type: Observation Point
2,426 minutes of yellow glare
0 minutes of green glare



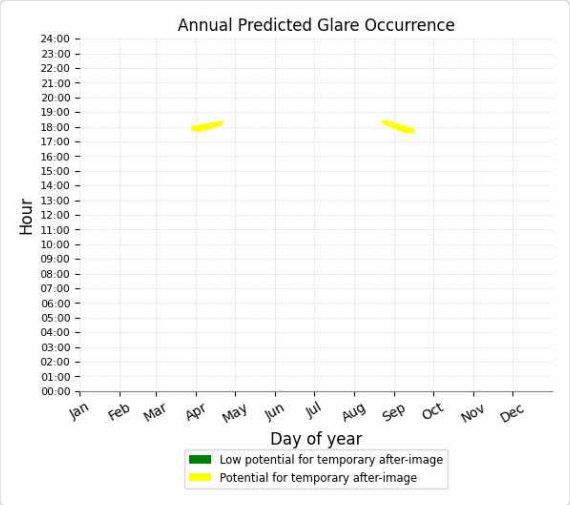


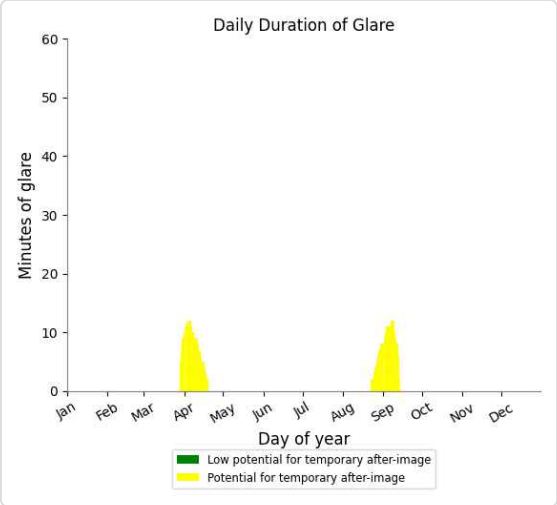


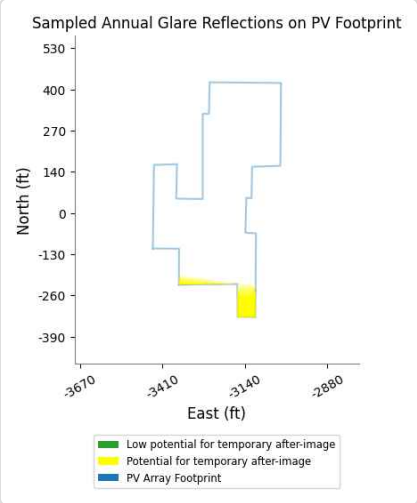


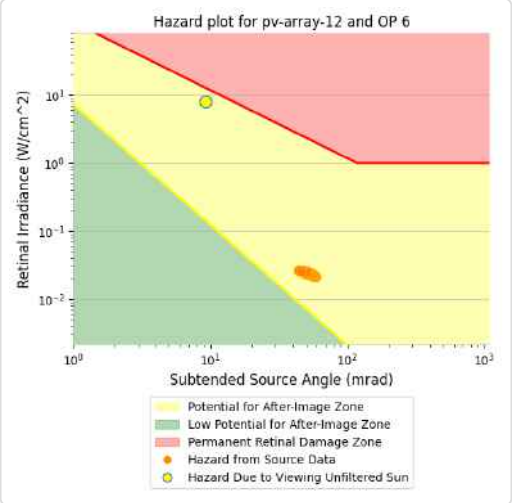
PV array 12 and OP 6

Receptor type: Observation Point
353 minutes of yellow glare
0 minutes of green glare



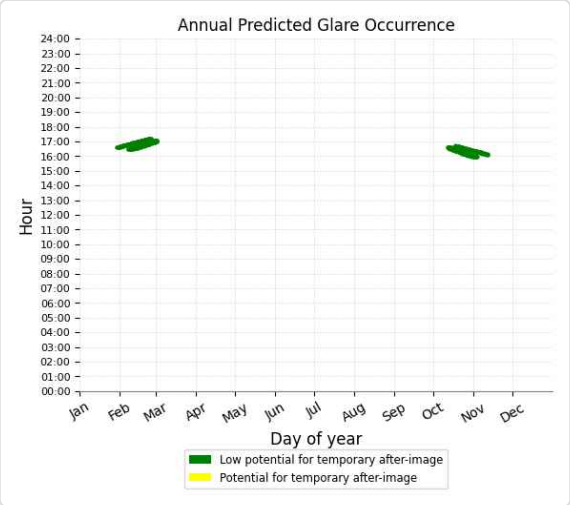


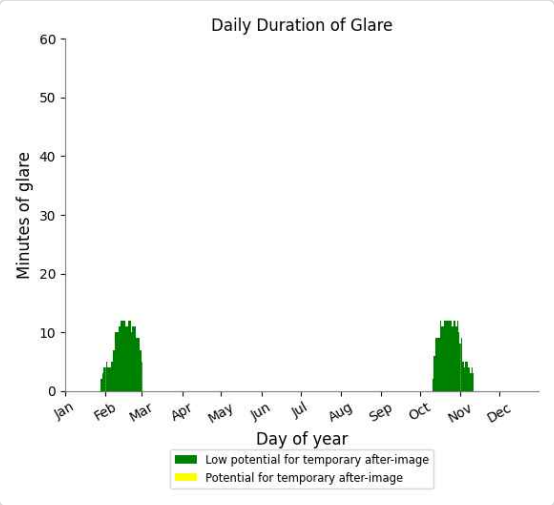


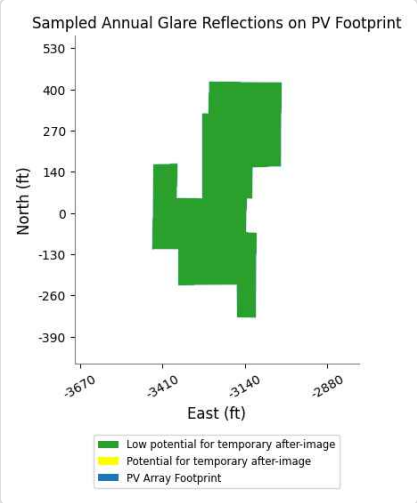


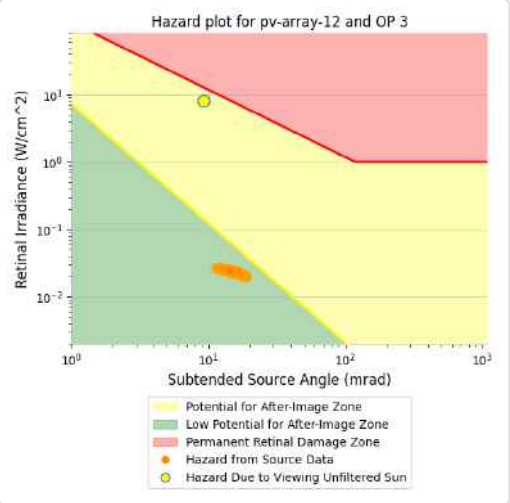
PV array 12 and OP 3

Receptor type: Observation Point
0 minutes of yellow glare
538 minutes of green glare



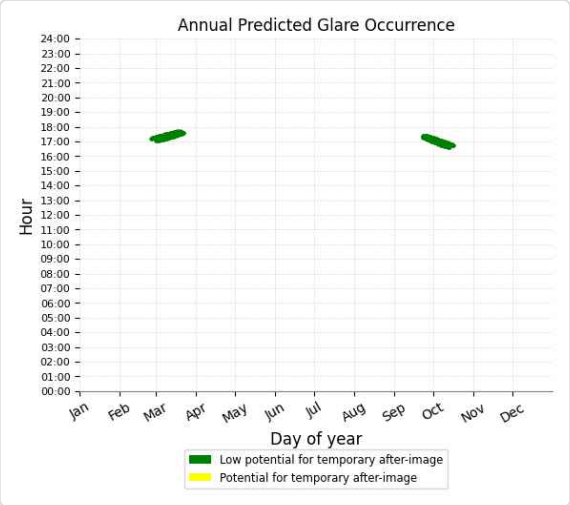


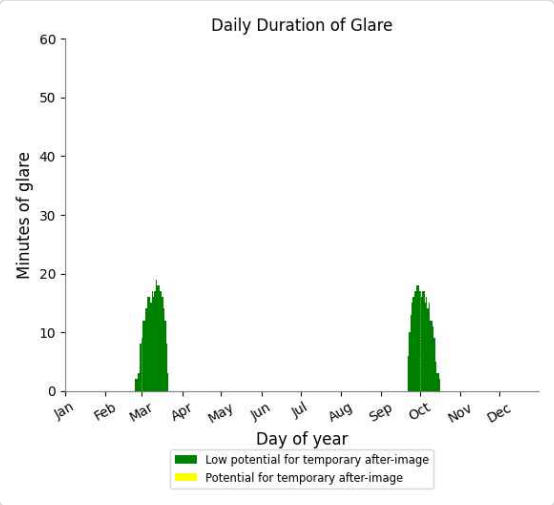


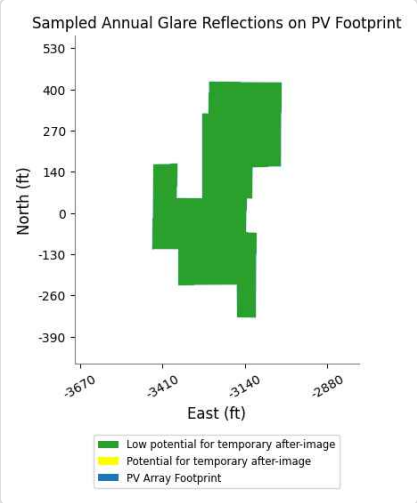


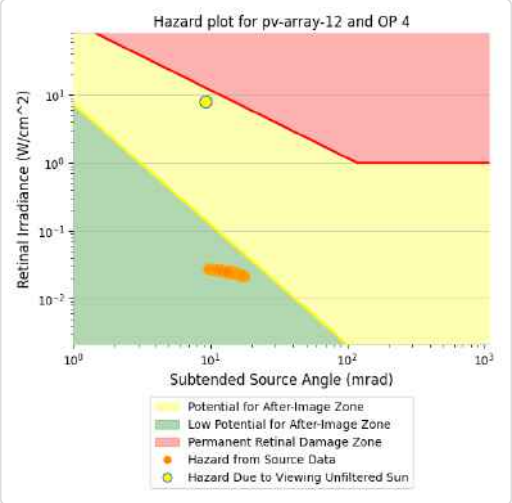
PV array 12 and OP 4

Receptor type: Observation Point
0 minutes of yellow glare
632 minutes of green glare









PV array 12 and OP 1

Receptor type: Observation Point
No glare found

PV: PV array 13 low potential for temporary after-image

Receptor results ordered by category of glare

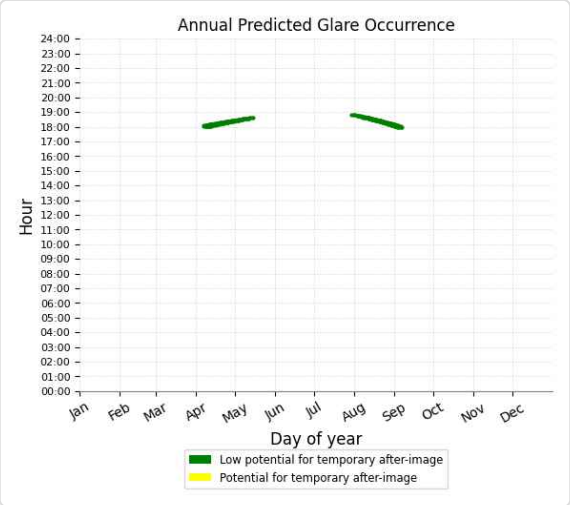
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 2	310	5.2	0	0.0
Route 3	1,189	19.8	0	0.0
Route 4	744	12.4	0	0.0
Route 5	570	9.5	0	0.0
Route 1	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 2	1,176	19.6	0	0.0
OP 3	473	7.9	0	0.0
OP 4	320	5.3	0	0.0
OP 5	622	10.4	0	0.0
OP 1	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

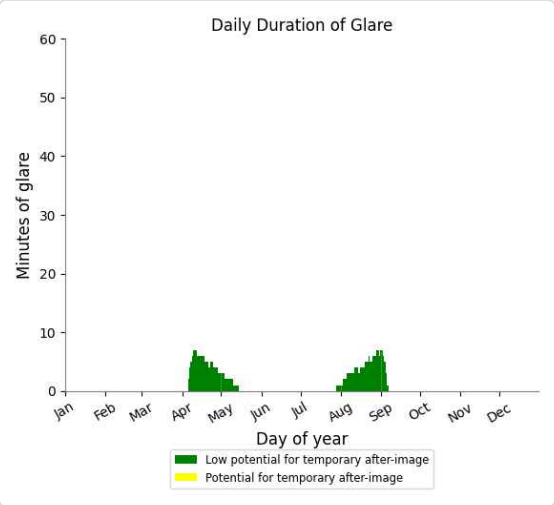
PV array 13 and Route 2

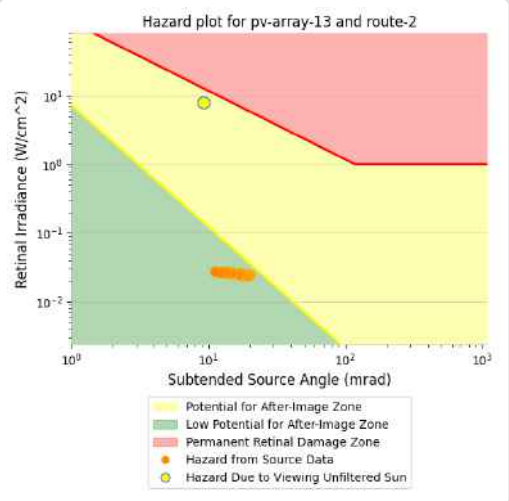
Receptor type: Route

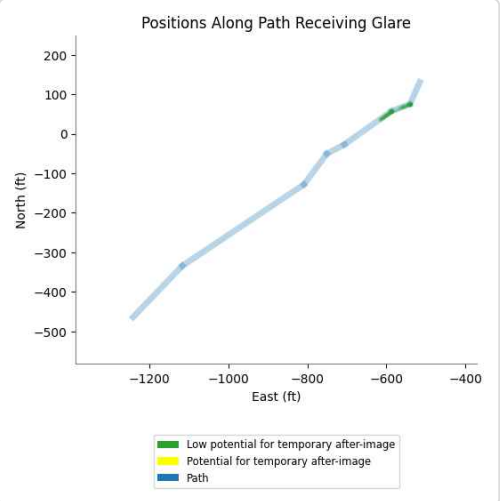
0 minutes of yellow glare

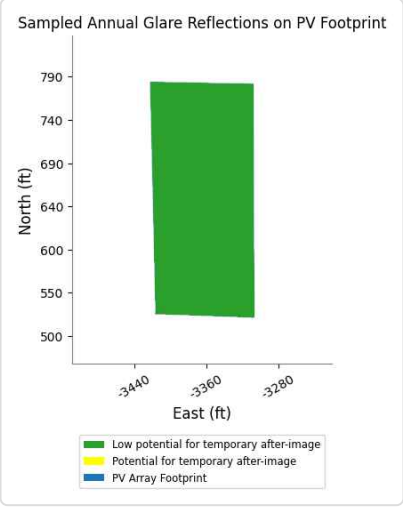
310 minutes of green glare









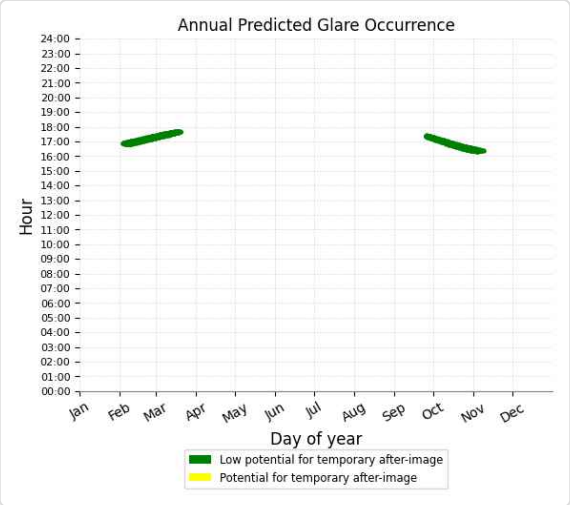


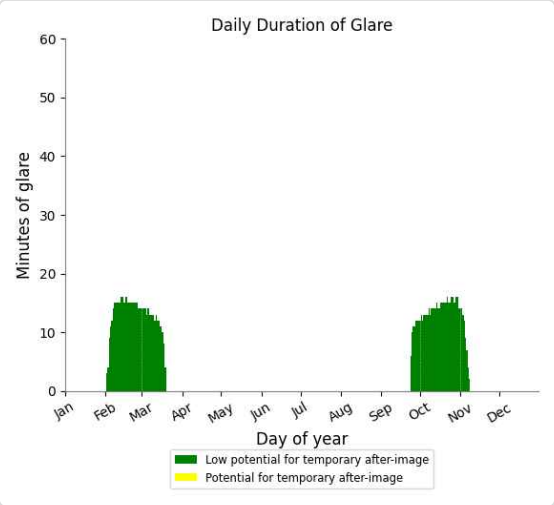
PV array 13 and Route 3

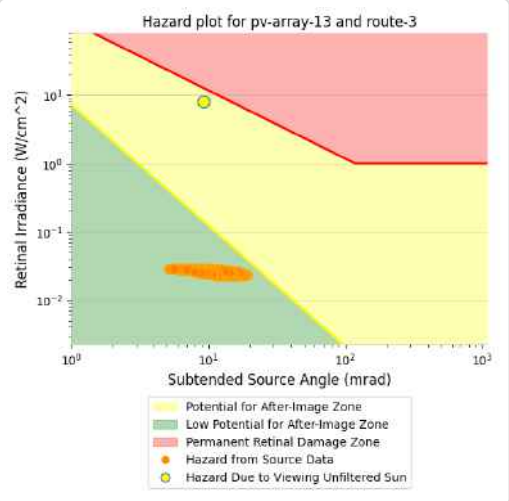
Receptor type: Route

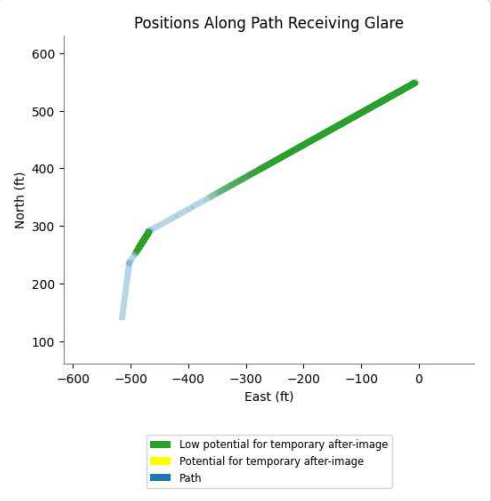
0 minutes of yellow glare

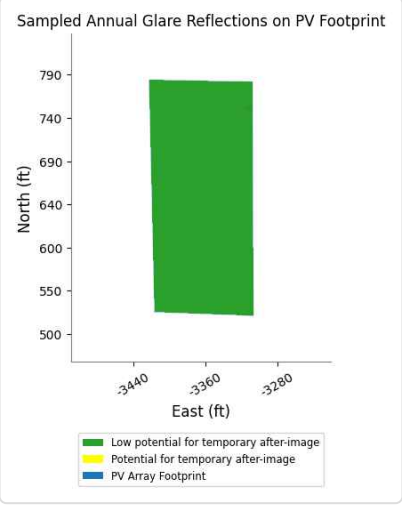
1,189 minutes of green glare









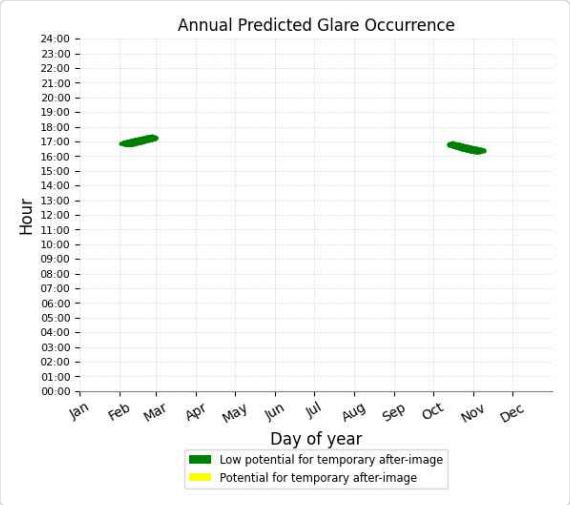


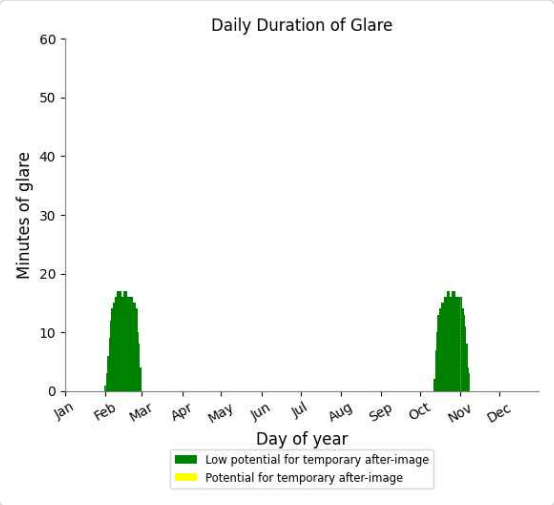
PV array 13 and Route 4

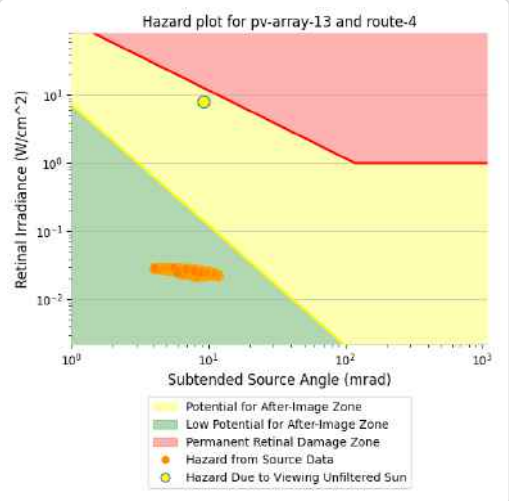
Receptor type: Route

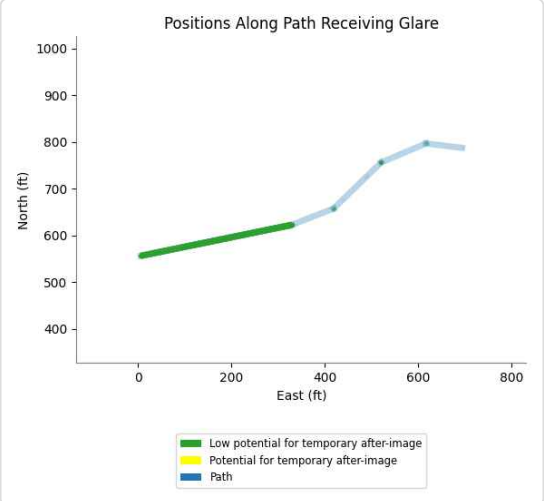
0 minutes of yellow glare

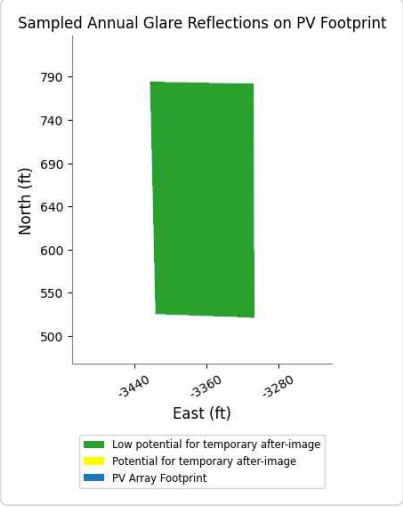
744 minutes of green glare









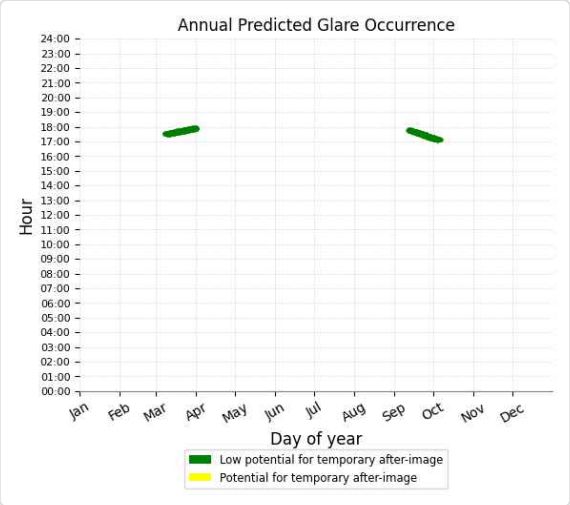


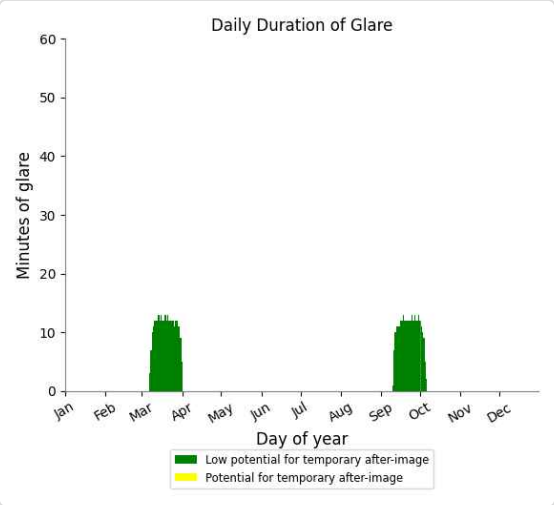
PV array 13 and Route 5

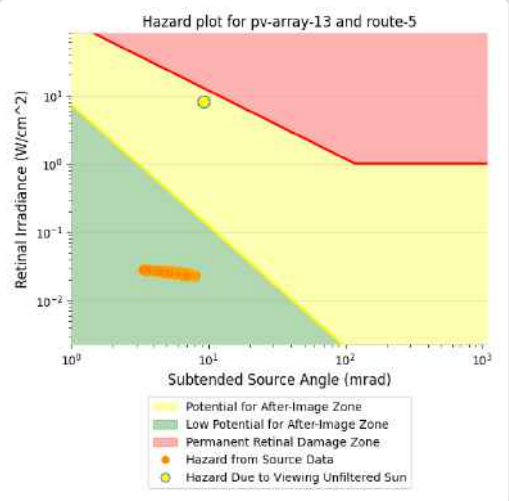
Receptor type: Route

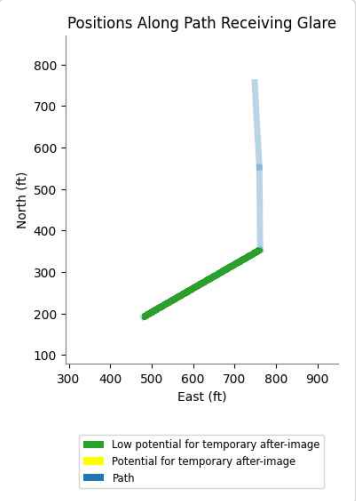
0 minutes of yellow glare

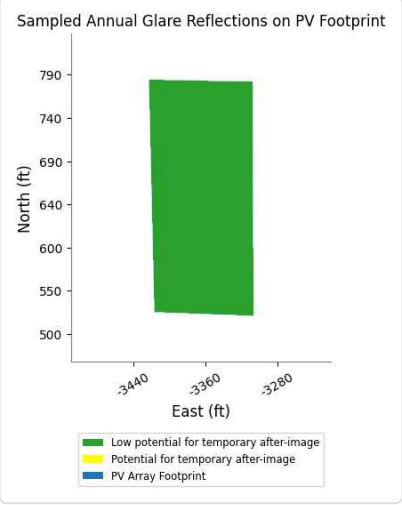
570 minutes of green glare











PV array 13 and Route 1

Receptor type: Route

No glare found

PV array 13 and Route 6

Receptor type: Route

No glare found

PV array 13 and Route 7

Receptor type: Route

No glare found

PV array 13 and Route 8

Receptor type: Route

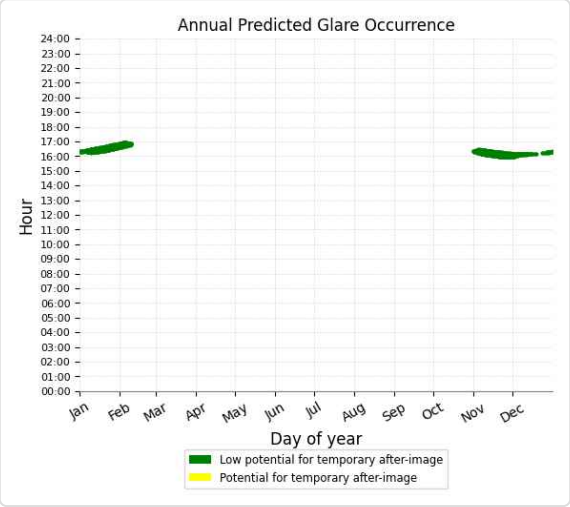
No glare found

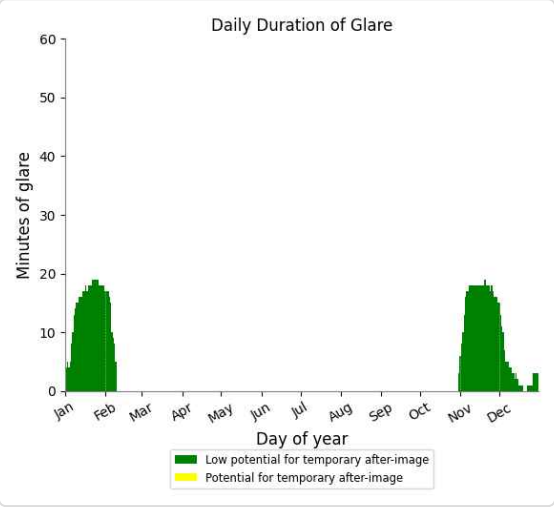
PV array 13 and OP 2

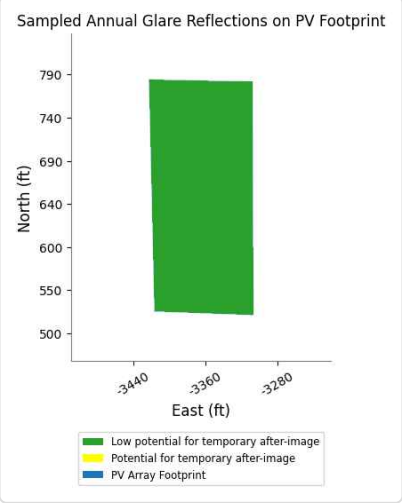
Receptor type: Observation Point

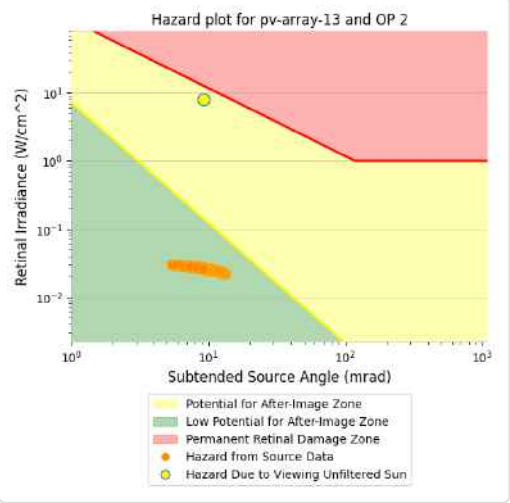
0 minutes of yellow glare

1,176 minutes of green glare



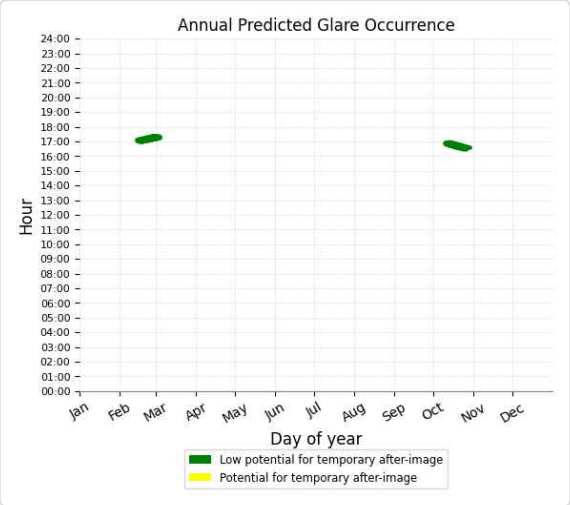


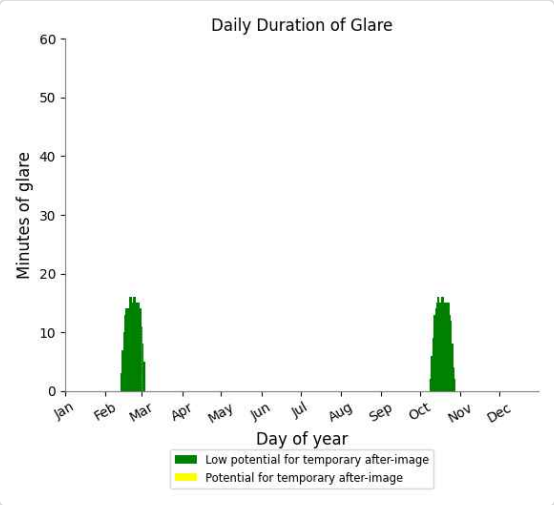


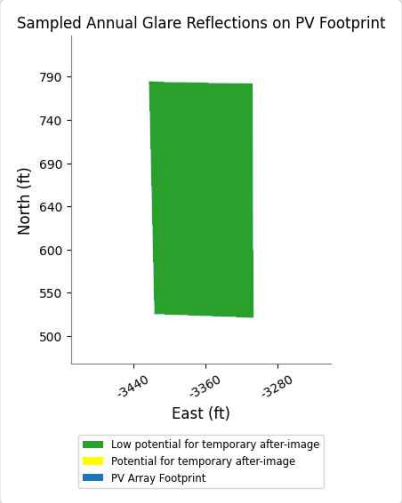


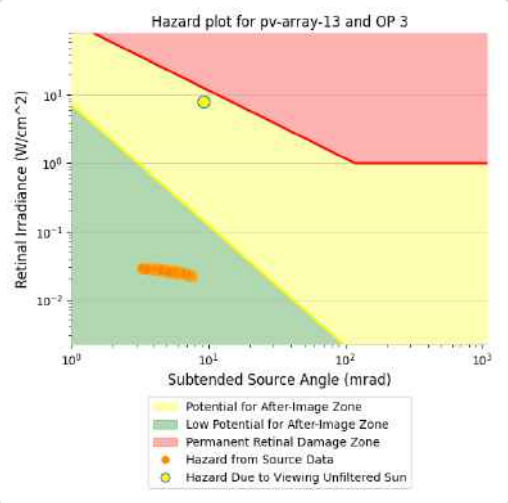
PV array 13 and OP 3

Receptor type: Observation Point
0 minutes of yellow glare
473 minutes of green glare



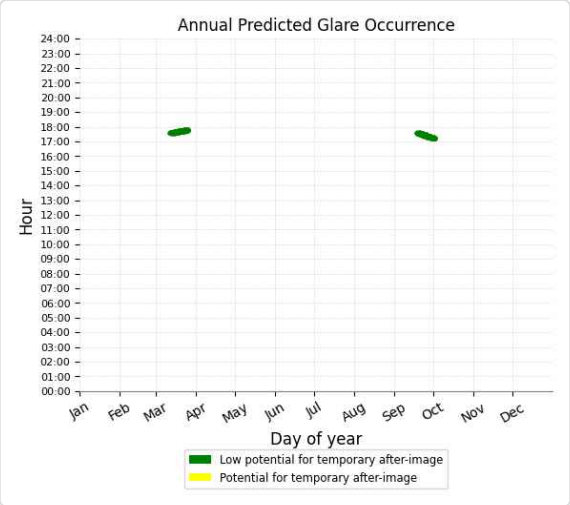


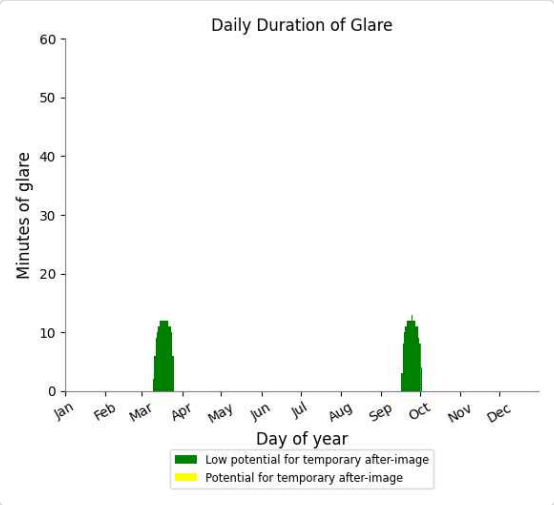


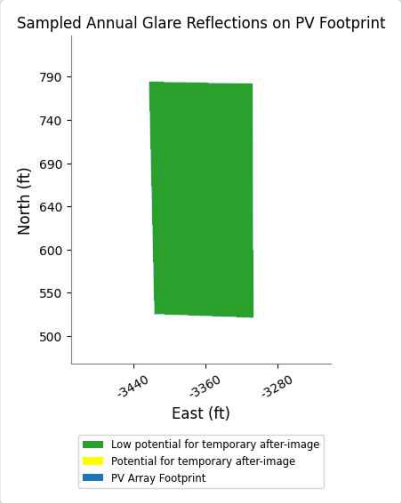


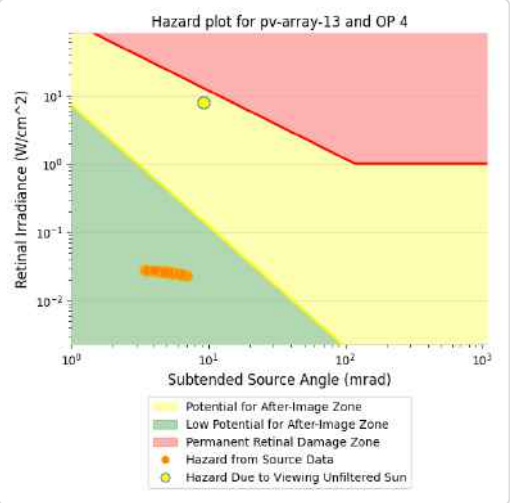
PV array 13 and OP 4

Receptor type: Observation Point
0 minutes of yellow glare
320 minutes of green glare



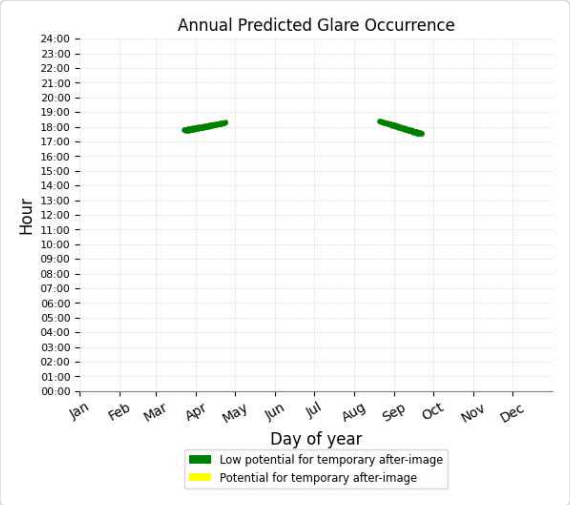


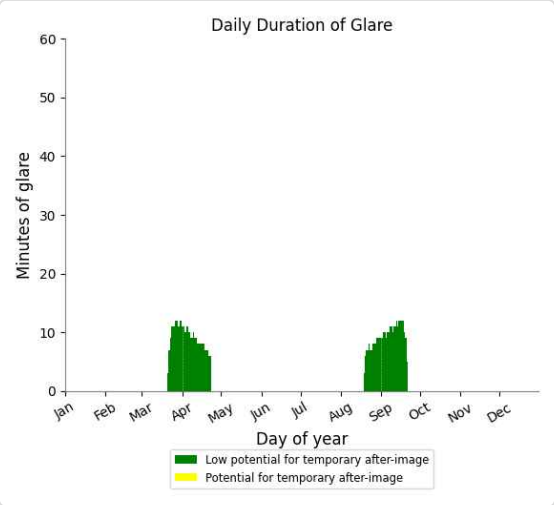


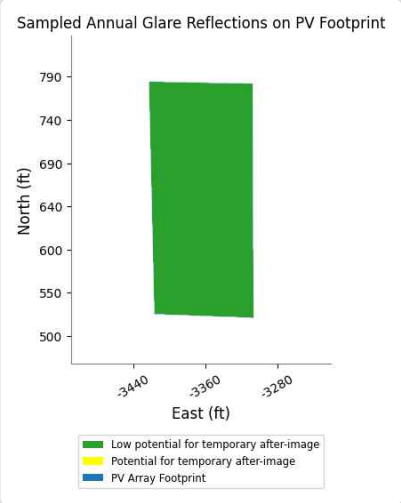


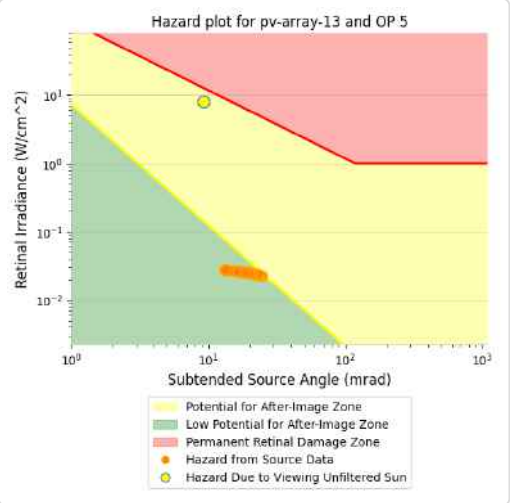
PV array 13 and OP 5

Receptor type: Observation Point
0 minutes of yellow glare
622 minutes of green glare









PV array 13 and OP 1

Receptor type: Observation Point
No glare found

PV array 13 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 14 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

PV array 14 and Route 1

Receptor type: Route
No glare found

PV array 14 and Route 2

Receptor type: Route
No glare found

PV array 14 and Route 3

Receptor type: Route
No glare found

PV array 14 and Route 4

Receptor type: Route
No glare found

PV array 14 and Route 5

Receptor type: Route
No glare found

PV array 14 and Route 6

Receptor type: Route
No glare found

PV array 14 and Route 7

Receptor type: Route
No glare found

PV array 14 and Route 8

Receptor type: Route
No glare found

PV array 14 and OP 1

Receptor type: Observation Point
No glare found

PV array 14 and OP 2

Receptor type: Observation Point
No glare found

PV array 14 and OP 3

Receptor type: Observation Point
No glare found

PV array 14 and OP 4

Receptor type: Observation Point
No glare found

PV array 14 and OP 5

Receptor type: Observation Point
No glare found

PV array 14 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 15 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

PV array 15 and Route 1

Receptor type: Route
No glare found

PV array 15 and Route 2

Receptor type: Route
No glare found

PV array 15 and Route 3

Receptor type: Route
No glare found

PV array 15 and Route 4

Receptor type: Route
No glare found

PV array 15 and Route 5

Receptor type: Route
No glare found

PV array 15 and Route 6

Receptor type: Route
No glare found

PV array 15 and Route 7

Receptor type: Route
No glare found

PV array 15 and Route 8

Receptor type: Route
No glare found

PV array 15 and OP 1

Receptor type: Observation Point
No glare found

PV array 15 and OP 2

Receptor type: Observation Point
No glare found

PV array 15 and OP 3

Receptor type: Observation Point
No glare found

PV array 15 and OP 4

Receptor type: Observation Point
No glare found

PV array 15 and OP 5

Receptor type: Observation Point
No glare found

PV array 15 and OP 6

Receptor type: Observation Point
No glare found

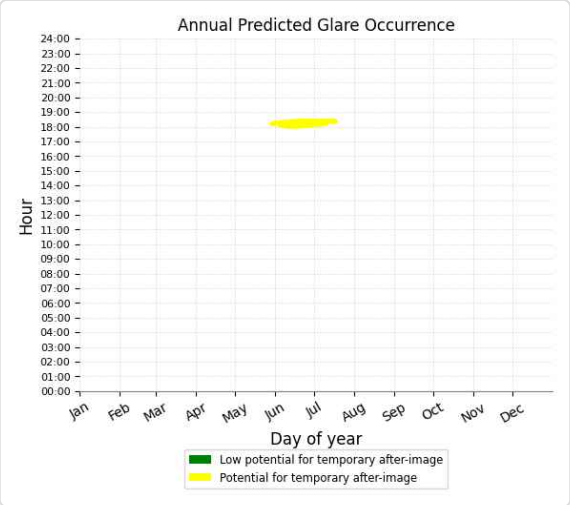
PV: PV array 2 potential temporary after-image

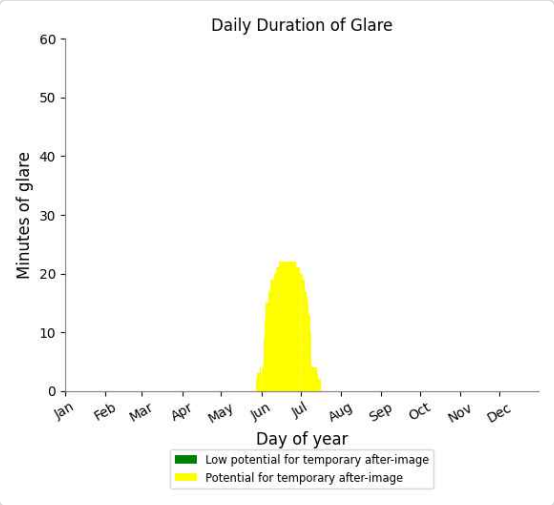
Receptor results ordered by category of glare

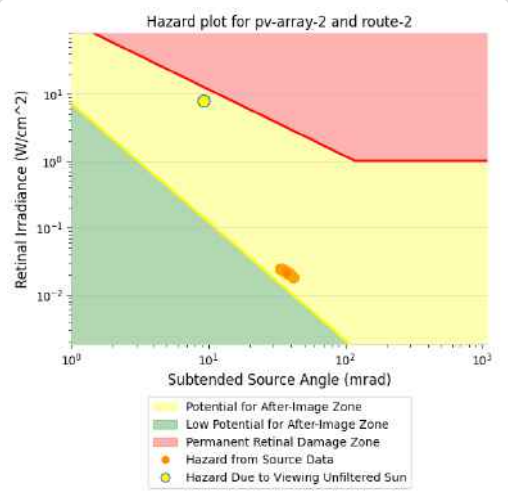
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 2	0	0.0	747	12.4
Route 3	0	0.0	1,870	31.2
Route 4	3	0.1	2,788	46.5
Route 5	430	7.2	1,248	20.8
Route 6	0	0.0	292	4.9
Route 7	0	0.0	3,148	52.5
Route 8	0	0.0	281	4.7
Route 1	0	0.0	0	0.0
OP 2	0	0.0	2,628	43.8
OP 3	125	2.1	500	8.3
OP 4	542	9.0	1,986	33.1
OP 5	0	0.0	1,240	20.7
OP 1	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

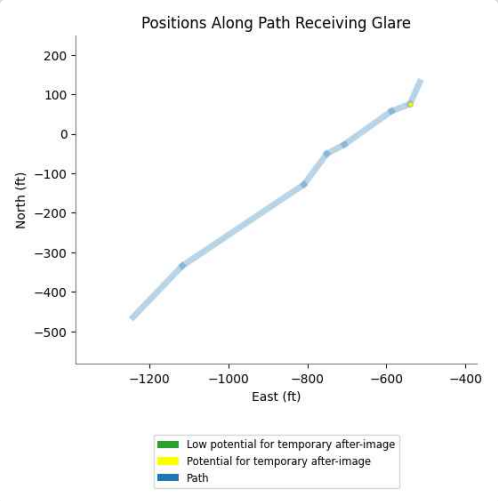
PV array 2 and Route 2

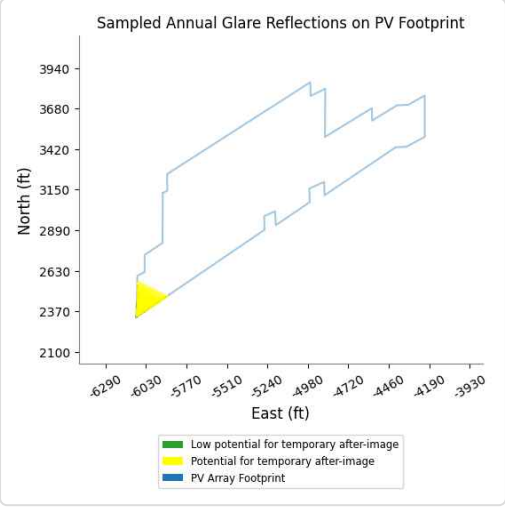
Receptor type: Route
747 minutes of yellow glare
0 minutes of green glare









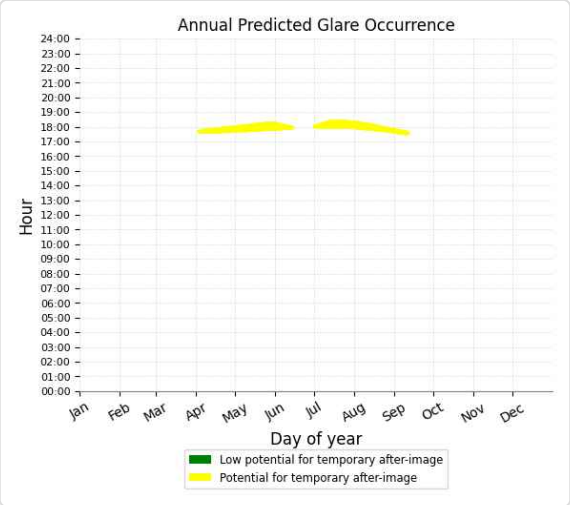


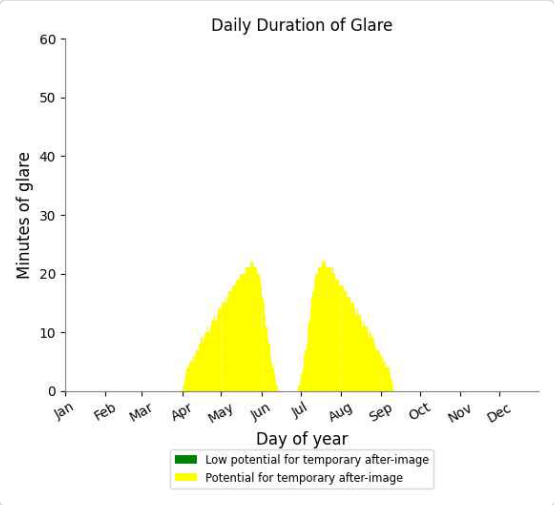
PV array 2 and Route 3

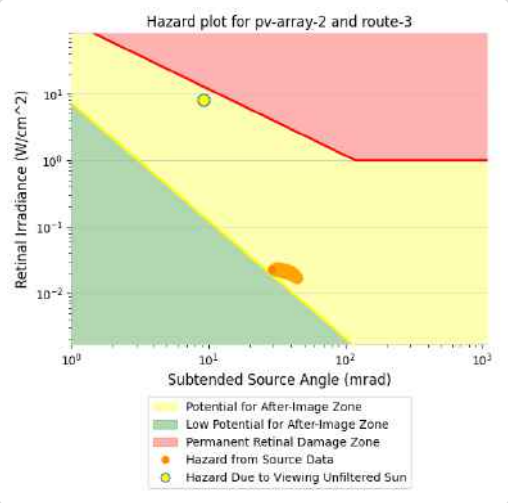
Receptor type: Route

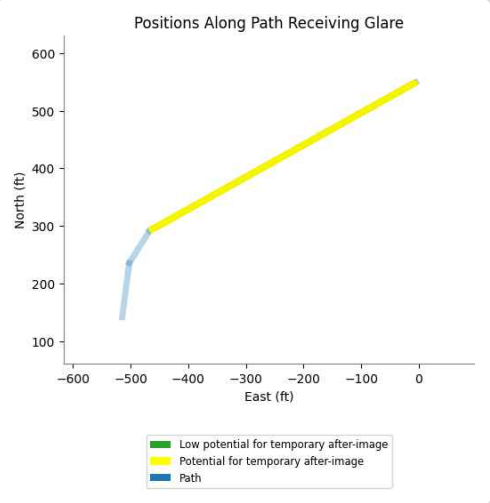
1,870 minutes of yellow glare

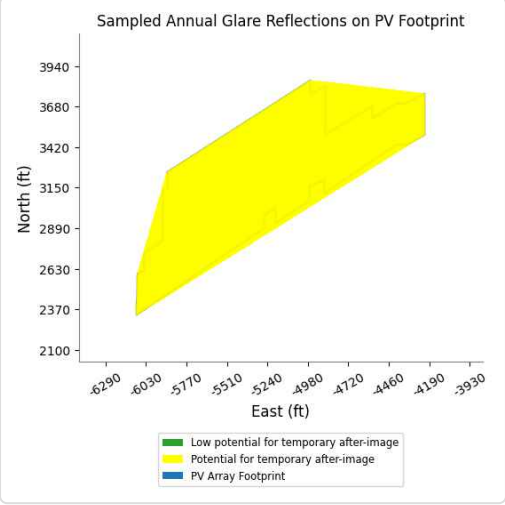
0 minutes of green glare









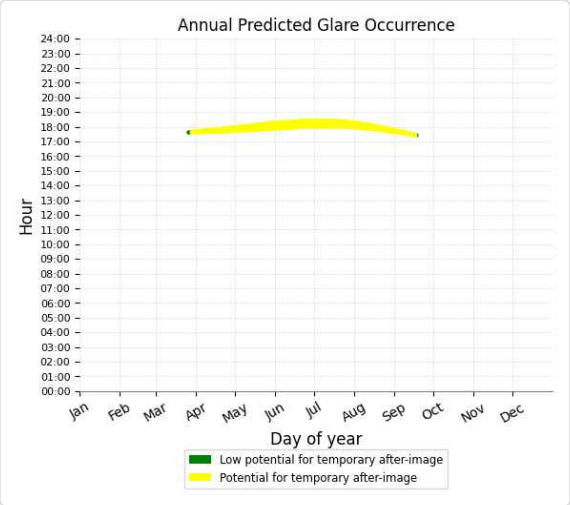


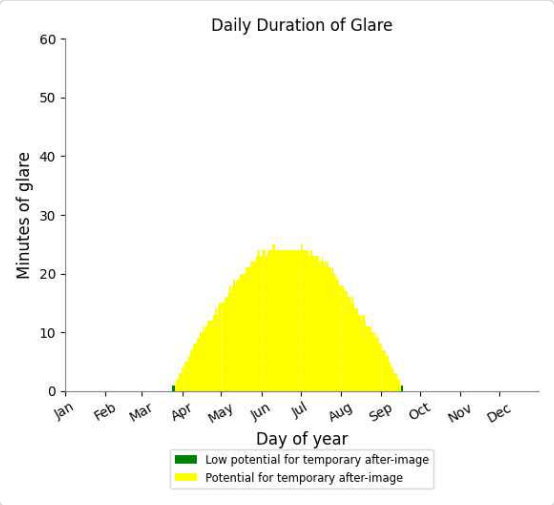
PV array 2 and Route 4

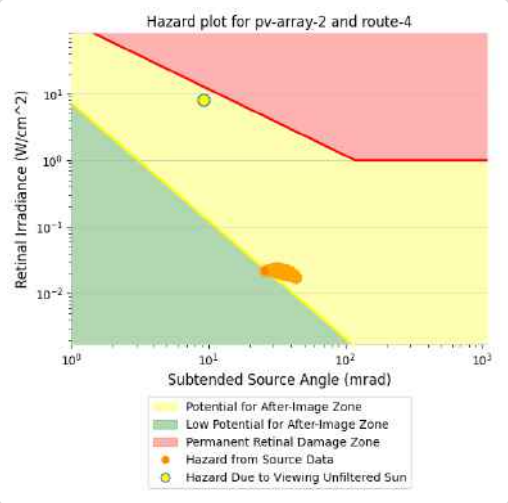
Receptor type: Route

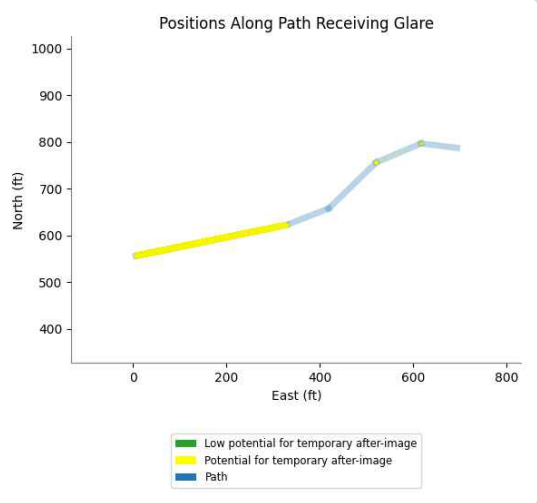
2,788 minutes of yellow glare

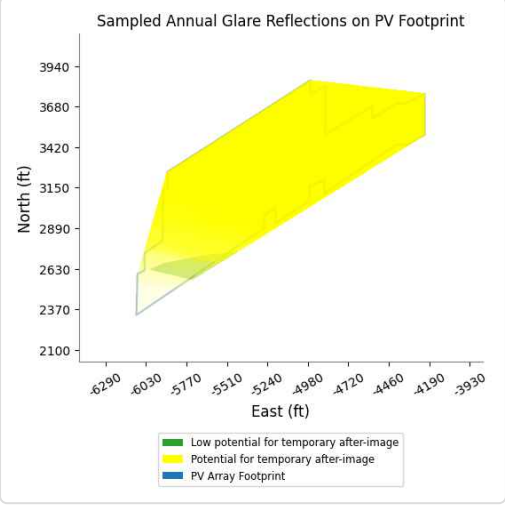
3 minutes of green glare









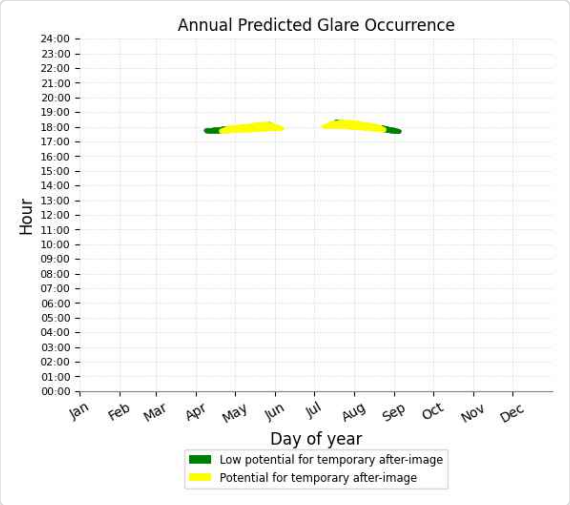


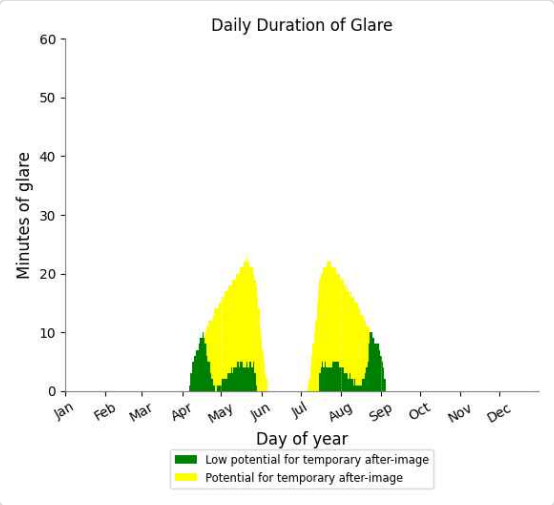
PV array 2 and Route 5

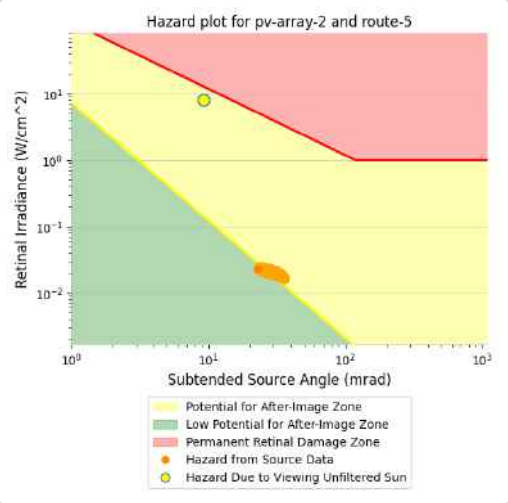
Receptor type: Route

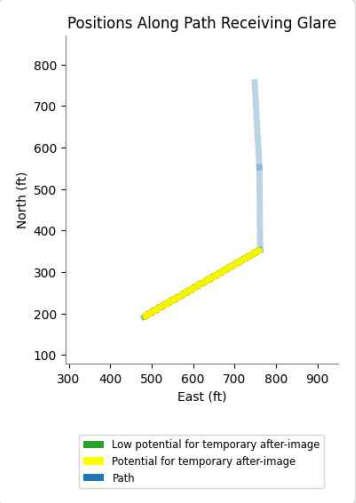
1,248 minutes of yellow glare

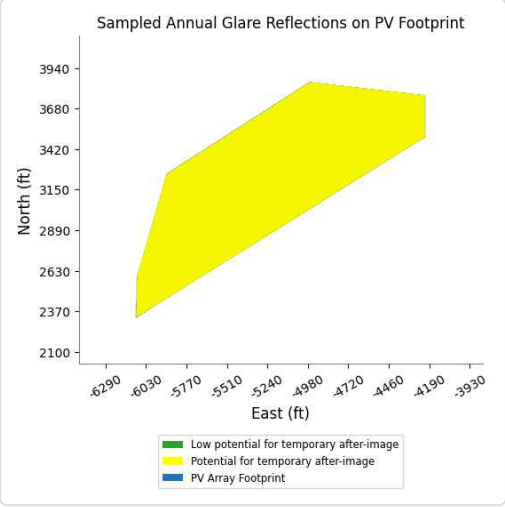
430 minutes of green glare





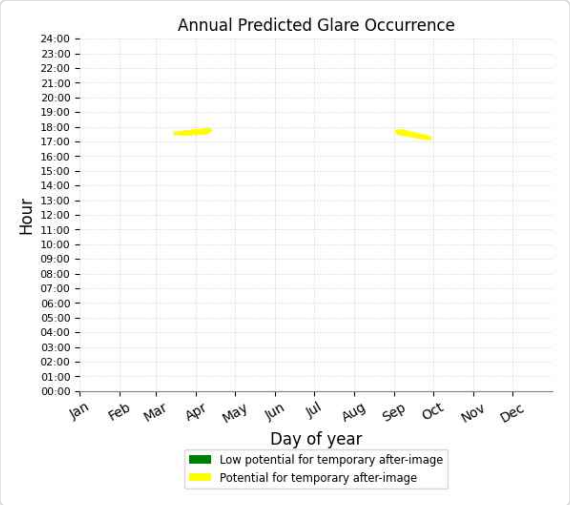


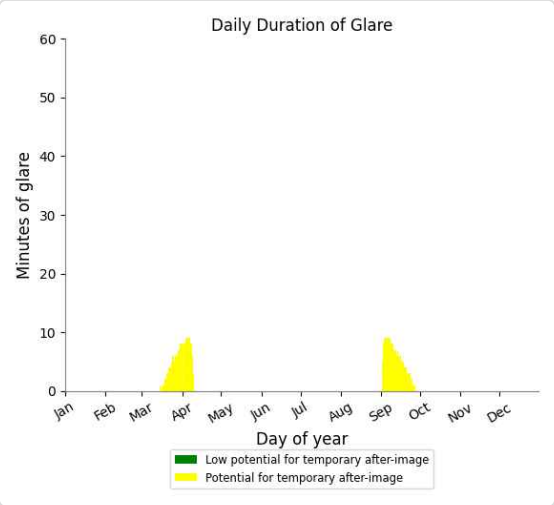


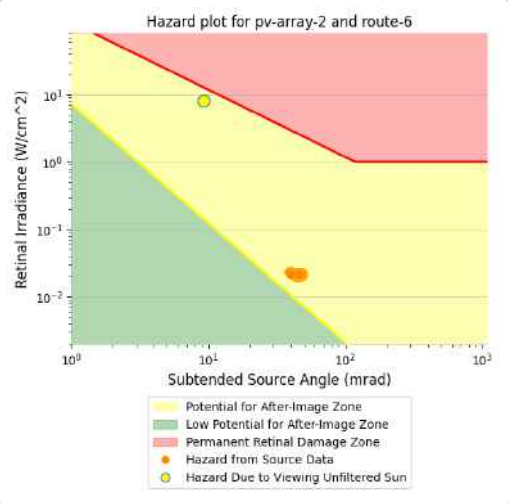


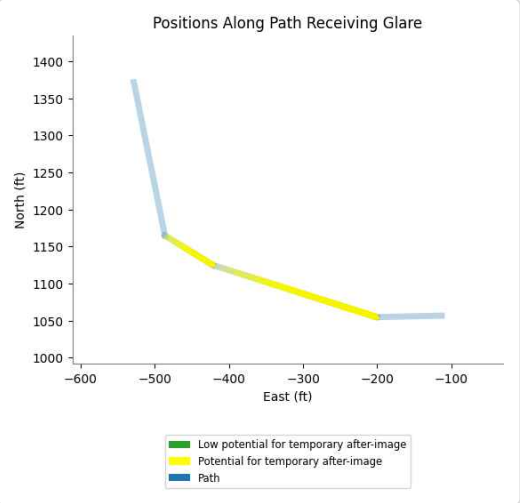
PV array 2 and Route 6

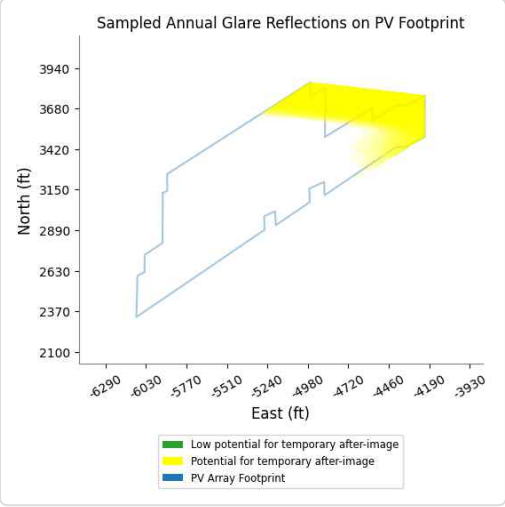
Receptor type: Route
292 minutes of yellow glare
0 minutes of green glare









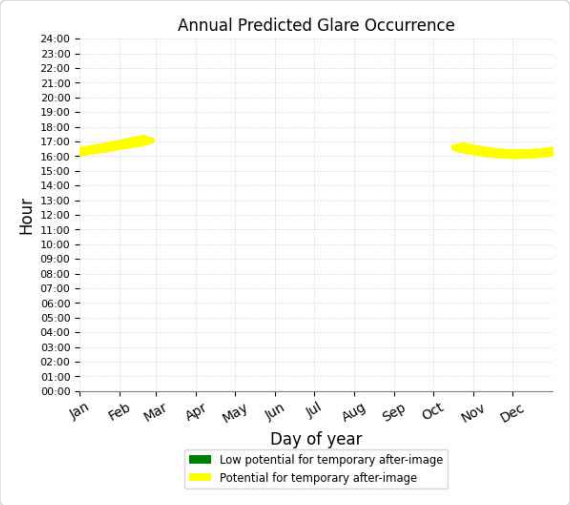


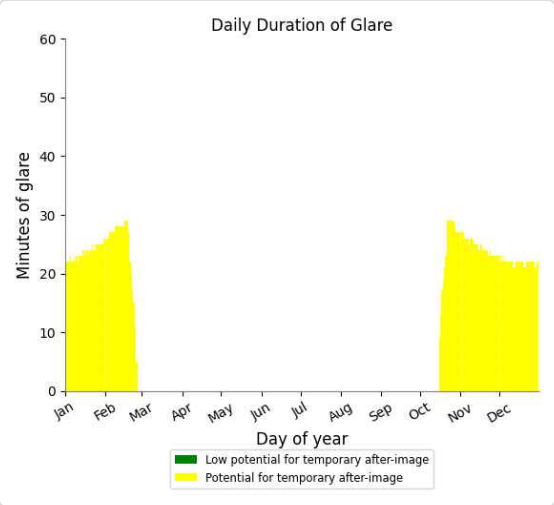
PV array 2 and Route 7

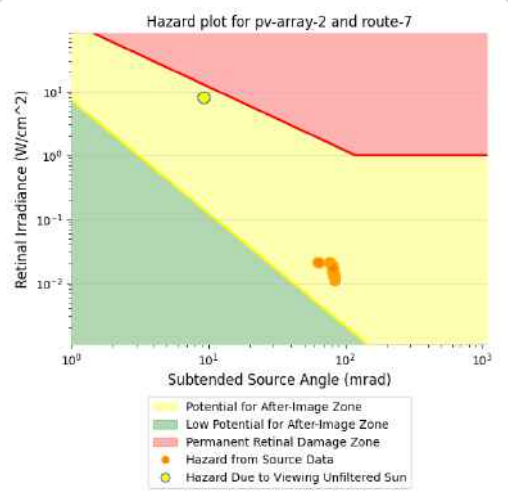
Receptor type: Route

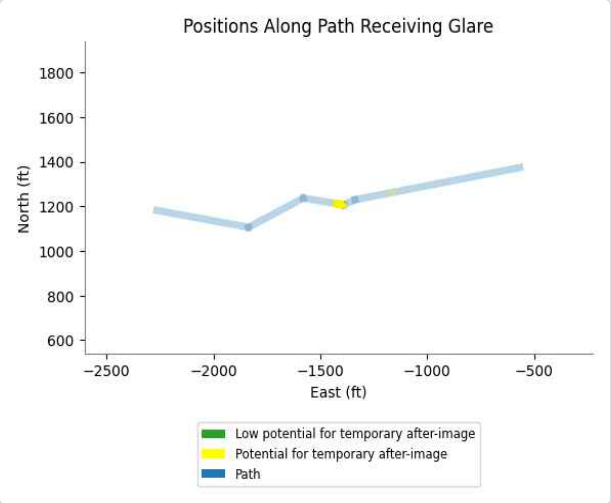
3,148 minutes of yellow glare

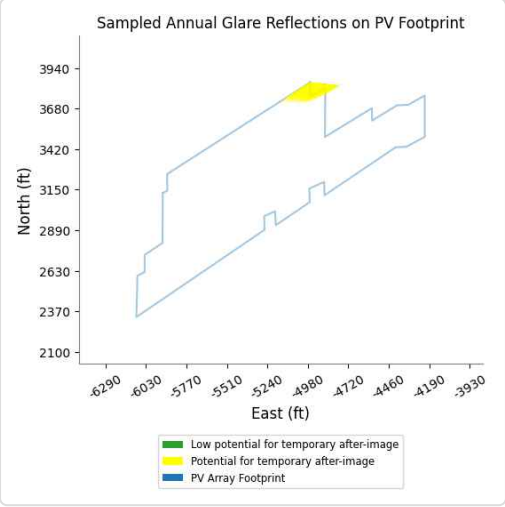
0 minutes of green glare









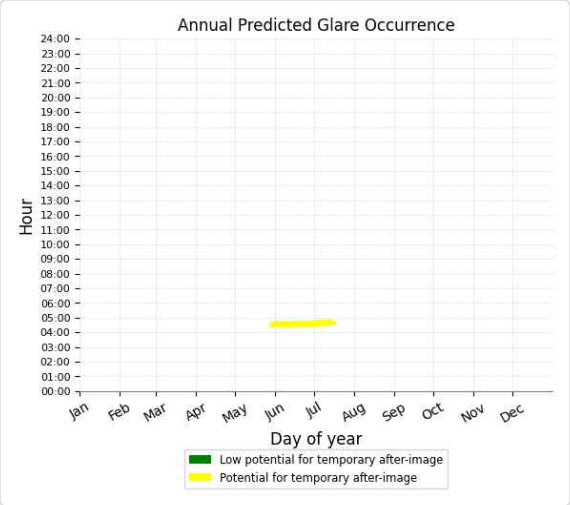


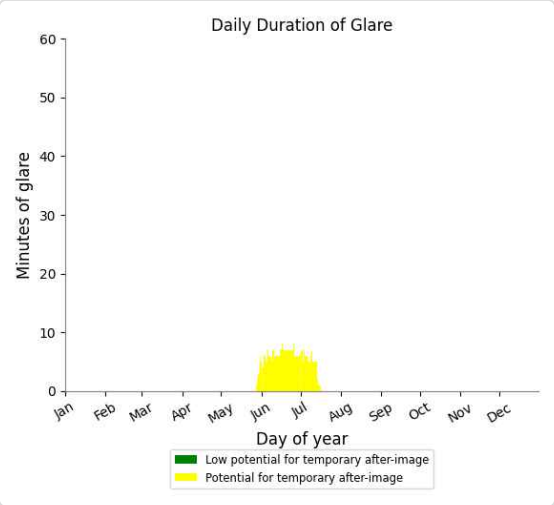
PV array 2 and Route 8

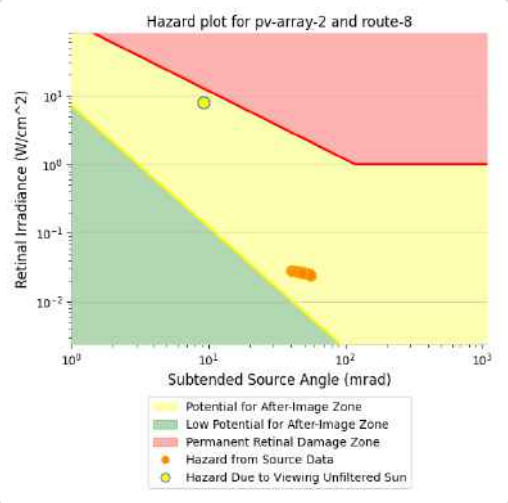
Receptor type: Route

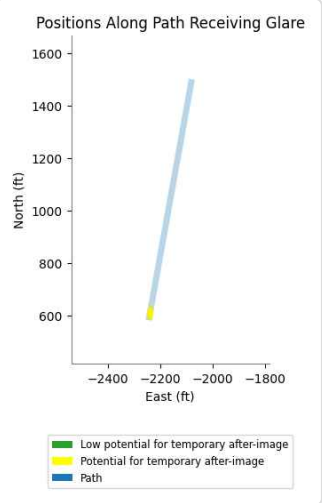
281 minutes of yellow glare

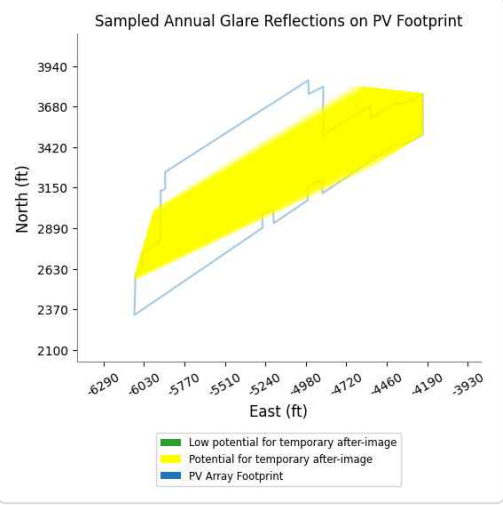
0 minutes of green glare











PV array 2 and Route 1

Receptor type: Route

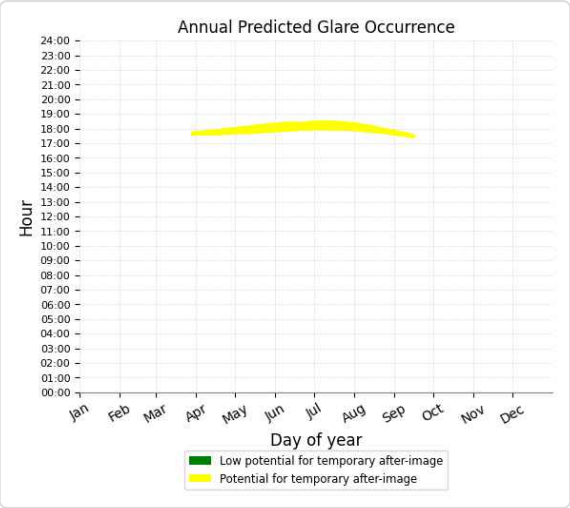
No glare found

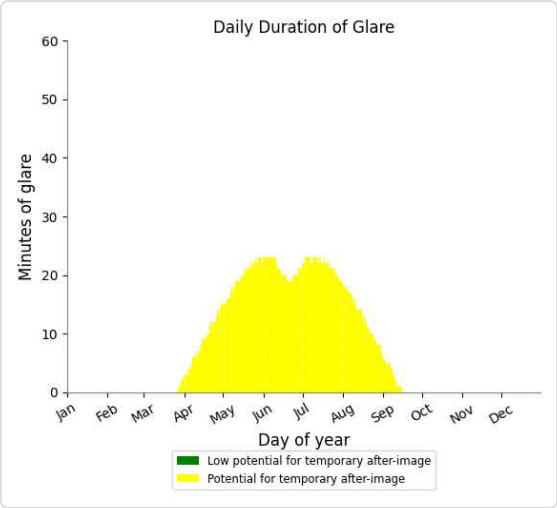
PV array 2 and OP 2

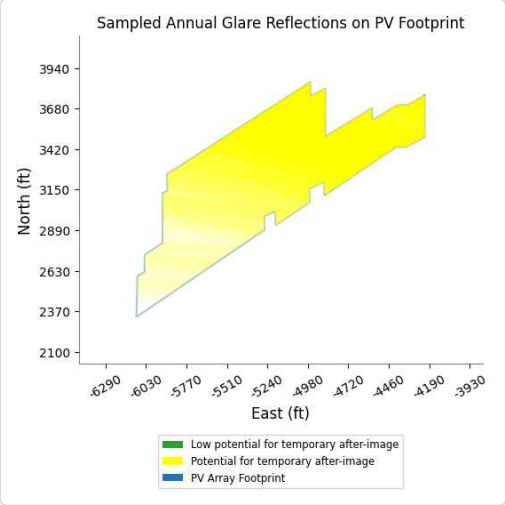
Receptor type: Observation Point

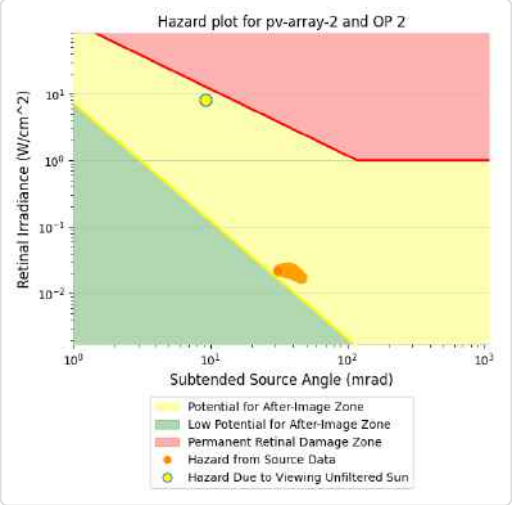
2,628 minutes of yellow glare

0 minutes of green glare



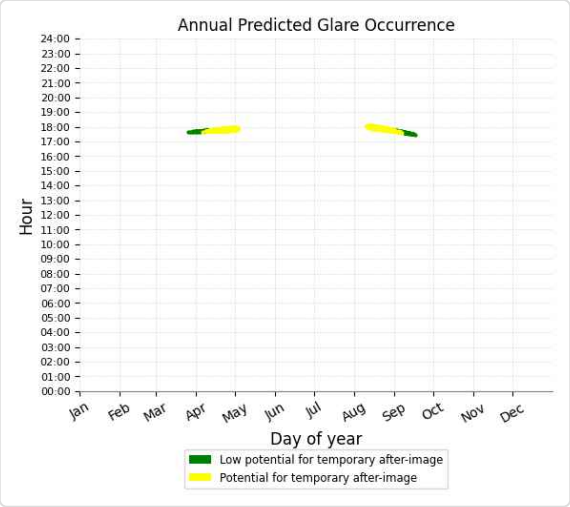


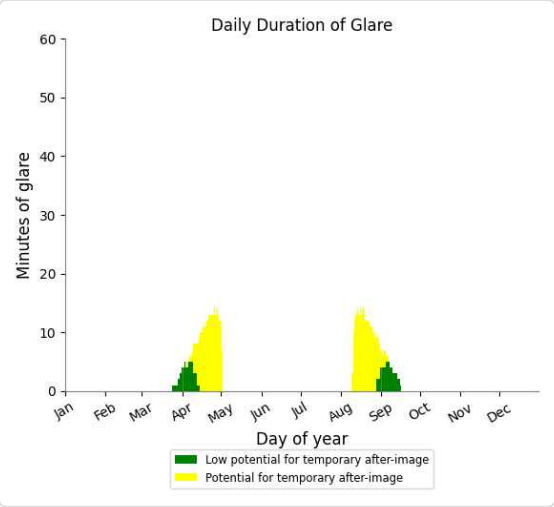


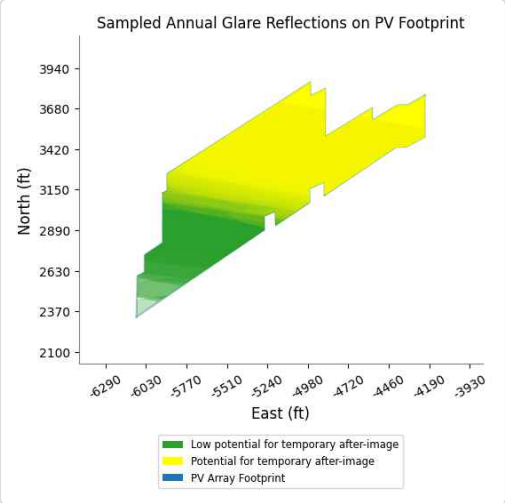


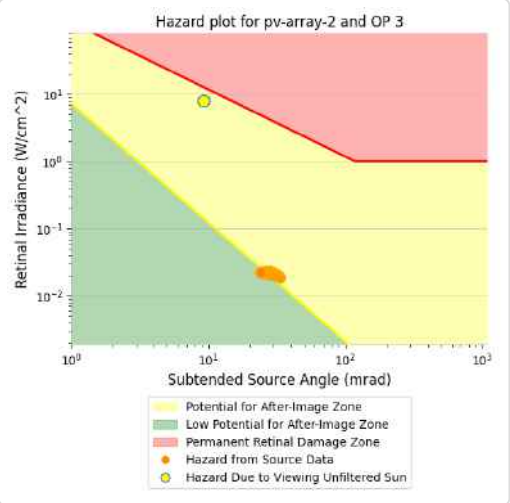
PV array 2 and OP 3

Receptor type: Observation Point
500 minutes of yellow glare
125 minutes of green glare



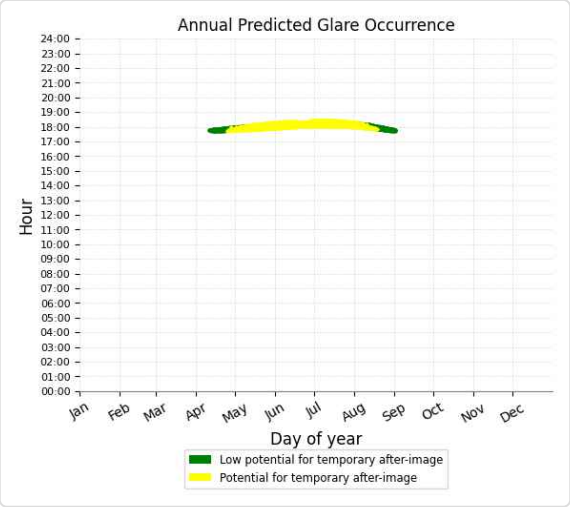


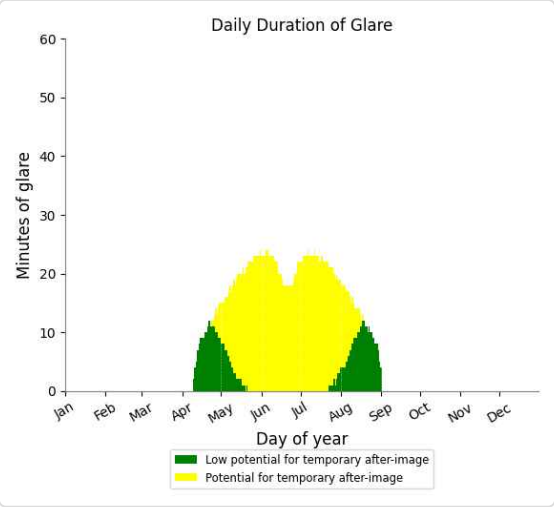


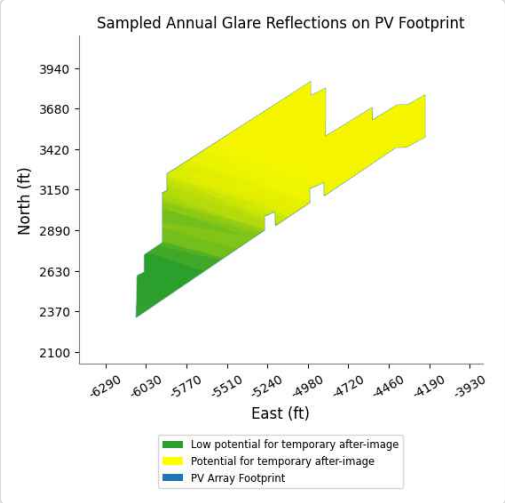


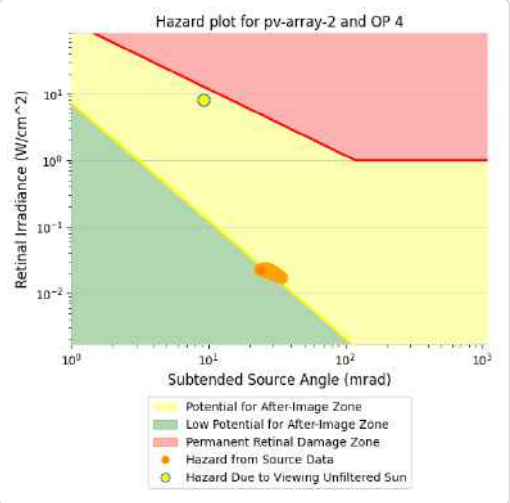
PV array 2 and OP 4

Receptor type: Observation Point
1,986 minutes of yellow glare
542 minutes of green glare



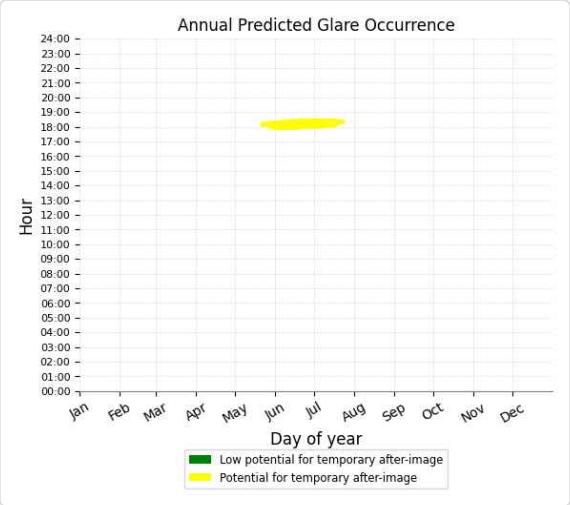


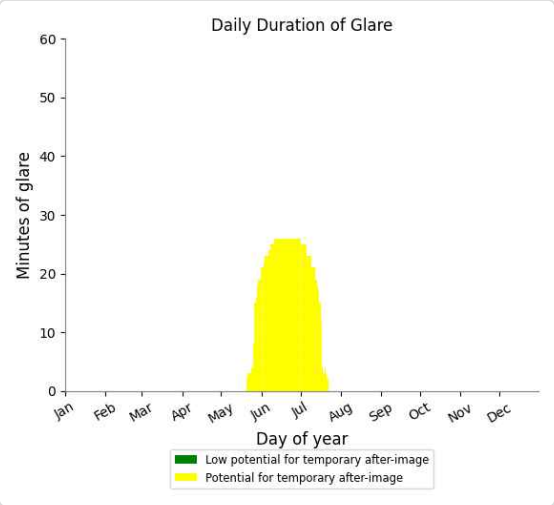


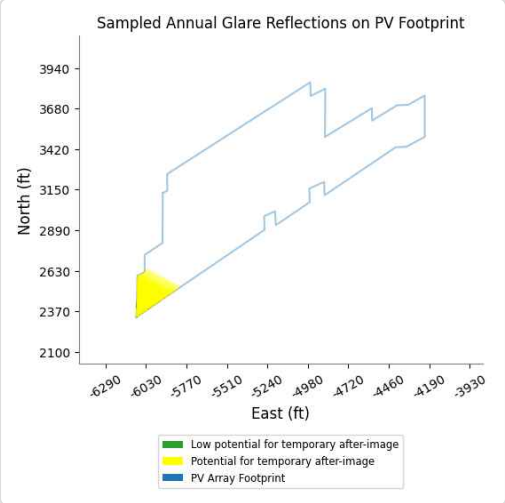


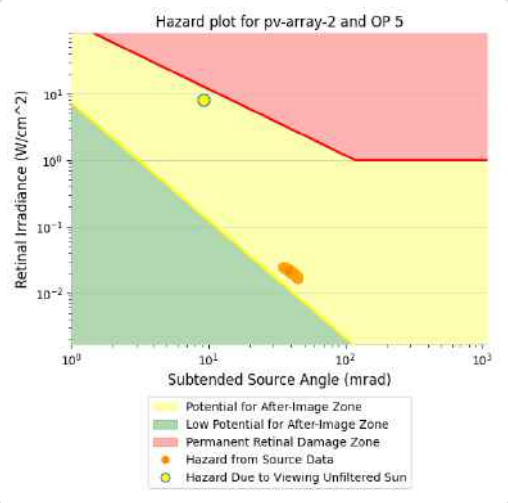
PV array 2 and OP 5

Receptor type: Observation Point
1,240 minutes of yellow glare
0 minutes of green glare









PV array 2 and OP 1

Receptor type: Observation Point
No glare found

PV array 2 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 3 low potential for temporary after-image

Receptor results ordered by category of glare

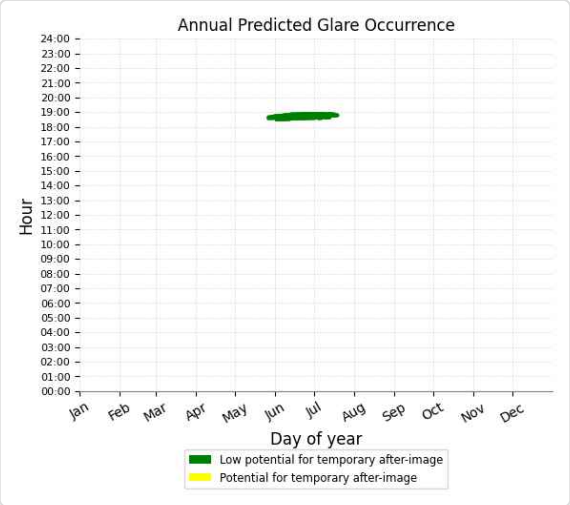
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 2	469	7.8	0	0.0
Route 3	1,197	19.9	0	0.0
Route 4	697	11.6	0	0.0
Route 5	744	12.4	0	0.0
Route 6	258	4.3	0	0.0
Route 1	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 2	403	6.7	0	0.0
OP 3	327	5.5	0	0.0
OP 4	417	7.0	0	0.0
OP 5	681	11.3	0	0.0
OP 1	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

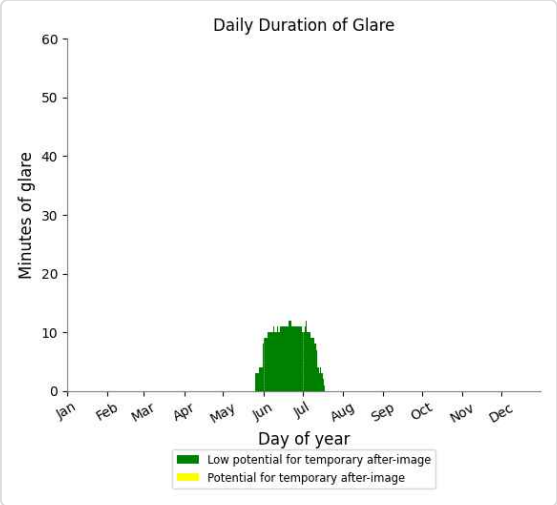
PV array 3 and Route 2

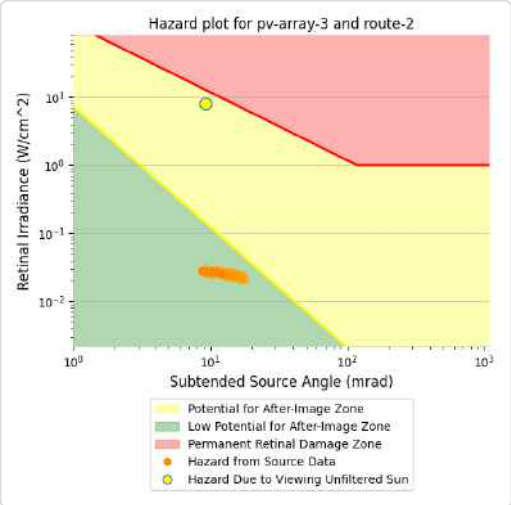
Receptor type: Route

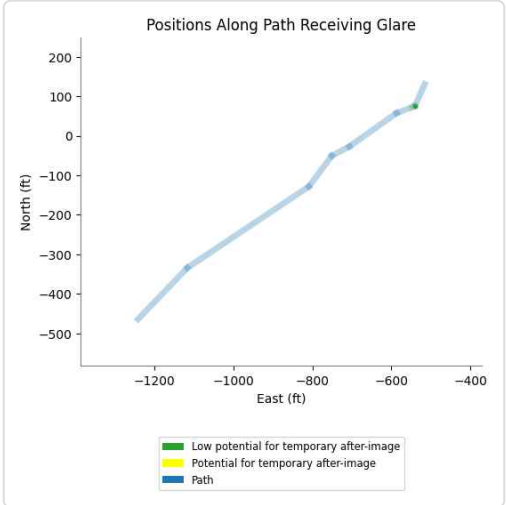
0 minutes of yellow glare

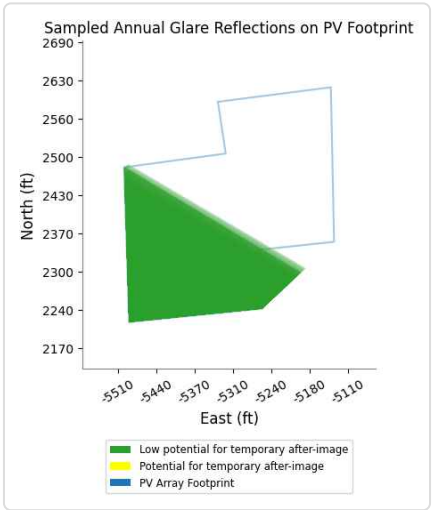
469 minutes of green glare









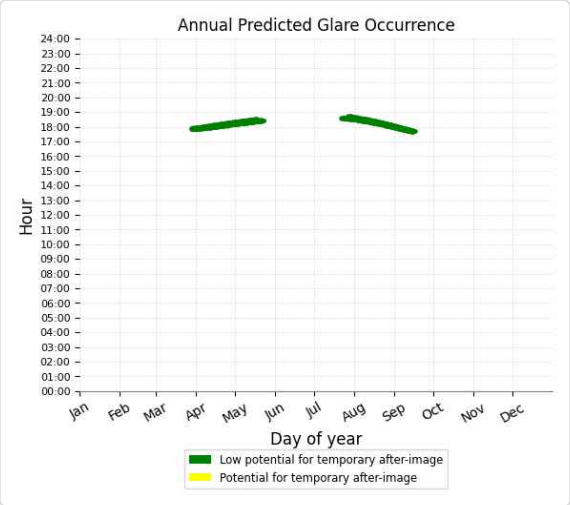


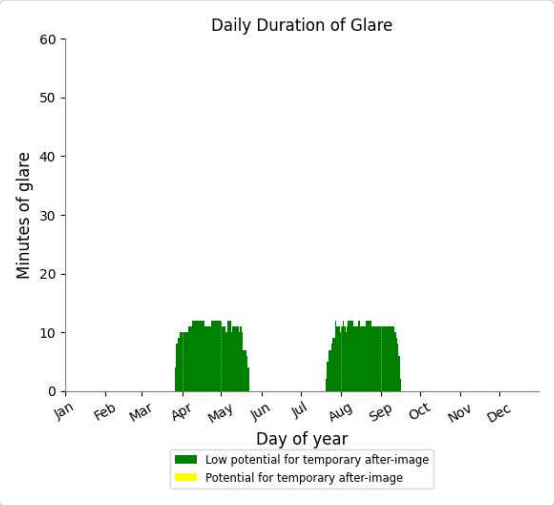
PV array 3 and Route 3

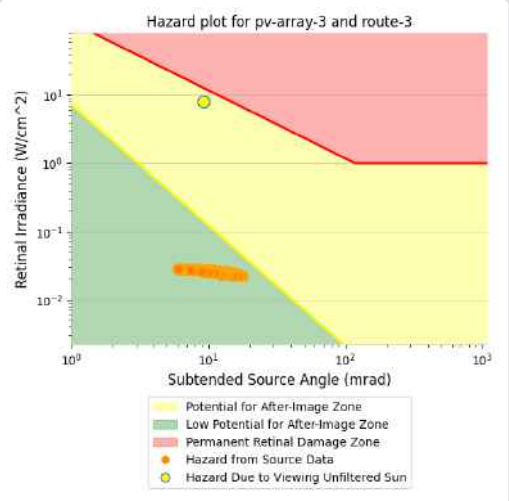
Receptor type: Route

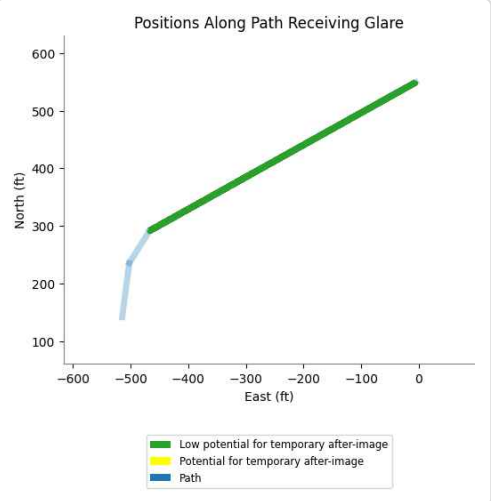
0 minutes of yellow glare

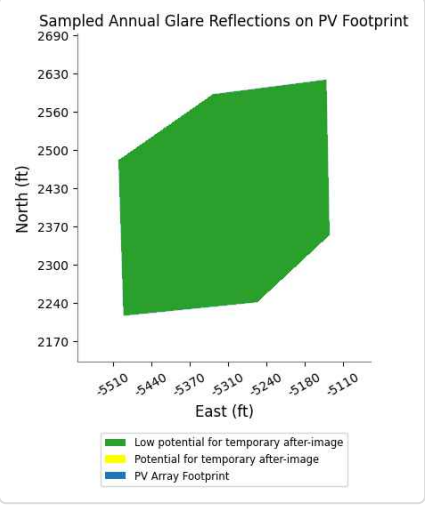
1,197 minutes of green glare









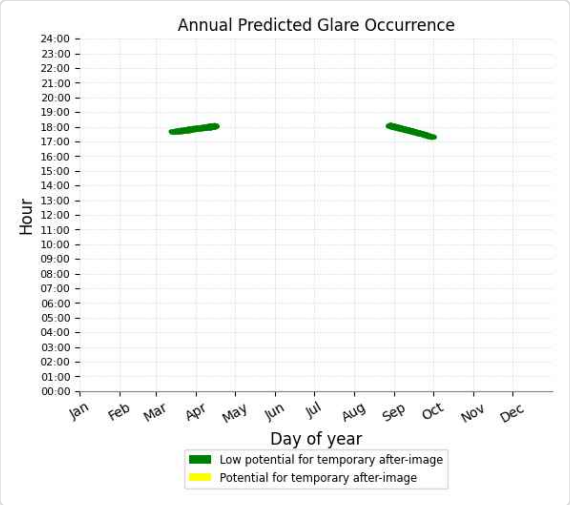


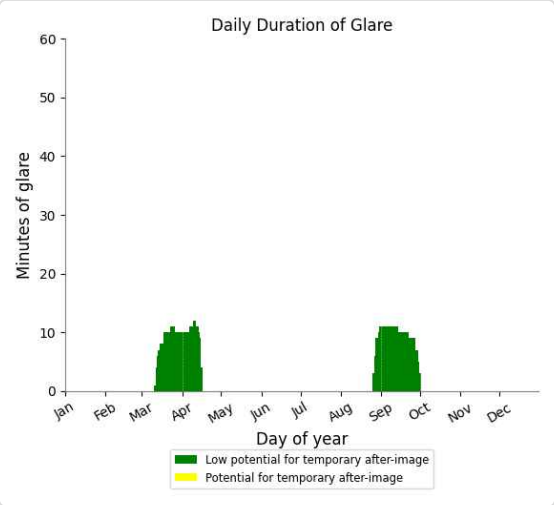
PV array 3 and Route 4

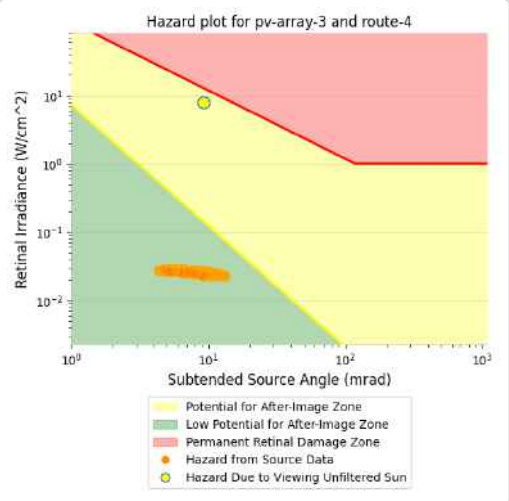
Receptor type: Route

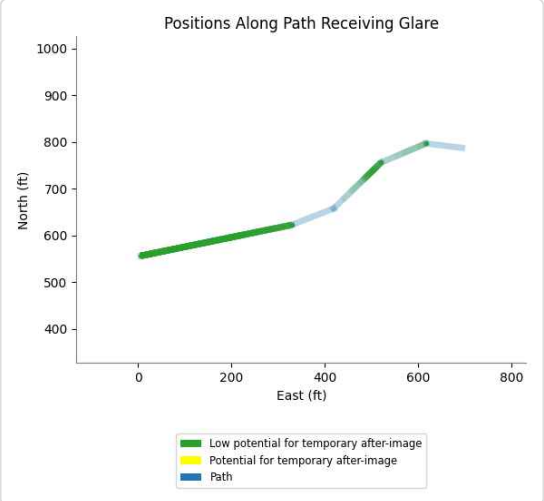
0 minutes of yellow glare

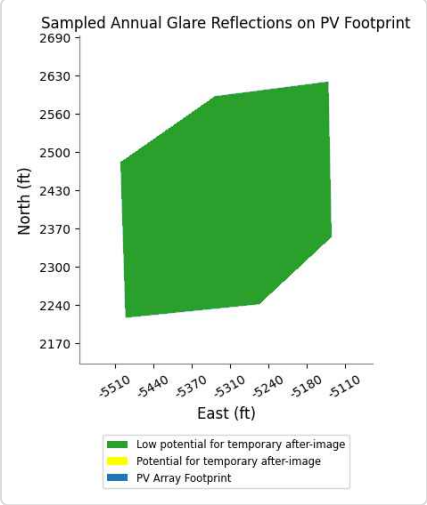
697 minutes of green glare









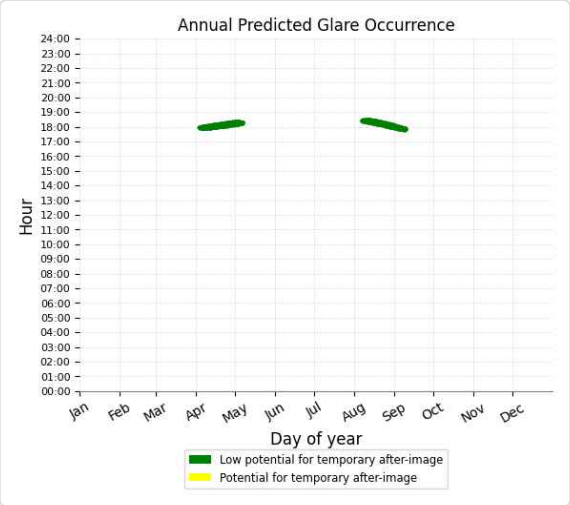


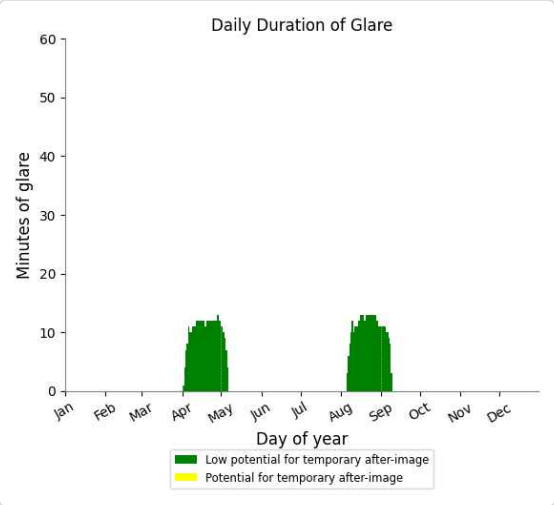
PV array 3 and Route 5

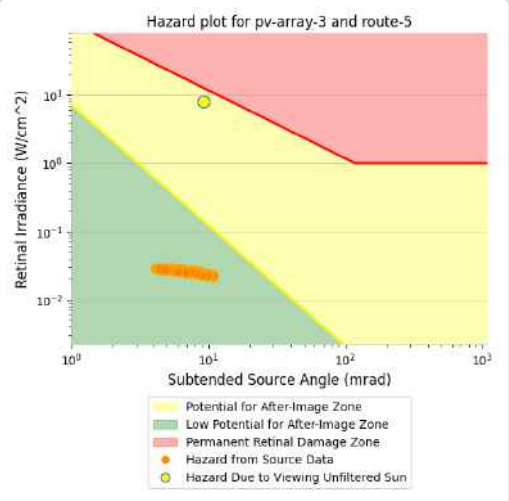
Receptor type: Route

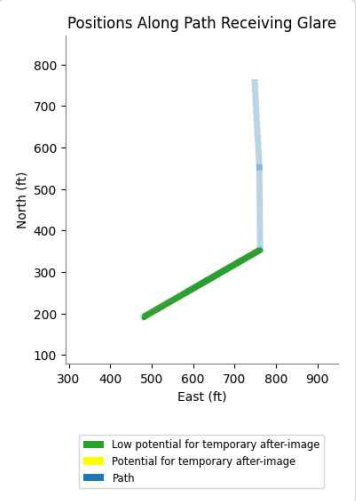
0 minutes of yellow glare

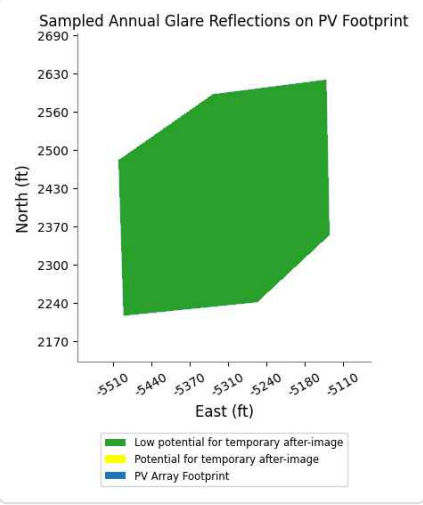
744 minutes of green glare









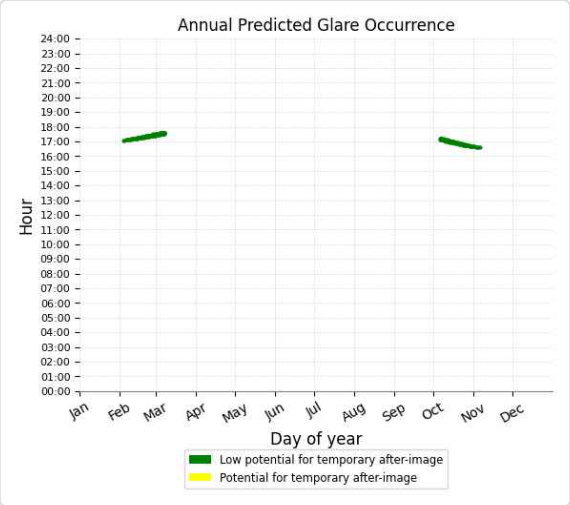


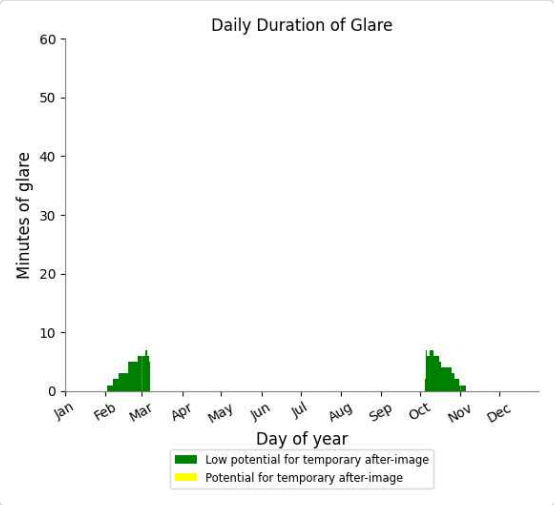
PV array 3 and Route 6

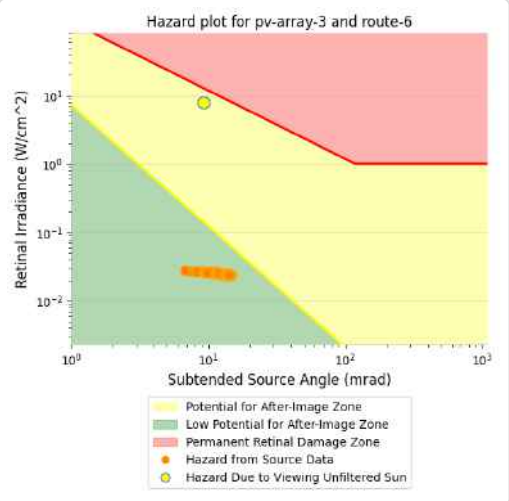
Receptor type: Route

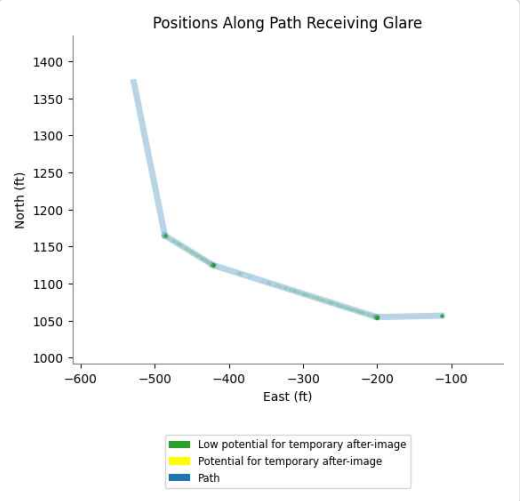
0 minutes of yellow glare

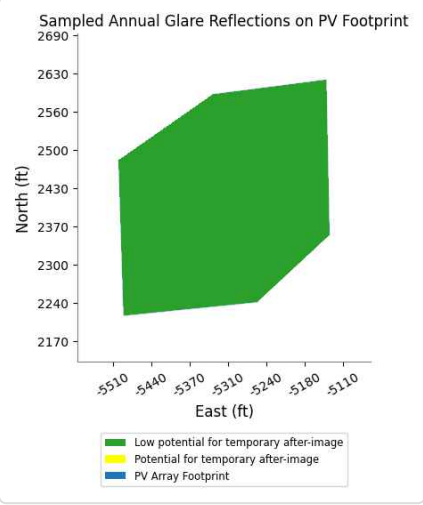
258 minutes of green glare











PV array 3 and Route 1

Receptor type: Route

No glare found

PV array 3 and Route 7

Receptor type: Route

No glare found

PV array 3 and Route 8

Receptor type: Route

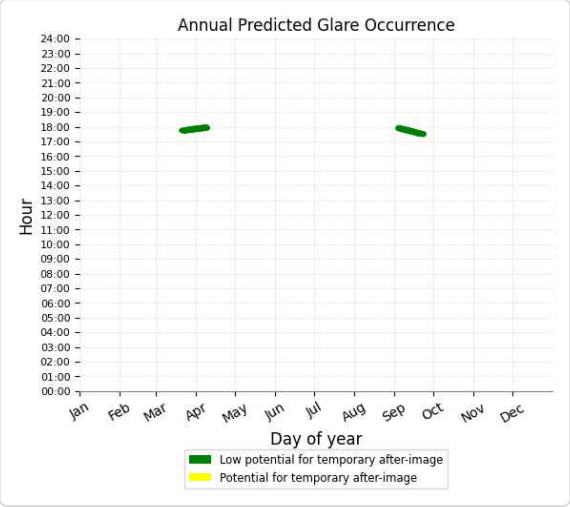
No glare found

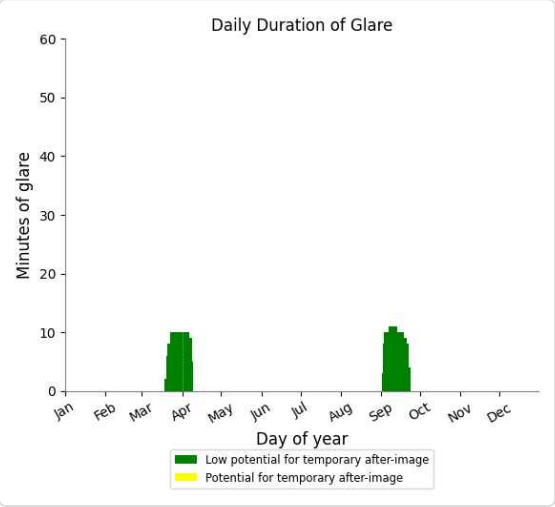
PV array 3 and OP 2

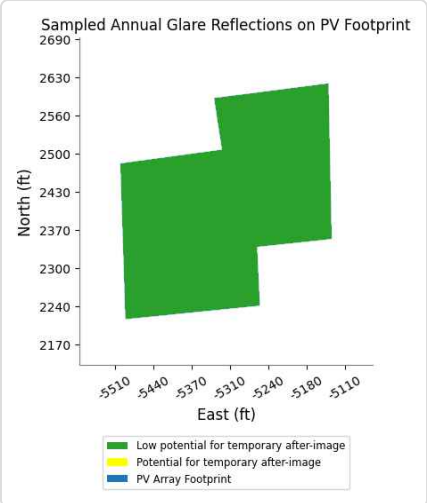
Receptor type: Observation Point

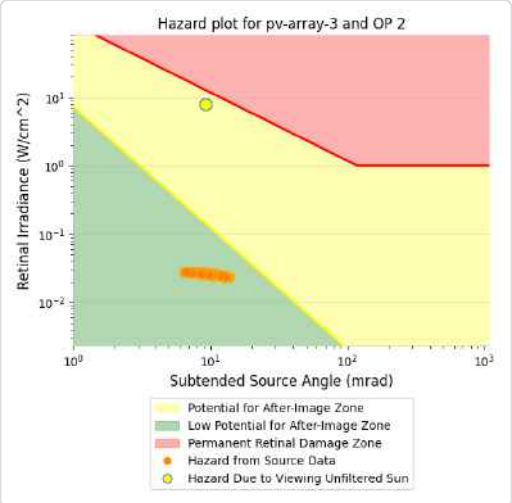
0 minutes of yellow glare

403 minutes of green glare



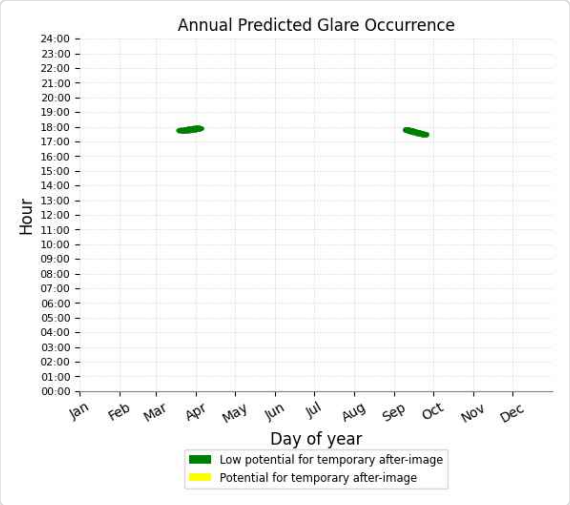


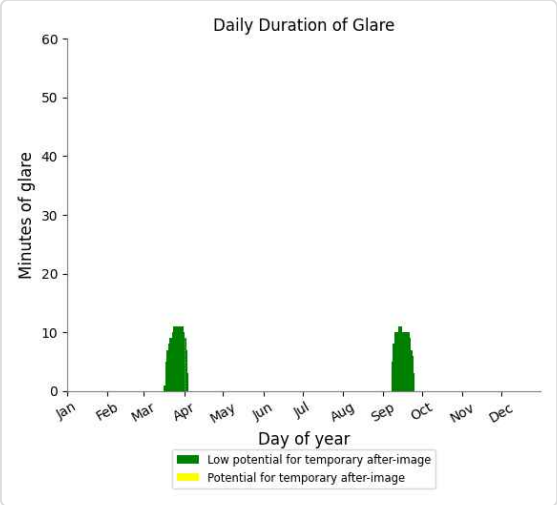


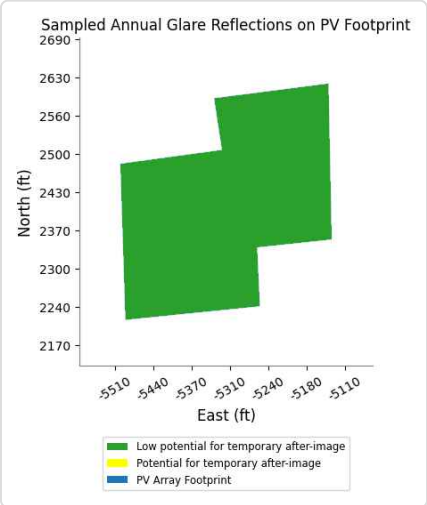


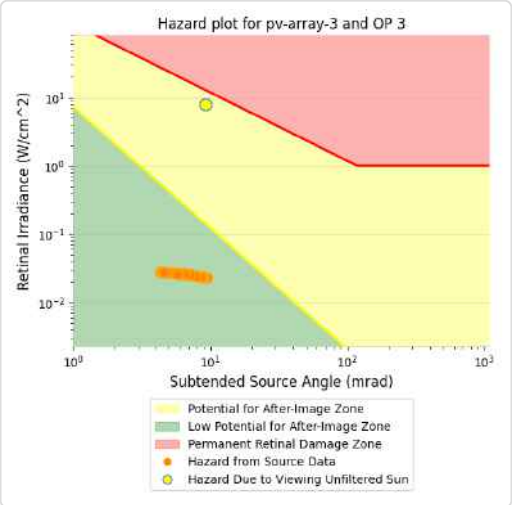
PV array 3 and OP 3

Receptor type: Observation Point
0 minutes of yellow glare
327 minutes of green glare



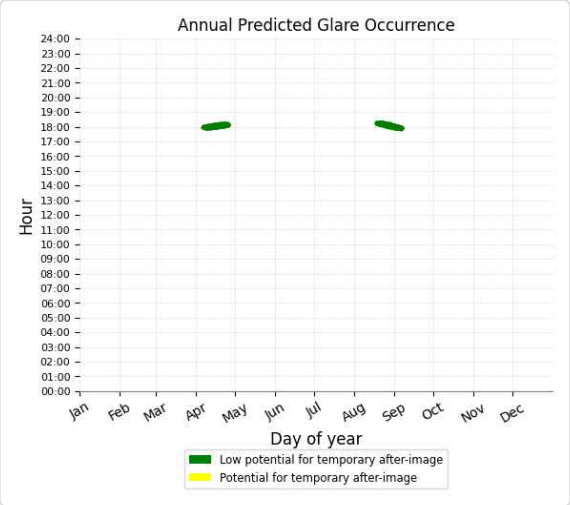


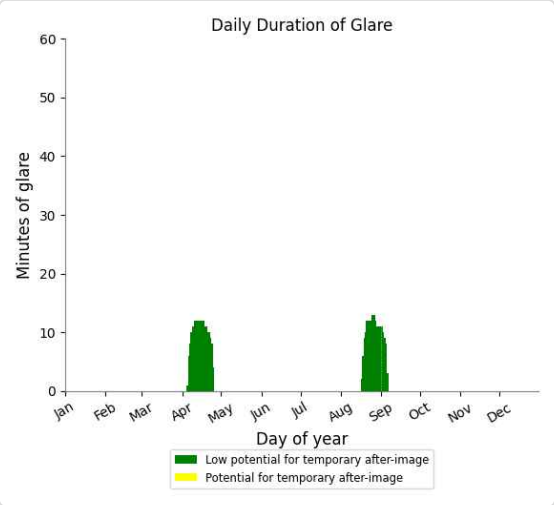


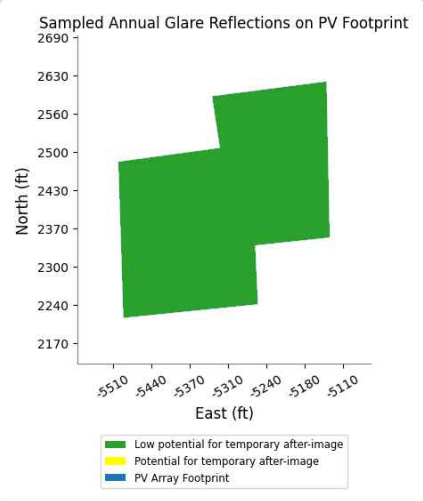


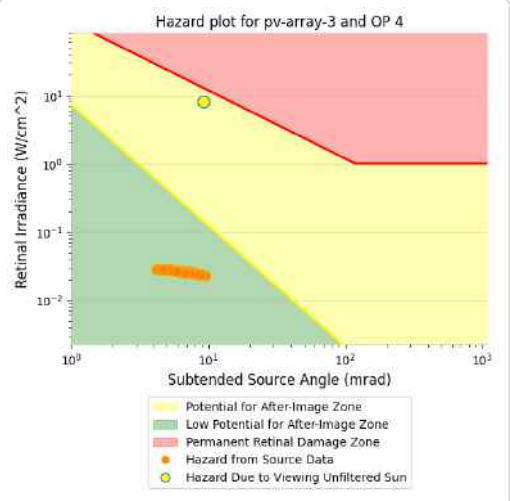
PV array 3 and OP 4

Receptor type: Observation Point
0 minutes of yellow glare
417 minutes of green glare



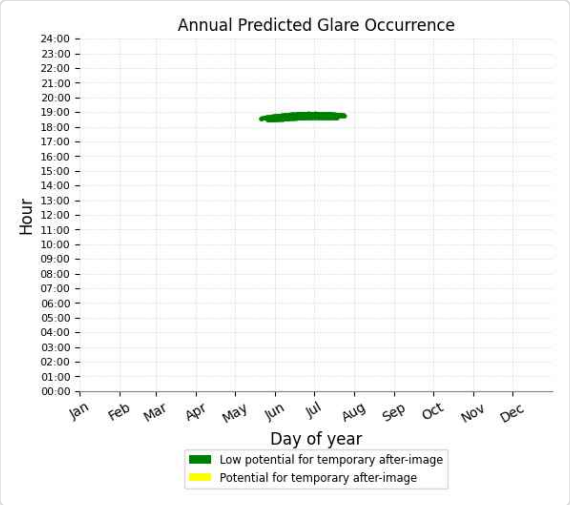


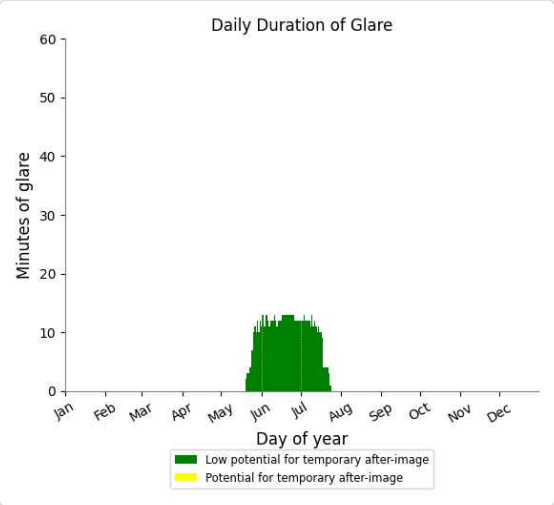


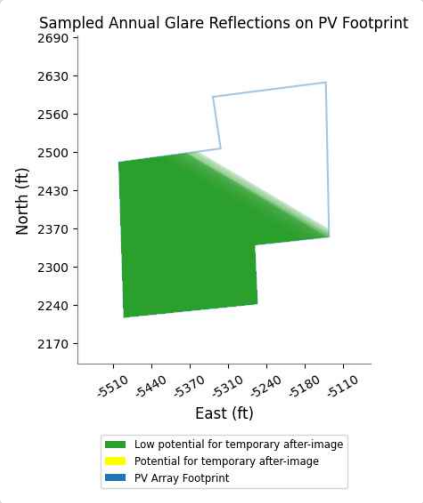


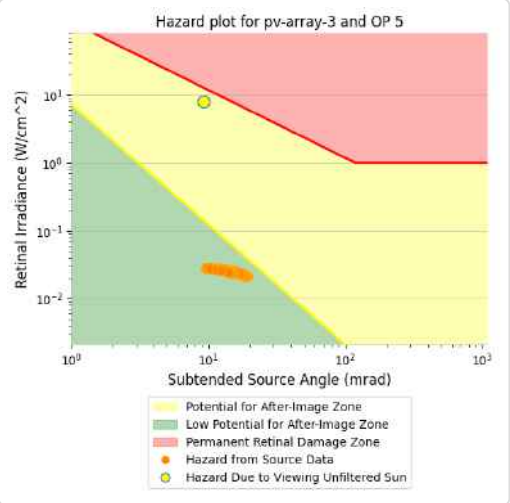
PV array 3 and OP 5

Receptor type: Observation Point
0 minutes of yellow glare
681 minutes of green glare









PV array 3 and OP 1

Receptor type: Observation Point
No glare found

PV array 3 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 4 potential temporary after-image

Receptor results ordered by category of glare

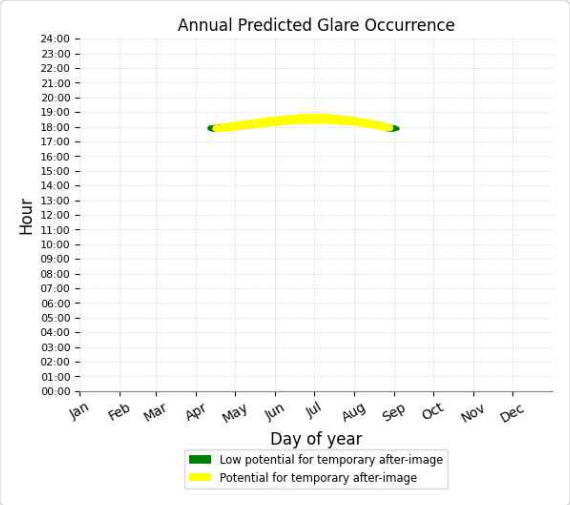
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 4	328	5.5	2,420	40.3
Route 6	0	0.0	6,350	105.8
Route 5	294	4.9	0	0.0
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 2	0	0.0	873	14.6
OP 3	1,410	23.5	1,032	17.2
OP 4	1,256	20.9	0	0.0
OP 1	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

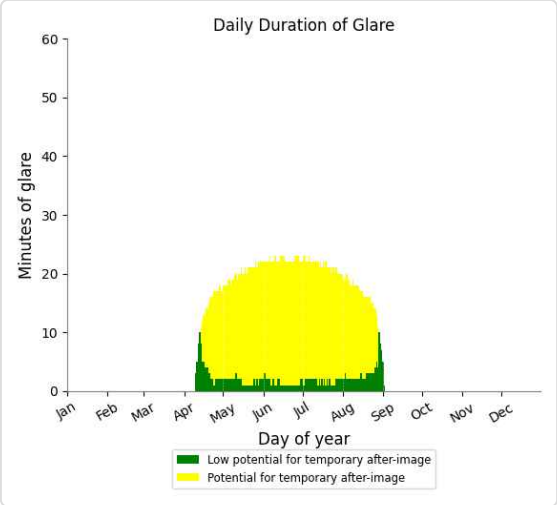
PV array 4 and Route 4

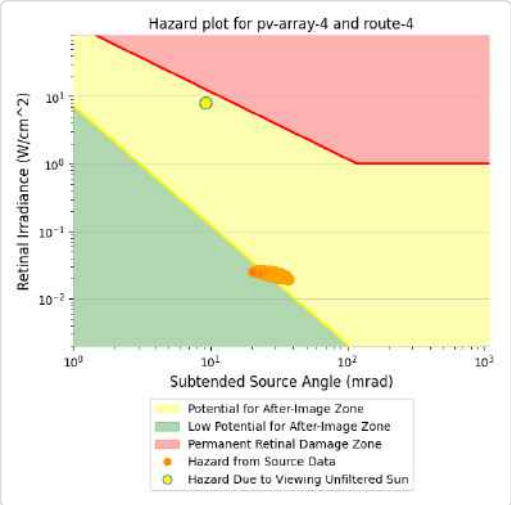
Receptor type: Route

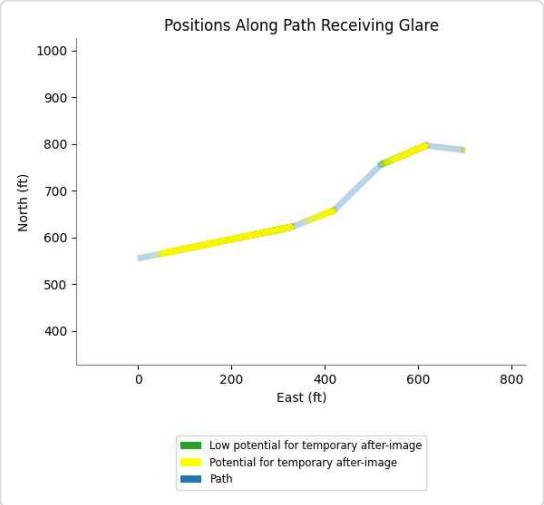
2,420 minutes of yellow glare

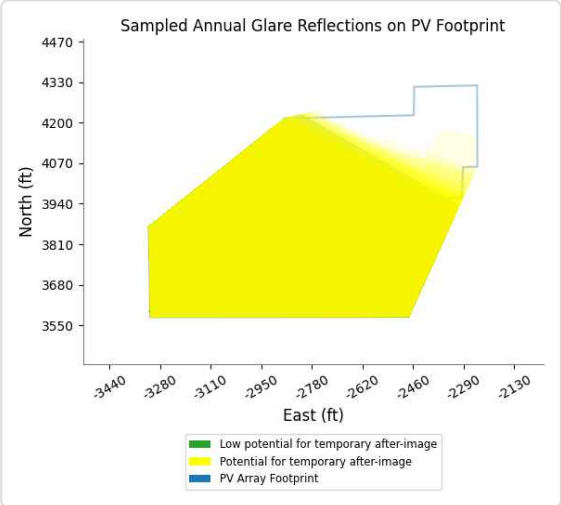
328 minutes of green glare









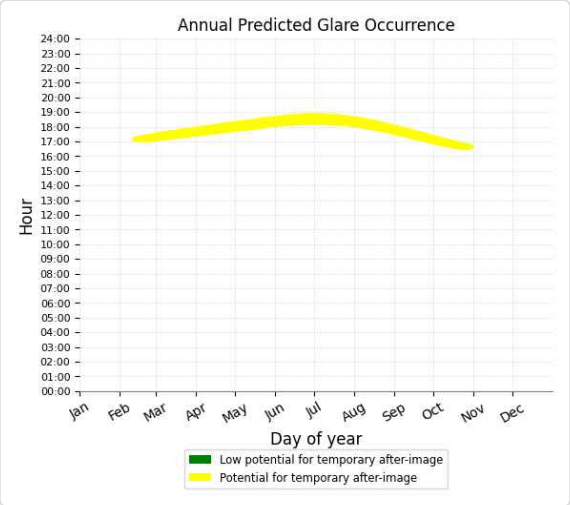


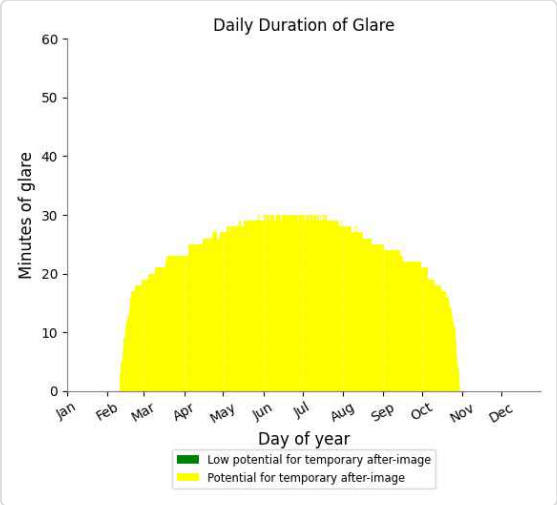
PV array 4 and Route 6

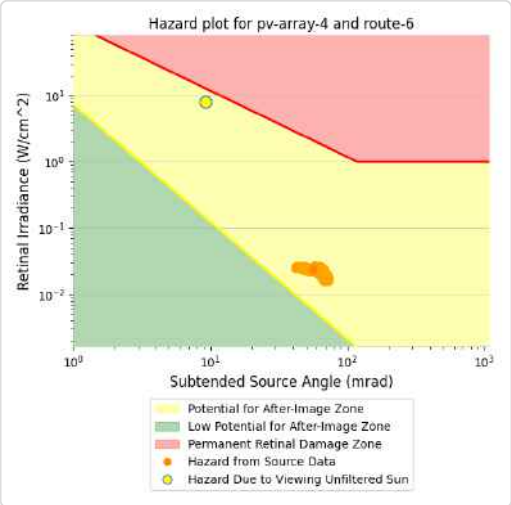
Receptor type: Route

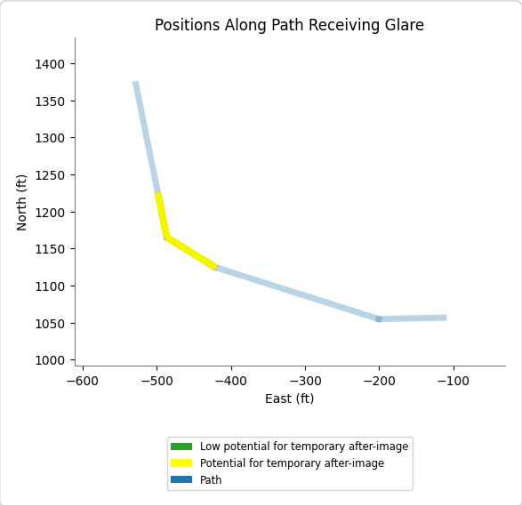
6,350 minutes of yellow glare

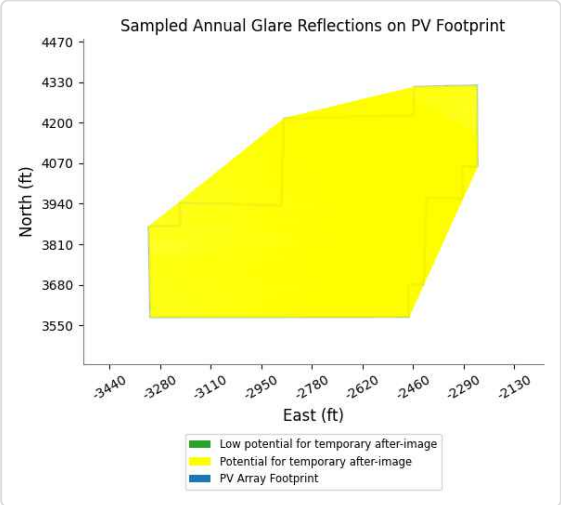
0 minutes of green glare





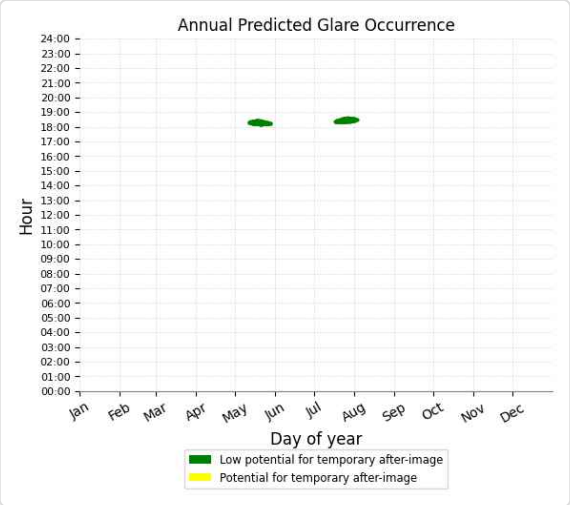


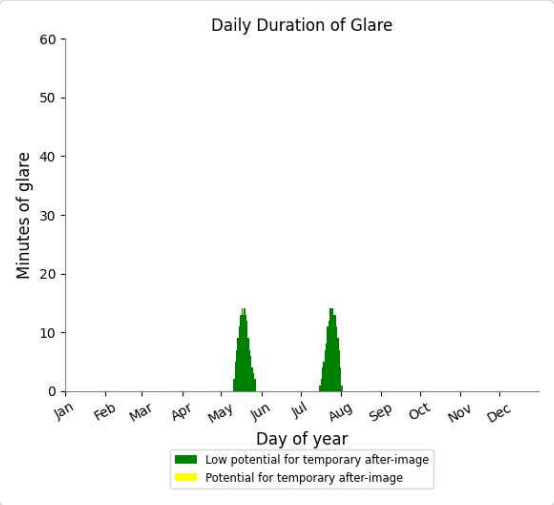


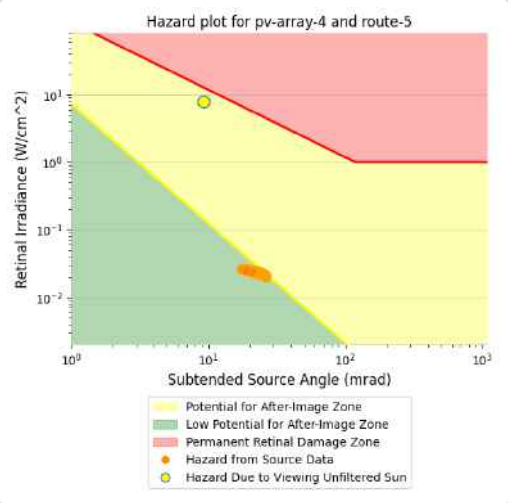


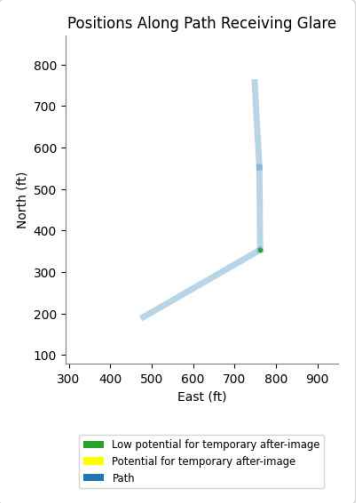
PV array 4 and Route 5

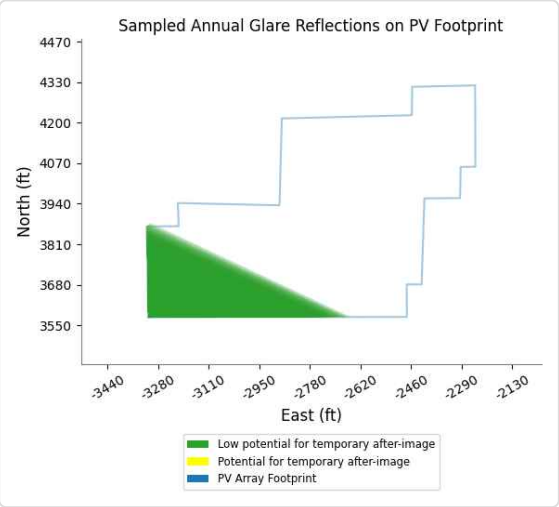
Receptor type: Route
0 minutes of yellow glare
294 minutes of green glare











PV array 4 and Route 1

Receptor type: Route

No glare found

PV array 4 and Route 2

Receptor type: Route

No glare found

PV array 4 and Route 3

Receptor type: Route

No glare found

PV array 4 and Route 7

Receptor type: Route

No glare found

PV array 4 and Route 8

Receptor type: Route

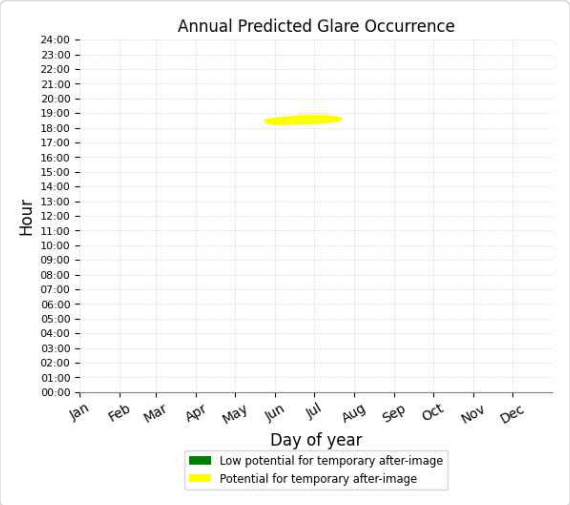
No glare found

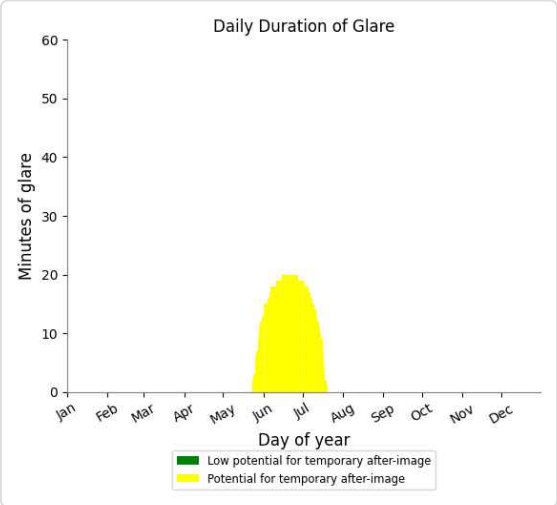
PV array 4 and OP 2

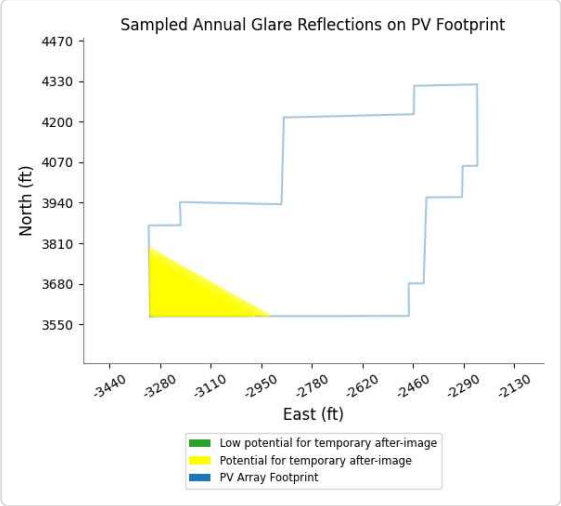
Receptor type: Observation Point

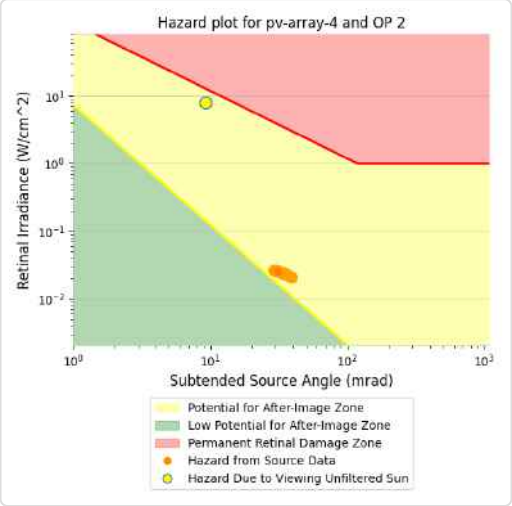
873 minutes of yellow glare

0 minutes of green glare



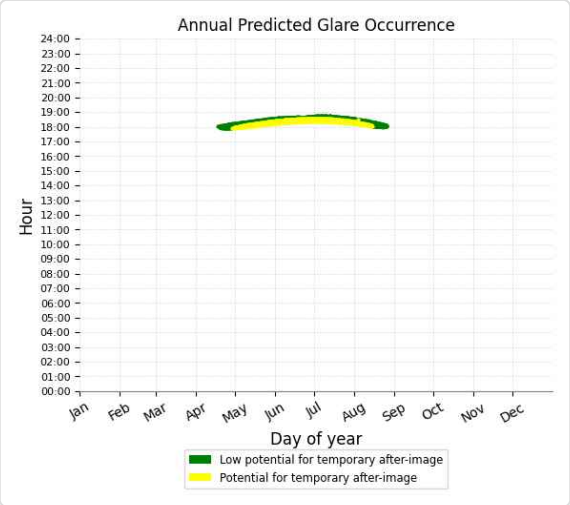


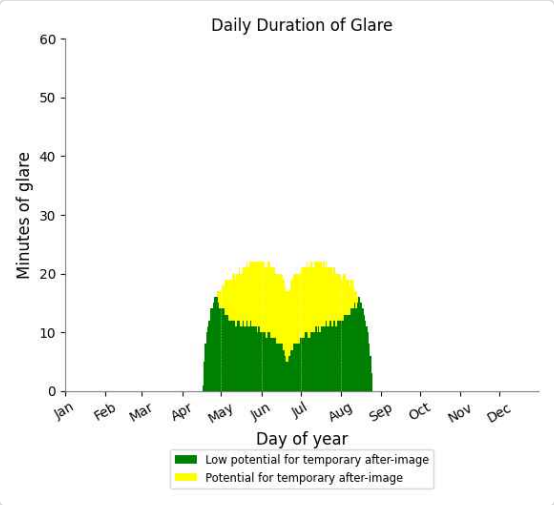


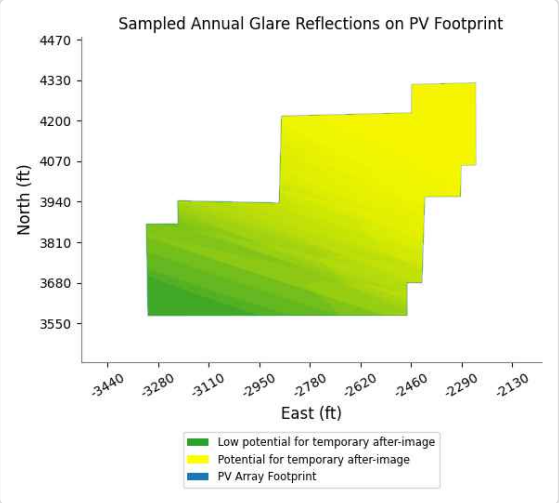


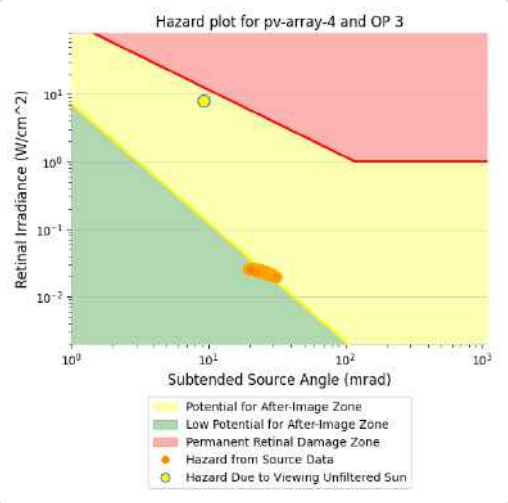
PV array 4 and OP 3

Receptor type: Observation Point
1,032 minutes of yellow glare
1,410 minutes of green glare



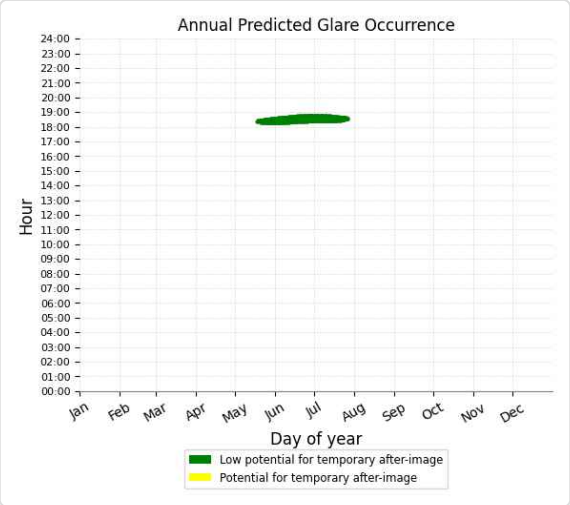


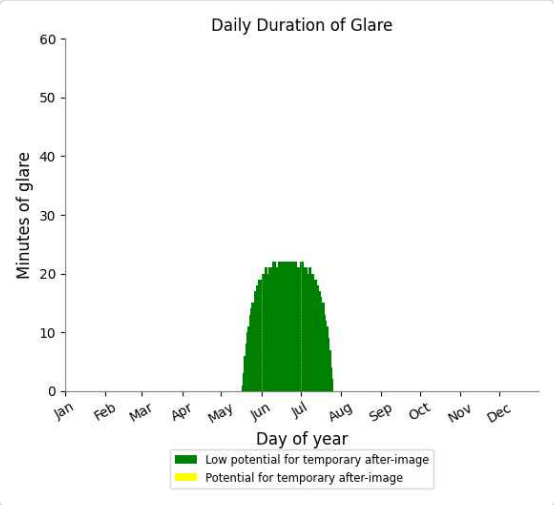


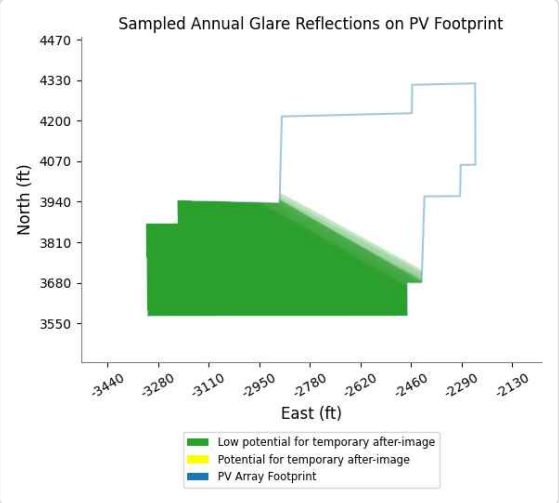


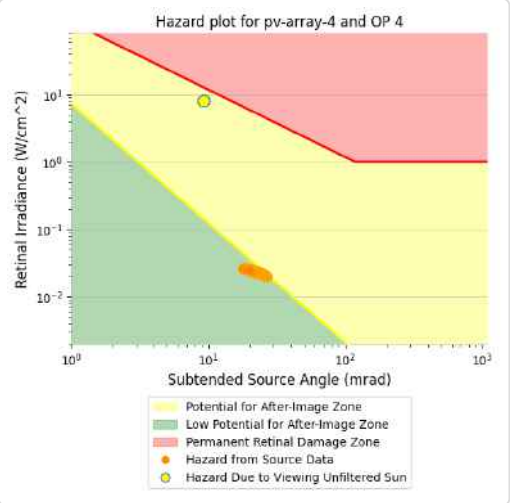
PV array 4 and OP 4

Receptor type: Observation Point
0 minutes of yellow glare
1,256 minutes of green glare









PV array 4 and OP 1

Receptor type: Observation Point
No glare found

PV array 4 and OP 5

Receptor type: Observation Point
No glare found

PV array 4 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 5 potential temporary after-image

Receptor results ordered by category of glare

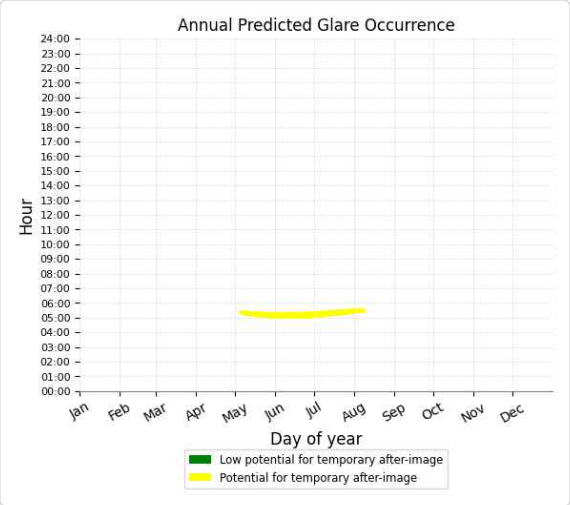
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	734	12.2
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

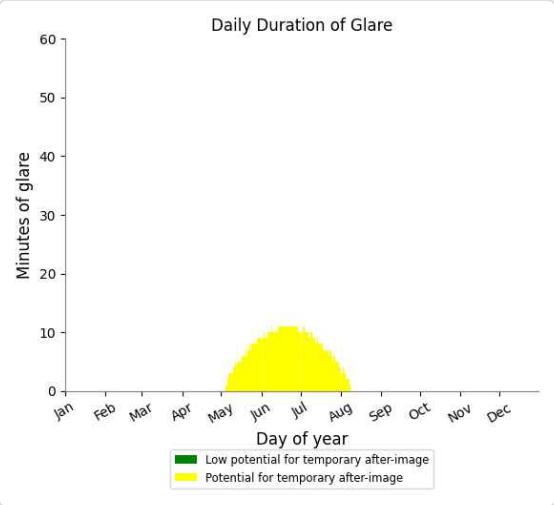
PV array 5 and Route 1

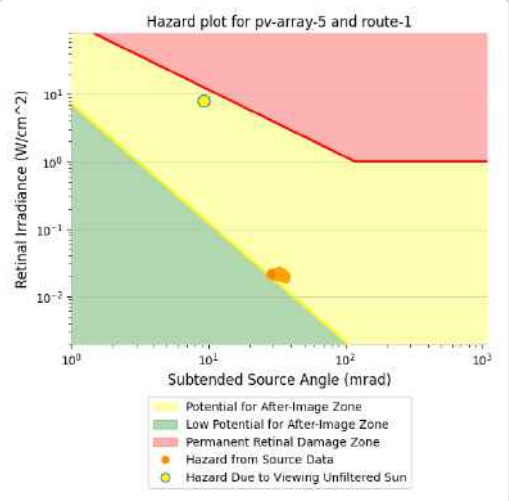
Receptor type: Route

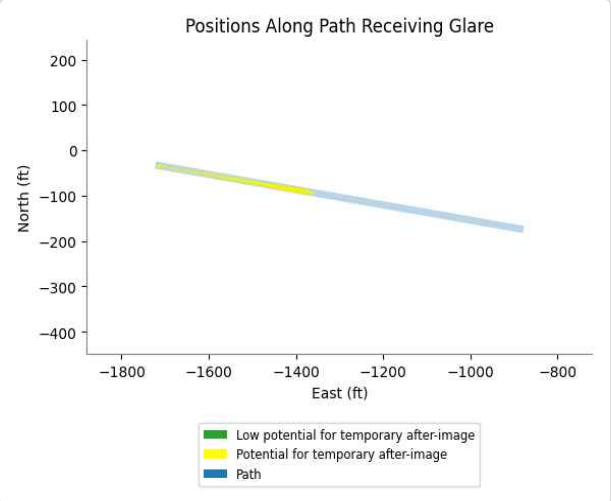
734 minutes of yellow glare

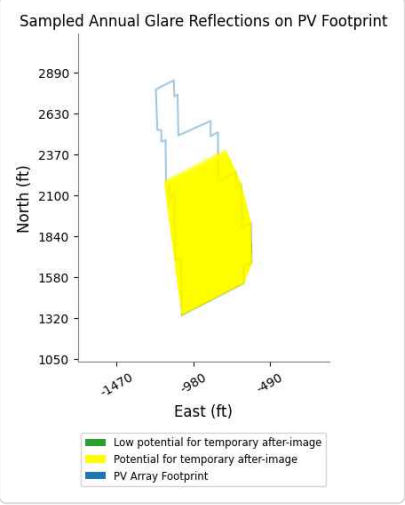
0 minutes of green glare











PV array 5 and Route 2

Receptor type: Route
No glare found

PV array 5 and Route 3

Receptor type: Route
No glare found

PV array 5 and Route 4

Receptor type: Route
No glare found

PV array 5 and Route 5

Receptor type: Route
No glare found

PV array 5 and Route 6

Receptor type: Route
No glare found

PV array 5 and Route 7

Receptor type: Route
No glare found

PV array 5 and Route 8

Receptor type: Route
No glare found

PV array 5 and OP 1

Receptor type: Observation Point
No glare found

PV array 5 and OP 2

Receptor type: Observation Point
No glare found

PV array 5 and OP 3

Receptor type: Observation Point
No glare found

PV array 5 and OP 4

Receptor type: Observation Point
No glare found

PV array 5 and OP 5

Receptor type: Observation Point
No glare found

PV array 5 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 6 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 7	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

PV array 6 and Route 1

Receptor type: Route
No glare found

PV array 6 and Route 2

Receptor type: Route
No glare found

PV array 6 and Route 3

Receptor type: Route
No glare found

PV array 6 and Route 4

Receptor type: Route
No glare found

PV array 6 and Route 5

Receptor type: Route
No glare found

PV array 6 and Route 6

Receptor type: Route
No glare found

PV array 6 and Route 7

Receptor type: Route
No glare found

PV array 6 and Route 8

Receptor type: Route
No glare found

PV array 6 and OP 1

Receptor type: Observation Point
No glare found

PV array 6 and OP 2

Receptor type: Observation Point
No glare found

PV array 6 and OP 3

Receptor type: Observation Point
No glare found

PV array 6 and OP 4

Receptor type: Observation Point
No glare found

PV array 6 and OP 5

Receptor type: Observation Point
No glare found

PV array 6 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 7 potential temporary after-image

Receptor results ordered by category of glare

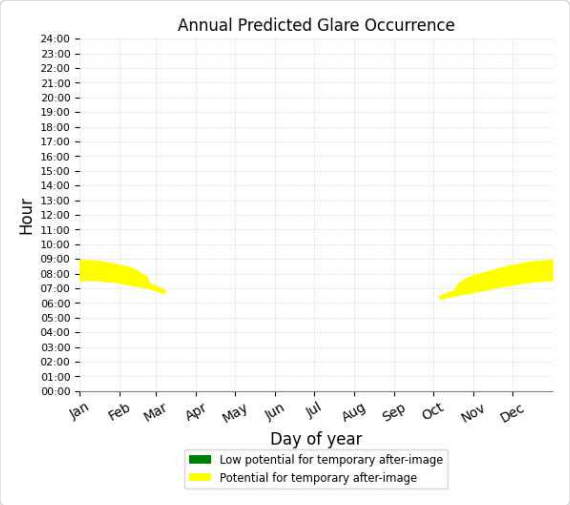
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 7	0	0.0	7,888	131.5
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	3,723	62.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

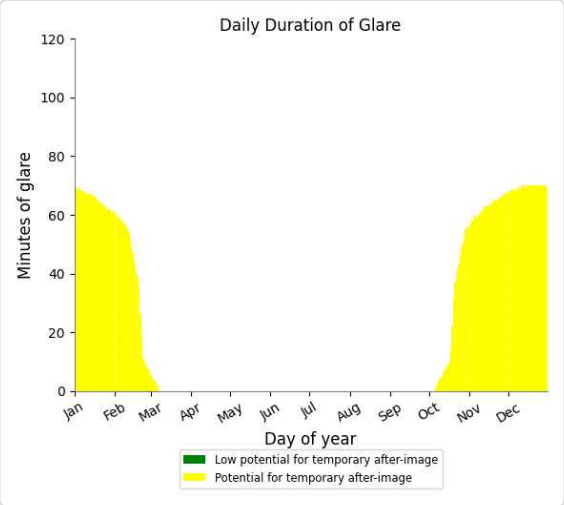
PV array 7 and Route 7

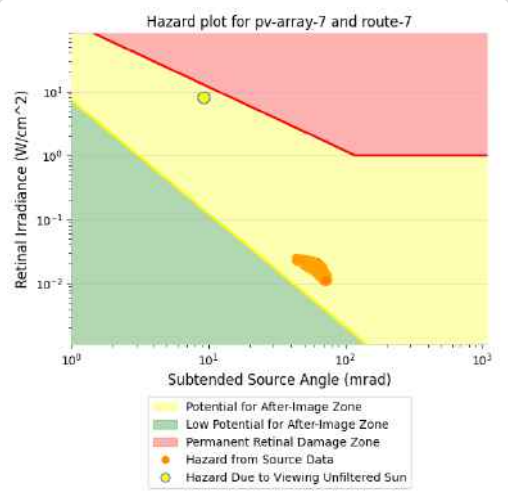
Receptor type: Route

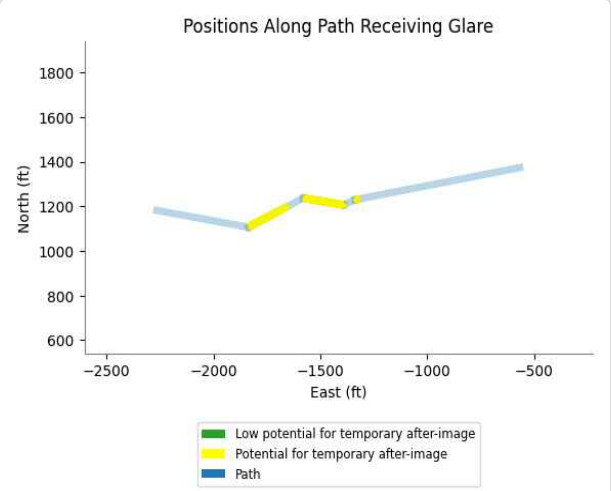
7,888 minutes of yellow glare

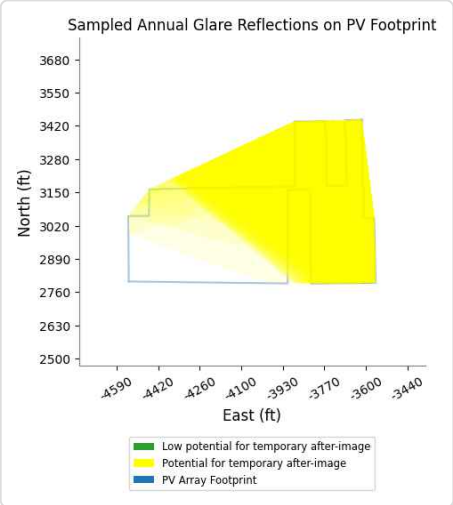
0 minutes of green glare











PV array 7 and Route 1

Receptor type: Route

No glare found

PV array 7 and Route 2

Receptor type: Route

No glare found

PV array 7 and Route 3

Receptor type: Route

No glare found

PV array 7 and Route 4

Receptor type: Route

No glare found

PV array 7 and Route 5

Receptor type: Route

No glare found

PV array 7 and Route 6

Receptor type: Route

No glare found

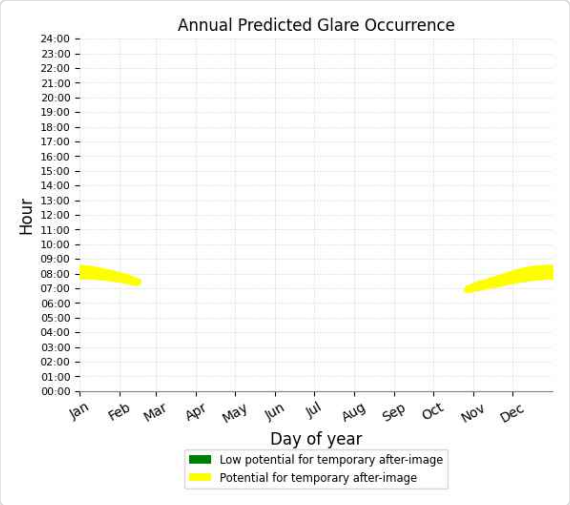
PV array 7 and Route 8

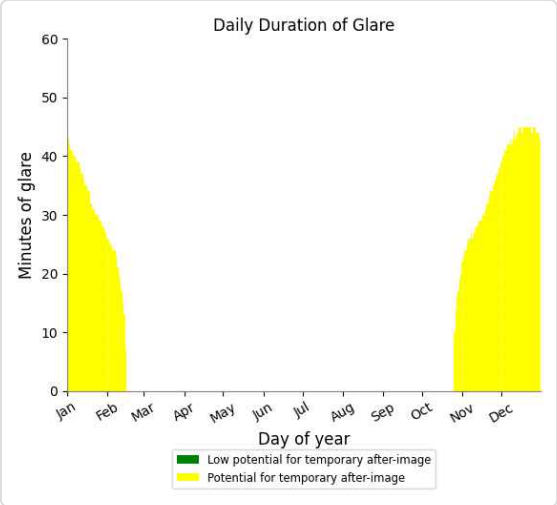
Receptor type: Route

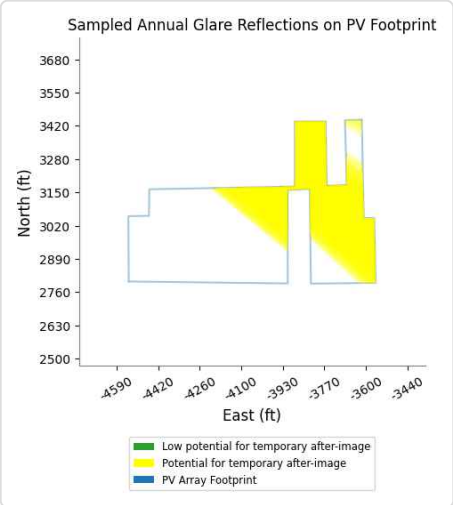
No glare found

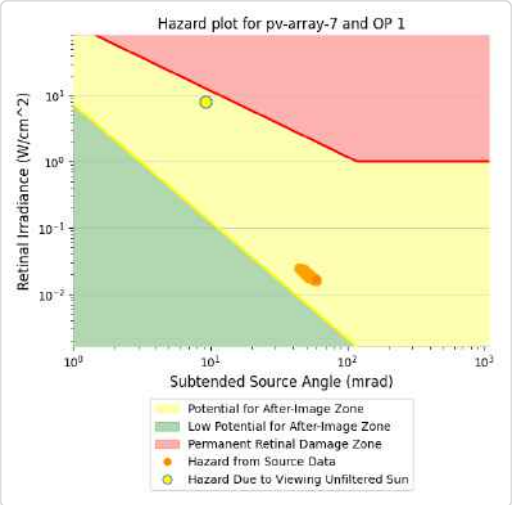
PV array 7 and OP 1

Receptor type: Observation Point
3,723 minutes of yellow glare
0 minutes of green glare









PV array 7 and OP 2

Receptor type: Observation Point
No glare found

PV array 7 and OP 3

Receptor type: Observation Point
No glare found

PV array 7 and OP 4

Receptor type: Observation Point
No glare found

PV array 7 and OP 5

Receptor type: Observation Point
No glare found

PV array 7 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 8 potential temporary after-image

Receptor results ordered by category of glare

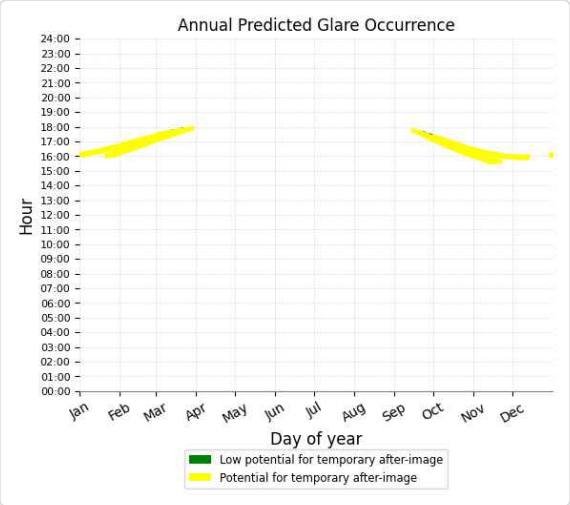
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 6	35	0.6	1,983	33.0
Route 7	263	4.4	5,005	83.4
Route 4	97	1.6	0	0.0
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	1,509	25.1
OP 3	11	0.2	0	0.0
OP 2	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

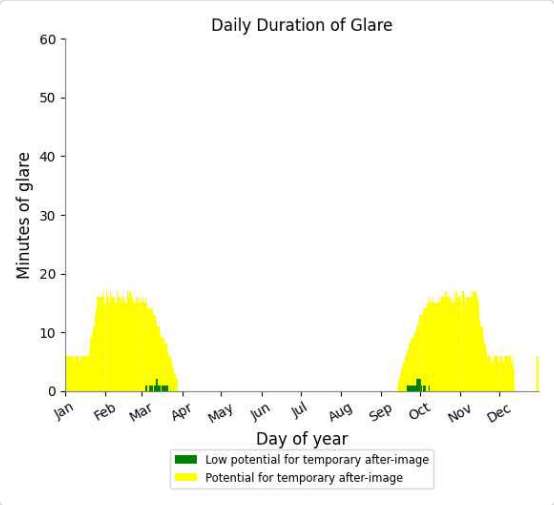
PV array 8 and Route 6

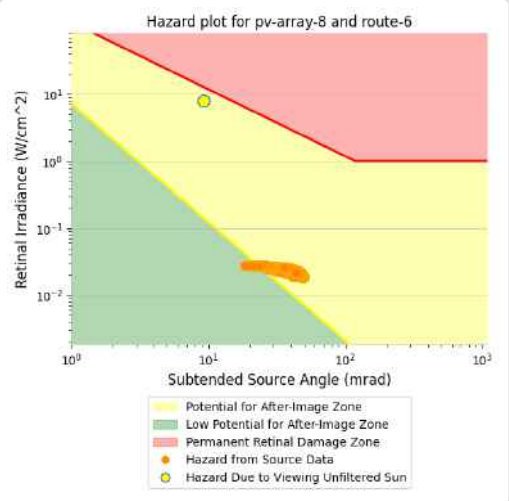
Receptor type: Route

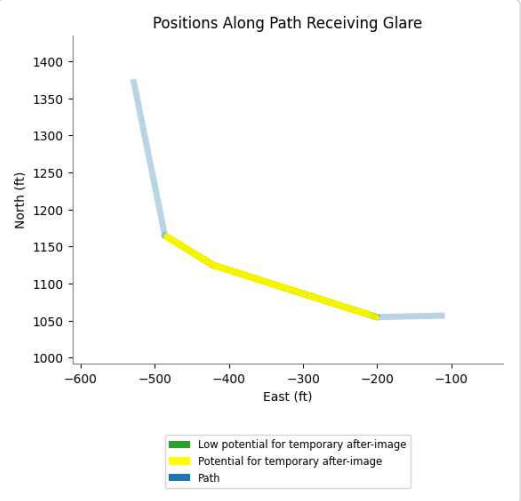
1,983 minutes of yellow glare

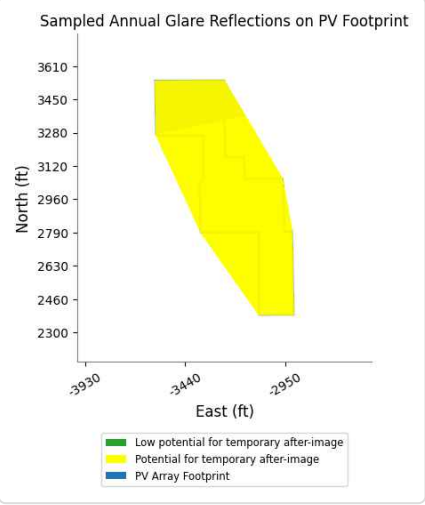
35 minutes of green glare









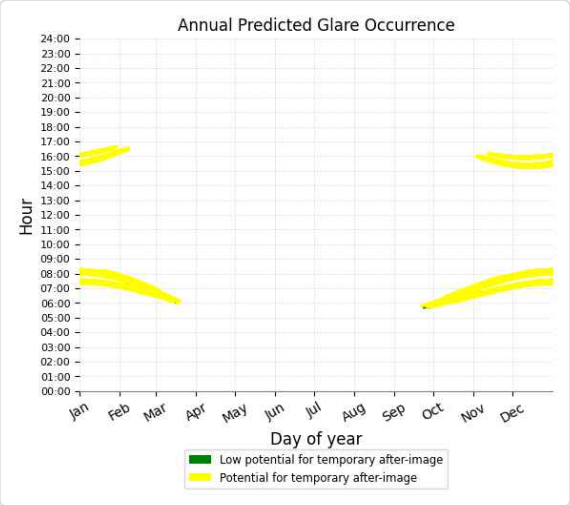


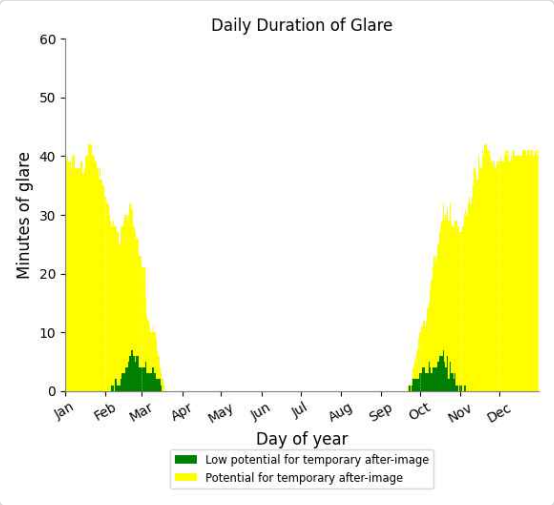
PV array 8 and Route 7

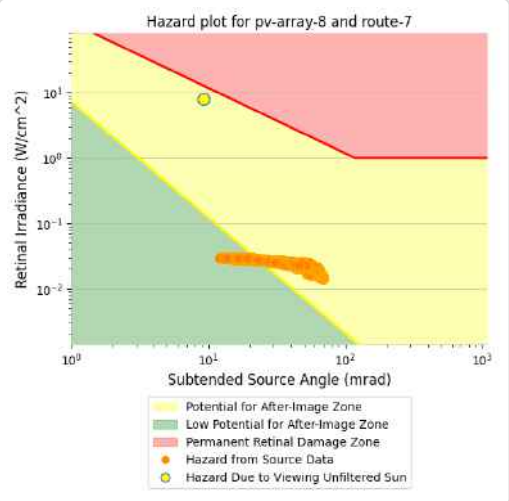
Receptor type: Route

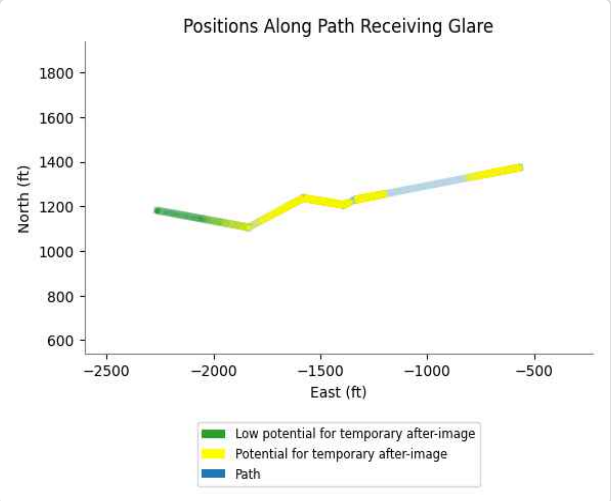
5,005 minutes of yellow glare

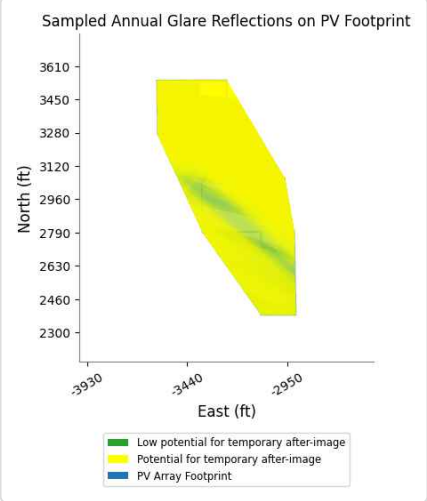
263 minutes of green glare









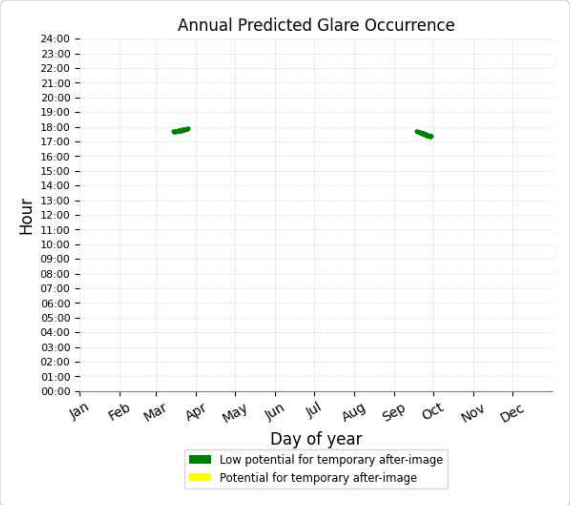


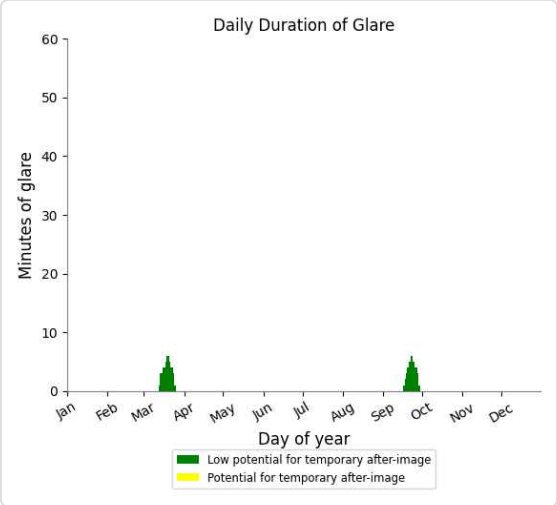
PV array 8 and Route 4

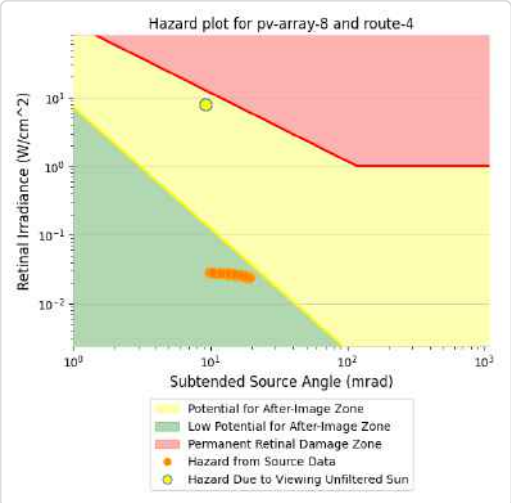
Receptor type: Route

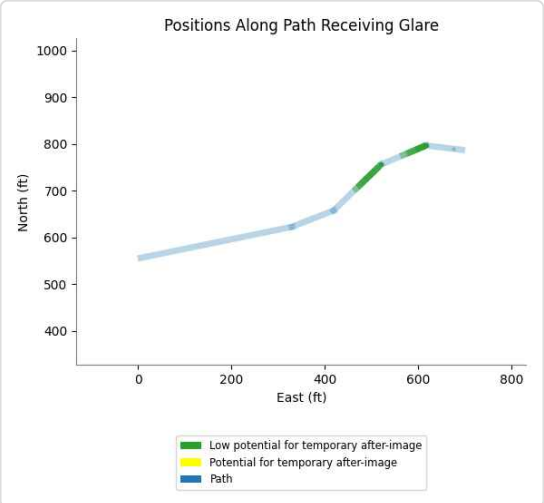
0 minutes of yellow glare

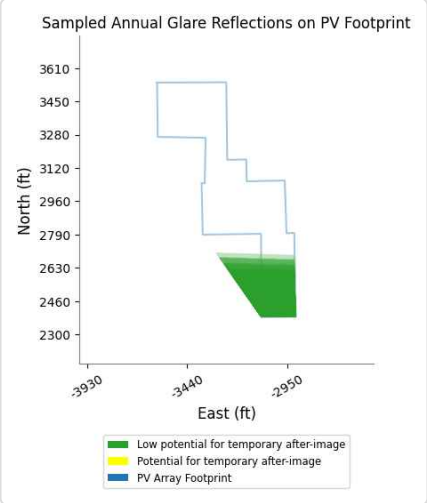
97 minutes of green glare











PV array 8 and Route 1

Receptor type: Route

No glare found

PV array 8 and Route 2

Receptor type: Route

No glare found

PV array 8 and Route 3

Receptor type: Route

No glare found

PV array 8 and Route 5

Receptor type: Route

No glare found

PV array 8 and Route 8

Receptor type: Route

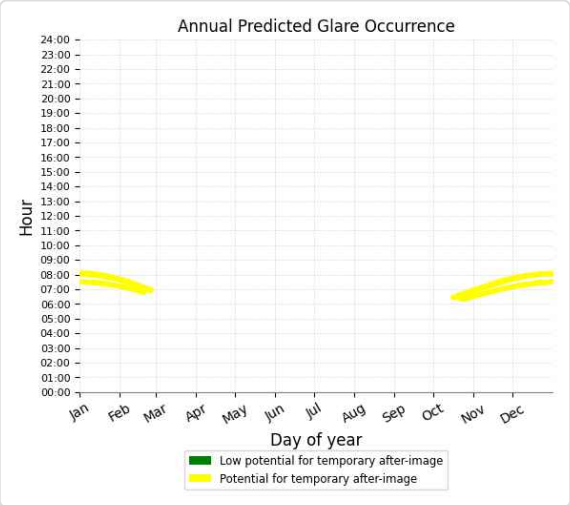
No glare found

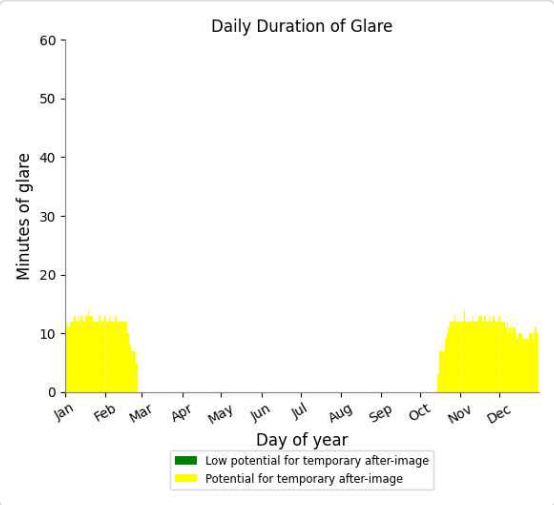
PV array 8 and OP 1

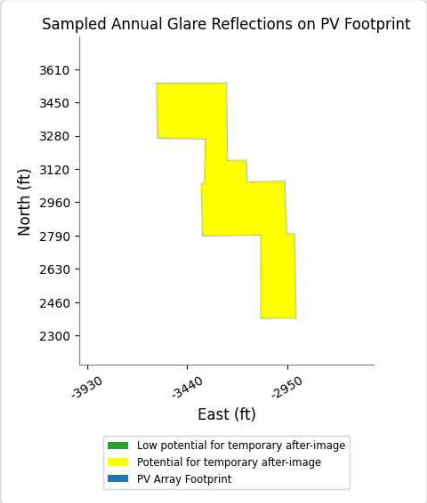
Receptor type: Observation Point

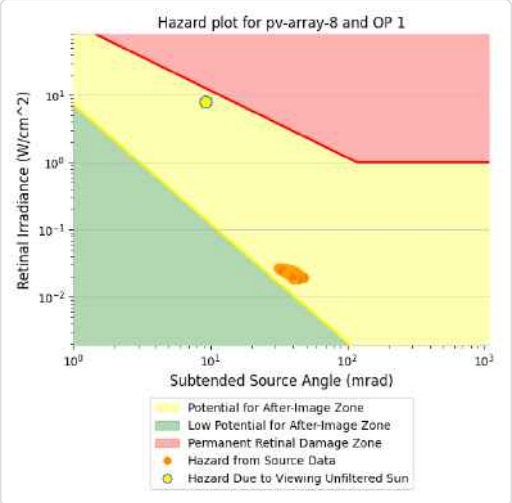
1,509 minutes of yellow glare

0 minutes of green glare



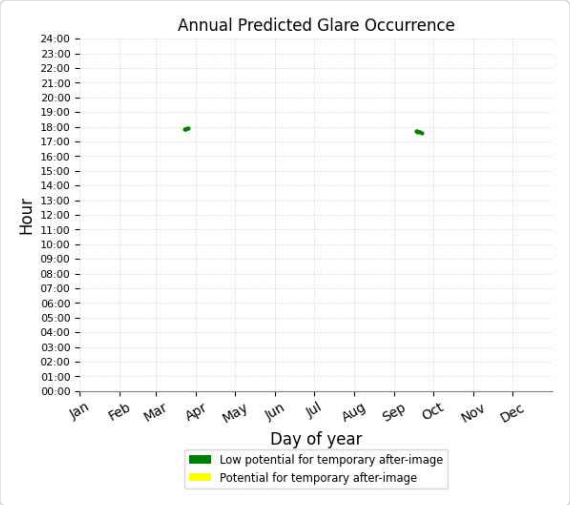


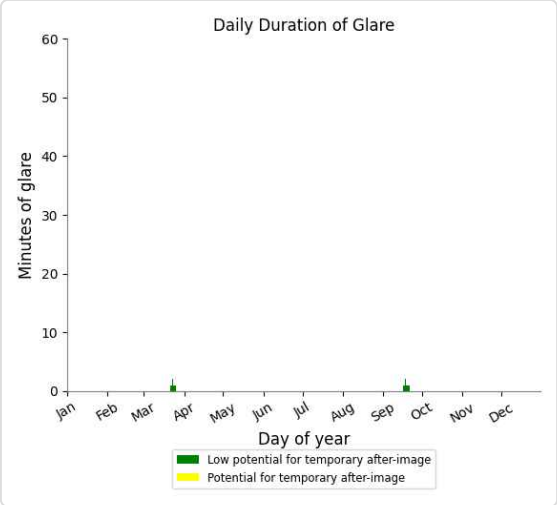


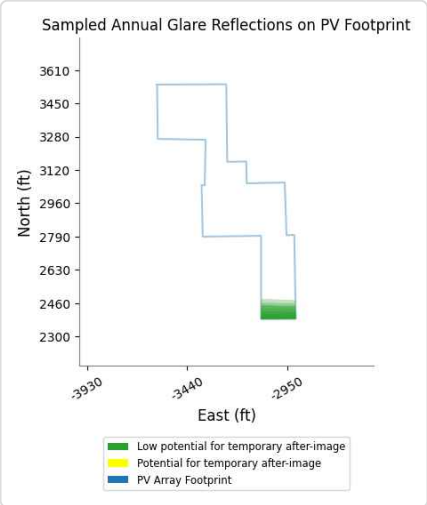


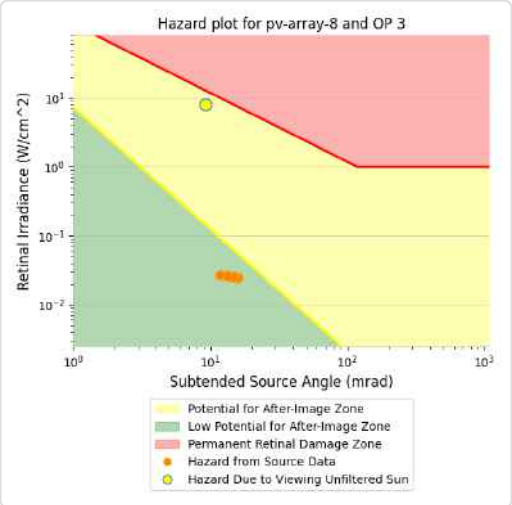
PV array 8 and OP 3

Receptor type: Observation Point
0 minutes of yellow glare
11 minutes of green glare









PV array 8 and OP 2

Receptor type: Observation Point
No glare found

PV array 8 and OP 4

Receptor type: Observation Point
No glare found

PV array 8 and OP 5

Receptor type: Observation Point
No glare found

PV array 8 and OP 6

Receptor type: Observation Point
No glare found

PV: PV array 9 potential temporary after-image

Receptor results ordered by category of glare

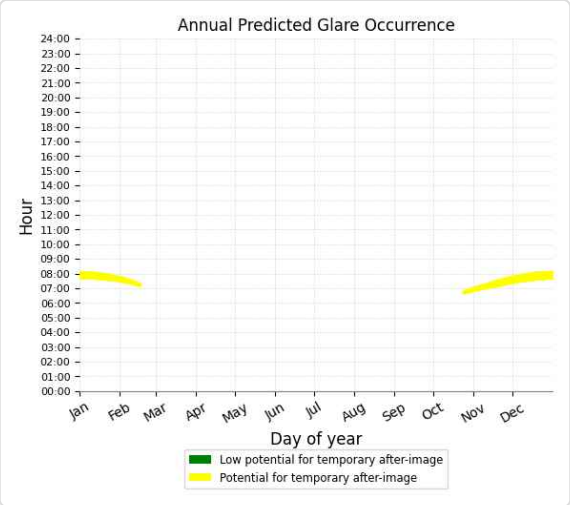
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Route 7	0	0.0	1,588	26.5
Route 1	0	0.0	0	0.0
Route 2	0	0.0	0	0.0
Route 3	0	0.0	0	0.0
Route 4	0	0.0	0	0.0
Route 5	0	0.0	0	0.0
Route 6	0	0.0	0	0.0
Route 8	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0

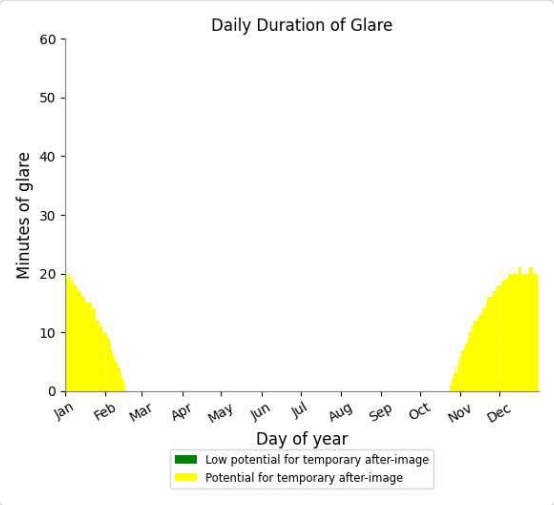
PV array 9 and Route 7

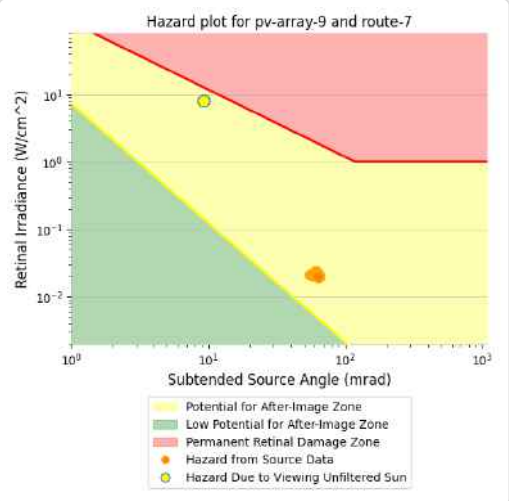
Receptor type: Route

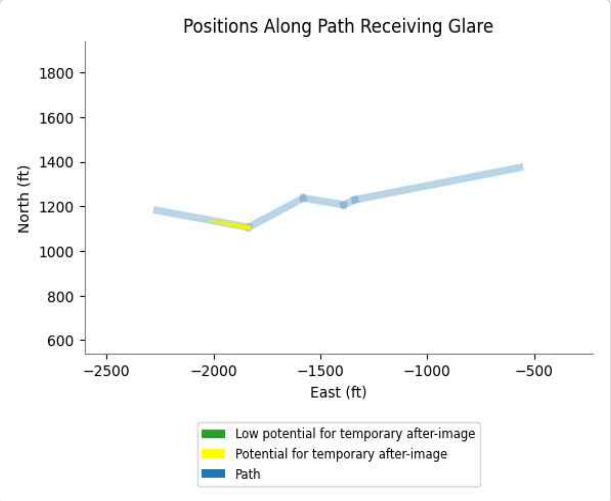
1,588 minutes of yellow glare

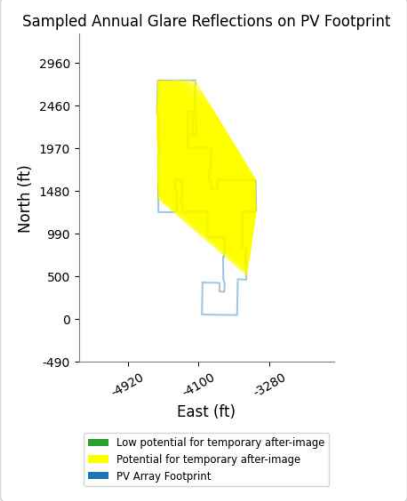
0 minutes of green glare











PV array 9 and Route 1

Receptor type: Route
No glare found

PV array 9 and Route 2

Receptor type: Route
No glare found

PV array 9 and Route 3

Receptor type: Route
No glare found

PV array 9 and Route 4

Receptor type: Route
No glare found

PV array 9 and Route 5

Receptor type: Route
No glare found

PV array 9 and Route 6

Receptor type: Route
No glare found

PV array 9 and Route 8

Receptor type: Route
No glare found

PV array 9 and OP 1

Receptor type: Observation Point
No glare found

PV array 9 and OP 2

Receptor type: Observation Point
No glare found

PV array 9 and OP 3

Receptor type: Observation Point
No glare found

PV array 9 and OP 4

Receptor type: Observation Point
No glare found

PV array 9 and OP 5

Receptor type: Observation Point
No glare found

PV array 9 and OP 6

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 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

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