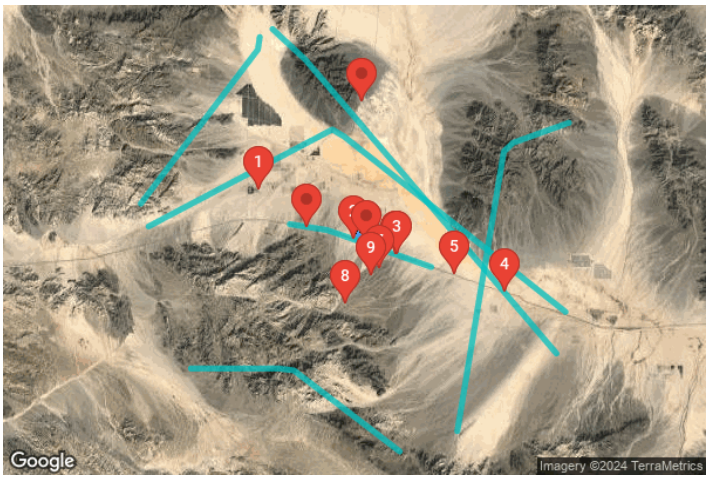
Appendix B: Glare Analysis

FORGESOLAR GLARE ANALYSIS

Project: **Savira Solar Project**
Site configuration: **Savira Solar Project**

Created 20 Aug, 2024
Updated 20 Aug, 2024
Time-step 1 minute
Timezone offset UTC-8
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 500 kW to 1 MW
Site ID 127272.21768

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2



Summary of Results

Glare with low potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV 01	SA tracking	SA tracking	28,059	467.6	0	0.0	-
PV 02	SA tracking	SA tracking	29,405	490.1	0	0.0	-
PV 03	SA tracking	SA tracking	29,234	487.2	0	0.0	-
PV 04	SA tracking	SA tracking	27,272	454.5	0	0.0	-
PV 05	SA tracking	SA tracking	27,653	460.9	0	0.0	-

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

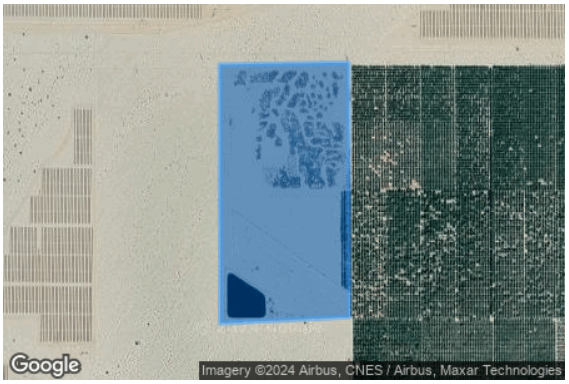
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
I-10 Eastbound	67	1.1	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1265 - 1500 ft AGL	23,746	395.8	0	0.0
VR1265 - 200 ft AGL	15,035	250.6	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
VR1267 and VR1268 - 1500 ft AGL	23,680	394.7	0	0.0
VR1267 and VR1268 - 200 ft AGL	18,327	305.4	0	0.0
VR289 - 200 ft AGL	4,300	71.7	0	0.0
VR289 - 4000 ft AGL	8,988	149.8	0	0.0
VR296 - 200 ft AGL	17,188	286.5	0	0.0
VR296 - 2500 ft AGL	30,292	504.9	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

Component Data

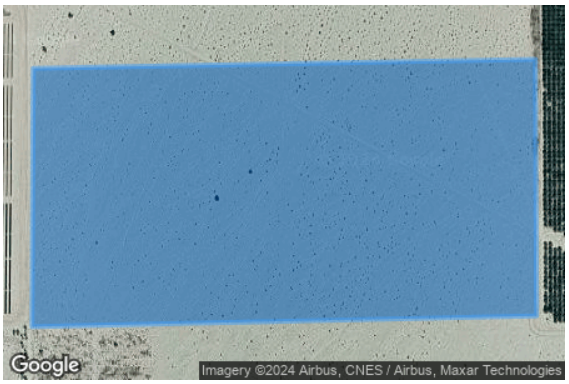
PV Arrays

Name: PV 01
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



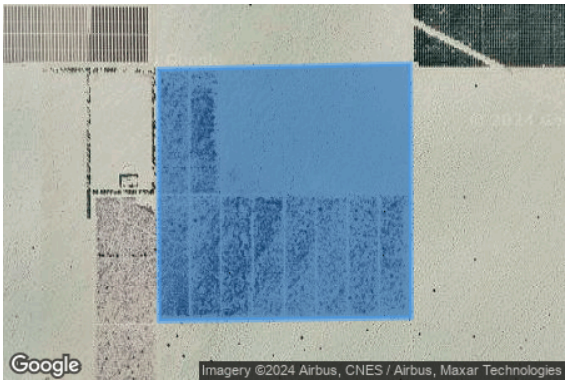
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.714991	-115.261424	574.99	15.00	589.99
2	33.715044	-115.257010	563.49	15.00	578.49
3	33.707802	-115.256970	602.36	15.00	617.36
4	33.707625	-115.261407	615.14	15.00	630.14

Name: PV 02
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



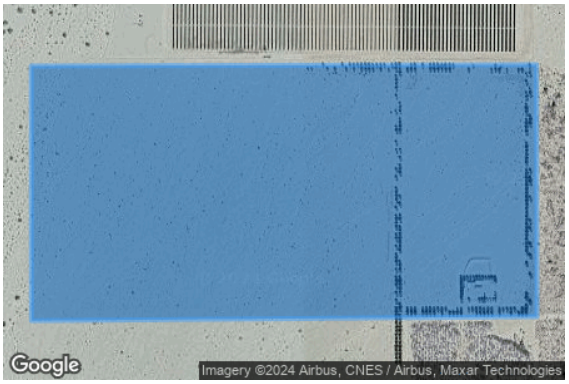
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.704096	-115.265577	648.04	15.00	663.04
2	33.704224	-115.256951	617.80	15.00	632.80
3	33.700560	-115.256931	638.37	15.00	653.37
4	33.700406	-115.265599	670.33	15.00	685.33

Name: PV 03
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



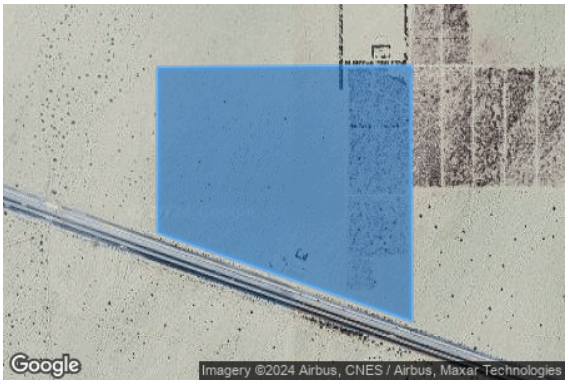
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.700406	-115.265599	670.33	15.00	685.33
2	33.700560	-115.256931	638.37	15.00	653.37
3	33.693318	-115.256899	683.69	15.00	698.69
4	33.693226	-115.265581	713.67	15.00	728.67

Name: PV 04
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.700387	-115.274281	696.55	15.00	711.55
2	33.700406	-115.265599	670.33	15.00	685.33
3	33.696816	-115.265590	692.77	15.00	707.77
4	33.696759	-115.274278	721.44	15.00	736.44

Name: PV 05
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.696759	-115.274278	721.44	15.00	736.44
2	33.696816	-115.265590	692.77	15.00	707.77
3	33.689570	-115.265572	736.51	15.00	751.51
4	33.692083	-115.274273	750.09	15.00	765.09

Route Receptors

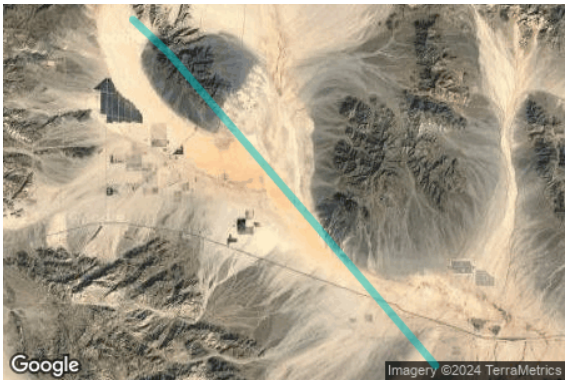
Name: I-10 Eastbound
Path type: One-way (toward increasing index)
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.706987	-115.352010	813.34	9.40	822.74
2	33.705879	-115.343430	814.42	9.40	823.82
3	33.704770	-115.334851	818.81	9.40	828.21
4	33.703661	-115.326272	781.09	9.40	790.49
5	33.702551	-115.317694	770.32	9.40	779.72
6	33.701433	-115.309117	755.52	9.40	764.92
7	33.699185	-115.300872	761.29	9.40	770.69
8	33.696781	-115.292682	765.81	9.40	775.21
9	33.694376	-115.284493	765.15	9.40	774.55
10	33.691970	-115.276304	761.89	9.40	771.29
11	33.689590	-115.268105	749.10	9.40	758.50
12	33.687213	-115.259905	737.49	9.40	746.89
13	33.684806	-115.251718	721.94	9.40	731.34
14	33.682240	-115.243603	704.05	9.40	713.45
15	33.679829	-115.235418	679.51	9.40	688.91
16	33.677416	-115.227233	658.53	9.40	667.93
17	33.675004	-115.219050	641.53	9.40	650.93
18	33.672590	-115.210866	619.56	9.40	628.96
19	33.670176	-115.202683	605.95	9.40	615.35
20	33.667762	-115.194501	581.77	9.40	591.17
21	33.665347	-115.186319	563.46	9.40	572.86

Name: I-10 Westbound
Path type: One-way (toward increasing index)
Observer view angle: 50.0°

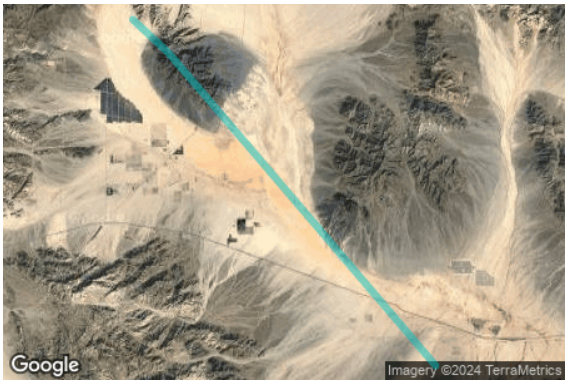
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.665639	-115.186119	561.05	9.40	570.45
2	33.668054	-115.194301	578.94	9.40	588.34
3	33.670468	-115.202483	602.38	9.40	611.78
4	33.672882	-115.210666	618.41	9.40	627.81
5	33.675295	-115.218850	639.21	9.40	648.61
6	33.677708	-115.227034	654.13	9.40	663.53
7	33.680120	-115.235218	678.01	9.40	687.41
8	33.682532	-115.243403	699.04	9.40	708.44
9	33.685097	-115.251518	717.41	9.40	726.81
10	33.687505	-115.259705	733.31	9.40	742.71
11	33.689882	-115.267905	744.29	9.40	753.69
12	33.692262	-115.276104	761.96	9.40	771.36
13	33.694668	-115.284293	762.33	9.40	771.73
14	33.697073	-115.292482	762.93	9.40	772.33
15	33.699477	-115.300672	759.92	9.40	769.32
16	33.701738	-115.308913	753.32	9.40	762.72
17	33.702859	-115.317489	767.76	9.40	777.16
18	33.703969	-115.326068	778.52	9.40	787.92
19	33.705078	-115.334647	815.39	9.40	824.79
20	33.706187	-115.343226	814.38	9.40	823.78
21	33.707295	-115.351806	812.43	9.40	821.83

Name: VR1265 - 1500 ft AGL
Path type: Two-way
Observer view angle: 180.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.896761	-115.372272	1122.02	1500.00	2622.02
2	33.886900	-115.359507	1151.74	1500.00	2651.74
3	33.877037	-115.346746	1360.62	1500.00	2860.62
4	33.867173	-115.333987	2417.99	1500.00	3917.99
5	33.856246	-115.322550	2611.30	1500.00	4111.30
6	33.845261	-115.311187	2237.72	1500.00	3737.72
7	33.834275	-115.299827	1271.90	1500.00	2771.90
8	33.823288	-115.288470	842.19	1500.00	2342.19
9	33.812300	-115.277115	498.64	1500.00	1998.64
10	33.801312	-115.265764	463.80	1500.00	1963.80
11	33.790322	-115.254415	442.54	1500.00	1942.54
12	33.779331	-115.243069	440.44	1500.00	1940.44
13	33.768339	-115.231726	432.58	1500.00	1932.58
14	33.757346	-115.220386	433.32	1500.00	1933.32
15	33.746352	-115.209049	429.37	1500.00	1929.37
16	33.735358	-115.197715	429.64	1500.00	1929.64
17	33.724362	-115.186384	427.99	1500.00	1927.99
18	33.713365	-115.175055	444.84	1500.00	1944.84
19	33.702368	-115.163730	459.69	1500.00	1959.69
20	33.691369	-115.152407	421.66	1500.00	1921.66
21	33.680370	-115.141087	425.33	1500.00	1925.33
22	33.669369	-115.129770	396.98	1500.00	1896.98
23	33.658368	-115.118456	394.02	1500.00	1894.02
24	33.647365	-115.107145	391.24	1500.00	1891.24
25	33.636362	-115.095836	400.89	1500.00	1900.89
26	33.625358	-115.084531	410.90	1500.00	1910.90
27	33.614352	-115.073228	423.16	1500.00	1923.16
28	33.603346	-115.061928	432.64	1500.00	1932.64
29	33.592339	-115.050631	438.71	1500.00	1938.71
30	33.581331	-115.039337	457.07	1500.00	1957.07

Name: VR1265 - 200 ft AGL
Path type: Two-way
Observer view angle: 180.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.896761	-115.372272	1122.02	200.00	1322.02
2	33.886900	-115.359507	1151.74	200.00	1351.74
3	33.877037	-115.346746	1360.62	200.00	1560.62
4	33.867173	-115.333987	2417.99	200.00	2617.99
5	33.856246	-115.322550	2611.30	200.00	2811.30
6	33.845261	-115.311187	2237.72	200.00	2437.72
7	33.834275	-115.299827	1271.90	200.00	1471.90
8	33.823288	-115.288470	842.19	200.00	1042.19
9	33.812300	-115.277115	498.64	200.00	698.64
10	33.801312	-115.265764	463.80	200.00	663.80
11	33.790322	-115.254415	442.54	200.00	642.54
12	33.779331	-115.243069	440.44	200.00	640.44
13	33.768339	-115.231726	432.58	200.00	632.58
14	33.757346	-115.220386	433.32	200.00	633.32
15	33.746352	-115.209049	429.37	200.00	629.37
16	33.735358	-115.197715	429.64	200.00	629.64
17	33.724362	-115.186384	427.99	200.00	627.99
18	33.713365	-115.175055	444.84	200.00	644.84
19	33.702368	-115.163730	459.69	200.00	659.69
20	33.691369	-115.152407	421.66	200.00	621.66
21	33.680370	-115.141087	425.33	200.00	625.33
22	33.669369	-115.129770	396.98	200.00	596.98
23	33.658368	-115.118456	394.02	200.00	594.02
24	33.647365	-115.107145	391.24	200.00	591.24
25	33.636362	-115.095836	400.89	200.00	600.89
26	33.625358	-115.084531	410.90	200.00	610.90
27	33.614352	-115.073228	423.16	200.00	623.16
28	33.603346	-115.061928	432.64	200.00	632.64
29	33.592339	-115.050631	438.71	200.00	638.71
30	33.581331	-115.039337	457.07	200.00	657.07

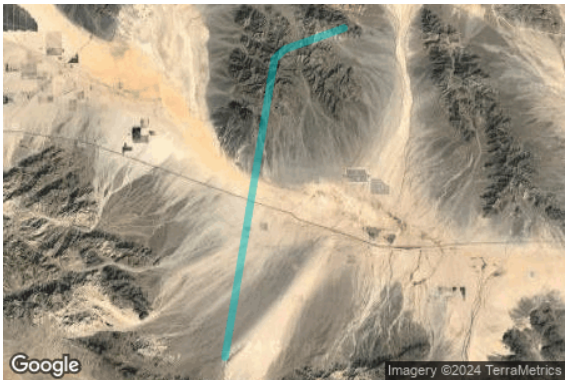
Name: VR1266 - 1500 ft AGL
Path type: Two-way
Observer view angle: 180.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.485881	-115.223028	1783.01	1500.00	3283.01
2	33.494665	-115.236813	1887.86	1500.00	3387.86
3	33.503448	-115.250600	2088.88	1500.00	3588.88
4	33.512229	-115.264391	2149.06	1500.00	3649.06
5	33.521008	-115.278185	2205.67	1500.00	3705.67
6	33.529786	-115.291981	2174.60	1500.00	3674.60
7	33.538563	-115.305780	2564.84	1500.00	4064.84
8	33.547338	-115.319582	2738.58	1500.00	4238.58
9	33.556112	-115.333387	3199.37	1500.00	4699.37
10	33.564884	-115.347194	4142.10	1500.00	5642.10
11	33.566673	-115.363812	3379.63	1500.00	4879.63
12	33.566679	-115.381147	2990.61	1500.00	4490.61
13	33.566683	-115.398482	3247.34	1500.00	4747.34
14	33.566685	-115.415816	3060.71	1500.00	4560.71
15	33.566684	-115.433151	2658.22	1500.00	4158.22
16	33.566681	-115.450486	2394.34	1500.00	3894.34
17	33.566675	-115.467821	1996.76	1500.00	3496.76

Name: VR1266 - 200 ft AGL
Path type: Two-way
Observer view angle: 180.0°

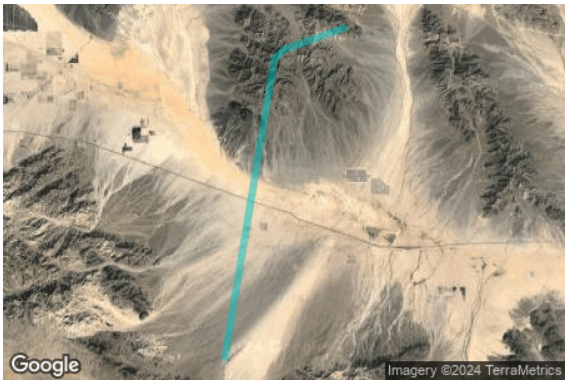
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.485881	-115.223028	1783.01	200.00	1983.01
2	33.494665	-115.236813	1887.86	200.00	2087.86
3	33.503448	-115.250600	2088.88	200.00	2288.88
4	33.512229	-115.264391	2149.06	200.00	2349.06
5	33.521008	-115.278185	2205.67	200.00	2405.67
6	33.529786	-115.291981	2174.60	200.00	2374.60
7	33.538563	-115.305780	2564.84	200.00	2764.84
8	33.547338	-115.319582	2738.58	200.00	2938.58
9	33.556112	-115.333387	3199.37	200.00	3399.37
10	33.564884	-115.347194	4142.10	200.00	4342.10
11	33.566673	-115.363812	3379.63	200.00	3579.63
12	33.566679	-115.381147	2990.61	200.00	3190.61
13	33.566683	-115.398482	3247.34	200.00	3447.34
14	33.566685	-115.415816	3060.71	200.00	3260.71
15	33.566684	-115.433151	2658.22	200.00	2858.22
16	33.566681	-115.450486	2394.34	200.00	2594.34
17	33.566675	-115.467821	1996.76	200.00	2196.76

Name: VR1267 and VR1268 - 1500 ft AGL
Path type: Two-way
Observer view angle: 180.0°



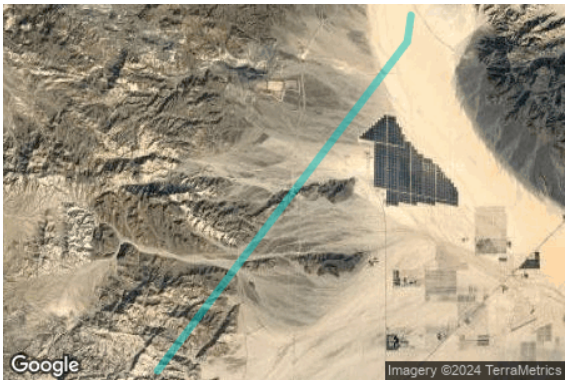
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.505607	-115.155556	1152.58	1500.00	2652.58
2	33.519919	-115.152703	1064.55	1500.00	2564.55
3	33.534231	-115.149849	971.10	1500.00	2471.10
4	33.548543	-115.146994	881.80	1500.00	2381.80
5	33.562855	-115.144138	792.40	1500.00	2292.40
6	33.577167	-115.141281	709.28	1500.00	2209.28
7	33.591478	-115.138422	634.15	1500.00	2134.15
8	33.605790	-115.135563	569.97	1500.00	2069.97
9	33.620101	-115.132702	515.65	1500.00	2015.65
10	33.634412	-115.129841	475.12	1500.00	1975.12
11	33.648724	-115.126978	429.10	1500.00	1929.10
12	33.663034	-115.124115	394.65	1500.00	1894.65
13	33.677345	-115.121250	411.89	1500.00	1911.89
14	33.691656	-115.118384	480.03	1500.00	1980.03
15	33.705967	-115.115518	565.14	1500.00	2065.14
16	33.720277	-115.112650	954.68	1500.00	2454.68
17	33.734587	-115.109781	1306.47	1500.00	2806.47
18	33.748898	-115.106911	2022.76	1500.00	3522.76
19	33.763208	-115.104040	2579.80	1500.00	4079.80
20	33.777518	-115.101168	2630.39	1500.00	4130.39
21	33.786225	-115.090284	2724.31	1500.00	4224.31
22	33.791095	-115.073915	1843.69	1500.00	3343.69
23	33.795963	-115.057544	2287.94	1500.00	3787.94
24	33.800829	-115.041171	1610.27	1500.00	3110.27
25	33.805692	-115.024797	1756.49	1500.00	3256.49

Name: VR1267 and VR1268 - 200 ft AGL
Path type: Two-way
Observer view angle: 180.0°



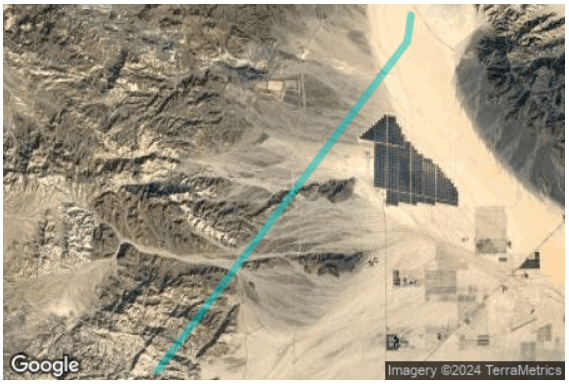
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.505607	-115.155556	1152.58	200.00	1352.58
2	33.519919	-115.152703	1064.55	200.00	1264.55
3	33.534231	-115.149849	971.10	200.00	1171.10
4	33.548543	-115.146994	881.80	200.00	1081.80
5	33.562855	-115.144138	792.40	200.00	992.40
6	33.577167	-115.141281	709.28	200.00	909.28
7	33.591478	-115.138422	634.15	200.00	834.15
8	33.605790	-115.135563	569.97	200.00	769.97
9	33.620101	-115.132702	515.65	200.00	715.65
10	33.634412	-115.129841	475.12	200.00	675.12
11	33.648724	-115.126978	429.10	200.00	629.10
12	33.663034	-115.124115	394.65	200.00	594.65
13	33.677345	-115.121250	411.89	200.00	611.89
14	33.691656	-115.118384	480.03	200.00	680.03
15	33.705967	-115.115518	565.14	200.00	765.14
16	33.720277	-115.112650	954.68	200.00	1154.68
17	33.734587	-115.109781	1306.47	200.00	1506.47
18	33.748898	-115.106911	2022.76	200.00	2222.76
19	33.763208	-115.104040	2579.80	200.00	2779.80
20	33.777518	-115.101168	2630.39	200.00	2830.39
21	33.786225	-115.090284	2724.31	200.00	2924.31
22	33.791095	-115.073915	1843.69	200.00	2043.69
23	33.795963	-115.057544	2287.94	200.00	2487.94
24	33.800829	-115.041171	1610.27	200.00	1810.27
25	33.805692	-115.024797	1756.49	200.00	1956.49

Name: VR289 - 200 ft AGL
Path type: Two-way
Observer view angle: 180.0°



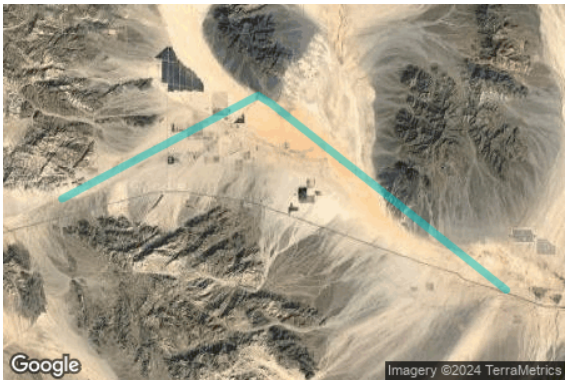
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.888909	-115.387166	949.73	200.00	1149.73
2	33.876917	-115.389229	865.21	200.00	1065.21
3	33.865399	-115.399810	805.57	200.00	1005.57
4	33.853880	-115.410388	809.32	200.00	1009.32
5	33.842360	-115.420963	822.37	200.00	1022.37
6	33.830839	-115.431536	867.44	200.00	1067.44
7	33.819317	-115.442106	910.12	200.00	1110.12
8	33.807794	-115.452673	1046.98	200.00	1246.98
9	33.796270	-115.463236	1093.70	200.00	1293.70
10	33.784745	-115.473798	1296.35	200.00	1496.35
11	33.773219	-115.484356	1421.56	200.00	1621.56
12	33.761692	-115.494911	1438.12	200.00	1638.12
13	33.750164	-115.505464	2255.12	200.00	2455.12
14	33.738635	-115.516013	2001.90	200.00	2201.90
15	33.727105	-115.526560	1941.34	200.00	2141.34

Name: VR289 - 4000 ft AGL
Path type: Two-way
Observer view angle: 180.0°



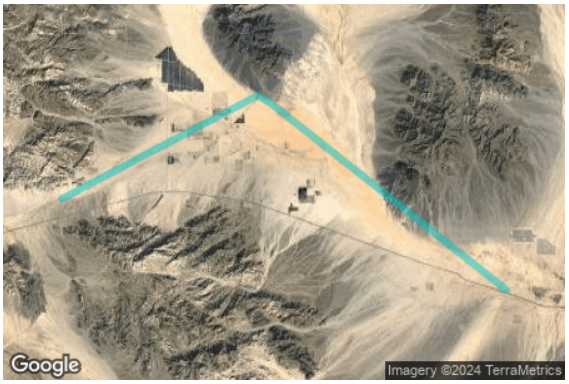
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.888909	-115.387166	949.73	4000.00	4949.73
2	33.876917	-115.389229	865.21	4000.00	4865.21
3	33.865399	-115.399810	805.57	4000.00	4805.57
4	33.853880	-115.410388	809.32	4000.00	4809.32
5	33.842360	-115.420963	822.37	4000.00	4822.37
6	33.830839	-115.431536	867.44	4000.00	4867.44
7	33.819317	-115.442106	910.12	4000.00	4910.12
8	33.807794	-115.452673	1046.98	4000.00	5046.98
9	33.796270	-115.463236	1093.70	4000.00	5093.71
10	33.784745	-115.473798	1296.35	4000.00	5296.35
11	33.773219	-115.484356	1421.56	4000.00	5421.56
12	33.761692	-115.494911	1438.12	4000.00	5438.12
13	33.750164	-115.505464	2255.12	4000.00	6255.12
14	33.738635	-115.516013	2001.90	4000.00	6001.90
15	33.727105	-115.526560	1941.34	4000.00	5941.34

Name: VR296 - 200 ft AGL
Path type: Two-way
Observer view angle: 180.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.621787	-115.028756	371.12	200.00	571.12
2	33.639748	-115.056004	356.52	200.00	556.52
3	33.657703	-115.083262	370.25	200.00	570.25
4	33.675653	-115.110533	402.90	200.00	602.90
5	33.684626	-115.124172	440.41	200.00	640.41
6	33.693597	-115.137814	442.76	200.00	642.76
7	33.702567	-115.151459	465.54	200.00	665.54
8	33.711535	-115.165107	487.16	200.00	687.16
9	33.720502	-115.178758	440.84	200.00	640.84
10	33.729468	-115.192412	427.69	200.00	627.69
11	33.738432	-115.206068	430.21	200.00	630.21
12	33.747395	-115.219728	429.71	200.00	629.71
13	33.756356	-115.233390	444.09	200.00	644.09
14	33.765316	-115.247055	443.06	200.00	643.06
15	33.774274	-115.260723	464.68	200.00	664.68
16	33.783231	-115.274394	475.12	200.00	675.12
17	33.792187	-115.288068	489.25	200.00	689.25
18	33.799142	-115.301965	534.15	200.00	734.15
19	33.792424	-115.317370	549.42	200.00	749.42
20	33.785703	-115.332773	556.85	200.00	756.85
21	33.778981	-115.348173	565.73	200.00	765.73
22	33.772256	-115.363571	593.56	200.00	793.56
23	33.765530	-115.378967	642.06	200.00	842.06
24	33.758802	-115.394360	701.92	200.00	901.92
25	33.752071	-115.409751	767.50	200.00	967.50
26	33.745339	-115.425140	836.70	200.00	1036.70
27	33.738604	-115.440526	909.70	200.00	1109.70
28	33.731868	-115.455910	983.03	200.00	1183.03
29	33.718389	-115.486671	1180.09	200.00	1380.09
30	33.704902	-115.517423	1260.37	200.00	1460.37

Name: VR296 - 2500 ft AGL
Path type: Two-way
Observer view angle: 180.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	33.621787	-115.028756	371.12	2500.00	2871.12
2	33.639748	-115.056004	356.52	2500.00	2856.52
3	33.657703	-115.083262	370.25	2500.00	2870.25
4	33.675653	-115.110533	402.90	2500.00	2902.90
5	33.684626	-115.124172	440.41	2500.00	2940.41
6	33.693597	-115.137814	442.76	2500.00	2942.76
7	33.702567	-115.151459	465.54	2500.00	2965.54
8	33.711535	-115.165107	487.16	2500.00	2987.16
9	33.720502	-115.178758	440.84	2500.00	2940.84
10	33.729468	-115.192412	427.69	2500.00	2927.69
11	33.738432	-115.206068	430.21	2500.00	2930.21
12	33.747395	-115.219728	429.71	2500.00	2929.71
13	33.756356	-115.233390	444.09	2500.00	2944.09
14	33.765316	-115.247055	443.06	2500.00	2943.06
15	33.774274	-115.260723	464.68	2500.00	2964.68
16	33.783231	-115.274394	475.12	2500.00	2975.12
17	33.792187	-115.288068	489.25	2500.00	2989.25
18	33.799142	-115.301965	534.15	2500.00	3034.15
19	33.792424	-115.317370	549.42	2500.00	3049.42
20	33.785703	-115.332773	556.85	2500.00	3056.85
21	33.778981	-115.348173	565.73	2500.00	3065.73
22	33.772256	-115.363571	593.56	2500.00	3093.56
23	33.765530	-115.378967	642.06	2500.00	3142.06
24	33.758802	-115.394360	701.92	2500.00	3201.92
25	33.752071	-115.409751	767.50	2500.00	3267.50
26	33.745339	-115.425140	836.70	2500.00	3336.70
27	33.738604	-115.440526	909.70	2500.00	3409.70
28	33.731868	-115.455910	983.03	2500.00	3483.03
29	33.718389	-115.486671	1180.09	2500.00	3680.09
30	33.704902	-115.517423	1260.37	2500.00	3760.37

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	33.740430	-115.387985	712.49	6.00
OP 2	2	33.691885	-115.276448	763.70	6.00
OP 3	3	33.677066	-115.226425	666.49	6.00
OP 4	4	33.640713	-115.099398	399.12	6.00
OP 5	5	33.657705	-115.158933	507.03	6.00
OP 6	6	33.677931	-115.227470	663.82	6.00
OP 7	7	33.663440	-115.246205	825.06	6.00
OP 8	8	33.629366	-115.285785	1304.67	6.00
OP 9	9	33.657008	-115.256218	927.39	6.00
OP 10	10	33.826343	-115.267530	501.54	6.00
OP 11	11	33.688130	-115.261545	735.51	6.00
OP 12	12	33.704323	-115.332322	804.61	6.00

Glare Analysis Results

Summary of Results

Glare with low potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV 01	SA tracking	SA tracking	28,059	467.6	0	0.0	-
PV 02	SA tracking	SA tracking	29,405	490.1	0	0.0	-
PV 03	SA tracking	SA tracking	29,234	487.2	0	0.0	-
PV 04	SA tracking	SA tracking	27,272	454.5	0	0.0	-
PV 05	SA tracking	SA tracking	27,653	460.9	0	0.0	-

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

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
I-10 Eastbound	67	1.1	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1265 - 1500 ft AGL	23,746	395.8	0	0.0
VR1265 - 200 ft AGL	15,035	250.6	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
VR1267 and VR1268 - 1500 ft AGL	23,680	394.7	0	0.0
VR1267 and VR1268 - 200 ft AGL	18,327	305.4	0	0.0
VR289 - 200 ft AGL	4,300	71.7	0	0.0
VR289 - 4000 ft AGL	8,988	149.8	0	0.0
VR296 - 200 ft AGL	17,188	286.5	0	0.0
VR296 - 2500 ft AGL	30,292	504.9	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

PV: PV 01 low potential for temporary after-image

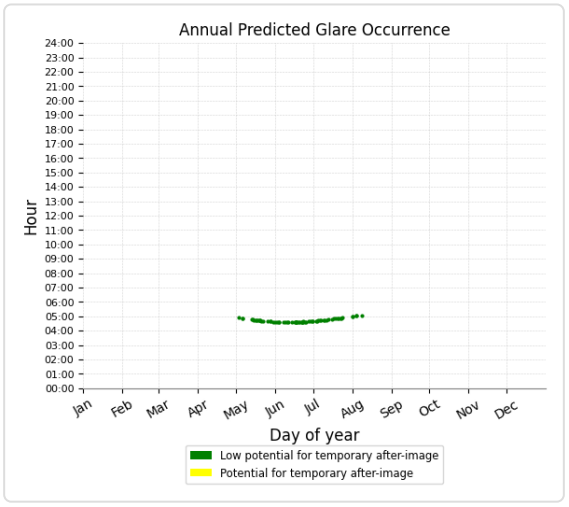
Receptor results ordered by category of glare

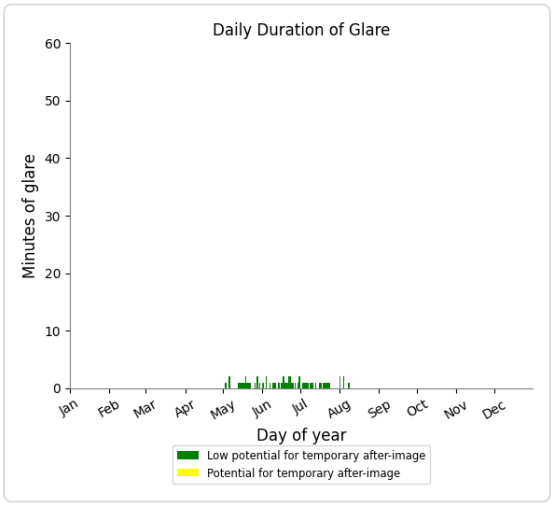
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
I-10 Eastbound	67	1.1	0	0.0
VR1265 - 1500 ft AGL	4,608	76.8	0	0.0
VR1265 - 200 ft AGL	2,775	46.2	0	0.0
VR1267 and VR1268 - 1500 ft AGL	4,383	73.0	0	0.0
VR1267 and VR1268 - 200 ft AGL	3,359	56.0	0	0.0
VR289 - 200 ft AGL	966	16.1	0	0.0
VR289 - 4000 ft AGL	1,957	32.6	0	0.0
VR296 - 200 ft AGL	3,551	59.2	0	0.0
VR296 - 2500 ft AGL	6,393	106.5	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

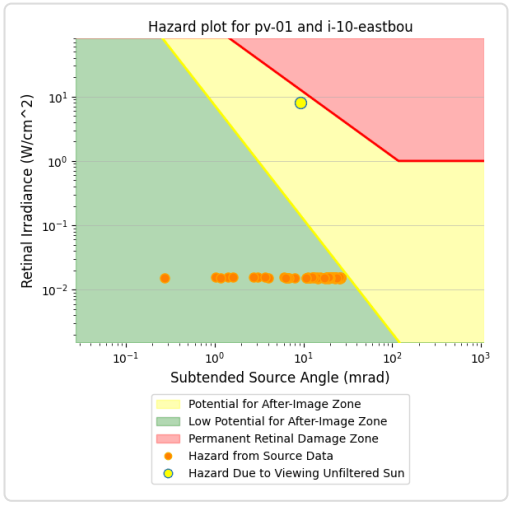
PV 01 and Route: I-10 Eastbound

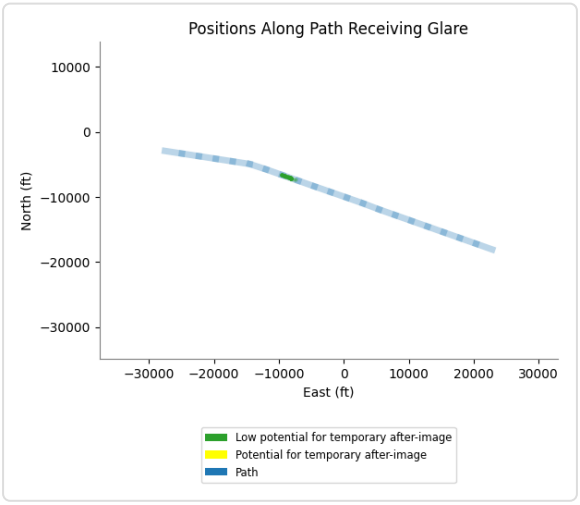
Yellow glare: none

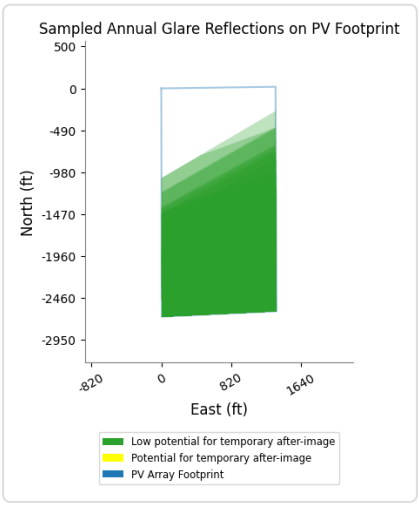
Green glare: 67 min.







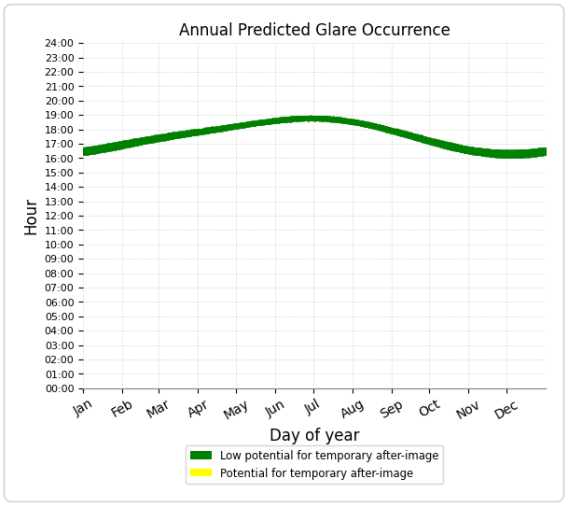


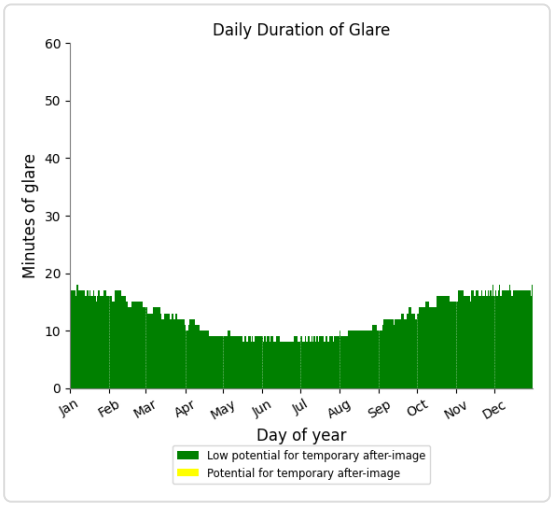


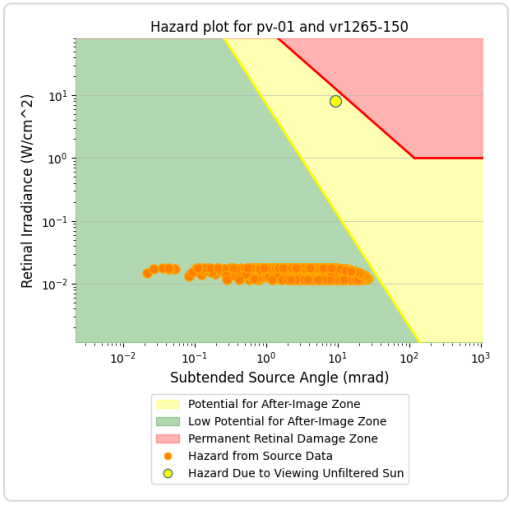
PV 01 and Route: VR1265 - 1500 ft AGL

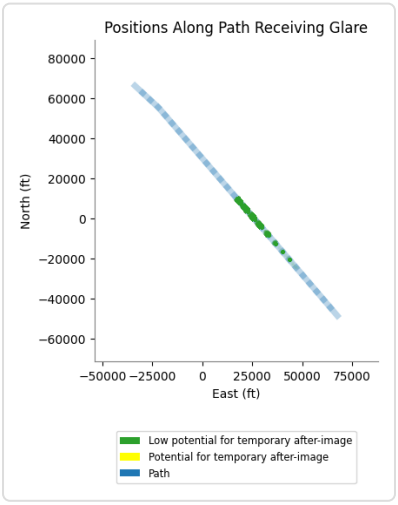
Yellow glare: none

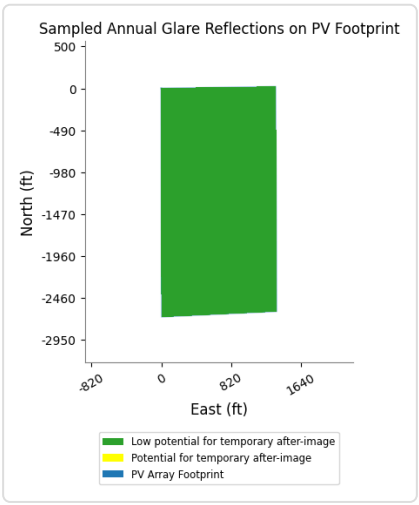
Green glare: 4,608 min.







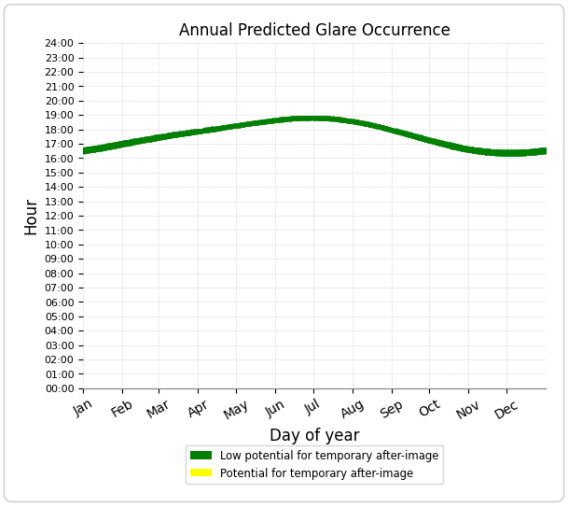


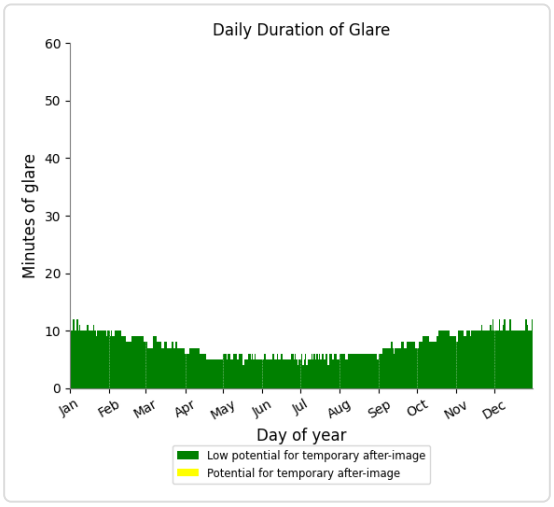


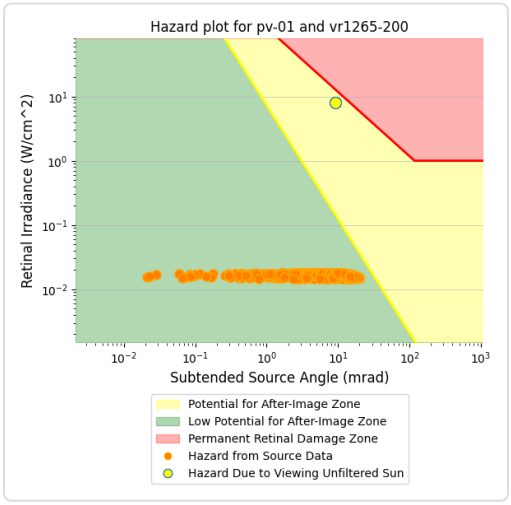
PV 01 and Route: VR1265 - 200 ft AGL

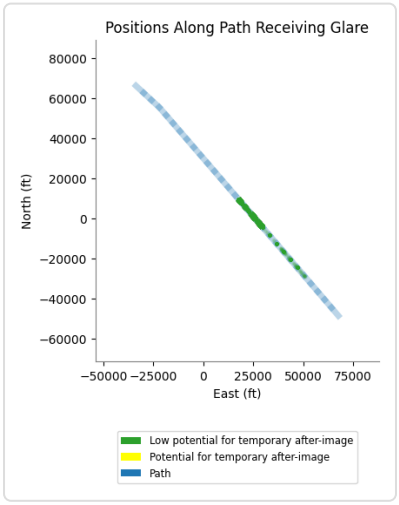
Yellow glare: none

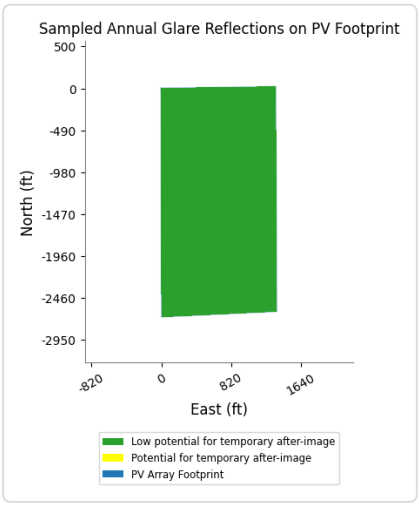
Green glare: 2,775 min.







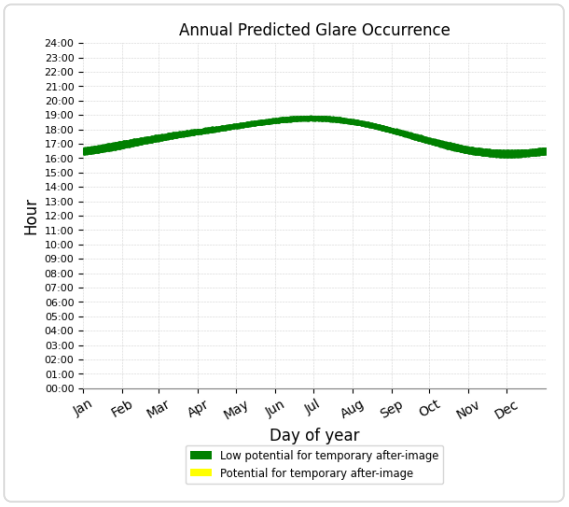


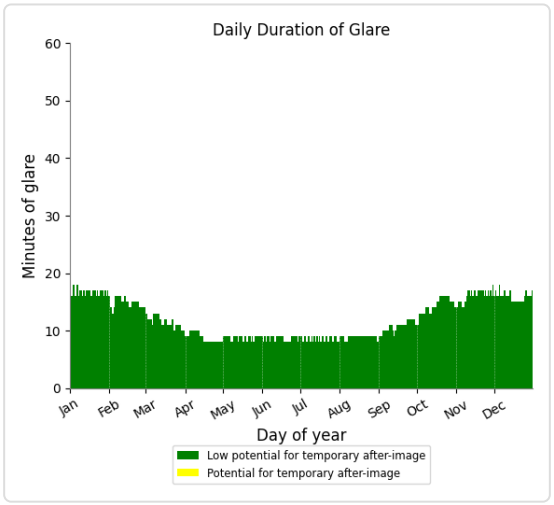


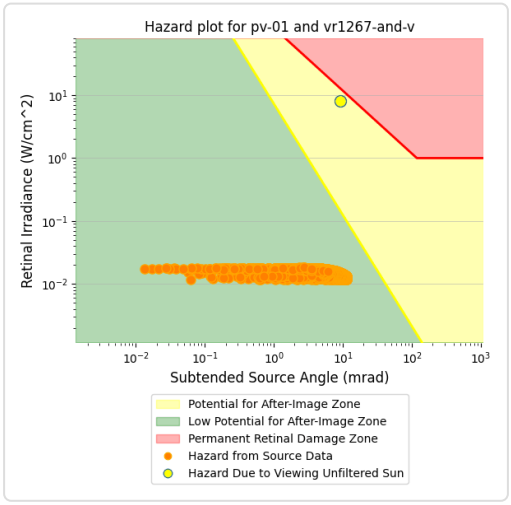
PV 01 and Route: VR1267 and VR1268 - 1500 ft AGL

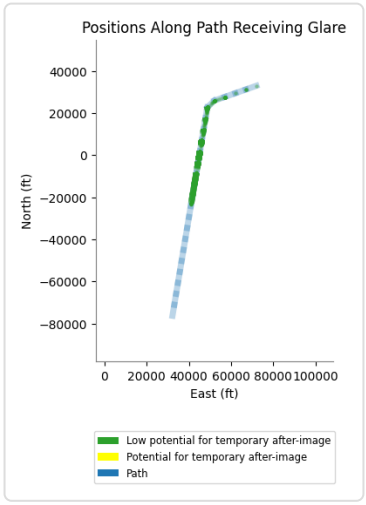
Yellow glare: none

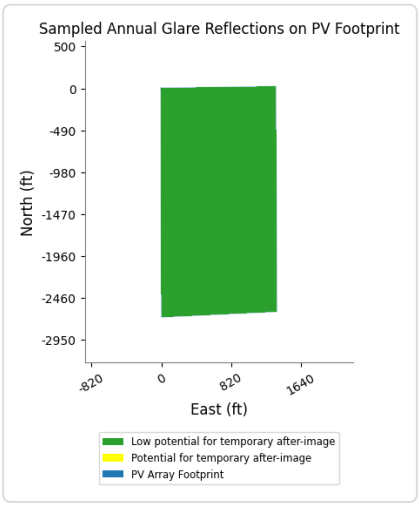
Green glare: 4,383 min.







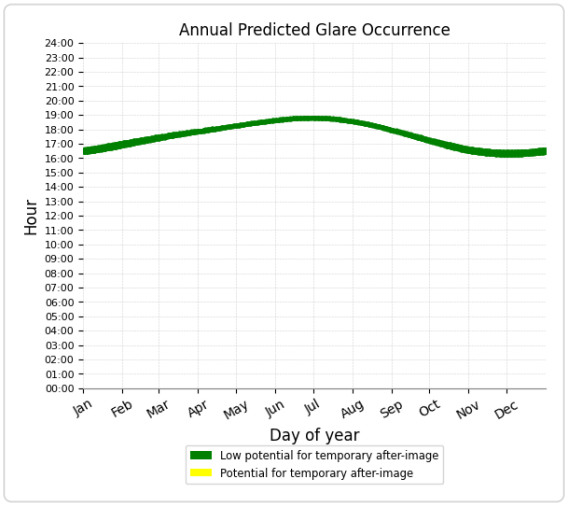


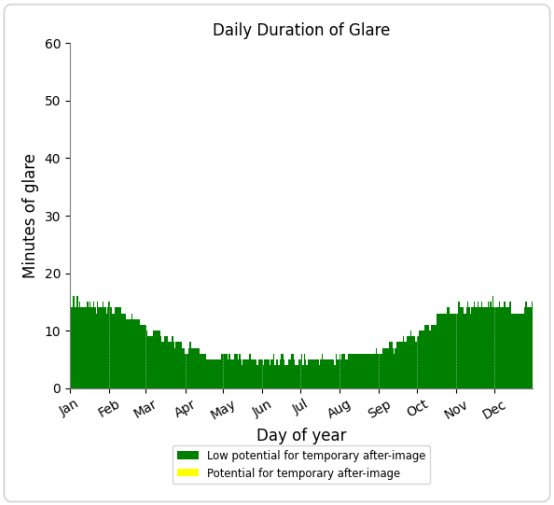


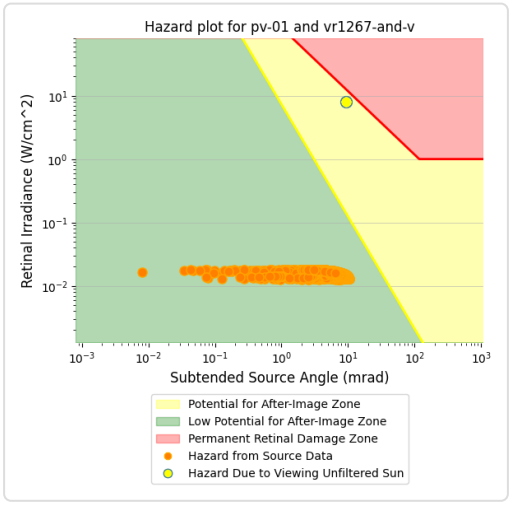
PV 01 and Route: VR1267 and VR1268 - 200 ft AGL

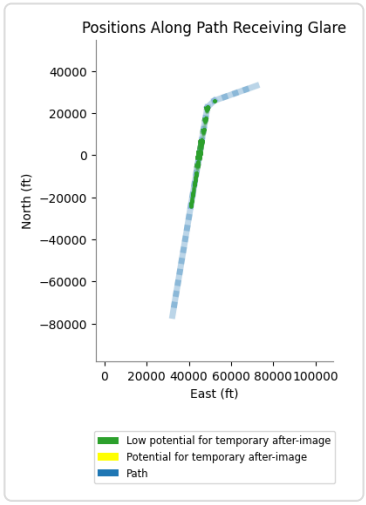
Yellow glare: none

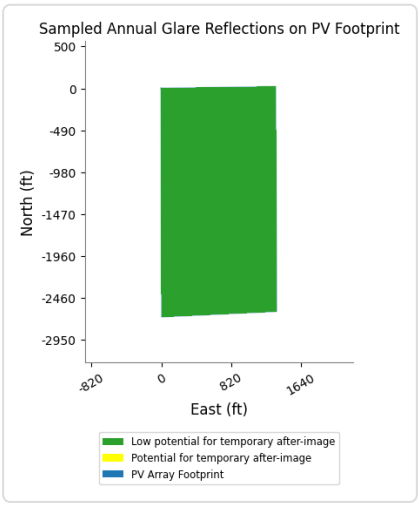
Green glare: 3,359 min.







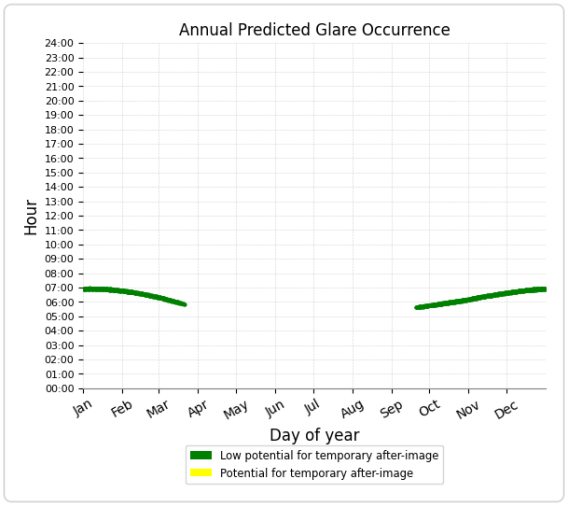


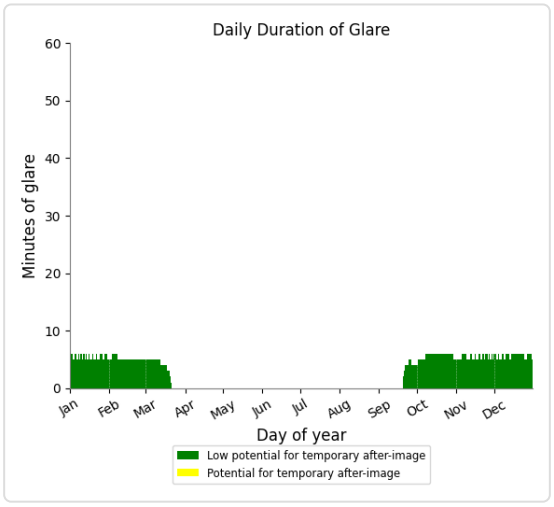


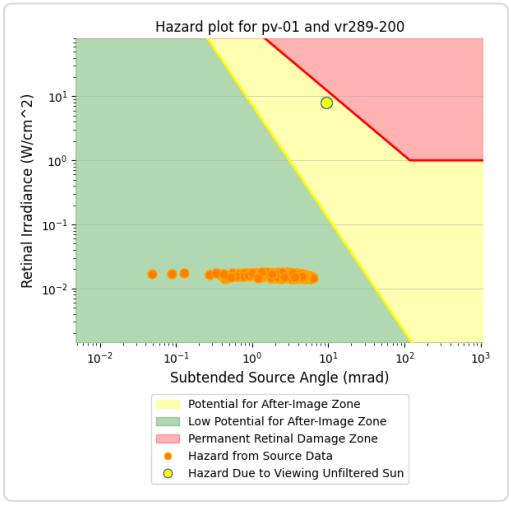
PV 01 and Route: VR289 - 200 ft AGL

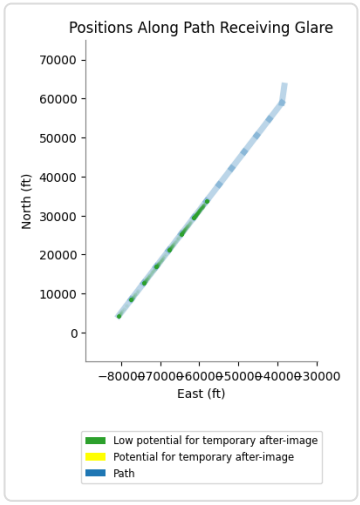
Yellow glare: none

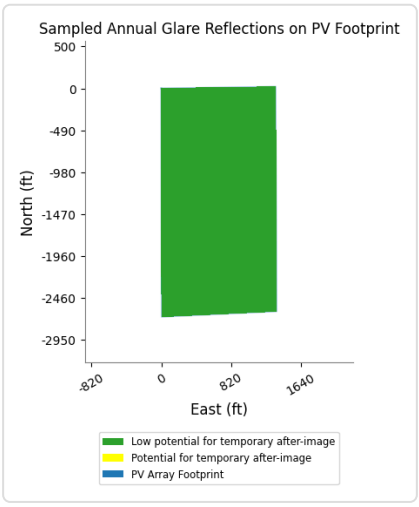
Green glare: 966 min.







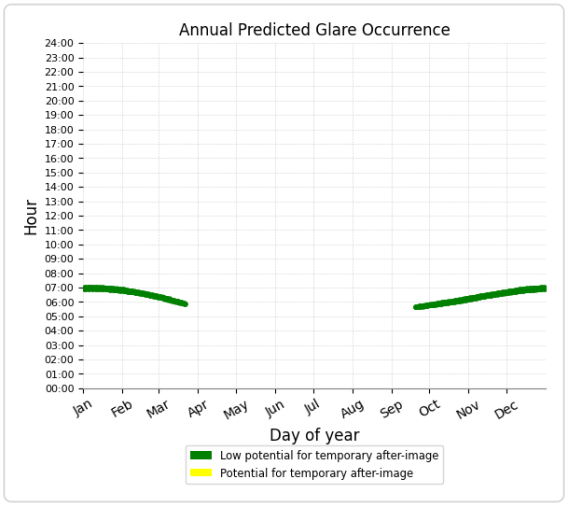


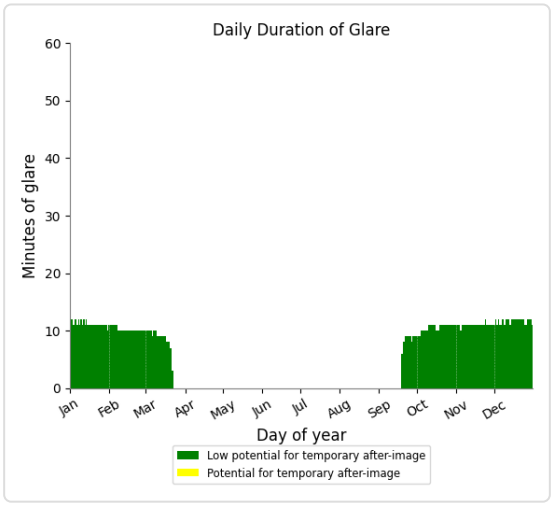


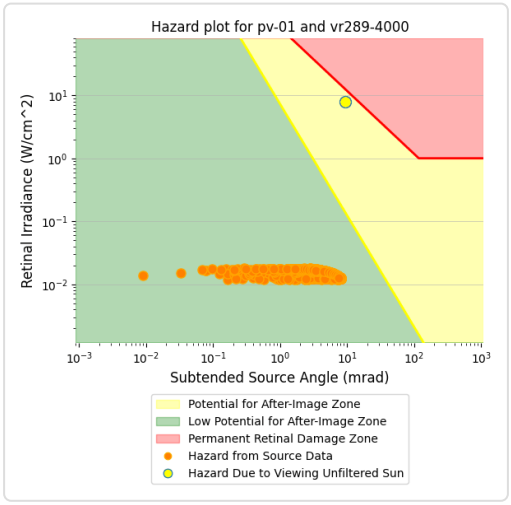
PV 01 and Route: VR289 - 4000 ft AGL

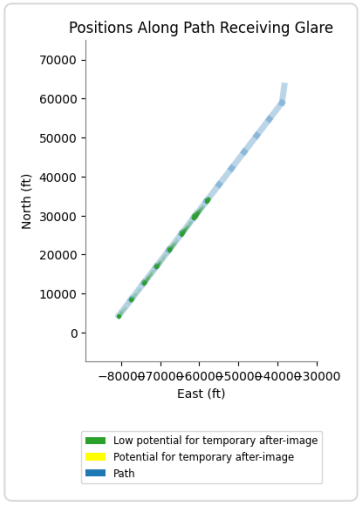
Yellow glare: none

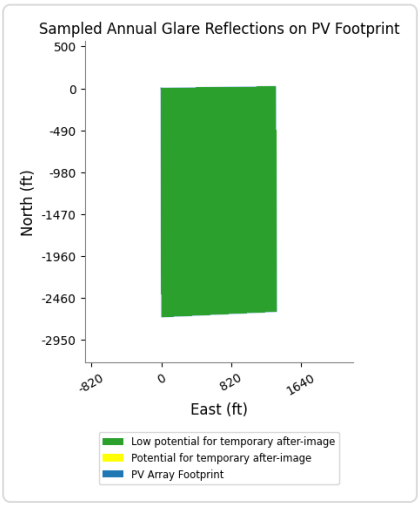
Green glare: 1,957 min.







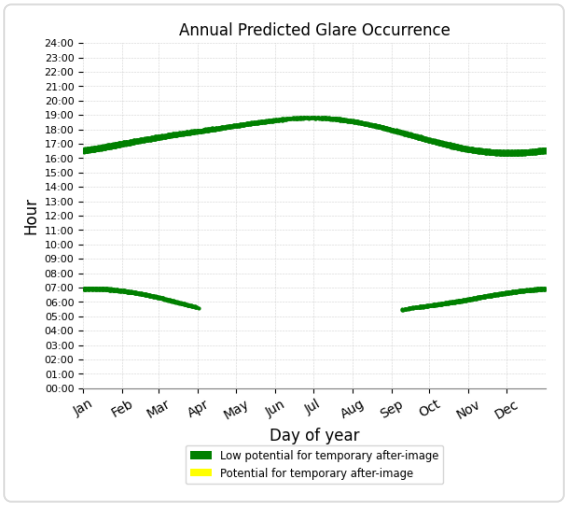


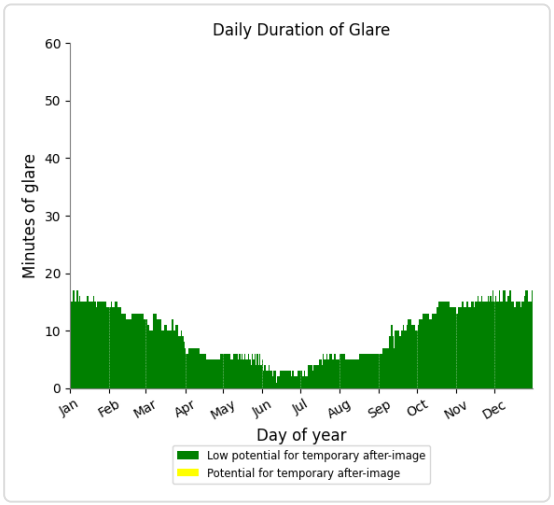


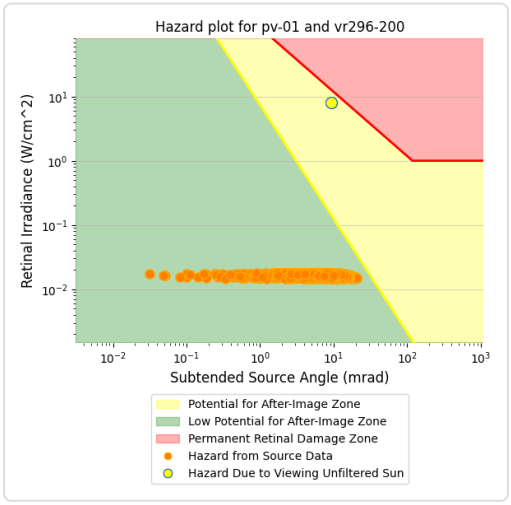
PV 01 and Route: VR296 - 200 ft AGL

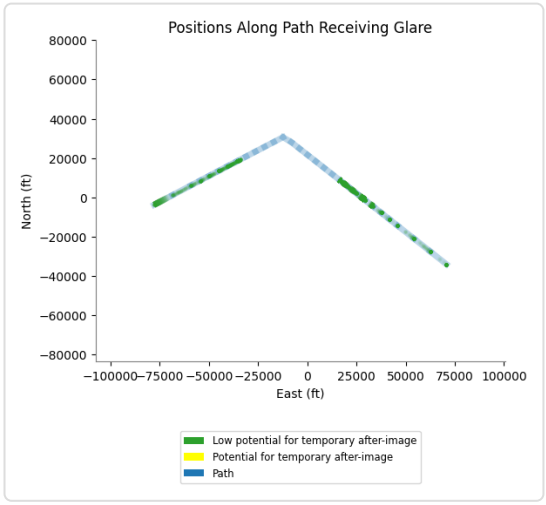
Yellow glare: none

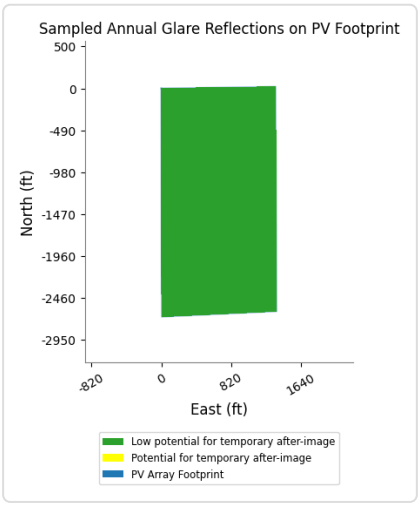
Green glare: 3,551 min.







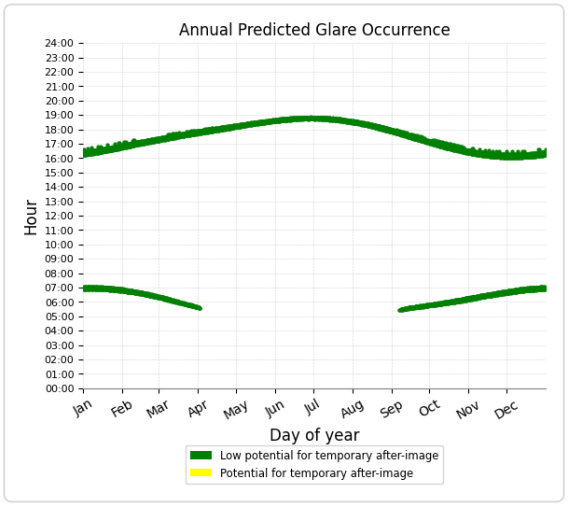


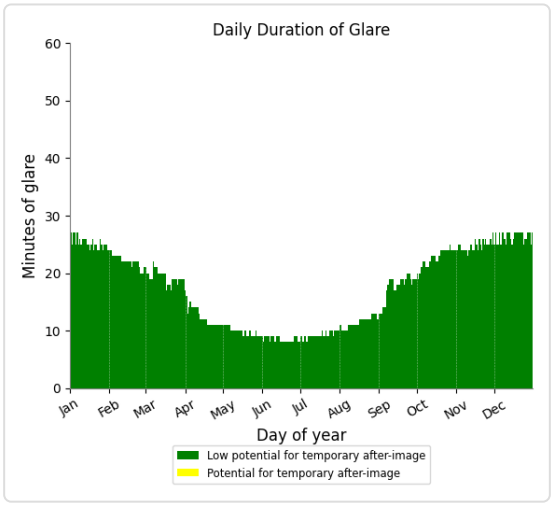


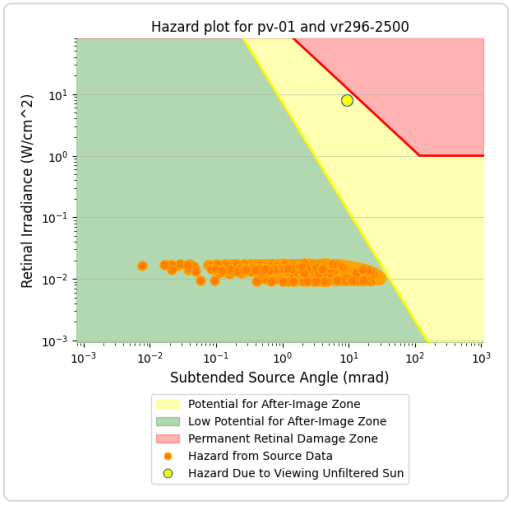
PV 01 and Route: VR296 - 2500 ft AGL

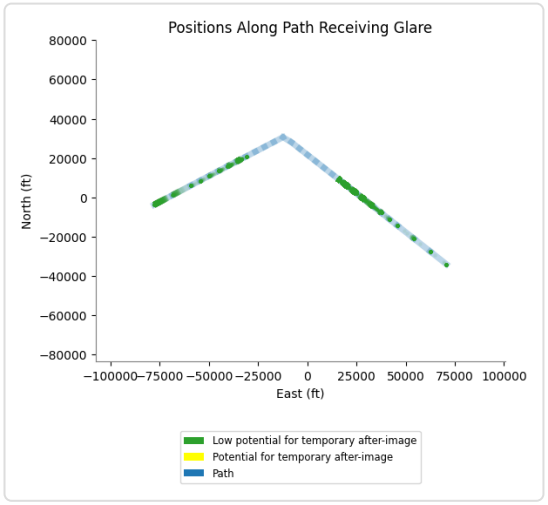
Yellow glare: none

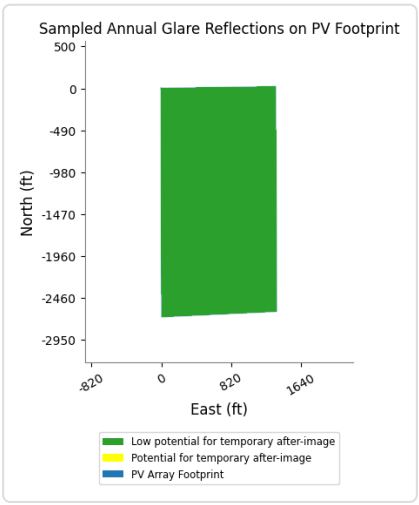
Green glare: 6,393 min.











PV 01 and Route: I-10 Westbound

No glare found

PV 01 and Route: VR1266 - 1500 ft AGL

No glare found

PV 01 and Route: VR1266 - 200 ft AGL

No glare found

PV 01 and OP 1

No glare found

PV 01 and OP 2

No glare found

PV 01 and OP 3

No glare found

PV 01 and OP 4

No glare found

PV 01 and OP 5

No glare found

PV 01 and OP 6

No glare found

PV 01 and OP 7

No glare found

PV 01 and OP 8

No glare found

PV 01 and OP 9

No glare found

PV 01 and OP 10

No glare found

PV 01 and OP 11

No glare found

PV 01 and OP 12

No glare found

PV: PV 02 low potential for temporary after-image

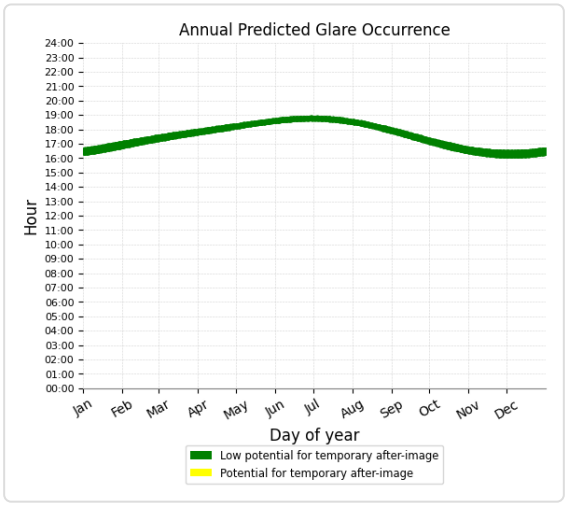
Receptor results ordered by category of glare

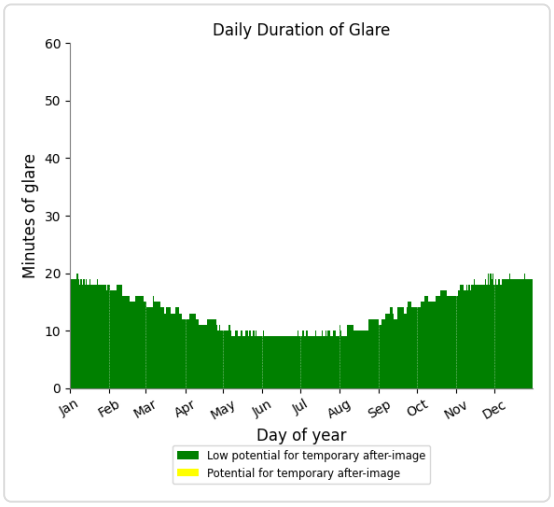
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
VR1265 - 1500 ft AGL	5,024	83.7	0	0.0
VR1265 - 200 ft AGL	3,269	54.5	0	0.0
VR1267 and VR1268 - 1500 ft AGL	4,980	83.0	0	0.0
VR1267 and VR1268 - 200 ft AGL	3,913	65.2	0	0.0
VR289 - 200 ft AGL	794	13.2	0	0.0
VR289 - 4000 ft AGL	1,754	29.2	0	0.0
VR296 - 200 ft AGL	3,589	59.8	0	0.0
VR296 - 2500 ft AGL	6,082	101.4	0	0.0
I-10 Eastbound	0	0.0	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

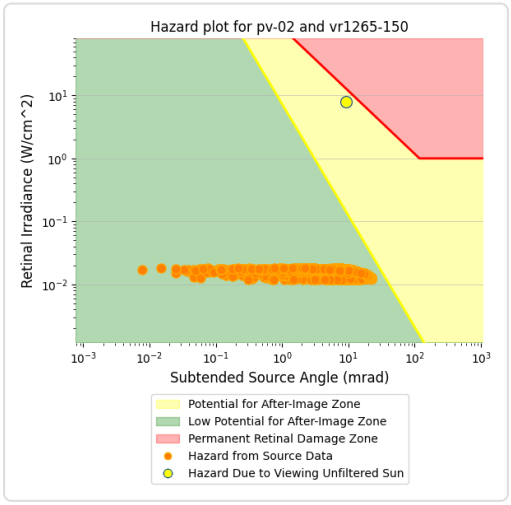
PV 02 and Route: VR1265 - 1500 ft AGL

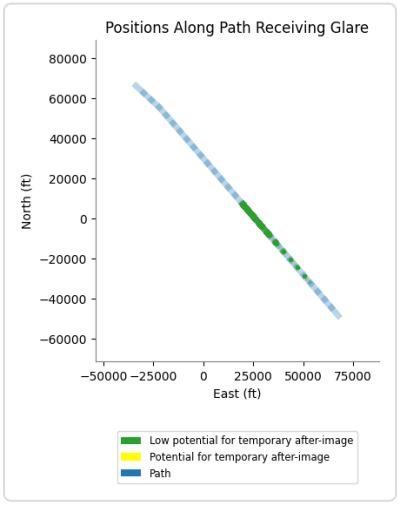
Yellow glare: none

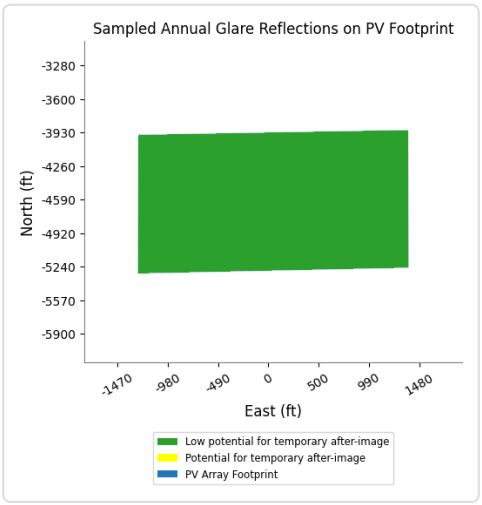
Green glare: 5,024 min.







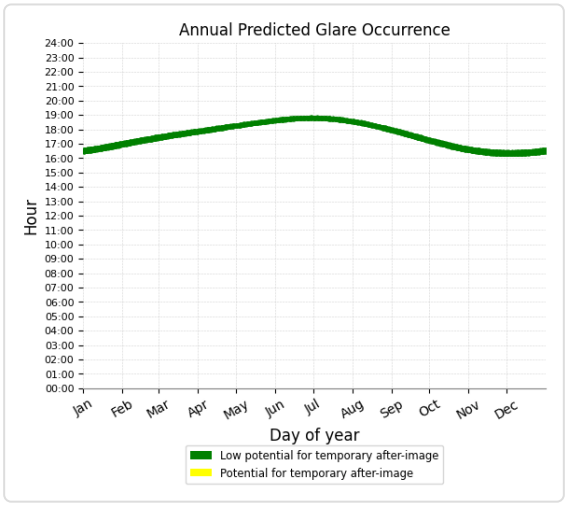


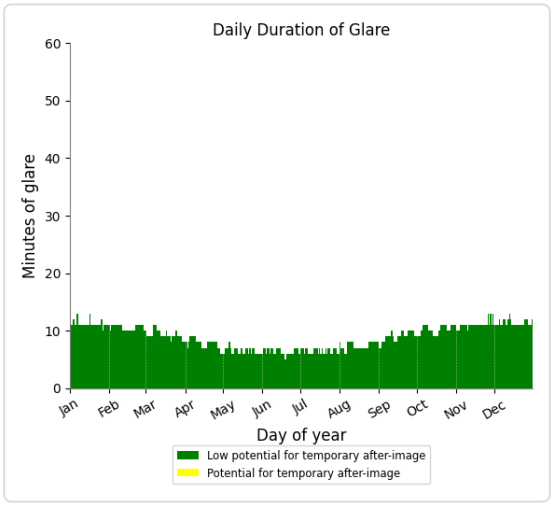


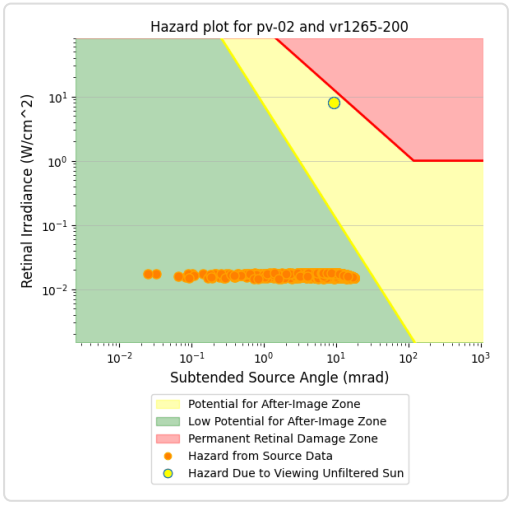
PV 02 and Route: VR1265 - 200 ft AGL

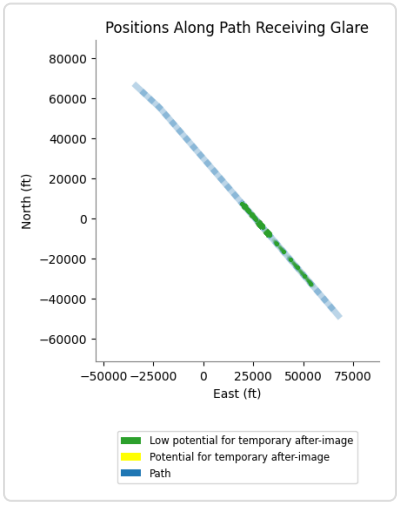
Yellow glare: none

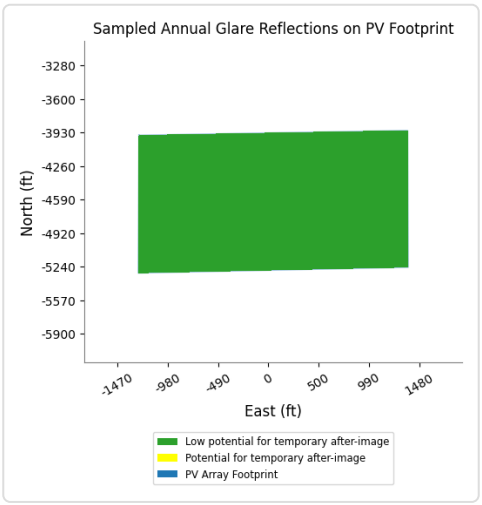
Green glare: 3,269 min.







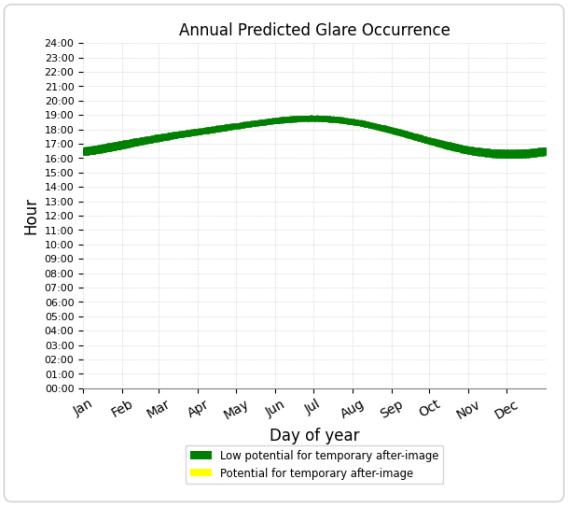


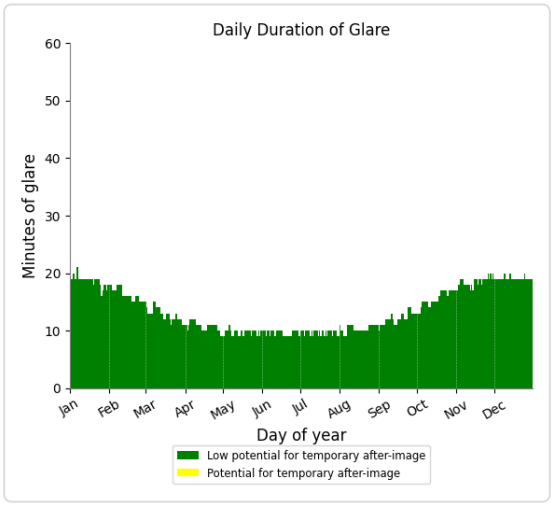


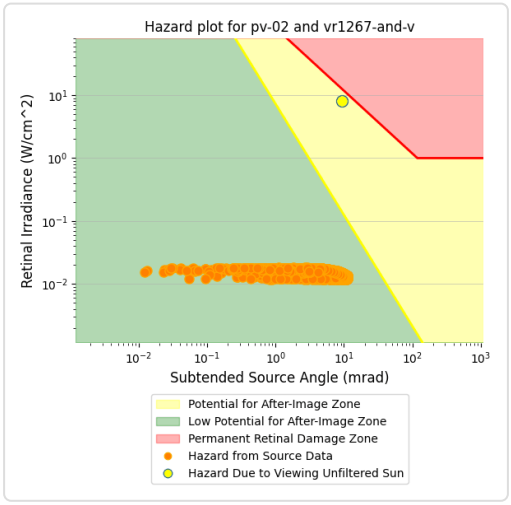
PV 02 and Route: VR1267 and VR1268 - 1500 ft AGL

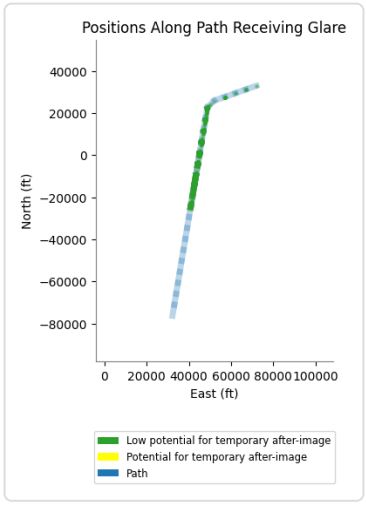
Yellow glare: none

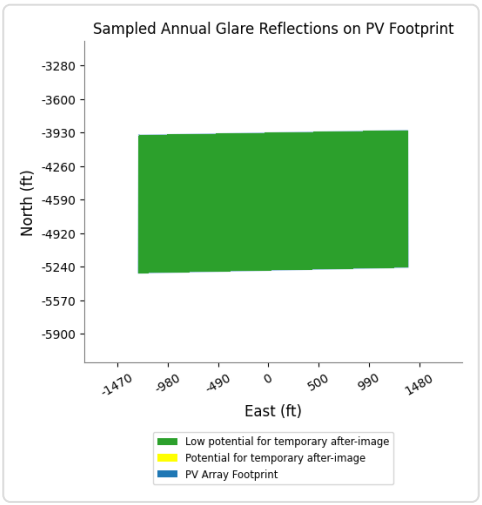
Green glare: 4,980 min.







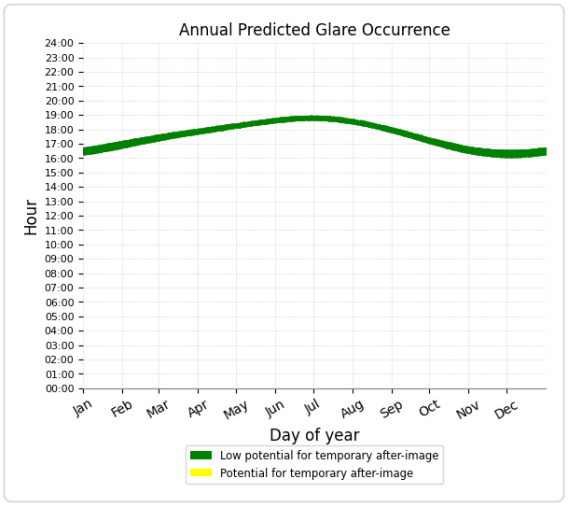


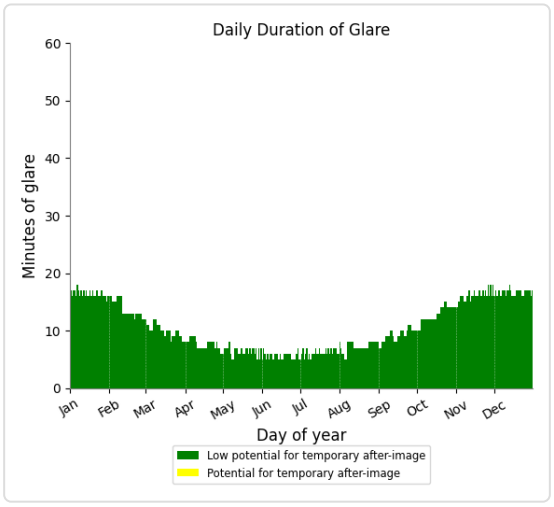


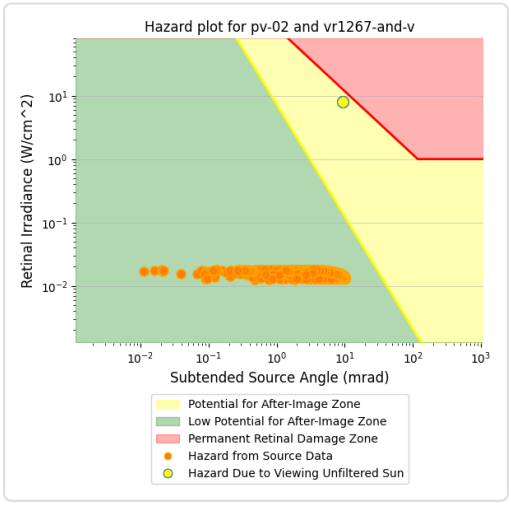
PV 02 and Route: VR1267 and VR1268 - 200 ft AGL

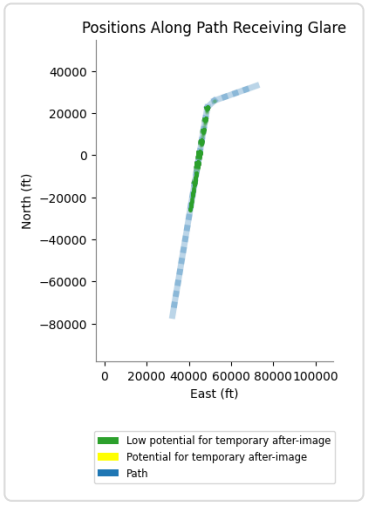
Yellow glare: none

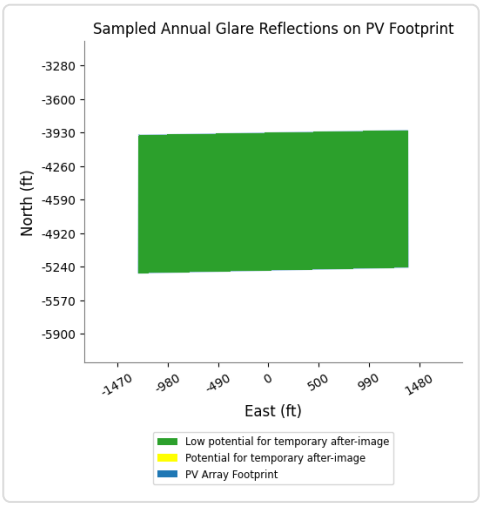
Green glare: 3,913 min.







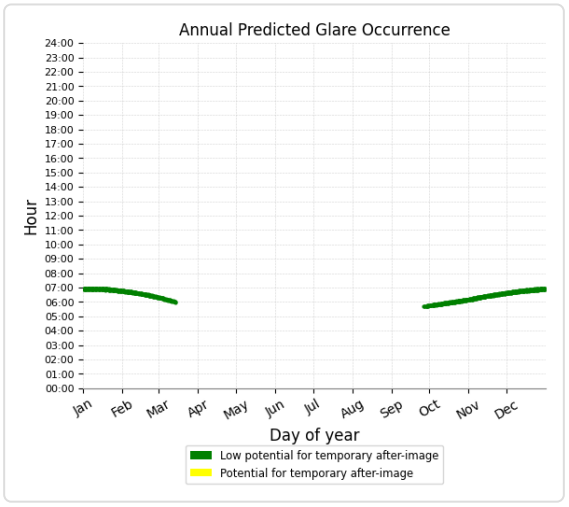


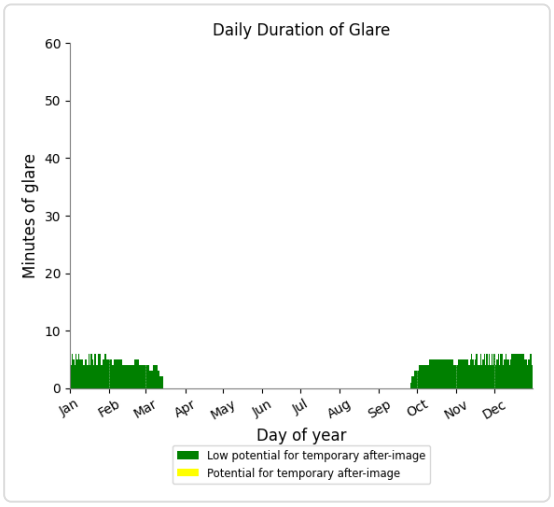


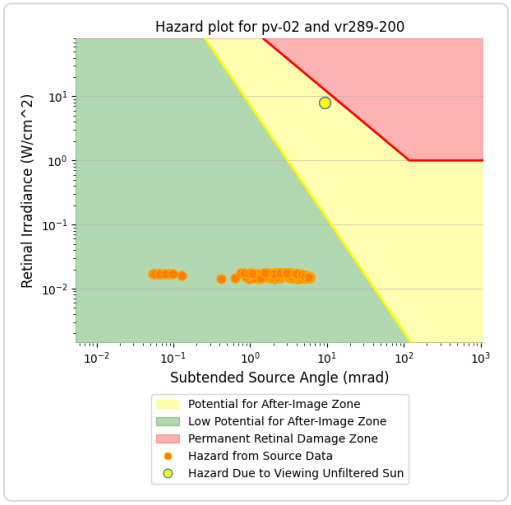
PV 02 and Route: VR289 - 200 ft AGL

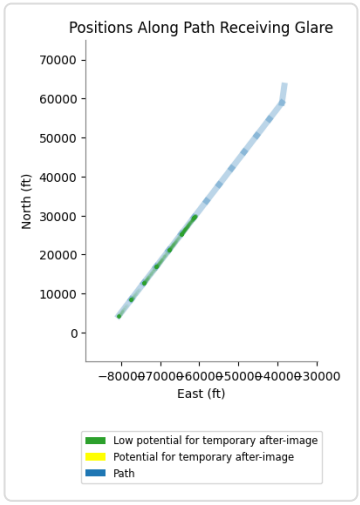
Yellow glare: none

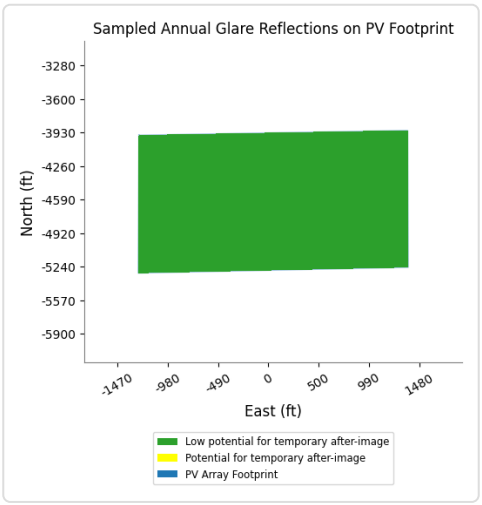
Green glare: 794 min.







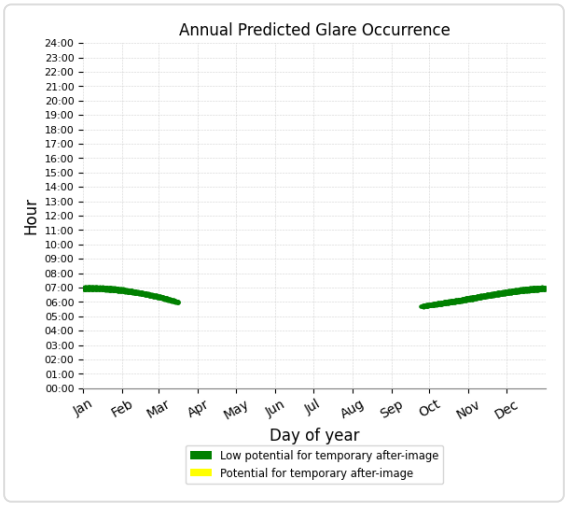


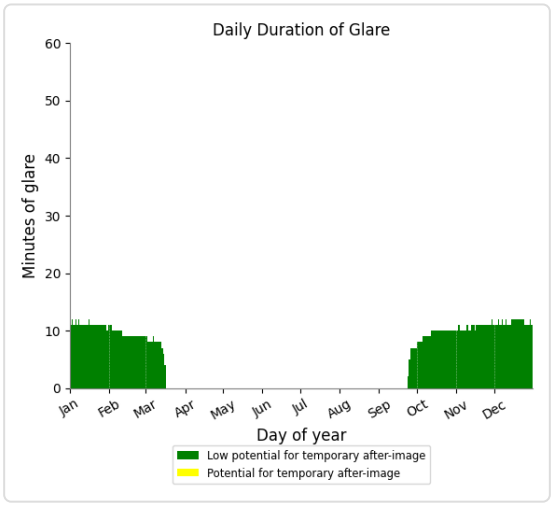


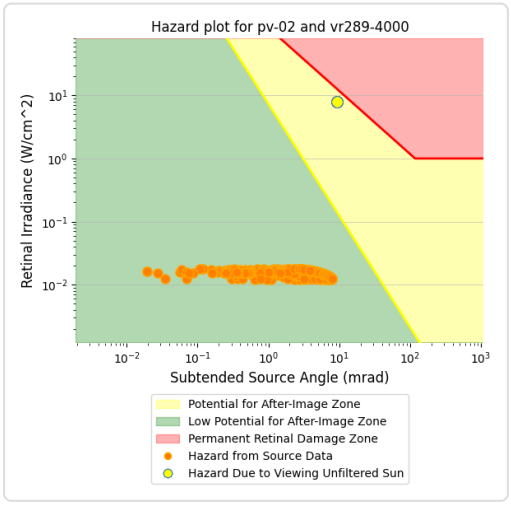
PV 02 and Route: VR289 - 4000 ft AGL

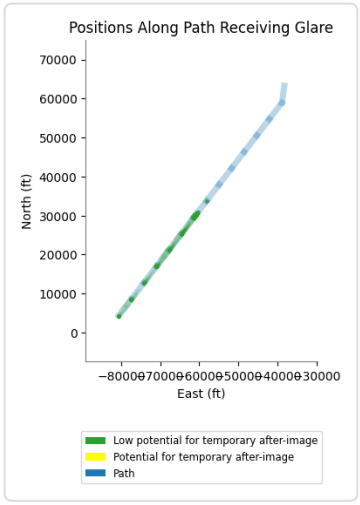
Yellow glare: none

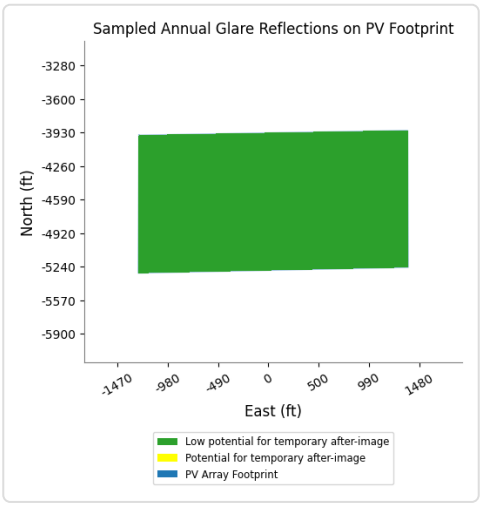
Green glare: 1,754 min.







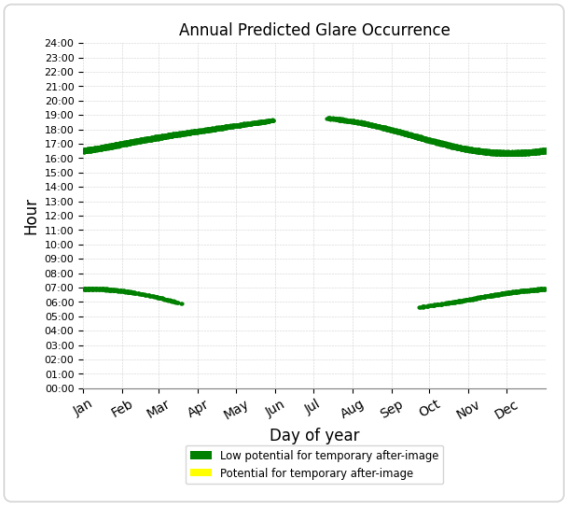


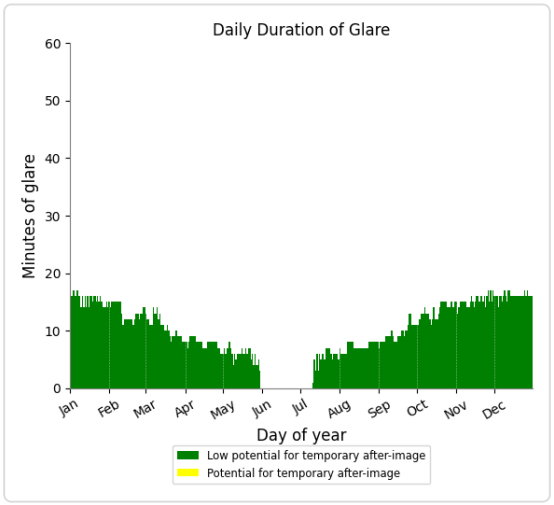


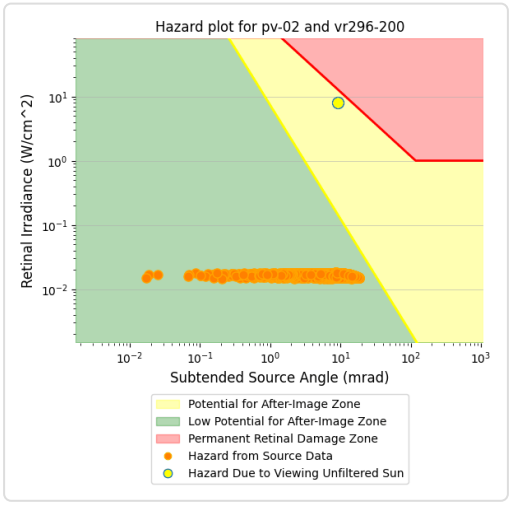
PV 02 and Route: VR296 - 200 ft AGL

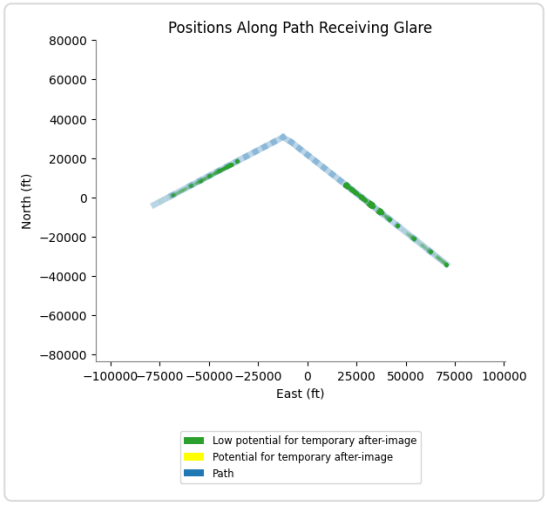
Yellow glare: none

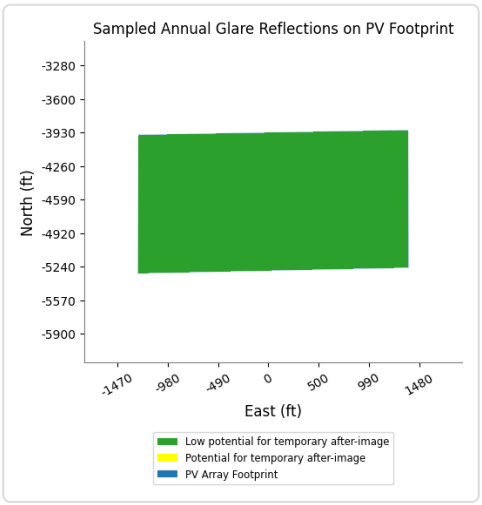
Green glare: 3,589 min.







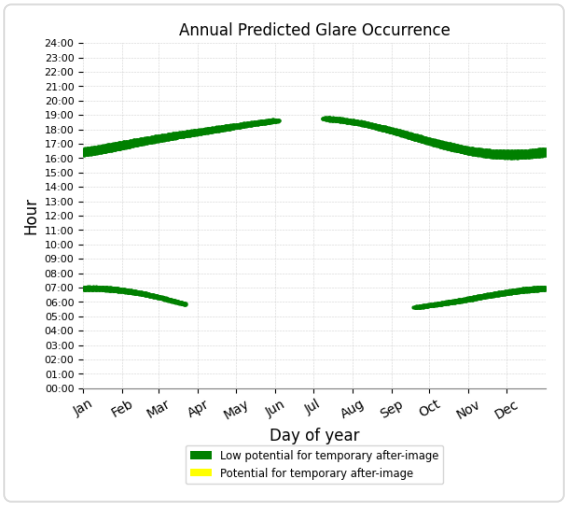


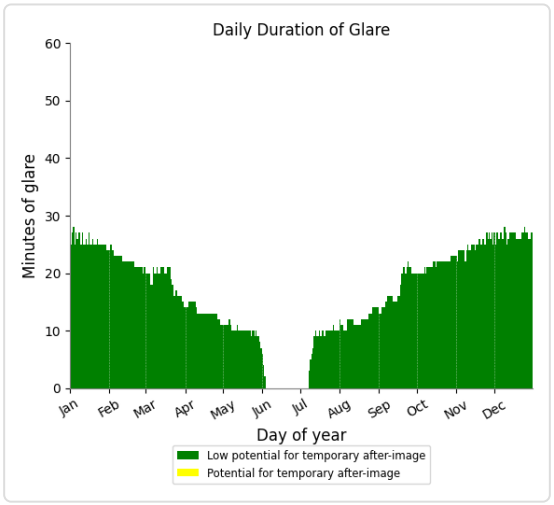


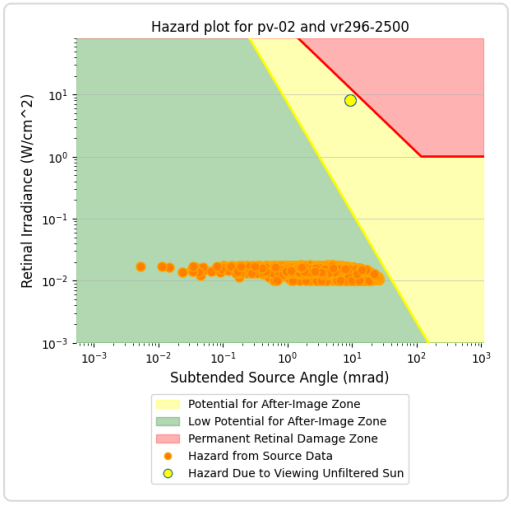
PV 02 and Route: VR296 - 2500 ft AGL

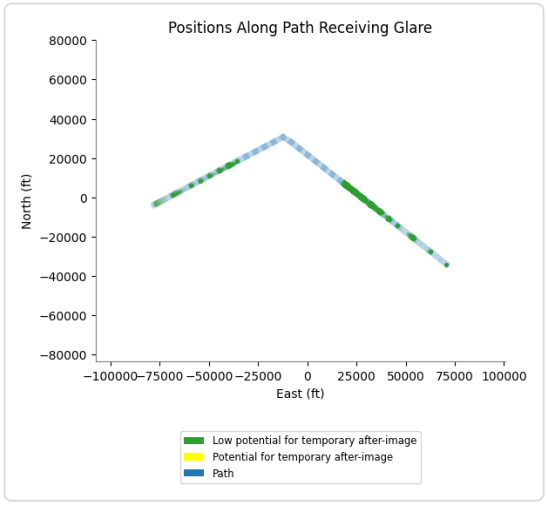
Yellow glare: none

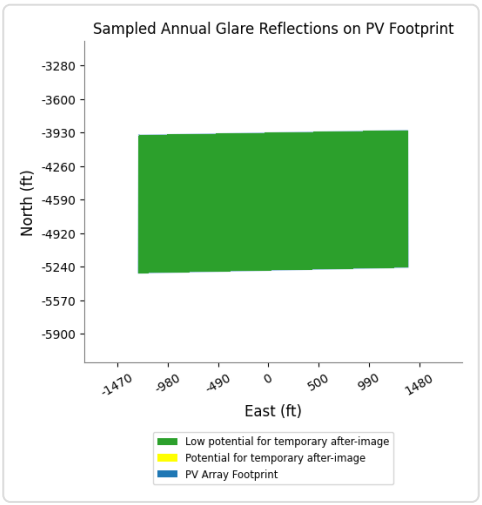
Green glare: 6,082 min.











PV 02 and Route: I-10 Eastbound

No glare found

PV 02 and Route: I-10 Westbound

No glare found

PV 02 and Route: VR1266 - 1500 ft AGL

No glare found

PV 02 and Route: VR1266 - 200 ft AGL

No glare found

PV 02 and OP 1

No glare found

PV 02 and OP 2

No glare found

PV 02 and OP 3

No glare found

PV 02 and OP 4

No glare found

PV 02 and OP 5

No glare found

PV 02 and OP 6

No glare found

PV 02 and OP 7

No glare found

PV 02 and OP 8

No glare found

PV 02 and OP 9

No glare found

PV 02 and OP 10

No glare found

PV 02 and OP 11

No glare found

PV 02 and OP 12

No glare found

PV: PV 03 low potential for temporary after-image

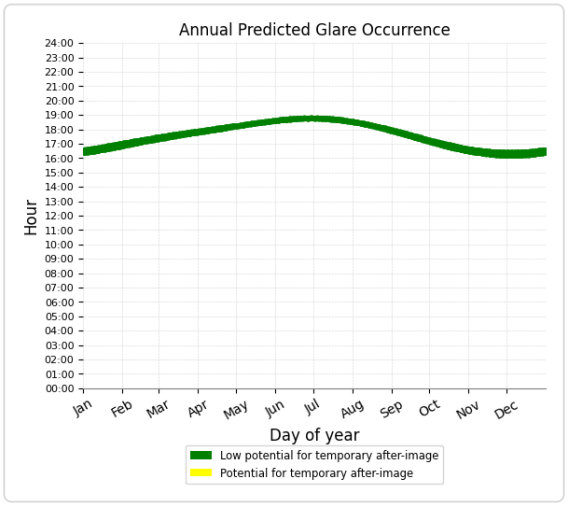
Receptor results ordered by category of glare

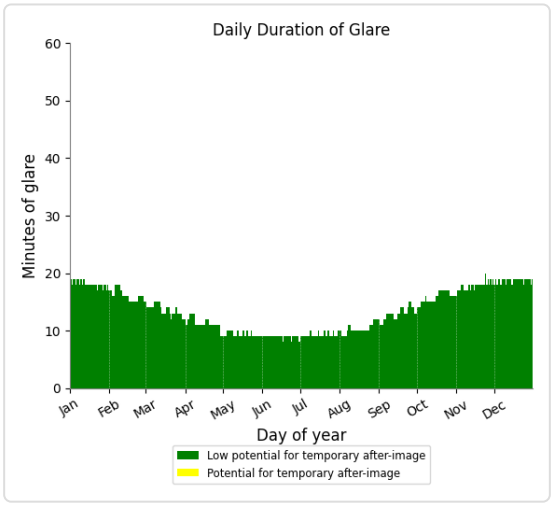
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
VR1265 - 1500 ft AGL	4,947	82.5	0	0.0
VR1265 - 200 ft AGL	3,232	53.9	0	0.0
VR1267 and VR1268 - 1500 ft AGL	4,948	82.5	0	0.0
VR1267 and VR1268 - 200 ft AGL	3,899	65.0	0	0.0
VR289 - 200 ft AGL	828	13.8	0	0.0
VR289 - 4000 ft AGL	1,732	28.9	0	0.0
VR296 - 200 ft AGL	3,525	58.8	0	0.0
VR296 - 2500 ft AGL	6,123	102.0	0	0.0
I-10 Eastbound	0	0.0	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

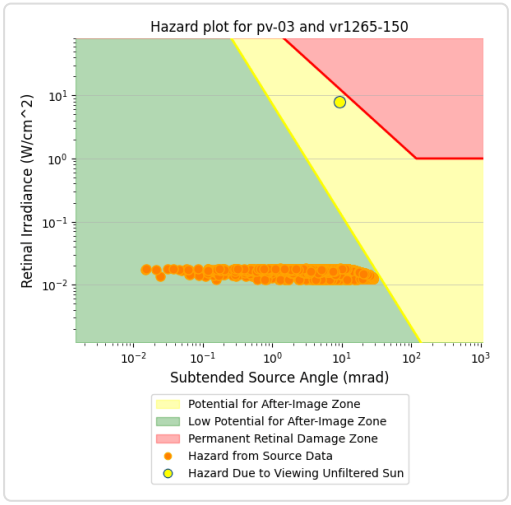
PV 03 and Route: VR1265 - 1500 ft AGL

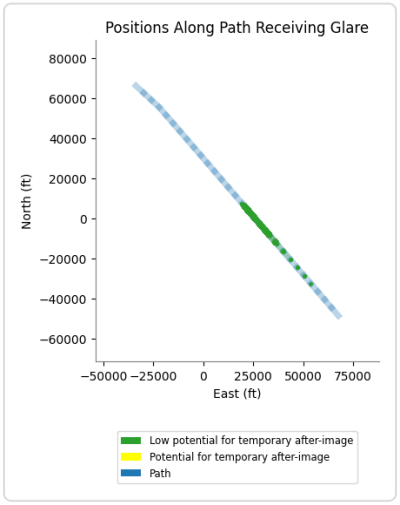
Yellow glare: none

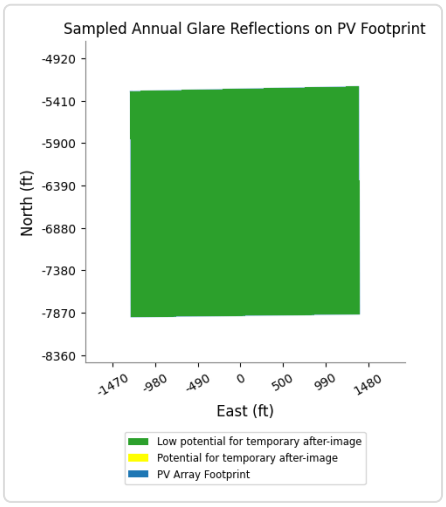
Green glare: 4,947 min.







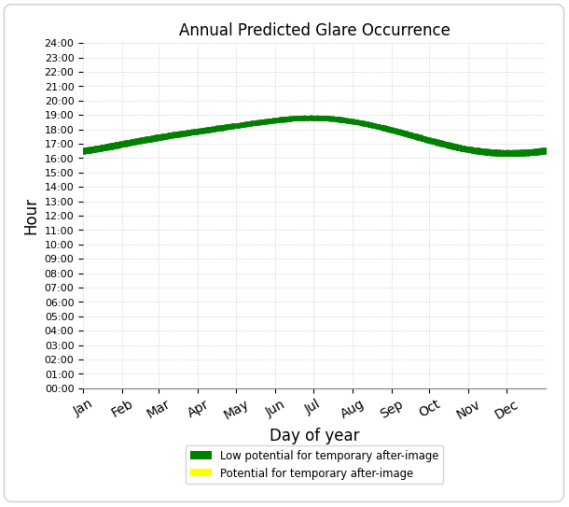


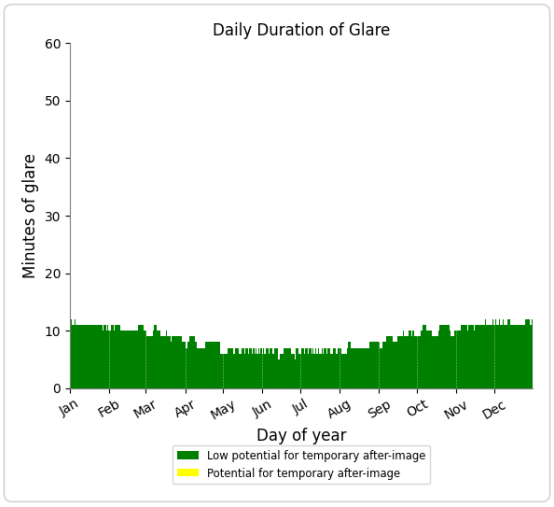


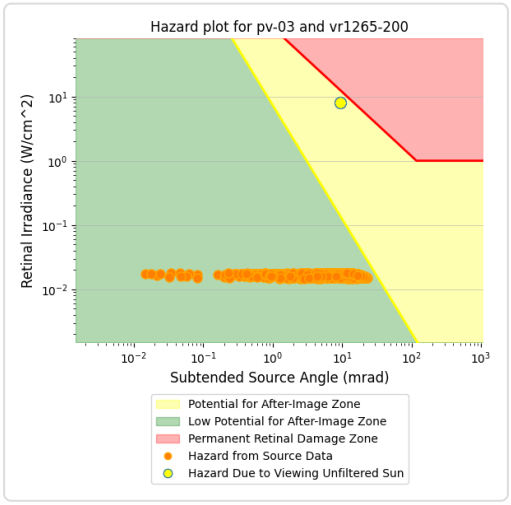
PV 03 and Route: VR1265 - 200 ft AGL

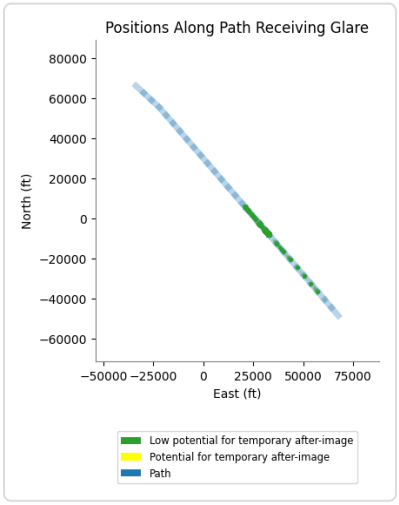
Yellow glare: none

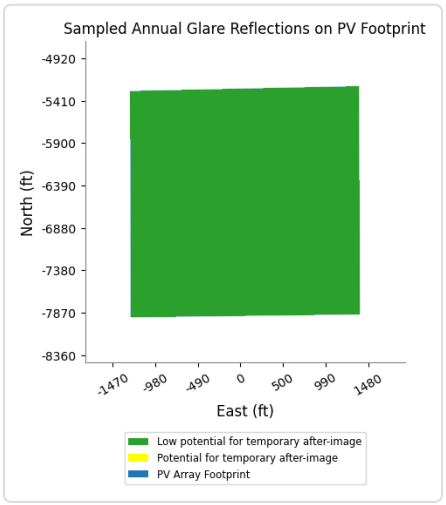
Green glare: 3,232 min.







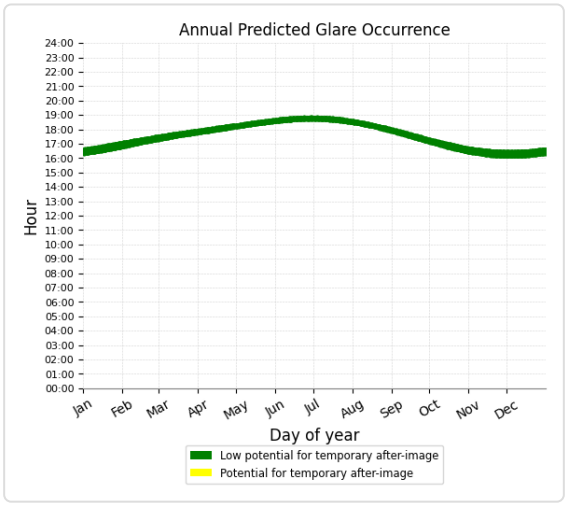


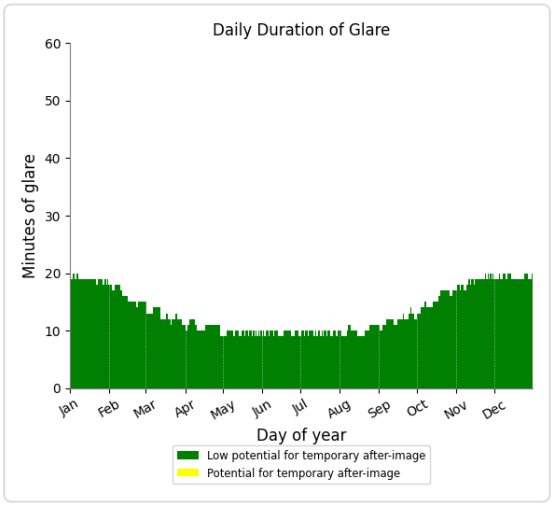


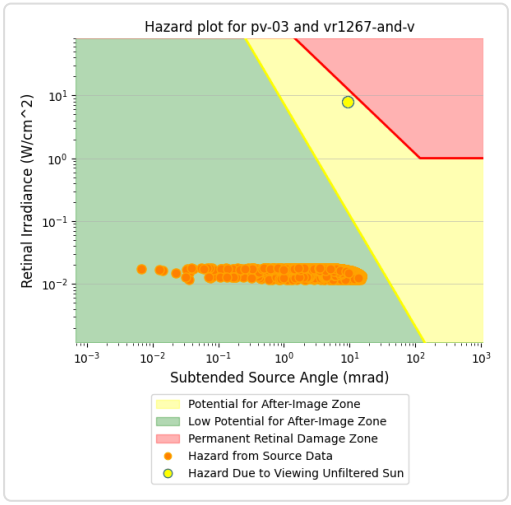
PV 03 and Route: VR1267 and VR1268 - 1500 ft AGL

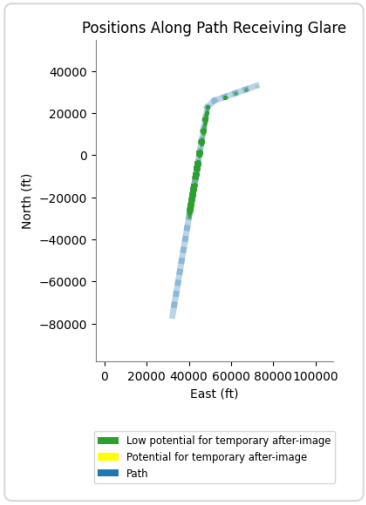
Yellow glare: none

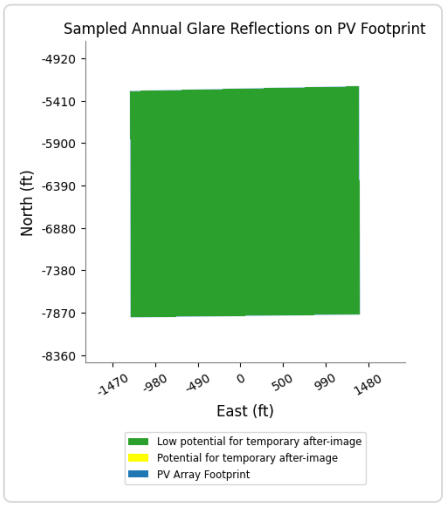
Green glare: 4,948 min.







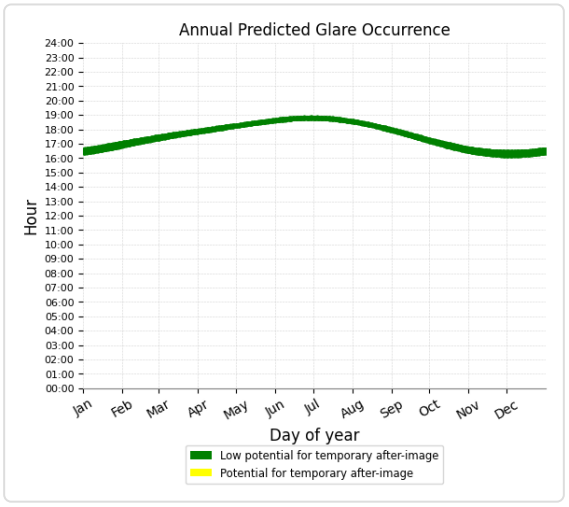


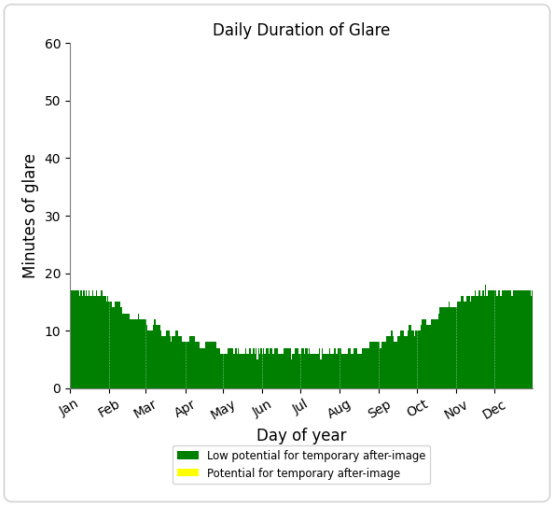


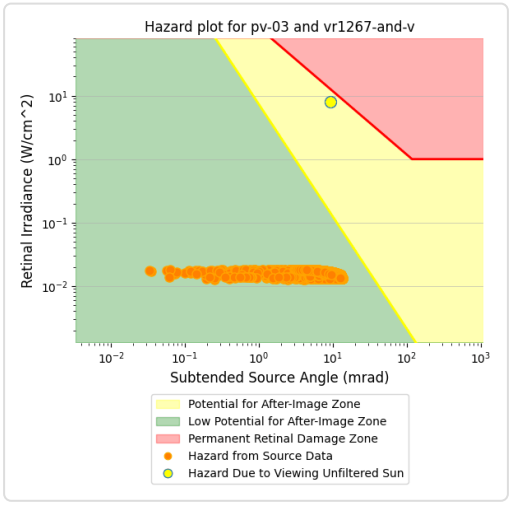
PV 03 and Route: VR1267 and VR1268 - 200 ft AGL

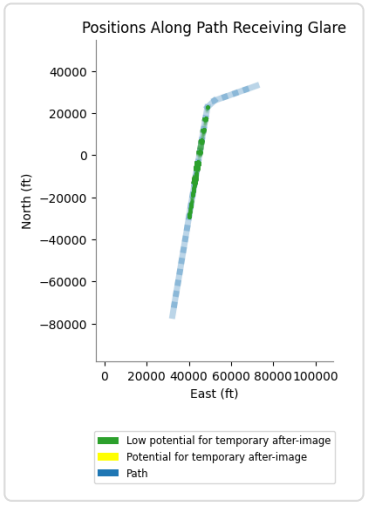
Yellow glare: none

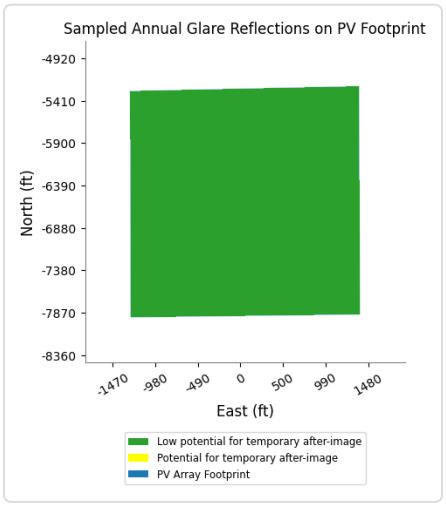
Green glare: 3,899 min.







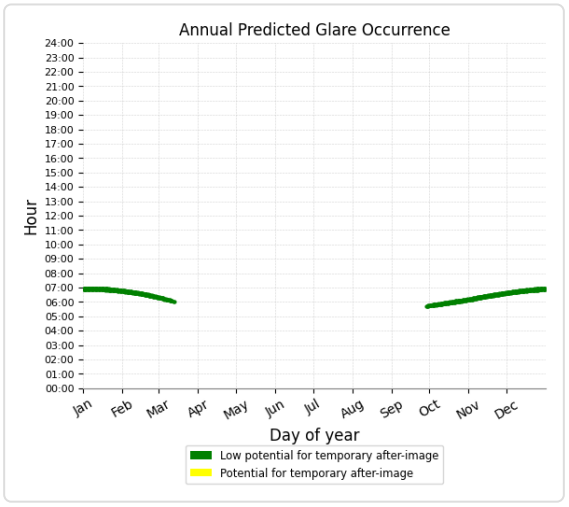


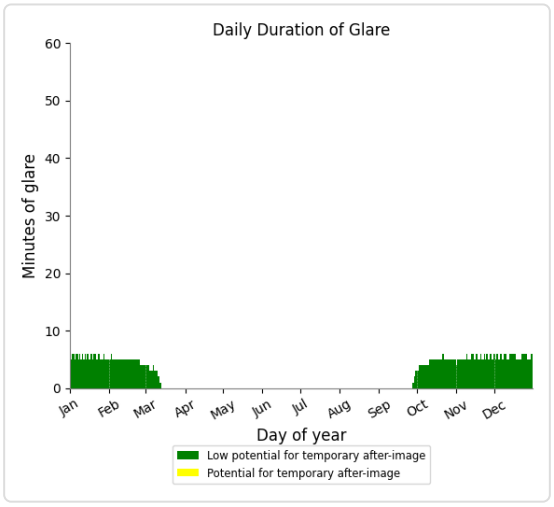


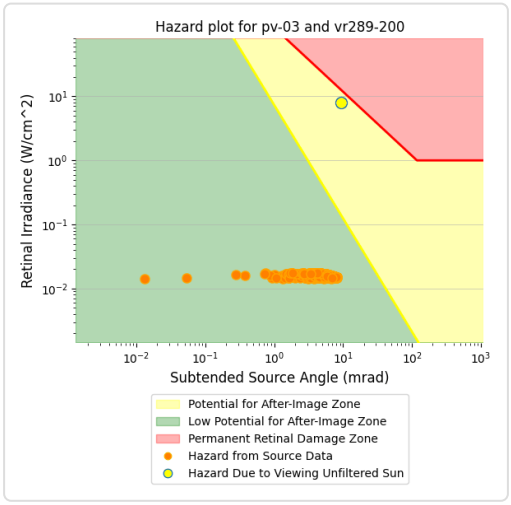
PV 03 and Route: VR289 - 200 ft AGL

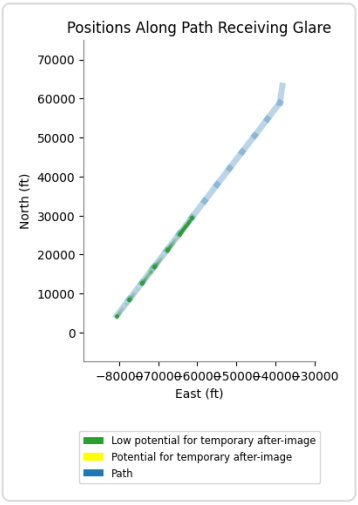
Yellow glare: none

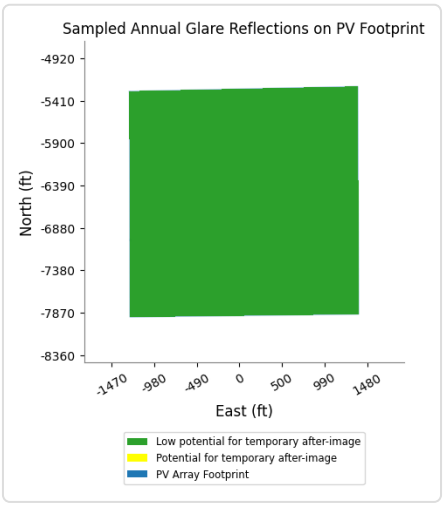
Green glare: 828 min.







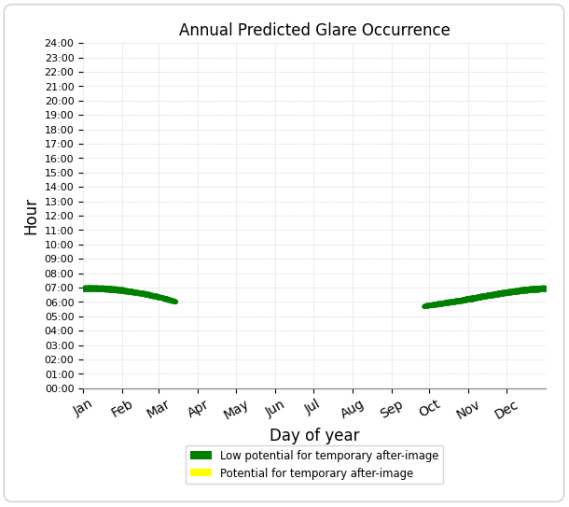


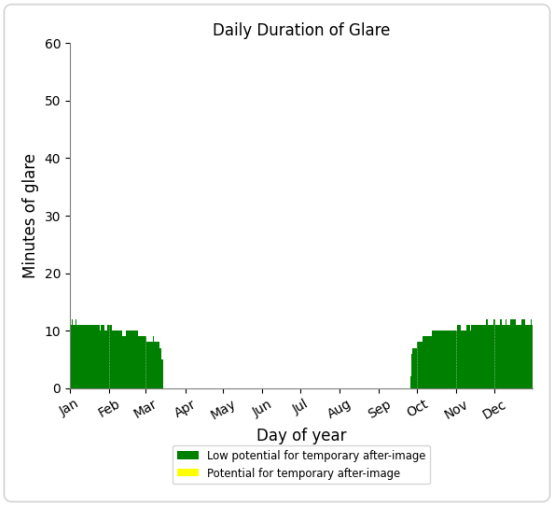


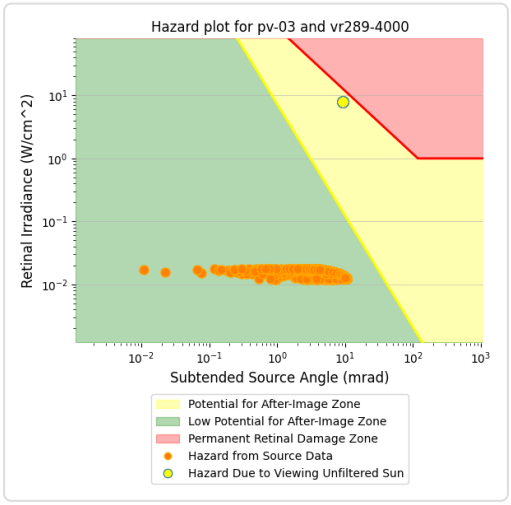
PV 03 and Route: VR289 - 4000 ft AGL

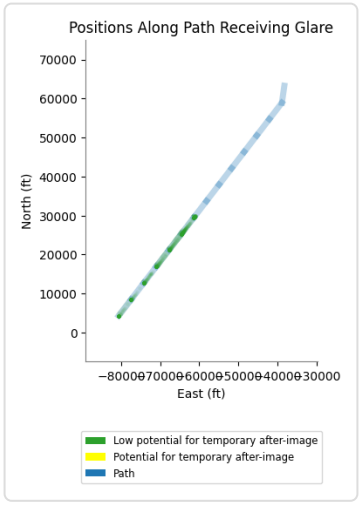
Yellow glare: none

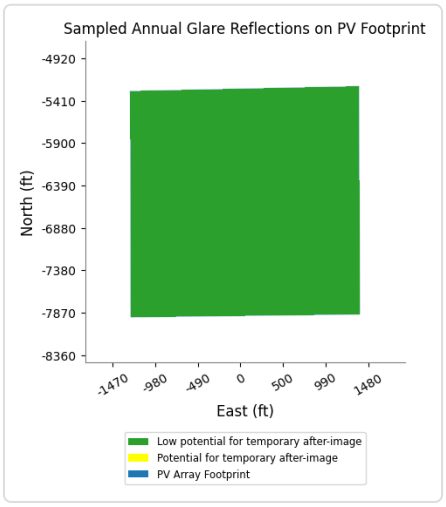
Green glare: 1,732 min.







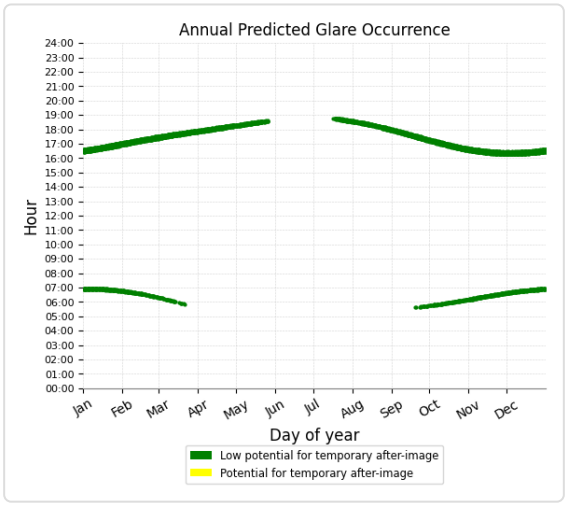


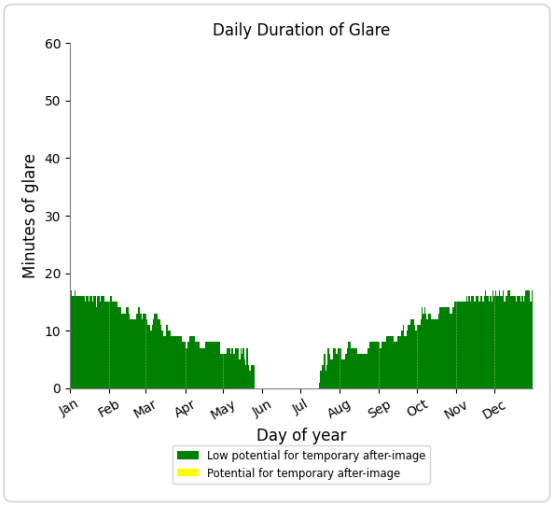


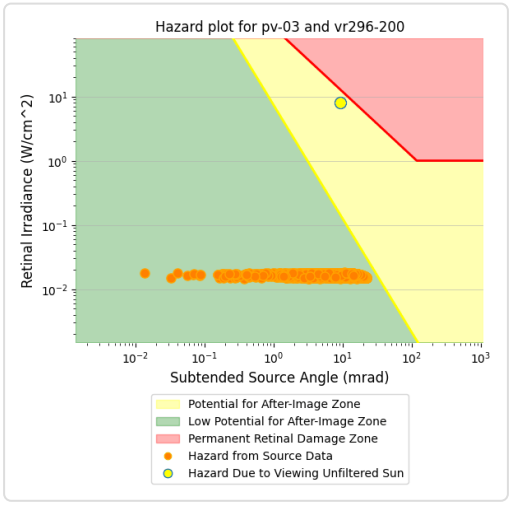
PV 03 and Route: VR296 - 200 ft AGL

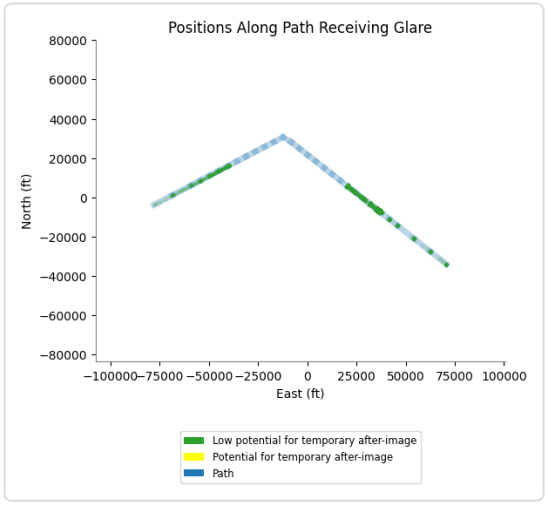
Yellow glare: none

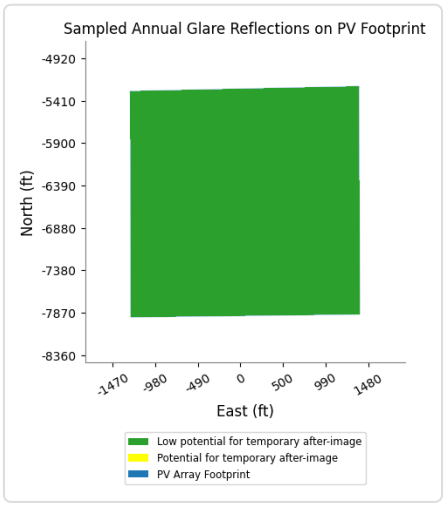
Green glare: 3,525 min.







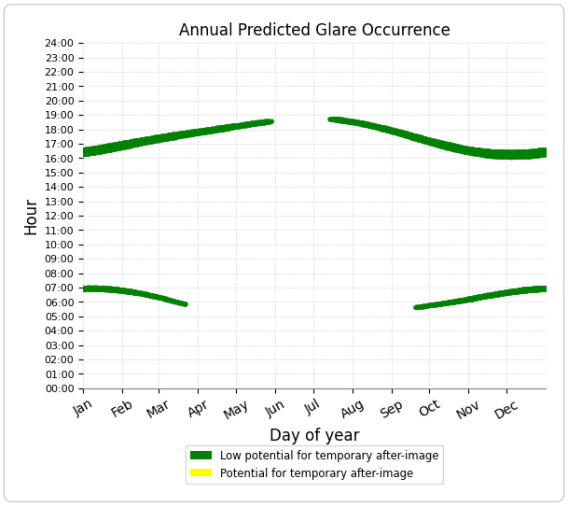


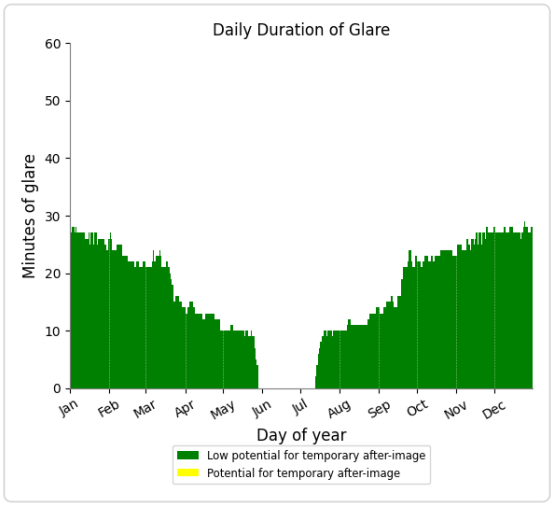


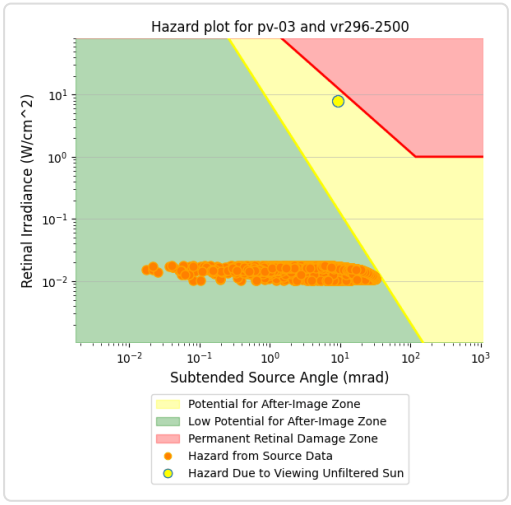
PV 03 and Route: VR296 - 2500 ft AGL

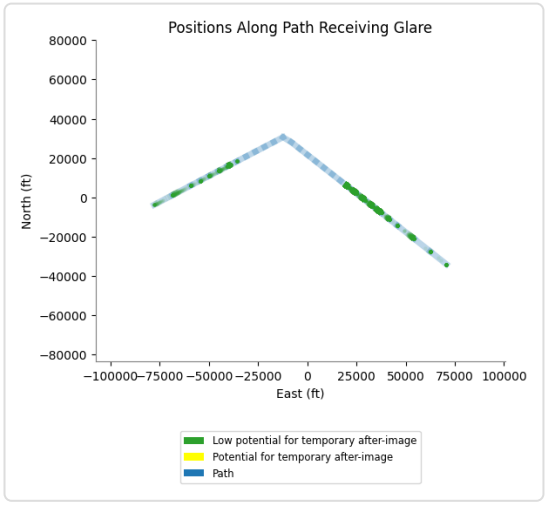
Yellow glare: none

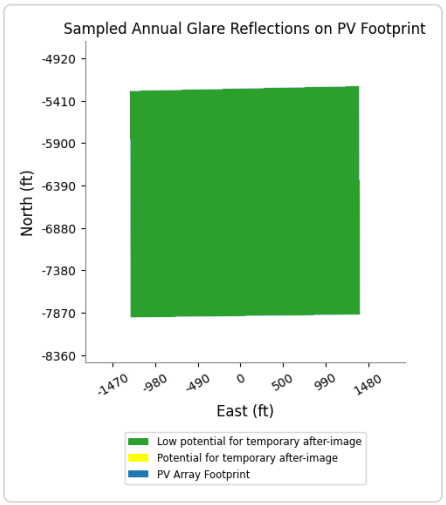
Green glare: 6,123 min.











PV 03 and Route: I-10 Eastbound

No glare found

PV 03 and Route: I-10 Westbound

No glare found

PV 03 and Route: VR1266 - 1500 ft AGL

No glare found

PV 03 and Route: VR1266 - 200 ft AGL

No glare found

PV 03 and OP 1

No glare found

PV 03 and OP 2

No glare found

PV 03 and OP 3

No glare found

PV 03 and OP 4

No glare found

PV 03 and OP 5

No glare found

PV 03 and OP 6

No glare found

PV 03 and OP 7

No glare found

PV 03 and OP 8

No glare found

PV 03 and OP 9

No glare found

PV 03 and OP 10

No glare found

PV 03 and OP 11

No glare found

PV 03 and OP 12

No glare found

PV: PV 04 low potential for temporary after-image

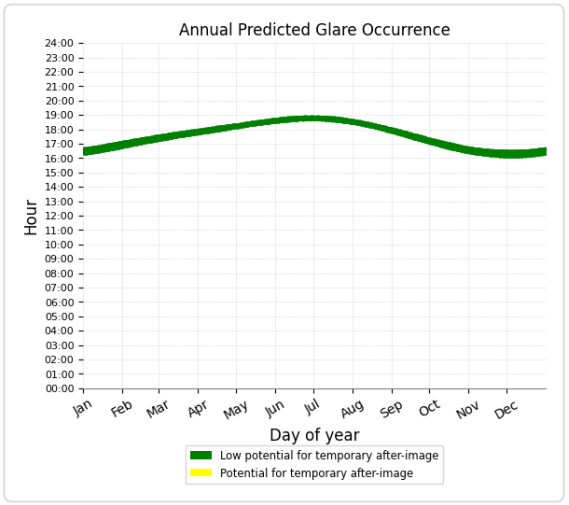
Receptor results ordered by category of glare

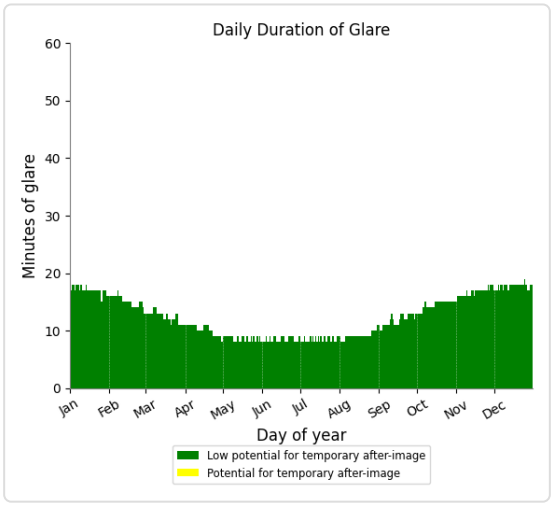
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
VR1265 - 1500 ft AGL	4,576	76.3	0	0.0
VR1265 - 200 ft AGL	2,730	45.5	0	0.0
VR1267 and VR1268 - 1500 ft AGL	4,650	77.5	0	0.0
VR1267 and VR1268 - 200 ft AGL	3,486	58.1	0	0.0
VR289 - 200 ft AGL	876	14.6	0	0.0
VR289 - 4000 ft AGL	1,807	30.1	0	0.0
VR296 - 200 ft AGL	3,293	54.9	0	0.0
VR296 - 2500 ft AGL	5,854	97.6	0	0.0
I-10 Eastbound	0	0.0	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

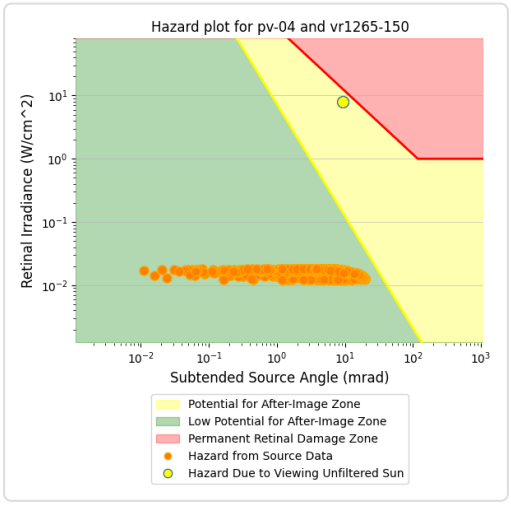
PV 04 and Route: VR1265 - 1500 ft AGL

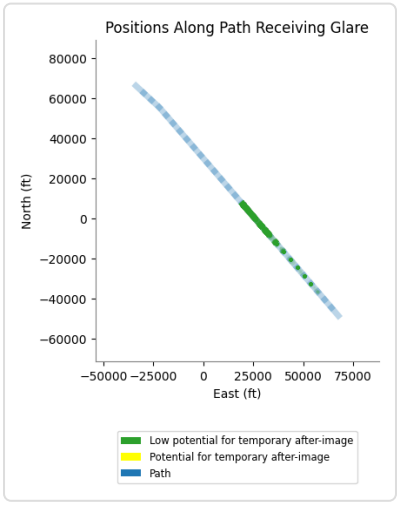
Yellow glare: none

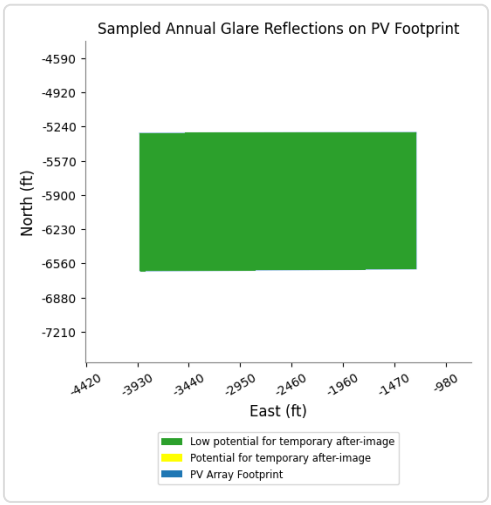
Green glare: 4,576 min.







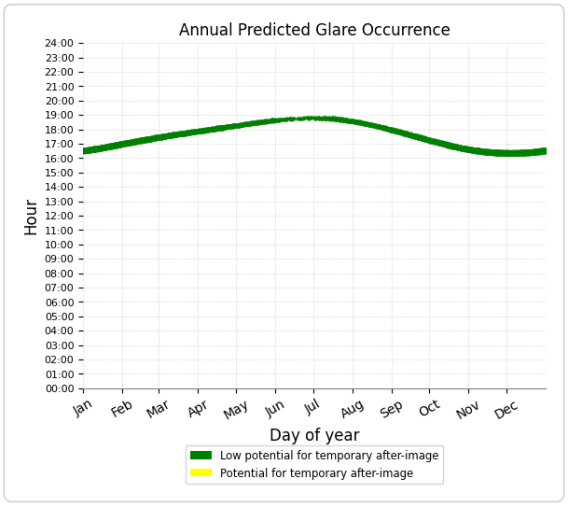


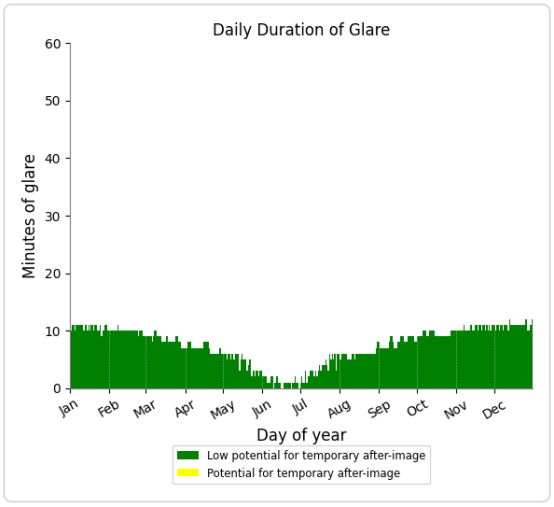


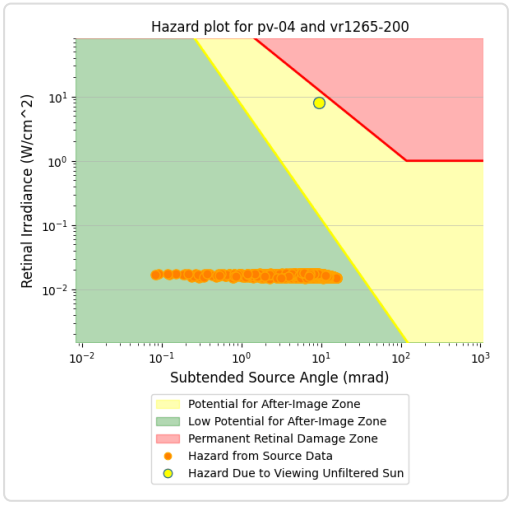
PV 04 and Route: VR1265 - 200 ft AGL

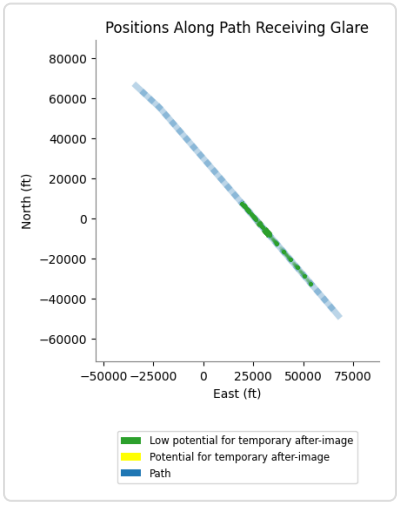
Yellow glare: none

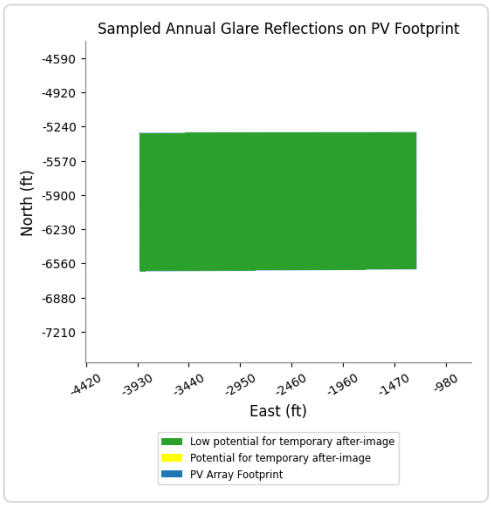
Green glare: 2,730 min.







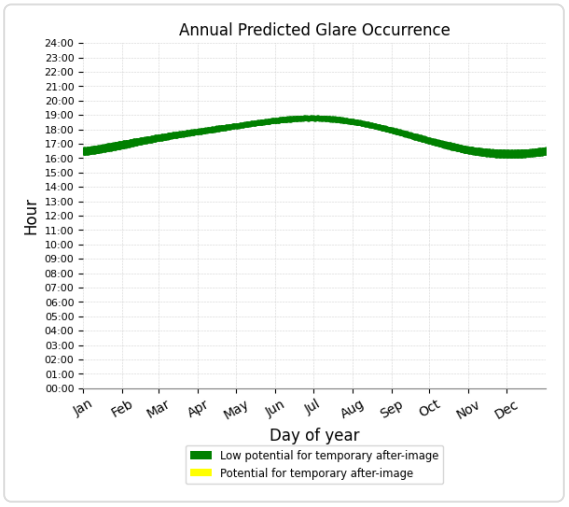


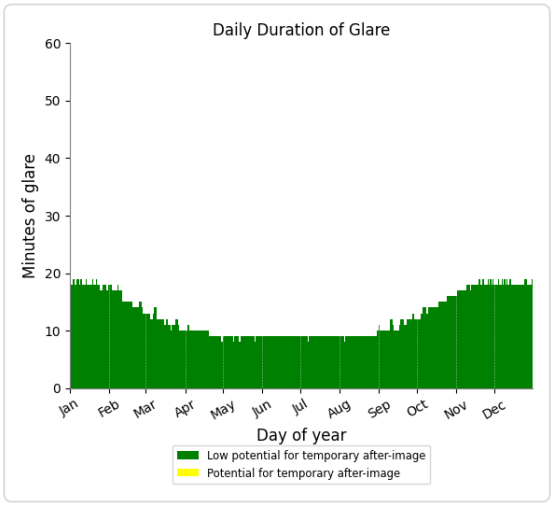


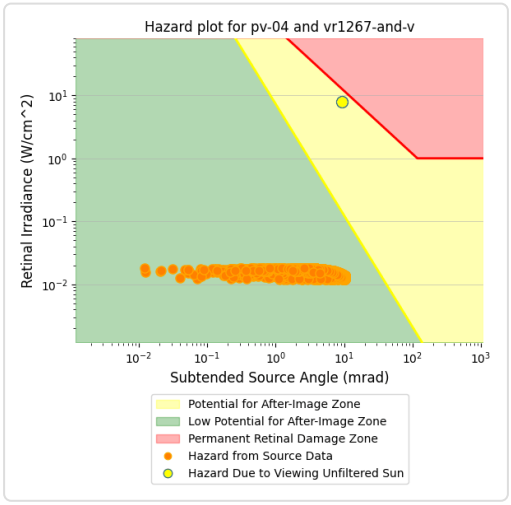
PV 04 and Route: VR1267 and VR1268 - 1500 ft AGL

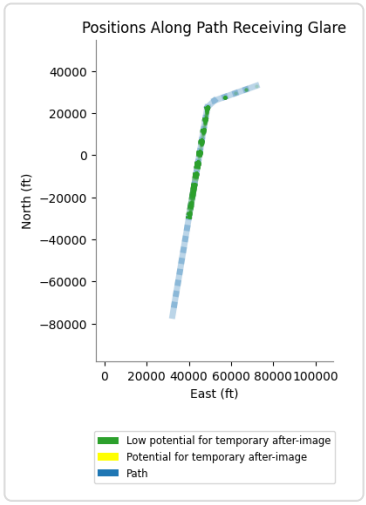
Yellow glare: none

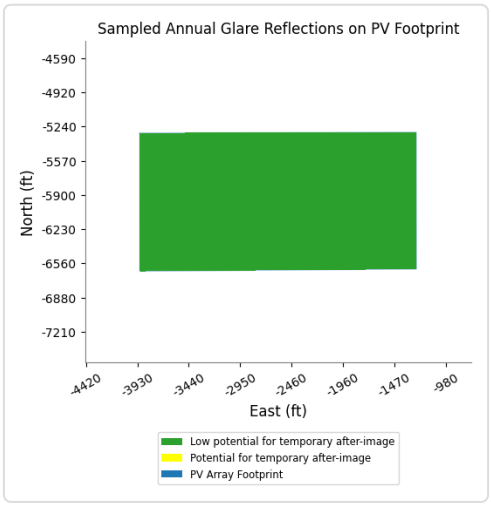
Green glare: 4,650 min.







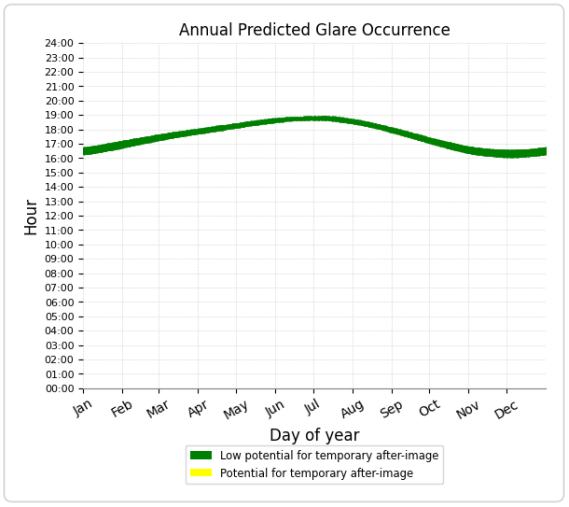


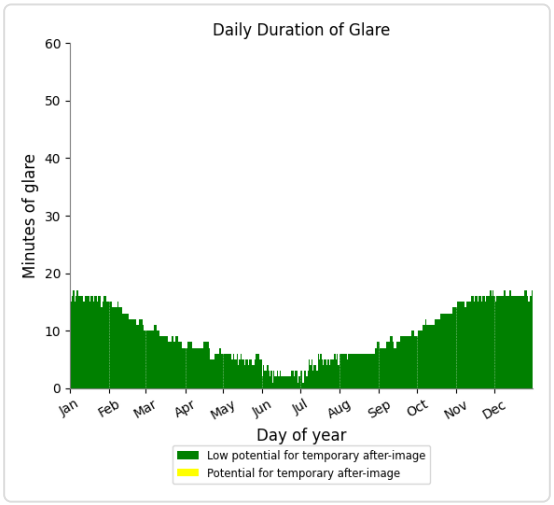


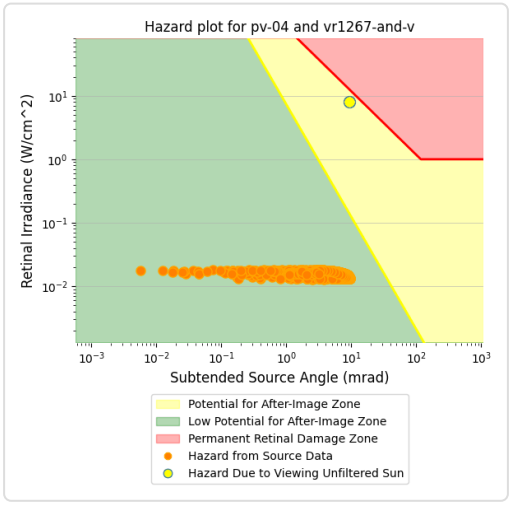
PV 04 and Route: VR1267 and VR1268 - 200 ft AGL

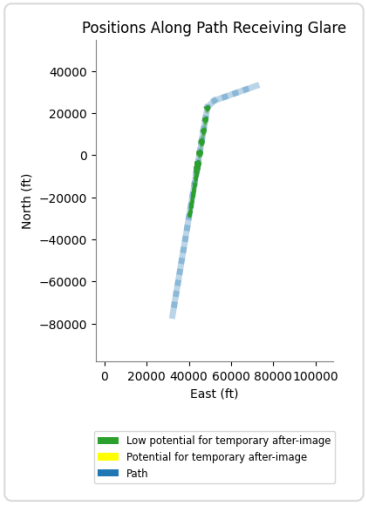
Yellow glare: none

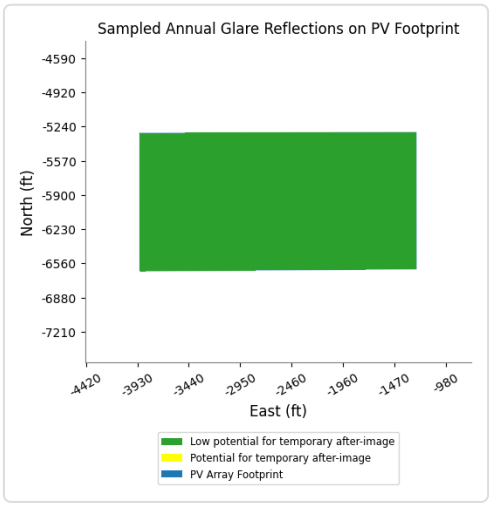
Green glare: 3,486 min.







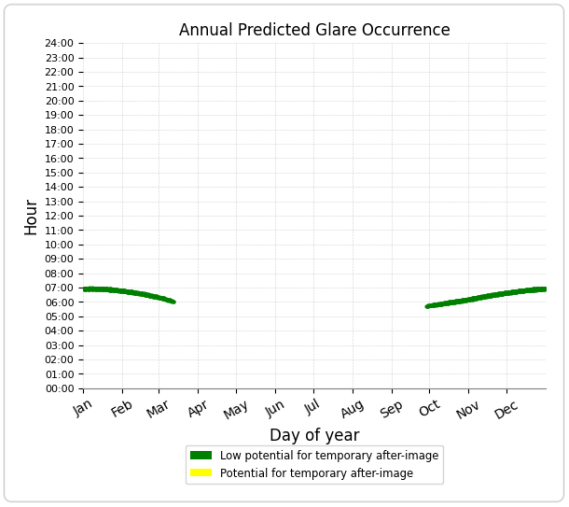


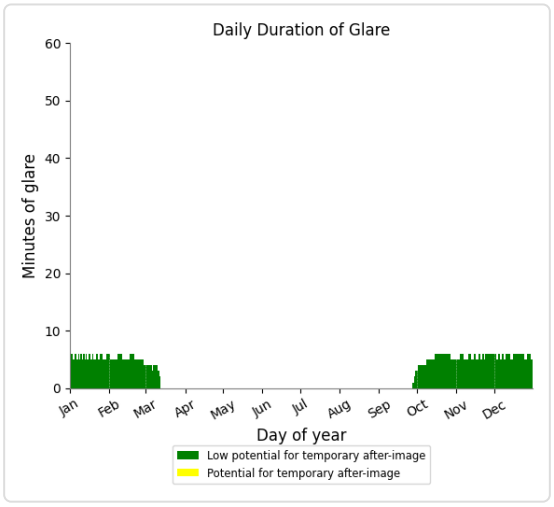


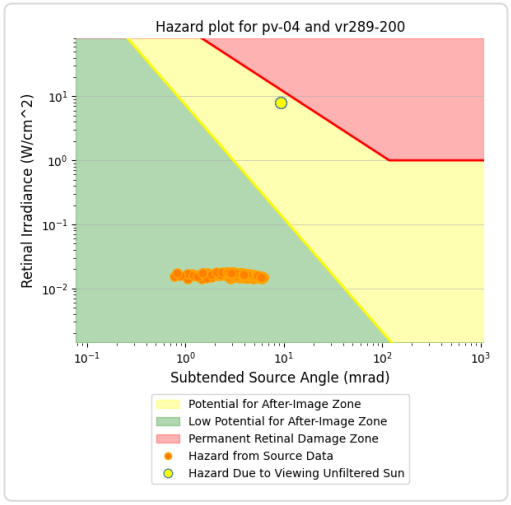
PV 04 and Route: VR289 - 200 ft AGL

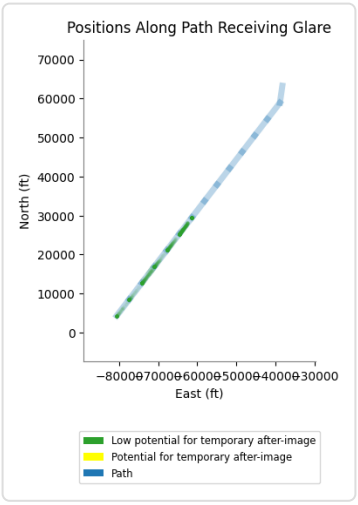
Yellow glare: none

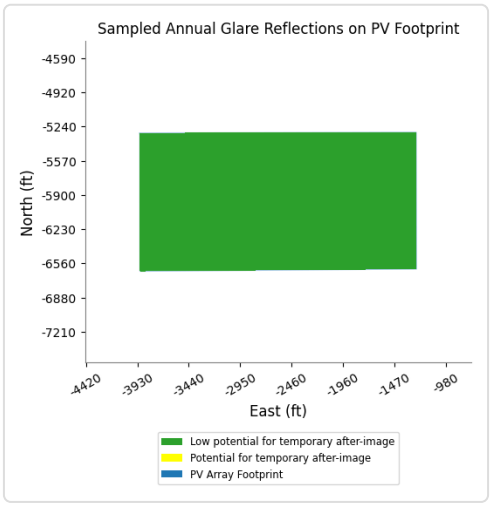
Green glare: 876 min.







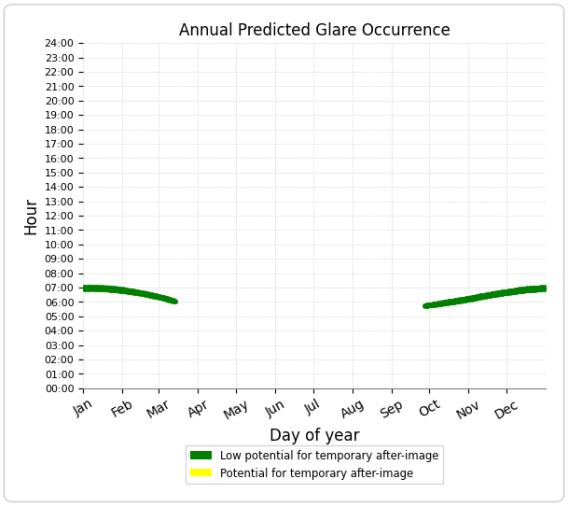


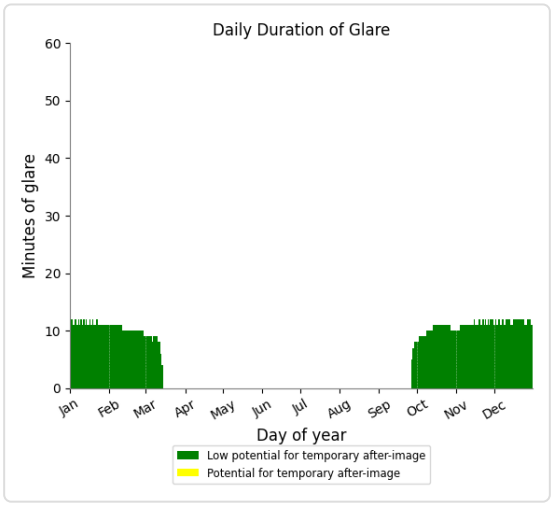


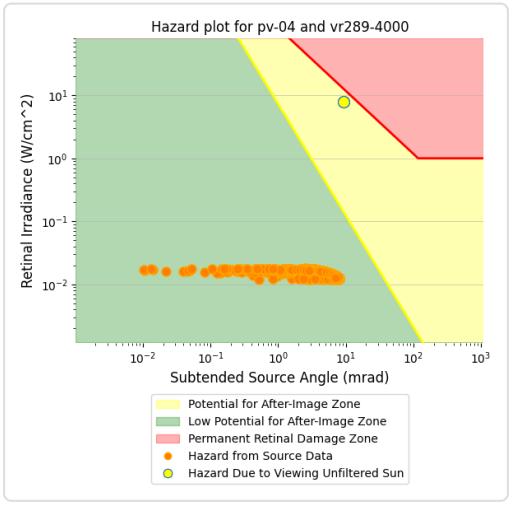
PV 04 and Route: VR289 - 4000 ft AGL

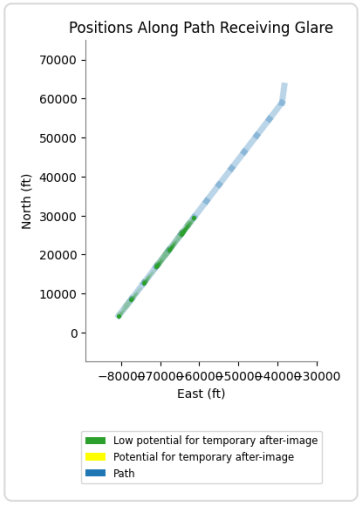
Yellow glare: none

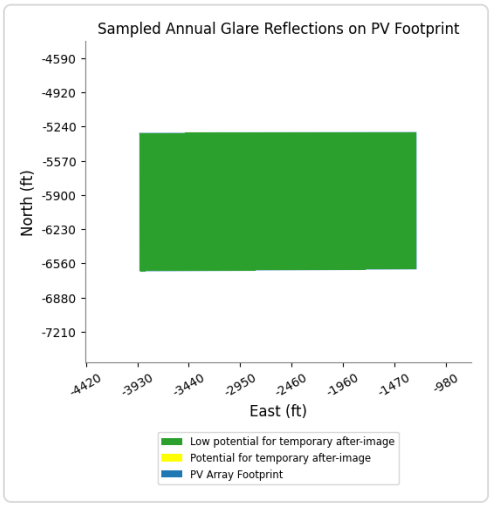
Green glare: 1,807 min.







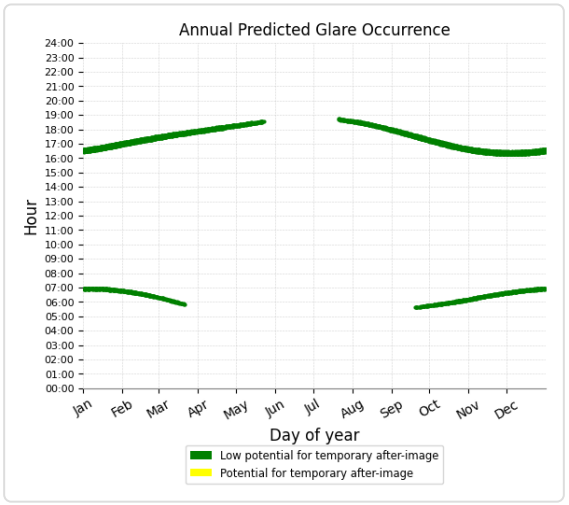


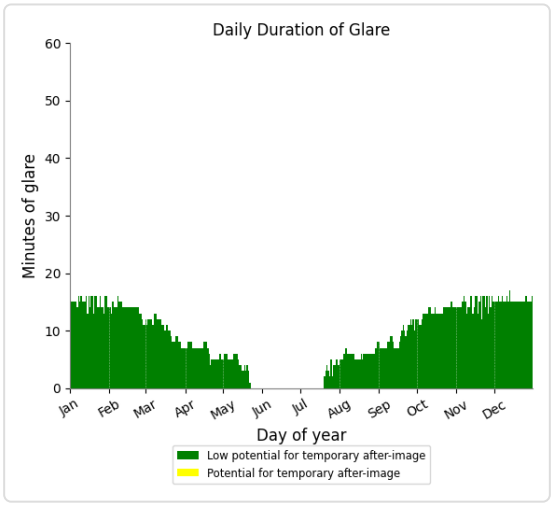


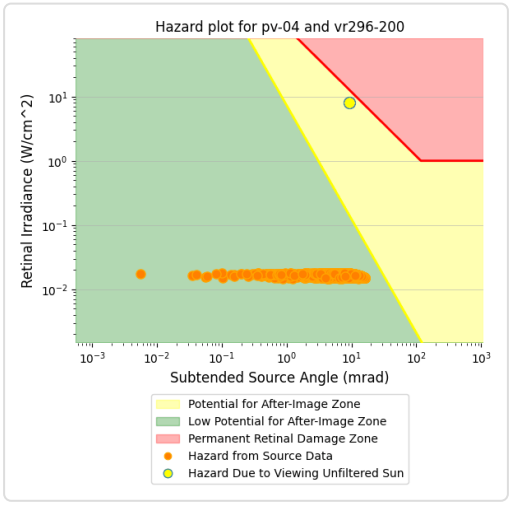
PV 04 and Route: VR296 - 200 ft AGL

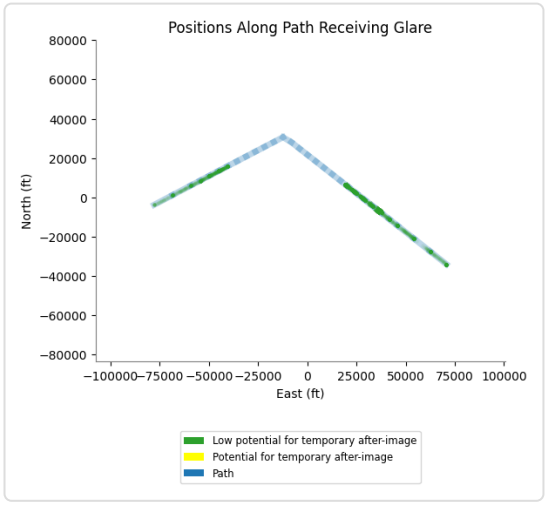
Yellow glare: none

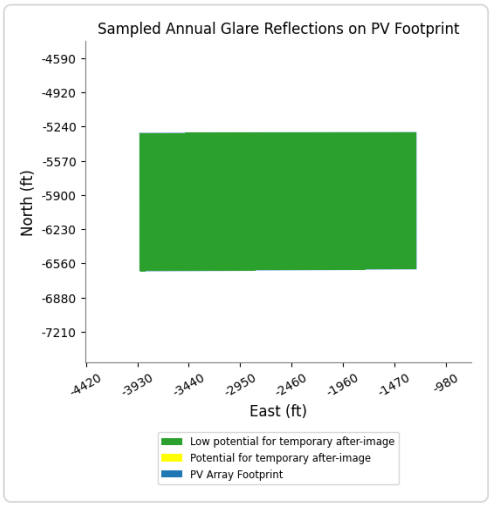
Green glare: 3,293 min.







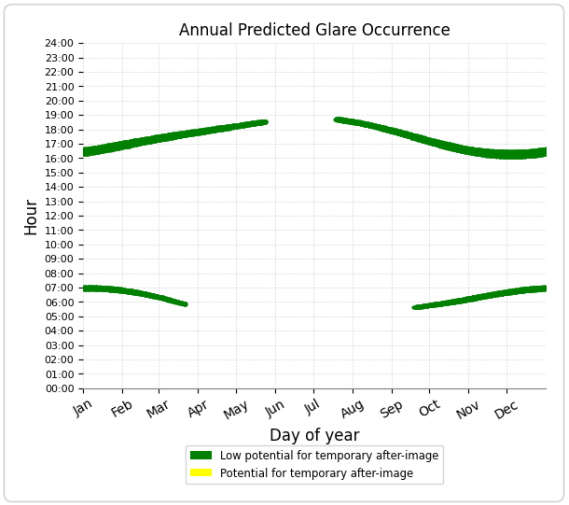


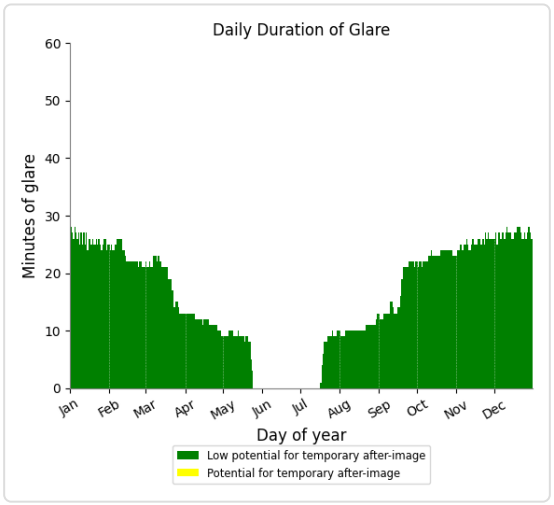


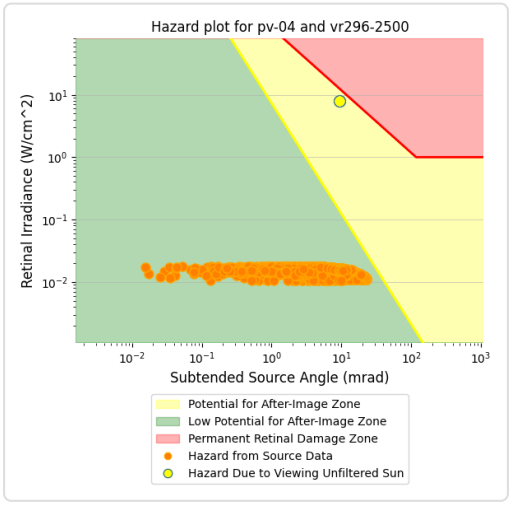
PV 04 and Route: VR296 - 2500 ft AGL

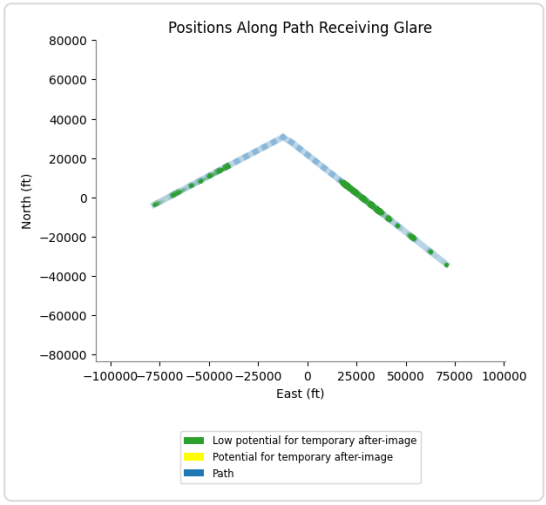
Yellow glare: none

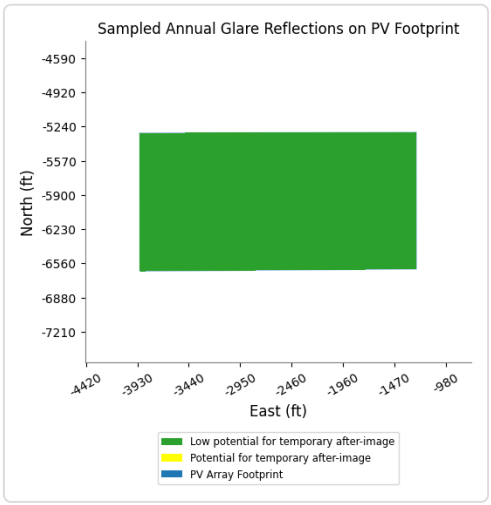
Green glare: 5,854 min.











PV 04 and Route: I-10 Eastbound

No glare found

PV 04 and Route: I-10 Westbound

No glare found

PV 04 and Route: VR1266 - 1500 ft AGL

No glare found

PV 04 and Route: VR1266 - 200 ft AGL

No glare found

PV 04 and OP 1

No glare found

PV 04 and OP 2

No glare found

PV 04 and OP 3

No glare found

PV 04 and OP 4

No glare found

PV 04 and OP 5

No glare found

PV 04 and OP 6

No glare found

PV 04 and OP 7

No glare found

PV 04 and OP 8

No glare found

PV 04 and OP 9

No glare found

PV 04 and OP 10

No glare found

PV 04 and OP 11

No glare found

PV 04 and OP 12

No glare found

PV: PV 05 low potential for temporary after-image

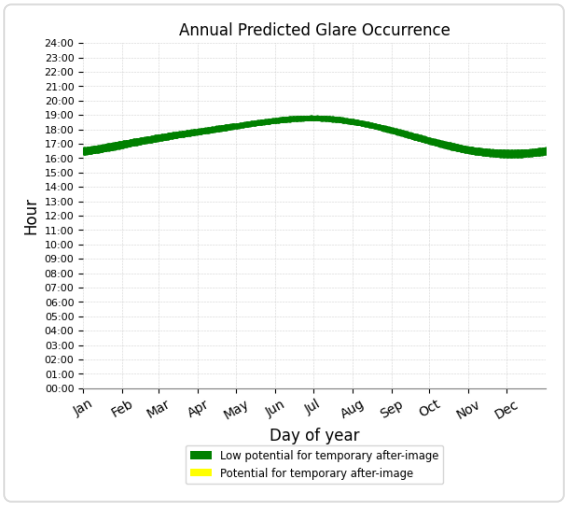
Receptor results ordered by category of glare

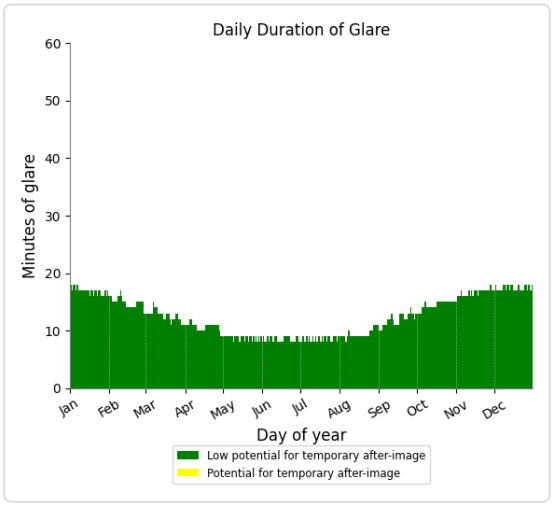
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
VR1265 - 1500 ft AGL	4,591	76.5	0	0.0
VR1265 - 200 ft AGL	3,029	50.5	0	0.0
VR1267 and VR1268 - 1500 ft AGL	4,719	78.7	0	0.0
VR1267 and VR1268 - 200 ft AGL	3,670	61.2	0	0.0
VR289 - 200 ft AGL	836	13.9	0	0.0
VR289 - 4000 ft AGL	1,738	29.0	0	0.0
VR296 - 200 ft AGL	3,230	53.8	0	0.0
VR296 - 2500 ft AGL	5,840	97.3	0	0.0
I-10 Eastbound	0	0.0	0	0.0
I-10 Westbound	0	0.0	0	0.0
VR1266 - 1500 ft AGL	0	0.0	0	0.0
VR1266 - 200 ft AGL	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0

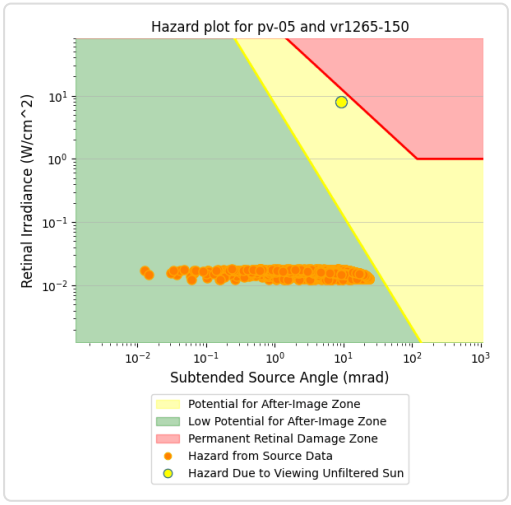
PV 05 and Route: VR1265 - 1500 ft AGL

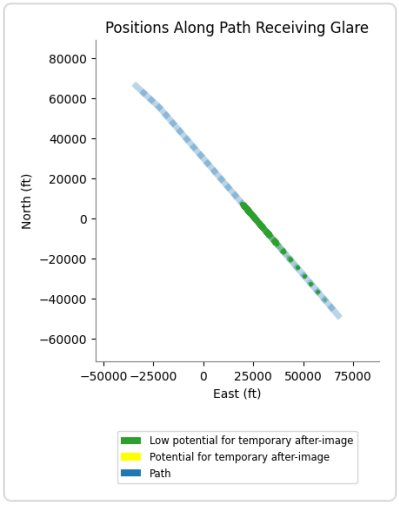
Yellow glare: none

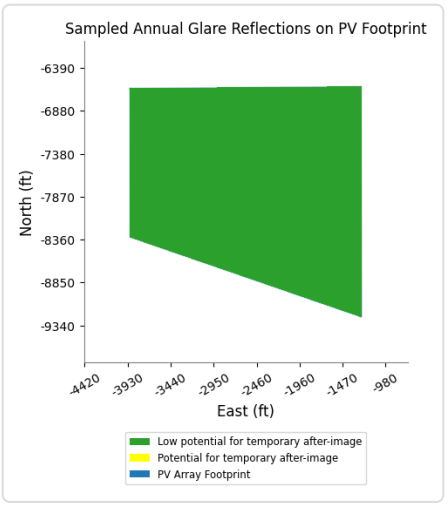
Green glare: 4,591 min.







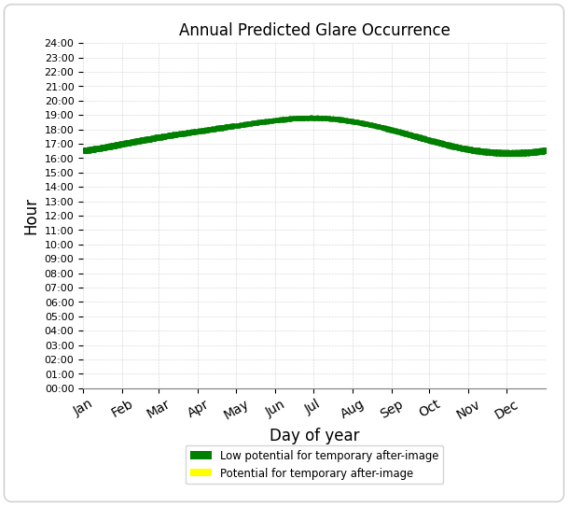


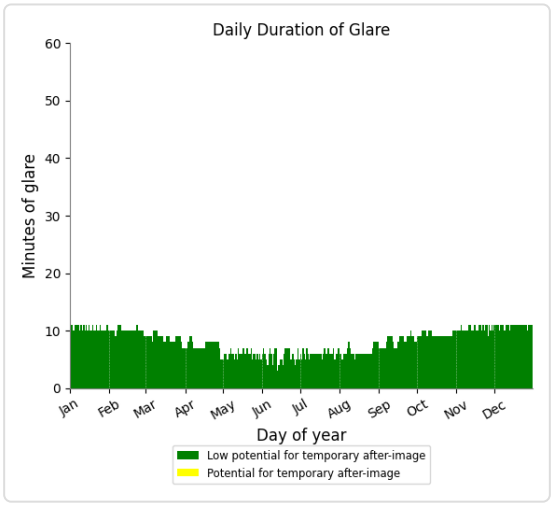


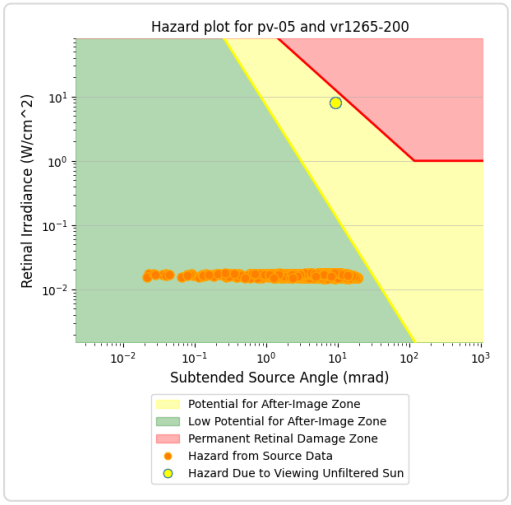
PV 05 and Route: VR1265 - 200 ft AGL

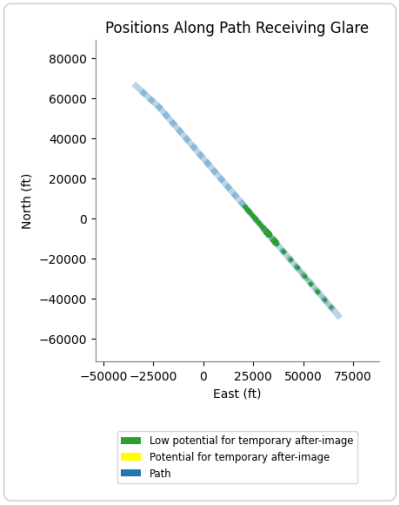
Yellow glare: none

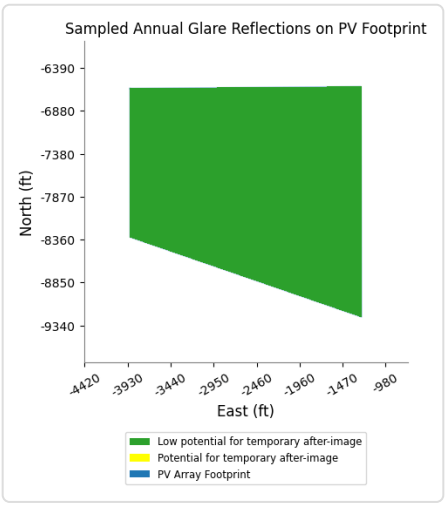
Green glare: 3,029 min.







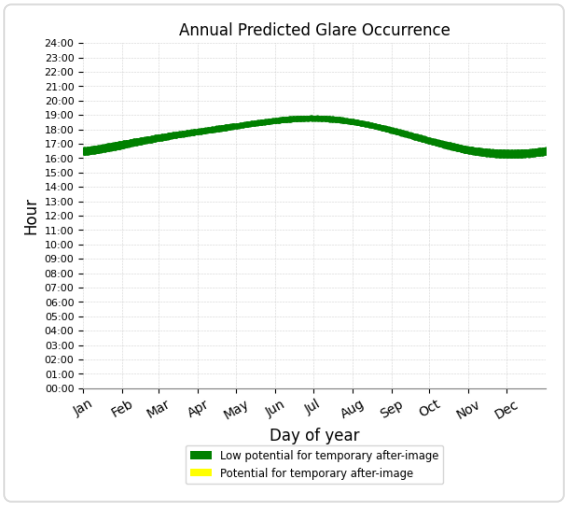


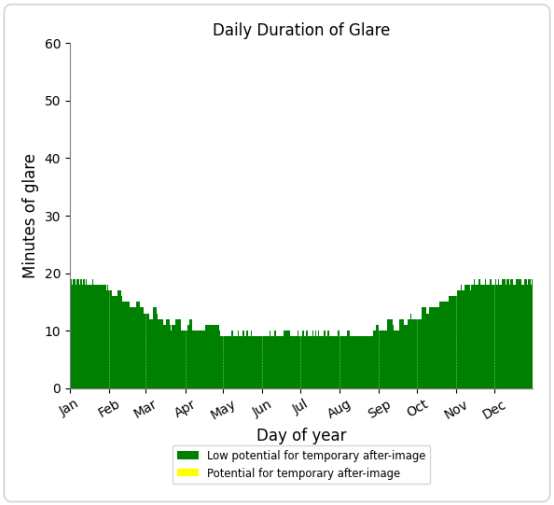


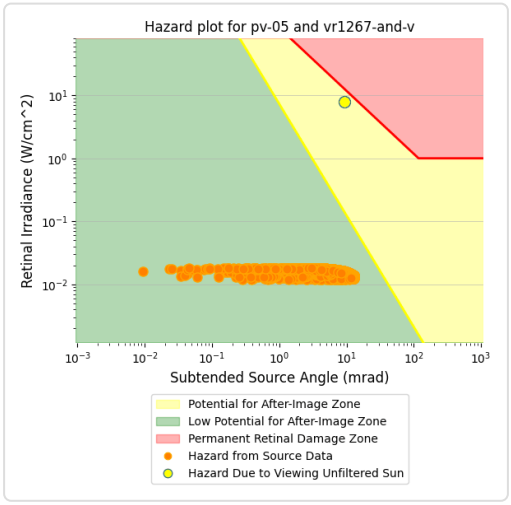
PV 05 and Route: VR1267 and VR1268 - 1500 ft AGL

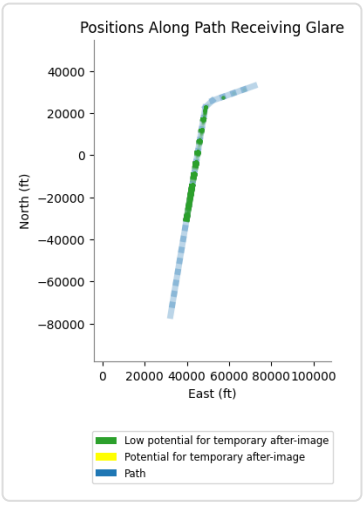
Yellow glare: none

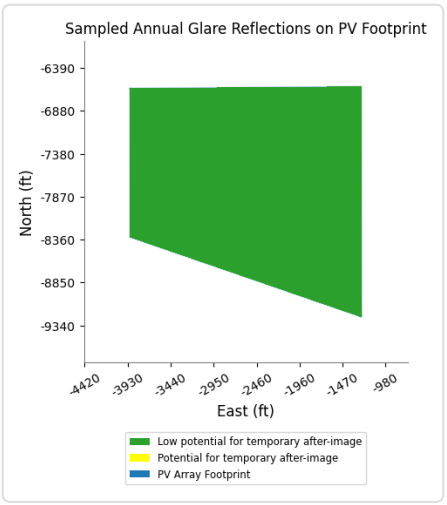
Green glare: 4,719 min.







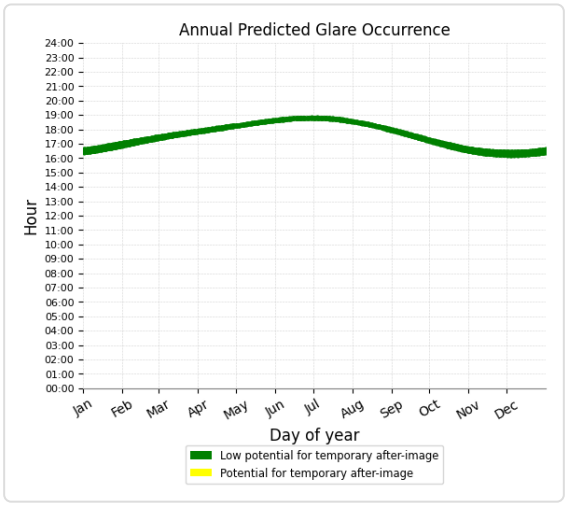


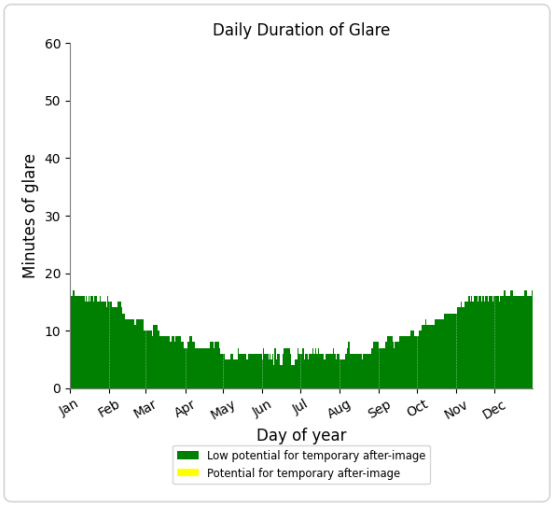


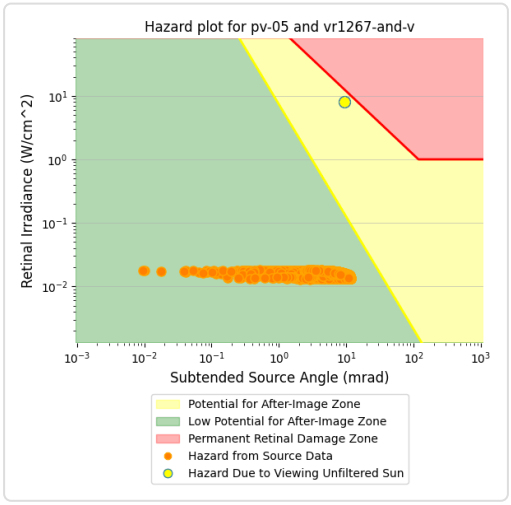
PV 05 and Route: VR1267 and VR1268 - 200 ft AGL

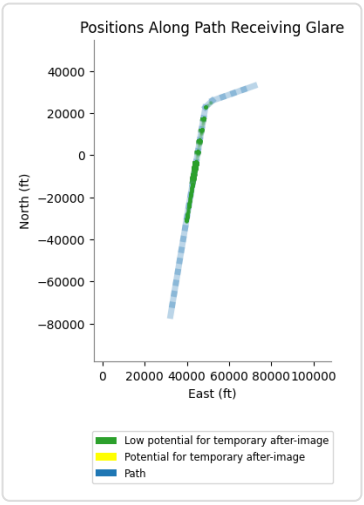
Yellow glare: none

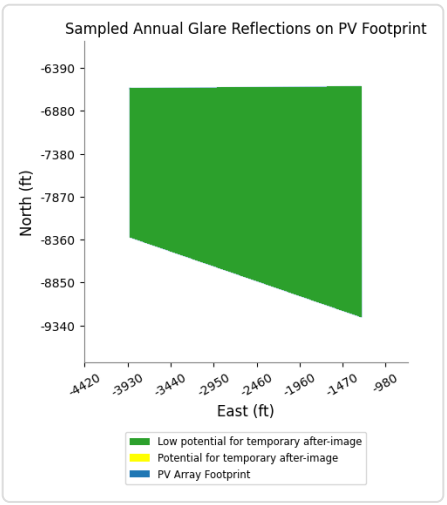
Green glare: 3,670 min.







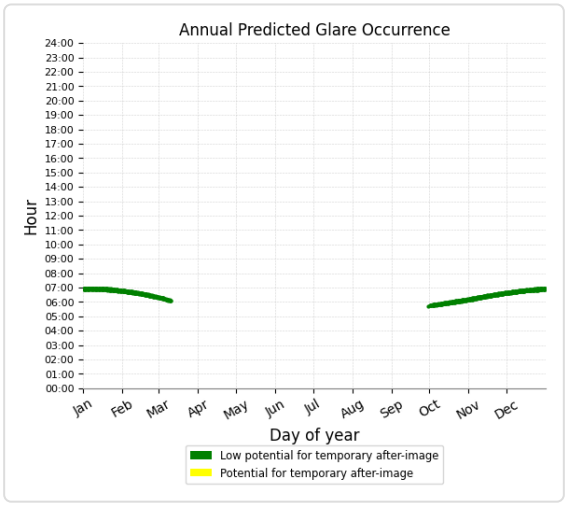


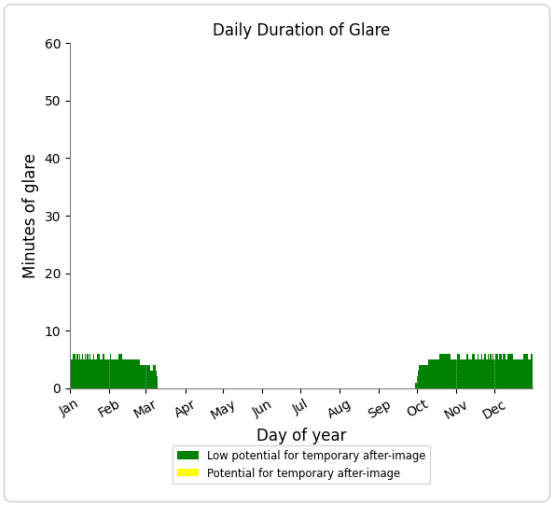


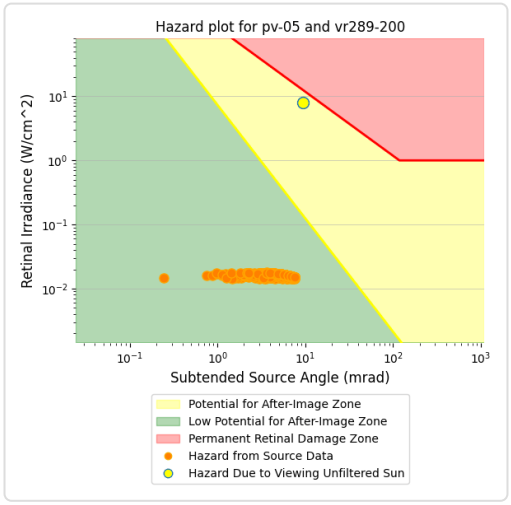
PV 05 and Route: VR289 - 200 ft AGL

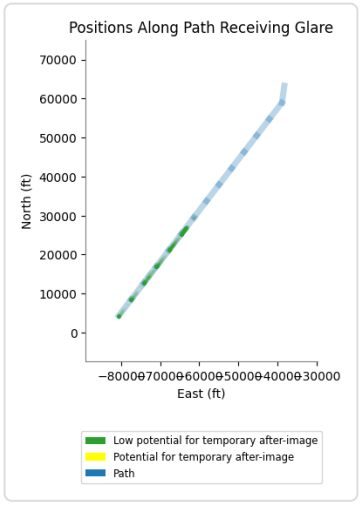
Yellow glare: none

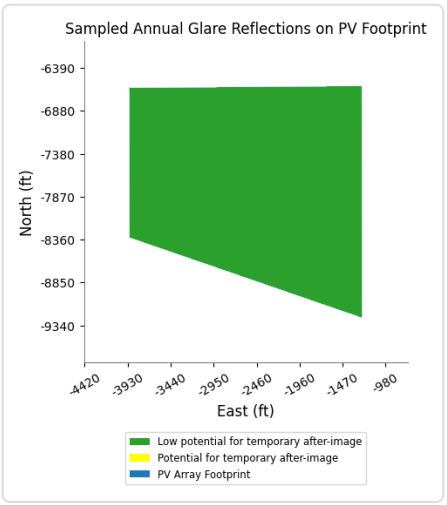
Green glare: 836 min.







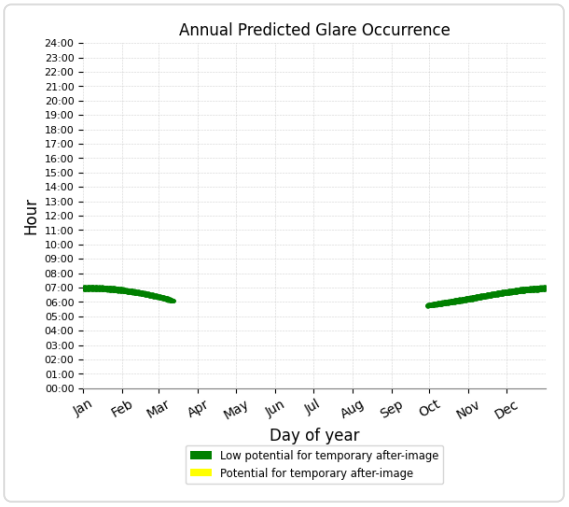


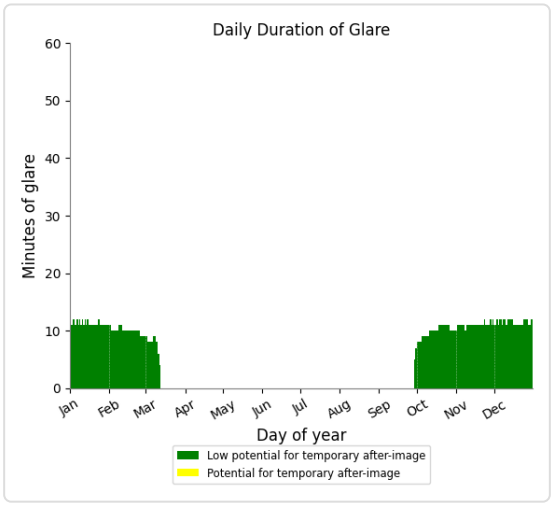


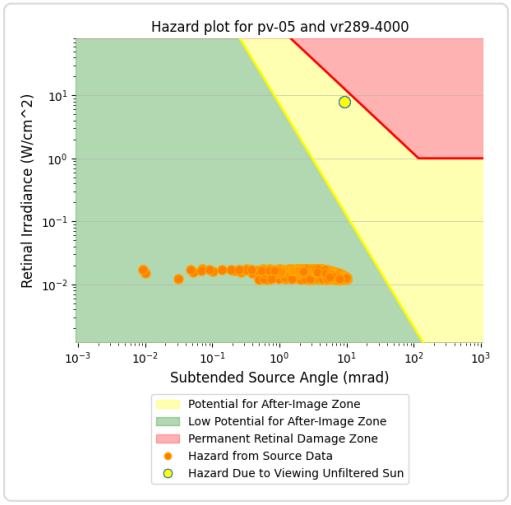
PV 05 and Route: VR289 - 4000 ft AGL

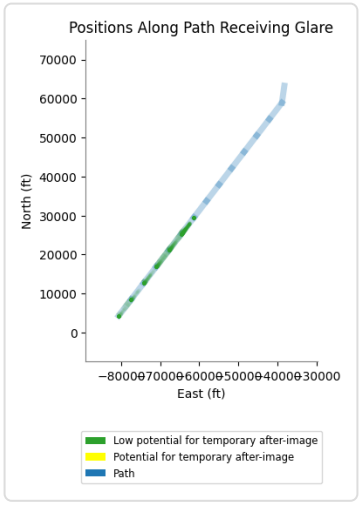
Yellow glare: none

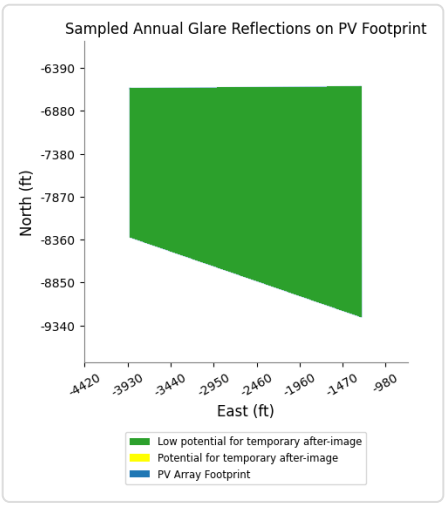
Green glare: 1,738 min.







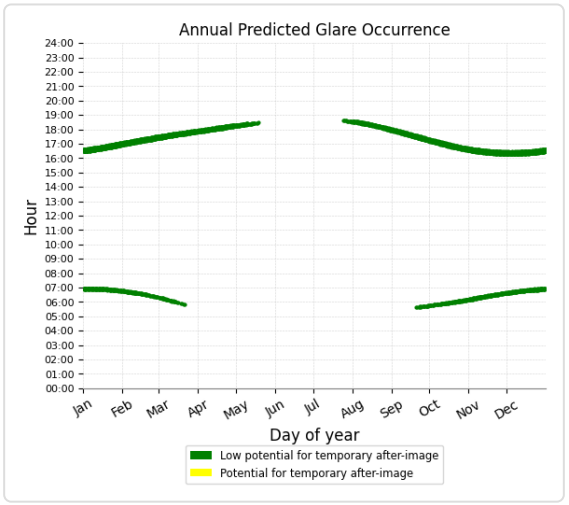


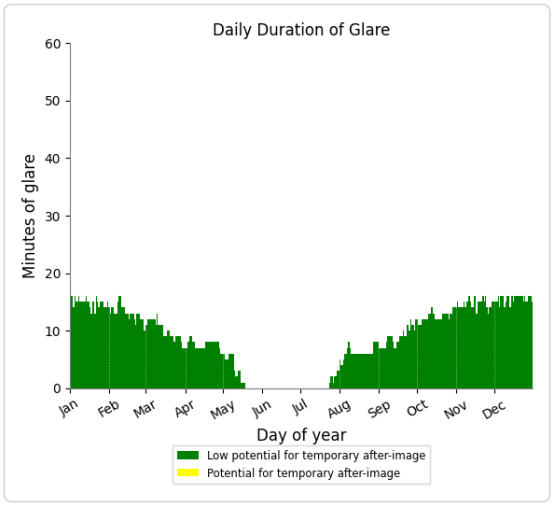


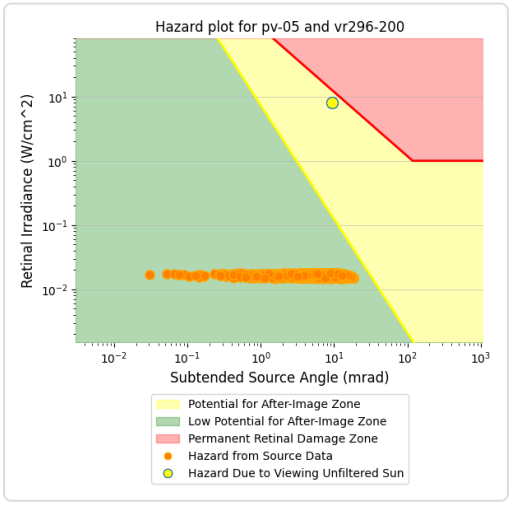
PV 05 and Route: VR296 - 200 ft AGL

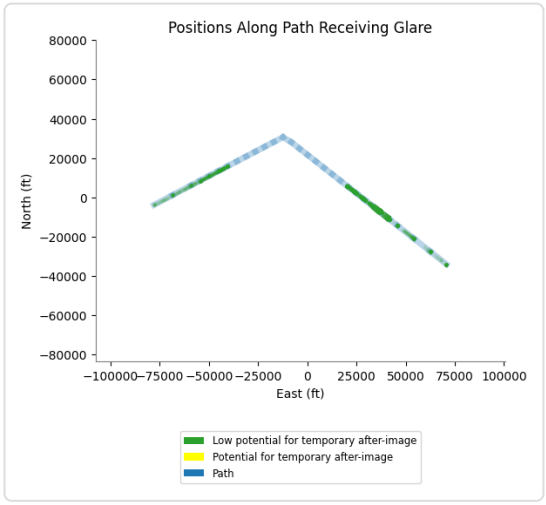
Yellow glare: none

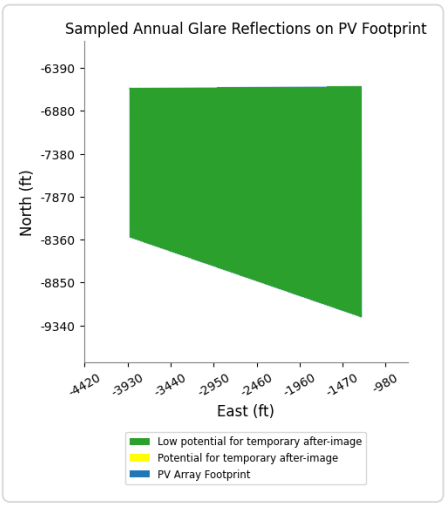
Green glare: 3,230 min.







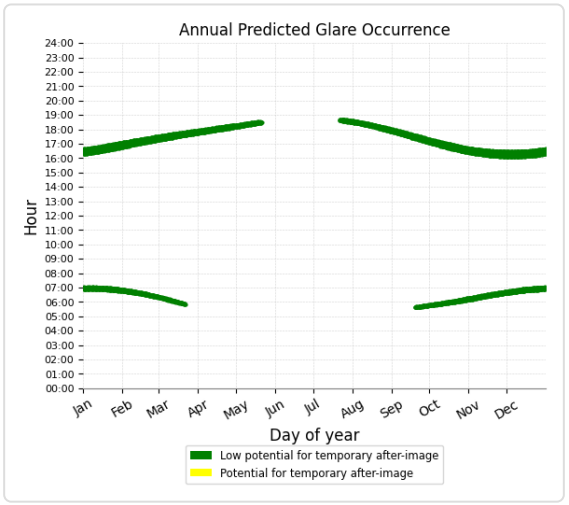


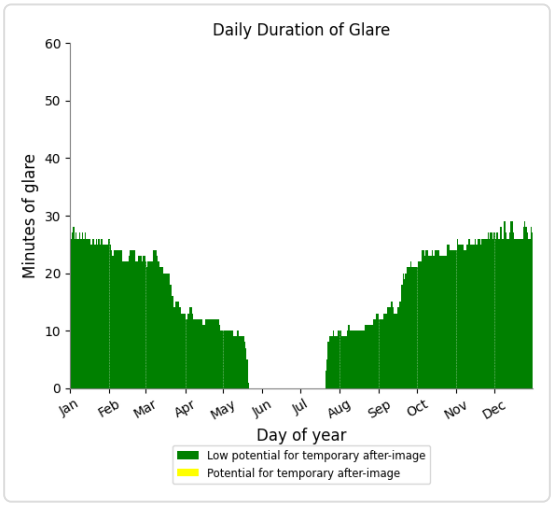


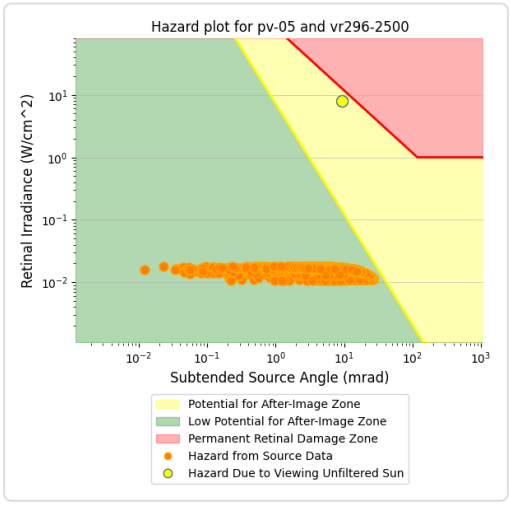
PV 05 and Route: VR296 - 2500 ft AGL

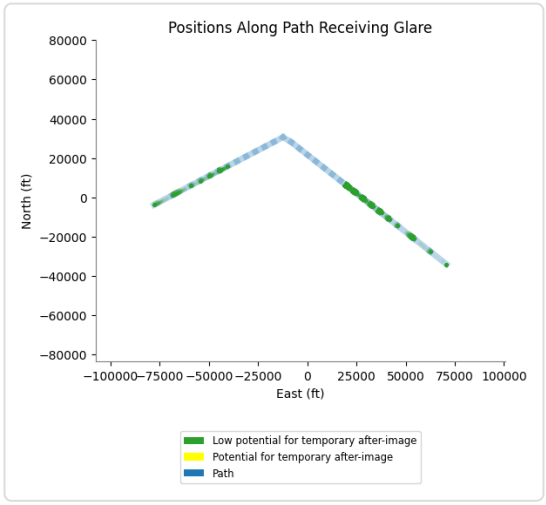
Yellow glare: none

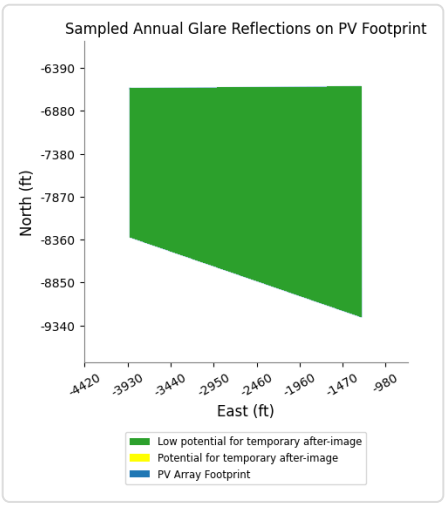
Green glare: 5,840 min.











PV 05 and Route: I-10 Eastbound

No glare found

PV 05 and Route: I-10 Westbound

No glare found

PV 05 and Route: VR1266 - 1500 ft AGL

No glare found

PV 05 and Route: VR1266 - 200 ft AGL

No glare found

PV 05 and OP 1

No glare found

PV 05 and OP 2

No glare found

PV 05 and OP 3

No glare found

PV 05 and OP 4

No glare found

PV 05 and OP 5

No glare found

PV 05 and OP 6

No glare found

PV 05 and OP 7

No glare found

PV 05 and OP 8

No glare found

PV 05 and OP 9

No glare found

PV 05 and OP 10

No glare found

PV 05 and OP 11

No glare found

PV 05 and OP 12

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

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

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

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