



moir
STUDIO

Brewongle Solar Farm

Glint and Glare Assessment

Brewongle Solar Farm

Glint and Glare Assessment

Prepared for

ERM

Issue

04

Date

21.01.2025

Project Number

2523

Revision	Date	Author	Checked	Comment
A	10.10.2024	JH	JR	Draft for Review
B	9.12.2024	CD	AR	Draft for Review
C	14.01.2025	CD	AR	Submission
D	21.01.2025	CD	NL	Submission



Moir Landscape Architecture Pty Ltd

(T/A **Moir Studio**)

Studio 1, 88 Fern Street

PO Box 111, Islington NSW 2296

admin@moirla.com.au

Ph.(02) 4965 3500

www.moirstudio.com.au

ACN: 097 558 908

ABN: 48 097 558 908

Executive Summary

Moir Studio have been engaged by Environmental Resources Management Australia (ERM) Pty Ltd on behalf of Edify Energy Pty Ltd (the proponent) to provide a Glint and Glare Assessment for the proposed Brewongle Solar Farm (the Project). The report will accompany the Environmental Impact Statement (EIS) prepared for the Project.

The Project is located approximately 12 kilometres (km) southeast of Bathurst in the Bathurst Regional Council Local Government Area (LGA).

The Glint and Glare Assessment has been prepared in accordance with the *Department of Planning, Housing and Infrastructure's* (DPHI) *Large-Scale Solar Energy Guideline* (November 2024) (referred to hereafter as 'the Guideline').

In accordance with the Guideline, the following has been assessed:

- Private receptors within three (3) km of the proposed solar array (PV) with a line of sight.
- All public roads and railway lines within one (1) km of the proposed PV.
- Aviation Receptors within five (5) km of the proposed PV

Moir Studio has undertaken this glint and glare assessment utilising the Solar Glare Hazard Analysis Tool (SGHAT). The SGHAT is used to evaluate glare resulting from solar farms at different receptors, based on proximity, orientation and specifications of the PV modules.

It is important to note, this assessment is based on a worst-case scenario and does not take into account weather conditions, intervening elements such as vegetation and built structures.

A total of 33 private receptors within 3 km with a line of sight to the Project (based off the zone of theoretical visibility) were identified as sensitive Observation Points (OP). Based on the desktop

assessment no potential glare was detected for private receptors. Consequently, no mitigation measures are required in line with the Guideline.

A total of one (1) road receptor (Tarana Road) and one (1) rail receptor (Main Western Railway) were assessed within 1 km of the PV Array. The results indicate no instances of potential glare for Tarana Road and the potential for glare along Main Western Railway. In accordance with the Guidelines, mitigation measures will be required along the northeastern boundary between the Project and the Main Western Railway

No aviation receptors were identified within 5 km of the PV Array.

As the modelling was based on worst case assumptions, Moir have provided recommendations to reduce the potential for glint and glare from the Main Western Railway. Mitigation in the form of altering tracking patterns of the solar panels has been recommended in order to to eliminate all potential for glare from the nearby receivers.

1.0 Introduction

1.1 The Purpose of this Report

Brewongle Solar Farm (the Project) is located approximately 12 km to the southeast of Bathurst in the Bathurst Regional LGA.

This Glint and Glare Assessment has been prepared to meet the Secretary's Environmental Assessment Requirements (SEARs) for the Project, and has been prepared in accordance with the NSW Department of Planning, Housing and Infrastructure (DPHI) Large-Scale Solar Energy Guideline (November 2024) (referred to hereafter as 'the Guideline').

1.1.1 Overview of Glint and Glare

Glint is generally defined as a momentary flash of bright light while glare can be defined as continuous source of excessive brightness proportionate to ambient lighting (FAA, 2021).

While it is acknowledged that '*significant glint and glare impacts are uncommon with large-scale solar energy developments*' (DPHI, 2024), the purpose of this report is '*to model and assess these impacts to ensure any potential significant impact is avoided or mitigated appropriately.*' (DPHI 2024)

Therefore, assessments must be undertaken to ensure that sensitive visual receptors such as road users, surrounding rail network, nearby buildings, air traffic controllers and pilots are not significantly impacted by the proposed development (ForgeSolar, 2022).

The performance objectives of the Guideline for residential receivers, road and rail receivers and aviation receivers are outlined in each of the receptor assessments.

1.1.2 Acknowledgement of Likelihood of Glint & Glare Impacts

The Guidelines note that *'significant glint and glare impacts are uncommon with large-scale solar energy developments because:*

- *solar panels are designed to absorb light and typically reflect less than 2% of incoming sunlight*
- *glint and glare typically occur for short periods of time and require very specific geometric and atmospheric conditions*
- *many solar energy projects are now fitted with tracking panels that can be adjusted to avoid or minimise the geometric conditions needed to cause glint and glare. (DPHI 2024)*

The purposes of this report is to identify any potential large scale glare impacts and take appropriate measures to mitigate these potential impacts.

1.2 Glint and Glare Key Principles

The key principles for ensuring the Project can be undertaken whilst maintaining an acceptable level of amenity are outlined in the Guideline and are as follows:

1. Solar panels should be sited to reduce the likely impacts of glint and glare.

2. Solar panels and other infrastructure should be constructed of materials and / or treated to minimise glint and glare.

3. If a large scale-solar energy development is likely to exceed the relevant criteria for glare and standards for glint, mitigation strategies must be adopted to reduce the impacts

1.3 Assessment Requirements

Table 1 provides an outline of the assessment requirements for the report. The SEARs also state that the Proponent is to ‘*provide a glint and glare assessment prepared in accordance with the Solar Guideline*’.

The objective of the assessment as stated in the Guideline is to ‘*demonstrate that glint and glare would not pose a significant risk to motorists or pilots and that nuisance from glare is minimised for residential locations in accordance with the objectives.*’

Report Structure

Requirements for Glint and Glare Assessment:

Addressed in report:

A justification for excluding any modeled glare results because they would be insignificant due to the size, position and luminance of the glare source or high ambient luminance.

Refer to:
Section 2.0: Study Methodology

A description of the proposed PV panels indicating:

- *the axis of rotation and maximum tilt angle*
- *the light absorption efficiency and / or refractive index values at different angles.*
- *whether any backtracking is proposed and the time and duration of these operations.*

Refer to:
Section 3.0: Project Overview

Results of the glint and glare analysis for each assessable receptor

Refer to:

Section 4.0: Residential Receptors (Assess all residential receptors within 3 km of the proposed PV that have a line of sight.)

Section 5.0: Road and Rail Receptors (Assess all roads and rail lines within 1 km of the proposed PV.)

Section 6.0: Aviation Receptors (Assess all air traffic control towers and take off / landing approaches to any runway or landing strip within 5 km of the proposed PV.)

Identification of existing vegetation or built structures and a quantitative assessment of whether these features would eliminate or reduce the modeled impacts.

Refer to:
Section 7.0: Performance Objectives

Details of strategies to either avoid or mitigate impacts including re-siting or sizing the Project, altering the tracking patterns, implementing vegetation screening, or entering neighbor agreements with landowners if all other measures have been exhausted.

Refer to:
Section 8.0: Mitigation Recommendations

Table 1 Overview of Assessment Requirements

2.0 Study Method

2.1 Assessment Methodology

Moir Studio has undertaken the assessment utilising the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories. The SGHAT is used to evaluate glare resulting from solar farms at different receptors, which is based on proximity, orientation and specifications of the PV modules. This tool is recognised by the Australian Government Civil Aviation Safety Authority (CASA).

SGHAT is used to indicate the nature of glare that can be expected at each potential receptor. Glare can be broadly classified into three categories:

- **Low** potential for temporary after-image
- **Potential** for temporary after-image
- **Permanent** after-image (i.e. retinal burn, not expected for PV)

Note: The main focus of this assessment is the 'potential' glare. 'Permanent' glare is not expected for PV and glare with 'low' potential to cause after image is deemed negligible. (HO,2011)

The SGHAT used to assess the glint and glare hazard was run at a simulation interval of one minute, based on the reflectivity of solar rays off PV modules which typically lasts for at least one minute.

Modelling for the solar farms in the SGHAT tool is based on the following factors:

- Position of the sun over time with respect to the location of the proposed solar farm.
- Assessment is based on a worst-case scenario assuming clear weather all year round, (ie. no consideration of cloud coverage).
- Tracking axis tilt, tracking axis orientation and properties of the PV modules.
- Potential to screen the impact by surrounding topography (does not take into account intervening elements such as vegetation and built structures).

2.2 Modelling Limitations

It should be emphasized that the results of the SGHAT are representation of a worst-case scenario model. Any results of potential for glare and corresponding proposed mitigation measures are based off a conservative estimate.

The analysis gives an indication of potential glint and glare effects and does not consider:

- intervening elements such as existing vegetation or built structures. The analysis only considers a bare ground scenario (i.e. topography only).
- Varying weather conditions that reduce glare such as cloud cover. The analysis is only based on worst-case scenario weather conditions for glare (i.e. Clear weather conditions).

2.3 Modelling Assumptions

The glare and glint impact is calculated utilising the geographic location, elevation, position of the sun and other vector calculations including module orientation, reflective environment and visual factors. Sun position is determined at every one (1) minute interval throughout the year.

Although the SGHAT is an instructive tool to understand the impacts of potential glare, it does not consider weather conditions, separation between PV modules and existing surrounding vegetation (if present) between the Project and a sensitive receptor.

Single axis tracking PV panels with the maximum height of 4.2 m, capable of rotating to a maximum tilt angle of 55° have been considered to indicate a full rotational range of 110° for this analysis. The trackers are oriented north south with a minimum pitch distance of 6 m. Glare modelling has been conducted to correspond to maximum tracker height to provide a wider range of observed solar glare based on the extremities.

The glint and glare effects of PV panels depends on the scale and type of infrastructure, the prominence and topography of the site relative to the surrounding environment, and any proposed screening measures to reduce visibility of the site.

Glare modelling has been conducted using the 'shade-slope' backtracking function within the SGHAT tool. Ground Coverage Ratio (GCR) calculations are used within the SGHAT tool for 'shade-slope' backtracking analysis. GCR is defined as the ratio of the array length (L) to proposed pitch distance (R) (Doubleday et al. 2016) and assumes a 1P configuration (Refer to **Image 1**).

$$\text{GCR} = \frac{L}{R}$$

For this assessment GCR is calculated considering $L = 2.4$ m and $R = 6$ m. The resulting $\text{GCR} = 0.4$

Section 3.0 provides an overview of the PV panel parameters used for the assessment.

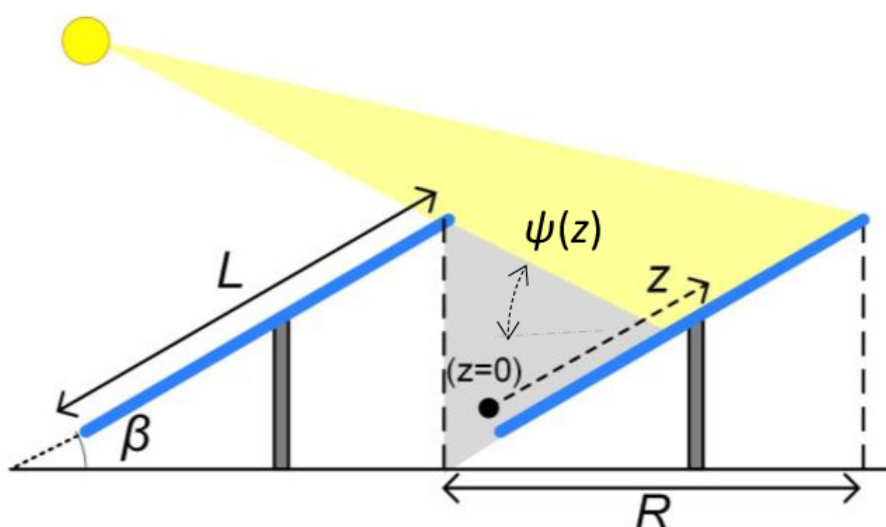


Image 1 Ground Coverage Ratio Calculations (Doubleday et al. 2016)

2.4 Backtracking Operations

A single axis horizontal tracking system can be configured to do a 'backtracking' technique, which implies that when the sun is low in the sky in the morning or evening, the tracking system can adjust the panels to maximise solar capture while minimising overshadowing, refer to **Image 2**.

The SGHAT tool uses a simplified model of backtracking to avoid shading. Single-axis trackers follow the movement of the sun as it moves east to west throughout the day. Yields are maximised, and light reflection is minimised when panels are directly facing the sun. At times when the sun is not in the tracking range, it is assumed that the panels continuously 'backtrack' to their resting angle of 0° (horizontal) over night. Due to this, glare from the backtracking mechanism will be more conservatively simulated. Glare impacts will be more noticeable when the sun is at a lower angle relative to the array particularly at times of sunset and sunrise.

Variable angles of incidence of the sun relative to the panels may occur when the tracking system is performing a backtracking operation, and this variation is represented by the SGHAT.

'Shade-slope' backtracking function within the SGHAT tool considers the lowest possible panel rotation angle during backtracking. Therefore, 0° resting angle option is modelled. This function simulates the panels returning to a predefined angle after the maximum tilt angle has been attained.

It is important to note, that this backtracking modelling is not a realistic representation of how a backtracking technique would work in actuality but gives an indication of the potential glare of shifting the PV panels away from the sun after the maximum tilt is reached.

For the purposes of the assessment, the assumptions for backtracking in relation to the Project is as follows:

- Normal tracking with backtracking and a night time stowing angle of 0° - to represent a worst-case scenario for the Project. In this case, the panels move between the operational range of $\pm 55^\circ$ (maximum).

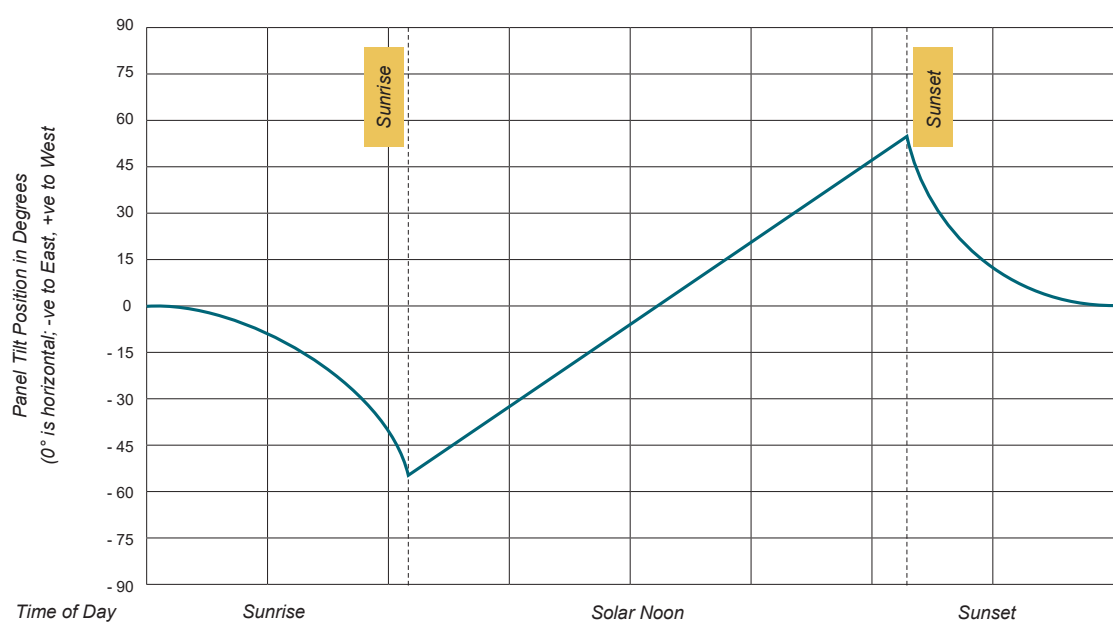
2.5 Operational Management Strategy

Utilising operational management techniques is an alternative mitigation measure to alter the functioning of the PV array during the backtracking mode. This method serves to mitigate glare effectively. To reduce the potential glare impacts to the Project, an operational management technique strategy has been rigorously assessed and adjustments to the tracking patterns modelled using ForgeSolar.

The following aspects of each scenario have been undertaken to ascertain an appropriate mitigation strategy:

- **Scenario 1** (worst case): Normal tracking with backtracking and night time stowing angle of 0°. scenario was modelled as a worst-case scenario for the Project. In this case, the panels move between the operational range (maximum tilt) discussed in Section 2.4. (**Refer to Image 02**).
- **Scenario 2:** Normal tracking with backtracking and night time stowing angle of 5° - scenario was modelled with a normal tracking angle of $\pm 55^\circ$ angle with backtracking operation. In this case, the panels move between the operational range (maximum tilt) and backtrack to 5° when the sun is out of range and remain at this angle only switching back during the night. (**Refer to Image 03**)
- **Scenario 3:** Normal tracking with backtracking and night time stowing angle of 22° - scenario was modelled with a normal tracking angle of $\pm 55^\circ$ angle with backtracking operation. In this case, the panels move between the operational range (maximum tilt) and backtrack to 22° when the sun is out of range and remain at this angle only switching back during the night. (**Refer to Image 03**)

SGHAT - Normal Tracking Mode: Maximum Tracking Angle +/- 50° / Resting Angle 0°, 5°, 22°, 45°, 50°

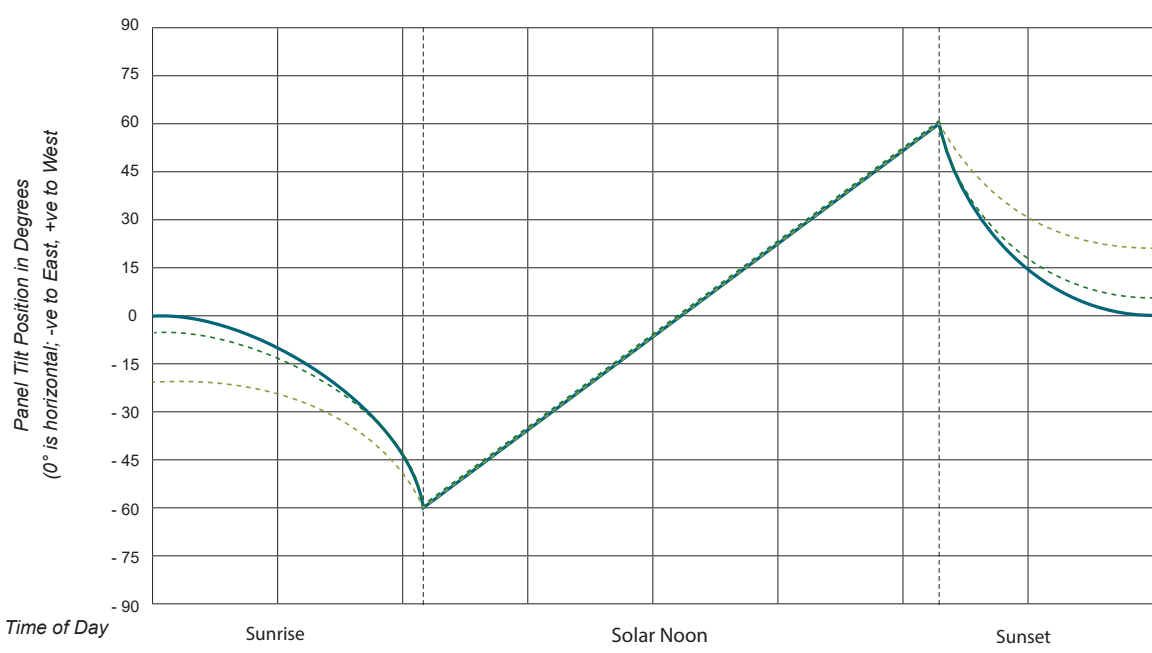


LEGEND

— Panel Angle Range (Normal Tracking with Backtracking and Resting Angle of 0°)

Image 2 Normal Tracking with Backtracking and Resting Angle of 0° (2024)

SGHAT - Normal Tracking Mode: Maximum Tracking Angle +/- 60° / Resting Angle 0°, 5°, 22°



LEGEND

- Scenario 1: 0° Resting Angle
- - - Scenario 2: 5° Resting Angle
- - - Scenario 3: 22° Resting Angle

Image 3 Backtracking Operations for Mitigation (2024)

3.0 Project Overview

3.1 Site Context

The Project is located off Tarana Road, approx. 5 km southwest of the Great Western Highway as shown in **Figure 1**.

The Project involves the construction and operation of a solar farm consisting of a solar photovoltaic energy (the PV Array). This facility will have an estimated capacity of 90 MW, and associated infrastructure which includes transmission connection works and battery energy storage of up to 90 MW / 180 MWh.

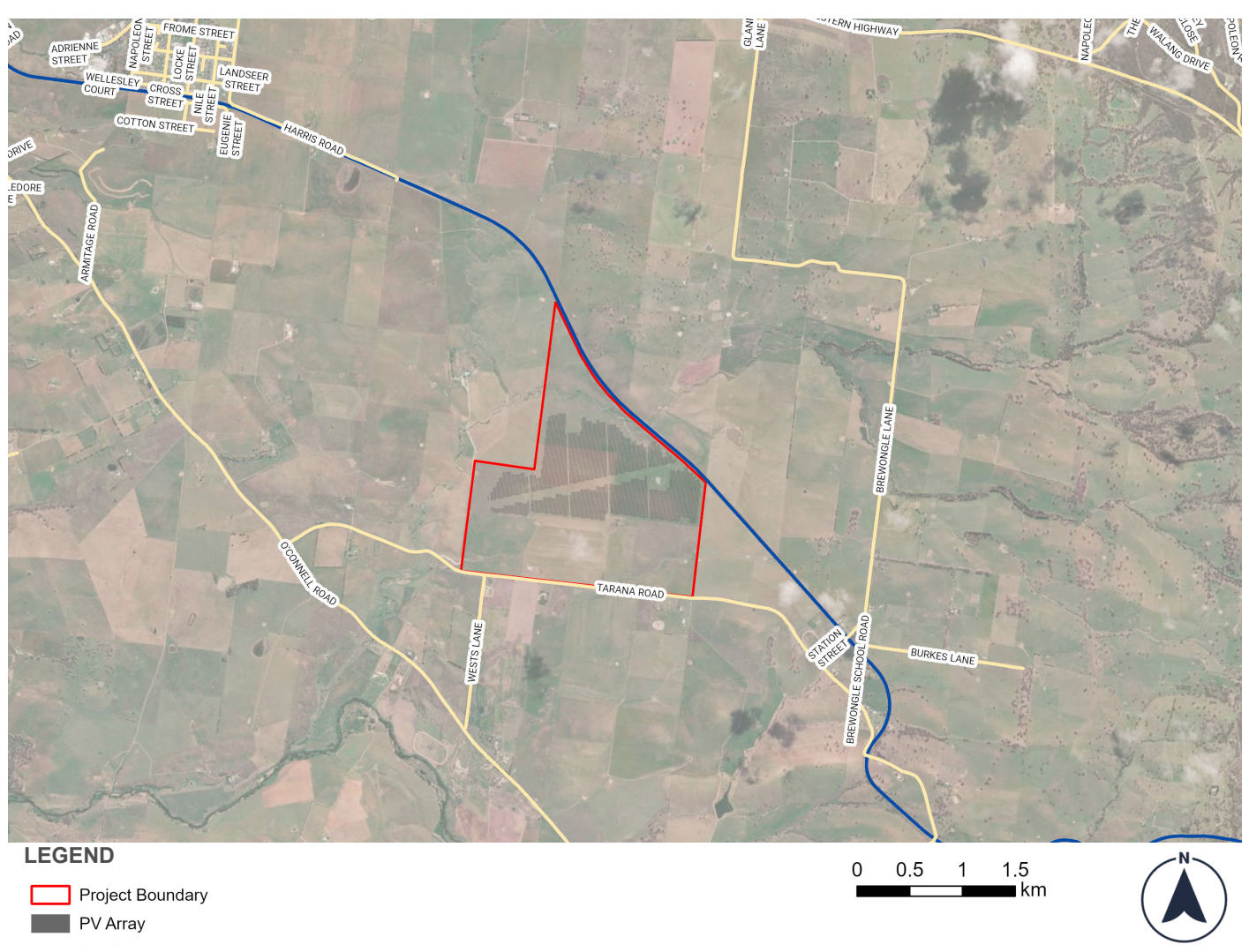


Figure 1 Project Site Context (Map Source: ArcGIS, 2024)

3.2 Solar Panel Specifications

Each module consists of P type mono-crystalline cell type with a 2.0 mm, anti-reflection coated heat strengthened glass set in an anodised aluminium alloy frame (Trina Solar Limited, 2023).

To attain optimum solar energy collection, the Project modelling has utilised a maximum rotational range of 110° . The panels are fixed on a tubular frame with a single axis tracking procedure. For accuracy, glare analysis has been performed using maximum panel height not exceeding 4.2 m when facing at the highest angle.

Refer to **Figure 2** for typical panel dimensions utilised for this assessment.

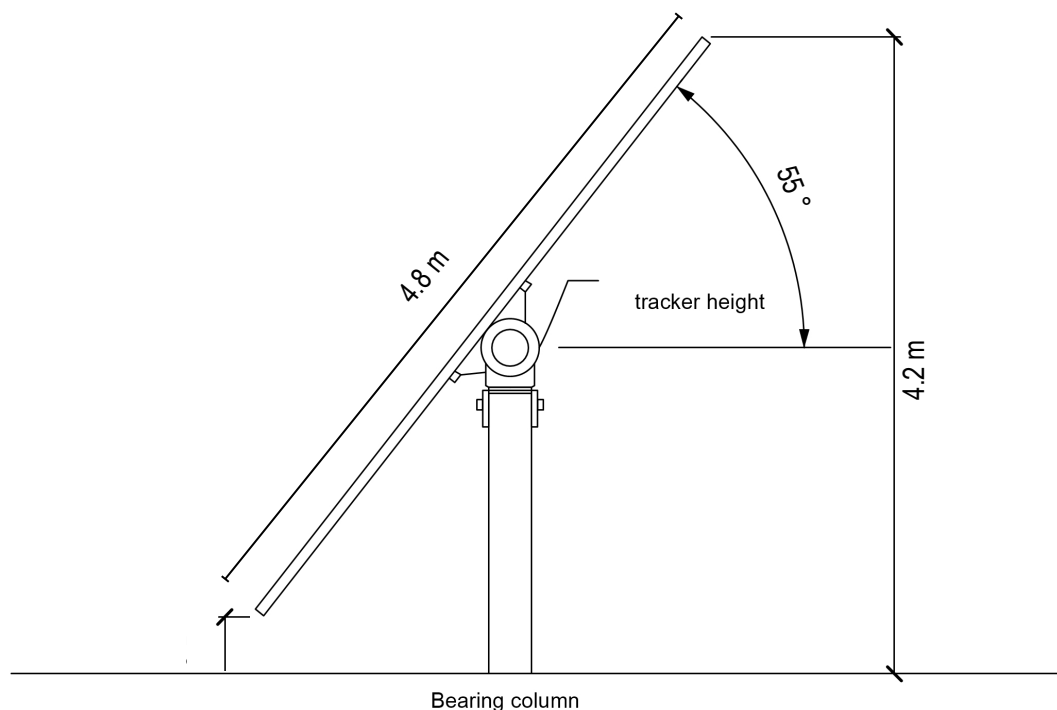


Figure 2 PV Parameters utilised for assessment (provided by ERM)

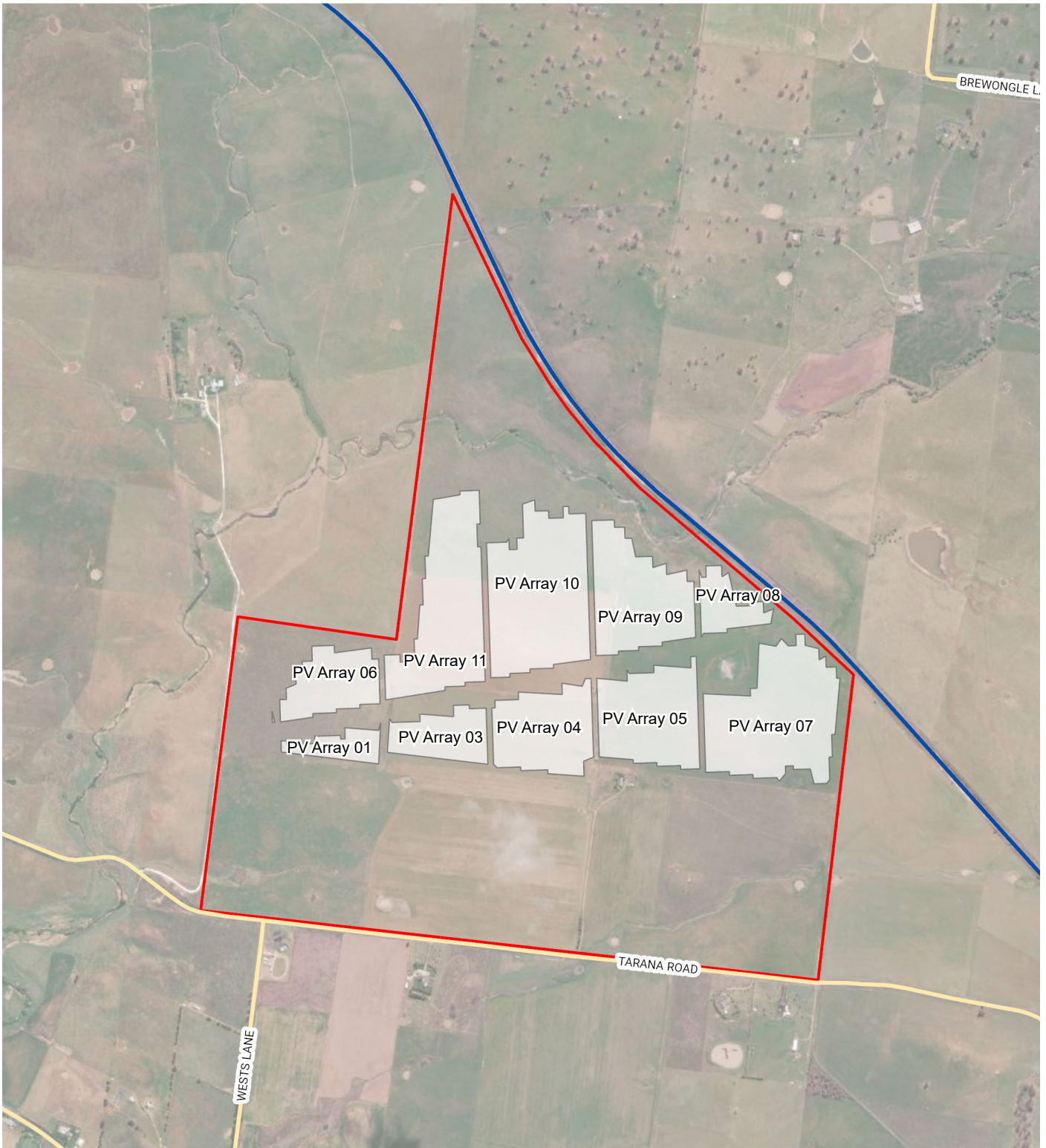
General Solar PV system inputs:			
Input Data	Units	Value	Comments
Time Zone	UTC	+10	NSW Time Zone
Orientation of Array	Degrees	0	Rows aligned in north-south directions
PV Surface materials	-	Smooth Glass with Anti-Reflective Coating	Provided by ERM
Mounting Type	-	Single Axis Tracking	As per tracker data sheet
Maximum Panel Height	Metres	4.2 m	Provided by ERM
Panel Dimensions	Metres	2.3 m (L) x 1.3 m (W)	Provided by ERM
Panel Distance	Metres	Min. 6.0 m	Provided by ERM
Single Axis Tracking Parameters			
Axis Orientation	Degrees	0	Panels orientated north south
Module Offset angle	Degrees	0	Facing upwards Panels rotate during operation
Max tracking angle	Degrees	±55° (Range of 110°)	Panels following the Sun
Resting angle	Degrees	0°	Panels following the Sun, to represent backtracking and after dark stowing angle
Maximum Tracker Height	Metres	2.50 m	Provided by ERM.
Backtracking	-	Shade-Slope	
Ground Coverage Ration	-	0.4	Ratio of the array length to the pitch distance.

Table 2. Summary of modelling parameters





3.3 Array Layout

A single axis tracking system follows the sun's trajectory and rotates the panels across east to west. The rows of modules will be spaced at a min. of 6 m apart to ensure limited shading occurs and allows for ease of access for maintenance purposes, refer to **Table 2**.

Refer **Figure 03** for PV array areas and sections.



LEGEND

-  Project Boundary
-  PV Array
-  Roads
-  Railway

0 0.5 1 km



Figure 3 PV Array Areas (Map Source: ArcGIS, 2024)

4.0 Private Receptors

4.1 Overview of Methodology

Table 3 provides an overview of the scope, methodology and performance objectives for assessment of glint and glare on residential receptors.

Glint and Glare Requirements - Private Receptors		
Scope	Methodology	Performance Objective
All residential receptors within 3 km of the proposed solar array that have a line of sight.	Analysis of the daily and yearly glare impacts in minutes.	Refer to Table 4.
Representative viewpoints may be used for residential receptors that are clustered together.	All residential receptors must be assessed at a height of 1.5 m above ground level.	
Note: Modelling for residential receptors is calculated on a receptor height of 1.5 m Above Ground Level (AGL).		

Table 3. Residential Receptors Assessment Requirements (Source: DPFI, 2022)

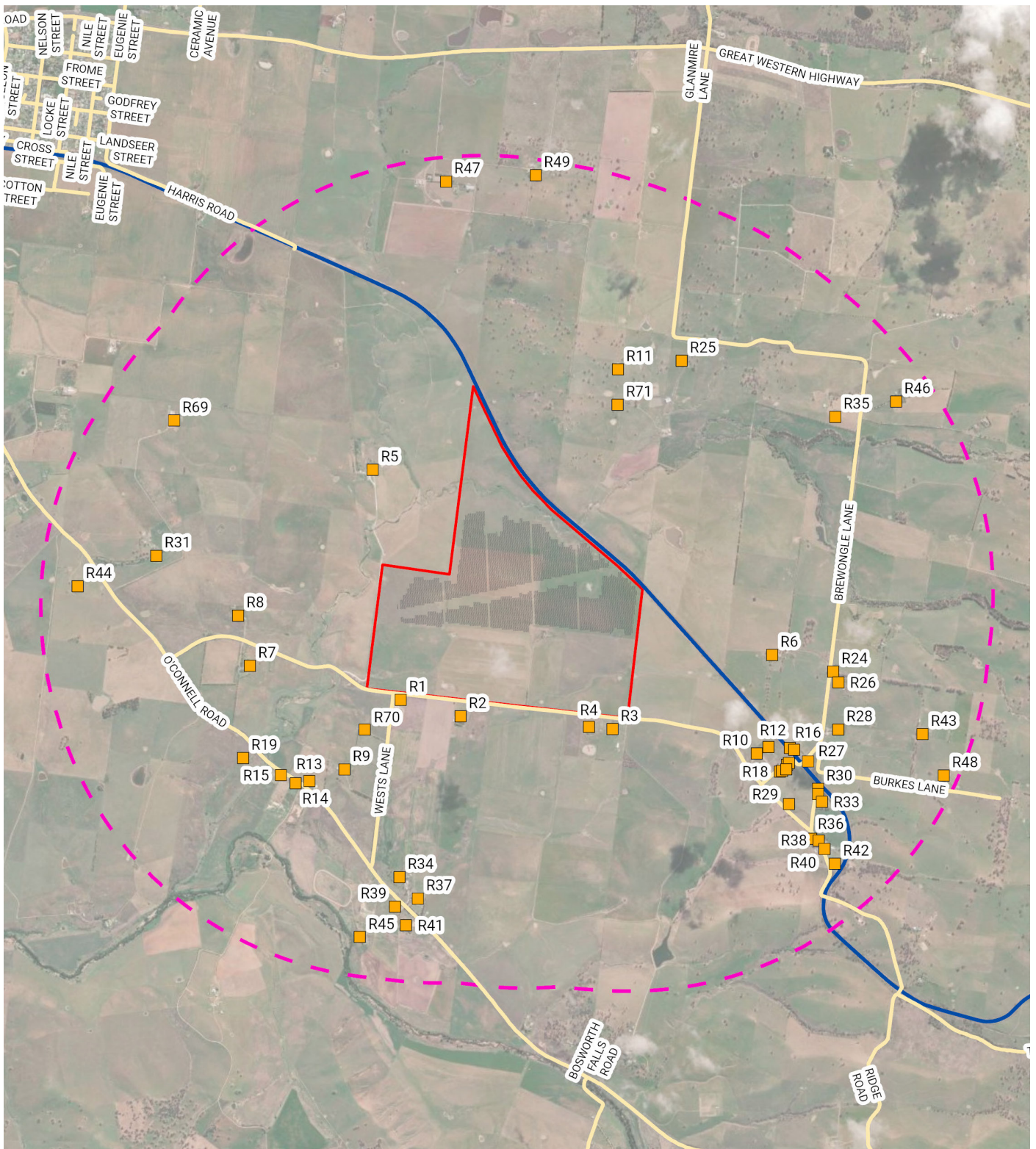
Impact Rating & Performance Objectives for Glare Impacts of Private Receivers		
High Glare Impact	Moderate Glare Impact	Low Glare Impact
> 30 minutes per day > 30 hours per year	< 30 minutes per day < 30 hours per year	< 10 minutes per day < 10 hours per year
<i>Significant amount of glare that should be avoided</i>	<i>Implement mitigation measures to reduce impacts as far as practicable</i>	<i>No mitigation required</i>

Table 4. Residential Receptor Impact Rating and Performance Objectives (Source: DPFI, 2022)

4.2 Private and Public Receptors

A viewshed analysis was conducted to identify any private or public receptors within 3 km of the PV with a direct line of sight to the Project to be assessed as part of this assessment.

A total of 33 non-associated private receptors were identified as part of the assessment (based off the zone of theoretical visibility) (refer to **Figure 4**).



LEGEND

- Project Boundary
- PV Array
- Magnitude Threshold (3 km from PV Array)
- Roads
- Railway
- Private Receptors within 3 km of the PV Array

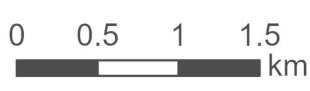


Figure 4 Private Receptors (Map Source: ArcGIS, 2024)

Private Receptor	Address	Coordinates	Elevation	Distance to the nearest solar panel	Potential Glare (Hours Per Year):	Potential Glint and Glare Rating	Recommended Mitigation Measures
R1	142 WESTS LANE, BREWONGLE, NSW 2795	33°28'30.02"S 149°40'40.27"E	702 m	0.64 km	0	NIL	Not Required.
R2	264 TARANA ROAD, BREWONGLE, NSW 2795	33°28'35.03"S 149°40'59.62"E	708 m	0.76 km	0	NIL	Not Required.
R3	390 TARANA ROAD, BREWONGLE, NSW 2795	33°28'39.84"S 149°41'48.99"E	734 m	0.79 km	0	NIL	Not Required.
R4	380 TARANA ROAD, BREWONGLE, BREWONGLE, NSW 2795	33°28'39.03"S 149°41'41.32"E	740 m	0.79 km	0	NIL	Not Required.
R5	155 TARANA ROAD, BREWONGLE, NSW 2795	33°27'26.89"S 149°40'33.52"E	708 m	0.86 km	0	NIL	Not Required.
R6	674 BREWONGLE LANE BREWONGLE, NSW 2795	33°27'26.89"S 149°40'33.52"E	764 m	1.19 km	0	NIL	Not Required.
R7	72 TARANA ROAD, BREWONGLE, NSW 2795	33°28'19.39"S 149°39'51.48"E	706 m	1.32 km	0	NIL	Not Required.
R8	47 TARANA ROAD, BREWONGLE, NSW 2795	33°28'5.55"S 149°39'48.18"E	704 m	1.33 km	0	NIL	Not Required.
R9	3306 O'CONNELL ROAD, BREWONGLE, NSW 2795	33°28'48.56"S 149°40'21.23"E	706 m	1.32 km	0	NIL	Not Required.
R10	17 STATION STREET, BREWONGLE, NSW 2795	33°28'47.76"S 149°42'35.76"E	750 m	1.45 km	0	NIL	Not Required.
R11	244 BREWONGLE LANE, GLANMIRE, NSW 2795	33°27'1.53"S 149°41'54.53"E	746 m	1.45 km	0	NIL	Not Required.
R12	23 STATION STREET, BREWONGLE, NSW 2795	33°28'46.10"S 149°42'39.65"E	752 m	1.49 km	0	NIL	Not Required.
R16	752 BREWONGLE LANE, BREWONGLE, NSW 2795	33°28'46.54"S 149°42'46.61"E	758 m	1.63 km	0	NIL	Not Required.
R17	758 BREWONGLE LANE, BREWONGLE, NSW 2795	33°28'47.10"S 149°42'47.99"E	758 m	1.67 km	0	NIL	Not Required.
R19	3443 O'CONNELL ROAD, BREWONGLE, NSW 2795	33°28'44.53"S 149°39'48.29"E	682 m	1.75 km	0	NIL	Not Required.
R20	26 STATION STREET, BREWONGLE, NSW 2795	33°28'51.10"S 149°42'45.56"E	752 m	1.70 km	0	NIL	Not Required.
R22	28 STATION STREET, BREWONGLE, NSW 2795	33°28'50.64"S 149°42'46.17"E	752 m	1.71 km	0	NIL	Not Required.
R24	673 BREWONGLE LANE, BREWONGLE, NSW 2795	33°28'26.08"S 149°43'1.54"E	778 m	1.72 km	0	NIL	Not Required.
R25	264 BREWONGLE LANE, GLANMIRE, NSW 2795	33°26'59.74"S 149°42'15.35"E	748 m	1.73 km	0	NIL	Not Required.
R26	681 BREWONGLE LANE, BREWONGLE, NSW 2795	33°28'29.03"S 149°43'3.10"E	778 m	1.78 km	0	NIL	Not Required.
R27	757 BREWONGLE LANE, BREWONGLE, NSW 2795	33°28'50.38"S 149°42'52.40"E	756 m	1.82 km	0	NIL	Not Required.
R31	3664 OCONNELL ROAD, BREWONGLE, NSW 2795	33°27'48.50"S 149°39'22.14"E	732 m	2.06 km	0	NIL	Not Required.
R33	26 BREWONGLE SCHOOL ROAD, BREWONGLE, NSW 2795	33°29'1.55"S 149°42'56.52"E	756 m	2.13 km	0	NIL	Not Required.
R35	462 BREWONGLE LANE, GLANMIRE, NSW 2795	33°27'16.44"S 149°43'4.81"E	756 m	2.20 km	0	NIL	Not Required.
R37	3252 O'CONNELL ROAD, BREWONGLE, NSW 2795	33°29'24.50"S 149°40'43.79"E	686 m	2.29 km	0	NIL	Not Required.

Private Receptor	Address	Coordinates	Elevation	Distance to the nearest solar panel	Potential Glare (Hours Per Year):	Potential Glint and Glare Rating	Recommended Mitigation Measures
R44	3671 O'CONNELL ROAD, BREWONGLE, NSW 2795	33°27'56.14"S 149°38'56.15"E	732 m	2.69 km	0	NIL	Not Required.
R46	457 BREWONGLE LANE, GLANMIRE, NSW 2795	33°27'12.77"S 149°43'24.82"E	770 m	2.69 km	0	NIL	Not Required.
R47	4985 GREAT WESTERN HIGHWAY, GLANMIRE, NSW 2795	33°26'8.75"S 149°41'0.47"E	748 m	2.79 km	0	NIL	Not Required.
R48	121 BURKES LANE, BREWONGLE, NSW 2795	33°28'55.39"S 149°43'36.48"E	790 m	2.88 km	0	NIL	Not Required.
R49	4887 GREAT WESTERN HIGHWAY, GLANMIRE, NSW 2795	33°26'7.78"S 149°41'29.75"E	762 m	2.86 km	0	NIL	Not Required.
R69	3632 O'CONNELL ROAD BREWONGLE, NSW 2795	33°27'11.66"S 149°39'29.35"E	744 m	2.41 km	0	NIL	Not Required.
R70	3306 O'CONNELL ROAD, BREWONGLE, NSW 2795	33°28'37.81"S 149°40'28.22"E	706 m	0.95 km	0	NIL	Not Required.
R71	244 BREWONGLE LANE, GLANMIRE, NSW 2795	33°27'11.22"S 149°41'54.05"E	736 m	1.19 km	0	NIL	Not Required.

Table 5. Private and Public Receptors Assessment Results

The SGHAT model, using Scenario 1 assumptions (refer to **Section 2.5**) assessed negligible glare impacts for all the 33 non-associated private receptors identified within 3 km of the PV Array. Therefore, no further assessment or mitigation is required.

Detailed information for each private receptor is provided in **Appendix A**.

5.0 Road and Rail Receptors

5.1 Overview of Methodology

Table 7 provides an overview of the scope, methodology and performance objectives for assessment of glint and glare on road and railway receptors.

Glint and Glare Requirements - Road & Rail		
Scope	Methodology	Performance Objective
All roads and rail lines within 1 km of the proposed solar array.	Solar glare analysis to identify whether glint and glare are geometrically possible within the forward looking eye-line of motorists and rail operators.	If glare is geometrically possible then measures should be taken to eliminate the occurrence of glare. Alternatively, the applicant must demonstrate that glare would not significantly impede the safe operation of vehicles or the interpretation of signals and signage.
<p>Note: Modelling for Road Receptors is calculated on a maximum height of 2.4 m AGL - representative of the eye level for truck drivers (Source: Austroads Ltd. 2021).</p> <p>Modelling for rail lines is based a representative eye height of 3 m AGL to represent the eye level of train drivers (Source: Transport Asset Standards Authority 2020).</p>		

Table 7. Road and Rail Receptor Assessment Requirements (Source: DPFI, 2022)

5.2 Road and Rail Receptors

The desktop assessment has identified one (1) road receptor identified as Tarana Road, and one (1) rail receptor identified as the Main Western Railway within 1 km radius of the solar array, as shown in **Figure 5**.



LEGEND

- Project Boundary
- PV Array
- Magnitude Threshold (1 km from PV Array)
- Roads
- Railway
- Road Receptors within 1km of the Project
- Railway Receptors within 1km of the Project



Figure 5 Road and Rail Receptors (Map Source: ArcGIS, 2024)

5.3 Results of Glint and Glare Assessment - Road and Rail

One (1) road receptors were considered as part of the assessment. **Table 8** provides an overview of the annual glare experienced Tarana Road.

Road Receptor:	Approximate Distance to the Project:	Elevation:	Potential Glare (Hours Per Year):	Mitigation Recommendations:
Tarana Road	0.58km	695-757m	0	Not Required.

Rail Receptor:	Approximate Distance to the Project:	Elevation:	Potential Glare (Hours Per Year):	Mitigation Recommendations:
Main Western Railway	0.02km	723-745m	38.1 hr	<p>Mitigation will be required along the northeastern boundary between the Project and Main Western Railway to reduce glare to an acceptable level.</p> <p>Operational management techniques such as altering normal tracking operations to the panels is recommended along the northeastern boundary. Refer to Section 8.0 for details.</p>

Table 8. Road & Rail Receptor Assessment Results

Based on the desktop assessment using the SGHAT model for Scenario 1 (refer to **Section 2.5**), potential glare has been identified for Main Western Railway. A detailed assessment of the results indicate that:

- Tarana Road will have negligible glare impacts.
- Main Western Railway will experience 38.1 hours of potential glare per year, from February to May and August to October. PV Array 08, PV Array 09 and PV Array 10 all contribute to potential glare affecting this receptor.

According to the Guidelines, *'If glare is geometrically possible then measures should be taken to eliminate the occurrence of glare.'* Therefore, mitigation measures have been recommended for the Main Western Railway. (Refer to **Section 8.0**)

*It is crucial to emphasise that this assessment is based on a worst-case scenario and does not account for factors such as weather conditions, intervening elements like vegetation, or built structures, which may influence the actual glare experienced. (Refer to **Section 2.2**)

More detailed findings for the glare impact on the Tarana Road and Main Western Railway are included in the **Appendix A - Glint and Glare Results**.

6.0 Aviation Receptors

6.1 Overview of Methodology

Table 9 provides an overview of the scope, methodology and performance objectives for assessment of glint and glare on aviation receptors.

Glint and Glare Requirements - Aviation Receptors

Scope	Methodology	Performance Objective
All air traffic control towers and take off / landing approaches to any runway or landing strip within 5km of the proposed solar array.	Solar glare analysis that is worst case in all scenarios accounting for all aircraft using the airport (e.g. gliders, helicopters etc).	Any glint and glare should be avoided unless the aerodrome operator agrees that the impact would not be material (e.g. occurs at times when there are no flights or would not pose a safety risk to airport operations).

Note: Modelling for Flight Path receptors is calculated on a threshold crossing height of 50 ft (15 m) in 2 mile (3.21 km) point ground elevation and the ± 50 degree azimuthal and 30 degree vertical viewing angle representative of the pilot field view from cockpit. (Source: Rogers, 2015)

Table 9. Aviation Receptor Assessment Requirements (Source: DPHI, 2022)

6.2 Aviation Receptors

The desktop assessment has identified no aviation receptors within a 5 km radius of the solar array.

As a result and in accordance with the Guidelines, no further assessment is required.

7.0 Performance Objectives

7.1 Summary of assessment results

7.1.1 Private and Public Receptors

Table 3 & 4 provides a comprehensive overview of the scope, methodology, and performance objectives related to the assessment of glint and glare on private and public receptors. The assessment is summarised as follows:

A total of 33 private receptors were identified and assessed within 3 km of the solar array. The results indicate negligible glare impacts for all 33 private receptors.

There were no public receptors identified within 3 km of the solar array.

7.1.2 Road and Rail Receptors

Table 7 provides a comprehensive overview of the scope, methodology, and performance objectives concerning the assessment of glint and glare on road receptors. The assessment is summarised below:

One (1) road receptor (Tarana Road) was identified and assessed within 1 km of the solar array. The results indicate that Tarana Road will have negligible glare impacts.

One (1) rail receptor (Main Western Railway) was identified and assessed within 1 km of the solar array. The results indicate potential glare for the Main Western Railway.

As noted in the performance objectives: *'If glare is geometrically possible then measures should be taken to eliminate the occurrence of glare. Alternatively, the applicant must demonstrate that glare would not significantly impede the safe operation of vehicles or the interpretation of signals and signage'*

Upon conducting a desktop assessment of the Main Western Railway using aerial imagery, it can be seen that there is limited existing vegetation between the affected sections of the Main Western Railway. Therefore, additional mitigation in the form of either screen planting or operational management techniques is recommended. These mitigations options are outlined in **Section 8.0**.

7.1.3 Aviation Receptors

Table 9 provides a comprehensive overview of the scope, methodology, and performance objectives related to the assessment of glint and glare on aviation receptors.

There were no aviation receptors identified within 5 km of the solar array.

As a result of the findings, and in accordance with the Guideline, no mitigation is required for the Project.

8.0 Mitigation Measures

8.1 Overview of Impacts

In accordance with the Guideline: *Details of strategies to either avoid or mitigate impacts of the Project must be provided.* The following summarises the key results and proposed mitigation strategies to address the potential impacts.

8.1.1 Residential Receptors

33 residential receptors returned a negligible glare impact and therefore no mitigation measures are required for these receptors in accordance with the Guidelines.

8.1.2 Road and Rail Receptors

One (1) railway (Main Western Railway) was identified within a 1 km radius of the solar array with the potential to experience glare.

In accordance with the Guidelines, mitigation in the form of either screen planting or operational management techniques is recommended. (Refer to **Section 8.2**)

8.1.3 Aviation Receptors

No Aviation receptors were identified within 5 km of the Project.

8.2 Proposed Mitigation Strategies

The Guideline states: *Vegetation screening, or the planting of trees and shrubs, to visually screen solar energy projects or other potential visual impacts (such as glint and glare) from view may be a useful mitigation option for selected viewpoints.* On-site screening, such as perimeter planting, should be considered in the first instance. If this is unlikely to be effective, other mitigation options such as re-siting or sizing the project and altering the tracking patterns can be considered at affected viewpoints.

Vegetation screening is not viable for the affected rail receptor (Main Western Railway) given the topography, therefore, alternate mitigation has been suggested.

As an alternative mitigation strategy, Moir Studio has undertaken additional assessments, modelling altering tracking patterns to prevent potential glare at the affected rail receptor. As explained in **Section 2.4**, the scenario 1, 2, and 3 involve modelling different scenarios with normal tracking, backtracking, and resting angles of 0°, 5°, and 22°.

In the glare modelling conducted for each scenario, the details and outcomes have been outlined comprehensively in **Appendix B & Appendix C**. Notably, it has been observed that if the PV Arrays contributing to the potential glare (PV Array 08, PV Array 09 and PV Array 10) utilise alternate tracking patterns, specifically following Scenario 2 or 3, all potential for glare is eliminated from all receptors.

Therefore a slight adjustment to the resting angles and subsequent tracking patterns of the solar panels affecting the rail receptor at evening/morning before & after normal operations begin, can eliminate all potential for glare from all receivers.

9.0 Conclusion

The purpose of this report is to identify potential glint and glare impacts on the surrounding area, including residential receptors (within 3 km of the PV Array Area), road and rail receptors (within 1 km of the PV Array Area) and aviation receptors (within 5 km of the PV Array Area).

It is noted that this assessment is a worst-case scenario and does not account for factors including cloud cover and intervening elements in the landscape such as vegetation and built structures.

Based on the assumptions and aforementioned parameters for Scenario 1, the findings of the assessment were:

33 residential receptors were identified within 3 km of the solar array and within line of sight of the Project (based off the zone of theoretical visibility). The outcomes of the modelling assessment 'assessed negligible glare impacts for all the 33 non-associated private receptors identified within 3 km. Consequently, no mitigation measures are required in line with the Guideline.

The assessment identified one (1) road receptor identified as Tarana Road and one (1) rail receptor identified as the Main Western Railway within 1 km of the PV Array. The results indicate no potential glare for Tarana Road and the potential for glare along Main Western Railway. In accordance with the Guidelines, mitigation measures will be required along the northeastern boundary between the Project and the Main Western Railway.

There were no aviation receptors identified within 5 km of the solar array.

In accordance with the performance objectives for Road and Rail Receptors, 'if glare is geometrically possible, measures should be taken to eliminate the occurrence of glare.'

It has been observed that using different tracking patterns, particularly in Scenario 2 or 3, can effectively will mitigate the potential glare for surrounding receptors. By altering the tracking patterns, glare incidents can be minimized, especially during the backtracking mode of the PV array operation.

References

Austrroads Ltd. 2021, Guide to Road Design Part 3: Geometric Design, AGRD03-16, Austrroads Ltd., Sydney, NSW.

Australian Rail Track Corporation Limited 2010, Signal Sighting and Position, ESC-04-01, Australian Rail Track Corporation Limited, Sydney.

Doubleday, K., Choi, B., Maksimovic, D., Deline, C., & Olalla, C. (2016). Recovery of inter-row shading losses using differential power-processing submodule DC–DC converters. *Solar Energy*, 135, 512-517.

ForgeSolar n.d., www.forgesolar.com, viewed 26 November 2024, <<https://www.forgesolar.com/help/#glare>>.

Federal Aviation Administration (2021). Final Policy, Review of Solar Energy System Projects on Federally Obligated Airports. Document Number 2021-09862.

Google Earth, Imagery date 8 August 2024.

Wattle Creek Solar Farm, Statement of Environmental Effects, December 2023, Spark Renewables

Ho, C. K., Ghanbari, C. M., and Diver, R. B., 2011, “Methodology to Assess Potential Glint and Glare Hazards From Concentrating Solar Power Plants: Analytical Models and Experimental Validation”, *ASME J. Sol. Energy Eng.*, 133.

New South Wales Department of Planning and Environment, Large-Scale Solar Energy Guideline, November 2024

New South Wales Department of Planning and Environment (now Department Planning, Housing and Infrastructure), Large-Scale Solar Energy Guideline- Technical Supplement - Landscape and Visual Impact Assessment, November 2024

Rogers, J. A., et al. (2015). “Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach”, Federal Aviation Administration ([link](#))

Transport Asset Standards Authority 2020, Minimum Operating Standards for Rolling Stock – General Interface Requirements, T HR RS 00100 ST, Transport NSW, Sydney.

Yellowhair, J. and C.K. Ho. “Assessment of Photovoltaic Surface Texturing on Transmittance Effects and Glint/Glare Impacts”. ASME 2015 9th International Conference on Energy Sustainability collocated with the ASME 2015 Power Conference, the ASME 2015 13th International Conference on Fuel Cell Science, Engineering and Technology, and the ASME 2015 Nuclear Forum. 2015. American Society of Mechanical Engineers. (PDF)

FORGESOLAR GLARE ANALYSIS

Project: 2523_BREWONGLE SOLAR FARM

The Project involves the construction and operation of a solar farm consisting of a solar photovoltaic energy (the PV Array) generating facility with an estimated capacity of 90 MW, and associated infrastructure, including transmission connection works and battery energy storage of up to 90 MW / 180 MWh.

Site configuration: **2523_BREWONGLE SOLAR FARM**

Client: ERM

Created 26 Sep, 2024

Updated 26 Nov, 2024

Time-step 1 minute

Timezone offset UTC10

Minimum sun altitude 0.0 deg

DNI peaks at 1,000.0 W/m²

Category 10 MW to 100 MW

Site ID 129839.22175

Ocular transmission coefficient 0.5

Pupil diameter 0.002 m

Eye focal length 0.017 m

Sun subtended angle 9.3 mrad

PV analysis methodology V2

Summary of Results Glare with potential for temporary after-image predicted

PV Array	Tilt °	Orient °	Annual Green Glare		Annual Yellow Glare		Energy kWh
			min	hr	min	hr	
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	1,358	22.6	241	4.0	-
PV11	SA tracking	SA tracking	570	9.5	0	0.0	-
PV2	SA tracking	SA tracking	2,190	36.5	0	0.0	-
PV3	SA tracking	SA tracking	3,000	50.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	895	14.9	1,506	25.1	-
PV9	SA tracking	SA tracking	1,163	19.4	540	9.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	1,572	26.2	2,287	38.1
Tarana Road	1,546	25.8	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	77	1.3	0	0.0
OP 4	0	0.0	0	0.0
OP 5	211	3.5	0	0.0
OP 6	106	1.8	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	254	4.2	0	0.0
OP 11	0	0.0	0	0.0
OP 12	244	4.1	0	0.0
OP 16	246	4.1	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 17	242	4.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	254	4.2	0	0.0
OP 22	246	4.1	0	0.0
OP 24	103	1.7	0	0.0
OP 25	0	0.0	0	0.0
OP 26	113	1.9	0	0.0
OP 27	240	4.0	0	0.0
OP 31	322	5.4	0	0.0
OP 33	301	5.0	0	0.0
OP 35	1,235	20.6	0	0.0
OP 37	0	0.0	0	0.0
OP 44	183	3.0	0	0.0
OP 46	1,265	21.1	0	0.0
OP 47	0	0.0	0	0.0
OP 48	191	3.2	0	0.0
OP 49	0	0.0	0	0.0
OP 69	225	3.8	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 0.0°
Max tracking angle: 55.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468244	149.681932	712.04	2.75	714.79
2	-33.469562	149.681803	710.00	2.75	712.75
3	-33.469081	149.678099	705.06	2.75	707.81
4	-33.468724	149.678099	705.02	2.75	707.77
5	-33.468724	149.678318	705.25	2.75	708.00
6	-33.468843	149.678318	705.37	2.75	708.12
7	-33.468842	149.679390	707.09	2.75	709.84
8	-33.468606	149.679390	707.03	2.75	709.78
9	-33.468606	149.680383	708.51	2.75	711.26
10	-33.468724	149.680383	708.35	2.75	711.10
11	-33.468724	149.680551	708.84	2.75	711.59
12	-33.468363	149.680551	709.05	2.75	711.80
13	-33.468484	149.681842	711.97	2.75	714.72

Name: PV10

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461256	149.688091	709.52	2.75	712.27
2	-33.461617	149.688091	711.11	2.75	713.86
3	-33.461617	149.688607	711.87	2.75	714.62
4	-33.461859	149.688607	712.57	2.75	715.32
5	-33.461860	149.689162	712.33	2.75	715.08
6	-33.461498	149.689162	710.73	2.75	713.48
7	-33.461498	149.689382	710.41	2.75	713.16
8	-33.461740	149.689382	711.61	2.75	714.36
9	-33.461742	149.690025	709.76	2.75	712.51
10	-33.466433	149.690027	721.90	2.75	724.65
11	-33.466552	149.688607	719.77	2.75	722.52
12	-33.466671	149.688607	719.57	2.75	722.32
13	-33.466671	149.687704	719.26	2.75	722.01
14	-33.466795	149.687704	718.91	2.75	721.66
15	-33.466795	149.686930	718.91	2.75	721.66
16	-33.466914	149.686930	718.56	2.75	721.31
17	-33.466914	149.686194	717.87	2.75	720.62
18	-33.462582	149.686195	711.73	2.75	714.48
19	-33.462582	149.686969	712.86	2.75	715.61
20	-33.462463	149.687059	712.82	2.75	715.57
21	-33.462825	149.687059	713.35	2.75	716.10
22	-33.462825	149.687356	713.76	2.75	716.51
23	-33.462463	149.687356	713.24	2.75	715.99
24	-33.462463	149.687614	713.24	2.75	715.99
25	-33.461379	149.687614	709.18	2.75	711.93

Name: PV11

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461974	149.685850	709.87	2.75	712.62
2	-33.462701	149.685850	711.51	2.75	714.26
3	-33.462701	149.685980	711.60	2.75	714.35
4	-33.467033	149.685979	717.22	2.75	719.97
5	-33.467033	149.685206	714.98	2.75	717.73
6	-33.467156	149.685205	714.62	2.75	717.37
7	-33.467156	149.684431	712.67	2.75	715.42
8	-33.467275	149.684431	712.51	2.75	715.26
9	-33.467517	149.682147	712.26	2.75	715.01
10	-33.466076	149.682147	709.66	2.75	712.41
11	-33.466076	149.682753	710.50	2.75	713.25
12	-33.466315	149.682753	710.64	2.75	713.39
13	-33.466314	149.683308	710.38	2.75	713.13
14	-33.465592	149.683308	710.92	2.75	713.67
15	-33.465592	149.683437	711.11	2.75	713.86
16	-33.464508	149.683567	709.72	2.75	712.47
17	-33.464508	149.683696	709.91	2.75	712.66
18	-33.463666	149.683696	709.69	2.75	712.44
19	-33.463666	149.683825	709.86	2.75	712.61
20	-33.462944	149.683825	709.80	2.75	712.55
21	-33.462944	149.683954	709.99	2.75	712.74
22	-33.461137	149.684212	706.63	2.75	709.38
23	-33.461018	149.685244	706.28	2.75	709.03
24	-33.460895	149.685244	705.95	2.75	708.70
25	-33.460895	149.685980	704.95	2.75	707.70
26	-33.461974	149.685980	710.06	2.75	712.81

Name: PV2

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468116	149.677884	705.00	2.75	707.75
2	-33.468116	149.677794	705.00	2.75	707.75
3	-33.467759	149.677794	704.88	2.75	707.63

Name: PV3

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467760	149.685334	713.15	2.75	715.90
2	-33.467883	149.685334	712.92	2.75	715.67
3	-33.467883	149.685979	713.75	2.75	716.50
4	-33.469685	149.685979	712.24	2.75	714.99
5	-33.469200	149.682147	709.59	2.75	712.34
6	-33.468121	149.682276	712.32	2.75	715.07
7	-33.468243	149.682366	712.26	2.75	715.01
8	-33.468245	149.683437	711.00	2.75	713.75
9	-33.468002	149.683437	711.00	2.75	713.75
10	-33.468121	149.684728	712.10	2.75	714.85
11	-33.467760	149.684728	712.24	2.75	714.99

Name: PV4

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467037	149.690027	721.82	2.75	724.57
2	-33.469562	149.690027	721.54	2.75	724.29
3	-33.469685	149.689640	720.63	2.75	723.38
4	-33.470166	149.689640	721.02	2.75	723.77
5	-33.470047	149.688259	716.62	2.75	719.37
6	-33.469924	149.688259	716.43	2.75	719.18
7	-33.469923	149.687227	715.50	2.75	718.25
8	-33.469805	149.687227	715.51	2.75	718.26
9	-33.469804	149.686323	712.61	2.75	715.36
10	-33.469685	149.686194	712.62	2.75	715.37
11	-33.467883	149.686194	714.36	2.75	717.11
12	-33.467883	149.686323	714.74	2.75	717.49
13	-33.467641	149.686323	715.55	2.75	718.30
14	-33.467641	149.687227	716.43	2.75	719.18
15	-33.467398	149.687227	717.13	2.75	719.88
16	-33.467522	149.688904	718.20	2.75	720.95
17	-33.467161	149.688904	719.11	2.75	721.86
18	-33.467280	149.689677	720.53	2.75	723.28
19	-33.467037	149.689808	721.21	2.75	723.96

Name: PV5

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.466438	149.694074	726.76	2.75	729.51
2	-33.470047	149.694074	730.12	2.75	732.87
3	-33.470047	149.693339	728.53	2.75	731.28
4	-33.469924	149.693339	728.48	2.75	731.23
5	-33.469923	149.692436	726.52	2.75	729.27
6	-33.469803	149.692436	726.42	2.75	729.17
7	-33.469804	149.691532	725.94	2.75	728.69
8	-33.469685	149.691532	725.78	2.75	728.53
9	-33.469562	149.690242	722.25	2.75	725.00
10	-33.467037	149.690242	722.21	2.75	724.96
11	-33.467160	149.691403	723.08	2.75	725.83
12	-33.466799	149.691403	723.00	2.75	725.75
13	-33.466918	149.691494	723.03	2.75	725.78
14	-33.466918	149.692436	724.42	2.75	727.17
15	-33.466676	149.692436	724.42	2.75	727.17
16	-33.466799	149.693855	726.21	2.75	728.96
17	-33.466438	149.693855	726.47	2.75	729.22

Name: PV6

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

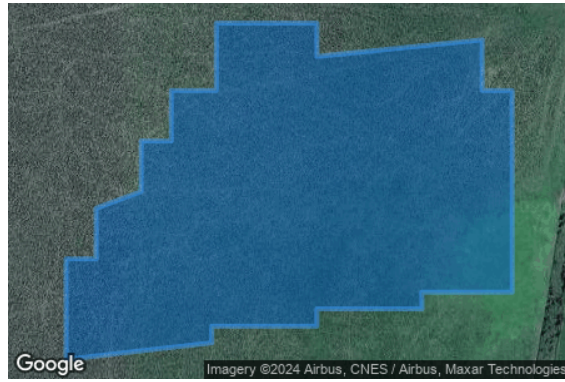
Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465715	149.680254	704.33	2.75	707.08
2	-33.465953	149.680254	704.97	2.75	707.72
3	-33.465834	149.681674	708.03	2.75	710.78
4	-33.466195	149.681674	709.10	2.75	711.85
5	-33.466195	149.681932	709.52	2.75	712.27
6	-33.467636	149.681932	712.09	2.75	714.84
7	-33.467636	149.681155	710.71	2.75	713.46
8	-33.467755	149.681158	710.91	2.75	713.66
9	-33.467755	149.680254	707.65	2.75	710.40
10	-33.467878	149.680254	707.75	2.75	710.50
11	-33.467879	149.679351	706.44	2.75	709.19
12	-33.467997	149.679351	706.55	2.75	709.30
13	-33.468116	149.678099	705.00	2.75	707.75
14	-33.467398	149.678099	703.90	2.75	706.65
15	-33.467398	149.678358	704.33	2.75	707.08
16	-33.467037	149.678358	703.72	2.75	706.47
17	-33.466918	149.678745	704.20	2.75	706.95
18	-33.466557	149.678745	703.68	2.75	706.43
19	-33.466557	149.679003	704.05	2.75	706.80
20	-33.466195	149.679003	703.63	2.75	706.38
21	-33.466196	149.679390	703.97	2.75	706.72
22	-33.465715	149.679390	703.03	2.75	705.78

Name: PV7

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465834	149.698251	729.17	2.75	731.92
2	-33.466195	149.698251	729.77	2.75	732.52
3	-33.466314	149.698767	729.11	2.75	731.86
4	-33.466675	149.698767	730.14	2.75	732.89
5	-33.466556	149.699025	729.41	2.75	732.16
6	-33.466918	149.699025	730.47	2.75	733.22
7	-33.466918	149.699412	730.32	2.75	733.07
8	-33.467279	149.699412	731.52	2.75	734.27
9	-33.467279	149.699541	731.52	2.75	734.27
10	-33.469081	149.699284	731.50	2.75	734.25
11	-33.469081	149.699154	731.31	2.75	734.06
12	-33.469804	149.699154	731.19	2.75	733.94
13	-33.469804	149.699026	731.01	2.75	733.76
14	-33.470526	149.699026	731.99	2.75	734.74
15	-33.470645	149.698896	731.85	2.75	734.60
16	-33.470645	149.698419	731.27	2.75	734.02
17	-33.470165	149.698290	729.94	2.75	732.69
18	-33.470165	149.697645	730.01	2.75	732.76
19	-33.470045	149.697645	730.01	2.75	732.76
20	-33.470045	149.697348	730.31	2.75	733.06
21	-33.470284	149.697348	730.16	2.75	732.91
22	-33.470526	149.697090	730.01	2.75	732.76
23	-33.470407	149.697000	730.17	2.75	732.92
24	-33.470408	149.696096	730.18	2.75	732.93
25	-33.470284	149.696096	730.37	2.75	733.12
26	-33.470284	149.695193	730.95	2.75	733.70
27	-33.470164	149.695193	731.12	2.75	733.87
28	-33.470165	149.694290	730.23	2.75	732.98
29	-33.467641	149.694289	726.20	2.75	728.95
30	-33.467761	149.696096	728.71	2.75	731.46
31	-33.467522	149.696096	728.36	2.75	731.11
32	-33.467522	149.696354	728.72	2.75	731.47
33	-33.466076	149.696483	727.11	2.75	729.86
34	-33.466195	149.697128	729.08	2.75	731.83
35	-33.465953	149.697347	729.07	2.75	731.82
36	-33.466195	149.697606	730.25	2.75	733.00
37	-33.466195	149.697902	730.12	2.75	732.87
38	-33.465834	149.697902	729.24	2.75	731.99

Name: PV8

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.463547	149.695154	716.96	2.75	719.71
2	-33.463909	149.695154	717.89	2.75	720.64
3	-33.463785	149.695412	718.47	2.75	721.22
4	-33.464869	149.695670	722.31	2.75	725.06
5	-33.464868	149.696225	722.71	2.75	725.46
6	-33.464389	149.696315	722.25	2.75	725.00
7	-33.464750	149.696315	722.74	2.75	725.49
8	-33.464750	149.696702	724.08	2.75	726.83
9	-33.465111	149.696702	724.54	2.75	727.29
10	-33.464992	149.697089	725.20	2.75	727.95
11	-33.465468	149.696960	726.87	2.75	729.62
12	-33.465588	149.695287	725.83	2.75	728.58
13	-33.465711	149.695283	726.37	2.75	729.12
14	-33.465710	149.694379	726.92	2.75	729.67
15	-33.465830	149.694289	727.00	2.75	729.75
16	-33.463666	149.694289	714.23	2.75	716.98
17	-33.463908	149.694379	716.07	2.75	718.82
18	-33.463909	149.694547	716.39	2.75	719.14
19	-33.463547	149.694547	714.89	2.75	717.64

Name: PV9

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 0.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461979	149.691106	710.08	2.75	712.83
2	-33.462218	149.691106	710.78	2.75	713.53
3	-33.462221	149.691493	710.76	2.75	713.51
4	-33.462582	149.691493	712.21	2.75	714.96
5	-33.462582	149.691751	711.83	2.75	714.58
6	-33.463185	149.691880	714.44	2.75	717.19
7	-33.463186	149.692526	713.50	2.75	716.25
8	-33.463547	149.692526	715.31	2.75	718.06
9	-33.463424	149.693042	713.44	2.75	716.19
10	-33.463785	149.693042	715.30	2.75	718.05
11	-33.463666	149.693816	713.43	2.75	716.18
12	-33.464028	149.693816	716.06	2.75	718.81
13	-33.464029	149.694074	716.42	2.75	719.17
14	-33.465830	149.694074	726.97	2.75	729.72
15	-33.465948	149.692784	725.59	2.75	728.34
16	-33.466072	149.692784	725.41	2.75	728.16
17	-33.466070	149.691881	723.90	2.75	726.65
18	-33.466191	149.691881	723.80	2.75	726.55
19	-33.466191	149.691106	722.83	2.75	725.58
20	-33.466310	149.691106	722.92	2.75	725.67
21	-33.466310	149.690242	722.18	2.75	724.93
22	-33.461979	149.690242	710.51	2.75	713.26

Route Receptors

Name: Main Western Railway

Path type: Two-way

Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.452459	149.686142	723.80	2.40	726.20
2	-33.455466	149.687773	720.32	2.40	722.72
3	-33.456970	149.688589	720.13	2.40	722.53
4	-33.458832	149.690091	719.38	2.40	721.78
5	-33.462197	149.694125	715.06	2.40	717.46
6	-33.465169	149.698287	726.56	2.40	728.96
7	-33.468283	149.701506	731.81	2.40	734.21
8	-33.474477	149.707600	744.99	2.40	747.39

Name: Tarana Road
Path type: Two-way
Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.471332	149.667158	692.99	2.40	695.39
2	-33.472088	149.669127	685.53	2.40	687.93
3	-33.472167	149.669334	685.24	2.40	687.64
4	-33.472258	149.669629	684.90	2.40	687.30
5	-33.472310	149.669894	684.66	2.40	687.06
6	-33.472328	149.670144	684.42	2.40	686.82
7	-33.472310	149.670527	684.20	2.40	686.60
8	-33.472274	149.670999	683.71	2.40	686.11
9	-33.472276	149.671313	683.01	2.40	685.41
10	-33.472303	149.671571	682.47	2.40	684.87
11	-33.472375	149.671793	683.01	2.40	685.41
12	-33.472498	149.672029	683.52	2.40	685.92
13	-33.472654	149.672271	684.13	2.40	686.53
14	-33.473695	149.673810	693.83	2.40	696.23
15	-33.473842	149.674054	695.40	2.40	697.80
16	-33.473963	149.674301	696.93	2.40	699.33
17	-33.474093	149.674666	698.07	2.40	700.47
18	-33.474158	149.674922	698.74	2.40	701.14
19	-33.474199	149.675175	698.83	2.40	701.23
20	-33.474290	149.675808	698.89	2.40	701.29
21	-33.476988	149.697974	732.47	2.40	734.87
22	-33.477033	149.698547	733.60	2.40	736.00
23	-33.477098	149.699792	738.54	2.40	740.94
24	-33.477138	149.700395	740.88	2.40	743.28
25	-33.477221	149.701085	743.94	2.40	746.34
26	-33.478061	149.705443	754.83	2.40	757.23

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-33.475005	149.677853	702.00	1.50
OP 2	2	-33.476396	149.683227	708.00	1.50
OP 3	3	-33.477733	149.696943	734.00	1.50
OP 4	4	-33.477509	149.694812	740.00	1.50
OP 5	5	-33.457469	149.675977	708.00	1.50
OP 6	6	-33.472491	149.711617	764.00	1.50
OP 7	7	-33.472053	149.664301	706.00	1.50
OP 8	8	-33.468208	149.663383	704.00	1.50
OP 9	9	-33.480154	149.672563	706.00	1.50
OP 10	10	-33.479932	149.709933	750.00	1.50
OP 11	11	-33.450425	149.698480	746.00	1.50
OP 12	12	-33.479473	149.711014	752.00	1.50
OP 16	16	-33.479595	149.712948	758.00	1.50
OP 17	17	-33.479749	149.713331	758.00	1.50
OP 19	19	-33.479036	149.663413	682.00	1.50
OP 20	20	-33.480862	149.712656	752.00	1.50
OP 22	22	-33.480734	149.712824	752.00	1.50
OP 24	24	-33.473910	149.717093	778.00	1.50
OP 25	25	-33.449927	149.704263	748.00	1.50
OP 26	26	-33.474732	149.717528	778.00	1.50
OP 27	27	-33.480660	149.714556	756.00	1.50
OP 31	31	-33.463473	149.656149	732.00	1.50
OP 33	33	-33.483764	149.715699	756.00	1.50
OP 35	35	-33.454568	149.718002	756.00	1.50
OP 37	37	-33.490140	149.678831	686.00	1.50
OP 44	44	-33.465595	149.648931	732.00	1.50
OP 46	46	-33.453549	149.723560	770.00	1.50
OP 47	47	-33.435763	149.683463	748.00	1.50
OP 48	48	-33.482054	149.726800	790.00	1.50
OP 49	49	-33.435494	149.691598	762.00	1.50
OP 69	69	-33.453238	149.658153	734.00	1.50
OP 70	70	-33.477170	149.674507	757.00	1.50
OP 71	71	-33.453117	149.698347	756.00	1.50

Glare Analysis Results

Summary of Results Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
			min	hr	min	hr	kWh
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	1,358	22.6	241	4.0	-
PV11	SA tracking	SA tracking	570	9.5	0	0.0	-
PV2	SA tracking	SA tracking	2,190	36.5	0	0.0	-
PV3	SA tracking	SA tracking	3,000	50.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	895	14.9	1,506	25.1	-
PV9	SA tracking	SA tracking	1,163	19.4	540	9.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	1,572	26.2	2,287	38.1
Tarana Road	1,546	25.8	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	77	1.3	0	0.0
OP 4	0	0.0	0	0.0
OP 5	211	3.5	0	0.0
OP 6	106	1.8	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	254	4.2	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 11	0	0.0	0	0.0
OP 12	244	4.1	0	0.0
OP 16	246	4.1	0	0.0
OP 17	242	4.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	254	4.2	0	0.0
OP 22	246	4.1	0	0.0
OP 24	103	1.7	0	0.0
OP 25	0	0.0	0	0.0
OP 26	113	1.9	0	0.0
OP 27	240	4.0	0	0.0
OP 31	322	5.4	0	0.0
OP 33	301	5.0	0	0.0
OP 35	1,235	20.6	0	0.0
OP 37	0	0.0	0	0.0
OP 44	183	3.0	0	0.0
OP 46	1,265	21.1	0	0.0
OP 47	0	0.0	0	0.0
OP 48	191	3.2	0	0.0
OP 49	0	0.0	0	0.0
OP 69	225	3.8	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV: PV1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV1 and Route: Main Western Railway

No glare found

PV1 and Route: Tarana Road

No glare found

PV1 and OP 1

No glare found

PV1 and OP 2

No glare found

PV1 and OP 3

No glare found

PV1 and OP 4

No glare found

PV1 and OP 5

No glare found

PV1 and OP 6

No glare found

PV1 and OP 7

No glare found

PV1 and OP 8

No glare found

PV1 and OP 9

No glare found

PV1 and OP 10

No glare found

PV1 and OP 11

No glare found

PV1 and OP 12

No glare found

PV1 and OP 16

No glare found

PV1 and OP 17

No glare found

PV1 and OP 19

No glare found

PV1 and OP 20

No glare found

PV1 and OP 22

No glare found

PV1 and OP 24

No glare found

PV1 and OP 25

No glare found

PV1 and OP 26

No glare found

PV1 and OP 27

No glare found

PV1 and OP 31

No glare found

PV1 and OP 33

No glare found

PV1 and OP 35

No glare found

PV1 and OP 37

No glare found

PV1 and OP 44

No glare found

PV1 and OP 46

No glare found

PV1 and OP 47

No glare found

PV1 and OP 48

No glare found

PV1 and OP 49

No glare found

PV1 and OP 69

No glare found

PV1 and OP 70

No glare found

PV1 and OP 71

No glare found

PV: PV10 potential temporary after-image

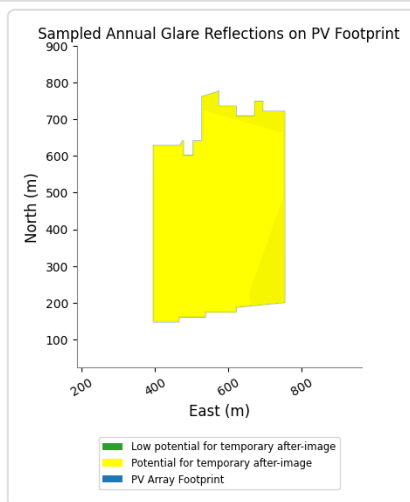
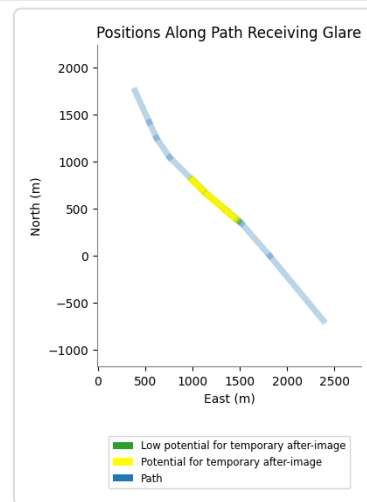
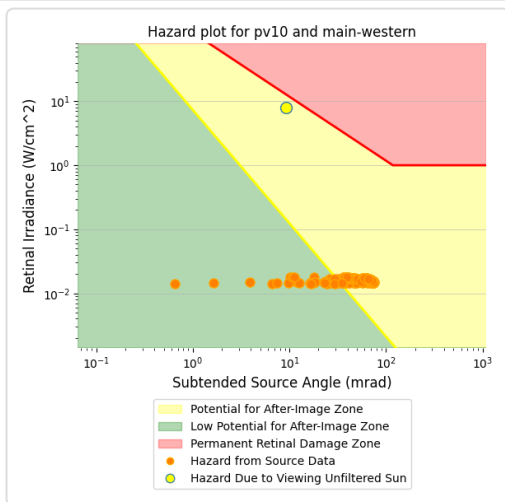
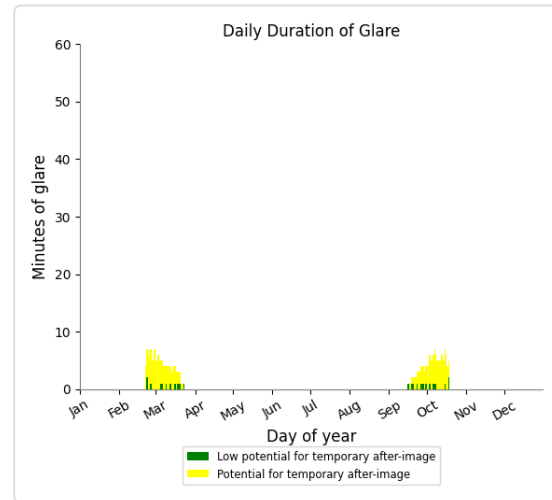
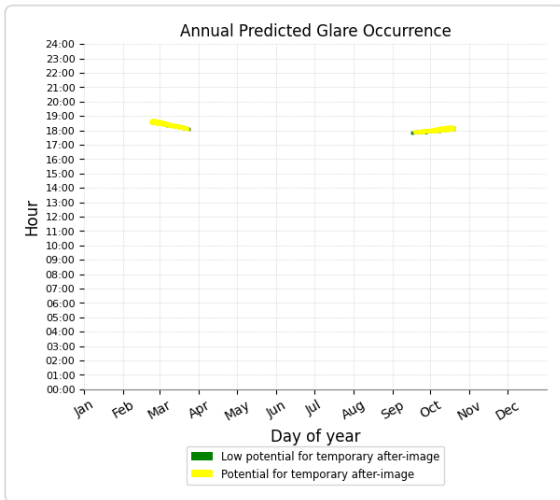
Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	28	0.5	241	4.0
Tarana Road	0	0.0	0	0.0
OP 31	296	4.9	0	0.0
OP 35	416	6.9	0	0.0
OP 44	183	3.0	0	0.0
OP 46	418	7.0	0	0.0
OP 69	17	0.3	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV10 and Route: Main Western Railway

Yellow glare: 241 min.

Green glare: 28 min.

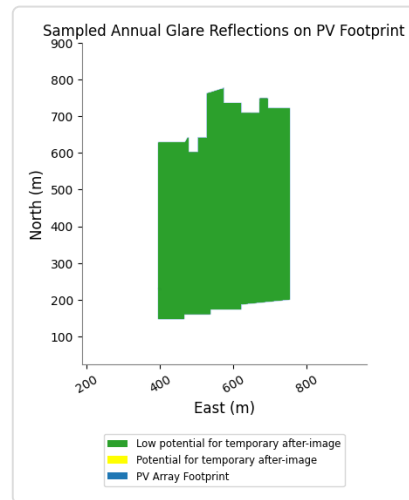
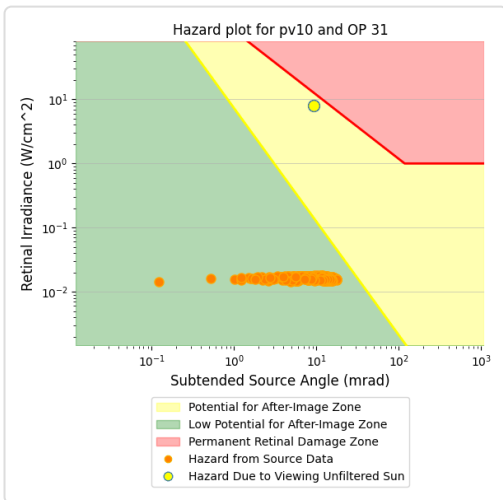
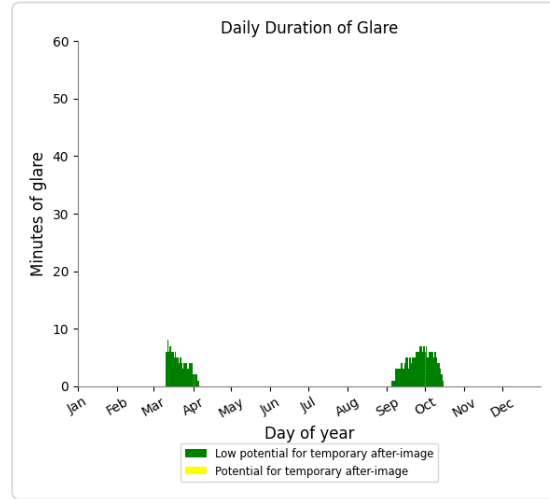
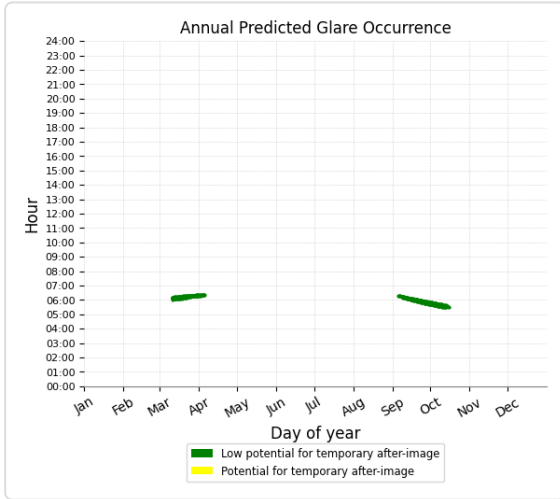


PV10 and Route: Tarana Road

No glare found

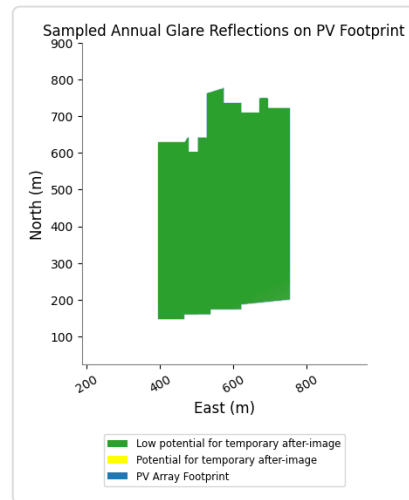
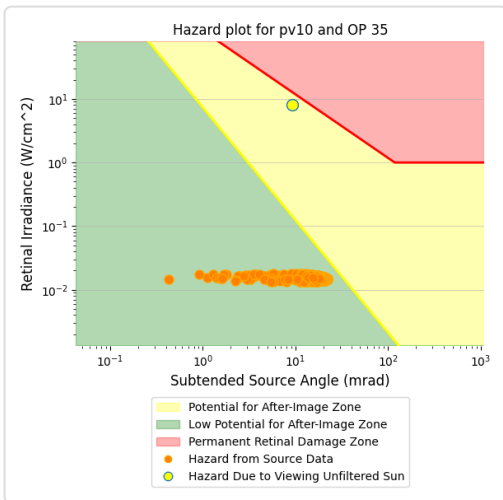
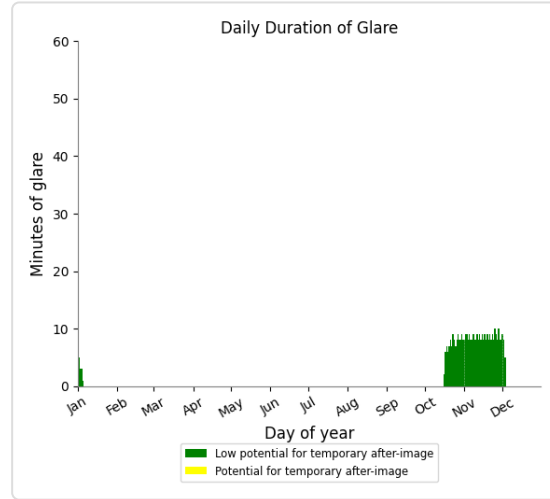
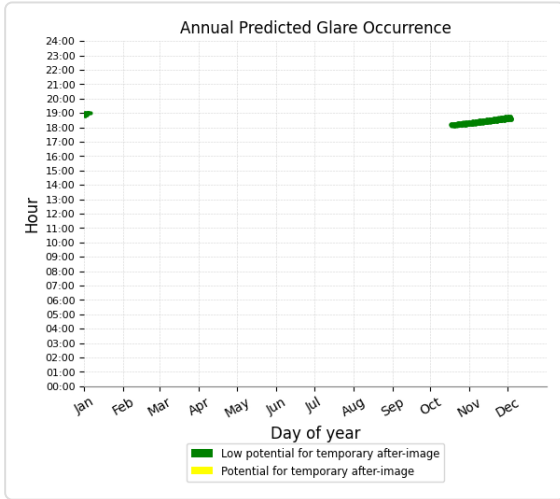
PV10 and OP 31

Yellow glare: none
 Green glare: 296 min.



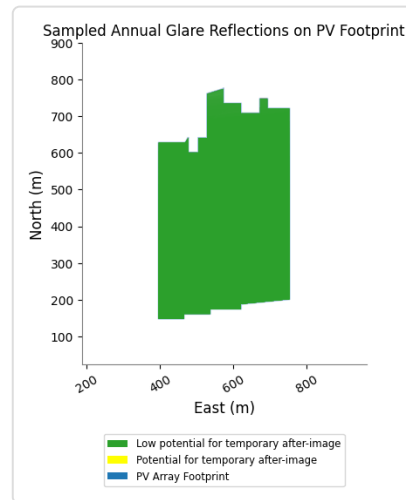
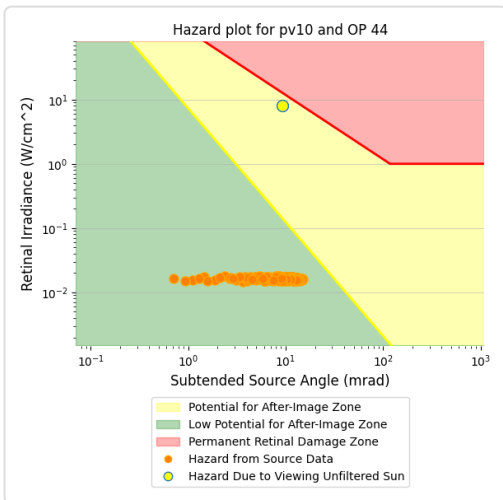
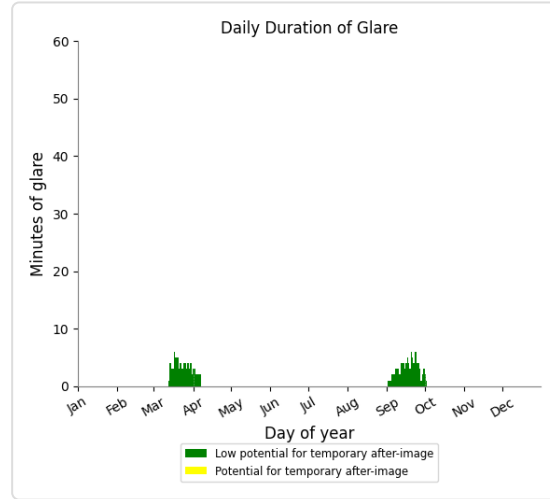
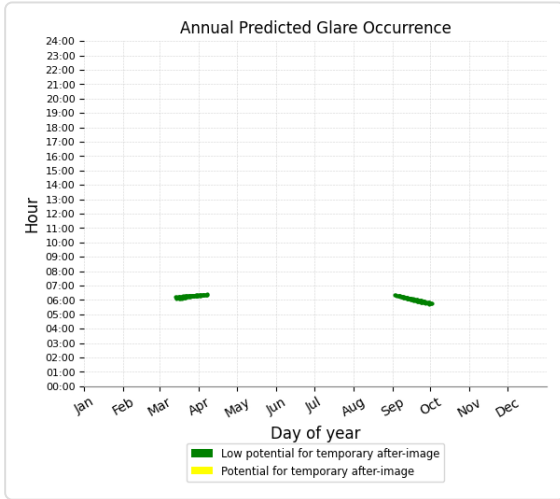
PV10 and OP 35

Yellow glare: none
 Green glare: 416 min.



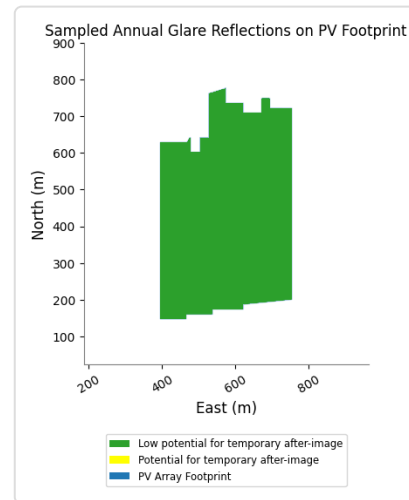
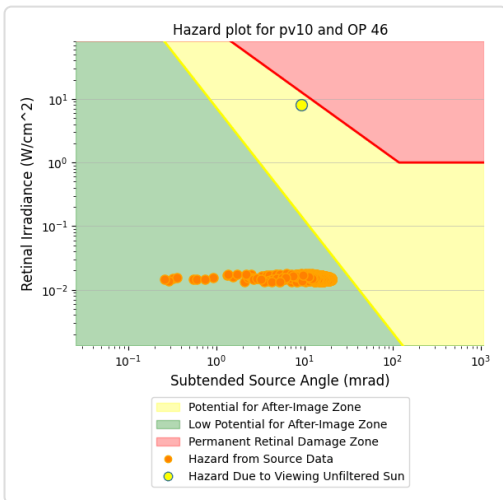
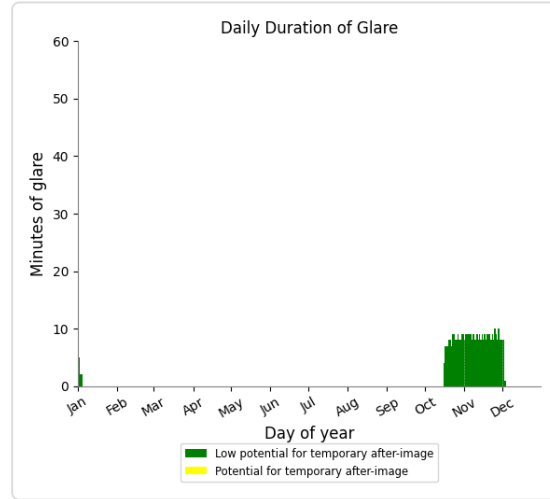
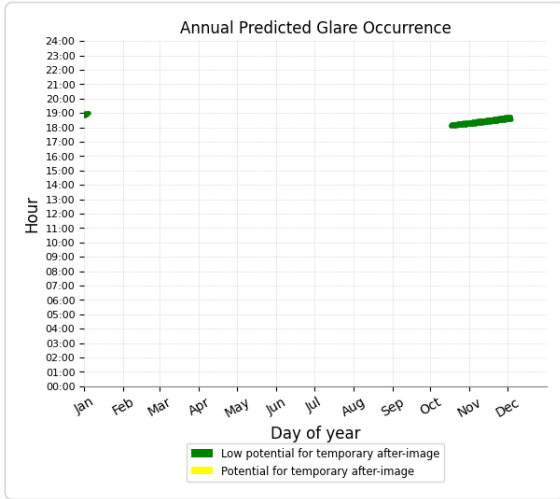
PV10 and OP 44

Yellow glare: none
 Green glare: 183 min.



PV10 and OP 46

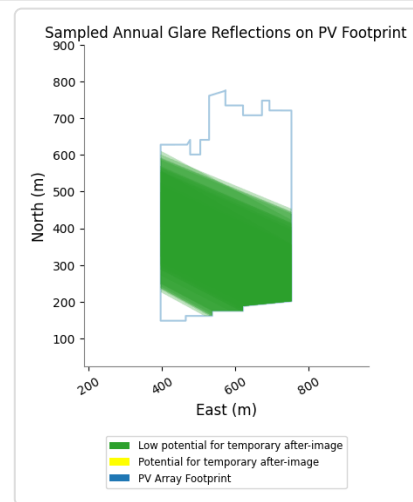
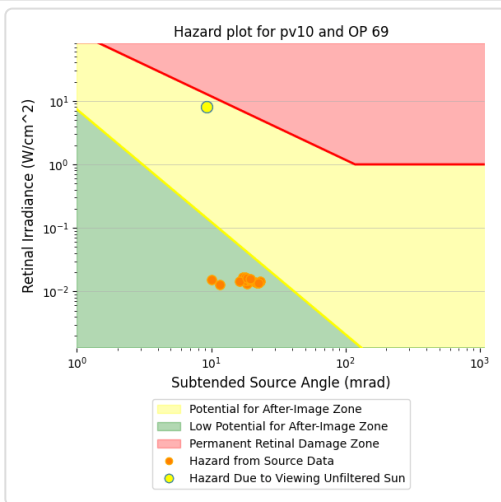
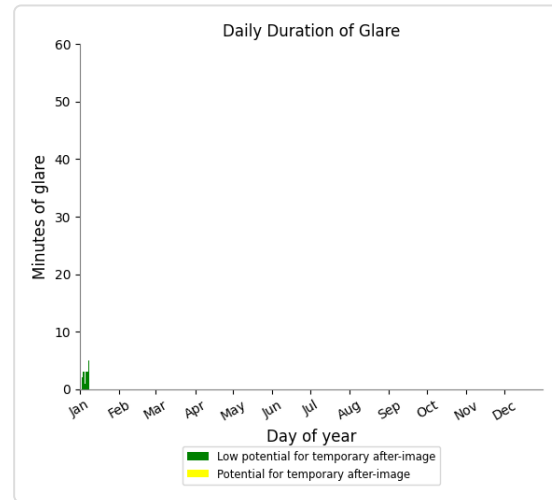
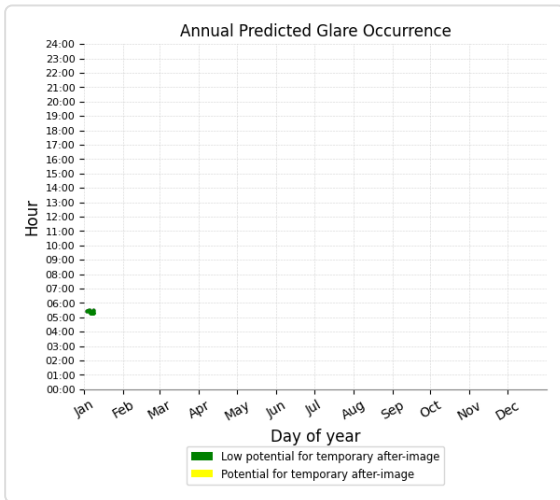
Yellow glare: none
 Green glare: 418 min.



PV10 and OP 69

Yellow glare: none

Green glare: 17 min.



PV10 and OP 1

No glare found

PV10 and OP 2

No glare found

PV10 and OP 3

No glare found

PV10 and OP 4

No glare found

PV10 and OP 5

No glare found

PV10 and OP 6

No glare found

PV10 and OP 7

No glare found

PV10 and OP 8

No glare found

PV10 and OP 9

No glare found

PV10 and OP 10

No glare found

PV10 and OP 11

No glare found

PV10 and OP 12

No glare found

PV10 and OP 16

No glare found

PV10 and OP 17

No glare found

PV10 and OP 19

No glare found

PV10 and OP 20

No glare found

PV10 and OP 22

No glare found

PV10 and OP 24

No glare found

PV10 and OP 25

No glare found

PV10 and OP 26

No glare found

PV10 and OP 27

No glare found

PV10 and OP 33

No glare found

PV10 and OP 37

No glare found

PV10 and OP 47

No glare found

PV10 and OP 48

No glare found

PV10 and OP 49

No glare found

PV10 and OP 70

No glare found

PV10 and OP 71

No glare found

PV: PV11 low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 35	272	4.5	0	0.0
OP 46	298	5.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV11 and Route: Main Western Railway

No glare found

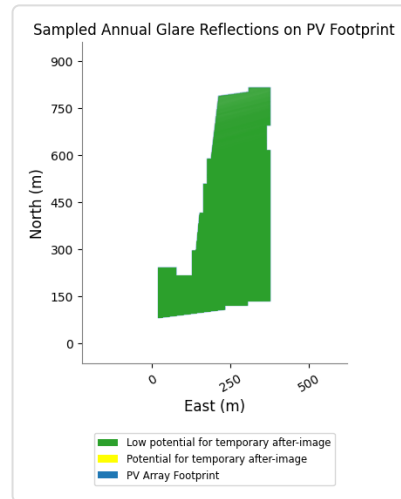
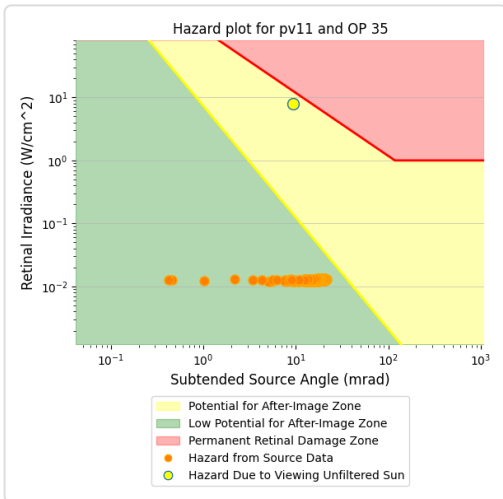
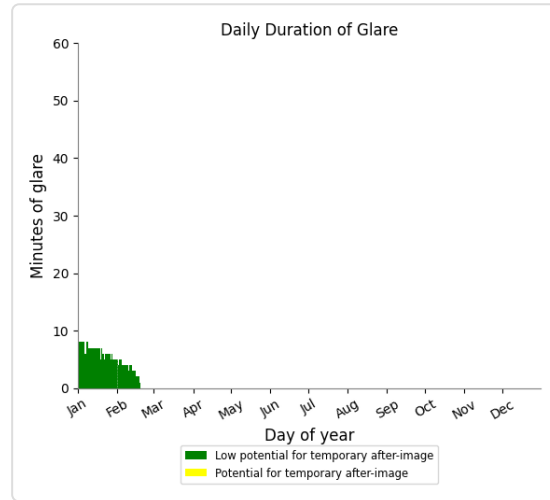
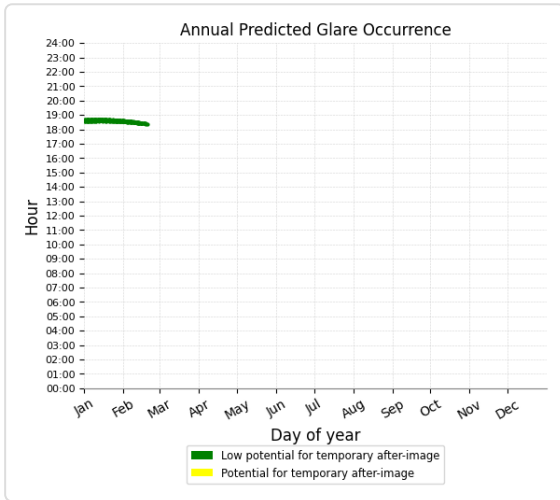
PV11 and Route: Tarana Road

No glare found

PV11 and OP 35

Yellow glare: none

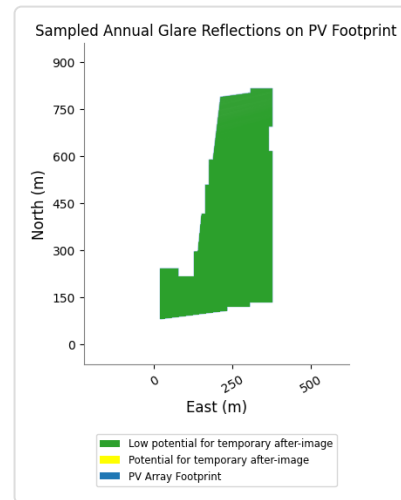
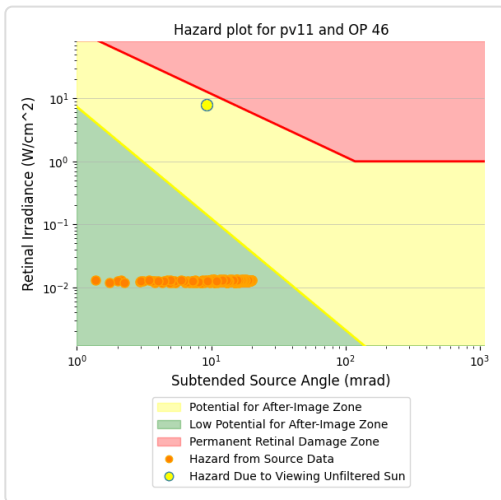
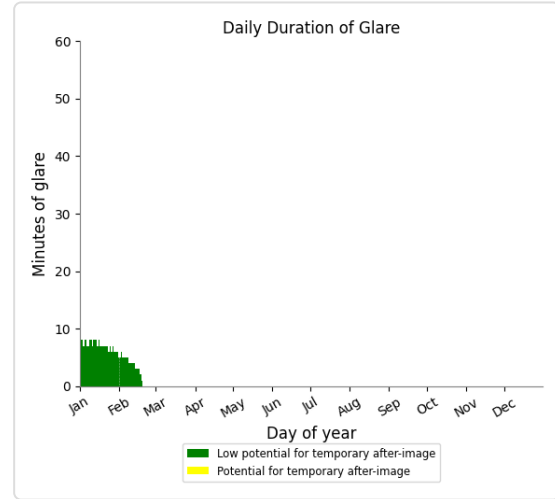
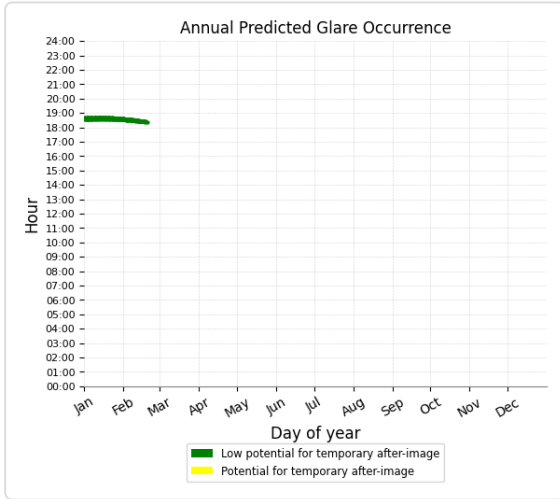
Green glare: 272 min.



PV11 and OP 46

Yellow glare: none

Green glare: 298 min.



PV11 and OP 1

No glare found

PV11 and OP 2

No glare found

PV11 and OP 3

No glare found

PV11 and OP 4

No glare found

PV11 and OP 5

No glare found

PV11 and OP 6

No glare found

PV11 and OP 7

No glare found

PV11 and OP 8

No glare found

PV11 and OP 9

No glare found

PV11 and OP 10

No glare found

PV11 and OP 11

No glare found

PV11 and OP 12

No glare found

PV11 and OP 16

No glare found

PV11 and OP 17

No glare found

PV11 and OP 19

No glare found

PV11 and OP 20

No glare found

PV11 and OP 22

No glare found

PV11 and OP 24

No glare found

PV11 and OP 25

No glare found

PV11 and OP 26

No glare found

PV11 and OP 27

No glare found

PV11 and OP 31

No glare found

PV11 and OP 33

No glare found

PV11 and OP 37

No glare found

PV11 and OP 44

No glare found

PV11 and OP 47

No glare found

PV11 and OP 48

No glare found

PV11 and OP 49

No glare found

PV11 and OP 69

No glare found

PV11 and OP 70

No glare found

PV11 and OP 71

No glare found

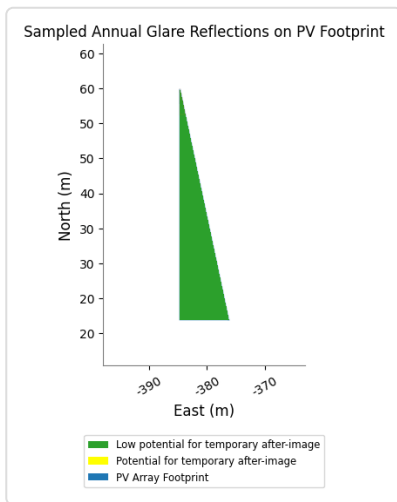
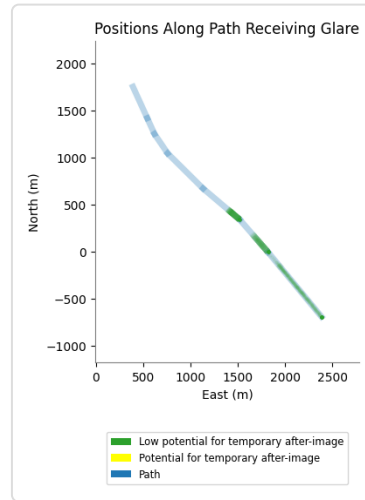
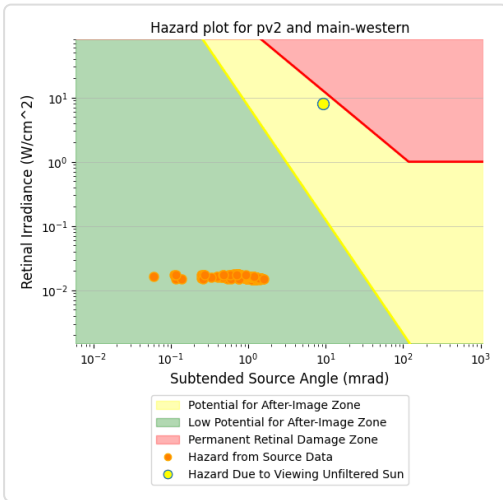
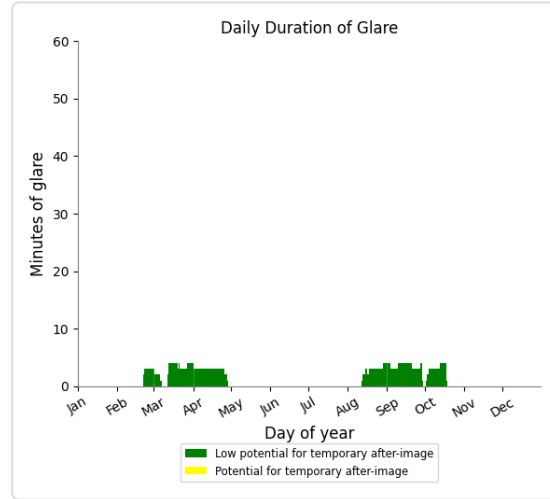
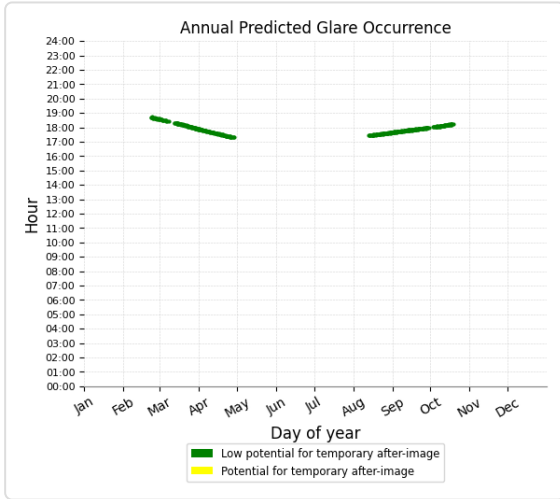
PV: PV2 low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	397	6.6	0	0.0
Tarana Road	369	6.2	0	0.0
OP 3	77	1.3	0	0.0
OP 10	151	2.5	0	0.0
OP 12	120	2.0	0	0.0
OP 16	104	1.7	0	0.0
OP 17	104	1.7	0	0.0
OP 20	158	2.6	0	0.0
OP 22	147	2.5	0	0.0
OP 27	120	2.0	0	0.0
OP 33	246	4.1	0	0.0
OP 35	74	1.2	0	0.0
OP 46	68	1.1	0	0.0
OP 48	55	0.9	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV2 and Route: Main Western Railway

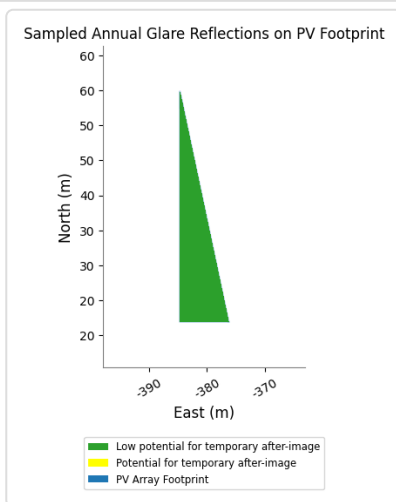
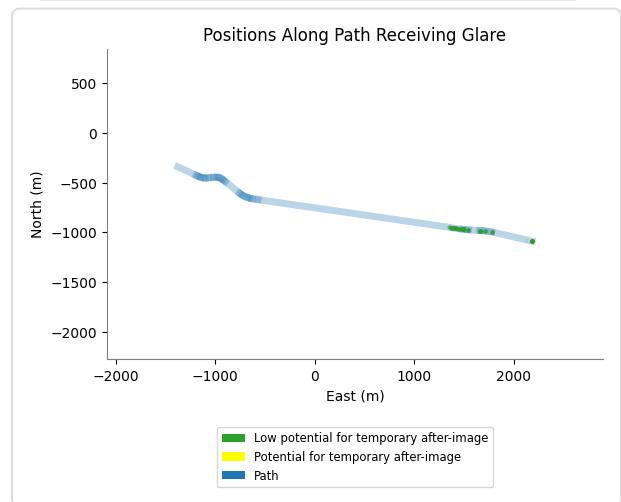
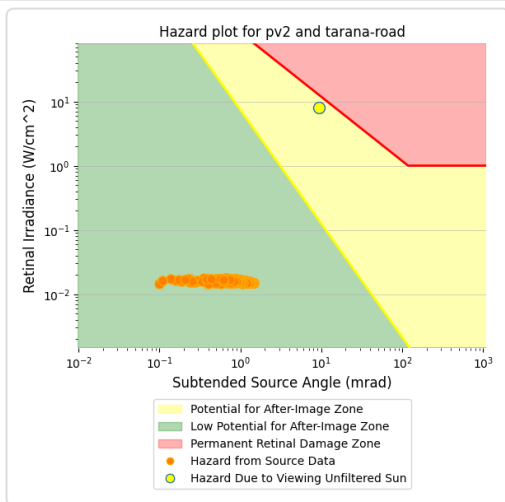
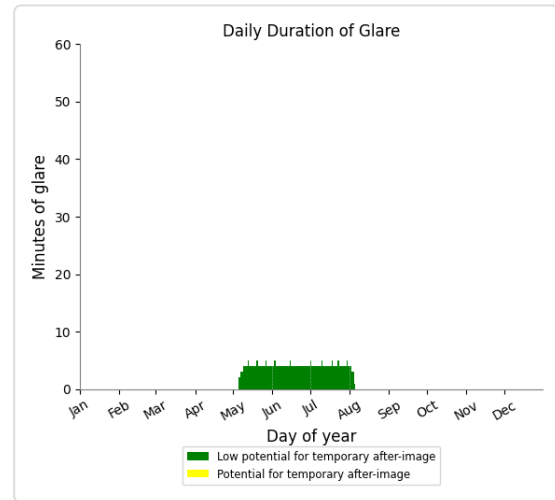
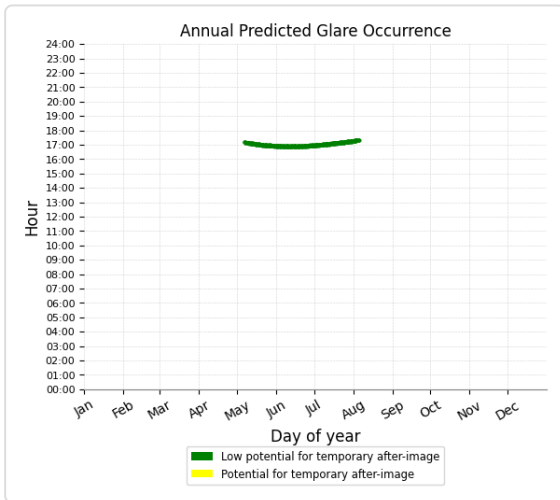
Yellow glare: none
 Green glare: 397 min.



PV2 and Route: Tarana Road

Yellow glare: none

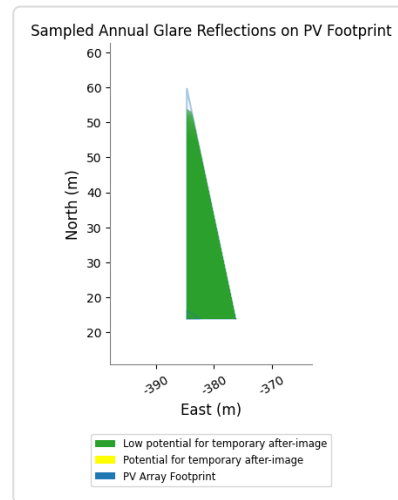
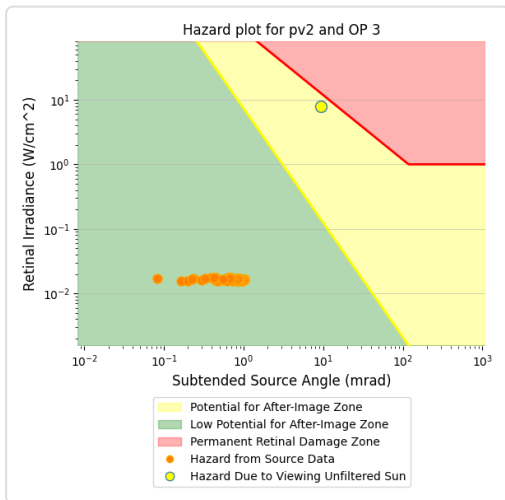
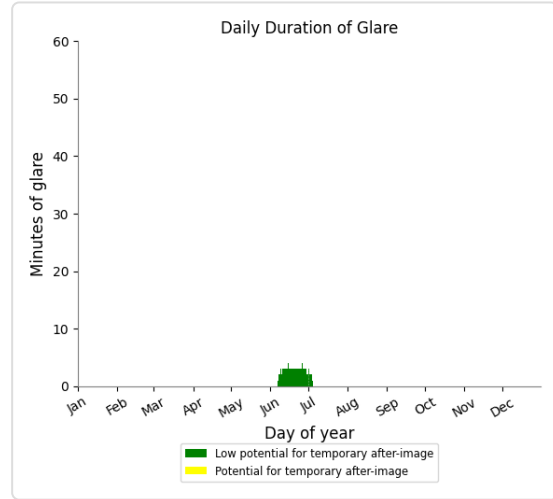
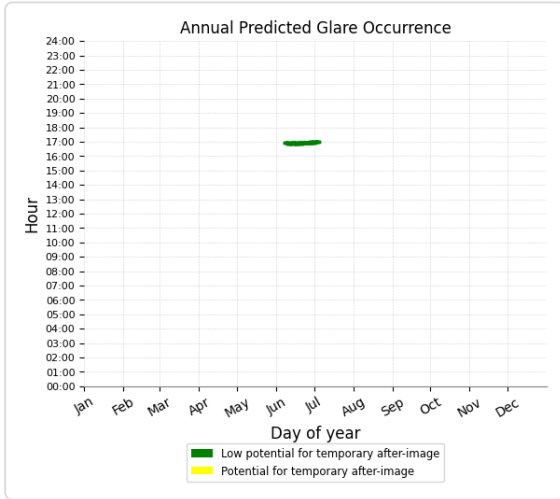
Green glare: 369 min.



PV2 and OP 3

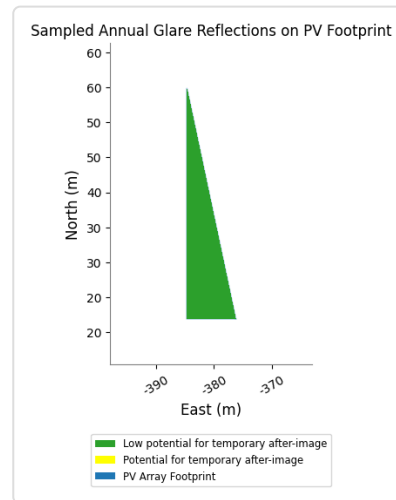
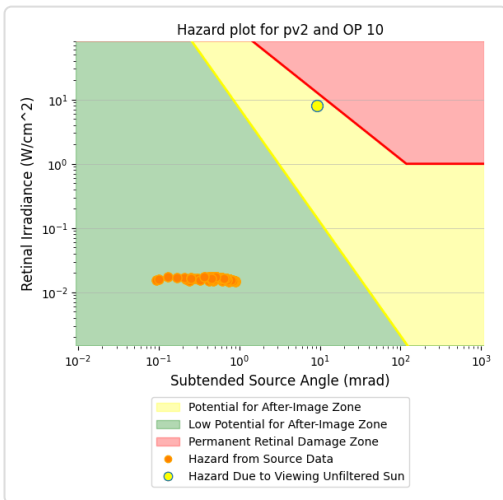
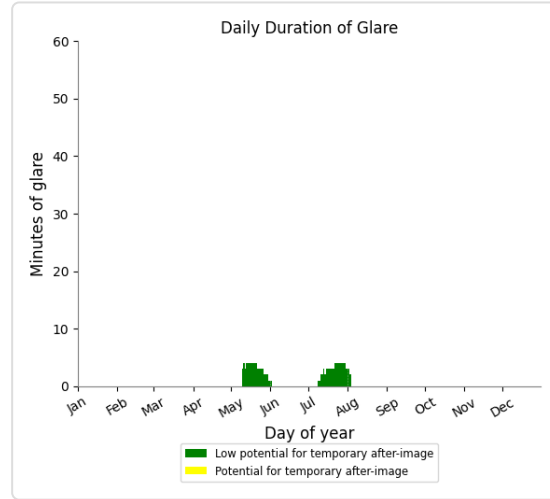
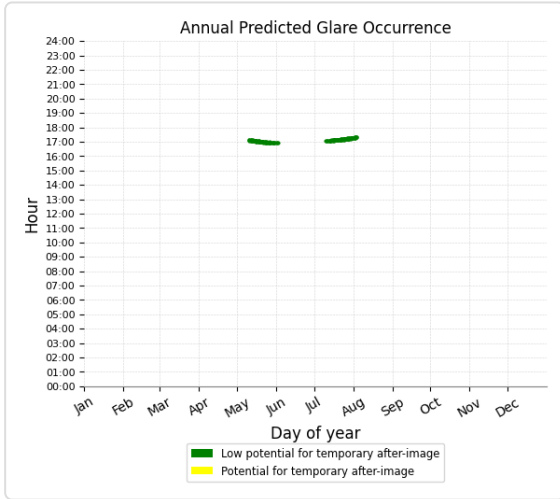
Yellow glare: none

Green glare: 77 min.



PV2 and OP 10

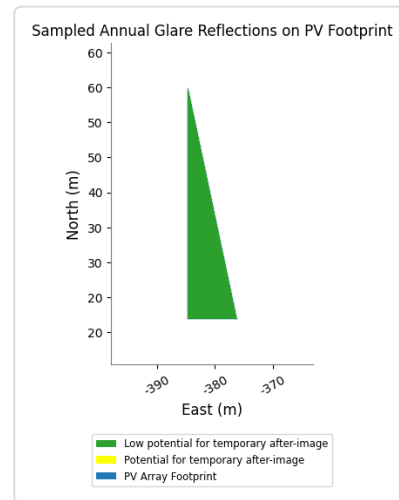
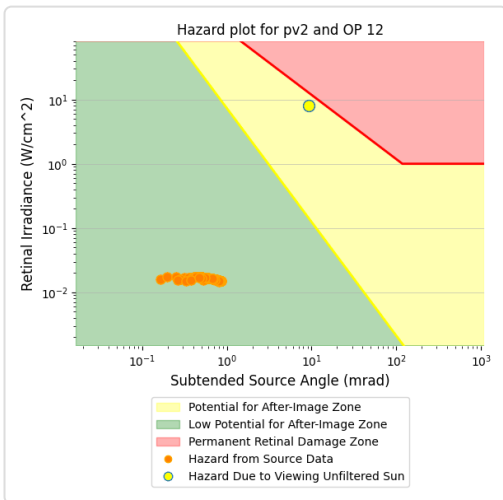
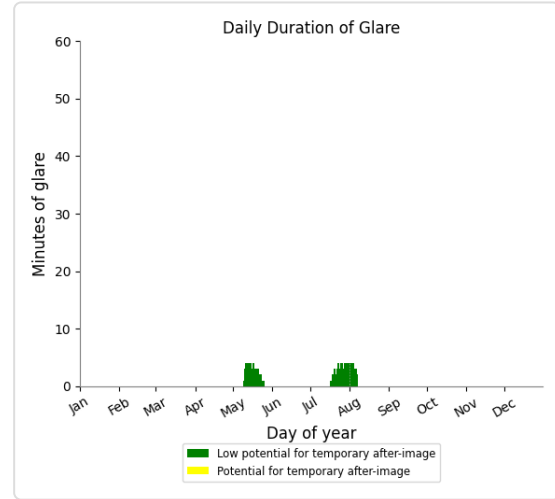
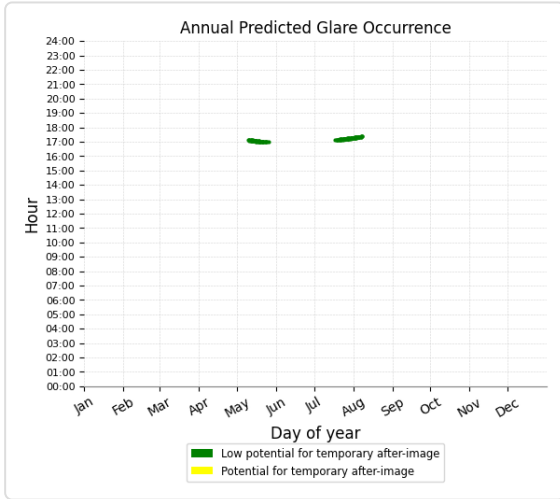
Yellow glare: none
 Green glare: 151 min.



PV2 and OP 12

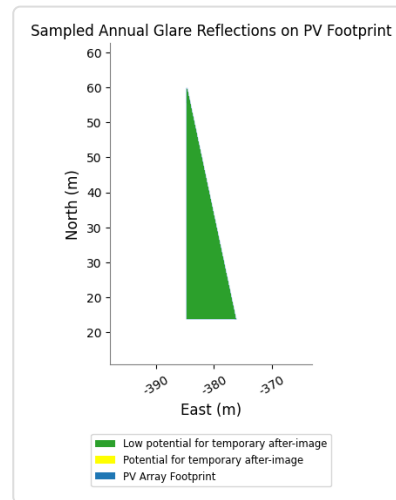
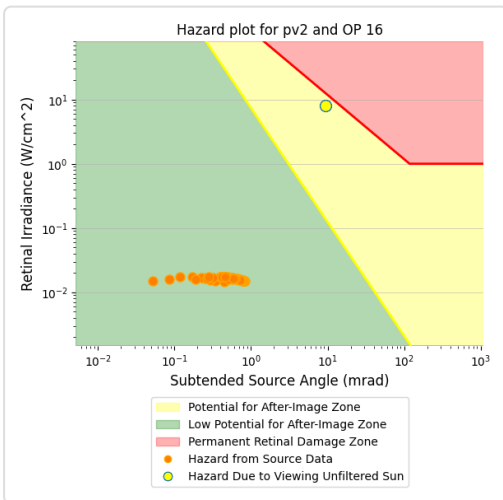
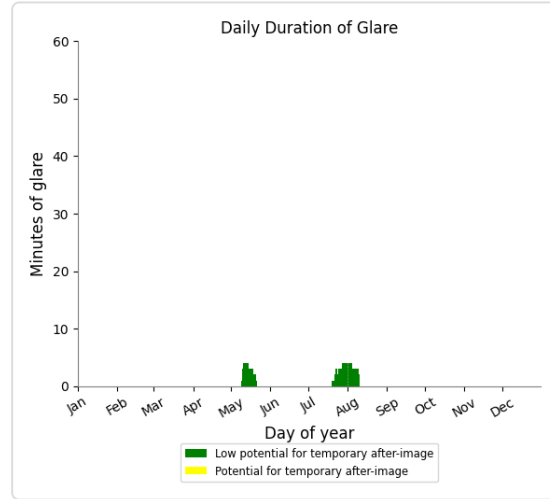
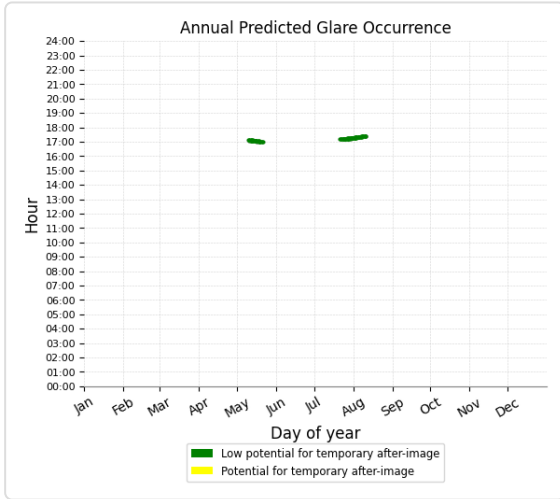
Yellow glare: none

Green glare: 120 min.



PV2 and OP 16

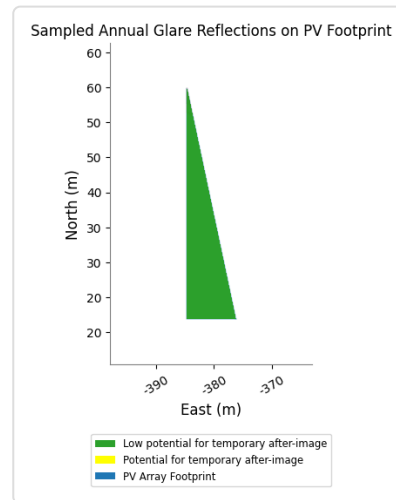
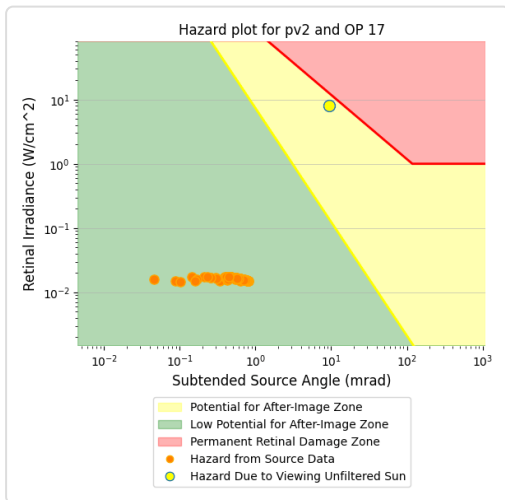
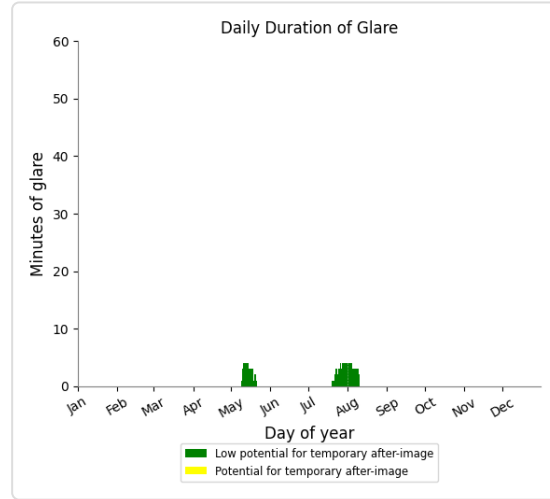
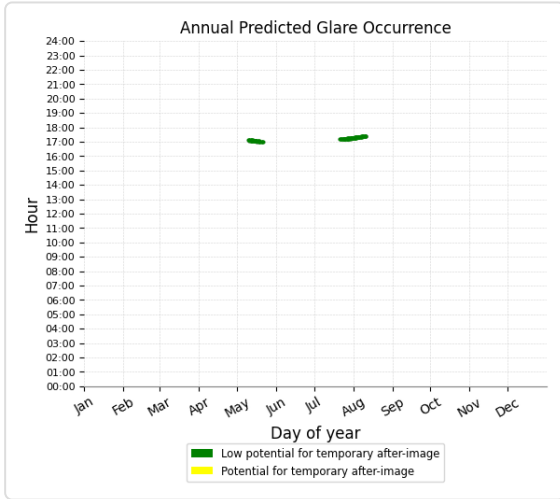
Yellow glare: none
 Green glare: 104 min.



PV2 and OP 17

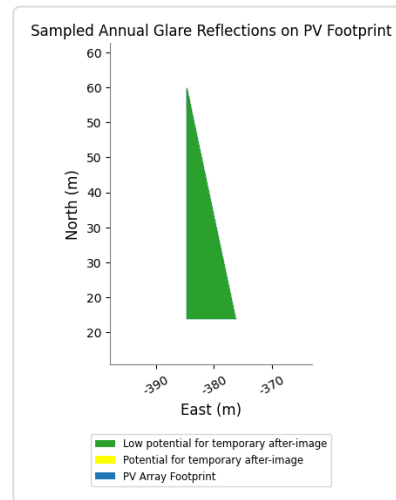
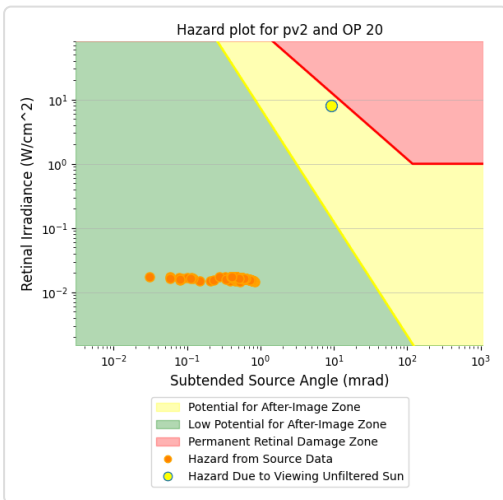
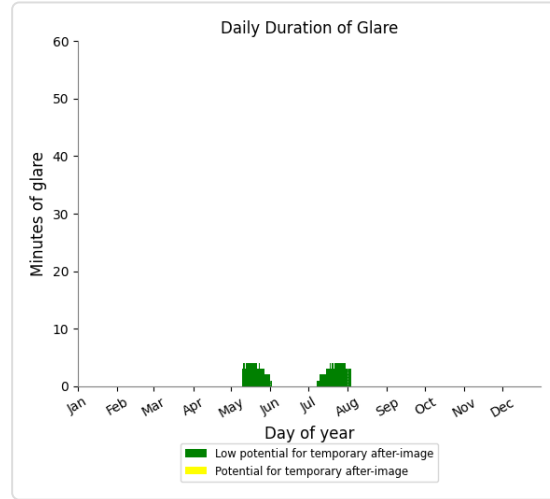
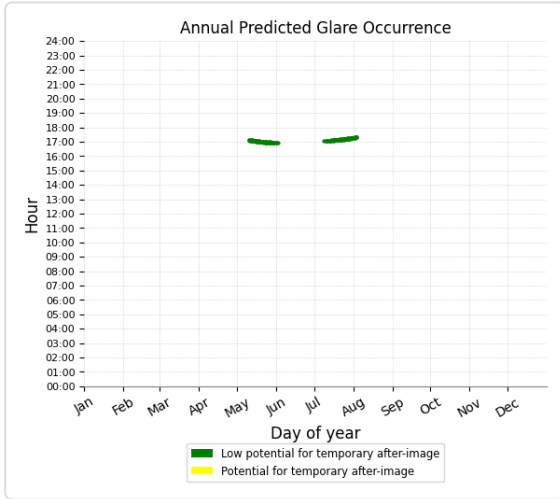
Yellow glare: none

Green glare: 104 min.



PV2 and OP 20

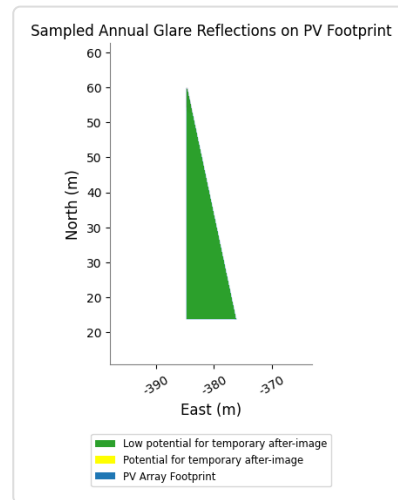
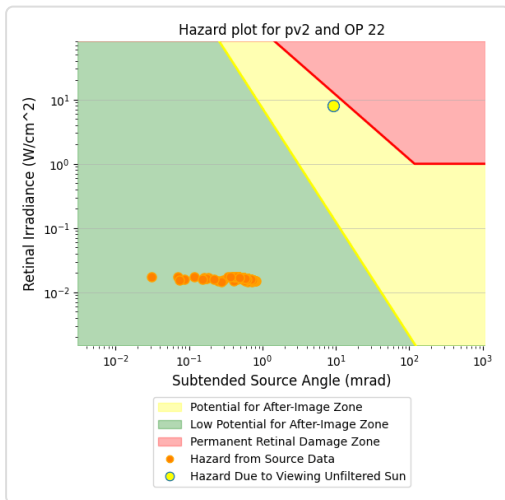
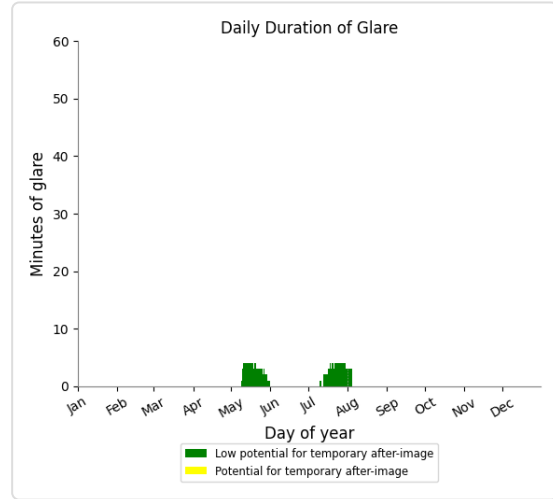
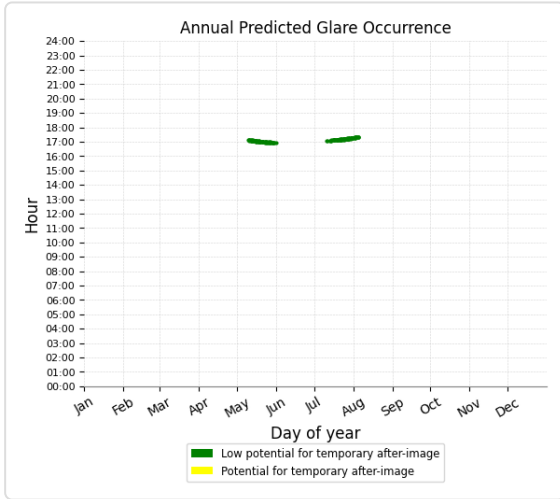
Yellow glare: none
 Green glare: 158 min.



PV2 and OP 22

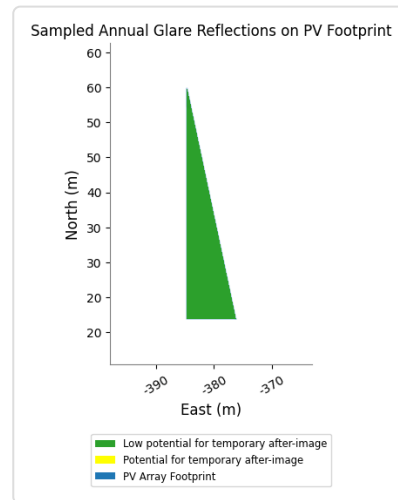
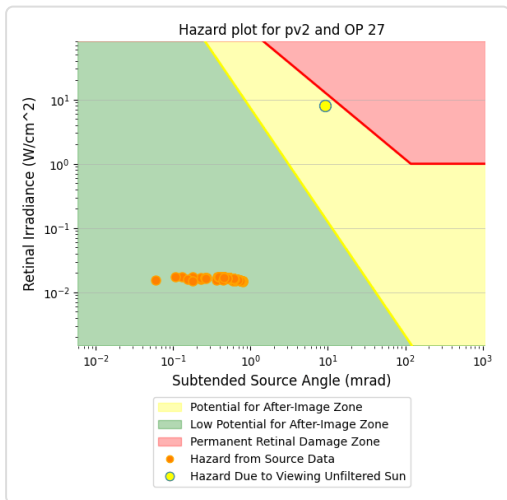
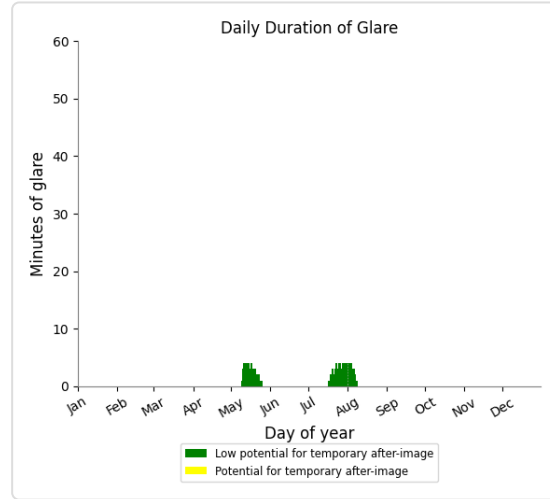
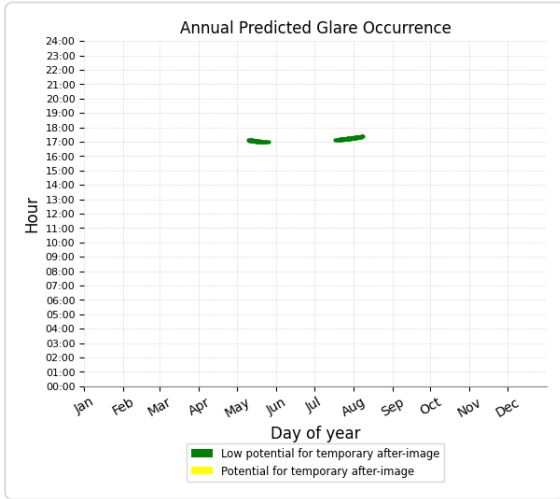
Yellow glare: none

Green glare: 147 min.



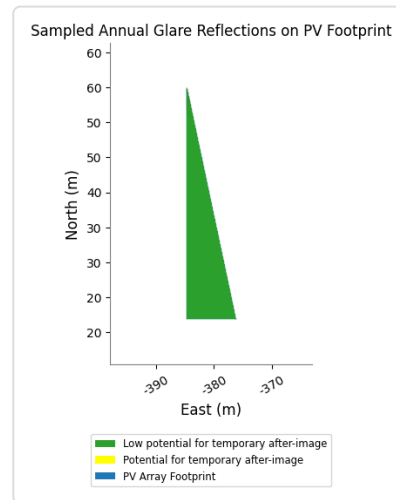
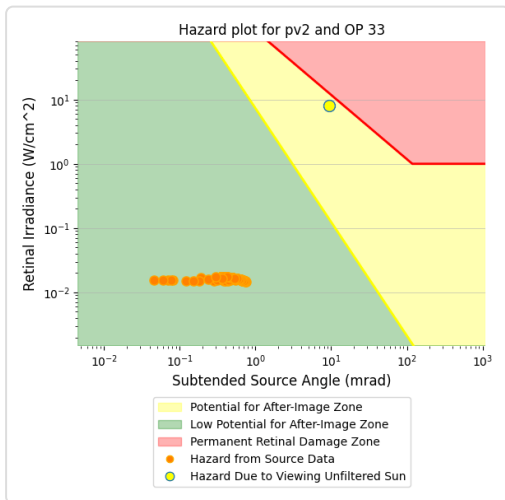
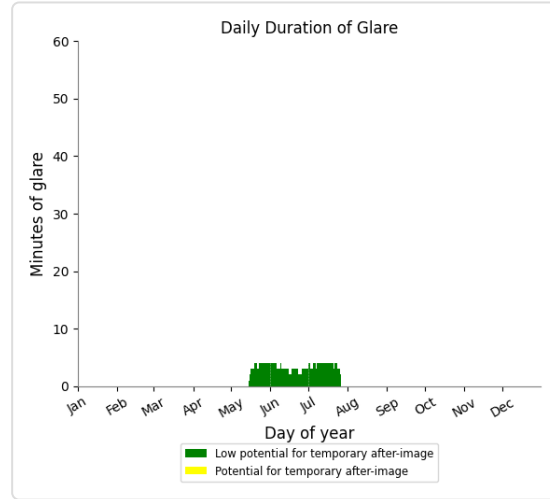
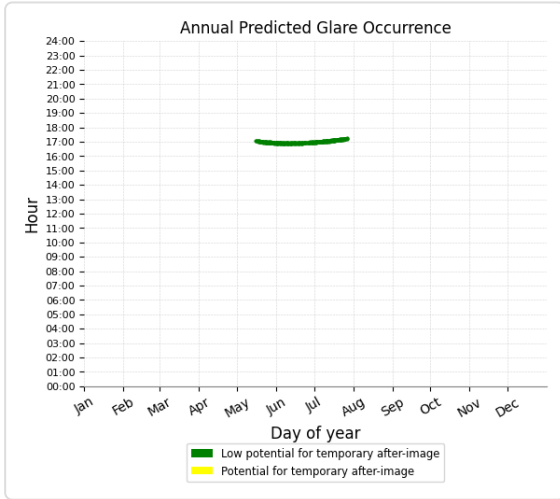
PV2 and OP 27

Yellow glare: none
 Green glare: 120 min.



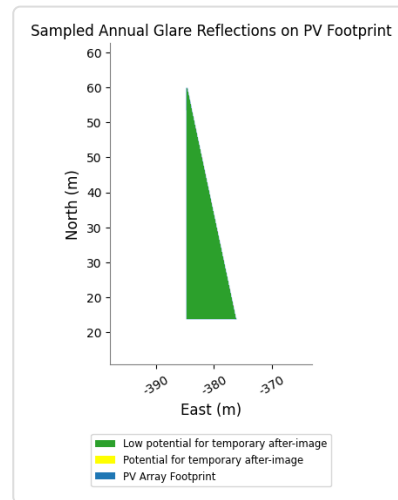
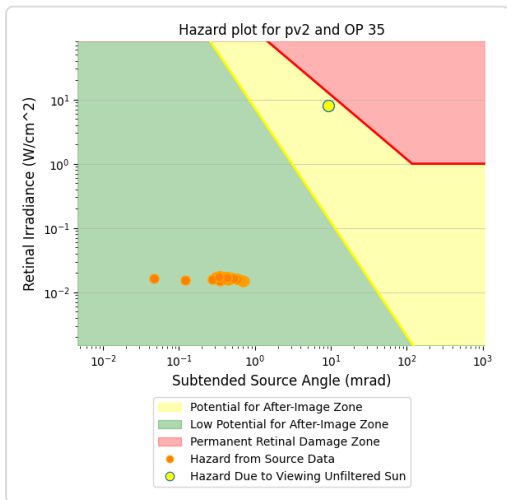
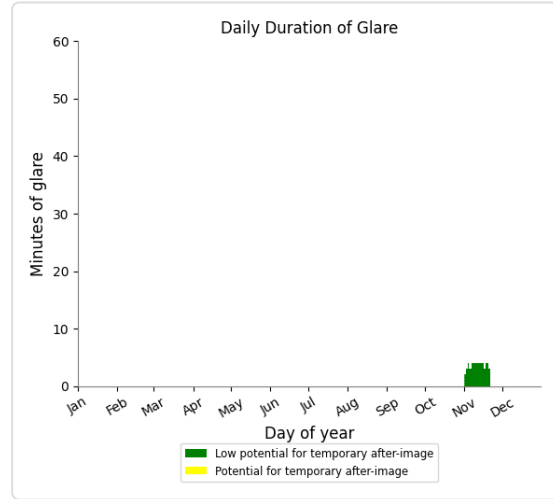
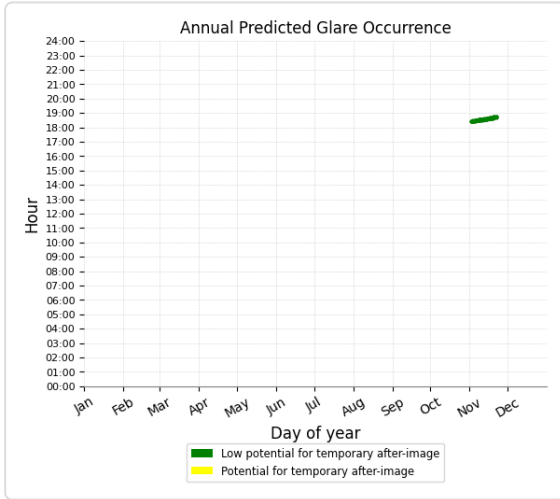
PV2 and OP 33

Yellow glare: none
 Green glare: 246 min.



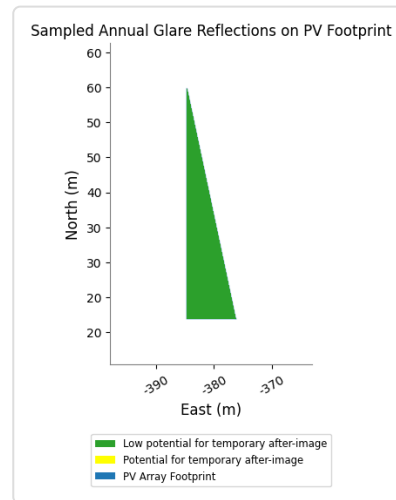
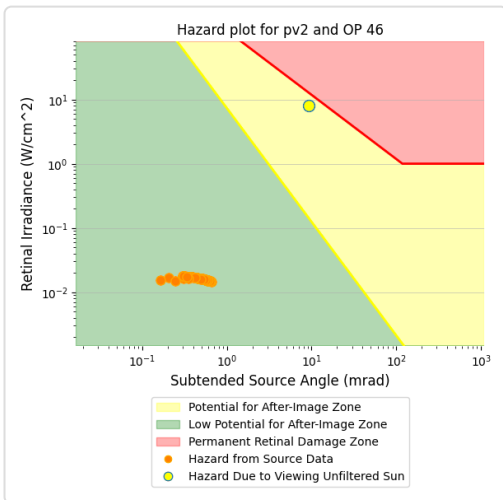
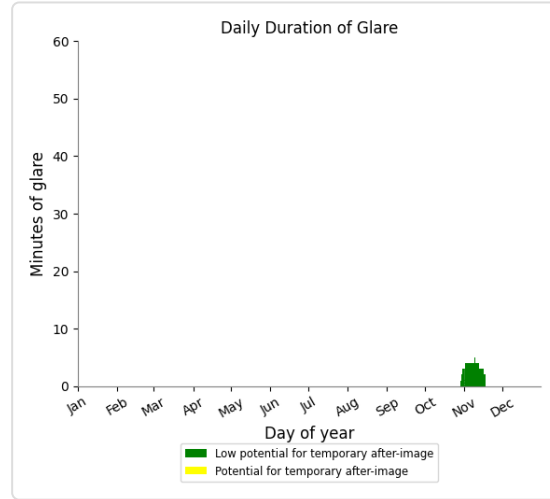
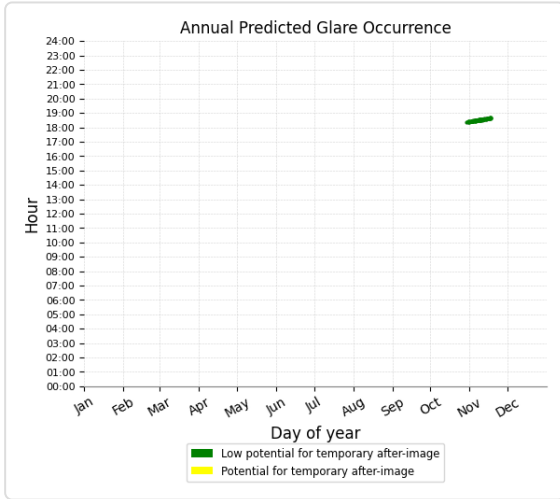
PV2 and OP 35

Yellow glare: none
Green glare: 74 min.



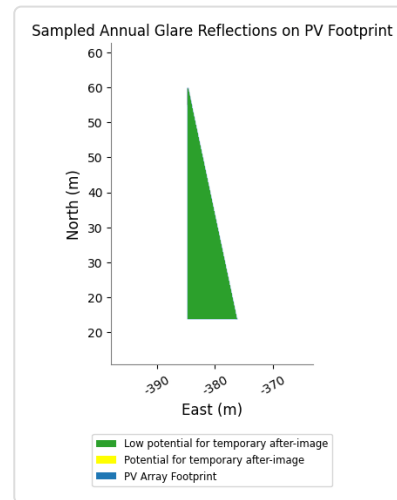
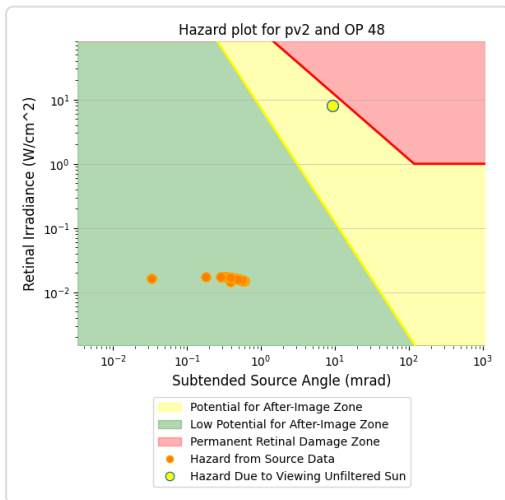
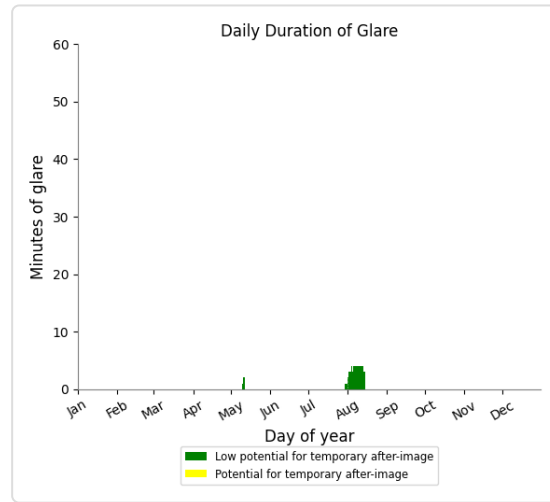
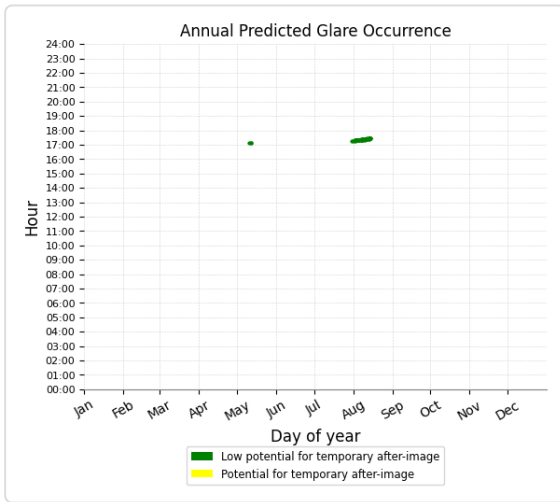
PV2 and OP 46

Yellow glare: none
 Green glare: 68 min.



PV2 and OP 48

Yellow glare: none
Green glare: 55 min.



PV2 and OP 1

No glare found

PV2 and OP 2

No glare found

PV2 and OP 4

No glare found

PV2 and OP 5

No glare found

PV2 and OP 6

No glare found

PV2 and OP 7

No glare found

PV2 and OP 8

No glare found

PV2 and OP 9

No glare found

PV2 and OP 11

No glare found

PV2 and OP 19

No glare found

PV2 and OP 24

No glare found

PV2 and OP 25

No glare found

PV2 and OP 26

No glare found

PV2 and OP 31

No glare found

PV2 and OP 37

No glare found

PV2 and OP 44

No glare found

PV2 and OP 47

No glare found

PV2 and OP 49

No glare found

PV2 and OP 69

No glare found

PV2 and OP 70

No glare found

PV2 and OP 71

No glare found

PV: PV3 low potential for temporary after-image

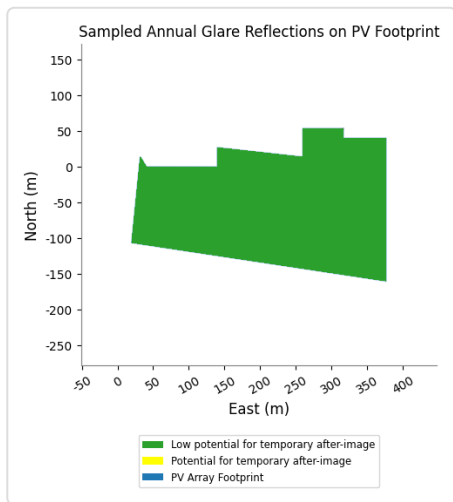
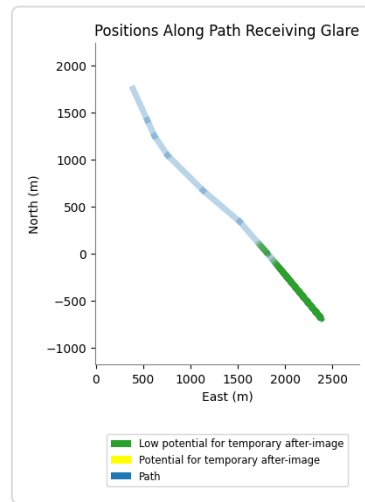
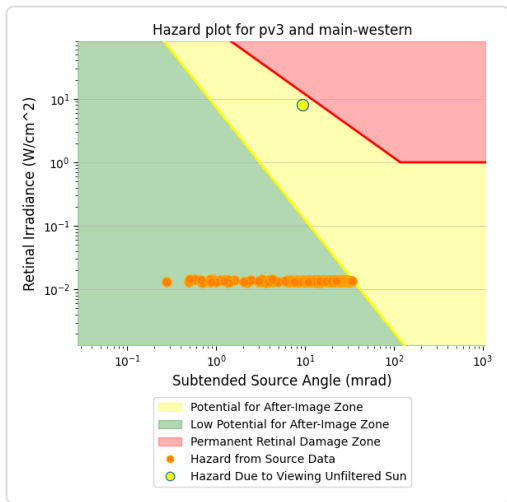
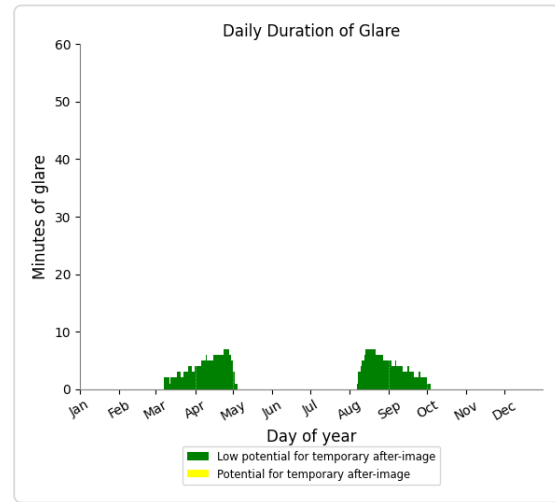
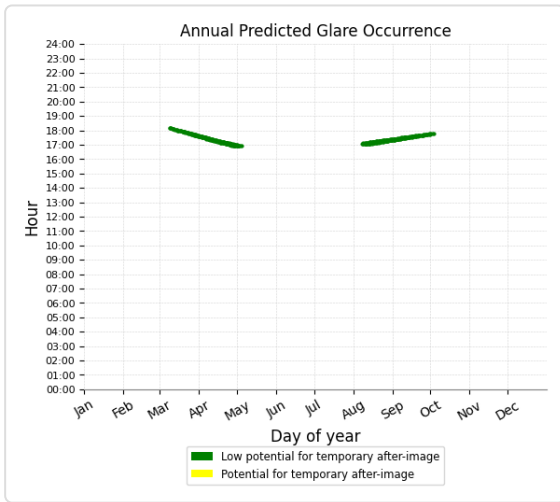
Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	472	7.9	0	0.0
Tarana Road	1,177	19.6	0	0.0
OP 6	106	1.8	0	0.0
OP 10	103	1.7	0	0.0
OP 12	124	2.1	0	0.0
OP 16	142	2.4	0	0.0
OP 17	138	2.3	0	0.0
OP 20	96	1.6	0	0.0
OP 22	99	1.6	0	0.0
OP 24	103	1.7	0	0.0
OP 26	113	1.9	0	0.0
OP 27	120	2.0	0	0.0
OP 33	55	0.9	0	0.0
OP 46	16	0.3	0	0.0
OP 48	136	2.3	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV3 and Route: Main Western Railway

Yellow glare: none

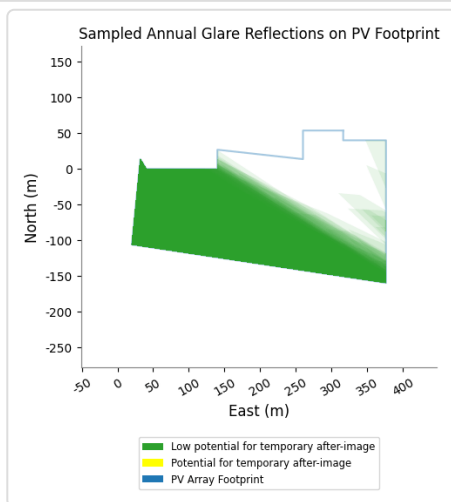
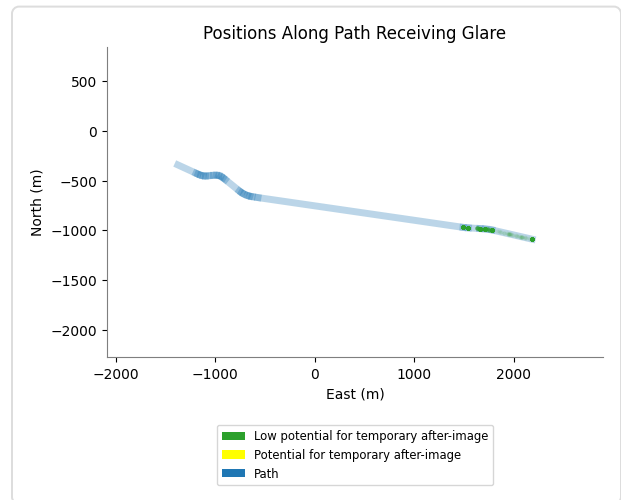
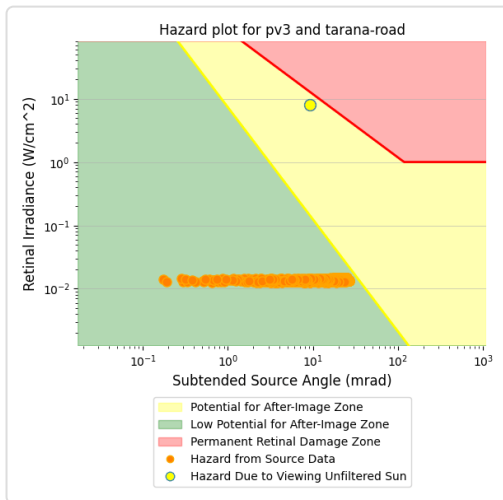
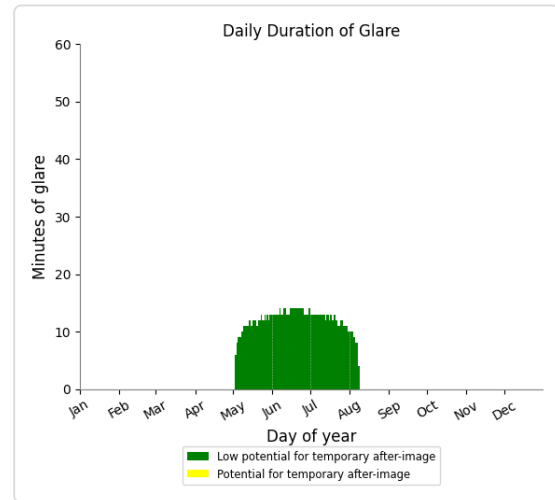
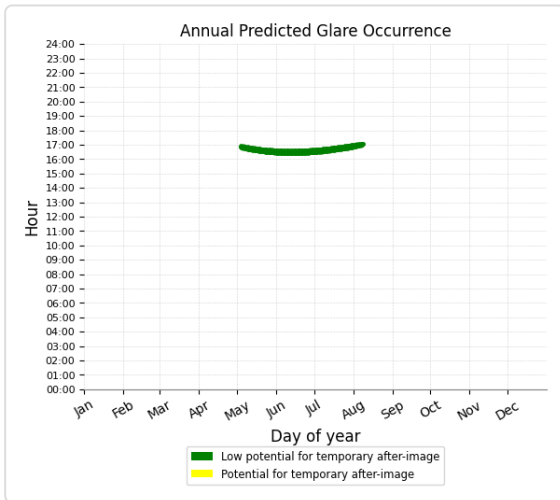
Green glare: 472 min.



PV3 and Route: Tarana Road

Yellow glare: none

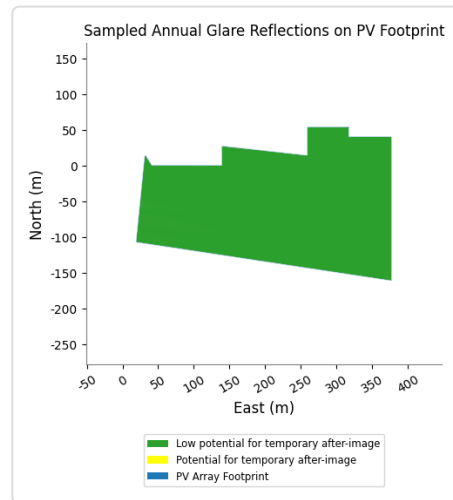
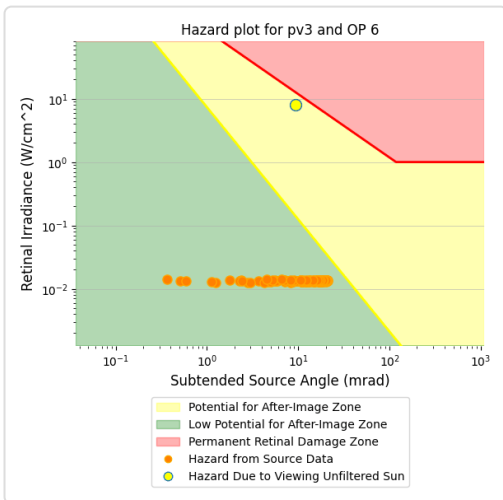
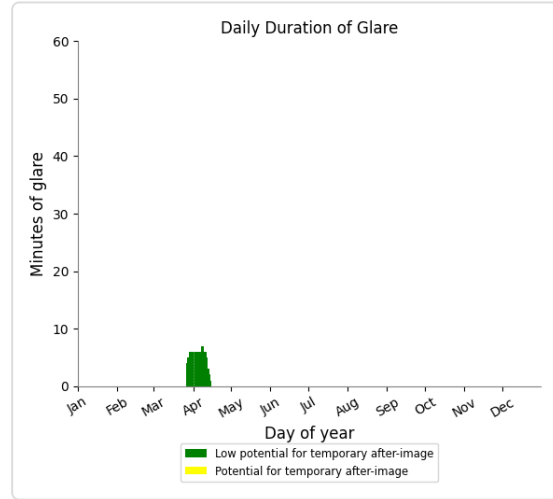
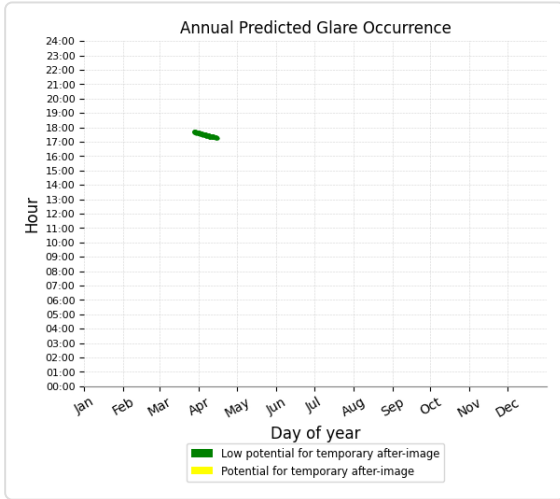
Green glare: 1,177 min.



PV3 and OP 6

Yellow glare: none

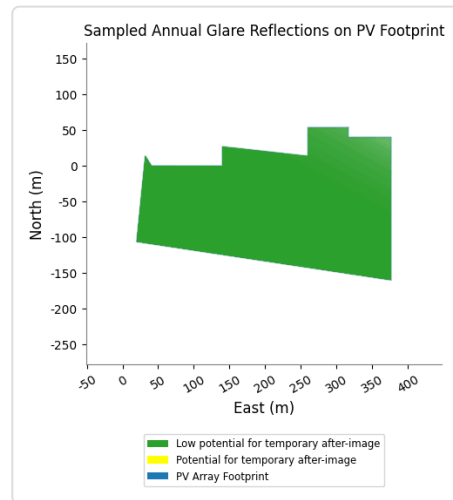
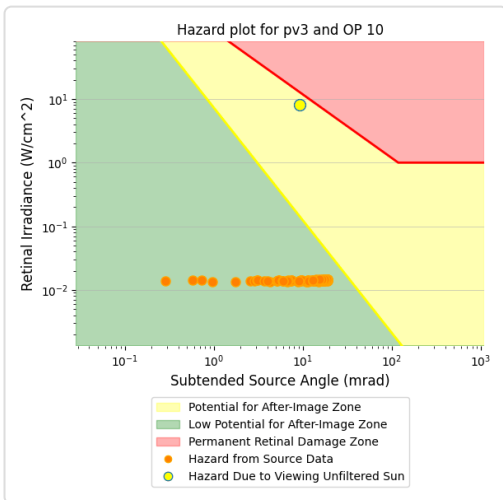
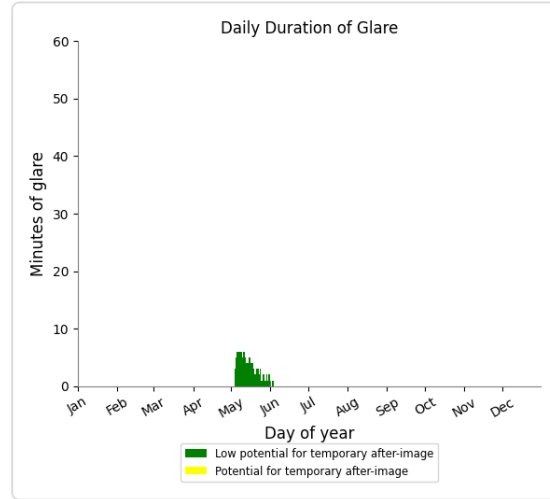
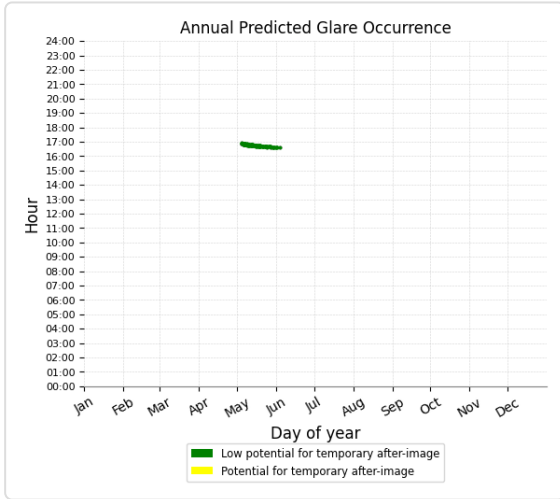
Green glare: 106 min.



PV3 and OP 10

Yellow glare: none

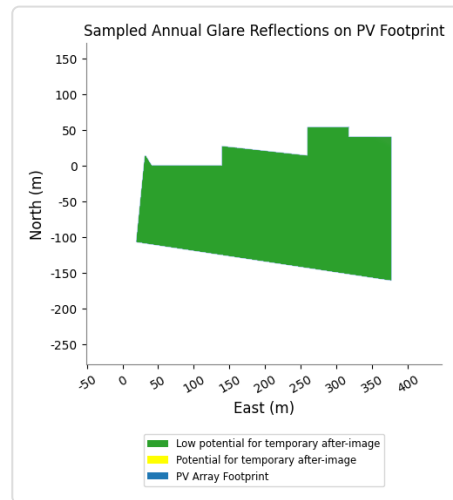
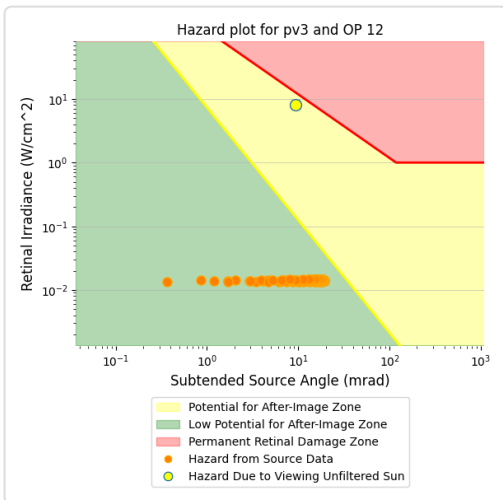
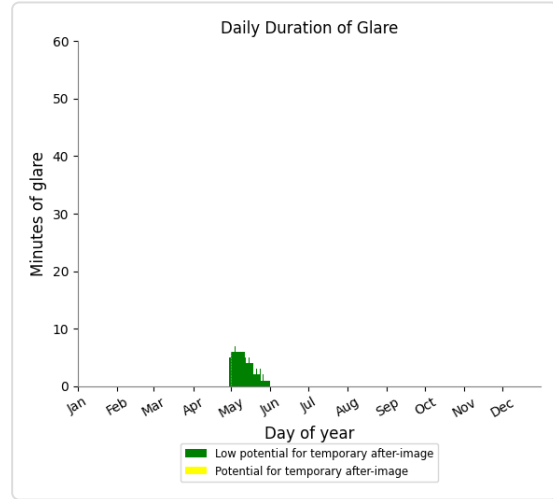
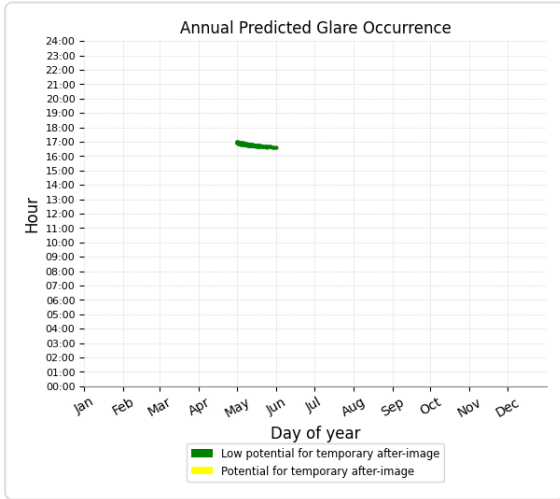
Green glare: 103 min.



PV3 and OP 12

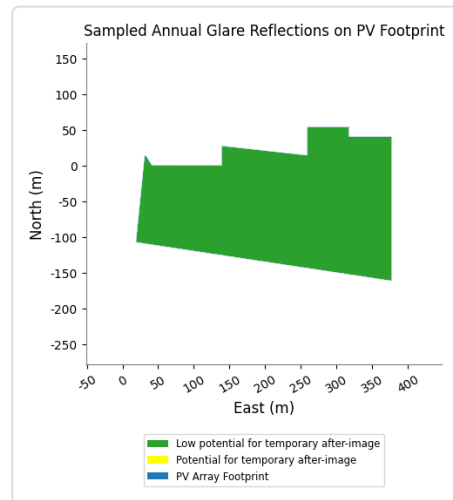
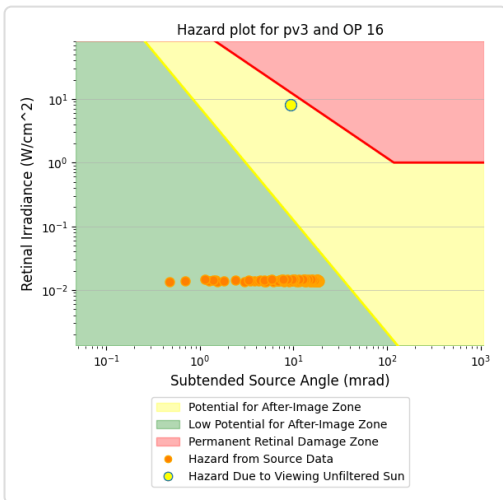
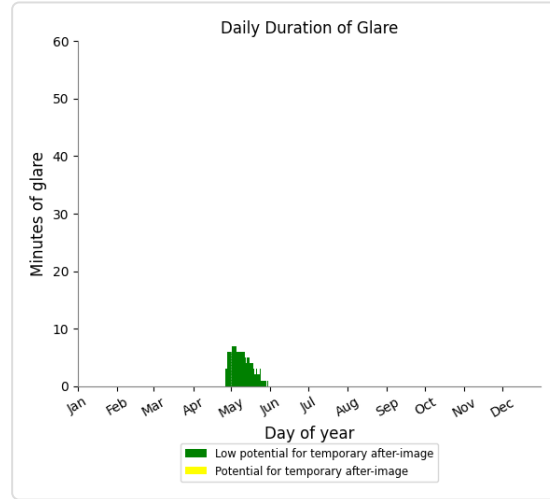
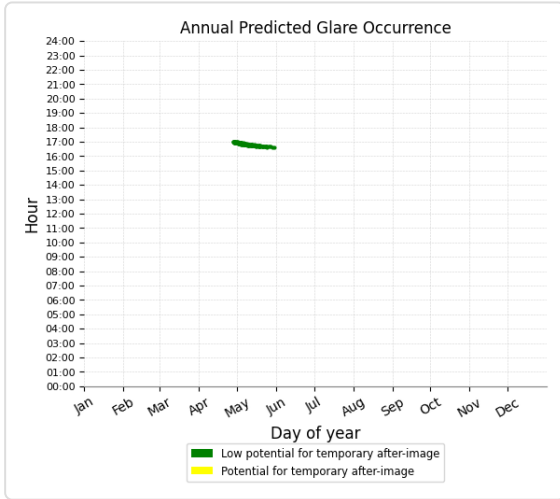
Yellow glare: none

Green glare: 124 min.



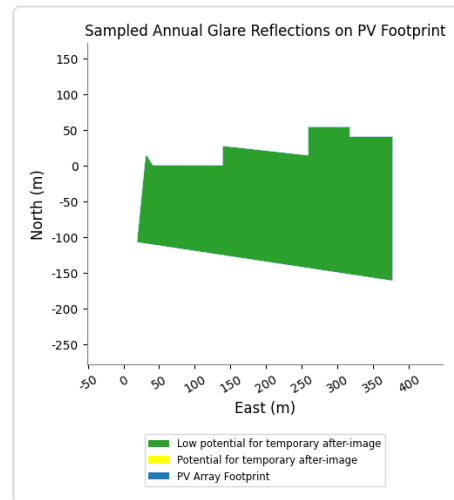
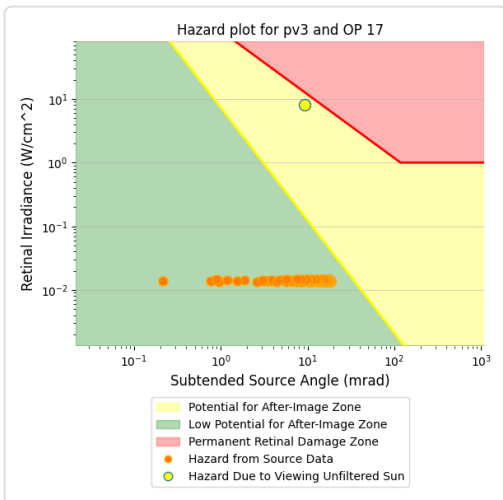
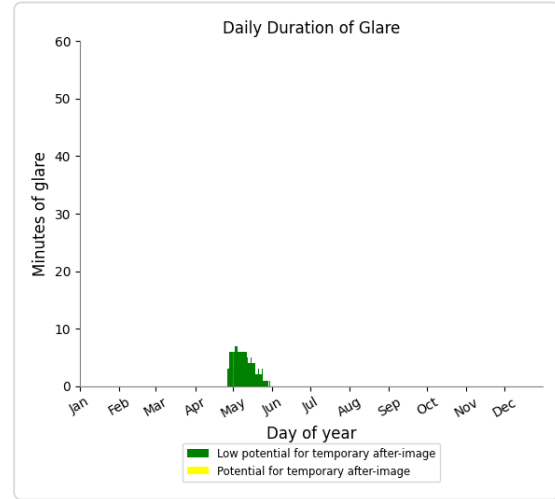
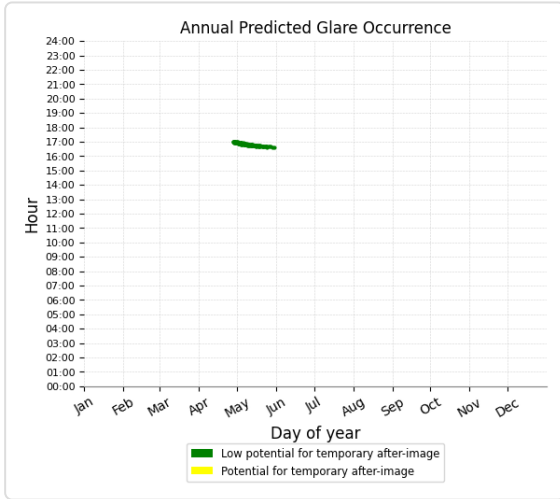
PV3 and OP 16

Yellow glare: none
 Green glare: 142 min.



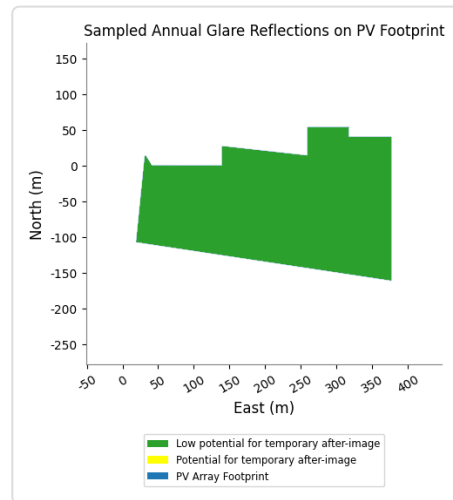
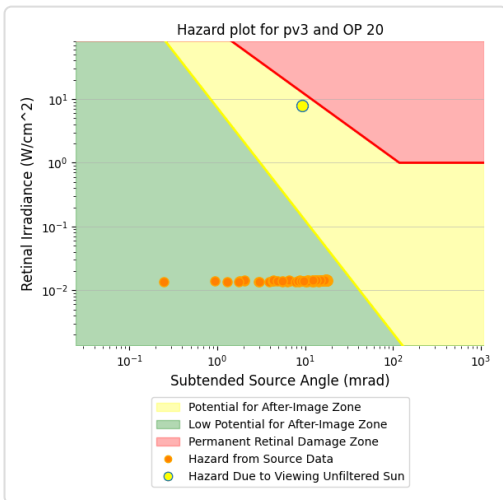
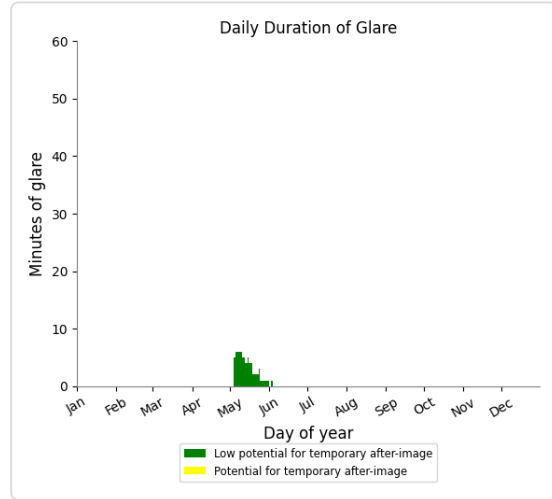
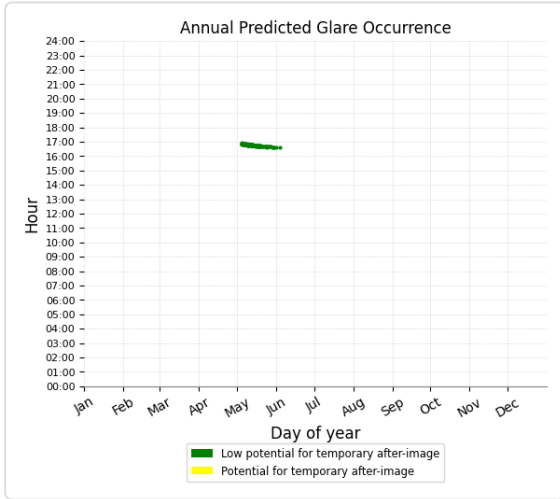
PV3 and OP 17

Yellow glare: none
 Green glare: 138 min.



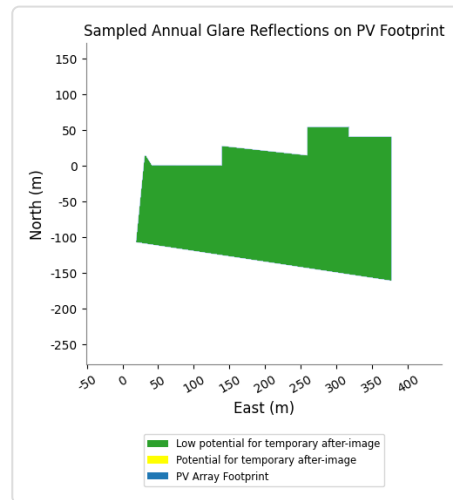
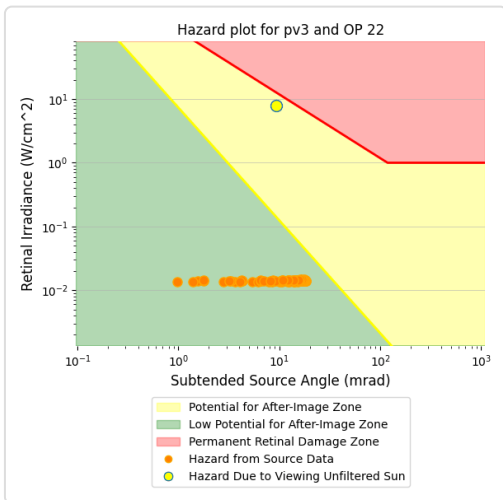
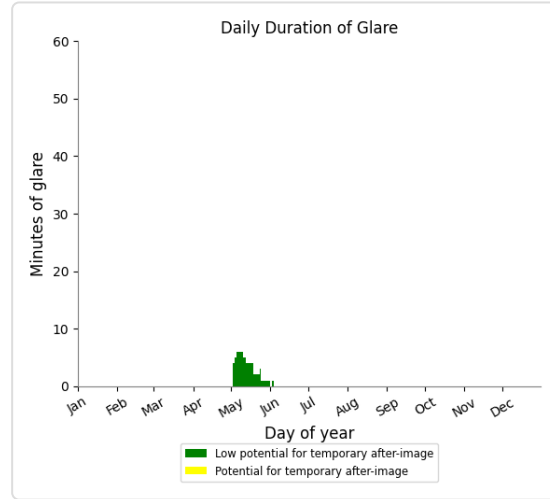
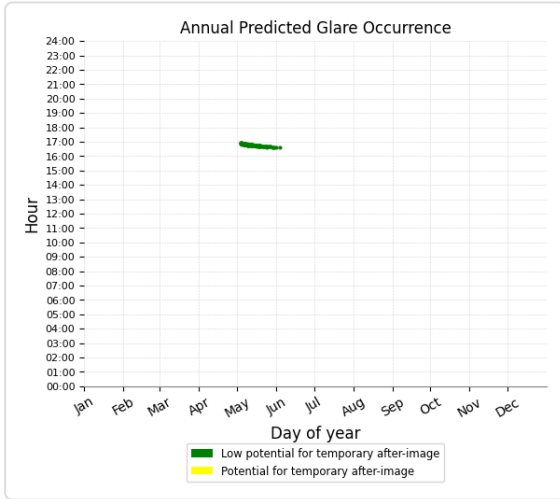
PV3 and OP 20

Yellow glare: none
 Green glare: 96 min.



PV3 and OP 22

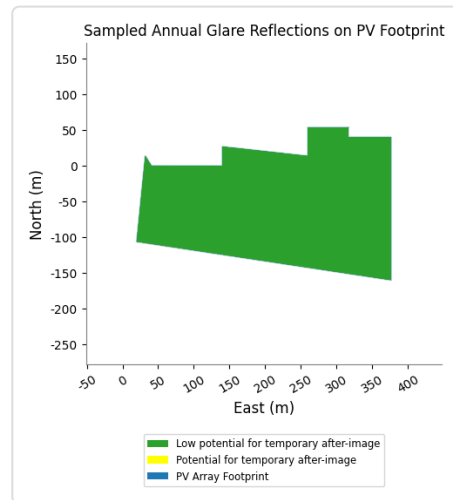
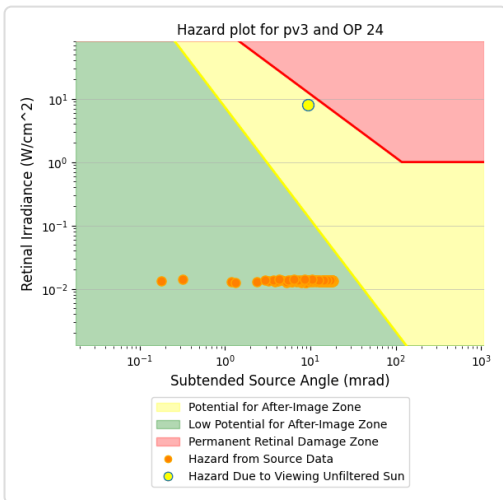
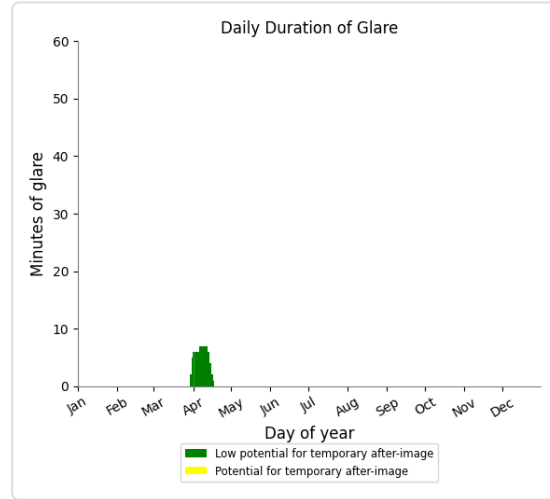
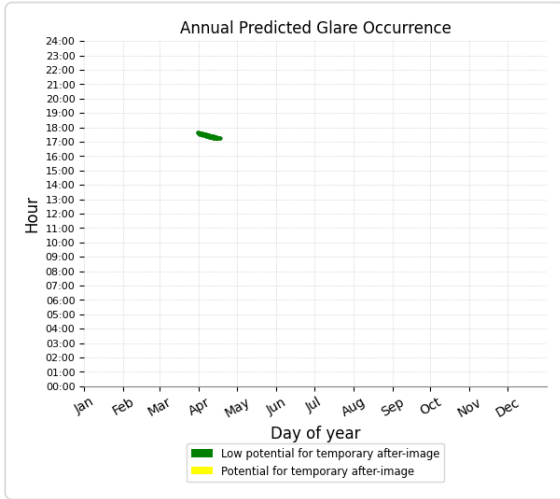
Yellow glare: none
Green glare: 99 min.



PV3 and OP 24

Yellow glare: none

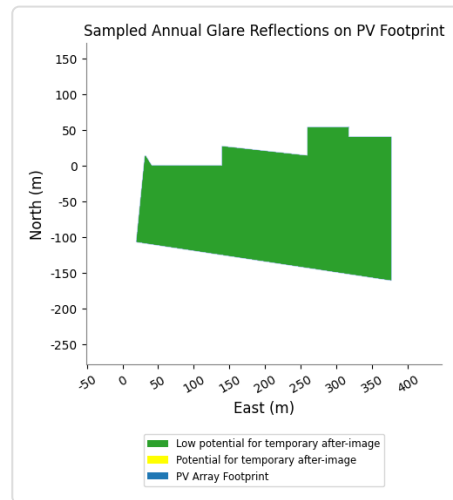
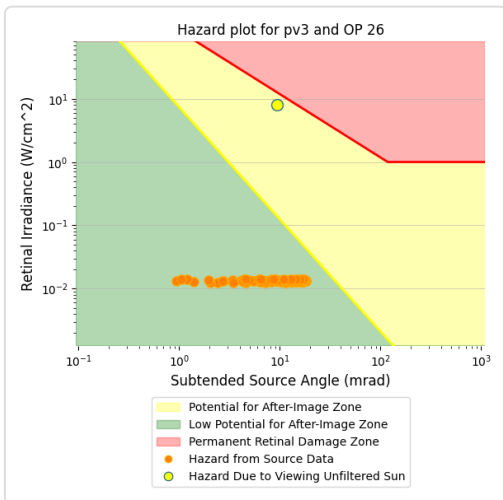
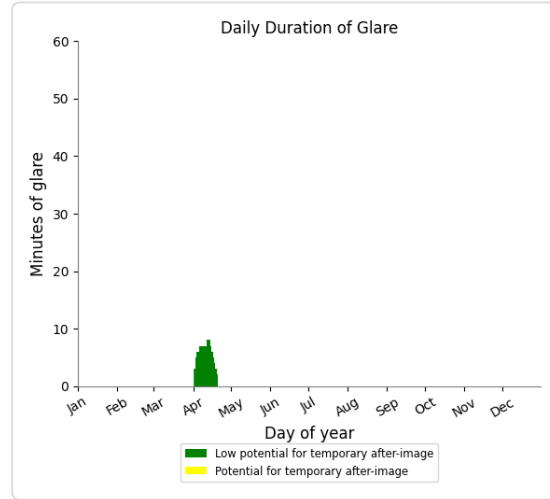
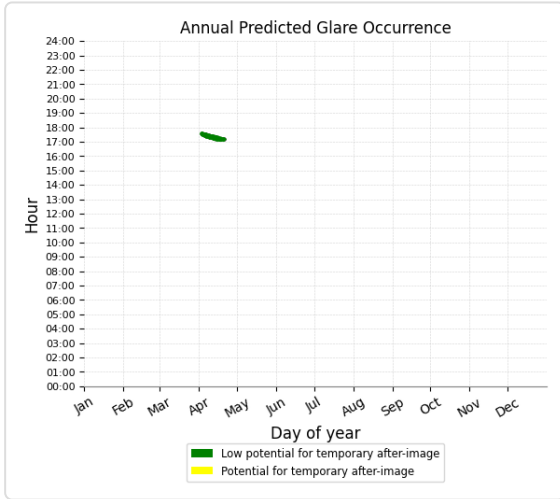
Green glare: 103 min.



PV3 and OP 26

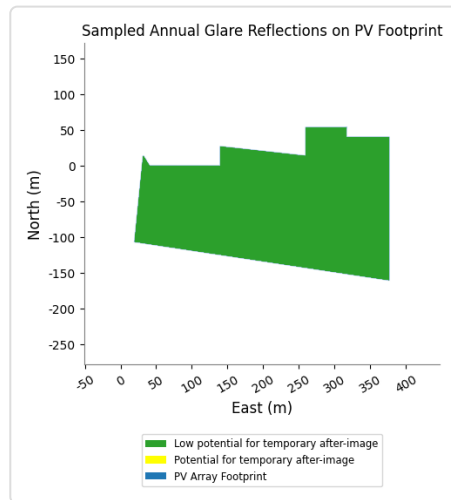
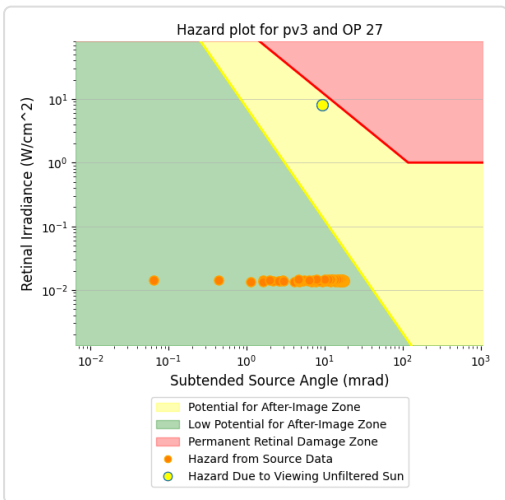
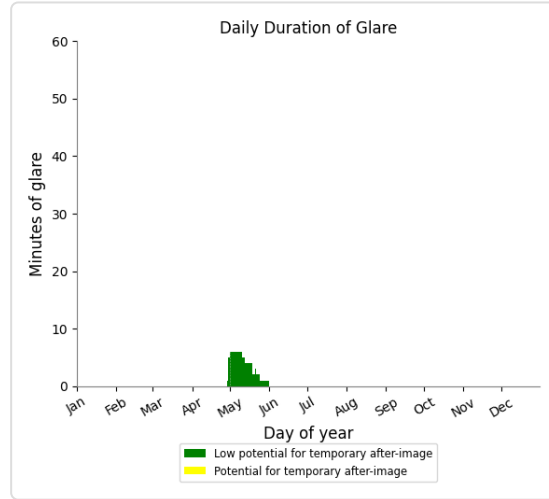
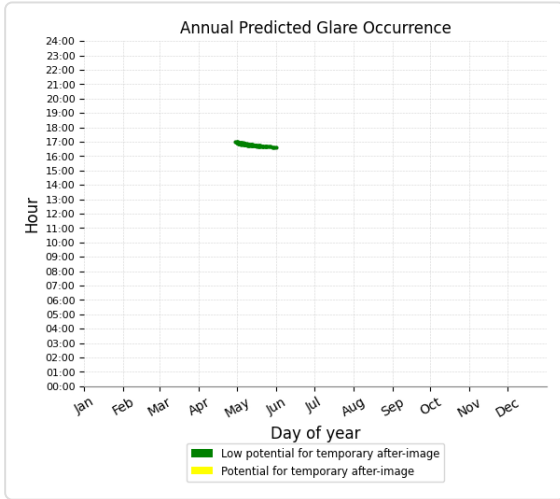
Yellow glare: none

Green glare: 113 min.



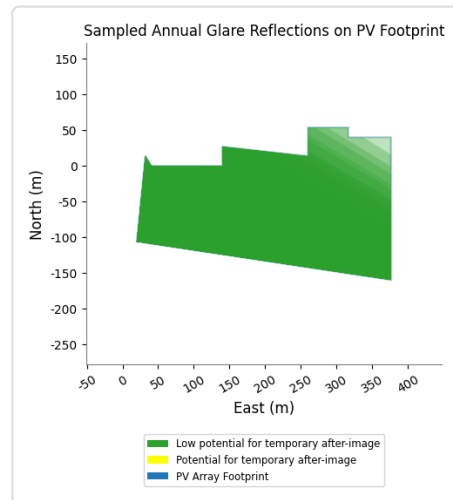
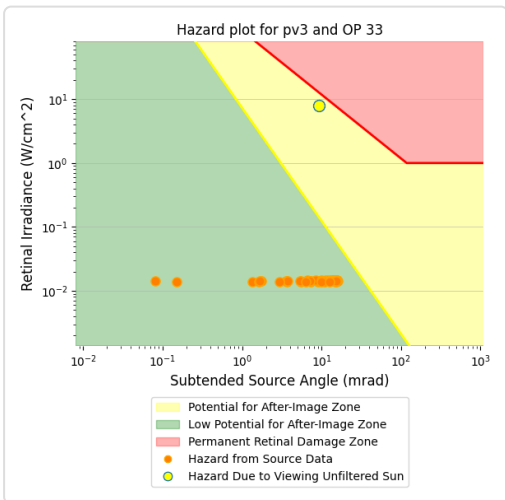
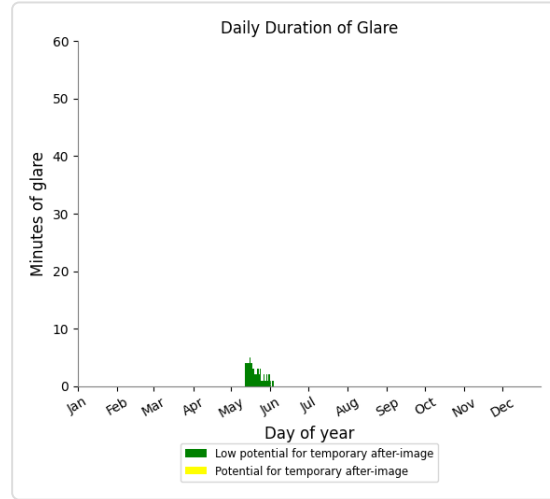
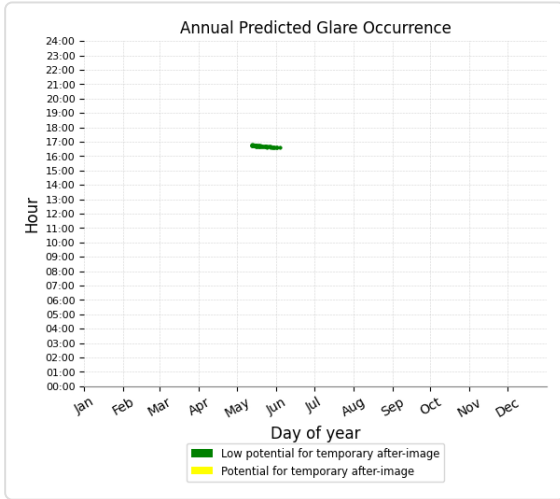
PV3 and OP 27

Yellow glare: none
 Green glare: 120 min.



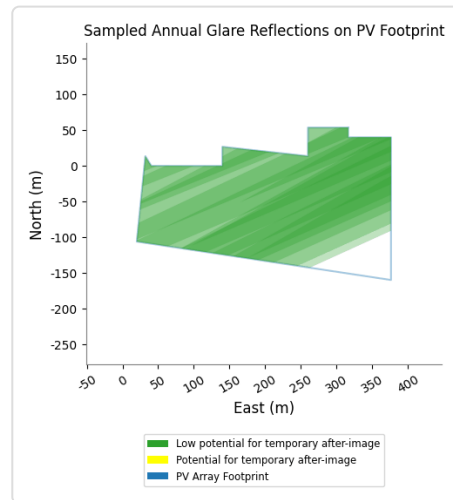
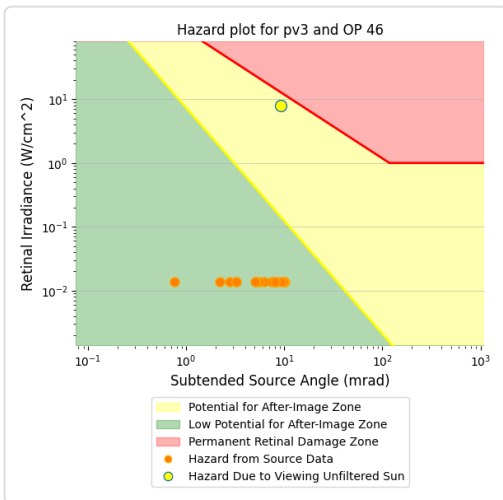
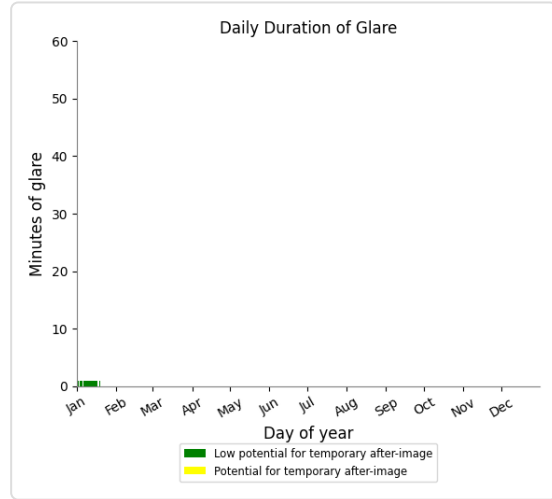
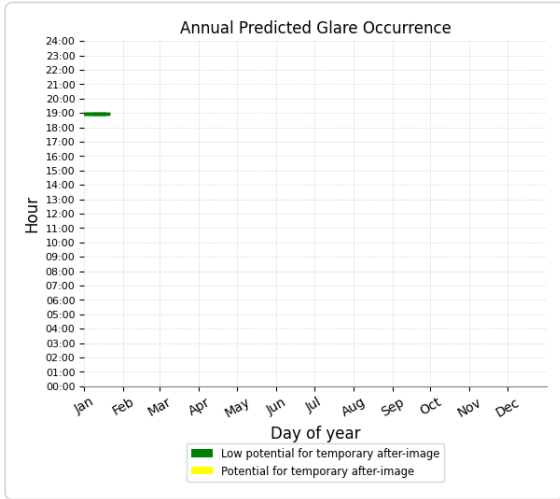
PV3 and OP 33

Yellow glare: none
 Green glare: 55 min.



PV3 and OP 46

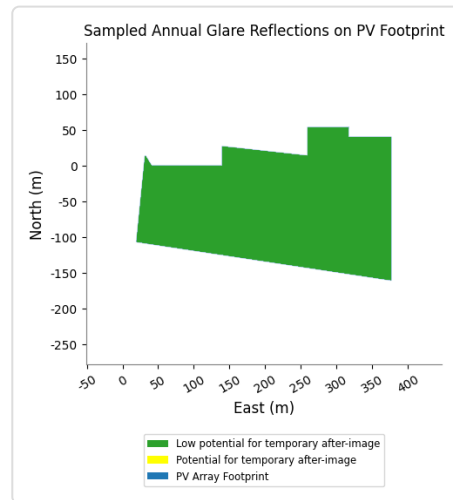
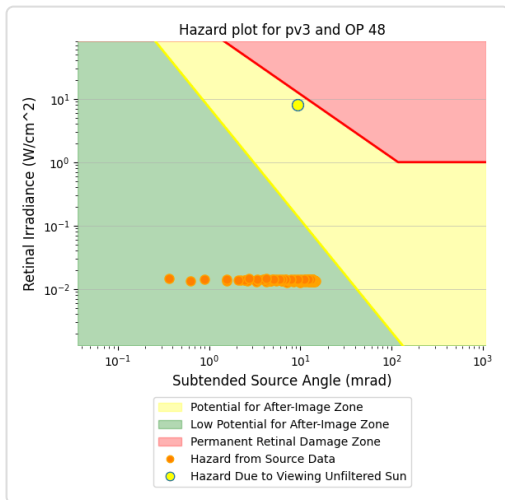
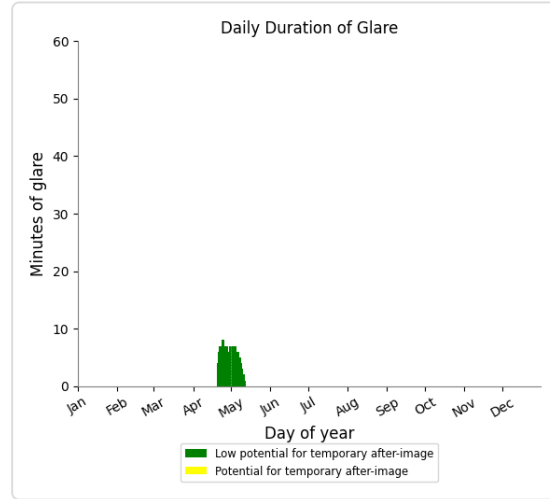
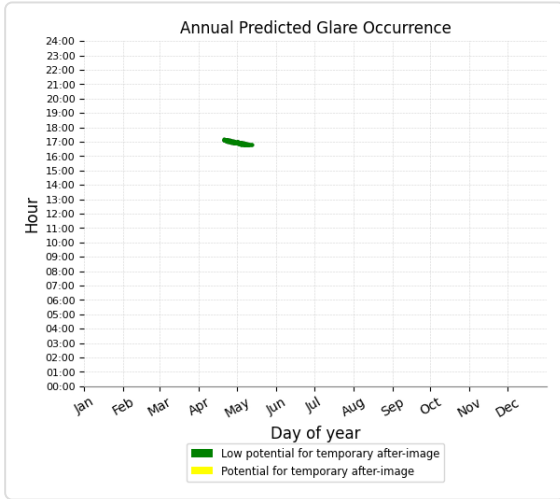
Yellow glare: none
 Green glare: 16 min.



PV3 and OP 48

Yellow glare: none

Green glare: 136 min.



PV3 and OP 1

No glare found

PV3 and OP 2

No glare found

PV3 and OP 3

No glare found

PV3 and OP 4

No glare found

PV3 and OP 5

No glare found

PV3 and OP 7

No glare found

PV3 and OP 8

No glare found

PV3 and OP 9

No glare found

PV3 and OP 11

No glare found

PV3 and OP 19

No glare found

PV3 and OP 25

No glare found

PV3 and OP 31

No glare found

PV3 and OP 35

No glare found

PV3 and OP 37

No glare found

PV3 and OP 44

No glare found

PV3 and OP 47

No glare found

PV3 and OP 49

No glare found

PV3 and OP 69

No glare found

PV3 and OP 70

No glare found

PV3 and OP 71

No glare found

PV: PV4 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV4 and Route: Main Western Railway

No glare found

PV4 and Route: Tarana Road

No glare found

PV4 and OP 1

No glare found

PV4 and OP 2

No glare found

PV4 and OP 3

No glare found

PV4 and OP 4

No glare found

PV4 and OP 5

No glare found

PV4 and OP 6

No glare found

PV4 and OP 7

No glare found

PV4 and OP 8

No glare found

PV4 and OP 9

No glare found

PV4 and OP 10

No glare found

PV4 and OP 11

No glare found

PV4 and OP 12

No glare found

PV4 and OP 16

No glare found

PV4 and OP 17

No glare found

PV4 and OP 19

No glare found

PV4 and OP 20

No glare found

PV4 and OP 22

No glare found

PV4 and OP 24

No glare found

PV4 and OP 25

No glare found

PV4 and OP 26

No glare found

PV4 and OP 27

No glare found

PV4 and OP 31

No glare found

PV4 and OP 33

No glare found

PV4 and OP 35

No glare found

PV4 and OP 37

No glare found

PV4 and OP 44

No glare found

PV4 and OP 46

No glare found

PV4 and OP 47

No glare found

PV4 and OP 48

No glare found

PV4 and OP 49

No glare found

PV4 and OP 69

No glare found

PV4 and OP 70

No glare found

PV4 and OP 71

No glare found

PV: PV5 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV5 and Route: Main Western Railway

No glare found

PV5 and Route: Tarana Road

No glare found

PV5 and OP 1

No glare found

PV5 and OP 2

No glare found

PV5 and OP 3

No glare found

PV5 and OP 4

No glare found

PV5 and OP 5

No glare found

PV5 and OP 6

No glare found

PV5 and OP 7

No glare found

PV5 and OP 8

No glare found

PV5 and OP 9

No glare found

PV5 and OP 10

No glare found

PV5 and OP 11

No glare found

PV5 and OP 12

No glare found

PV5 and OP 16

No glare found

PV5 and OP 17

No glare found

PV5 and OP 19

No glare found

PV5 and OP 20

No glare found

PV5 and OP 22

No glare found

PV5 and OP 24

No glare found

PV5 and OP 25

No glare found

PV5 and OP 26

No glare found

PV5 and OP 27

No glare found

PV5 and OP 31

No glare found

PV5 and OP 33

No glare found

PV5 and OP 35

No glare found

PV5 and OP 37

No glare found

PV5 and OP 44

No glare found

PV5 and OP 46

No glare found

PV5 and OP 47

No glare found

PV5 and OP 48

No glare found

PV5 and OP 49

No glare found

PV5 and OP 69

No glare found

PV5 and OP 70

No glare found

PV5 and OP 71

No glare found

PV: PV6 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV6 and Route: Main Western Railway

No glare found

PV6 and Route: Tarana Road

No glare found

PV6 and OP 1

No glare found

PV6 and OP 2

No glare found

PV6 and OP 3

No glare found

PV6 and OP 4

No glare found

PV6 and OP 5

No glare found

PV6 and OP 6

No glare found

PV6 and OP 7

No glare found

PV6 and OP 8

No glare found

PV6 and OP 9

No glare found

PV6 and OP 10

No glare found

PV6 and OP 11

No glare found

PV6 and OP 12

No glare found

PV6 and OP 16

No glare found

PV6 and OP 17

No glare found

PV6 and OP 19

No glare found

PV6 and OP 20

No glare found

PV6 and OP 22

No glare found

PV6 and OP 24

No glare found

PV6 and OP 25

No glare found

PV6 and OP 26

No glare found

PV6 and OP 27

No glare found

PV6 and OP 31

No glare found

PV6 and OP 33

No glare found

PV6 and OP 35

No glare found

PV6 and OP 37

No glare found

PV6 and OP 44

No glare found

PV6 and OP 46

No glare found

PV6 and OP 47

No glare found

PV6 and OP 48

No glare found

PV6 and OP 49

No glare found

PV6 and OP 69

No glare found

PV6 and OP 70

No glare found

PV6 and OP 71

No glare found

PV: PV7 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV7 and Route: Main Western Railway

No glare found

PV7 and Route: Tarana Road

No glare found

PV7 and OP 1

No glare found

PV7 and OP 2

No glare found

PV7 and OP 3

No glare found

PV7 and OP 4

No glare found

PV7 and OP 5

No glare found

PV7 and OP 6

No glare found

PV7 and OP 7

No glare found

PV7 and OP 8

No glare found

PV7 and OP 9

No glare found

PV7 and OP 10

No glare found

PV7 and OP 11

No glare found

PV7 and OP 12

No glare found

PV7 and OP 16

No glare found

PV7 and OP 17

No glare found

PV7 and OP 19

No glare found

PV7 and OP 20

No glare found

PV7 and OP 22

No glare found

PV7 and OP 24

No glare found

PV7 and OP 25

No glare found

PV7 and OP 26

No glare found

PV7 and OP 27

No glare found

PV7 and OP 31

No glare found

PV7 and OP 33

No glare found

PV7 and OP 35

No glare found

PV7 and OP 37

No glare found

PV7 and OP 44

No glare found

PV7 and OP 46

No glare found

PV7 and OP 47

No glare found

PV7 and OP 48

No glare found

PV7 and OP 49

No glare found

PV7 and OP 69

No glare found

PV7 and OP 70

No glare found

PV7 and OP 71

No glare found

PV: PV8 potential temporary after-image

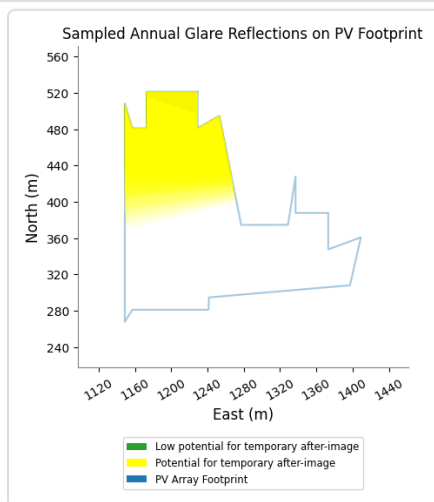
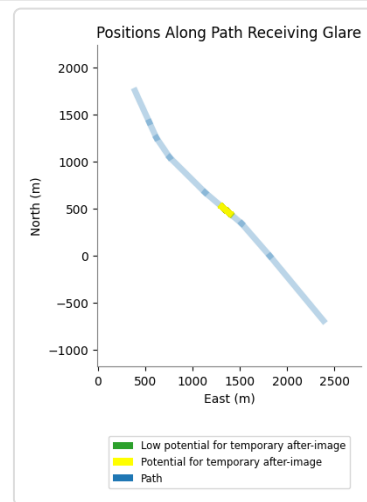
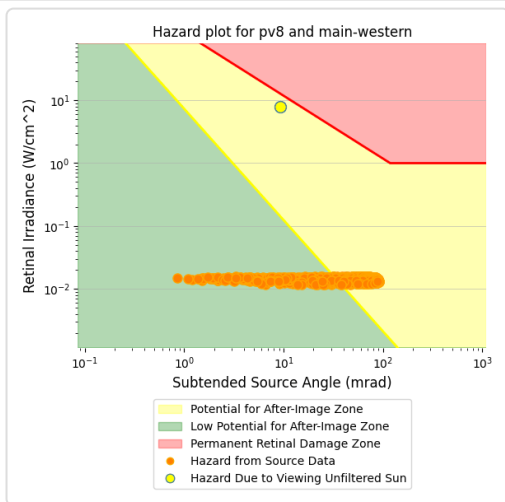
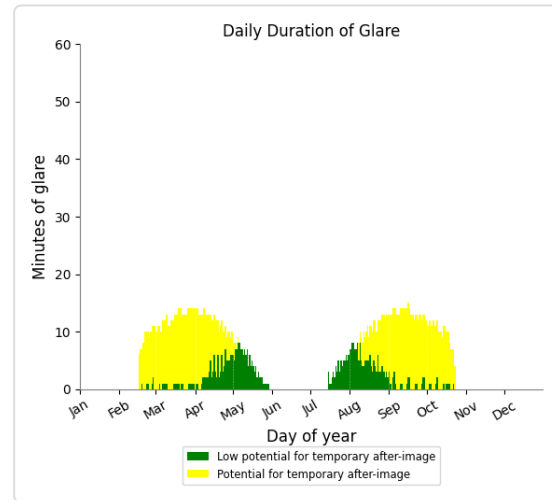
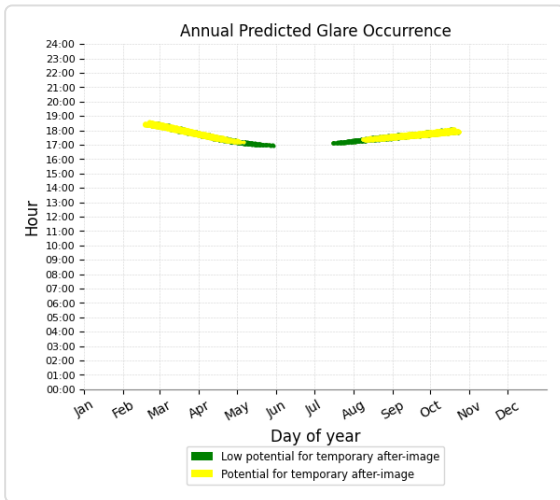
Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	497	8.3	1,506	25.1
Tarana Road	0	0.0	0	0.0
OP 35	200	3.3	0	0.0
OP 46	198	3.3	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV8 and Route: Main Western Railway

Yellow glare: 1,506 min.

Green glare: 497 min.



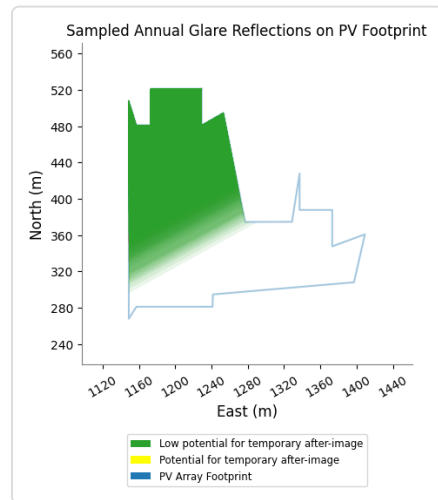
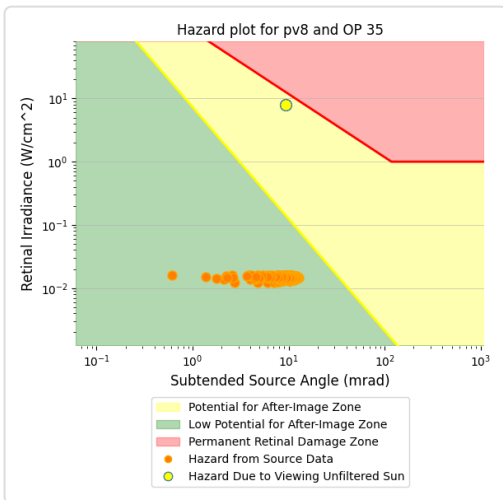
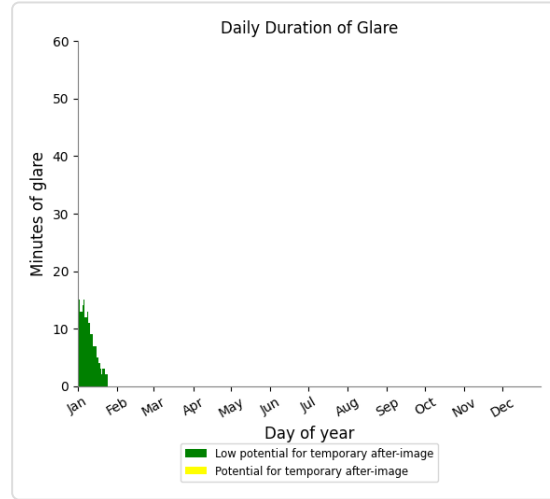
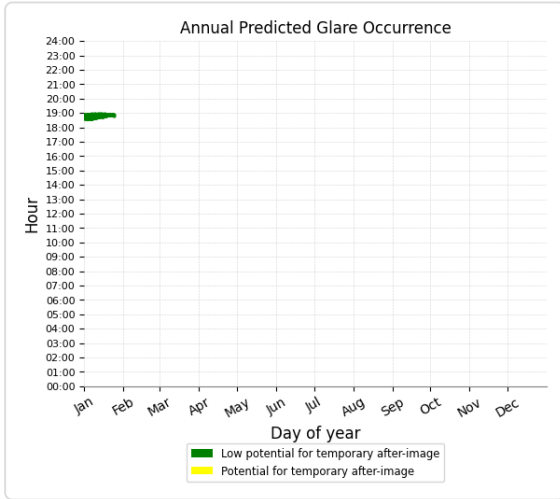
PV8 and Route: Tarana Road

No glare found

PV8 and OP 35

Yellow glare: none

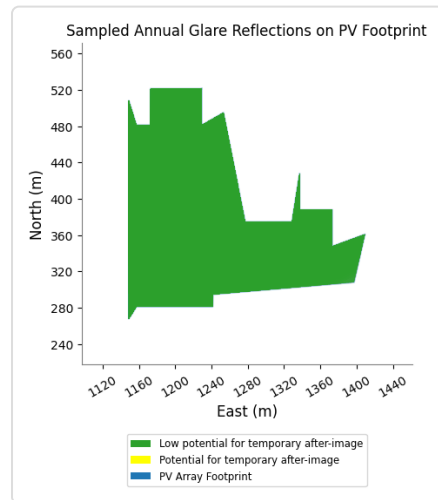
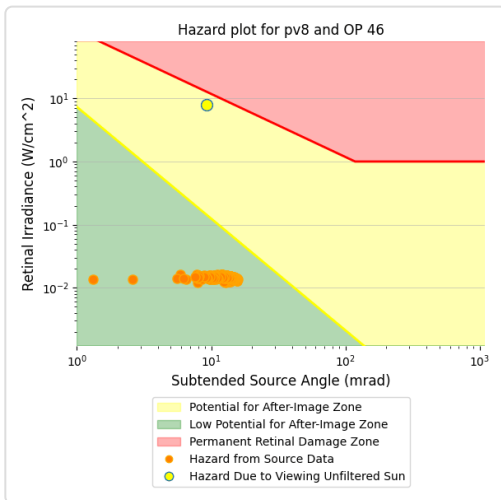
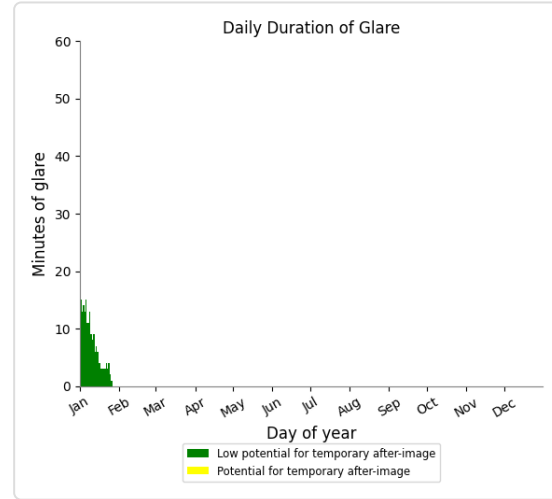
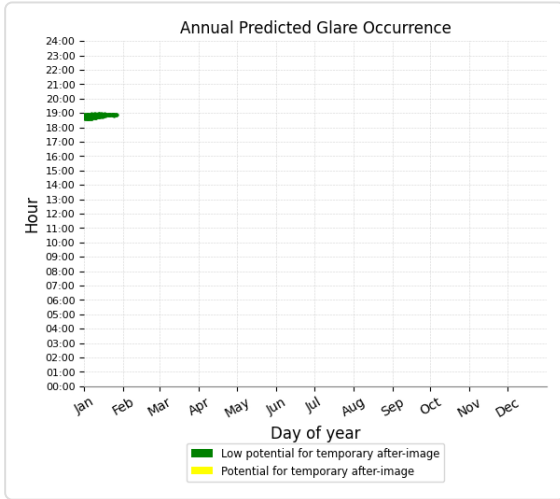
Green glare: 200 min.



PV8 and OP 46

Yellow glare: none

Green glare: 198 min.



PV8 and OP 1

No glare found

PV8 and OP 2

No glare found

PV8 and OP 3

No glare found

PV8 and OP 4

No glare found

PV8 and OP 5

No glare found

PV8 and OP 6

No glare found

PV8 and OP 7

No glare found

PV8 and OP 8

No glare found

PV8 and OP 9

No glare found

PV8 and OP 10

No glare found

PV8 and OP 11

No glare found

PV8 and OP 12

No glare found

PV8 and OP 16

No glare found

PV8 and OP 17

No glare found

PV8 and OP 19

No glare found

PV8 and OP 20

No glare found

PV8 and OP 22

No glare found

PV8 and OP 24

No glare found

PV8 and OP 25

No glare found

PV8 and OP 26

No glare found

PV8 and OP 27

No glare found

PV8 and OP 31

No glare found

PV8 and OP 33

No glare found

PV8 and OP 37

No glare found

PV8 and OP 44

No glare found

PV8 and OP 47

No glare found

PV8 and OP 48

No glare found

PV8 and OP 49

No glare found

PV8 and OP 69

No glare found

PV8 and OP 70

No glare found

PV8 and OP 71

No glare found

PV: PV9 potential temporary after-image

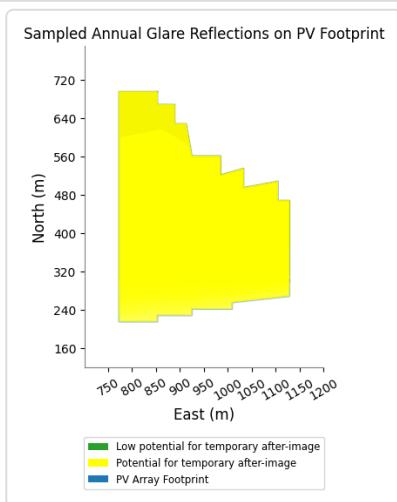
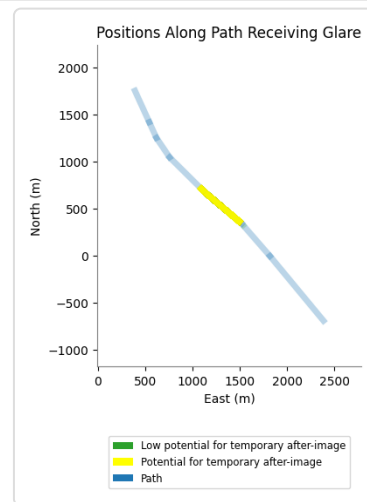
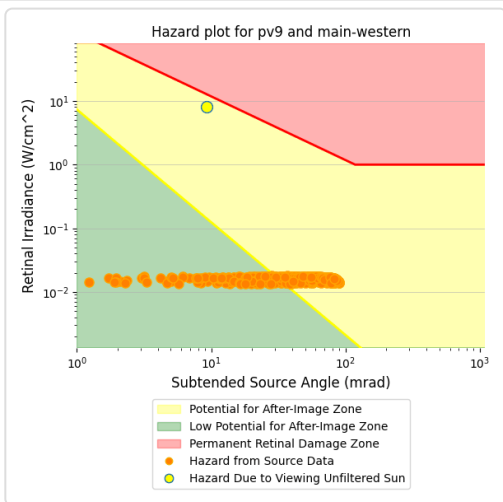
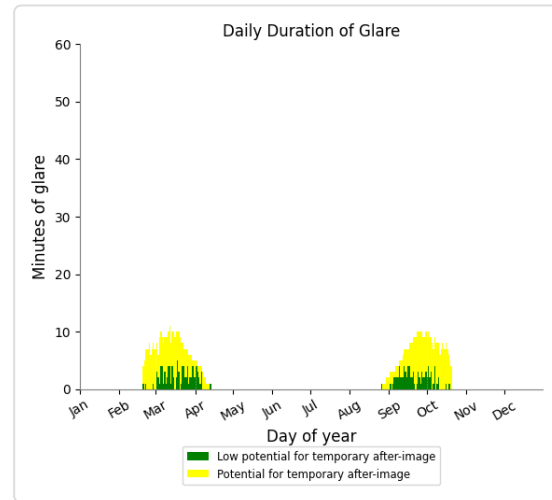
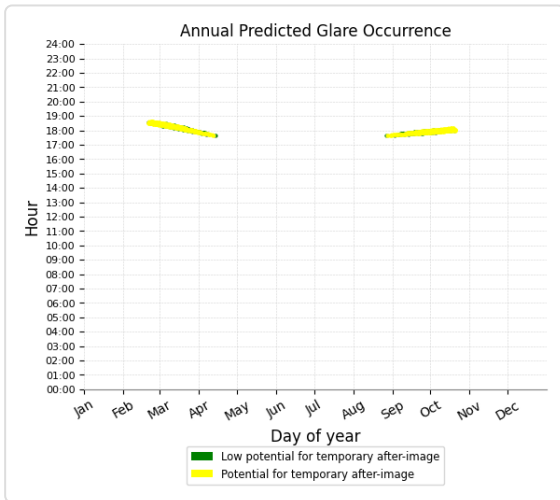
Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	178	3.0	540	9.0
Tarana Road	0	0.0	0	0.0
OP 5	211	3.5	0	0.0
OP 31	26	0.4	0	0.0
OP 35	273	4.5	0	0.0
OP 46	267	4.5	0	0.0
OP 69	208	3.5	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV9 and Route: Main Western Railway

Yellow glare: 540 min.

Green glare: 178 min.

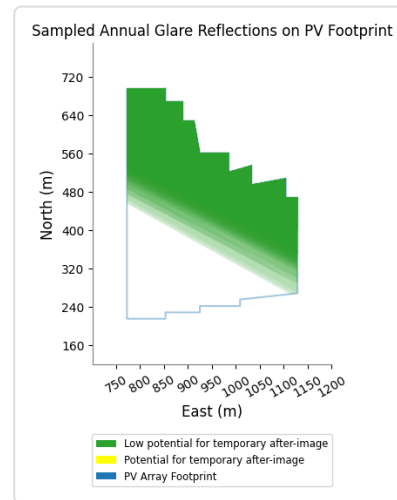
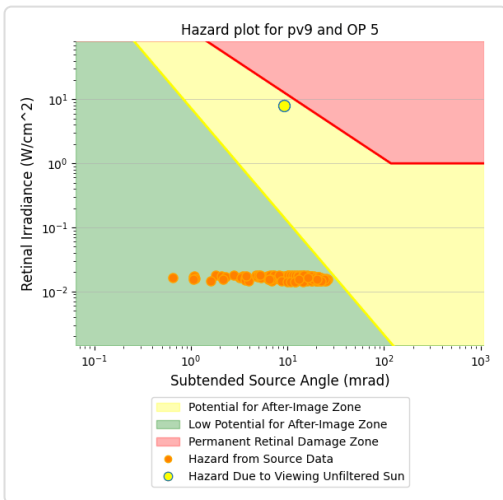
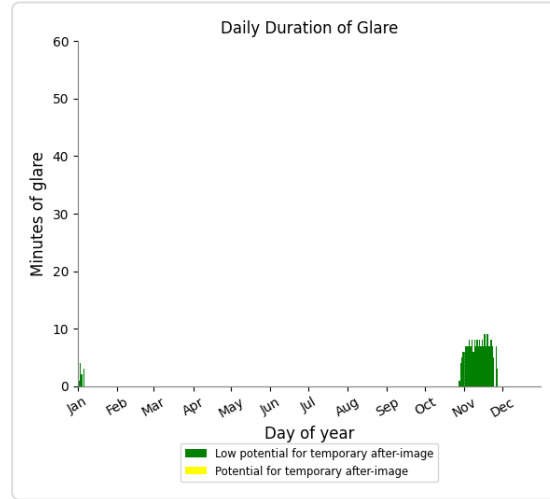
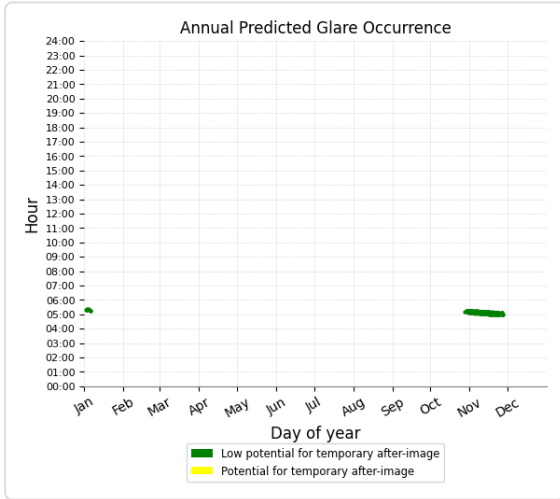


PV9 and Route: Tarana Road

No glare found

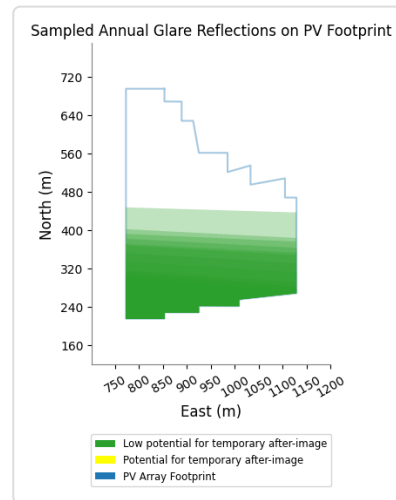
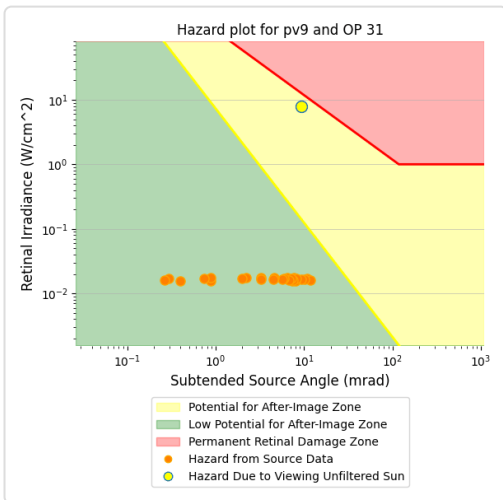
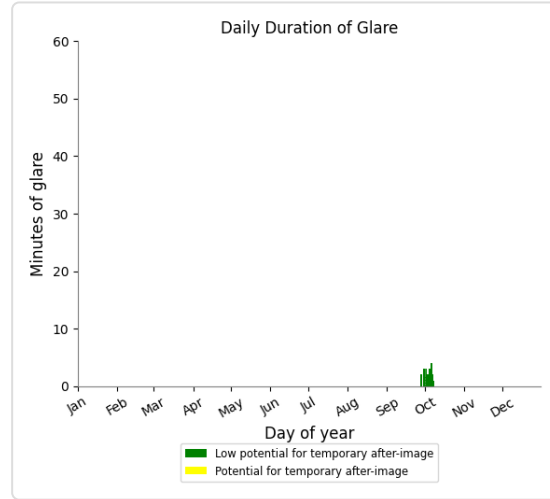
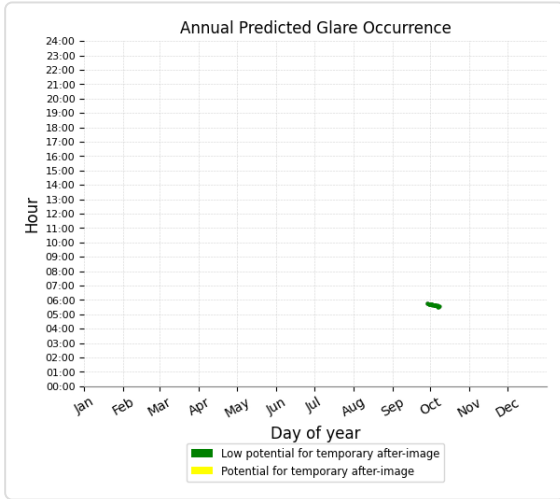
PV9 and OP 5

Yellow glare: none
 Green glare: 211 min.



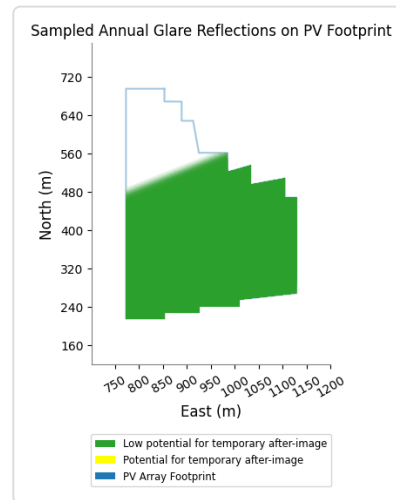
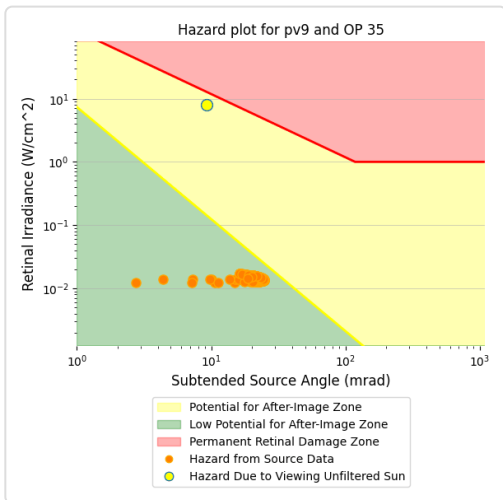
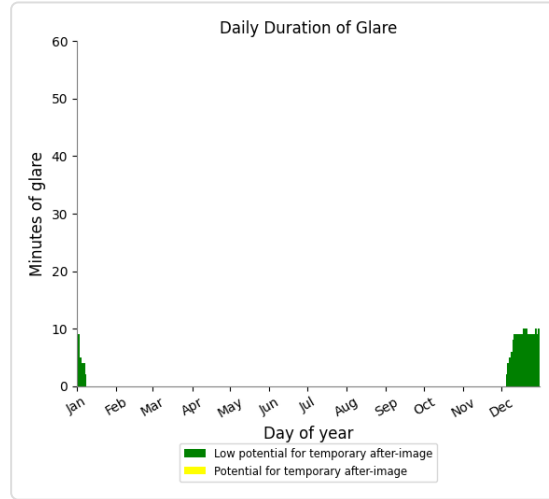
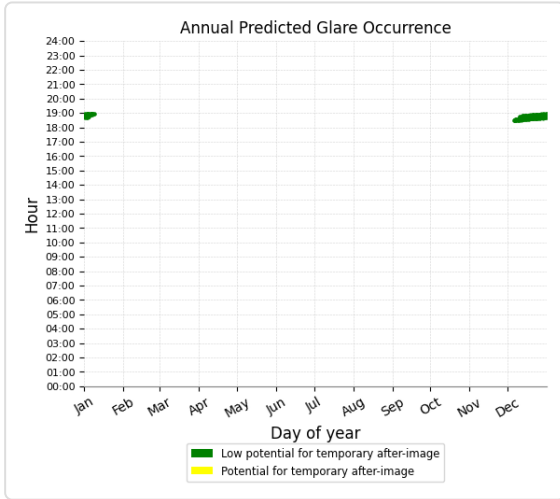
PV9 and OP 31

Yellow glare: none
 Green glare: 26 min.



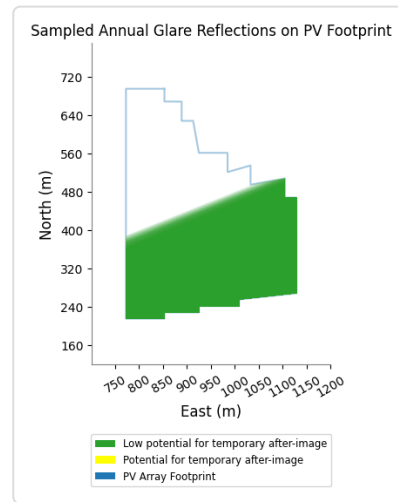
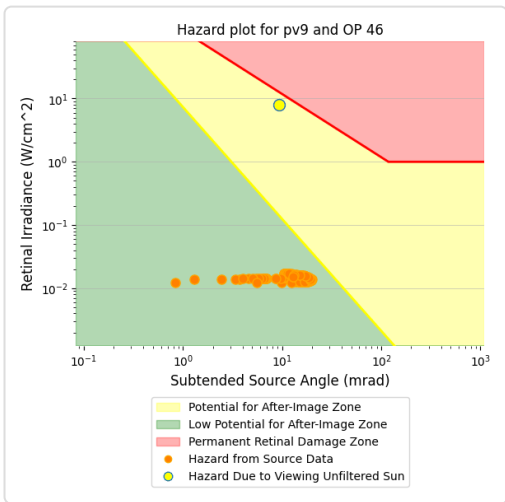
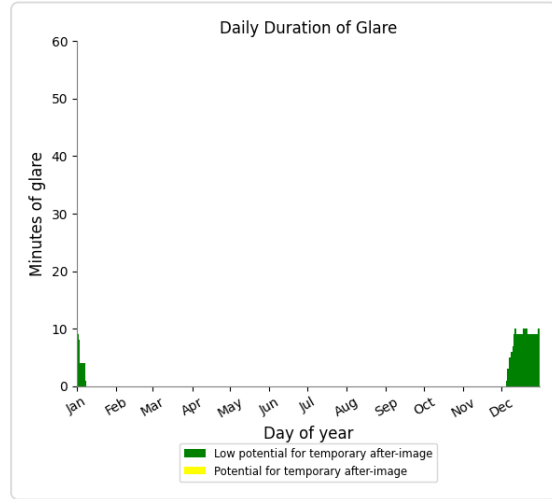
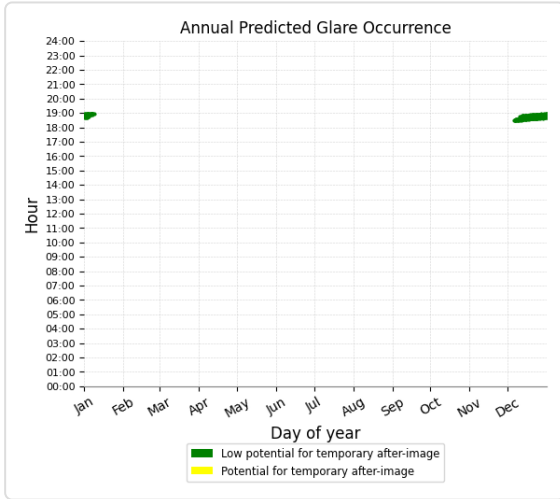
PV9 and OP 35

Yellow glare: none
 Green glare: 273 min.



PV9 and OP 46

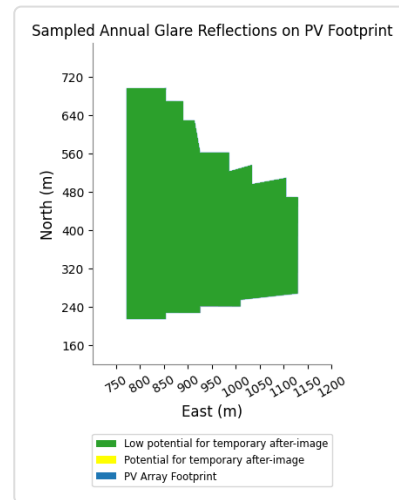
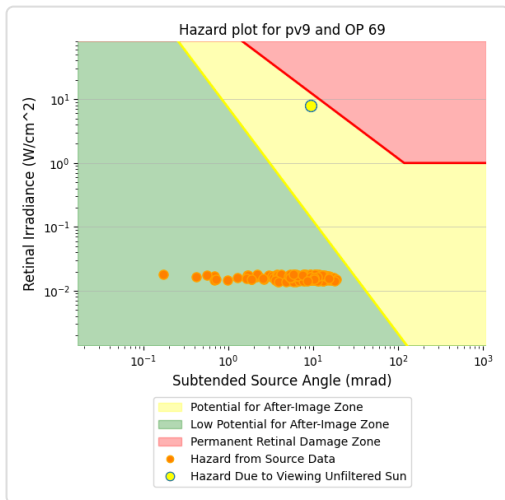
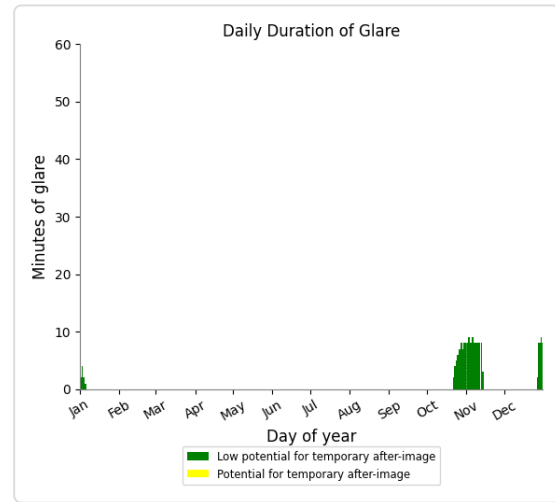
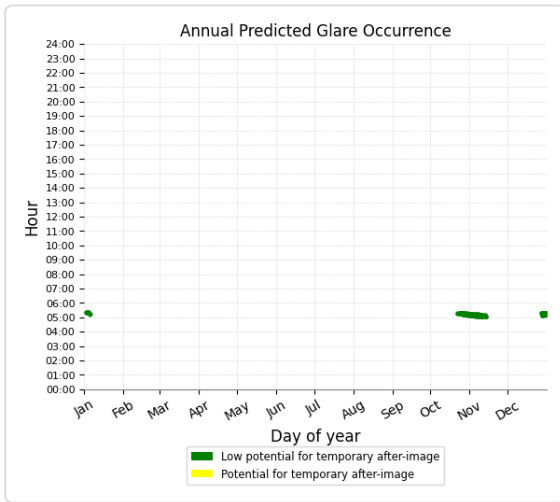
Yellow glare: none
 Green glare: 267 min.



PV9 and OP 69

Yellow glare: none

Green glare: 208 min.



PV9 and OP 1

No glare found

PV9 and OP 2

No glare found

PV9 and OP 3

No glare found

PV9 and OP 4

No glare found

PV9 and OP 6

No glare found

PV9 and OP 7

No glare found

PV9 and OP 8

No glare found

PV9 and OP 9

No glare found

PV9 and OP 10

No glare found

PV9 and OP 11

No glare found

PV9 and OP 12

No glare found

PV9 and OP 16

No glare found

PV9 and OP 17

No glare found

PV9 and OP 19

No glare found

PV9 and OP 20

No glare found

PV9 and OP 22

No glare found

PV9 and OP 24

No glare found

PV9 and OP 25

No glare found

PV9 and OP 26

No glare found

PV9 and OP 27

No glare found

PV9 and OP 33

No glare found

PV9 and OP 37

No glare found

PV9 and OP 44

No glare found

PV9 and OP 47

No glare found

PV9 and OP 48

No glare found

PV9 and OP 49

No glare found

PV9 and OP 70

No glare found

PV9 and OP 71

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.

The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.

Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.

Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.

The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.

The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)

The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.

The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.

The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.

Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.

Refer to the Help page at www.forgesolar.com/help/ for assumptions and limitations not listed here.

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

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

© Sims Industries d/b/a ForgeSolar, All Rights Reserved.

FORGESOLAR GLARE ANALYSIS

Project: 2523_BREWONGLE SOLAR FARM

The Project involves the construction and operation of a solar farm consisting of a solar photovoltaic energy (the PV Array) generating facility with an estimated capacity of 90 MW, and associated infrastructure, including transmission connection works and battery energy storage of up to 90 MW / 180 MWh.

Site configuration: **2523_BrewongleSF_5d**

Client: ERM

Created 26 Nov, 2024

Updated 26 Nov, 2024

Time-step 1 minute

Timezone offset UTC10

Minimum sun altitude 0.0 deg

DNI peaks at 1,000.0 W/m²

Category 10 MW to 100 MW

Site ID 135224.22175

Ocular transmission coefficient 0.5

Pupil diameter 0.002 m

Eye focal length 0.017 m

Sun subtended angle 9.3 mrad

PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt °	Orient °	Annual Green Glare		Annual Yellow Glare		Energy kWh
			min	hr	min	hr	
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	0	0.0	0	0.0	-
PV11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV9	SA tracking	SA tracking	0	0.0	0	0.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 0.0°
Max tracking angle: 55.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468244	149.681932	712.04	2.75	714.79
2	-33.469562	149.681803	710.00	2.75	712.75
3	-33.469081	149.678099	705.06	2.75	707.81
4	-33.468724	149.678099	705.02	2.75	707.77
5	-33.468724	149.678318	705.25	2.75	708.00
6	-33.468843	149.678318	705.37	2.75	708.12
7	-33.468842	149.679390	707.09	2.75	709.84
8	-33.468606	149.679390	707.03	2.75	709.78
9	-33.468606	149.680383	708.51	2.75	711.26
10	-33.468724	149.680383	708.35	2.75	711.10
11	-33.468724	149.680551	708.84	2.75	711.59
12	-33.468363	149.680551	709.05	2.75	711.80
13	-33.468484	149.681842	711.97	2.75	714.72

Name: PV10

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461256	149.688091	709.52	2.75	712.27
2	-33.461617	149.688091	711.11	2.75	713.86
3	-33.461617	149.688607	711.87	2.75	714.62
4	-33.461859	149.688607	712.57	2.75	715.32
5	-33.461860	149.689162	712.33	2.75	715.08
6	-33.461498	149.689162	710.73	2.75	713.48
7	-33.461498	149.689382	710.41	2.75	713.16
8	-33.461740	149.689382	711.61	2.75	714.36
9	-33.461742	149.690025	709.76	2.75	712.51
10	-33.466433	149.690027	721.90	2.75	724.65
11	-33.466552	149.688607	719.77	2.75	722.52
12	-33.466671	149.688607	719.57	2.75	722.32
13	-33.466671	149.687704	719.26	2.75	722.01
14	-33.466795	149.687704	718.91	2.75	721.66
15	-33.466795	149.686930	718.91	2.75	721.66
16	-33.466914	149.686930	718.56	2.75	721.31
17	-33.466914	149.686194	717.87	2.75	720.62
18	-33.462582	149.686195	711.73	2.75	714.48
19	-33.462582	149.686969	712.86	2.75	715.61
20	-33.462463	149.687059	712.82	2.75	715.57
21	-33.462825	149.687059	713.35	2.75	716.10
22	-33.462825	149.687356	713.76	2.75	716.51
23	-33.462463	149.687356	713.24	2.75	715.99
24	-33.462463	149.687614	713.24	2.75	715.99
25	-33.461379	149.687614	709.18	2.75	711.93

Name: PV11

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461974	149.685850	709.87	2.75	712.62
2	-33.462701	149.685850	711.51	2.75	714.26
3	-33.462701	149.685980	711.60	2.75	714.35
4	-33.467033	149.685979	717.22	2.75	719.97
5	-33.467033	149.685206	714.98	2.75	717.73
6	-33.467156	149.685205	714.62	2.75	717.37
7	-33.467156	149.684431	712.67	2.75	715.42
8	-33.467275	149.684431	712.51	2.75	715.26
9	-33.467517	149.682147	712.26	2.75	715.01
10	-33.466076	149.682147	709.66	2.75	712.41
11	-33.466076	149.682753	710.50	2.75	713.25
12	-33.466315	149.682753	710.64	2.75	713.39
13	-33.466314	149.683308	710.38	2.75	713.13
14	-33.465592	149.683308	710.92	2.75	713.67
15	-33.465592	149.683437	711.11	2.75	713.86
16	-33.464508	149.683567	709.72	2.75	712.47
17	-33.464508	149.683696	709.91	2.75	712.66
18	-33.463666	149.683696	709.69	2.75	712.44
19	-33.463666	149.683825	709.86	2.75	712.61
20	-33.462944	149.683825	709.80	2.75	712.55
21	-33.462944	149.683954	709.99	2.75	712.74
22	-33.461137	149.684212	706.63	2.75	709.38
23	-33.461018	149.685244	706.28	2.75	709.03
24	-33.460895	149.685244	705.95	2.75	708.70
25	-33.460895	149.685980	704.95	2.75	707.70
26	-33.461974	149.685980	710.06	2.75	712.81

Name: PV2

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468116	149.677884	705.00	2.75	707.75
2	-33.468116	149.677794	705.00	2.75	707.75
3	-33.467759	149.677794	704.88	2.75	707.63

Name: PV3

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467760	149.685334	713.15	2.75	715.90
2	-33.467883	149.685334	712.92	2.75	715.67
3	-33.467883	149.685979	713.75	2.75	716.50
4	-33.469685	149.685979	712.24	2.75	714.99
5	-33.469200	149.682147	709.59	2.75	712.34
6	-33.468121	149.682276	712.32	2.75	715.07
7	-33.468243	149.682366	712.26	2.75	715.01
8	-33.468245	149.683437	711.00	2.75	713.75
9	-33.468002	149.683437	711.00	2.75	713.75
10	-33.468121	149.684728	712.10	2.75	714.85
11	-33.467760	149.684728	712.24	2.75	714.99

Name: PV4

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467037	149.690027	721.82	2.75	724.57
2	-33.469562	149.690027	721.54	2.75	724.29
3	-33.469685	149.689640	720.63	2.75	723.38
4	-33.470166	149.689640	721.02	2.75	723.77
5	-33.470047	149.688259	716.62	2.75	719.37
6	-33.469924	149.688259	716.43	2.75	719.18
7	-33.469923	149.687227	715.50	2.75	718.25
8	-33.469805	149.687227	715.51	2.75	718.26
9	-33.469804	149.686323	712.61	2.75	715.36
10	-33.469685	149.686194	712.62	2.75	715.37
11	-33.467883	149.686194	714.36	2.75	717.11
12	-33.467883	149.686323	714.74	2.75	717.49
13	-33.467641	149.686323	715.55	2.75	718.30
14	-33.467641	149.687227	716.43	2.75	719.18
15	-33.467398	149.687227	717.13	2.75	719.88
16	-33.467522	149.688904	718.20	2.75	720.95
17	-33.467161	149.688904	719.11	2.75	721.86
18	-33.467280	149.689677	720.53	2.75	723.28
19	-33.467037	149.689808	721.21	2.75	723.96

Name: PV5

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.466438	149.694074	726.76	2.75	729.51
2	-33.470047	149.694074	730.12	2.75	732.87
3	-33.470047	149.693339	728.53	2.75	731.28
4	-33.469924	149.693339	728.48	2.75	731.23
5	-33.469923	149.692436	726.52	2.75	729.27
6	-33.469803	149.692436	726.42	2.75	729.17
7	-33.469804	149.691532	725.94	2.75	728.69
8	-33.469685	149.691532	725.78	2.75	728.53
9	-33.469562	149.690242	722.25	2.75	725.00
10	-33.467037	149.690242	722.21	2.75	724.96
11	-33.467160	149.691403	723.08	2.75	725.83
12	-33.466799	149.691403	723.00	2.75	725.75
13	-33.466918	149.691494	723.03	2.75	725.78
14	-33.466918	149.692436	724.42	2.75	727.17
15	-33.466676	149.692436	724.42	2.75	727.17
16	-33.466799	149.693855	726.21	2.75	728.96
17	-33.466438	149.693855	726.47	2.75	729.22

Name: PV6

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

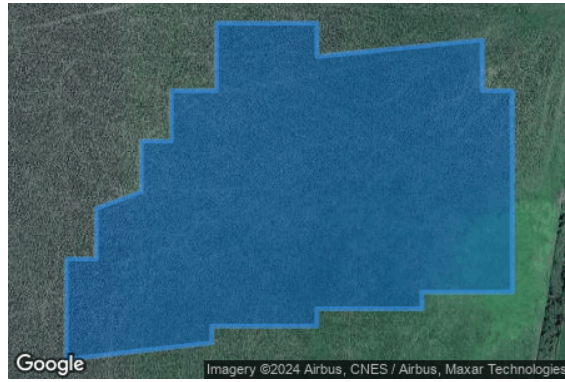
Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465715	149.680254	704.33	2.75	707.08
2	-33.465953	149.680254	704.97	2.75	707.72
3	-33.465834	149.681674	708.03	2.75	710.78
4	-33.466195	149.681674	709.10	2.75	711.85
5	-33.466195	149.681932	709.52	2.75	712.27
6	-33.467636	149.681932	712.09	2.75	714.84
7	-33.467636	149.681155	710.71	2.75	713.46
8	-33.467755	149.681158	710.91	2.75	713.66
9	-33.467755	149.680254	707.65	2.75	710.40
10	-33.467878	149.680254	707.75	2.75	710.50
11	-33.467879	149.679351	706.44	2.75	709.19
12	-33.467997	149.679351	706.55	2.75	709.30
13	-33.468116	149.678099	705.00	2.75	707.75
14	-33.467398	149.678099	703.90	2.75	706.65
15	-33.467398	149.678358	704.33	2.75	707.08
16	-33.467037	149.678358	703.72	2.75	706.47
17	-33.466918	149.678745	704.20	2.75	706.95
18	-33.466557	149.678745	703.68	2.75	706.43
19	-33.466557	149.679003	704.05	2.75	706.80
20	-33.466195	149.679003	703.63	2.75	706.38
21	-33.466196	149.679390	703.97	2.75	706.72
22	-33.465715	149.679390	703.03	2.75	705.78

Name: PV7

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465834	149.698251	729.17	2.75	731.92
2	-33.466195	149.698251	729.77	2.75	732.52
3	-33.466314	149.698767	729.11	2.75	731.86
4	-33.466675	149.698767	730.14	2.75	732.89
5	-33.466556	149.699025	729.41	2.75	732.16
6	-33.466918	149.699025	730.47	2.75	733.22
7	-33.466918	149.699412	730.32	2.75	733.07
8	-33.467279	149.699412	731.52	2.75	734.27
9	-33.467279	149.699541	731.52	2.75	734.27
10	-33.469081	149.699284	731.50	2.75	734.25
11	-33.469081	149.699154	731.31	2.75	734.06
12	-33.469804	149.699154	731.19	2.75	733.94
13	-33.469804	149.699026	731.01	2.75	733.76
14	-33.470526	149.699026	731.99	2.75	734.74
15	-33.470645	149.698896	731.85	2.75	734.60
16	-33.470645	149.698419	731.27	2.75	734.02
17	-33.470165	149.698290	729.94	2.75	732.69
18	-33.470165	149.697645	730.01	2.75	732.76
19	-33.470045	149.697645	730.01	2.75	732.76
20	-33.470045	149.697348	730.31	2.75	733.06
21	-33.470284	149.697348	730.16	2.75	732.91
22	-33.470526	149.697090	730.01	2.75	732.76
23	-33.470407	149.697000	730.17	2.75	732.92
24	-33.470408	149.696096	730.18	2.75	732.93
25	-33.470284	149.696096	730.37	2.75	733.12
26	-33.470284	149.695193	730.95	2.75	733.70
27	-33.470164	149.695193	731.12	2.75	733.87
28	-33.470165	149.694290	730.23	2.75	732.98
29	-33.467641	149.694289	726.20	2.75	728.95
30	-33.467761	149.696096	728.71	2.75	731.46
31	-33.467522	149.696096	728.36	2.75	731.11
32	-33.467522	149.696354	728.72	2.75	731.47
33	-33.466076	149.696483	727.11	2.75	729.86
34	-33.466195	149.697128	729.08	2.75	731.83
35	-33.465953	149.697347	729.07	2.75	731.82
36	-33.466195	149.697606	730.25	2.75	733.00
37	-33.466195	149.697902	730.12	2.75	732.87
38	-33.465834	149.697902	729.24	2.75	731.99

Name: PV8

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.463547	149.695154	716.96	2.75	719.71
2	-33.463909	149.695154	717.89	2.75	720.64
3	-33.463785	149.695412	718.47	2.75	721.22
4	-33.464869	149.695670	722.31	2.75	725.06
5	-33.464868	149.696225	722.71	2.75	725.46
6	-33.464389	149.696315	722.25	2.75	725.00
7	-33.464750	149.696315	722.74	2.75	725.49
8	-33.464750	149.696702	724.08	2.75	726.83
9	-33.465111	149.696702	724.54	2.75	727.29
10	-33.464992	149.697089	725.20	2.75	727.95
11	-33.465468	149.696960	726.87	2.75	729.62
12	-33.465588	149.695287	725.83	2.75	728.58
13	-33.465711	149.695283	726.37	2.75	729.12
14	-33.465710	149.694379	726.92	2.75	729.67
15	-33.465830	149.694289	727.00	2.75	729.75
16	-33.463666	149.694289	714.23	2.75	716.98
17	-33.463908	149.694379	716.07	2.75	718.82
18	-33.463909	149.694547	716.39	2.75	719.14
19	-33.463547	149.694547	714.89	2.75	717.64

Name: PV9

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 5.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461979	149.691106	710.08	2.75	712.83
2	-33.462218	149.691106	710.78	2.75	713.53
3	-33.462221	149.691493	710.76	2.75	713.51
4	-33.462582	149.691493	712.21	2.75	714.96
5	-33.462582	149.691751	711.83	2.75	714.58
6	-33.463185	149.691880	714.44	2.75	717.19
7	-33.463186	149.692526	713.50	2.75	716.25
8	-33.463547	149.692526	715.31	2.75	718.06
9	-33.463424	149.693042	713.44	2.75	716.19
10	-33.463785	149.693042	715.30	2.75	718.05
11	-33.463666	149.693816	713.43	2.75	716.18
12	-33.464028	149.693816	716.06	2.75	718.81
13	-33.464029	149.694074	716.42	2.75	719.17
14	-33.465830	149.694074	726.97	2.75	729.72
15	-33.465948	149.692784	725.59	2.75	728.34
16	-33.466072	149.692784	725.41	2.75	728.16
17	-33.466070	149.691881	723.90	2.75	726.65
18	-33.466191	149.691881	723.80	2.75	726.55
19	-33.466191	149.691106	722.83	2.75	725.58
20	-33.466310	149.691106	722.92	2.75	725.67
21	-33.466310	149.690242	722.18	2.75	724.93
22	-33.461979	149.690242	710.51	2.75	713.26

Route Receptors

Name: Main Western Railway

Path type: Two-way

Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.452459	149.686142	723.80	2.40	726.20
2	-33.455466	149.687773	720.32	2.40	722.72
3	-33.456970	149.688589	720.13	2.40	722.53
4	-33.458832	149.690091	719.38	2.40	721.78
5	-33.462197	149.694125	715.06	2.40	717.46
6	-33.465169	149.698287	726.56	2.40	728.96
7	-33.468283	149.701506	731.81	2.40	734.21
8	-33.474477	149.707600	744.99	2.40	747.39

Name: Tarana Road
Path type: Two-way
Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.471332	149.667158	692.99	2.40	695.39
2	-33.472088	149.669127	685.53	2.40	687.93
3	-33.472167	149.669334	685.24	2.40	687.64
4	-33.472258	149.669629	684.90	2.40	687.30
5	-33.472310	149.669894	684.66	2.40	687.06
6	-33.472328	149.670144	684.42	2.40	686.82
7	-33.472310	149.670527	684.20	2.40	686.60
8	-33.472274	149.670999	683.71	2.40	686.11
9	-33.472276	149.671313	683.01	2.40	685.41
10	-33.472303	149.671571	682.47	2.40	684.87
11	-33.472375	149.671793	683.01	2.40	685.41
12	-33.472498	149.672029	683.52	2.40	685.92
13	-33.472654	149.672271	684.13	2.40	686.53
14	-33.473695	149.673810	693.83	2.40	696.23
15	-33.473842	149.674054	695.40	2.40	697.80
16	-33.473963	149.674301	696.93	2.40	699.33
17	-33.474093	149.674666	698.07	2.40	700.47
18	-33.474158	149.674922	698.74	2.40	701.14
19	-33.474199	149.675175	698.83	2.40	701.23
20	-33.474290	149.675808	698.89	2.40	701.29
21	-33.476988	149.697974	732.47	2.40	734.87
22	-33.477033	149.698547	733.60	2.40	736.00
23	-33.477098	149.699792	738.54	2.40	740.94
24	-33.477138	149.700395	740.88	2.40	743.28
25	-33.477221	149.701085	743.94	2.40	746.34
26	-33.478061	149.705443	754.83	2.40	757.23

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-33.475005	149.677853	702.00	1.50
OP 2	2	-33.476396	149.683227	708.00	1.50
OP 3	3	-33.477733	149.696943	734.00	1.50
OP 4	4	-33.477509	149.694812	740.00	1.50
OP 5	5	-33.457469	149.675977	708.00	1.50
OP 6	6	-33.472491	149.711617	764.00	1.50
OP 7	7	-33.472053	149.664301	706.00	1.50
OP 8	8	-33.468208	149.663383	704.00	1.50
OP 9	9	-33.480154	149.672563	706.00	1.50
OP 10	10	-33.479932	149.709933	750.00	1.50
OP 11	11	-33.450425	149.698480	746.00	1.50
OP 12	12	-33.479473	149.711014	752.00	1.50
OP 16	16	-33.479595	149.712948	758.00	1.50
OP 17	17	-33.479749	149.713331	758.00	1.50
OP 19	19	-33.479036	149.663413	682.00	1.50
OP 20	20	-33.480862	149.712656	752.00	1.50
OP 22	22	-33.480734	149.712824	752.00	1.50
OP 24	24	-33.473910	149.717093	778.00	1.50
OP 25	25	-33.449927	149.704263	748.00	1.50
OP 26	26	-33.474732	149.717528	778.00	1.50
OP 27	27	-33.480660	149.714556	756.00	1.50
OP 31	31	-33.463473	149.656149	732.00	1.50
OP 33	33	-33.483764	149.715699	756.00	1.50
OP 35	35	-33.454568	149.718002	756.00	1.50
OP 37	37	-33.490140	149.678831	686.00	1.50
OP 44	44	-33.465595	149.648931	732.00	1.50
OP 46	46	-33.453549	149.723560	770.00	1.50
OP 47	47	-33.435763	149.683463	748.00	1.50
OP 48	48	-33.482054	149.726800	790.00	1.50
OP 49	49	-33.435494	149.691598	762.00	1.50
OP 69	69	-33.453238	149.658153	734.00	1.50
OP 70	70	-33.477170	149.674507	757.00	1.50
OP 71	71	-33.453117	149.698347	756.00	1.50

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
			min	hr	min	hr	kWh
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	0	0.0	0	0.0	-
PV11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV9	SA tracking	SA tracking	0	0.0	0	0.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV: PV1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV1 and Route: Main Western Railway

No glare found

PV1 and Route: Tarana Road

No glare found

PV1 and OP 1

No glare found

PV1 and OP 2

No glare found

PV1 and OP 3

No glare found

PV1 and OP 4

No glare found

PV1 and OP 5

No glare found

PV1 and OP 6

No glare found

PV1 and OP 7

No glare found

PV1 and OP 8

No glare found

PV1 and OP 9

No glare found

PV1 and OP 10

No glare found

PV1 and OP 11

No glare found

PV1 and OP 12

No glare found

PV1 and OP 16

No glare found

PV1 and OP 17

No glare found

PV1 and OP 19

No glare found

PV1 and OP 20

No glare found

PV1 and OP 22

No glare found

PV1 and OP 24

No glare found

PV1 and OP 25

No glare found

PV1 and OP 26

No glare found

PV1 and OP 27

No glare found

PV1 and OP 31

No glare found

PV1 and OP 33

No glare found

PV1 and OP 35

No glare found

PV1 and OP 37

No glare found

PV1 and OP 44

No glare found

PV1 and OP 46

No glare found

PV1 and OP 47

No glare found

PV1 and OP 48

No glare found

PV1 and OP 49

No glare found

PV1 and OP 69

No glare found

PV1 and OP 70

No glare found

PV1 and OP 71

No glare found

PV: PV10 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV10 and Route: Main Western Railway

No glare found

PV10 and Route: Tarana Road

No glare found

PV10 and OP 1

No glare found

PV10 and OP 2

No glare found

PV10 and OP 3

No glare found

PV10 and OP 4

No glare found

PV10 and OP 5

No glare found

PV10 and OP 6

No glare found

PV10 and OP 7

No glare found

PV10 and OP 8

No glare found

PV10 and OP 9

No glare found

PV10 and OP 10

No glare found

PV10 and OP 11

No glare found

PV10 and OP 12

No glare found

PV10 and OP 16

No glare found

PV10 and OP 17

No glare found

PV10 and OP 19

No glare found

PV10 and OP 20

No glare found

PV10 and OP 22

No glare found

PV10 and OP 24

No glare found

PV10 and OP 25

No glare found

PV10 and OP 26

No glare found

PV10 and OP 27

No glare found

PV10 and OP 31

No glare found

PV10 and OP 33

No glare found

PV10 and OP 35

No glare found

PV10 and OP 37

No glare found

PV10 and OP 44

No glare found

PV10 and OP 46

No glare found

PV10 and OP 47

No glare found

PV10 and OP 48

No glare found

PV10 and OP 49

No glare found

PV10 and OP 69

No glare found

PV10 and OP 70

No glare found

PV10 and OP 71

No glare found

PV: PV11 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV11 and Route: Main Western Railway

No glare found

PV11 and Route: Tarana Road

No glare found

PV11 and OP 1

No glare found

PV11 and OP 2

No glare found

PV11 and OP 3

No glare found

PV11 and OP 4

No glare found

PV11 and OP 5

No glare found

PV11 and OP 6

No glare found

PV11 and OP 7

No glare found

PV11 and OP 8

No glare found

PV11 and OP 9

No glare found

PV11 and OP 10

No glare found

PV11 and OP 11

No glare found

PV11 and OP 12

No glare found

PV11 and OP 16

No glare found

PV11 and OP 17

No glare found

PV11 and OP 19

No glare found

PV11 and OP 20

No glare found

PV11 and OP 22

No glare found

PV11 and OP 24

No glare found

PV11 and OP 25

No glare found

PV11 and OP 26

No glare found

PV11 and OP 27

No glare found

PV11 and OP 31

No glare found

PV11 and OP 33

No glare found

PV11 and OP 35

No glare found

PV11 and OP 37

No glare found

PV11 and OP 44

No glare found

PV11 and OP 46

No glare found

PV11 and OP 47

No glare found

PV11 and OP 48

No glare found

PV11 and OP 49

No glare found

PV11 and OP 69

No glare found

PV11 and OP 70

No glare found

PV11 and OP 71

No glare found

PV: PV2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV2 and Route: Main Western Railway

No glare found

PV2 and Route: Tarana Road

No glare found

PV2 and OP 1

No glare found

PV2 and OP 2

No glare found

PV2 and OP 3

No glare found

PV2 and OP 4

No glare found

PV2 and OP 5

No glare found

PV2 and OP 6

No glare found

PV2 and OP 7

No glare found

PV2 and OP 8

No glare found

PV2 and OP 9

No glare found

PV2 and OP 10

No glare found

PV2 and OP 11

No glare found

PV2 and OP 12

No glare found

PV2 and OP 16

No glare found

PV2 and OP 17

No glare found

PV2 and OP 19

No glare found

PV2 and OP 20

No glare found

PV2 and OP 22

No glare found

PV2 and OP 24

No glare found

PV2 and OP 25

No glare found

PV2 and OP 26

No glare found

PV2 and OP 27

No glare found

PV2 and OP 31

No glare found

PV2 and OP 33

No glare found

PV2 and OP 35

No glare found

PV2 and OP 37

No glare found

PV2 and OP 44

No glare found

PV2 and OP 46

No glare found

PV2 and OP 47

No glare found

PV2 and OP 48

No glare found

PV2 and OP 49

No glare found

PV2 and OP 69

No glare found

PV2 and OP 70

No glare found

PV2 and OP 71

No glare found

PV: PV3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV3 and Route: Main Western Railway

No glare found

PV3 and Route: Tarana Road

No glare found

PV3 and OP 1

No glare found

PV3 and OP 2

No glare found

PV3 and OP 3

No glare found

PV3 and OP 4

No glare found

PV3 and OP 5

No glare found

PV3 and OP 6

No glare found

PV3 and OP 7

No glare found

PV3 and OP 8

No glare found

PV3 and OP 9

No glare found

PV3 and OP 10

No glare found

PV3 and OP 11

No glare found

PV3 and OP 12

No glare found

PV3 and OP 16

No glare found

PV3 and OP 17

No glare found

PV3 and OP 19

No glare found

PV3 and OP 20

No glare found

PV3 and OP 22

No glare found

PV3 and OP 24

No glare found

PV3 and OP 25

No glare found

PV3 and OP 26

No glare found

PV3 and OP 27

No glare found

PV3 and OP 31

No glare found

PV3 and OP 33

No glare found

PV3 and OP 35

No glare found

PV3 and OP 37

No glare found

PV3 and OP 44

No glare found

PV3 and OP 46

No glare found

PV3 and OP 47

No glare found

PV3 and OP 48

No glare found

PV3 and OP 49

No glare found

PV3 and OP 69

No glare found

PV3 and OP 70

No glare found

PV3 and OP 71

No glare found

PV: PV4 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV4 and Route: Main Western Railway

No glare found

PV4 and Route: Tarana Road

No glare found

PV4 and OP 1

No glare found

PV4 and OP 2

No glare found

PV4 and OP 3

No glare found

PV4 and OP 4

No glare found

PV4 and OP 5

No glare found

PV4 and OP 6

No glare found

PV4 and OP 7

No glare found

PV4 and OP 8

No glare found

PV4 and OP 9

No glare found

PV4 and OP 10

No glare found

PV4 and OP 11

No glare found

PV4 and OP 12

No glare found

PV4 and OP 16

No glare found

PV4 and OP 17

No glare found

PV4 and OP 19

No glare found

PV4 and OP 20

No glare found

PV4 and OP 22

No glare found

PV4 and OP 24

No glare found

PV4 and OP 25

No glare found

PV4 and OP 26

No glare found

PV4 and OP 27

No glare found

PV4 and OP 31

No glare found

PV4 and OP 33

No glare found

PV4 and OP 35

No glare found

PV4 and OP 37

No glare found

PV4 and OP 44

No glare found

PV4 and OP 46

No glare found

PV4 and OP 47

No glare found

PV4 and OP 48

No glare found

PV4 and OP 49

No glare found

PV4 and OP 69

No glare found

PV4 and OP 70

No glare found

PV4 and OP 71

No glare found

PV: PV5 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV5 and Route: Main Western Railway

No glare found

PV5 and Route: Tarana Road

No glare found

PV5 and OP 1

No glare found

PV5 and OP 2

No glare found

PV5 and OP 3

No glare found

PV5 and OP 4

No glare found

PV5 and OP 5

No glare found

PV5 and OP 6

No glare found

PV5 and OP 7

No glare found

PV5 and OP 8

No glare found

PV5 and OP 9

No glare found

PV5 and OP 10

No glare found

PV5 and OP 11

No glare found

PV5 and OP 12

No glare found

PV5 and OP 16

No glare found

PV5 and OP 17

No glare found

PV5 and OP 19

No glare found

PV5 and OP 20

No glare found

PV5 and OP 22

No glare found

PV5 and OP 24

No glare found

PV5 and OP 25

No glare found

PV5 and OP 26

No glare found

PV5 and OP 27

No glare found

PV5 and OP 31

No glare found

PV5 and OP 33

No glare found

PV5 and OP 35

No glare found

PV5 and OP 37

No glare found

PV5 and OP 44

No glare found

PV5 and OP 46

No glare found

PV5 and OP 47

No glare found

PV5 and OP 48

No glare found

PV5 and OP 49

No glare found

PV5 and OP 69

No glare found

PV5 and OP 70

No glare found

PV5 and OP 71

No glare found

PV: PV6 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV6 and Route: Main Western Railway

No glare found

PV6 and Route: Tarana Road

No glare found

PV6 and OP 1

No glare found

PV6 and OP 2

No glare found

PV6 and OP 3

No glare found

PV6 and OP 4

No glare found

PV6 and OP 5

No glare found

PV6 and OP 6

No glare found

PV6 and OP 7

No glare found

PV6 and OP 8

No glare found

PV6 and OP 9

No glare found

PV6 and OP 10

No glare found

PV6 and OP 11

No glare found

PV6 and OP 12

No glare found

PV6 and OP 16

No glare found

PV6 and OP 17

No glare found

PV6 and OP 19

No glare found

PV6 and OP 20

No glare found

PV6 and OP 22

No glare found

PV6 and OP 24

No glare found

PV6 and OP 25

No glare found

PV6 and OP 26

No glare found

PV6 and OP 27

No glare found

PV6 and OP 31

No glare found

PV6 and OP 33

No glare found

PV6 and OP 35

No glare found

PV6 and OP 37

No glare found

PV6 and OP 44

No glare found

PV6 and OP 46

No glare found

PV6 and OP 47

No glare found

PV6 and OP 48

No glare found

PV6 and OP 49

No glare found

PV6 and OP 69

No glare found

PV6 and OP 70

No glare found

PV6 and OP 71

No glare found

PV: PV7 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV7 and Route: Main Western Railway

No glare found

PV7 and Route: Tarana Road

No glare found

PV7 and OP 1

No glare found

PV7 and OP 2

No glare found

PV7 and OP 3

No glare found

PV7 and OP 4

No glare found

PV7 and OP 5

No glare found

PV7 and OP 6

No glare found

PV7 and OP 7

No glare found

PV7 and OP 8

No glare found

PV7 and OP 9

No glare found

PV7 and OP 10

No glare found

PV7 and OP 11

No glare found

PV7 and OP 12

No glare found

PV7 and OP 16

No glare found

PV7 and OP 17

No glare found

PV7 and OP 19

No glare found

PV7 and OP 20

No glare found

PV7 and OP 22

No glare found

PV7 and OP 24

No glare found

PV7 and OP 25

No glare found

PV7 and OP 26

No glare found

PV7 and OP 27

No glare found

PV7 and OP 31

No glare found

PV7 and OP 33

No glare found

PV7 and OP 35

No glare found

PV7 and OP 37

No glare found

PV7 and OP 44

No glare found

PV7 and OP 46

No glare found

PV7 and OP 47

No glare found

PV7 and OP 48

No glare found

PV7 and OP 49

No glare found

PV7 and OP 69

No glare found

PV7 and OP 70

No glare found

PV7 and OP 71

No glare found

PV: PV8 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV8 and Route: Main Western Railway

No glare found

PV8 and Route: Tarana Road

No glare found

PV8 and OP 1

No glare found

PV8 and OP 2

No glare found

PV8 and OP 3

No glare found

PV8 and OP 4

No glare found

PV8 and OP 5

No glare found

PV8 and OP 6

No glare found

PV8 and OP 7

No glare found

PV8 and OP 8

No glare found

PV8 and OP 9

No glare found

PV8 and OP 10

No glare found

PV8 and OP 11

No glare found

PV8 and OP 12

No glare found

PV8 and OP 16

No glare found

PV8 and OP 17

No glare found

PV8 and OP 19

No glare found

PV8 and OP 20

No glare found

PV8 and OP 22

No glare found

PV8 and OP 24

No glare found

PV8 and OP 25

No glare found

PV8 and OP 26

No glare found

PV8 and OP 27

No glare found

PV8 and OP 31

No glare found

PV8 and OP 33

No glare found

PV8 and OP 35

No glare found

PV8 and OP 37

No glare found

PV8 and OP 44

No glare found

PV8 and OP 46

No glare found

PV8 and OP 47

No glare found

PV8 and OP 48

No glare found

PV8 and OP 49

No glare found

PV8 and OP 69

No glare found

PV8 and OP 70

No glare found

PV8 and OP 71

No glare found

PV: PV9 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV9 and Route: Main Western Railway

No glare found

PV9 and Route: Tarana Road

No glare found

PV9 and OP 1

No glare found

PV9 and OP 2

No glare found

PV9 and OP 3

No glare found

PV9 and OP 4

No glare found

PV9 and OP 5

No glare found

PV9 and OP 6

No glare found

PV9 and OP 7

No glare found

PV9 and OP 8

No glare found

PV9 and OP 9

No glare found

PV9 and OP 10

No glare found

PV9 and OP 11

No glare found

PV9 and OP 12

No glare found

PV9 and OP 16

No glare found

PV9 and OP 17

No glare found

PV9 and OP 19

No glare found

PV9 and OP 20

No glare found

PV9 and OP 22

No glare found

PV9 and OP 24

No glare found

PV9 and OP 25

No glare found

PV9 and OP 26

No glare found

PV9 and OP 27

No glare found

PV9 and OP 31

No glare found

PV9 and OP 33

No glare found

PV9 and OP 35

No glare found

PV9 and OP 37

No glare found

PV9 and OP 44

No glare found

PV9 and OP 46

No glare found

PV9 and OP 47

No glare found

PV9 and OP 48

No glare found

PV9 and OP 49

No glare found

PV9 and OP 69

No glare found

PV9 and OP 70

No glare found

PV9 and OP 71

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.

The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.

Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.

Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.

The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.

The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)

The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.

The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.

The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.

Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.

Refer to the Help page at www.forgesolar.com/help/ for assumptions and limitations not listed here.

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

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

© Sims Industries d/b/a ForgeSolar, All Rights Reserved.

FORGESOLAR GLARE ANALYSIS

Project: 2523_BREWONGLE SOLAR FARM

The Project involves the construction and operation of a solar farm consisting of a solar photovoltaic energy (the PV Array) generating facility with an estimated capacity of 90 MW, and associated infrastructure, including transmission connection works and battery energy storage of up to 90 MW / 180 MWh.

Site configuration: **2523_BREWONGLE SOLAR FARM_22D**

Client: ERM

Created 08 Oct, 2024

Updated 26 Nov, 2024

Time-step 1 minute

Timezone offset UTC10

Minimum sun altitude 0.0 deg

DNI peaks at 1,000.0 W/m²

Category 10 MW to 100 MW

Site ID 130707.22175

Ocular transmission coefficient 0.5

Pupil diameter 0.002 m

Eye focal length 0.017 m

Sun subtended angle 9.3 mrad

PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt °	Orient °	Annual Green Glare		Annual Yellow Glare		Energy kWh
			min	hr	min	hr	
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	0	0.0	0	0.0	-
PV11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV9	SA tracking	SA tracking	0	0.0	0	0.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 0.0°
Max tracking angle: 55.0°
Resting angle: 22.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468244	149.681932	712.04	2.75	714.79
2	-33.469562	149.681803	710.00	2.75	712.75
3	-33.469081	149.678099	705.06	2.75	707.81
4	-33.468724	149.678099	705.02	2.75	707.77
5	-33.468724	149.678318	705.25	2.75	708.00
6	-33.468843	149.678318	705.37	2.75	708.12
7	-33.468842	149.679390	707.09	2.75	709.84
8	-33.468606	149.679390	707.03	2.75	709.78
9	-33.468606	149.680383	708.51	2.75	711.26
10	-33.468724	149.680383	708.35	2.75	711.10
11	-33.468724	149.680551	708.84	2.75	711.59
12	-33.468363	149.680551	709.05	2.75	711.80
13	-33.468484	149.681842	711.97	2.75	714.72

Name: PV10

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461256	149.688091	709.52	2.75	712.27
2	-33.461617	149.688091	711.11	2.75	713.86
3	-33.461617	149.688607	711.87	2.75	714.62
4	-33.461859	149.688607	712.57	2.75	715.32
5	-33.461860	149.689162	712.33	2.75	715.08
6	-33.461498	149.689162	710.73	2.75	713.48
7	-33.461498	149.689382	710.41	2.75	713.16
8	-33.461740	149.689382	711.61	2.75	714.36
9	-33.461742	149.690025	709.76	2.75	712.51
10	-33.466433	149.690027	721.90	2.75	724.65
11	-33.466552	149.688607	719.77	2.75	722.52
12	-33.466671	149.688607	719.57	2.75	722.32
13	-33.466671	149.687704	719.26	2.75	722.01
14	-33.466795	149.687704	718.91	2.75	721.66
15	-33.466795	149.686930	718.91	2.75	721.66
16	-33.466914	149.686930	718.56	2.75	721.31
17	-33.466914	149.686194	717.87	2.75	720.62
18	-33.462582	149.686195	711.73	2.75	714.48
19	-33.462582	149.686969	712.86	2.75	715.61
20	-33.462463	149.687059	712.82	2.75	715.57
21	-33.462825	149.687059	713.35	2.75	716.10
22	-33.462825	149.687356	713.76	2.75	716.51
23	-33.462463	149.687356	713.24	2.75	715.99
24	-33.462463	149.687614	713.24	2.75	715.99
25	-33.461379	149.687614	709.18	2.75	711.93

Name: PV11

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461974	149.685850	709.87	2.75	712.62
2	-33.462701	149.685850	711.51	2.75	714.26
3	-33.462701	149.685980	711.60	2.75	714.35
4	-33.467033	149.685979	717.22	2.75	719.97
5	-33.467033	149.685206	714.98	2.75	717.73
6	-33.467156	149.685205	714.62	2.75	717.37
7	-33.467156	149.684431	712.67	2.75	715.42
8	-33.467275	149.684431	712.51	2.75	715.26
9	-33.467517	149.682147	712.26	2.75	715.01
10	-33.466076	149.682147	709.66	2.75	712.41
11	-33.466076	149.682753	710.50	2.75	713.25
12	-33.466315	149.682753	710.64	2.75	713.39
13	-33.466314	149.683308	710.38	2.75	713.13
14	-33.465592	149.683308	710.92	2.75	713.67
15	-33.465592	149.683437	711.11	2.75	713.86
16	-33.464508	149.683567	709.72	2.75	712.47
17	-33.464508	149.683696	709.91	2.75	712.66
18	-33.463666	149.683696	709.69	2.75	712.44
19	-33.463666	149.683825	709.86	2.75	712.61
20	-33.462944	149.683825	709.80	2.75	712.55
21	-33.462944	149.683954	709.99	2.75	712.74
22	-33.461137	149.684212	706.63	2.75	709.38
23	-33.461018	149.685244	706.28	2.75	709.03
24	-33.460895	149.685244	705.95	2.75	708.70
25	-33.460895	149.685980	704.95	2.75	707.70
26	-33.461974	149.685980	710.06	2.75	712.81

Name: PV2

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.468116	149.677884	705.00	2.75	707.75
2	-33.468116	149.677794	705.00	2.75	707.75
3	-33.467759	149.677794	704.88	2.75	707.63

Name: PV3

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467760	149.685334	713.15	2.75	715.90
2	-33.467883	149.685334	712.92	2.75	715.67
3	-33.467883	149.685979	713.75	2.75	716.50
4	-33.469685	149.685979	712.24	2.75	714.99
5	-33.469200	149.682147	709.59	2.75	712.34
6	-33.468121	149.682276	712.32	2.75	715.07
7	-33.468243	149.682366	712.26	2.75	715.01
8	-33.468245	149.683437	711.00	2.75	713.75
9	-33.468002	149.683437	711.00	2.75	713.75
10	-33.468121	149.684728	712.10	2.75	714.85
11	-33.467760	149.684728	712.24	2.75	714.99

Name: PV4

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.467037	149.690027	721.82	2.75	724.57
2	-33.469562	149.690027	721.54	2.75	724.29
3	-33.469685	149.689640	720.63	2.75	723.38
4	-33.470166	149.689640	721.02	2.75	723.77
5	-33.470047	149.688259	716.62	2.75	719.37
6	-33.469924	149.688259	716.43	2.75	719.18
7	-33.469923	149.687227	715.50	2.75	718.25
8	-33.469805	149.687227	715.51	2.75	718.26
9	-33.469804	149.686323	712.61	2.75	715.36
10	-33.469685	149.686194	712.62	2.75	715.37
11	-33.467883	149.686194	714.36	2.75	717.11
12	-33.467883	149.686323	714.74	2.75	717.49
13	-33.467641	149.686323	715.55	2.75	718.30
14	-33.467641	149.687227	716.43	2.75	719.18
15	-33.467398	149.687227	717.13	2.75	719.88
16	-33.467522	149.688904	718.20	2.75	720.95
17	-33.467161	149.688904	719.11	2.75	721.86
18	-33.467280	149.689677	720.53	2.75	723.28
19	-33.467037	149.689808	721.21	2.75	723.96

Name: PV5

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.466438	149.694074	726.76	2.75	729.51
2	-33.470047	149.694074	730.12	2.75	732.87
3	-33.470047	149.693339	728.53	2.75	731.28
4	-33.469924	149.693339	728.48	2.75	731.23
5	-33.469923	149.692436	726.52	2.75	729.27
6	-33.469803	149.692436	726.42	2.75	729.17
7	-33.469804	149.691532	725.94	2.75	728.69
8	-33.469685	149.691532	725.78	2.75	728.53
9	-33.469562	149.690242	722.25	2.75	725.00
10	-33.467037	149.690242	722.21	2.75	724.96
11	-33.467160	149.691403	723.08	2.75	725.83
12	-33.466799	149.691403	723.00	2.75	725.75
13	-33.466918	149.691494	723.03	2.75	725.78
14	-33.466918	149.692436	724.42	2.75	727.17
15	-33.466676	149.692436	724.42	2.75	727.17
16	-33.466799	149.693855	726.21	2.75	728.96
17	-33.466438	149.693855	726.47	2.75	729.22

Name: PV6

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

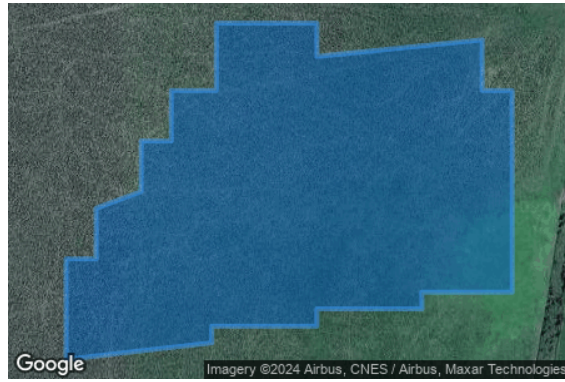
Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465715	149.680254	704.33	2.75	707.08
2	-33.465953	149.680254	704.97	2.75	707.72
3	-33.465834	149.681674	708.03	2.75	710.78
4	-33.466195	149.681674	709.10	2.75	711.85
5	-33.466195	149.681932	709.52	2.75	712.27
6	-33.467636	149.681932	712.09	2.75	714.84
7	-33.467636	149.681155	710.71	2.75	713.46
8	-33.467755	149.681158	710.91	2.75	713.66
9	-33.467755	149.680254	707.65	2.75	710.40
10	-33.467878	149.680254	707.75	2.75	710.50
11	-33.467879	149.679351	706.44	2.75	709.19
12	-33.467997	149.679351	706.55	2.75	709.30
13	-33.468116	149.678099	705.00	2.75	707.75
14	-33.467398	149.678099	703.90	2.75	706.65
15	-33.467398	149.678358	704.33	2.75	707.08
16	-33.467037	149.678358	703.72	2.75	706.47
17	-33.466918	149.678745	704.20	2.75	706.95
18	-33.466557	149.678745	703.68	2.75	706.43
19	-33.466557	149.679003	704.05	2.75	706.80
20	-33.466195	149.679003	703.63	2.75	706.38
21	-33.466196	149.679390	703.97	2.75	706.72
22	-33.465715	149.679390	703.03	2.75	705.78

Name: PV7

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.465834	149.698251	729.17	2.75	731.92
2	-33.466195	149.698251	729.77	2.75	732.52
3	-33.466314	149.698767	729.11	2.75	731.86
4	-33.466675	149.698767	730.14	2.75	732.89
5	-33.466556	149.699025	729.41	2.75	732.16
6	-33.466918	149.699025	730.47	2.75	733.22
7	-33.466918	149.699412	730.32	2.75	733.07
8	-33.467279	149.699412	731.52	2.75	734.27
9	-33.467279	149.699541	731.52	2.75	734.27
10	-33.469081	149.699284	731.50	2.75	734.25
11	-33.469081	149.699154	731.31	2.75	734.06
12	-33.469804	149.699154	731.19	2.75	733.94
13	-33.469804	149.699026	731.01	2.75	733.76
14	-33.470526	149.699026	731.99	2.75	734.74
15	-33.470645	149.698896	731.85	2.75	734.60
16	-33.470645	149.698419	731.27	2.75	734.02
17	-33.470165	149.698290	729.94	2.75	732.69
18	-33.470165	149.697645	730.01	2.75	732.76
19	-33.470045	149.697645	730.01	2.75	732.76
20	-33.470045	149.697348	730.31	2.75	733.06
21	-33.470284	149.697348	730.16	2.75	732.91
22	-33.470526	149.697090	730.01	2.75	732.76
23	-33.470407	149.697000	730.17	2.75	732.92
24	-33.470408	149.696096	730.18	2.75	732.93
25	-33.470284	149.696096	730.37	2.75	733.12
26	-33.470284	149.695193	730.95	2.75	733.70
27	-33.470164	149.695193	731.12	2.75	733.87
28	-33.470165	149.694290	730.23	2.75	732.98
29	-33.467641	149.694289	726.20	2.75	728.95
30	-33.467761	149.696096	728.71	2.75	731.46
31	-33.467522	149.696096	728.36	2.75	731.11
32	-33.467522	149.696354	728.72	2.75	731.47
33	-33.466076	149.696483	727.11	2.75	729.86
34	-33.466195	149.697128	729.08	2.75	731.83
35	-33.465953	149.697347	729.07	2.75	731.82
36	-33.466195	149.697606	730.25	2.75	733.00
37	-33.466195	149.697902	730.12	2.75	732.87
38	-33.465834	149.697902	729.24	2.75	731.99

Name: PV8

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.463547	149.695154	716.96	2.75	719.71
2	-33.463909	149.695154	717.89	2.75	720.64
3	-33.463785	149.695412	718.47	2.75	721.22
4	-33.464869	149.695670	722.31	2.75	725.06
5	-33.464868	149.696225	722.71	2.75	725.46
6	-33.464389	149.696315	722.25	2.75	725.00
7	-33.464750	149.696315	722.74	2.75	725.49
8	-33.464750	149.696702	724.08	2.75	726.83
9	-33.465111	149.696702	724.54	2.75	727.29
10	-33.464992	149.697089	725.20	2.75	727.95
11	-33.465468	149.696960	726.87	2.75	729.62
12	-33.465588	149.695287	725.83	2.75	728.58
13	-33.465711	149.695283	726.37	2.75	729.12
14	-33.465710	149.694379	726.92	2.75	729.67
15	-33.465830	149.694289	727.00	2.75	729.75
16	-33.463666	149.694289	714.23	2.75	716.98
17	-33.463908	149.694379	716.07	2.75	718.82
18	-33.463909	149.694547	716.39	2.75	719.14
19	-33.463547	149.694547	714.89	2.75	717.64

Name: PV9

Axis tracking: Single-axis rotation

Backtracking: Shade-slope

Tracking axis orientation: 0.0°

Max tracking angle: 55.0°

Resting angle: 22.0°

Ground Coverage Ratio: 0.4

Rated power: -

Panel material: Smooth glass with AR coating

Reflectivity: Vary with sun

Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.461979	149.691106	710.08	2.75	712.83
2	-33.462218	149.691106	710.78	2.75	713.53
3	-33.462221	149.691493	710.76	2.75	713.51
4	-33.462582	149.691493	712.21	2.75	714.96
5	-33.462582	149.691751	711.83	2.75	714.58
6	-33.463185	149.691880	714.44	2.75	717.19
7	-33.463186	149.692526	713.50	2.75	716.25
8	-33.463547	149.692526	715.31	2.75	718.06
9	-33.463424	149.693042	713.44	2.75	716.19
10	-33.463785	149.693042	715.30	2.75	718.05
11	-33.463666	149.693816	713.43	2.75	716.18
12	-33.464028	149.693816	716.06	2.75	718.81
13	-33.464029	149.694074	716.42	2.75	719.17
14	-33.465830	149.694074	726.97	2.75	729.72
15	-33.465948	149.692784	725.59	2.75	728.34
16	-33.466072	149.692784	725.41	2.75	728.16
17	-33.466070	149.691881	723.90	2.75	726.65
18	-33.466191	149.691881	723.80	2.75	726.55
19	-33.466191	149.691106	722.83	2.75	725.58
20	-33.466310	149.691106	722.92	2.75	725.67
21	-33.466310	149.690242	722.18	2.75	724.93
22	-33.461979	149.690242	710.51	2.75	713.26

Route Receptors

Name: Main Western Railway

Path type: Two-way

Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.452459	149.686142	723.80	2.40	726.20
2	-33.455466	149.687773	720.32	2.40	722.72
3	-33.456970	149.688589	720.13	2.40	722.53
4	-33.458832	149.690091	719.38	2.40	721.78
5	-33.462197	149.694125	715.06	2.40	717.46
6	-33.465169	149.698287	726.56	2.40	728.96
7	-33.468283	149.701506	731.81	2.40	734.21
8	-33.474477	149.707600	744.99	2.40	747.39

Name: Tarana Road
Path type: Two-way
Observer view angle: 50.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-33.471332	149.667158	692.99	2.40	695.39
2	-33.472088	149.669127	685.53	2.40	687.93
3	-33.472167	149.669334	685.24	2.40	687.64
4	-33.472258	149.669629	684.90	2.40	687.30
5	-33.472310	149.669894	684.66	2.40	687.06
6	-33.472328	149.670144	684.42	2.40	686.82
7	-33.472310	149.670527	684.20	2.40	686.60
8	-33.472274	149.670999	683.71	2.40	686.11
9	-33.472276	149.671313	683.01	2.40	685.41
10	-33.472303	149.671571	682.47	2.40	684.87
11	-33.472375	149.671793	683.01	2.40	685.41
12	-33.472498	149.672029	683.52	2.40	685.92
13	-33.472654	149.672271	684.13	2.40	686.53
14	-33.473695	149.673810	693.83	2.40	696.23
15	-33.473842	149.674054	695.40	2.40	697.80
16	-33.473963	149.674301	696.93	2.40	699.33
17	-33.474093	149.674666	698.07	2.40	700.47
18	-33.474158	149.674922	698.74	2.40	701.14
19	-33.474199	149.675175	698.83	2.40	701.23
20	-33.474290	149.675808	698.89	2.40	701.29
21	-33.476988	149.697974	732.47	2.40	734.87
22	-33.477033	149.698547	733.60	2.40	736.00
23	-33.477098	149.699792	738.54	2.40	740.94
24	-33.477138	149.700395	740.88	2.40	743.28
25	-33.477221	149.701085	743.94	2.40	746.34
26	-33.478061	149.705443	754.83	2.40	757.23

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-33.475005	149.677853	702.00	1.50
OP 2	2	-33.476396	149.683227	708.00	1.50
OP 3	3	-33.477733	149.696943	734.00	1.50
OP 4	4	-33.477509	149.694812	740.00	1.50
OP 5	5	-33.457469	149.675977	708.00	1.50
OP 6	6	-33.472491	149.711617	764.00	1.50
OP 7	7	-33.472053	149.664301	706.00	1.50
OP 8	8	-33.468208	149.663383	704.00	1.50
OP 9	9	-33.480154	149.672563	706.00	1.50
OP 10	10	-33.479932	149.709933	750.00	1.50
OP 11	11	-33.450425	149.698480	746.00	1.50
OP 12	12	-33.479473	149.711014	752.00	1.50
OP 16	16	-33.479595	149.712948	758.00	1.50
OP 17	17	-33.479749	149.713331	758.00	1.50
OP 19	19	-33.479036	149.663413	682.00	1.50
OP 20	20	-33.480862	149.712656	752.00	1.50
OP 22	22	-33.480734	149.712824	752.00	1.50
OP 24	24	-33.473910	149.717093	778.00	1.50
OP 25	25	-33.449927	149.704263	748.00	1.50
OP 26	26	-33.474732	149.717528	778.00	1.50
OP 27	27	-33.480660	149.714556	756.00	1.50
OP 31	31	-33.463473	149.656149	732.00	1.50
OP 33	33	-33.483764	149.715699	756.00	1.50
OP 35	35	-33.454568	149.718002	756.00	1.50
OP 37	37	-33.490140	149.678831	686.00	1.50
OP 44	44	-33.465595	149.648931	732.00	1.50
OP 46	46	-33.453549	149.723560	770.00	1.50
OP 47	47	-33.435763	149.683463	748.00	1.50
OP 48	48	-33.482054	149.726800	790.00	1.50
OP 49	49	-33.435494	149.691598	762.00	1.50
OP 69	69	-33.453238	149.658153	734.00	1.50
OP 70	70	-33.477170	149.674507	757.00	1.50
OP 71	71	-33.453117	149.698347	756.00	1.50

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
			min	hr	min	hr	kWh
PV1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV10	SA tracking	SA tracking	0	0.0	0	0.0	-
PV11	SA tracking	SA tracking	0	0.0	0	0.0	-
PV2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV3	SA tracking	SA tracking	0	0.0	0	0.0	-
PV4	SA tracking	SA tracking	0	0.0	0	0.0	-
PV5	SA tracking	SA tracking	0	0.0	0	0.0	-
PV6	SA tracking	SA tracking	0	0.0	0	0.0	-
PV7	SA tracking	SA tracking	0	0.0	0	0.0	-
PV8	SA tracking	SA tracking	0	0.0	0	0.0	-
PV9	SA tracking	SA tracking	0	0.0	0	0.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV: PV1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV1 and Route: Main Western Railway

No glare found

PV1 and Route: Tarana Road

No glare found

PV1 and OP 1

No glare found

PV1 and OP 2

No glare found

PV1 and OP 3

No glare found

PV1 and OP 4

No glare found

PV1 and OP 5

No glare found

PV1 and OP 6

No glare found

PV1 and OP 7

No glare found

PV1 and OP 8

No glare found

PV1 and OP 9

No glare found

PV1 and OP 10

No glare found

PV1 and OP 11

No glare found

PV1 and OP 12

No glare found

PV1 and OP 16

No glare found

PV1 and OP 17

No glare found

PV1 and OP 19

No glare found

PV1 and OP 20

No glare found

PV1 and OP 22

No glare found

PV1 and OP 24

No glare found

PV1 and OP 25

No glare found

PV1 and OP 26

No glare found

PV1 and OP 27

No glare found

PV1 and OP 31

No glare found

PV1 and OP 33

No glare found

PV1 and OP 35

No glare found

PV1 and OP 37

No glare found

PV1 and OP 44

No glare found

PV1 and OP 46

No glare found

PV1 and OP 47

No glare found

PV1 and OP 48

No glare found

PV1 and OP 49

No glare found

PV1 and OP 69

No glare found

PV1 and OP 70

No glare found

PV1 and OP 71

No glare found

PV: PV10 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV10 and Route: Main Western Railway

No glare found

PV10 and Route: Tarana Road

No glare found

PV10 and OP 1

No glare found

PV10 and OP 2

No glare found

PV10 and OP 3

No glare found

PV10 and OP 4

No glare found

PV10 and OP 5

No glare found

PV10 and OP 6

No glare found

PV10 and OP 7

No glare found

PV10 and OP 8

No glare found

PV10 and OP 9

No glare found

PV10 and OP 10

No glare found

PV10 and OP 11

No glare found

PV10 and OP 12

No glare found

PV10 and OP 16

No glare found

PV10 and OP 17

No glare found

PV10 and OP 19

No glare found

PV10 and OP 20

No glare found

PV10 and OP 22

No glare found

PV10 and OP 24

No glare found

PV10 and OP 25

No glare found

PV10 and OP 26

No glare found

PV10 and OP 27

No glare found

PV10 and OP 31

No glare found

PV10 and OP 33

No glare found

PV10 and OP 35

No glare found

PV10 and OP 37

No glare found

PV10 and OP 44

No glare found

PV10 and OP 46

No glare found

PV10 and OP 47

No glare found

PV10 and OP 48

No glare found

PV10 and OP 49

No glare found

PV10 and OP 69

No glare found

PV10 and OP 70

No glare found

PV10 and OP 71

No glare found

PV: PV11 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV11 and Route: Main Western Railway

No glare found

PV11 and Route: Tarana Road

No glare found

PV11 and OP 1

No glare found

PV11 and OP 2

No glare found

PV11 and OP 3

No glare found

PV11 and OP 4

No glare found

PV11 and OP 5

No glare found

PV11 and OP 6

No glare found

PV11 and OP 7

No glare found

PV11 and OP 8

No glare found

PV11 and OP 9

No glare found

PV11 and OP 10

No glare found

PV11 and OP 11

No glare found

PV11 and OP 12

No glare found

PV11 and OP 16

No glare found

PV11 and OP 17

No glare found

PV11 and OP 19

No glare found

PV11 and OP 20

No glare found

PV11 and OP 22

No glare found

PV11 and OP 24

No glare found

PV11 and OP 25

No glare found

PV11 and OP 26

No glare found

PV11 and OP 27

No glare found

PV11 and OP 31

No glare found

PV11 and OP 33

No glare found

PV11 and OP 35

No glare found

PV11 and OP 37

No glare found

PV11 and OP 44

No glare found

PV11 and OP 46

No glare found

PV11 and OP 47

No glare found

PV11 and OP 48

No glare found

PV11 and OP 49

No glare found

PV11 and OP 69

No glare found

PV11 and OP 70

No glare found

PV11 and OP 71

No glare found

PV: PV2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV2 and Route: Main Western Railway

No glare found

PV2 and Route: Tarana Road

No glare found

PV2 and OP 1

No glare found

PV2 and OP 2

No glare found

PV2 and OP 3

No glare found

PV2 and OP 4

No glare found

PV2 and OP 5

No glare found

PV2 and OP 6

No glare found

PV2 and OP 7

No glare found

PV2 and OP 8

No glare found

PV2 and OP 9

No glare found

PV2 and OP 10

No glare found

PV2 and OP 11

No glare found

PV2 and OP 12

No glare found

PV2 and OP 16

No glare found

PV2 and OP 17

No glare found

PV2 and OP 19

No glare found

PV2 and OP 20

No glare found

PV2 and OP 22

No glare found

PV2 and OP 24

No glare found

PV2 and OP 25

No glare found

PV2 and OP 26

No glare found

PV2 and OP 27

No glare found

PV2 and OP 31

No glare found

PV2 and OP 33

No glare found

PV2 and OP 35

No glare found

PV2 and OP 37

No glare found

PV2 and OP 44

No glare found

PV2 and OP 46

No glare found

PV2 and OP 47

No glare found

PV2 and OP 48

No glare found

PV2 and OP 49

No glare found

PV2 and OP 69

No glare found

PV2 and OP 70

No glare found

PV2 and OP 71

No glare found

PV: PV3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV3 and Route: Main Western Railway

No glare found

PV3 and Route: Tarana Road

No glare found

PV3 and OP 1

No glare found

PV3 and OP 2

No glare found

PV3 and OP 3

No glare found

PV3 and OP 4

No glare found

PV3 and OP 5

No glare found

PV3 and OP 6

No glare found

PV3 and OP 7

No glare found

PV3 and OP 8

No glare found

PV3 and OP 9

No glare found

PV3 and OP 10

No glare found

PV3 and OP 11

No glare found

PV3 and OP 12

No glare found

PV3 and OP 16

No glare found

PV3 and OP 17

No glare found

PV3 and OP 19

No glare found

PV3 and OP 20

No glare found

PV3 and OP 22

No glare found

PV3 and OP 24

No glare found

PV3 and OP 25

No glare found

PV3 and OP 26

No glare found

PV3 and OP 27

No glare found

PV3 and OP 31

No glare found

PV3 and OP 33

No glare found

PV3 and OP 35

No glare found

PV3 and OP 37

No glare found

PV3 and OP 44

No glare found

PV3 and OP 46

No glare found

PV3 and OP 47

No glare found

PV3 and OP 48

No glare found

PV3 and OP 49

No glare found

PV3 and OP 69

No glare found

PV3 and OP 70

No glare found

PV3 and OP 71

No glare found

PV: PV4 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV4 and Route: Main Western Railway

No glare found

PV4 and Route: Tarana Road

No glare found

PV4 and OP 1

No glare found

PV4 and OP 2

No glare found

PV4 and OP 3

No glare found

PV4 and OP 4

No glare found

PV4 and OP 5

No glare found

PV4 and OP 6

No glare found

PV4 and OP 7

No glare found

PV4 and OP 8

No glare found

PV4 and OP 9

No glare found

PV4 and OP 10

No glare found

PV4 and OP 11

No glare found

PV4 and OP 12

No glare found

PV4 and OP 16

No glare found

PV4 and OP 17

No glare found

PV4 and OP 19

No glare found

PV4 and OP 20

No glare found

PV4 and OP 22

No glare found

PV4 and OP 24

No glare found

PV4 and OP 25

No glare found

PV4 and OP 26

No glare found

PV4 and OP 27

No glare found

PV4 and OP 31

No glare found

PV4 and OP 33

No glare found

PV4 and OP 35

No glare found

PV4 and OP 37

No glare found

PV4 and OP 44

No glare found

PV4 and OP 46

No glare found

PV4 and OP 47

No glare found

PV4 and OP 48

No glare found

PV4 and OP 49

No glare found

PV4 and OP 69

No glare found

PV4 and OP 70

No glare found

PV4 and OP 71

No glare found

PV: PV5 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV5 and Route: Main Western Railway

No glare found

PV5 and Route: Tarana Road

No glare found

PV5 and OP 1

No glare found

PV5 and OP 2

No glare found

PV5 and OP 3

No glare found

PV5 and OP 4

No glare found

PV5 and OP 5

No glare found

PV5 and OP 6

No glare found

PV5 and OP 7

No glare found

PV5 and OP 8

No glare found

PV5 and OP 9

No glare found

PV5 and OP 10

No glare found

PV5 and OP 11

No glare found

PV5 and OP 12

No glare found

PV5 and OP 16

No glare found

PV5 and OP 17

No glare found

PV5 and OP 19

No glare found

PV5 and OP 20

No glare found

PV5 and OP 22

No glare found

PV5 and OP 24

No glare found

PV5 and OP 25

No glare found

PV5 and OP 26

No glare found

PV5 and OP 27

No glare found

PV5 and OP 31

No glare found

PV5 and OP 33

No glare found

PV5 and OP 35

No glare found

PV5 and OP 37

No glare found

PV5 and OP 44

No glare found

PV5 and OP 46

No glare found

PV5 and OP 47

No glare found

PV5 and OP 48

No glare found

PV5 and OP 49

No glare found

PV5 and OP 69

No glare found

PV5 and OP 70

No glare found

PV5 and OP 71

No glare found

PV: PV6 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV6 and Route: Main Western Railway

No glare found

PV6 and Route: Tarana Road

No glare found

PV6 and OP 1

No glare found

PV6 and OP 2

No glare found

PV6 and OP 3

No glare found

PV6 and OP 4

No glare found

PV6 and OP 5

No glare found

PV6 and OP 6

No glare found

PV6 and OP 7

No glare found

PV6 and OP 8

No glare found

PV6 and OP 9

No glare found

PV6 and OP 10

No glare found

PV6 and OP 11

No glare found

PV6 and OP 12

No glare found

PV6 and OP 16

No glare found

PV6 and OP 17

No glare found

PV6 and OP 19

No glare found

PV6 and OP 20

No glare found

PV6 and OP 22

No glare found

PV6 and OP 24

No glare found

PV6 and OP 25

No glare found

PV6 and OP 26

No glare found

PV6 and OP 27

No glare found

PV6 and OP 31

No glare found

PV6 and OP 33

No glare found

PV6 and OP 35

No glare found

PV6 and OP 37

No glare found

PV6 and OP 44

No glare found

PV6 and OP 46

No glare found

PV6 and OP 47

No glare found

PV6 and OP 48

No glare found

PV6 and OP 49

No glare found

PV6 and OP 69

No glare found

PV6 and OP 70

No glare found

PV6 and OP 71

No glare found

PV: PV7 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV7 and Route: Main Western Railway

No glare found

PV7 and Route: Tarana Road

No glare found

PV7 and OP 1

No glare found

PV7 and OP 2

No glare found

PV7 and OP 3

No glare found

PV7 and OP 4

No glare found

PV7 and OP 5

No glare found

PV7 and OP 6

No glare found

PV7 and OP 7

No glare found

PV7 and OP 8

No glare found

PV7 and OP 9

No glare found

PV7 and OP 10

No glare found

PV7 and OP 11

No glare found

PV7 and OP 12

No glare found

PV7 and OP 16

No glare found

PV7 and OP 17

No glare found

PV7 and OP 19

No glare found

PV7 and OP 20

No glare found

PV7 and OP 22

No glare found

PV7 and OP 24

No glare found

PV7 and OP 25

No glare found

PV7 and OP 26

No glare found

PV7 and OP 27

No glare found

PV7 and OP 31

No glare found

PV7 and OP 33

No glare found

PV7 and OP 35

No glare found

PV7 and OP 37

No glare found

PV7 and OP 44

No glare found

PV7 and OP 46

No glare found

PV7 and OP 47

No glare found

PV7 and OP 48

No glare found

PV7 and OP 49

No glare found

PV7 and OP 69

No glare found

PV7 and OP 70

No glare found

PV7 and OP 71

No glare found

PV: PV8 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV8 and Route: Main Western Railway

No glare found

PV8 and Route: Tarana Road

No glare found

PV8 and OP 1

No glare found

PV8 and OP 2

No glare found

PV8 and OP 3

No glare found

PV8 and OP 4

No glare found

PV8 and OP 5

No glare found

PV8 and OP 6

No glare found

PV8 and OP 7

No glare found

PV8 and OP 8

No glare found

PV8 and OP 9

No glare found

PV8 and OP 10

No glare found

PV8 and OP 11

No glare found

PV8 and OP 12

No glare found

PV8 and OP 16

No glare found

PV8 and OP 17

No glare found

PV8 and OP 19

No glare found

PV8 and OP 20

No glare found

PV8 and OP 22

No glare found

PV8 and OP 24

No glare found

PV8 and OP 25

No glare found

PV8 and OP 26

No glare found

PV8 and OP 27

No glare found

PV8 and OP 31

No glare found

PV8 and OP 33

No glare found

PV8 and OP 35

No glare found

PV8 and OP 37

No glare found

PV8 and OP 44

No glare found

PV8 and OP 46

No glare found

PV8 and OP 47

No glare found

PV8 and OP 48

No glare found

PV8 and OP 49

No glare found

PV8 and OP 69

No glare found

PV8 and OP 70

No glare found

PV8 and OP 71

No glare found

PV: PV9 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Main Western Railway	0	0.0	0	0.0
Tarana Road	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 44	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 69	0	0.0	0	0.0
OP 70	0	0.0	0	0.0
OP 71	0	0.0	0	0.0

PV9 and Route: Main Western Railway

No glare found

PV9 and Route: Tarana Road

No glare found

PV9 and OP 1

No glare found

PV9 and OP 2

No glare found

PV9 and OP 3

No glare found

PV9 and OP 4

No glare found

PV9 and OP 5

No glare found

PV9 and OP 6

No glare found

PV9 and OP 7

No glare found

PV9 and OP 8

No glare found

PV9 and OP 9

No glare found

PV9 and OP 10

No glare found

PV9 and OP 11

No glare found

PV9 and OP 12

No glare found

PV9 and OP 16

No glare found

PV9 and OP 17

No glare found

PV9 and OP 19

No glare found

PV9 and OP 20

No glare found

PV9 and OP 22

No glare found

PV9 and OP 24

No glare found

PV9 and OP 25

No glare found

PV9 and OP 26

No glare found

PV9 and OP 27

No glare found

PV9 and OP 31

No glare found

PV9 and OP 33

No glare found

PV9 and OP 35

No glare found

PV9 and OP 37

No glare found

PV9 and OP 44

No glare found

PV9 and OP 46

No glare found

PV9 and OP 47

No glare found

PV9 and OP 48

No glare found

PV9 and OP 49

No glare found

PV9 and OP 69

No glare found

PV9 and OP 70

No glare found

PV9 and OP 71

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.

The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.

Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.

Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.

The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.

The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)

The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.

The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.

The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.

Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.

Refer to the Help page at www.forgesolar.com/help/ for assumptions and limitations not listed here.

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

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

© Sims Industries d/b/a ForgeSolar, All Rights Reserved.