HOB LANE SOLAR FARM
GLINT AND GLARE ASSESSMENT

May 2025

Version 4.0

Hob Lane Solar Farm Ltd

Metrica Environmental Consulting Ltd.

[redacted]

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1 INTRODUCTION

Metrica Environmental Consulting Ltd ('Metrica') has been commissioned by Belltown Power UK Ltd on behalf of Hob Lane Solar Farm ('the Applicant') to undertake a Glint and Glare Impact Assessment for the proposed Hob Lane Solar Farm ('the proposed development'), located on land to the north and south of Rake Lane, Cheshire ('the site').

2 GLINT AND GLARE DEFINITION

'Glint' and 'Glare' are the effects caused by the reflection of sunlight from surfaces such as glazing or solar photovoltaic (PV) panels. The UK Government's National Policy Statement for Renewable Energy Infrastructure (EN-3)[1] defines these terms as follows:

- Glint: "*a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel*"; and
- Glare: "*a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel*".

It goes on to say that… " *Most commercially available solar panels are designed with anti-reflective glass or are produced with anti-reflective coating and have a reflective capacity that is generally equal to or less hazardous than other objects typically found in the outdoor environment, such as bodies of water or glass buildings*".

Further details on the guidance in EN-3 is provided in Section 4.12 of this report.

3 DEVELOPMENT OVERVIEW

The proposed development consists of the construction and operation of a 30 MWac photovoltaic ('PV') farm with associated infrastructure, landscape and ecological enhancements, for a temporary operational period of 40 years.

The solar panel arrays will be of a fixed (i.e. non-tilting) design, with an azimuth of 180 degrees (i.e. facing due south), and a tilt angle of 20 degrees. As is the case for the large majority of solar PV panels, this assessment is based upon panels with smooth glass, and a standard anti-reflective coating.

A proposed development layout drawing is provided in Appendix 1for reference.

4 GUIDANCE

4.1 PLANNING GUIDANCE

The following guidance and standards are pertinent to this assessment:

- The National Planning Policy Framework (NPPF)[2]; and
- National Policy Statement for Renewable Energy Infrastructure (EN-3).

4.1.1 The National Planning Policy Framework

The NPPF sets out the Government's planning policies for England, providing a framework within which local policies can be developed. The key principle of the NPPF is a presumption

[1] UK Government (November 2023). National Policy Statement for Renewable Energy Infrastructure.

[2] UK Government (2012). National Planning Policy Framework (last updated 12th December 2024).

in favour of sustainable development, although no specific references to solar PV development or glint and glare effects are made.

4.1.2 National Policy Statement for Renewable Energy Infrastructure

EN-3 notes that solar PV panels are specifically designed to absorb, rather than reflect light, however, they may nevertheless reflect the sun's rays at certain times / angles, potentially causing glint and glare effects. Whilst EN-3 relates to Nationally Significant renewable energy projects, the general principals referred to in EN-3 are equally valid for solar schemes of all scales.

EN-3 recommends a two-stage approach to determining the potential for glint and glare impacts. As a first stage, receptors should be mapped qualitatively to identify any potential glint and glare issues and determine whether a detailed glint and glare assessment is necessary as part of the application.

When a quantitative glint and glare assessment is found to be necessary, the geometric possibility of glint and glare affecting nearby receptors should be investigated through modelling, and an assessment of potential impact provided, based on the angle and duration of incidence and the intensity of the reflection.

With specific reference to aviation, EN3-notes that…"*there is no evidence that glint and glare from solar farms results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms*".

Notwithstanding the above, EN-3 does not provide specific assessment criteria, or give guidance on what is considered to be an acceptable level of impact.

4.2 TECHNICAL GUIDANCE

UK planning guidance does not provide a specific methodology for assessing the impact of glint and glare. However, the following guidance is regularly applied to assessments in the UK and together is considered to provide a reasonable and robust approach:

- Measurement and Assessment of Light Immissions[3];
- Rail Industry Standard (RIS) RIS-0737-CCS[4]
- Renewable Energy Developments: Solar Photovoltaic Developments[5]; and
- Review of Solar Energy System Projects on Federally-Obligated Airports[6].

4.2.1 Measurement and Assessment of Light Immissions

The German Ministry for Environment, Health and Consumer Protection published the *Measurement and Assessment of Light Immissions* in 1993, which was most recently updated

[3] Ministry for the Environment, Health and Consumer Protection (2014). Light Guidelines (Leitlinie des Ministeriums für Umwelt, Gesundheit und Verbraucherschutz zur Messung und Beurteilung vonm Lichtimmissionen)

[4] Rail Industry Standard (RIS) RIS-0737-CCS 'Signal Sighting Assessment Requirements'

[5] CAA (2023). Solar photovoltaic Developments CAST Aerodrome Safeguarding Guidance Note

[6] Federal Aviation Administration (2021) Review of Solar Energy System Projects on Federally-Obligated Airports.

in 2014. Paragraph 8 of the most recent version of the guidelines is dedicated to the assessment of reflections from solar PV panels.

The guidelines state that…[translated from German]*"experience has shown that immission locations that are more than approximately 100 m away from a photovoltaic system only experience short-term glare effects. Only in the case of extensive photovoltaic parks could more distant emission locations still be relevant."*

In addition, the guidelines note that where a reflection source is located in the same direction (+/- 10 degrees) as the sun itself, the direct glare from the sun masks any reflections, and can therefore be scoped out of further assessment.

For those receptors within the study area described above, the guidelines state that effects are acceptable when glare is experienced for no more than 30 minutes on any given day, or more than 30 hours per year.

4.2.2 RIS-0737-CCS

Network Rail guidance does not provide a specific methodology for the assessment of glint and glare effects on rail infrastructure. However, Rail Industry Standard (RIS) RIS-0737-CCS states that…*"a planned change external to the railway could affect signal sighting, for example changes that affect the built environment (for example, a new structure causing obscuration, a solar farm causing reflection)."*

4.2.3 Renewable Energy Developments: Solar Photovoltaic Developments

The UK Civil Aviation Authority (CAA) issued a guidance note, Renewable Energy Developments, in July 2023. This guidance note was prepared by the Combined Aerodrome Safeguarding Team (CAST), supported by the CAA, and aims to provide safeguarding advice in relation to solar photovoltaic developments on a range of matters, including glint and glare.

With specific reference to glint and glare effects, section 2 of the guidance note states that:

"In most cases, an assessment should be undertaken for a solar PV development which is being proposed within a specific distance (indicated by the aerodrome authority) from an aerodrome. For many aerodromes, 5 km is the distance of choice but it could be considered out to 10 km. In exceptional circumstances, assessments may be required beyond 10 km."

No specific methodology or assessment criteria are defined for assessing the impact of glint and glare on aviation infrastructure.

4.2.4 Review of Solar Energy System Projects on Federally-Obligated Airports

In 2013, the United States' Federal Aviation Administration (FAA) pul
which stated that for a solar PV development to obtain FAA approval or to receive no objection, there should be no more than a "low potential for after-image" along the final 2-mile approach path for any existing or proposed runway, as defined by Sandia Laboratories' Solar Glare Hazard Analysis Tool (SGHAT).

SGHAT categorises glint and glare into three tiers of severity (ocular hazards) that are referred to as different colours in the model output. It should be noted that these categories relate to the intensity of the reflection, rather than being duration dependant:

- Red glare: Glare predicted with a potential for permanent eye damage (retinal burn);
- Yellow glare: Glare predicted with a potential for temporary after image; and

- Green glare: Glare predicted with a low potential for temporary after image.

It also notes that no significant impacts are possible for reflections located more than 50 degrees either side of the direction of travel.

Page 2 of the Interim guidance stated that *"the FAA expects to continue to update these policies and procedures as part of an iterative process as new information and technologies become available."*

4.2.4.1 2021 Update

In accordance with the above, the Interim FAA guidance was updated in 2021 to reflect the state of knowledge at the time.

As part of the update, the FAA withdrew the requirement to undertake glint and glare analysis using SGHAT as the software is no longer available. The assessment of glint and glare impacts due to the Development therefore uses alternative industry standard modelling software which utilises the same methodology as SGHAT.

With regard to the potential for solar glint and glare impacts in general, the 2021 update states the following in the section entitled 'Developments Since Interim Policy':

"*Initially, the FAA believed that solar energy systems could introduce a novel glint and glare effect to pilots on final approach. FAA has subsequently concluded that in most cases, the glint and glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features. However, FAA has continued to receive reports of potential glint and glare from on-airport solar energy systems on personnel working in ATCT [Air Traffic Control Tower] cabs. Therefore, FAA has determined the scope of agency policy should be focused on the impact of on-airport solar energy systems to federally-obligated towered airports, specifically the airport's ATCT cab.*"

Given the above, it is clear that the FAA consider that with the exception of ATCTs, no unacceptable glint and glare impacts are expected from solar PV panels in terms of aviation safety.

5 STUDY AREAS

5.1 RESIDENTIAL RECEPTORS

As stated in Section 4.2.1, glint and glare effects are unlikely to be an issue for residential receptors more than approximately 100 m from PV panels, due to the reduced intensity and short duration of effects beyond this distance. However, as this distance is approximate and dependent upon the extent of the proposed development, the residential receptor study area for this assessment has been based upon a 200 m buffer distance in order to ensure a robust approach.

5.2 ROAD AND RAIL INFRASTRUCTURE

The assessment criteria for road and rail infrastructure relate purely to glare intensity, rather than duration of effects. In line with FAA guidance (see Section 4.2.5), whilst 'green' glare is acceptable, any incidence of 'yellow' or 'red' glare is considered an adverse impact, regardless of duration.

An appropriate study area for road and rail infrastructure has been determined through modelling undertaken by Metrica. It was found that for typical large-scale solar developments in the UK, there is no reasonable prospect of 'yellow glare' occurring beyond approximately 375 m, based on a number of worst-case parameters i.e. a 2 km^2 (2 km x 1 km) PV array with no anti-reflective coatings, tilt angles of 20 to 30 degrees, and receptors located along the longer array boundary, at heights between 1.5 m and 50 m above ground level (AGL).

Given all of the above, a study area of 500 m for road and rail infrastructure has been adopted and is considered a highly conservative approach.

In line with widely accepted best practice, local roads within the 500 m study area are not typically assessed; this is due to local roads having reduced traffic densities and speeds, meaning any potential impact due to a temporary reflection is low.

5.3 AERODROMES AND AVIATION INFRASTRUCTURE

The study area for aerodromes as defined in CAA guidance (See section 4.2.4) is as follows:

- 10 km for safeguarded civil or military aerodromes[7]; and
- 5 km for other / non-safeguarded aerodromes.

Notwithstanding the above, CAA guidance also states that: *"in exceptional circumstances, assessments may be required beyond 10 km".*

A study area of 13 km to identify safeguarded civil or military aerodromes has been used as a conservative approach.

It should be noted that any approach paths within the respective study area have been included, regardless of whether the aerodrome itself is located within that study area.

[7] As defined in UK Government (2016) 'Town and country planning (safeguarded aerodromes, technical sites and military explosives storage areas)',

5.3.1 Air Traffic Control Towers

With specific regard to Air Traffic Control Towers (ATCT), United States Federal Aviation Administration (FAA) guidance requires that…*"a proposed solar project will not result in ocular (i.e. glint or glare) impacts to the airport's ATCT".*

In the absence of more detailed guidance, the glint and glare threshold for ATCTs is therefore zero (i.e. no glint and glare is acceptable, regardless of intensity).

6 ASSESSMENT CRITERIA

6.1 RESIDENTIAL RECEPTORS

The assessment criteria for residential receptors are those described in Section 4.2.1, i.e., that the glint and glare effects are acceptable providing such effects occur for no more than 30 minutes per day, or 30 hours (equivalent to 1,800 minutes) per year.

6.2 ROAD, RAIL AND AVIATION RECEPTORS

The assessment criteria for road, rail and aviation receptors are those described in Section 4.2.4 i.e., that the glint and glare effects are acceptable providing there is found to be no more than a low potential for after-image (i.e., 'green glare') when assessing in accordance with the SGHAT methodology. As previously stated, the SGHAT methodology is based purely upon the intensity of the reflection and the viewing angle and is not duration-dependant.

7 IDENTIFICATION OF RECEPTORS

Figures 1 and 2 present large and small scale maps respectively, showing the proposed development boundary and the study areas applicable to this assessment.

Each potential receptor has been analysed using online mapping and aerial imagery. In addition to the identification of receptors, online mapping and aerial imagery have been used to identify where local terrain, vegetation, buildings or other infrastructure will provide shielding between receptors and the proposed development.

All identified receptors are identified in Figures 1 and 2.

7.1 RESIDENTIAL RECEPTORS

Residential receptors identified within the 200 m study area are all located at Maryburgh caravan park, which is a private park comprising of both caravan pitches and permanent lodges.

7.2 AVIATION RECEPTORS

Liverpool John Lennon Airport is located 8.1 km north of the proposed development. The airport is a safeguarded aerodrome, and operates a single asphalt runway (Runway 27 when approached from the east and Runway 09 when approached from west). An Air Traffic Control Tower (ATCT) with a height of 43 m AGL is located at the airport.

Consultation with the airport's safeguarding team was undertaken in March 2025 and modelling was requested for three approach paths for arrivals on runway 27. Additional assessments for both runways have also been carried out using the standard 2-mile approach with a 3-degree glide slope as recommended in the FAA guidance.

The aviation study areas and receptors are shown in Figure 2.

7.3 ROADS AND RAILWAY RECEPTORS

Two roads (the M56 and A5117) have been identified as requiring assessment, which are located along the northern and northeastern boundary respectively of the proposed development.

In addition to the road receptors, the Chester-Manchester rail line is located approximately 485 m to the southeast of the proposed development and has been assessed accordingly.

8 MODELLING METHODOLOGY

As discussed in Section 4.2.5, modelling of glint and glare effects at the receptors identified in Section 7 has been conducted using software implementing the SGHAT methodology, which accounts for the following site-specific parameters:

- Reflection Source:
  - Latitude, longitude and elevation of the Development;
  - Panel tilt, height, and azimuth (orientation relative to north); and
  - Panel technology (fixed / tracking, and presence of anti-reflective coatings);
- Propagation path:
  - Local terrain; and
  - Existing or proposed obstructions (e.g., forestry, non-sensitive buildings, etc.)
- Receptor:
  - Receptor type e.g. (dwelling, road, rail, flight path, ground-based aviation assets);
  - Receptor location;
  - Height above ground level (typically taken as 1.5 m for terrestrial receptors, except for rail where a height of 2.75 m is applied, or structures such as Air Traffic Control Towers (ATCT) which are modelled on a case-by case basis);
  - A pupil diameter of 2 mm, focal length of 17 mm, and an ocular transmission coefficient 0.5; and
  - Viewing angle and direction of travel (mobile receptors only).

As part of the modelling process, online mapping and aerial imagery has been reviewed to determine the presence of screening between the proposed development and the assessed receptors. This review established that there is an embankment running along the southern length of the M56. In addition, there are well-established trees and vegetation along the M56, A5117 and the Chester-Manchester rail line, all of which have been included in the glint and glare model.

9 ASSESSMENT

Table 1 presents a summary of the results of the modelling exercise.

Table 1: Assessment Results

Receptor	Result
Maryburgh Caravan Park	No Glare
Liverpool John Lennon Airport Runway 09 Standard Approach	No Glare
Liverpool John Lennon Airport Runway 27 Standard Approach	No Glare
Liverpool John Lennon Airport ATCT	No Glare
Liverpool John Lennon Airport Instrument Approach 27	Green Glare: Low potential for temporary after image
Liverpool John Lennon Airport Visual Approach 27	Green Glare: Low potential for temporary after image
Liverpool John Lennon Airport VFR 27 Arrival Approach from South	Green Glare: Low potential for temporary after image
M56	No Glare
A5117	No Glare
Train Line	No Glare

As presented in Table 1, no glint and glare effects are predicted at the residential receptors at Maryburgh Caravn Park, the M56, A5117 and the trainline. This is due to a combination of existing screening (embankments, local terrain and vegetation), along with the orientation and angle of the PV panels. In practice, this means that either the line of sight between the receptors and the PV panels is interrupted, or for any areas where there is potential visibility, no reflections are cast towards these receptors.

Whilst no glare is predicted at the airport's ATCT, some low-intensity 'green' glare is predicted on the three approach paths for runway 27. This has low potential for temporary after image and is acceptable in term of glint and glare impacts.

For those receptors where potential effects have been predicted, detailed result charts are presented in Appendix 2.

10 CONCLUSION

Metrica was commissioned to undertake a Glint and Glare Impact Assessment for the proposed Hob Lane Solar Farm. The assessment has been undertaken in accordance with best practice guidance. No effects are predicted on any of the assessed residential, road or rail receptors Whilst no glare is predicted at Liverpool John Lennon Airport ATCT, some low-intensity 'green' glare is predicted on the three approach paths for runway 27. However, this has low potential for temporary after image and is acceptable in terms of the relevant guidance and assessment criteria.

The proposed development is therefore acceptable in terms of glint and glare.

11 GLOSSARY OF TERMS

After-Image: An image that continues to appear in the eyes after exposure to the original image has ceased.

Axis Tracking: Motorised PV array modules which are able change their tilt and / or azimuth angle in order to face the sun as it tracks across the sky.

Azimuth: A direction or bearing defined a horizontal angle between 0° and 359° measured clockwise from North.

Elevation: height above mean sea level.

Elevation Angle: An angle that is formed between the horizontal line (0°) and the line of interest.

Field of View: The angular extent of the observable world that is seen at any given moment. For the assessment of glint and glare effects, this is typically taken as being 50° either side of the direct line of sight.

Glare: A continuous source of bright light typically received by static receptors or from large reflective surfaces.

Glint: A momentary flash of bright light typically received by moving receptors or from moving reflectors.

Green Glare: Glare predicted with a low potential for temporary after-image.

Local Road: Smaller 'C' or Unclassified roads, often linking a housing estate or a village to the rest of the network, and all roads within residential areas unless specifically classified otherwise.

National Road: 'A' Roads or Motorways, typically with a speed limit of up to 60mph or 70mph, intended to provide large-scale transport links within or between geographical areas.

Ocular Impact: In this context, ocular impact is a function of retinal irradiance and subtended source angle, as plotted on a Glare Hazard Plot.

Receptor: In this context, a receptor is a potential viewer of glint and glare effects, either static or mobile.

Red Glare: Glare predicted with a potential for permanent eye damage (retinal burn),

Regional Road: Typically classed as 'B' roads in the UK, intended to connect different areas, and to feed traffic between A roads and smaller roads on the network.

Retinal Irradiance: The amount of light or other radiant energy striking the retina, measured in watts per cm^2

Subtended Source Angle: The subtended source angle is the angle formed by hypothetical lines projecting from the eye to the top and bottom (or left and right sides) of a source of glare. The subtended source angle therefore represents the size of the glare viewed by an observer.

Yellow Glare: glare predicted with a potential for temporary after-image.

APPENDIX 1: PROPOSED DEVELOPMENT LAYOUT

APPENDIX 2: DETAILED RESULTS

PV arrays are numbered as per the modelling software and detailed on Figure 1 for reference.

A2.1: Predicted Effects from array A at Commercial Instrument Approach (1)

Chart A2.1.1: Approximate Source Area

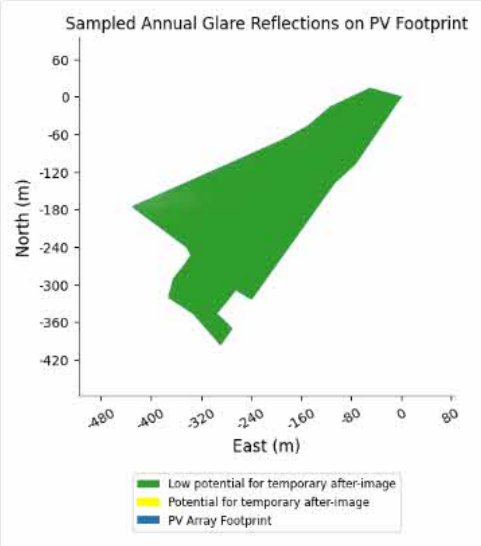
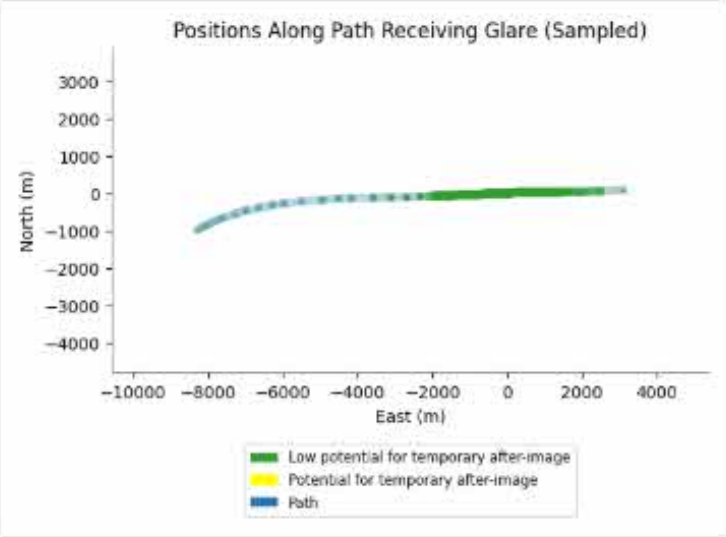


Chart A2.1.2: Location Along Path Receveing Glare



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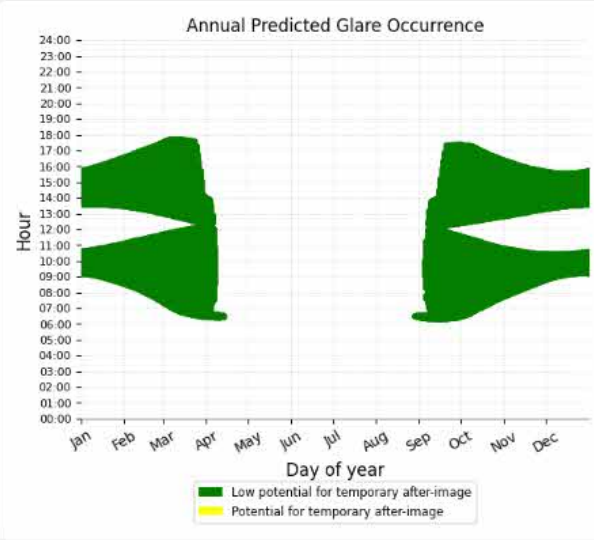


A2.2: Predicted Effects from array A at Commercial Visual Approach (1)

Chart A2.2.1: Approximate Source Area

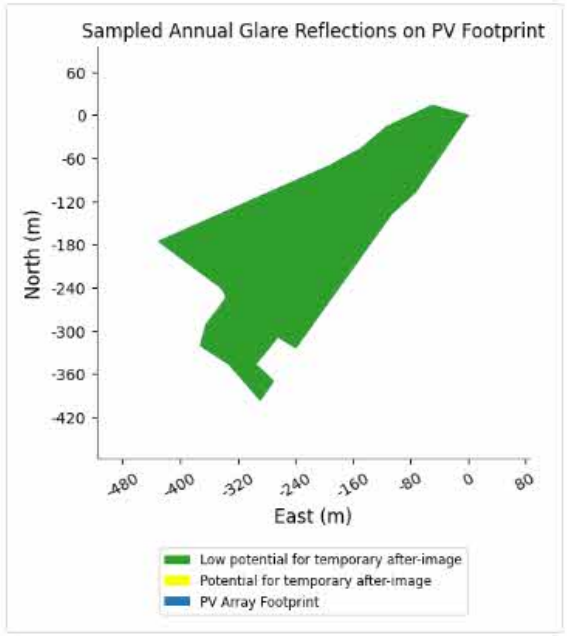


Chart A2.2.2: Location Along Path Receveing Glare

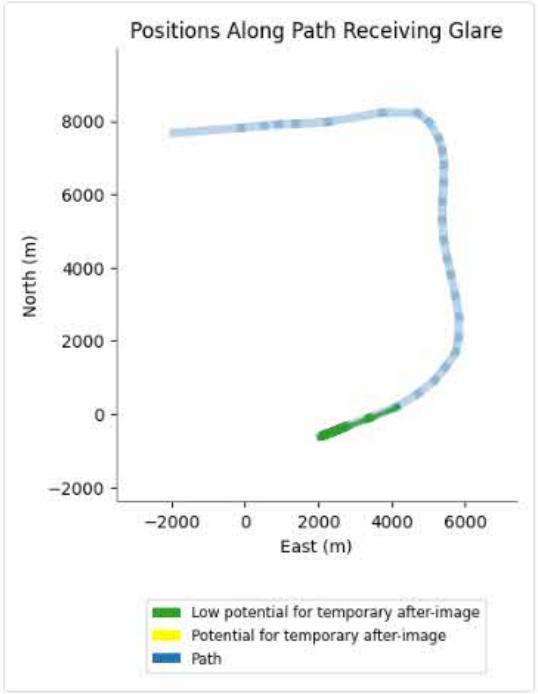
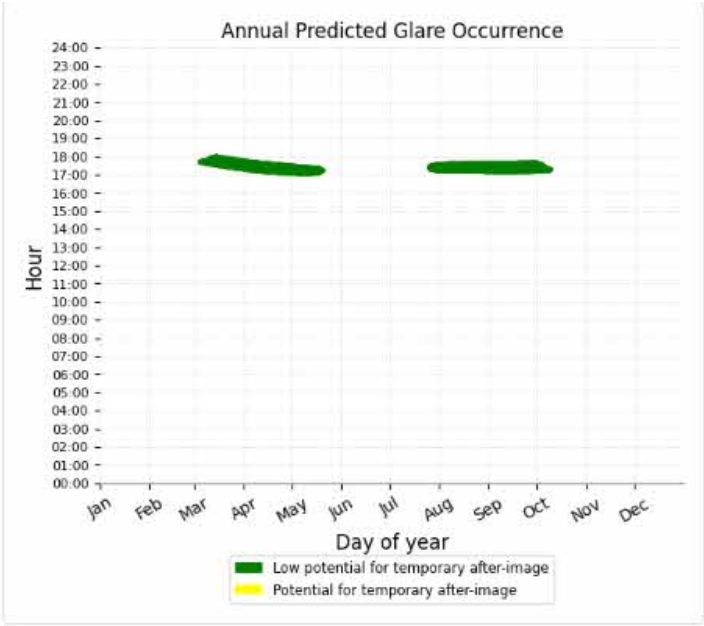


Chart A2.2.3 Times of Glare GMT)



A2.3: Predicted Effects from array A at Commercial Instrument Approach (2)

Chart A2.3.1: Approximate Source Area

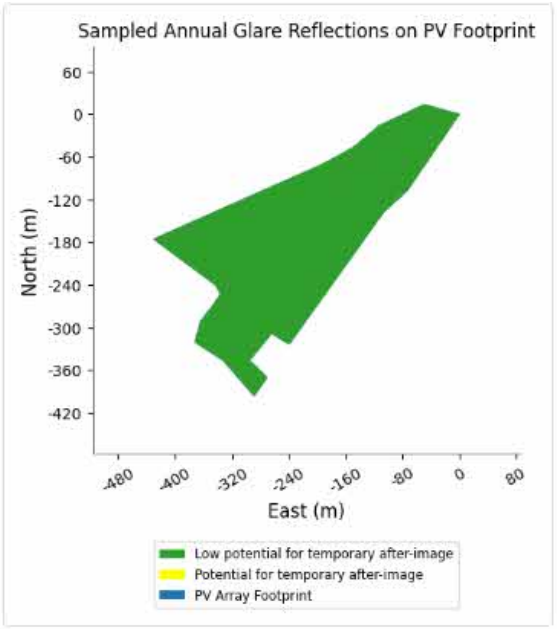
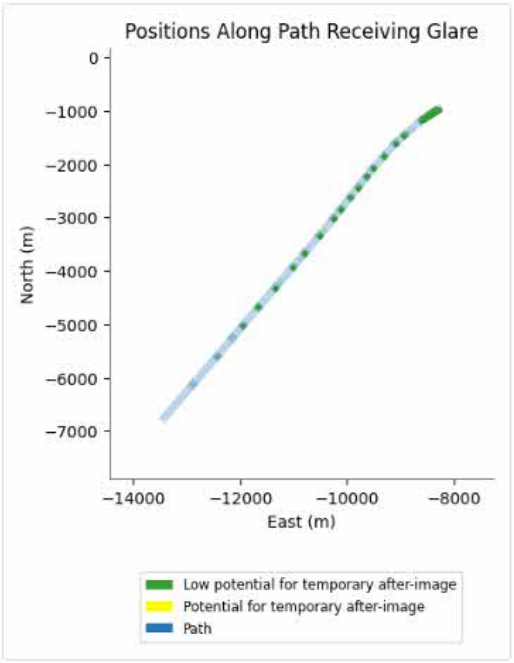


Chart A2.1.32: Location Along Path Receveing Glare



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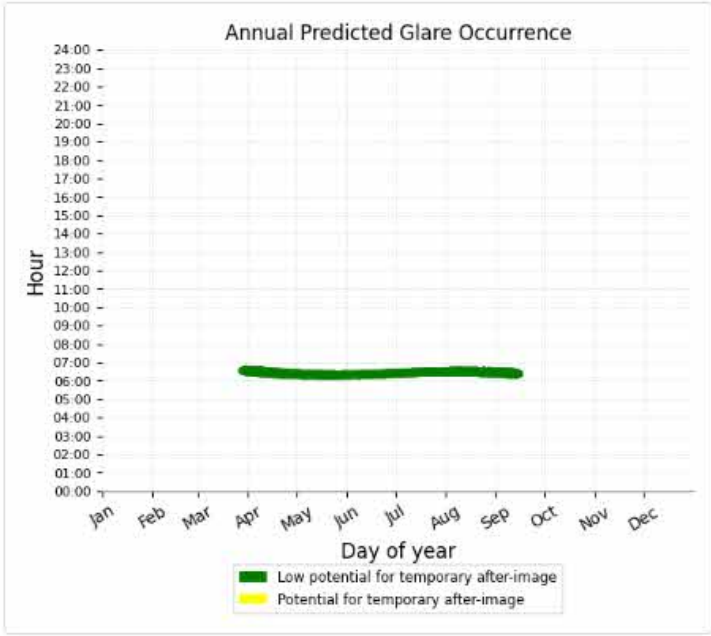


A2.4: Predicted Effects from array A at Commercial Visual Approach (2)

Chart A2.4.1: Approximate Source Area

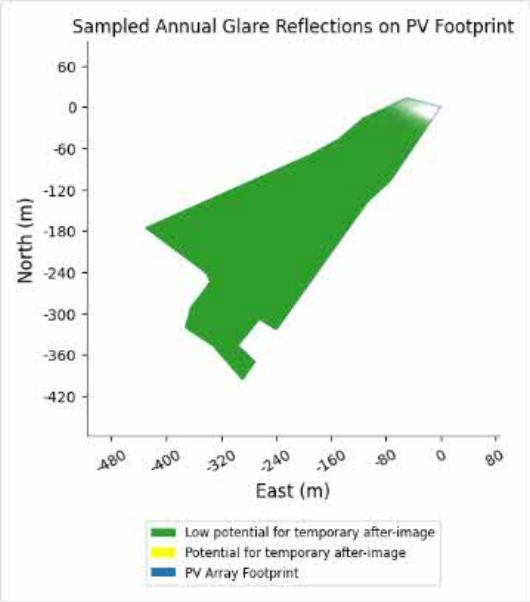
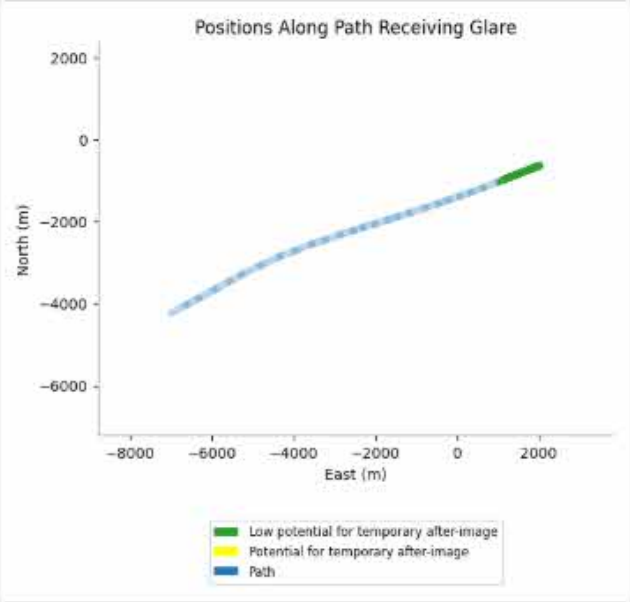


Chart A2.4.2: Location Along Path Receveing Glare



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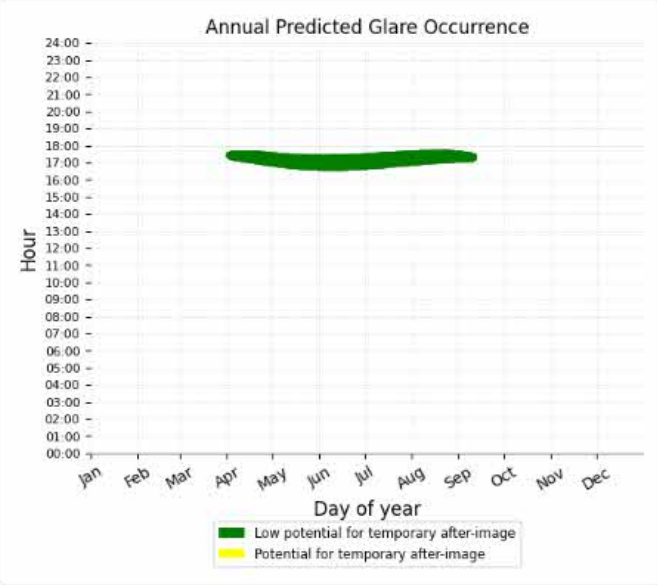


A2.5: Predicted Effects from array B at Commercial Instrument Approach (1)

Chart A2.5.1: Approximate Source Area

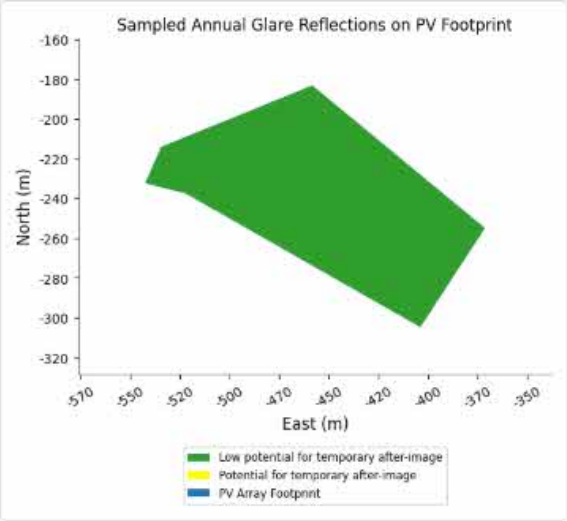
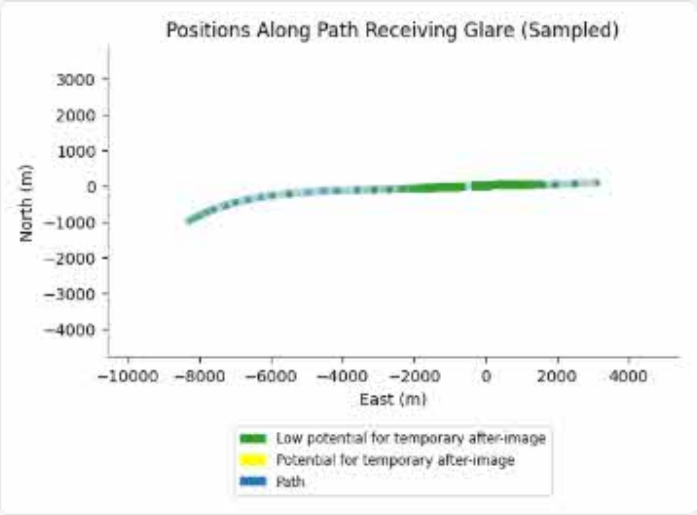


Chart A2.5.2: Location Along Path Receveing Glare



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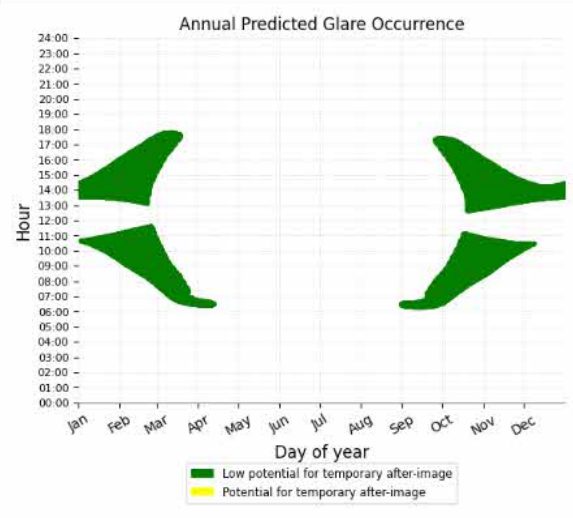


A2.6: Predicted Effects from array B at Commercial Visual Approach (1)

Chart A2.6.1: Approximate Source Area

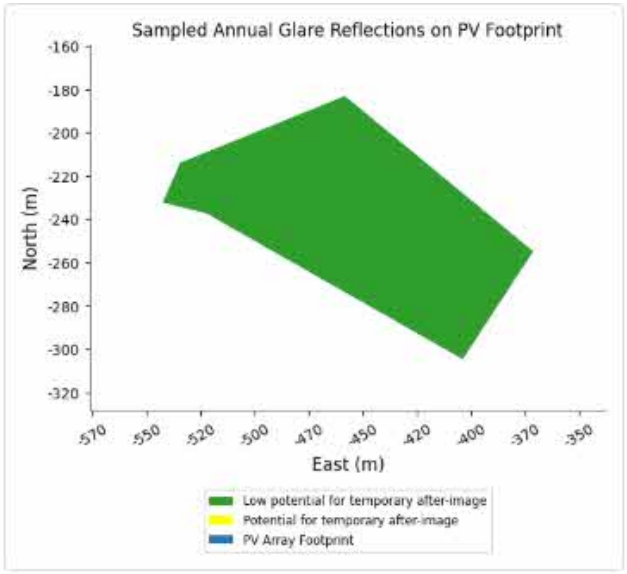


Chart A2.6.2: Location Along Path Receveing Glare

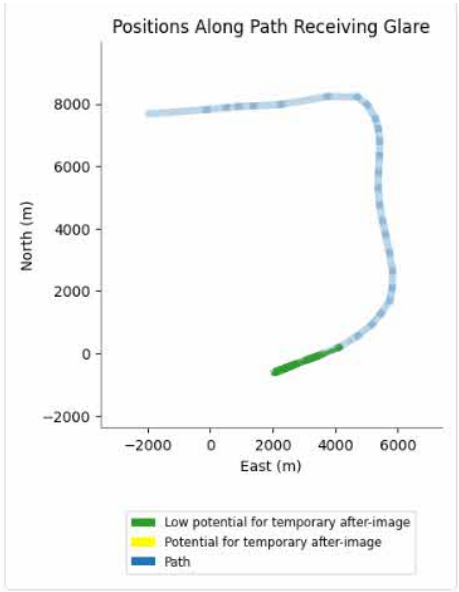
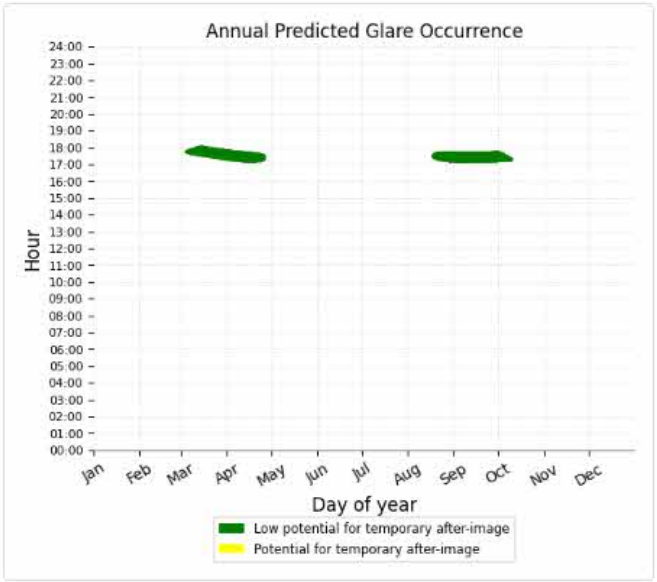


Chart A2.6.3 Times of Glare GMT)



A2.7: Predicted Effects from array B at Commercial Instrument Approach (2)

Chart A2.7.1: Approximate Source Area

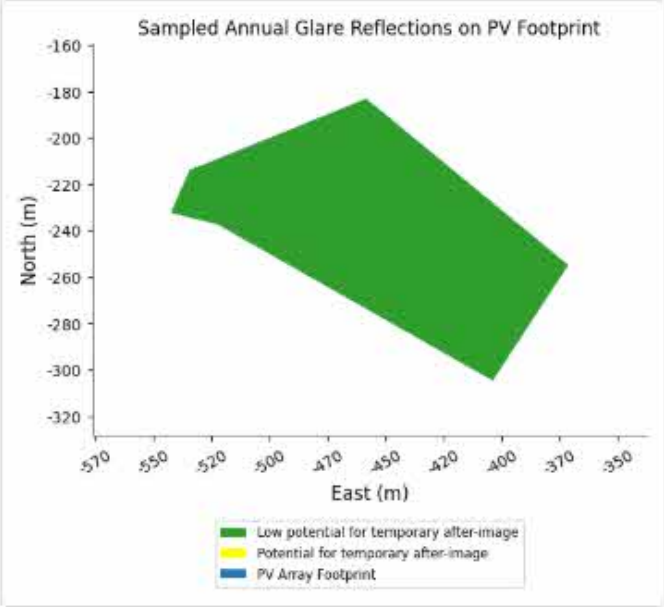


Chart A2.7.2: Location Along Path Receveing Glare

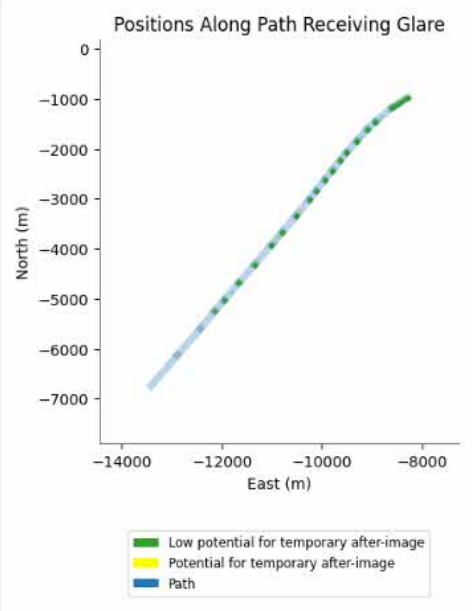
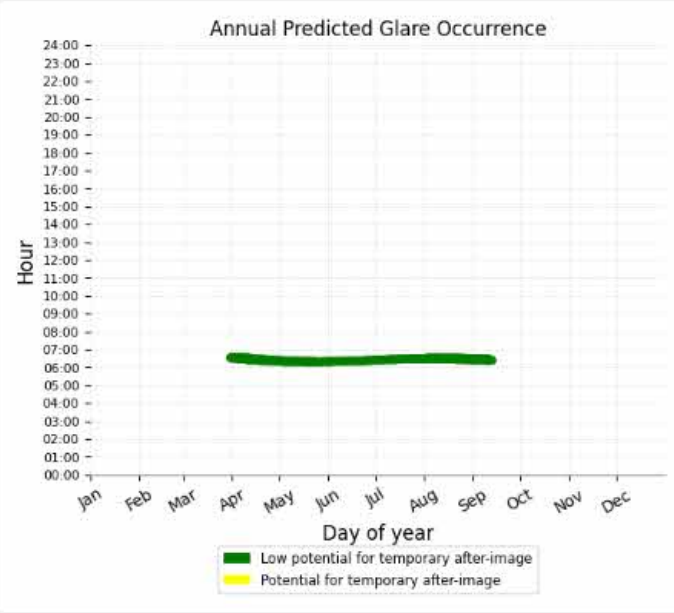


Chart A2.7.3 Times of Glare GMT)



A2.8: Predicted Effects from array B at Commercial Visual Approach (2)

Chart A2.8.1: Approximate Source Area

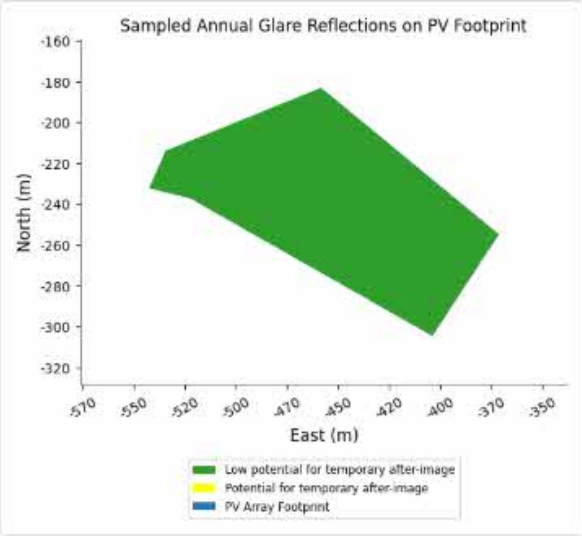


Chart A2.8.2: Location Along Path Receveing Glare

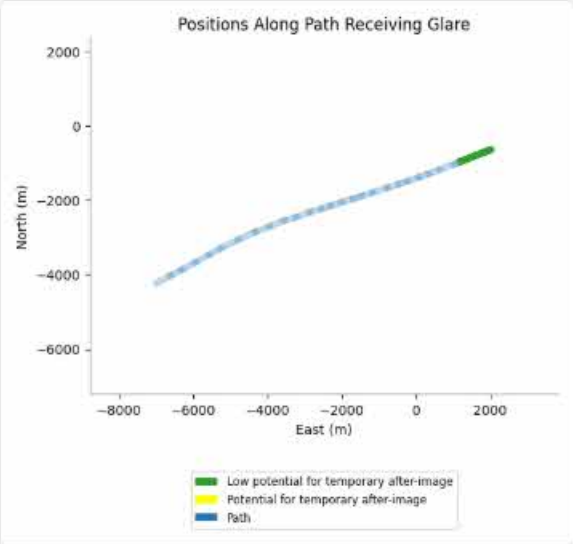
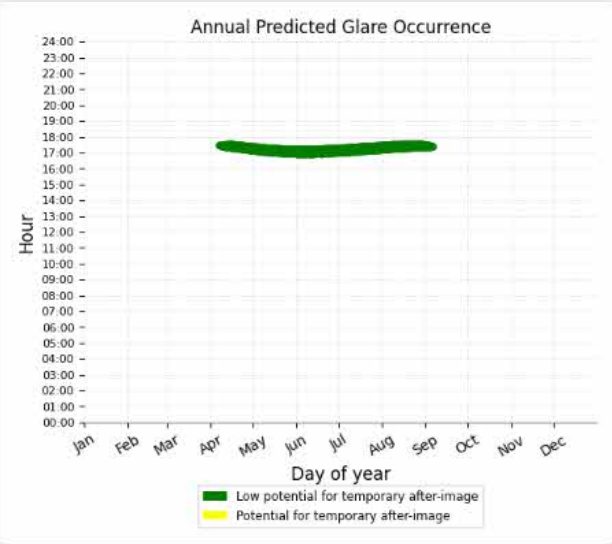


Chart A2.8.3 Times of Glare GMT)



A2.9: Predicted Effects from array C at Commercial Instrument Approach (1)

Chart A2.9.1: Approximate Source Area

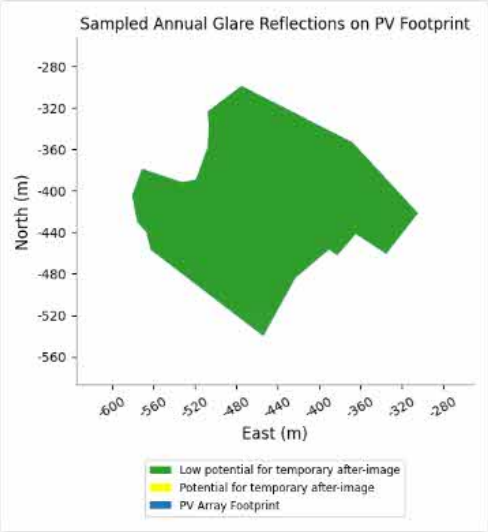


Chart A2.9.2: Location Along Path Receveing Glare

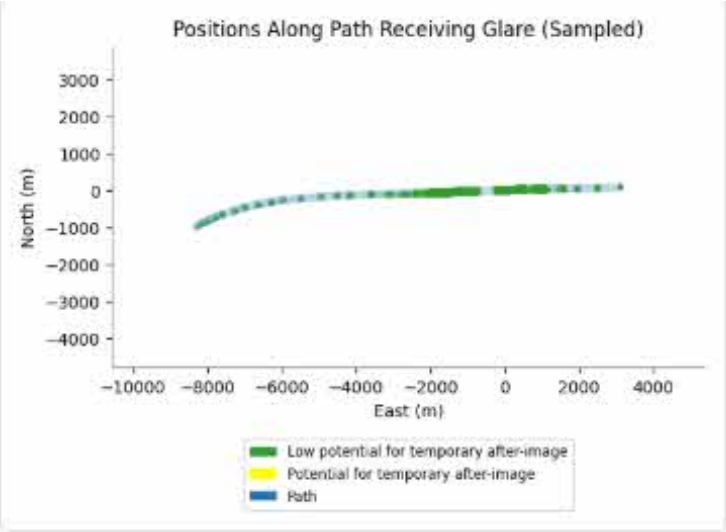
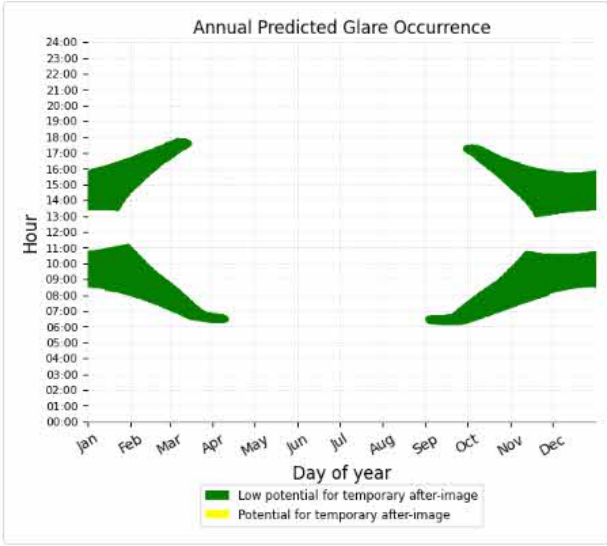


Chart A2.9.3 Times of Glare GMT)



A2.10 : Predicted Effects from array C at Commercial Visual Approach (1)

Chart A2.10.1: Approximate Source Area

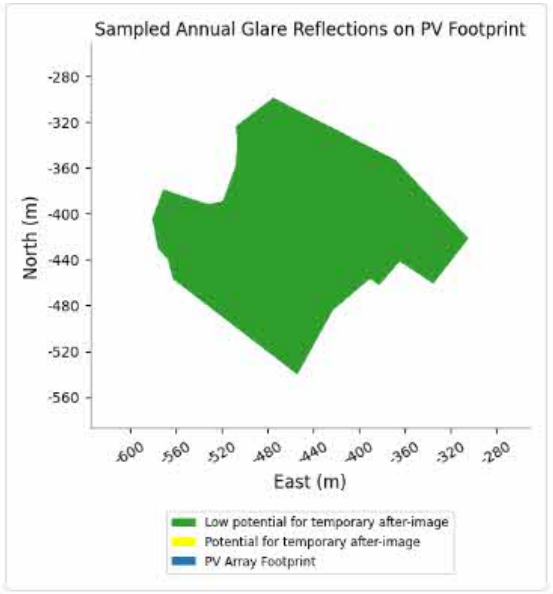


Chart A2.10.2: Location Along Path Receveing Glare

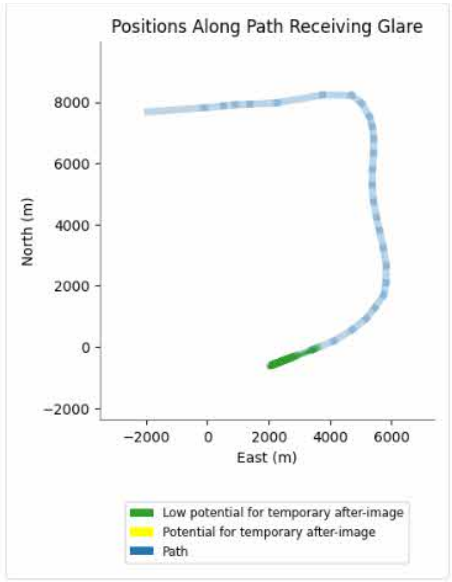
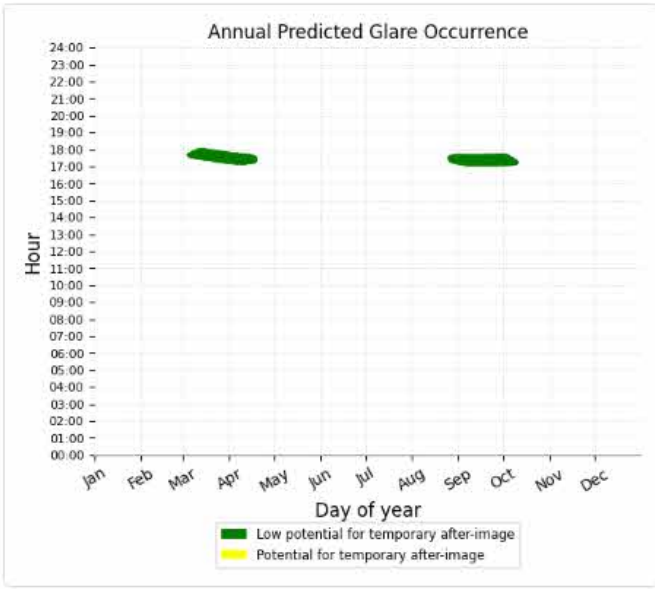


Chart A2.10.3 Times of Glare GMT)



A2.11: Predicted Effects from array C at Commercial Instrument Approach (2)

Chart A2.11.1: Approximate Source Area

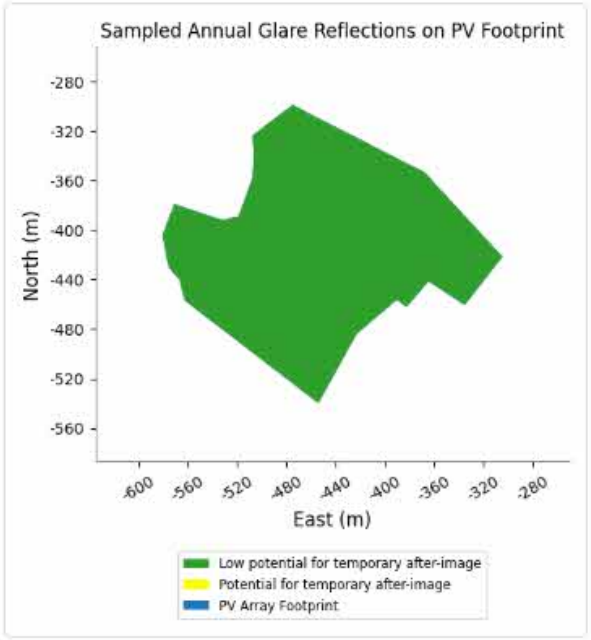


Chart A2.11.2: Location Along Path Receveing Glare

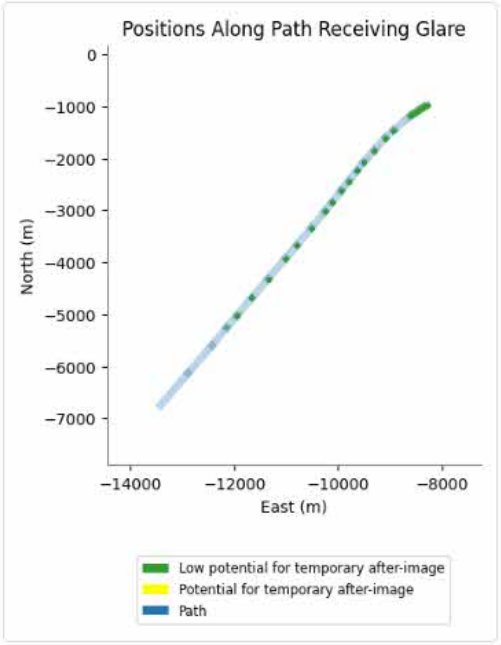
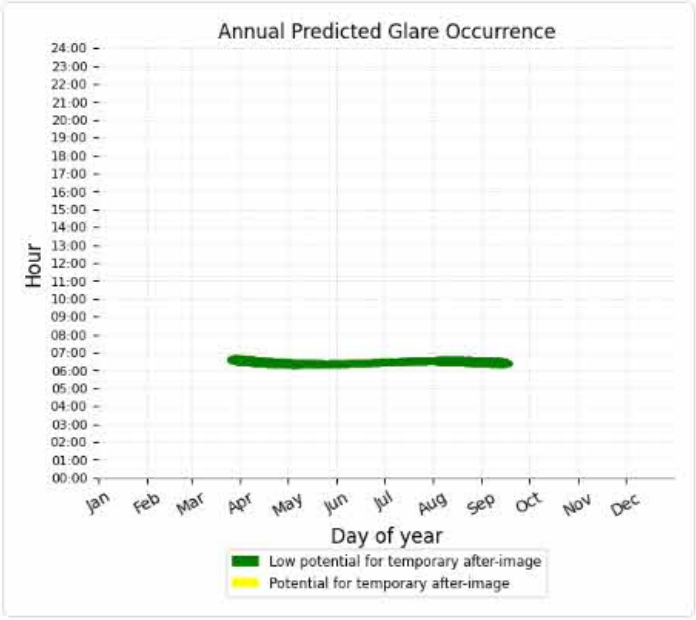


Chart A2.11.3 Times of Glare GMT)



A2.12: Predicted Effects from array C at Commercial Visual Approach (2)

Chart A2.12.1: Approximate Source Area

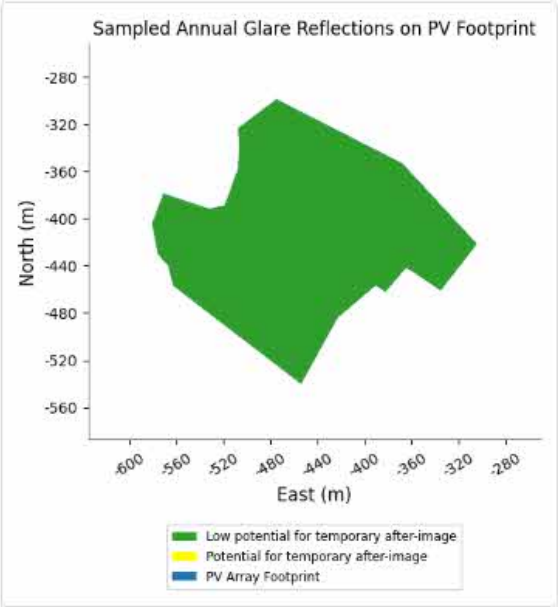


Chart A2.12.2: Location Along Path Receveing Glare

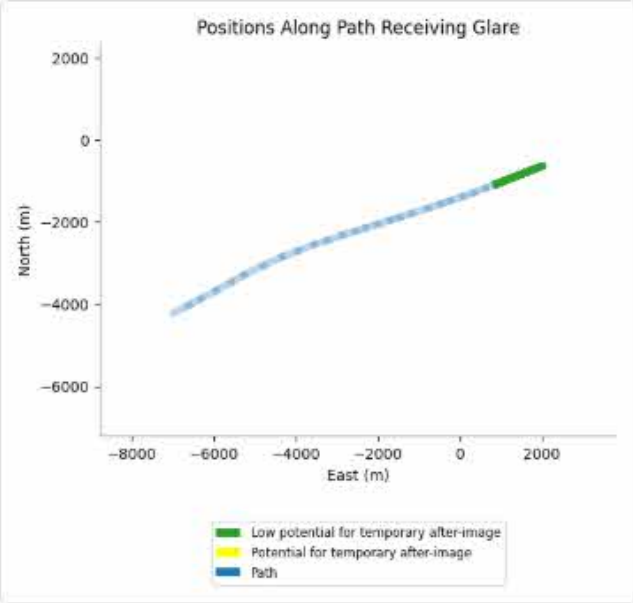
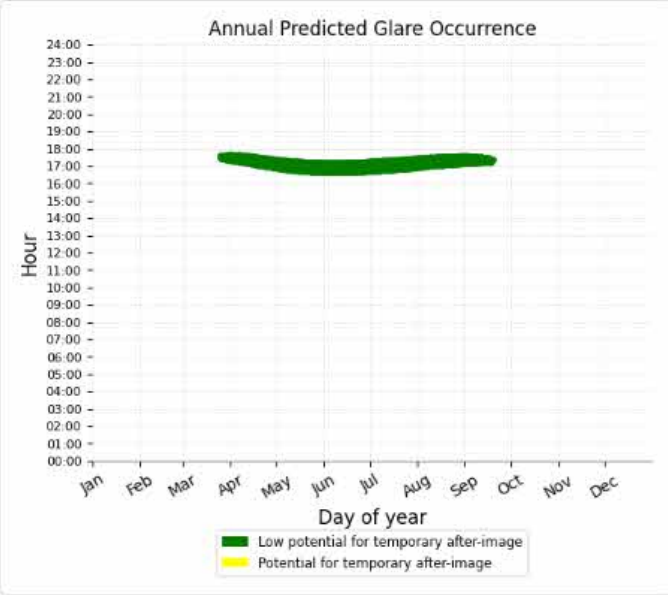


Chart A2.12.3 Times of Glare GMT)



A2.13 : Predicted Effects from array D at Commercial Instrument Approach (1)

Chart A2.13.1: Approximate Source Area

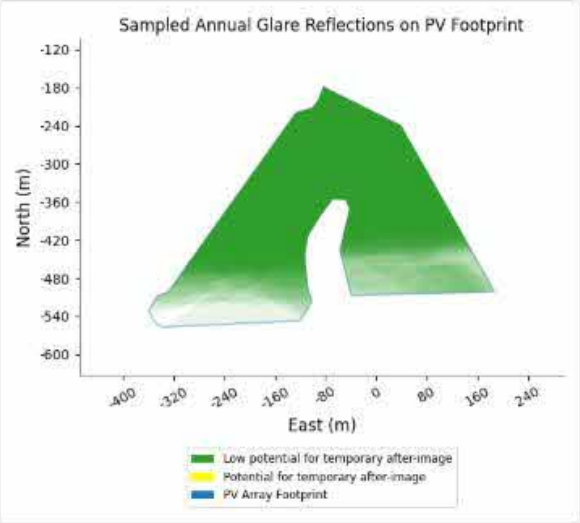


Chart A2.13.2: Location Along Path Receveing Glare

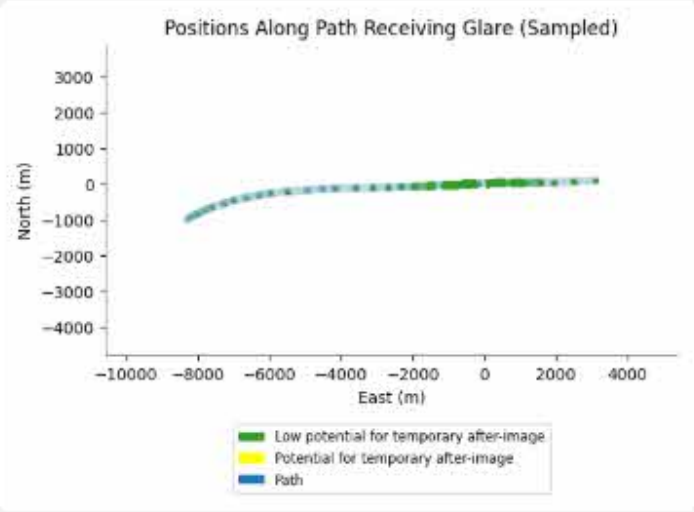
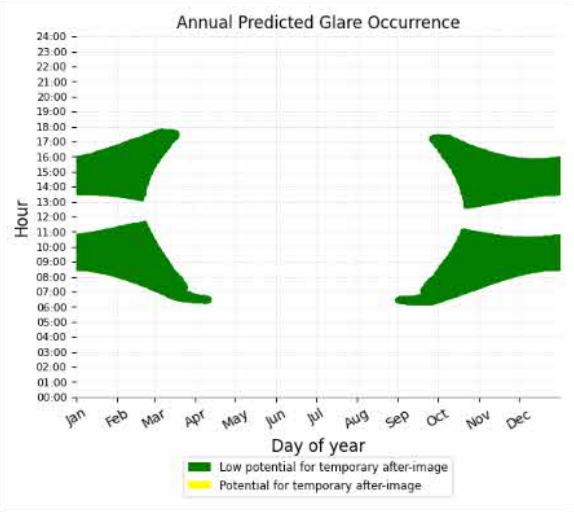


Chart A2.13.3 Times of Glare GMT)



A2.14 : Predicted Effects from array D at Commercial Visual Approach (1)

Chart A2.14.1: Approximate Source Area

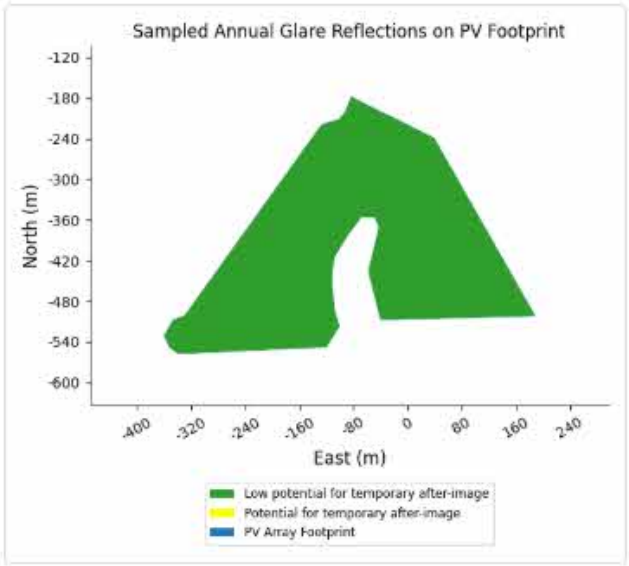


Chart A2.14.2: Location Along Path Receveing Glare

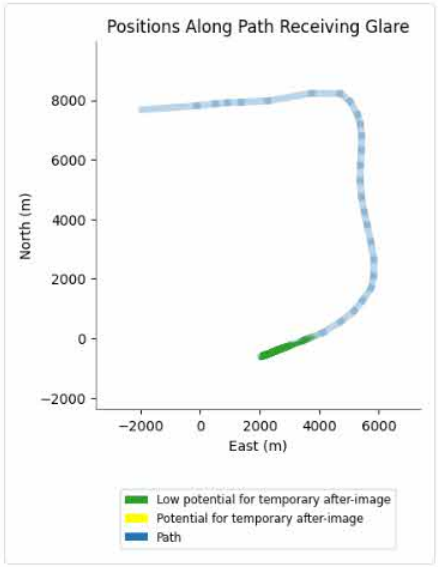
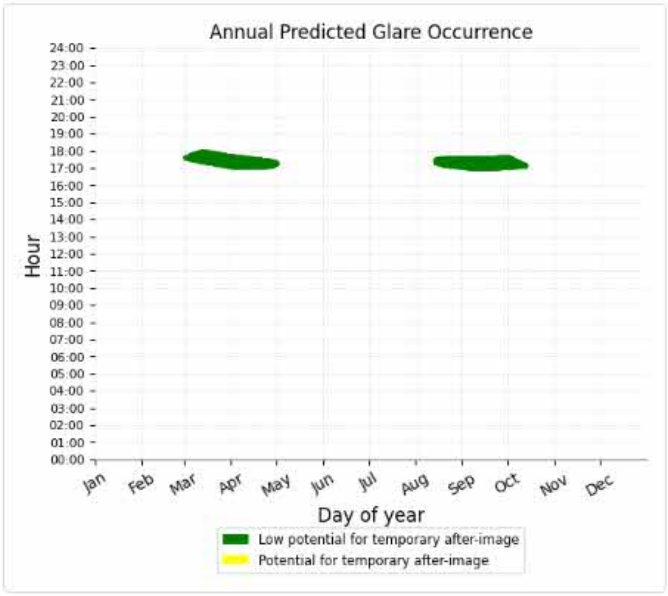


Chart A2.14.3 Times of Glare GMT)



A2.15 : Predicted Effects from array D at Commercial Instrument Approach (2)

Chart A2.15.1: Approximate Source Area

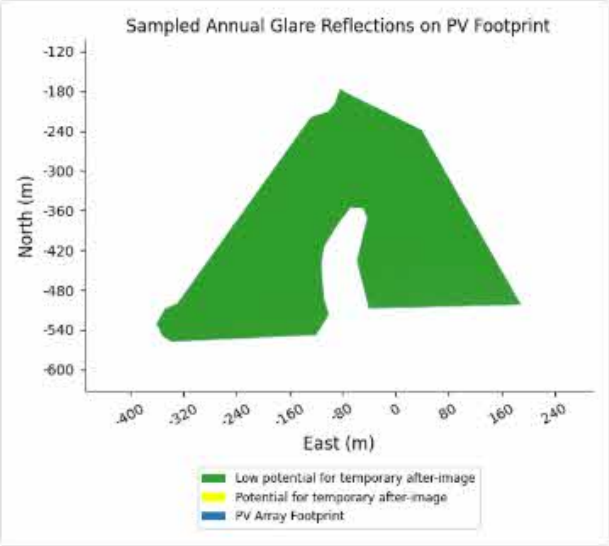


Chart A2.15.2: Location Along Path Receveing Glare

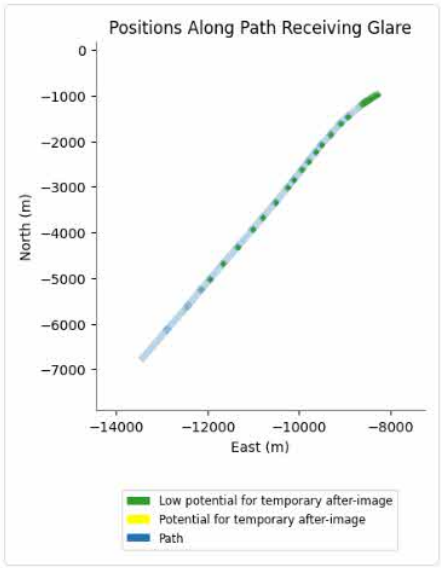
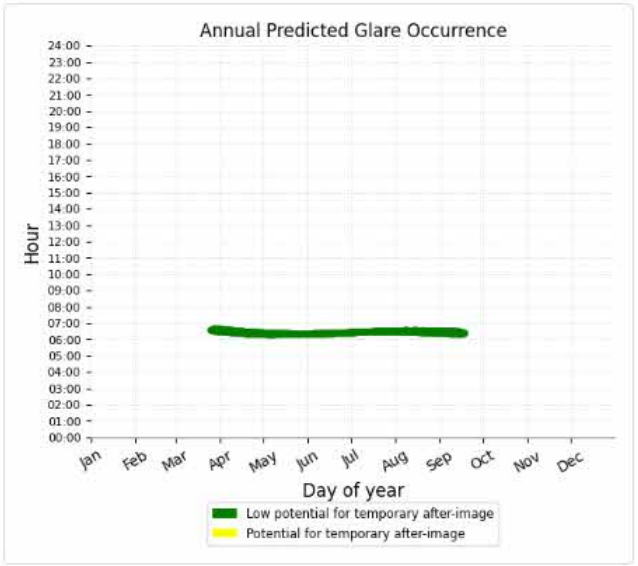


Chart A2.15.3 Times of Glare GMT)



A2.16 : Predicted Effects from array D at Commercial Visual Approach (2)

Chart A2.16.1: Approximate Source Area

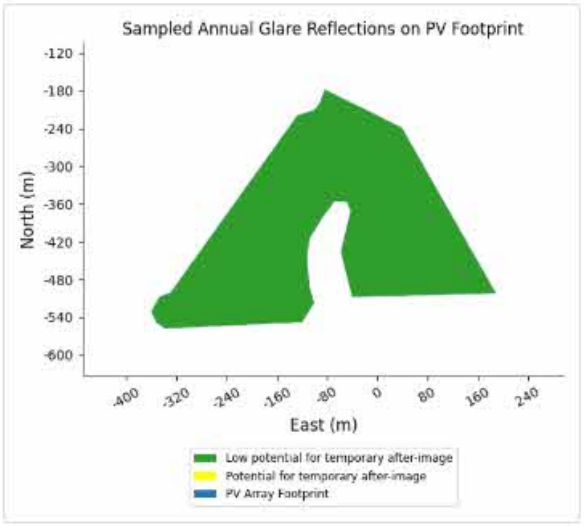


Chart A2.16.2: Location Along Path Receveing Glare

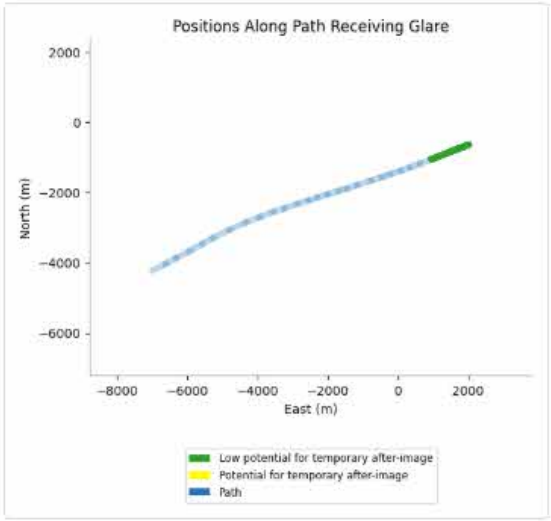
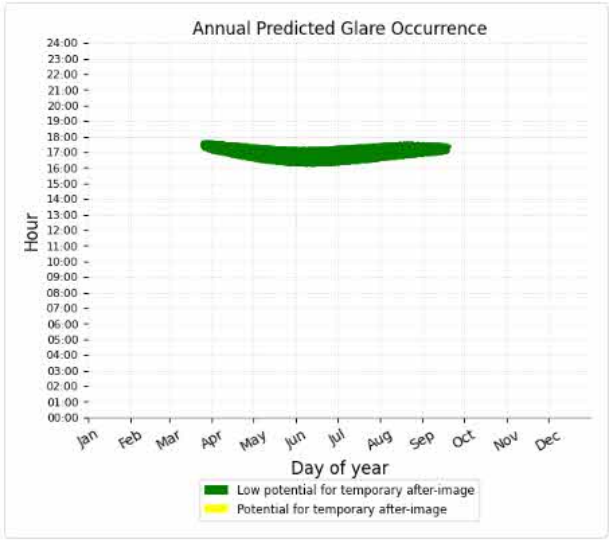


Chart A2.16.3 Times of Glare GMT)



A2.17: Predicted Effects from array E at Commercial Instrument Approach (1)

Chart A2.17.1: Approximate Source Area

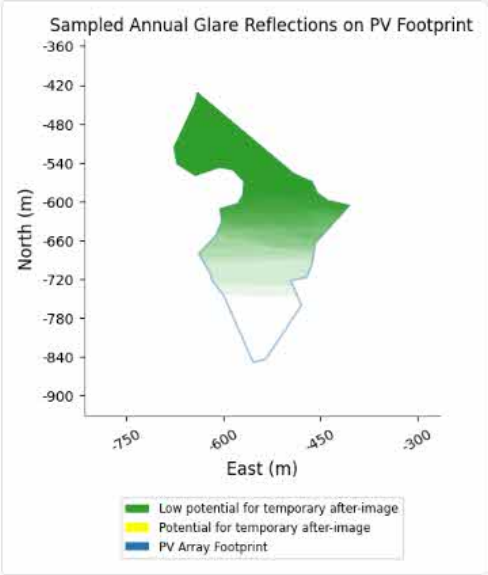


Chart A2.17.2: Location Along Path Receveing Glare

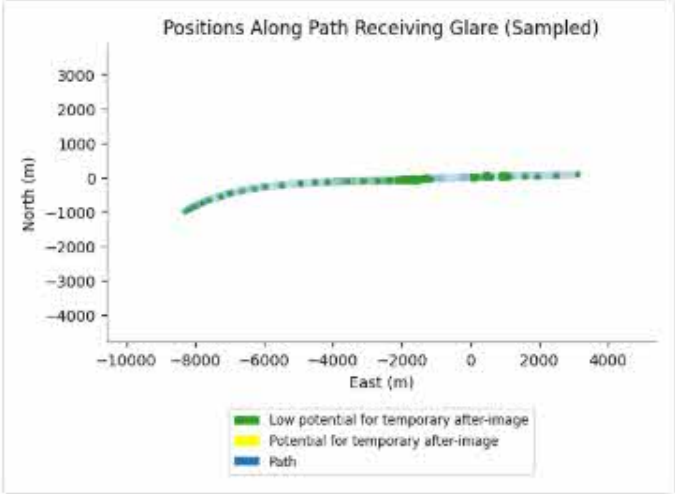
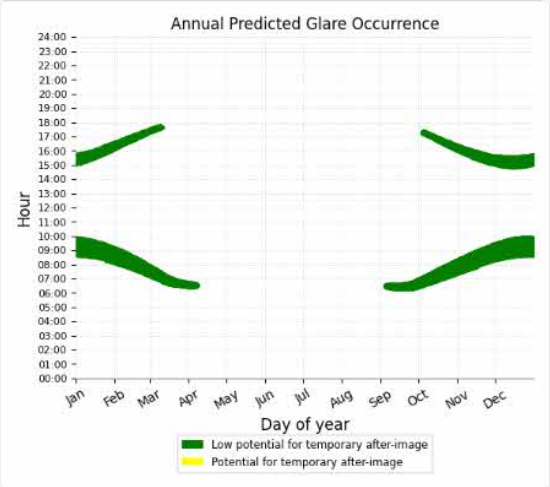


Chart A2.17.3 Times of Glare GMT)



A2.18 : Predicted Effects from array E at Commercial Visual Approach (1)

Chart A2.18.1: Approximate Source Area

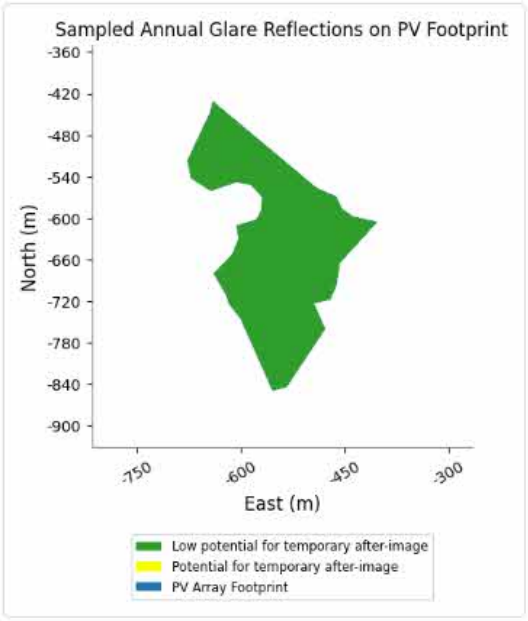


Chart A2.18.2: Location Along Path Receveing Glare

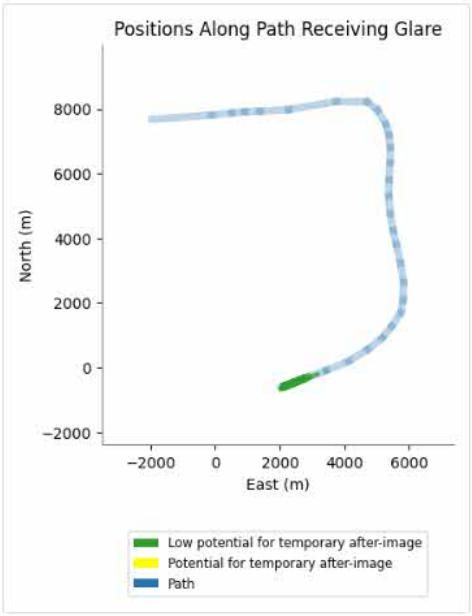
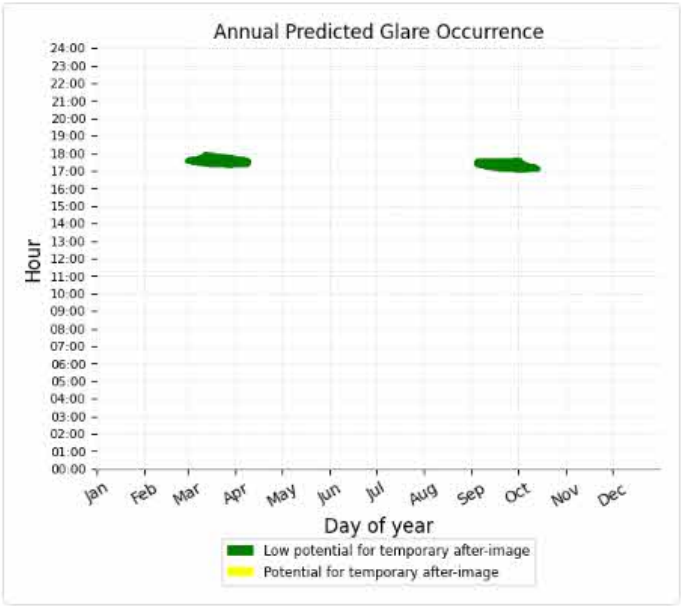


Chart A2.18.3 Times of Glare GMT)



A2.19 : Predicted Effects from array E at Commercial Instrument Approach (2)

Chart A2.19.1: Approximate Source Area

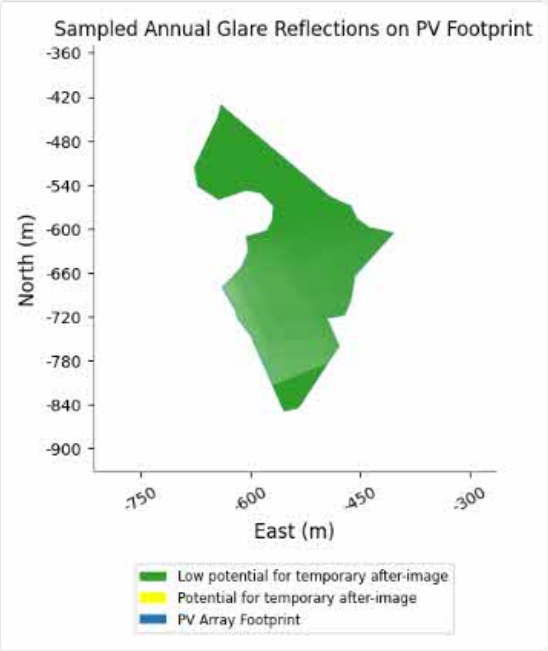


Chart A2.19.2: Location Along Path Receveing Glare

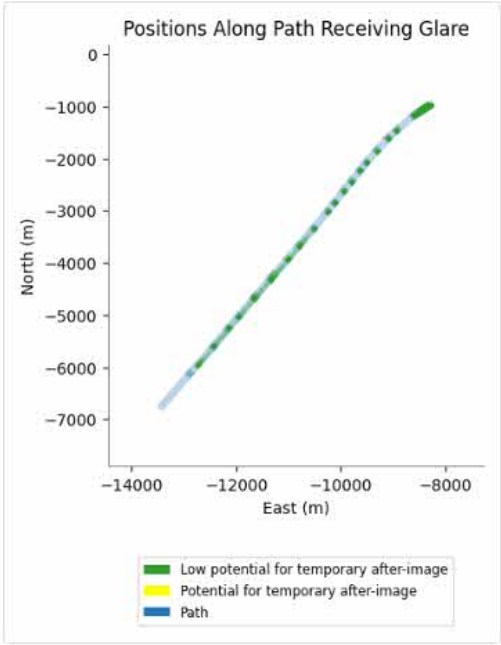
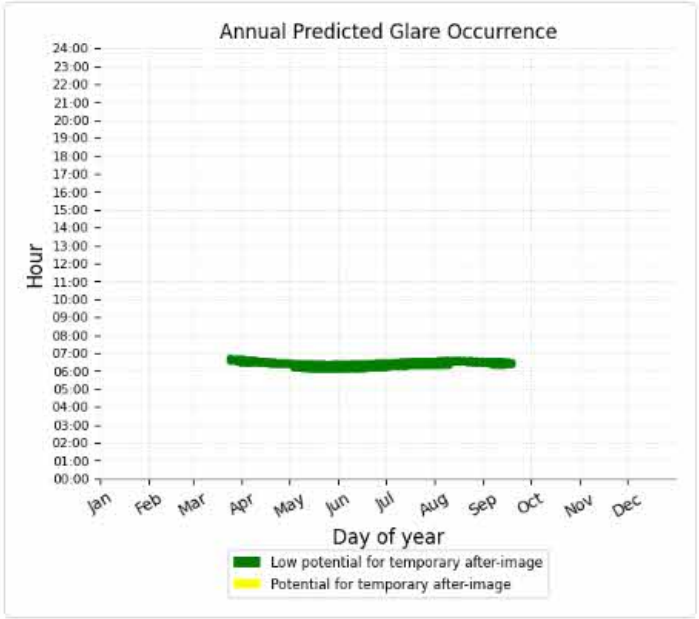


Chart A2.19.3 Times of Glare GMT)



A2.20: Predicted Effects from array E at Commercial Visual Approach (2)

Chart A2.20.1: Approximate Source Area

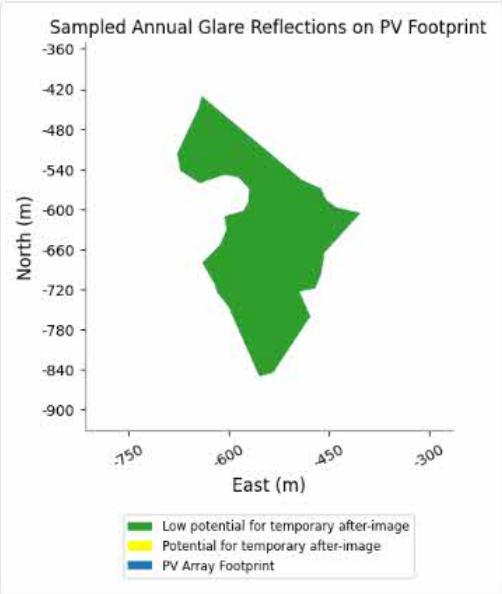


Chart A2.20.2: Location Along Path Receveing Glare

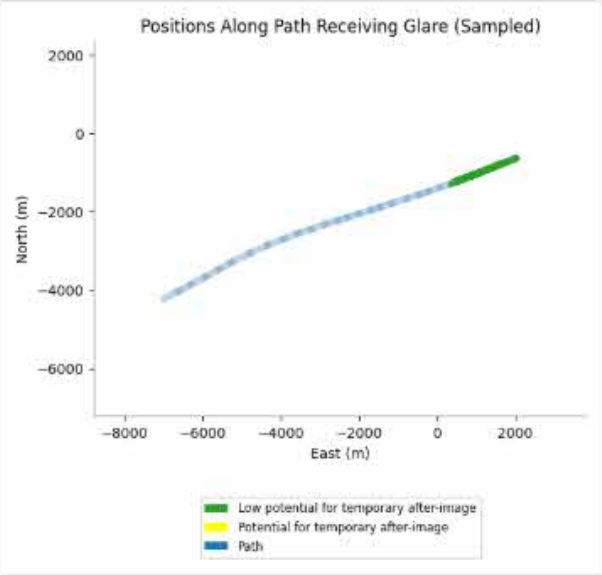
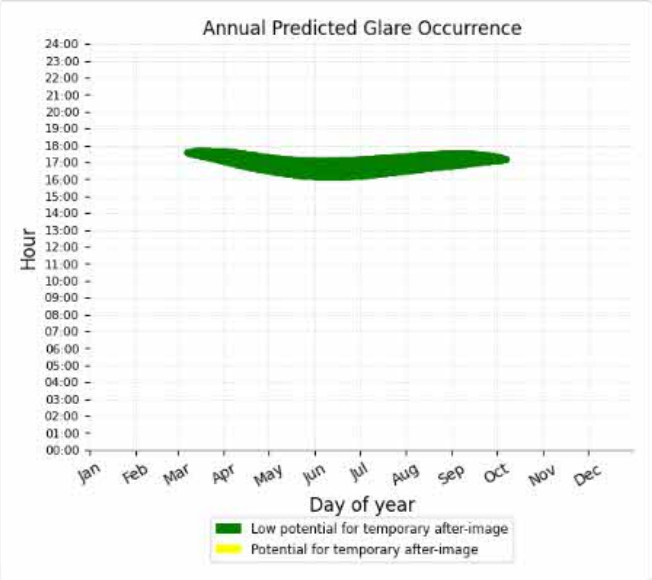


Chart A2.20.3 Times of Glare GMT)



A2.21: Predicted Effects from array F at Commercial Instrument Approach (1)

Chart A2.211: Approximate Source Area

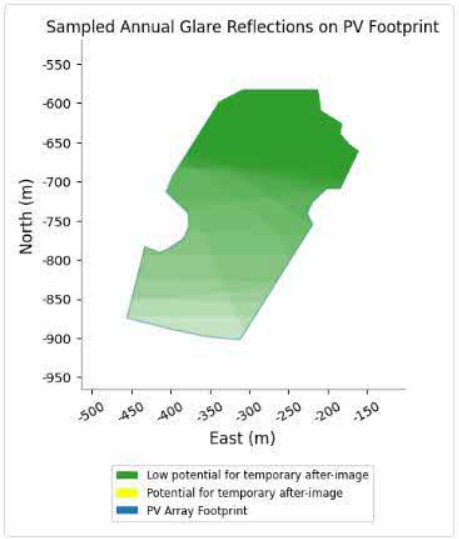


Chart A2.21.2: Location Along Path Receveing Glare

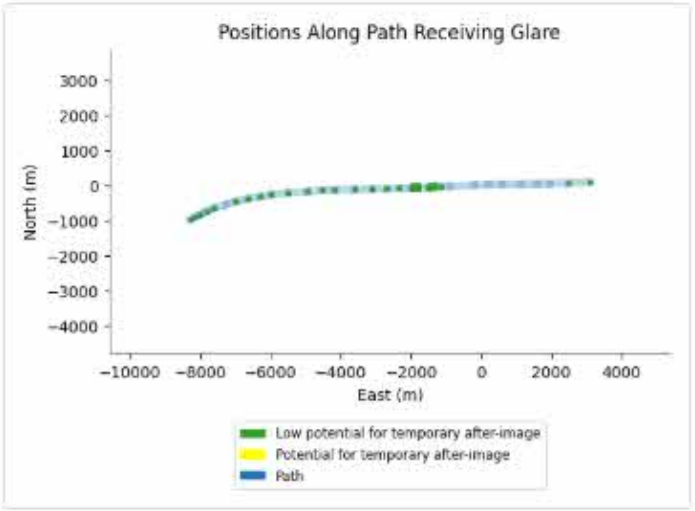
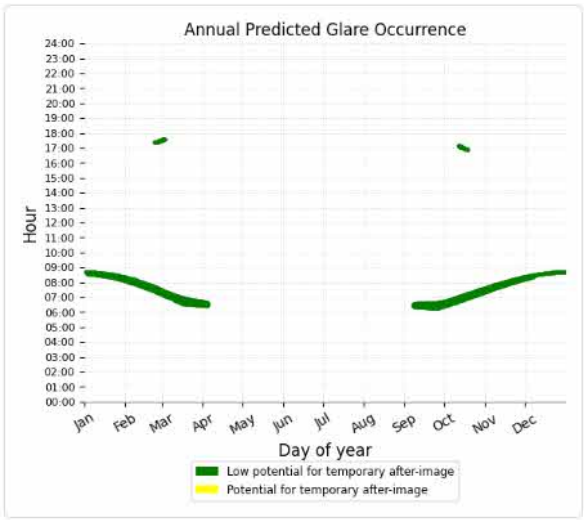


Chart A2.21.3 Times of Glare GMT)



A2.22: Predicted Effects from array F at Commercial Visual Approach (1)

Chart A2.22.1: Approximate Source Area

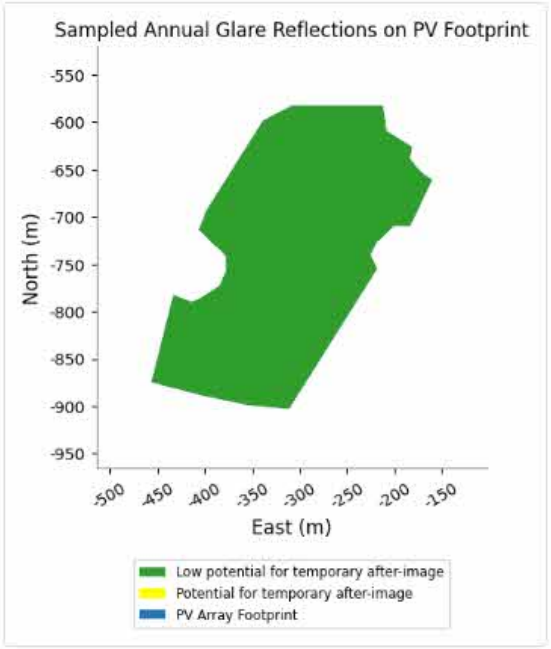


Chart A2.12.2: Location Along Path Receveing Glare

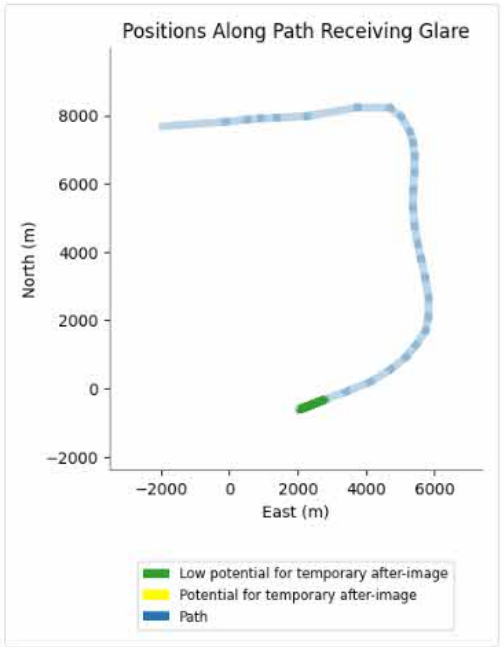
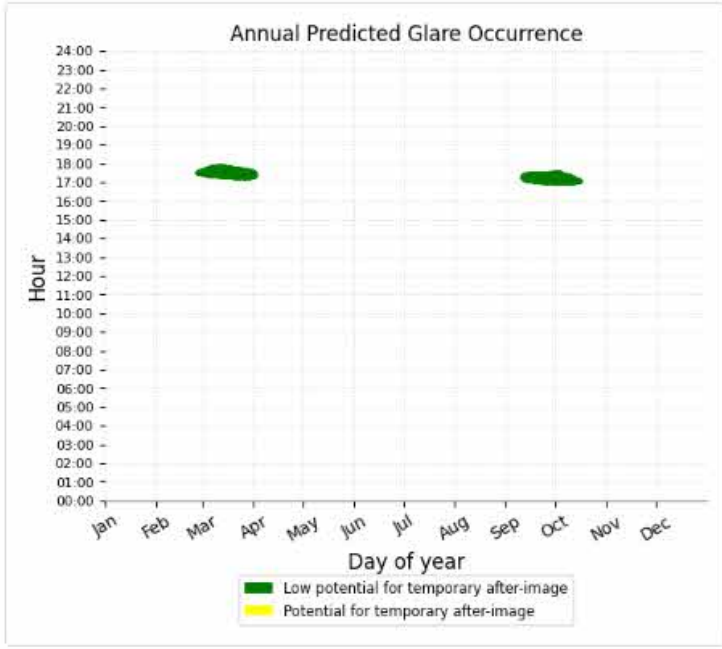


Chart A2.22.3 Times of Glare GMT)



A2.23: Predicted Effects from array F at Commercial Instrument Approach (2)

Chart A2.23.1: Approximate Source Area

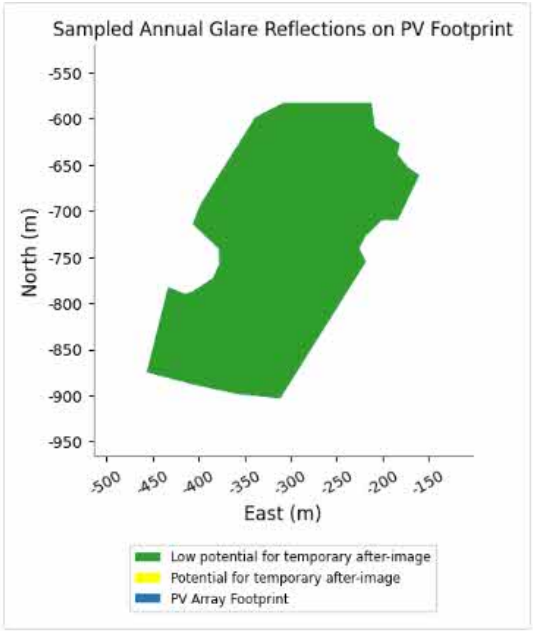


Chart A2.232: Location Along Path Receveing Glare

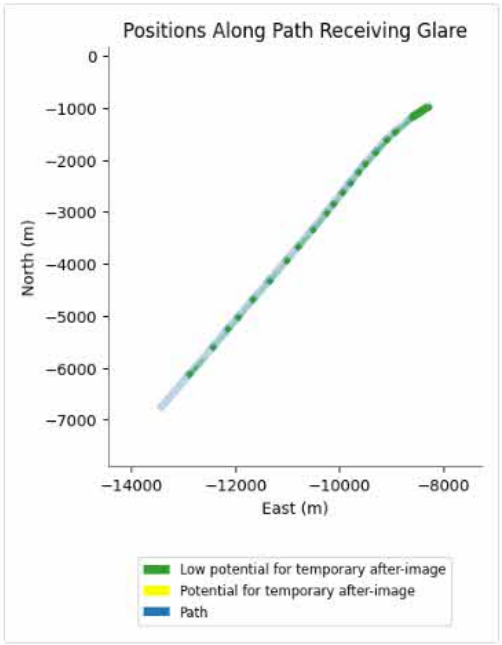
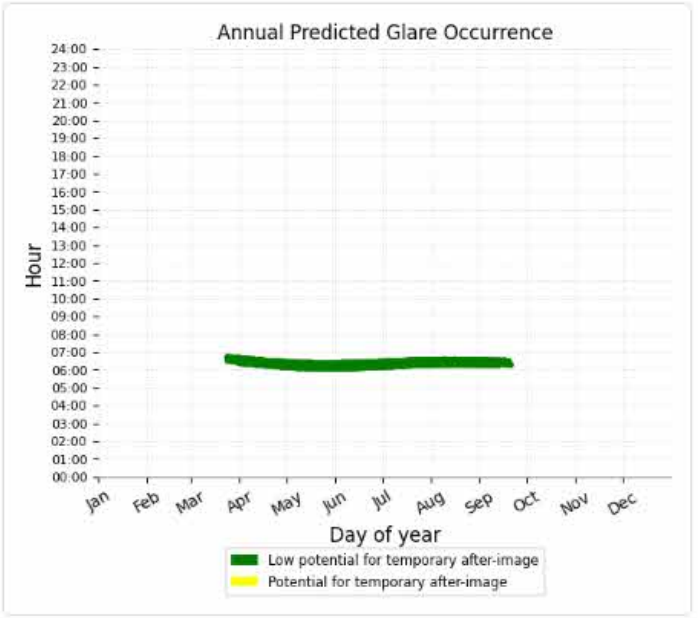


Chart A2.23.3 Times of Glare GMT)



A2.24: Predicted Effects from array F at Commercial Visual Approach (2)

Chart A2.24.1 Approximate Source Area

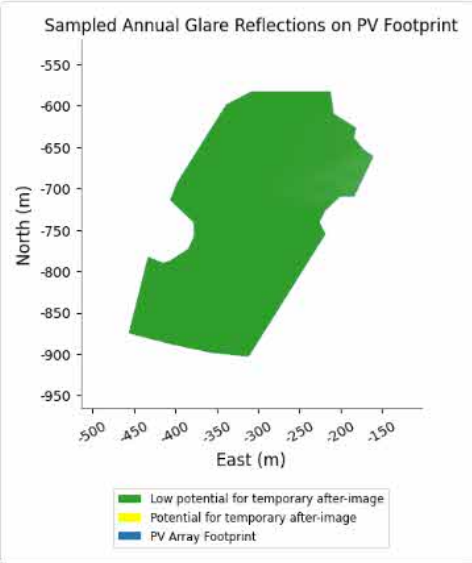


Chart A2.24.2: Location Along Path Receveing Glare

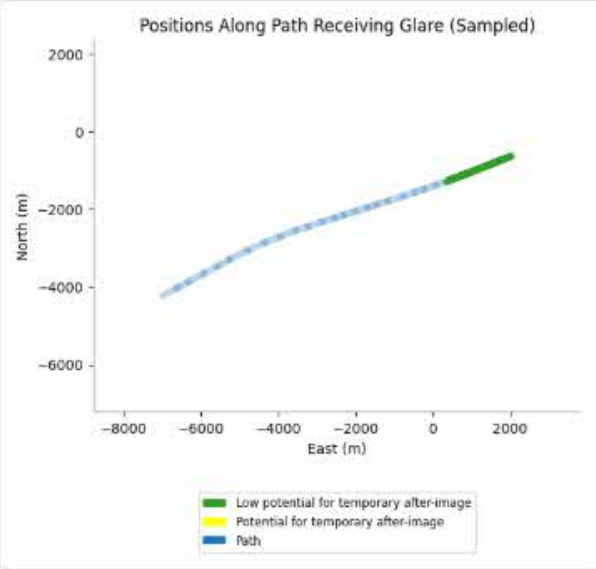
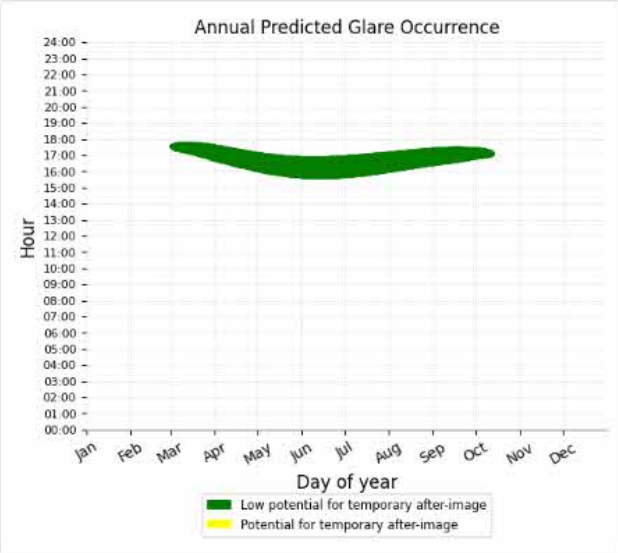


Chart A2.24.3 Times of Glare GMT)



A2.25: Predicted Effects from array G at Commercial Instrument Approach (1)

Chart A2.25.1: Approximate Source Area

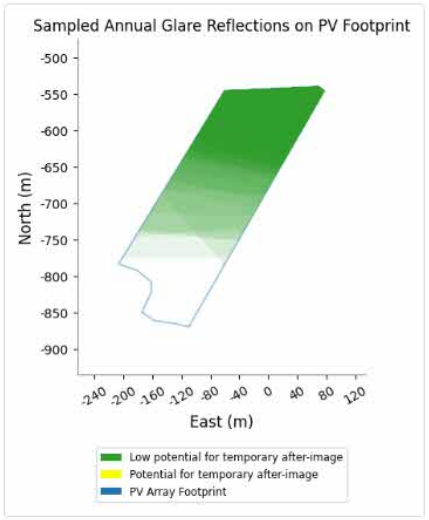


Chart A2.25.2: Location Along Path Receveing Glare

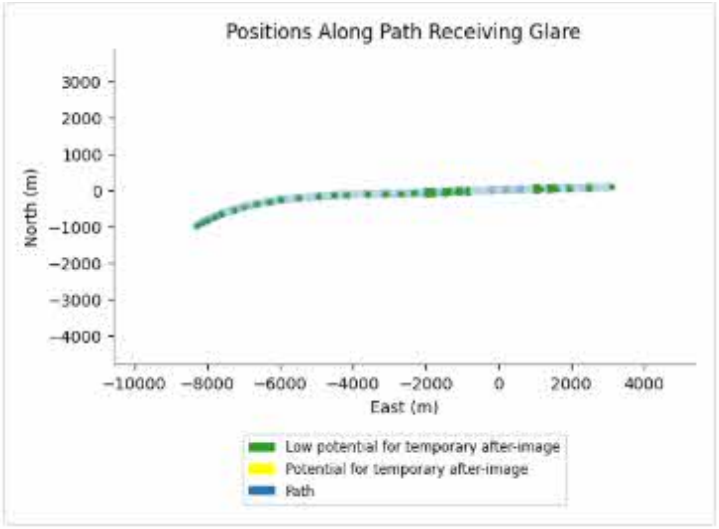
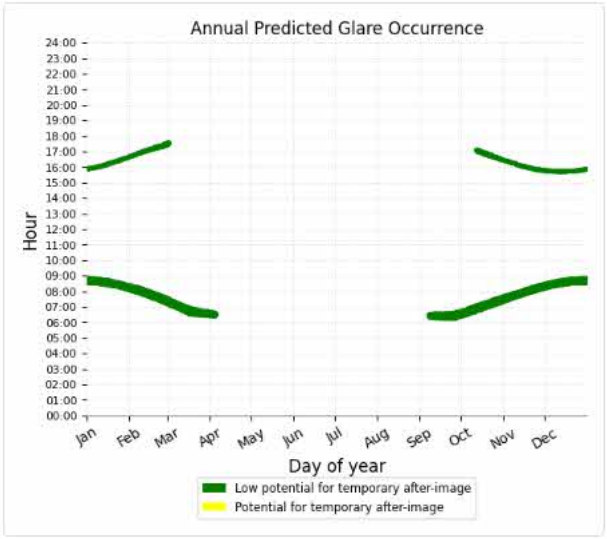


Chart A2.25.3 Times of Glare GMT)



A2.26: Predicted Effects from array G at Commercial Visual Approach (1)

Chart A2.26.1: Approximate Source Area

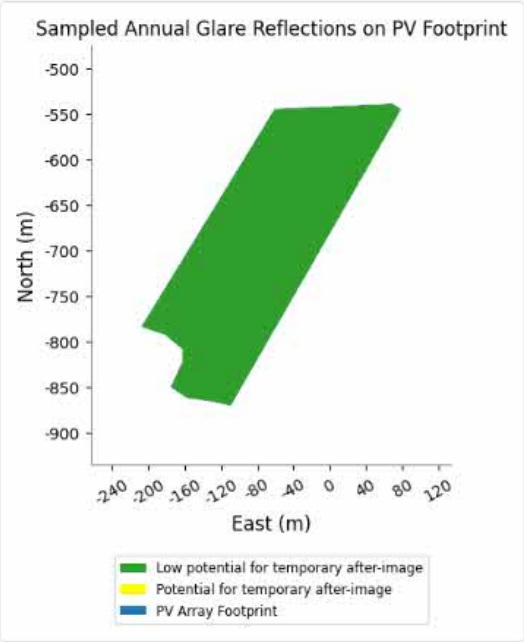


Chart A2.26.2: Location Along Path Receveing Glare

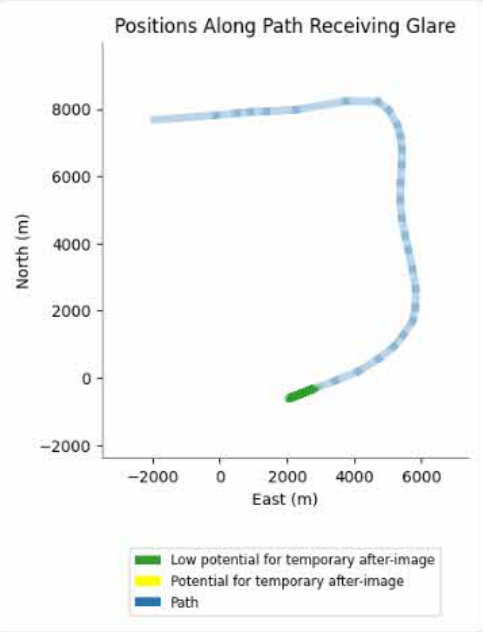
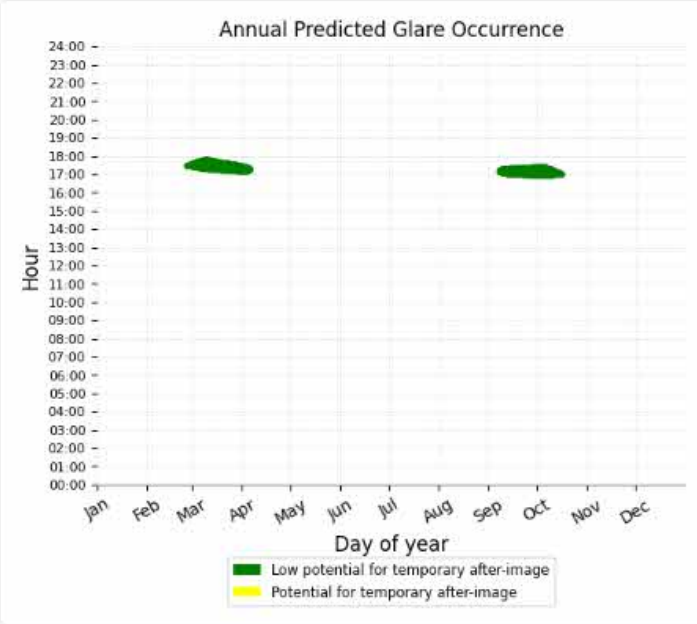


Chart A2.26.3 Times of Glare GMT)



A2.27: Predicted Effects from array G at Commercial Instrument Approach (2)

Chart A2.27.1: Approximate Source Area

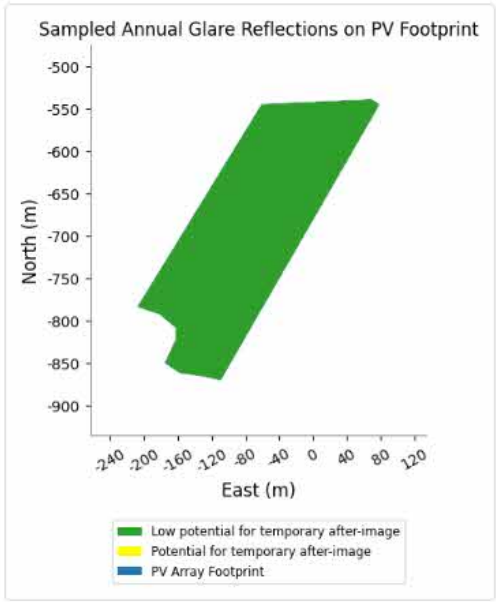


Chart A2.27.2: Location Along Path Receveing Glare

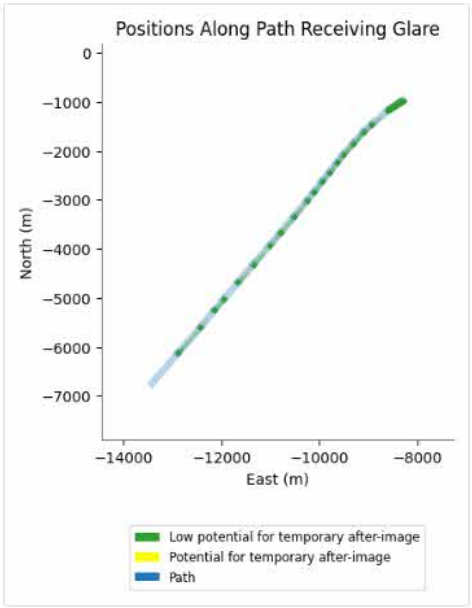
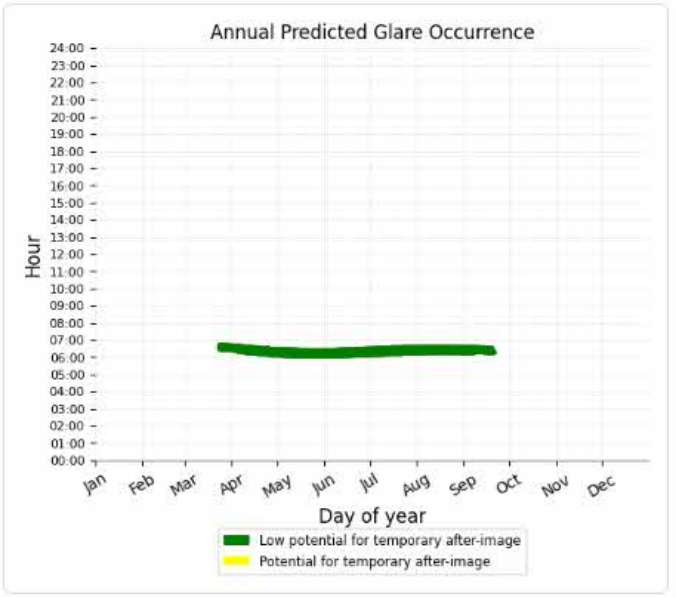


Chart A2.27.3 Times of Glare (GMT)



A2.28: Predicted Effects from array G at Commercial Visual Approach (2)

Chart A2.28.1: Approximate Source Area

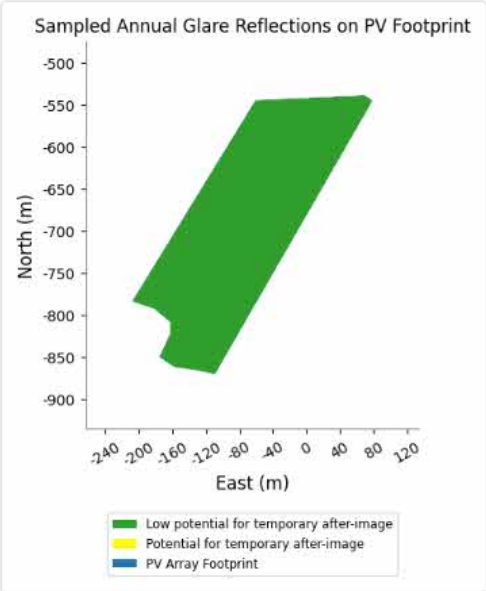


Chart A2.28.2: Location Along Path Receveing Glare

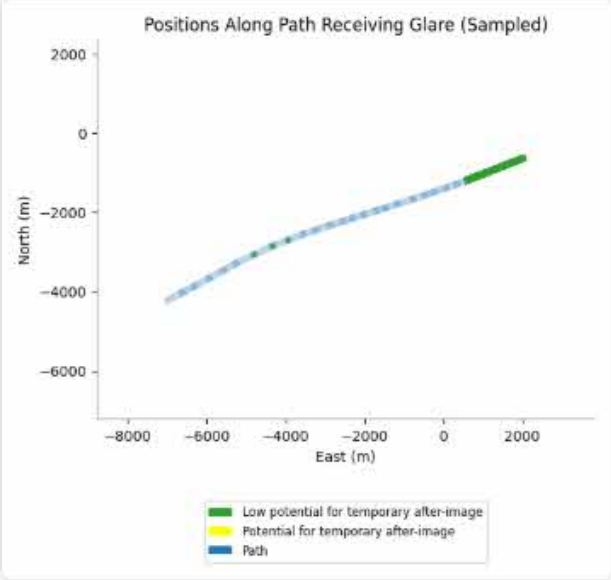
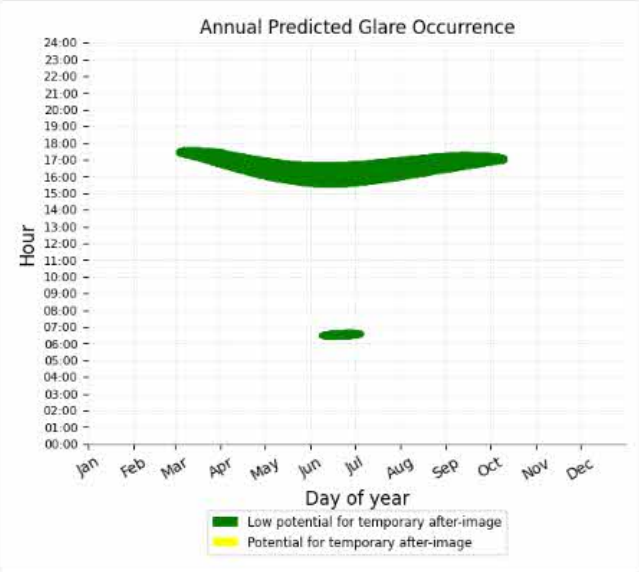


Chart A2.28.3 Times of Glare (GMT)



A2.29: Predicted Effects from array H at Commercial Instrument Approach (1)

Chart A2.29.1: Approximate Source Area

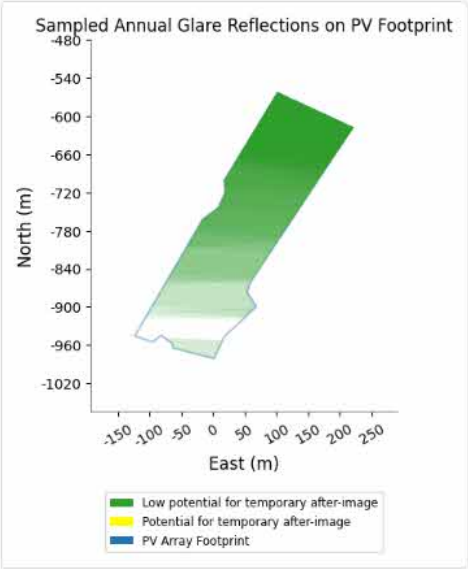


Chart A2.29.2: Location Along Path Receveing Glare

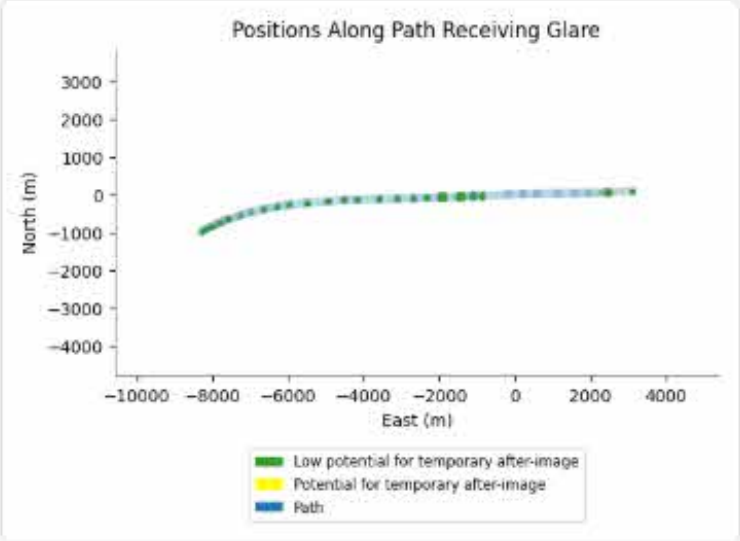
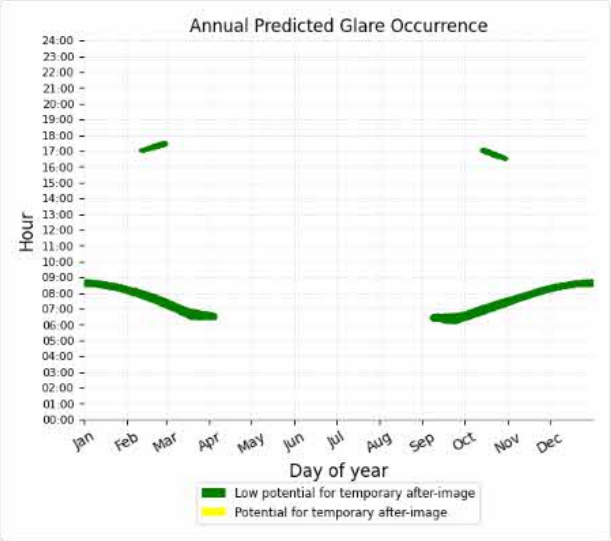


Chart A2.29.3 Times of Glare (GMT)



A2.30: Predicted Effects from array H at Commercial Visual Approach (1)

Chart A2.30.1: Approximate Source Area

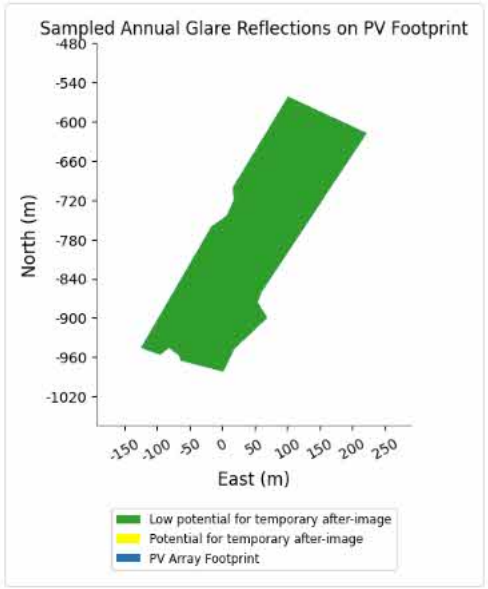


Chart A2.30.2: Location Along Path Receveing Glare

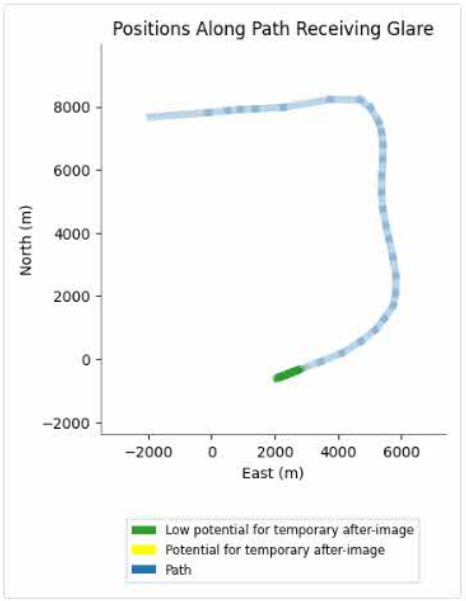
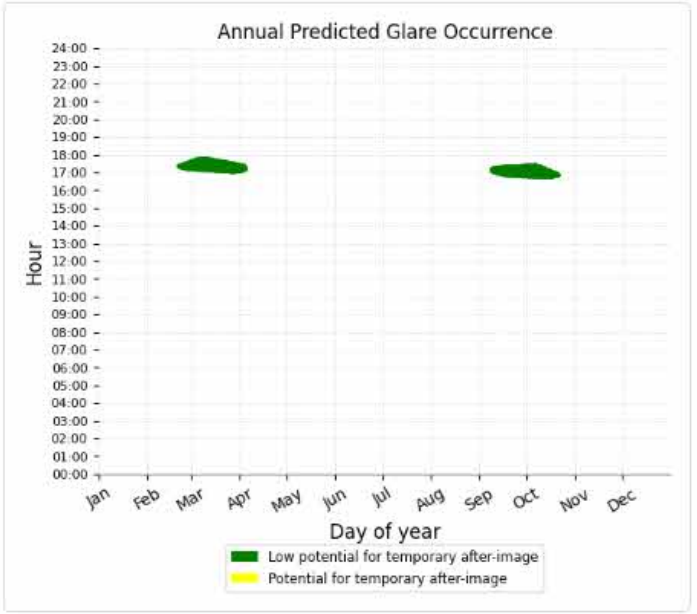


Chart A2.30.3 Times of Glare (GMT)



A2.31: Predicted Effects from array H at Commercial Instrument Approach (2)

Chart A2.31.1: Approximate Source Area

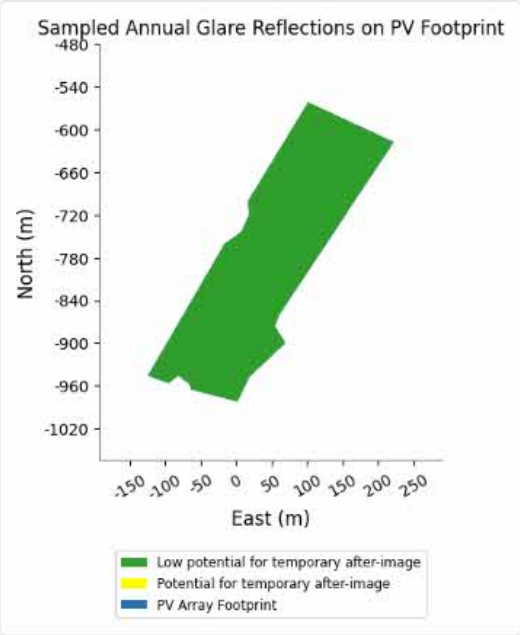


Chart A2.31.2: Location Along Path Receveing Glare

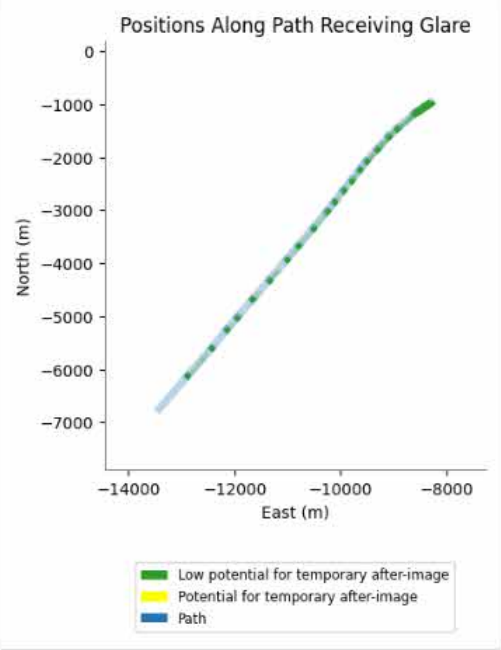
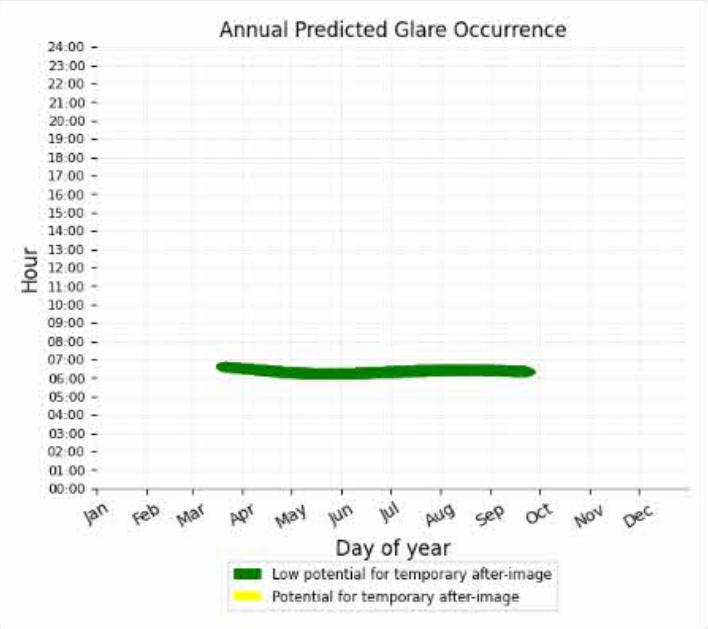


Chart A2.31.3 Times of Glare (GMT)



A2.32: Predicted Effects from array H at Commercial Visual Approach (2)

Chart A2.32.1: Approximate Source Area

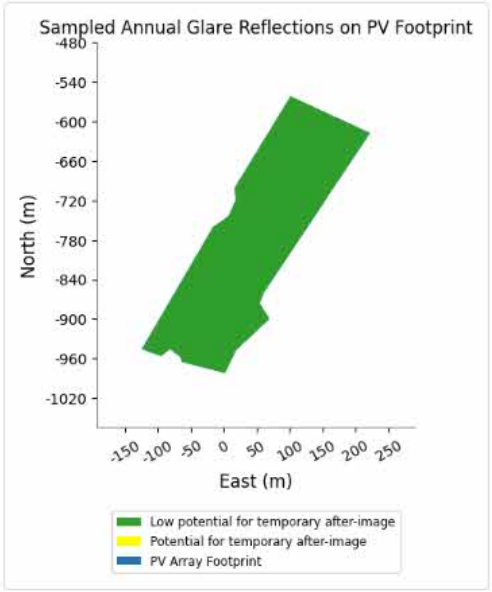


Chart A2.32.2: Location Along Path Receveing Glare

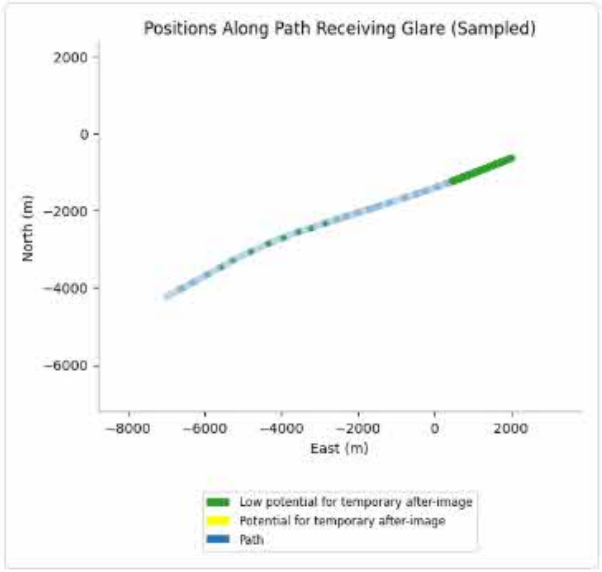
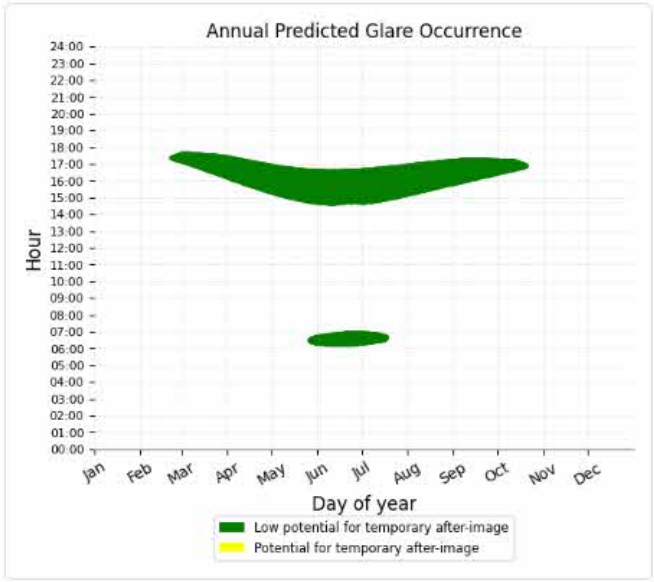


Chart A2.32.3 Times of Glare (GMT)



A2.33: Predicted Effects from array I at Commercial Instrument Approach (1)

Chart A2.33.1: Approximate Source Area

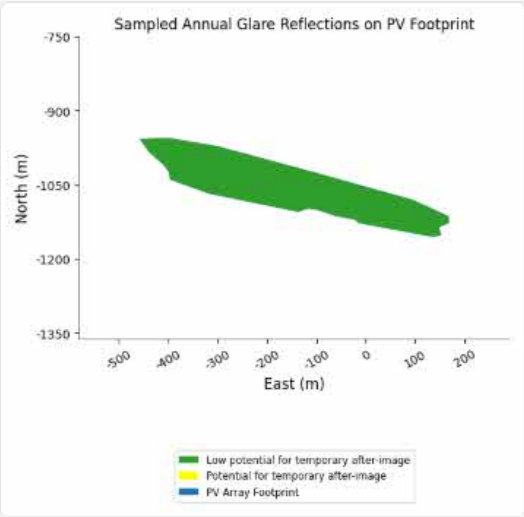


Chart A2.33.2: Location Along Path Receveing Glare

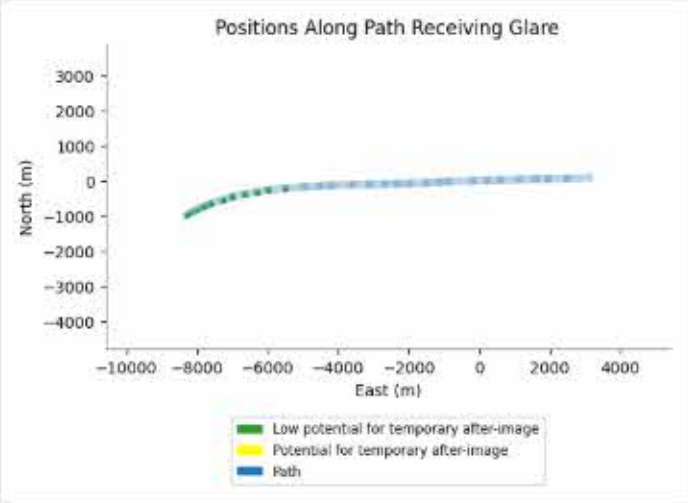
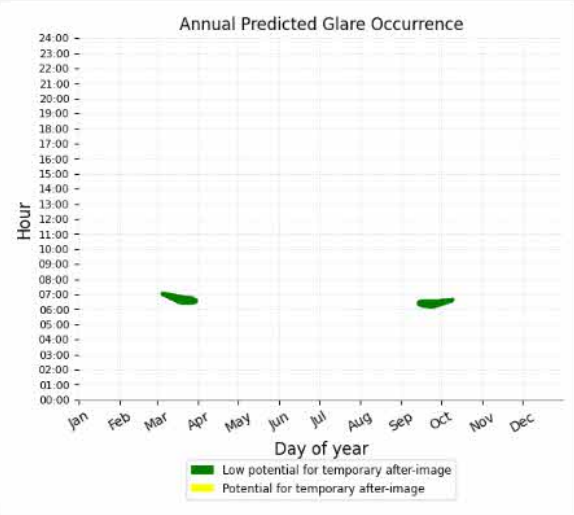


Chart A2.33.3 Times of Glare (GMT)



A2.34: Predicted Effects from array I at Commercial Visual Approach (1)

Chart A2.34.1: Approximate Source Area

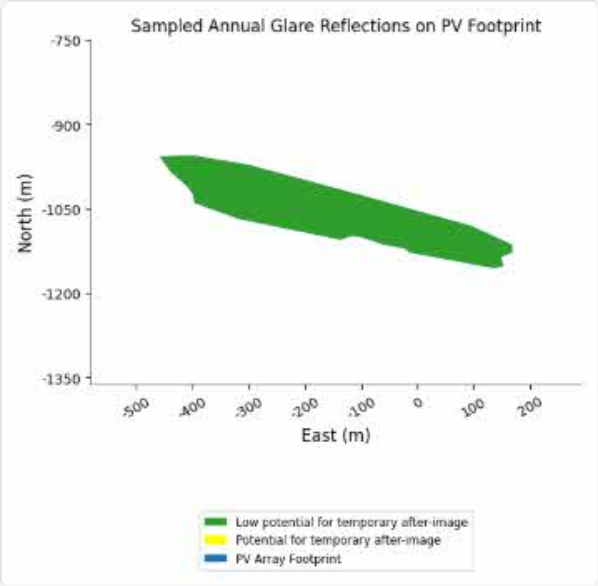


Chart A2.34.2: Location Along Path Receveing Glare

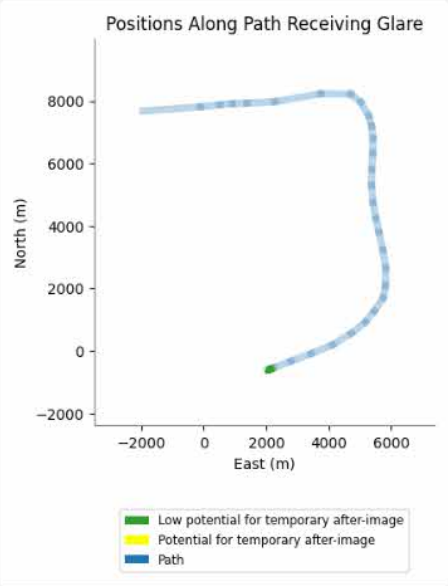
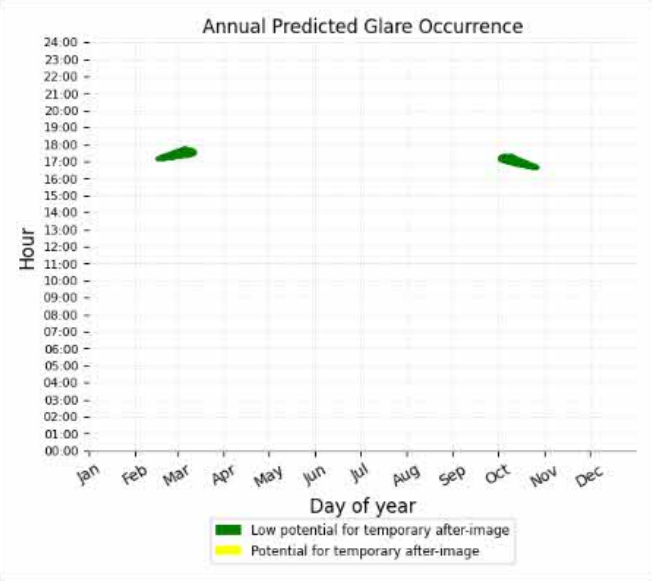


Chart A2.34.3 Times of Glare (GMT)



A2.35: Predicted Effects from array I at Commercial Instrument Approach (2)

Chart A2.35.1: Approximate Source Area

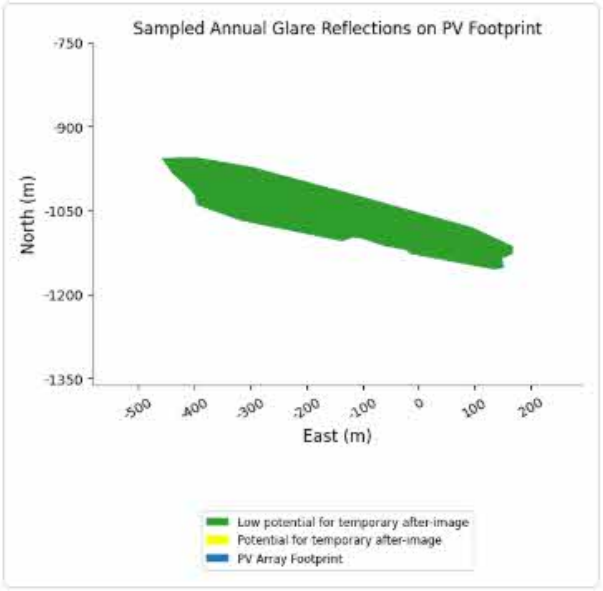


Chart A2.35.2: Location Along Path Receveing Glare

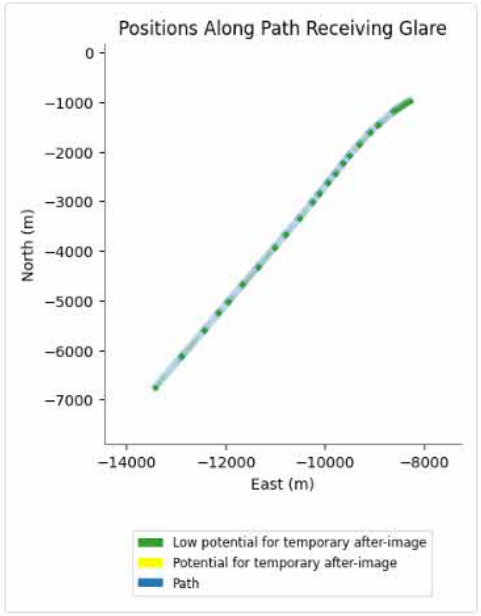
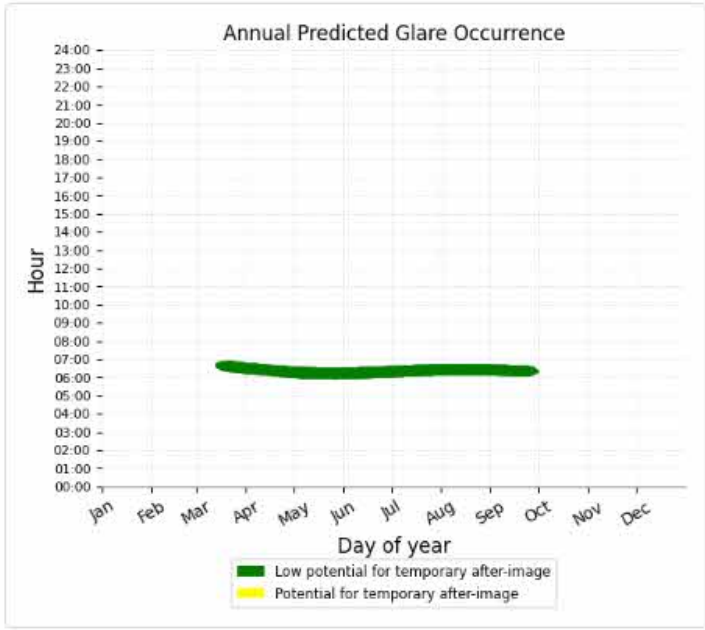


Chart A2.35.3 Times of Glare (GMT)



A2.36: Predicted Effects from array I at Commercial Visual Approach (2)

Chart A2.36.1: Approximate Source Area

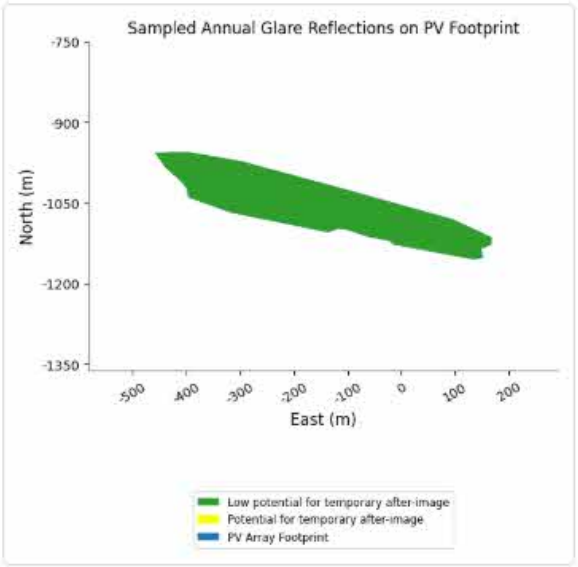


Chart A2.36.2: Location Along Path Receveing Glare

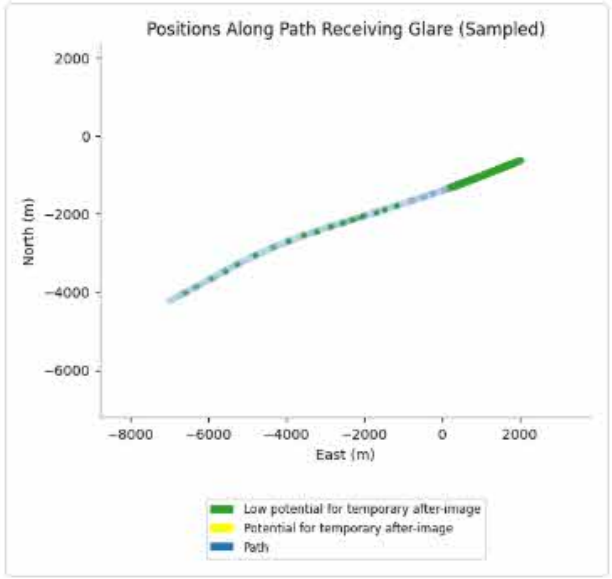
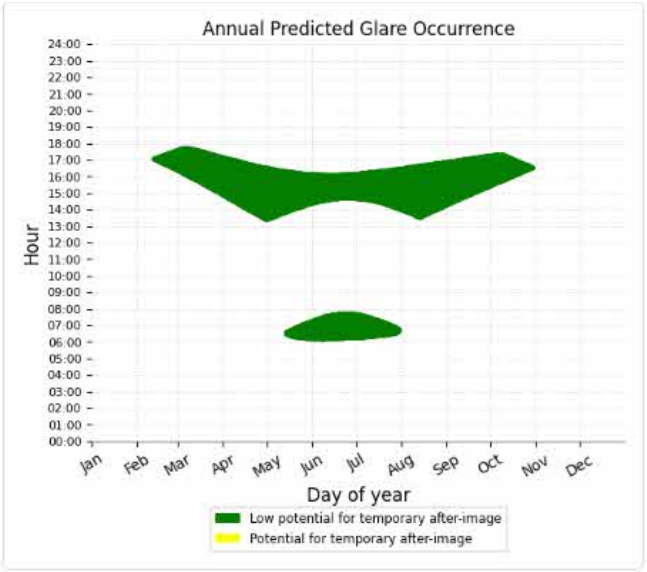


Chart A2.36.3 Times of Glare (GMT)



A2.37: Predicted Effects from array J at Commercial Instrument Approach (1)

Chart A2.37.1: Approximate Source Area

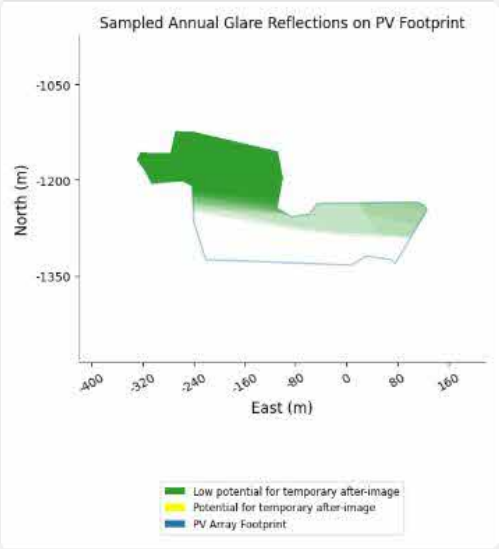


Chart A2.37.2: Location Along Path Receveing Glare

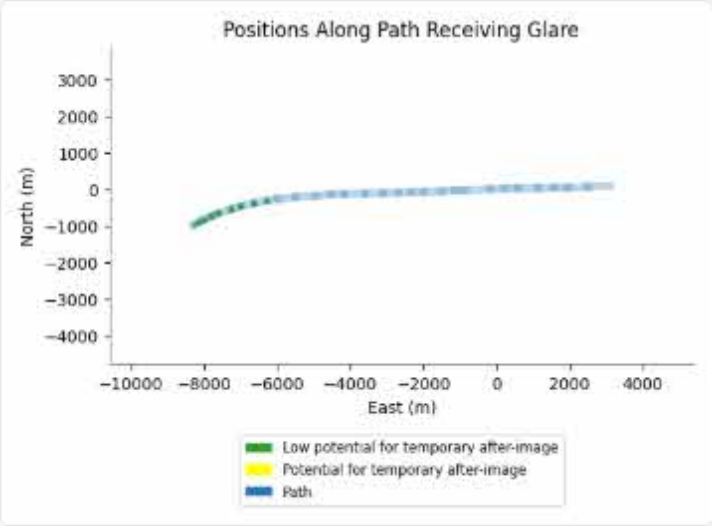
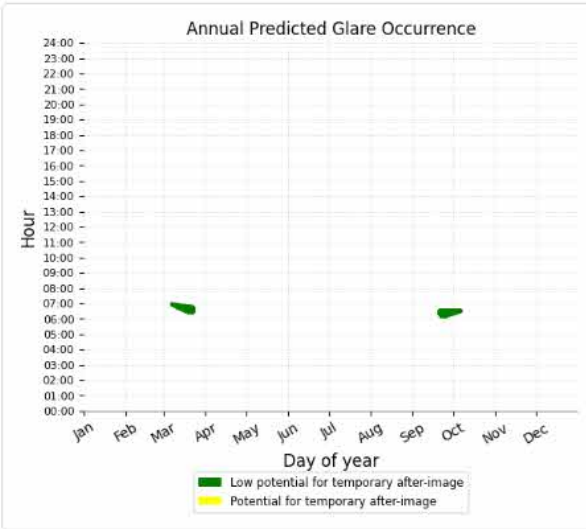


Chart A2.37.3 Times of Glare (GMT)



A2.38: Predicted Effects from array J at Commercial Visual Approach (1)

Chart A2.38.1: Approximate Source Area

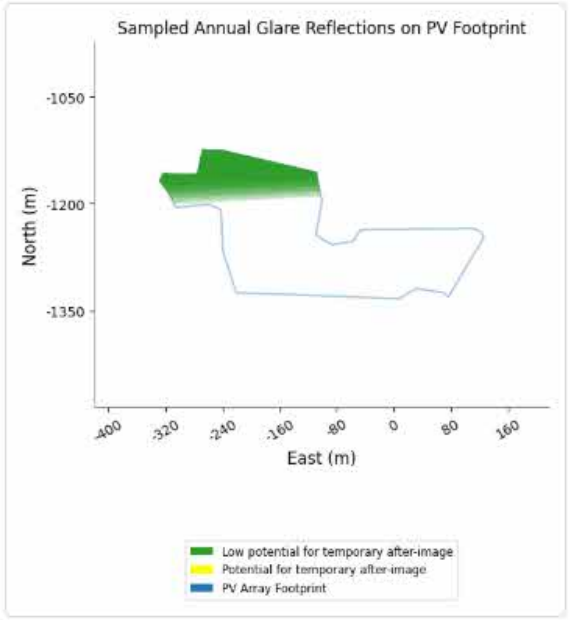


Chart A2.38.2: Location Along Path Receveing Glare

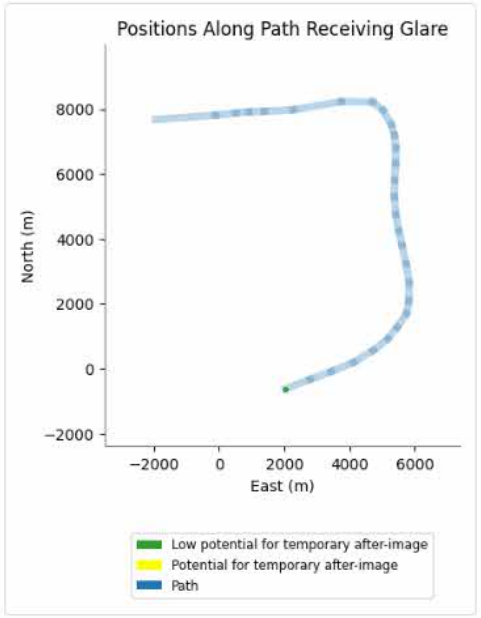
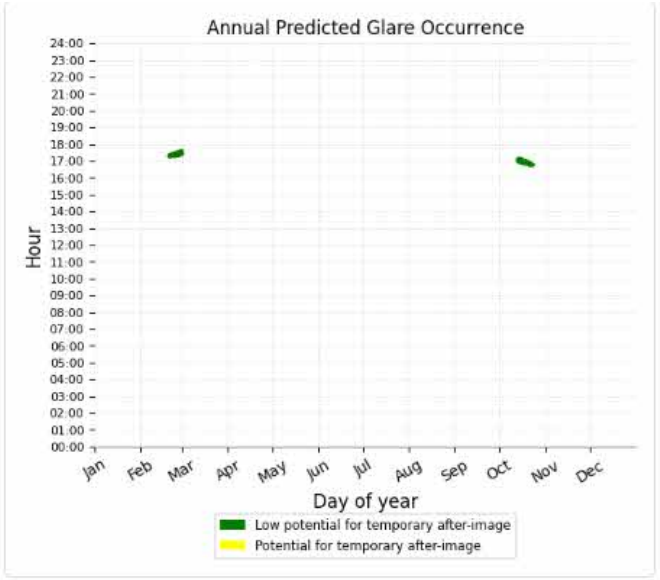


Chart A2.38.3 Times of Glare (GMT)



A2.39: Predicted Effects from array J at Commercial Instrument Approach (2)

Chart A2.39.1: Approximate Source Area

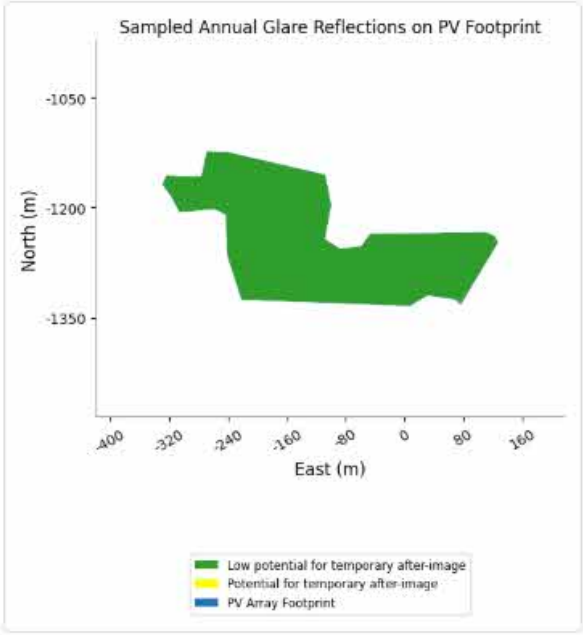


Chart A2.39.2: Location Along Path Receveing Glare

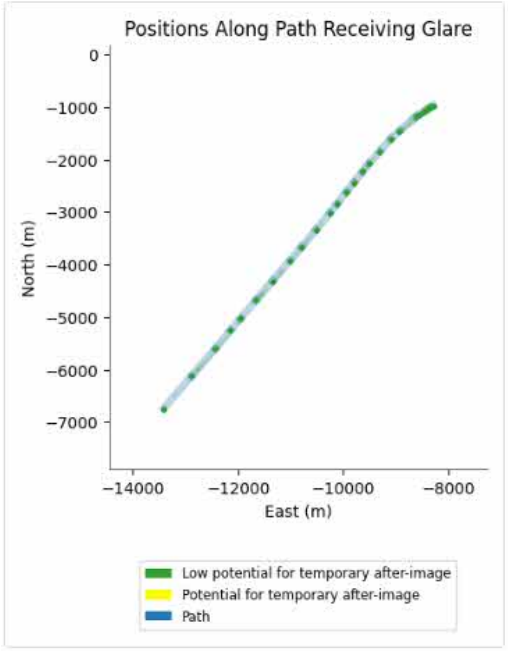
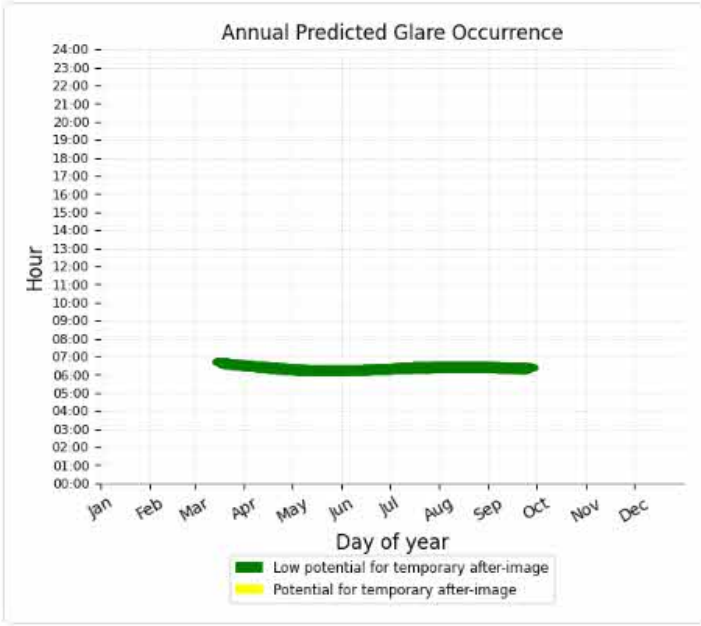


Chart A2.39.3 Times of Glare (GMT)



A2.40: Predicted Effects from array J at Commercial Visual Approach (2)

Chart A2.40.1: Approximate Source Area

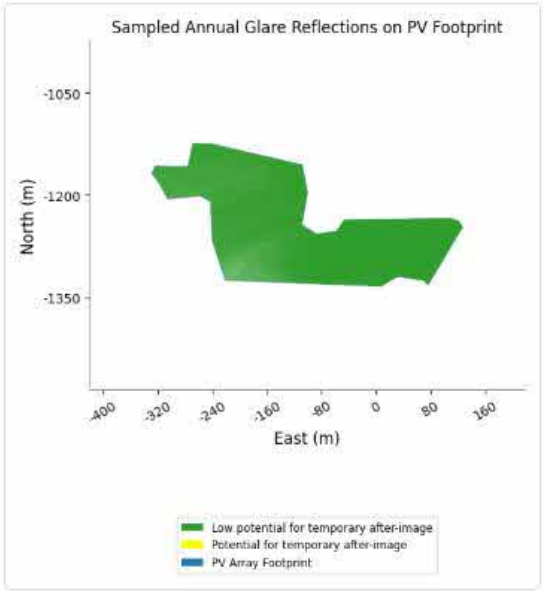


Chart A2.40.2: Location Along Path Receveing Glare

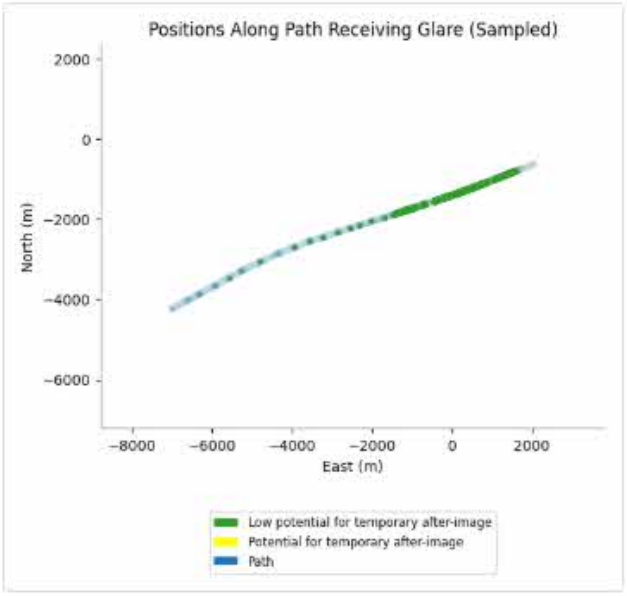


Chart A2.39.3 Times of Glare (GMT)

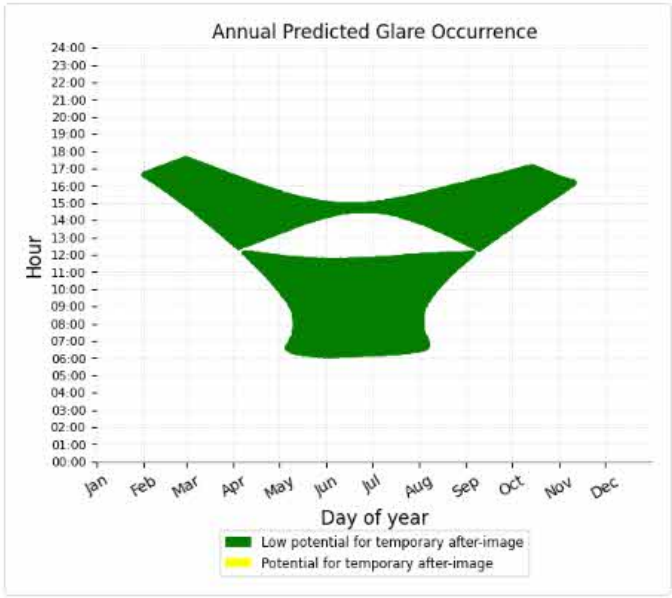


FIGURE 1: STUDY AREAS

Metrica
ENVIRONMENTAL CONSULTING

- Development Boundary
- PV Solar Area
- 200 m Residential Study Area
- 500 m Road & Rail Study Area
- Residential Receptors
- M56
- A5117
- Train Line

N

0 250 500 m

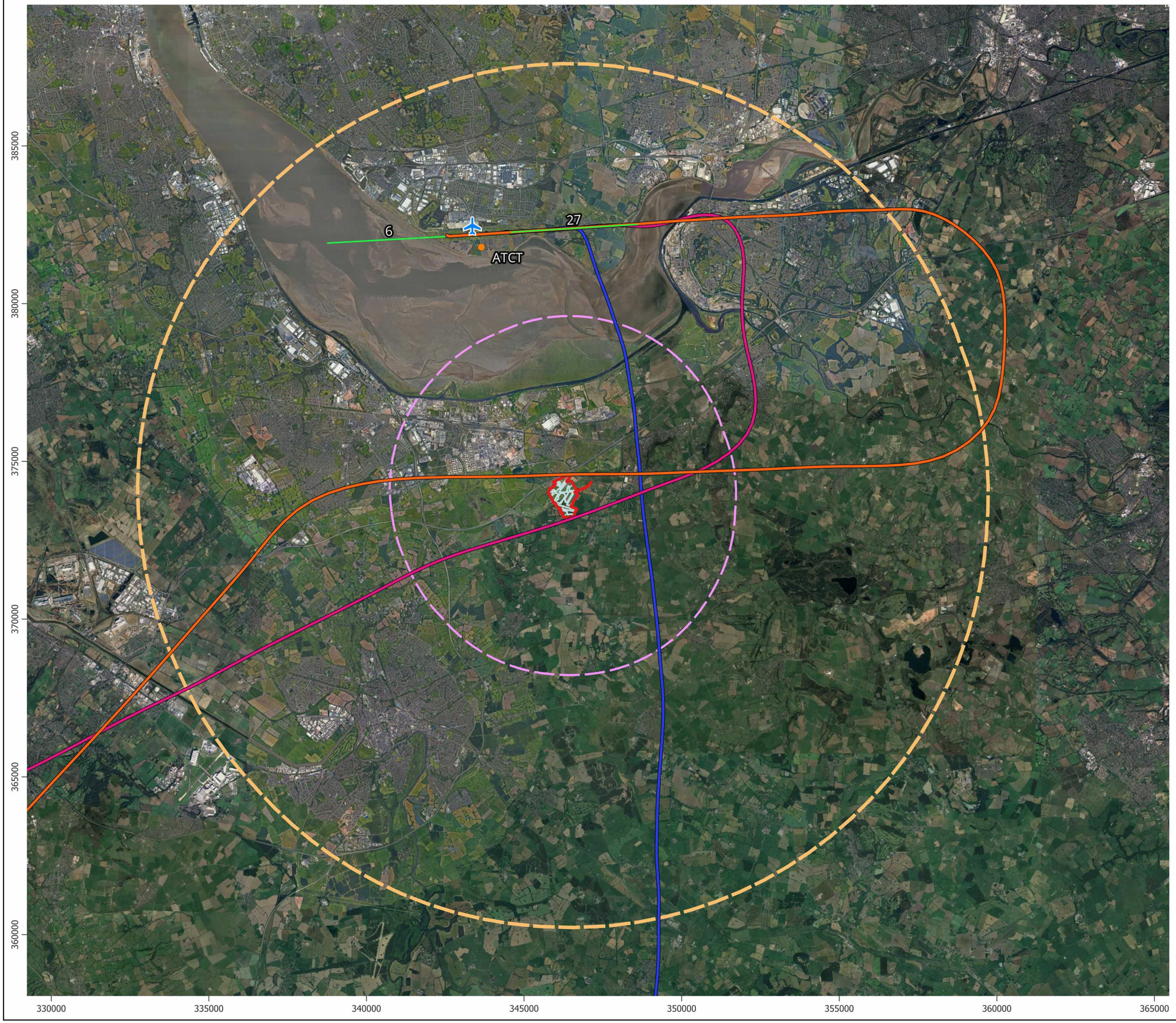
1:10,000

Date: 29/04/2025
Drawing Number: 0467/2
Version Number: 2

Figure 1
Glint & Glare Study Areas

Hob Lane Solar Farm

FIGURE 2: AVIATION STUDY AREAS



Metrica
ENVIRONMENTAL CONSULTING

- Development Boundary
- PV Solar Area
- 5 km Aviation Buffer
- 13 km Buffer
- Liverpool John Lennon Airport
- Assessed Runways
- Commercial Instrument Approach 27 Arrivals
- Commercial Visual Approach 27 Arrivals
- VFR Approach 27 Arrivals
- ATCT

N

0 2.5 5 km

1:115,000

Date: 29/04/2025
Drawing Number: 0467/2
Version Number: 2

Figure 2
Glint & Glare Aviation Study Areas

Hob Lane Solar Farm