

# FORGESOLAR GLARE ANALYSIS

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Project: **SGHAT\_IRE**

Site configuration: **Fosterstown SHD**

Analysis conducted by Luis Dominguez (luis@macroworks.ie) at 15:23 on 04 Apr, 2022.

## U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
2-mile flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	PASS	Receptor(s) marked as ATCT do not receive glare

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

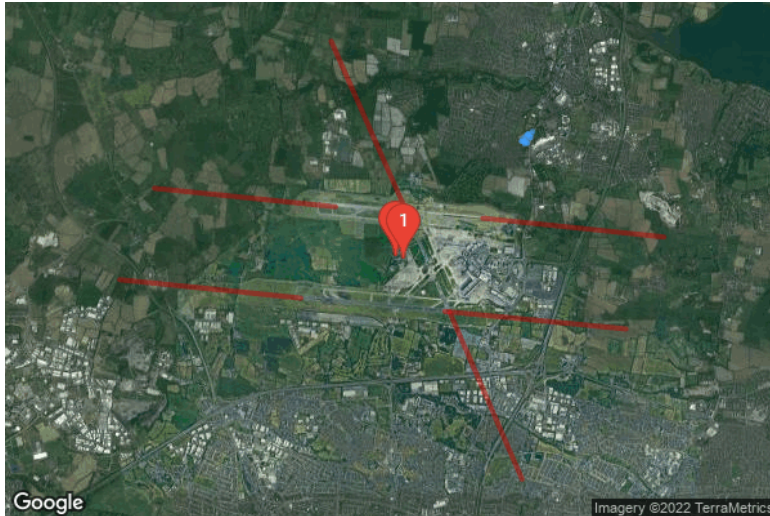
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at <https://www.federalregister.gov/d/2013-24729>

# SITE CONFIGURATION

## Analysis Parameters

DNI: peaks at 1,000.0 W/m<sup>2</sup>  
 Time interval: 1 min  
 Ocular transmission coefficient: 0.5  
 Pupil diameter: 0.002 m  
 Eye focal length: 0.017 m  
 Sun subtended angle: 9.3 mrad  
 Site Config ID: 67103.11293  
 Methodology: V2



## PV Array(s)

**Name:** Block10  
**Axis tracking:** Fixed (no rotation)  
**Tilt:** 13.0°  
**Orientation:** 202.0°  
**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	53.448896	-6.227752	39.50	29.70	69.20
2	53.448863	-6.227611	39.50	29.70	69.20
3	53.448842	-6.227625	39.50	29.70	69.20
4	53.448875	-6.227766	39.50	29.70	69.20
5	53.448896	-6.227752	39.50	29.70	69.20

**Name:** Block1 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.447033	-6.229140	45.00	18.70	63.70
2	53.447036	-6.229079	45.00	18.70	63.70
3	53.446961	-6.229067	45.00	18.70	63.70
4	53.446957	-6.229127	45.00	18.70	63.70
5	53.447033	-6.229140	45.00	18.70	63.70

**Name:** Block1 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.447033	-6.229140	45.00	18.70	63.70
2	53.447036	-6.229079	45.00	18.70	63.70
3	53.446961	-6.229067	45.00	18.70	63.70
4	53.446957	-6.229127	45.00	18.70	63.70
5	53.447033	-6.229140	45.00	18.70	63.70

**Name:** Block2 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.446987	-6.229913	46.00	18.70	64.70
2	53.446990	-6.229853	46.00	18.70	64.70
3	53.446915	-6.229841	46.00	18.70	64.70
4	53.446912	-6.229901	46.00	18.70	64.70
5	53.446987	-6.229913	46.00	18.70	64.70

**Name:** Block2 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.446987	-6.229913	46.00	18.70	64.70
2	53.446990	-6.229853	46.00	18.70	64.70
3	53.446915	-6.229841	46.00	18.70	64.70
4	53.446912	-6.229901	46.00	18.70	64.70
5	53.446987	-6.229913	46.00	18.70	64.70

**Name:** Block3 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.447311	-6.230660	46.00	18.70	64.70
2	53.447317	-6.230553	46.00	18.70	64.70
3	53.447272	-6.230546	46.00	18.70	64.70
4	53.447266	-6.230653	46.00	18.70	64.70
5	53.447311	-6.230660	46.00	18.70	64.70

**Name:** Block3 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.447311	-6.230660	46.00	18.70	64.70
2	53.447317	-6.230553	46.00	18.70	64.70
3	53.447272	-6.230546	46.00	18.70	64.70
4	53.447266	-6.230653	46.00	18.70	64.70
5	53.447311	-6.230660	46.00	18.70	64.70



**Name:** Block4 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.447254	-6.229958	45.00	27.15	72.15
2	53.447274	-6.229601	45.00	27.15	72.15
3	53.447349	-6.229613	45.00	27.15	72.15
4	53.447343	-6.229719	45.00	27.15	72.15
5	53.447283	-6.229710	45.00	27.15	72.15
6	53.447275	-6.229854	45.00	27.15	72.15
7	53.447335	-6.229864	45.00	27.15	72.15
8	53.447329	-6.229970	45.00	27.15	72.15
9	53.447254	-6.229958	45.00	27.15	72.15

**Name:** Block4 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.447254	-6.229958	45.00	27.15	72.15
2	53.447274	-6.229601	45.00	27.15	72.15
3	53.447349	-6.229613	45.00	27.15	72.15
4	53.447343	-6.229719	45.00	27.15	72.15
5	53.447283	-6.229710	45.00	27.15	72.15
6	53.447275	-6.229854	45.00	27.15	72.15
7	53.447335	-6.229864	45.00	27.15	72.15
8	53.447329	-6.229970	45.00	27.15	72.15
9	53.447254	-6.229958	45.00	27.15	72.15

**Name:** Block5

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 162.0°

**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	53.447813	-6.230117	44.50	24.00	68.50
2	53.447738	-6.230080	44.50	24.00	68.50
3	53.447721	-6.230176	44.50	24.00	68.50
4	53.447632	-6.230134	44.50	24.00	68.50
5	53.447650	-6.230036	44.50	24.00	68.50
6	53.447588	-6.230006	44.50	24.00	68.50
7	53.447567	-6.230127	44.50	24.00	68.50
8	53.447791	-6.230239	44.50	24.00	68.50
9	53.447791	-6.230239	44.50	24.00	68.50

**Name:** Block6

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 173.0°

**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	53.448053	-6.229618	44.50	30.30	74.80
2	53.448061	-6.229493	44.50	30.30	74.80
3	53.447983	-6.229480	44.50	30.30	74.80
4	53.447976	-6.229605	44.50	30.30	74.80
5	53.448053	-6.229618	44.50	30.30	74.80

**Name:** Block7

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 235.0°

**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	53.448474	-6.228859	43.50	29.70	73.20
2	53.448400	-6.228772	43.50	29.70	73.20
3	53.448387	-6.228803	43.50	29.70	73.20
4	53.448461	-6.228890	43.50	29.70	73.20
5	53.448474	-6.228859	43.50	29.70	73.20

**Name:** Block7 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.448400	-6.229064	43.50	29.70	73.20
2	53.448280	-6.229044	43.50	29.70	73.20
3	53.448291	-6.228867	43.50	29.70	73.20
4	53.448351	-6.228877	43.50	29.70	73.20
5	53.448342	-6.229015	43.50	29.70	73.20
6	53.448403	-6.229025	43.50	29.70	73.20
7	53.448400	-6.229064	43.50	29.70	73.20



**Name:** Block7 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.448400	-6.229064	43.50	29.70	73.20
2	53.448280	-6.229044	43.50	29.70	73.20
3	53.448291	-6.228867	43.50	29.70	73.20
4	53.448351	-6.228877	43.50	29.70	73.20
5	53.448342	-6.229015	43.50	29.70	73.20
6	53.448403	-6.229025	43.50	29.70	73.20
7	53.448400	-6.229064	43.50	29.70	73.20

**Name:** Block8 E

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 83.0°

**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	53.447939	-6.228377	43.50	29.70	73.20
2	53.447911	-6.228207	43.50	29.70	73.20
3	53.447868	-6.228227	43.50	29.70	73.20
4	53.447886	-6.228338	43.50	29.70	73.20
5	53.447813	-6.228372	43.50	29.70	73.20
6	53.447802	-6.228304	43.50	29.70	73.20
7	53.447787	-6.228311	43.50	29.70	73.20
8	53.447808	-6.228438	43.50	29.70	73.20
9	53.447939	-6.228377	43.50	29.70	73.20

**Name:** Block8 W

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 263.0°

**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	53.447939	-6.228377	43.50	29.70	73.20
2	53.447911	-6.228207	43.50	29.70	73.20
3	53.447868	-6.228227	43.50	29.70	73.20
4	53.447886	-6.228338	43.50	29.70	73.20
5	53.447813	-6.228372	43.50	29.70	73.20
6	53.447802	-6.228304	43.50	29.70	73.20
7	53.447787	-6.228311	43.50	29.70	73.20
8	53.447808	-6.228438	43.50	29.70	73.20
9	53.447939	-6.228377	43.50	29.70	73.20

**Name:** Block9

**Axis tracking:** Fixed (no rotation)

**Tilt:** 13.0°

**Orientation:** 196.0°

**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	53.448510	-6.228062	43.50	29.70	73.20
2	53.448478	-6.227867	43.50	29.70	73.20
3	53.448456	-6.227877	43.50	29.70	73.20
4	53.448476	-6.227998	43.50	29.70	73.20
5	53.448383	-6.228042	43.50	29.70	73.20
6	53.448391	-6.228090	43.50	29.70	73.20
7	53.448405	-6.228084	43.50	29.70	73.20
8	53.448409	-6.228108	43.50	29.70	73.20
9	53.448510	-6.228062	43.50	29.70	73.20

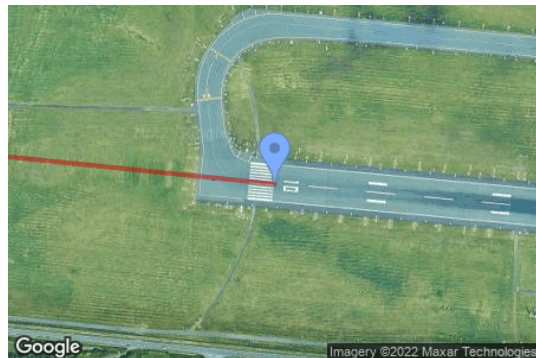
## Flight Path Receptor(s)

**Name:** 10L Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 95.8°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.436880	-6.280253	71.90	15.20	87.10
Two-mile	53.439822	-6.328592	74.90	180.90	255.80

**Name:** 10 Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 95.8°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.422405	-6.289520	74.00	15.30	89.30
Two-mile	53.425327	-6.337846	80.30	177.60	257.90

**Name:** 16 Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 156.1°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.436699	-6.261764	66.50	15.20	81.70
Two-mile	53.463138	-6.281428	69.70	180.70	250.40

**Name:** 28R Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 275.9°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



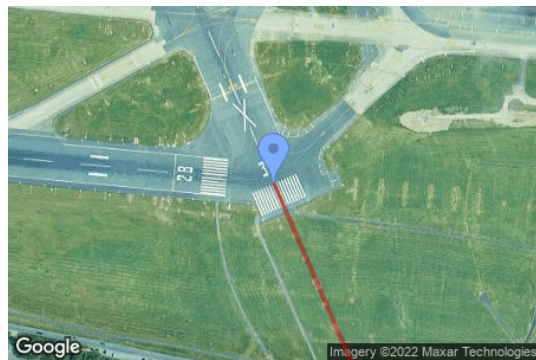
Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.435084	-6.240975	65.50	15.30	80.80
Two-mile	53.432097	-6.192645	34.00	215.50	249.50

**Name:** 28 Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 275.5°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.420299	-6.251111	62.00	15.20	77.20
Two-mile	53.417517	-6.202763	41.90	204.00	245.90

**Name:** 34 Runway  
**Description:** None  
**Threshold height:** 15 m  
**Direction:** 336.6°  
**Glide slope:** 3.0°  
**Pilot view restricted?** Yes  
**Vertical view:** 30.0°  
**Azimuthal view:** 120.0°



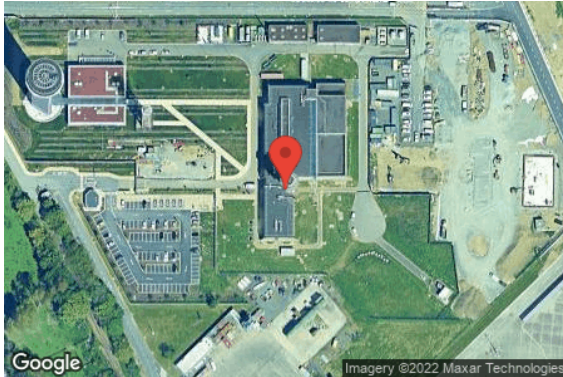
Point	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
Threshold	53.420211	-6.249810	62.20	15.30	77.50
Two-mile	53.393680	-6.230504	49.00	197.10	246.10



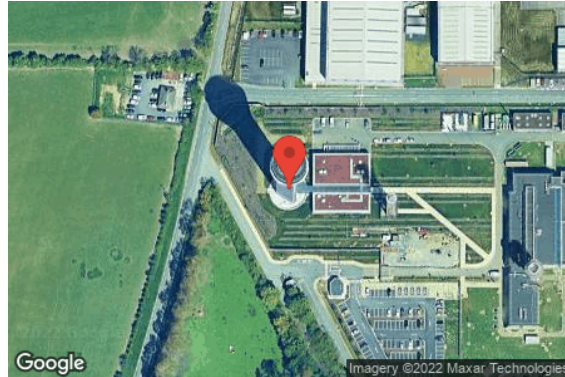
## Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
1-ATCT	1	53.428489	-6.262201	65.90	21.90
2-ATCT	2	53.428937	-6.264259	65.60	75.60

Map image of 1-ATCT



Map image of 2-ATCT





# GLARE ANALYSIS RESULTS

## Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
Block10	13.0	202.0	8,954	0	-
Block1 E	13.0	83.0	0	0	-
Block1 W	13.0	263.0	5,658	0	-
Block2 E	13.0	83.0	0	0	-
Block2 W	13.0	263.0	5,726	0	-
Block3 E	13.0	83.0	0	0	-
Block3 W	13.0	263.0	5,690	0	-
Block4 E	13.0	83.0	0	0	-
Block4 W	13.0	263.0	5,527	0	-
Block5	13.0	162.0	5,432	0	-
Block6	13.0	173.0	6,976	0	-
Block7	13.0	235.0	6,754	0	-
Block7 E	13.0	83.0	0	0	-
Block7 W	13.0	263.0	5,255	0	-
Block8 E	13.0	83.0	0	0	-
Block8 W	13.0	263.0	5,263	0	-
Block9	13.0	196.0	8,861	0	-

*Total annual glare received by each receptor*

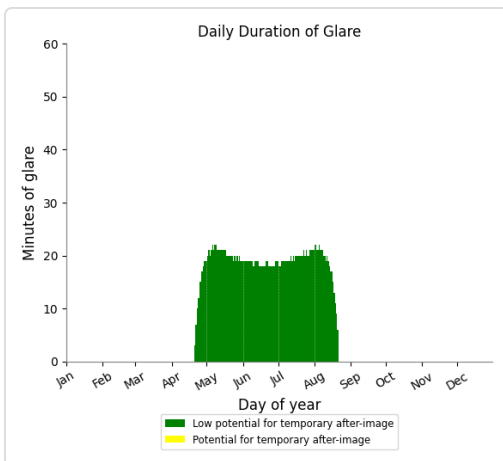
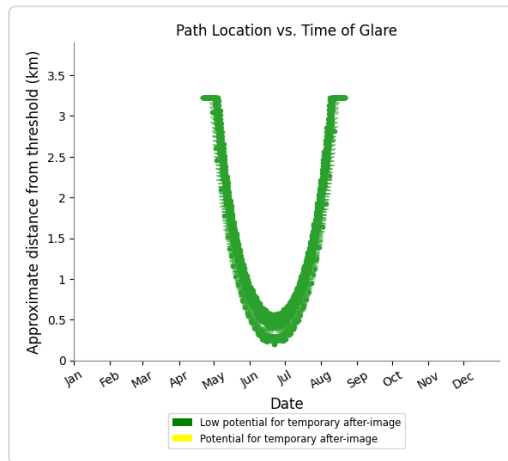
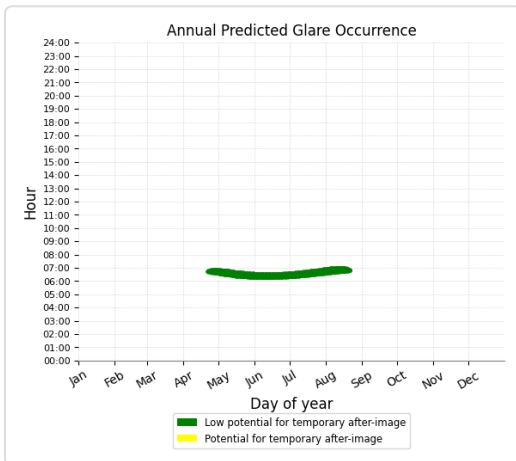
Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
10L Runway	8485	0
10 Runway	6683	0
16 Runway	54856	0
28R Runway	72	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

# Results for: Block10

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	2308	0
10 Runway	721	0
16 Runway	5925	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

## Flight Path: 10L Runway

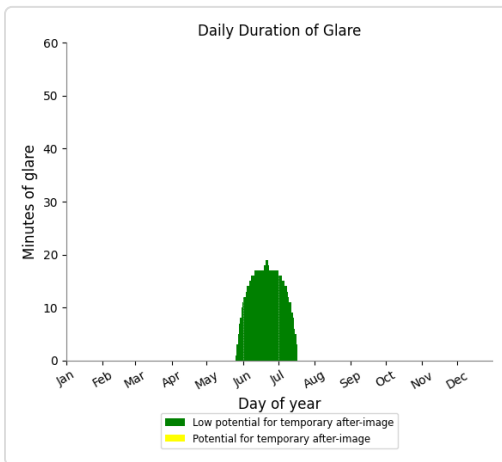
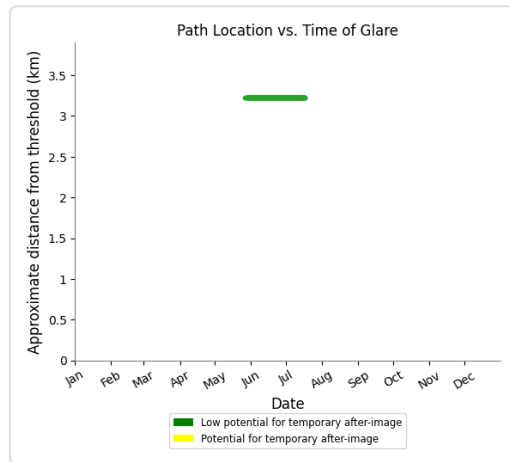
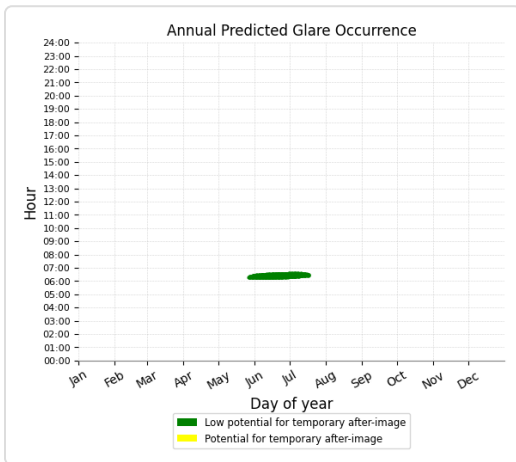
0 minutes of yellow glare  
 2308 minutes of green glare



## Flight Path: 10 Runway

0 minutes of yellow glare

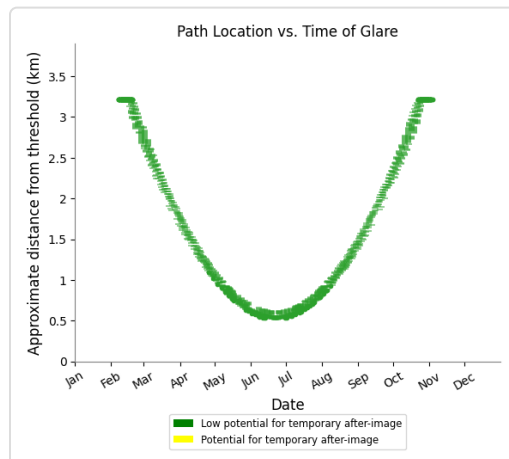
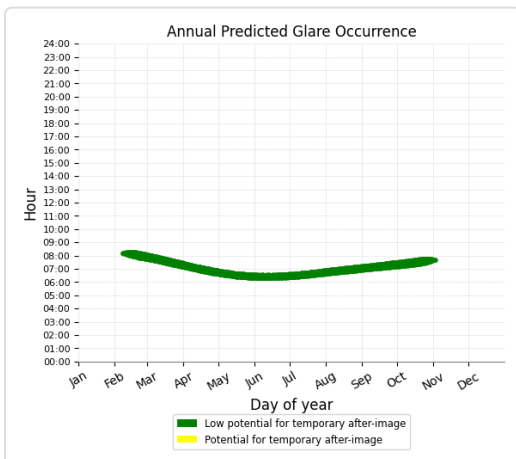
721 minutes of green glare

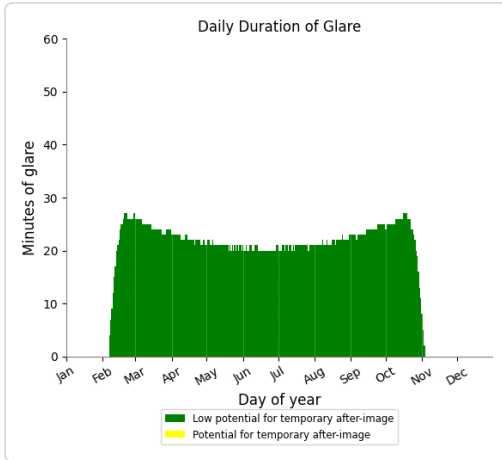


## Flight Path: 16 Runway

0 minutes of yellow glare

5925 minutes of green glare





### Flight Path: 28R Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 2-ATCT

0 minutes of yellow glare  
 0 minutes of green glare

## Results for: Block1 E

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 10 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 16 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28R Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare



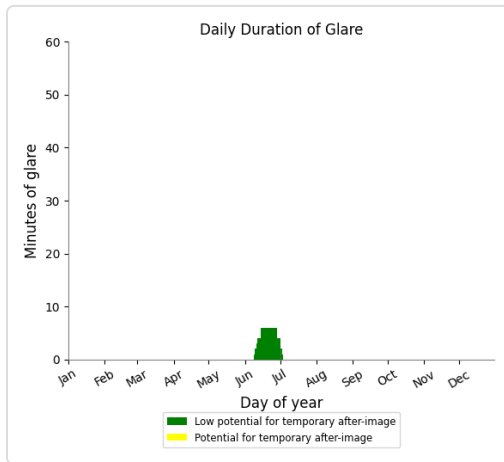
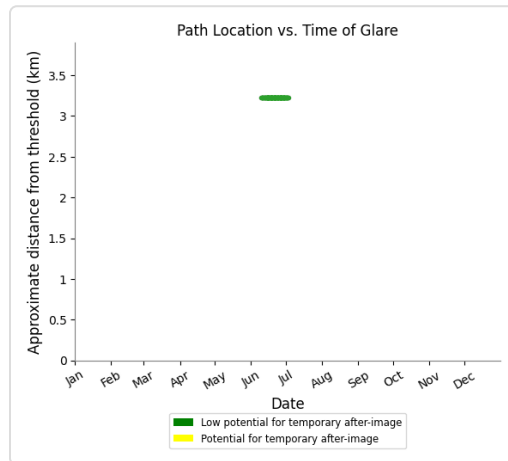
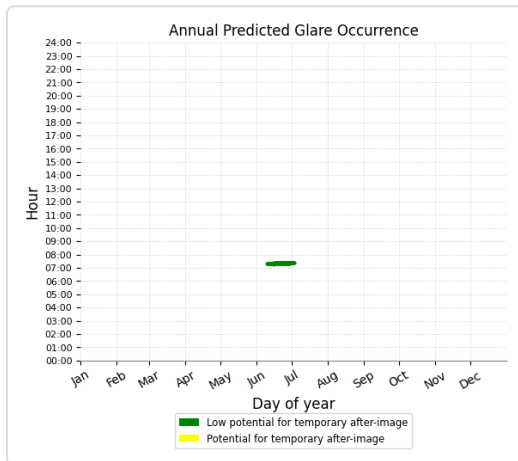
## Results for: Block1 W

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	117	0
10 Runway	0	0
16 Runway	5541	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

0 minutes of yellow glare

117 minutes of green glare



## Flight Path: 10 Runway

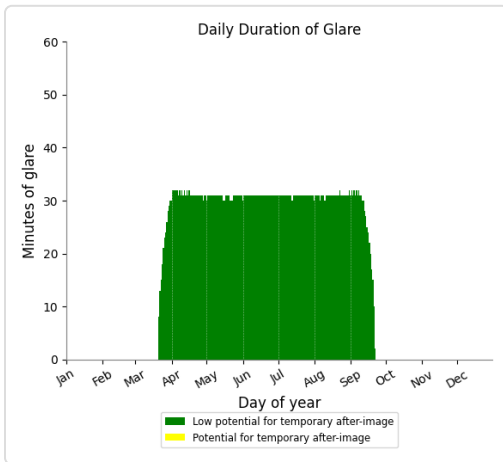
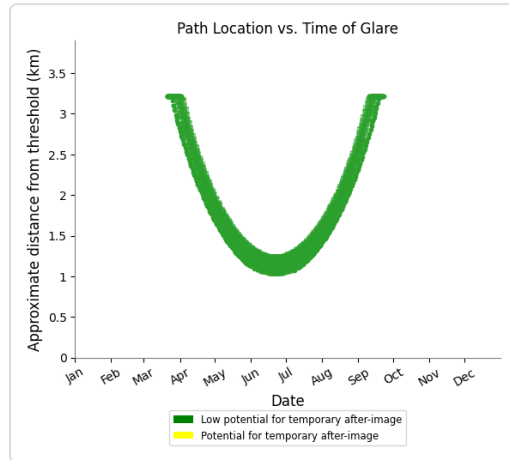
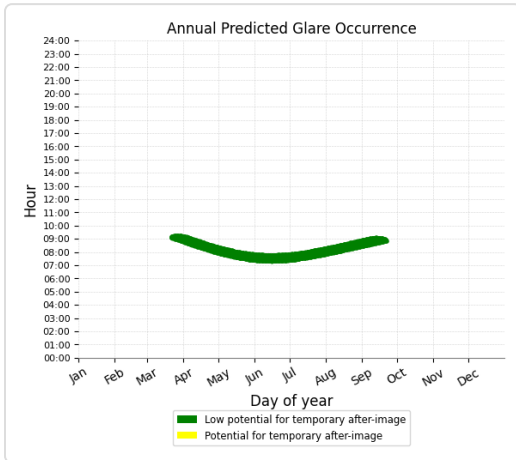
0 minutes of yellow glare

0 minutes of green glare

## Flight Path: 16 Runway

0 minutes of yellow glare

5541 minutes of green glare



## Flight Path: 28R Runway

0 minutes of yellow glare

0 minutes of green glare

## Flight Path: 28 Runway

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

## **Results for: Block2 E**

<b>Receptor</b>	<b>Green Glare (min)</b>	<b>Yellow Glare (min)</b>
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 10 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 16 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28R Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

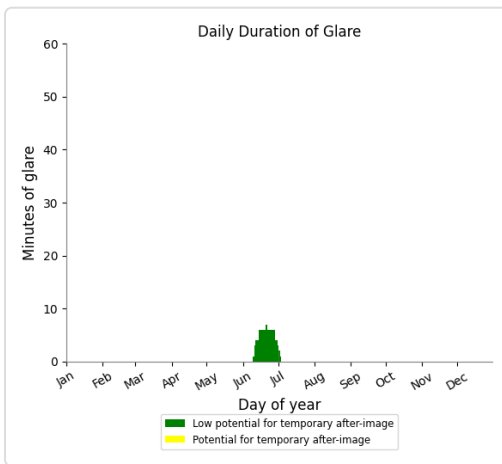
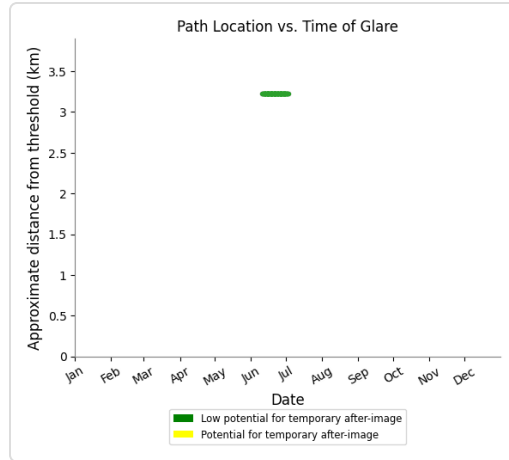
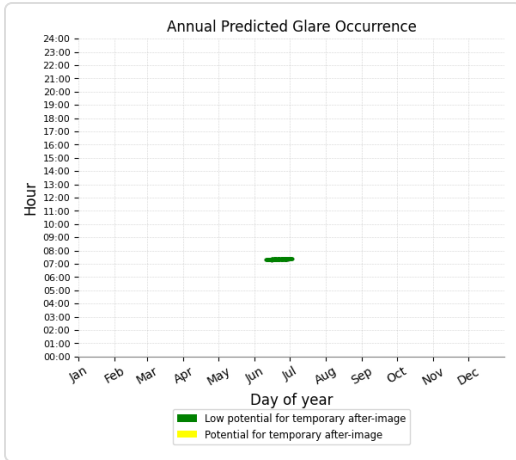
## **Results for: Block2 W**

<b>Receptor</b>	<b>Green Glare (min)</b>	<b>Yellow Glare (min)</b>
10L Runway	115	0
10 Runway	0	0
16 Runway	5611	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

115 minutes of green glare



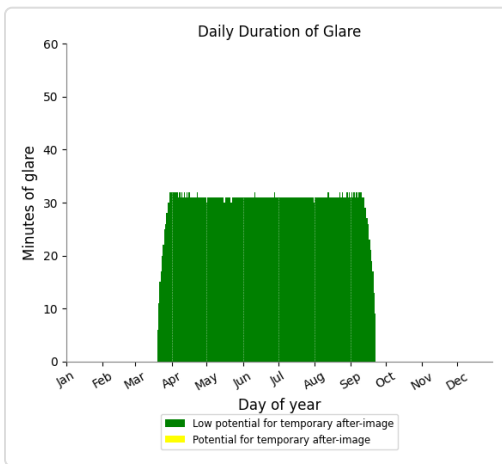
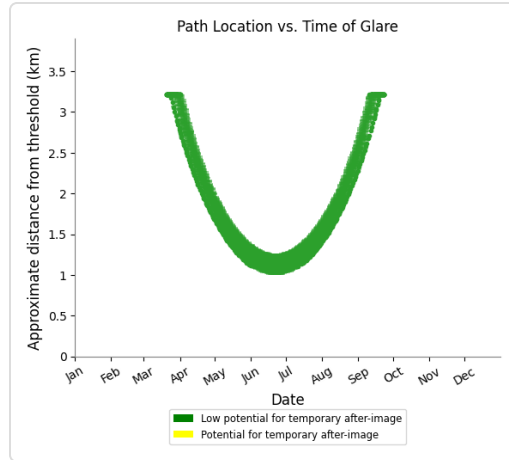
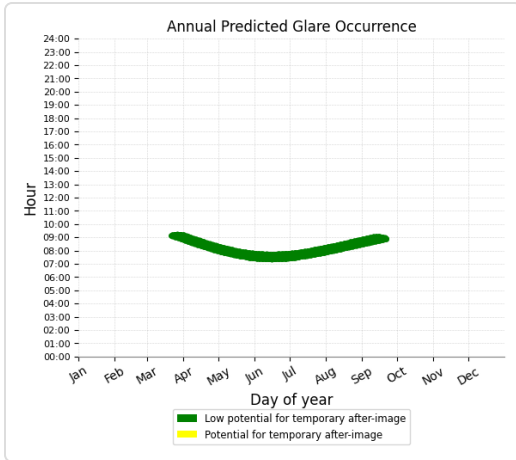
### Flight Path: 10 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare  
 5611 minutes of green glare





### Flight Path: 28R Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

## Results for: Block3 E

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 10 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 28R Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare

0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare

0 minutes of green glare

### Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

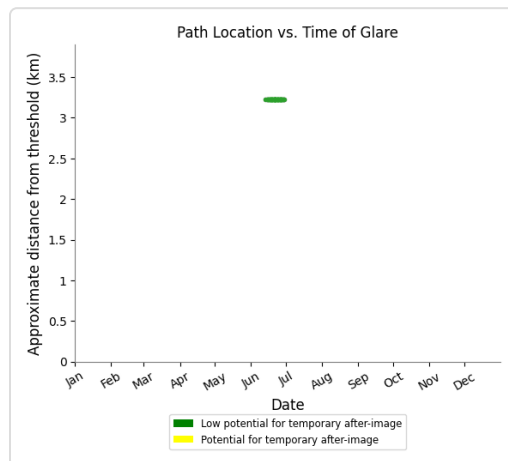
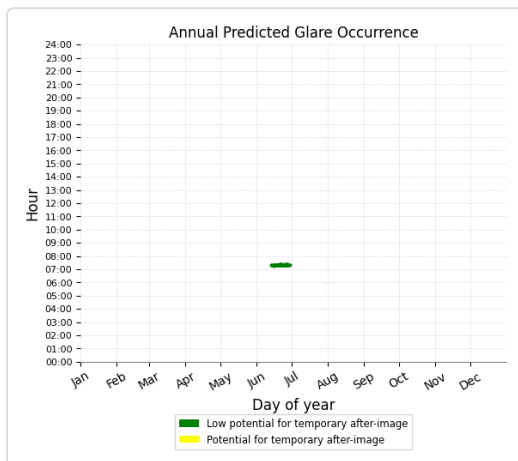
## Results for: Block3 W

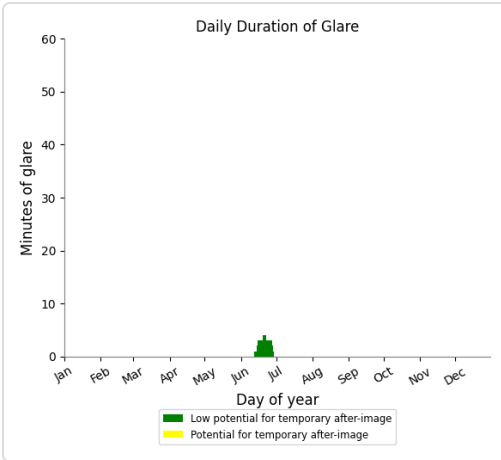
Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	46	0
10 Runway	0	0
16 Runway	5644	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

0 minutes of yellow glare

46 minutes of green glare



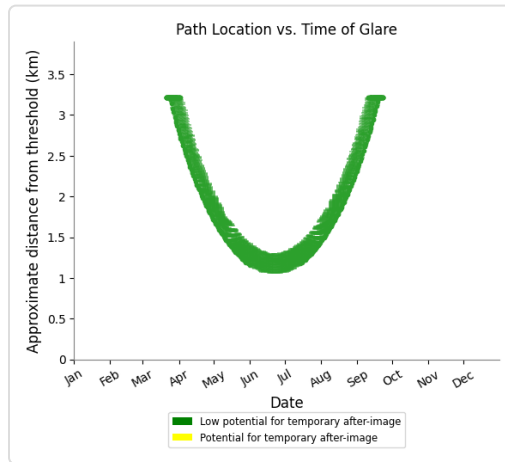
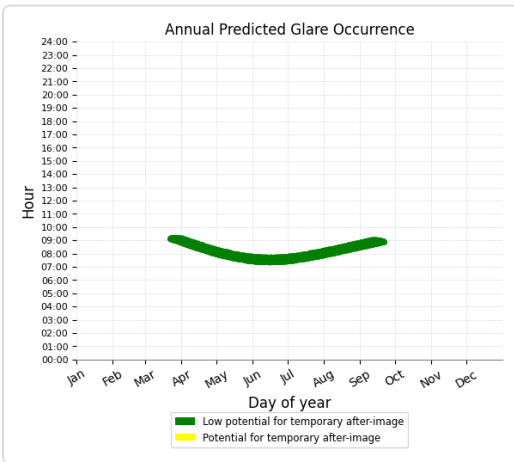


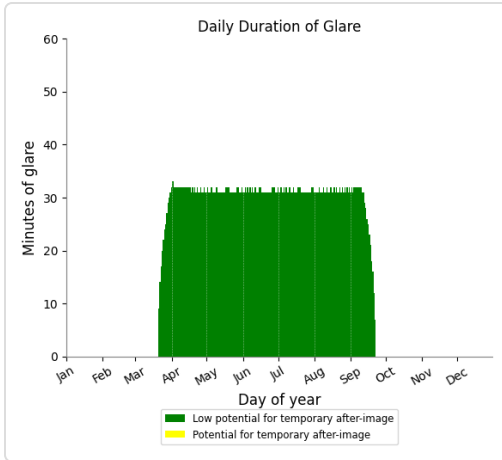
### Flight Path: 10 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare  
 5644 minutes of green glare





### Flight Path: 28R Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 2-ATCT

0 minutes of yellow glare  
0 minutes of green glare

## Results for: Block4 E

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0



Receptor	Green Glare (min)	Yellow Glare (min)
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 10 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 16 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28R Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

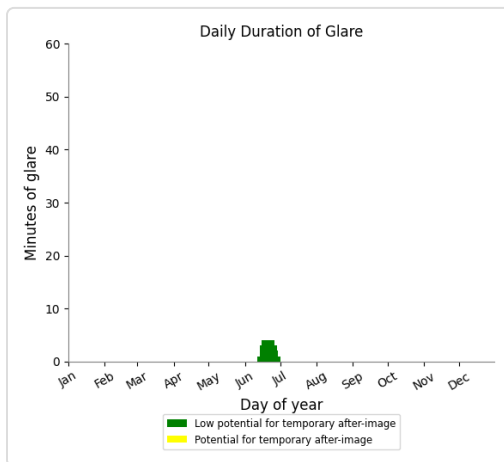
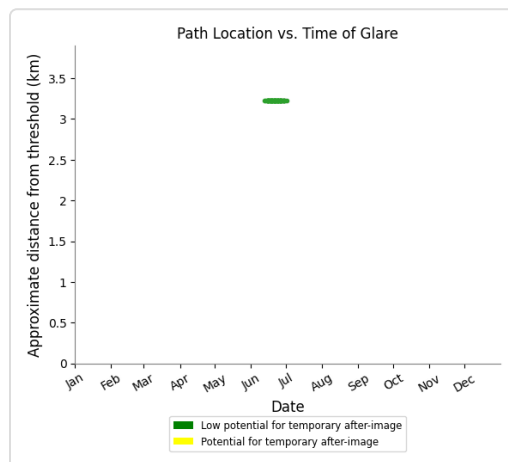
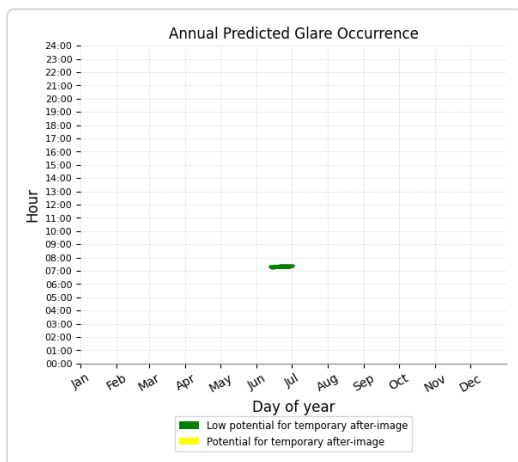
## Results for: Block4 W

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	62	0
10 Runway	0	0
16 Runway	5465	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

0 minutes of yellow glare

62 minutes of green glare



## Flight Path: 10 Runway

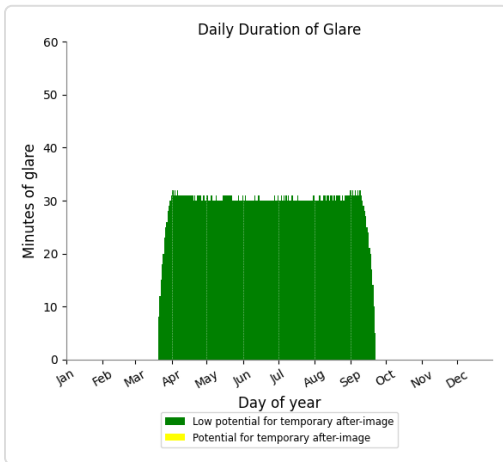
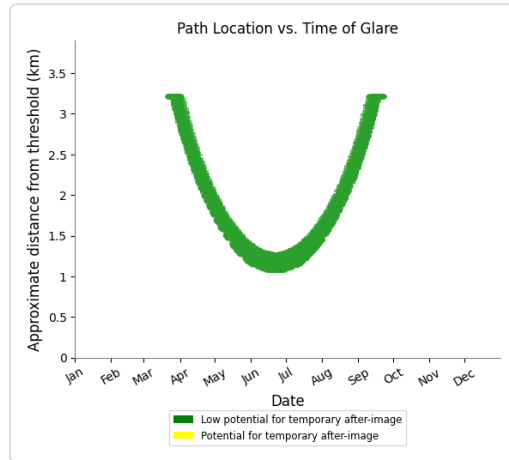
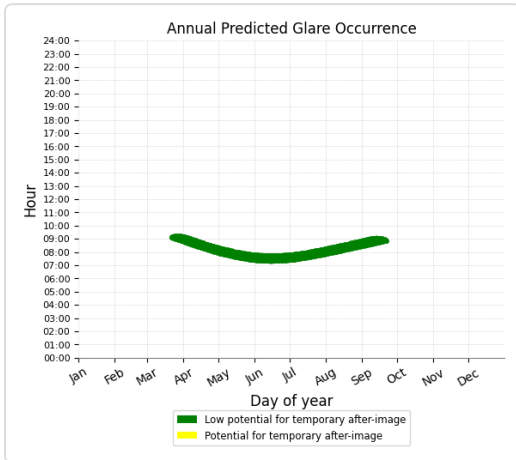
0 minutes of yellow glare

0 minutes of green glare

## Flight Path: 16 Runway

0 minutes of yellow glare

5465 minutes of green glare



## Flight Path: 28R Runway

0 minutes of yellow glare

0 minutes of green glare

## Flight Path: 28 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
 0 minutes of green glare

### Point Receptor: 2-ATCT

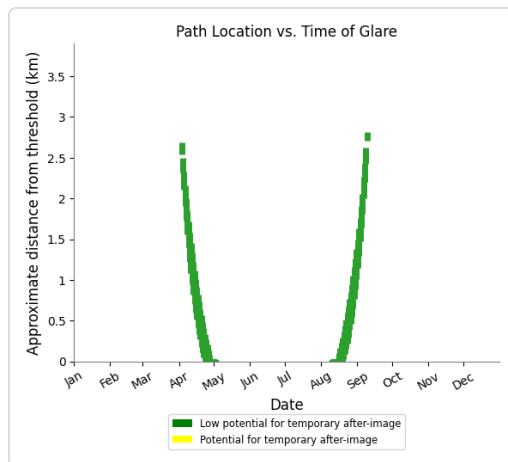
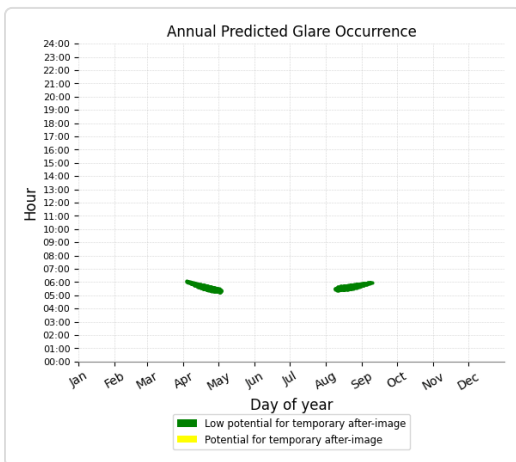
0 minutes of yellow glare  
 0 minutes of green glare

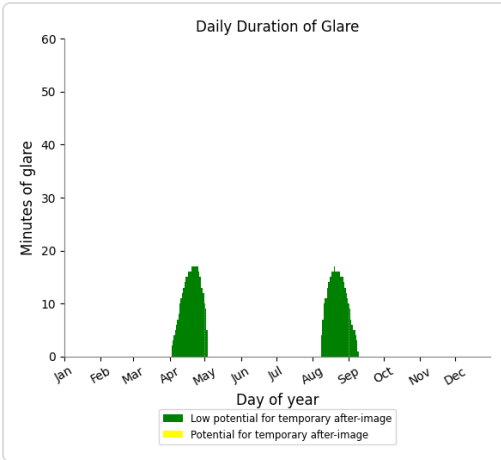
## Results for: Block5

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	726	0
10 Runway	2497	0
16 Runway	2209	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

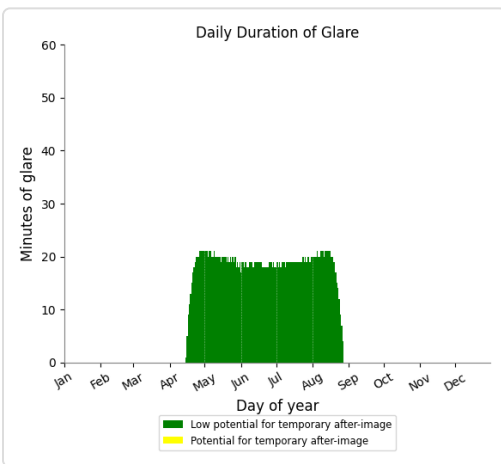
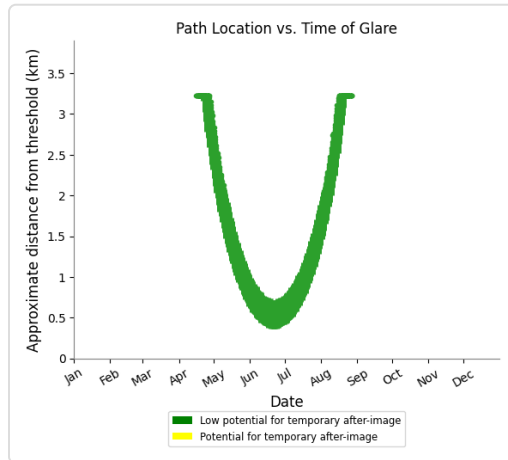
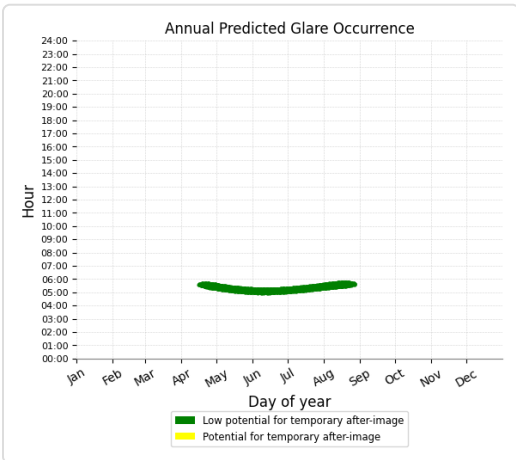
0 minutes of yellow glare  
 726 minutes of green glare





### Flight Path: 10 Runway

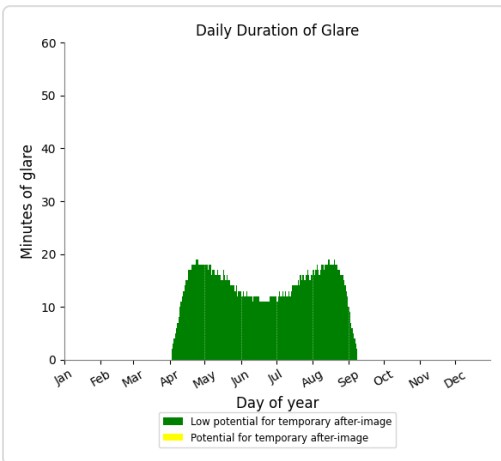
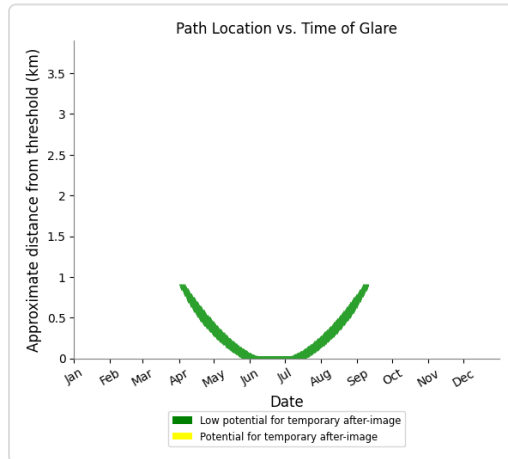
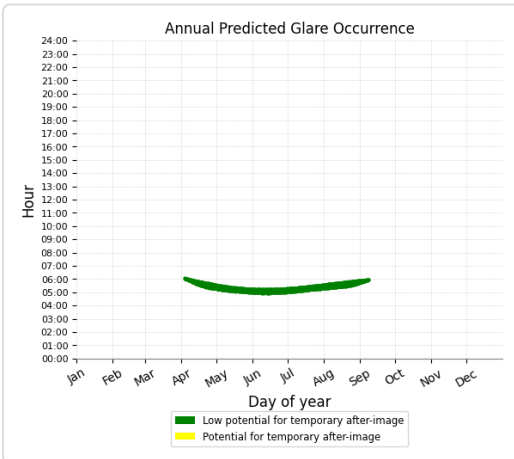
0 minutes of yellow glare  
 2497 minutes of green glare



### Flight Path: 16 Runway

0 minutes of yellow glare

2209 minutes of green glare



### Flight Path: 28R Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
0 minutes of green glare

## Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

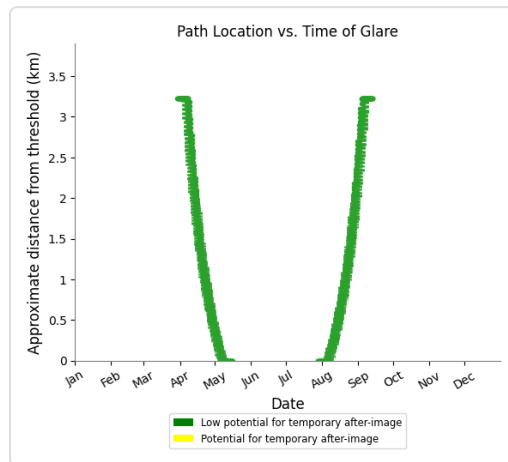
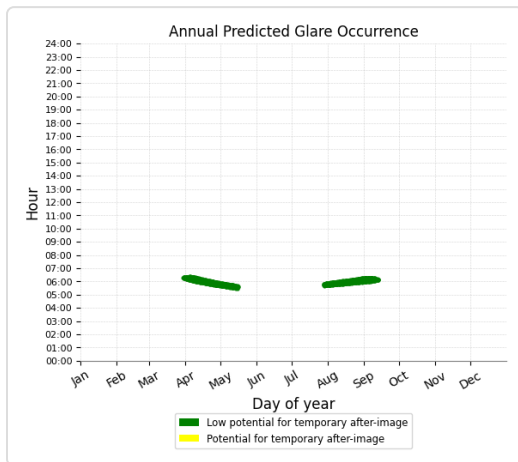
## Results for: Block6

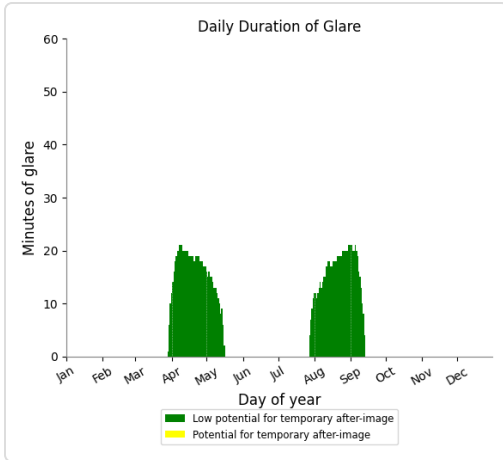
Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	1525	0
10 Runway	2208	0
16 Runway	3243	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

## Flight Path: 10L Runway

0 minutes of yellow glare

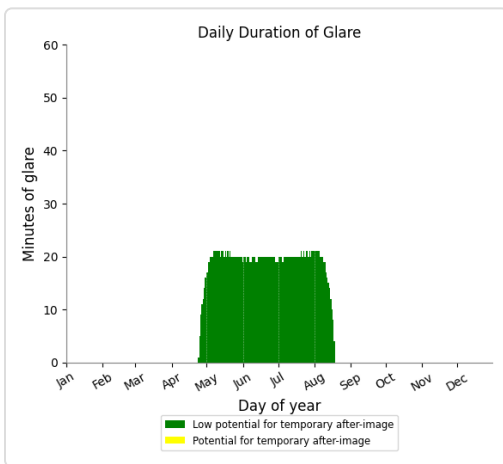
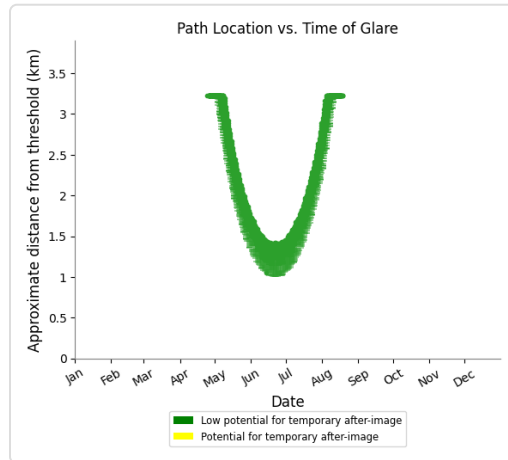
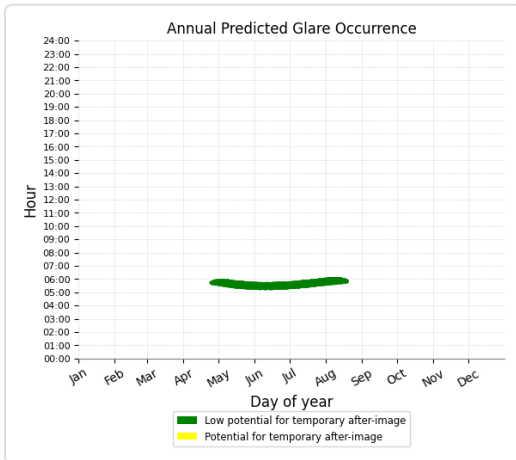
1525 minutes of green glare





### Flight Path: 10 Runway

0 minutes of yellow glare  
 2208 minutes of green glare

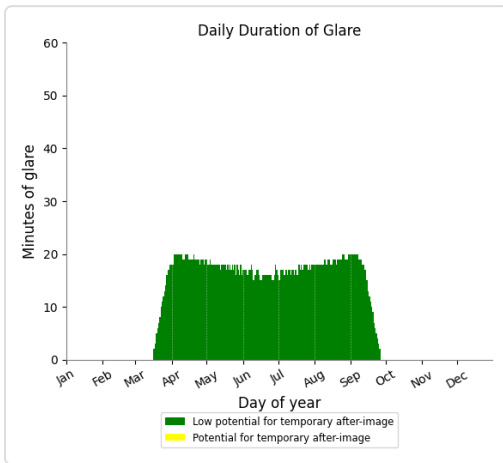
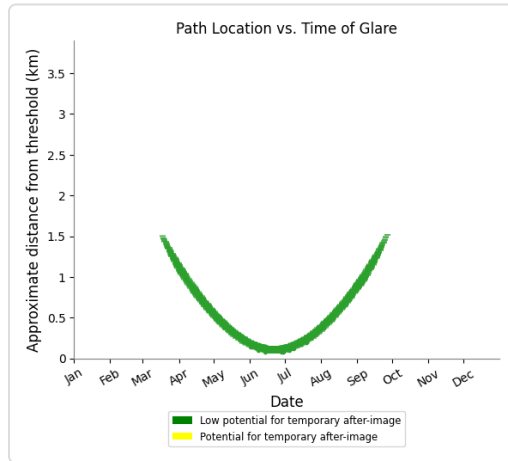
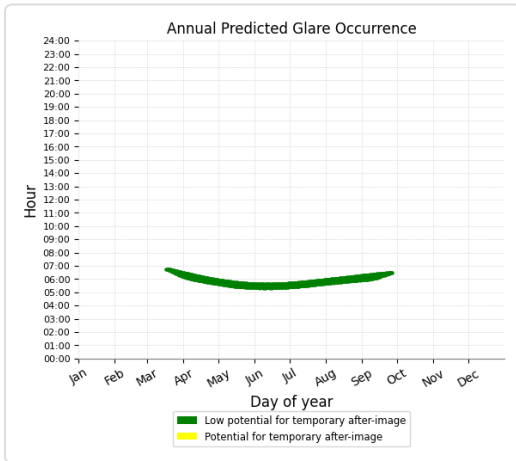


### Flight Path: 16 Runway

0 minutes of yellow glare



3243 minutes of green glare



### Flight Path: 28R Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
0 minutes of green glare

## Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

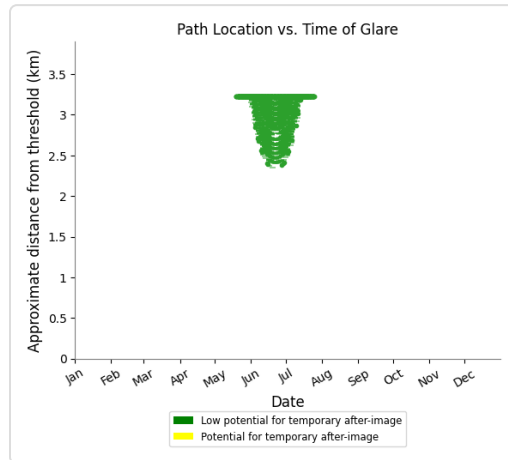
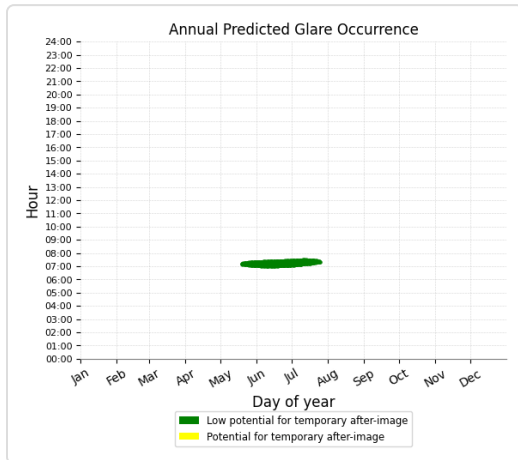
## Results for: Block7

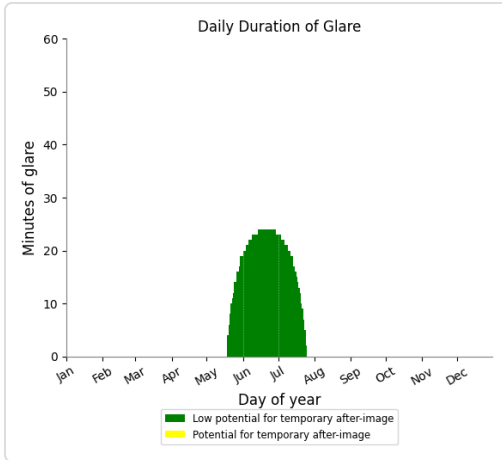
Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	1268	0
10 Runway	0	0
16 Runway	5414	0
28R Runway	72	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

## Flight Path: 10L Runway

0 minutes of yellow glare

1268 minutes of green glare



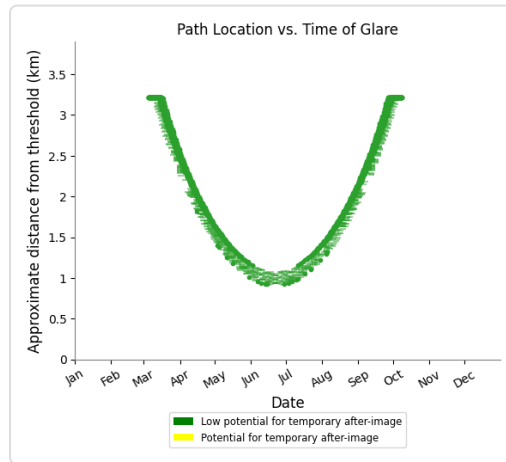
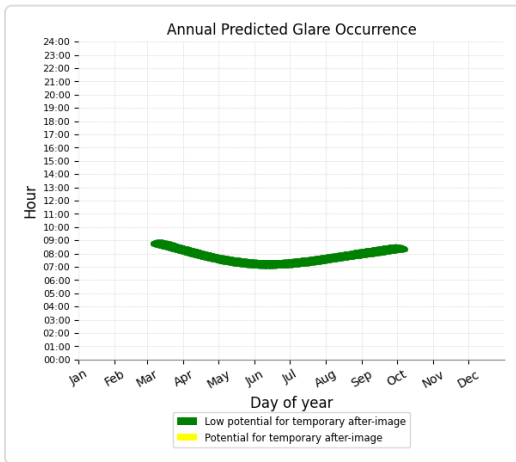


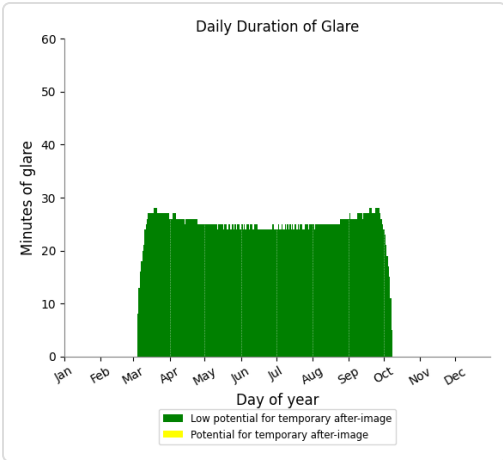
### Flight Path: 10 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 16 Runway

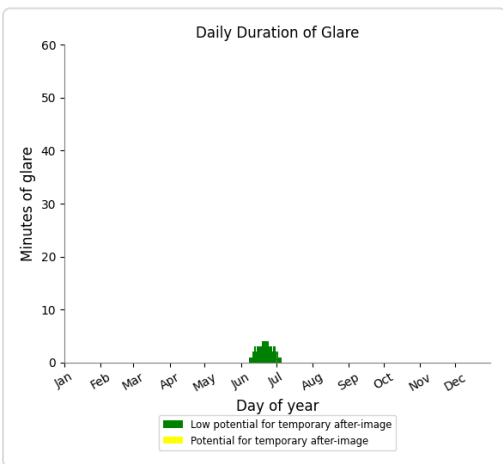
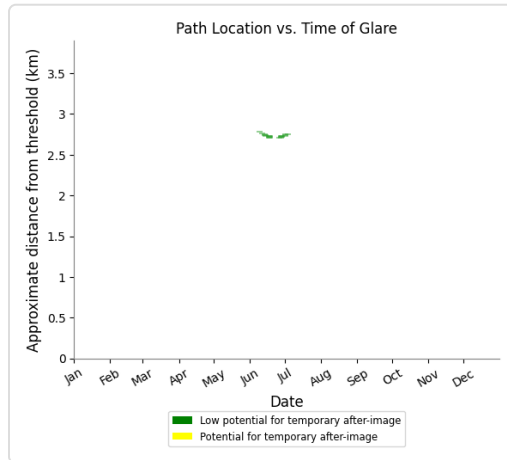
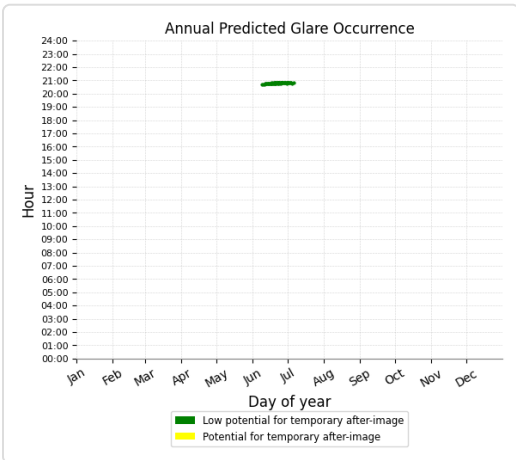
0 minutes of yellow glare  
 5414 minutes of green glare





### Flight Path: 28R Runway

0 minutes of yellow glare  
 72 minutes of green glare



### Flight Path: 28 Runway

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

## **Results for: Block7 E**

<b>Receptor</b>	<b>Green Glare (min)</b>	<b>Yellow Glare (min)</b>
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 10 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 16 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28R Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 28 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

## **Results for: Block7 W**

<b>Receptor</b>	<b>Green Glare (min)</b>	<b>Yellow Glare (min)</b>
10L Runway	0	0
10 Runway	0	0
16 Runway	5255	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Flight Path: 10 Runway**

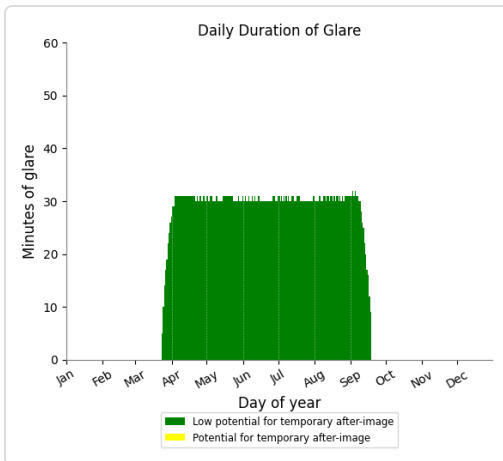
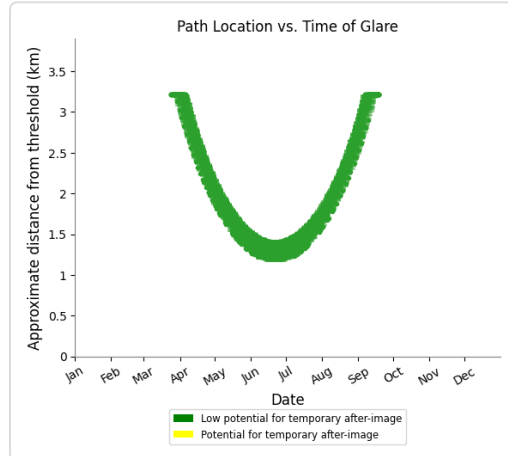
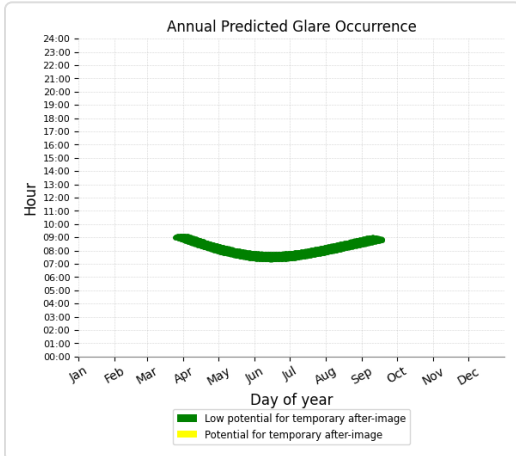
0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare

5255 minutes of green glare



### Flight Path: 28R Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare

0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare

0 minutes of green glare

### Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

## Results for: Block8 E

Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	0	0
10 Runway	0	0
16 Runway	0	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### Flight Path: 10L Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 10 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 28R Runway

0 minutes of yellow glare

0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare



0 minutes of green glare

### **Flight Path: 34 Runway**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 1-ATCT**

0 minutes of yellow glare

0 minutes of green glare

### **Point Receptor: 2-ATCT**

0 minutes of yellow glare

0 minutes of green glare

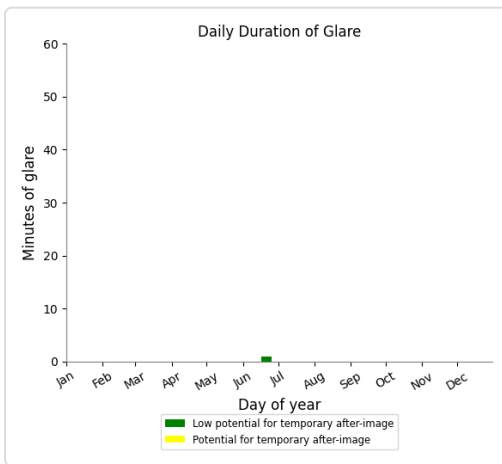
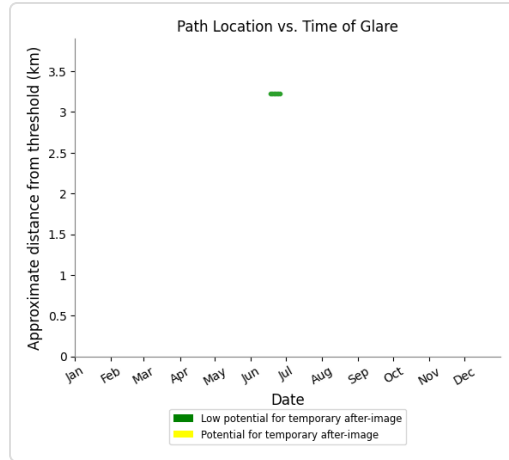
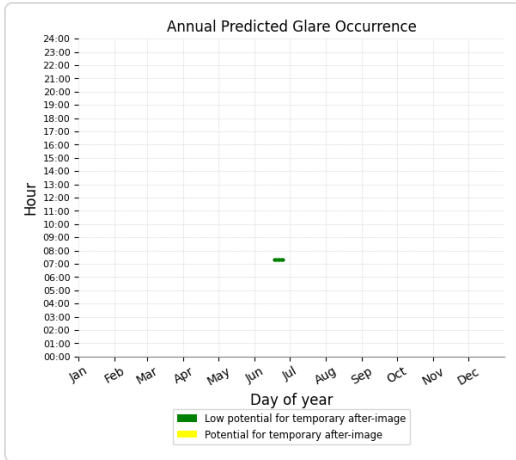
## **Results for: Block8 W**

<b>Receptor</b>	<b>Green Glare (min)</b>	<b>Yellow Glare (min)</b>
10L Runway	9	0
10 Runway	0	0
16 Runway	5254	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

### **Flight Path: 10L Runway**

0 minutes of yellow glare

9 minutes of green glare

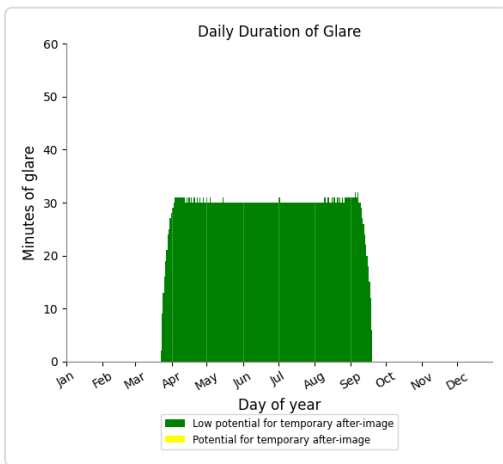
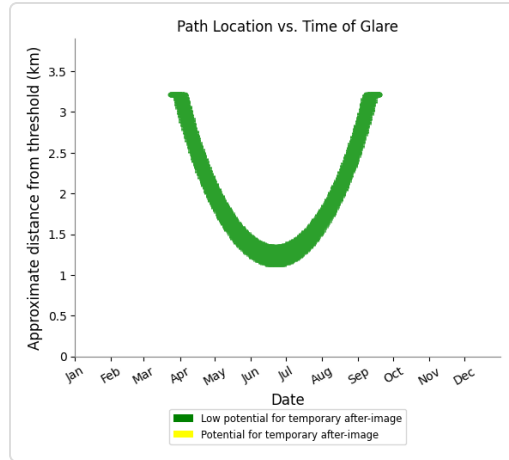
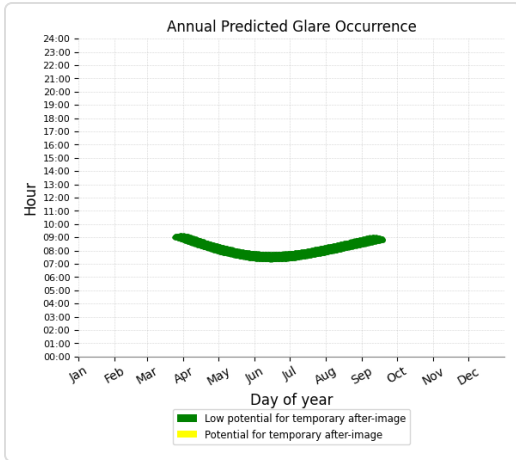


### Flight Path: 10 Runway

0 minutes of yellow glare  
 0 minutes of green glare

### Flight Path: 16 Runway

0 minutes of yellow glare  
 5254 minutes of green glare



### Flight Path: 28R Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
0 minutes of green glare

## Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

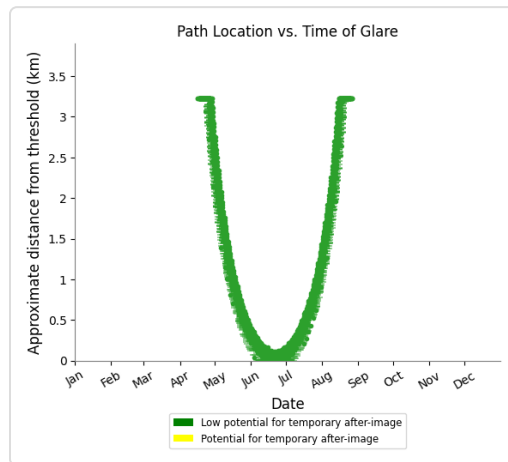
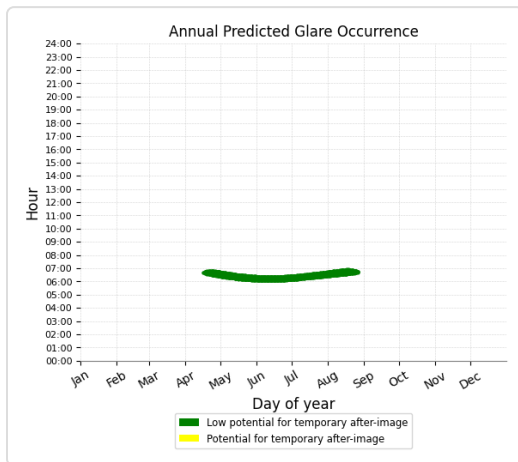
## Results for: Block9

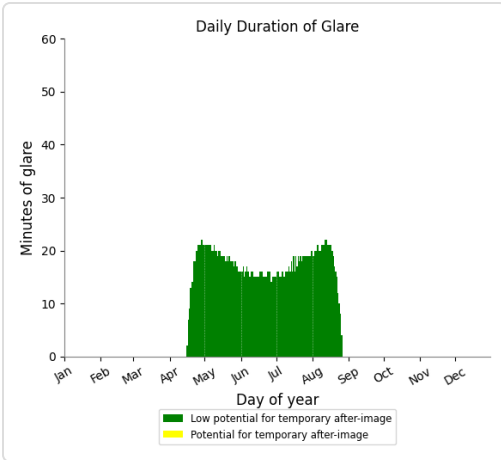
Receptor	Green Glare (min)	Yellow Glare (min)
10L Runway	2309	0
10 Runway	1257	0
16 Runway	5295	0
28R Runway	0	0
28 Runway	0	0
34 Runway	0	0
1-ATCT	0	0
2-ATCT	0	0

## Flight Path: 10L Runway

0 minutes of yellow glare

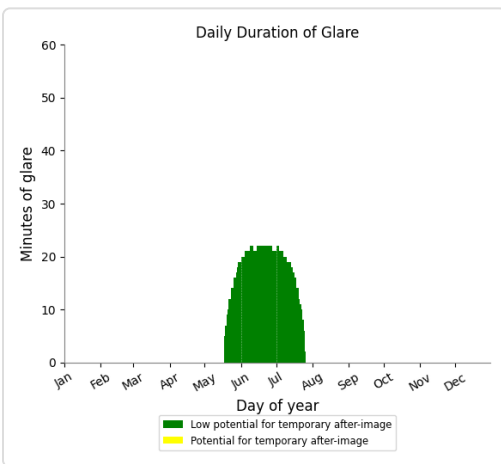
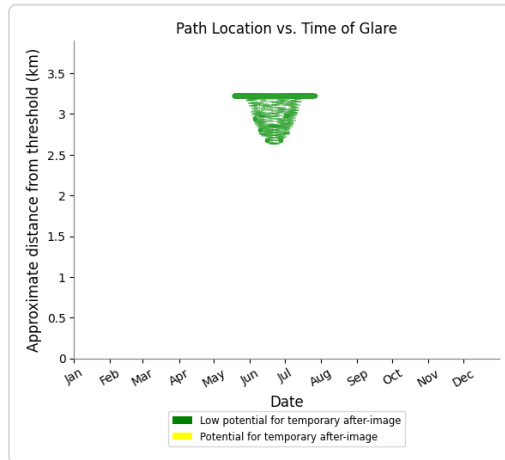
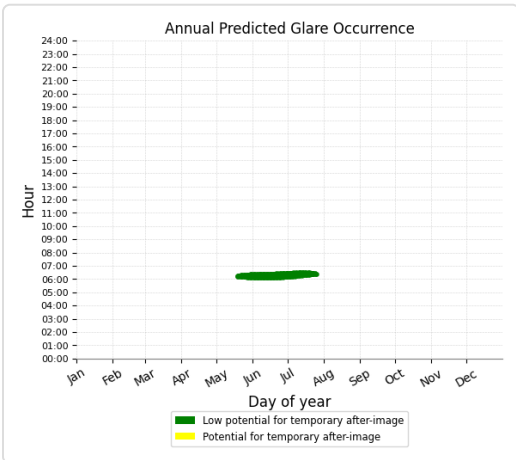
2309 minutes of green glare





### Flight Path: 10 Runway

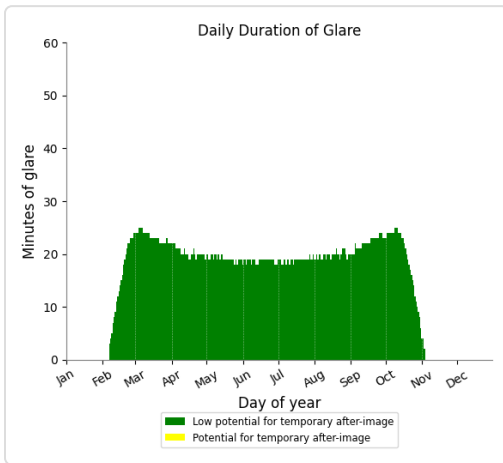
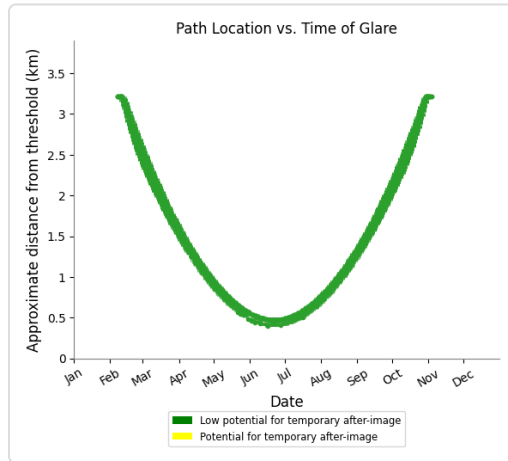
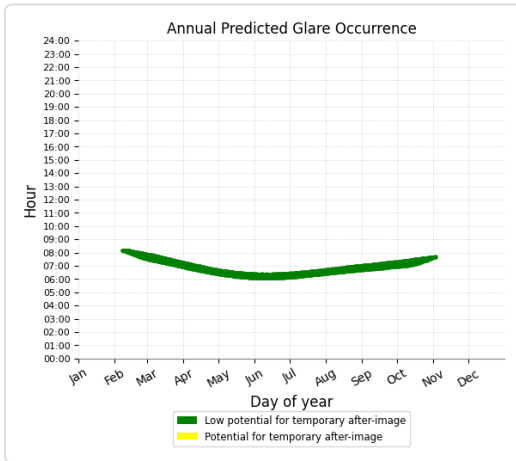
0 minutes of yellow glare  
 1257 minutes of green glare



### Flight Path: 16 Runway

0 minutes of yellow glare

5295 minutes of green glare



### Flight Path: 28R Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 28 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Flight Path: 34 Runway

0 minutes of yellow glare  
0 minutes of green glare

### Point Receptor: 1-ATCT

0 minutes of yellow glare  
0 minutes of green glare

## Point Receptor: 2-ATCT

0 minutes of yellow glare

0 minutes of green glare

## Assumptions

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"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.

Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.

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

The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.

Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)

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

Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.

The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.

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.

Refer to the Help page at [www.forgesolar.com/help/](http://www.forgesolar.com/help/) for assumptions and limitations not listed here.