# Appendix G

## Glint and Glare Assessment

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Goorambat East Solar Farm
Neoen Australia Pty Ltd
16-Aug-2019

# Glint and Glare Assessment

## Goorambat East Solar Farm

# Glint and Glare Assessment

Goorambat East Solar Farm

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# 1.0 Introduction

## 1.1 Background

AECOM Australia Pty Ltd (AECOM) has been commissioned by Neoen Australia Pty Ltd (the Client) to provide supporting information for a planning permit application which relates to the proposed development of a photovoltaic solar farm situated in Goorambat, Victoria. The proposed development will be called the Goorambat East Solar Farm (the Project) and will be sited within Goorambat locality, described in detail in Section 2.1.

As part of the planning permit application a Glint and Glare assessment must be undertaken to determine the likely impact of glint and glare from the proposed development on nearby sensitive receptors and identify appropriate, feasible and reasonable mitigation strategies if required.

The objectives of this study are as follows:

- Conduct a glare potential analysis of the proposed Goorambat East Solar Farm based on a single axis tracking system;
- Identify potential glare impacts at nominated observation points near the Project, and;
- Recommend improvements or mitigation options available to the Client to reduce glare issues that may impact the public.

This report details the key inputs, methodology and the results of this glare assessment.

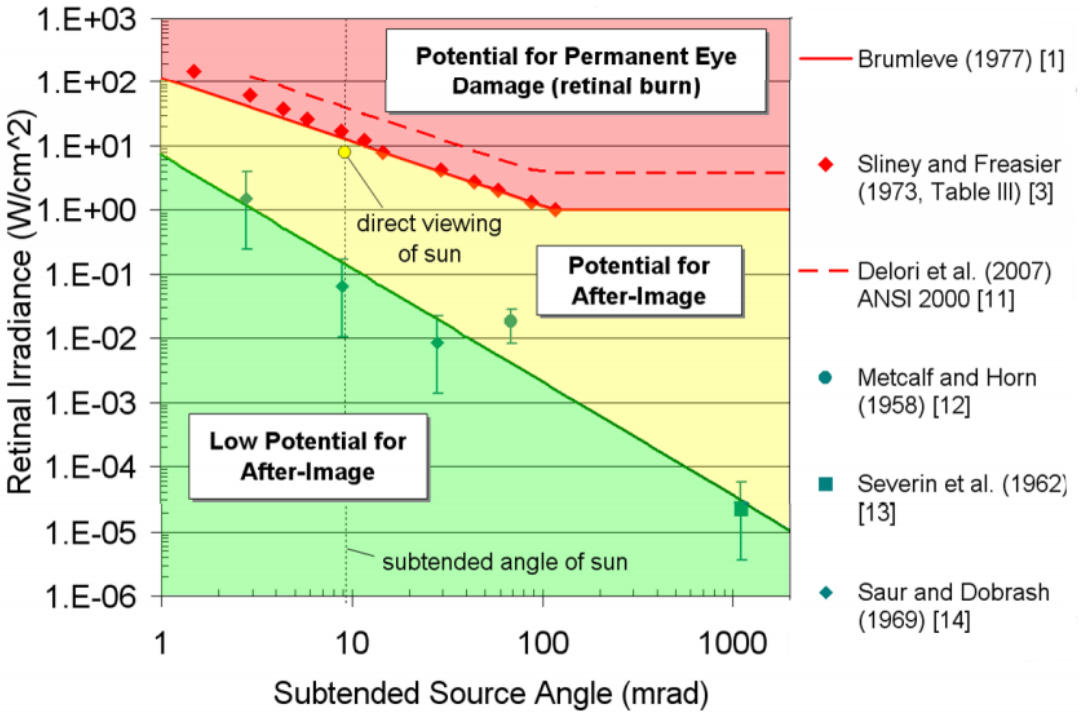
## 1.2 Glint and glare from solar panels

Glint and glare (referred to collectively in this report as glare) are caused by a significant contrast between a light source and background illuminance. Glare occurs over a continuous period while glint is a brief flash of light. Glint and glare can be hazardous when they affect critical operations like aviation. Aside from causing discomfort to the viewer, glare can be a source of distraction and can leave after-images in the viewer's vision.

The visual or ocular impact caused by glare is a function of the intensity of the glare source upon the retina (retinal irradiance) and the portion of a viewer's field of vision that the glare occupies (subtended source angle). This function is described in the glare hazard plot (refer Figure 1) which plots the risk of looking directly at the sun as a comparison.

In instances where glare is detected by the software, results of the assessment are shown graphically in the same manner.

**Figure 1 Glare hazard plot illustrating ocular impact as a function of retinal irradiance and subtended source angle[1]**




## 1.3 Civil Aviation Safety Authority requirements

The Civil Aviation Safety Regulations require that air traffic control towers are protected from glare. Through consultation with Air Services Australia (ASA) and the Civil Aviation Safety Authority (CASA), AECOM has been advised that there are no rules or regulations guiding the assessment of such glare. CASA therefore recommends that proponents of solar PV systems within or near airports follow the guidelines issued by the US Federal Aviation Administration (FAA) when making their assessments.

The FAA recommends that any proposed solar farms that are below the direct approach paths to an airport (aligned with a runway) and within a distance of around 5 nautical miles (approximately 10km) from a runway end should be referred for a specific assessment by the relevant authorities.

The FAA requires the use of Solar Glare Hazard Assessment Tool (SGHAT, currently marketed as GlareGauge) to demonstrate the impact of glare caused by PV systems proposed for installation on airports in the US[2]. CASA will typically not object to a solar farm if the glare analysis indicates that air traffic control (ATC) towers experience no glare and runway approaches experience at most “low potential for after-image” glare.

The nearest airstrip to Goorambat East Solar Farm is Benalla Airport at 17.1km to the south east. The physical distance makes it unlikely that the solar farm will cause any significant glare issues for pilots on approach or on departure from the airstrip. Accordingly, it is not deemed necessary to perform a specific assessment of aircraft flight paths in this study.

[1] Ho, C.K., Sims, C.A., Yellowhair, J., Bush, E. (2014), *Solar Glare Hazard Analysis Tool (SGHAT) Technical Reference Manual)*, Sandia National Laboratories and US Department of Energy.
[2] *Technical Guidance for Evaluating Selected Solar Technologies on Airports*, 2010, Federal Aviation Administration

# 2.0 Site Overview

## 2.1 Goorambat East Solar Farm

The Project is located approximately 12km north of Benalla, Victoria and 215km north east of Melbourne CBD, within the Goorambat locality. The solar farm is in early development stage with an initial total system capacity of around 250MW$_{DC}$ with an approximate area of 700 hectares. The array (the Site) is generally bound by Saunders Road and Thoona-Goorambat road to the northwest, Benalla-Tocumwal Road to the southwest, adjoining agricultural land and associated dwellings to the southeast, and Hooper Road to the northeast. The Site is traversed by Goorambat-Chesney Road and a railway track that runs northwest to southeast, as well as Spinks Lane that runs south west to north east and an existing power transmission line that runs east-west through the site.

Figure 2 shows the possible development area for Goorambat East Solar Farm.

Coordinates of the proposed solar farm development area are provided in the GlareGauge report attached in **Appendix B**.

**Figure 2 Proposed layout for Goorambat East Solar Farm**

# 3.0 Glare Analysis Software

## 3.1 Overview

AECOM has used the GlareGauge software marketed by ForgeSolar to undertake this glare analysis. GlareGauge's algorithms were developed by Sandia National Laboratories in its Solar Glare Hazard Analysis Tool (SGHAT).

GlareGauge employs an interactive Google Maps interface whereby the outline of the solar array can be manually drafted. It simulates an annual sun path based on the chosen location to calculate sun positions and vectors. GlareGauge requires a number of inputs regarding the characteristics of the solar PV systems including panel orientation, tracking type, slope and height above ground.

Glare hazard is determined based on the retinal irradiance and subtended angle described in Section 1.2. Glare hazards are defined according to the potential of the glare to impact vision as defined in Table 1.

**Table 1 Glare impact definitions**

| Colour Coding | Glare Impact Category | Definition |
|---|---|---|
| **Not shown on glare hazard plot** | No Glare Predicted | Indicates that no glare is expected at the observation points for the site configuration. |
| | | **This category is not shown on the glare hazard plot.** |
| **Not shown on glare hazard plot** | Glare beyond 50 degrees from pilot line-of-site on approach | Indicates that glare is present but will not cause a safety hazard to pilots according to recent research and flight simulator testing. |
| | | **This category is not shown on the glare hazard plot.** |
| **Green** | Low potential for after image | Indicates there is glare present however only a low potential for a temporary after-image (a lingering image of the glare in the field of view). |
| | | This category is shown green on the glare hazard plot. |
| **Yellow** | Potential for after image | Indicates that there is glare present with the potential to leave a temporary after-image of the glare. |
| | | This hazard is shown yellow on the glare hazard plot. |
| **Red** | Potential for permanent eye damage | Indicates that there is glare present with the potential for permanent eye damage if observed. |
| | | This hazard is shown red on the glare hazard plot. |

## 3.2 Assumptions

Glare hazard is difficult to define and is not the same for every person. It is dependent on a number of factors including reflectance parameters (light intensity, angle of reflectance etc.), the size of the glare source and the observer's distance from it, and ocular/eye parameters (pupil diameter, distance from the pupil to the retina, etc). Therefore, the following standard assumptions (default values within GlareGauge) have been made through the course of the analysis:

- The model assumes flat reflective surfaces and that light reflected by the solar panels is specular (i.e. the angle of incidence = the angle of reflection).
- The average subtended angle of the sun as viewed from earth is ~9.3 mrad or 0.5°.
- The ocular transmission coefficient accounts for radiation that is absorbed in the eye before reaching the retina. A value of 0.5 is typical[3].

[3] Solar Glare Hazard Analysis Tool (SGHAT) User's Manual v. 2H, Clifford K. Ho, Cianan A. Sims, Julius E. Yellowhair Sandia National Laboratories Updated 22/07/2015

- Diameter of the pupil – the size impacts the amount of light entering the eye and reaching the retina. The typical value is 0.002m for daylight-adjusted eyes
- Eye focal length: This value is used to determine the projected image size on the retina for a given subtended angle of the glare source. A typical value of 0.017 m is used
- Additionally, the PV array at each location is further split into smaller arrays for modelling purposes. PV array areas with small cut-outs are automatically filled in during modelling, meaning the modelled area would be larger than that in the design. Thus, to maintain accuracy, large PV arrays with cut-outs are modelled as multiple array areas instead.
- The entirety of the Site is assumed to be leased or owned by the Client for the duration of the project

## 3.3 Limitations

GlareGauge has the following limitations:

- The detailed geometry of the solar panel arrays is not rigorously represented, e.g. gaps between panels, detailed variations in height of the array and support structures.
- Obstacles (e.g. trees, vegetation buffers, structures or earth) between the observation points and the solar panel arrays that may obstruct observed glare are not considered. This results in a more conservative assessment.
- Directional viewpoints from each observation point are not defined. Instead the cumulative impact of the entire solar panel array on each observation point is calculated. In specific circumstances, this may lead to an overestimation of the extent of glare at a particular observation point.
- A typical clear-day solar irradiance profile (worst-case for glare) is used. The model profile has a lower irradiance level in the mornings and evenings and a maximum at solar noon. Actual irradiance levels and profile on any given day can be affected by cloud cover and other environmental factors, however this is not considered in this model.
- ForgeSolar utilises a simplified model of backtracking. Single axis trackers track the movement of the sun as it moves east to west throughout the day. Yield is maximised, and light reflection is minimised when panels are directly normal to the sun. During times of day when the sun is outside the tracking range, it is assumed that panels instantaneously revert to a pre-determined resting angle which is defined as 0° (panels assumed to lie flat). This results in a more conservative simulation of glare from the backtracking mechanism and will result in higher incidences of glare during sunset and sunrise, when the sun is at a lower angle relative to the array.

# 4.0 GlareGauge Inputs

The sections below detail the inputs applied by AECOM for analysis in GlareGauge. All azimuth values are relative to true north and all tilt angles relative to horizontal.

## 4.1 PV system parameters

An overview of the input data used for the modelling of the Goorambat East Solar Farm is shown in Table 2. Site specific inputs are detailed in Section 4.2. The boundaries of the system are based on the proposed development areas shown in Figure 2. If any of the development areas change it is recommended that the glare potential be reanalysed.

**Table 2 General PV system inputs for GlareGauge**

| Input Data | Units | Value | Comment |
|---|---|---|---|
| **General Project Parameters** | | | |
| Reflectivity calculations | - | Varies with incident angle | As incident angle increases, the reflectivity increases. |
| Reflection diffusion | - | Correlated to module surface type | Calculates the spread of the reflected beam according to the glass texturing and ARC. |
| Time zone | UTC | +10 | VIC time zone. |
| Peak DNI | $W/m^2$ | 1,170 | AECOM estimate. |
| Orientation of array | degrees | 0 | Rows aligned in north-south direction. |
| Solar panel surface material | - | Smooth glass without Anti-Reflective Coating (ARC) | Provided by Client. |
| Time interval | mins | 1 | Model interval throughout the year. |
| Mounting type | - | Single axis tracking | As per tracker datasheet |
| **Single Axis Tracking Parameters** | | | |
| Tilt of tracking axis | degrees | 0 | 0° = Facing upwards. Panels rotate during operation according to single axis tracking operation. |
| Orientation of tracking axis | degrees | 0 | 0°= Rows aligned north-south. |
| Offset angle of panel | degrees | 0 | Angle between tracking axis and panel. |
| Tracking Range | degrees | ±60º (range of 120º) | |
| Height of panel above ground | m | 2.2 | Post height from ground measured to the point of tracking rotation as per tracker datasheet. |

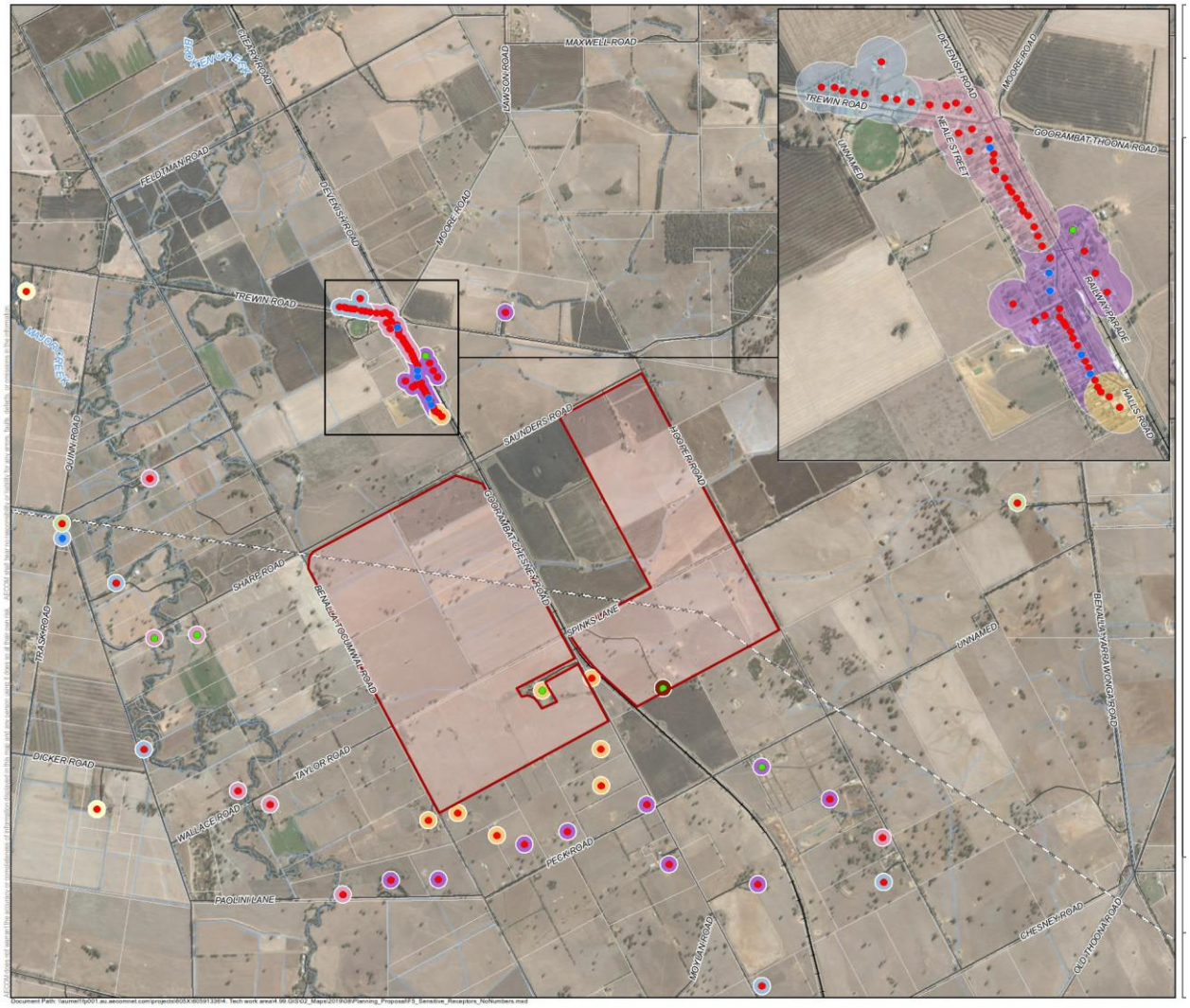
## 4.2 Observation Point and Route Receptor Locations

AECOM input observation points (OPs) and route receptor locations for each site into GlareGauge. These points were identified as potential areas where glare could impact the residents or drivers. Glare was assessed at each of the observation points and route receptors, assuming the observer was 1.5 m above ground which is assumed to be the typical viewing height whilst standing or driving. The route receptors also assume a view angle of 50 degrees (field of view (FOV) of observer to the left and

right in the direction of travel). FAA research suggests glare outside 50-degree FOV has no impact on the receptor[4].

The OPs are shown as red markers in Figure 3. Similarly, nearby roads and railways (termed route receptors, or RR) are shown as grey lines in Figure 3. A table of OP and RR coordinates is provided in the GlareGauge reports.

**Figure 3 Observation points and route receptors analysed**




[4] *Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach* (Report DOT/FAA/AM-15/12). Retrieved from: https://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2010s/media/201512.pdf

# 5.0 Results

## 5.1 Summary of results

An overview of the results for the Goorambat East Solar Farm from the glare analysis, presented as **total annual minutes of glare** for each observation point and route receptor, is provided in Table 3. Varying levels of glare have been predicted for the observation points and route receptors analysed.

**Table 3 Total annual minutes of glare caused by PV array**

| Observation Point | Low potential for after image (min/year) | Potential for after image (min/year) | Potential for permanent eye damage (min/year) | Hazard Summary |
|---|---|---|---|---|
| OP-1 | 139 | 4,752 | 0 | **Yellow** Glare with potential for after image |
| OP-2 | 286 | 4,092 | 0 | **Yellow** Glare with potential for after image |
| OP-3 | 420 | 3,816 | 0 | **Yellow** Glare with potential for after image |
| OP-4 | 686 | 3,046 | 0 | **Yellow** Glare with potential for after image |
| OP-5 | 170 | 3,068 | 0 | **Yellow** Glare with potential for after image |
| OP-6 | 43 | 5,374 | 0 | **Yellow** Glare with potential for after image |
| OP-7 | 0 | 6,292 | 0 | **Yellow** Glare with potential for after image |
| OP-8 | 0 | 10,851 | 0 | **Yellow** Glare with potential for after image |
| OP-9 | 0 | 1,993 | 0 | **Yellow** Glare with potential for after image |
| OP-10 | 153 | 13,465 | 0 | **Yellow** Glare with potential for after image |
| OP-11 | 1 | 7,775 | 0 | **Yellow** Glare with potential for after image |
| OP-12 | 77 | 893 | 0 | **Yellow** Glare with potential for after image |
| OP-13 | 124 | 1,990 | 0 | **Yellow** Glare with potential for after image |
| OP-14 | 4 | 21 | 0 | **Yellow** Glare with potential for after image |
| OP-15 | 0 | 0 | 0 | No glare predicted |

| Observation Point | Low potential for after image (min/year) | Potential for after image (min/year) | Potential for permanent eye damage (min/year) | Hazard Summary |
|---|---|---|---|---|
| OP-16 | 371 | 2,211 | 0 | **Yellow** Glare with potential for after image |
| OP-17 | 23 | 5,906 | 0 | **Yellow** Glare with potential for after image |
| OP-18 | 0 | 1,908 | 0 | **Yellow** Glare with potential for after image |
| OP-19 | 0 | 1,799 | 0 | **Yellow** Glare with potential for after image |
| OP-20 | 0 | 0 | 0 | No glare predicted |
| OP-21 | 214 | 401 | 0 | **Yellow** Glare with potential for after image |
| OP-22 | 543 | 1,651 | 0 | **Yellow** Glare with potential for after image |
| OP-23 | 603 | 2,998 | 0 | **Yellow** Glare with potential for after image |
| OP-24 | 707 | 3,154 | 0 | **Yellow** Glare with potential for after image |
| OP-25 | 508 | 2,970 | 0 | **Yellow** Glare with potential for after image |
| OP-26 | 807 | 2,529 | 0 | **Yellow** Glare with potential for after image |
| OP-27 | 837 | 874 | 0 | **Yellow** Glare with potential for after image |
| OP-28 | 484 | 3,488 | 0 | **Yellow** Glare with potential for after image |
| OP-29 | 199 | 3,265 | 0 | **Yellow** Glare with potential for after image |
| OP-30 | 317 | 639 | 0 | **Yellow** Glare with potential for after image |
| OP-31 | 352 | 833 | 0 | **Yellow** Glare with potential for after image |
| OP-32 | 398 | 1,038 | 0 | **Yellow** Glare with potential for after image |
| OP-33 | 639 | 137 | 0 | **Yellow** Glare with potential for after image |
| OP-34 | 0 | 0 | 0 | No glare predicted |

| Observation Point | Low potential for after image (min/year) | Potential for after image (min/year) | Potential for permanent eye damage (min/year) | Hazard Summary |
|---|---|---|---|---|
| OP-35 | 96 | 162 | 0 | **Yellow** Glare with potential for after image |
| OP-36 | 28 | 58 | 0 | **Yellow** Glare with potential for after image |
| OP-37 | 0 | 0 | 0 | No glare predicted |
| OP-38 | 0 | 0 | 0 | No glare predicted |
| OP-39 | 0 | 0 | 0 | No glare predicted |
| OP-40 | 0 | 0 | 0 | No glare predicted |
| OP-41 | 1 | 0 | 0 | **Green** Low potential for temporary after image |
| OP-42 | 0 | 176 | 0 | **Yellow** Glare with potential for after image |
| Benalla-Tocumwal Road | 0 | 11,778 | 0 | **Yellow** Glare with potential for after image |
| Benalla-Yarrawonga Road | 0 | 0 | 0 | No glare predicted |
| Goorambat-Chesney Road | 67,643 | 196,961 | 0 | **Yellow** Glare with potential for after image |
| Paolini Lane | 0 | 0 | 0 | No glare predicted |
| Peck Road | 51 | 2,493 | 0 | **Yellow** Glare with potential for after image |
| Quinn Road | 0 | 0 | 0 | No glare predicted |
| Railway Track | 0 | 24,623 | 0 | **Yellow** Glare with potential for after image |
| Sharp Road | 1037 | 47,542 | 0 | **Yellow** Glare with potential for after image |
| Taylor Road | 0 | 0 | 0 | No glare predicted |
| Trask Road | 0 | 0 | 0 | No glare predicted |
| Trewin Road | 18 | 59,542 | 0 | **Yellow** Glare with potential for after image |
| Wilson Road | 0 | 0 | 0 | No glare predicted |

## 5.2 Cumulative Impact of Solar Farm Developments

Planning permission was recently granted to Goorambat Solar Farm (South Energy Project) and the planning application was made publicly available by the Benalla Rural City Council during the public notification period. The Goorambat Solar Farm is located at Allotment 59 Sharp Road, Goorambat, Victoria which neighbours the Site. It is a single-axis tracking system with a proposed capacity of 77MWDC/66MWAC.

A glint and glare assessment was undertaken for Goorambat Solar Farm and the report was viewed by AECOM during the public consultation period. Based on the system location and configuration of Goorambat Solar farm described in that report, AECOM expects that the cumulative duration of glare for selected OPs and RRs may increase beyond the results noted in this report, but that the intensity of glare is not expected to exceed beyond yellow glare (glare with moderate potential for after image).

# 6.0 Recommendations and Mitigation Options

## 6.1 Summary of Recommendations

The modelling results show that a number of OPs and RRs are predicted to experience glare with low to moderate potential for after image during various times of the day. This section summarises the results with suggestions for glare mitigation for each OP and RR that was shown to potentially experience glare. These recommendations should be considered during detailed design and further discussion of these findings can be found in **Appendix A**.

**Table 4 Summary of glare mitigation strategies**

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| OP-1 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-7PM from February to October | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-2 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-7PM from March to September | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-3 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-7PM from March to September | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-4 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-7PM from April to September | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-5 | **Yellow** Glare with potential for after image | For up to 25 minutes between 4PM-7PM from April to August | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-6 | **Yellow** Glare with | For up to 25 minutes between | Limited existing vegetation | Assess the effectiveness of existing |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| | potential for after image | 4PM-7PM from March to September | | vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-7 | **Yellow** Glare with potential for after image | For up to 30 minutes between 4PM-7PM from March to October | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-8 | **Yellow** Glare with potential for after image | For up to 35 minutes between 4PM-8PM from January to November | NA | Consider planting screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-9 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-6PM from April to August | NA | Consider planting screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP 10 | **Yellow** Glare with potential for after image | For up to 75 minutes between 6AM-8AM and between 3:30PM-8PM throughout the year | Within array area which will be leased by the Client | None suggested |
| OP-11 | **Yellow** Glare with potential for after image | For up to 30 minutes between 4PM-8PM throughout the year | NA | Consider planting additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-12 | **Yellow** Glare with potential for after image | For up to 25 minutes between 7AM-8AM from June to July | NA | Consider planting additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-13 | **Yellow** Glare with potential for after image | For up to 20 minutes between 7AM-8AM from May to July | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern and western border of the |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| | | | | Site if appropriate. |
| OP-14 | **Yellow** Glare with potential for after image | For up to 4 minutes between 7AM-8AM from June to July | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern and western border of the Site if appropriate. |
| OP-16 | **Yellow** Glare with potential for after image | For up to 20 minutes between 5PM-8PM from January to April and from September to December | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-17 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-8PM throughout the year | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the various borders of the Site if appropriate. |
| OP-18 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-6PM from April to September | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| OP-19 | **Yellow** Glare with potential for after image | For up to 20 minutes between 4PM-6PM from April to August | NA | Consider planting additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate |
| OP-21 | **Yellow** Glare with potential for after image | For up to 15 minutes between 7AM-8AM from May to July | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern and western border of the Site if appropriate. |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| OP-22 | **Yellow** Glare with potential for after image | For up to 15 minutes between 7AM-8AM from May to August | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-23 | **Yellow** Glare with potential for after image | For up to 15 minutes between 6AM-8AM from March to September | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-24 | **Yellow** Glare with potential for after image | For up to 15 minutes between 6AM-8AM from March to October | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-25 | **Yellow** Glare with potential for after image | For up to 15 minutes between 6AM-8AM from March to October | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-26 | **Yellow** Glare with potential for after image | For up to 15 minutes between 5AM-8AM from February to October | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-27 | **Yellow** Glare with potential for after image | For up to 10 minutes between 6AM-8AM from March to October | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-28 | **Yellow** Glare with potential for after image | For up to 15 minutes between 5AM-8AM throughout the year | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| | | | | mesh screening along the western border of the Site if appropriate. |
| OP-29 | **Yellow** Glare with potential for after image | For up to 15 minutes between 5AM-8AM throughout the year | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the western border of the Site if appropriate. |
| OP-30 | **Yellow** Glare with potential for after image | For up to 10 minutes between 6AM-8AM from March to May and from July to October | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the northern and western border of the Site if appropriate. |
| OP-31 | **Yellow** Glare with potential for after image | For up to 10 minutes between 5AM-7AM from January to April and from August to December | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the northern and western border of the Site if appropriate. |
| OP-32 | **Yellow** Glare with potential for after image | For up to 10 minutes between 5AM-7AM from January to March and from August to December | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the northern and western border of the Site if appropriate. |
| OP-33 | **Yellow** Glare with potential for after image | For up to 10 minutes between 5AM-7AM from January to March and from October to December | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the northern and western border of the Site if appropriate. |
| OP-35 | **Yellow** Glare with potential for after image | For up to 10 minutes between 4:30AM-6AM in January and from November to December | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| | | | | the northern border of the Site if appropriate. |
| OP-36 | **Yellow** Glare with potential for after image | For up to 10 minutes between 4:30AM-6AM in January and from November to December | Some existing vegetation and other obstacles | Assess the effectiveness of existing vegetation and other obstacles and consider additional screening vegetation or installing mesh screening along the northern border of the Site if appropriate. |
| OP-41 | **Green** Low potential for temporary after image | For 1 minute between 5AM-6AM in December | Some existing vegetation and other obstacles | None suggested due to the low duration of low hazard glare and the existence of vegetation and other obstacles. |
| OP-42 | **Yellow** Glare with potential for after image | For up to 10 minutes between 4PM-6PM from May to July | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| Benalla-Tocumwal Road | **Yellow** Glare with potential for after image | For up to 45 minutes between 5AM-9AM throughout the year | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along various borders of the Site if appropriate. |
| Goorambat-Chesney Road | **Yellow** Glare with potential for after image | For over 700 minutes between 5AM-8PM throughout the year | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along various borders of the Site if appropriate. |
| Peck Road | **Yellow** Glare with potential for after image | For up to 15 minutes between 4PM-8PM from February to November | Existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along the southern border of the Site if appropriate. |
| Railway Track | **Yellow** Glare with potential for after image | For up to 75 minutes between 8AM-9AM and between 5PM-8PM throughout | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing |

| Observation Point/Route Receptor | Glare Hazard | Time of Day | Existing Mitigation | Suggested Mitigation |
|---|---|---|---|---|
| | | the year | | mesh screening along various borders of the Site if appropriate. |
| Sharp Road | **Yellow** Glare with potential for after image | For up to 200 minutes between 4:30AM-8:30AM and between 4PM-8PM throughout the year | Limited existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along various borders of the Site if appropriate. |
| Trewin Road | **Yellow** Glare with potential for after image | For up to 150 minutes between 5AM-8AM and between 4PM-8PM throughout the year | Some existing vegetation | Assess the effectiveness of existing vegetation and consider additional screening vegetation or installing mesh screening along eastern border of the Site if appropriate. |

# 7.0 Conclusions

AECOM conducted a glare hazard analysis for the proposed Goorambat East Solar Farm as detailed in this report. The results of the analysis identified that for Goorambat East Solar Farm, glare with low to moderate potential for after image is predicted to occur under the configuration and operation regime detailed in this report. Measures to reduce glare were discussed for observation points and route receptors identified to be potentially affected by low to moderate potential hazard glare. These mitigation strategies include installing screening or planting additional vegetation along the border of the solar array area.

The glare model developed for the Project assumes the solar array is installed as in Figure 2 and the entire development area is considered a potential glare source. The model includes conservative assumptions (i.e. a high irradiance) and does not consider any vegetation, buildings or topographical features that may exist between the solar panel arrays and the observation points.

The GlareGauge model is unable to accurately account for the backtracking operation of the tracker, where the actual glare may exceed the values reported herein during the early morning and late afternoon. The software is able to run a simplified model of backtracking, whereby the panels are modelled to revert to a pre-determined resting angle when the angle of the sun is outside of the tracking range. This resting angle was set at 0° to maintain conservativeness.

# Appendix A

## Discussion of Results

# Appendix A Discussion of Results

## Glare occurring north of Site boundary

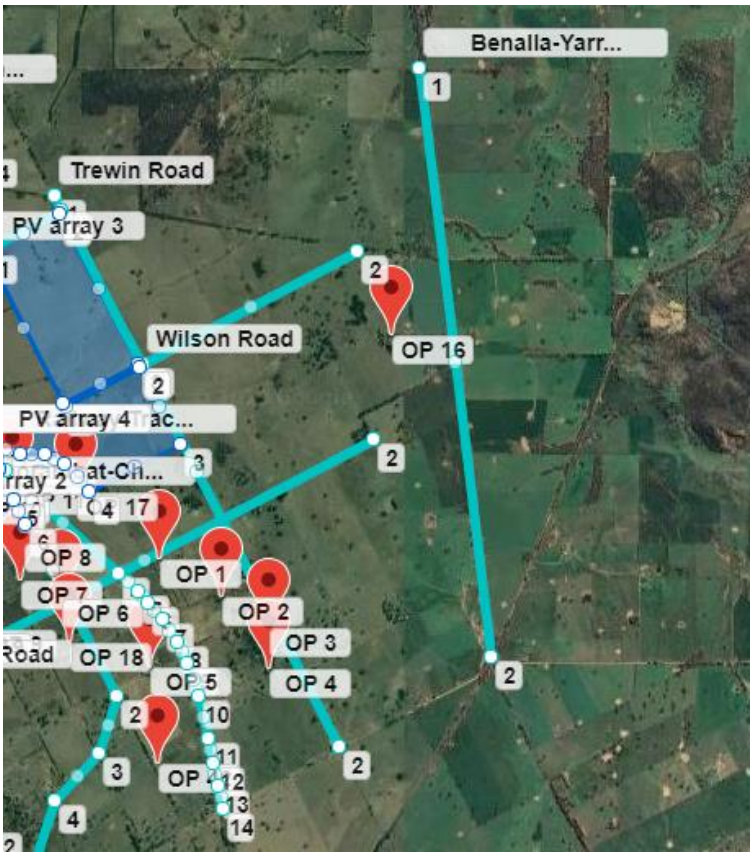
The GlareGauge modelling results indicated that a number of OPs and RRs located to the north of the Site as shown in Figure 4 is predicted to experience glare with low to moderate hazard potential at various times of the year. The glare is predicted to occur in the early morning when backtracking would typically occur. As described in Section 3.3, the GlareGauge software runs a simplified model of backtracking which may overpredict the incidence of glare when the sun is low in the sky. It is recommended to assess the effectiveness of existing vegetation between the northern border of the array and the OPs and RRs in screening potential glare. Where the screening is insufficient to mitigate the glare, additional screening measures should be implemented. This can include additional vegetation or installing mesh screening along the northern border of the array.

**Figure 4 OPs and RRs located north of the Site**


## Glare occurring east of Site boundary

The GlareGauge results show that OP-16, located to the east of the Site as shown in Figure 5, is predicted to experience glare with low to moderate hazard potential between in the late afternoon, indicating that some of the glare may be potentially over-predicted due to the conservative modelling of glare during typical backtracking times. It is recommended to assess the effectiveness of existing vegetation surrounding OP-16 and located between the eastern boundary of the array and the OP in mitigating potential glare. Where the existing vegetation is insufficient to mitigate the glare, additional screening measures should be implemented. This can include planting a screening vegetation buffer or installing mesh screens along the eastern boundary of the array.

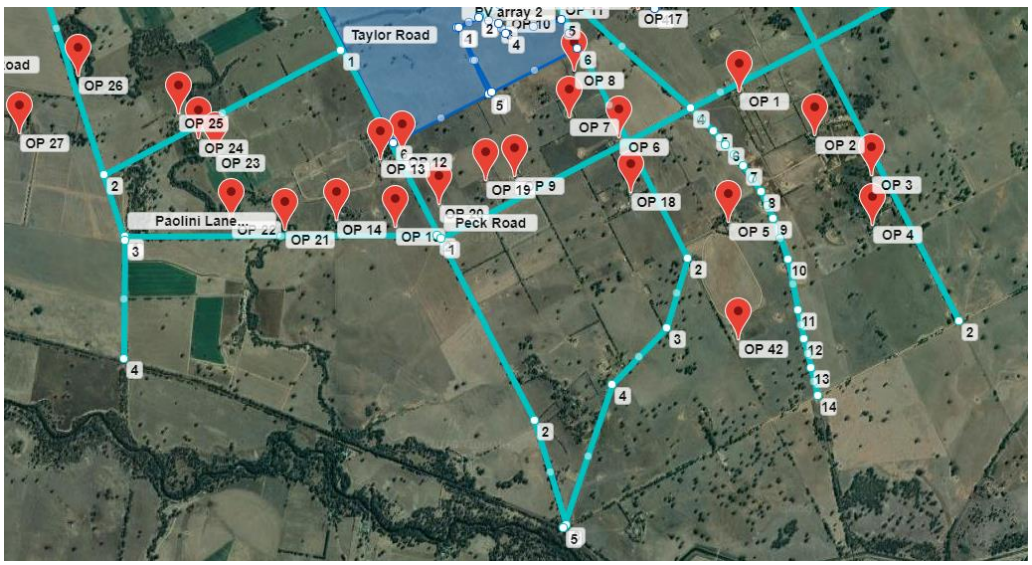
**Figure 5 Location of OP-16**




## Glare occurring south of Site boundary

The GlareGauge results show that a number of OPs and RRs located to the south of the Site boundary as shown in Figure 6 are predicted to experience low to moderate hazard potential glare at various times in the year. It is recommended to assess the effectiveness of existing vegetation located between the OPs and RRs and the array boundary in mitigating potential glare. Where the existing vegetation is insufficient to mitigate the glare, additional screening measures should be implemented. This can include planting a screening vegetation buffer or installing mesh screens along the southern boundary of the array.

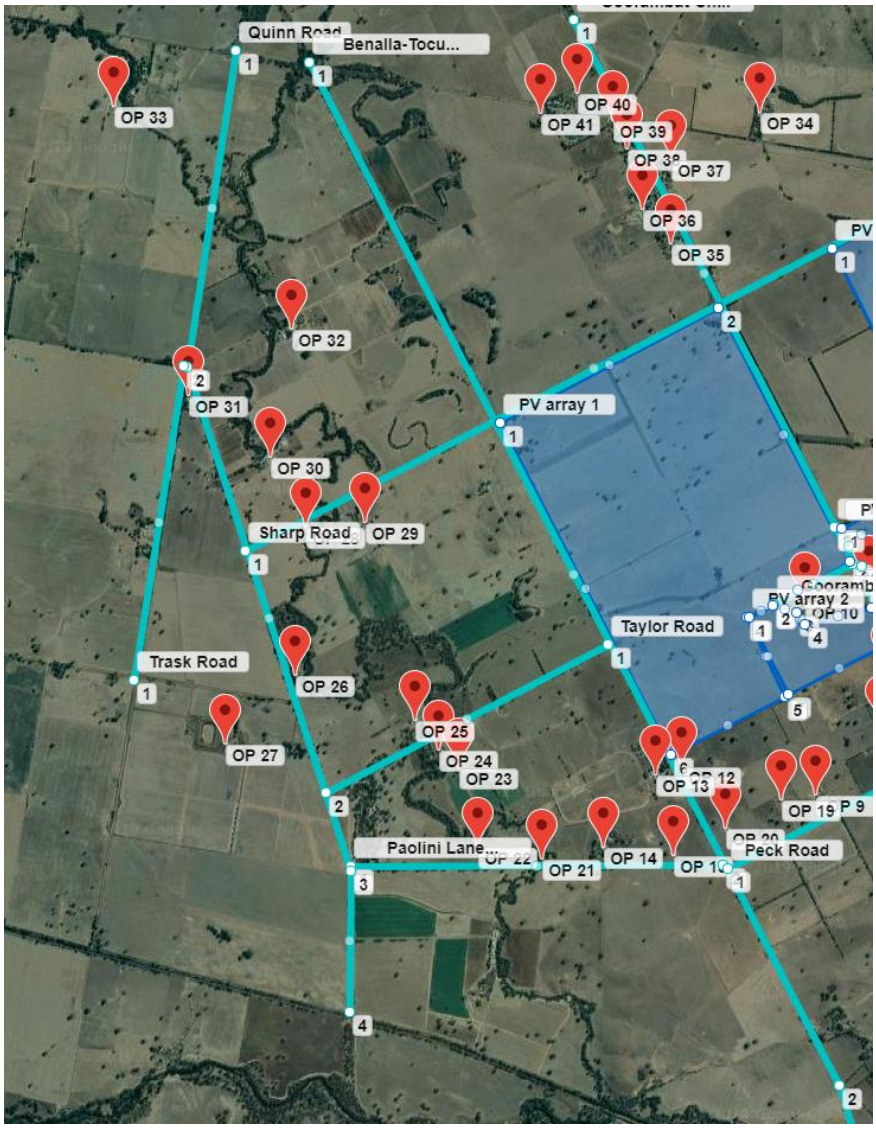
**Figure 6 OPs and RRs south of the Site**



## Glare occurring west of Site boundary

The GlareGauge modelling results show that a number of OPs located to the west of the Site boundary as shown in Figure 7 are predicted to experience glare with low to moderate potential glare hazard in the morning at various times throughout the year. It is noted that the duration in intensity of glare occurring in the early morning may be over-predicted due to the conservative modelling of backtracking when the sun is low in the sky. It is recommended to assess the effectiveness of existing vegetation located between the OPs and RRs and the array boundary in mitigating potential glare. Where the existing vegetation is insufficient to mitigate the glare, additional screening measures should be implemented. This can include planting a screening vegetation buffer or installing mesh screens along the western boundary of the array.

**Figure 7 OPs and RRs west of the Site**



# Appendix B

## GlareGauge Report

# GlareGauge Glare Analysis Results

## Site Configuration: Eastern Front v3

Project site configuration details and results.


Created **Aug. 5, 2019 11:58 p.m.**
Updated **Aug. 6, 2019 1:14 a.m.**
DNI **varies** and peaks at **1,170.0 W/m^2**
Analyze every **1** minute(s)
**0.5** ocular transmission coefficient
**0.002 m** pupil diameter
**0.017 m** eye focal length
**9.3 mrad** sun subtended angle
Timezone **UTC10**
Site Configuration ID: 30098.4538

## Summary of Results

Glare with potential for temporary after-image predicted

| PV name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 68,680 | 314,031 | - |
| PV array 2 | SA tracking | SA tracking | 4,489 | 43,156 | - |
| PV array 3 | SA tracking | SA tracking | 1,308 | 53,723 | - |
| PV array 4 | SA tracking | SA tracking | 3,502 | 35,654 | - |

## Component Data

### PV Array(s)

**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

**Name**: PV array 1
**Axis tracking**: Single-axis rotation
**Tracking axis orientation**: 0.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg
**Resting angle**: 0.0 deg
**Rated power**: -
**Panel material**: Smooth glass without AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 6.55 mrad

| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.424578 | 145.911832 | 155.14 | 2.20 | 157.34 |
| 2 | -36.417896 | 145.927603 | 160.53 | 2.20 | 162.73 |
| 3 | -36.432710 | 145.937152 | 164.01 | 2.20 | 166.21 |
| 4 | -36.435904 | 145.929641 | 158.28 | 2.20 | 160.48 |
| 5 | -36.440530 | 145.932463 | 162.37 | 2.20 | 164.57 |
| 6 | -36.443939 | 145.924202 | 164.63 | 2.20 | 166.83 |


**Name**: PV array 2
**Axis tracking**: Single-axis rotation
**Tracking axis orientation**: 0.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg
**Resting angle**: 0.0 deg
**Rated power**: -
**Panel material**: Smooth glass without AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 6.55 mrad

| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.435930 | 145.929845 | 158.50 | 2.20 | 160.70 |
| 2 | -36.435248 | 145.931530 | 160.19 | 2.20 | 162.39 |
| 3 | -36.435658 | 145.933257 | 163.96 | 2.20 | 166.16 |
| 4 | -36.436318 | 145.933858 | 163.35 | 2.20 | 165.55 |
| 5 | -36.435343 | 145.938718 | 161.32 | 2.20 | 163.52 |
| 6 | -36.437380 | 145.940027 | 164.76 | 2.20 | 166.96 |
| 7 | -36.440435 | 145.932656 | 162.24 | 2.20 | 164.44 |

**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

**Name**: PV array 3
**Axis tracking**: Single-axis rotation
**Tracking axis orientation**: 0.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg
**Resting angle**: 0.0 deg
**Rated power**: -
**Panel material**: Smooth glass without AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 6.55 mrad

| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.414428 | 145.935834 | 178.91 | 2.20 | 181.11 |
| 2 | -36.411216 | 145.943624 | 193.36 | 2.20 | 195.56 |
| 3 | -36.423942 | 145.951842 | 177.39 | 2.20 | 179.59 |
| 4 | -36.427240 | 145.943881 | 170.00 | 2.20 | 172.20 |


**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

**Name**: PV array 4
**Axis tracking**: Single-axis rotation
**Tracking axis orientation**: 0.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg
**Resting angle**: 0.0 deg
**Rated power**: -
**Panel material**: Smooth glass without AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 6.55 mrad

| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.430732 | 145.936532 | 163.43 | 2.20 | 165.63 |
| 2 | -36.424219 | 145.952014 | 177.35 | 2.20 | 179.55 |
| 3 | -36.430676 | 145.956262 | 181.27 | 2.20 | 183.47 |
| 4 | -36.434612 | 145.946724 | 172.81 | 2.20 | 175.01 |
| 5 | -36.432264 | 145.944053 | 167.76 | 2.20 | 169.96 |
| 6 | -36.431453 | 145.942014 | 166.52 | 2.20 | 168.72 |
| 7 | -36.431453 | 145.939407 | 165.91 | 2.20 | 168.11 |


## Route Receptor(s)

**Name**: Benalla-Tocumwal Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.403629 | 145.897973 | 156.20 | 1.50 | 157.70 |
| 2 | -36.463178 | 145.936346 | 162.57 | 1.50 | 164.07 |
| 3 | -36.470425 | 145.939136 | 168.64 | 1.50 | 170.14 |

**Name**: Benalla-Yarrawonga Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.398852 | 145.981369 | 183.82 | 1.50 | 185.32 |
| 2 | -36.448682 | 145.988893 | 182.59 | 1.50 | 184.09 |

**Name**: Goorambat-Chesney Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.401079 | 145.917148 | 157.21 | 1.50 | 158.71 |
| 2 | -36.430642 | 145.936117 | 162.88 | 1.50 | 164.38 |
| 3 | -36.432938 | 145.937994 | 163.87 | 1.50 | 165.37 |
| 4 | -36.441544 | 145.949820 | 171.64 | 1.50 | 173.14 |
| 5 | -36.443100 | 145.951791 | 173.37 | 1.50 | 174.87 |
| 6 | -36.444070 | 145.952858 | 176.04 | 1.50 | 177.54 |
| 7 | -36.445496 | 145.954365 | 175.82 | 1.50 | 177.32 |
| 8 | -36.447342 | 145.955953 | 177.40 | 1.50 | 178.90 |
| 9 | -36.449189 | 145.957004 | 176.18 | 1.50 | 177.68 |
| 10 | -36.451988 | 145.958220 | 177.82 | 1.50 | 179.32 |
| 11 | -36.455543 | 145.959121 | 168.54 | 1.50 | 170.04 |
| 12 | -36.457563 | 145.959657 | 168.68 | 1.50 | 170.18 |
| 13 | -36.459530 | 145.960258 | 166.89 | 1.50 | 168.39 |
| 14 | -36.461463 | 145.960795 | 163.55 | 1.50 | 165.05 |

**Name**: Goorambat-Chesney Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.435147 | 145.931656 | 160.38 | 1.50 | 161.88 |
| 2 | -36.432817 | 145.937278 | 163.98 | 1.50 | 165.48 |

**Name**: Paolini Lane
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.450408 | 145.900988 | 159.30 | 1.50 | 160.80 |
| 2 | -36.450373 | 145.927982 | 168.90 | 1.50 | 170.40 |

**Name**: Peck Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.450571 | 145.928304 | 168.02 | 1.50 | 169.52 |
| 2 | -36.430314 | 145.976562 | 204.54 | 1.50 | 206.04 |

**Name**: Quinn Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.402895 | 145.892720 | 151.67 | 1.50 | 153.17 |
| 2 | -36.421338 | 145.889158 | 152.58 | 1.50 | 154.08 |
| 3 | -36.450697 | 145.900974 | 159.51 | 1.50 | 161.01 |
| 4 | -36.458912 | 145.900889 | 163.57 | 1.50 | 165.07 |

**Name**: Railway Track
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.430676 | 145.936066 | 162.79 | 1.50 | 164.29 |
| 2 | -36.451963 | 145.949614 | 180.49 | 1.50 | 181.99 |
| 3 | -36.456796 | 145.947768 | 179.14 | 1.50 | 180.64 |
| 4 | -36.460727 | 145.943076 | 190.50 | 1.50 | 192.00 |
| 5 | -36.470682 | 145.938894 | 169.09 | 1.50 | 170.59 |

**Name**: Sharp Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.432029 | 145.893369 | 155.62 | 1.50 | 157.12 |
| 2 | -36.410861 | 145.943837 | 195.91 | 1.50 | 197.41 |

**Name**: Taylor Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.437500 | 145.919632 | 159.87 | 1.50 | 161.37 |
| 2 | -36.446166 | 145.899204 | 155.95 | 1.50 | 157.45 |

**Name**: Trask Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.439581 | 145.885267 | 154.18 | 1.50 | 155.68 |
| 2 | -36.421281 | 145.888872 | 152.67 | 1.50 | 154.17 |

**Name**: Trewin Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.409735 | 145.943020 | 193.87 | 1.50 | 195.37 |
| 2 | -36.456271 | 145.973011 | 172.96 | 1.50 | 174.46 |

**Name**: Wilson Road
**Route type** Two-way
**View angle**: 50.0 deg


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | -36.423870 | 145.952323 | 177.37 | 1.50 | 178.87 |
| 2 | -36.414330 | 145.974864 | 189.54 | 1.50 | 191.04 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | -36.440404 | 145.954082 | 185.29 | 1.50 | 186.79 |
| OP 2 | -36.443482 | 145.960588 | 200.53 | 1.50 | 202.03 |
| OP 3 | -36.446186 | 145.965494 | 217.13 | 1.50 | 218.63 |
| OP 4 | -36.449633 | 145.965526 | 196.12 | 1.50 | 197.62 |
| OP 5 | -36.449443 | 145.953092 | 194.44 | 1.50 | 195.94 |
| OP 6 | -36.443595 | 145.943689 | 176.74 | 1.50 | 178.24 |
| OP 7 | -36.442186 | 145.939381 | 167.71 | 1.50 | 169.21 |
| OP 8 | -36.438973 | 145.939780 | 166.17 | 1.50 | 167.67 |
| OP 9 | -36.446271 | 145.934665 | 169.23 | 1.50 | 170.73 |
| OP 10 | -36.435006 | 145.933902 | 166.97 | 1.50 | 168.47 |
| OP 11 | -36.434074 | 145.938532 | 165.55 | 1.50 | 167.05 |
| OP 12 | -36.444646 | 145.924946 | 164.37 | 1.50 | 165.87 |
| OP 13 | -36.445088 | 145.923088 | 165.78 | 1.50 | 167.28 |
| OP 14 | -36.449330 | 145.919318 | 163.34 | 1.50 | 164.84 |
| OP 15 | -36.449823 | 145.924329 | 165.33 | 1.50 | 166.83 |
| OP 16 | -36.421474 | 145.978373 | 195.17 | 1.50 | 196.67 |
| OP 17 | -36.434672 | 145.945270 | 169.11 | 1.50 | 170.61 |
| OP 18 | -36.447402 | 145.944692 | 173.61 | 1.50 | 175.11 |
| OP 19 | -36.446564 | 145.932147 | 174.15 | 1.50 | 175.65 |
| OP 20 | -36.448188 | 145.928136 | 172.44 | 1.50 | 173.94 |
| OP 21 | -36.450038 | 145.914800 | 162.38 | 1.50 | 163.88 |
| OP 22 | -36.449318 | 145.910200 | 160.32 | 1.50 | 161.82 |
| OP 23 | -36.444706 | 145.908799 | 159.40 | 1.50 | 160.90 |
| OP 24 | -36.443679 | 145.907360 | 159.97 | 1.50 | 161.47 |
| OP 25 | -36.441914 | 145.905632 | 159.10 | 1.50 | 160.60 |
| OP 26 | -36.439310 | 145.896989 | 159.71 | 1.50 | 161.21 |
| OP 27 | -36.443342 | 145.891953 | 156.39 | 1.50 | 157.89 |
| OP 28 | -36.430709 | 145.897764 | 159.84 | 1.50 | 161.34 |
| OP 29 | -36.430423 | 145.902023 | 157.42 | 1.50 | 158.92 |
| OP 30 | -36.426607 | 145.895199 | 155.21 | 1.50 | 156.71 |
| OP 31 | -36.423003 | 145.889282 | 156.62 | 1.50 | 158.12 |
| OP 32 | -36.419174 | 145.896712 | 156.51 | 1.50 | 158.01 |
| OP 33 | -36.406178 | 145.883832 | 151.48 | 1.50 | 152.98 |
| OP 34 | -36.406502 | 145.930599 | 172.52 | 1.50 | 174.02 |
| OP 35 | -36.414178 | 145.924196 | 162.99 | 1.50 | 164.49 |
| OP 36 | -36.412179 | 145.922122 | 162.49 | 1.50 | 163.99 |
| OP 37 | -36.409267 | 145.924201 | 165.36 | 1.50 | 166.86 |
| OP 38 | -36.408648 | 145.921046 | 162.93 | 1.50 | 164.43 |
| OP 39 | -36.406977 | 145.919941 | 162.51 | 1.50 | 164.01 |
| OP 40 | -36.405415 | 145.917412 | 159.88 | 1.50 | 161.38 |
| OP 41 | -36.406538 | 145.914786 | 166.12 | 1.50 | 167.62 |
| OP 42 | -36.457623 | 145.953933 | 172.58 | 1.50 | 174.08 |

# PV Array Results

## PV array 1 potential temporary after-image

**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

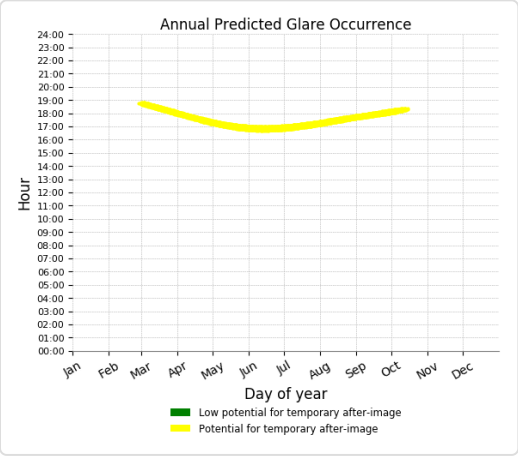
| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 3409 |
| OP: OP 2 | 0 | 3053 |
| OP: OP 3 | 0 | 2944 |
| OP: OP 4 | 0 | 2144 |
| OP: OP 5 | 0 | 2127 |
| OP: OP 6 | 0 | 3023 |
| OP: OP 7 | 0 | 3305 |
| OP: OP 8 | 0 | 4248 |
| OP: OP 9 | 0 | 1993 |
| OP: OP 10 | 0 | 11910 |
| OP: OP 11 | 0 | 7111 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 625 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 2206 |
| OP: OP 17 | 0 | 5213 |
| OP: OP 18 | 0 | 1908 |
| OP: OP 19 | 0 | 1799 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 664 |
| OP: OP 23 | 0 | 1467 |
| OP: OP 24 | 0 | 1766 |
| OP: OP 25 | 0 | 1718 |
| OP: OP 26 | 0 | 1543 |
| OP: OP 27 | 0 | 281 |
| OP: OP 28 | 0 | 2504 |
| OP: OP 29 | 0 | 2176 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 397 |
| OP: OP 32 | 0 | 464 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |

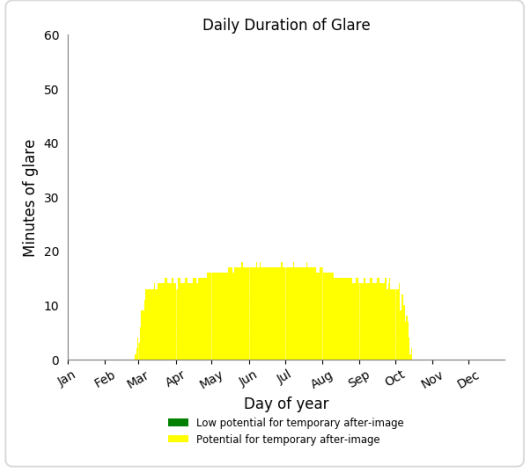
| | | |
|---|---|---|
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 176 |
| Route: Benalla-Tocumwal Road | 0 | 11640 |
| Route: Benalla-Yarrawonga Road | 0 | 0 |
| Route: Goorambat-Chesney Road | 0 | 4147 |
| Route: Goorambat-Chesney Road | 67643 | 190871 |
| Route: Paolini Lane | 0 | 0 |
| Route: Peck Road | 0 | 684 |
| Route: Quinn Road | 0 | 0 |
| Route: Railway Track | 0 | 6855 |
| Route: Sharp Road | 1037 | 28894 |
| Route: Taylor Road | 0 | 0 |
| Route: Trask Road | 0 | 0 |
| Route: Trewin Road | 0 | 766 |
| Route: Wilson Road | 0 | 0 |

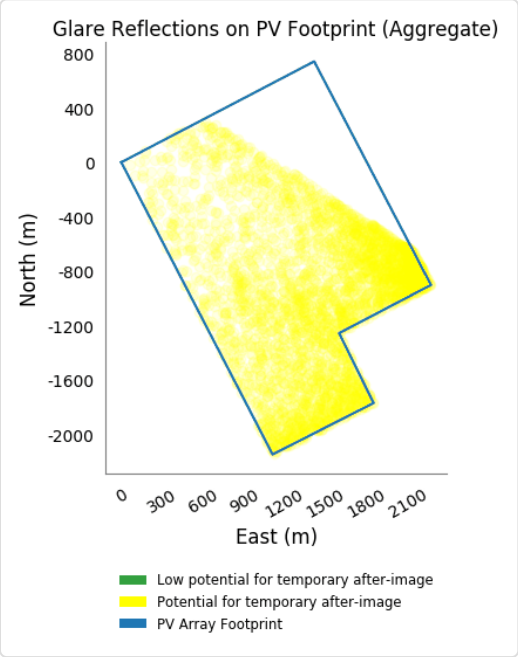
## PV array 1 - OP Receptor (OP 1)

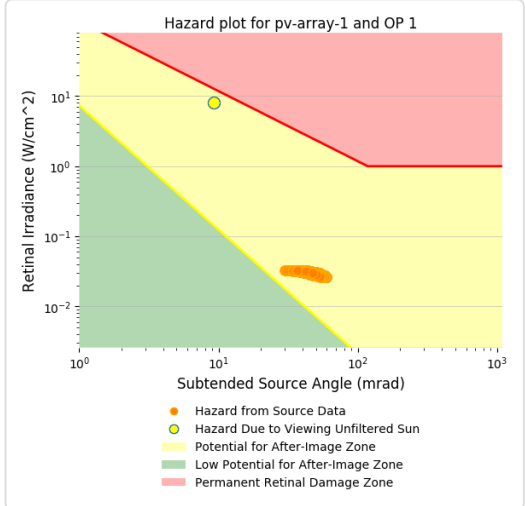
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,409 minutes of "yellow" glare with potential to cause temporary after-image.



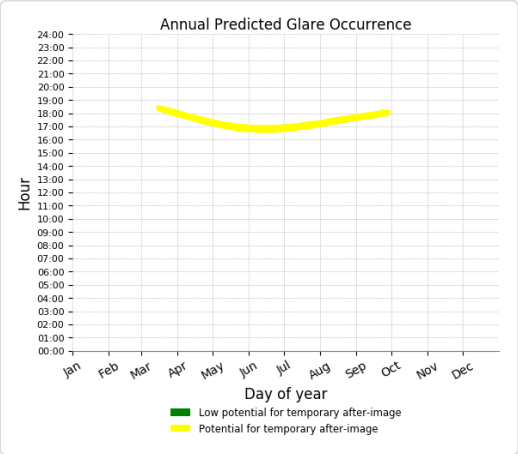



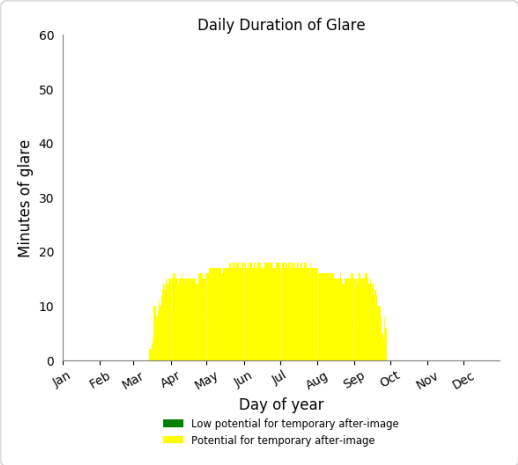



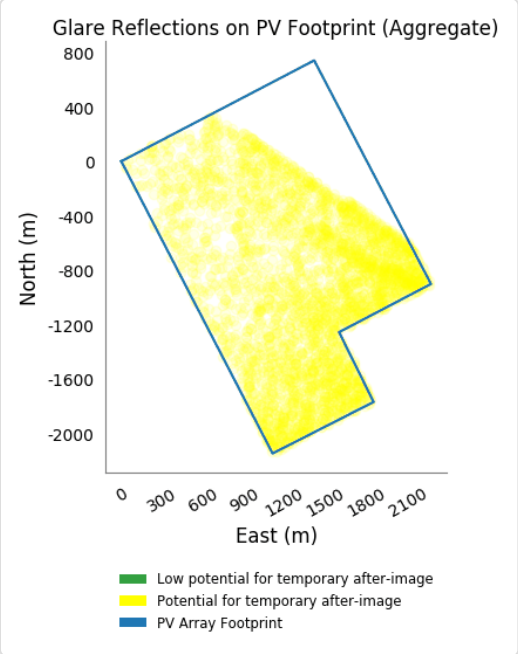
## PV array 1 - OP Receptor (OP 2)

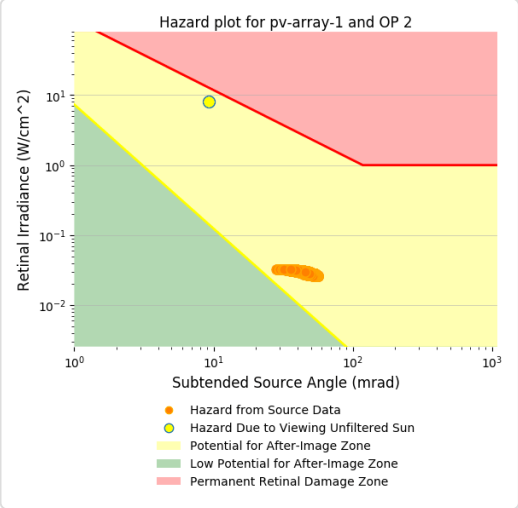
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,053 minutes of "yellow" glare with potential to cause temporary after-image.



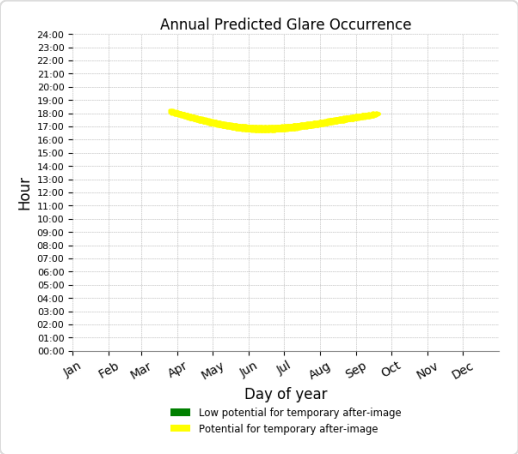



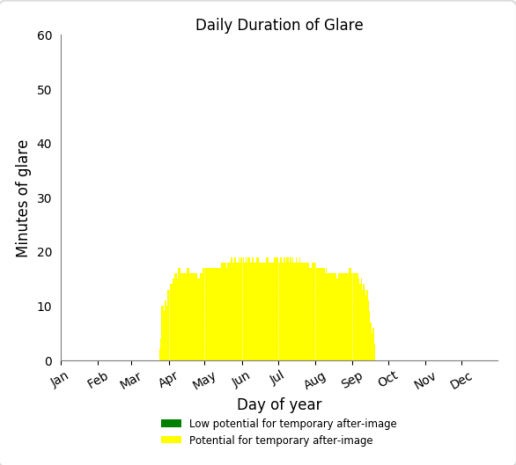



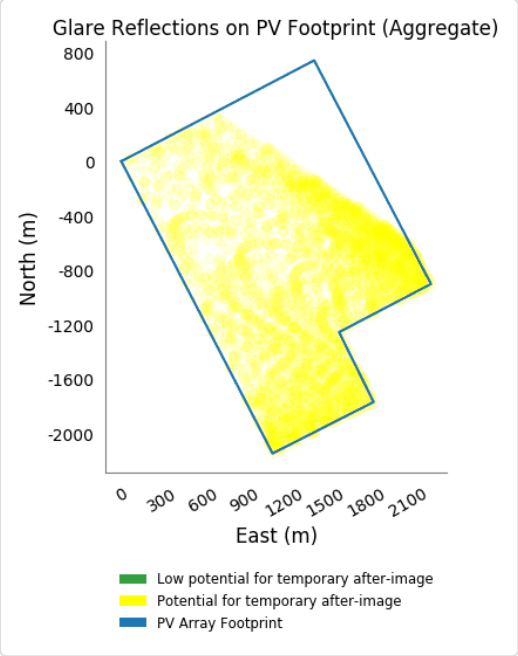
## PV array 1 - OP Receptor (OP 3)

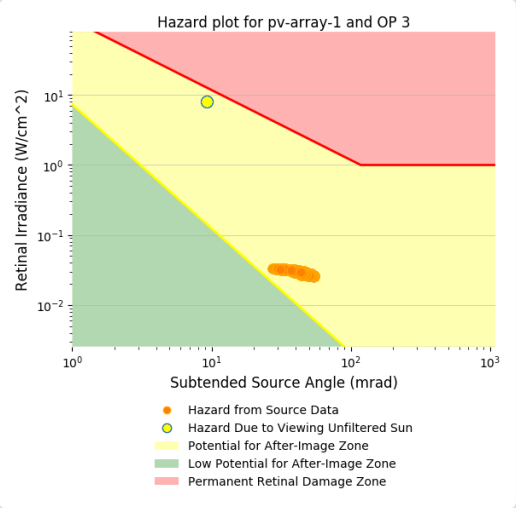
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,944 minutes of "yellow" glare with potential to cause temporary after-image.



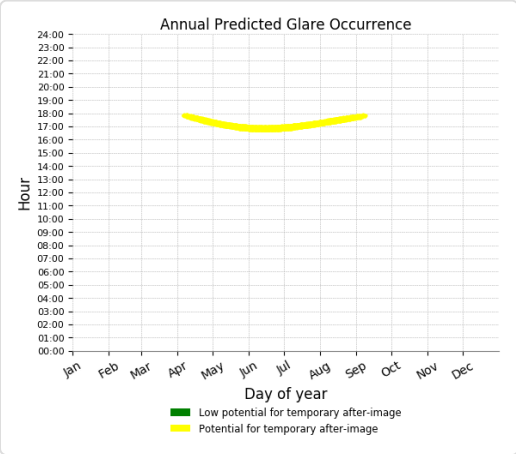



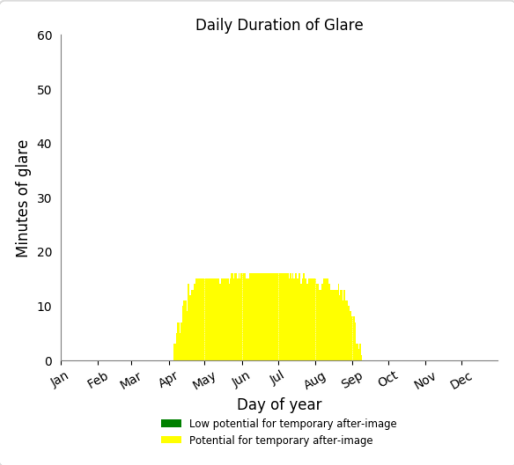



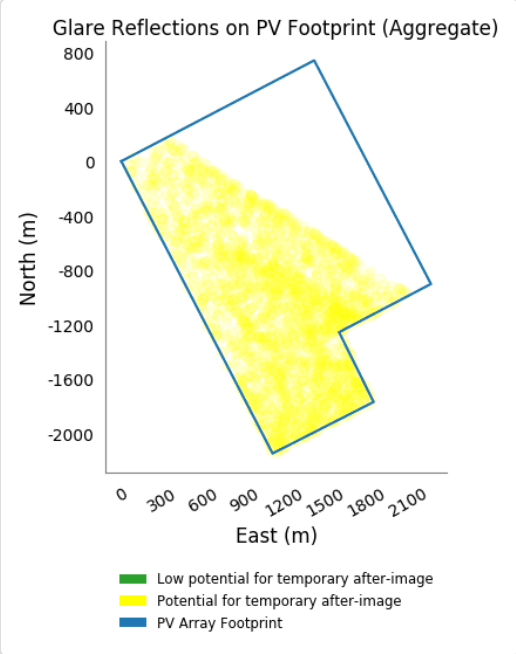
## PV array 1 - OP Receptor (OP 4)

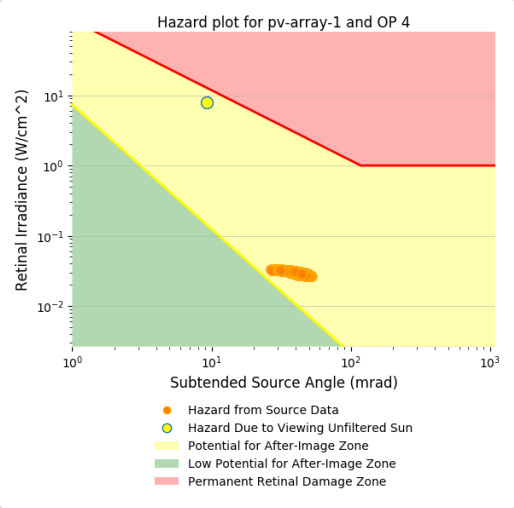
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,144 minutes of "yellow" glare with potential to cause temporary after-image.



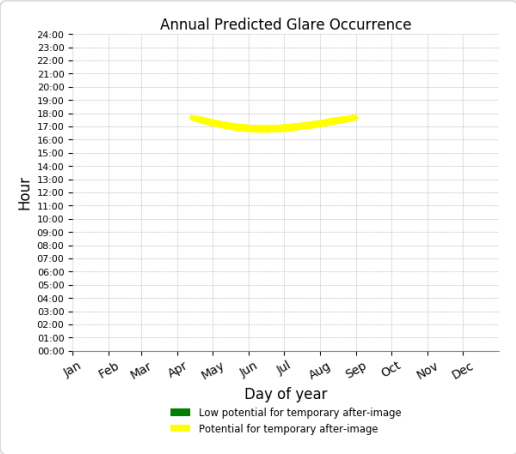



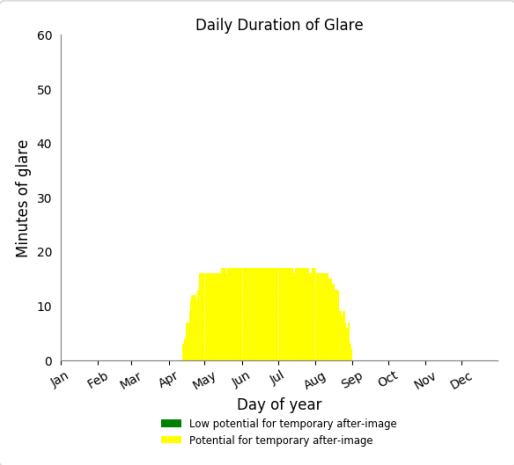



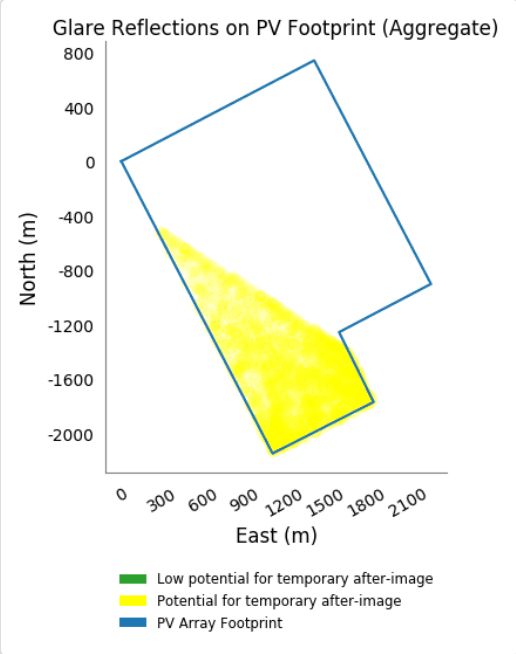
## PV array 1 - OP Receptor (OP 5)

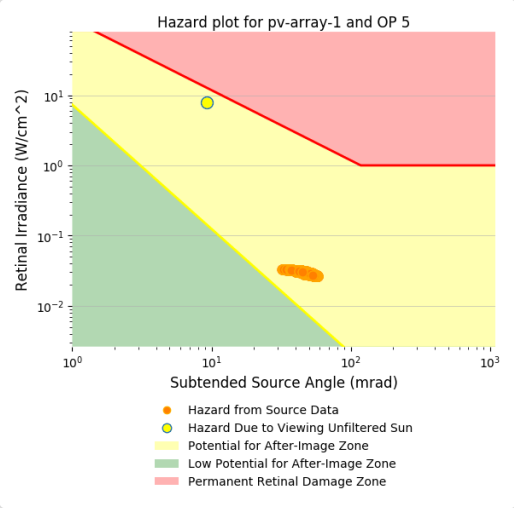
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,127 minutes of "yellow" glare with potential to cause temporary after-image.



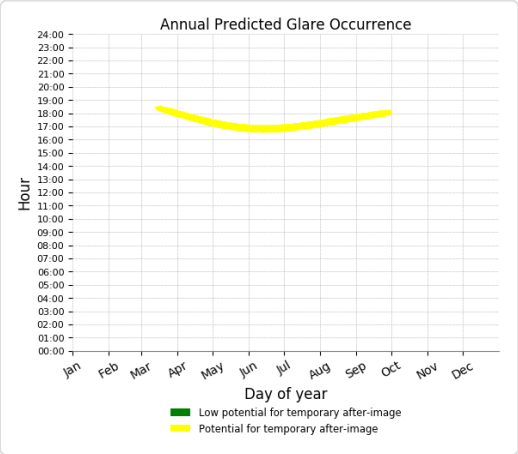



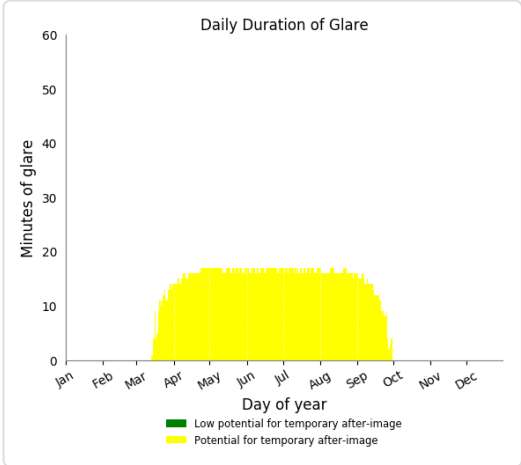



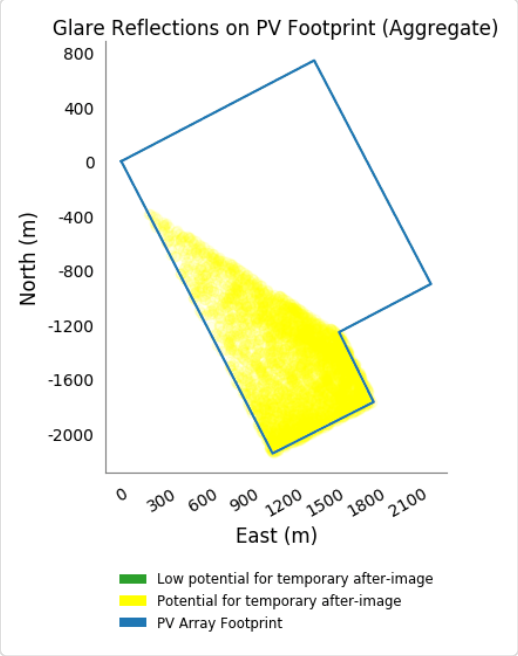
## PV array 1 - OP Receptor (OP 6)

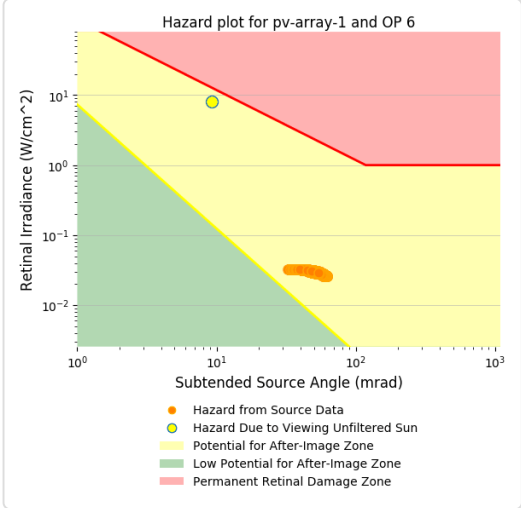
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,023 minutes of "yellow" glare with potential to cause temporary after-image.



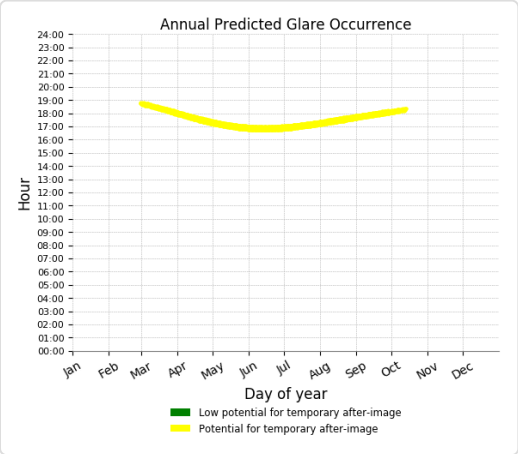



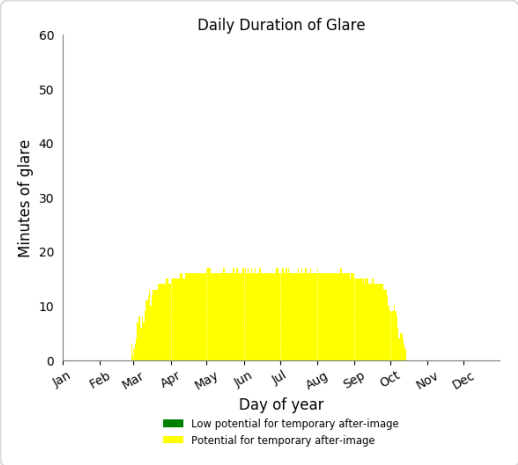



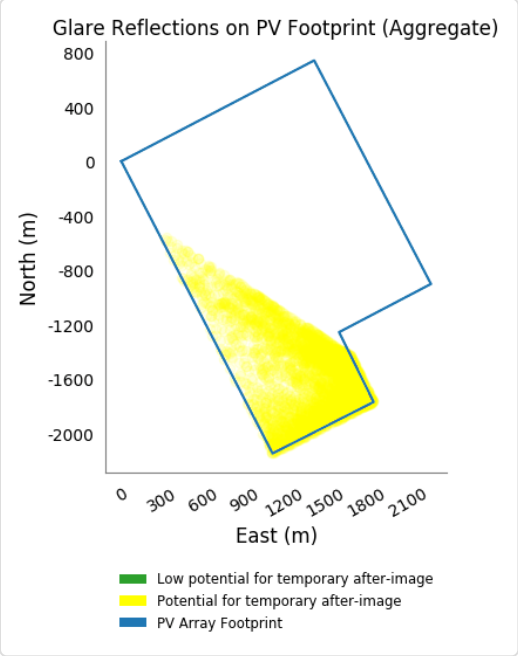
## PV array 1 - OP Receptor (OP 7)

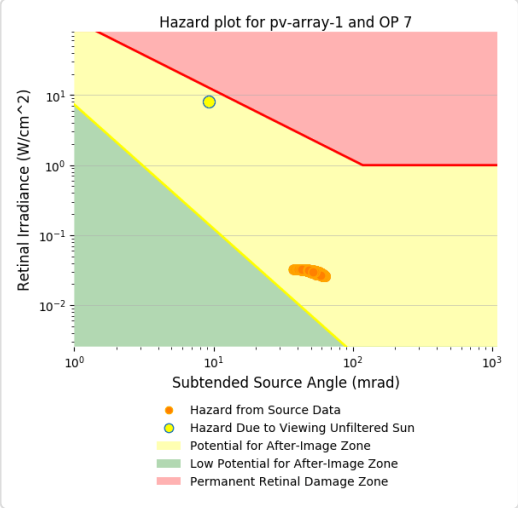
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,305 minutes of "yellow" glare with potential to cause temporary after-image.



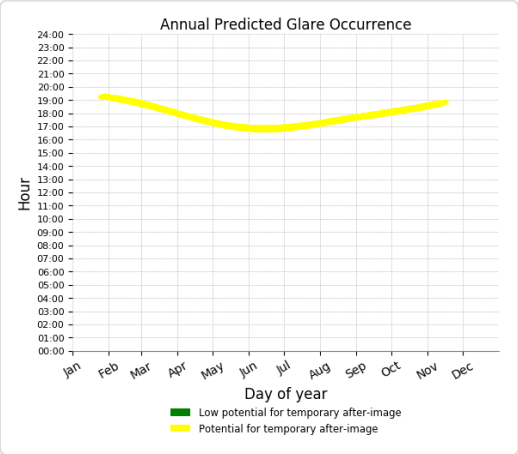



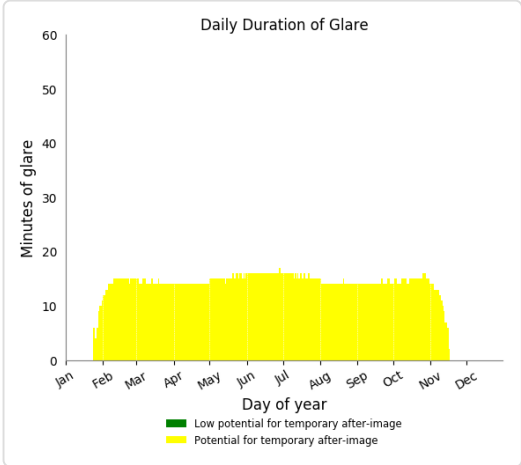



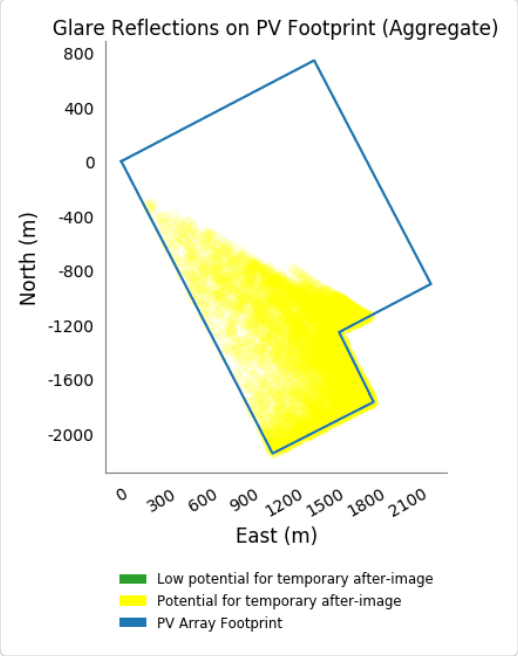
## PV array 1 - OP Receptor (OP 8)

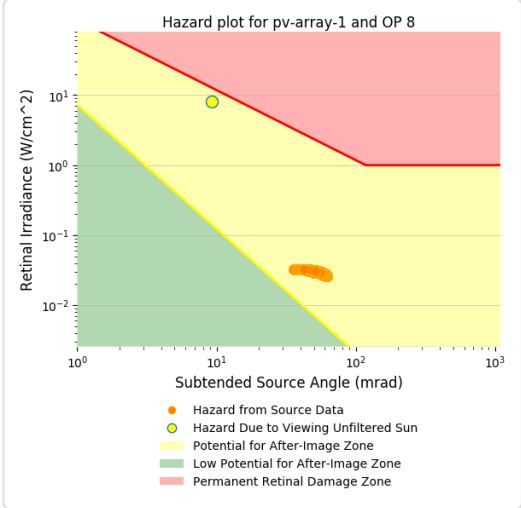
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 4,248 minutes of "yellow" glare with potential to cause temporary after-image.



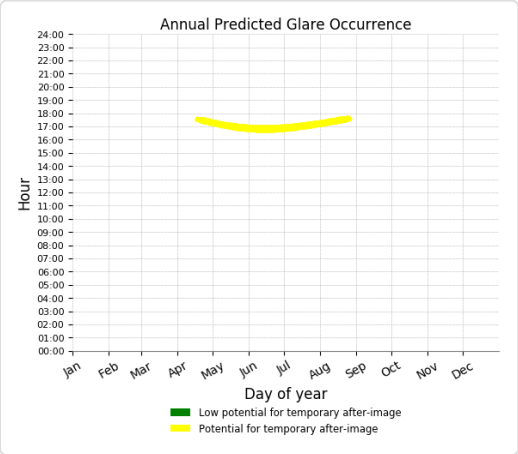



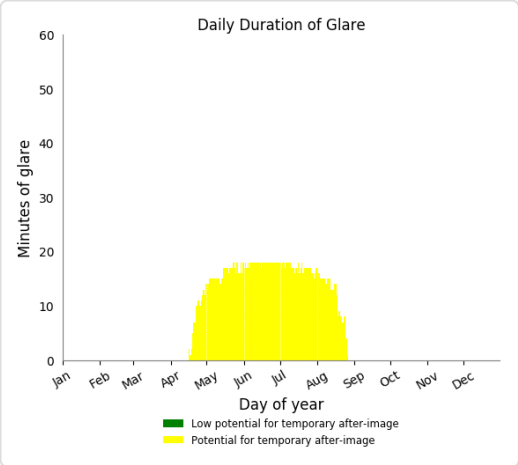



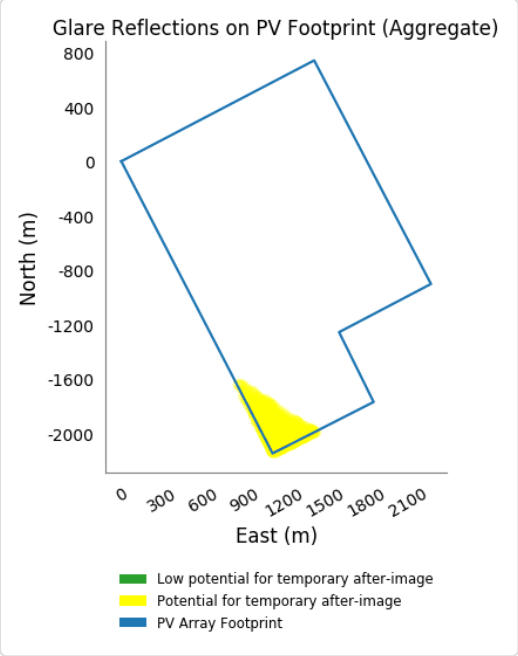
## PV array 1 - OP Receptor (OP 9)

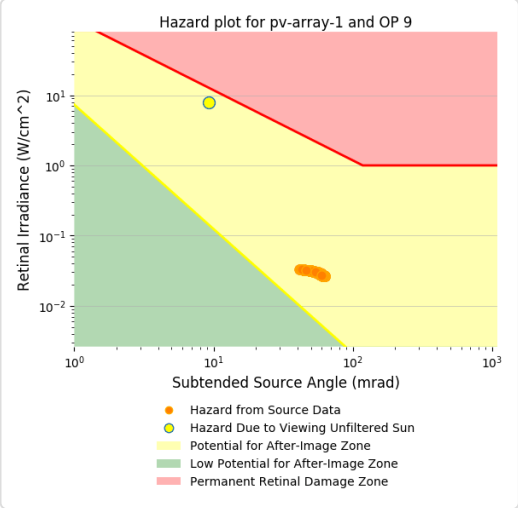
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,993 minutes of "yellow" glare with potential to cause temporary after-image.



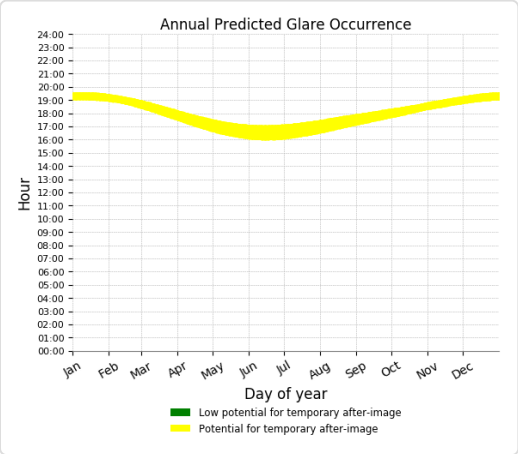



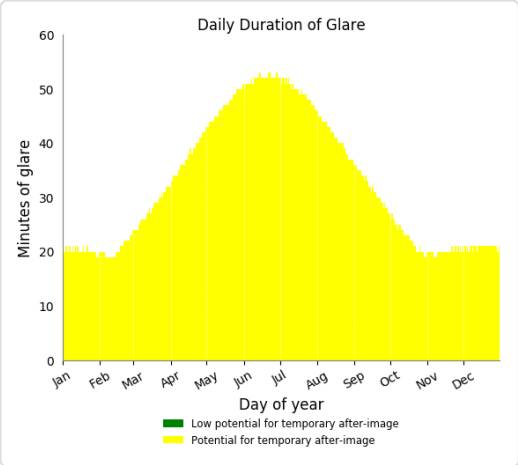



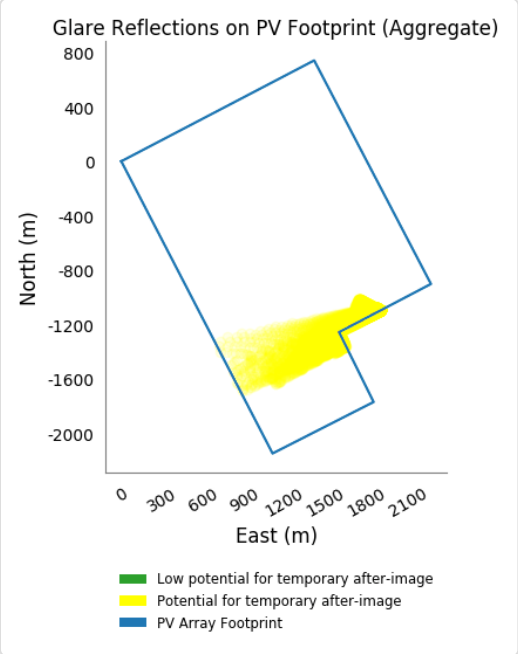
## PV array 1 - OP Receptor (OP 10)

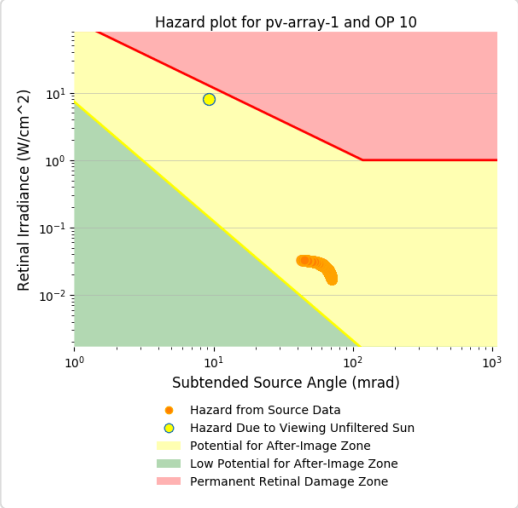
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 11,910 minutes of "yellow" glare with potential to cause temporary after-image.



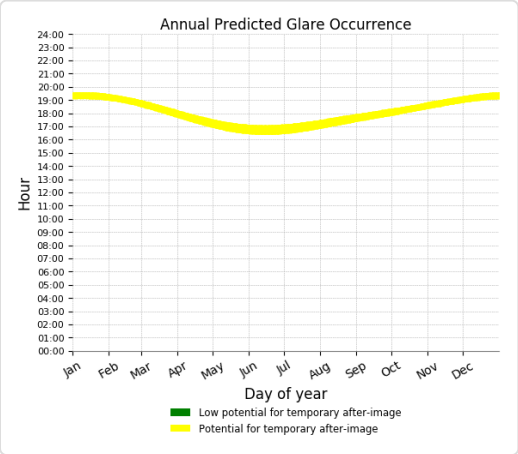



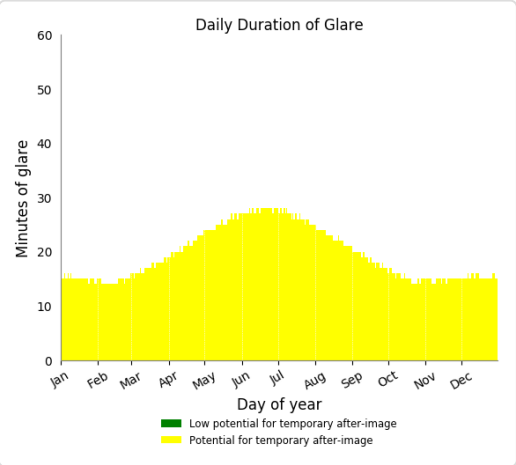



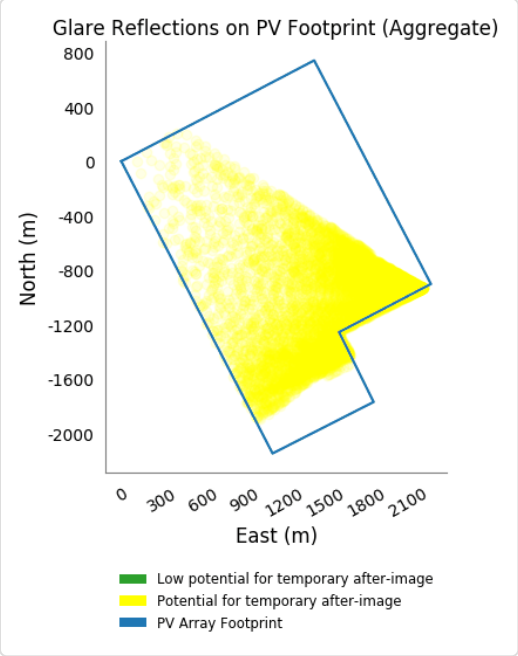
## PV array 1 - OP Receptor (OP 11)

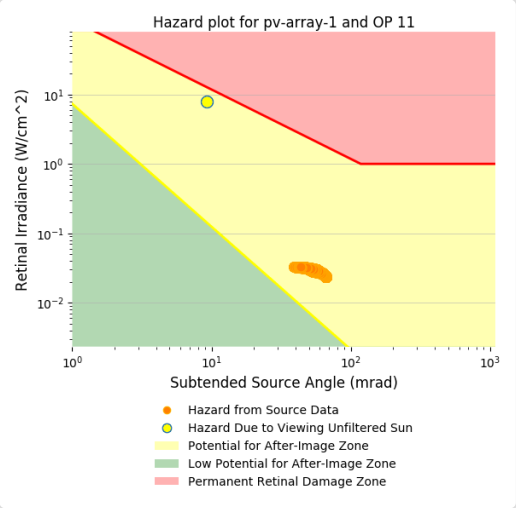
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 7,111 minutes of "yellow" glare with potential to cause temporary after-image.



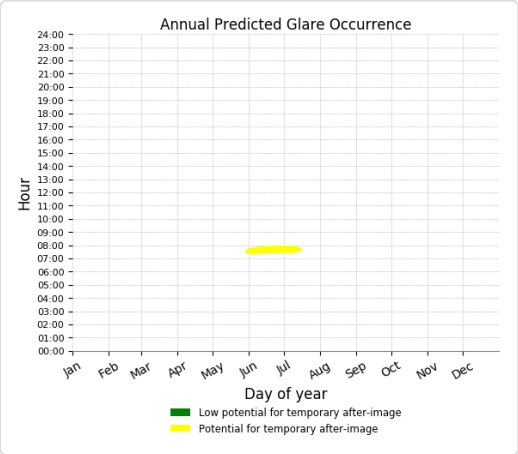

## PV array 1 - OP Receptor (OP 12)

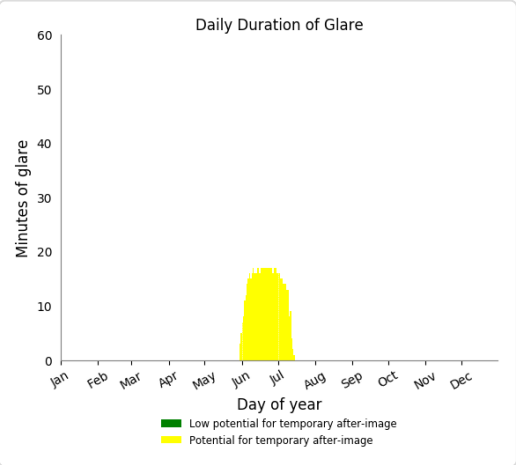
*No glare found*

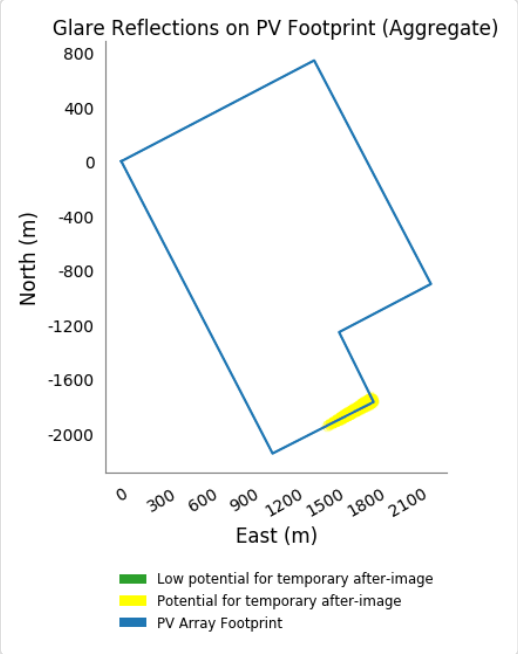
## PV array 1 - OP Receptor (OP 13)

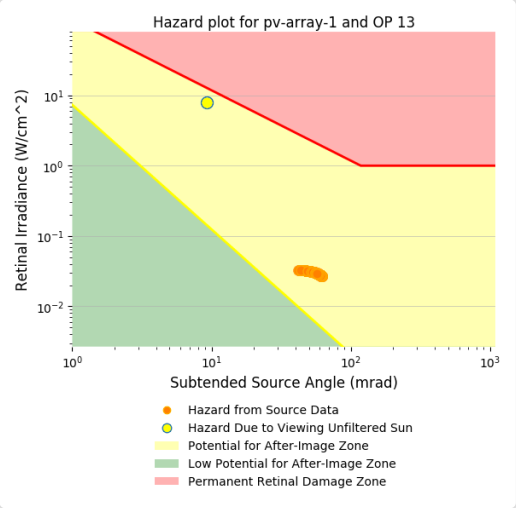
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 625 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 1 - OP Receptor (OP 14)

*No glare found*

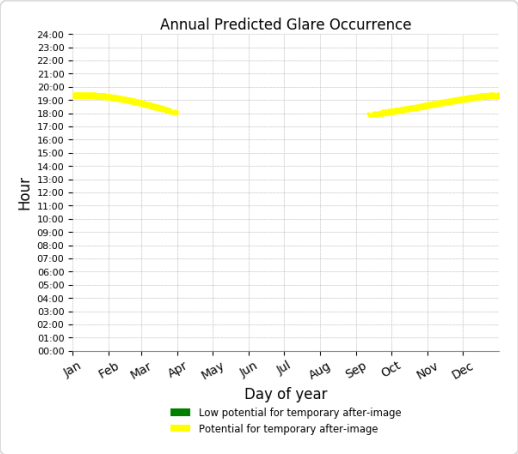
## PV array 1 - OP Receptor (OP 15)

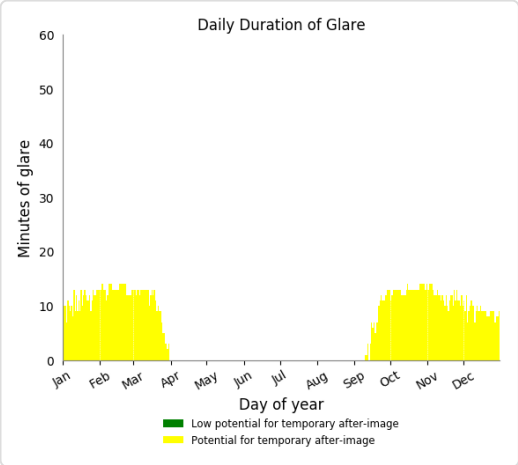
*No glare found*

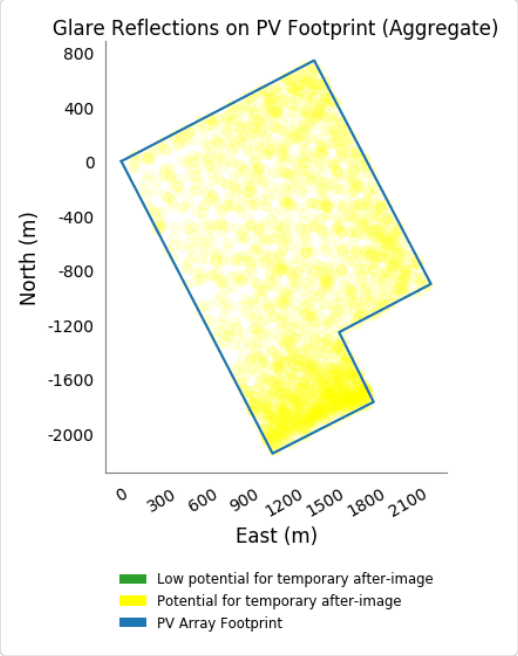
## PV array 1 - OP Receptor (OP 16)

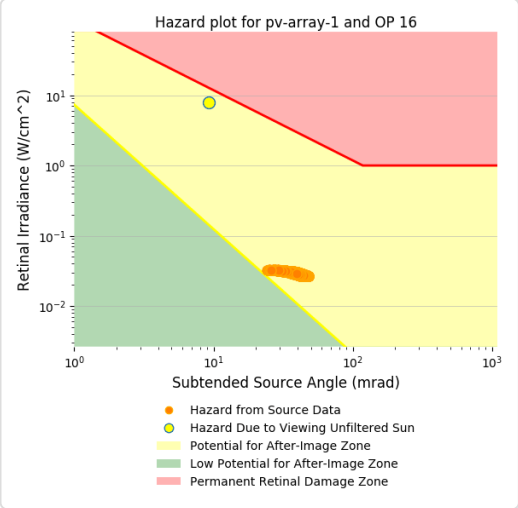
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,206 minutes of "yellow" glare with potential to cause temporary after-image.



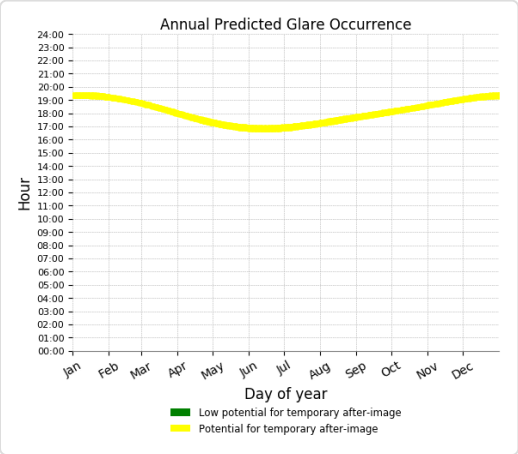



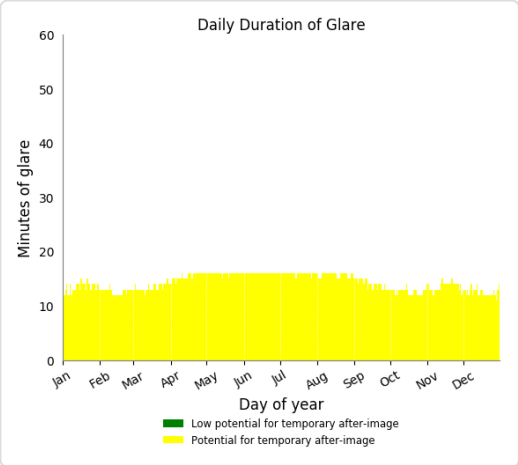



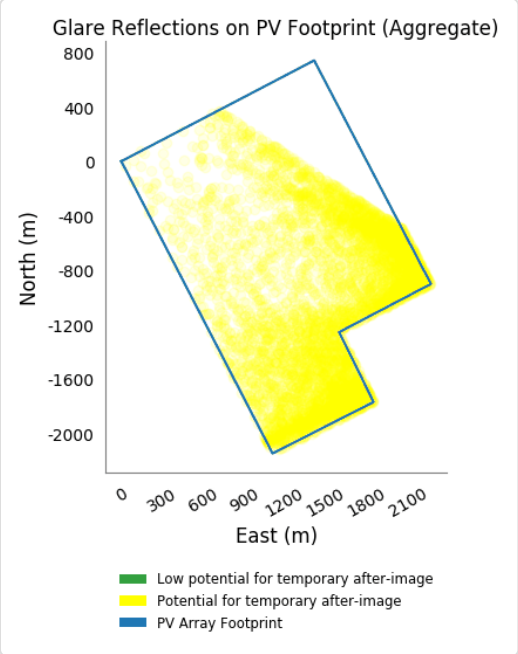
## PV array 1 - OP Receptor (OP 17)

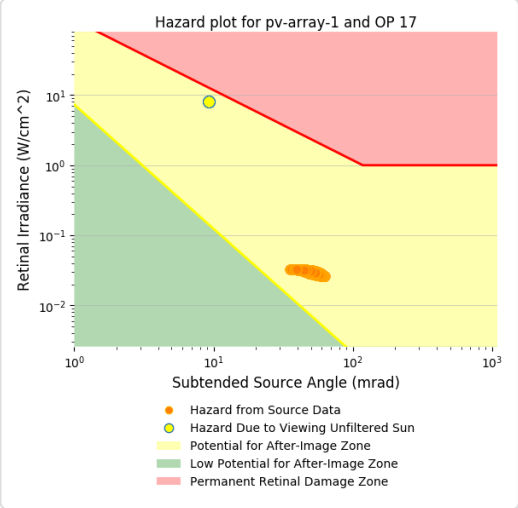
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 5,213 minutes of "yellow" glare with potential to cause temporary after-image.



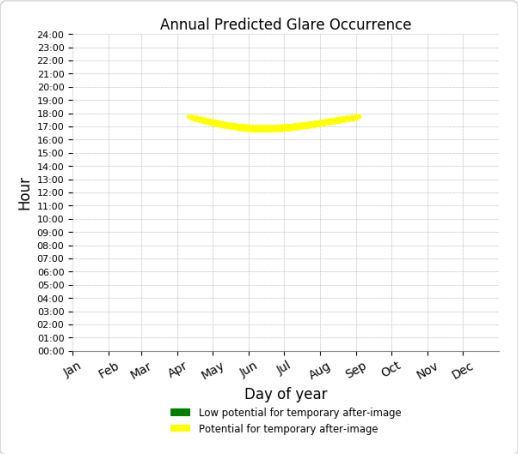



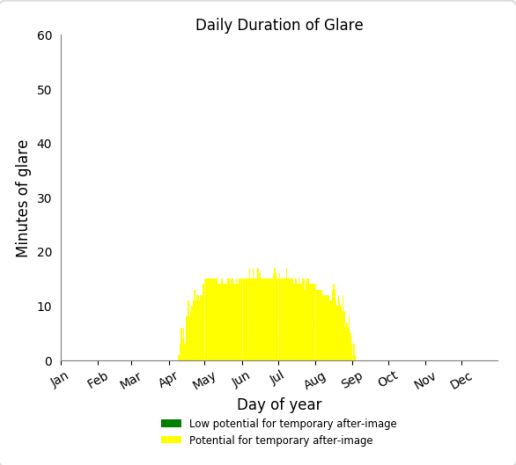



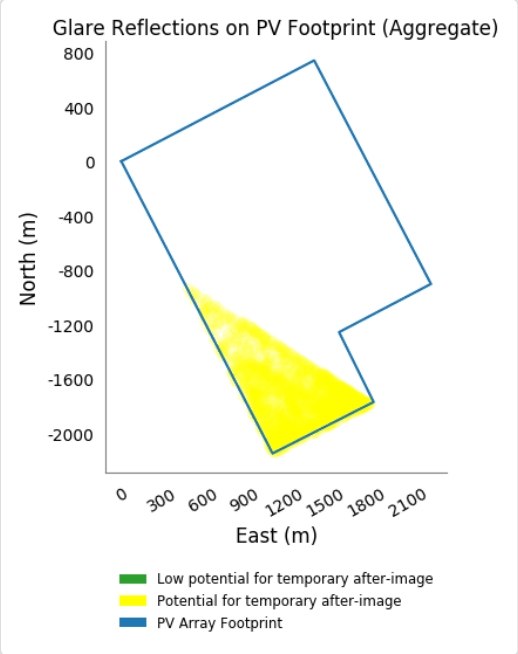
## PV array 1 - OP Receptor (OP 18)

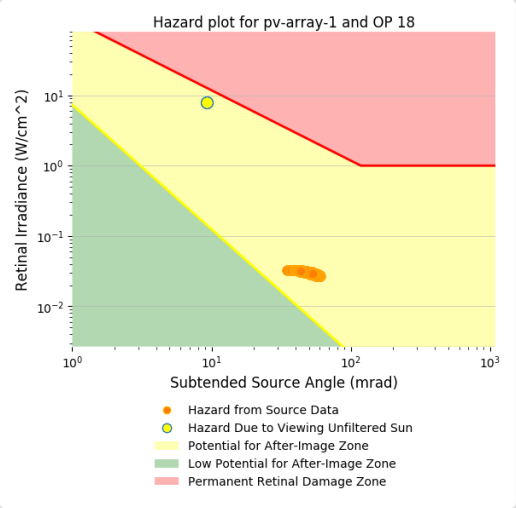
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,908 minutes of "yellow" glare with potential to cause temporary after-image.



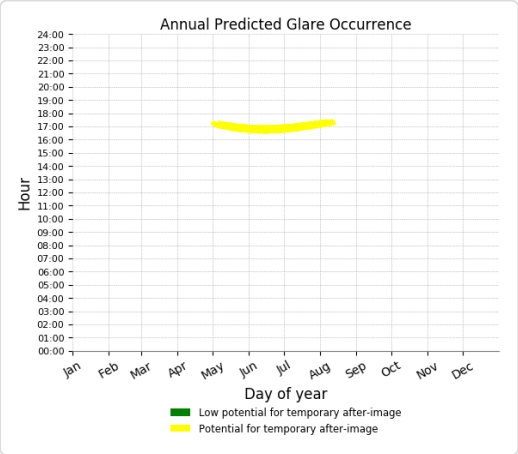



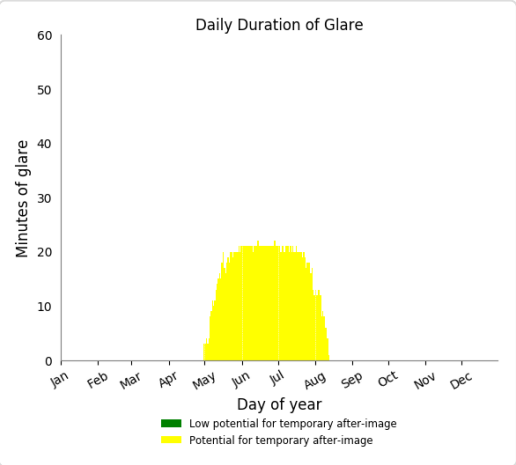



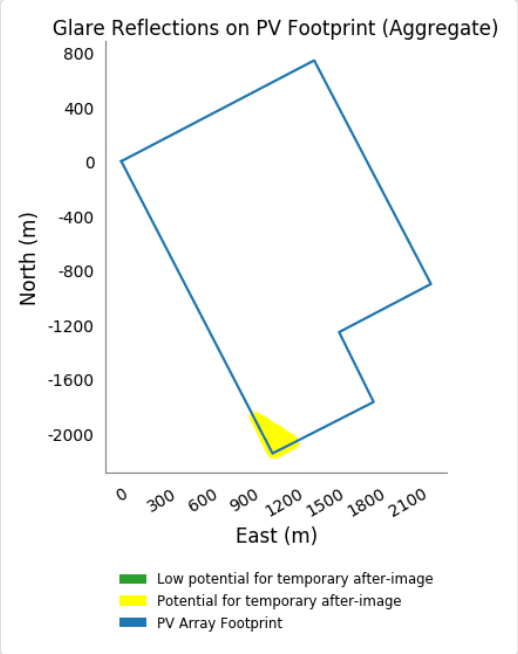
## PV array 1 - OP Receptor (OP 19)

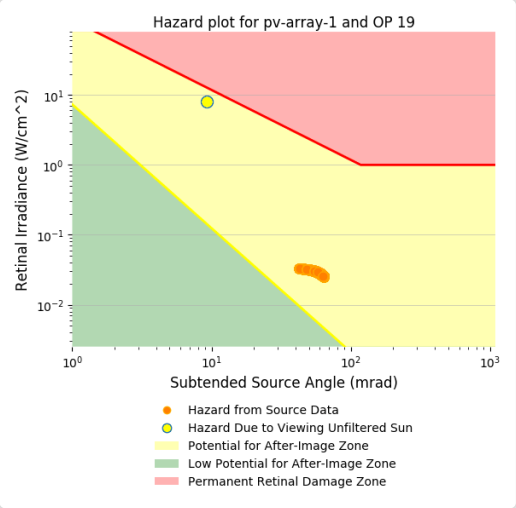
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,799 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 1 - OP Receptor (OP 20)

*No glare found*

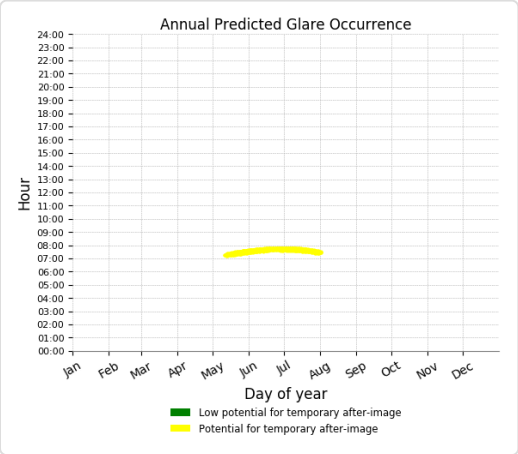
## PV array 1 - OP Receptor (OP 21)

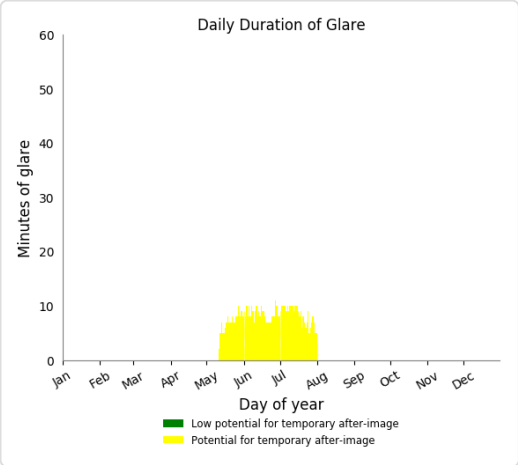
*No glare found*

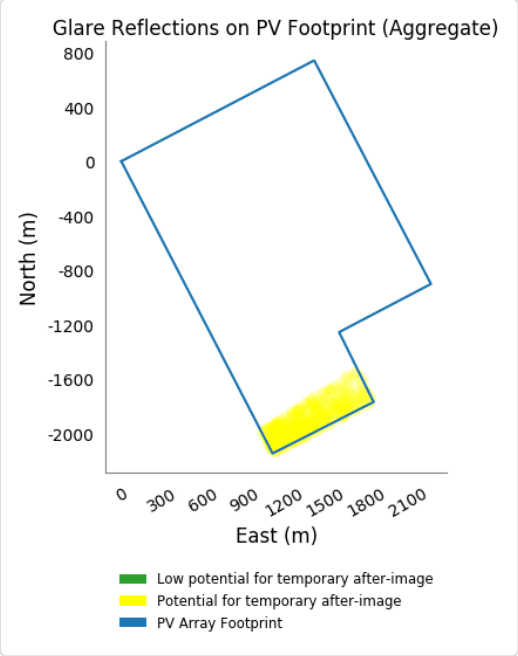
## PV array 1 - OP Receptor (OP 22)

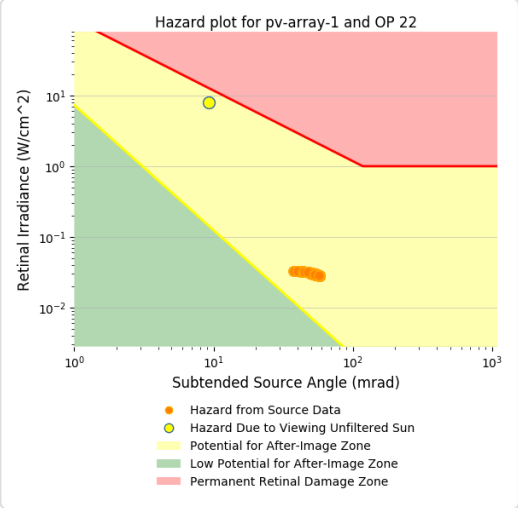
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 664 minutes of "yellow" glare with potential to cause temporary after-image.



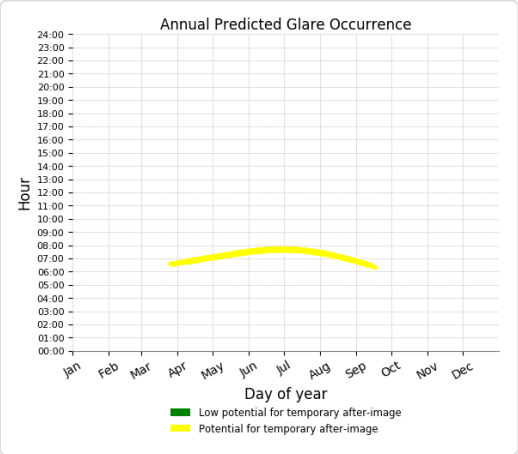



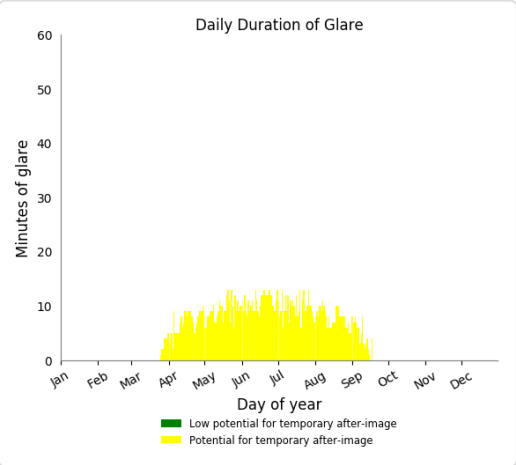



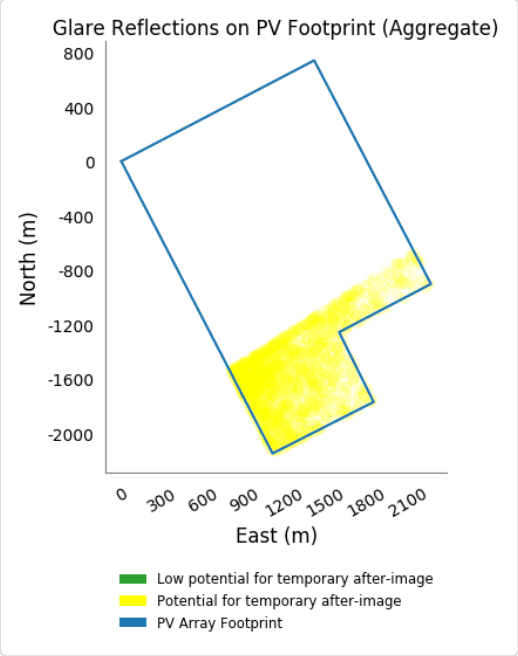
## PV array 1 - OP Receptor (OP 23)

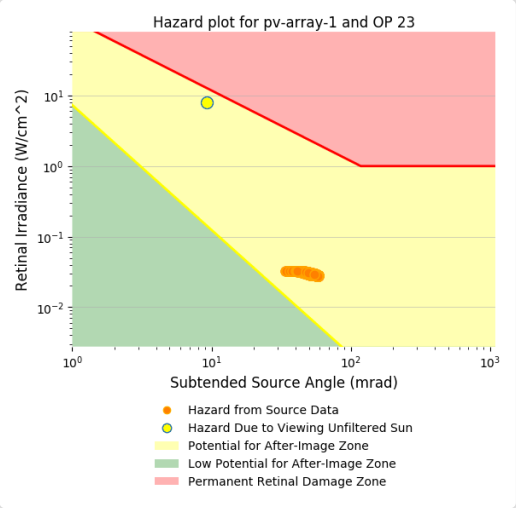
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,467 minutes of "yellow" glare with potential to cause temporary after-image.



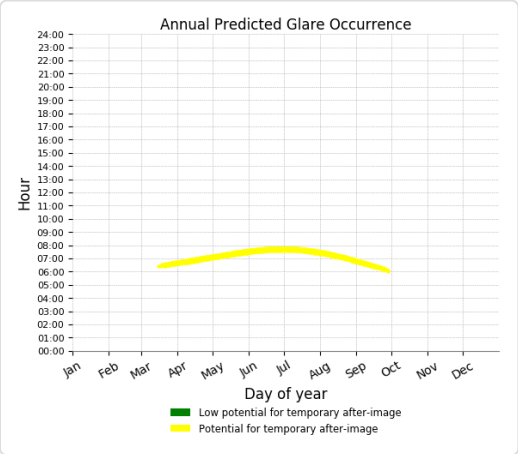



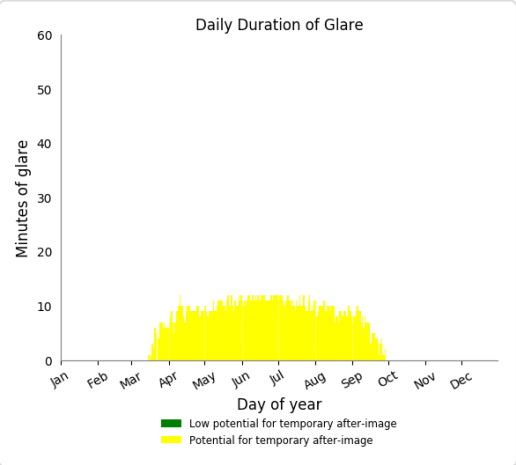



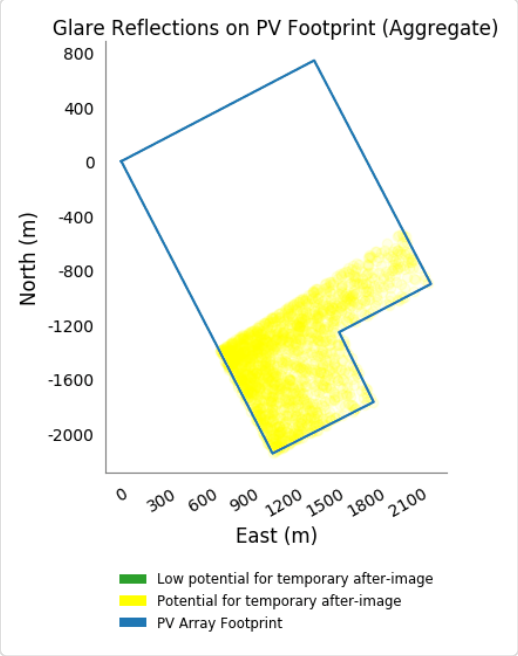
## PV array 1 - OP Receptor (OP 24)

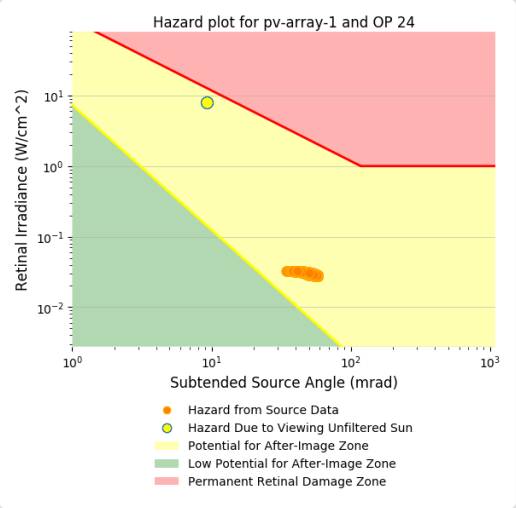
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,766 minutes of "yellow" glare with potential to cause temporary after-image.



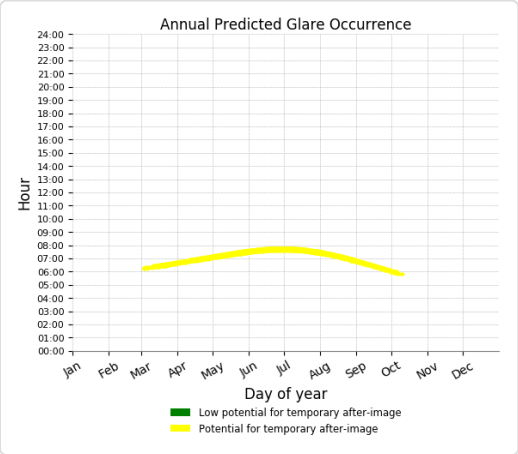



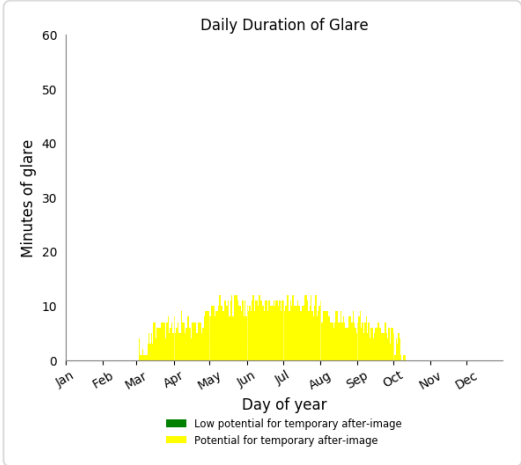



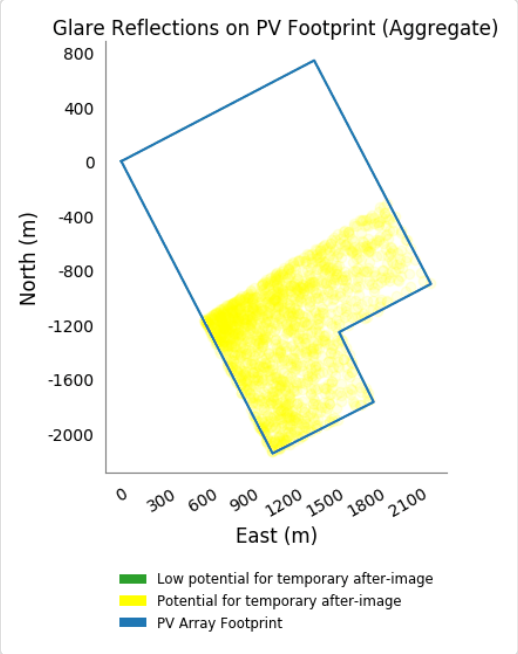
## PV array 1 - OP Receptor (OP 25)

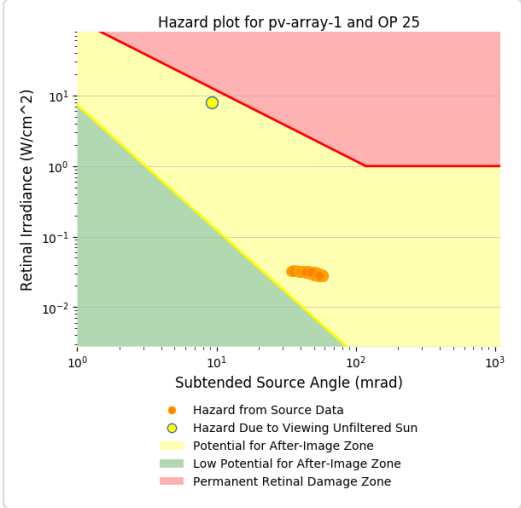
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,718 minutes of "yellow" glare with potential to cause temporary after-image.



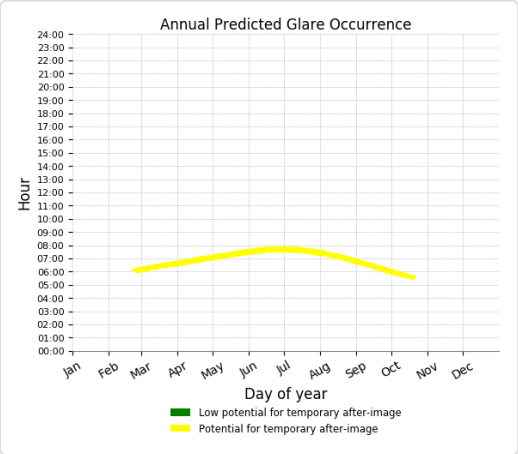



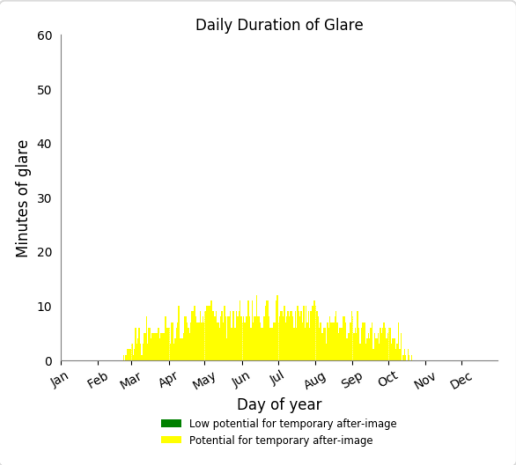



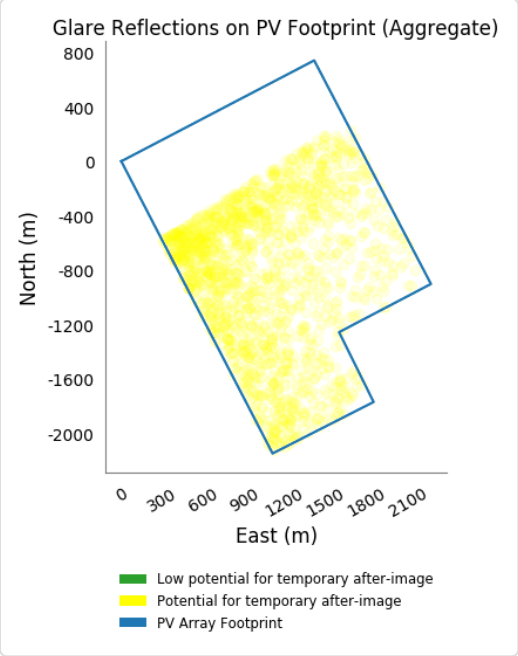
## PV array 1 - OP Receptor (OP 26)

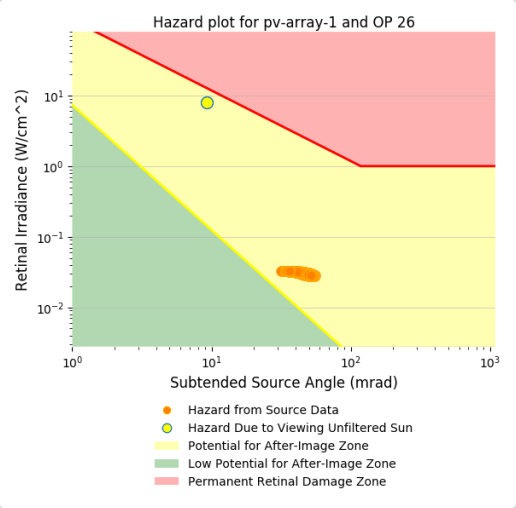
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,543 minutes of "yellow" glare with potential to cause temporary after-image.



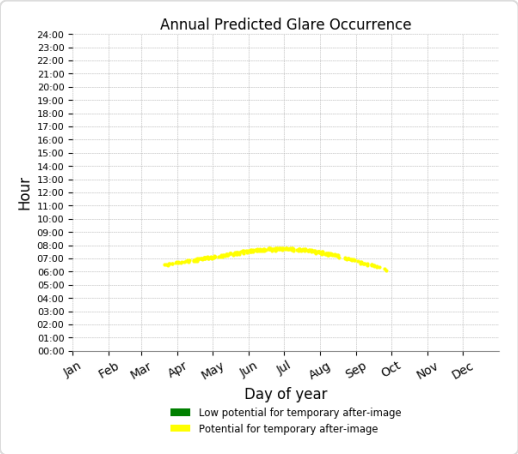



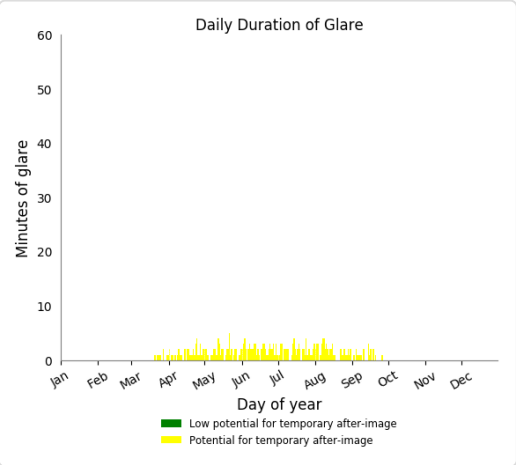



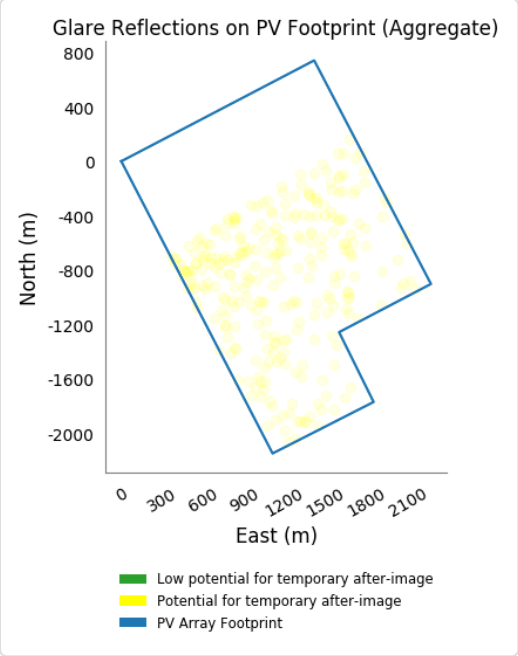
## PV array 1 - OP Receptor (OP 27)

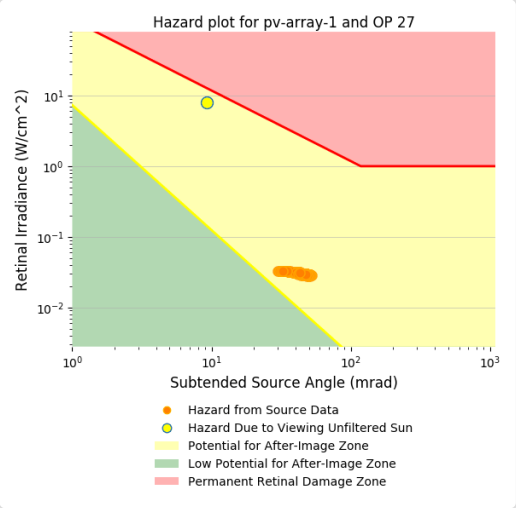
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 281 minutes of "yellow" glare with potential to cause temporary after-image.



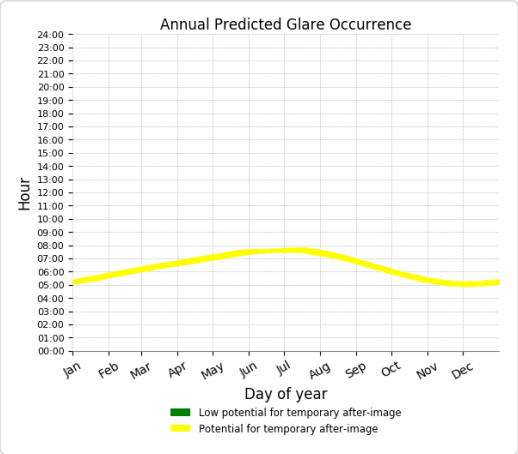



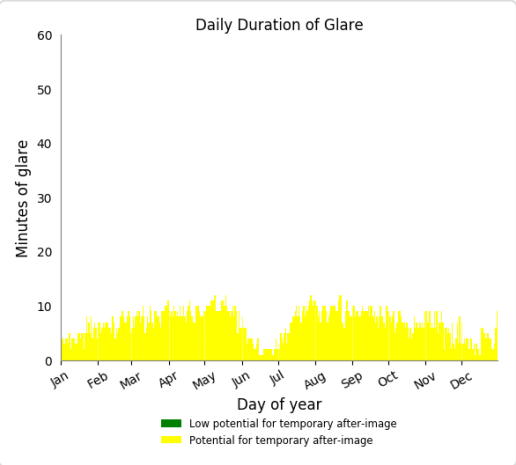



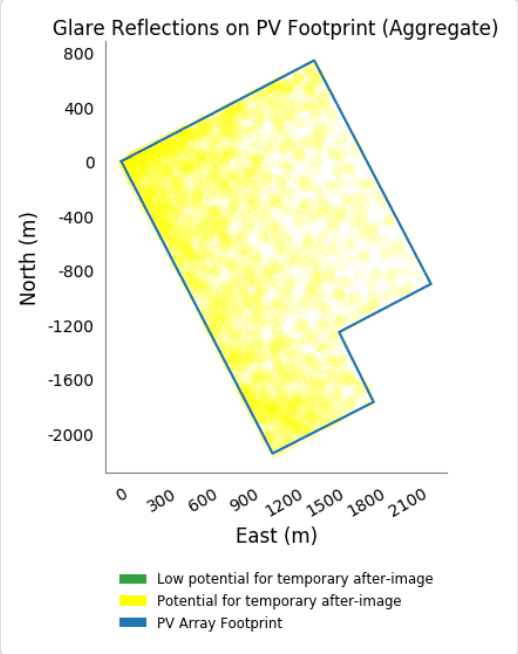
## PV array 1 - OP Receptor (OP 28)

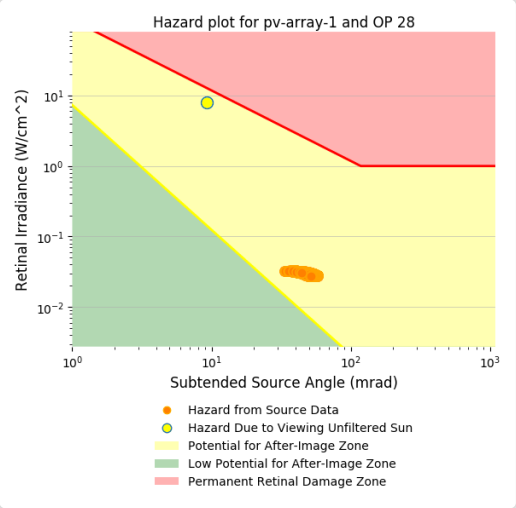
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,504 minutes of "yellow" glare with potential to cause temporary after-image.



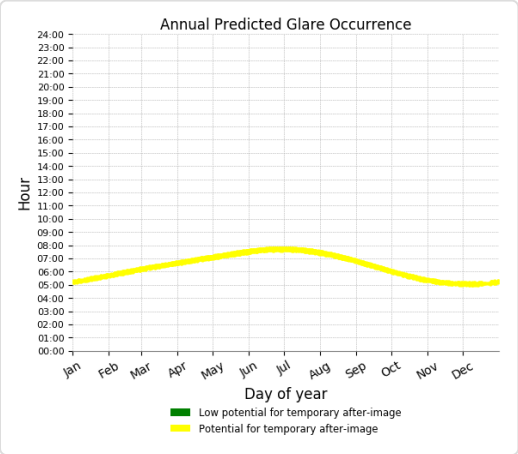



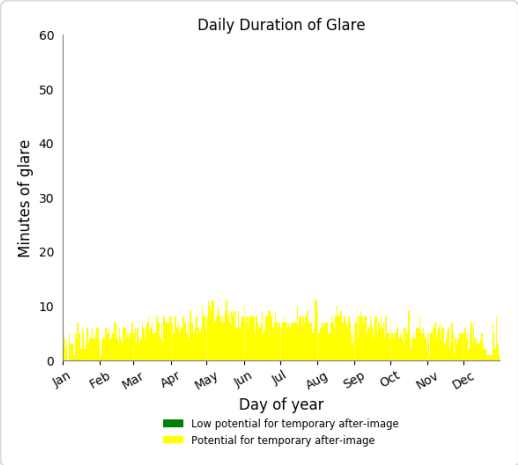



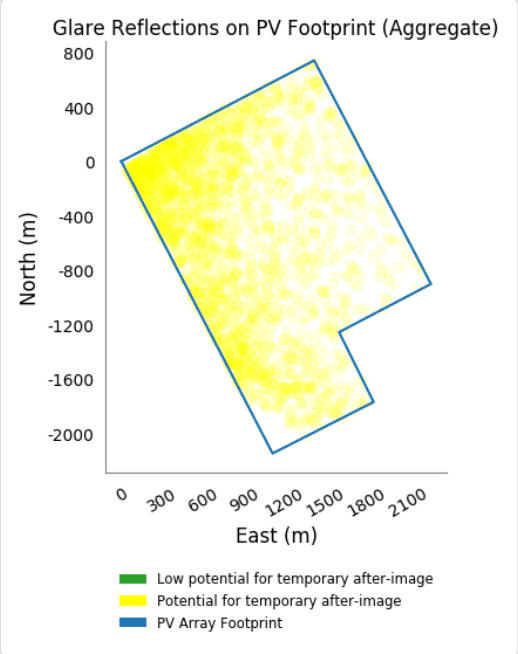
## PV array 1 - OP Receptor (OP 29)

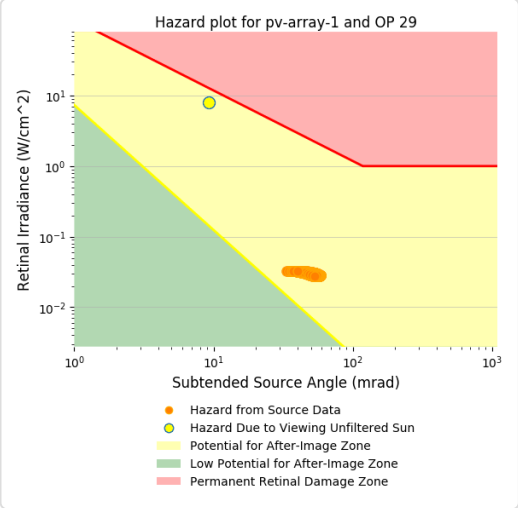
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,176 minutes of "yellow" glare with potential to cause temporary after-image.



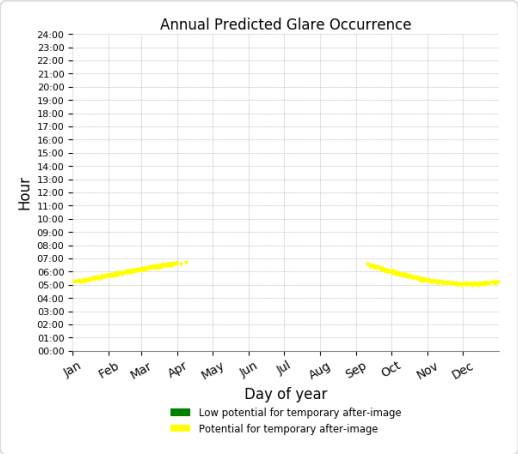

## PV array 1 - OP Receptor (OP 30)

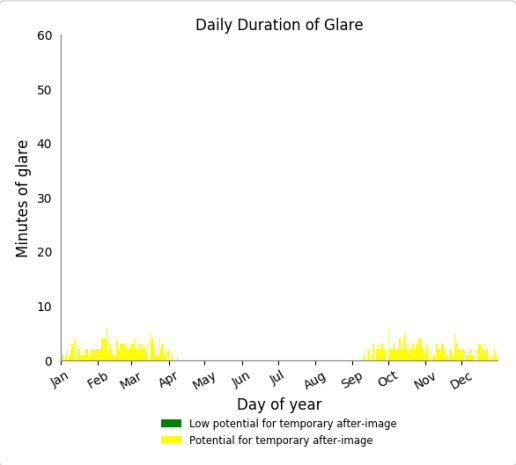
*No glare found*

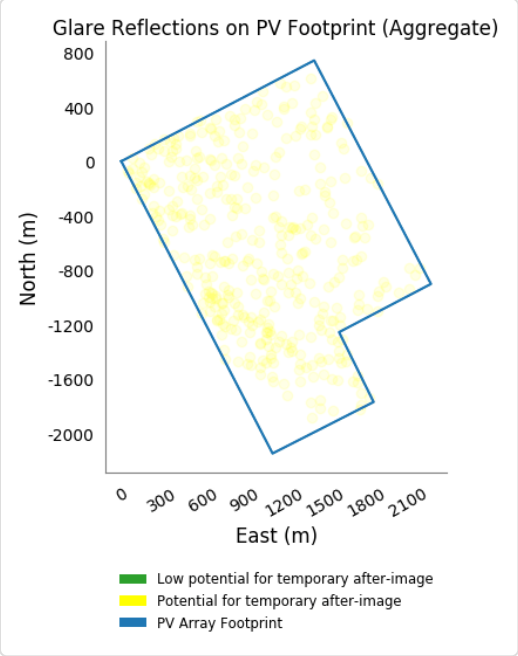
## PV array 1 - OP Receptor (OP 31)

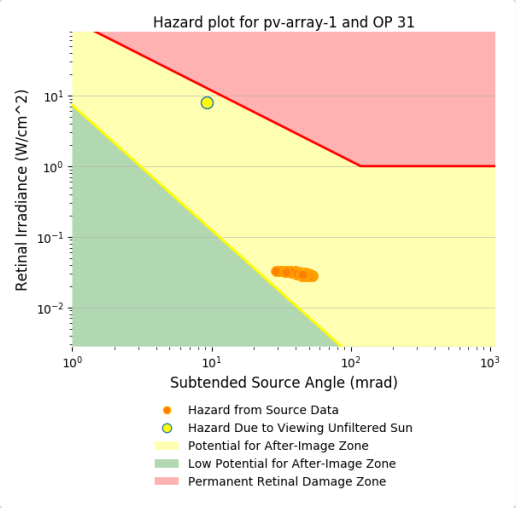
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 397 minutes of "yellow" glare with potential to cause temporary after-image.



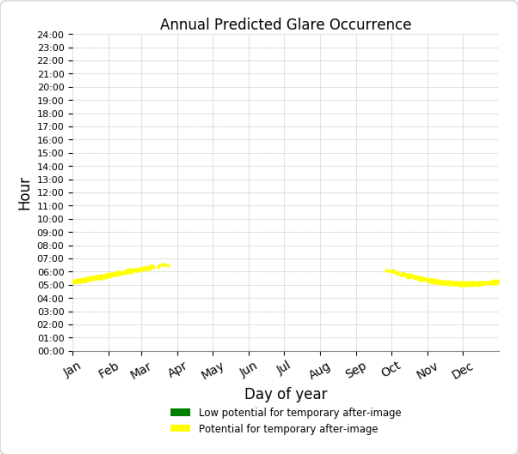



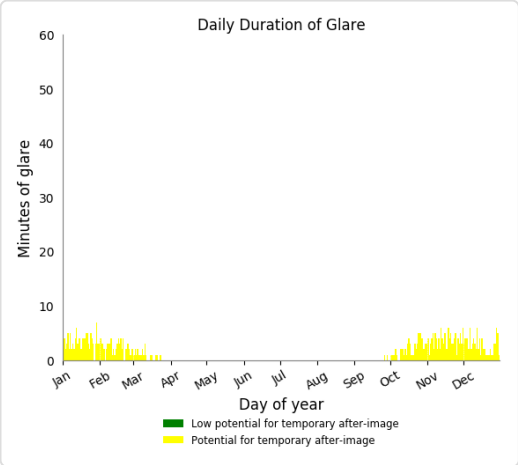



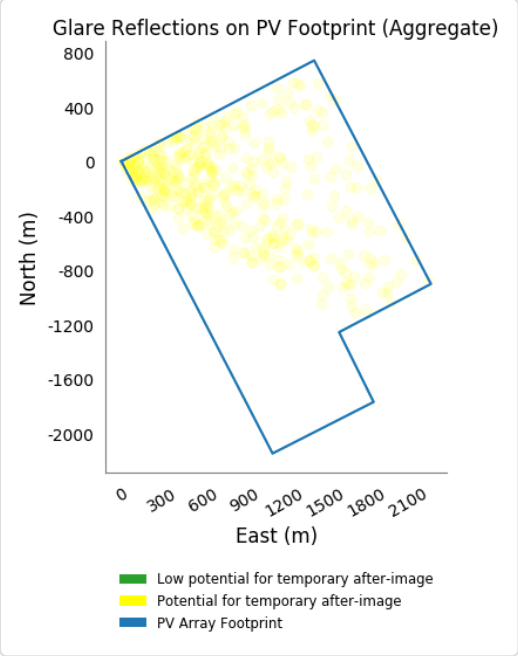
## PV array 1 - OP Receptor (OP 32)

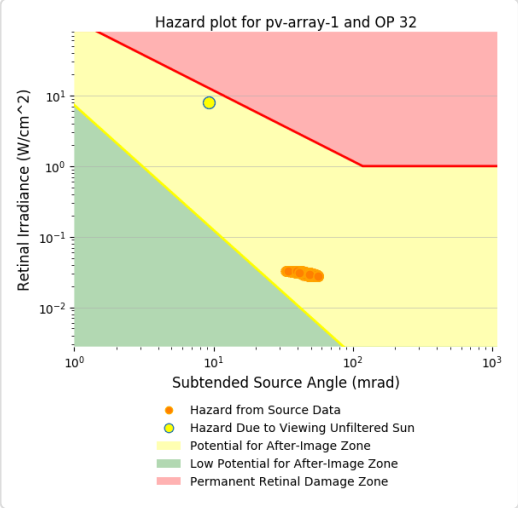
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 464 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 1 - OP Receptor (OP 33)

*No glare found*

## PV array 1 - OP Receptor (OP 34)

*No glare found*

## PV array 1 - OP Receptor (OP 35)

*No glare found*

## PV array 1 - OP Receptor (OP 36)

*No glare found*

## PV array 1 - OP Receptor (OP 37)

*No glare found*

## PV array 1 - OP Receptor (OP 38)

*No glare found*

## PV array 1 - OP Receptor (OP 39)

*No glare found*

## PV array 1 - OP Receptor (OP 40)

*No glare found*

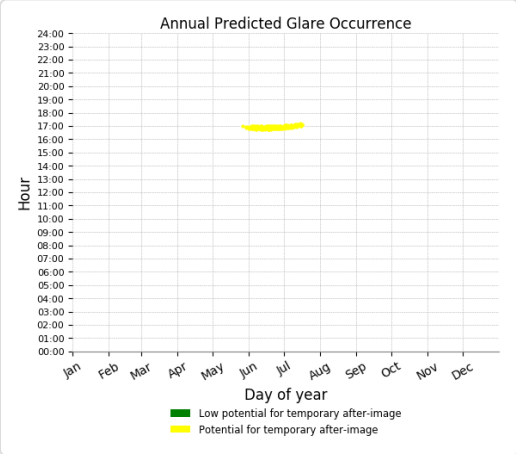
## PV array 1 - OP Receptor (OP 41)

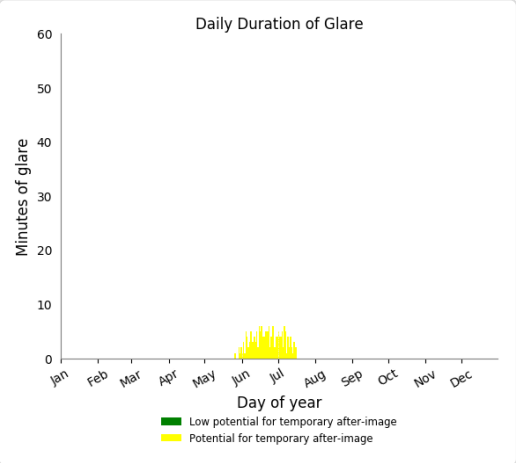
*No glare found*

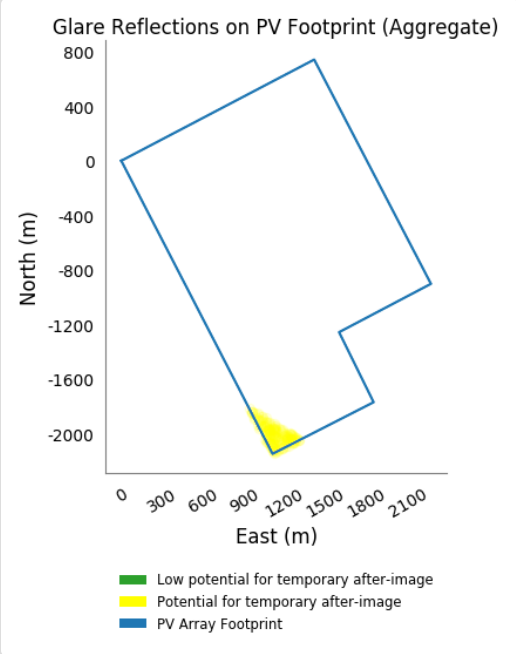
## PV array 1 - OP Receptor (OP 42)

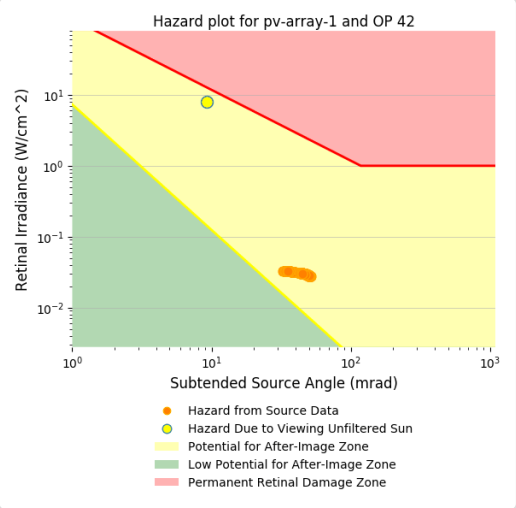
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 176 minutes of "yellow" glare with potential to cause temporary after-image.



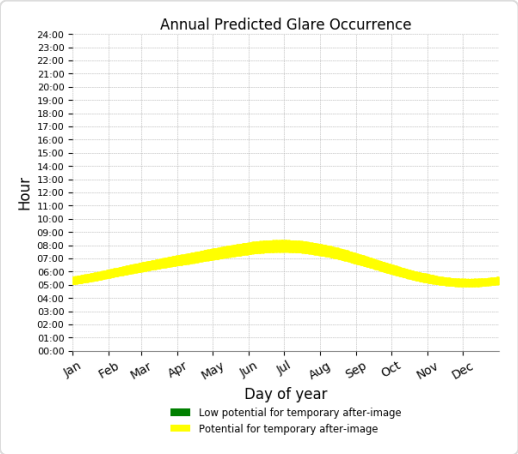



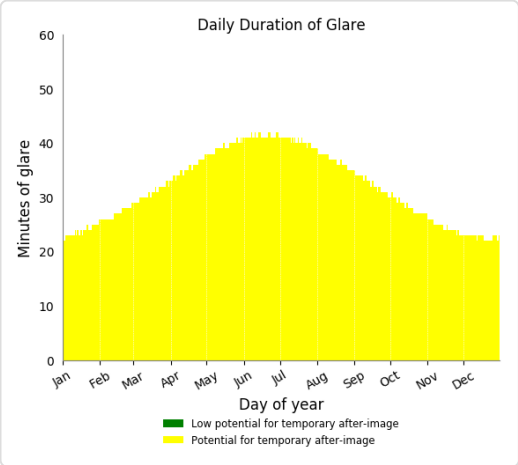



## PV array 1 - Route Receptor (Benalla-Tocumwal Road)

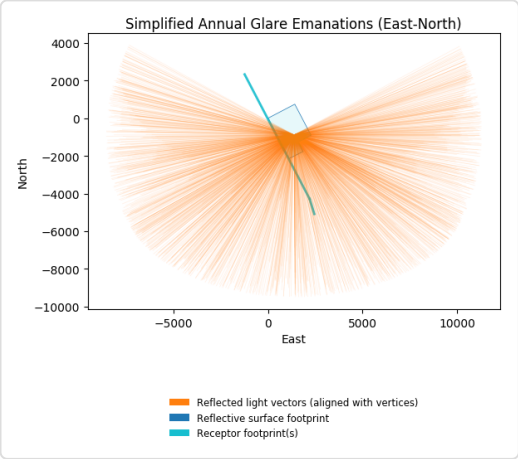
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 11,640 minutes of "yellow" glare with potential to cause temporary after-image.








*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

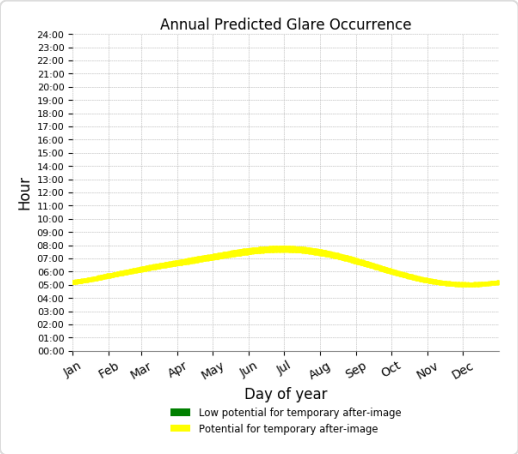
## PV array 1 - Route Receptor (Benalla-Yarrawonga Road)

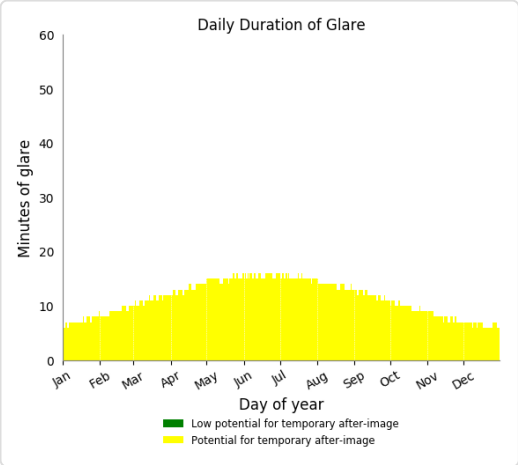
*No glare found*

## PV array 1 - Route Receptor (Goorambat-Chesney Road)

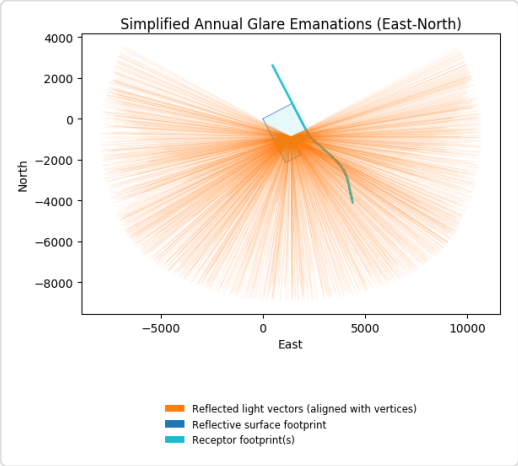
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 4,147 minutes of "yellow" glare with potential to cause temporary after-image.





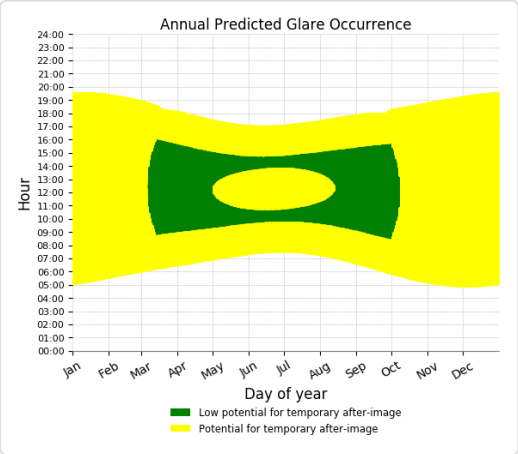


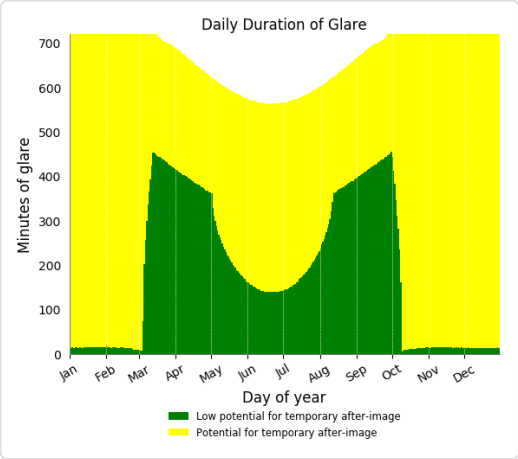

*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

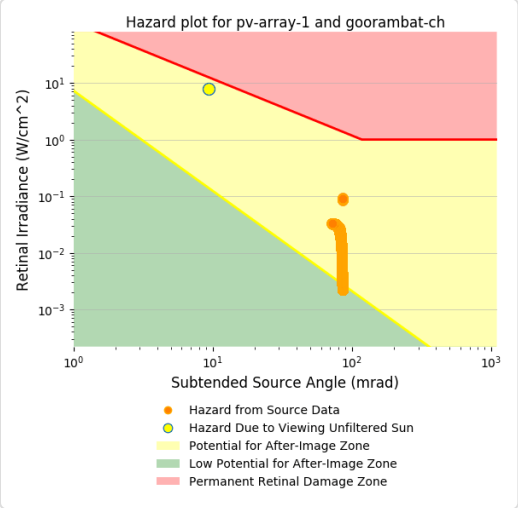
## PV array 1 - Route Receptor (Goorambat-Chesney Road)

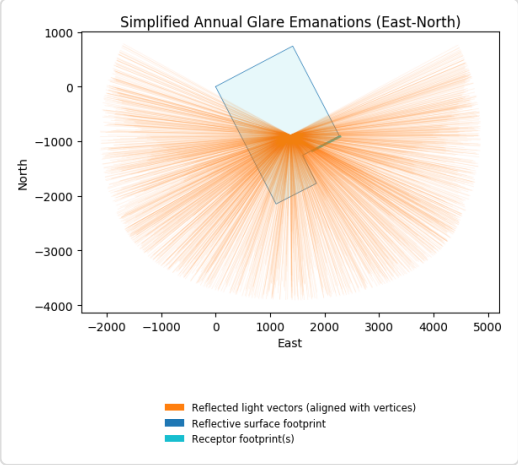
PV array is expected to produce the following glare for receptors at this location:

- 67,643 minutes of "green" glare with low potential to cause temporary after-image.
- 190,871 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

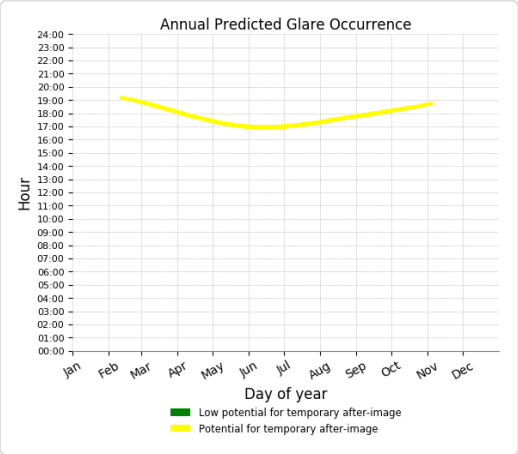
## PV array 1 - Route Receptor (Paolini Lane)

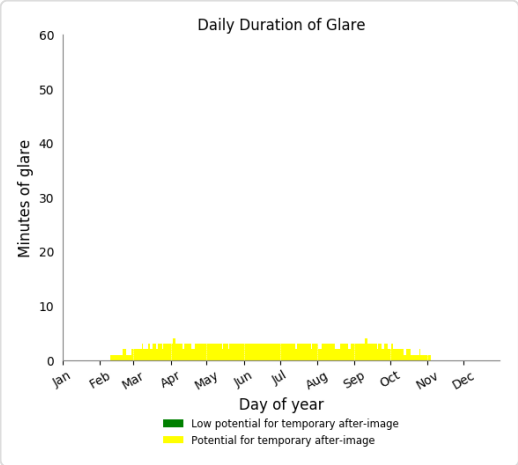
*No glare found*

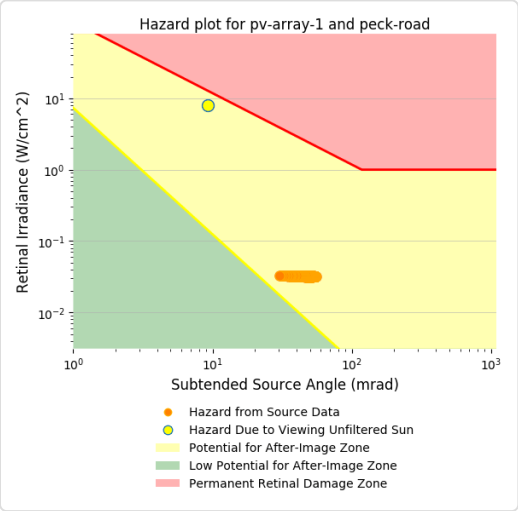
## PV array 1 - Route Receptor (Peck Road)

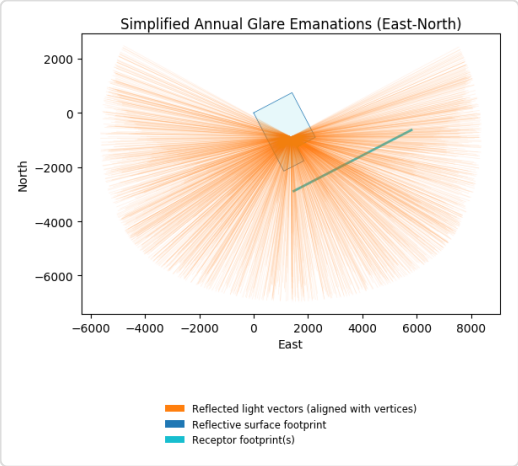
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 684 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

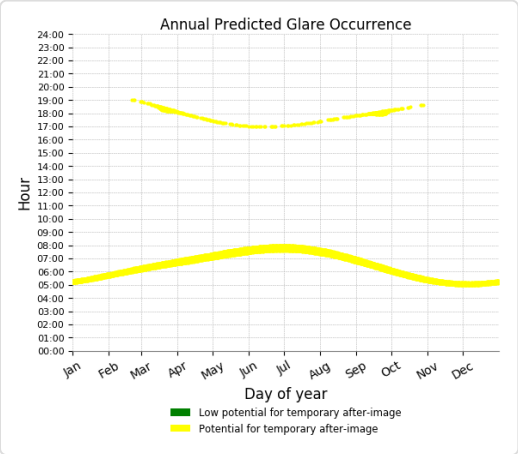
## PV array 1 - Route Receptor (Quinn Road)

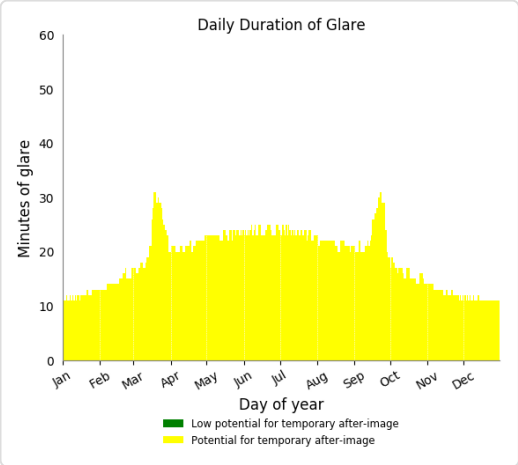
*No glare found*

## PV array 1 - Route Receptor (Railway Track)

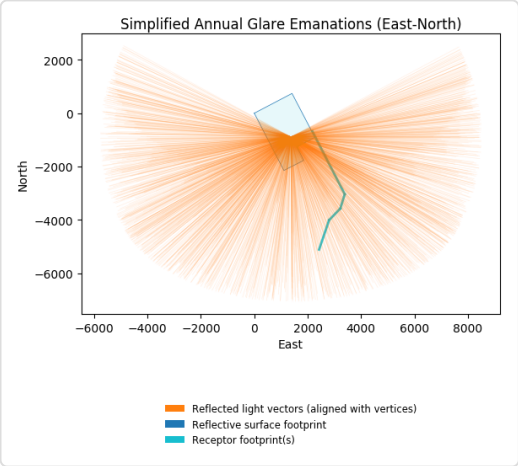
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 6,855 minutes of "yellow" glare with potential to cause temporary after-image.





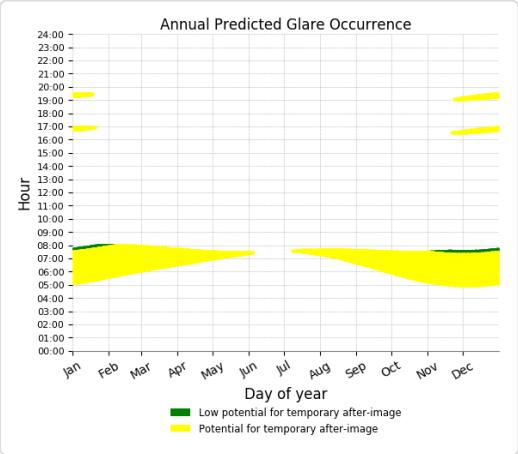


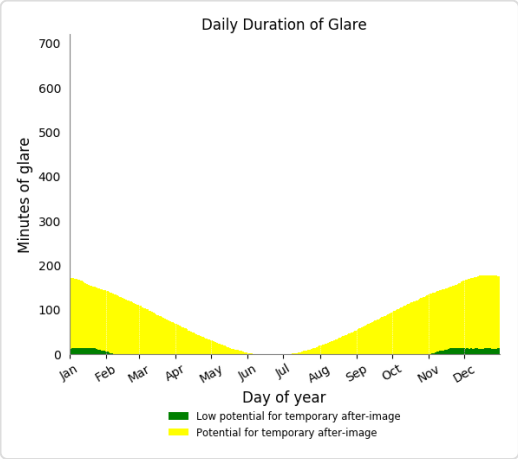

*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

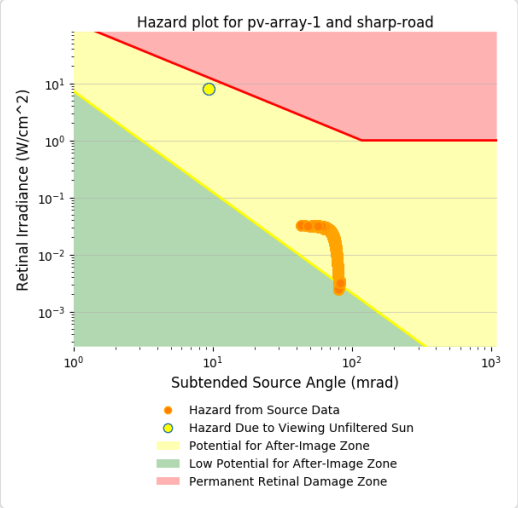
## PV array 1 - Route Receptor (Sharp Road)

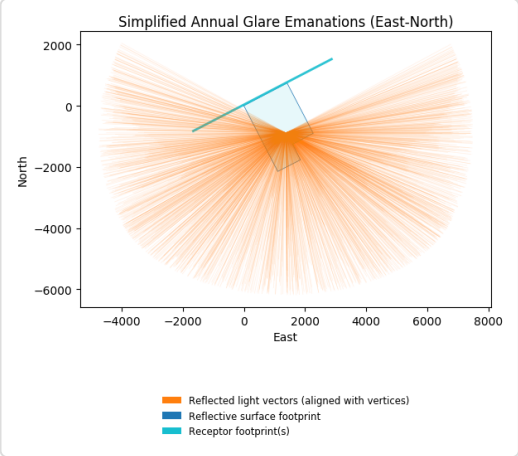
PV array is expected to produce the following glare for receptors at this location:

- 1,037 minutes of "green" glare with low potential to cause temporary after-image.
- 28,894 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 1 - Route Receptor (Taylor Road)

*No glare found*

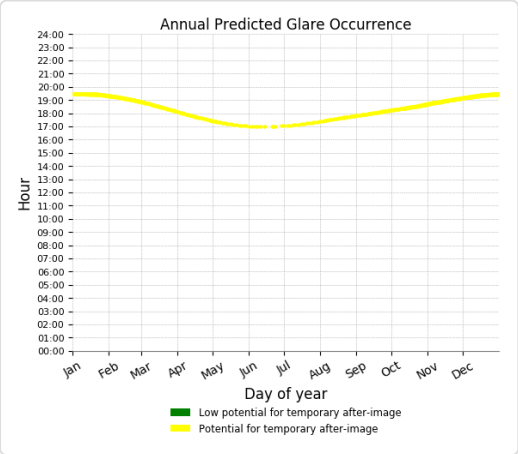
## PV array 1 - Route Receptor (Trask Road)

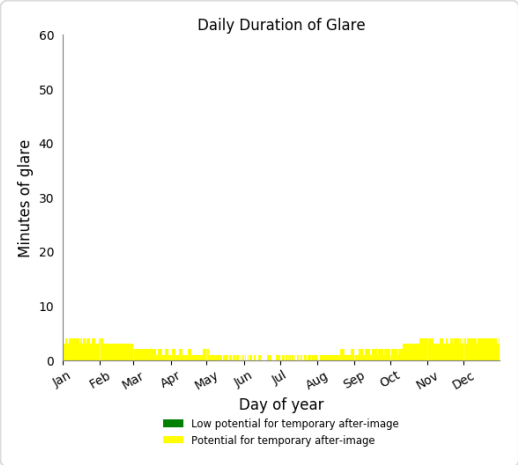
*No glare found*

## PV array 1 - Route Receptor (Trewin Road)

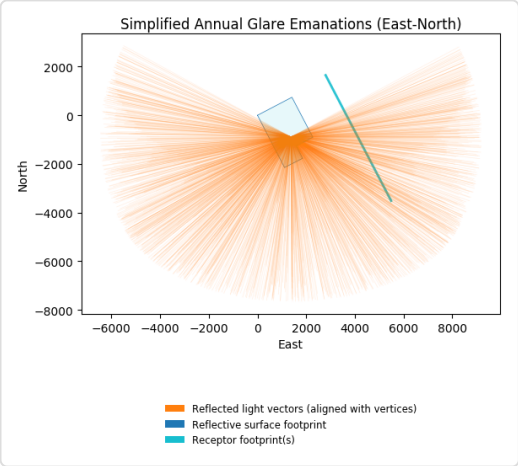
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 766 minutes of "yellow" glare with potential to cause temporary after-image.








*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 1 - Route Receptor (Wilson Road)

*No glare found*

## PV array 2 potential temporary after-image

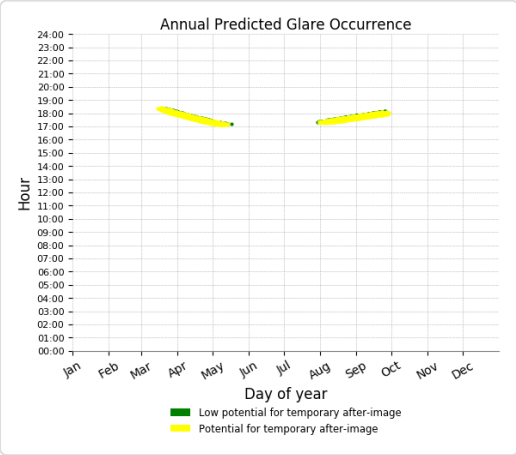
| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 139 | 1343 |
| OP: OP 2 | 286 | 1033 |
| OP: OP 3 | 420 | 866 |
| OP: OP 4 | 686 | 902 |
| OP: OP 5 | 170 | 941 |
| OP: OP 6 | 43 | 2351 |
| OP: OP 7 | 0 | 2987 |
| OP: OP 8 | 0 | 6603 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 64 |
| OP: OP 11 | 1 | 664 |
| OP: OP 12 | 38 | 658 |
| OP: OP 13 | 48 | 984 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 351 | 0 |
| OP: OP 17 | 23 | 693 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 100 | 220 |
| OP: OP 22 | 420 | 660 |
| OP: OP 23 | 308 | 715 |
| OP: OP 24 | 271 | 549 |
| OP: OP 25 | 272 | 384 |
| OP: OP 26 | 361 | 99 |
| OP: OP 27 | 388 | 0 |
| OP: OP 28 | 81 | 26 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 2 | 0 |
| OP: OP 32 | 12 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| Route: Benalla-Tocumwal Road | 0 | 0 |
| Route: Benalla-Yarrawonga Road | 0 | 0 |
| Route: Goorambat-Chesney Road | 0 | 1841 |
| Route: Goorambat-Chesney Road | 0 | 0 |
| Route: Paolini Lane | 0 | 0 |
| Route: Peck Road | 51 | 806 |
| Route: Quinn Road | 0 | 0 |

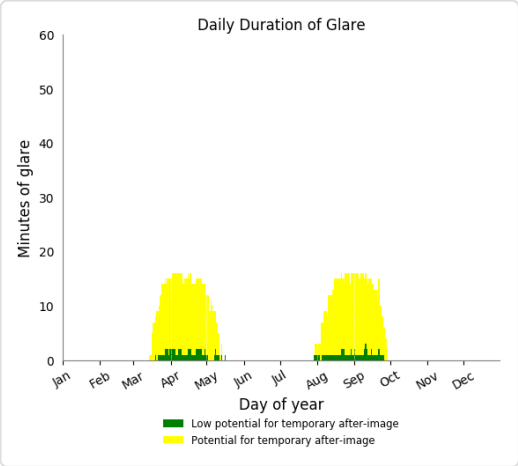
| | | |
|---|---|---|
| Route: Railway Track | 0 | 17767 |
| Route: Sharp Road | 0 | 0 |
| Route: Taylor Road | 0 | 0 |
| Route: Trask Road | 0 | 0 |
| Route: Trewin Road | 18 | 0 |
| Route: Wilson Road | 0 | 0 |

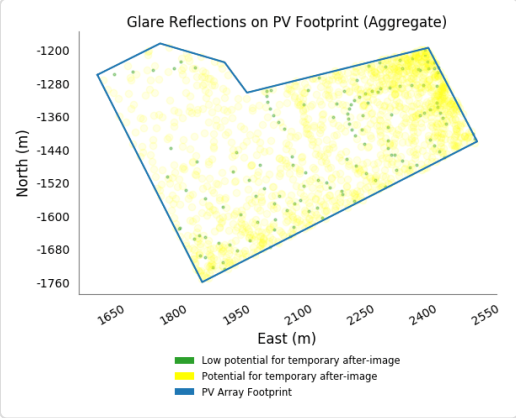
## PV array 2 - OP Receptor (OP 1)

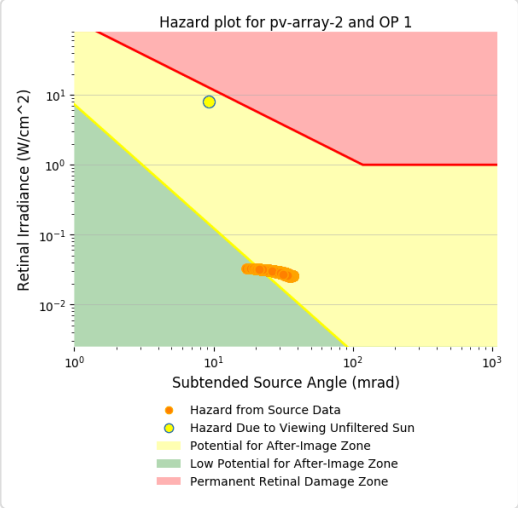
PV array is expected to produce the following glare for receptors at this location:

- 139 minutes of "green" glare with low potential to cause temporary after-image.
- 1,343 minutes of "yellow" glare with potential to cause temporary after-image.



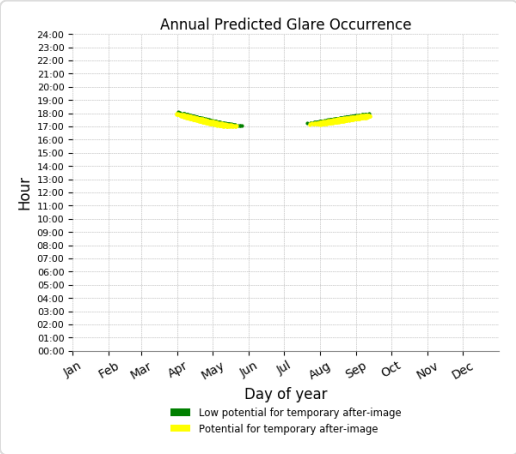



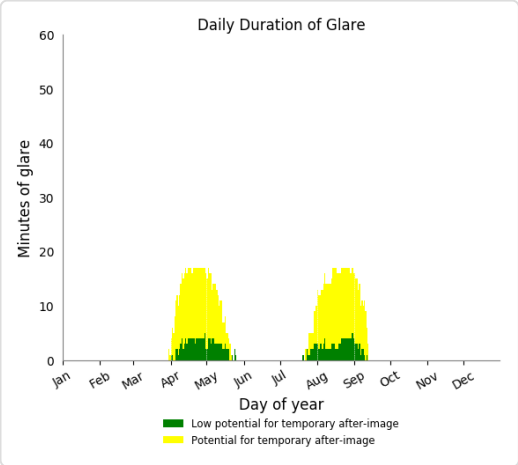



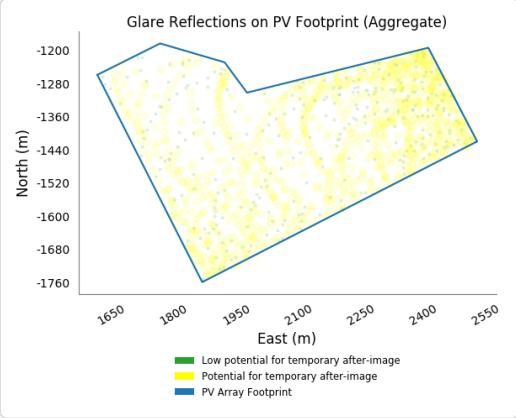
## PV array 2 - OP Receptor (OP 2)

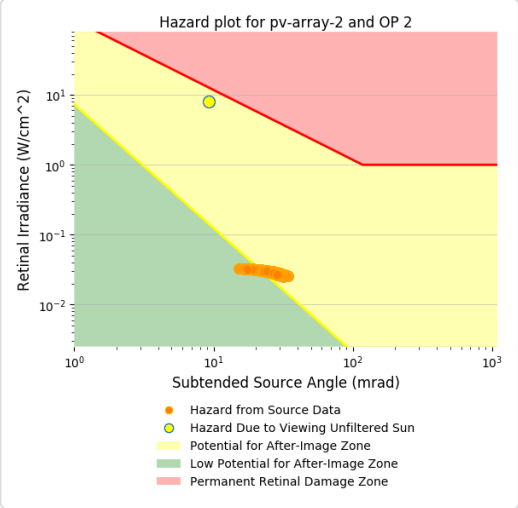
PV array is expected to produce the following glare for receptors at this location:

- 286 minutes of "green" glare with low potential to cause temporary after-image.
- 1,033 minutes of "yellow" glare with potential to cause temporary after-image.



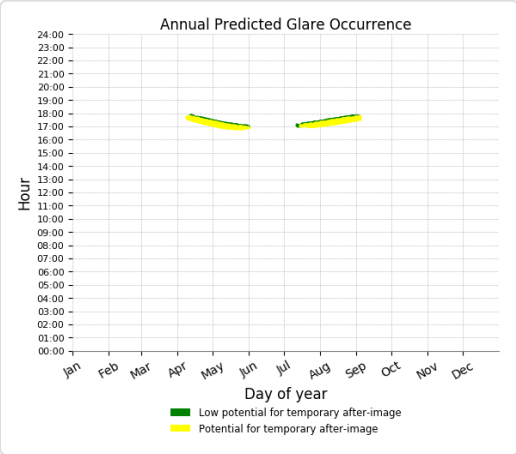



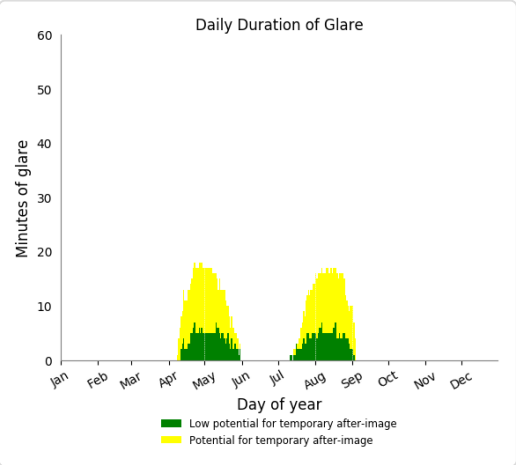



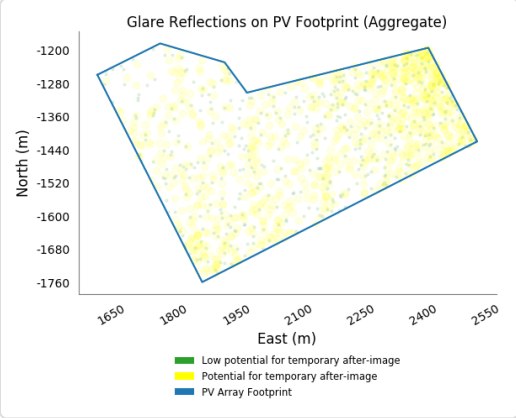
## PV array 2 - OP Receptor (OP 3)

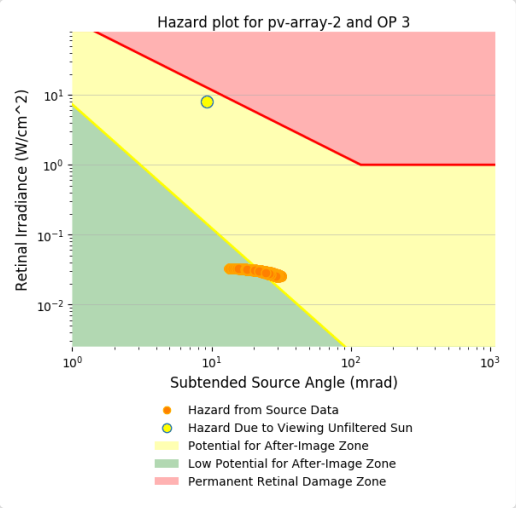
PV array is expected to produce the following glare for receptors at this location:

- 420 minutes of "green" glare with low potential to cause temporary after-image.
- 866 minutes of "yellow" glare with potential to cause temporary after-image.



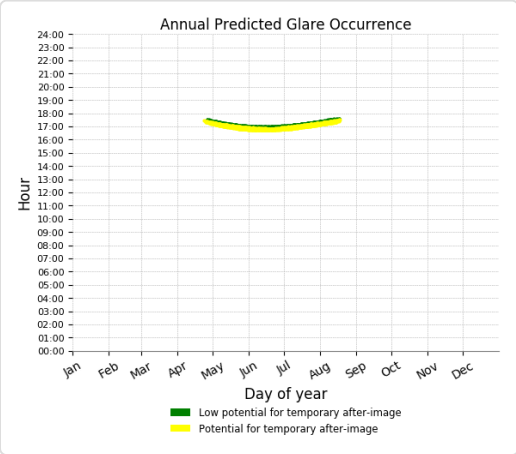



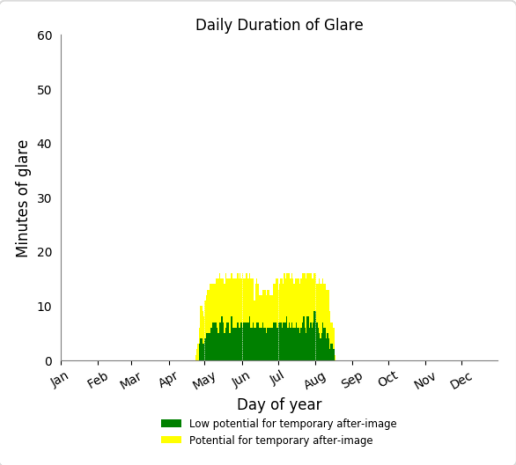



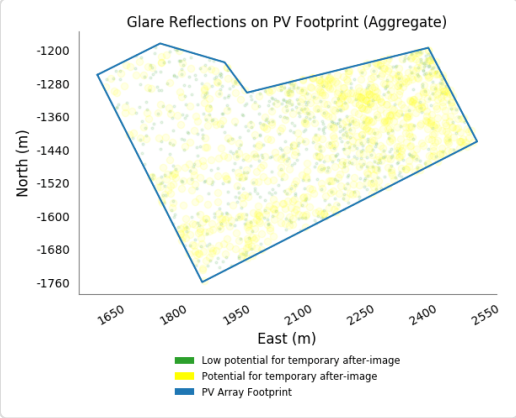
## PV array 2 - OP Receptor (OP 4)

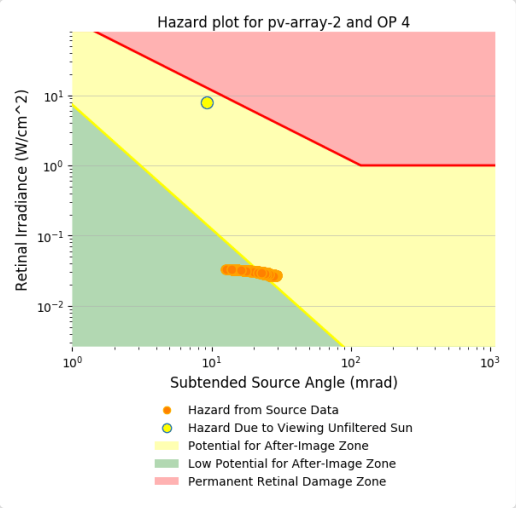
PV array is expected to produce the following glare for receptors at this location:

- 686 minutes of "green" glare with low potential to cause temporary after-image.
- 902 minutes of "yellow" glare with potential to cause temporary after-image.



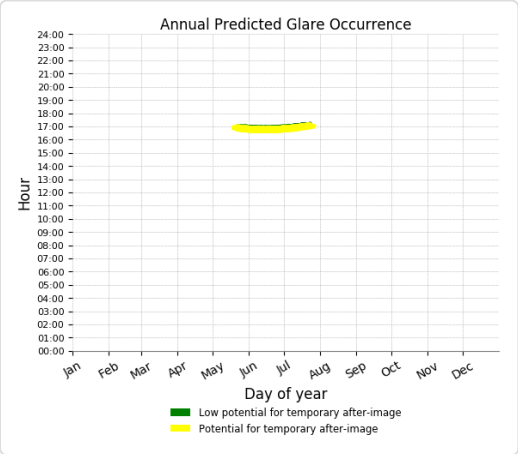



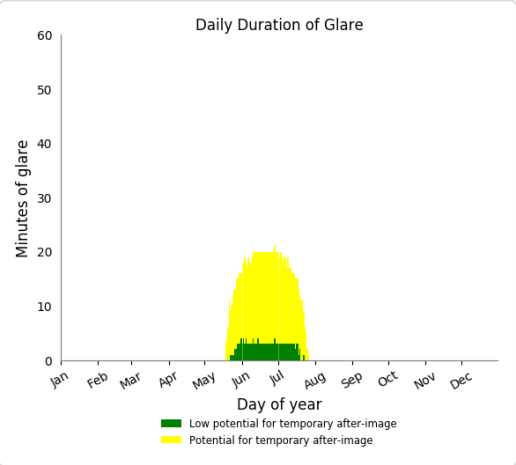



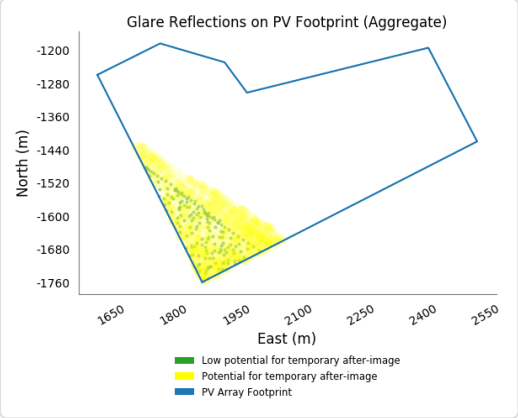
## PV array 2 - OP Receptor (OP 5)

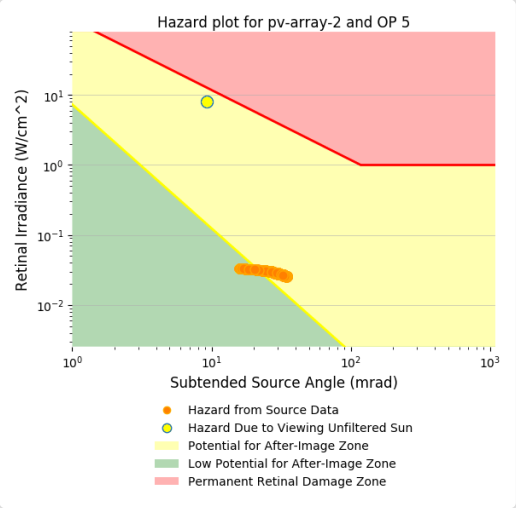
PV array is expected to produce the following glare for receptors at this location:

- 170 minutes of "green" glare with low potential to cause temporary after-image.
- 941 minutes of "yellow" glare with potential to cause temporary after-image.



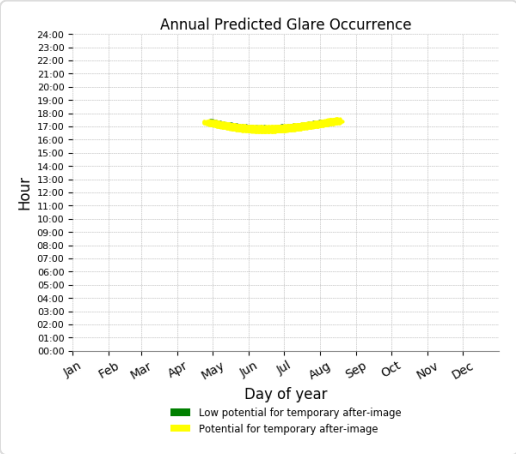



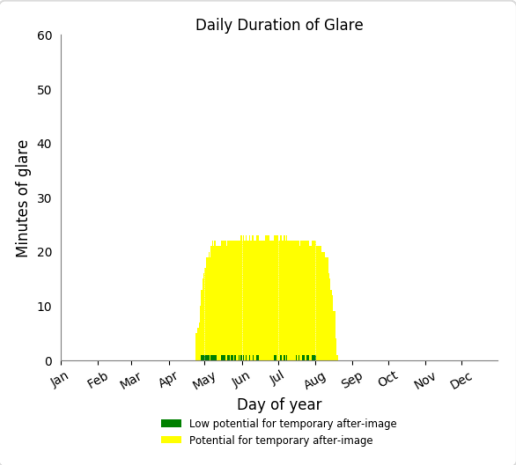



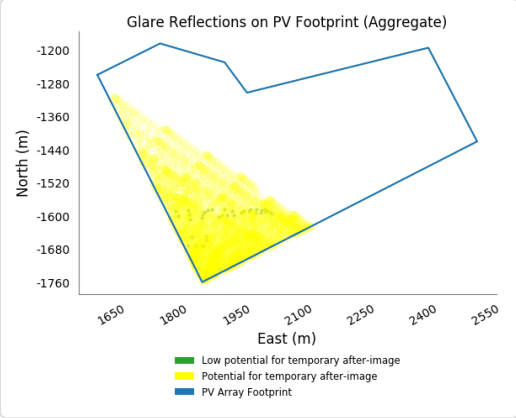
## PV array 2 - OP Receptor (OP 6)

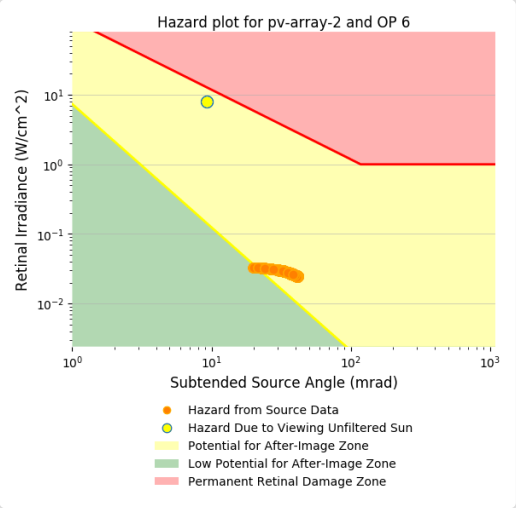
PV array is expected to produce the following glare for receptors at this location:

- 43 minutes of "green" glare with low potential to cause temporary after-image.
- 2,351 minutes of "yellow" glare with potential to cause temporary after-image.



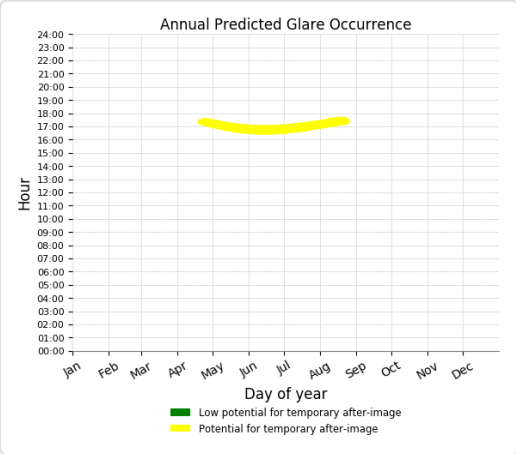



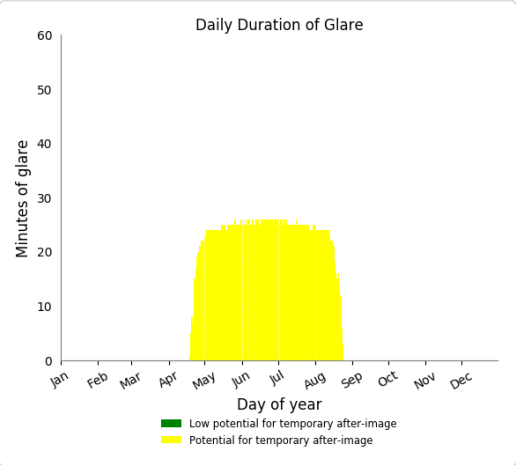



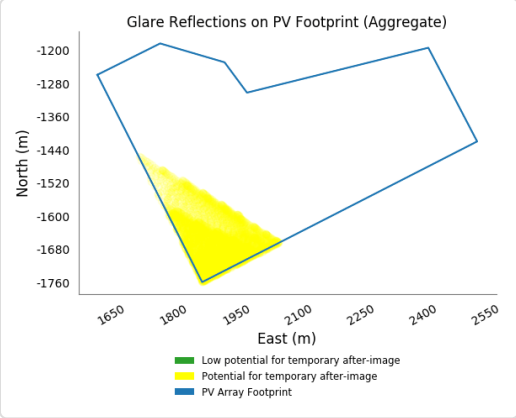
## PV array 2 - OP Receptor (OP 7)

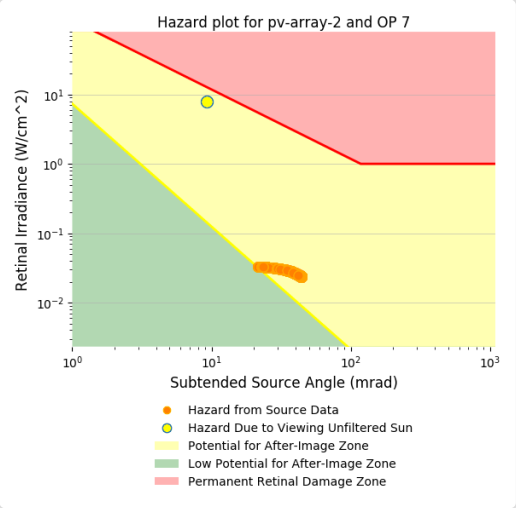
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,987 minutes of "yellow" glare with potential to cause temporary after-image.



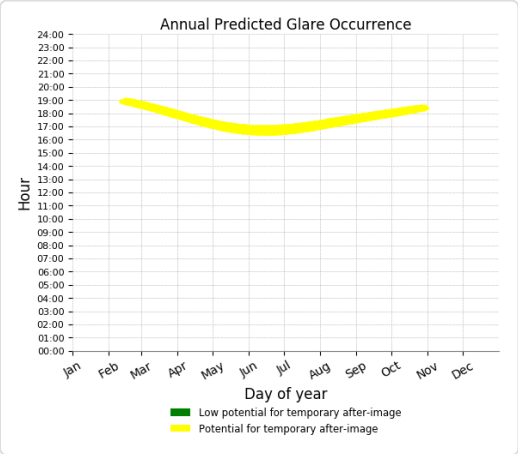



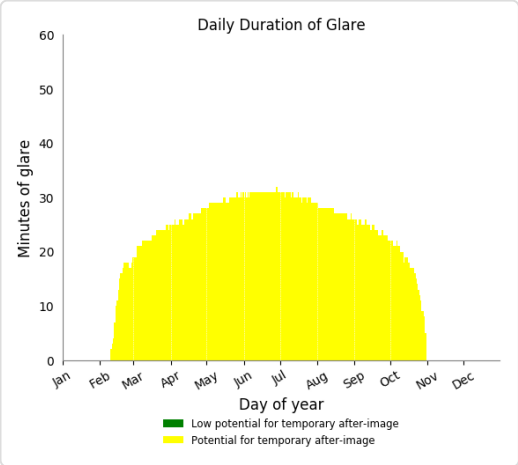



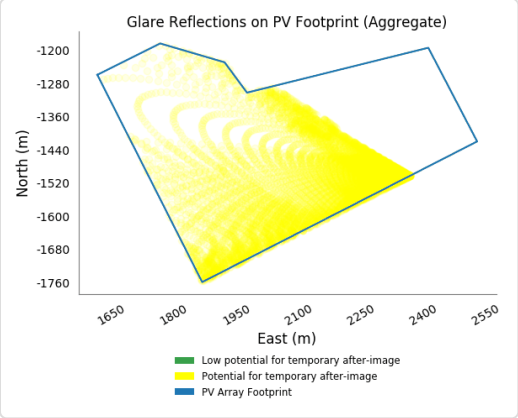
## PV array 2 - OP Receptor (OP 8)

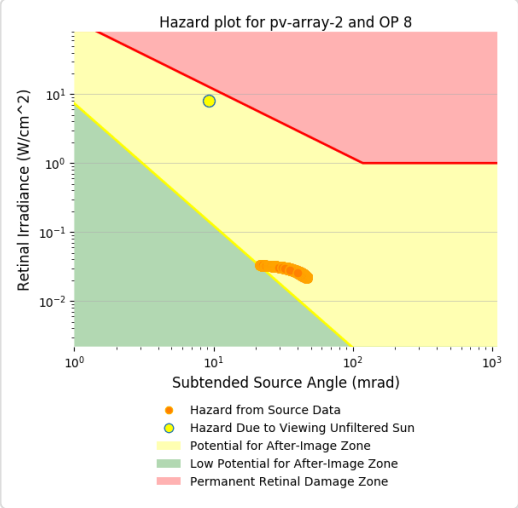
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 6,603 minutes of "yellow" glare with potential to cause temporary after-image.



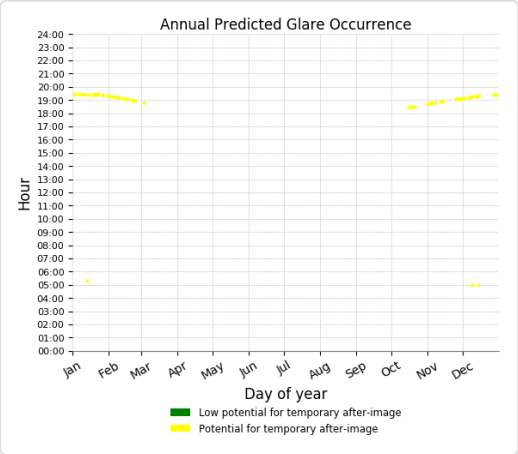

## PV array 2 - OP Receptor (OP 9)

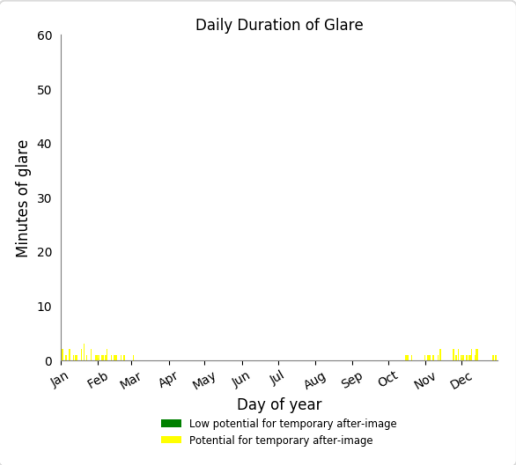
*No glare found*

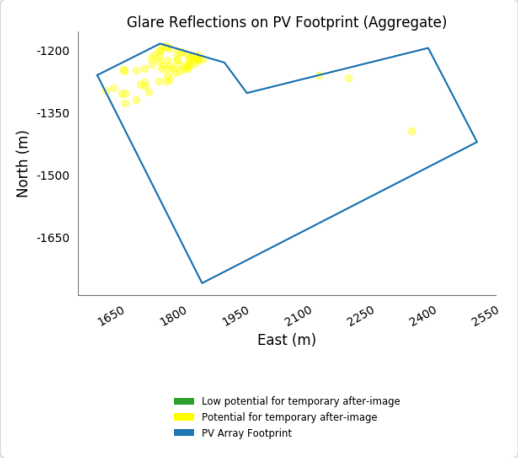
## PV array 2 - OP Receptor (OP 10)

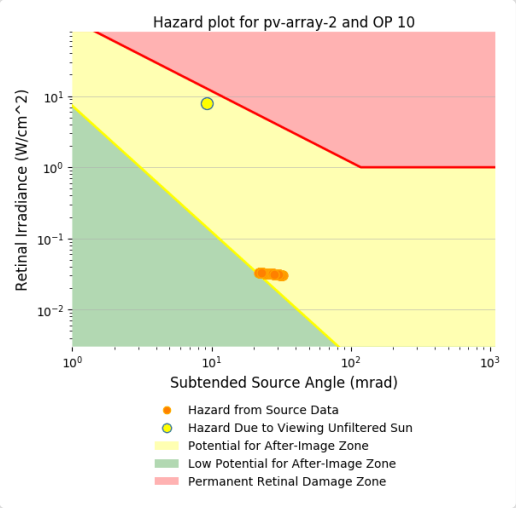
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 64 minutes of "yellow" glare with potential to cause temporary after-image.



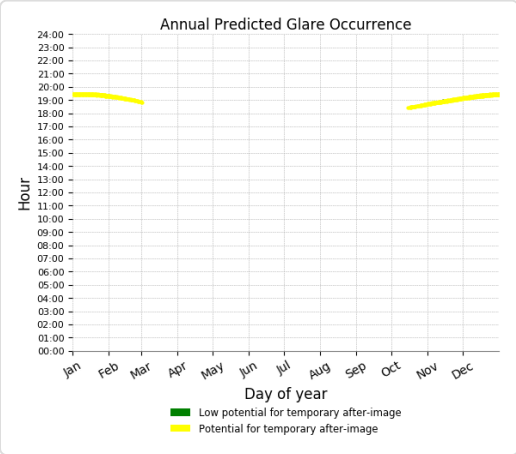



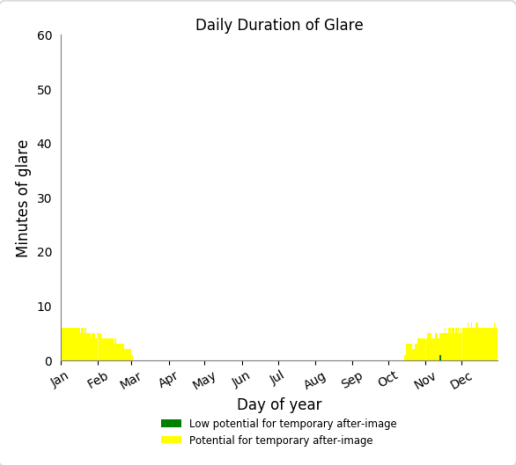



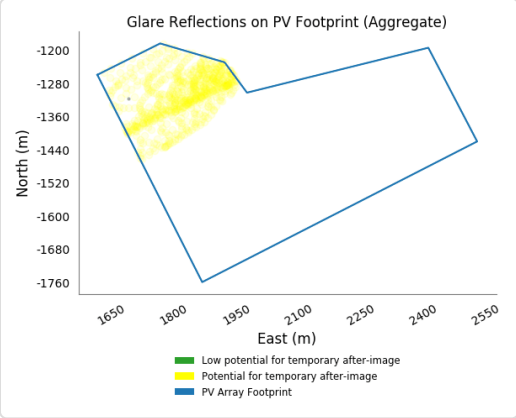
## PV array 2 - OP Receptor (OP 11)

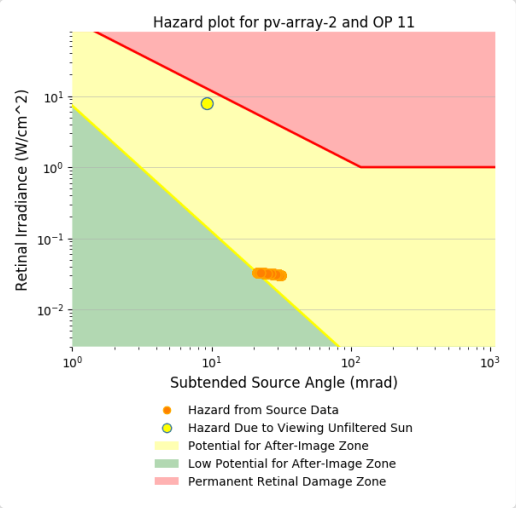
PV array is expected to produce the following glare for receptors at this location:

- 1 minutes of "green" glare with low potential to cause temporary after-image.
- 664 minutes of "yellow" glare with potential to cause temporary after-image.



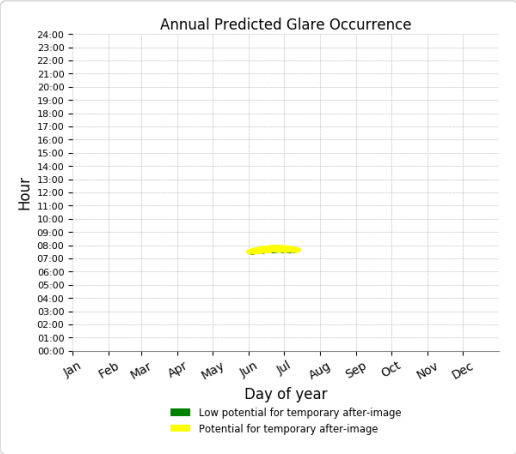



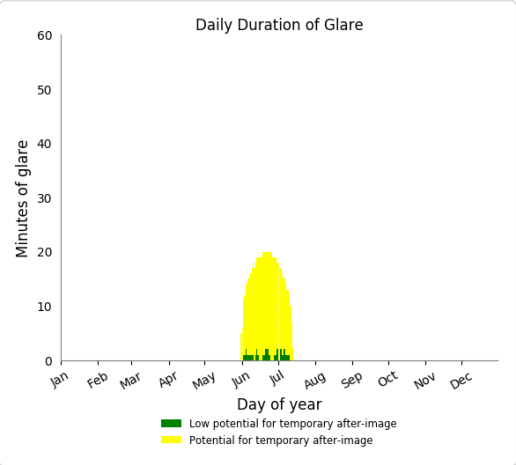



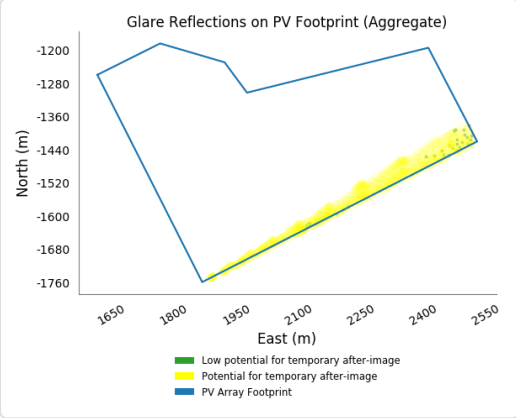
## PV array 2 - OP Receptor (OP 12)

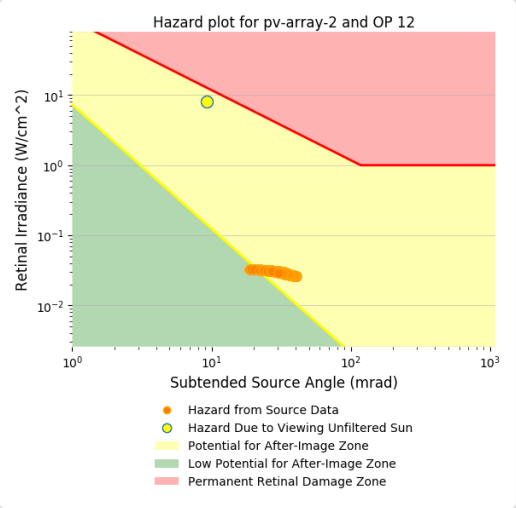
PV array is expected to produce the following glare for receptors at this location:

- 38 minutes of "green" glare with low potential to cause temporary after-image.
- 658 minutes of "yellow" glare with potential to cause temporary after-image.



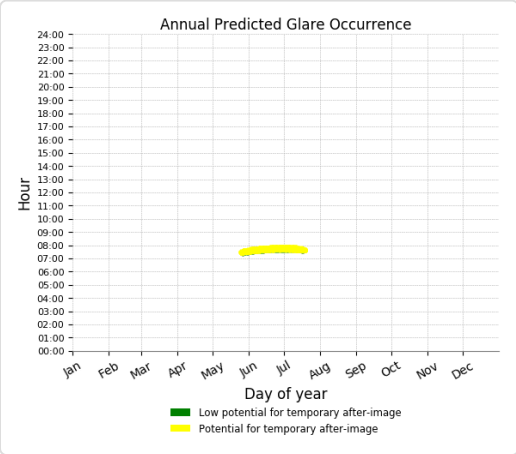



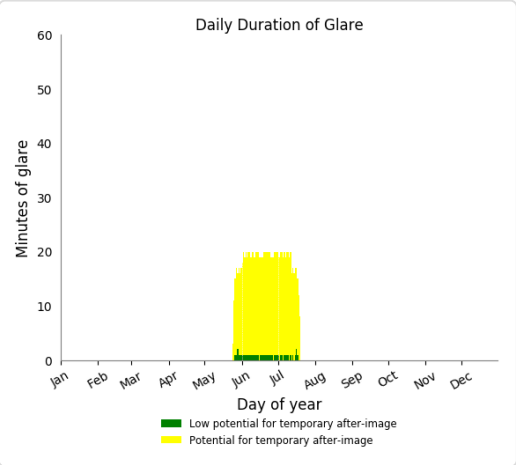



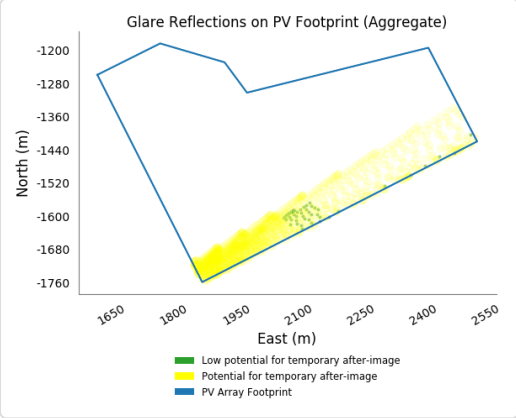
## PV array 2 - OP Receptor (OP 13)

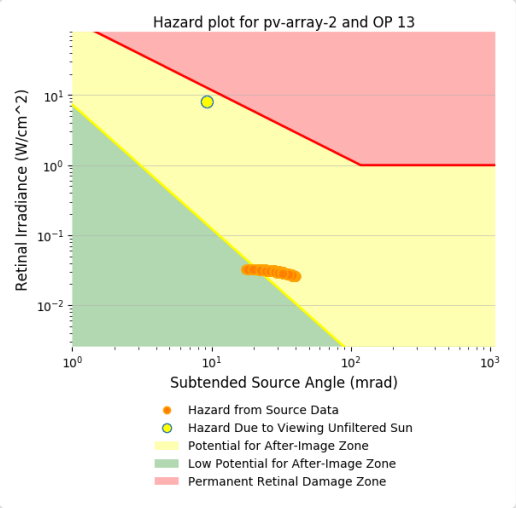
PV array is expected to produce the following glare for receptors at this location:

- 48 minutes of "green" glare with low potential to cause temporary after-image.
- 984 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 2 - OP Receptor (OP 14)

*No glare found*

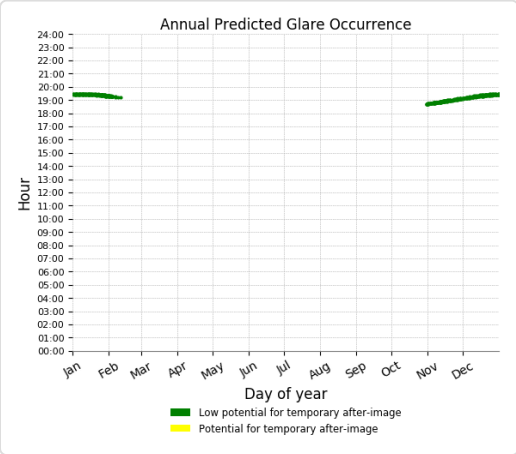
## PV array 2 - OP Receptor (OP 15)

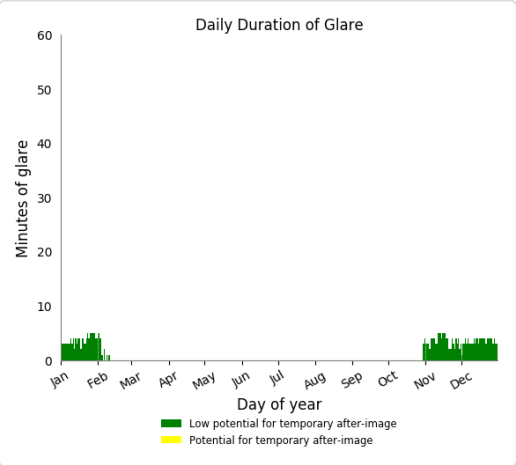
*No glare found*

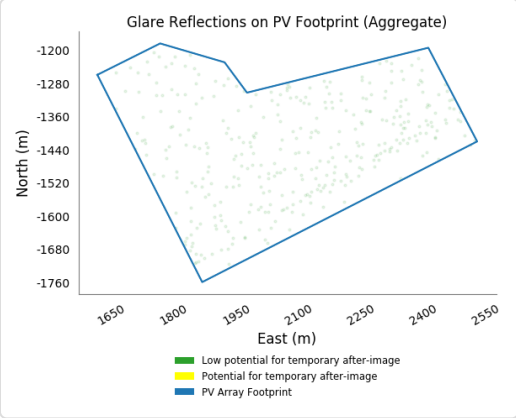
## PV array 2 - OP Receptor (OP 16)

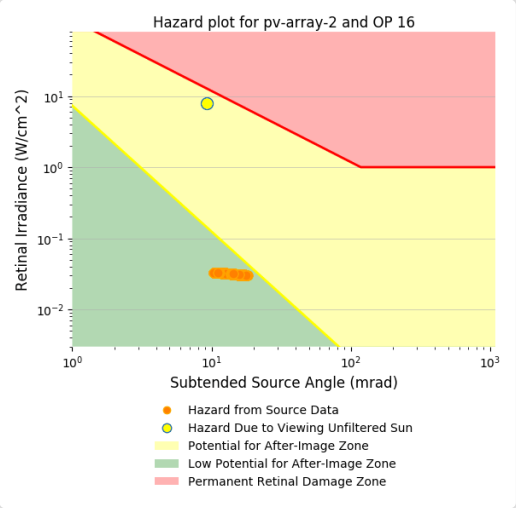
PV array is expected to produce the following glare for receptors at this location:

- 351 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.



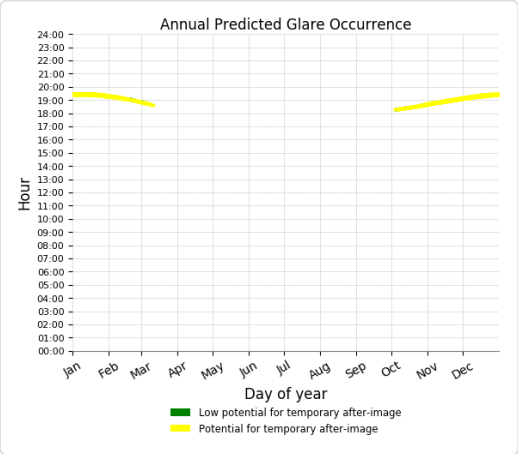



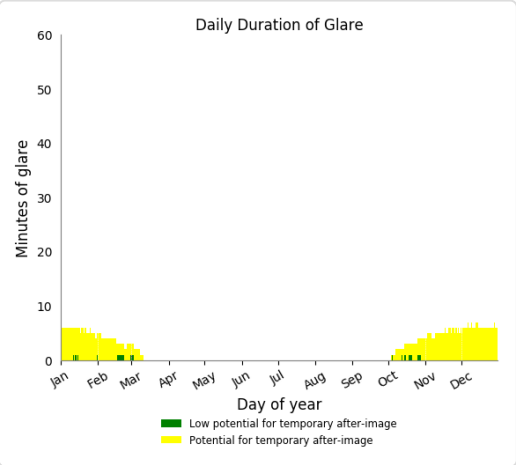



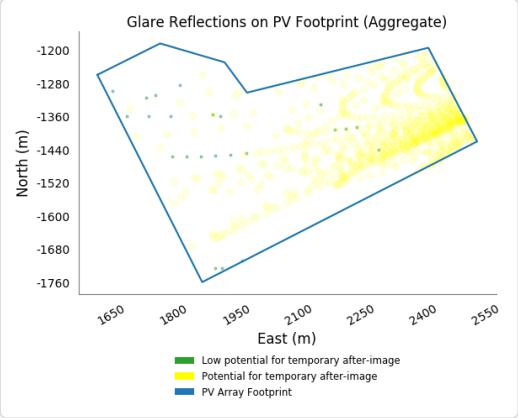
## PV array 2 - OP Receptor (OP 17)

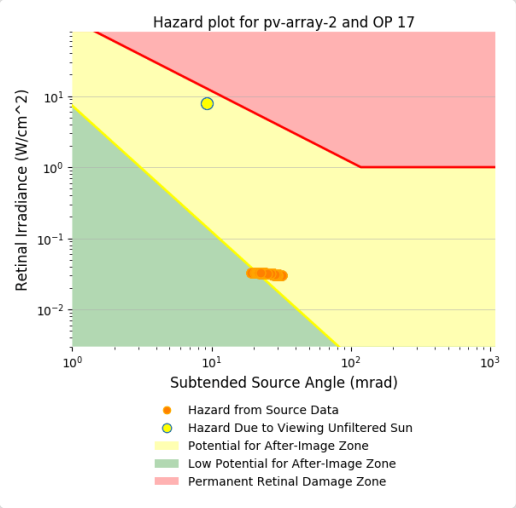
PV array is expected to produce the following glare for receptors at this location:

- 23 minutes of "green" glare with low potential to cause temporary after-image.
- 693 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 2 - OP Receptor (OP 18)

*No glare found*

## PV array 2 - OP Receptor (OP 19)

*No glare found*

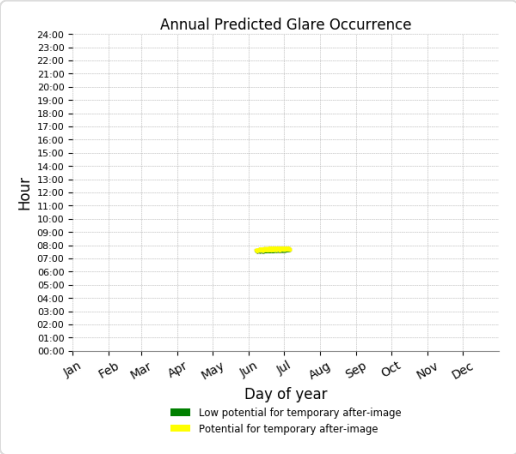
## PV array 2 - OP Receptor (OP 20)

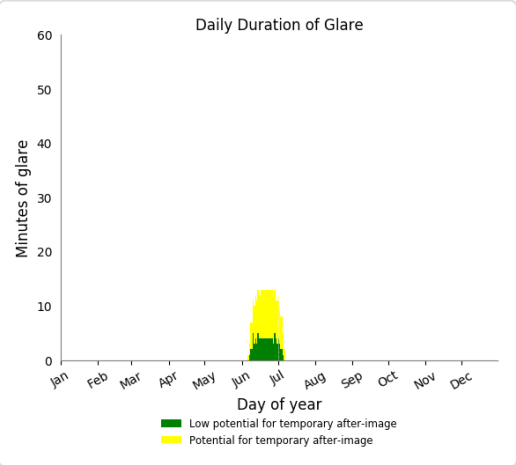
*No glare found*

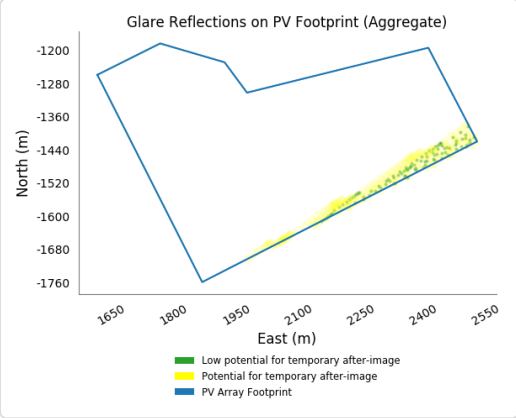
## PV array 2 - OP Receptor (OP 21)

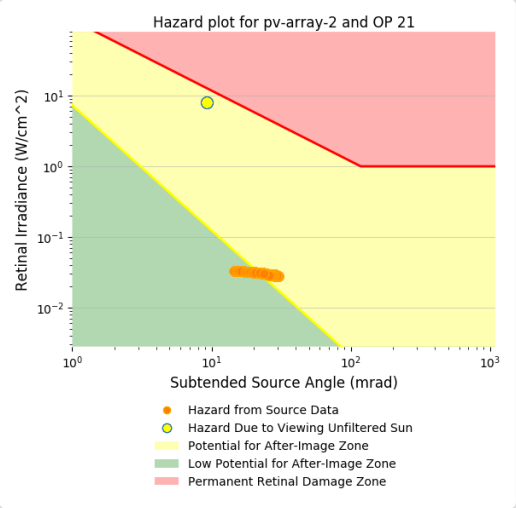
PV array is expected to produce the following glare for receptors at this location:

- 100 minutes of "green" glare with low potential to cause temporary after-image.
- 220 minutes of "yellow" glare with potential to cause temporary after-image.



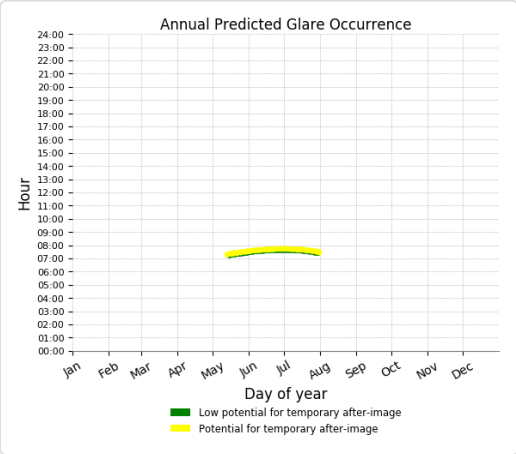



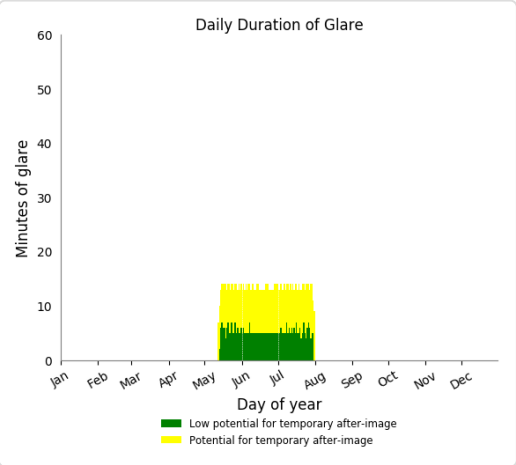



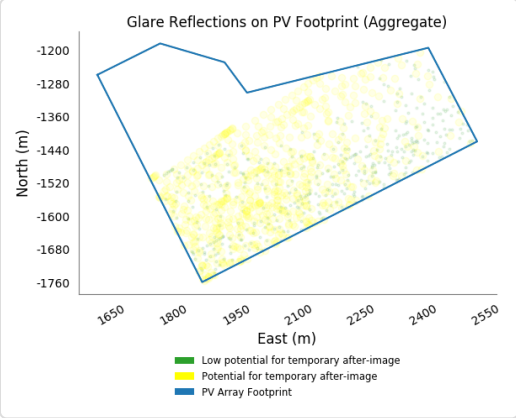
## PV array 2 - OP Receptor (OP 22)

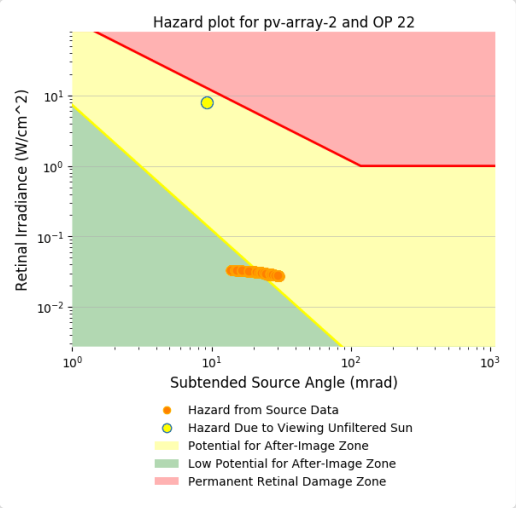
PV array is expected to produce the following glare for receptors at this location:

- 420 minutes of "green" glare with low potential to cause temporary after-image.
- 660 minutes of "yellow" glare with potential to cause temporary after-image.



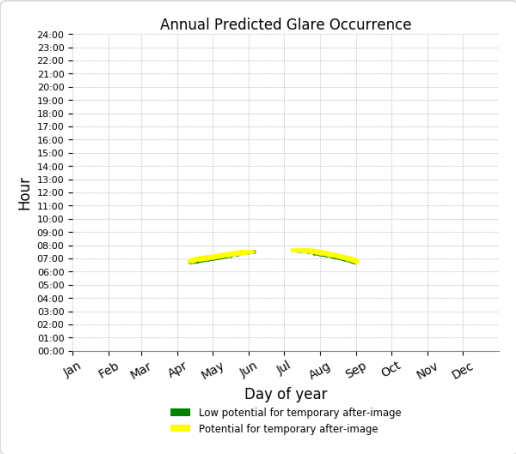



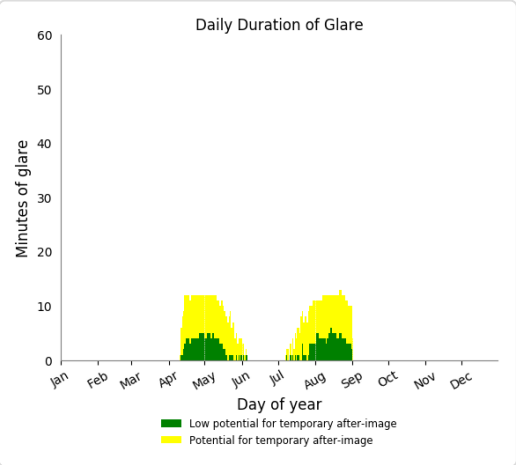



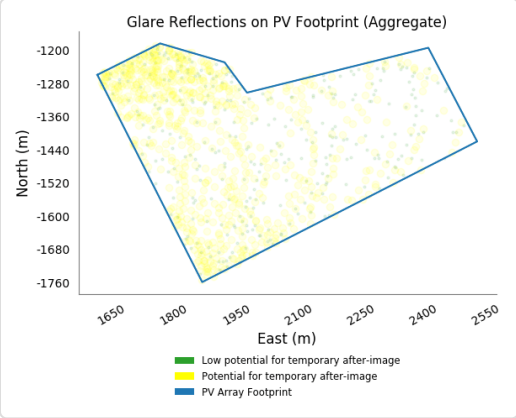
## PV array 2 - OP Receptor (OP 23)

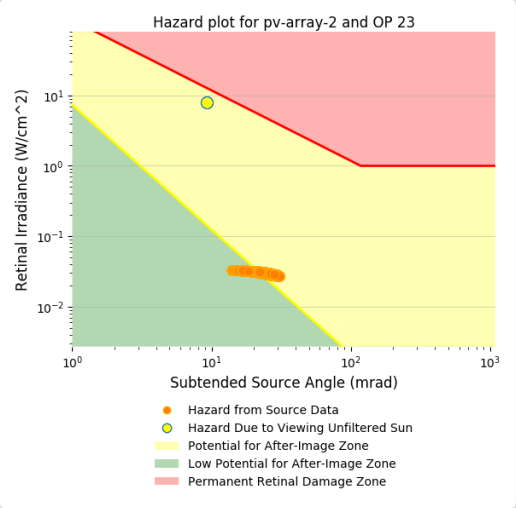
PV array is expected to produce the following glare for receptors at this location:

- 308 minutes of "green" glare with low potential to cause temporary after-image.
- 715 minutes of "yellow" glare with potential to cause temporary after-image.



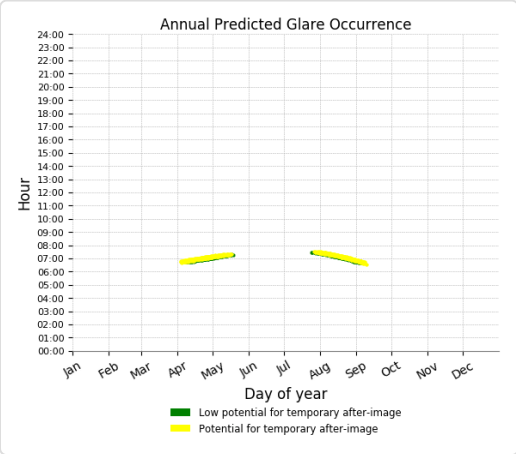



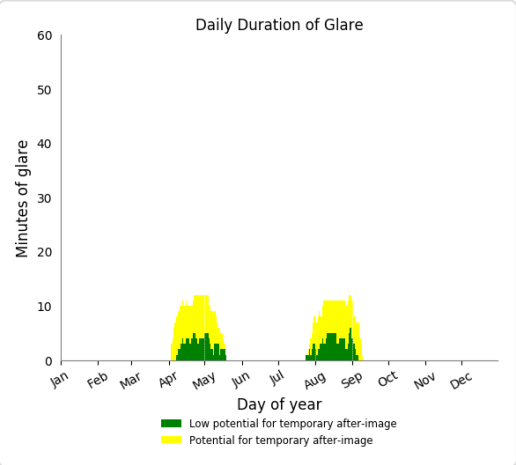



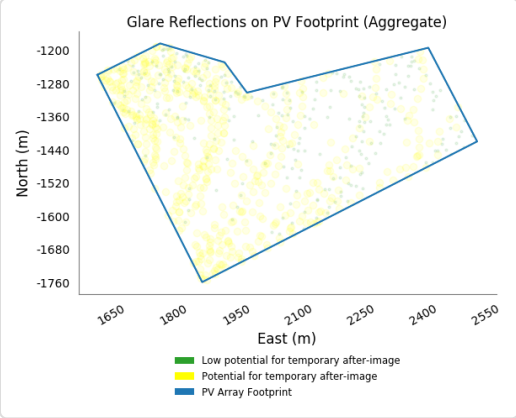
## PV array 2 - OP Receptor (OP 24)

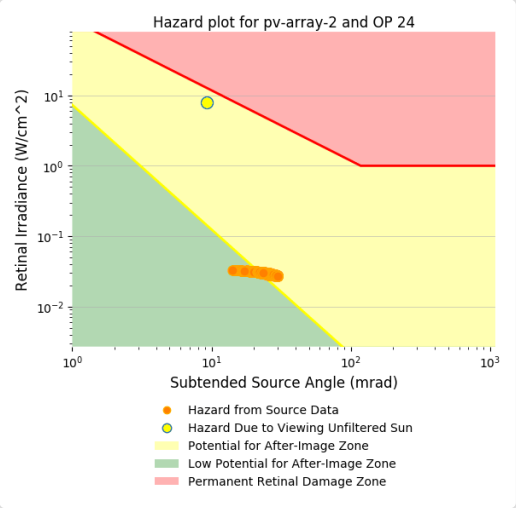
PV array is expected to produce the following glare for receptors at this location:

- 271 minutes of "green" glare with low potential to cause temporary after-image.
- 549 minutes of "yellow" glare with potential to cause temporary after-image.



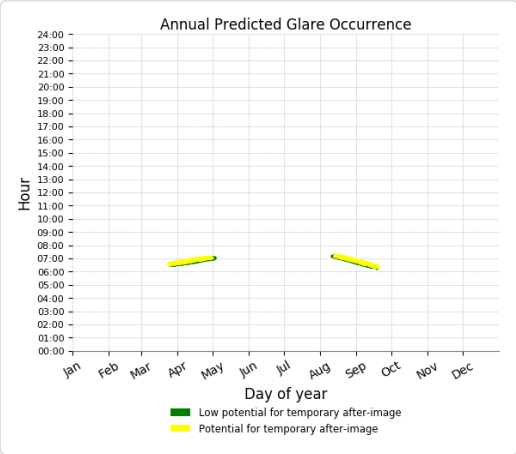



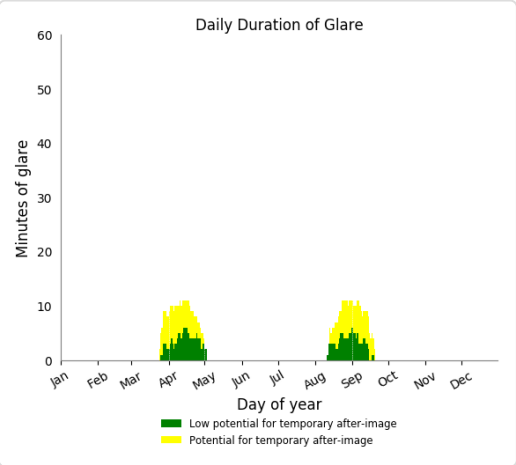



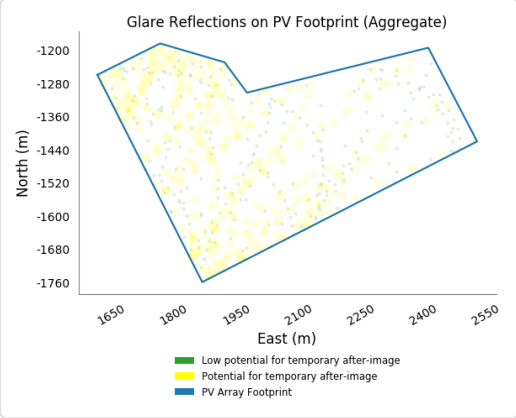
## PV array 2 - OP Receptor (OP 25)

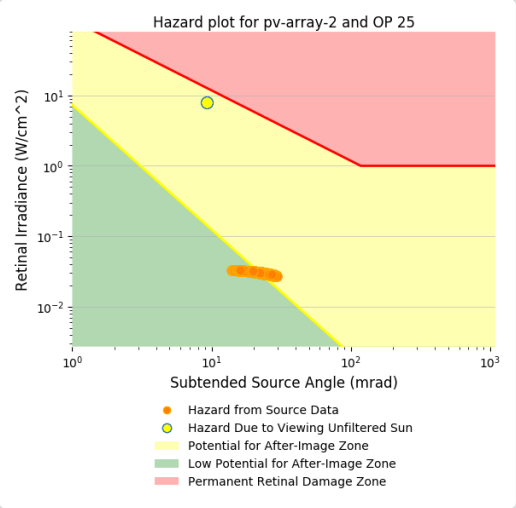
PV array is expected to produce the following glare for receptors at this location:

- 272 minutes of "green" glare with low potential to cause temporary after-image.
- 384 minutes of "yellow" glare with potential to cause temporary after-image.



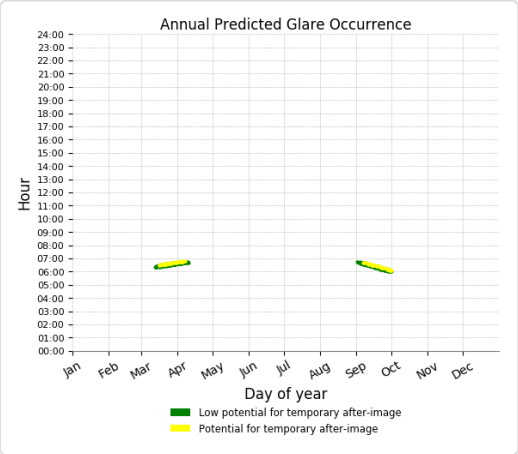



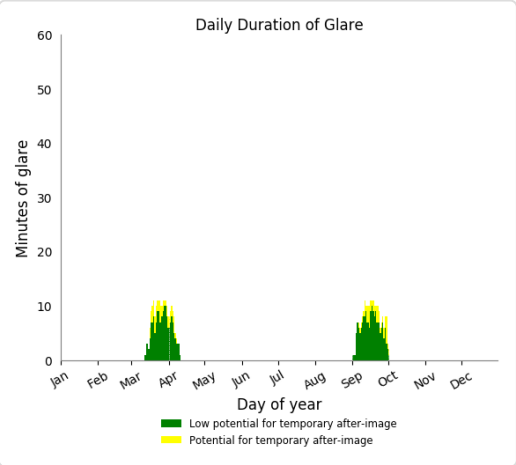



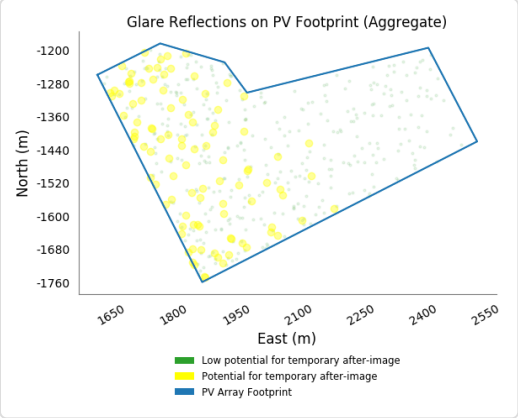
## PV array 2 - OP Receptor (OP 26)

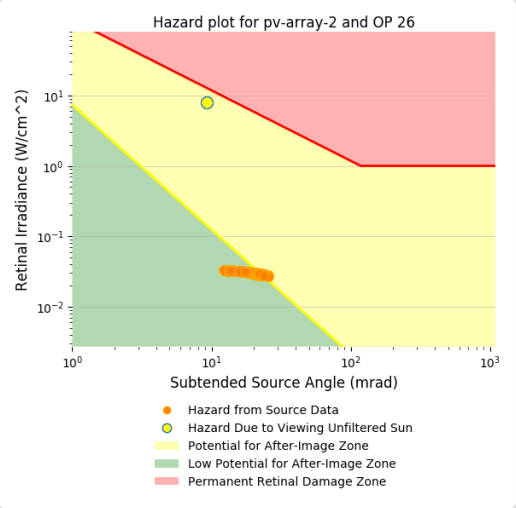
PV array is expected to produce the following glare for receptors at this location:

- 361 minutes of "green" glare with low potential to cause temporary after-image.
- 99 minutes of "yellow" glare with potential to cause temporary after-image.



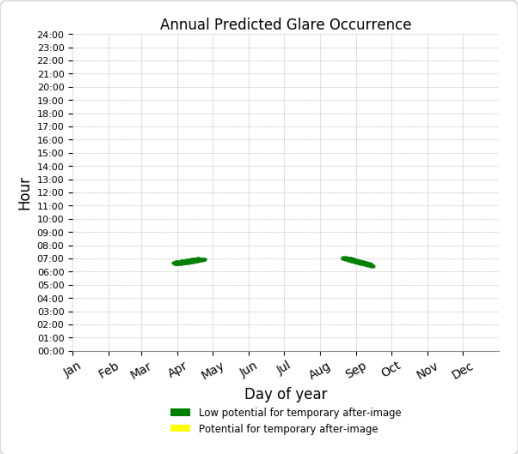



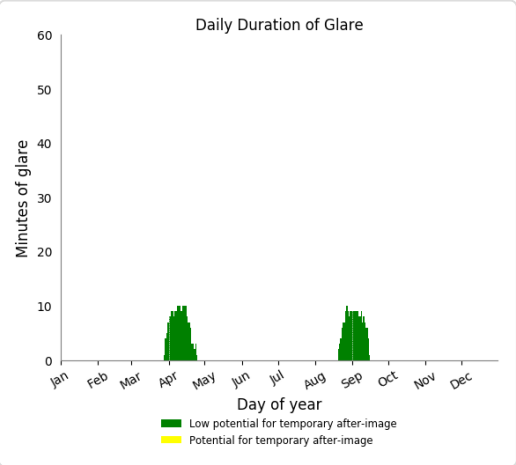



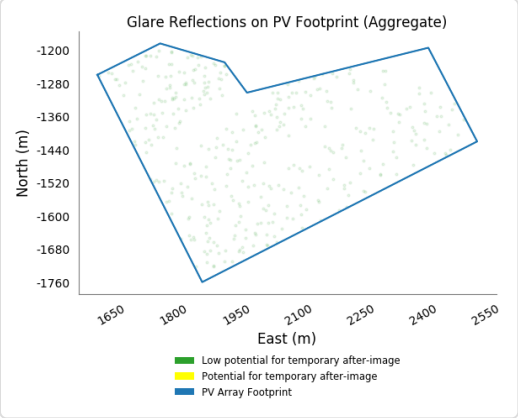
## PV array 2 - OP Receptor (OP 27)

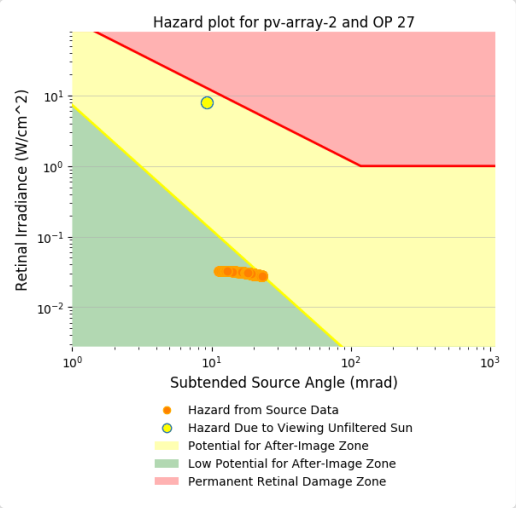
PV array is expected to produce the following glare for receptors at this location:

- 388 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.



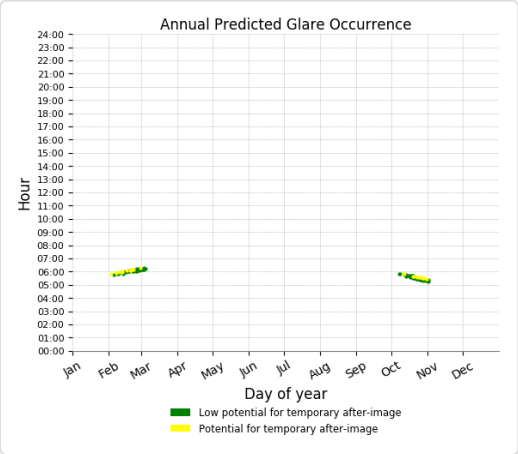



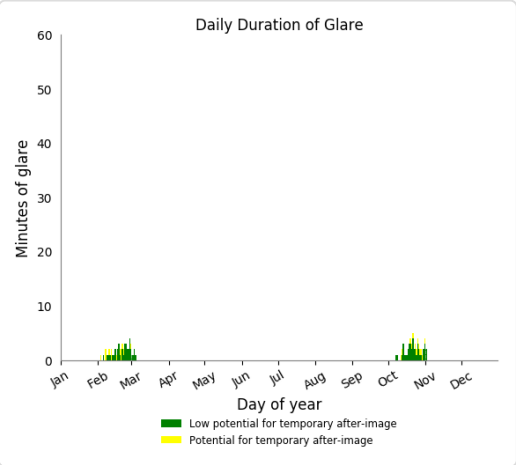



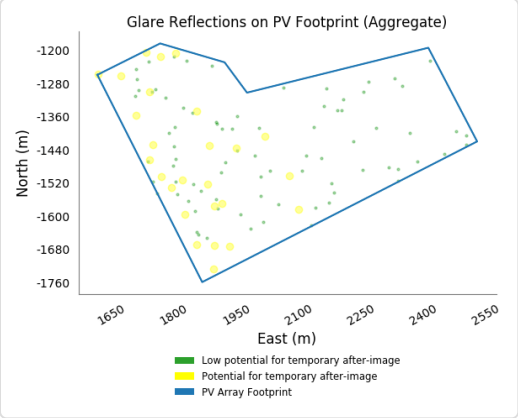
## PV array 2 - OP Receptor (OP 28)

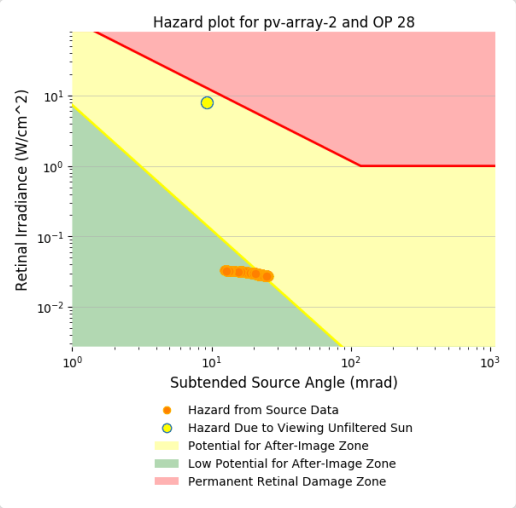
PV array is expected to produce the following glare for receptors at this location:

- 81 minutes of "green" glare with low potential to cause temporary after-image.
- 26 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 2 - OP Receptor (OP 29)

*No glare found*

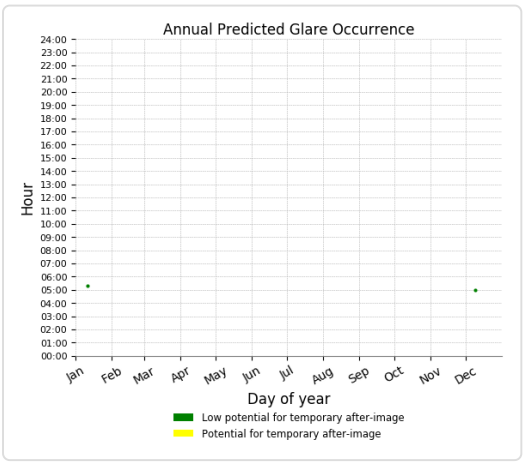
## PV array 2 - OP Receptor (OP 30)

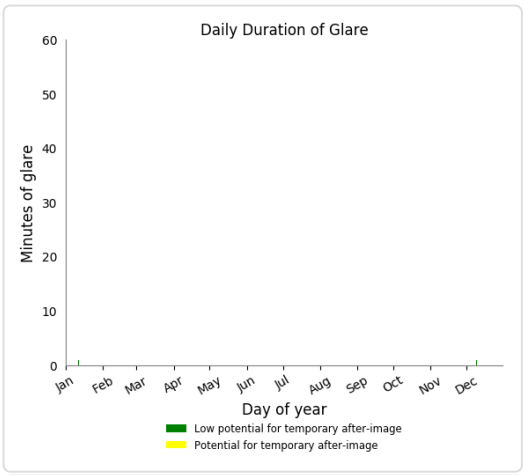
*No glare found*

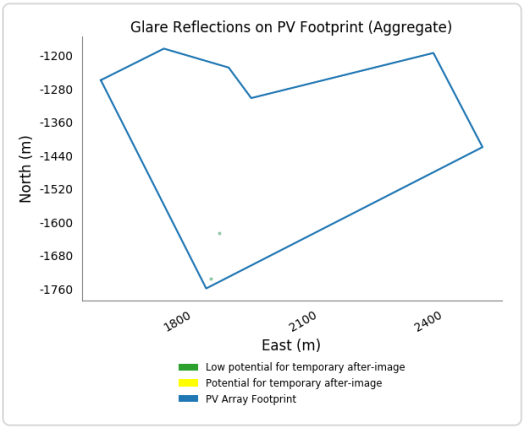
## PV array 2 - OP Receptor (OP 31)

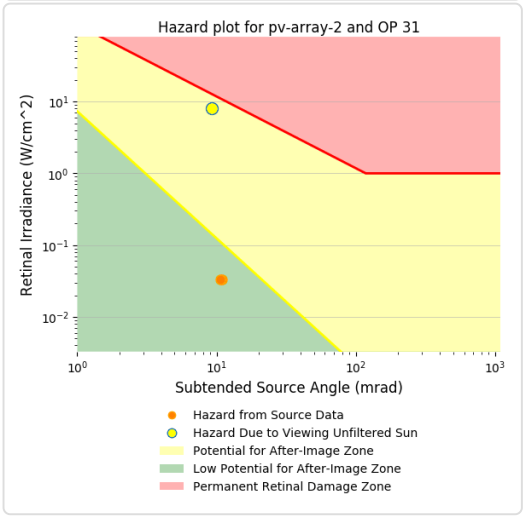
PV array is expected to produce the following glare for receptors at this location:

- 2 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.



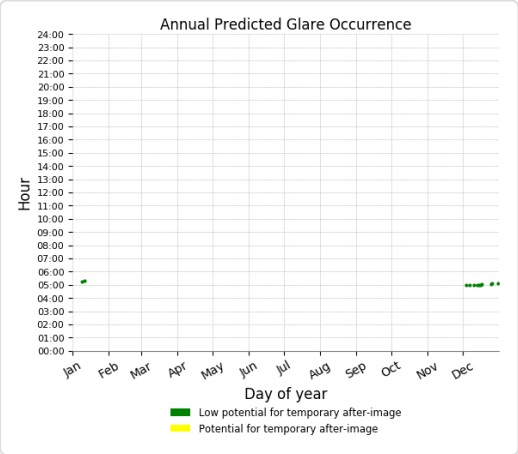



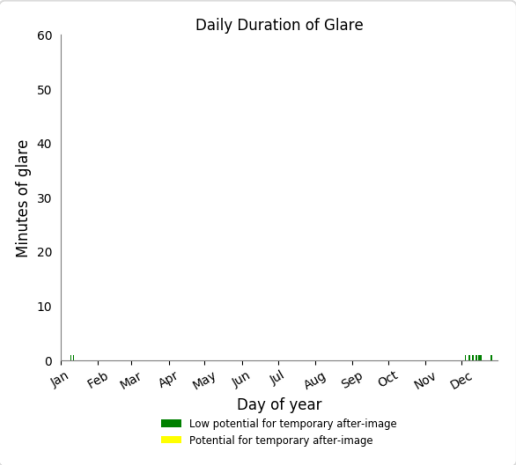



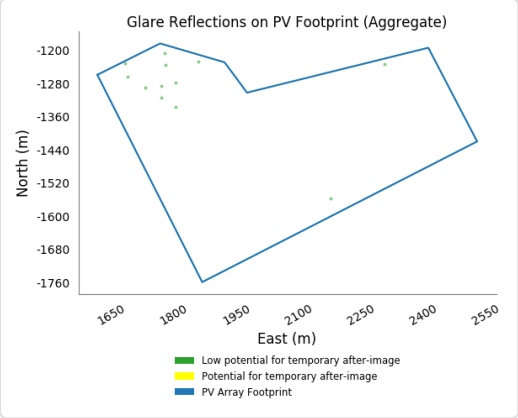
## PV array 2 - OP Receptor (OP 32)

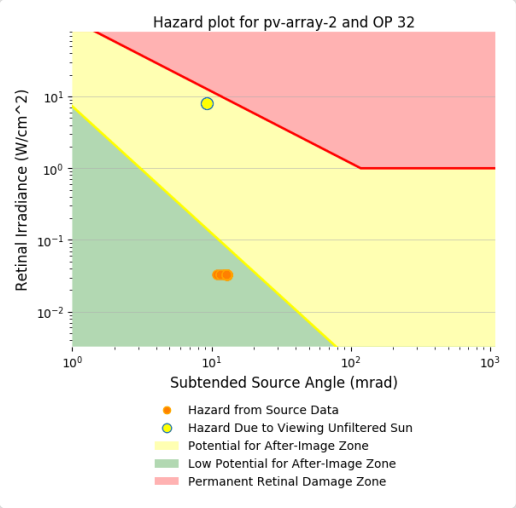
PV array is expected to produce the following glare for receptors at this location:

- 12 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 2 - OP Receptor (OP 33)

*No glare found*

## PV array 2 - OP Receptor (OP 34)

*No glare found*

## PV array 2 - OP Receptor (OP 35)

*No glare found*

## PV array 2 - OP Receptor (OP 36)

*No glare found*

## PV array 2 - OP Receptor (OP 37)

*No glare found*

## PV array 2 - OP Receptor (OP 38)

*No glare found*

## PV array 2 - OP Receptor (OP 39)

*No glare found*

## PV array 2 - OP Receptor (OP 40)

*No glare found*

## PV array 2 - OP Receptor (OP 41)

*No glare found*

## PV array 2 - OP Receptor (OP 42)

*No glare found*

## PV array 2 - Route Receptor (Benalla-Tocumwal Road)

*No glare found*

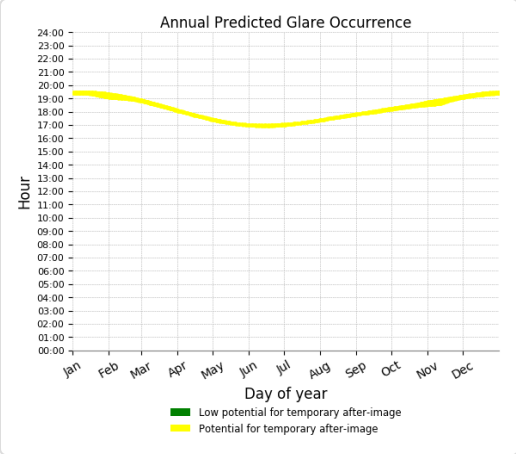
## PV array 2 - Route Receptor (Benalla-Yarrawonga Road)

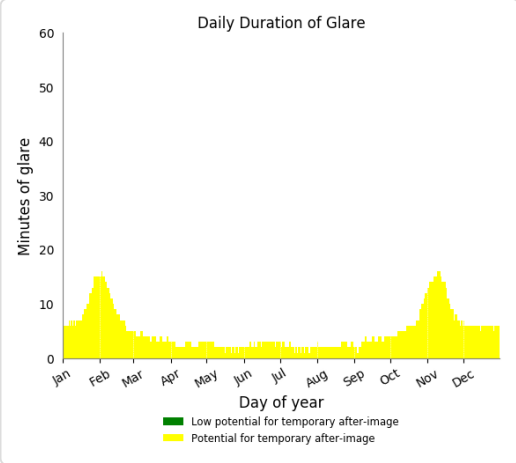
*No glare found*

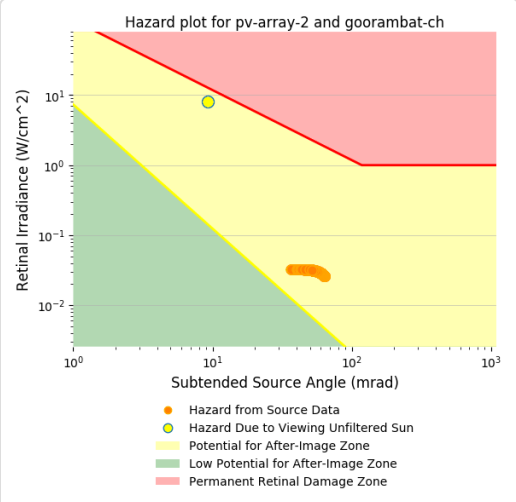
## PV array 2 - Route Receptor (Goorambat-Chesney Road)

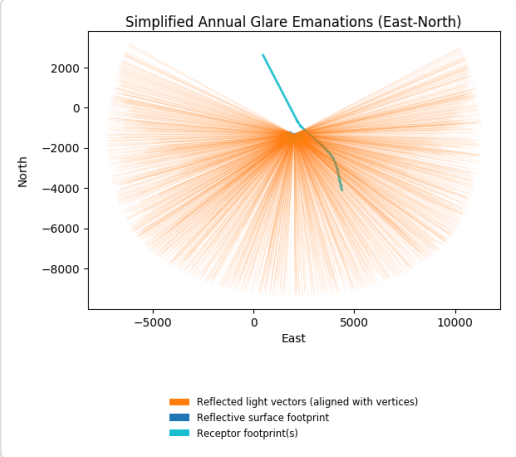
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,841 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 2 - Route Receptor (Goorambat-Chesney Road)

*No glare found*

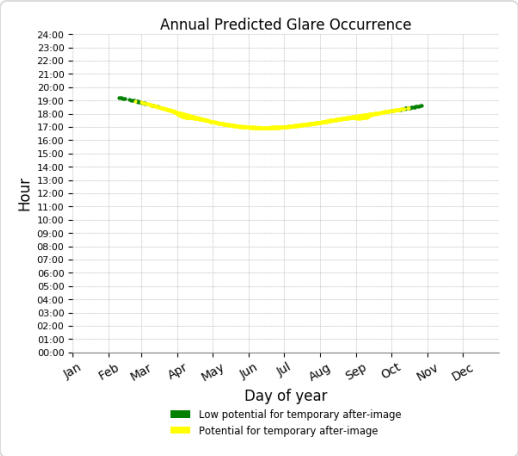
## PV array 2 - Route Receptor (Paolini Lane)

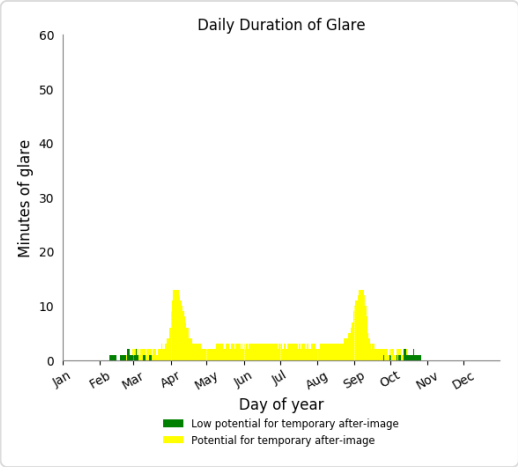
*No glare found*

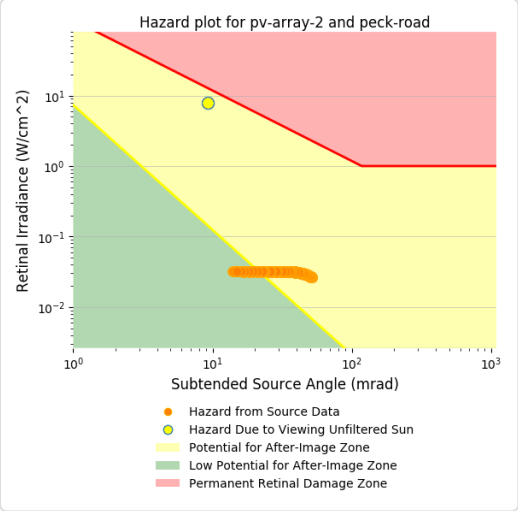
## PV array 2 - Route Receptor (Peck Road)

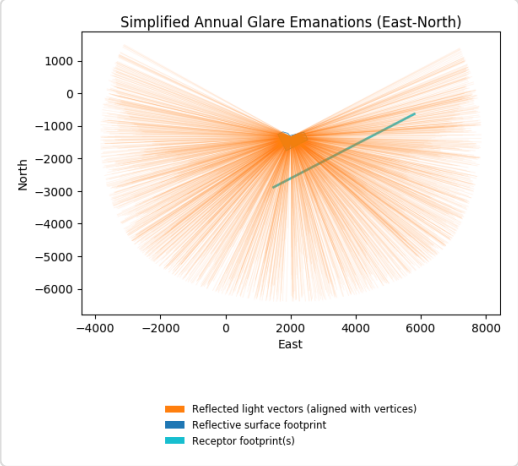
PV array is expected to produce the following glare for receptors at this location:

- 51 minutes of "green" glare with low potential to cause temporary after-image.
- 806 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

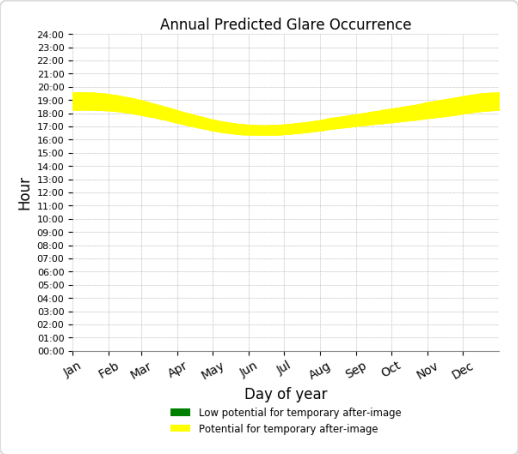
## PV array 2 - Route Receptor (Quinn Road)

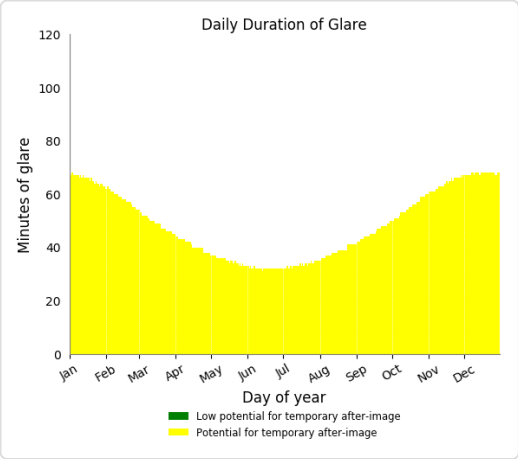
*No glare found*

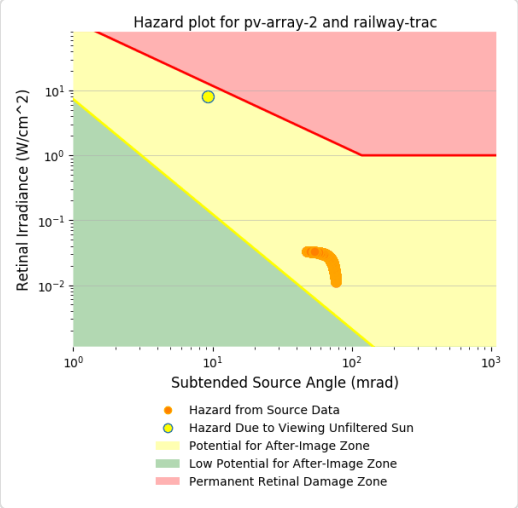
## PV array 2 - Route Receptor (Railway Track)

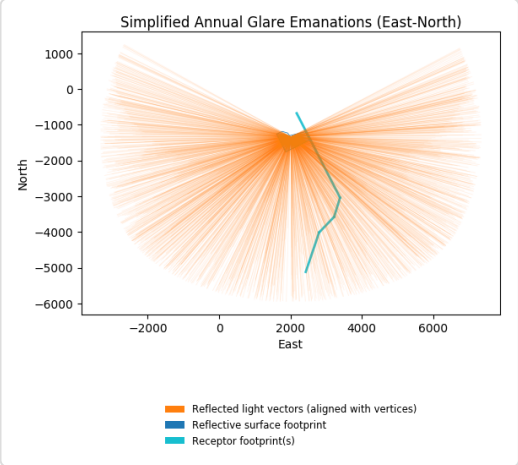
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 17,767 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 2 - Route Receptor (Sharp Road)

*No glare found*

## PV array 2 - Route Receptor (Taylor Road)

*No glare found*

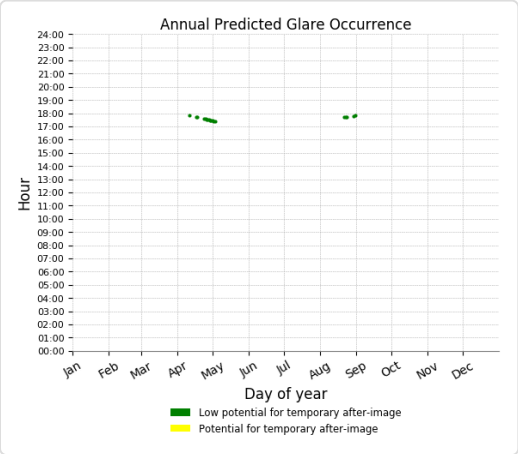
## PV array 2 - Route Receptor (Trask Road)

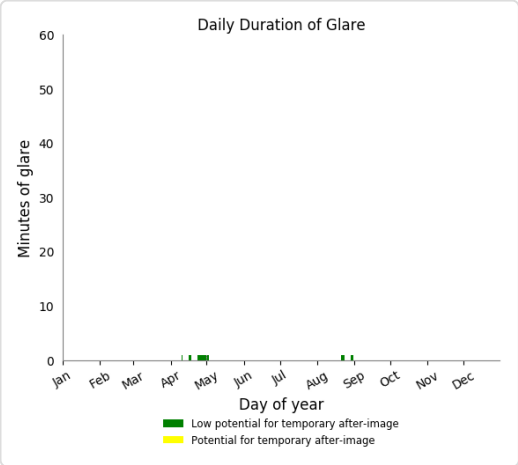
*No glare found*

## PV array 2 - Route Receptor (Trewin Road)

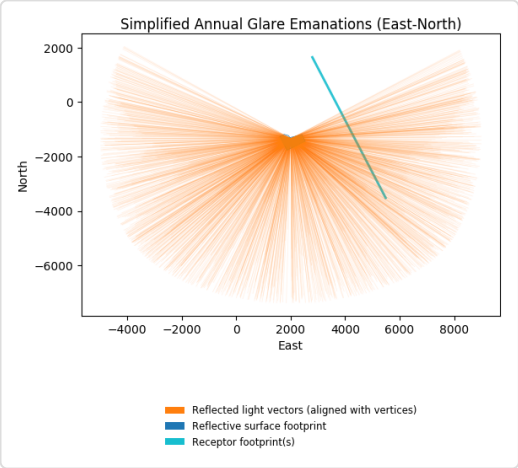
PV array is expected to produce the following glare for receptors at this location:

- 18 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.








*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 2 - Route Receptor (Wilson Road)

*No glare found*

## PV array 3 potential temporary after-image

**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 5 | 5 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 16 | 176 |
| OP: OP 24 | 65 | 342 |
| OP: OP 25 | 27 | 543 |
| OP: OP 26 | 239 | 702 |
| OP: OP 27 | 176 | 477 |
| OP: OP 28 | 246 | 760 |
| OP: OP 29 | 55 | 844 |
| OP: OP 30 | 115 | 493 |
| OP: OP 31 | 160 | 362 |
| OP: OP 32 | 124 | 348 |
| OP: OP 33 | 80 | 132 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |

| | | |
|---|---|---|
| Route: Benalla-Tocumwal Road | 0 | 0 |
| Route: Benalla-Yarrawonga Road | 0 | 0 |
| Route: Goorambat-Chesney Road | 0 | 0 |
| Route: Goorambat-Chesney Road | 0 | 0 |
| Route: Paolini Lane | 0 | 0 |
| Route: Peck Road | 0 | 418 |
| Route: Quinn Road | 0 | 0 |
| Route: Railway Track | 0 | 0 |
| Route: Sharp Road | 0 | 18466 |
| Route: Taylor Road | 0 | 0 |
| Route: Trask Road | 0 | 0 |
| Route: Trewin Road | 0 | 29655 |
| Route: Wilson Road | 0 | 0 |

### PV array 3 - OP Receptor (OP 1)

*No glare found*

### PV array 3 - OP Receptor (OP 2)

*No glare found*

### PV array 3 - OP Receptor (OP 3)

*No glare found*

### PV array 3 - OP Receptor (OP 4)

*No glare found*

### PV array 3 - OP Receptor (OP 5)

*No glare found*

### PV array 3 - OP Receptor (OP 6)

*No glare found*

### PV array 3 - OP Receptor (OP 7)

*No glare found*

### PV array 3 - OP Receptor (OP 8)

*No glare found*

### PV array 3 - OP Receptor (OP 9)

*No glare found*

### PV array 3 - OP Receptor (OP 10)

*No glare found*

### PV array 3 - OP Receptor (OP 11)

*No glare found*

### PV array 3 - OP Receptor (OP 12)

*No glare found*

## PV array 3 - OP Receptor (OP 13)

*No glare found*

## PV array 3 - OP Receptor (OP 14)

*No glare found*

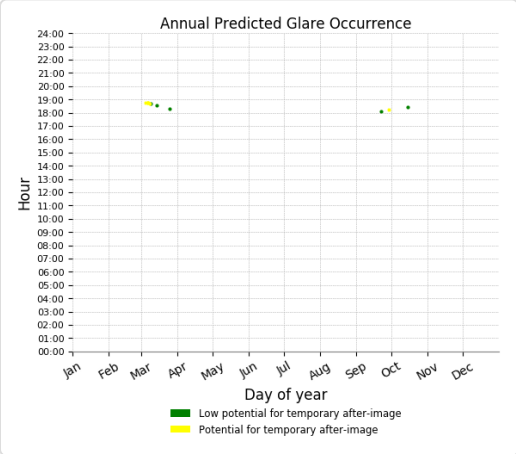
## PV array 3 - OP Receptor (OP 15)

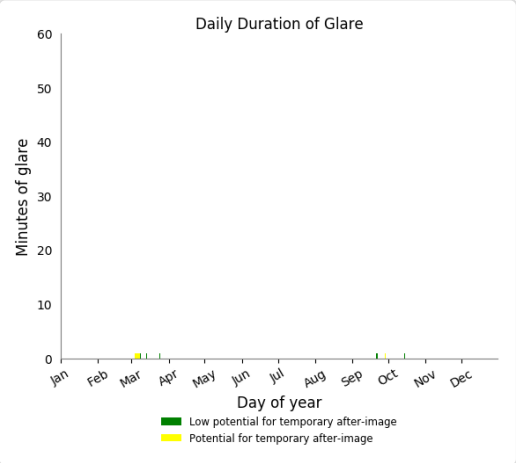
*No glare found*

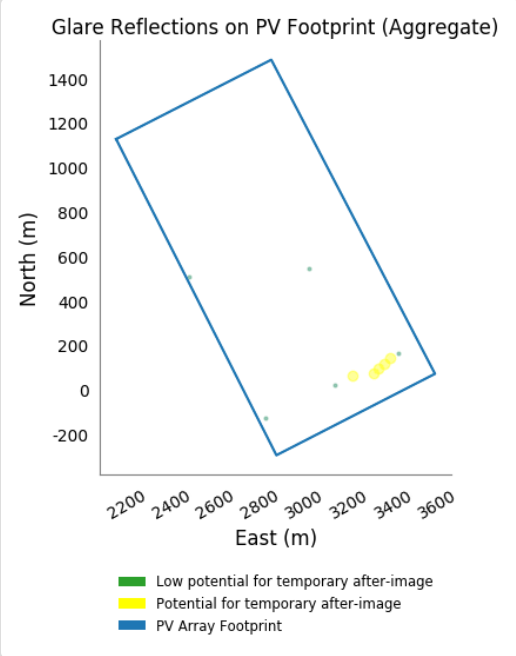
## PV array 3 - OP Receptor (OP 16)

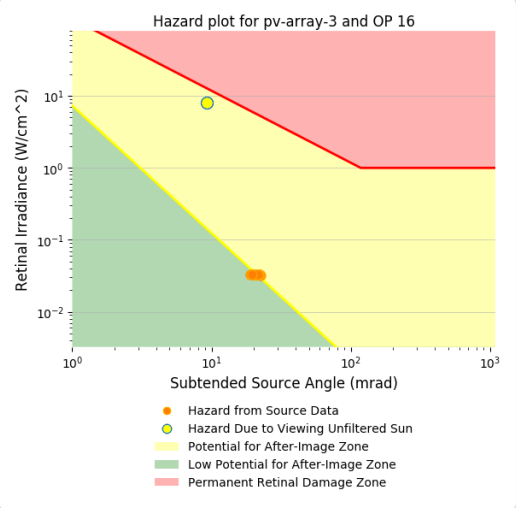
PV array is expected to produce the following glare for receptors at this location:

- 5 minutes of "green" glare with low potential to cause temporary after-image.
- 5 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 3 - OP Receptor (OP 17)

*No glare found*

## PV array 3 - OP Receptor (OP 18)

*No glare found*

## PV array 3 - OP Receptor (OP 19)

*No glare found*

## PV array 3 - OP Receptor (OP 20)

*No glare found*

## PV array 3 - OP Receptor (OP 21)

*No glare found*

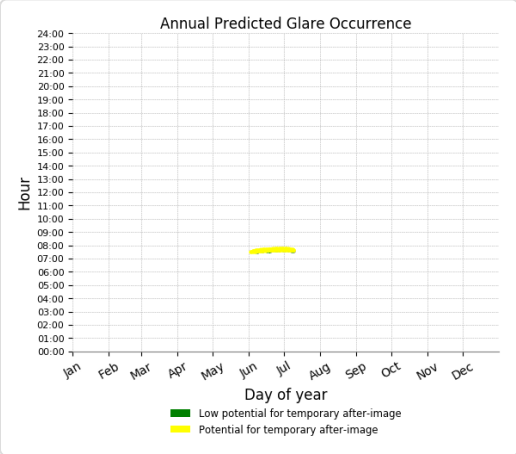
## PV array 3 - OP Receptor (OP 22)

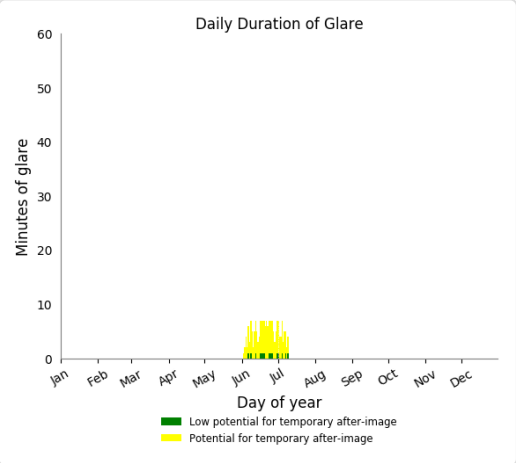
*No glare found*

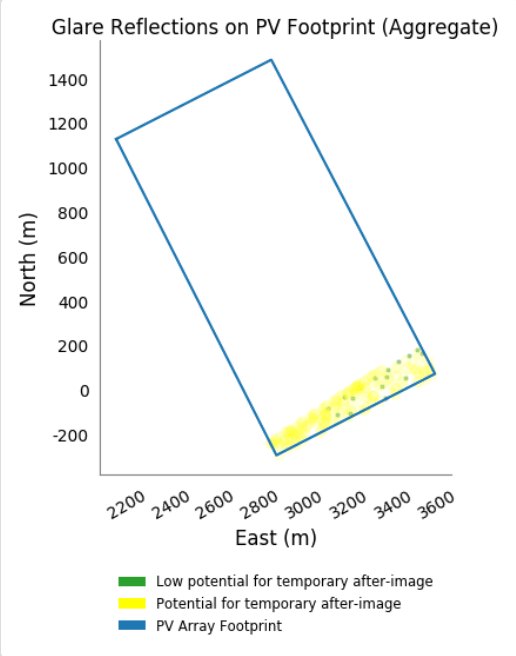
## PV array 3 - OP Receptor (OP 23)

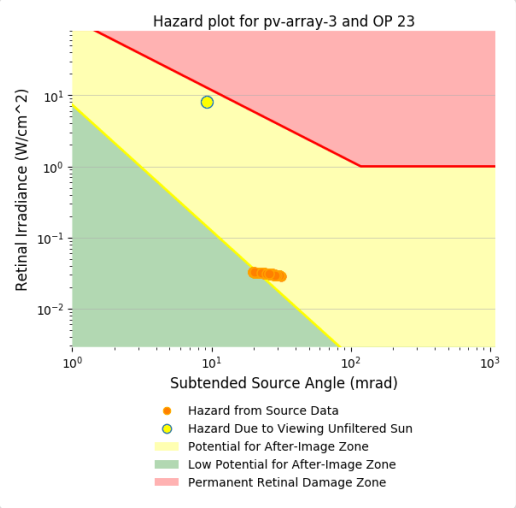
PV array is expected to produce the following glare for receptors at this location:

- 16 minutes of "green" glare with low potential to cause temporary after-image.
- 176 minutes of "yellow" glare with potential to cause temporary after-image.



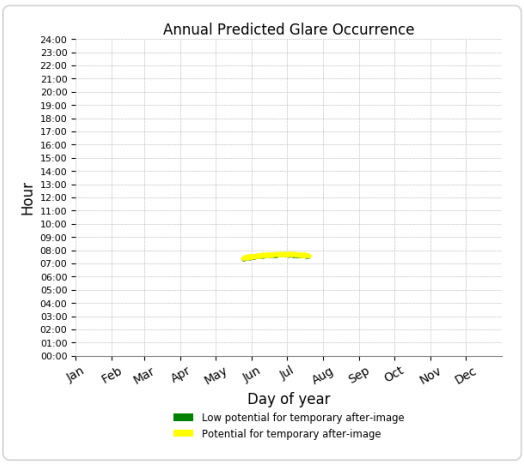



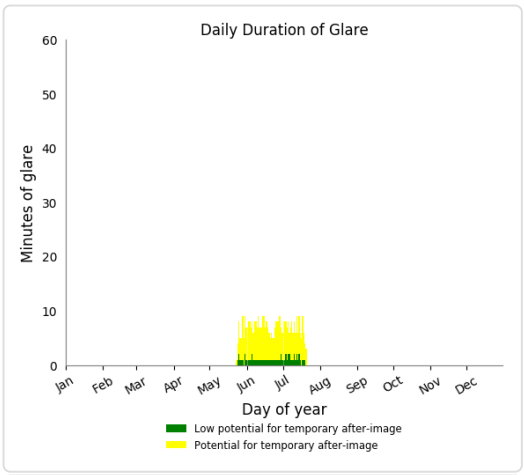



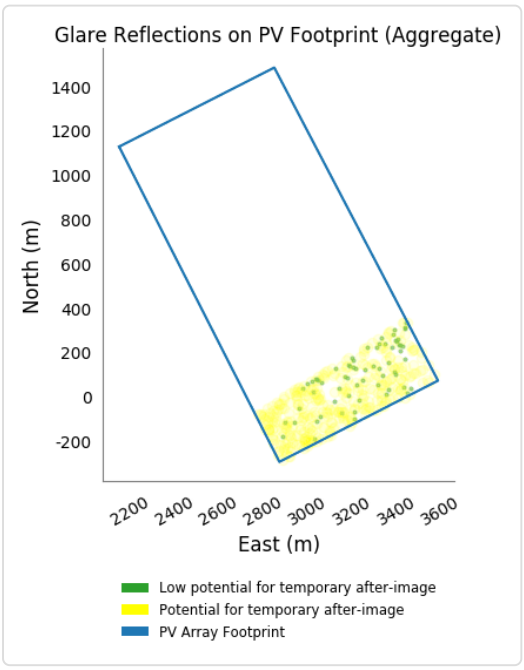
## PV array 3 - OP Receptor (OP 24)

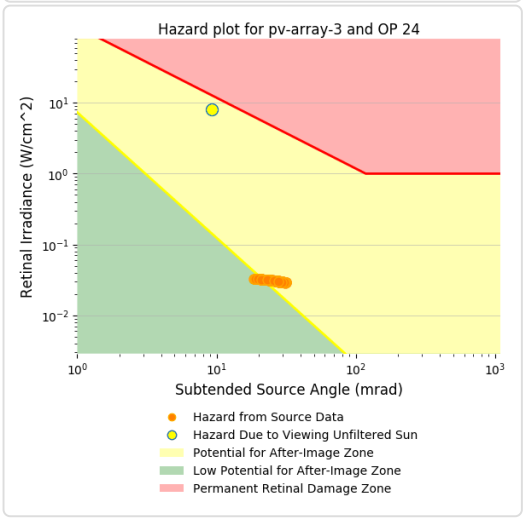
PV array is expected to produce the following glare for receptors at this location:

- 65 minutes of "green" glare with low potential to cause temporary after-image.
- 342 minutes of "yellow" glare with potential to cause temporary after-image.



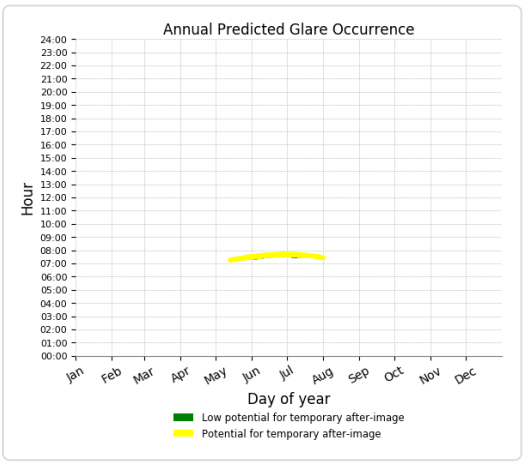



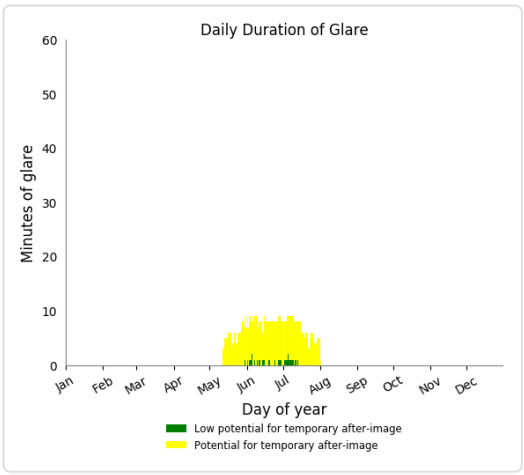



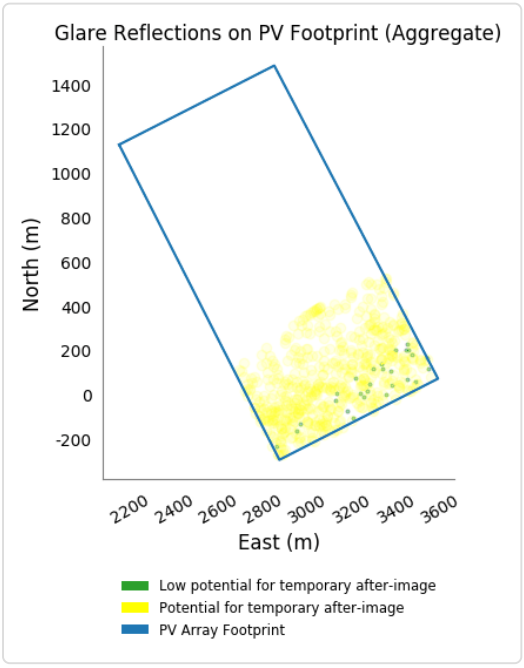
## PV array 3 - OP Receptor (OP 25)

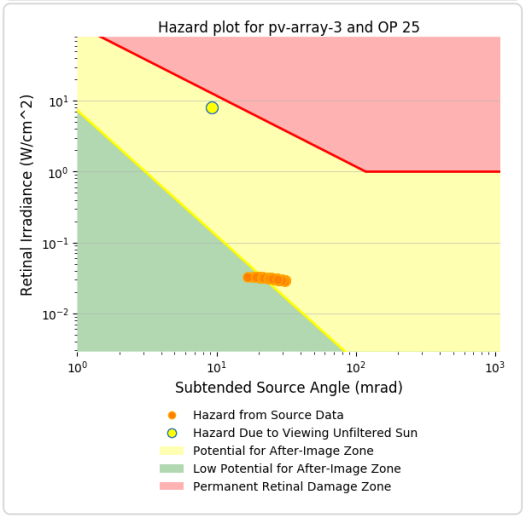
PV array is expected to produce the following glare for receptors at this location:

- 27 minutes of "green" glare with low potential to cause temporary after-image.
- 543 minutes of "yellow" glare with potential to cause temporary after-image.



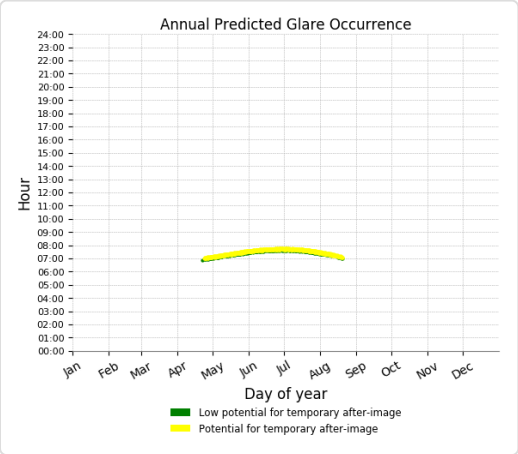



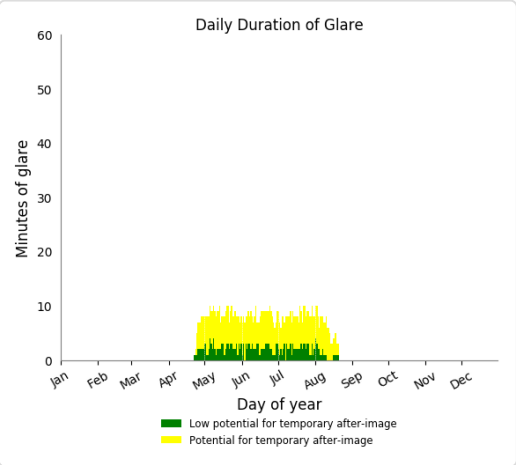



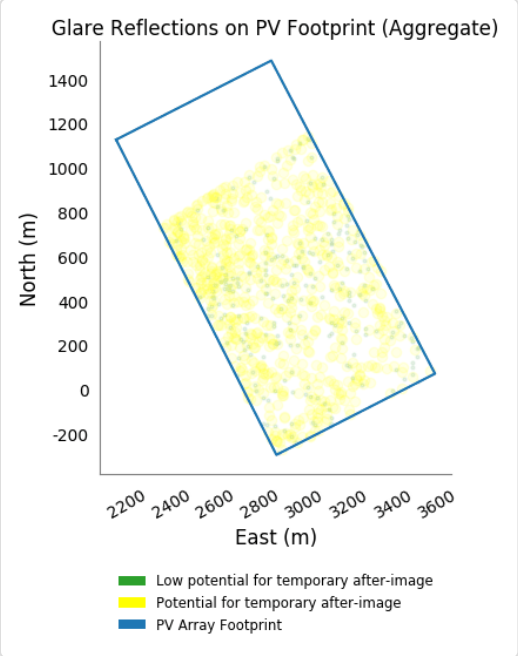
## PV array 3 - OP Receptor (OP 26)

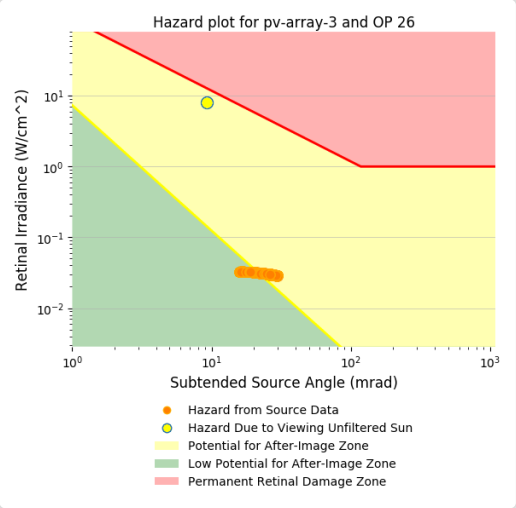
PV array is expected to produce the following glare for receptors at this location:

- 239 minutes of "green" glare with low potential to cause temporary after-image.
- 702 minutes of "yellow" glare with potential to cause temporary after-image.



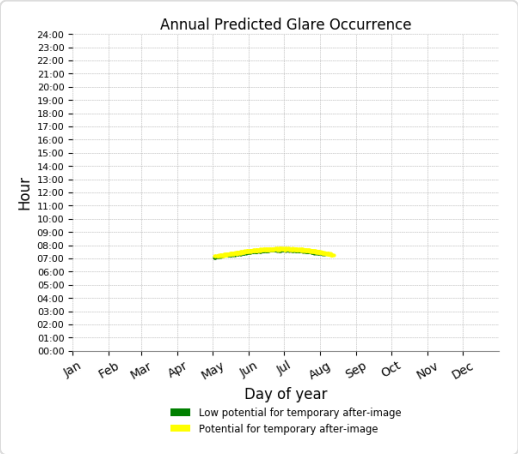



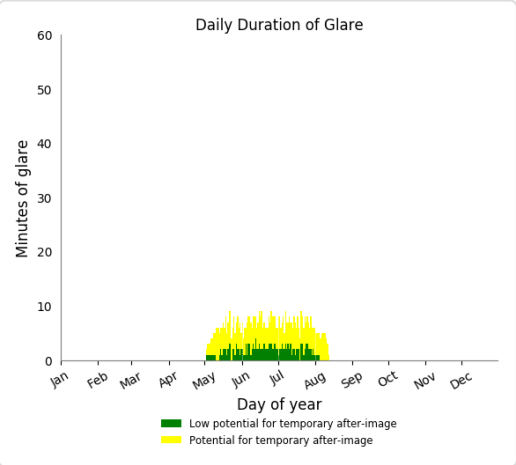



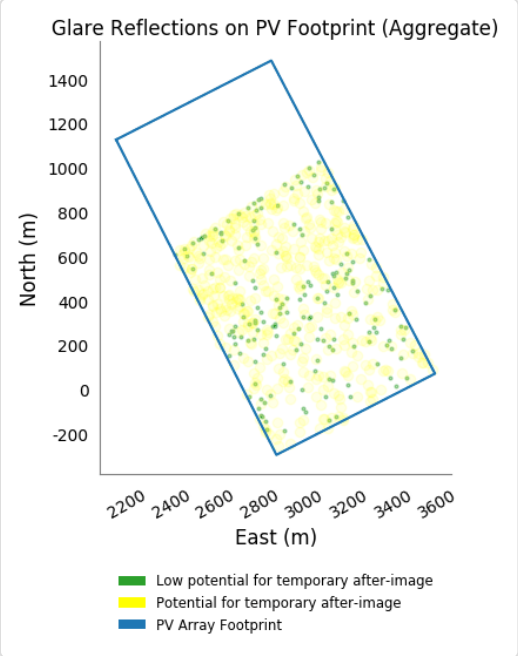
## PV array 3 - OP Receptor (OP 27)

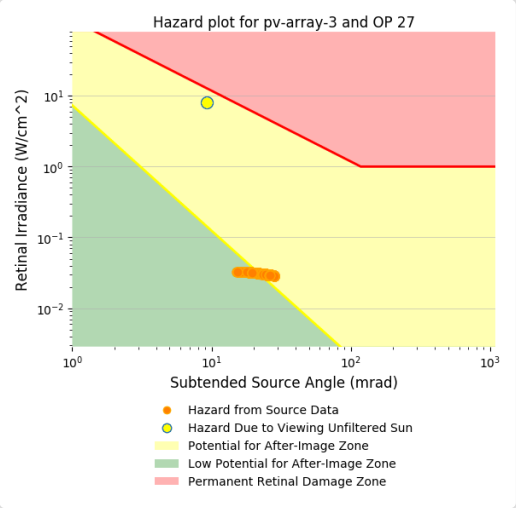
PV array is expected to produce the following glare for receptors at this location:

- 176 minutes of "green" glare with low potential to cause temporary after-image.
- 477 minutes of "yellow" glare with potential to cause temporary after-image.



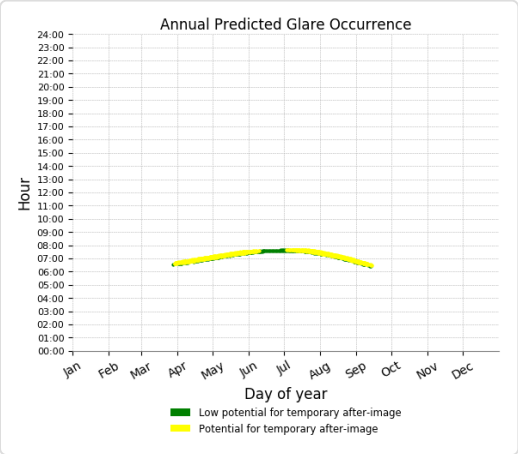



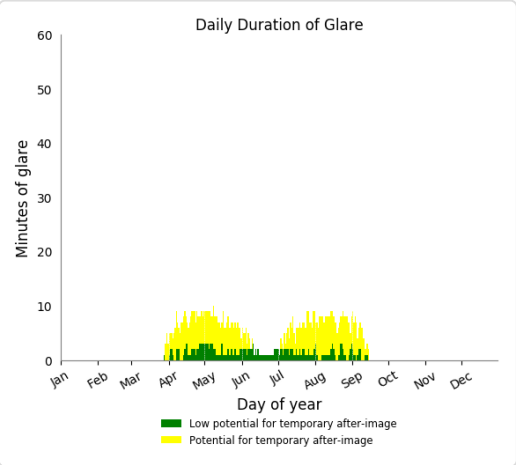



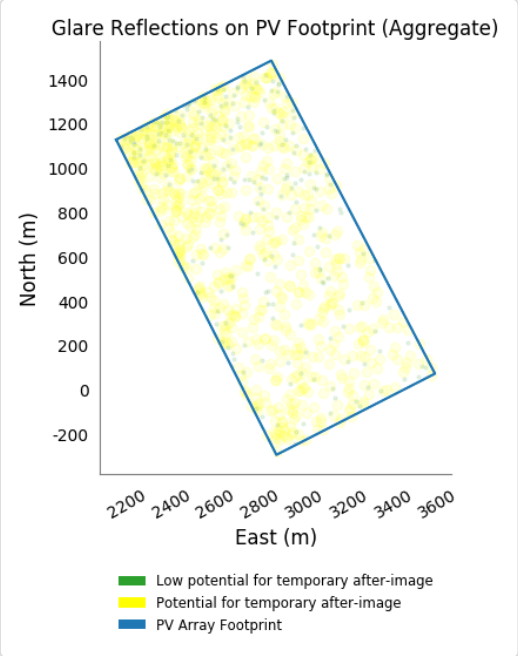
## PV array 3 - OP Receptor (OP 28)

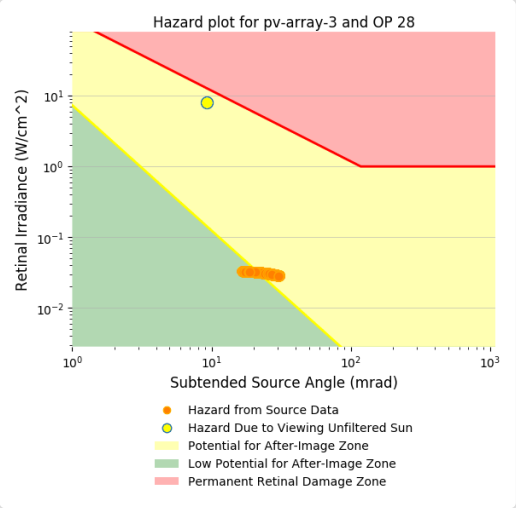
PV array is expected to produce the following glare for receptors at this location:

- 246 minutes of "green" glare with low potential to cause temporary after-image.
- 760 minutes of "yellow" glare with potential to cause temporary after-image.



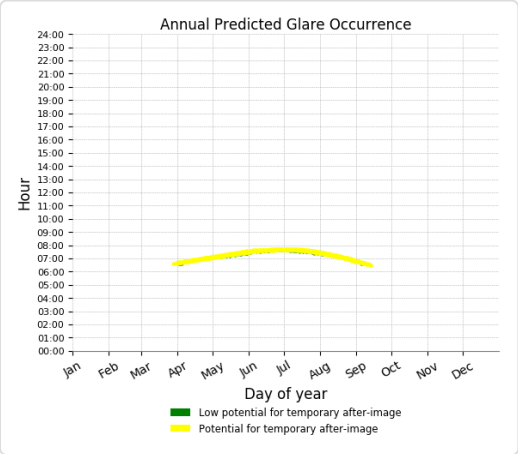



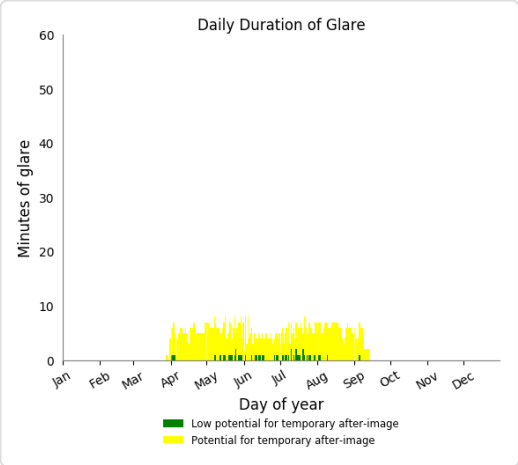



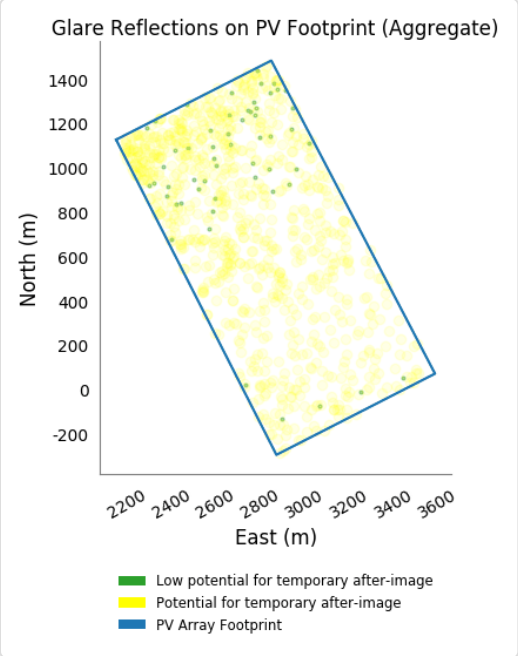
## PV array 3 - OP Receptor (OP 29)

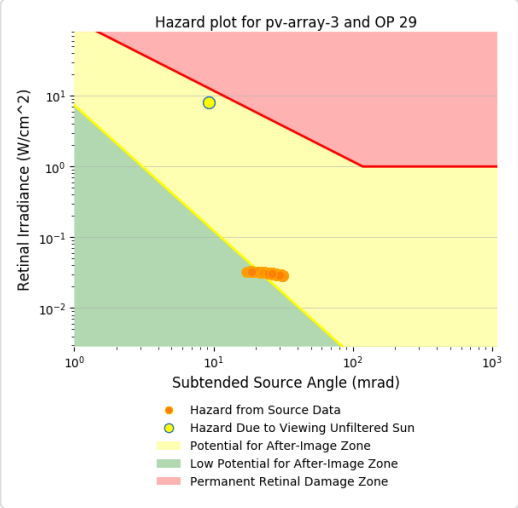
PV array is expected to produce the following glare for receptors at this location:

- 55 minutes of "green" glare with low potential to cause temporary after-image.
- 844 minutes of "yellow" glare with potential to cause temporary after-image.



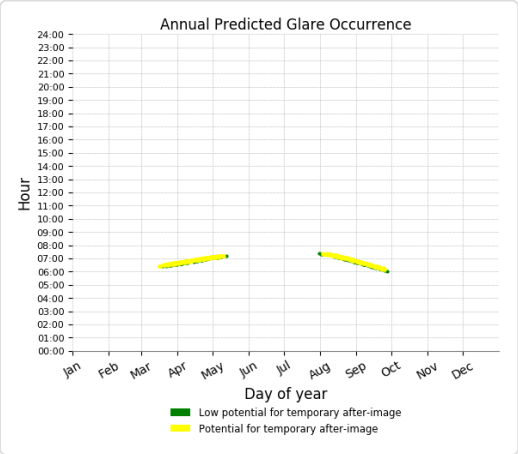



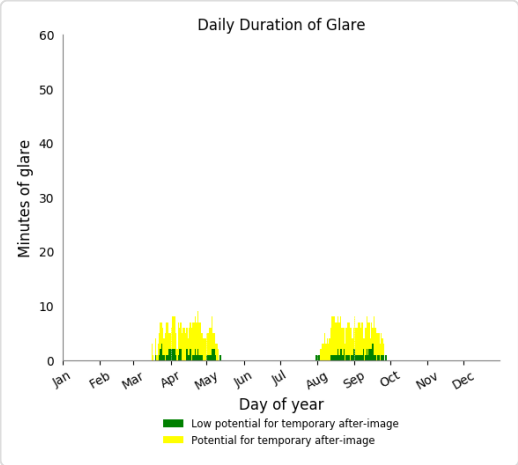



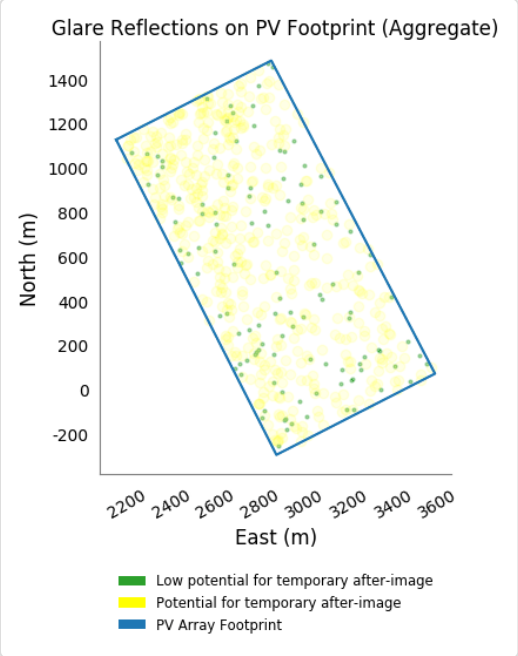
## PV array 3 - OP Receptor (OP 30)

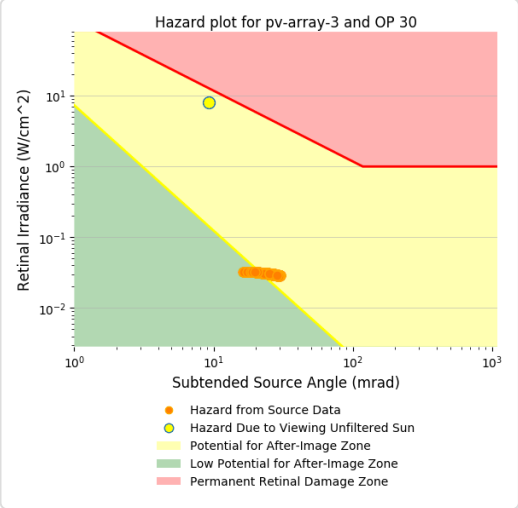
PV array is expected to produce the following glare for receptors at this location:

- 115 minutes of "green" glare with low potential to cause temporary after-image.
- 493 minutes of "yellow" glare with potential to cause temporary after-image.



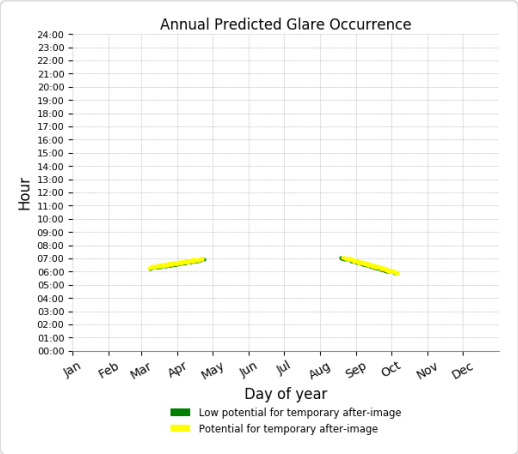



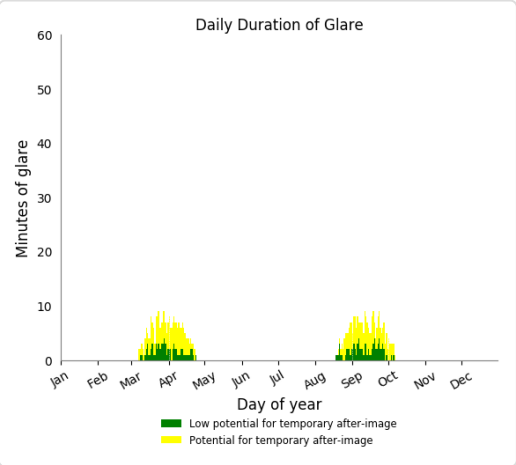



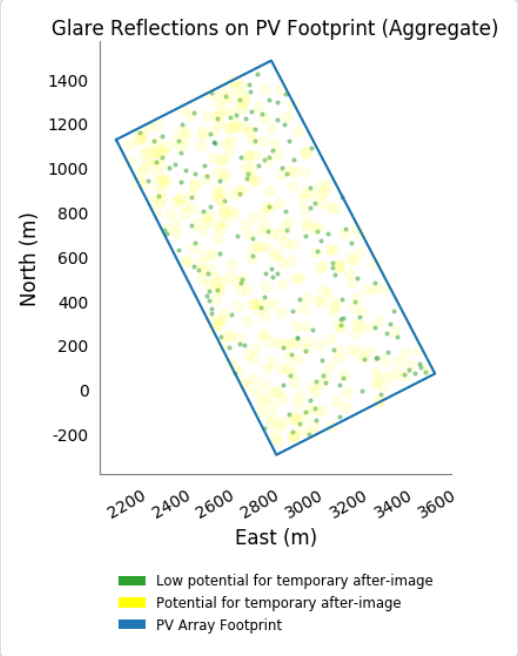
## PV array 3 - OP Receptor (OP 31)

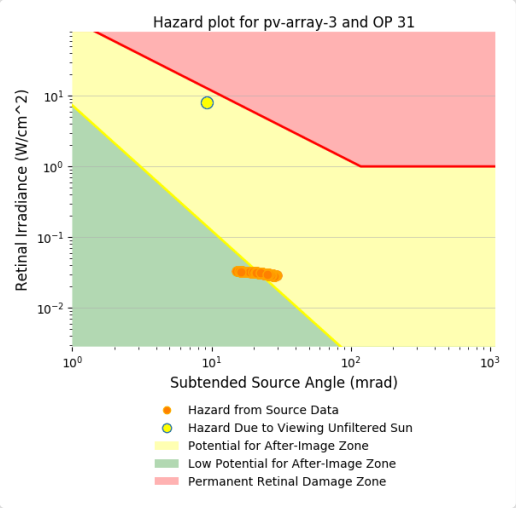
PV array is expected to produce the following glare for receptors at this location:

- 160 minutes of "green" glare with low potential to cause temporary after-image.
- 362 minutes of "yellow" glare with potential to cause temporary after-image.



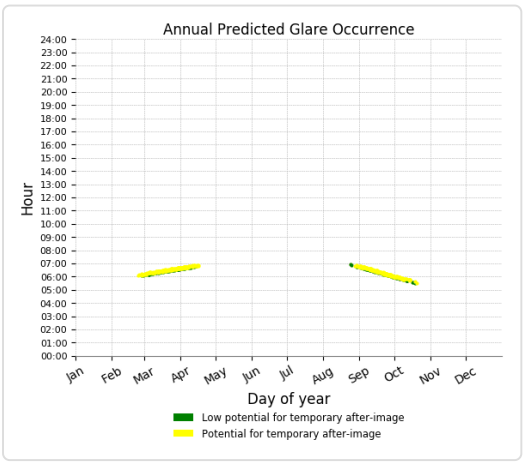



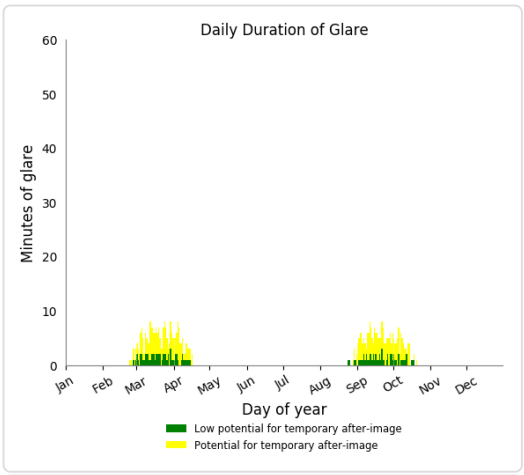



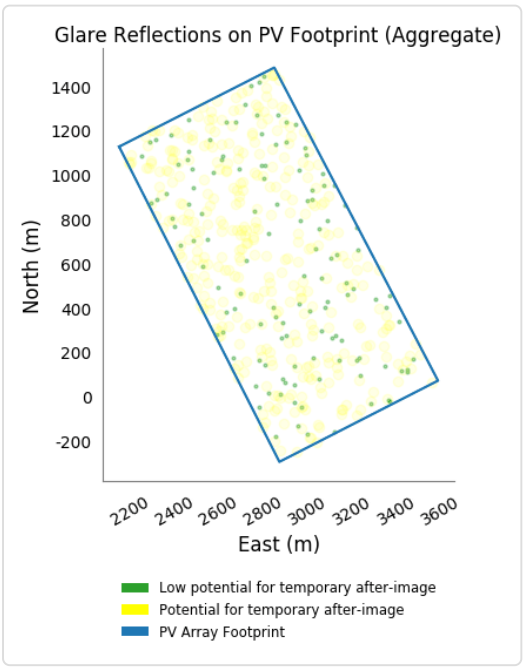
## PV array 3 - OP Receptor (OP 32)

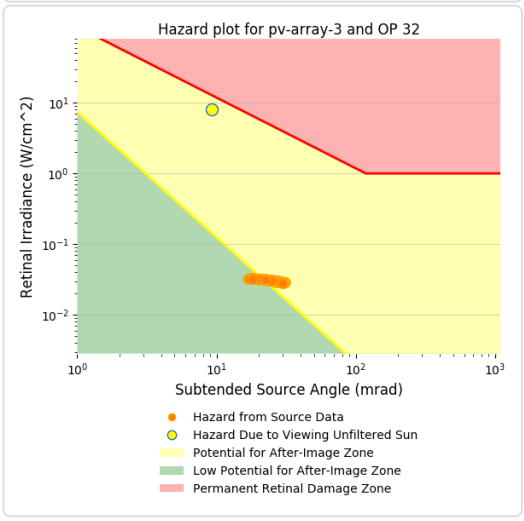
PV array is expected to produce the following glare for receptors at this location:

- 124 minutes of "green" glare with low potential to cause temporary after-image.
- 348 minutes of "yellow" glare with potential to cause temporary after-image.



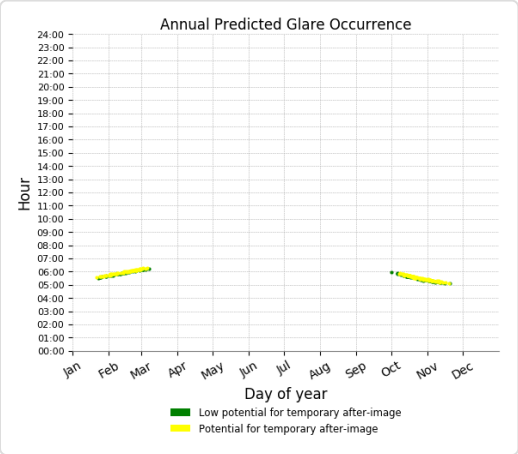



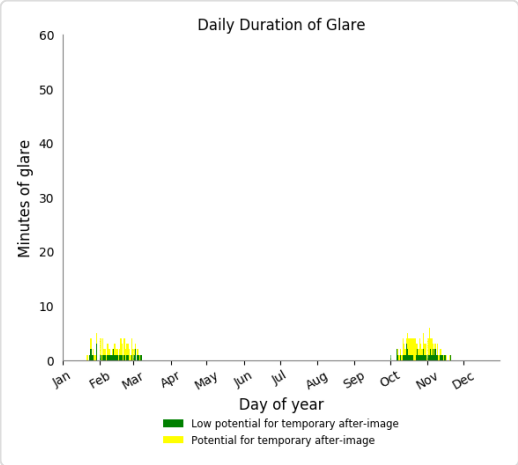



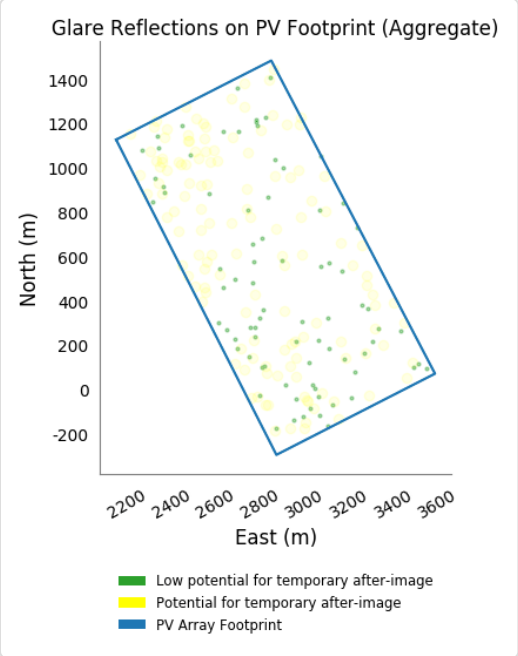
## PV array 3 - OP Receptor (OP 33)

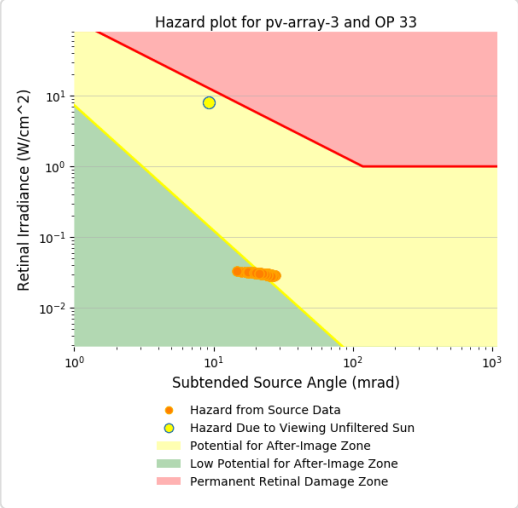
PV array is expected to produce the following glare for receptors at this location:

- 80 minutes of "green" glare with low potential to cause temporary after-image.
- 132 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 3 - OP Receptor (OP 34)

*No glare found*

## PV array 3 - OP Receptor (OP 35)

*No glare found*

## PV array 3 - OP Receptor (OP 36)

*No glare found*

## PV array 3 - OP Receptor (OP 37)

*No glare found*

## PV array 3 - OP Receptor (OP 38)

*No glare found*

## PV array 3 - OP Receptor (OP 39)

*No glare found*

### PV array 3 - OP Receptor (OP 40)

*No glare found*

### PV array 3 - OP Receptor (OP 41)

*No glare found*

### PV array 3 - OP Receptor (OP 42)

*No glare found*

### PV array 3 - Route Receptor (Benalla-Tocumwal Road)

*No glare found*

### PV array 3 - Route Receptor (Benalla-Yarrawonga Road)

*No glare found*

### PV array 3 - Route Receptor (Goorambat-Chesney Road)

*No glare found*

### PV array 3 - Route Receptor (Goorambat-Chesney Road)

*No glare found*

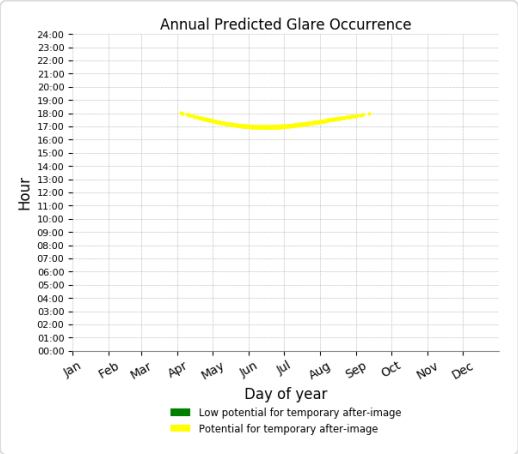
### PV array 3 - Route Receptor (Paolini Lane)

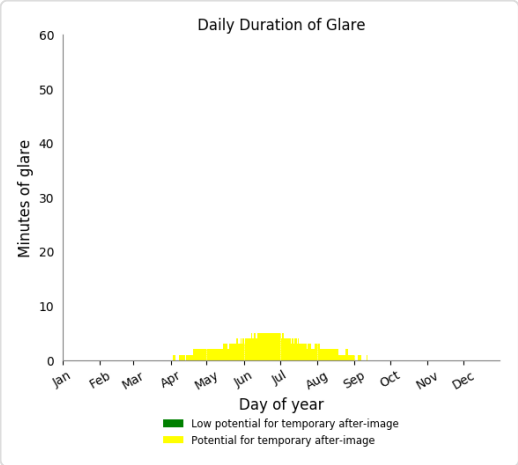
*No glare found*

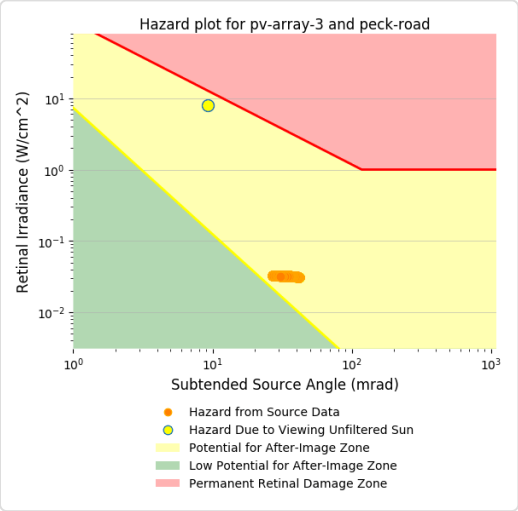
## PV array 3 - Route Receptor (Peck Road)

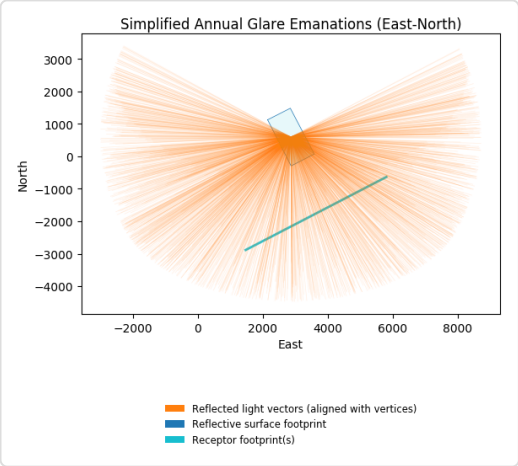
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 418 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 3 - Route Receptor (Quinn Road)

*No glare found*

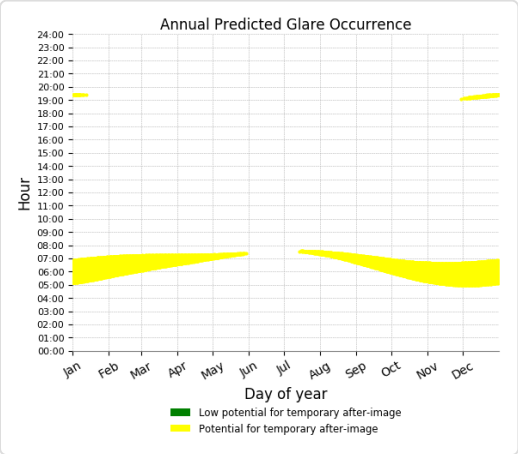
## PV array 3 - Route Receptor (Railway Track)

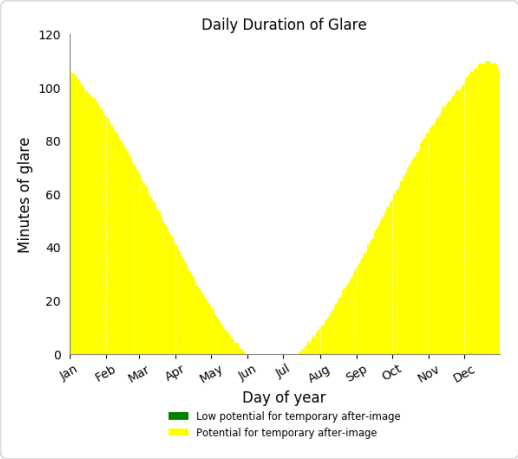
*No glare found*

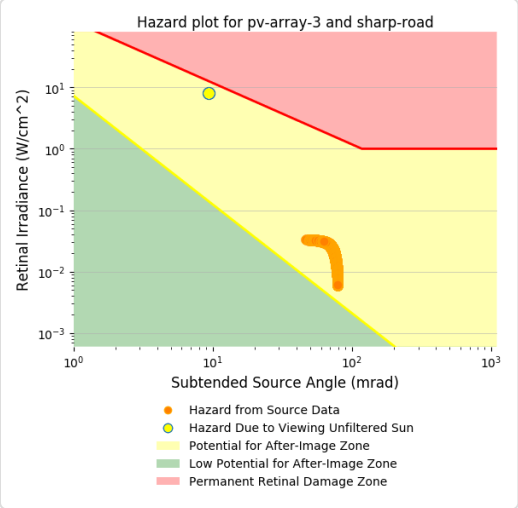
## PV array 3 - Route Receptor (Sharp Road)

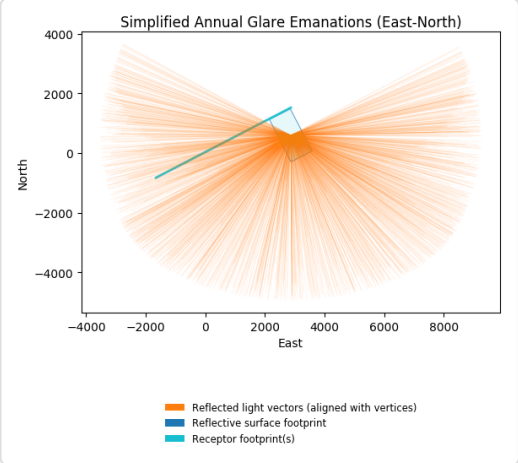
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 18,466 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 3 - Route Receptor (Taylor Road)

*No glare found*

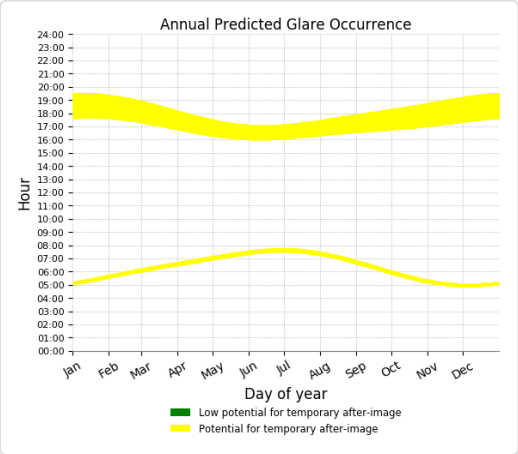
## PV array 3 - Route Receptor (Trask Road)

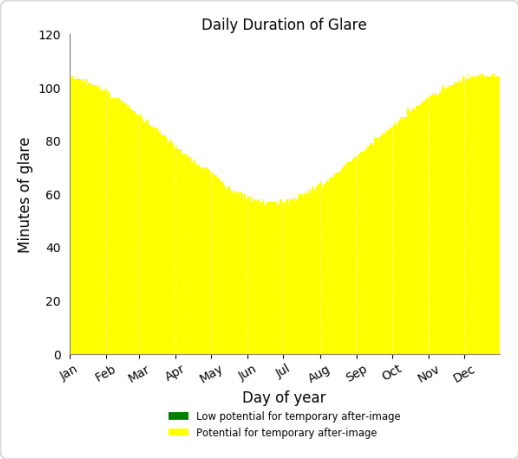
*No glare found*

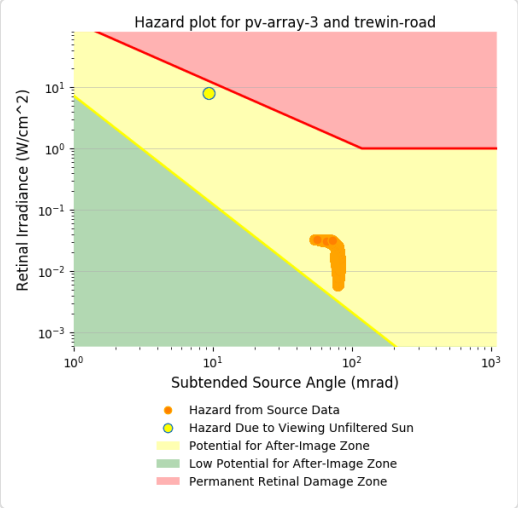
## PV array 3 - Route Receptor (Trewin Road)

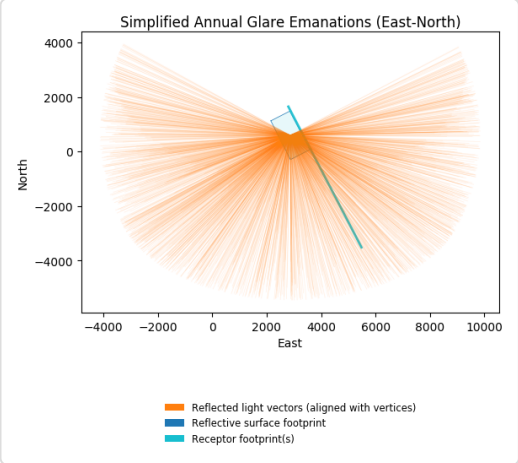
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 29,655 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 3 - Route Receptor (Wilson Road)

*No glare found*

## PV array 4 potential temporary after-image

**Warning:** This PV array encompasses a large surface area. This may reduce the accuracy of certain calculations if receptors are near the array. These calculations utilize the PV footprint centroid, rather than the glare-spot location, due to analysis method limitations. Additional analyses of array sub-sections may provide more information on expected glare. (Note that the subtended source angle is limited by the footprint surface area.)

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 6 |
| OP: OP 3 | 0 | 6 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 153 | 1491 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 39 | 235 |
| OP: OP 13 | 76 | 381 |
| OP: OP 14 | 4 | 21 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 15 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 114 | 181 |
| OP: OP 22 | 123 | 327 |
| OP: OP 23 | 279 | 640 |
| OP: OP 24 | 371 | 497 |
| OP: OP 25 | 209 | 325 |
| OP: OP 26 | 207 | 185 |
| OP: OP 27 | 273 | 116 |
| OP: OP 28 | 157 | 198 |
| OP: OP 29 | 144 | 245 |
| OP: OP 30 | 202 | 146 |
| OP: OP 31 | 190 | 74 |
| OP: OP 32 | 262 | 226 |
| OP: OP 33 | 559 | 5 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 96 | 162 |
| OP: OP 36 | 28 | 58 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 1 | 0 |
| OP: OP 42 | 0 | 0 |

| | | |
|---|---|---|
| Route: Benalla-Tocumwal Road | 0 | 138 |
| Route: Benalla-Yarrawonga Road | 0 | 0 |
| Route: Goorambat-Chesney Road | 0 | 102 |
| Route: Goorambat-Chesney Road | 0 | 0 |
| Route: Paolini Lane | 0 | 0 |
| Route: Peck Road | 0 | 585 |
| Route: Quinn Road | 0 | 0 |
| Route: Railway Track | 0 | 1 |
| Route: Sharp Road | 0 | 182 |
| Route: Taylor Road | 0 | 0 |
| Route: Trask Road | 0 | 0 |
| Route: Trewin Road | 0 | 29121 |
| Route: Wilson Road | 0 | 0 |

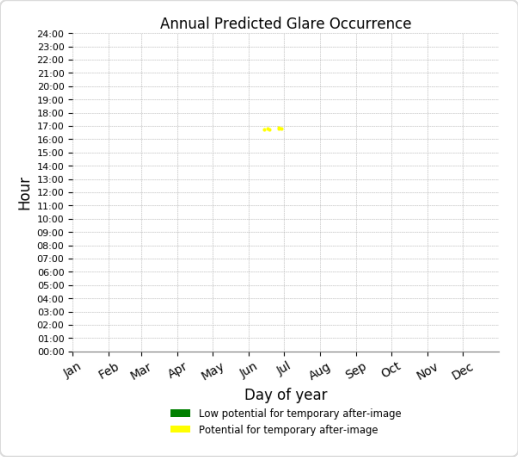
## PV array 4 - OP Receptor (OP 1)

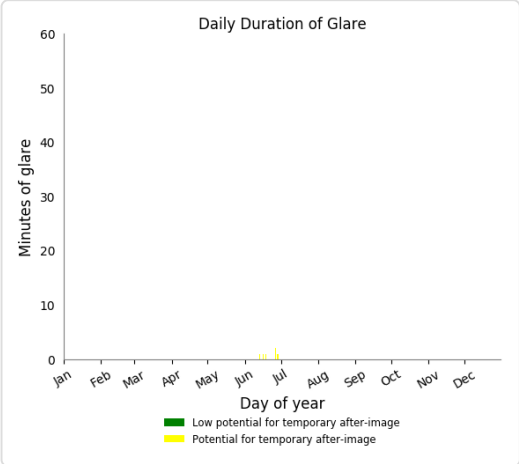
*No glare found*

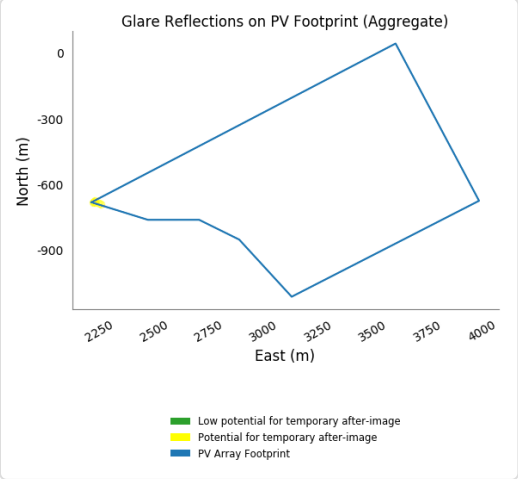
## PV array 4 - OP Receptor (OP 2)

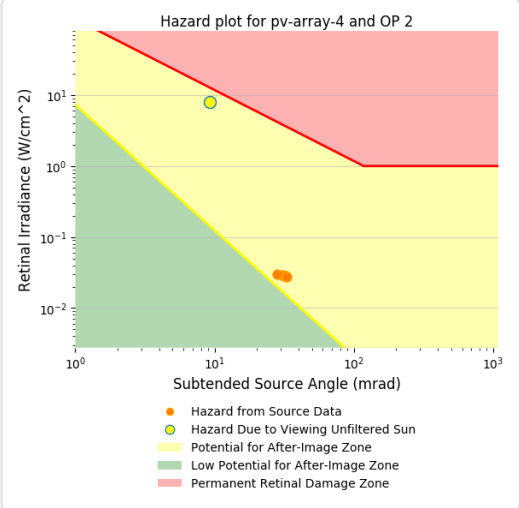
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 6 minutes of "yellow" glare with potential to cause temporary after-image.



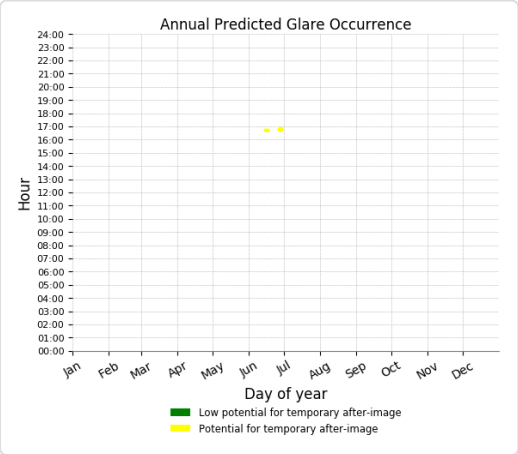



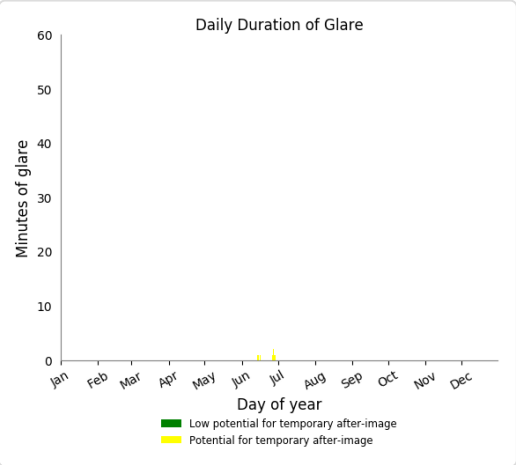



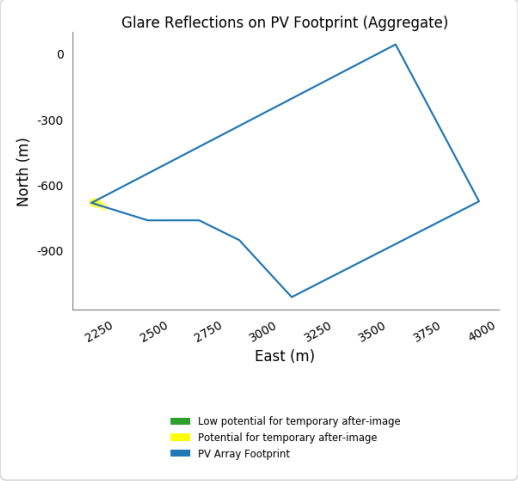
## PV array 4 - OP Receptor (OP 3)

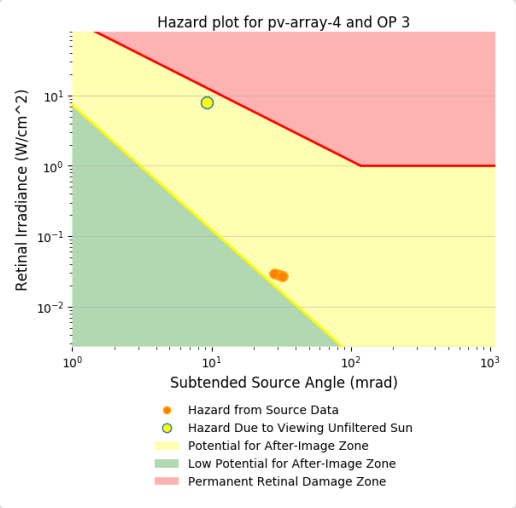
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 6 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 4 - OP Receptor (OP 4)

*No glare found*

## PV array 4 - OP Receptor (OP 5)

*No glare found*

## PV array 4 - OP Receptor (OP 6)

*No glare found*

## PV array 4 - OP Receptor (OP 7)

*No glare found*

## PV array 4 - OP Receptor (OP 8)

*No glare found*

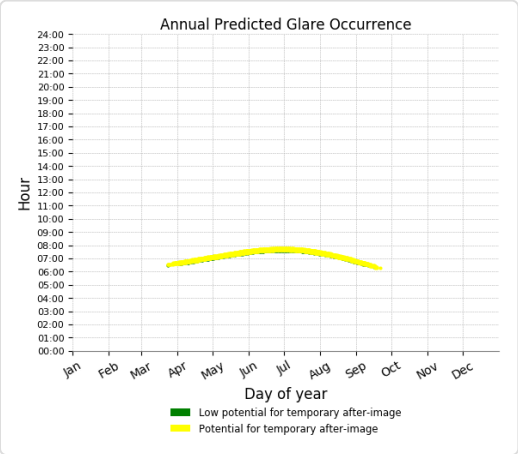
## PV array 4 - OP Receptor (OP 9)

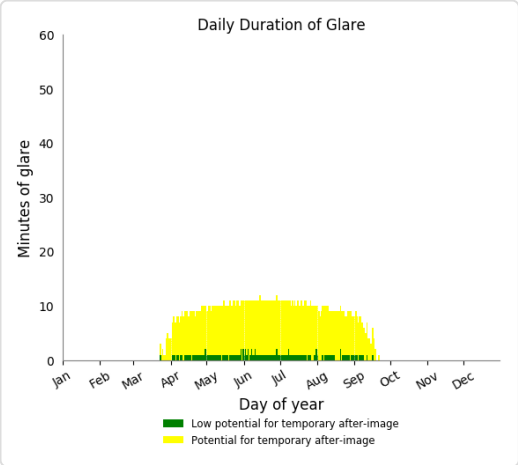
*No glare found*

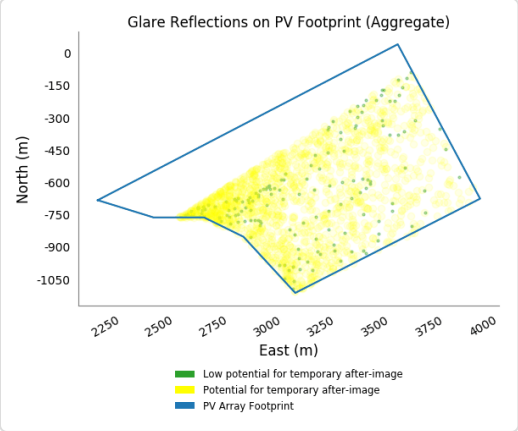
## PV array 4 - OP Receptor (OP 10)

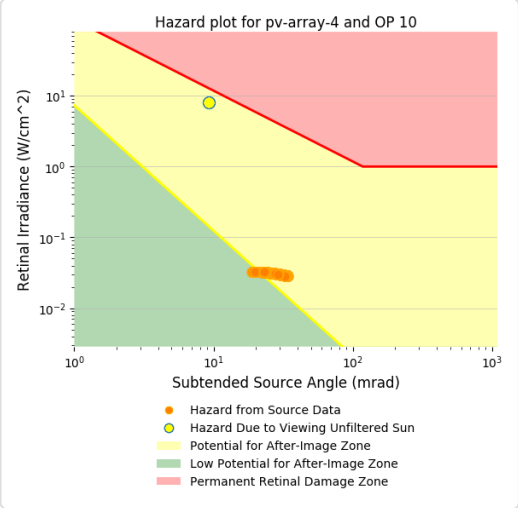
PV array is expected to produce the following glare for receptors at this location:

- 153 minutes of "green" glare with low potential to cause temporary after-image.
- 1,491 minutes of "yellow" glare with potential to cause temporary after-image.



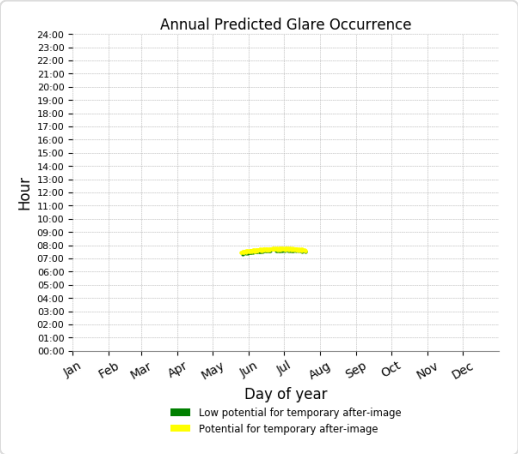

## PV array 4 - OP Receptor (OP 11)

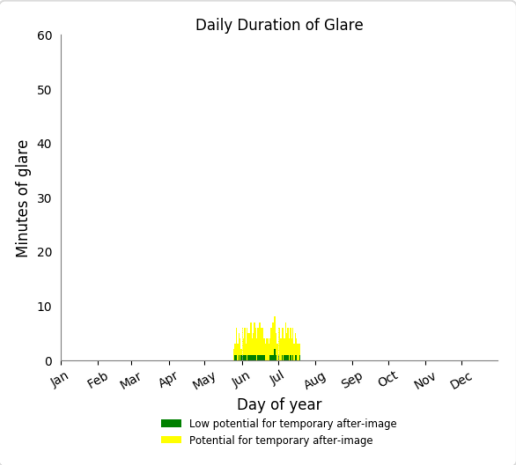
*No glare found*

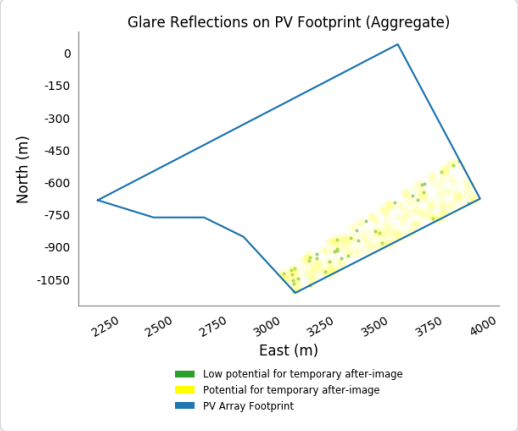
## PV array 4 - OP Receptor (OP 12)

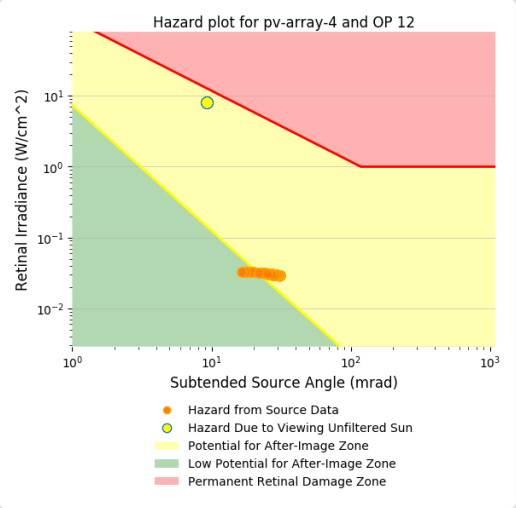
PV array is expected to produce the following glare for receptors at this location:

- 39 minutes of "green" glare with low potential to cause temporary after-image.
- 235 minutes of "yellow" glare with potential to cause temporary after-image.



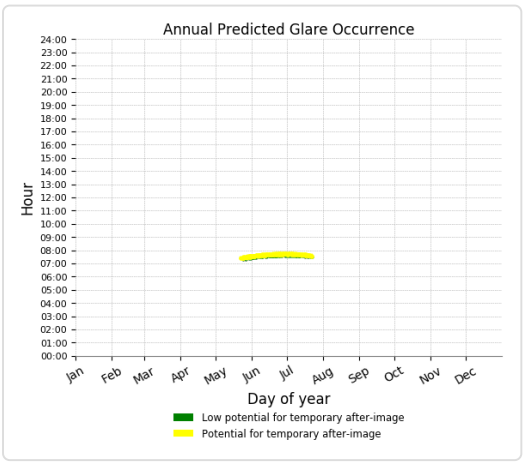



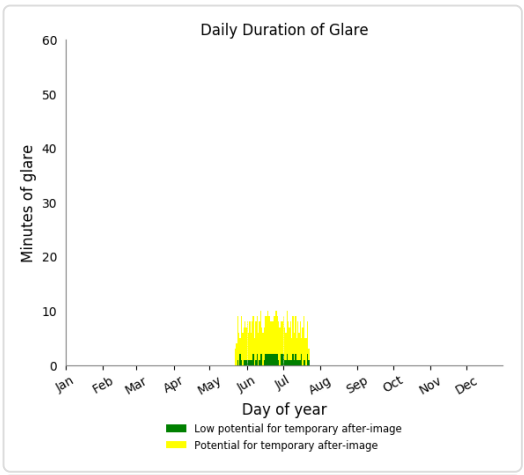



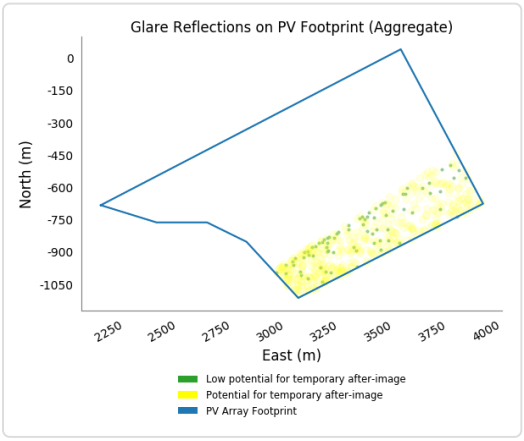
## PV array 4 - OP Receptor (OP 13)

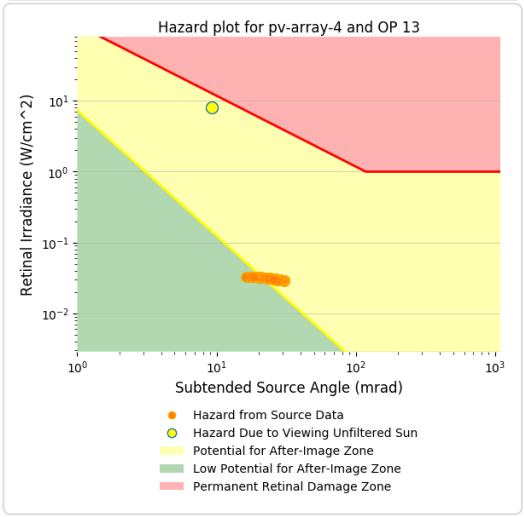
PV array is expected to produce the following glare for receptors at this location:

- 76 minutes of "green" glare with low potential to cause temporary after-image.
- 381 minutes of "yellow" glare with potential to cause temporary after-image.



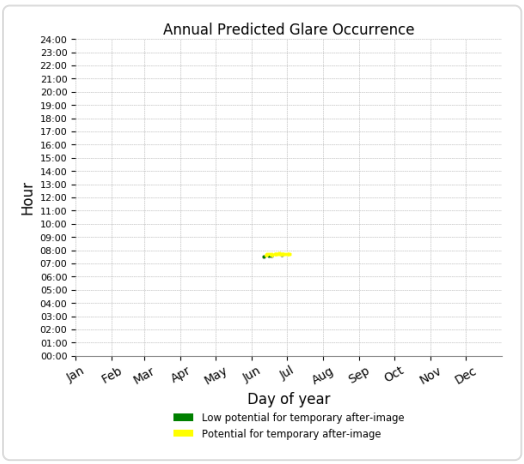



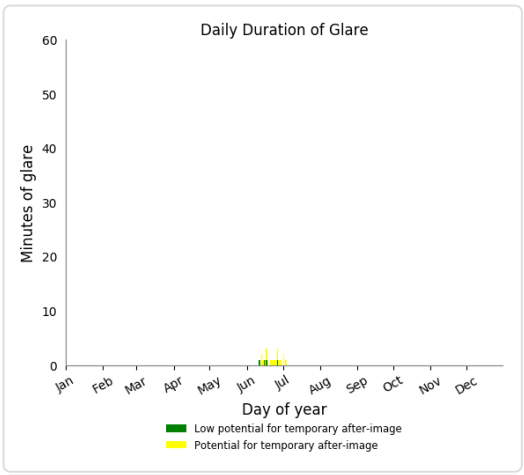



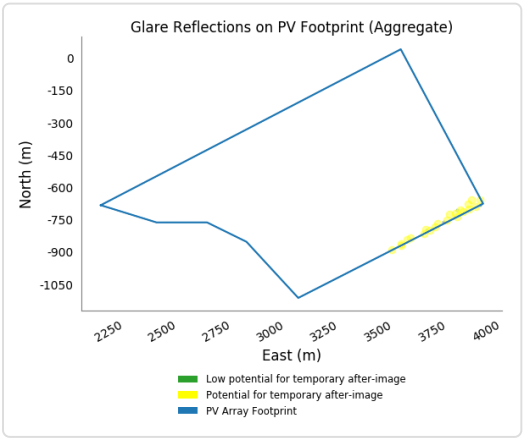
## PV array 4 - OP Receptor (OP 14)

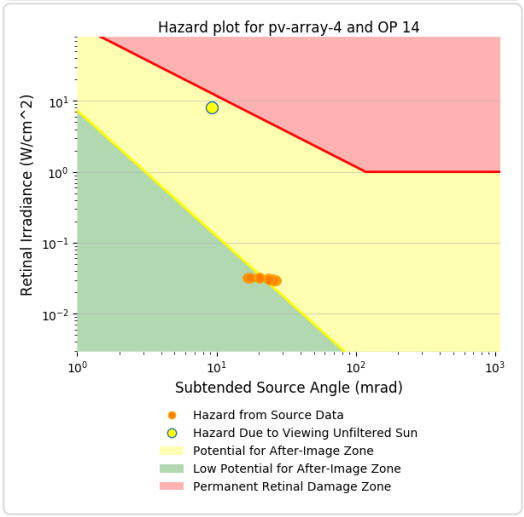
PV array is expected to produce the following glare for receptors at this location:

- 4 minutes of "green" glare with low potential to cause temporary after-image.
- 21 minutes of "yellow" glare with potential to cause temporary after-image.



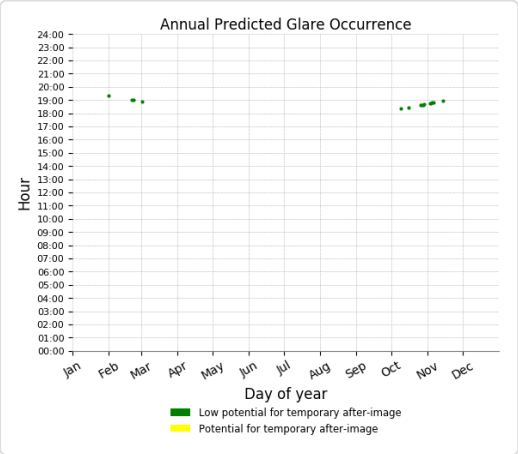

## PV array 4 - OP Receptor (OP 15)

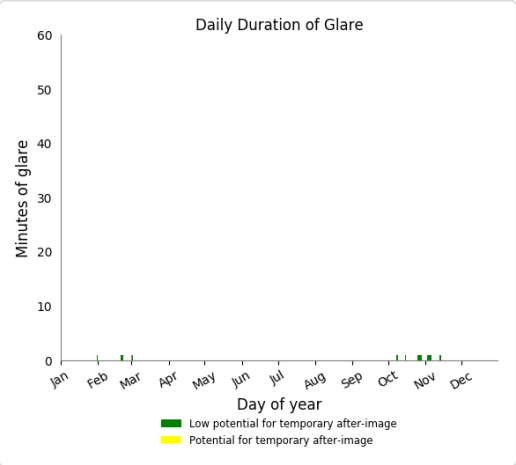
*No glare found*

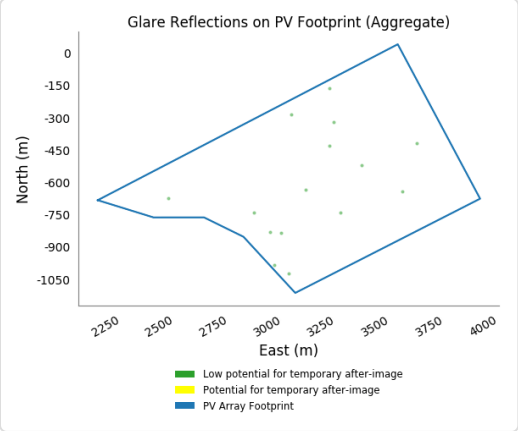
## PV array 4 - OP Receptor (OP 16)

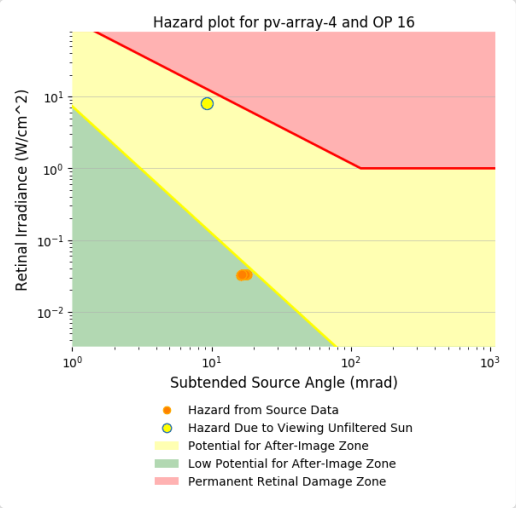
PV array is expected to produce the following glare for receptors at this location:

- 15 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 4 - OP Receptor (OP 17)

*No glare found*

## PV array 4 - OP Receptor (OP 18)

*No glare found*

## PV array 4 - OP Receptor (OP 19)

*No glare found*

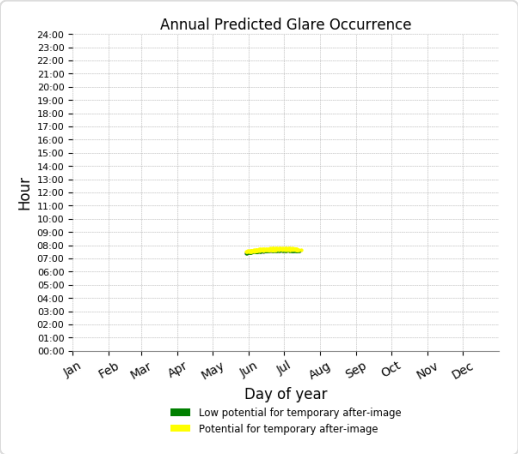
## PV array 4 - OP Receptor (OP 20)

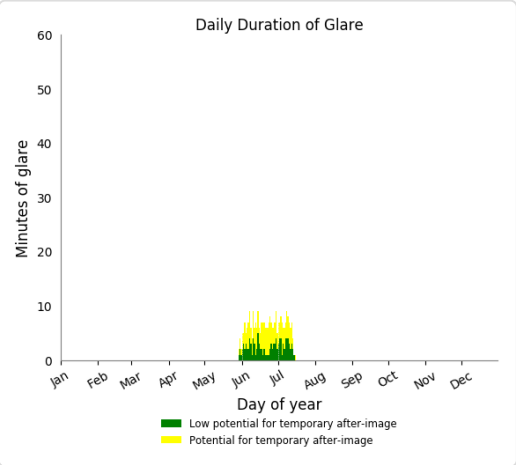
*No glare found*

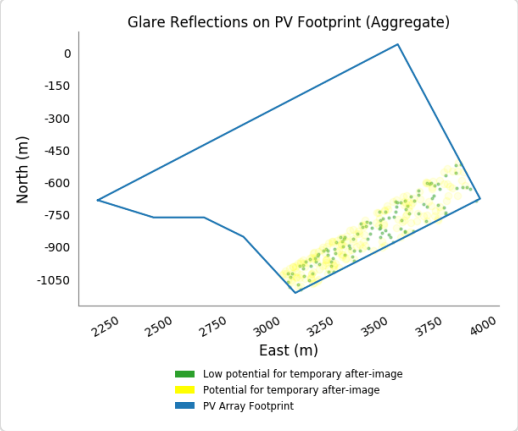
## PV array 4 - OP Receptor (OP 21)

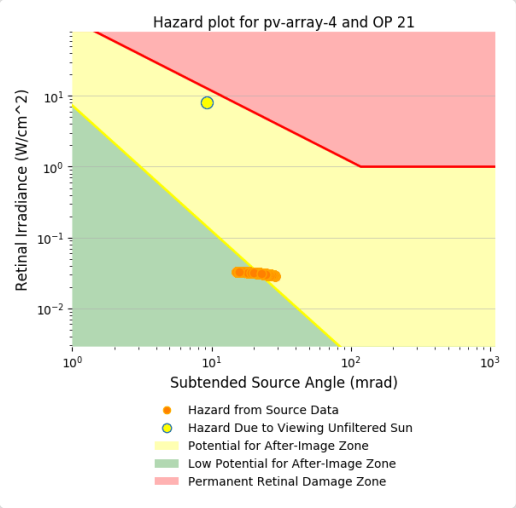
PV array is expected to produce the following glare for receptors at this location:

- 114 minutes of "green" glare with low potential to cause temporary after-image.
- 181 minutes of "yellow" glare with potential to cause temporary after-image.



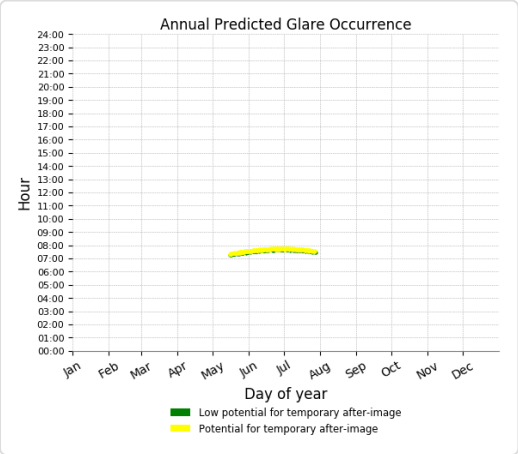



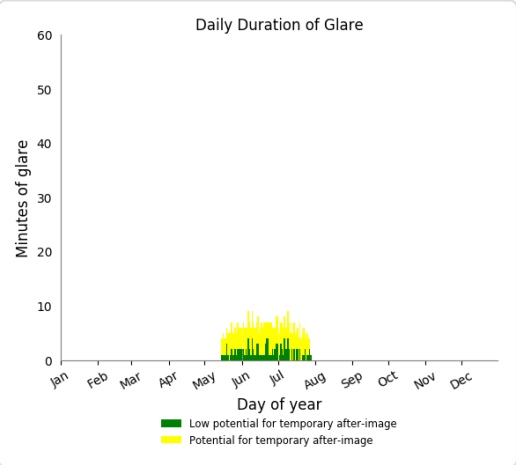



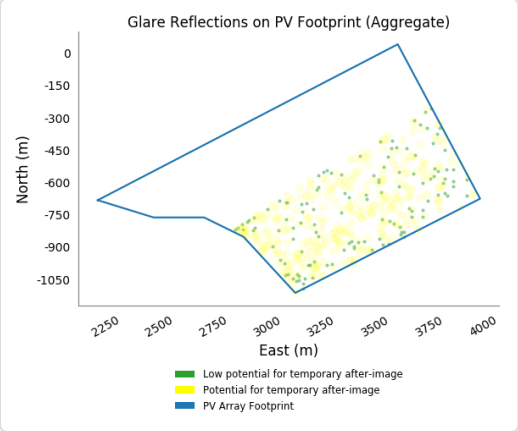
## PV array 4 - OP Receptor (OP 22)

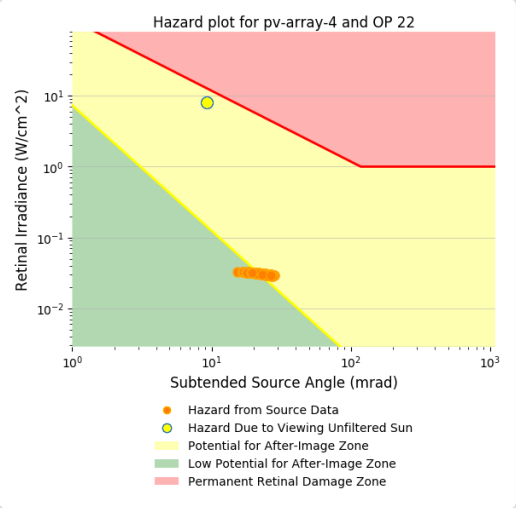
PV array is expected to produce the following glare for receptors at this location:

- 123 minutes of "green" glare with low potential to cause temporary after-image.
- 327 minutes of "yellow" glare with potential to cause temporary after-image.



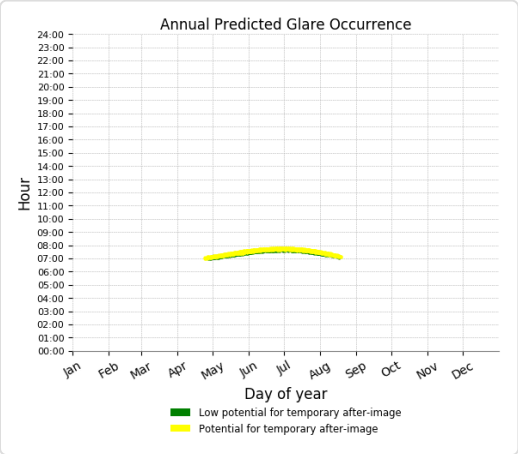



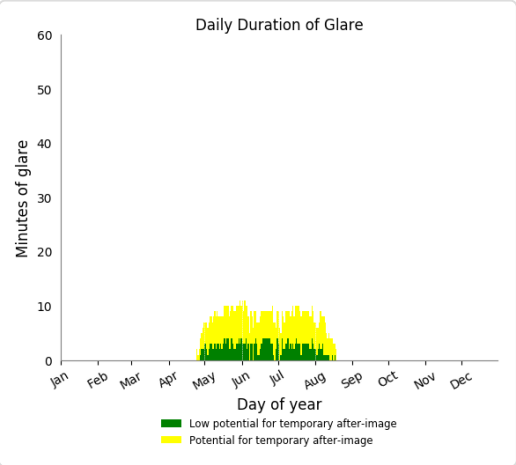



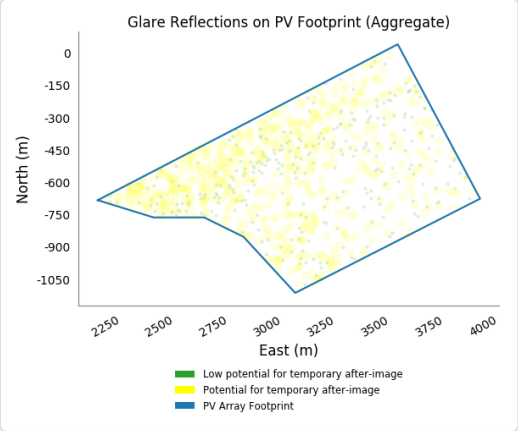
## PV array 4 - OP Receptor (OP 23)

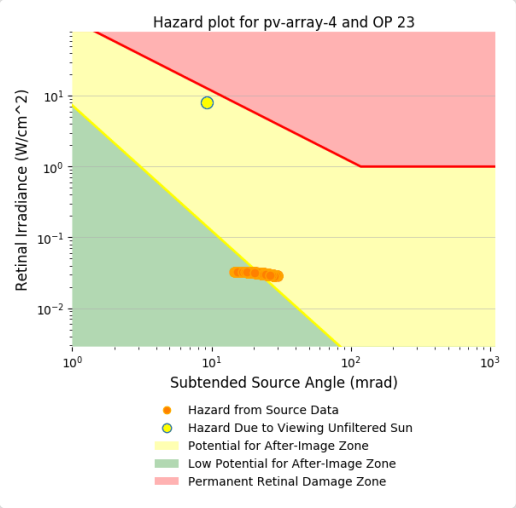
PV array is expected to produce the following glare for receptors at this location:

- 279 minutes of "green" glare with low potential to cause temporary after-image.
- 640 minutes of "yellow" glare with potential to cause temporary after-image.



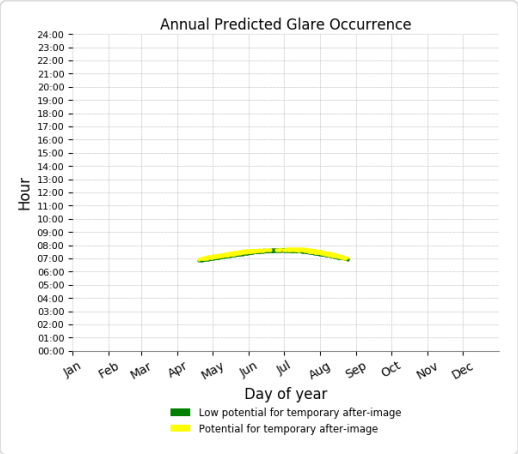



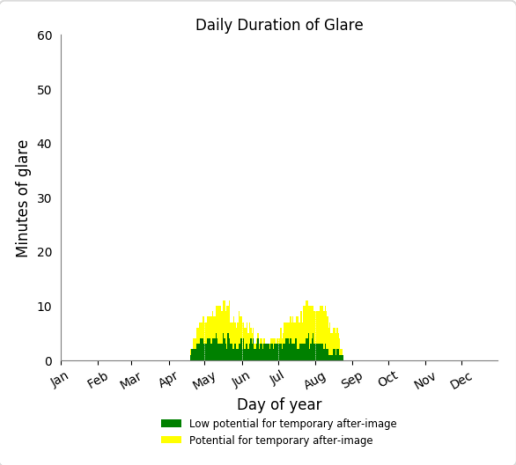



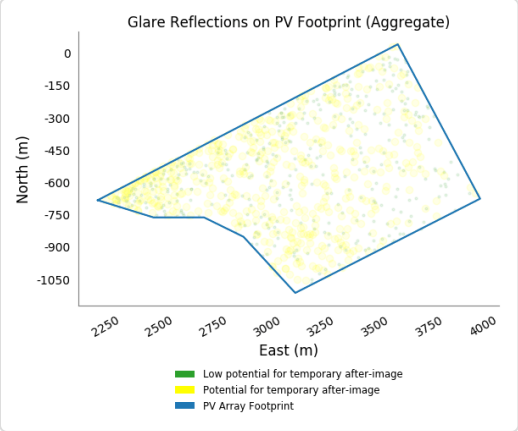
## PV array 4 - OP Receptor (OP 24)

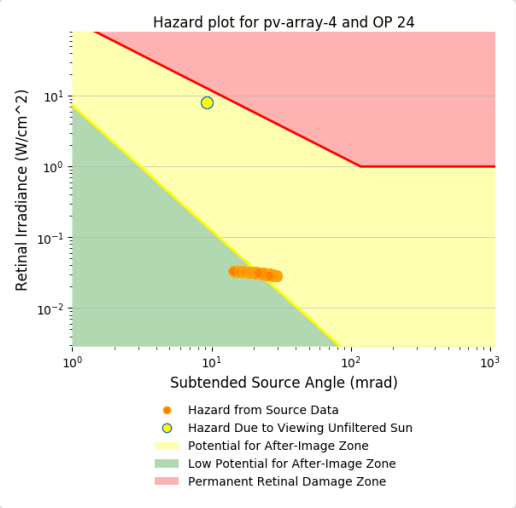
PV array is expected to produce the following glare for receptors at this location:

- 371 minutes of "green" glare with low potential to cause temporary after-image.
- 497 minutes of "yellow" glare with potential to cause temporary after-image.



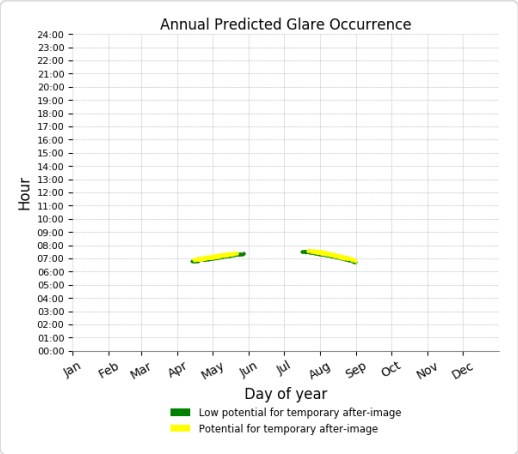



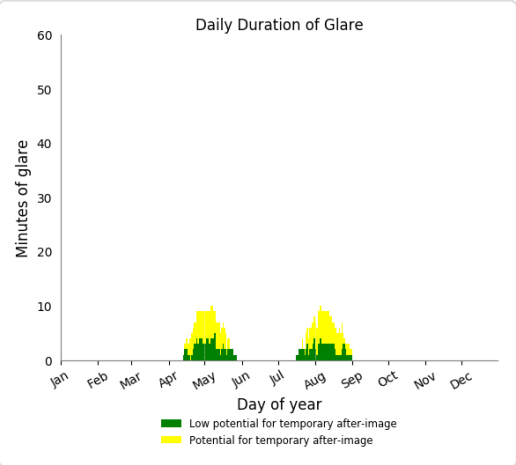



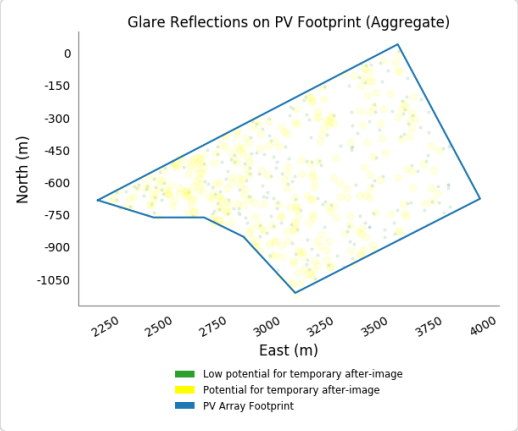
## PV array 4 - OP Receptor (OP 25)

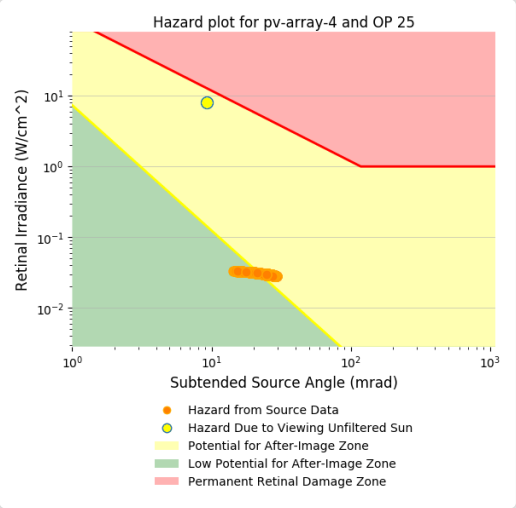
PV array is expected to produce the following glare for receptors at this location:

- 209 minutes of "green" glare with low potential to cause temporary after-image.
- 325 minutes of "yellow" glare with potential to cause temporary after-image.



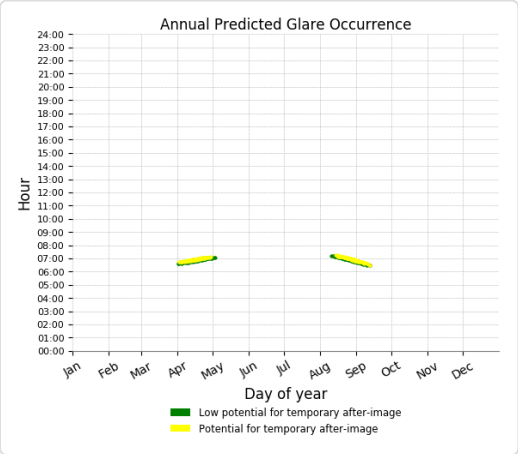



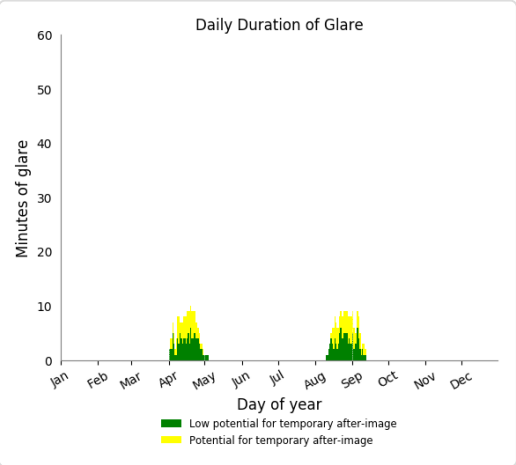



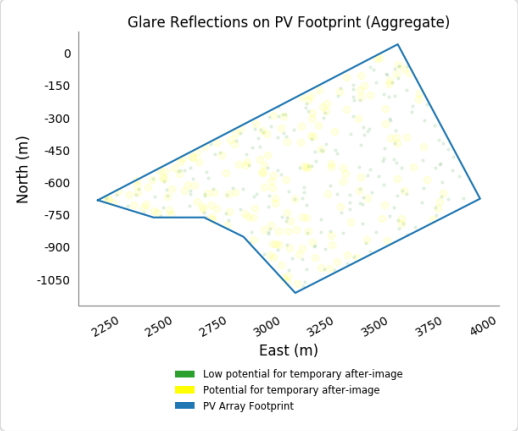
## PV array 4 - OP Receptor (OP 26)

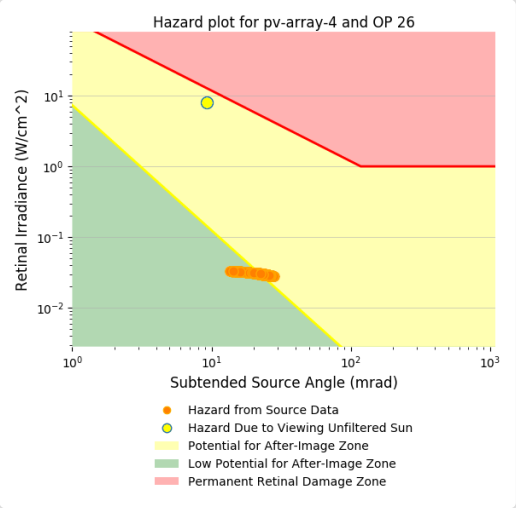
PV array is expected to produce the following glare for receptors at this location:

- 207 minutes of "green" glare with low potential to cause temporary after-image.
- 185 minutes of "yellow" glare with potential to cause temporary after-image.



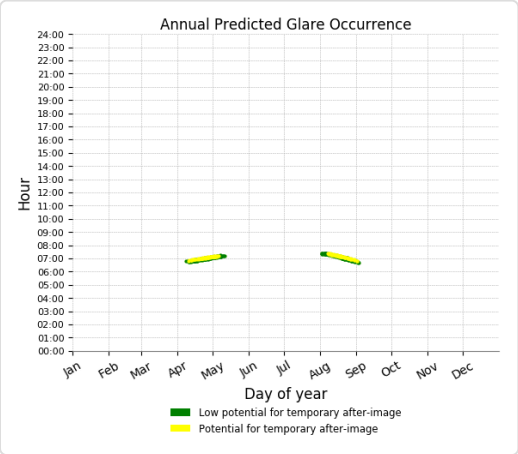



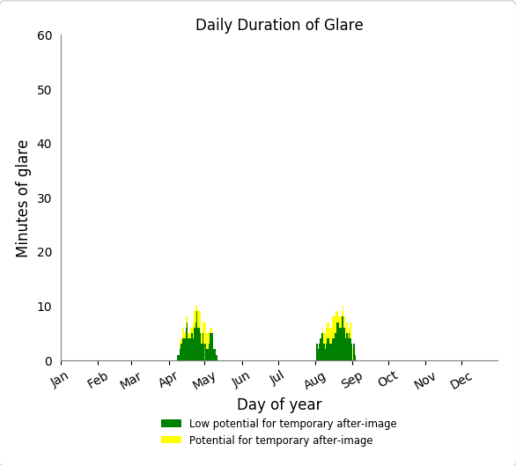



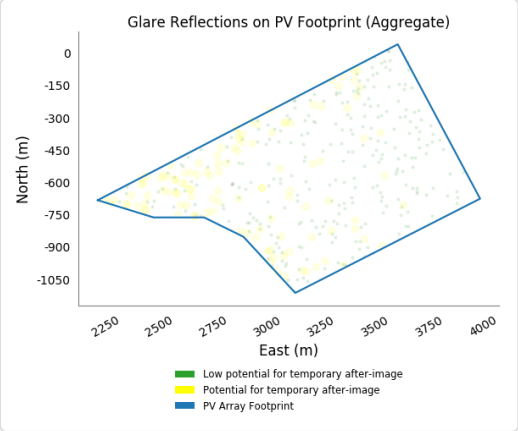
## PV array 4 - OP Receptor (OP 27)

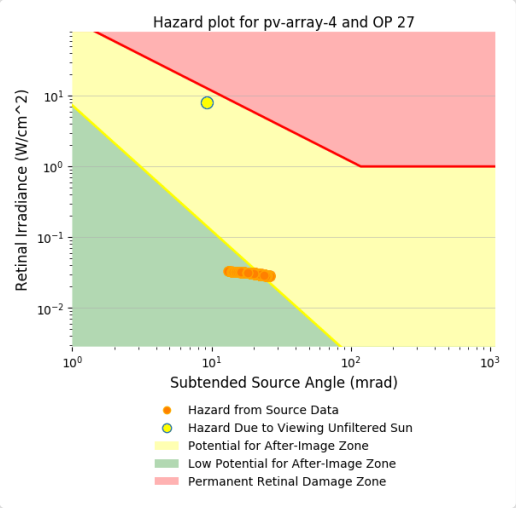
PV array is expected to produce the following glare for receptors at this location:

- 273 minutes of "green" glare with low potential to cause temporary after-image.
- 116 minutes of "yellow" glare with potential to cause temporary after-image.



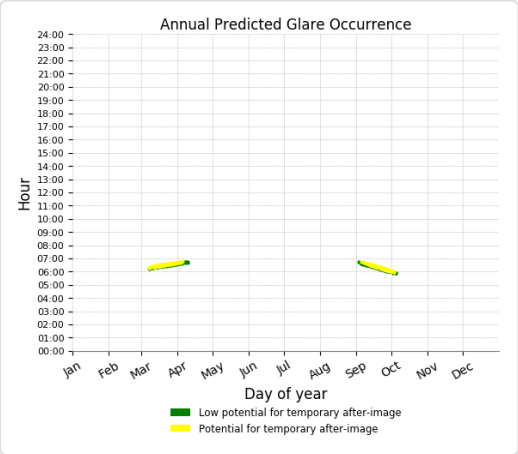



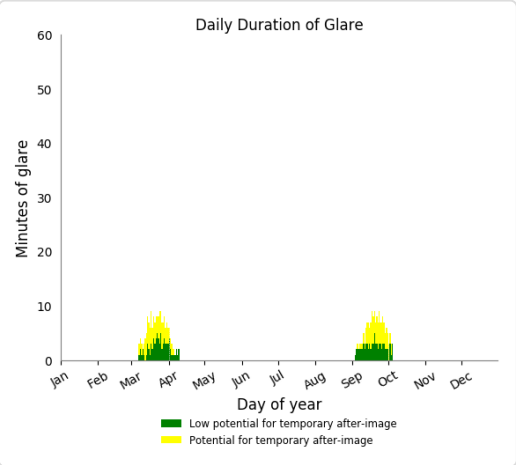



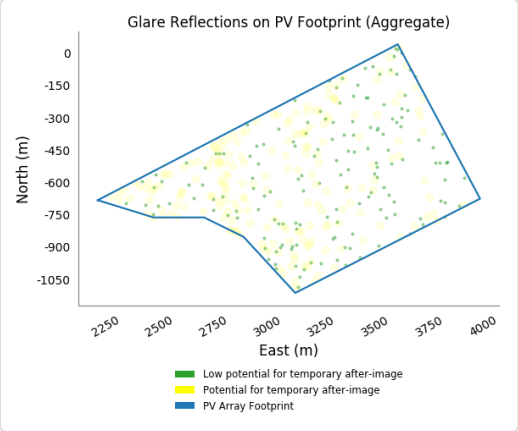
## PV array 4 - OP Receptor (OP 28)

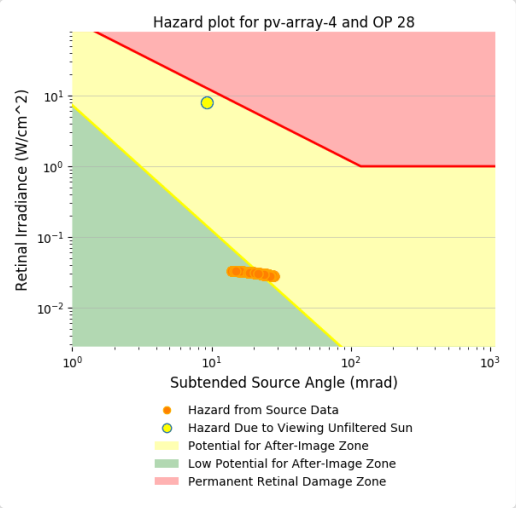
PV array is expected to produce the following glare for receptors at this location:

- 157 minutes of "green" glare with low potential to cause temporary after-image.
- 198 minutes of "yellow" glare with potential to cause temporary after-image.



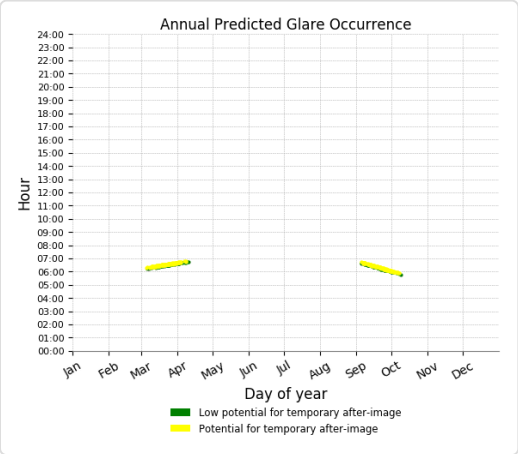



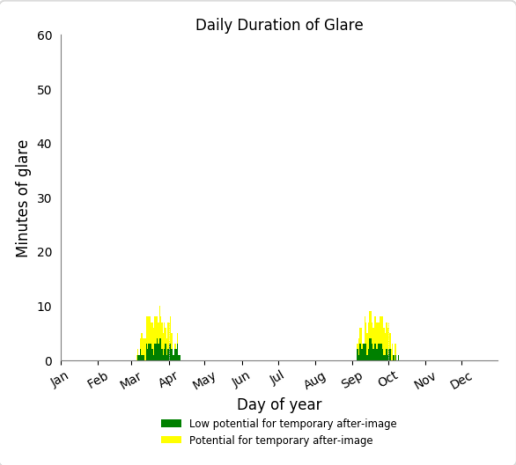



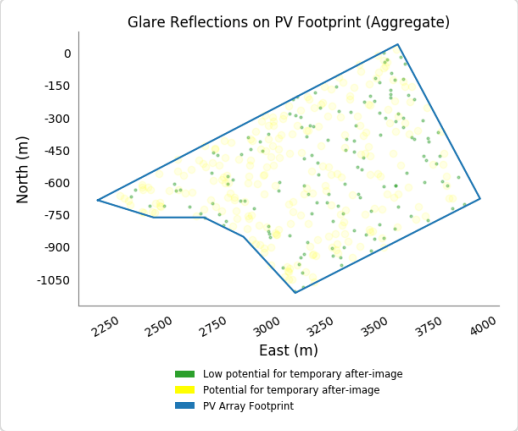
## PV array 4 - OP Receptor (OP 29)

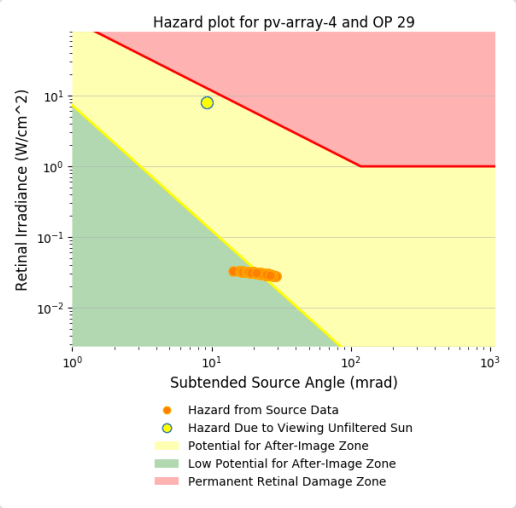
PV array is expected to produce the following glare for receptors at this location:

- 144 minutes of "green" glare with low potential to cause temporary after-image.
- 245 minutes of "yellow" glare with potential to cause temporary after-image.



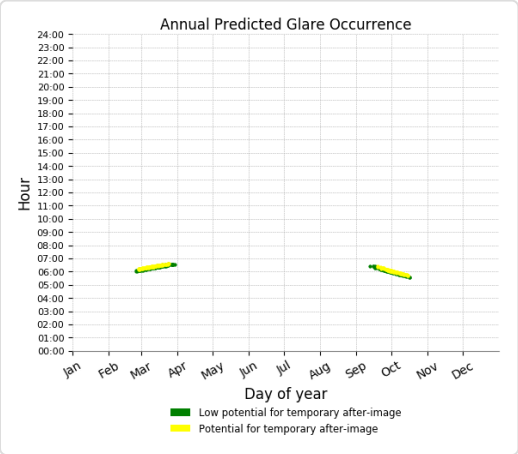



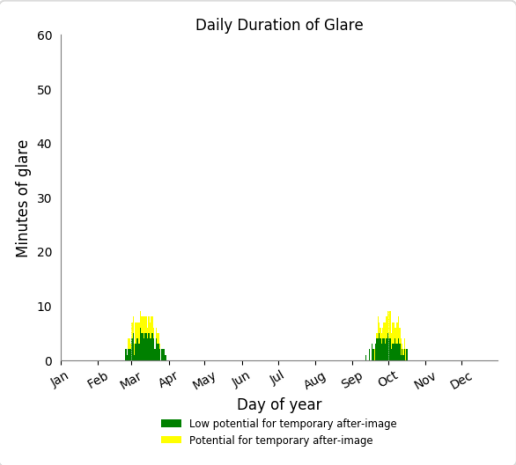



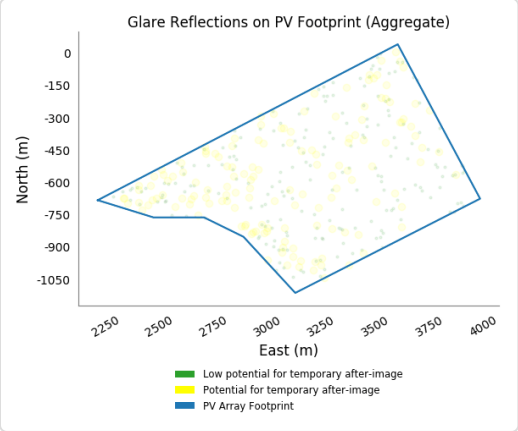
## PV array 4 - OP Receptor (OP 30)

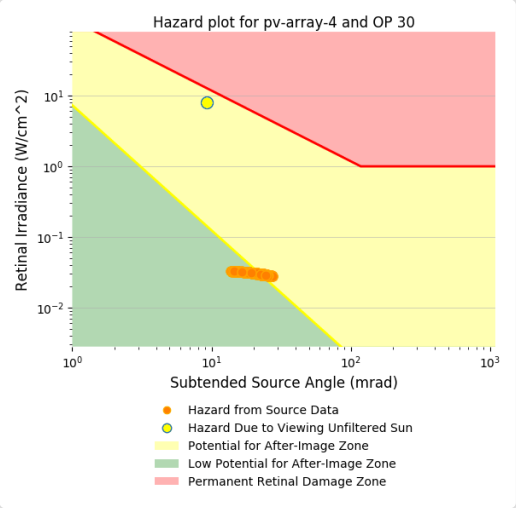
PV array is expected to produce the following glare for receptors at this location:

- 202 minutes of "green" glare with low potential to cause temporary after-image.
- 146 minutes of "yellow" glare with potential to cause temporary after-image.



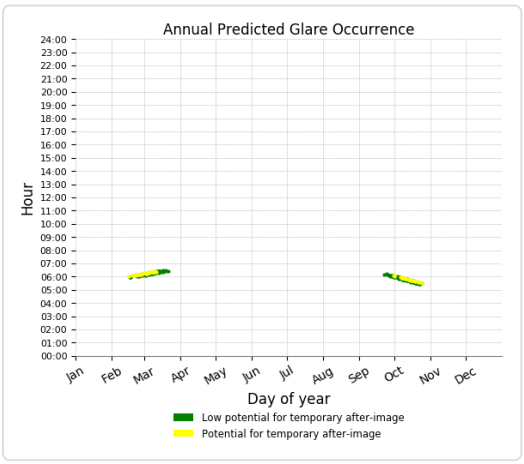



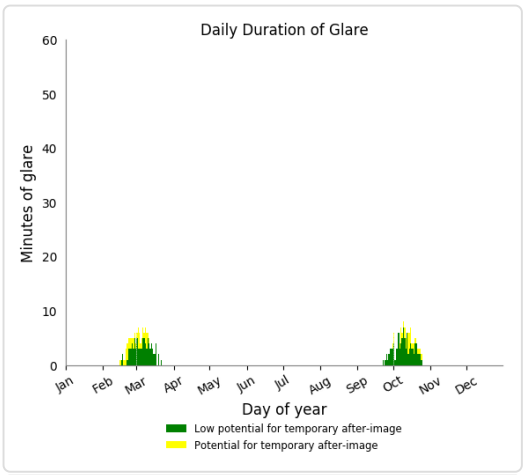



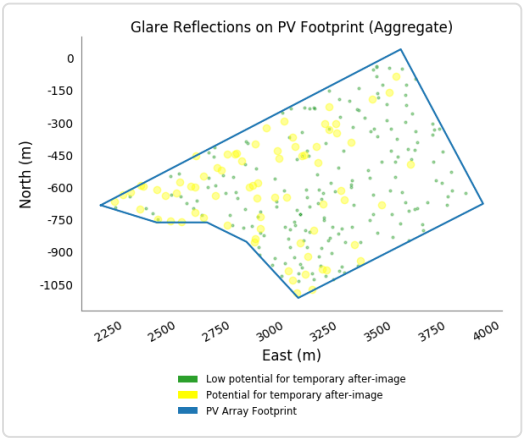
## PV array 4 - OP Receptor (OP 31)

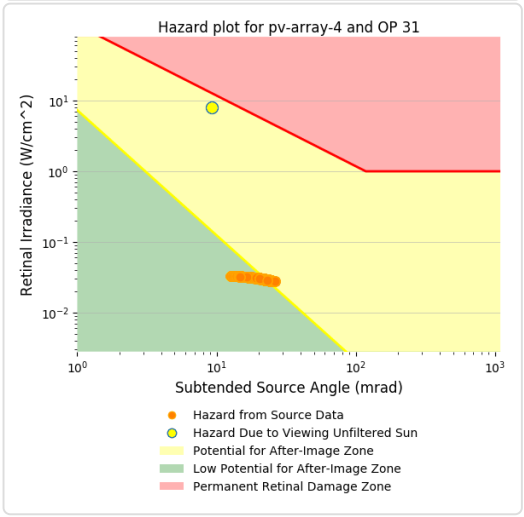
PV array is expected to produce the following glare for receptors at this location:

- 190 minutes of "green" glare with low potential to cause temporary after-image.
- 74 minutes of "yellow" glare with potential to cause temporary after-image.



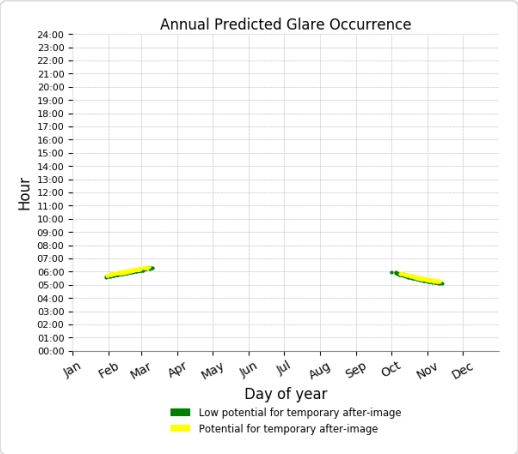



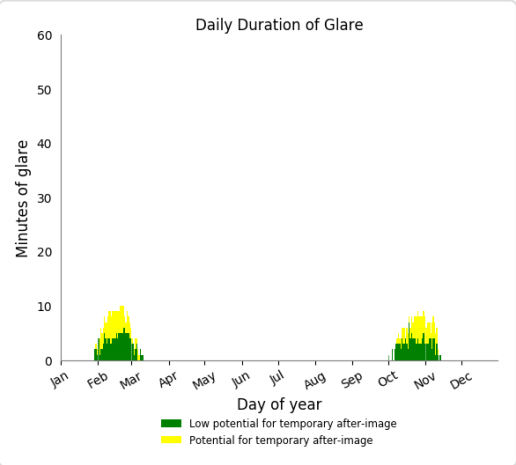



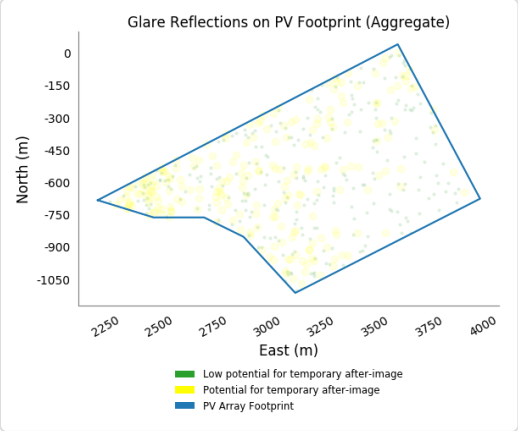
## PV array 4 - OP Receptor (OP 32)

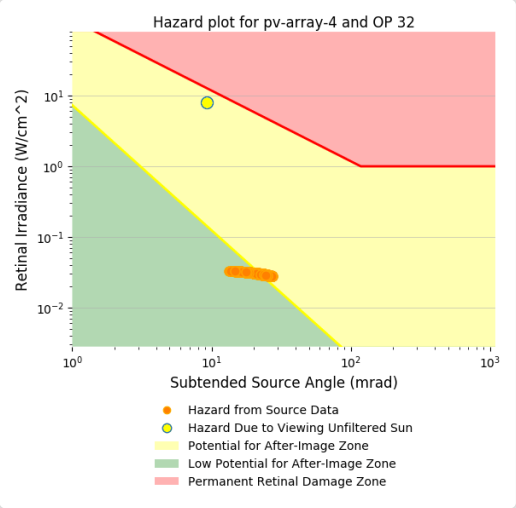
PV array is expected to produce the following glare for receptors at this location:

- 262 minutes of "green" glare with low potential to cause temporary after-image.
- 226 minutes of "yellow" glare with potential to cause temporary after-image.



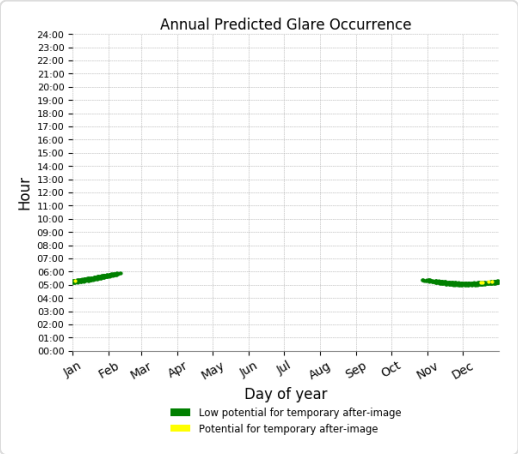



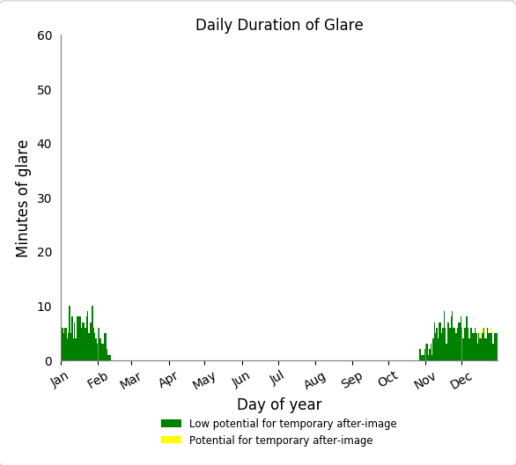



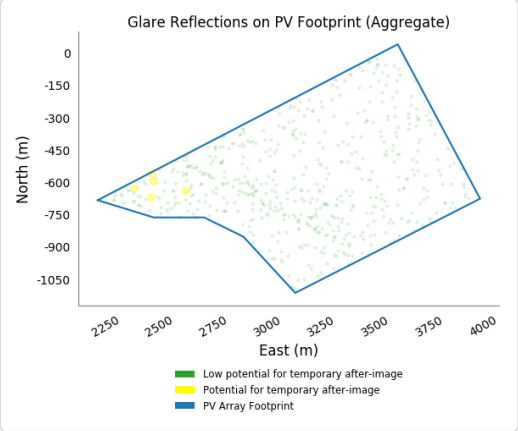
## PV array 4 - OP Receptor (OP 33)

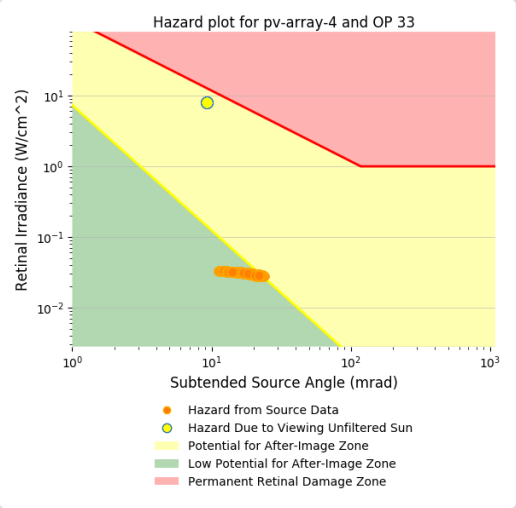
PV array is expected to produce the following glare for receptors at this location:

- 559 minutes of "green" glare with low potential to cause temporary after-image.
- 5 minutes of "yellow" glare with potential to cause temporary after-image.



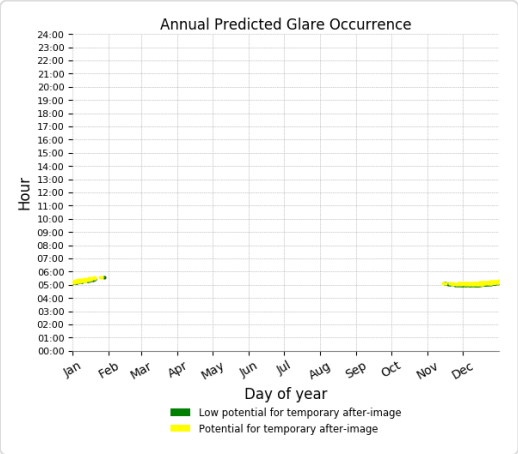

## PV array 4 - OP Receptor (OP 34)

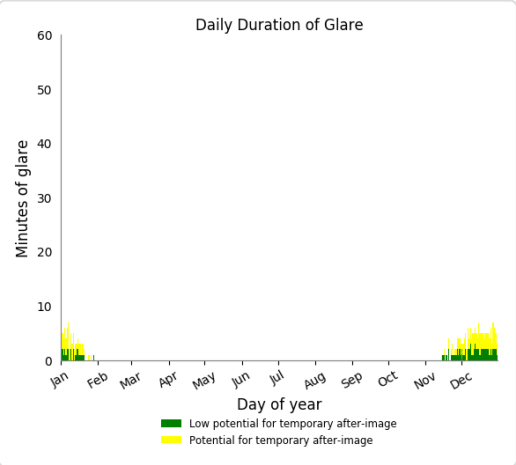
*No glare found*

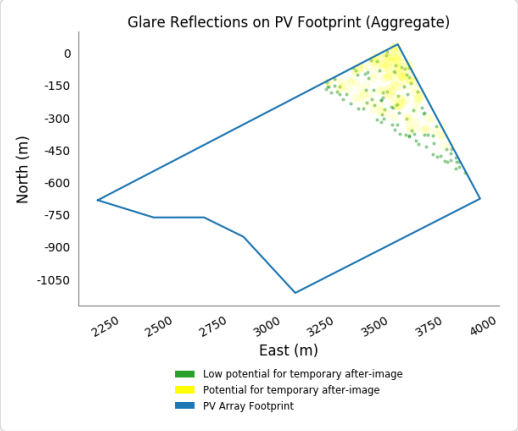
## PV array 4 - OP Receptor (OP 35)

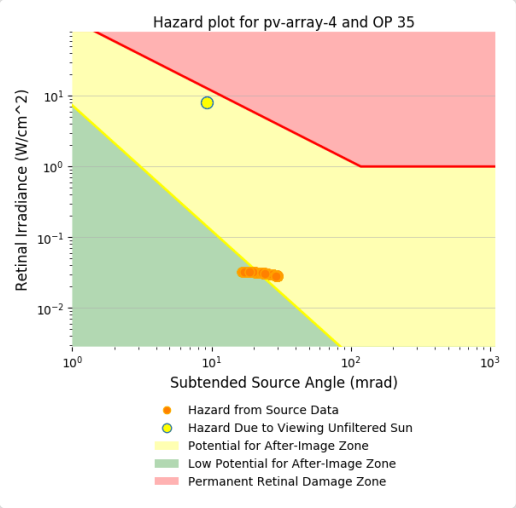
PV array is expected to produce the following glare for receptors at this location:

- 96 minutes of "green" glare with low potential to cause temporary after-image.
- 162 minutes of "yellow" glare with potential to cause temporary after-image.



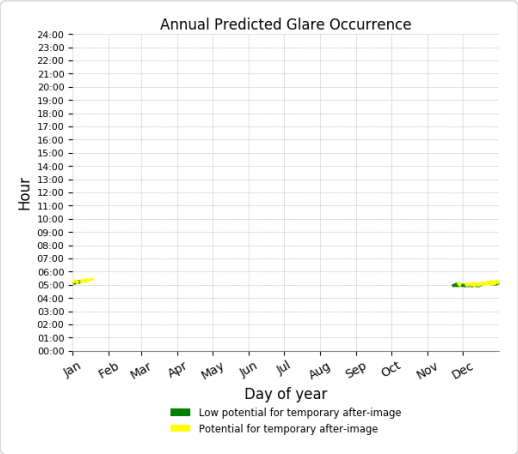



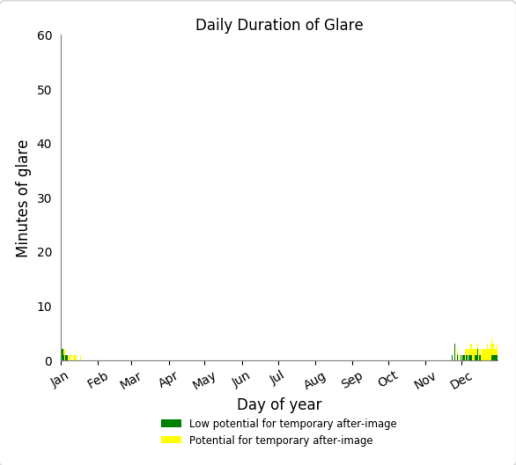



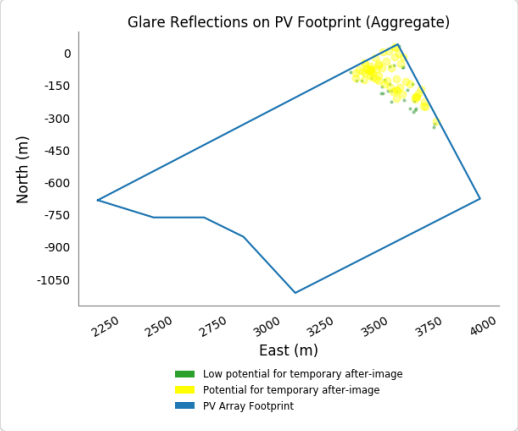
## PV array 4 - OP Receptor (OP 36)

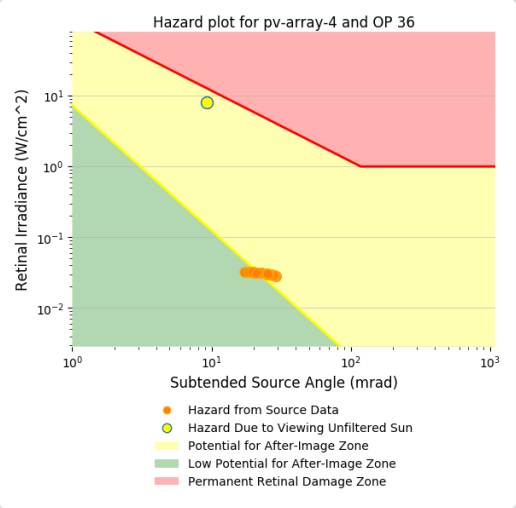
PV array is expected to produce the following glare for receptors at this location:

- 28 minutes of "green" glare with low potential to cause temporary after-image.
- 58 minutes of "yellow" glare with potential to cause temporary after-image.




## PV array 4 - OP Receptor (OP 37)

*No glare found*

## PV array 4 - OP Receptor (OP 38)

*No glare found*

## PV array 4 - OP Receptor (OP 39)

*No glare found*

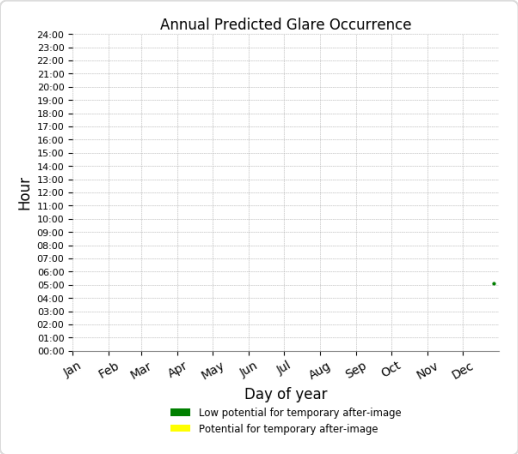
## PV array 4 - OP Receptor (OP 40)

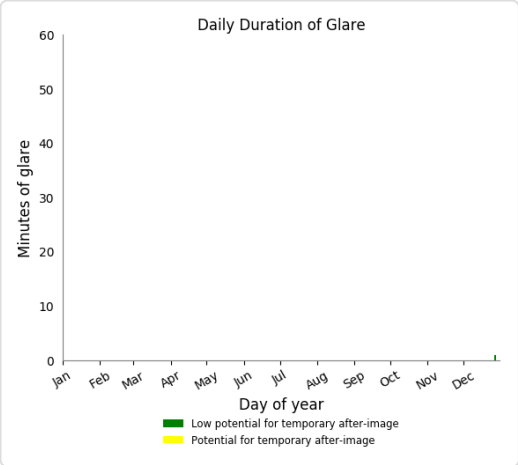
*No glare found*

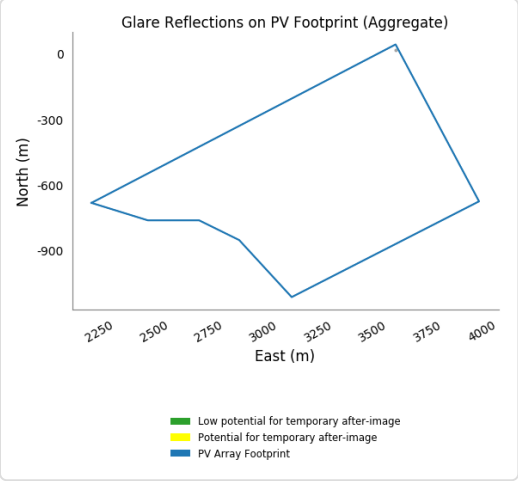
## PV array 4 - OP Receptor (OP 41)

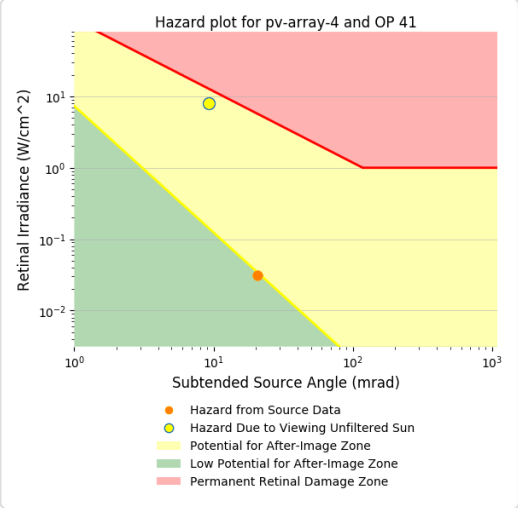
PV array is expected to produce the following glare for receptors at this location:

- 1 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.



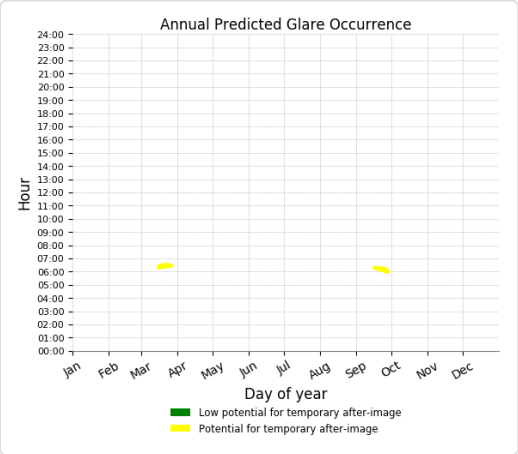

## PV array 4 - OP Receptor (OP 42)

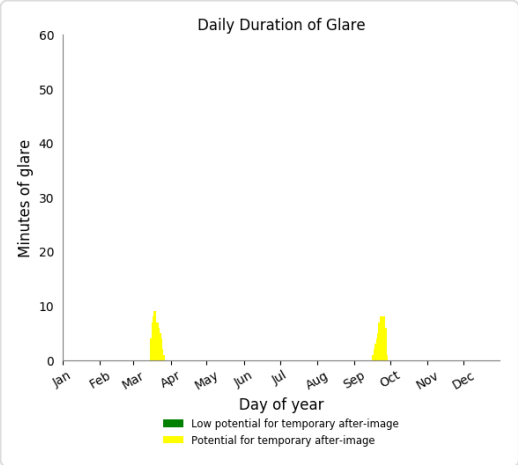
*No glare found*

## PV array 4 - Route Receptor (Benalla-Tocumwal Road)

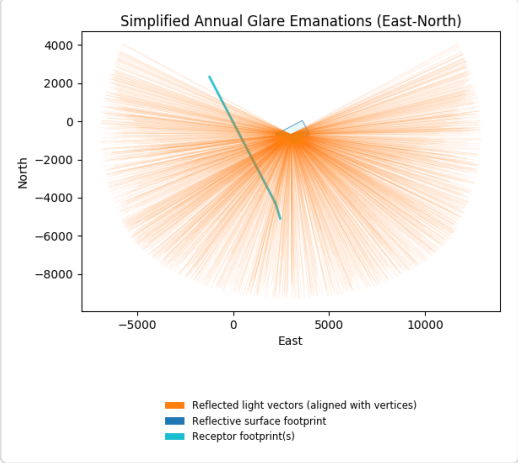
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 138 minutes of "yellow" glare with potential to cause temporary after-image.








*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

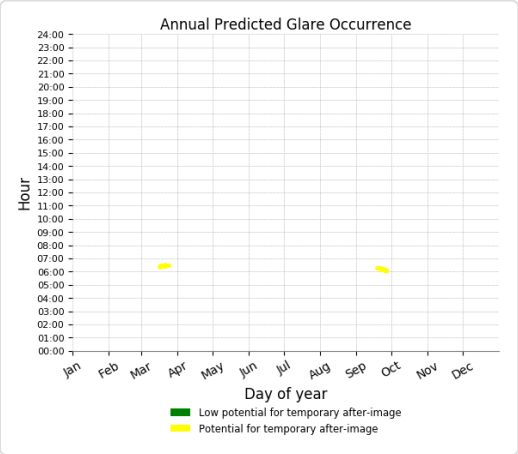
## PV array 4 - Route Receptor (Benalla-Yarrawonga Road)

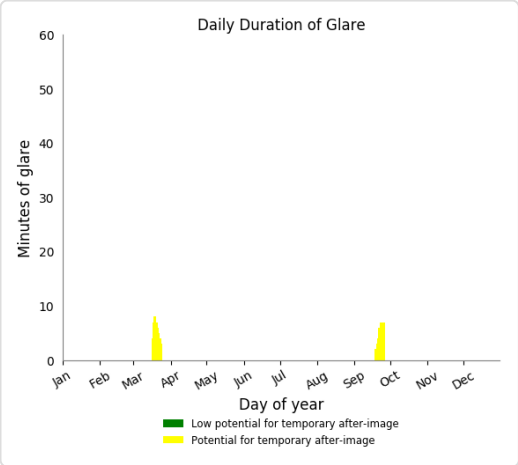
*No glare found*

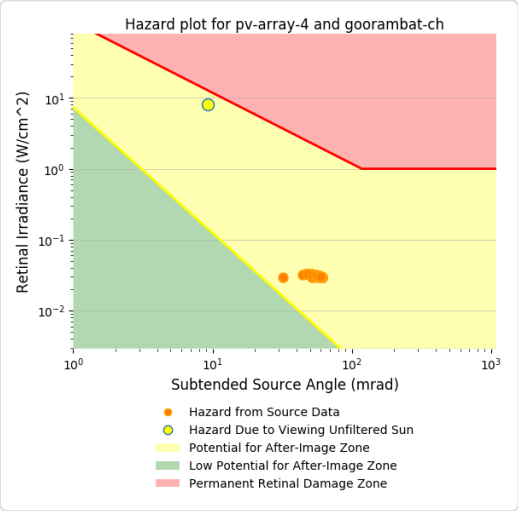
## PV array 4 - Route Receptor (Goorambat-Chesney Road)

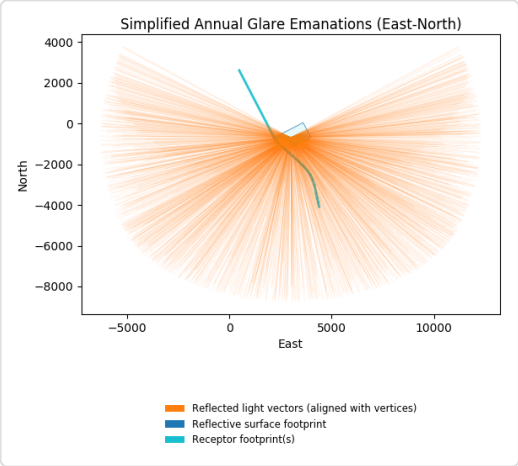
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 102 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 4 - Route Receptor (Goorambat-Chesney Road)

*No glare found*

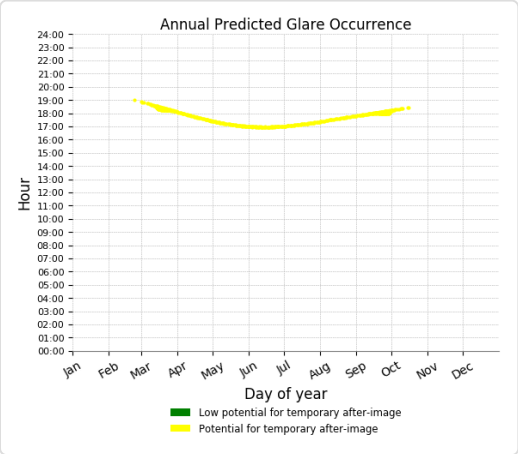
## PV array 4 - Route Receptor (Paolini Lane)

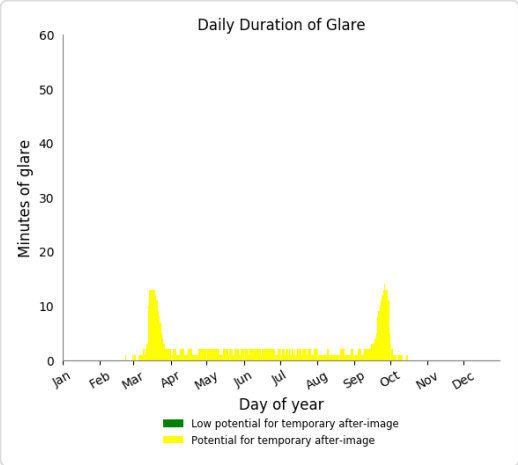
*No glare found*

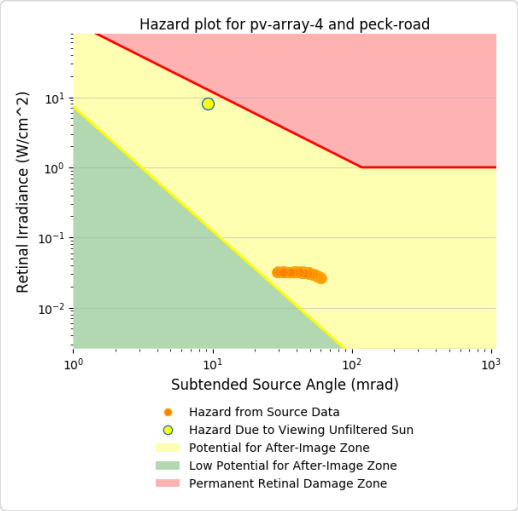
## PV array 4 - Route Receptor (Peck Road)

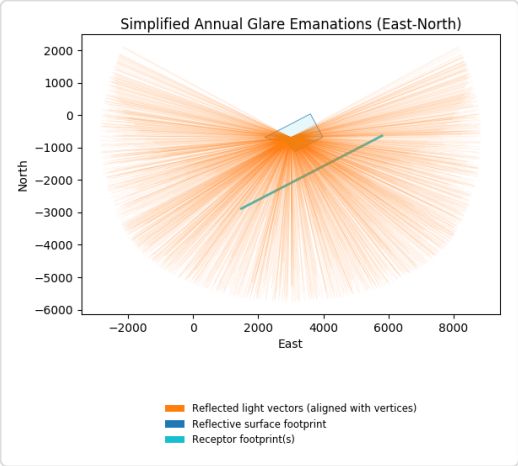
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 585 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

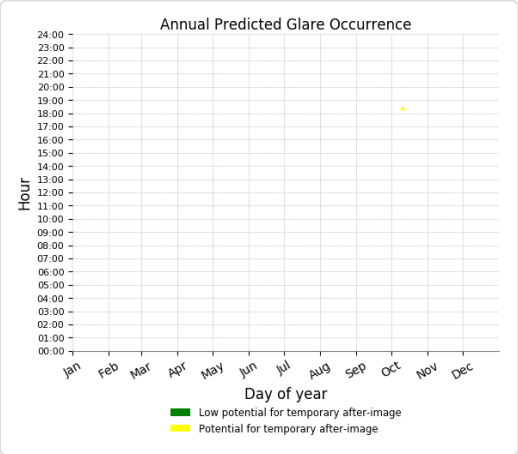
## PV array 4 - Route Receptor (Quinn Road)

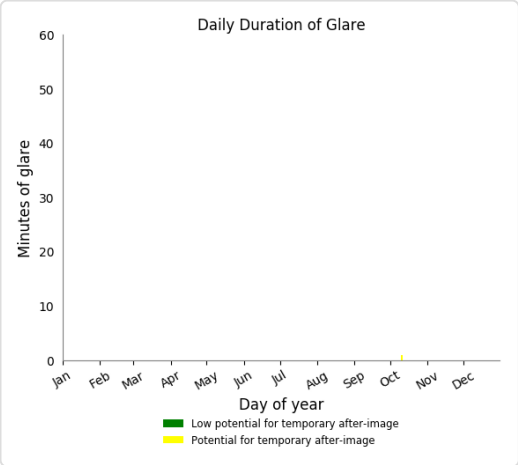
*No glare found*

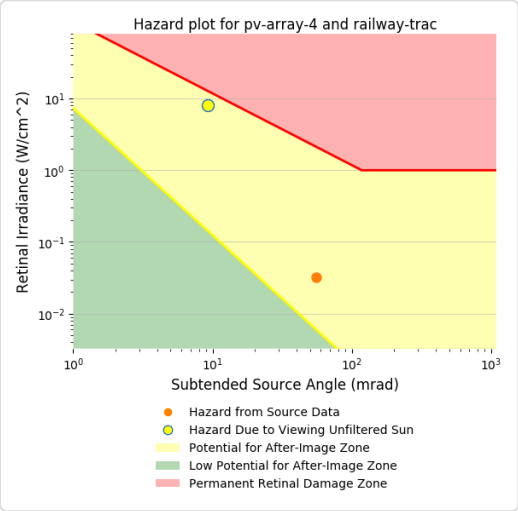
## PV array 4 - Route Receptor (Railway Track)

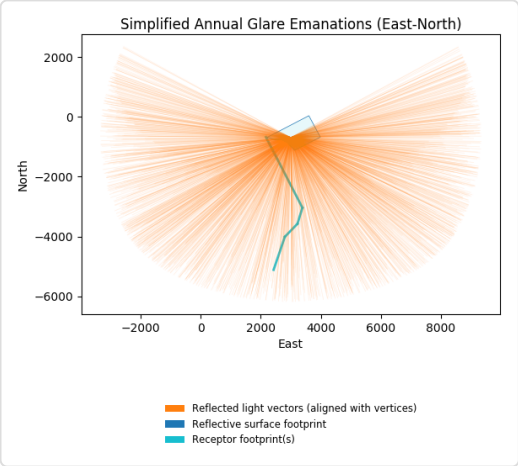
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1 minutes of "yellow" glare with potential to cause temporary after-image.



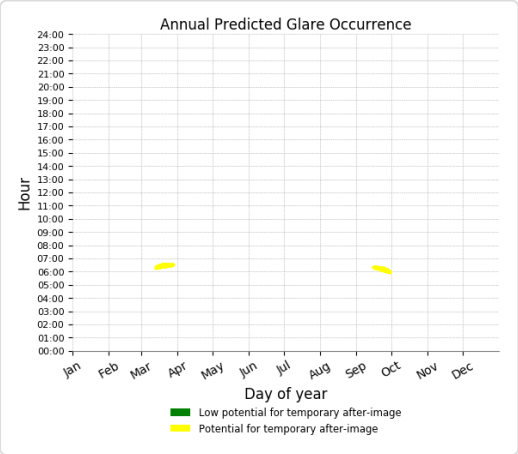



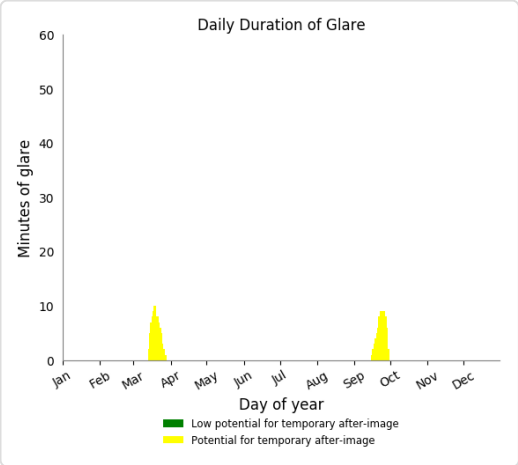

*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 4 - Route Receptor (Sharp Road)

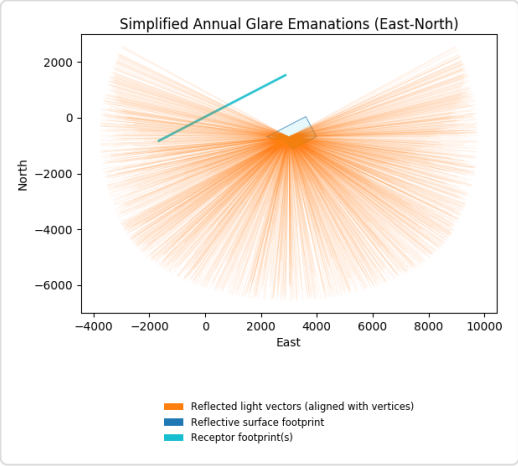
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 182 minutes of "yellow" glare with potential to cause temporary after-image.








*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 4 - Route Receptor (Taylor Road)

*No glare found*

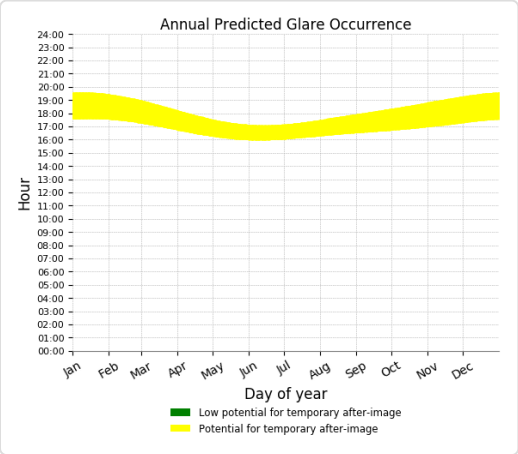
## PV array 4 - Route Receptor (Trask Road)

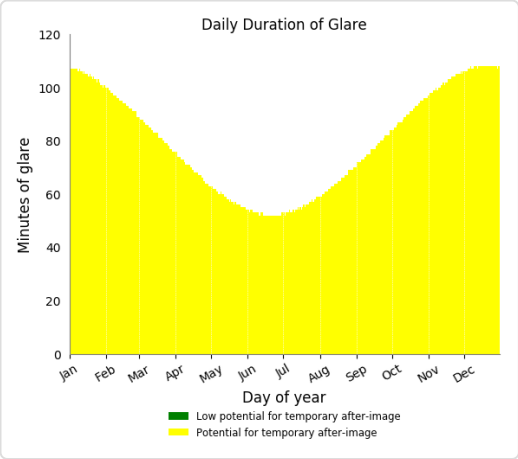
*No glare found*

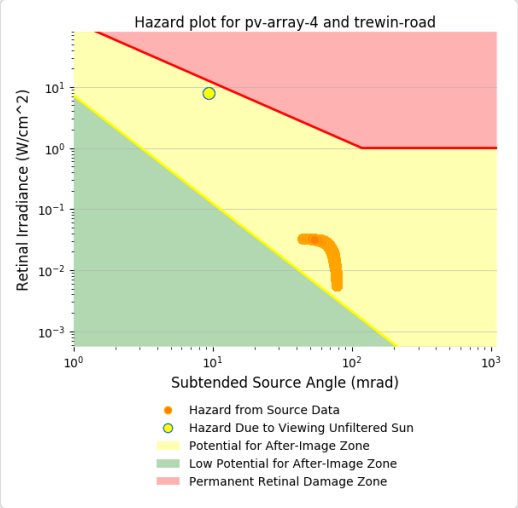
## PV array 4 - Route Receptor (Trewin Road)

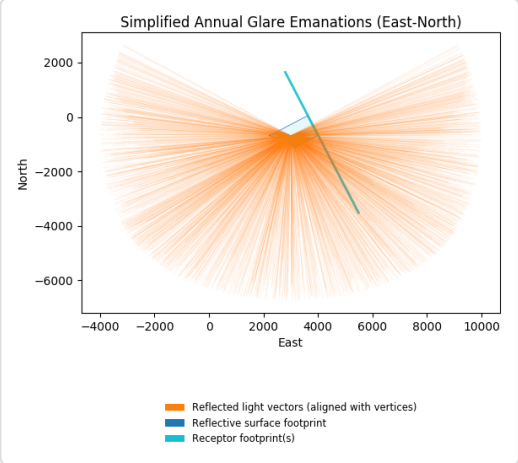
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 29,121 minutes of "yellow" glare with potential to cause temporary after-image.




*Glare vectors placed at PV centroid for clarity. Actual glare-spot location vary.*

## PV array 4 - Route Receptor (Wilson Road)

*No glare found*

## Assumptions

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