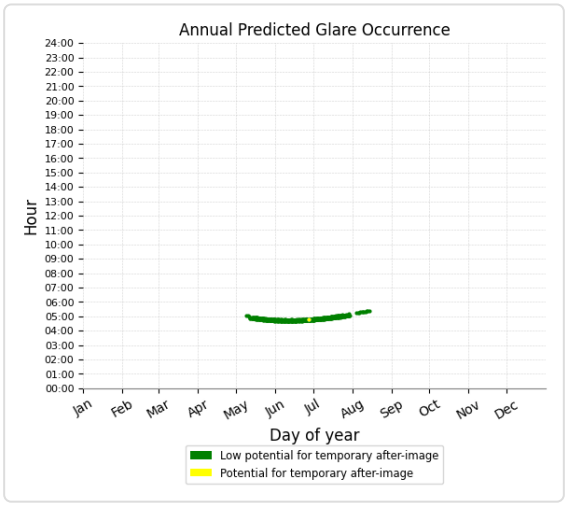
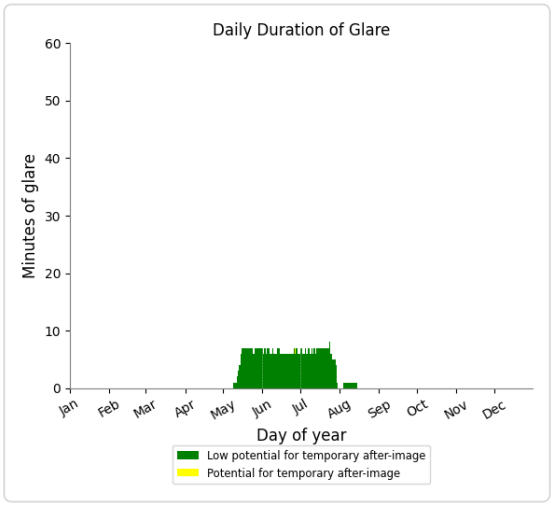
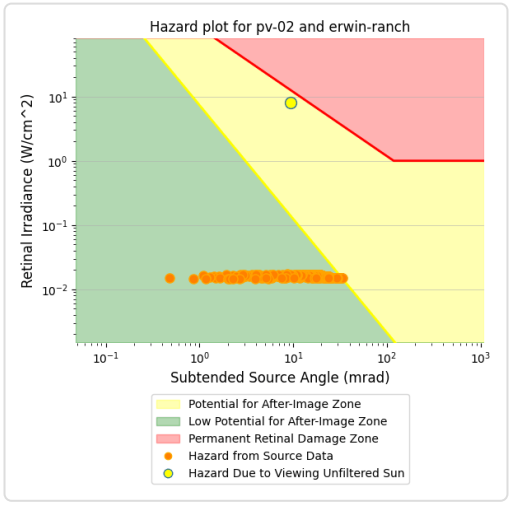
PV 02 and Route: Erwin Ranch Rd

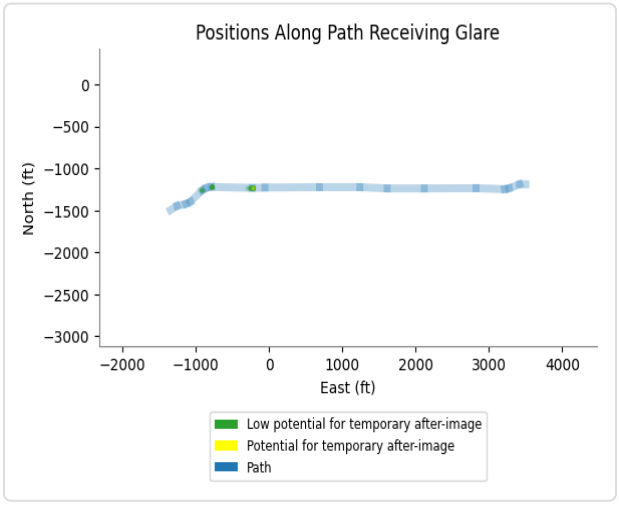
Yellow glare: 1 min.

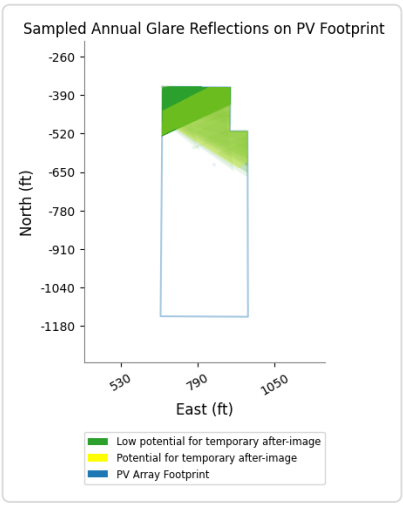
Green glare: 518 min.







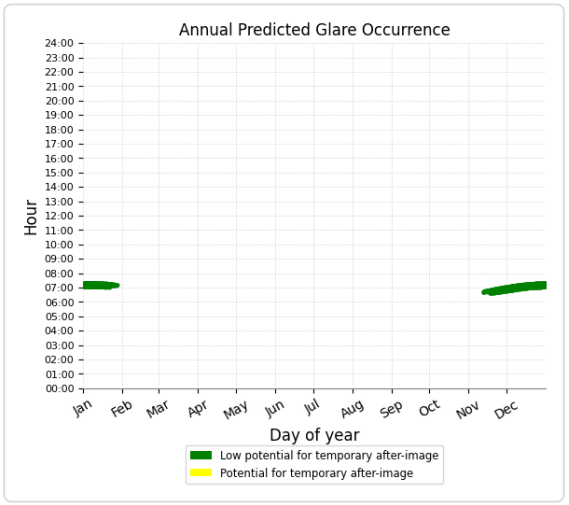


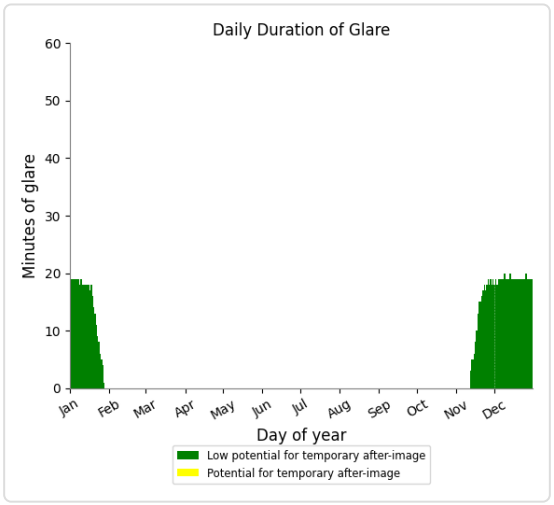


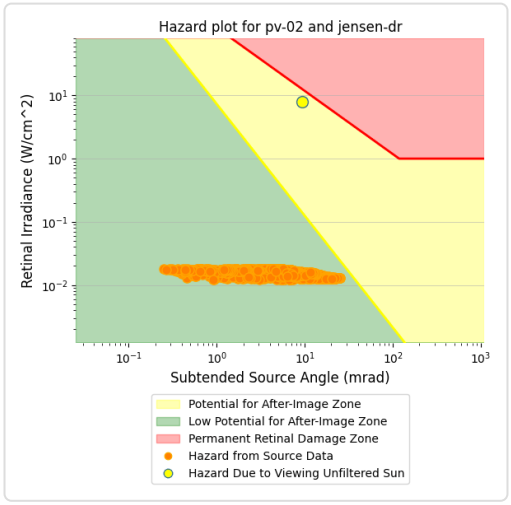
PV 02 and Route: Jensen Dr - Ringwood Trl

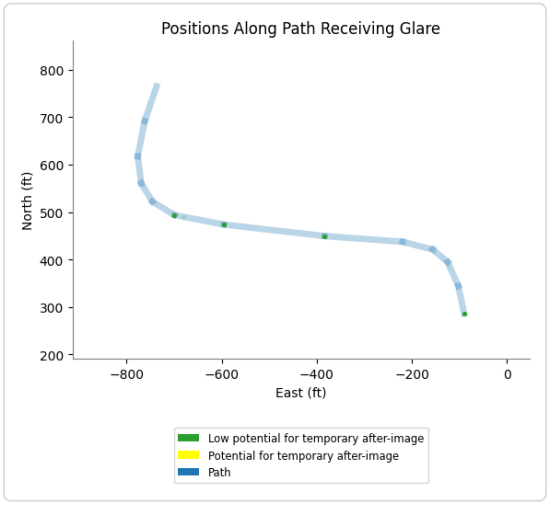
Yellow glare: none

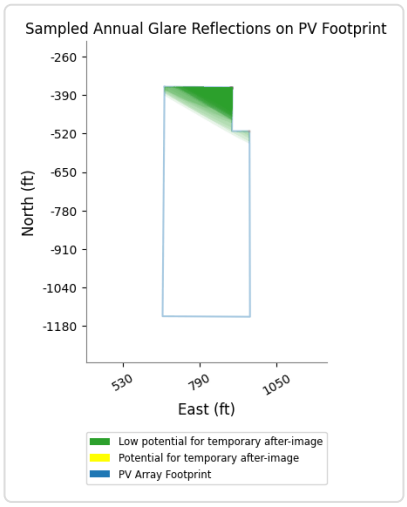
Green glare: 1,269 min.







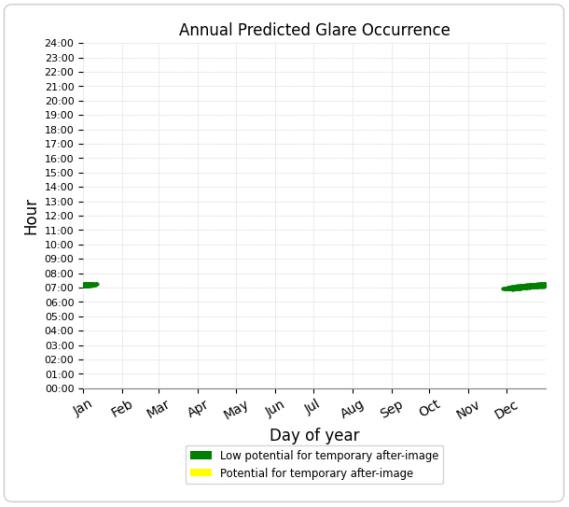


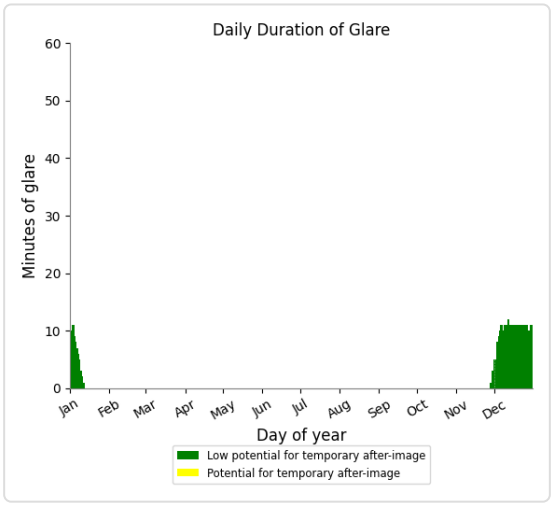


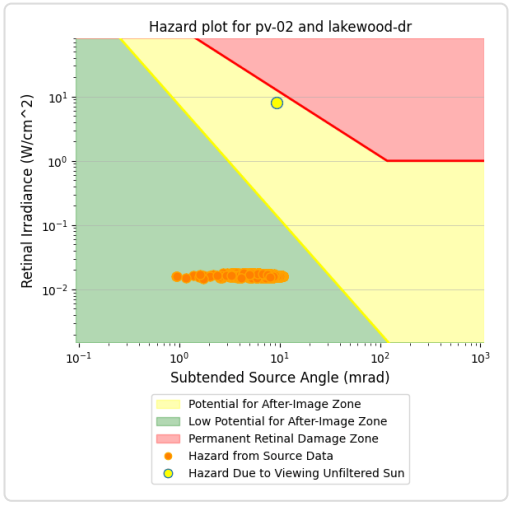
PV 02 and Route: Lakewood Dr

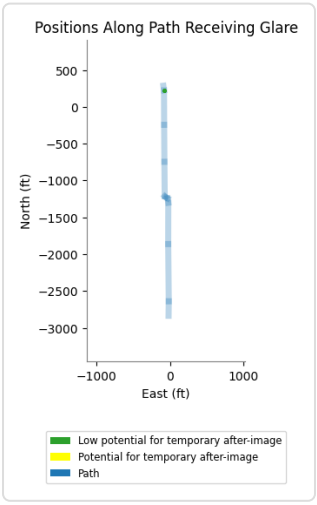
Yellow glare: none

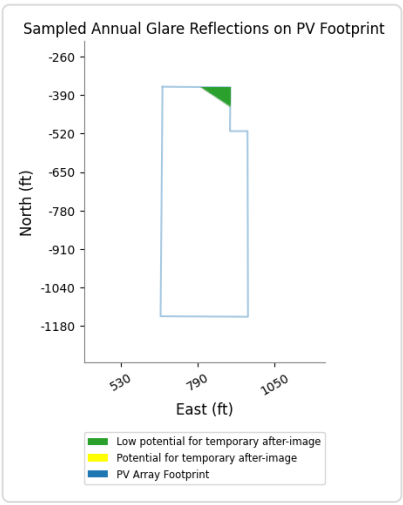
Green glare: 413 min.











PV 02 and Route: Central Ln

No glare found

PV 02 and Route: Cypress Ln

No glare found

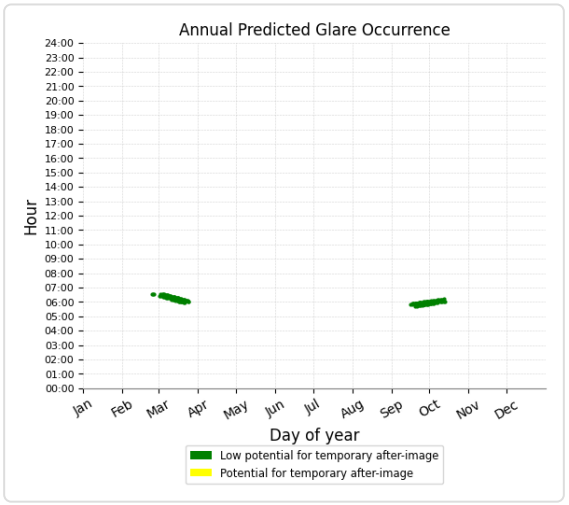
PV 02 and Route: Willow Ln

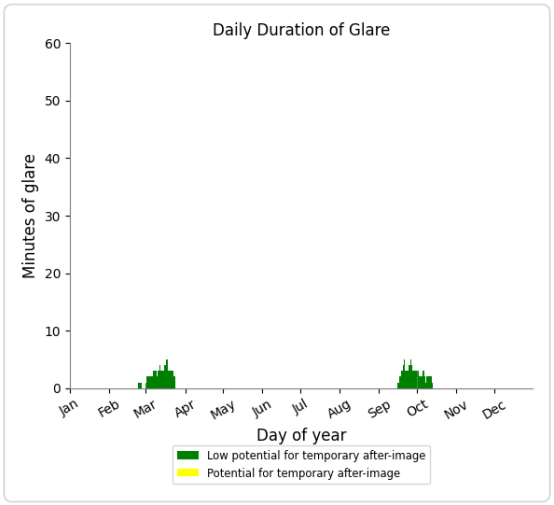
No glare found

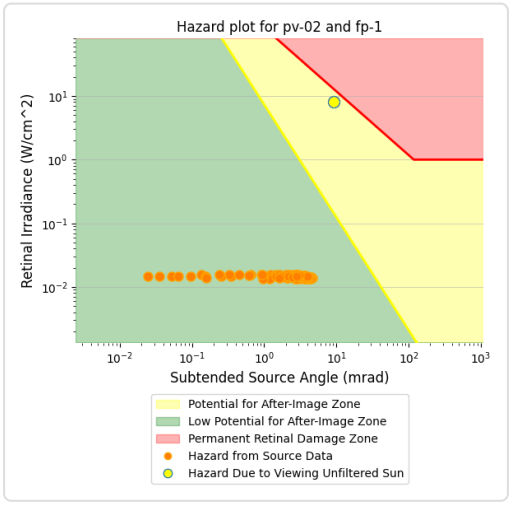
PV 02 and FP: FP 1

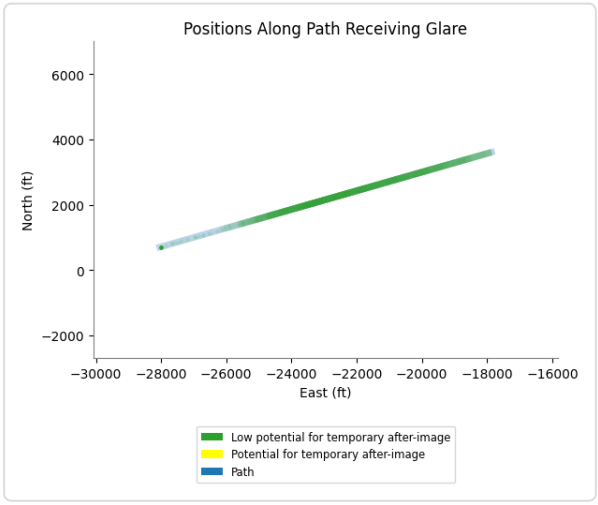
Yellow glare: none

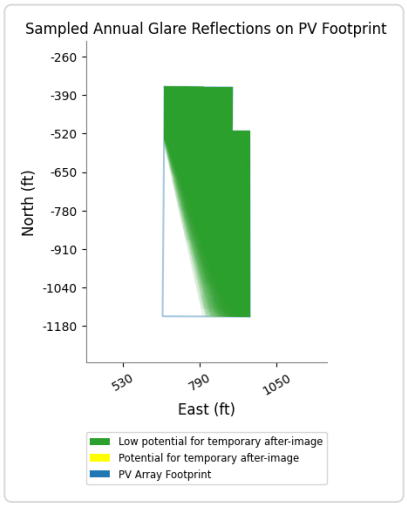
Green glare: 146 min.

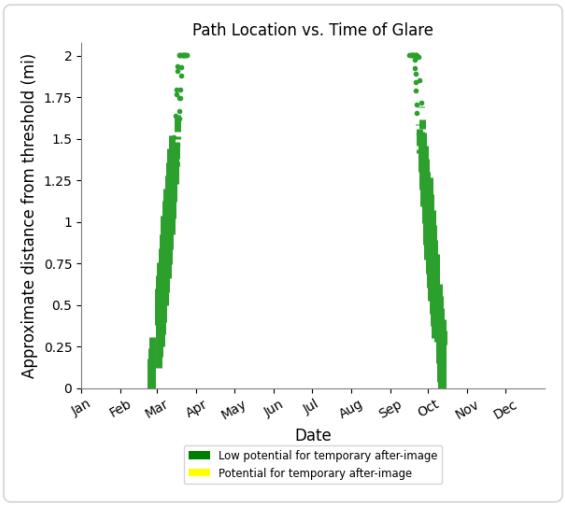












PV 02 and FP: FP 2

No glare found

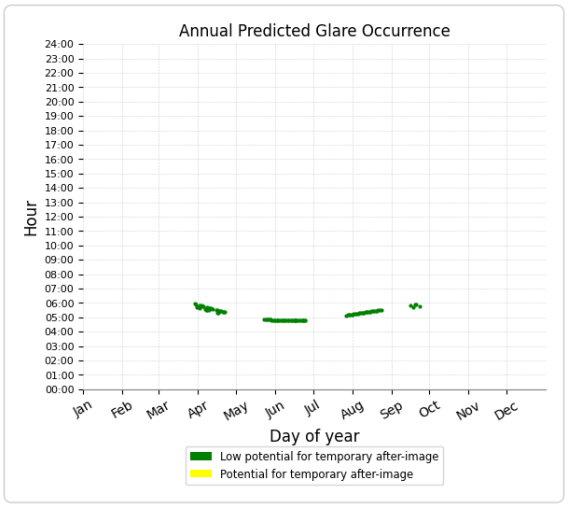
PV 02 and FP: FP 3

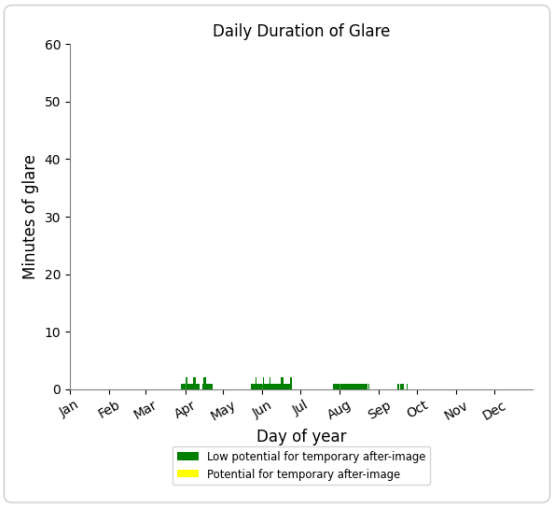
No glare found

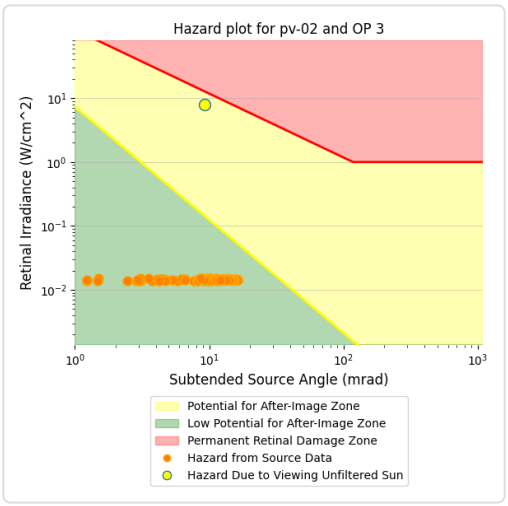
PV 02 and OP 3

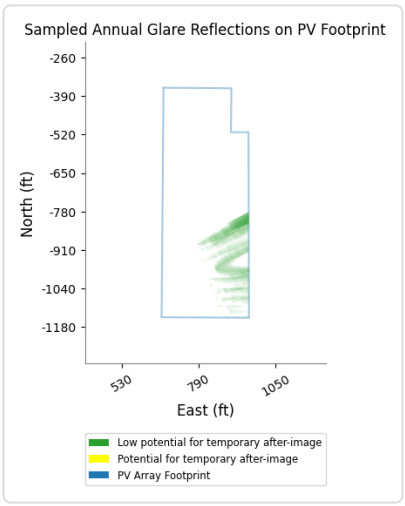
Yellow glare: none

Green glare: 101 min.





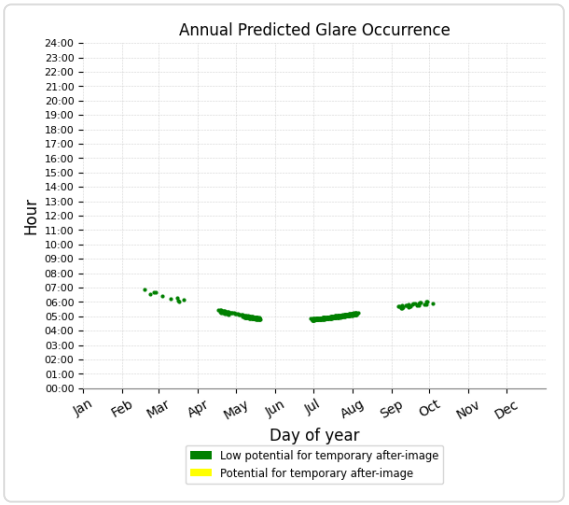


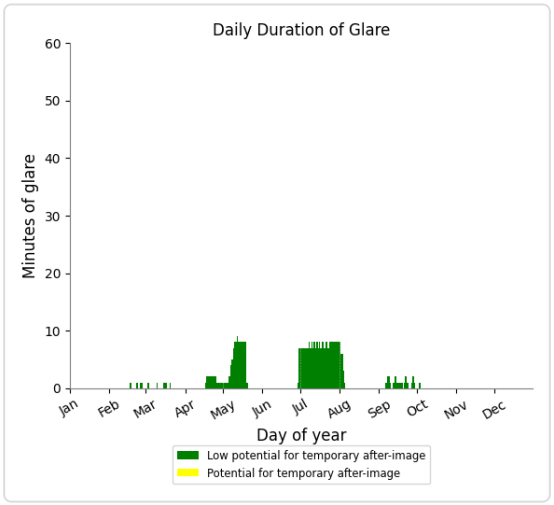


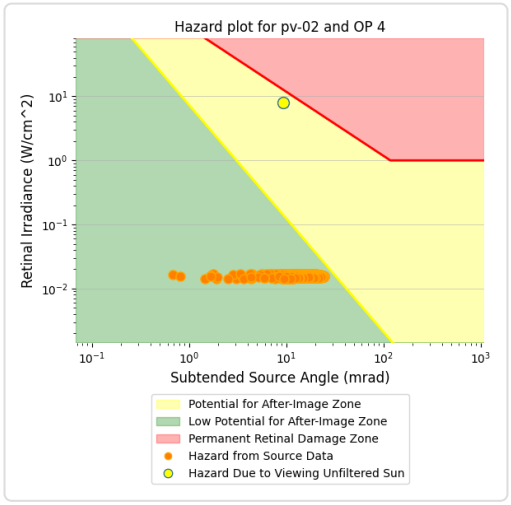
PV 02 and OP 4

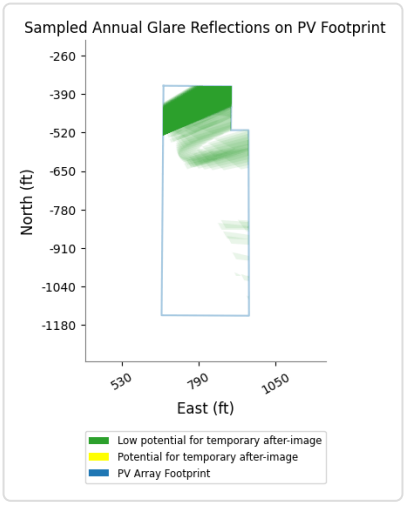
Yellow glare: none

Green glare: 429 min.





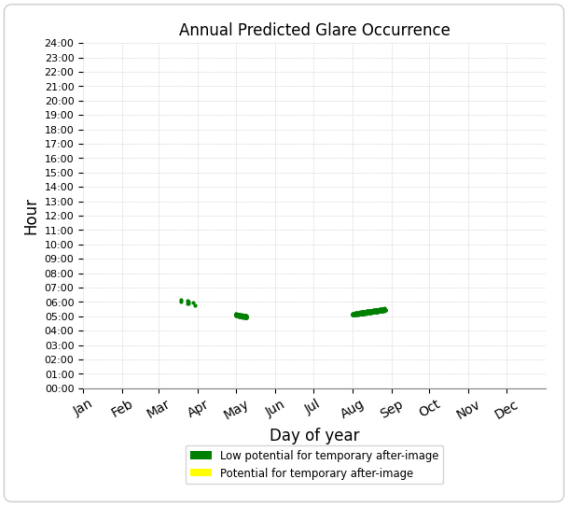


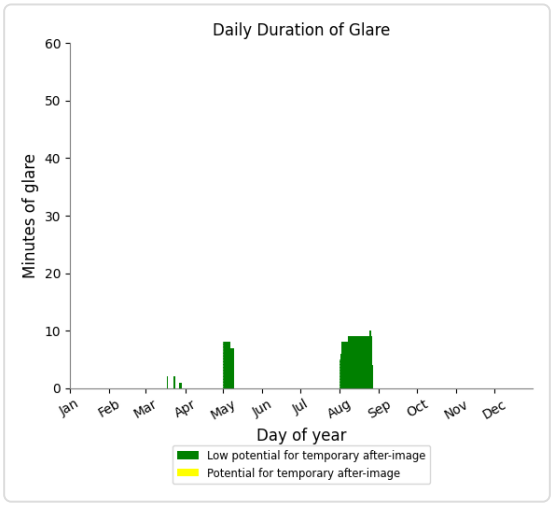


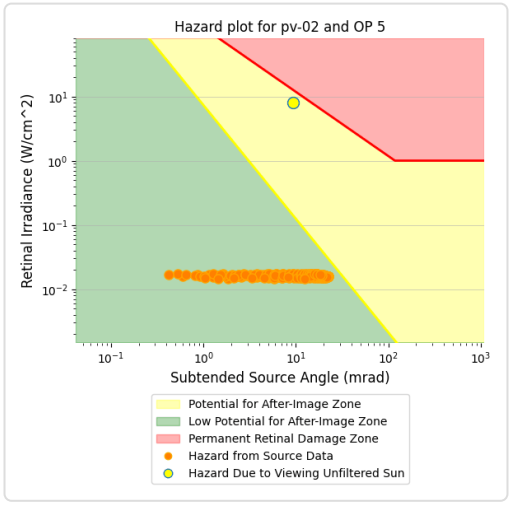
PV 02 and OP 5

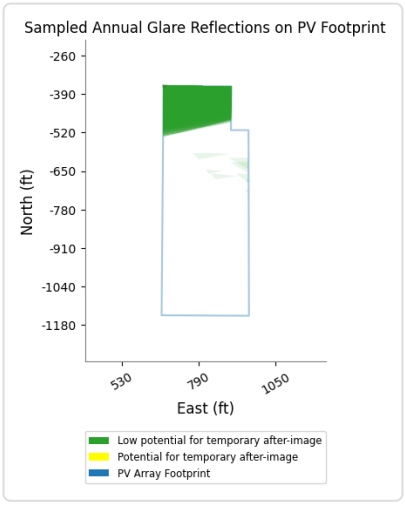
Yellow glare: none

Green glare: 304 min.



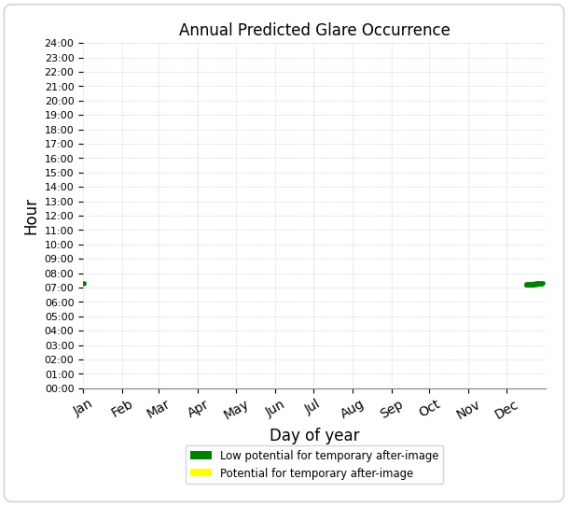


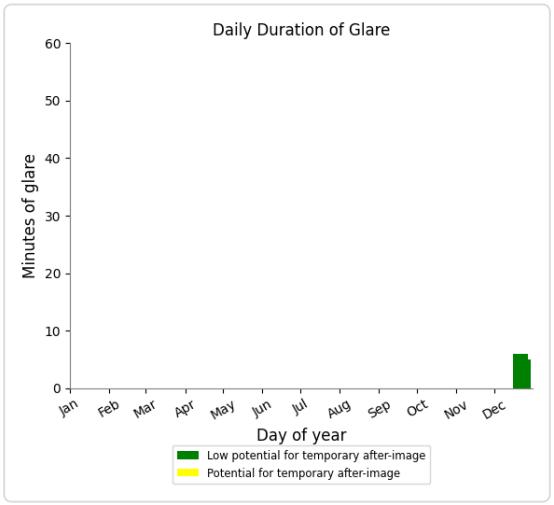


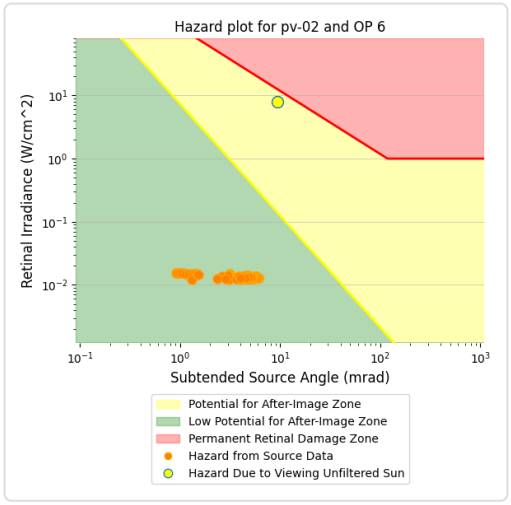


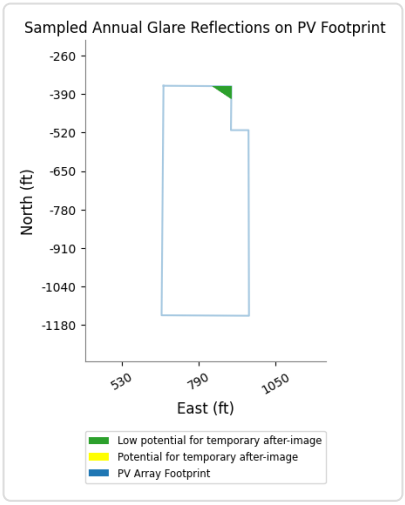
PV 02 and OP 6

Yellow glare: none
Green glare: 86 min.









PV 02 and OP 1

No glare found

PV 02 and OP 2

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 02 and OP 13

No glare found

PV 02 and OP 14

No glare found

PV 02 and OP 15

No glare found

PV 02 and OP 16

No glare found

PV: PV 03 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Erwin Ranch Rd	0	0.0	0	0.0
Jensen Dr - Ringwood Trl	0	0.0	0	0.0
Lakewood Dr	0	0.0	0	0.0
Willow Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

PV 03 and Route: Central Ln

No glare found

PV 03 and Route: Cypress Ln

No glare found

PV 03 and Route: Erwin Ranch Rd

No glare found

PV 03 and Route: Jensen Dr - Ringwood Trl

No glare found

PV 03 and Route: Lakewood Dr

No glare found

PV 03 and Route: Willow Ln

No glare found

PV 03 and FP: FP 1

No glare found

PV 03 and FP: FP 2

No glare found

PV 03 and FP: FP 3

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 03 and OP 13

No glare found

PV 03 and OP 14

No glare found

PV 03 and OP 15

No glare found

PV 03 and OP 16

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

APPENDIX B - FORGESOLAR GLARE ANALYSIS RESULTS (WITHOUT VISUAL BUFFERS)

**Table 2: Bear Valley Solar Energy Project –
Summary of Predicted Glare (without visual buffers)**

Viewpoint Location	Annual Green Glare (minutes/year)	Annual Yellow Glare (minutes/year)	Glare Source	Distance and Direction to Source	Approximate Time of Year and Day	Maximum Daily Duration (Green and Yellow combined) (minutes/day)	Comments
Erwin Ranch Road	279	none	PV 01	0.3 mi NE	May to Jul - morning	5	Glare predicted along western segment of road, northwest of Big Bear Ranch Park
	743	874	PV 02	60 ft N to NE	Mar to Sep - morning	10	Glare predicted along segment of road south and southwest of PV 02
	245	606	PV 03	60 ft N to NE	May to Aug - morning	12	Glare predicted along segment of road south and southwest of PV 03
Jensen Drive – Ringwood Trail	1,965	130	PV 01	630 ft SE	Nov to Jan - morning	31	
	1,269	none	PV 02	0.2 mi SE	Nov to Jan - morning	19	
Lakewood Drive	963	234	PV 02	730 ft E	Mar to May, Jul to Sep, and Dec to Jan - morning	10	Glare predicted from Erwin Ranch Road intersection northward
FP 1	818	none	PV 01	3.5 mi E	Feb to Mar and Sep to Oct - morning	15	
	807	none	PV 02	3.6 mi E	Feb to Mar and Sep to Oct - morning	12	
OP 1	599	none	PV 02	780 ft ENE	Apr to Sep - morning	10	
OP 2	290	none	PV 02	330 ft NE	May to Jul - morning	8	
	20	none	PV 03	460 ft ENE	May and Jul - morning	2	
OP 3	673	386	PV 02	290 ft E	Apr to Sep - morning	13	
OP 4	310	none	PV 01	500 ft NE	May to Jul - morning	9	
	1,686	none	PV 02	580 ft E	Intervals throughout the year - morning	12	
OP 5	498	182	PV 01	250 ft NE	Apr to Aug - morning	11	
	1,133	none	PV 02	870 ft E	Aug to May - morning	11	
OP 6	93	none	PV 02	0.3 mi SE	Dec to Jan - morning	7	
OP 7	460	none	PV 01	0.3 mi ESE	Oct to Mar - morning	12	
	476	none	PV 02	0.5 mi SE	Oct to Feb - morning	11	
OP 8	437	none	PV 01	0.3 mi E	Feb to Mar and Sep to Oct - morning	11	

**Table 2: Bear Valley Solar Energy Project –
Summary of Predicted Glare (without visual buffers)**

Viewpoint Location	Annual Green Glare (minutes/year)	Annual Yellow Glare (minutes/year)	Glare Source	Distance and Direction to Source	Approximate Time of Year and Day	Maximum Daily Duration (Green and Yellow combined) (minutes/day)	Comments
	423	none	PV 02	0.5 mi ESE	Feb to Mar and Oct to Nov - morning	10	
OP 15	104	none	PV 02	810 ft SW	Jan to Feb - evening	5	

FORGESOLAR GLARE ANALYSIS

Project: **Bear Valley Solar Energy Project**

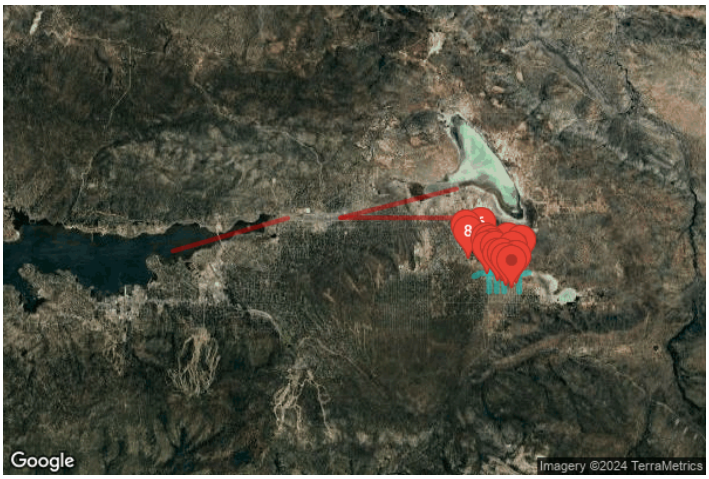
Proposed 5.7-megawatt (MW) solar photovoltaic (PV) project located on approximately 30 acres on Erwin Ranch Road in unincorporated San Bernardino County, California

Site configuration: **BV1-BT-0-deg**

Client: EDF Renewables Distributed Solutions

Created 05 Nov, 2024
Updated 05 Nov, 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 5 MW to 10 MW
Site ID 133322.22713

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



Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV 01	SA tracking	SA tracking	4,767	79.5	312	5.2	-
PV 02	SA tracking	SA tracking	9,259	154.3	1,494	24.9	-
PV 03	SA tracking	SA tracking	265	4.4	606	10.1	-

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
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Erwin Ranch Rd	1,267	21.1	1,480	24.7
Jensen Dr - Ringwood Trl	3,234	53.9	130	2.2
Lakewood Dr	963	16.1	234	3.9
Willow Ln	0	0.0	0	0.0
FP 1	1,625	27.1	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 1	599	10.0	0	0.0
OP 2	310	5.2	0	0.0
OP 3	673	11.2	386	6.4
OP 4	1,996	33.3	0	0.0
OP 5	1,631	27.2	182	3.0
OP 6	93	1.6	0	0.0
OP 7	936	15.6	0	0.0
OP 8	860	14.3	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	104	1.7	0	0.0
OP 16	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: 0.4
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	34.253853	-116.805054	6771.20	5.00	6776.20
2	34.252416	-116.805086	6775.06	5.00	6780.06
3	34.252416	-116.802892	6776.59	5.00	6781.59
4	34.252846	-116.802881	6775.61	5.00	6780.61
5	34.252855	-116.803235	6775.53	5.00	6780.53
6	34.253130	-116.803235	6775.72	5.00	6780.72
7	34.253134	-116.803809	6775.33	5.00	6780.33
8	34.253440	-116.803809	6775.38	5.00	6780.38
9	34.253449	-116.804335	6771.80	5.00	6776.80
10	34.253853	-116.804340	6771.96	5.00	6776.96

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: 0.4
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	34.252851	-116.802849	6775.62	5.00	6780.62
2	34.250696	-116.802871	6787.99	5.00	6792.99
3	34.250691	-116.801884	6789.00	5.00	6794.00
4	34.252434	-116.801889	6779.00	5.00	6784.00
5	34.252434	-116.802087	6778.96	5.00	6783.96
6	34.252846	-116.802082	6779.03	5.00	6784.03

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: 0.4
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	34.252842	-116.801664	6779.38	5.00	6784.38
2	34.252429	-116.801658	6779.03	5.00	6784.03
3	34.252429	-116.801766	6779.01	5.00	6784.01
4	34.250691	-116.801760	6788.78	5.00	6793.78
5	34.250691	-116.801015	6790.45	5.00	6795.45
6	34.252837	-116.801009	6783.78	5.00	6788.78
7	34.252846	-116.800923	6783.67	5.00	6788.67
8	34.253148	-116.800923	6788.55	5.00	6793.55
9	34.253148	-116.801508	6785.10	5.00	6790.10
10	34.252842	-116.801508	6780.63	5.00	6785.63

Route Receptors

Name: Central Ln
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.250483	-116.802954	6790.01	6.00	6796.01
2	34.250096	-116.802964	6791.93	6.00	6797.93
3	34.248468	-116.802939	6802.29	6.00	6808.29
4	34.247755	-116.802940	6807.07	6.00	6813.07
5	34.247484	-116.802905	6811.78	6.00	6817.78
6	34.247213	-116.802937	6813.37	6.00	6819.37
7	34.246607	-116.802937	6815.85	6.00	6821.85
8	34.246044	-116.802929	6820.51	6.00	6826.51

Name: Cypress Ln
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.250452	-116.796329	6785.05	6.00	6791.05
2	34.250324	-116.796310	6785.09	6.00	6791.09
3	34.250054	-116.796284	6786.42	6.00	6792.42
4	34.249657	-116.796278	6787.18	6.00	6793.18
5	34.249205	-116.796295	6788.78	6.00	6794.78
6	34.248635	-116.796284	6790.82	6.00	6796.82
7	34.247979	-116.796291	6795.51	6.00	6801.51
8	34.246908	-116.796287	6800.76	6.00	6806.76
9	34.246012	-116.796269	6806.49	6.00	6812.49

Name: Erwin Ranch Rd
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.249734	-116.809496	6792.06	6.00	6798.06
2	34.249871	-116.809195	6790.28	6.00	6796.28
3	34.249938	-116.808806	6790.59	6.00	6796.59
4	34.250011	-116.808589	6791.37	6.00	6797.37
5	34.250381	-116.808066	6789.30	6.00	6795.30
6	34.250459	-116.807875	6786.66	6.00	6792.66
7	34.250494	-116.807639	6787.38	6.00	6793.38
8	34.250461	-116.805797	6787.21	6.00	6793.21
9	34.250475	-116.805231	6787.96	6.00	6793.96
10	34.250486	-116.802771	6789.27	6.00	6795.27
11	34.250486	-116.800950	6790.17	6.00	6796.17
12	34.250446	-116.799719	6789.39	6.00	6795.39
13	34.250445	-116.798042	6785.76	6.00	6791.76
14	34.250453	-116.795711	6784.23	6.00	6790.23
15	34.250422	-116.794424	6782.28	6.00	6788.28
16	34.250453	-116.794212	6781.85	6.00	6787.85
17	34.250581	-116.793743	6780.66	6.00	6786.66
18	34.250579	-116.793461	6780.12	6.00	6786.12

Name: Jensen Dr - Ringwood Trl
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.255954	-116.807491	6886.54	6.00	6892.54
2	34.255753	-116.807575	6879.13	6.00	6885.13
3	34.255549	-116.807623	6870.92	6.00	6876.92
4	34.255393	-116.807599	6864.32	6.00	6870.32
5	34.255287	-116.807521	6860.81	6.00	6866.81
6	34.255209	-116.807368	6860.05	6.00	6866.05
7	34.255154	-116.807025	6853.49	6.00	6859.49
8	34.255087	-116.806322	6828.14	6.00	6834.14
9	34.255054	-116.805780	6801.69	6.00	6807.69
10	34.255010	-116.805571	6793.31	6.00	6799.31
11	34.254937	-116.805466	6786.99	6.00	6792.99
12	34.254798	-116.805393	6779.93	6.00	6785.93
13	34.254640	-116.805352	6773.79	6.00	6779.79

Name: Lakewood Dr
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.254638	-116.805351	6773.79	6.00	6779.79
2	34.254467	-116.805323	6770.65	6.00	6776.65
3	34.253181	-116.805316	6771.85	6.00	6777.85
4	34.251804	-116.805305	6781.38	6.00	6787.38
5	34.250521	-116.805290	6787.95	6.00	6793.95
6	34.250477	-116.805234	6787.87	6.00	6793.87
7	34.250441	-116.805157	6788.76	6.00	6794.76
8	34.250277	-116.805129	6791.08	6.00	6797.08
9	34.248736	-116.805133	6800.24	6.00	6806.24
10	34.246602	-116.805109	6817.69	6.00	6823.69
11	34.246063	-116.805117	6821.27	6.00	6827.27

Name: Willow Ln
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.250480	-116.800751	6789.82	6.00	6795.82
2	34.250180	-116.800764	6791.62	6.00	6797.62
3	34.249547	-116.800757	6794.12	6.00	6800.12
4	34.249281	-116.800783	6795.52	6.00	6801.52
5	34.249089	-116.800761	6797.77	6.00	6803.77
6	34.248947	-116.800753	6798.84	6.00	6804.84
7	34.248821	-116.800764	6799.14	6.00	6805.14
8	34.248335	-116.800759	6802.48	6.00	6808.48
9	34.247605	-116.800731	6808.51	6.00	6814.51
10	34.246942	-116.800731	6813.29	6.00	6819.29
11	34.246783	-116.800711	6815.89	6.00	6821.89
12	34.246054	-116.800711	6817.99	6.00	6823.99

Flight Path Receptors

Name: FP 1
Description:
Threshold height: 29 ft
Direction: 74.0°
Glide slope: 4.3°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.263779	-116.864144	6753.64	29.00	6782.64
Two-mile	34.255809	-116.897812	6745.41	831.24	7576.65

Name: FP 2
Description:
Threshold height: 46 ft
Direction: 270.0°
Glide slope: 4.3°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.263835	-116.848690	6756.32	46.00	6802.32
Two-mile	34.263835	-116.813665	6743.08	853.25	7596.33

Name: FP 3
Description:
Threshold height: 46 ft
Direction: 256.0°
Glide slope: 4.3°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.263835	-116.848689	6756.32	46.00	6802.32
Two-mile	34.270829	-116.814705	6711.30	885.04	7596.33

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	34.250192	-116.805503	6792.88	6.00
OP 2	2	34.250160	-116.803294	6795.48	8.00
OP 3	3	34.250738	-116.803942	6791.36	8.00
OP 4	4	34.251642	-116.804936	6784.71	8.00
OP 5	5	34.252013	-116.805874	6778.97	8.00
OP 6	6	34.255694	-116.807161	6896.13	8.00
OP 7	7	34.255223	-116.811646	6764.44	6.00
OP 8	8	34.253904	-116.811181	6772.14	8.00
OP 9	9	34.248501	-116.802576	6803.42	8.00
OP 10	10	34.248474	-116.801074	6804.24	8.00
OP 11	11	34.247310	-116.800162	6812.56	8.00
OP 12	12	34.246845	-116.798387	6809.84	8.00
OP 13	13	34.247796	-116.796905	6796.92	8.00
OP 14	14	34.250039	-116.798024	6790.95	8.00
OP 15	15	34.252042	-116.799274	6819.42	8.00
OP 16	16	34.251464	-116.795675	6862.01	8.00

Glare Analysis Results

Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV 01	SA tracking	SA tracking	4,767	79.5	312	5.2	-
PV 02	SA tracking	SA tracking	9,259	154.3	1,494	24.9	-
PV 03	SA tracking	SA tracking	265	4.4	606	10.1	-

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
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Erwin Ranch Rd	1,267	21.1	1,480	24.7
Jensen Dr - Ringwood Trl	3,234	53.9	130	2.2
Lakewood Dr	963	16.1	234	3.9
Willow Ln	0	0.0	0	0.0
FP 1	1,625	27.1	0	0.0
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 1	599	10.0	0	0.0
OP 2	310	5.2	0	0.0
OP 3	673	11.2	386	6.4
OP 4	1,996	33.3	0	0.0
OP 5	1,631	27.2	182	3.0
OP 6	93	1.6	0	0.0
OP 7	936	15.6	0	0.0
OP 8	860	14.3	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	104	1.7	0	0.0
OP 16	0	0.0	0	0.0

PV: PV 01 potential temporary after-image

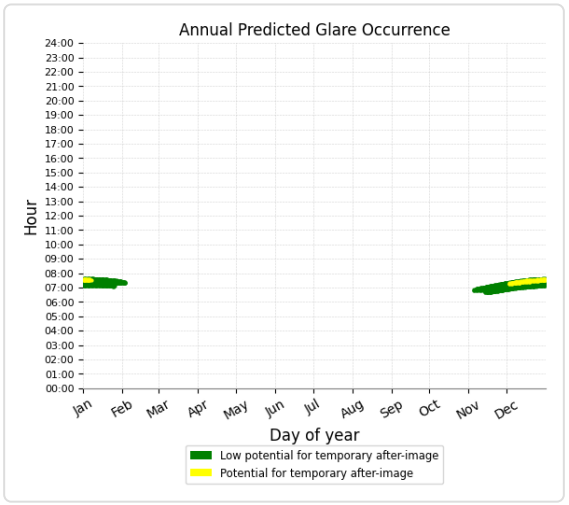
Receptor results ordered by category of glare

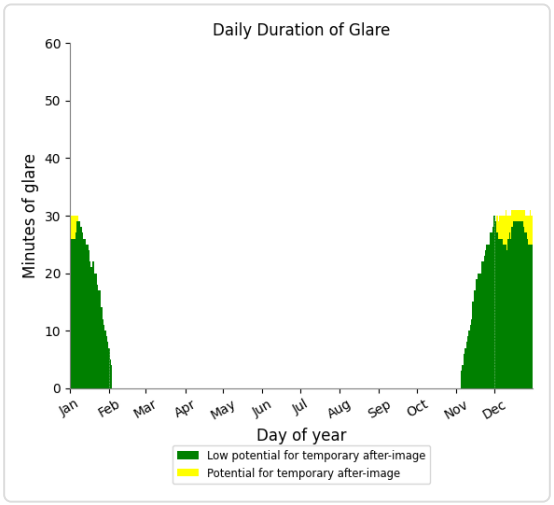
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Jensen Dr - Ringwood Trl	1,965	32.8	130	2.2
Erwin Ranch Rd	279	4.7	0	0.0
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Lakewood Dr	0	0.0	0	0.0
Willow Ln	0	0.0	0	0.0
FP 1	818	13.6	0	0.0
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 5	498	8.3	182	3.0
OP 4	310	5.2	0	0.0
OP 7	460	7.7	0	0.0
OP 8	437	7.3	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

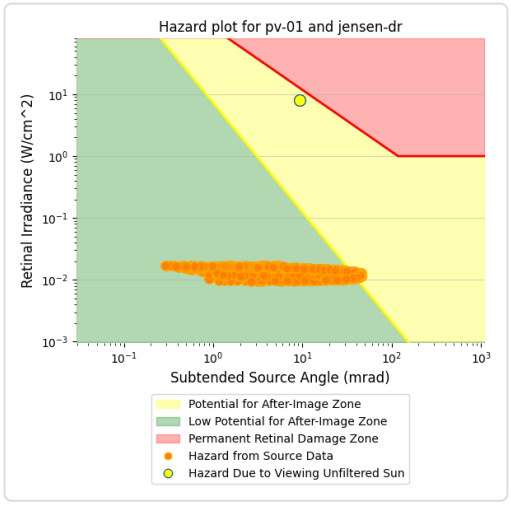
PV 01 and Route: Jensen Dr - Ringwood Trl

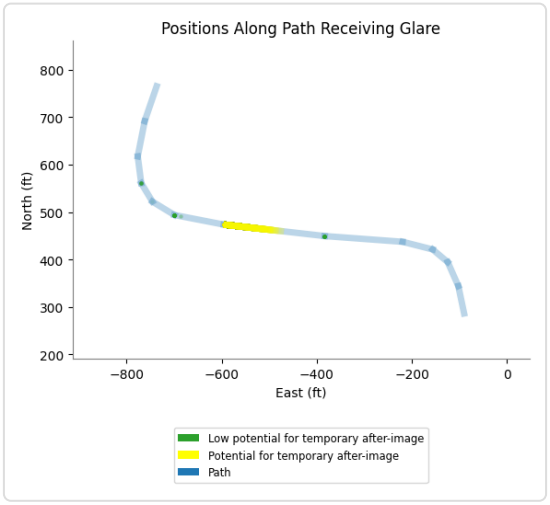
Yellow glare: 130 min.

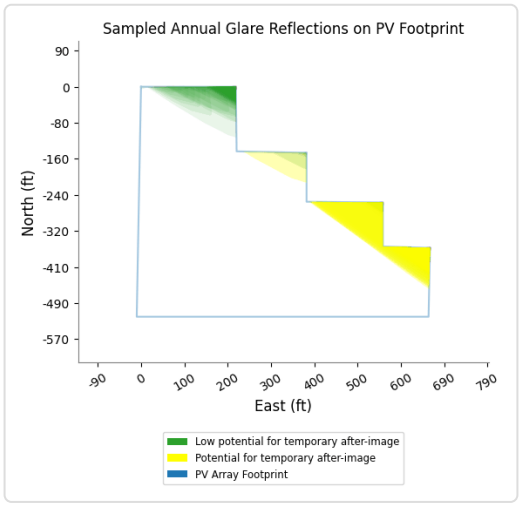
Green glare: 1,965 min.







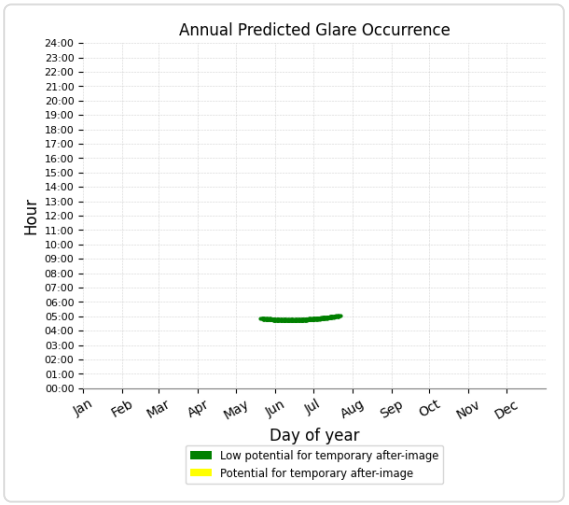


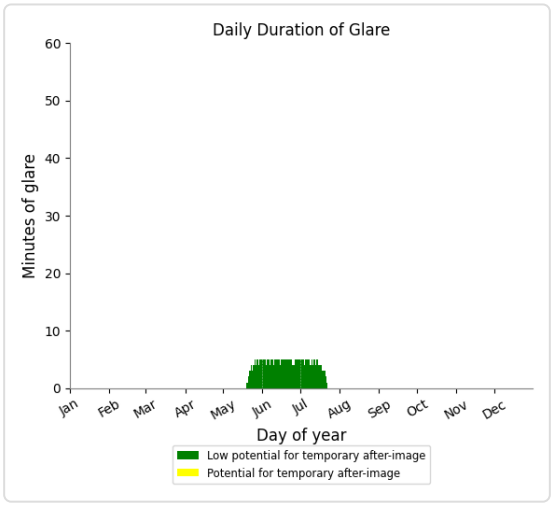


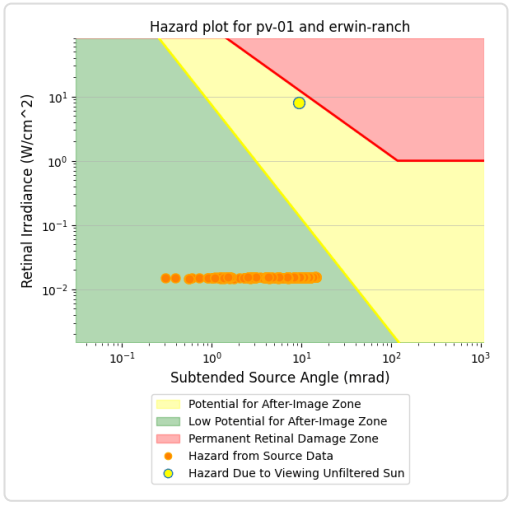
PV 01 and Route: Erwin Ranch Rd

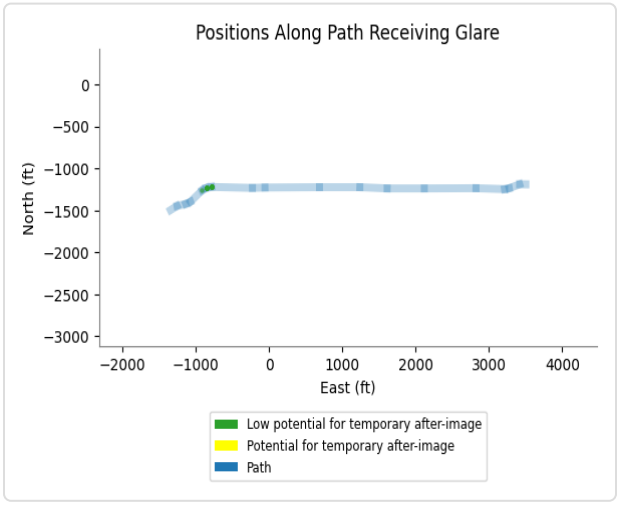
Yellow glare: none

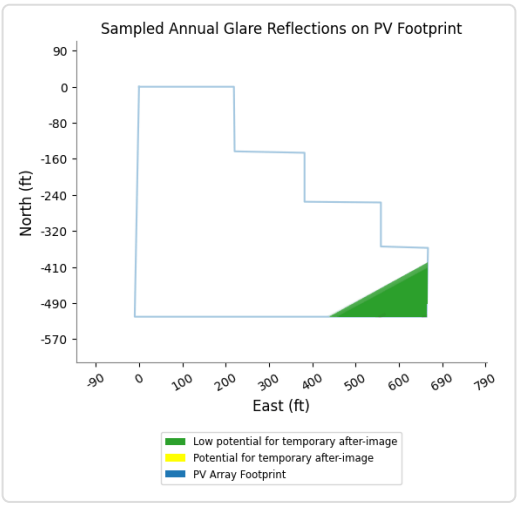
Green glare: 279 min.











PV 01 and Route: Central Ln

No glare found

PV 01 and Route: Cypress Ln

No glare found

PV 01 and Route: Lakewood Dr

No glare found

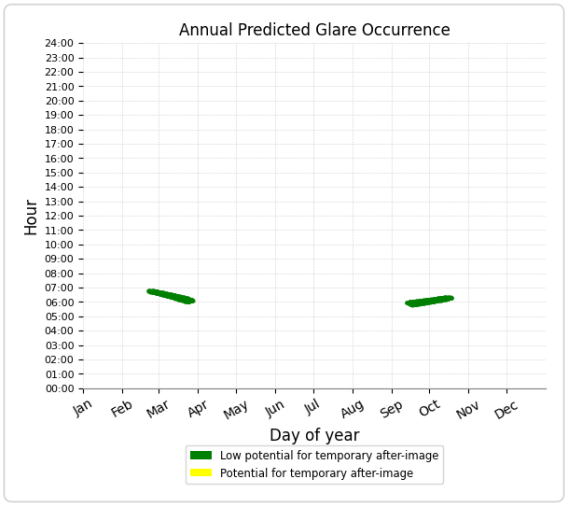
PV 01 and Route: Willow Ln

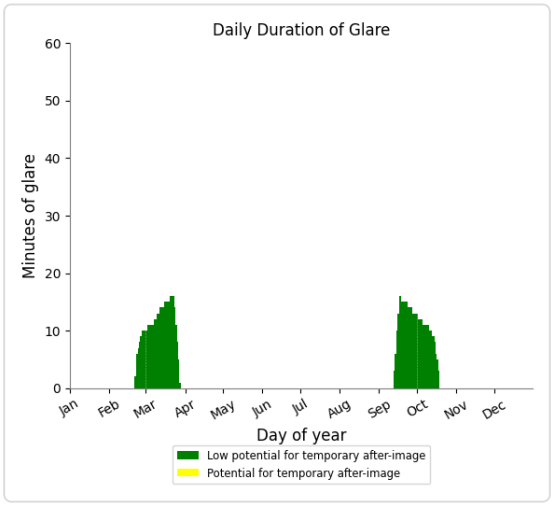
No glare found

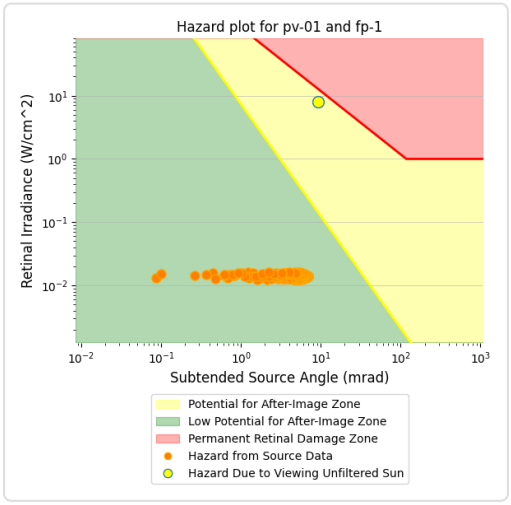
PV 01 and FP: FP 1

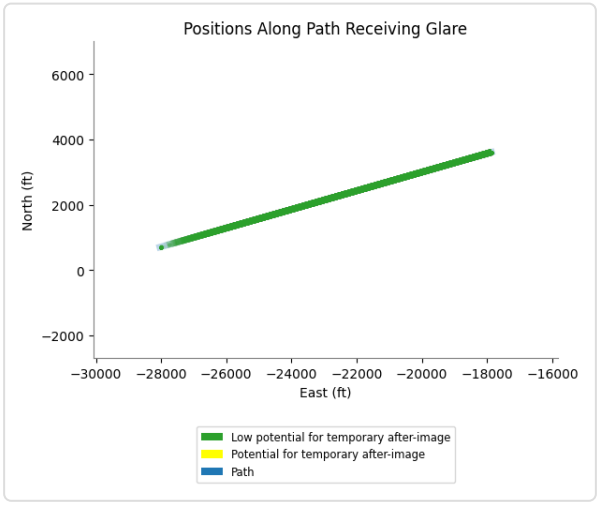
Yellow glare: none

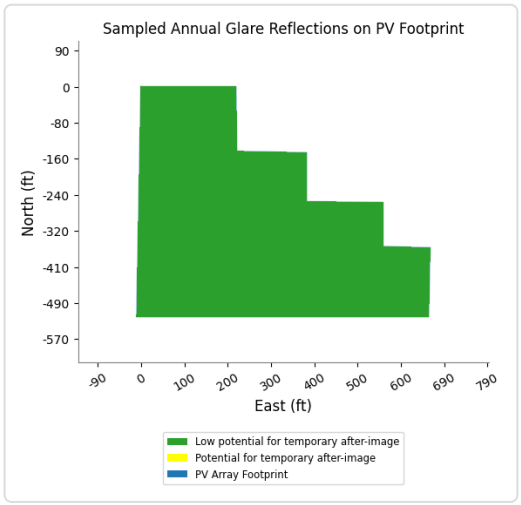
Green glare: 818 min.

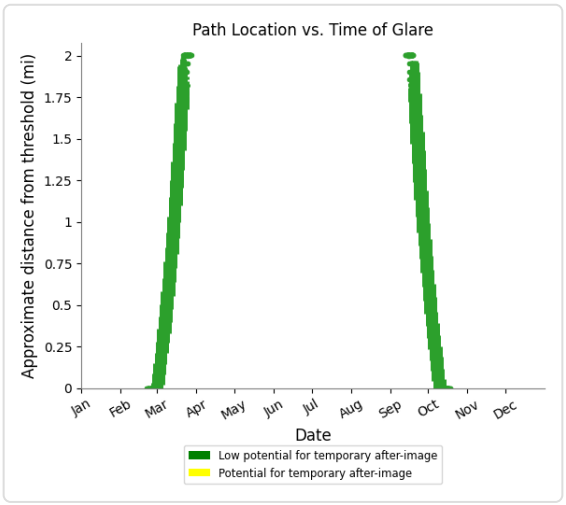












PV 01 and FP: FP 2

No glare found

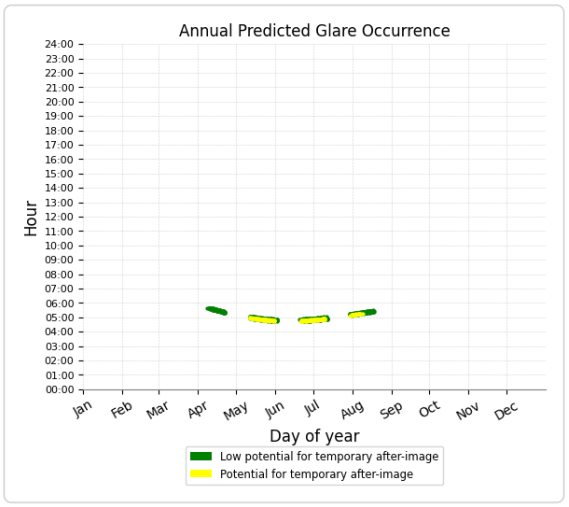
PV 01 and FP: FP 3

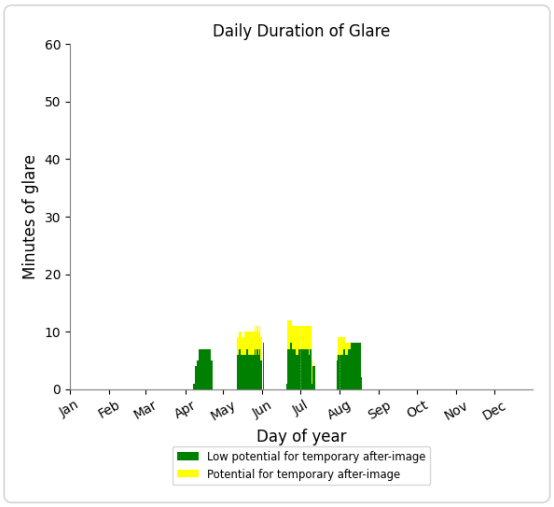
No glare found

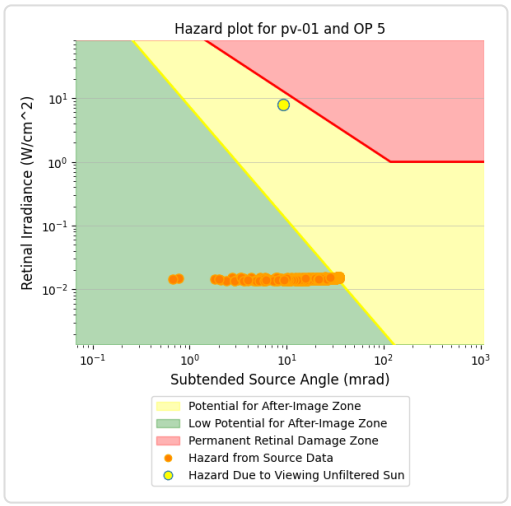
PV 01 and OP 5

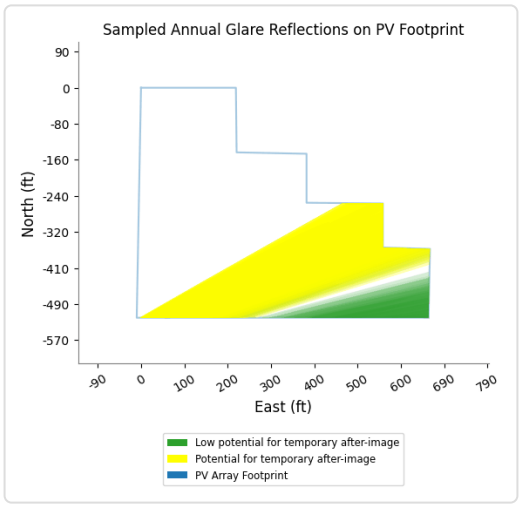
Yellow glare: 182 min.

Green glare: 498 min.





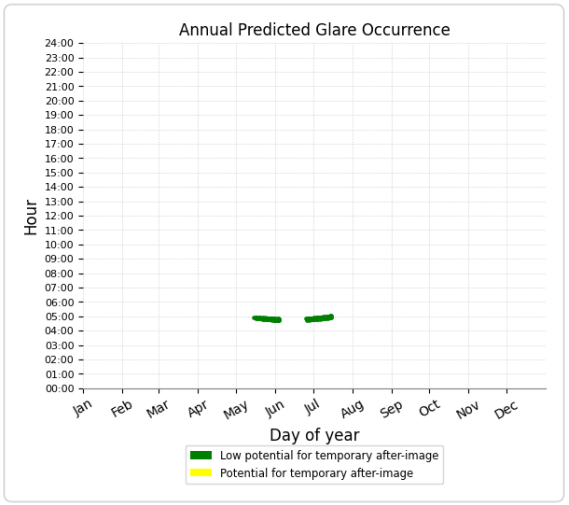


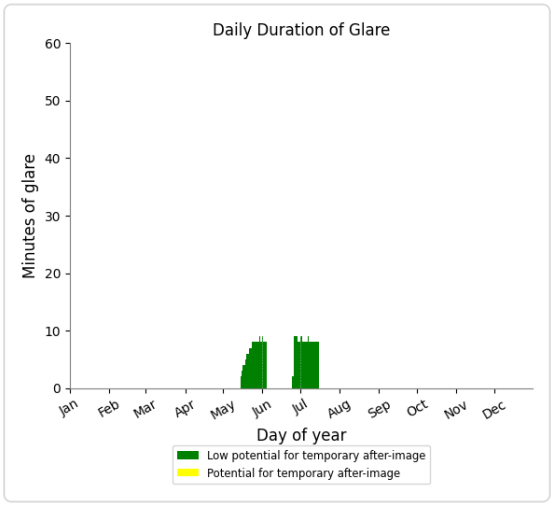


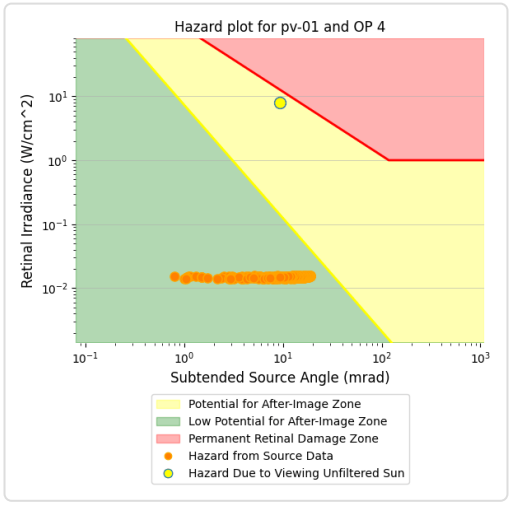
PV 01 and OP 4

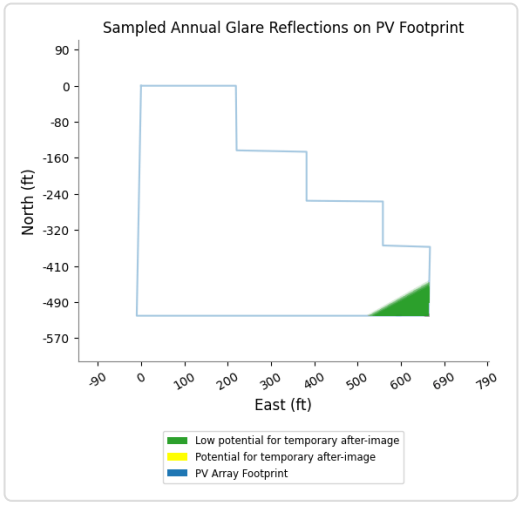
Yellow glare: none

Green glare: 310 min.





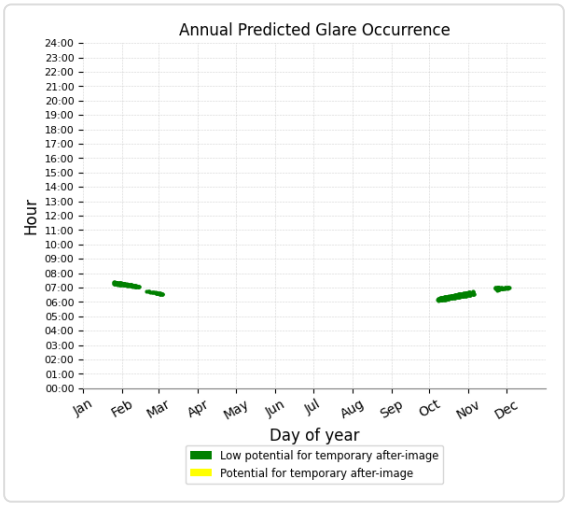


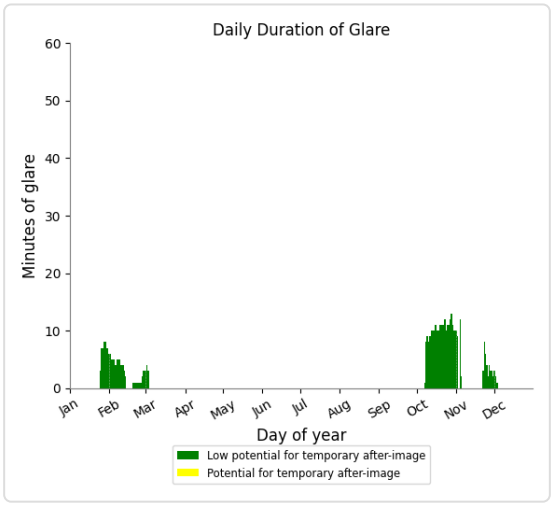


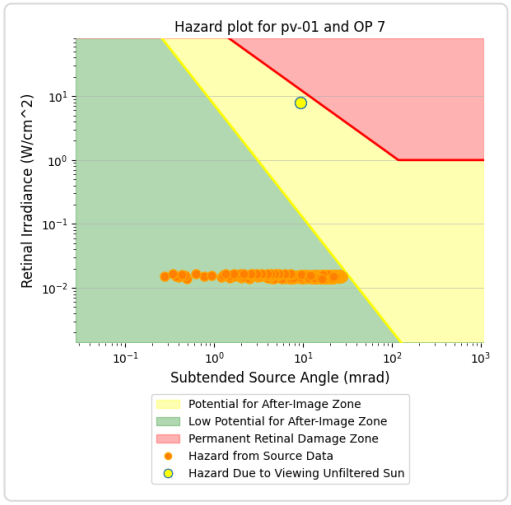
PV 01 and OP 7

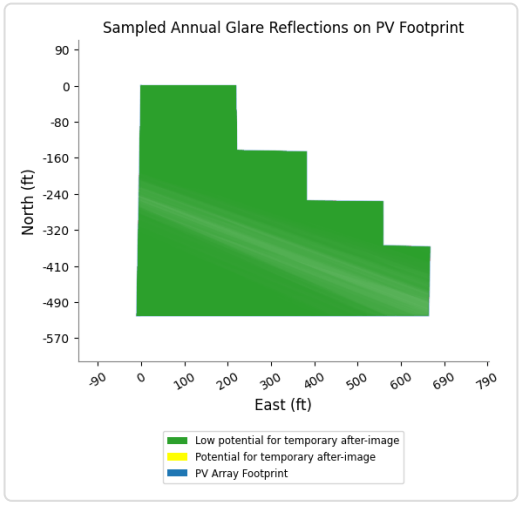
Yellow glare: none

Green glare: 460 min.





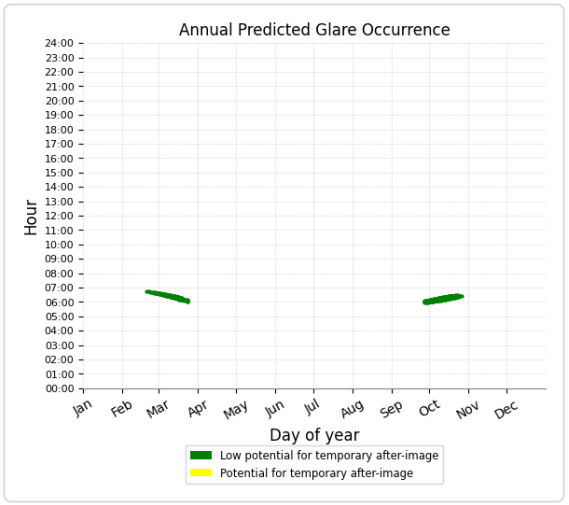


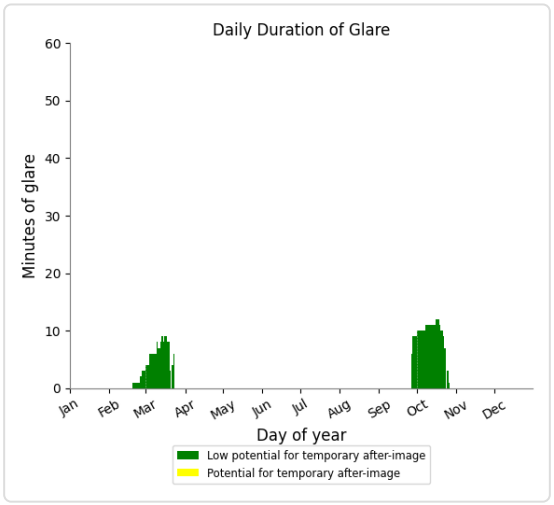


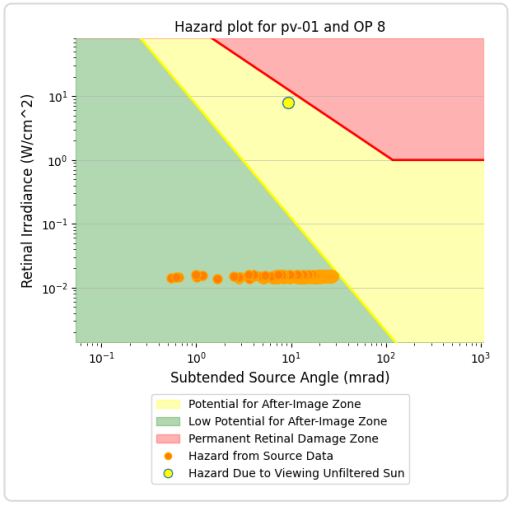
PV 01 and OP 8

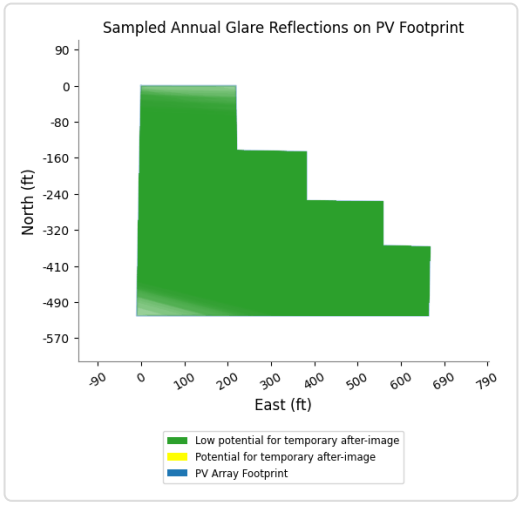
Yellow glare: none

Green glare: 437 min.









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 6

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 01 and OP 13

No glare found

PV 01 and OP 14

No glare found

PV 01 and OP 15

No glare found

PV 01 and OP 16

No glare found

PV: PV 02 potential temporary after-image

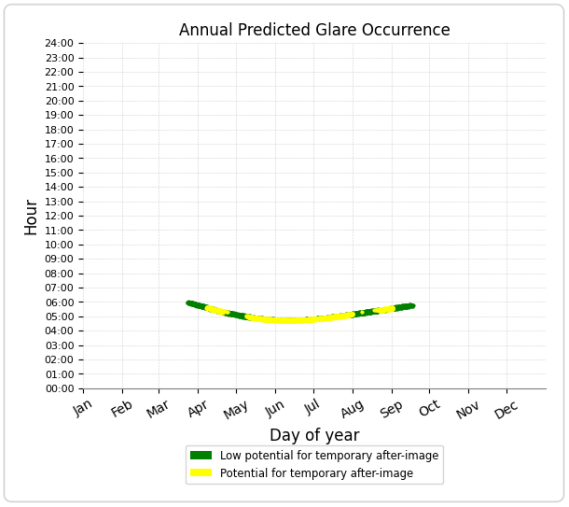
Receptor results ordered by category of glare

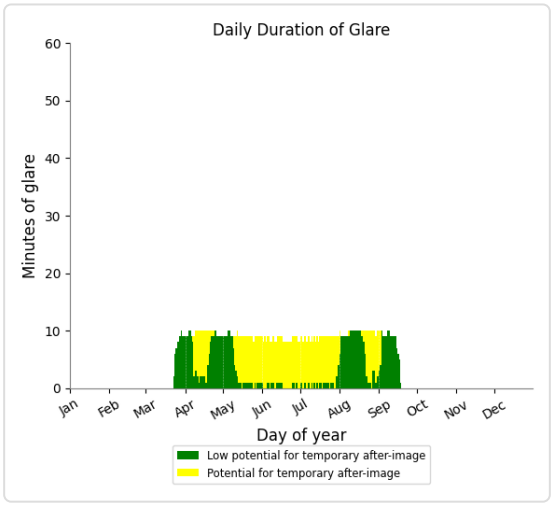
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Erwin Ranch Rd	743	12.4	874	14.6
Lakewood Dr	963	16.1	234	3.9
Jensen Dr - Ringwood Trl	1,269	21.1	0	0.0
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Willow Ln	0	0.0	0	0.0
FP 1	807	13.4	0	0.0
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 3	673	11.2	386	6.4
OP 1	599	10.0	0	0.0
OP 2	290	4.8	0	0.0
OP 4	1,686	28.1	0	0.0
OP 5	1,133	18.9	0	0.0
OP 6	93	1.6	0	0.0
OP 7	476	7.9	0	0.0
OP 8	423	7.0	0	0.0
OP 15	104	1.7	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

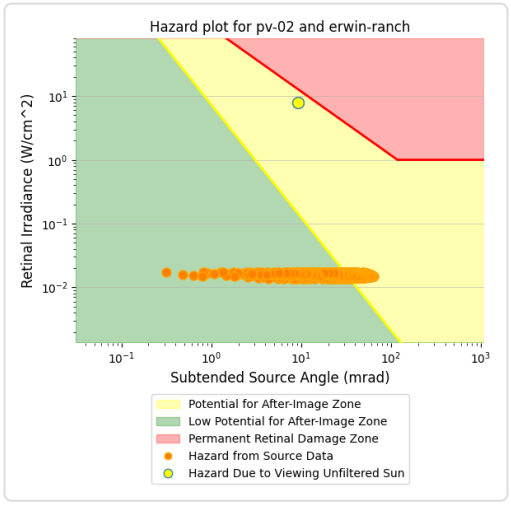
PV 02 and Route: Erwin Ranch Rd

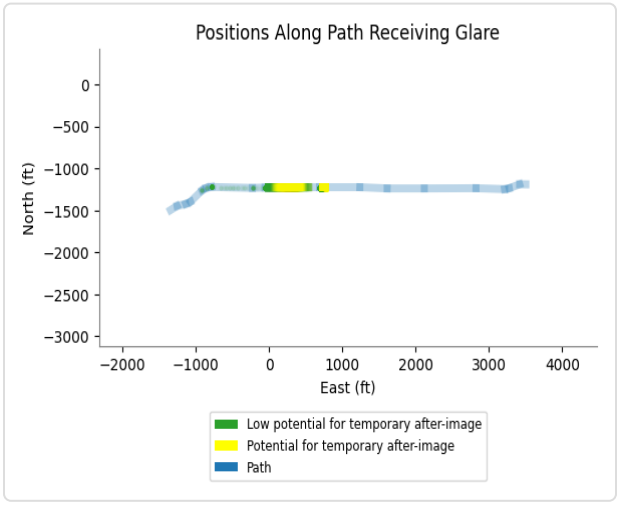
Yellow glare: 874 min.

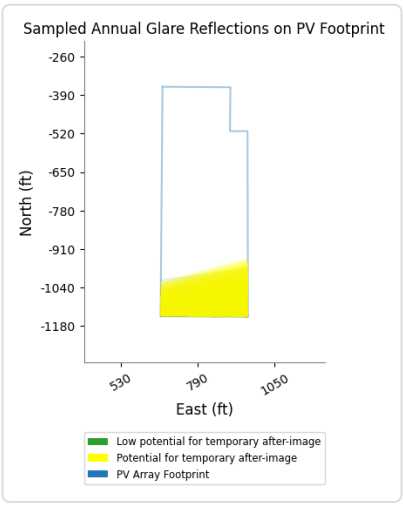
Green glare: 743 min.







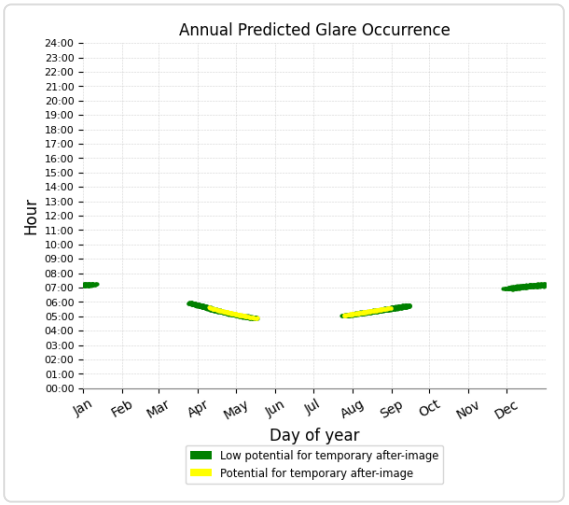


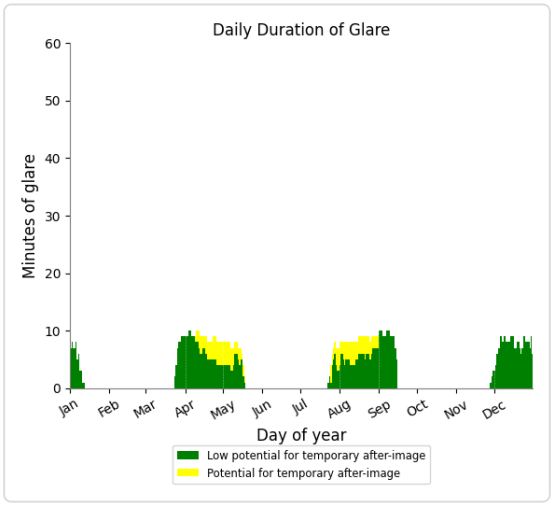


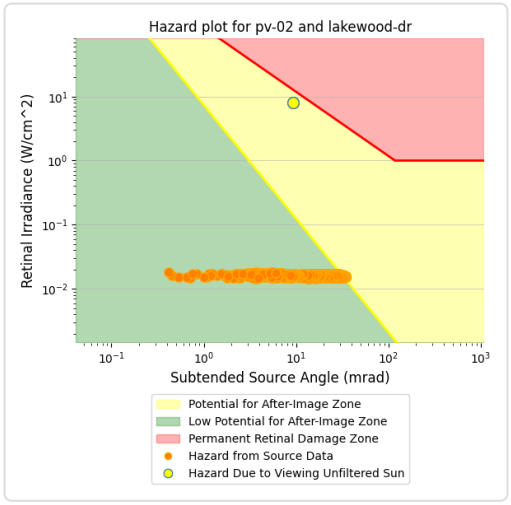
PV 02 and Route: Lakewood Dr

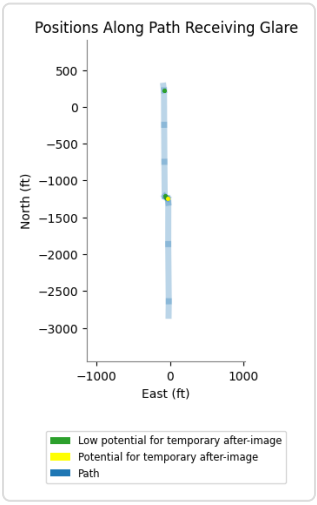
Yellow glare: 234 min.

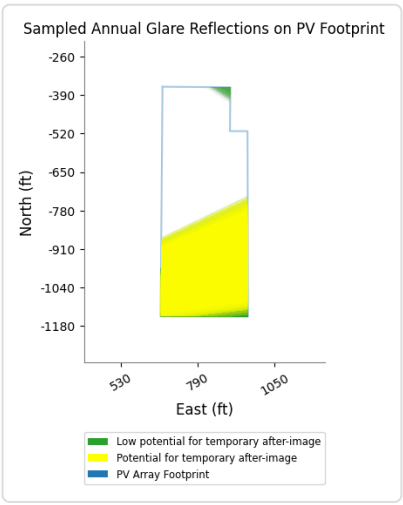
Green glare: 963 min.







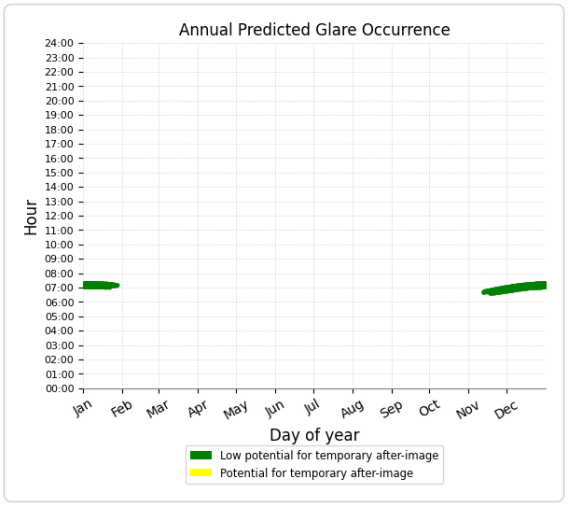


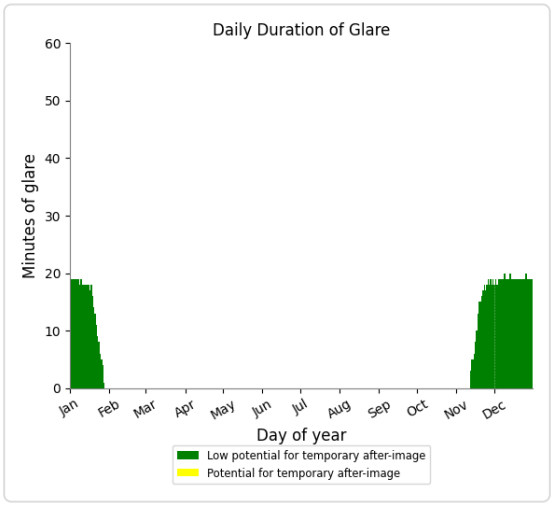


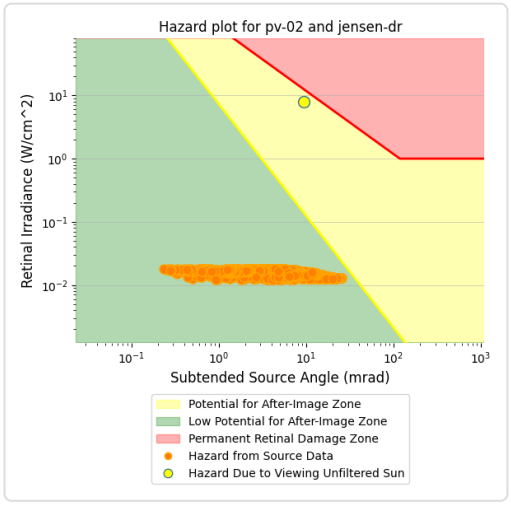
PV 02 and Route: Jensen Dr - Ringwood Trl

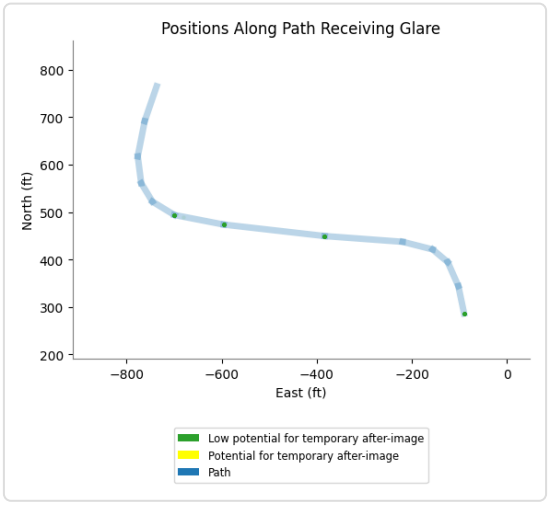
Yellow glare: none

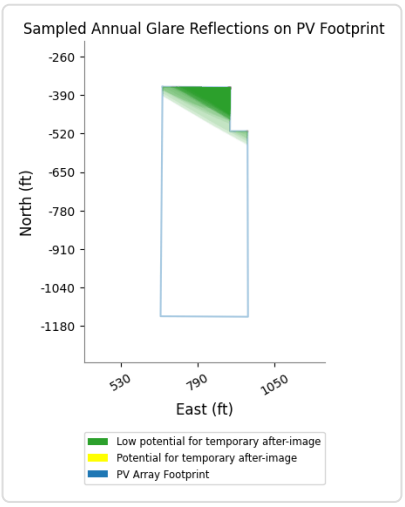
Green glare: 1,269 min.











PV 02 and Route: Central Ln

No glare found

PV 02 and Route: Cypress Ln

No glare found

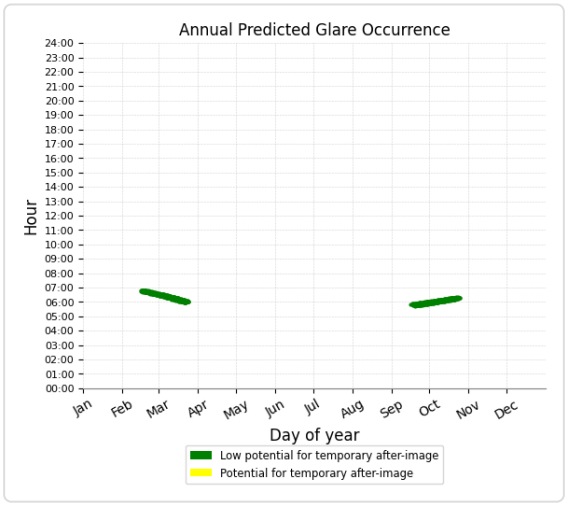
PV 02 and Route: Willow Ln

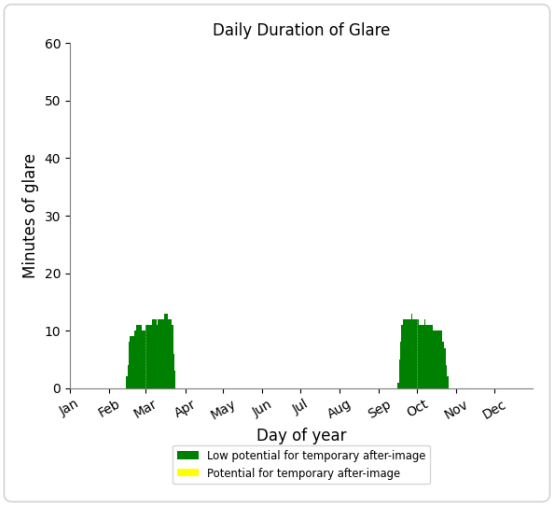
No glare found

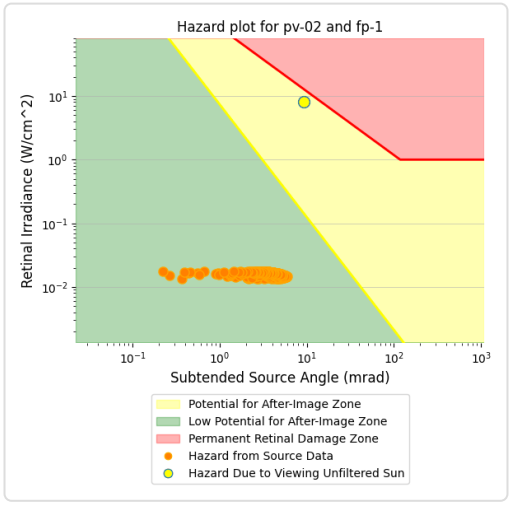
PV 02 and FP: FP 1

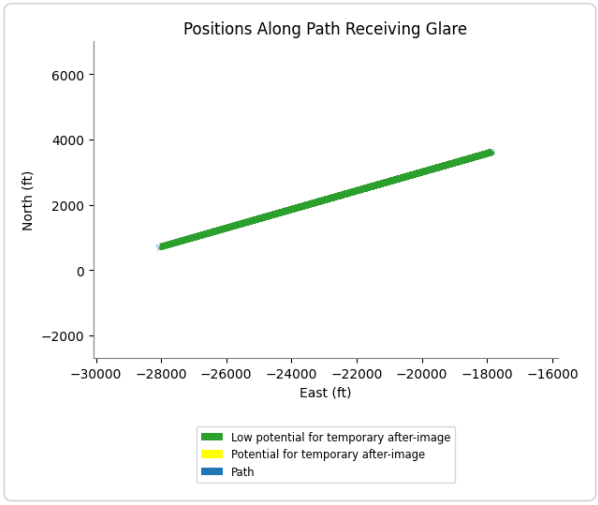
Yellow glare: none

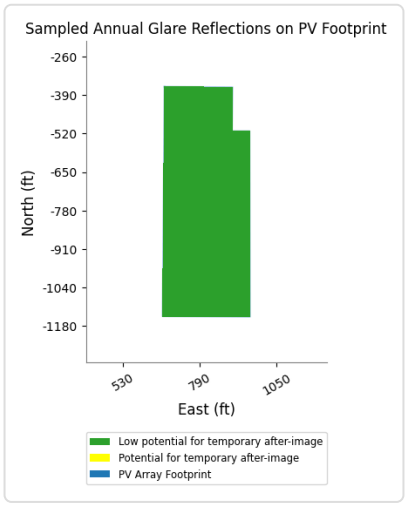
Green glare: 807 min.

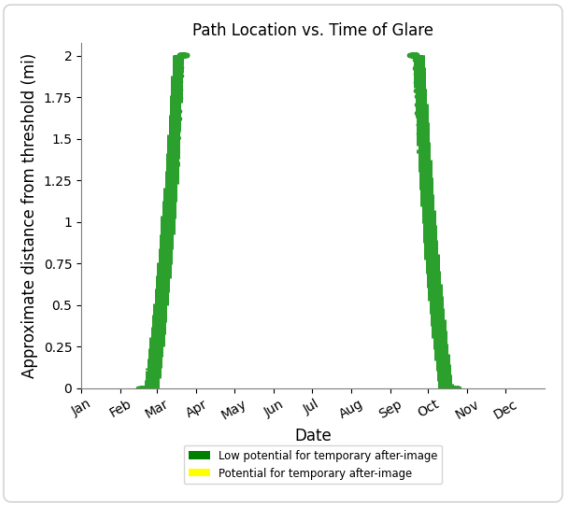












PV 02 and FP: FP 2

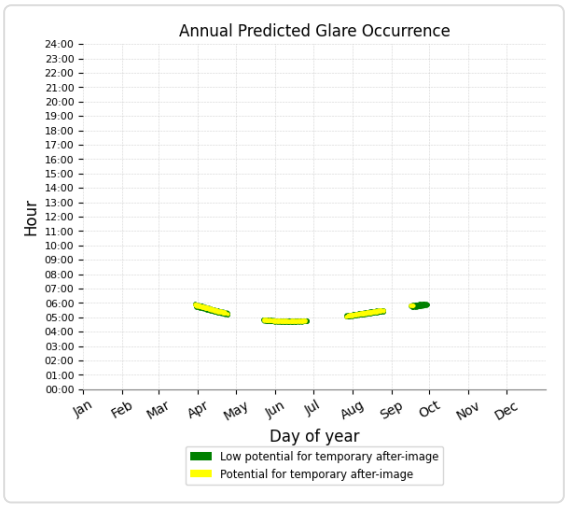
No glare found

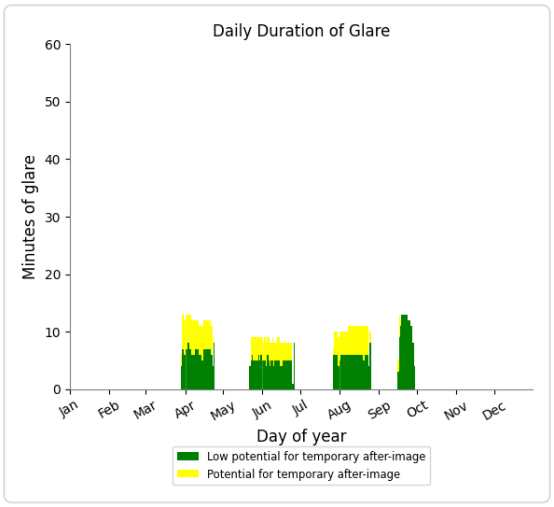
PV 02 and FP: FP 3

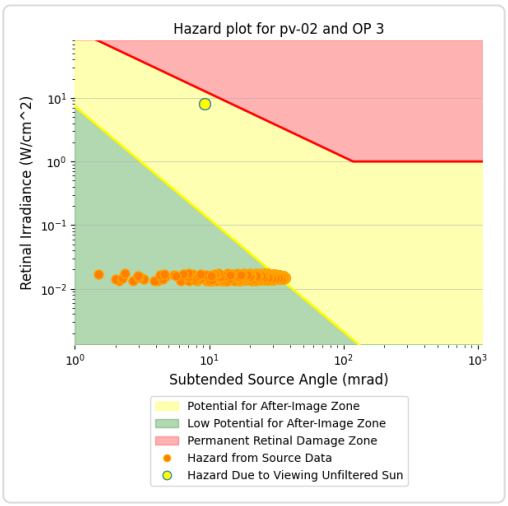
No glare found

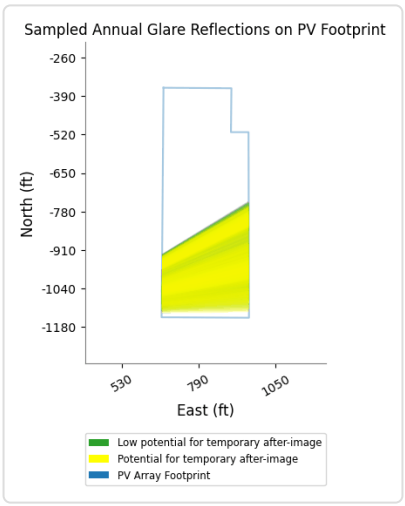
PV 02 and OP 3

Yellow glare: 386 min.
Green glare: 673 min.





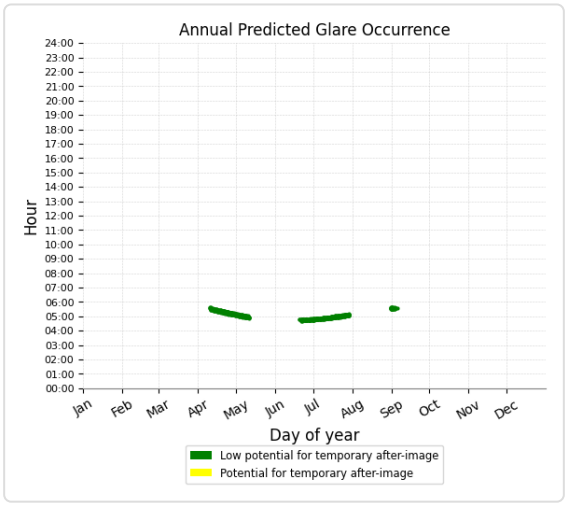


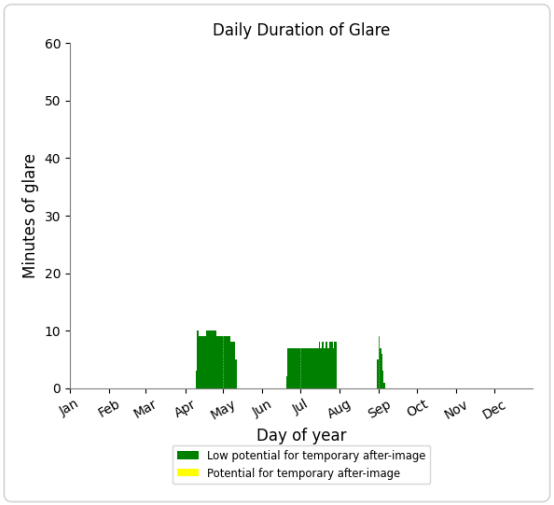


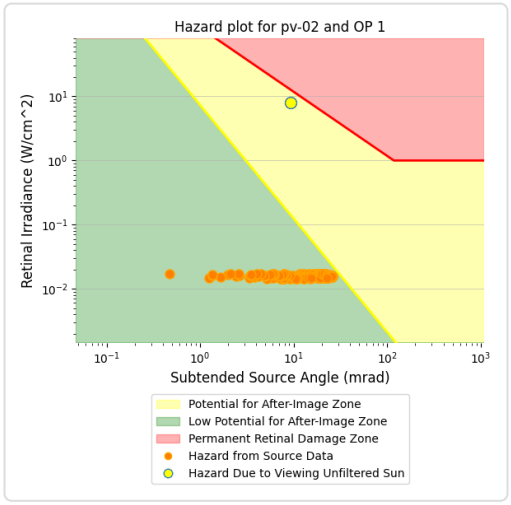
PV 02 and OP 1

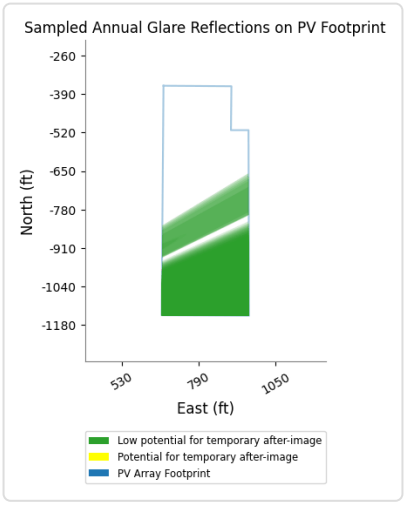
Yellow glare: none

Green glare: 599 min.





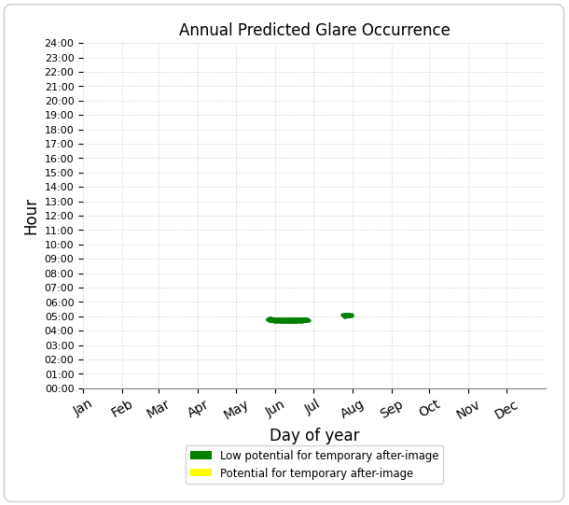


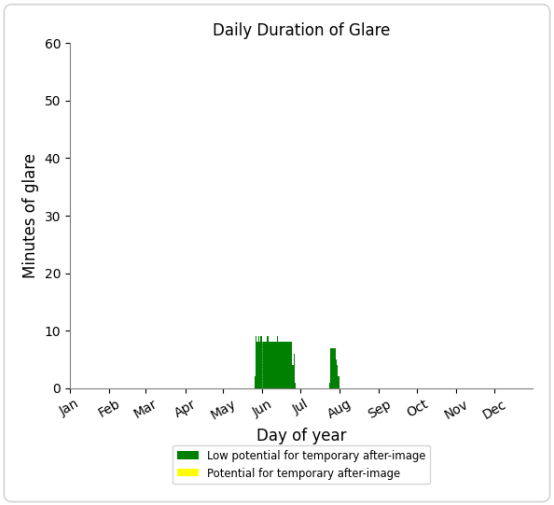


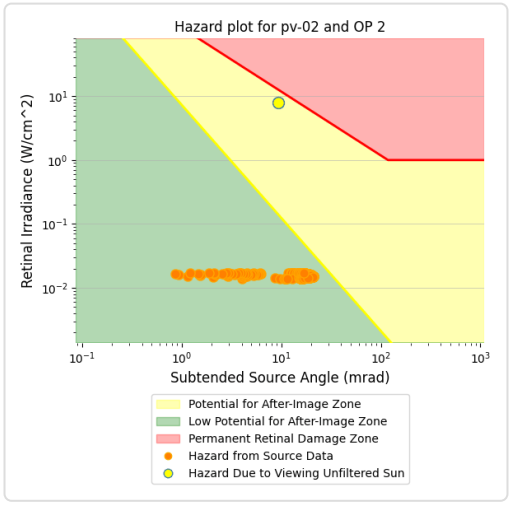
PV 02 and OP 2

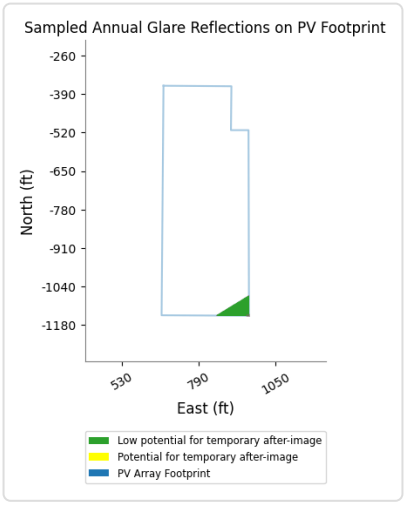
Yellow glare: none

Green glare: 290 min.





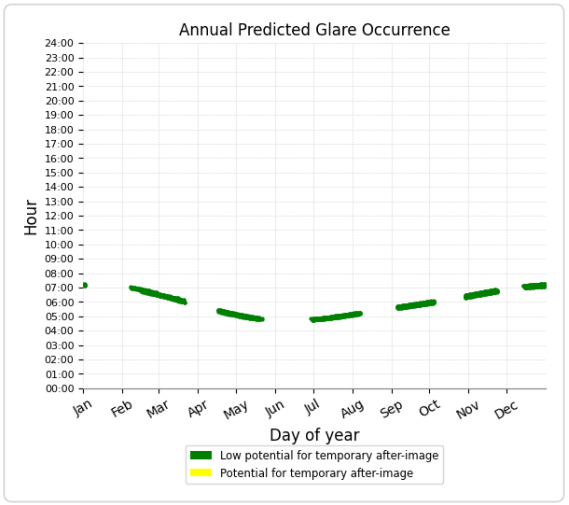


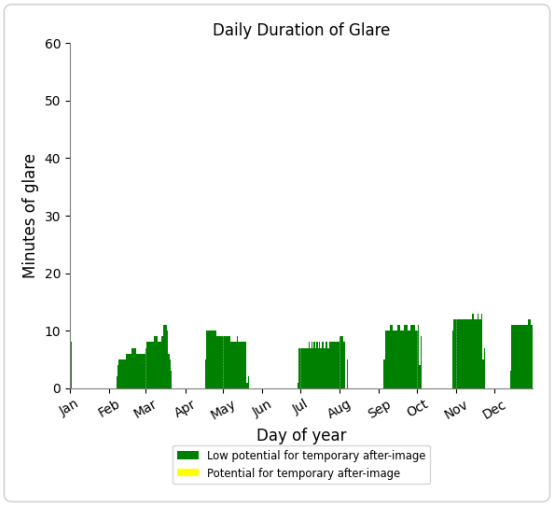


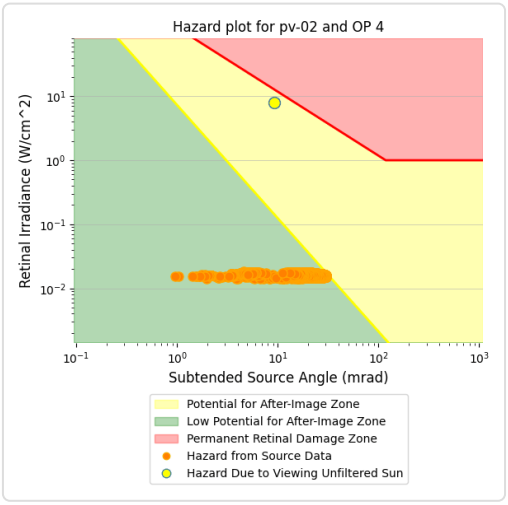
PV 02 and OP 4

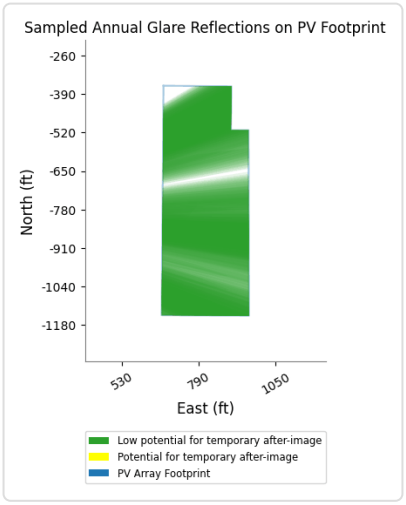
Yellow glare: none

Green glare: 1,686 min.





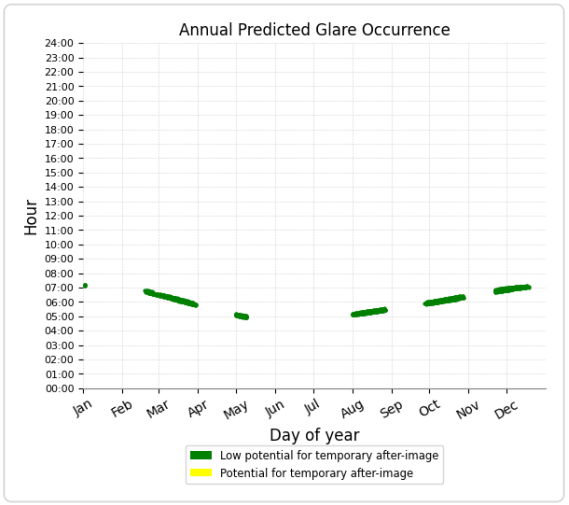


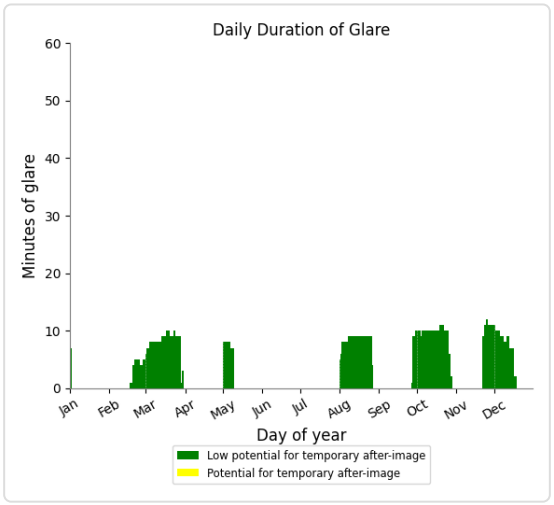


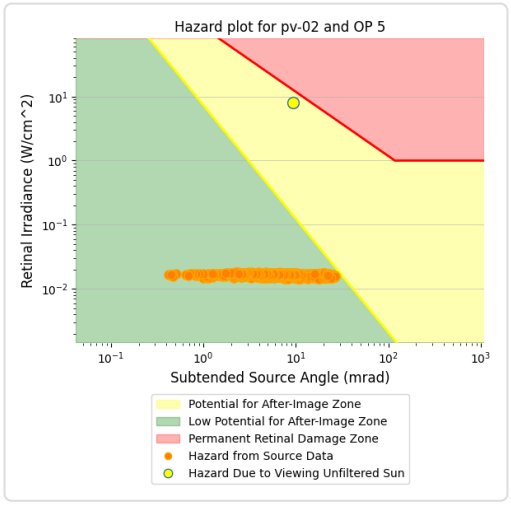
PV 02 and OP 5

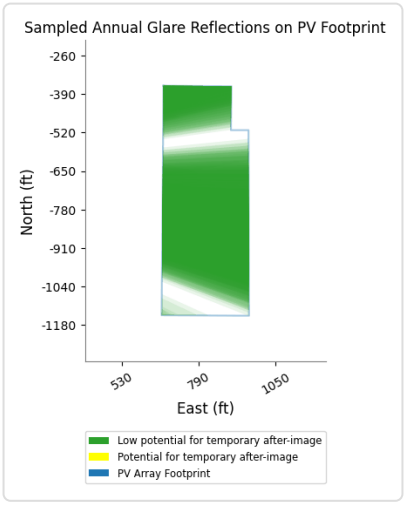
Yellow glare: none

Green glare: 1,133 min.





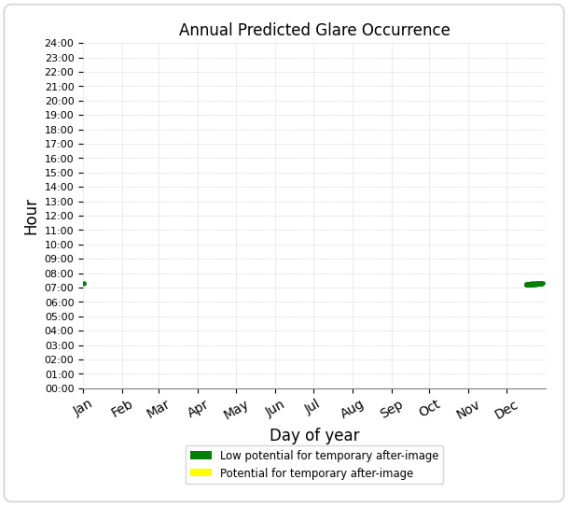


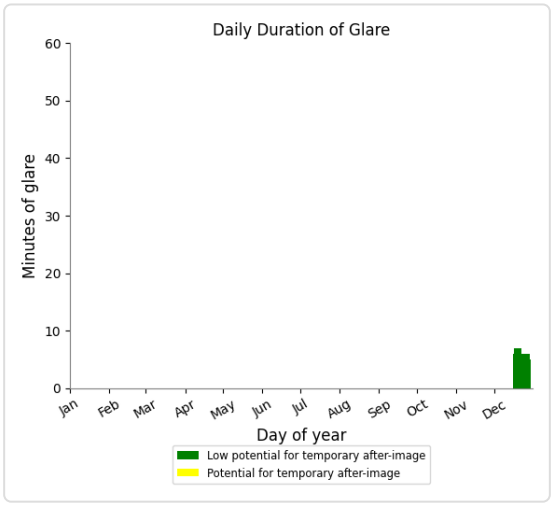


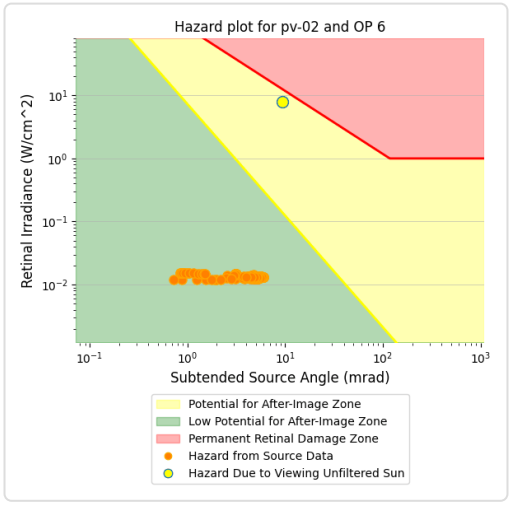
PV 02 and OP 6

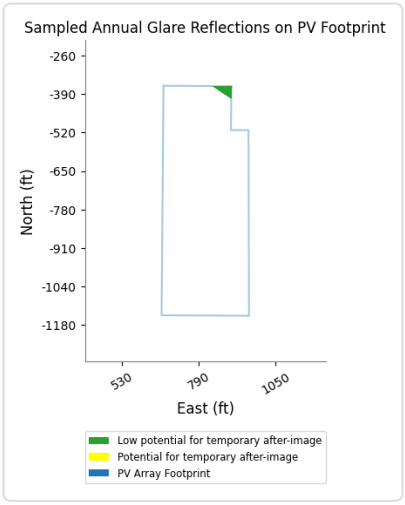
Yellow glare: none

Green glare: 93 min.





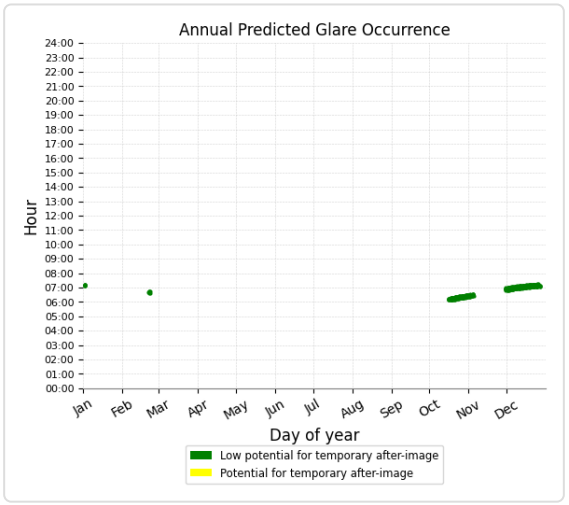


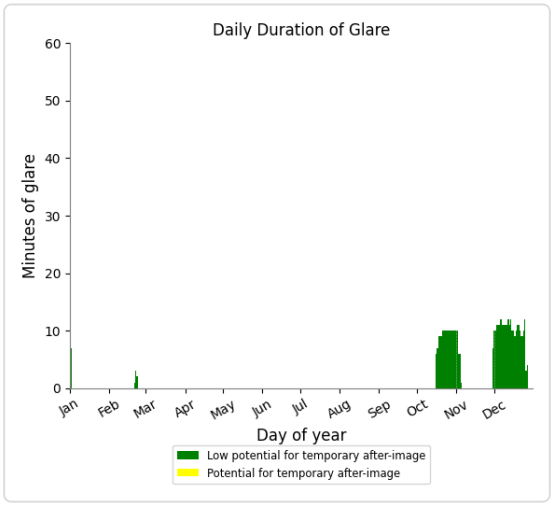


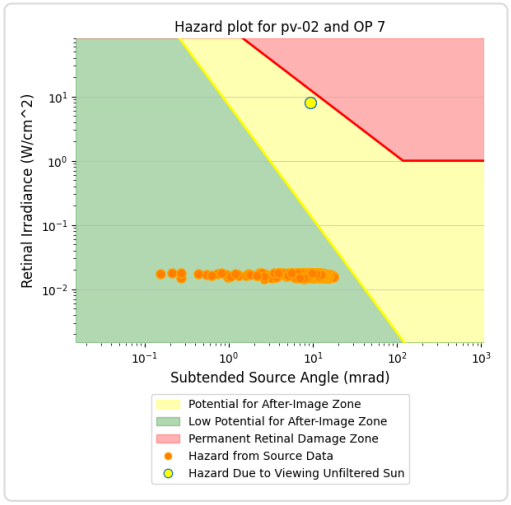
PV 02 and OP 7

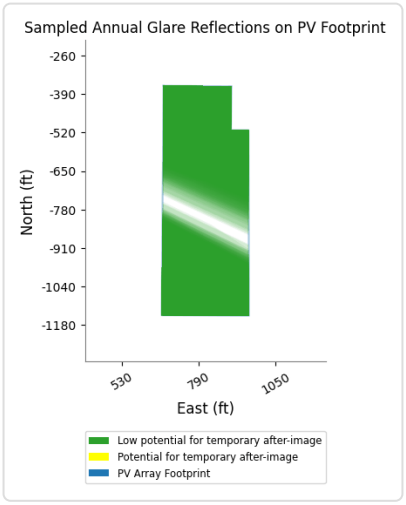
Yellow glare: none

Green glare: 476 min.





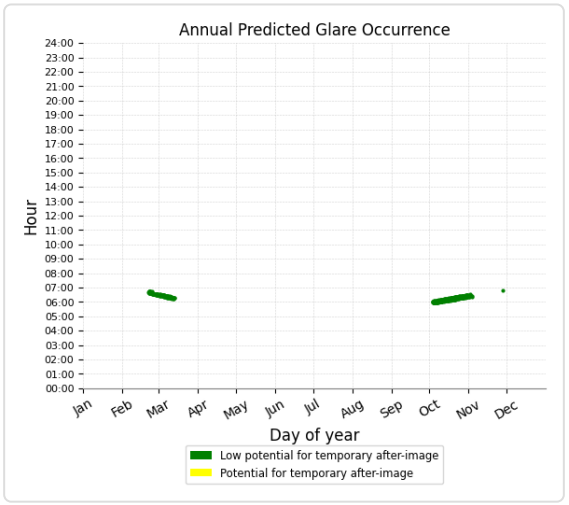


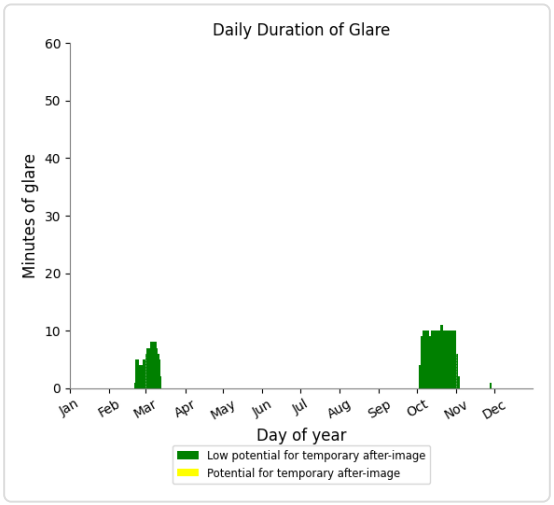


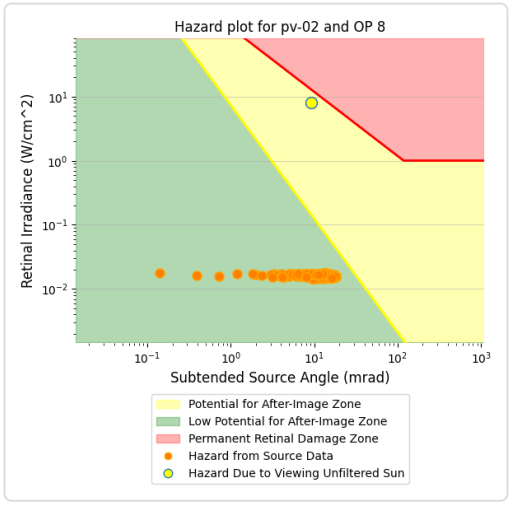
PV 02 and OP 8

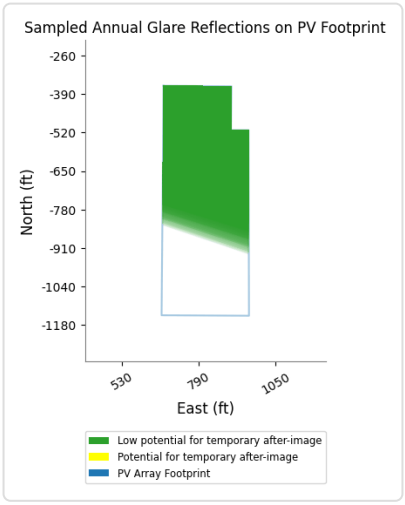
Yellow glare: none

Green glare: 423 min.



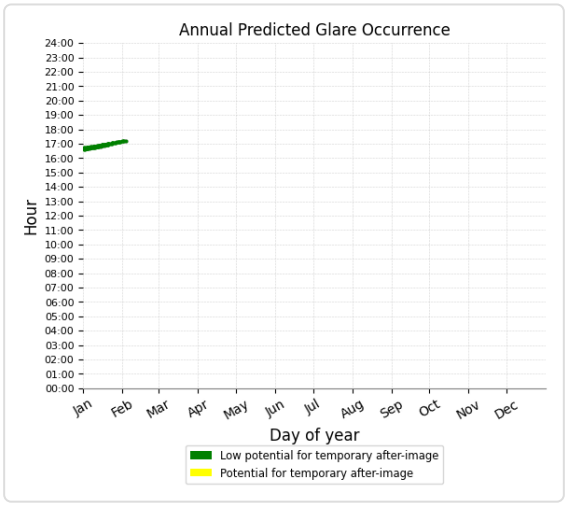


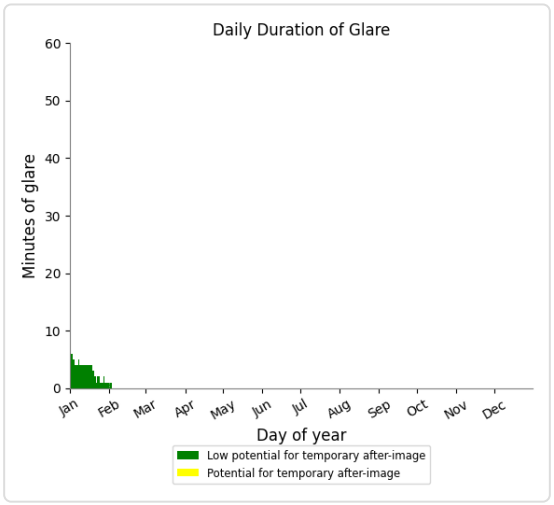


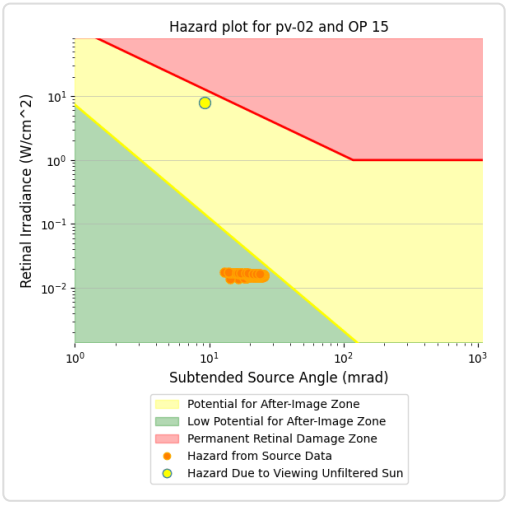


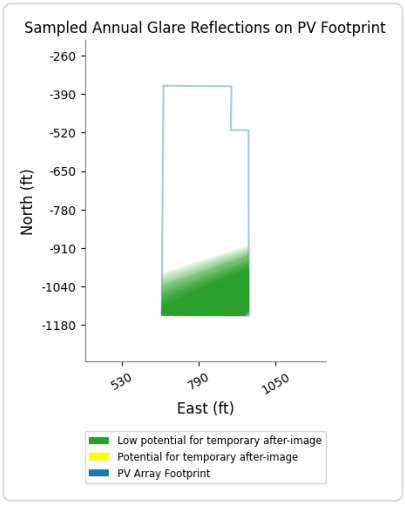
PV 02 and OP 15

Yellow glare: none
Green glare: 104 min.









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 02 and OP 13

No glare found

PV 02 and OP 14

No glare found

PV 02 and OP 16

No glare found

PV: PV 03 potential temporary after-image

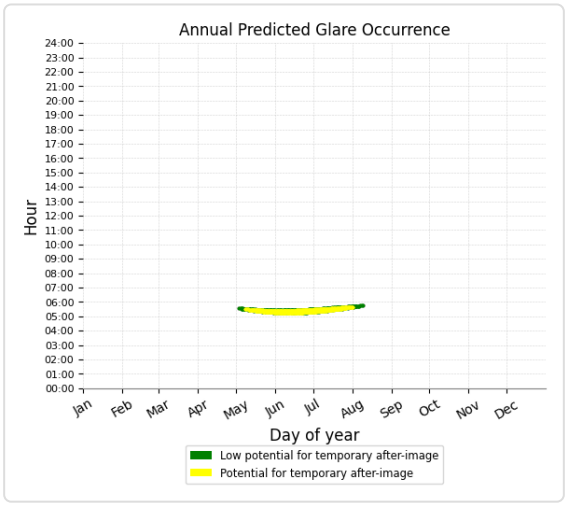
Receptor results ordered by category of glare

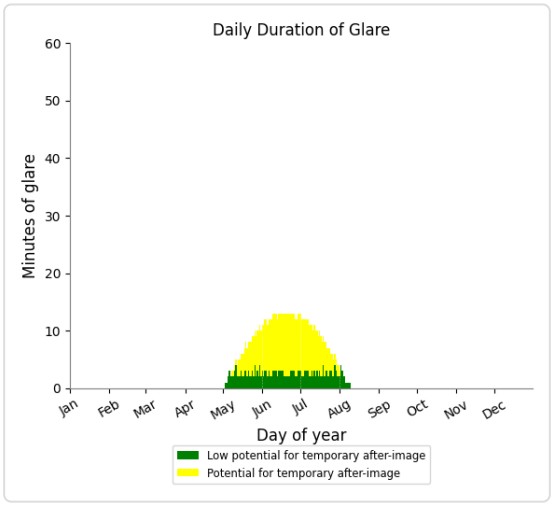
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Erwin Ranch Rd	245	4.1	606	10.1
Central Ln	0	0.0	0	0.0
Cypress Ln	0	0.0	0	0.0
Jensen Dr - Ringwood Trl	0	0.0	0	0.0
Lakewood Dr	0	0.0	0	0.0
Willow Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
FP 3	0	0.0	0	0.0
OP 2	20	0.3	0	0.0
OP 1	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0

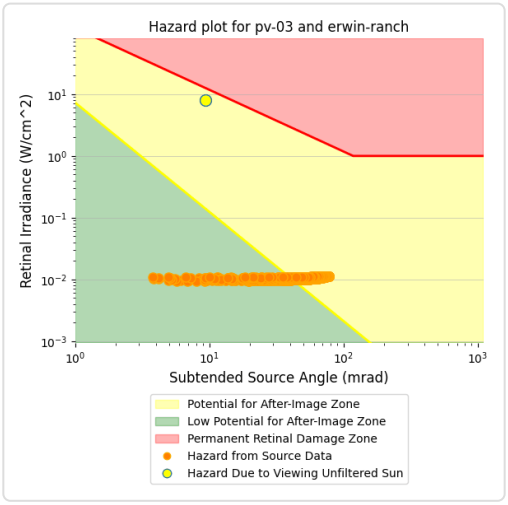
PV 03 and Route: Erwin Ranch Rd

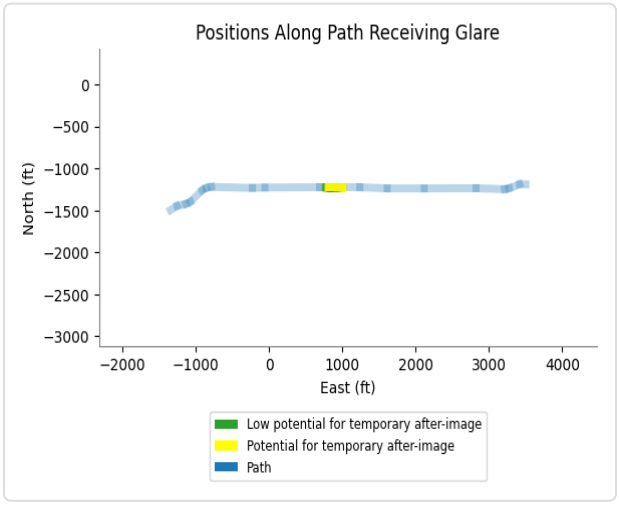
Yellow glare: 606 min.

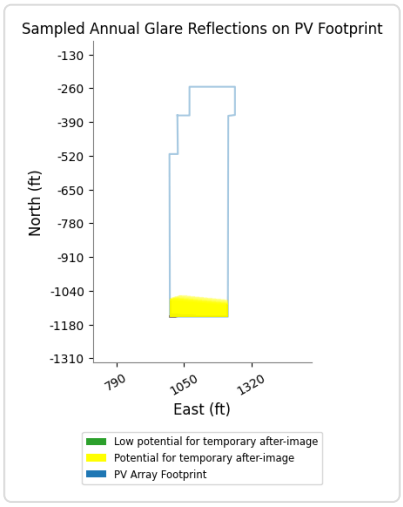
Green glare: 245 min.











PV 03 and Route: Central Ln

No glare found

PV 03 and Route: Cypress Ln

No glare found

PV 03 and Route: Jensen Dr - Ringwood Trl

No glare found

PV 03 and Route: Lakewood Dr

No glare found

PV 03 and Route: Willow Ln

No glare found

PV 03 and FP: FP 1

No glare found

PV 03 and FP: FP 2

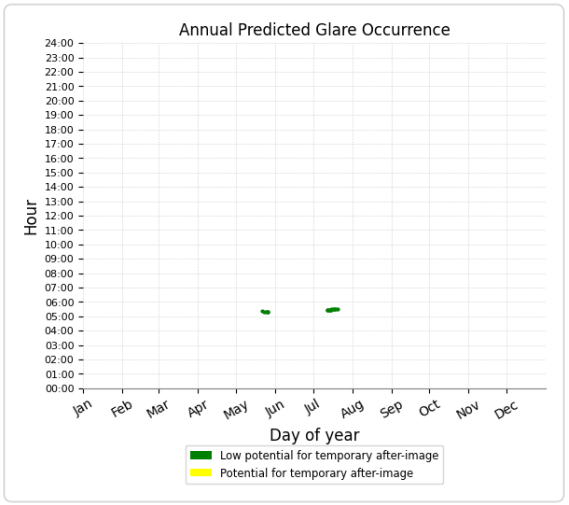
No glare found

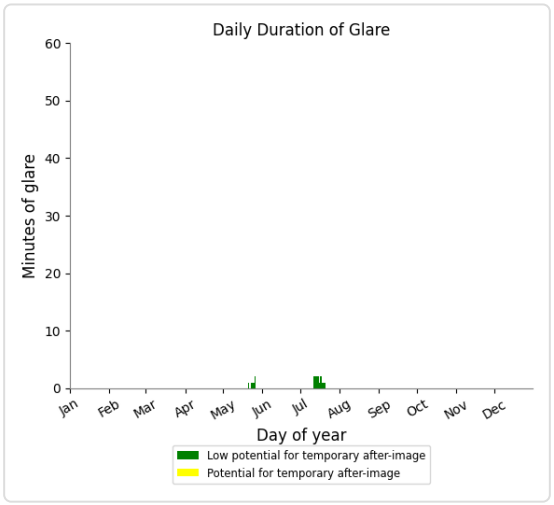
PV 03 and FP: FP 3

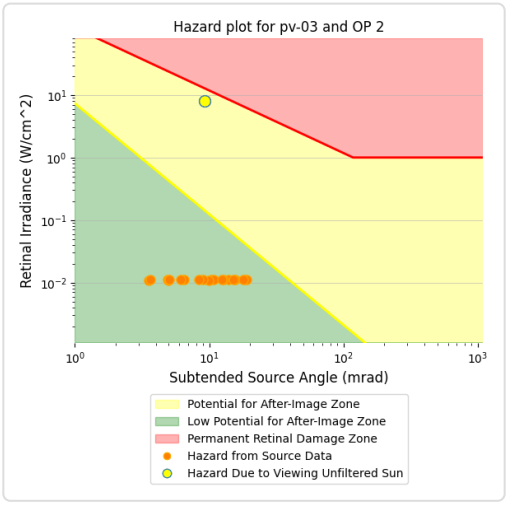
No glare found

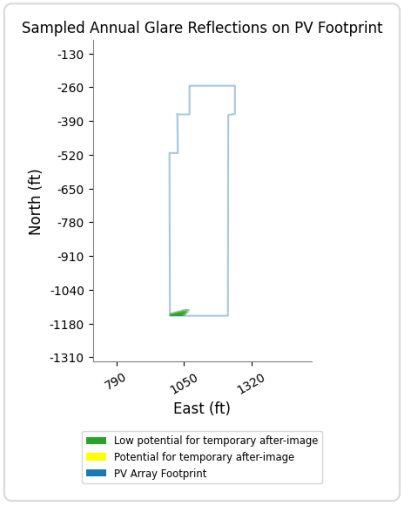
PV 03 and OP 2

Yellow glare: none
Green glare: 20 min.









PV 03 and OP 1

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 03 and OP 13

No glare found

PV 03 and OP 14

No glare found

PV 03 and OP 15

No glare found

PV 03 and OP 16

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

APPENDIX C AIR QUALITY/GREENHOUSE GAS ASSESSMENT

Air Quality and Greenhouse Gas Assessment

Bear Valley Solar Energy Project

PREPARED FOR
EDF Renewables Distribution-Scale Power

DATE
31 July 20255

REFERENCE
0739207

DOCUMENT DETAILS

The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.	
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DATE	31 July 2025
VERSION (delete field if unneeded)	02
AUTHOR	Crispina O'Connor, Sunveer Bajwa, Carlos Ciudad-Real, Josie Sellers
CLIENT NAME	EDF Renewables Distribution-Scale Power

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				ERM APPROVAL TO ISSUE		
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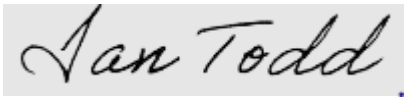
Version 1	001	Crispina O'Connor, Sunveer Bajwa, Carlos Ciudad-Real, Josie Sellers	Crispina O'Connor, Mat Carson	Ian Todd	11.14.24	
Version 2	000	Crispina O'Connor, Sunveer Bajwa, Carlos Ciudad-Real, Josie Sellers	Crispina O'Connor, Linnea Hofstrom, Mat Carson	Ian Todd	7.31.24	Response to County comments

SIGNATURE PAGE

Air Quality and Greenhouse Gas Assessment

Bear Valley Solar Energy Project

0739207



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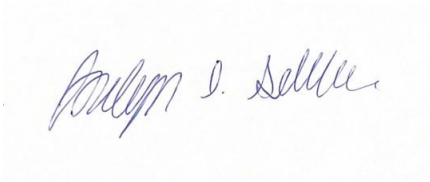
Crispina O'Connor
Principal Consultant



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AAQS	ambient air quality standard
AB	Assembly Bill
AQMP	Air Quality Management Plan
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standard
CalEEMod	California Emissions Estimator Model
Cap-and-Trade Program	California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DPM	Diesel particulate matter
ERM	Environmental Resources Management, Inc.
HAP	Hazardous air pollutant
LST	Localized Significance Threshold
MT	Metric ton
$MTCO_2e$	Metric tons of carbon dioxide equivalent
MW	Megawatt
NAAQS	National Ambient Air Quality Standard
NO_X	Nitrogen oxides

Acronym	Description
NR	Natural Resource
O&M	Operation and maintenance
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns and less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns and less
Project	Bear Valley Solar Energy Project
RE	Renewable Energy
RGHGRP	Regional Greenhouse Gas Reduction Plan
RPS	Renewables Portfolio Standard
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SF_6	sulfur hexafluoride
TAC	toxic air contaminant
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

This study analyzes the potential air quality and greenhouse gas (GHG) emissions of the proposed Bear Valley Solar Energy Project (Project) near the City of Big Bear Lake in unincorporated San Bernardino County, California. The Project consists of a new, community-oriented approximately 5-megawatt (MW) alternating current solar photovoltaic (PV) facility situated on approximately 30 acres of privately owned land to meet local energy demand. Environmental Resources Management, Inc. (ERM) prepared this study under contract from EDF Renewables Distribution-Scale Power. The purpose of this study is to analyze the Project's potential air quality and GHG impacts related to both temporary construction activity and long-term operation of the Project. This analysis is part of the environmental review process to comply with the California Environmental Quality Act (CEQA).

2. AIR QUALITY

The Environmental Setting section of this study provides a description of the air quality in unincorporated San Bernardino County. The Regulatory Setting section provides a description of applicable federal, state, and local regulatory policies that were developed in part from information contained in the San Bernardino County Countywide Plan – Natural Resources Element, Goal NR -1: Air Quality[1]. Additional documents utilized are noted as appropriate. The Methodologies and Thresholds Section describes the methodologies used for determining significance as well as the thresholds used. The Impact Evaluation Section provides a description of the potential impacts of the Project and includes the identification of feasible mitigation measures (if necessary and feasible) to avoid or reduce the potential for significant impacts to less-than-significant levels.

2.1 ENVIRONMENTAL SETTING

2.1.1 GEOGRAPHY

The Project is located on unincorporated land in Big Bear Valley which is a part of the South Coast Air Basin (SCAB). The SCAB is bounded by the San Gabriel and San Bernardino Mountains to the north and the San Jacinto Mountains to the east. The relationship between geography and air quality is described in the following section on meteorology.

2.1.2 METEOROLOGY

Big Bear Valley has a climate characterized by warm summers and cold winters with precipitation occurring as rainfall in the warmer months and snowfall in the colder months. Average daily summer temperatures range between 60 to 70 degrees Fahrenheit, and average daily winter temperatures range between 35 to 40 degrees Fahrenheit[2]. Average annual precipitation is

[1] San Bernardino County. Countywide Plan – Natural Resources Element, Goal NR -1: Air Quality. https://countywideplan.sbcounty.gov/policy-plan/natural-resources/
[2] PRISM Climate Group, Oregon State University. 2024. https://prism.oregonstate.edu, data accessed September 2024.

21 inches and ranges from 0.12 inches in June to 4.73 in February[3]. The prevailing winds originate predominately from the west and southeast and have maximum speeds up to 5.7 meters per second.[4]

The San Bernardino Mountains surrounding Big Bear Valley create a barrier to airflow, which can trap air pollutants in the valley during unfavorable meteorological conditions and temperature inversions. Air stagnation can occur when large high-pressure cells lie over the valley. The lack of surface wind during these periods and the reduced vertical flow caused by low surface heating reduces the influx of outside air and allows pollutants to become concentrated in the air. The surface concentrations of pollutants are highest when these conditions are combined with increased levels of smoke or when temperature inversions trap cool air, fog, and pollutants near the ground.

2.1.3 AMBIENT AIR QUALITY

As required by the federal-level Clean Air Act (CAA), the United States Environmental Protection Agency (USEPA) has identified six criteria pollutants and has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The six criteria pollutants are ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter with an aerodynamic diameter of 10 microns and less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 microns and less ($PM_{2.5}$), and lead. To protect human health and the environment, the USEPA has set "primary" and "secondary" maximum ambient standards for each of the criteria pollutants. Primary standards were set to protect human health, particularly sensitive individuals such as children, the elderly, and individuals suffering from chronic lung conditions such as asthma and emphysema. Secondary standards were set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings. The NAAQS are defined as the maximum acceptable concentration that may be reached, but not exceeded more than once per year.

California has adopted the California Ambient Air Quality Standards (CAAQS), which are more stringent ambient air quality standards (AAQS) for most of the criteria pollutants. The California Air Resources Board (CARB) is the State agency responsible for establishing CAAQS. If ambient air quality concentrations of the pollutants of concern are below the NAAQS and CAAQS standards, then health impacts are not anticipated. However, when concentrations of the air pollutants exceed the NAAQS and CAAQS standards, then health impacts are considered to vary based on the level of exceedance. The USEPA and CARB designate counties in California as being in attainment or non-attainment for the NAAQS and CAAQS, respectively. Table 2.1-1 summarizes the most stringent NAAQS/CAAQS and the attainment status of the SCAB.

[3] United States Geological Survey (USGS). 2012. Geohydrology of Big Bear Valley, California phase 1—Geologic Framework, Recharge, and Preliminary Assessment of the Source and Age of Groundwater. Available at: https://pubs.usgs.gov/sir/2012/5100/pdf/sir20125100.pdf. Accessed July 2024.
[4] South Coast Air Quality Management District (SCAQMD). 2024. AERMOD Table 1: Meteorological Sites. https://www.aqmd.gov/home/air-quality/meteorological-data/aermod-table-1, data accessed October 2024.

TABLE 2.1-1 MOST STRINGENT AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS FOR THE SOUTH COAST AIR BASIN

Pollutant	Averaging Time	CAAQS Concentration	CAAQS Status	NAAQS Concentration	NAAQS Status
Ozone	8 hours	0.070 ppm	N	0.070 ppm	N
	1 hour	0.09 ppm	N	0.12 ppm[a]	N
Carbon Monoxide	8 hours	9 ppm	A	9 ppm	A
	1 hour	20 ppm	A	35 ppm	A
Nitrogen Dioxide	1 hour	0.18 ppm	A	0.10	A
	Annual	0.03 ppm	A	0.053 ppm	A
Sulfur Dioxide	24 hours	0.04 ppm	A	-	-
	1 hour	-	-	0.075 ppm	A
Particulate Matter (PM_{10})	Annual	20 µg/m^3	N	-	-
	24 hours	50 µg/m^3	N	150 µg/m^3	N
Particulate Matter - Fine ($PM_{2.5}$)	Annual	12 µg/m^3	N	9.0 µg/m^3	To be determined[b]
	24 hours	-	-	35 µg/m^3	N
Sulfates	24 hours	25 µg/m^3	A	—	—
Lead	Rolling 3-Month Average	-	-	0.15 µg/m^3	A
	30-day average	1.5 µg/m^3	N	-	-

A=Attainment; N=Non-attainment; U=Unclassified
ppm = parts per million; µg/m^3 = micrograms per cubic meter

a) *1-hour O3 standard (0.12 ppm) was revoked, effective 15 June 2005; however, the Basin has not attained this standard and is still subject to anti-backsliding requirements.*
b) *In February 2024 the USEPA strengthened the NAAQS for PM2.5 to 9.0 µg/m3. The USEPA has 2 years to designate areas as in attainment or non-attainment so current monitoring data is still being analyzed. However, the air basin was not in attainment with the previous standard of 12.0 µg/m3 and based on monitoring data for 2020-2022, the air basin will likely not be in attainment with the more stringent threshold either.*

2.1.4 SENSITIVE RECEPTORS

Land uses where air pollution-sensitive individuals are most likely to spend time include schools and schoolyards, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential communities (sensitive sites or sensitive land uses). The South Coast Air Quality Management District (SCAQMD) identifies sensitive receptors as residences, schools, playgrounds, childcare centers, long-term healthcare facilities, rehabilitation centers, convalescent centers, and retirement homes. The Project site is bounded on the north and east by undeveloped land, on the south by Erwin Ranch Road, and on the west by Lakewood Drive. The site is in a rural area consisting mostly of ranches; however, there is a residential ranch house on the east, south, and west sides of the Project with the closest located adjacent to the south side of the Project site.

2.2 REGULATORY SETTING

This section summarizes the relevant laws, regulations, and policies related to air quality at federal, state, regional, and local levels.

2.2.1 FEDERAL

As discussed in the Ambient Air Quality section, the CAA establishes the statutory framework for regulation of air quality in the United States. Pursuant to this act, the USEPA has established various regulations to achieve and maintain acceptable air quality, including the adoption of NAAQS, mandatory State Implementation Plan or maintenance plan requirements to achieve and maintain NAAQS, and emission standards for both stationary and mobile sources of air pollution. The NAAQS were established in 1970 for six criteria pollutants because they are considered the most prevalent air pollutants known to be hazardous to human health. If a region is designated as non-attainment for a NAAQS, the CAA requires the state to develop a State Implementation Plan to demonstrate how the standard will be attained, including the establishment of specific requirements for review and approval of new or modified stationary sources of air pollution. The CAA Amendments of 1990 directed the USEPA to set standards for toxic air contaminants (TAC) and required facilities to sharply reduce emissions. Table 2.1-1 summarizes state and federal AAQS.

Another major component of the CAA is Hazardous Air Pollutants (HAPs). The 1977 CAA amendments required the USEPA to identify National Emission Standards for Hazardous Air Pollutants known as NESHAPs to protect public health and welfare. HAPs include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that are expected to result in a decrease of public health, based on scientific studies of exposure to humans and other mammals. The 1990 CAA amendments required the USEPA to set standard permissible ceilings for 187 substances and chemical families. The amendments also required businesses to implement risk-management programs for dealing with potential releases of hazardous substances.

2.2.2 STATE

The CARB is the State agency responsible for California air quality management. It establishes CAAQS, TAC standards, mobile source emission standards, and GHG regulations, as well as

oversight of regional air quality districts and preparation of implementation plans, including regulations for stationary sources of air pollution.

The CAAQS are generally more stringent than federal NAAQS, except for the 1-hour nitrogen dioxide and sulfur dioxide standards, and include more pollutants than the NAAQS (see Table 2.1-1). California specifies four additional criteria pollutants: visibility reducing particles, sulfates and hydrogen sulfide, and vinyl chloride. Similar to USEPA, CARB designates counties in California as being in attainment or non-attainment for the CAAQS.

State law has also established the framework for California's TAC identification and control program, which is generally more stringent than the Federal HAP program and aimed at TACs that are a problem in California. According to section 39655 of the California Health and Safety Code, a TAC is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." CARB has formally identified over 200 substances and groups of substances as TACs including diesel particulate matter (DPM). In addition, substances which have been listed as federal HAPs pursuant to section 7412 of Title 42 of the United States Code are TACs under California's air toxics program. CARB is adopting appropriate control measures for sources of these TACs. The following measures are required by California law to reduce DPM emissions:

- Fleet owners of mobile construction equipment are subject to the CARB Regulation for In-Use Off-Road Diesel Vehicles (Title 13 California Code of Regulations, Chapter 9, Section 2449), the purpose of which is to reduce DPM and criteria pollutant emissions from in-use (existing) off-road diesel-fueled vehicles.
- All commercial diesel vehicles are subject to Title 13, Section 2485 of the California Code of Regulations, limiting engine idling time. Idling of heavy-duty diesel construction equipment and trucks during loading and unloading shall be limited to 5 minutes; electric auxiliary power units should be used whenever possible.

2.2.3 REGIONAL - *SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)*

The Project site is located within the jurisdiction of the SCAQMD. The SCAQMD is the regional air agency charged with preparing, adopting, and implementing emission control measures and standards for stationary sources of air pollution pursuant to delegated state and federal authority. Because the Project would not involve construction of new stationary sources, and most equipment that will be used for construction is classified as mobile sources and is thus exempt from stationary source permit requirements, there are no relevant air permitting regulations. The SCAQMD has published CEQA guidelines for analysis and mitigation of impacts from projects within its jurisdiction, and established thresholds of significance for construction impacts as well as impacts from operation of non-permitted equipment and activities.

Under the CAA, the SCAQMD is required to develop an air quality plan to achieve and/or maintain compliance with federal and state non-attainment criteria pollutants within its air district. The SCAQMD has taken action and developed attainment plans, namely the 2022 Air Quality

Management Plan (AQMP) and the SCAB Attainment Plan for the 2012 Annual $PM_{2.5}$ Standard, to achieve and/or maintain compliance with the federal and state ozone, PM_{10}, and $PM_{2.5}$ standards[5].

Notification Requirements under SCAQMD Rule 403. Rule 403 (Fugitive Dust) prohibits creation of dust plumes that are visible beyond the property line of the emission source and requires all active operations to implement applicable best available control measures. Enhanced dust control and notification requirements apply if the project is considered a "large operation" under this rule, which is any active operations on property that contains 50 or more acres of disturbed surface area. As the total parcel is approximately 30 acres with the disturbed area under 21 acres, enhanced dust control and notification requirements are not applicable.

2.2.4 LOCAL - *COUNTY OF SAN BERNARDINO*

Local jurisdictions, such as the County of San Bernardino, are responsible for the assessment and mitigation of air emissions resulting from its land use decisions. In accordance with CEQA requirements and the CEQA review process, the County assesses the air quality impacts of new development projects, requires mitigation of potentially significant air quality impacts by conditioning discretionary permits, and monitors and enforces implementation of such mitigation. The applicable San Bernardino County's Countywide Plan goals and policies and Development Code regulations are listed below.

2.2.4.1 SAN BERNARDINO COUNTY COUNTYWIDE PLAN / POLICY PLAN

The County's Countywide Plan, adopted on 27 October 2020, serves as a set of plans and tools for the County's unincorporated communities and complements the Countywide vision. The Countywide Plan consists of the Policy Plan, Business Plan, and Community Action Guides, together with the supporting environmental clearance. The Policy Plan is a component of the Countywide Plan that is an update and expansion of the County's General Plan for the unincorporated areas. The following goals and policies are applicable to the Project:

Natural Resources (NR) Element

"Goal NR-1: Air Quality
Air quality that promotes health and wellness of residents in San Bernardino County through improvements in locally generated emissions."

Policies:

"NR-1.1 Land use. We promote compact and transit-oriented development countywide and regulate the types and locations of development in unincorporated areas to minimize vehicle miles traveled and greenhouse gas emissions."

"NR-1.2 Indoor air quality. We promote the improvement of indoor air quality through the California Building and Energy Codes and through the provision of public health programs and services."

[5] South Coast Air Quality Management District (SCAQMD). 2009. Localized Significance Thresholds. https://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/localized-significance-thresholds

"NR-1.3 Coordination on air pollution. We collaborate with air quality management districts and other local agencies to monitor and reduce major pollutants affecting the county at the emission source."

"NR-1.6 Fugitive dust emissions. We coordinate with air quality management districts on requirements for dust control plans, revegetation, and soil compaction to prevent fugitive dust emissions."

"NR-1.8 Construction and operations. We invest in County facilities and fleet vehicles to improve energy efficiency and reduce emissions. We encourage County contractors and other builders and developers to use low-emission construction vehicles and equipment to improve air quality and reduce emissions."

"NR-1.9 Building design and upgrades. We use the CALGreen Code to meet energy efficiency standards for new buildings and encourage the upgrading of existing buildings to incorporate design elements, building materials, and fixtures that improve environmental sustainability and reduce emissions."

Renewable Energy (RE) Element

Policies:

"RE 4.1 Apply standards to the design, siting, and operation of all renewable energy facilities that protect the environment, including sensitive biological resources, air quality, water supply and quality, cultural, archaeological, paleontological, and scenic resources."

"RE 4.3.1 Define measures required to minimize ground disturbance, soil erosion, flooding, and blowing of sand and dust, with appropriate enforcements mechanisms in the Development Code."

2.2.4.2 SAN BERNARDINO COUNTY DEVELOPMENT CODE

Section 83.01.040

"(c) Diesel Exhaust Emissions Control Measures. The following emissions control measures shall apply to all discretionary land use projects approved by the County on or after January 15, 2009:

1) On-Road Diesel Vehicles. On-road diesel vehicles are regulated by the State of California Air Resources Board.
2) Off-Road Diesel Vehicle/Equipment Operations. All business establishments and contractors that use off-road diesel vehicle/equipment as part of their normal business operations shall adhere to the following measures during their operations in order to reduce DPM emissions from diesel-fueled engines:
    A. Off-road vehicles/equipment shall not be left idling on site for periods in excess of five minutes. The idling limit does not apply to:
        (I) Idling when queuing;
        (II) Idling to verify that the vehicle is in safe operating condition;
        (III) Idling for testing, servicing, repairing or diagnostic purposes;

(IV) Idling necessary to accomplish work for which the vehicle was designed (such as operating a crane);

(V) Idling required to bring the machine system to operating temperature; and;

(VI) Idling necessary to ensure safe operation of the vehicle.

B. Use reformulated ultra-low-sulfur diesel fuel in equipment and use equipment certified by the U.S. Environmental Protection Agency (EPA) or that pre-dates EPA regulations.

C. Maintain engines in good working order to reduce emissions.

D. Signs shall be posted requiring vehicle drivers to turn off engines when parked.

E. Any requirements or standards subsequently adopted by the South Coast Air Quality Management District, the Mojave Desert Air Quality Management District or the California Air Resources Board.

F. Provide temporary traffic control during all phases of construction.

G. On-site electrical power connections shall be provided for electric construction tools to eliminate the need for diesel-powered electric generators, where feasible.

H. Maintain construction equipment engines in good working order to reduce emissions. The developer shall have each contractor certify that all construction equipment is properly serviced and maintained in good operating condition.

I. Contractors shall use ultra-low sulfur diesel fuel for stationary construction equipment as required by Air Quality Management District (AQMD) Rules 431.1 and 431.2 to reduce the release of undesirable emissions.

J. Substitute electric and gasoline-powered equipment for diesel-powered equipment, where feasible."

Section 84.29.035

(c) The finding of fact shall include the following:

20) "The proposed commercial solar energy generation facility will be designed, constructed, and operated so as to minimize dust generation, including provision of sufficient watering of excavated or graded soil during construction to prevent excessive dust. Watering will occur at a minimum of three (3) times daily on disturbed soil areas with active operations, unless dust is otherwise controlled by rainfall or use of a dust palliative, or other approved dust control measure.

21) All clearing, grading, earth moving, and excavation activities will cease during period of winds greater than 20 miles per hour (mph), averaged over one hour, or when dust

plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property, and in conformance with AQMD regulations.

22) For sites where the boundary of a new commercial solar energy generation facility will be located within one-quarter mile of a primary residential structure, an adequate wind barrier will be provided to reduce potentially blowing dust in the direction of the residence during construction and ongoing operation of the commercial solar energy generation facility.

23) Any unpaved roads and access ways will be treated and maintained with a dust palliative or graveled or treated by another approved dust control Chapter 83.09 of the Development Code.

24) On-site vehicle speed will be limited to 15 mph."

2.3 METHODOLOGY AND THRESHOLDS

2.3.1 THRESHOLDS OF SIGNIFICANCE

The thresholds of significance for this section are established by the SCAQMD significance thresholds identified in their document titled *South Coast AQMD Air Quality Significance Thresholds*.[6] The following are potential thresholds for significance:

- Result in an exceedance of an SCAQMD mass daily threshold during construction or operation.
- Result in exposure of sensitive receptors to emissions of TAC over the maximum health risk.
- Result in an odor nuisance as defined in SCAQMD Rule 402.
- Result in an exceedance of an AAQS for criteria pollutants.

To characterize the potential impact of criteria air pollutant emissions in the CEQA process, SCAQMD recommends use of regional significance thresholds for construction and for project-related operation emissions that are subject to CEQA review. The emissions from the activities of construction and operation of the project are compared to these SCAQMD regional significance thresholds to determine whether the project would result in adverse air quality impacts.

The project-level SCAQMD regional significance emissions thresholds for CEQA review are shown below in Figure 2.3-1.

[6] South Coast Air Quality Management District. South Coast AQMD Air Quality Significance Thresholds. https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf?sfvrsn=25

FIGURE 2.3-1 SCAQMD REGIONAL SIGNIFICANCE EMISSIONS THRESHOLDS

South Coast AQMD Air Quality Significance Thresholds

Mass Daily Thresholds [a]		
Pollutant	**Construction**	**Operation**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Toxic Air Contaminants (TACs), Odor, and GHG Thresholds		
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to South Coast AQMD Rule 402	

Source: SCAQMD 2023[7].

For emissions exceeding the regional significance thresholds, the SCAQMD also provides air quality significance thresholds for ambient air quality impact assessments, which may be used to calculate the downwind concentrations caused by the on-site portions of project emissions.

For emissions from sites that are near sensitive receptors and are 5 acres or less, SCAQMD developed the Localized Significance Thresholds (LSTs) to evaluate whether a mass emission rate from a project may generate significant adverse localized air quality impacts. The LSTs may be used by lead agencies as a way of indicating whether a project could locally exceed the AAQSs at a given distance from the site boundary. The LSTs vary depending on the meteorological conditions for each source receptor area within the SCAQMD jurisdiction. Since the Project would occupy approximately 21 acres of the 30-acre parcel, use of LSTs would not be appropriate for this Project. While SCAQMD recommends that proposed projects larger than 5 acres in area undergo air dispersion modeling to determine localized air quality, the Project would not include new stationary sources that could be subject to risk assessment programs.

2.3.2 METHODOLOGY

Air quality impacts associated with onsite construction and operational activities were calculated using the California Emissions Estimator Model (CalEEMod) version 2022.1.1.17. CalEEMod was developed for the California Air Pollution Control Officers Association in collaboration with California air districts to calculate air quality and GHG emissions associated with land use projects. The program analyzes construction (short-term) emissions by utilizing both default values for specific geographic areas and typical land use projects as well as project-specific values such as construction schedules and equipment rosters. The estimated use of construction equipment and the CalEEMod output are provided in Appendix A. It is assumed that minimal or no waste soil hauling will occur as a result of constructing the Project. CalEEMod was also set up to assume that

95 percent of the roads traveled by the construction crew are paved and that the remaining portion (5 percent) to access the site is unpaved.

The Project would be operated remotely and would be unstaffed. Operations would emit less than 0.005 tons per year of any criteria air pollutant. Project operations would entail infrequent maintenance inspections by part-time personnel, which would include local service businesses, as needed. Repair/servicing and replacement of equipment may be required periodically over the Project lifespan. These types of maintenance visits, assumed to occur within 1 to 2 workdays at most, would be comparable to the short-term construction emissions.

2.4 IMPACT EVALUATION

Appendix G, part III of the CEQA Environmental Checklist includes four questions relevant to the potential for impacts to air quality. Where available, the significance criteria established by the applicable air quality management district or air pollution control district (i.e., SCAQMD) may be relied upon to make the following determinations. The CEQA Environmental Checklist asks if the Project would:

a) Conflict with or obstruct implementation of the applicable air quality plan?

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state AAQS (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

c) Expose sensitive receptors to substantial pollutant concentrations?

d) Create objectionable odors affecting a substantial number of people?

A. CONFLICT WITH OR OBSTRUCT IMPLEMENTATION OF THE APPLICABLE AIR QUALITY PLAN?

For the Project area, the SCAQMD and CARB ensure implementation of California's AQMPs, known collectively as the State Implementation Plan. State-level air quality planning strategies to attain CAAQS are implemented through rules, regulations, and programs adopted by SCAQMD and CARB to control ozone precursors, PM_{10}, and $PM_{2.5}$. All construction and Project development-related activities, including operation and maintenance and eventual decommissioning, would comply with the applicable rules, regulations, and programs. Strategies and control measures identified within the SCAQMD 2016 AQMP, and the updated 2022 AQMP, apply directly to Project activities as promulgated through SCAQMD's rules and regulations.

All construction and operational activities and eventual decommissioning would comply with SCAQMD's Rule 402 and 403, which prevent nuisances and regulate fugitive dust emissions. The Project would also conform to the federal and state CAA requirements by complying with the rules and regulations that are contained in the air quality plan.

A project could be inconsistent with the applicable AQMP or attainment plan if it causes population and/or employment growth or growth in vehicle-miles traveled in excess of the growth forecasts included in the attainment plan. The Project would be operated remotely and employ no more than four part-time positions for ongoing operation and maintenance (O&M) related activities. The

construction workforce would involve only temporary employment for a period of approximately 6 -9 months. Accordingly, Project construction and operation would not result in activities that would conflict with or obstruct implementation of the applicable air quality plan, and this impact would be *less than significant.*

B. RESULT IN A CUMULATIVELY CONSIDERABLE NET INCREASE OF ANY CRITERIA POLLUTANT FOR WHICH THE PROJECT REGION IS NON-ATTAINMENT UNDER AN APPLICABLE FEDERAL OR STATE AMBIENT AIR QUALITY STANDARD?

Construction-related activities of the proposed Project will most likely require approximately 6 months of continuous activity involving six overlapping phases during normal working hours, 5 days per week. It is not uncommon for construction projects to experience delays. Although CalEEMod was used to calculate emissions associated with the planned 6-month schedule, delays could extend construction to approximately 9 months. It is noted that construction-related activities that emit air emissions will be a mix of short-term, intermittent, and temporary durations; and will vary by phase and from equipment type usage.

Construction-related activities of the proposed Project will generate air pollutant emissions from entrained dust, off-road equipment use, and vehicle emissions. Off-site emissions will be generated by construction worker daily commute trips and heavy-duty diesel haul and vendor truck trips. Construction-related emissions could vary substantially from day to day, depending on the level of activity, the specific type of operation, and, for dust, the prevailing weather conditions. Exhaust emissions include ozone precursors (volatile organic compounds and nitrogen oxides [NO_x]), CO, and particulate matter (including PM_{10} and $PM_{2.5}$). Fugitive dust includes particulate matter from soil eroded by ground-disturbing activities and by travel on unpaved surfaces and on paved road surfaces. Dust control and engine exhaust would be subject to SCAQMD rules and regulations to avoid adverse levels of air pollutant concentrations.

Table 2.4-1 summarizes the maximum daily emissions rates anticipated for the 6-month Project lifespan.

TABLE 2.4-1 MAXIMUM DAILY CONSTRUCTION EMISSIONS

Pollutant	Emissions (max lb/day)	SCAQMD Air Quality Significance Thresholds	Below Threshold (Y/N)
VOC	2.45	75 lbs/day	Y
NO_x	20.8	100 lbs/day	Y
CO	23.0	550 lbs/day	Y
SO_x	0.04	150 lbs/day	Y
PM_{10} Total	63.3	150 lbs/day	Y

Pollutant	Emissions (max lb/day)	SCAQMD Air Quality Significance Thresholds	Below Threshold (Y/N)
$PM_{2.5}$ Total	6.67	55 lbs/day	Y

CO = carbon monoxide; lb/day = pounds per day; N = no; NO_x = nitrogen oxides; PM_{10} = particulate matter 10 micrometers or less in diameter; $PM_{2.5}$ = particulate matter 2.5 micrometers or less in diameter; SO_x = sulfur oxides; VOC = volatile organic compounds; Y = yes

As shown in Table 2.4-1, all maximum daily construction-related emissions without controls (both dust controls and off-road equipment controls) would be well below the SCAQMD daily thresholds for construction. Application of SCAQMD and San Bernardino County dust control and off-road equipment emissions controls as mitigation measures would even further reduce the construction emissions of NO_x and PM_{10} below the SCAQMD thresholds. As such, the Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state AAQS, and the impact would be *less than significant*.

C. EXPOSE SENSITIVE RECEPTORS TO SUBSTANTIAL POLLUTANT CONCENTRATIONS?

As discussed in Section 2.1.4, sensitive receptors are those individuals more susceptible to the effects of air pollution. Although the site is located in a rural region, there are several residences surrounding the property to east, west, and south. While these residences are in close proximity to the Project site, construction emissions are well below thresholds and would be short duration in nature; therefore, sensitive receptors would not be exposed to substantial pollutants concentrations.

As noted previously, operations would entail infrequent maintenance activities, as needed, resulting in minimal emissions from maintenance vehicles and equipment. Therefore, operations would not expose existing sensitive receptors to substantial pollutant concentrations.

In addition to impacts from criteria pollutants discussed under B., other emissions may include TACs or HAPs identified by the state and federal government, respectively. The greatest potential for TAC emissions during construction would be DPM emissions from heavy equipment operations and heavy-duty trucks. As shown in Table 2.4-1, maximum daily particulate matter (PM10 or PM2.5) emissions generated by construction equipment operation, combined with fugitive dust generated by equipment operation, would be well below the SCAQMD significance thresholds. During operation, the Project would include minimal sources of TAC emissions, potentially including use of pressure washers once annually for panel washing and use of water trucks for periodic water deliveries to the site. Given the minor increase in emissions, operational activities are not expected to be a significant source of DPM or associated potential health impacts.

Given that the estimated Project emissions are well below significance thresholds as shown in Table 2.4-1, any potential impacts from exposure to substantial pollutant concentrations during construction and project operations would be *less than significant*.

D. RESULT IN OTHER EMISSIONS (SUCH AS THOSE LEADING TO ODORS ADVERSELY AFFECTING A SUBSTANTIAL NUMBER OF PEOPLE)?

Typical odor nuisances include hydrogen sulfide, ammonia, chlorine, and other sulfide-related emissions. No significant sources of these odor-causing pollutants would exist during construction. An additional potential source of odor is diesel engine emissions. During construction, diesel exhaust produced by off-road construction equipment could generate odors; however, several pieces of construction equipment would need to operate concurrently in a relatively small area to generate a constant plume of diesel exhaust that could cause objectionable odors for a substantial number of people. These circumstances are not expected to occur as part of the Project because construction equipment would not all operate at the same time. In addition, with respect to Project operations, no odor-generating activities are expected to occur.

As described, because few sources of odor would exist and they would be short term in nature, the Project would not result in other emissions adversely affecting a substantial number of people and impacts due to other emissions would be *less than significant*.

3. GREENHOUSE GAS EMISSIONS

3.1 ENVIRONMENTAL SETTING

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). The major concern in releasing excess GHG to the atmosphere is global climate change. Global climate change is a change in the average climate on Earth that can be measured by wind patterns, storms, precipitation, and temperature. Human activity directly contributes to emissions of six primary anthropogenic GHGs: carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride (SF_6).[7] The most important and widely occurring anthropogenic GHG is CO_2, primarily from the use of fossil fuels as a source of energy.

Research by California's Office of Environmental Health Hazard Assessment documents climate change indicators by categorizing the effects as: changes in California's climate; impacts to physical systems including oceans, lakes, rivers, and snowpack; and impacts to biological systems including humans, vegetation, and wildlife. The primary observed changes in California's climate include increased annual average air temperatures, more-frequent extremely hot days and nights, and increased severity of drought. Impacts to physical systems affected by warming temperatures and changing precipitation patterns show decreasing snowmelt runoff, shrinking glaciers, and rising sea levels. Impacts to terrestrial, marine, and freshwater biological systems, with resulting changes in habitat, agriculture, and food supply are occurring in conjunction with the potential to impact human well-being[8].

The electricity sector in California has achieved substantial GHG emissions reductions through renewable and zero-carbon energy deployment. Moving forward, a clean, affordable, and reliable electricity grid will serve as a backbone to support deep decarbonization across California's

[7] California Air Resources Board. AB 32 Global Warming Solutions Act of 2006 Assembly Bill 32 Overview. https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006
[8] OEHHA (Office of Environmental Health Hazard Assessment, California Environmental Protection Agency). 2018. Indicators of Climate Change in California.

economy. Decarbonizing the electricity sector is a crucial pillar of achieving carbon neutrality, and CARB anticipates that the role of electricity in powering the economy will continue to grow while electric loads increase[9]. California continues to add zero-carbon energy resources to replace fossil-fuel generation and support growing demand. Moving to zero-carbon resources is critical to reducing GHG emissions and addressing the long-term impacts of climate change[10].

Renewable and zero-carbon sources of energy do not operate on-demand like traditional fossil fuel power plants. Energy storage improves California's ability to efficiently integrate renewable resources. The growth of zero-carbon resources, especially solar resources, has shifted the reliability concerns from the peak hour (hour with the highest energy demand) to net peak hours (hours when energy demand minus wind and solar generation is largest). The changing resource mix is driving a change in the characteristics of the electricity system and requires consideration of the net demand curve, total electricity demand less the wind and solar generation. The "duck curve" is characterized by more drastic increases in net demand in the evening hours as solar decreases, and a net peak that occurs later in the evening when solar generation is substantially diminished or nonexistent. Storing some midday solar generation flattens the duck's curve, and dispatching the stored solar generation in the evening shortens the duck's neck[11]. Presently, fossil-fuel natural gas-fired power plants provide about 75 percent of the flexible capacity for grid reliability. As more renewable power enters the system, other resources such as storage and demand-side management are essential to maintain reliability with high concentrations of renewables[9].

3.1.1 EXISTING CONDITIONS

In 2016, San Bernardino County generated approximately 16 million metric tons (MT) of carbon dioxide equivalents (CO_2e)[12]. The largest portion of these emissions (51 percent) is attributed to on-road vehicles, while the second largest portion (35 percent) is due to building energy. In 2030, San Bernardino County is forecast to generate approximately 17.6 million tons of CO_2e, a GHG emissions increase of 15 percent. The largest portion of these emissions (51 percent) is attributed to on-road vehicles, while the second largest portion (38 percent) is due to building energy.

3.2 REGULATORY SETTING

3.2.1 FEDERAL

The Supreme Court decision in Massachusetts et al. v. Environmental Protection Agency et al. (Supreme Court Case 051120) found that the USEPA has the authority to list GHGs as pollutants and to regulate emissions of GHGs under the federal-level CAA. On 17 April 2009, USEPA found that CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and SF_6 may contribute

[9] California Air Resources Board. 2022. California's Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.
[10] California Energy Commission. 2022. Final 2021 Integrated Energy Policy Report (IEPR), Volume II - Ensuring Reliability in a Changing Climate. https://efiling.energy.ca.gov/GetDocument.aspx?tn=241583.
[11] U.S. EIA (Energy Information Administration). 2023. Today in Energy: As solar capacity grows, duck curves are getting deeper in California. June. https://www.eia.gov/todayinenergy/detail.php?id=56880.
[12] San Bernardino County Transportation Authority. March 2021. San Bernardino County Regional Greenhouse Gas Reduction Plan. Appendix A. https://www.gosbcta.com/wp-content/uploads/2019/09/San_Bernardino_Regional_GHG_Reduction_Plan_Appendices_Mar_2021.pdf

to air pollution and may endanger public health and welfare. The USEPA has established reporting regulations that require specific facilities and industries to report their GHG emissions annually. *40 Code of Federal Regulations Part 98, Mandatory Reporting of Greenhouse Gases Rule* requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 MT of CO_2e ($MTCO_2e$) per year.

3.2.2 STATE

ASSEMBLY BILL 32: GLOBAL WARMING SOLUTIONS ACT OF 2006

In 2006, the California State Legislature signed the Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). AB 32 provides the framework for regulating GHG emissions in California. This law requires the CARB to design and implement emission limits, regulations, and other measures such that statewide GHG emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020.

The bill also requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions. The bill authorizes CARB to adopt market-based compliance mechanisms. The bill additionally requires the state board to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism adopted by the state board, pursuant to specified provisions of existing law. The bill also authorizes CARB to adopt a schedule of fees to be paid by regulated sources of GHG emissions. Because the bill requires CARB to establish emissions limits and other requirements, the violation of which would be a crime, this bill would create a state-mandated local program. Under AB 32, by 30 June 2007, CARB was to identify a list of discrete early action GHG reductions that will be legally enforceable by 2010. By 1 January 2008, CARB was also to adopt regulations that will identify and require selected sectors to report their statewide GHG emissions. By 1 January 2011, CARB must adopt rules and regulations to achieve the maximum technologically feasible and cost-effective reductions in GHG reductions. CARB is authorized to enforce compliance with the program that it develops.[13]

STATE EXECUTIVE ORDERS ON GHG EMISSIONS

State Executive Order S-3-05 (June 2005) established the initial GHG reduction targets for the State of California. The targets called for a reduction of GHG emissions to 2000 levels by 2010; a reduction of GHG emissions to 1990 levels by 2020; and a reduction of GHG emissions to 80 percent below 1990 levels by 2050.

In April 2015, Governor Brown signed Executive Order B-30-15, establishing the intermediate target of reducing GHG emissions to 40 percent below 1990 levels by 2030, to ensure the state meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050 (Executive Order S-3-05). On 8 September 2016, Governor Brown signed SB 32 and AB 197, which codified the 2030 GHG emissions reduction target of 40 percent below 1990 levels and provided additional direction for updating the scoping plan.

[13] AB 32 Global Warming Solutions Act of 2006 Assembly Bill 32 Overview

In September 2018, Executive Order B-55-18 established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter. CARB was directed to develop the framework for implementing the goal of carbon neutrality.

RENEWABLES PORTFOLIO STANDARD (RPS) PROGRAM AND SENATE BILLS 350 & 100

On 10 September 2018, Governor Brown signed Senate Bill 100, establishing that 100 percent of all electricity in California must be obtained from renewable and zero-carbon energy resources by 31 December 2045. Specifically, the bill increases required energy from renewable sources for both investor-owned utilities and publicly-owned utilities from 50 percent to 60 percent by 2030. Incrementally, these energy providers must also have a renewable energy supply of 33 percent by 2020, 44 percent by 2024, and 52 percent by 2027. California must procure 100 percent of its energy from carbon-free energy sources by the end of 2045.[14]

Senate Bill 100 also creates new standards for the Renewables Portfolio Standard (RPS) goals established by Senate Bill 350 in 2015. The Clean Energy and Pollution Reduction Act of 2015 (Senate Bill 350) established California's state policy objectives on long-term energy planning and procurement as signed into law on October 7, 2015.

CAP-AND-TRADE PROGRAM (17 CALIFORNIA CODE OF REGULATIONS 95801 TO 96022)

The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) was initially approved by CARB in 2011. The Cap-and-Trade Program applies to covered entities that fall within certain source categories, including suppliers of transportation fuels, retail providers of electricity, and operators of electricity generating facilities. The program is triggered when facility emissions exceed 25,000 $MTCO_2e$ in a year. The covered entities must hold compliance instruments sufficient to cover the actual GHG emissions, as evidenced through CARB's Mandatory Reporting Regulation requirements. This means that transportation fuel suppliers bear the GHG compliance obligation in the Cap-and-Trade Program for the GHG emissions from motor vehicle and off-road equipment fuels used by construction workforces and crews. No specific reporting requirements apply to electric power generation from solar resources.

SENATE BILLS 97 AND 743

SB 97, enacted in 2007, amended the CEQA statue to establish that GHG emissions and their effects are a prominent environmental issue that require analysis and identification of feasible mitigation under CEQA. GHG emissions were incorporated into the CEQA guidelines on 18 March 2010.

With the passing of SB 743 in 2013, the Governor's Office of Planning and Research further amended the State CEQA Guidelines providing alternative criteria to level of service for evaluating transportation impacts. One of the goals of the new criteria is to promote the reduction of GHG.

[14] Senate Bill 100. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100.

Local jurisdictions were required to implement SB 743 by 1 July 2020 or do additional transportation analysis on a project-by-project basis.

EMISSION REDUCTIONS OF SF_6 FROM GAS INSULATED EQUIPMENT (17 CALIFORNIA CODE OF REGULATIONS 95350 TO 95359)

Electric power gas insulated equipment and switchgear used in transmission and distribution systems are subject to this regulation for reducing or phasing-out SF_6 emissions and leaks. The regulation, initially adopted by CARB in 2010 and amended in 2022, requires owners of such gas-insulated equipment or switchgear to phase out use of SF_6, maintain records and inventories of their gas-insulated equipment and capacities, and report CO_2e emissions to demonstrate compliance with annual limits set by the rule.

CLIMATE CHANGE SCOPING PLAN

CARB published a Climate Change Scoping Plan in December 2022 that outlines reduction measures to lower the state's GHG emissions and achieve a 85 percent reduction from 1990 levels as required by AB 1279.[15] Key elements for reducing California's GHG emissions to 85 percent of 1990 levels by 2045 include:

- Direct emission reduction for sources covered by the AB 32 Inventory;
- Reducing demand for petroleum fuels;
- Carbon capture and sequestration for petroleum refineries and manufacturing facilities; and
- Electrification of industrial, commercial, and residential energy use

3.2.3 REGIONAL - *SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)*

On 5 December 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is lead agency. This interim guidance includes a numeric threshold to determine significance for industrial projects where SCAQMD is the lead agency[16]. This interim guidance has continued to be used and is repeated in SCAQMD's Air Quality Significance thresholds that were published in March 2023.[17]

3.2.4 LOCAL – *COUNTY OF SAN BERNARDINO*

Local jurisdictions, such as the County of San Bernardino, have the authority and responsibility to reduce GHG emissions through their police power and decision-making authority. Specifically, the County is responsible for the assessment and mitigation of GHG emissions resulting from its land use decisions. In accordance with CEQA requirements and the CEQA review process, the County assesses the global climate change potential of new development projects, requires mitigation of

[15] California Air Resources Board. 2022 Scoping Plan Documents. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents
[16] SCAQMD Governing Board Agenda Item 31. 5 December 2008. https://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2
[17] SCAQMD Air Quality Significance Thresholds. March 2023. https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf?sfvrsn=25

potentially significant global climate change impacts by conditioning discretionary permits, and monitors and enforces implementation of such mitigation.

The *Greenhouse Gas Emissions Development Review Processes* (GHG Review Processes), prepared for the County of San Bernardino, March 2015, provides project level direction on how the County plans to achieve the reduction in GHG Emissions[18]. Further, the San Bernardino Policy Plan[19] includes goals and policies that all new projects are required to comply with, as applicable. The following goals and policies are applicable to this community oriented Project:

- "NR 1.7: **Greenhouse gas reduction targets.** We strive to meet the 2040 and 2050 greenhouse gas emission reduction targets in accordance with state law."
- "RE 2.1: Support solar energy generation, solar water heating, wind energy and bioenergy systems that are consistent with the orientation, siting and environmental compatibility policies of the General Plan."
- "RE 3.2: Encourage community-oriented renewable energy (CORE) generation that primarily serves local uses in the county."

3.2.4.1 SAN BERNARDINO COUNTY 2014 REGIONAL GREENHOUSE GAS REDUCTION PLAN (RGHGRP)

In addition, the County participated with San Bernardino Associated Government's regional planning efforts in the adoption of the San Bernardino County 2014 RGHGRP. The 2014 RGHGRP was developed to meet the requirements of AB 32 and SB 375 and includes a regional GHG emissions inventory, summarizes actions that participating jurisdictions have selected to reduce GHG emissions to 1990 levels by 2020, and provides specific reduction goals for each participating jurisdiction. In March 2021, San Bernardino Council of Governments prepared an update to the 2021 RGHGRP in order to address SB 32, which mandates a 40 percent reduction in GHG emissions from 1990 levels by 2030. The 2021 RGHGRP was prepared in accordance with the GHG reduction measures provided in California's 2017 Climate Change Scoping Plan, November 2017[20].

3.3 METHODOLOGY AND SIGNIFICANCE THRESHOLD

Similar to criteria pollutants, GHG impacts associated with onsite construction were calculated using the CalEEMod version 2022.1.1.17. CalEEMod was developed for the California Air Pollution Control Officers Association in collaboration with California air districts to calculate air and GHG emissions associated with land use projects. The program analyzes construction (short-term) emissions by utilizing both default values for specific geographic areas and typical land use projects as well as Project-specific values such as construction schedules and equipment rosters. There is not an appropriate land use type for solar facilities, so Industrial was selected which would overestimate operational emissions. The estimated use of construction equipment and the

[18] County of San Bernardino, Greenhouse Gas Emissions Development Review Processes County of San Bernardino, California, March 2015
[19] County of San Bernardino, County Policy Plan, October 2020.
[20] California Air Resources Board (CARB), Final Staff Report Proposed Update to the SB 375 Greenhouse Gas Emission Reduction Targets, February 2018.

CalEEMod output are provided in Appendix A. It is assumed that no waste hauling will occur as a result of constructing the Project.

The threshold of significance for GHG emissions from industrial facilities in the SCAQMD is 10,000 $MTCO_2e$ per year.[17] Project-related GHG emissions would be considered to have a significant impact on the environment if total project emissions (direct and indirect effects) would exceed this threshold.

The SCAQMD's thresholds specifically allow for amortization of construction emissions over 30 years, to be combined with annual operational emissions to determine total annual average GHG emissions to be compared to the numerical threshold[17].

For the purposes of this assessment, the estimated construction-phase GHG emissions arising from short-term construction and decommissioning activities were amortized over 30 years and added to the operational emissions for comparison with the threshold.

3.4 IMPACT EVALUATION

Appendix G, part VIII of the CEQA Environmental Checklist includes two questions relevant to the potential for impacts to GHG emissions. The CEQA Environmental Checklist asks if the Project would:

A. GENERATE GHG EMISSIONS, EITHER DIRECTLY OR INDIRECTLY, THAT MAY HAVE A SIGNIFICANT IMPACT ON THE ENVIRONMENT?

Construction and eventual decommissioning activities would cause GHG emissions resulting from fossil-fuel combustion in the engines of construction equipment and the vehicles carrying construction materials and workers to and from the site. Diesel fuel or gasoline will be used in mobilizing the heavy-duty construction equipment during all six phases of the Project: site preparation, pile and skid foundations, module install, electrical install, and commissioning.

The Project would be operated on an autonomous, unstaffed basis, and monitored remotely from an existing off-site facility. It is anticipated that maintenance requirements will be minimal as the proposed Project's photovoltaic arrays will operate with limited moving parts. Operational activities are limited to monitoring plant performance, periodic mowing, and unscheduled preventative maintenance. The Project will operate during daylight hours only, and no heavy equipment will be used during routine Project operation. Default operational emissions from CalEEMod are based on land type, land amount, and local area precipitation. The major contributor to GHG emissions is the default water use number of 20 million gallons annually based on the equation used in Department of Water Resources Model Water Efficient Landscape Ordinance. These operational emissions are a gross over assumption as native drought tolerant plants will be used; however, these default values are used to be conservative.

Equipment and vehicle use over the duration of construction would amount to approximately 143 $MTCO_2e$ of GHG emissions (See Appendix A for CalEEMod Output). For assessing the overall rate of project GHG emissions, San Bernardino County as CEQA lead agency allows short-term construction GHG emissions to be included with operational emissions by averaging construction effects over a 30-year life of the project, as recommended by SCAQMD. The overall construction

GHG emissions amortized over 30 years would be equivalent to an annualized rate of 5 $MTCO_2e$/year. It is assumed that decommissioning activities would be similar in nature and duration to construction activities, so decommissioning emissions are assumed to be the same as construction emissions. Decommissioning is typically faster than construction, so this is a conservative assumption. During the operational life of the project, direct on-site O&M activities would contribute an additional 46.2 $MTCO_2e$ per year. The emissions of O&M activities are shown with the one-time and annualized GHG emissions rates of construction in Table 3.4-1.

The data provided in Table 3.4-1 shows that the proposed Project would create a total of 56 $MTCO_2e$ per year, which is well within the SCAQMD threshold of 10,000 $MTCO_2e$ per year. Even if the construction schedule slipped, and GHG emissions were doubled, it would still be well below thresholds.

TABLE 3.4-1 BEAR VALLEY ESTIMATED GREENHOUSE GAS EMISSIONS

Category	Total ($MTCO_2e$)
Total Construction Emissions	143
Amortized Construction Emissions (30 years)	4.77
Amortized Decommissioning Emissions (30 years)	4.77
Annual Operational Emissions	46
Total Annual Emissions (includes operational and amortized construction and decommissioning activities)	**55.54**
SCAQMD Annual Threshold	**10,000**
Below Threshold (Y/N)	**Y**

$MTCO_2e$ = metric tons of carbon dioxide equivalent; N = no; Y = yes

Further, operation of the solar facility will offset GHG emissions by displacing power produced by carbon-based fuels that would otherwise be used to meet electricity demand. The power displaced is incremental power provided by generators elsewhere on the grid, typically from natural gas power plants. The Project will generate an estimated 13,987 megawatt-hours of solar-generated electricity each year that will be added to the power grid and be used in place of electricity generated by fossil-fuel sources. One hundred percent of the power produced by the Project will be consumed locally within Bear Valley Electric Service, Inc. service territory.

Therefore, because GHG emissions from the Project are well below the threshold and because this Project would displace conventional fossil-fueled electricity generation a less than significant

generation of GHG emissions would occur from development of the proposed Project. Impacts to the environment would be *less than significant*.

B. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

The Project would produce electricity in a manner that improves California's ability to supply renewable energy to end-use customers and to achieve statewide renewable energy goals. Electricity from the solar generating station would be used to serve the needs of California's customers and would facilitate compliance with California's RPS and CARB's 2022 Climate Change Scoping Plan.

The San Bernardino County 2021 RGHGRP includes GHG inventories, and local GHG reduction strategies for each partnership jurisdiction including the unincorporated areas of San Bernardino County. The RGHGRP demonstrates how unincorporated San Bernardino County could achieve its selected goal of reducing its GHG emissions to 40 percent below its 2020 GHG emissions level by 2030. The majority (approximately 80 percent) of unincorporated San Bernardino County's GHG reduction goal will be achieved through state efforts such as vehicle standards, the state's low carbon fuel standard, the RPS, and other state measures to reduce GHG emissions in the on-road, solid waste, and building energy sectors in 2030. According to the RGHGRP, the remaining 20 percent needed to meet its goal could be achieved "primarily through the following local measures, in order of reductions achieved: Solar Installation for Existing Commercial/Industrial (Energy-8); Waste Diversion and Reduction (Waste-2); Solar Installation for Existing Housing (Energy-7)."

Further, the proposed Project is consistent with the GHG goals and policies in the San Bernardino Policy Plan, specifically NR-1.7, RE 2.1, RE 4.1 and RE 4.3.1.

The Project is consistent with the County's RGHGRP and County Policy Plan goal to encourage renewable energy, including solar facilities. The Project would be consistent with state and regional plans to reduce GHG emissions and would result in *no impact*.

APPENDIX A CALEEMOD SUMMARY AND DETAILED REPORT

Bear Valley Solar Summary Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Bear Valley Solar
Construction Start Date	4/7/2025
Operational Year	2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.30
Precipitation (days)	14.2
Location	2151 Erwin Ranch Rd, Big Bear, CA 92314, USA
County	San Bernardino-South Coast
City	Unincorporated
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5156
EDFZ	10
Electric Utility	Bear Valley Electric Service
Gas Utility	Southwest Gas Corp.
App Version	2022.1.1.28

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Industrial	1,307	User Defined Unit	30.0	0.00	1,307,000	—	—	Solar Facility

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.45	20.8	23.0	0.04	1.08	63.3	63.4	0.99	6.40	6.67	5,403
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.29	2.36	3.19	0.01	0.10	14.4	14.5	0.09	1.46	1.55	862
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.05	0.43	0.58	< 0.005	0.02	2.63	2.65	0.02	0.27	0.28	143

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	279
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—

Unmit.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	46.2

6. Climate Risk Detailed Report

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	1	1	4
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A

Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

7. Health and Equity Details

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	19.0
Healthy Places Index Score for Project Location (b)	41.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

Bear Valley Solar Detailed Report

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Data Field	Value
Project Name	Bear Valley Solar
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Location	2151 Erwin Ranch Rd, Big Bear, CA 92314, USA
County	San Bernardino-South Coast
City	Unincorporated
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5156
EDFZ	10
Electric Utility	Bear Valley Electric Service
Gas Utility	Southwest Gas Corp.
App Version	2022.1.1.28

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Industrial	1,307	User Defined Unit	30.0	0.00	1,307,000	—	—	Solar Facility

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.45	20.8	23.0	0.04	1.08	63.3	63.4	0.99	6.40	6.67	5,403
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.29	2.36	3.19	0.01	0.10	14.4	14.5	0.09	1.46	1.55	862
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.05	0.43	0.58	< 0.005	0.02	2.63	2.65	0.02	0.27	0.28	143

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
2026	2.45	20.8	23.0	0.04	1.08	63.3	63.4	0.99	6.40	6.67	5,403
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
2026	0.29	2.36	3.19	0.01	0.10	14.4	14.5	0.09	1.46	1.55	862
Annual	—	—	—	—	—	—	—	—	—	—	—
2026	0.05	0.43	0.58	< 0.005	0.02	2.63	2.65	0.02	0.27	0.28	143

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	279
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	46.2

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	279
Waste	—	—	—	—	—	—	—	—	—	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Area	0.00	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	279
Waste	—	—	—	—	—	—	—	—	—	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	0.03
Area	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	279
Waste	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	279
Annual	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	0.01
Area	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Water	—	—	—	—	—	—	—	—	—	—	46.2
Waste	—	—	—	—	—	—	—	—	—	—	0.00
Total	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	46.2

3. Construction Emissions Details

3.1. Site Prep (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.54	12.1	9.52	0.02	0.69	—	0.69	0.64	—	0.64	2,612
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.66	0.52	< 0.005	0.04	—	0.04	0.03	—	0.03	143
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.12	0.10	< 0.005	0.01	—	0.01	0.01	—	0.01	23.7
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	1.08	0.00	0.00	20.6	20.6	0.00	2.08	2.08	210
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.80	0.46	< 0.005	0.01	14.9	14.9	0.01	1.52	1.53	714
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	1.09	1.09	0.00	0.11	0.11	10.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	0.05	0.03	< 0.005	< 0.005	0.78	0.79	< 0.005	0.08	0.08	39.1
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.20	0.20	0.00	0.02	0.02	1.77
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.14	0.14	< 0.005	0.01	0.01	6.47

3.3. Commissioning (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.36	2.04	2.82	0.01	0.07	—	0.07	0.06	—	0.06	1,372
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	150
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	24.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.36	0.00	0.00	6.87	6.87	0.00	0.69	0.69	70.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.72	0.72	0.00	0.07	0.07	7.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.13	0.13	0.00	0.01	0.01	1.18
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Module Install (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	1.93	2.98	< 0.005	0.06	—	0.06	0.06	—	0.06	446
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.34	0.53	< 0.005	0.01	—	0.01	0.01	—	0.01	79.4
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.2

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	1.08	0.00	0.00	20.6	20.6	0.00	2.08	2.08	210
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	3.53	3.53	0.00	0.36	0.36	34.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.64	0.64	0.00	0.07	0.07	5.75
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Electrical Install (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	1.59	2.47	< 0.005	0.05	—	0.05	0.04	—	0.04	370
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.03	0.28	0.44	< 0.005	0.01	—	0.01	0.01	—	0.01	65.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	10.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	1.08	0.00	0.00	20.6	20.6	0.00	2.08	2.08	210
Vendor	0.01	0.66	0.36	< 0.005	0.01	15.2	15.2	0.01	1.54	1.55	637
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.15	0.00	0.00	3.53	3.53	0.00	0.36	0.36	34.8
Vendor	< 0.005	0.12	0.06	< 0.005	< 0.005	2.60	2.60	< 0.005	0.26	0.27	113
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.64	0.64	0.00	0.07	0.07	5.75
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.47	0.47	< 0.005	0.05	0.05	18.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Skid Foundations (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.50	3.82	4.04	0.01	0.14	—	0.14	0.13	—	0.13	1,308
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.21	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	71.7
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	11.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	1.08	0.00	0.00	20.6	20.6	0.00	2.08	2.08	210
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	1.09	1.09	0.00	0.11	0.11	10.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.20	0.20	0.00	0.02	0.02	1.77
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Pile Foundations (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.77	7.75	10.9	0.02	0.38	—	0.38	0.35	—	0.35	1,656
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.42	0.60	< 0.005	0.02	—	0.02	0.02	—	0.02	90.8
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.11	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	15.0
Paving	0.00	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	1.08	0.00	0.00	20.6	20.6	0.00	2.08	2.08	210
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	1.09	1.09	0.00	0.11	0.11	10.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.20	0.20	0.00	0.02	0.02	1.77
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Consumer Products	0.00	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Total	0.00	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	279

Total	—	—	—	—	—	—	—	—	—	—	279
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	279
Total	—	—	—	—	—	—	—	—	—	—	279
Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	46.2
Total	—	—	—	—	—	—	—	—	—	—	46.2

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.00

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Prep	Site Preparation	4/1/2026	4/28/2026	5.00	20.0	—
Commissioning	Site Preparation	8/1/2026	9/25/2026	5.00	40.0	—
Module Install	Building Construction	6/1/2026	8/29/2026	5.00	65.0	—
Electrical Install	Building Construction	7/1/2026	9/29/2026	5.00	65.0	—
Skid Foundations	Building Construction	5/5/2026	6/1/2026	5.00	20.0	—
Pile Foundations	Paving	4/1/2026	4/28/2026	5.00	20.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Prep	Excavators	Diesel	Average	1.00	8.00	367	0.40
Site Prep	Skid Steer Loaders	Diesel	Average	1.00	8.00	84.0	0.37
Site Prep	Rollers	Diesel	Average	1.00	4.00	376	0.38
Site Prep	Off-Highway Trucks	Diesel	Average	1.00	4.00	148	0.41
Commissioning	Other General Industrial Equipment	Diesel	Average	2.00	4.00	367	0.40
Module Install	Forklifts	Diesel	Average	1.00	4.00	82.0	0.20
Module Install	Skid Steer Loaders	Diesel	Average	2.00	4.00	71.0	0.37
Module Install	Other General Industrial Equipment	Diesel	Average	2.00	4.00	35.0	0.34
Electrical Install	Other General Industrial Equipment	Diesel	Average	2.00	4.00	35.0	0.34
Electrical Install	Skid Steer Loaders	Diesel	Average	2.00	4.00	71.0	0.37
Skid Foundations	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Skid Foundations	Off-Highway Trucks	Diesel	Average	1.00	4.00	376	0.38
Skid Foundations	Cranes	Diesel	Average	1.00	4.00	367	0.29
Pile Foundations	Skid Steer Loaders	Diesel	Average	2.00	8.00	71.0	0.37

Pile Foundations	Forklifts	Diesel	Average	1.00	4.00	82.0	0.20
Pile Foundations	Other General Industrial Equipment	Diesel	Average	2.00	4.00	35.0	0.34
Pile Foundations	Other Construction Equipment	Diesel	Average	3.00	8.00	82.0	0.42

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Prep	—	—	—	—
Site Prep	Worker	15.0	18.5	LDA,LDT1,LDT2
Site Prep	Vendor	—	10.2	HHDT,MHDT
Site Prep	Hauling	10.0	20.0	HHDT
Site Prep	Onsite truck	—	—	HHDT
Pile Foundations	—	—	—	—
Pile Foundations	Worker	15.0	18.5	LDA,LDT1,LDT2
Pile Foundations	Vendor	—	10.2	HHDT,MHDT
Pile Foundations	Hauling	0.00	20.0	HHDT
Pile Foundations	Onsite truck	—	—	HHDT
Module Install	—	—	—	—
Module Install	Worker	15.0	18.5	LDA,LDT1,LDT2
Module Install	Vendor	0.00	10.2	HHDT,MHDT
Module Install	Hauling	0.00	20.0	HHDT
Module Install	Onsite truck	—	—	HHDT
Commissioning	—	—	—	—
Commissioning	Worker	5.00	18.5	LDA,LDT1,LDT2
Commissioning	Vendor	—	10.2	HHDT,MHDT
Commissioning	Hauling	0.00	20.0	HHDT

Commissioning	Onsite truck	—	—	HHDT
Electrical Install	—	—	—	—
Electrical Install	Worker	15.0	18.5	LDA,LDT1,LDT2
Electrical Install	Vendor	20.0	10.2	HHDT,MHDT
Electrical Install	Hauling	0.00	20.0	HHDT
Electrical Install	Onsite truck	—	—	HHDT
Skid Foundations	—	—	—	—
Skid Foundations	Worker	15.0	18.5	LDA,LDT1,LDT2
Skid Foundations	Vendor	0.00	10.2	HHDT,MHDT
Skid Foundations	Hauling	0.00	20.0	HHDT
Skid Foundations	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Prep	—	—	0.00	0.00	—
Pile Foundations	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
User Defined Industrial	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	912	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Total all Land Uses	0.00	0.00	0.00	52.0	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
User Defined Industrial	0.00	912	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
User Defined Industrial	0.00	20,989,274

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
User Defined Industrial	0.00	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	39.3	annual days of extreme heat
Extreme Precipitation	4.40	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	31.0	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A

Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	1	1	4
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	97.6
AQ-PM	1.68
AQ-DPM	4.41
Drinking Water	60.7
Lead Risk Housing	11.6
Pesticides	11.0
Toxic Releases	8.39
Traffic	1.35
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	0.00
Impaired Water Bodies	0.00
Solid Waste	11.6
Sensitive Population	—
Asthma	63.6
Cardio-vascular	92.9
Low Birth Weights	66.3
Socioeconomic Factor Indicators	—
Education	33.5
Housing	22.1
Linguistic	8.49
Poverty	67.0
Unemployment	64.5

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	54.07416913
Employed	2.34826126
Median HI	47.09354549
Education	—
Bachelor's or higher	24.38085461
High school enrollment	100
Preschool enrollment	95.7141024
Transportation	—
Auto Access	86.34672142
Active commuting	8.161170281
Social	—
2-parent households	29.38534582
Voting	73.38637239
Neighborhood	—
Alcohol availability	87.1423072
Park access	51.00731426
Retail density	9.110740408
Supermarket access	10.57359168
Tree canopy	85.29449506
Housing	—
Homeownership	77.15898884
Housing habitability	49.54446298
Low-inc homeowner severe housing cost burden	35.91684845
Low-inc renter severe housing cost burden	3.708456307

Uncrowded housing	96.93314513
Health Outcomes	—
Insured adults	30.92518927
Arthritis	0.0
Asthma ER Admissions	46.4
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	16.7
Cognitively Disabled	5.2
Physically Disabled	5.0
Heart Attack ER Admissions	10.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	59.1
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	87.1
SLR Inundation Area	0.0

Children	65.5
Elderly	25.8
English Speaking	82.2
Foreign-born	0.7
Outdoor Workers	31.4
Climate Change Adaptive Capacity	—
Impervious Surface Cover	94.7
Traffic Density	3.7
Traffic Access	23.0
Other Indices	—
Hardship	62.9
Other Decision Support	—
2016 Voting	81.4

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	19.0
Healthy Places Index Score for Project Location (b)	41.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Project size is 30 acres
Construction: Construction Phases	Durations scaled from a similar project
Construction: Off-Road Equipment	Per project team
Construction: Trips and VMT	Per project team
Construction: Dust From Material Movement	no import/export
Construction: On-Road Fugitive Dust	Unpaved Erwin Ranch Road

APPENDIX D BIOLOGICAL RESOURCES ASSESSMENT

Biological Resources Assessment

Bear Valley Solar Energy Project

PREPARED FOR

EDF Renewables Distribution-Scale Power

DATE
10 October 2024

REFERENCE
0739207

DOCUMENT DETAILS

The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.	
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SIGNATURE PAGE

Biological Resources Assessment

Bear Valley Solar Energy Project

0739207

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ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
APN	Assessor's Parcel Number
APT	Antecedent Precipitation Tool
CCH	Consortium of California Herbaria
CDFW	California Department of Fish and Wildlife
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWHR	California Wildlife Habitat Relationships
EDFR-DSP	EDF Renewables Distribution Scale Power
ERM	Environmental Resources Management
FEMA	Federal Emergency Management Agency
IPaC	Information for Planning and Conservation
MW	Megawatt
NHD	National Hydrology Dataset
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration's

NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
Project	Bear Valley Solar Energy Project
Project Area	Assessor's Parcel Number 031440129
PV	Photovoltaic
RPI	Rare Plant Inventory
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
USFS	United States Forest Service
USGS	United States Geological Survey

1. INTRODUCTION

Environmental Resources Management, Inc. (ERM), was retained by EDF Renewables Distribution-Scale Power to provide biological services in support of the Bear Valley Solar Energy Project (Project) located on a privately owned parcel, near the City of Big Bear Lake in unincorporated San Bernardino County, California (Appendix A, Figure 1, *Regional Map*; Appendix A, Figure 2, *Vicinity Map*). ERM was tasked with conducting a biological resources assessment for the 29.53-acre parcel where the Project is proposed to be developed ([Project Area] Appendix A, Figure 3). The purpose of this assessment was to evaluate the site's potential to support special-status species or sensitive habitats, to identify any potential biological site constraints related to permits needed to execute Project-related activities, and to assess the potential for significant impacts to biological resources and propose recommendations. This assessment is part of the environmental review process to comply with the California Environmental Quality Act (CEQA). To complete this assessment, ERM reviewed publicly available data from the Project vicinity and conducted a reconnaissance-level ecological survey of the site. This report summarizes the results of these assessments.

1.1 PROJECT DESCRIPTION

The Project proposes to construct a new, approximately 5-megawatt (MW) alternating current (AC) solar photovoltaic (PV) facility. The Project is owned by Bear Valley Electric Service, Inc. (BVES; Applicant) and being designed, permitted, and developed by EDF Renewables Distribution-Scale Power (EDFR-DSP).

1.2 LOCATION

The Project is situated within a 29.53-acre parcel, referred to as Assessor's Parcel Number (APN) 031440129, located at 2151 Erwin Ranch Road, near the City of Big Bear Lake in unincorporated San Bernardino County, California. The Project is approximately 2.5 miles to the southeast of Big Bear City, California, approximately 4 miles to the southeast of Big Bear Lake, approximately 1.5 miles to the south of Baldwin Lake, and approximately 0.6 miles northwest of Erwin Lake (Appendix A, Figure 1, *Regional Map*; Appendix A, Figure 2, *Vicinity Map*). Local access is provided by Erwin Ranch Road and Lakewood Drive, and regional access is provided by State Route 38. The Project is in the United States Geological Survey (USGS) 7.5-minute quadrangle for Big Bear City, California, within Section 17 of Township 2 North, Range 2 East. The San Bernardino National Forest borders the Project Area on the north but does not extend into the bounds of the Project Area. Additionally, the Project Area does not contain residential properties but is visible from Erwin Ranch Road, Lakewood Drive, and the neighboring rural residences on the east, west, and south.

2. REGULATORY FRAMEWORK

Table 1 summarizes the regulatory framework relevant to the potential biological resources within the Project Area that could be triggered by the development of the proposed Project.

TABLE 1 REGULATORY SETTING

Regulations	Responsible Agency
Federal Regulations	
Federal Endangered Species Act	United States Fish and Wildlife Service
Bald and Golden Eagle Protection Act	United States Fish and Wildlife Service
Migratory Bird Treaty Act	United States Fish and Wildlife Service
State Regulations	
California Endangered Species Act	California Department of Fish and Wildlife
California Environmental Quality Act	San Bernardino County
California Desert Native Plants Act; California Food and Agriculture Code Sections 80001-80201	California Department of Fish and Wildlife
Native Plant Protection Act; California Fish and Game Code Sections 1900-1913	California Department of Fish and Wildlife
Natural Community Conservation Plan; California Fish and Game Code Section 2800	California Department of Fish and Wildlife
Fully Protected Species; California Fish and Game Code Sections 3511, 3515, 3800, 4700, 5050 and 5515	California Department of Fish and Wildlife
Fully Protected Fur Bearing Mammals; California Code of Regulations Title 14, § 460, and California Fish and Game Code Section 4000	California Department of Fish and Wildlife
Protection of Birds, Eggs and Nests; California Fish and Game Code Section 3503, 3503.5 and 3513	California Department of Fish and Wildlife
Western Joshua Tree Conservation Act; California Fish and Game Code Section 1927	California Department of Fish and Wildlife
Local Regulations/Planning Documents	
San Bernardino County Countywide Plan – Natural Resources Element; Goal NR-5: Biological Resources	San Bernardino County
San Bernardino Countywide Plan - Renewable Energy and Conservation Element; Goal RE-4 Environmental Compatibility	San Bernardino County

3. BASELINE CONDITIONS

3.1 TOPOGRAPHY & REGIONAL CONTEXT

The Project Area is located within the U.S. Environmental Protection Agency (USEPA) Level IV Ecoregion 8f, also known as the Southern California Montane Conifer Forest, which occurs on the igneous-dominated mountains of the eastern Transverse Range and the Peninsular Ranges. The Project Area is located within the USGS Baldwin Lake Sub-Watershed (Hydrologic Unit Code 12 180702030101) and California's Regional Water Quality Control Board (RWQCB) / State Water Resources Control Board (SWRCB) Baldwin Hydrologic Subarea (801.73). The Project Area is in the Big Bear Valley and consists of a sloped pinyon-juniper woodland in the north, a minor topographic depression comprised of upland mustards and other ruderal vegetation in the northwestern to north central area, and a flat big sagebrush plant community in the south (Appendix A, Figure 1, *Regional Map*, Figure 2, *Vicinity Map*, Figure 5, *Vegetation Community and Land Cover Map*). The sloped pinyon-juniper woodland is characterized by 30 to 50 percent slopes and occurs between approximately 6,785 and 6,875 feet above mean sea level (Google Earth 2024). The minor topographic depression is characterized by 0 to 2 percent slopes at the toe-of-slope of the wooded hillside and occurs between approximately 6,780 and 6,785 feet above mean sea level. The flat big sagebrush community is characterized by 0 to 2 percent slopes and occurs between approximately 6,785 and 6,790 feet above mean sea level. The minor topographic depression is demarcated by slight changes in elevation (approximately 1 to 2 feet) associated with the toe of slope at the base of the woodland to the north, Lakewood Drive to the west, the residence with the equestrian facility to the southwest, the flat big sagebrush community to the south, and a 5-foot by 5-foot abandoned mineshaft and associated mining facilities to the east (Google Earth 2024).

3.2 CLIMATE

Big Bear Valley has warm summers and cold winters with precipitation occurring as rainfall in the warmer months and snowfall in the colder months. Average daily summer temperatures range between 60 to 70 degrees Fahrenheit, and average daily winter temperatures range between 35 to 40 degrees Fahrenheit (PRISM Climate Group 2024; USGS 2012). Due to the rain shadow effect of the San Bernardino Mountains, annual precipitation distribution within the valley is variable, ranging from approximately 35 inches on the western edge of Big Bear Lake to approximately 18 inches on the eastern edge of Baldwin Lake (USGS 2012).

Thirty-year climatological normals (1991-2020) for the 4-square-kilometer grid cell containing the Project Area interpolated by the data values among the surrounding grid cells indicate an annual average precipitation of 20.88 inches, (ranging from 0.12 inches in June, the driest month, to 4.73 inches in February, the wettest month) with an average July maximum temperature of 80.1 degrees Fahrenheit, and an average December minimum temperature of 23.1 degrees Fahrenheit (PRISM Climate Group 2024). Historical precipitation data from 2014 to 2023 indicates the most winter precipitation occurred in February 2019 (11.76 inches) and the most summer precipitation occurred in August 2023 (4.31 inches). The U.S. Army Corps of Engineers (USACE) Antecedent Precipitation Tool (APT) Version 2.0, which is a desktop tool that compares antecedent precipitation with normal ranges based on National Oceanic and Atmospheric Administration's

(NOAA) Daily Global Historical Climatology Network, indicates that weather conditions at the time of the field investigation represent normal conditions (USACE 2023).

4. METHODS

4.1 DESKTOP INVESTIGATION

A database and literature review were conducted to assess biological resources and habitats with potential to occur in the Project Area and form a list of target special-status species to assess during the reconnaissance-level survey. The following databases and resources were queried for the USGS 7.5-minute quadrangle within which the Project Area is located, Big Bear City, as well as the 8 surrounding quadrangles: Big Bear Lake, Cougar Buttes, Fawnskin, Lucerne Valley, Moonridge, Old Woman Springs, Onyx Peak, and Rattlesnake Canyon (Appendix A, Figure 1, *Regional Map*).

- Calflora: a database providing information on wild California plants (Calflora 2024);
- California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB) (CDFW 2024a);
- California Department of Fish and Wildlife's (CDFW) California Wildlife Habitat Relationships (CWHR) (CDFW 2024d);
- California Native Plant Society (CNPS) Rare Plant Inventory (RPI) (CNPS 2024a);
- Consortium of California Herbaria (CCH) (CCH 2024);
- eBird: a citizen-based bird observation network (eBird 2024);
- Google Earth Imagery (Google 2024);
- iNaturalist: a citizen-based organism observation network (iNaturalist 2024);
- United States Fish and Wildlife Service (USFWS) Critical Habitat (USFWS 2024a);
- USFWS Information for Planning and Conservation (IPaC) (USFWS 2024b);
- USFWS National Wetland Inventory (NWI) (USFWS 2024c);
- National Marine Fisheries Service (NMFS) Critical Habitat (NMFS 2024);
- USGS's National Hydrology Dataset (NHD) (USGS 2024); and
- United States Department of Agriculture's (USDA) Natural Resources Conservation Service's (NRCS) Web Soil Survey (Soil Survey Staff 2024);

A list of special-status species was produced by querying special-status species occurrence data in the vicinity of the Project Area. For environmental reviews, conducting a nine-quadrangle (9-quad) search for special-status species surrounding a Project Area serves as a baseline for evaluating potential species' occurrence data and follows the regulatory guidance set forth by CDFW (CDFW 2018a; CDFW 2019; CNPS 2024c). The CNDDB and the CNPS RPI were queried using a 9-quad search from the Project Area. A federal special-level species list report was also produced by the USFWS IPaC system.

4.2 FIELD SURVEY

ERM biologists Nicholas Smith and Marissa Juarez conducted an aquatic resource delineation and site constraints survey within the Project Area (Appendix A, Figure 3) on Monday, 01 July 2024. The purpose of the initial site visit was to determine whether wetlands and non-wetlands waters potentially subject to federal jurisdiction under Section 404 of the Clean Water Act (CWA) and

potentially subject to state jurisdiction under Section 401 of the CWA, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and Section 1600 of the California Fish and Game Code (CFGC) are present, and if so, their extent within the Project Area (ERM 2024b).

Nicholas Smith returned to the Project Area to conduct a general biological resources survey on Wednesday, 04 September 2024. The focus of both the aquatic resources and biological resources surveys was to map the existing vegetation communities and aquatic resources, if present, document the presence of habitat that could support special-status species, if present, and develop a compendium of floral and faunal species present at the time of the survey. The surveys were conducted via meandering transects on foot with use of binoculars for wildlife observation. During the time of the surveys, temperatures ranged from 51 degrees Fahrenheit in the early morning to 83 degrees Fahrenheit in the afternoon. Vegetation classification and mapping was conducted in accordance with the Survey of California Vegetation Classification and Mapping Standards (CDFW 2022) and Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Sensitive Natural Communities (CDFW 2018a), using CDFW's Vegetation Classification and Mapping Program's current list of natural communities (CDFW 2024b) and the membership rules published in the Manual of California Vegetation (CNPS 2024b). Wildlife and plants were identified using relevant field guides and dichotomous keys (Jepson eFlora 2024, Sibley 2014, Nafis 2024). Geospatial information was recorded using a global position system unit with 15-foot accuracy. Representative site photographs are provided in Appendix B (Photos 1 and 2). Floral and faunal compendia are provided in Appendix C.

5. RESULTS

5.1 GENERAL SITE CONDITION

The overall site condition was moderately disturbed. During the July 2024 survey, most of the vegetation was intact; however, during the September 2024 visit, approximately one-third of the vegetation in the western portion of the parcel had been mowed. Furthermore, approximately thirty wild donkeys were observed grazing vegetation during the time of the September 2024 survey. Anecdotal claims by a neighboring resident described the site as a former pastureland for Erwin Ranch. Foot paths traversed the site, and an unpaved access drive runs along the eastern boundary of the extent of the property.

In terms of historical land use, aerial photographs from between the late 1940s to the late 1960s, show what appears to be ground disturbance onsite due to mining operations within the pinyon-juniper woodland along the northern hillside of the Project Area (NETROnline 2024). The USGS Mineral Resource Data System indicates that the Gold Hill Mine, developed in 1942 and no longer active, is located near the northeast corner of the Project Area. The record indicates that the mine workings include surface and underground openings with an overall depth of 16.46 meters and comprised of shafts, 100 feet of trenches, and a crosscut adit at 1,200 feet long with 200 feet of drifts plus several additional adits. At the time of ERM's July 2024 site visit, a partially backfilled excavation approximately 5 feet by 5 feet wide and 10 feet deep was observed on the northeastern portion of the Project Impact Footprint. The excavation appears to be an abandoned mineshaft (Appendix A, Figure 7, and Appendix B, Photo 13). The opening of the shaft is partially blocked with heavily weathered and degraded wooden planks and was flooded to within 10 or 15 feet of the surface. What appears to be a small tailing pile was observed adjacent to the mineshaft (Appendix A, Figure 7, and Appendix B, Photo 14). A former ventilation shaft within a 10-foot by 10-foot concrete slab and production shaft with subgrade machinery were also observed on the hillslope near the northeastern corner of the Project Site approximately 250-300 feet northeast of the mineshaft. The ventilation shaft was capped, and the production shaft was backfilled with soil and covered with a metal grate.

5.2 SOILS

Based on the USDA NRCS online Web Soil Survey data (Soil Survey Staff 2024 Appendix A, Figure 4, *Soils Map*) the Project area consists of three different soil types including:

- **Aquents-Grunney complex, 0 to 4 percent slopes (2dvmq)** – This complex of poorly drained soils is comprised of Aquents and Grunney soils. Aquents soils formed in mixed alluvium and occur in floodplains and treads. They are typically comprised of sandy loam, have an occasional frequency of flooding, and are characterized as hydric soils. Grunney soils formed in mixed alluvium and occur in floodplains and treads. They are typically comprised of muck, mucky loam, and sandy loam, have an occasional frequency of flooding and ponding, range from non-saline to very slightly saline, and are characterized as hydric soils (Soil Survey Staff 2024).

- **Moonridge-Shayroad-Caribоucreek complex, 0 to 4 percent slopes (2dvn1)** – This complex of well-drained soils is comprised of Moonridge, Shayroad, and Caribоucreek soils. Moonridge soils formed in alluvium derived primarily from granite and related rocks and occur within alluvial fans and treads. They are typically comprised of loam, have an occasional frequency of flooding, and are not characterized as hydric soils. Shayroad soils formed in alluvium derived primarily from granite and related rocks and occur within alluvial fans and treads. They are typically comprised of sandy loam, range from non-saline to very slightly saline, and are not characterized as hydric soils. Caribоucreek soils formed in mixed alluvium and occur within alluvial fans and treads. They are typically comprised of loam and clay loam, have an occasional frequency of flooding, and are not characterized as hydric soils (Soil Survey Staff 2024).

- **Goldmountain-Deadmansridge-Deadpan complex, 30 to 50 percent slopes (2dvn6)** – This complex of well-drained is comprised of Goldmountain, Deadmansridge, and Deadpan soils. Goldmountain soils formed in colluvium derived from metasedimentary rock and occur on mountain slopes. They are typically comprised of very gravelly loam to extremely gravelly loam with lithic bedrock restriction at approximately 20 and 30 inches of depth and are not characterized as hydric soils. Deadmansridge soils formed in colluvium derived from igneous and metamorphic rock and occur on mountain slopes. They are typically comprised of very gravelly loam to very cobbly loam and are not characterized as hydric soils. Deadpan soils formed in formed in colluvium derived from igneous and metamorphic rock and occur on mountain slopes. They are typically comprised of cobbly loam to cobbly clay loam and are not characterized as hydric soils (Soil Survey Staff 2024).

5.3 CRITICAL HABITAT

No areas designated as Critical Habitat overlap the Project Area; the nearest Critical Habitat is located approximately 0.4 miles northeast of the Project Area (for the species Bear Valley sandwort, *Eremogone ursina*).

5.4 AQUATIC RESOURCES

ERM conducted an aquatic resources delineation in 2024 (ERM 2024b) and did not identify any USACE jurisdictional wetlands in the project site or within 200 feet of the project site. No NHD or NWI features occurred within the Project Area. However, NWI imagery depicts a seasonally flooded, riverine intermittent stream bed (R4SBC) approximately 65 feet from the northwestern area of the parcel, a semi-permanently flooded riverine system with an unconsolidated bottom (R5UBF) approximately 125 feet from the northwestern area of the Project Area, and a seasonally saturated palustrine emergent wetland (PEM1B) approximately 290 feet from the northwestern area of the Project Area (USFWS 2024) (Appendix A, Figure 2, *Vicinity Map*). Historic aerial imagery from 1938 indicates inundation and surface hydrologic connectivity between the northern sections of the Project Area and the adjacent seasonally saturated palustrine emergent wetland; however, all subsequent aerial imagery displays no evidence of surface hydrologic connectivity (NETROnline 2024).

The Federal Emergency Management Agency (FEMA) mapped floodplain classifies the entire Project Area as an area of minimal flood hazard (FEMA 2024). However, the California Department of Water Resources (DWR) Best Available Maps (BAM) Awareness dataset mapped the northwestern area of the parcel as within a 100-year floodplain (DWR 2024). While DWR BAM Awareness 100-year floodplains are not intended to replace FEMA regulatory floodplains, these maps identify areas where storm flows have a 1% chance of being equaled or exceeded in any year (DWR 2024).

5.5 VEGETATION COMMUNITIES & LAND COVER TYPES

Forty-seven plants (Appendix C, Table 4, *Floral Compendium*) were documented on site during the surveys. Following the dichotomous key and membership rules as defined in the Manual of California Vegetation (CNPS 2024b), three vegetative communities were also determined to occur within the Project Area, none of which are designated as sensitive by CDFW (see Table 2 below).

An overview of the spatial composition of the vegetation communities and land cover types can be viewed on the Appendix A, Figure 5, *Vegetation Communities and Land Cover Map*. Figure 5 depicts the vegetation communities from the Manual of California Vegetation (CNPS 2024b) in relation to the USDA NRCS soils mapped within the Project Area. Table 2 below includes the acreages for each natural community based on the Manual of California Vegetation schema within the Project Area, including their full scientific name and CDFW code. None of the communities identified on site are sensitive.

TABLE 2 VEGETATION COMMUNITIES, LAND COVER TYPES AND ACREAGES

Common Name	Scientific Name	Primary Life Form	Rarity Rank*	CDFW Sensitive	CDFW Natural Community Code	Acres
Big Sagebrush	*Artemisia tridentata* Shrubland Alliance	Shrub	G5S5	No	35.110.01	12.8
Upland Mustards or Star-Thistle Fields	*Brassica nigra* - *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance	Herbaceous	GNA / SNA	No	42.013.00	7.1
Singleleaf Pinyon – Utah Juniper Woodlands	*Pinus monophylla* – (*Juniperus osteosperma*) Woodland	Tree	G5S4	No	87.040.16	9.6

*Rarity Rank Definitions
GNA/SNA = Not Applicable — Global/State rank not applicable because ecosystem is not a suitable target for conservation activities.
G4/S4 = Global/State Apparently Secure — At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5/S5 = Global/State Secure — At very low risk of extinction or elimination due to a very extensive range, abundant populations, or occurrences, and little to no concern from declines or threats.

5.5.1 BIG SAGEBRUSH

The Project Area consists of approximately 12.8 acres of big sagebrush shrubland. Big sagebrush shrublands are natural communities dominated by big sagebrush (*Artemesia tridentata*) with open to continuous canopies that occur on plains, alluvial fans, bajadas, pediments, lower slopes, valley bottoms, hills, ridges, seasonal and perennial stream channels, and dry washes within well-drained, deep, sandy to loamy soils (CNPS 2024). Within the Project Area, big sagebrush is the dominant species with rubber rabbitbrush (*Ericameria nauseosa*), tansy mustard (*Descurainia sophia*), quack grass (*Elymus repens*), and Pacific lupine (*Lupinus lepidus*) occurring in subdominant proportions. Numerous individuals of California primrose (*Oenothera californica*) were observed along the eastern boundary of this community. Blue flag iris (*Iris missouriensis*) was observed in minor topographic depressions within this section of the site. Representative photos are included in Appendix B, Photo 3.

5.5.2 UPLAND MUSTARD FIELDS

The Project Area consists of approximately 7.1 acres of upland mustard fields. Upland mustard fields are semi-natural herbaceous communities with an open to continuous canopy that occur in fallow fields, rangelands, grasslands, roadsides, levee slopes, disturbed coastal scrub, riparian areas, cleared roadsides, and waste places. Soils typically consist of clays or sandy loams. Members of this community are highly variable though often contain over 80% relative cover of non-native ruderal forbs (CNPS 2024). During the July 2024 survey, the Project Area was dominated by non-native mustards such as tansy mustard and tumble mustard (*Sisymbrium altissimum)*. However, during the September survey, most of the desiccated mustard stalks were absent, and the site was dominated by other non-native species including pigweed amaranth (*Amaranthus albus*), strawberry blite (*Amaranthus biltoides*), dwarf mallow (*Malva neglecta*), intermediate wheatgrass (*Elymus hispidus*), and quack grass. Substantial patches of bare ground were also present. The dominant native species within this community is western mountain aster (*Symphyotrichum spathulatum*), and trace occurrences of other native plants include mugwort (*Artemesia ludoviciana)*, Pacific lupine, yarrow (*Achillea millefolium*), and rattlesnake sandmat (*Euphorbia albomarginata*). Representative photos are included in Appendix B, Photos 4 through 7, depicting these communities as observed in both July 2024 and September 2024.

5.5.3 SINGLELEAF PINYON – UTAH JUNIPER WOODLANDS

The Project Area consists of approximately 9.6 acres of singleleaf pinyon – Utah juniper woodlands. Singleleaf pinyon – Utah juniper woodlands are natural communities with an open to intermittent canopy that typically occur on alluvial fans, pediments, slopes, ridges, canyons, and ravines with well drained soils. Within the Project Area, this community dominates the sloping hillside in the northern section of the site. Singleleaf pinyon (*Pinus monophylla)* is dominant in the tree canopy with lower relative canopy cover of California juniper (*Juniperus californica*). Individuals of Jeffrey pine (*Pinus jeffreyi*) and Sierra juniper (*Juniperus grandis*) occur at higher elevations along the hillside. The intermittent to continuous shrub layer includes big sagebrush, rubber rabbitbrush, plains pricklypear (*Opuntia polyacantha*), and bitterbrush (*Purshia tridentata*).

Vegetation in the herbaceous layer is sparse and is dominated by cheatgrass (*Bromus tectorum*). Representative photos are included in Appendix B, Photo 8.

5.6 SPECIAL-STATUS SPECIES

Desktop investigations produced a list of 198 special-status species (132 vascular plants and 66 animals) to analyze for occurrence potential from previously existing records in the vicinity of the Project site (Appendix A, Figure 6, *Special Status Species Occurrence Map*). Likelihood of Occurrence determinations were made by analyzing specific required habitat components (e.g., vegetation community, vegetation density/structure, correct soils/soil friability, water resources, salinity, substrates, food availability, etc.) and other relevant information such as geographic range, elevation range, disturbance regime, and quality of records. The comprehensive evaluation of all 198 special-status species in conjunction with their record sources, habitat requirements, and their Likelihood of Occurrence designations can be viewed in Appendix D, Table 6. Biologists conducting this review used their best professional judgment to designate each species' Likelihood of Occurrence to one of the categories below:

- **Present**: Appropriate species-specific survey methodology and protocols were followed by qualified biologist(s) during an appropriate time of year and produced unequivocal positive results for species occurrence.
- **High Potential**: Project Area is within the range of the species and suitable habitat is present, and/or there is reasonably high certainty to assume a high potential to occur based on existing data. Bird and bat species have potential for occurrence further categorized as breeding, nesting, foraging, and/or wintering.
- **Moderate Potential**: Project Area is within the range of the species and moderately suitable habitat is present, and/or there is reasonably high certainty to assume a moderate potential to occur based on existing data. Bird and bat species have potential for occurrence further categorized as breeding, nesting, foraging, and/or wintering.
- **Low Potential**: Project Area is within the range of the species, but habitat is marginal, nearby records are historic/unreliable, or there is reasonably high certainty to assume a low potential to occur based on existing data. Bird and bat species have potential for occurrence further categorized as breeding, nesting, foraging, and/or wintering.
- **Does Not Occur**: Project Area is outside the range of the species, lacks suitable habitat, and/or there is reasonable certainty to assume the species does not occur based on existing data and range distribution.
- **Absent**: Appropriate species-specific survey methodology and protocols were followed by qualified biologist(s) during an appropriate time of year and produced unequivocal negative results for species occurrence.

An abbreviated table is provided in Table 3 below, which only includes the species that were found to be Present or have a Moderate-to-High potential to occur within the Project Area, omitting species that are Absent, Do Not Occur, or have a Low potential to occur within the Project Area. In total, 15 special-status species are present or have a moderate to high potential to occur within the Project area, including 5 plant species and 10 animal species.

TABLE 3 SPECIAL-STATUS SPECIES WITH A POTENTIAL TO OCCUR ONSITE

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
Plants					
Astragalus lentiginosus var. *sierrae*	Big Bear Valley milk-vetch	CRPR 1B.2	Mojavean desert scrub, meadows and seeps, pinyon and juniper woodland, upper montane coniferous forest. Microhabitat: gravelly (sometimes), rocky (sometimes). Blooming Period: April through August. Elevation: 5,905 to 8,530 feet.	CNDDB, RPI	**Present.** A population comprised of two individuals was observed within the Project Area during the July 2024 field visit within the Upland Mustards- Herbaceous Semi-Natural Alliance near the toe of the south-facing slope that occupies the northeastern portion of the site.
Boechera dispar	Pinyon rockcress	CRPR 2B.3	Joshua tree "woodland", Mojavean desert scrub, pinyon and juniper woodland. Microhabitat: granitic, gravelly. Blooming period: March through June. Elevation: 3,935 to 8,335 feet.	CNDDB, RPI	**Moderate Potential.** There are 14 CNDDB records of this species within the Project Area's USGS 7.5-minute quadrangle (Big Bear City). One CNDDB record occurs within a 1-mile radius of the Project Area with the nearest occurrence (2008) documented approximately 0.8 miles southeast. The Project Area is located along the western margin of the species range. Gravelly areas within the pinyon and juniper woodland and big sagebrush shrubland on site may provide suitable habitat.
Boechera parishii	Parish's rockcress	CRPR 1B.2	Pebble (pavement) plain, pinyon and juniper woodland, upper montane coniferous forest. Microhabitat: quartzite on clay, carbonate (sometimes), rocky. Blooming Period: April through May. Elevation: 5,805 to 9,810 feet.	CNDDB, RPI	**High Potential.** There are 7 CNDDB records of this species within the Project Area's USGS 7.5-minute quadrangle (Big Bear City). Four CNDDB records occur within a 1-mile radius of the Project Area with the nearest specific area occurrence (2012) overlapping the eastern section of

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
					the Project Area. Rocky areas within the big sagebrush shrubland – pinyon and juniper woodland ecotone on-site may provide suitable habitat.
Dudleya abramsii ssp. affinis	San Bernardino Mountains dudleya	CRPR 1B.2, FT	Pebble (Pavement) plain, pinyon and juniper woodland, upper montane coniferous forest. Microhabitat: quartzite (sometimes), carbonate (sometimes), granitic (sometimes). Blooming period: April through June. Elevation: 4,100 to 8,530 feet.	CNDDB, RPI	**High Potential.** There are 18 CNDDB records of this species within the Project Area's USGS 7.5-minute quadrangle (Big Bear City). Three CNDDB records occur within a 1-mile radius of the Project Area with the nearest occurrence (2008) documented approximately 0.25 miles east. South-facing slopes within the pinyon and juniper woodland on site may provide suitable habitat. However, this habitat type would not be affected by project activities because it occurs on a hillside and will not be developed.
Linanthus killipii	Baldwin Lake linanthus	CRPR 1B.2	Joshua tree "woodland", meadows and seeps (alkaline), pebble (pavement) plain, pinyon and juniper woodland. Blooming period: May through July. Elevation: 5,580 to 7,875 feet.	CNDDB, RPI	**Present**. A population comprised of eight desiccated individuals was observed within the Project Area during the September 2024 field visit on the south-facing slope that occupies the northeast portion of the site. However, this habitat type would not be affected by project activities because it occurs on a hillside and will not be developed.
Reptiles					
Charina umbratica	Southern rubber boa	ST	Meadow & seep, riparian forest, riparian woodland, upper montane coniferous forest, wetland. Found in a variety of montane forest habitats.	CNDDB	**Moderate Potential.** There are 29 CNDDB records within a 10-mile radius of the site. There are four records from the Big Bear

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
			Requires loose, moist soil for burrowing; seeks cover in rotting logs, rock outcrops, and under leaf litter and debris.		City Quad. If present, the species is most likely to occur on the south-facing slope in association with rock outcrops. If present, they could move through the northwest corner of the Project Area to reach the perennial damp meadows to the west of the Project Area. However, shelter within this portion of the site is limited. Leaf litter, logs, and debris are generally absent, so the species would not be anticipated to shelter within project footprint.
Phrynosoma blainvillii	Coast horned lizard	SSC	Chaparral, cismontane woodland, coastal bluff scrub, coastal scrub, desert wash, pinon & juniper woodlands, riparian scrub, riparian woodland, valley & foothill grassland. Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	CNDDB	**Moderate Potential.** Pinyon-juniper woodland within the Project Area may provide some suitable habitat for this species. Four CNDDB records (1907 to 2004) occur within a 10-mile radius of site. The nearest CNDDB record (2004) occurred 3.6 miles north of the site.
Birds					
Aquila chrysaetos	Golden eagle	FP, WL	Broadleaved upland forest, cismontane woodland, coastal prairie, Great Basin grassland, Great Basin scrub, lower montane coniferous forest, pinon & juniper woodlands, upper montane coniferous forest, valley & foothill grassland. Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting	CNDDB, IPaC	**Moderate Potential – Foraging.** No eagle nests were observed during biological surveys. Four CNDDB records (from 1992 to 2010) occur within a 10-mile radius of the site. Pinyon-juniper woodlands within the Project Area may provide suitable foraging habitat for this species. However, this habitat type would not be

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
			habitat in most parts of range; also, large trees in open areas.		affected by project activities because it occurs on a hillside and will not be developed.
Spinus lawrencei	Lawrence's goldfinch	SA	Broadleaved upland forest, chaparral, pinyon & juniper woodlands, riparian woodland. Nests in open oak or other arid woodland and chaparral, near water. Nearby herbaceous habitats used for feeding. Closely associated with oaks.	CNDDB	**Moderate Potential – Breeding, Nesting, Foraging.** While this species is closely associated with oaks, which are absent within the Project Area, pinyon-juniper woodlands may provide suitable nesting and foraging habitat. One unprocessed CNDDB record (2024) occurs within the Project Area's USGS 7.5-minute quadrangle (Big Bear City).
Mammals					
Callospermophilus lateralis bernardinus	San Bernardino golden-mantled ground squirrel	SA	Mixed conifer, ponderosa pine, Jeffrey pine, lodgepole pine, limber pine, pinyon-juniper, montane riparian, aspen, and alpine meadow. Prefer open canopy without dense understory, with logs, stumps, talus, and other rocks for cover. Digs burrows or may use pocket gopher burrows.	CNDDB	**Moderate Potential.** Pinyon-juniper woodlands and open areas may provide suitable habitat within the Project Area, however, the project footprint does not support this habitat type. Two of five unprocessed CNDDB records (2024) list occurrences of this species within the Project Area's USGS 7.5-minute quadrangle (Big Bear City).
Corynorhinus townsendii	Townsends big-eared bat	SSC	Broadleaved upland forest, chaparral, chenopod scrub, Great Basin grassland, Great Basin scrub, Joshua tree woodland, lower montane coniferous forest, meadow & seep, Mojavean desert scrub, riparian forest, riparian woodland, Sonoran desert scrub, Sonoran thorn woodland, upper montane coniferous forest, valley & foothill grassland. Roosts in caves and	CNDDB	**Moderate Potential.** Four of five CNDDB records (all from 1998) within a 10-mile radius of the site documented occurrences in abandoned mines surrounded by pinyon-juniper woodlands. The flooded mine shaft within the project footprint may provide short-term roosting habitat but would not provide the necessary

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
			mines. Extremely sensitive to human disturbance.		microhabitat for longer-term maternity roosting or hibernation. The partially backfilled production shaft on the hillslope to the north and outside of the project footprint may provide bats with access to the mine for longer-term roosting.
Myotis ciliolabrum	Western small-footed myotis	SA	Wide range of habitats mostly arid wooded and brushy uplands near water. Seeks cover in caves, buildings, mines, and crevices. Roosts individually or in small numbers. Prefers open stands in forests and woodlands. Requires drinking water. Feeds on a wide variety of small flying insects.	CNDDB	**Moderate Potential.** Two of three CNDDB records (all from 1998) within a 10-mile radius of the site documented occurrences in abandoned mines surrounded by pinyon-juniper woodlands. The flooded mine shaft within the project footprint may provide short-term roosting habitat but would not provide the necessary microhabitat for longer-term maternity roosting or hibernation. The partially backfilled production shaft on the hillslope to the north and outside of the project footprint may provide bats with access to the mine for longer-term roosting.
Myotis evotis	Long-eared myotis	SA	Found in all brush, woodland and forest habitats from sea level to about 9000 ft. Prefers coniferous woodlands and forests. Forms small nursery colonies in buildings, caves, mines, crevices, spaces under bark, and snags. Also switch roosts frequently (Snider et. al. 2013).	CNDDB	**Moderate Potential.** One CNDDB record (1998) approximately 8.2 miles east of the Project Area identified a maternity roost for this species in an abandoned mine surrounded by pinyon-juniper woodland. The flooded mine shaft within the project footprint may provide short-term roosting habitat but would not provide the necessary microhabitat for longer-term maternity roosting or

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
					hibernation. The partially backfilled production shaft on the hillslope to the north and outside of the project footprint may provide bats with access to the mine for longer-term roosting.
Myotis thysanodes	Fringed myotis	SA	In a wide variety of habitats, optimal habitats are pinyon-juniper, valley foothill hardwood and hardwood-conifer. Uses caves, mines, buildings or crevices for maternity colonies and roosts.	CNDDB	**Moderate Potential.** Three of four CNDDB records (all from 1998) within a 10-mile radius of the site documented occurrences in pinyon-juniper woodlands. The flooded mine shaft within the project footprint may provide short-term roosting habitat but would not provide the necessary microhabitat for longer-term maternity roosting or hibernation. The partially backfilled production shaft on the hillslope to the north and outside of the project footprint may provide bats with access to the mine for longer-term roosting.
Myotis volans	Long-legged myotis	SA	Upper montane coniferous forest. Most common in woodland and forest habitats above 4000 ft. Trees are important day roosts; caves and mines are night roosts. Maternity habitat is usually under bark or in hollow trees and changes every few days (Baker and Lacki 2006). Occasionally roosts in crevices, mines or buildings.	CNDDB	**Moderate Potential.** Two of three CNDDB records (all from 1998) within a 10-mile radius of the site documented occurrences in abandoned mines surrounded by pinyon-juniper woodlands. The flooded mine shaft within the project footprint may provide short-term roosting habitat but would not provide the necessary microhabitat for longer-term maternity roosting or hibernation. The partially backfilled production shaft on the hillslope to the north and outside of the project

Scientific Name	Common Name	Special Status[a]	Habitat[b]	Record Source[c]	Potential to Occur[d]
					footprint may provide bats with access to the mine for longer-term roosting.

[a] Habitat descriptions source: California Department of Fish and Wildlife, Biogeographic Data Branch (2023) and Rare Plant Inventory, California Native Plant Society (2023)

[b] Special-Status Definitions (CDFW 2023c, CDFW 2023d):

CRPR = California Rare Plant Rank
- 1B = Plants rare, threatened, or endangered in California and elsewhere
- 2B = Plants rare, threatened, or endangered in California but more common elsewhere
- 3 = Review List: Plants about which more information is needed
- 4 = Watch List: Plants of limited distribution
  - 0.1 = Seriously threatened in California
  - 0.2 = Moderately threatened in California
  - 0.3 = Not very threatened in California

SA = California Department of Fish and Wildlife - Special Animal
WL = California Department of Fish and Wildlife – Watch List
FP = California Department of Fish and Wildlife - Fully Protected
SSC = California Department of Fish and Wildlife - Species of Special Concern
FE = Federal Endangered Species Act - Endangered
FT = Federal Endangered Species Act - Threatened
FD = Federal Endangered Species Act - Delisted
FC = Federal Endangered Species Act - Candidate
ST = California Endangered Species Act - Threatened
SE = California Endangered Species Act - Endangered
SCE = California Endangered Species Act - Candidate Endangered
FTP = Federal Endangered Species Act - Proposed Threatened

[c] Record Source Definitions:

CNDDB = California Natural Diversity Database (California Department of Fish and Wildlife)
IPaC = Information for Planning and Consultation (U.S. Fish and Wildlife Service)
RPI = Rare Plant Inventory (California Native Plant Society)

[d] Potential to Occur Definitions:

Present: Appropriate species-specific survey methodology and protocols were followed by qualified biologist(s) during an appropriate time of year and produced unequivocal positive results for species occurrence.

High Potential: Project Area is within the range of the species and suitable habitat is present, and/or there is reasonably high certainty to assume a high potential to occur based on existing data. Bird species are further categorized as breeding, foraging and/or wintering.
Moderate Potential: Project Area is within the range of the species and moderately suitable habitat is present, and/or there is reasonably high certainty to assume a moderate potential to occur based on existing data. Bird species are further categorized as breeding, foraging and/or wintering.
Low Potential: Project Area is within the range of the species, but habitat is marginal, nearby records are historic/unreliable, or there is reasonably high certainty to assume a low potential to occur based on existing data. Bird species are further categorized as breeding, foraging and/or wintering.
Does Not Occur: Project Area outside the range of the species, lacks habitat or suitable conditions, and/or there is reasonable certainty to assume species does not occur based on existing data and range distribution.
Absent: Appropriate species-specific survey methodology and protocols were followed by qualified biologist(s) during an appropriate time of year and produced unequivocal negative results for species occurrence.

5.6.1 SPECIAL- STATUS PLANTS

Two special-status plants (Big Bear Valley milk-vetch and Baldwin Lake linanthus) were observed within the Project Area during biological surveys conducted by ERM in July and September, 2024, respectively (Appendix A, Figure 7, *Biological Resources and Potential Habitat Features* and Appendix B, Photos 9 and 10). Big Bear Valley milk-vetch was observed within flat terrain (Aquents-Grunney complex), which will be developed; Baldwin Lake linanthus was observed on sloping habitat (Goldmountain-Deadmansridge-Deadpan complex) consisting of pinyon-juniper woodland, which will not be affected by Project activities. Three additional species have potential to occur based on the presence of suitable habitat including San Bernardino Mountains dudleya (*Dudleya abramsii* ssp. *affinis*), Parish's rockcress (*Boechera parishii*) and pinyon rockcress (*Boechera dispar*). Like the Baldwin Lake linanthus, San Bernardino Mountains dudleya would occur on the south-facing slope that will not be developed. Therefore, neither species would be affected by Project activities. However, like Bear Valley milk-vetch, Parish's rockcress and pinyon rockcress have potential to occur within the flat terrain, which will be subject to development. Therefore, Project activities have potential to directly impact all three of these species.

Due to the disturbed nature of the site including historic mining activities and intensive grazing, the site is not anticipated to support large populations of any of the three species as suggested by the single Bear Valley milk-vetch that was observed within the Project Area. The Project Area also represents a small proportion of suitable habitat available for these species. Specifically, the range for the Bear Valley milk-vetch in the San Bernardino Mountains alone totals approximately 350 square miles much of which consists of suitable habitat communities (Mojavean desert scrub, meadows and seeps, pinyon and juniper woodland, upper montane coniferous forest). Additional populations are recorded in the San Gabriel Mountains, Tehachapi Mountains, Santa Rosa Mountains and on Frazier Mountain. The loss of two individuals and a small amount of disturbed habitat (less than 20 acres which equates to less than 0.008-percent of suitable habitat within the species range within the San Bernardino Mountains) would not significantly affect the species' long-term survival.

Similarly, pinyon rockcress is dispersed across Riverside, San Bernardino, Tulare, Kern, Inyo, and Mono Counties in California and Nye County in Nevada. With such a broad range, the potential loss of 20 acres of suitable habitat, even if occupied, would not significantly affect the species' long-term sustainability.

Parish's rockcress exhibits a slightly more restricted range. It is known only from San Bernardino County, but it occupies a range of approximately 500 square miles based on 199 CCH and 44 CNDDB records. According to data associated with the records, the overall population numbers exceed 30,000 individuals with the core of the population concentrated on approximately 250 square miles surrounding Big Bear Lake and Baldwin Lake. The record that overlaps the eastern portion of the project site indicates that approximately 16,730 individuals were observed in 2005 over an area of approximately 420 acres or approximately 40 individuals/acre. Approximately 1 acre of that area overlays the property which suggests that approximately 40 individuals (or approximately 0.1-percent of the existing population), may be lost due to project construction.

The loss of such a small proportion of the population is not anticipated to significantly affect the species' long-term sustainability.

5.6.2 SOUTHERN RUBBER BOA

Based on species records depicted in the USFWS 2021 Special Status Assessment Report for the Southern Rubber Boa, the nearest records for the species occur north of Baldwin Lake. The next nearest records occur approximately 1.3 miles to the southeast near Deadman's Ridge. The Project Area does contain habitat features that are consistent with suitable habitat for southern rubber boa, such as rock outcrops, surface rock, logs, forest litter, and rodent burrows. However, these features are generally limited to the south-facing hillslope which will not be impacted. Damp or moist soil and associated wet meadow or seep habitat does not occur within the Project Area. Additionally, within the flat terrain that characterizes the southern three-quarters of the site where development would occur, tree canopy is absent, the soil is somewhat compacted and large areas of ground are bare due to intensive grazing by donkeys. Although some small mammal burrows were observed, moisture-retaining leaf litter, logs, and bark are also generally absent in these areas, so the species is unlikely to shelter on site. However, if the species is present on the hillside along the northern portion of the site in association with rock outcrops, it could pass through the extreme northwest corner of the Project Area to reach the perennial wet meadows to the west of the site.

Because southern rubber boa is nocturnal, if an individual did pass through the site, it would do so when no construction activities were occurring. Therefore, the potential for ground-disturbing activities and vehicle traffic during construction or vehicle traffic during operations to harm or kill a southern rubber boa is limited. However, if such an impact occurred, it would be considered significant.

5.6.3 COAST HORNED LIZARD

Although there was no evidence of loose sandy soil due to compaction by wild donkeys in the development footprint, surrounding habitat on slopes could provide suitable habitat for this species. However, the Project will not develop in this habitat type. Therefore, the Project is not expected to affect this species.

5.6.4 GOLDEN EAGLE AND NESTING BIRDS PROTECTED BY THE MIGRATORY BIRD TREATY ACT

If present, Lawrence's goldfinch may forage within areas that would be developed; however, this species would nest in the pinyon and juniper woodland that will not be affected by project activities. Therefore, the species is unlikely to be impacted by this Project.

Similarly, golden eagle is known to occur in the region (four CNDDB records within 10 miles of the Project Area) and nests in trees. Golden eagle could forage within the pinyon pine habitat that will not be affected by Project activities. Therefore, golden eagle is unlikely to be affected by Project activities.

Birds protected by the Migratory Bird Treaty Act have the potential to nest within or near the development footprint and therefore could be affected by Project activities.

5.6.5 SPECIAL-STATUS BATS

Potential roosting habitat for special-status bats (Townsend's big-eared bat, western small-footed myotis, long-eared myotis, fringed myotis, and long-legged myotis) within the Project Site include the flooded mineshaft within the Project Impact Footprint, the mine shaft on the south-facing slope near the northeast corner of the Project Site and within logs or snags and under exfoliating bark on that same hillslope (see Appendix A, Figure 7, *Biological Resources and Potential Habitat Features*). However, the upper 10-15 feet of the flooded mine shaft within the Project Impact Footprint would provide only low-quality, short-term bat roosting habitat due to the lack of suitable airflow and shelter. The loss of short-term bat roosting habitat provided by the flooded mine shaft would not be significant given that mines similar to Gold Hill occur throughout the area surrounding Baldwin Lake.

However, if project construction directly disturbed a colony of hibernating individuals or an active maternity colony, the impacts could be significant for those species that do gather in large numbers. For bat species that roost individually or in small numbers, often change roosts, and use a wide variety of roost habitat, such as western small-footed myotis, long-legged myotis, and long-eared myotis, potential short-term disturbance to a few isolated roosting individuals would not significantly affect their long-term sustainability given their wide ranges. However, for those species that may roost in larger colonies, like fringed myotis, or roost in larger colonies and exhibit lower genetic diversity and utilize a narrower variety of roosts, like Townsend's big-eared bat, disturbance of a hibernating colony or active maternity colony could be significant depending upon the number of individuals impacted.

Project noise and vibration produced by construction activities have potential to affect bats if they forage or roost in the immediate vicinity of the Project Impact Footprint. However, like many species, bats can become accustomed to low levels of disturbance and avoid disturbance by seeking alternative foraging and roosting habitat, which is plentiful in the vicinity of the Project. Additionally, nearby colonial roosts in mine shafts, if present, benefit from the dampening of both noise and vibrational disturbances due to the depth of the underground structures they may be utilizing. For example, the Gold Hill Mine Tunnel and underground passageways (adits) are up to 16.5 meters deep. Therefore, construction and operational noise and vibrations are not anticipated to significantly disturb hibernations or maternity roosting, if occurring in the vicinity of the Project. Construction and operational lighting could be disorienting for bats as they exit and return for foraging; however, construction and operational lighting will not be needed during the Project and is therefore not likely to have an adverse impact. Additionally, the photovoltaic solar panels will be angled to the south and away from the potentially suitable bat habitat north of the Project, and, given that bat activity would peak near dusk when bats would exit the roost to forage, disorientation from reflected light is not anticipated. Therefore, no significant impacts to bats are anticipated.

5.6.6 SAN BERNARDINO GOLDEN-MANTLED GROUND SQUIRREL

Potential habitat for San Bernardino golden-mantled ground squirrel exists in the pinyon pine forest habitat on the slope; however, the Project will not develop in this habitat type. Therefore, the Project is not expected to affect this species.

5.7 WILDLIFE MOVEMENT

In the broader context, the Project is located within historically disturbed lands previously used for mining and grazing and continues to provide habitat for wild donkeys, although it has regained some of its natural characteristics. The Project Area is bound by Lakewood Drive to the west, Erwin Ranch Road to the south, an unpaved access drive to the east, and San Bernardino National Forest to the north. Residential development occurs immediately south, southwest, and approximately 0.1 miles east of the Project Area, with the residence bordering to the southwest also containing an equestrian facility. Existing uses surrounding the site would largely remain unchanged. Therefore, the site will not likely prevent wildlife movement through the region as the adjacent pinyon pine habitat will remain unfenced and accessible.

6. CONCLUSIONS

The Project Area does not contain any sensitive Natural Communities as designated by CDFW, and it also does not overlap with any federally designated Critical Habitat. Therefore, no impacts are anticipated to these resources.

As indicated in Table 3 above, the Project Area is known to support or have moderate-to-high potential to support 15 special-status species. The proposed Project has potential to significantly affect three species: Fringed myotis, Townsend's big-eared bat, and southern rubber boa. The Project also has the potential to impact nesting birds that are protected under the Migratory Bird Treaty Act. However, with the implementation of the below avoidance and minimization measures, impacts on special-status species and nesting birds would be less than significant.

6.1 RECOMMENDED AVOIDANCE AND MINIMIZATION MEASURES

ERM recommends the following avoidance and minimization measures to comply with the state, federal, and local regulations related to biological resources. These measures are typical for projects in San Bernardino County that have potential to impact similar biological resources such as the proposed Project. Environmental regulatory agencies may provide additional recommendations through the CEQA Process:

6.1.1 DESIGN

- Shield any necessary lighting and angle away from adjacent undeveloped land to the north of the Project to avoid disturbing wildlife, including rare bats.
- Construct a reptile exclusion fence around the perimeter of the Project area to avoid potential impacts to rubber boa.

6.1.2 PRE-CONSTRUCTION

- Prior to construction, conduct the following pre-construction clearance surveys:
  - A qualified biologist will conduct pre-construction surveys for nesting birds (including raptors) on and closely adjacent to the Project site no more than 10 days prior to any ground disturbance, if ground disturbance is to occur during the breeding season (February 1 through August 31).
    - If an active nest is detected, a 100-foot work avoidance buffer will be implemented for non-raptors and a 500-foot work avoidance buffer will be implemented for raptors.
    - nesting buffers may be reduced based upon the judgment of the biological monitor and should include monitored to detect any behavioral changes due to the reduced buffer. If behavioral changes are observed, the buffer will be restored to the original radii.
  - A qualified biologist will conduct pre-construction surveys for southern rubber boa within all disturbance areas plus a 100-foot buffer no more than 3 days prior to any ground disturbance during the active/breeding season (April 1 through October 31). Should southern rubber boa be observed, work shall be halted within 100 feet of the individual until it has moved out of area.

6.1.3 CONSTRUCTION

- A qualified biologist will conduct an education program for construction personnel. Topics to be discussed will include occurrence and distribution of special-status plants, rubber boa and bats; take avoidance measures being implemented during the Project, reporting requirements if incidental take occurs; and applicable definitions and prohibitions under the California Endangered Species Act. A fact sheet conveying this information will be prepared for distribution to Project personnel.
- A qualified biologist shall be on-site to conduct daily pre-construction sweeps for rubber boa during ground-disturbing activities initiated between April 1 and October 31. Once a reptile exclusion fence around the perimeter of the Project is constructed, daily pre-construction sweeps would not be required. In the event of unanticipated discovery of rubber boa within the site, construction personnel shall follow the guidance within the worker education program, including but not limited to halting construction and contacting a qualified biologist, etc.
- Project-related vehicles will observe a daytime speed limit of 15 miles per hour throughout the site in all Project Areas, except on county roads and state and federal highways. Nighttime construction will be minimized to the extent possible; however, if it does occur, then the speed limit shall be reduced to 10 miles per hour. Off-road traffic outside of designated Project Areas will be prohibited.
- To prevent inadvertent entrapment of wildlife during the construction phase of the Project, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals.
- All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed at least once a week from the Project site.
- No firearms will be allowed on the Project Area, excluding law enforcement personnel.
- No pets, such as dogs or cats, will be permitted on the Project Area.
- All spills of hazardous materials will be cleaned up immediately.
- Use of rodenticides and herbicides in Project Areas will be restricted.
- Should any vertical tubes, such as solar mount poles, chain link fencing poles, or any other hollow tubes or poles be utilized on the Project site, the poles will be capped immediately after installation to prevent entrapment of birds.

7. REFERENCES

Baker, MD and Lacki, MJ. 2006. "Day-Roosting Habitat of Female Long-Legged Myotis in Ponderosa Pine Forests," Journal of Wildlife Management 70(1), 207-215, (1 January 2006).

Calflora: Information on California plants for education, research and conservation. (Web application). 2024. Berkeley, California: The Calflora Database [a non-profit organization]. Available: https://www.calflora.org.

California Department of Fish and Wildlife (CDFW). 2018a. Re: 2018 Prioritization of Forest Practice Rule Updates for Botanical Resources. [Written Correspondence]. California Board of Forestry and Fire Protection. November 15, 2018. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=171112.

_____. 2018b. Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Sensitive Natural Communities. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959.

_____. 2019. Re: CDFW's Comments on the IS/MND for the Tahoe Valley Stormwater and Greenbelt Improvement Project (SCH 2019029152). [Written Correspondence]. City of South Lake Tahoe. March 29, 2019. Available at: https://www.cityofslt.us/DocumentCenter/View/12732/TVGreenbelt_PCSRAttachment6_CDFGComments_20190329?bidId=.

_____. 2022. November 4. Survey of California Vegetation Classification and Mapping Standards. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=102342&inline.

_____. 2023. June 1. California Natural Community List. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

_____. 2024a. California Natural Diversity Database (CNDDB) – Government version dated July 1st, 2024. https://apps.wildlife.ca.gov/bios6/?bookmark=327.

_____. 2024b. July. Special Animals List. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

_____. 2024c. July. Special Vascular Plants, Bryophytes, and Lichens list. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline.

_____. 2024d. California Wildlife Habitat Relationships (CWHR) System version 10.1.29. Available at: https://apps.wildlife.ca.gov/cwhr/index.shtml.

California Department of Water Resources. 2024. Best Available Maps (BAM) 100-Year Floodplain Awareness Dataset. Available online at: https://gis.bam.water.ca.gov/bam/. Accessed July 2024.

California Native Plant Society (CNPS), Rare Plant Program. 2024a. Rare Plant Inventory (RPI) (online edition, v9.5). Website https://www.rareplants.cnps.org.

_____. 2024b. A Manual of California Vegetation, Online Edition. http://www.cnps.org/cnps/vegetation/; California Native Plant Society, Sacramento, California.

_____. 2024c. Conducting plant searches - closing the gaps of environmental review. Retrieved September 2024, from https://ct.cnps.org/get-involved/conducting-plant-searches/

Consortium of California Herbaria (CCH) Portal. 2024. Biodiversity data provided by the participants of the Consortium of California Herbaria https://www.cch2.org/portal.

County of San Bernardino. 2007. Bear Valley Community Plan. Accessed: July 2024. Retrieved from: https://www.sbcounty.gov/Uploads/lus/CommunityPlans/BearValleyCP.pdf.

_____. 2019. General Plan - Renewable Energy and Conservation Element. Accessed: September 2024. Retrieved from: https://countywideplan.com/wp-content/uploads/sites/68/2021/02/REC-Element.pdf.

_____. 2020. Countywide Plan. Accessed: July 2024. Retrieved from: https://countywideplan.com/.

_____. 2024a. County Code of Ordinances, Development Code. Accessed: June 2024. Retrieved from: https://codelibrary.amlegal.com/codes/sanbernardino/latest/sanberncty_ca/0-0-0-166578.

Environmental Resources Management, Inc. (ERM). 2024b. Aquatic Resources Delineation Report: Bear Valley Solar Energy Project. Prepared for Bear Valley Electric Service (BVES) and EDF Renewables Distribution-Scale Power (EDFR-DSP). 2 August 2024.

Federal Emergency Management Agency (FEMA). 2024. National Flood Hazard Layer (NFHL) Viewer. Available online at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd. Accessed July 2024.

Habitat eBird. 2024. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org.

Google Earth 7.3.6.9345 (64-bit). 2024 [Online] Available at: https://earth.google.com/web/.

Griffith, G. E., Omernik, J. M., Smith, D. W., Cook, T. D., Tallyn, E. D., Moseley, K., & Johnson, C. B. "Ecoregions of California." US Geological Survey Open-File Report 1021. 2016. https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/ca/CA_eco_PosterText_Final_Feb2016.docx

iNaturalist. 2024. Web application. California Academy of Sciences, National Geographic Society. Available from https://www.inaturalist.org.

Jepson Flora Project (eds.) 2024. Jepson eFlora, https://ucjeps.berkeley.edu/eflora/.

Nafis, Gary. 2024. California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/.

National Marine Fisheries Service (NMFS). 2024. Endangered Species Act (ESA) Critical Habitat spatial data. Available at: https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=68d8df16b39c48fe9f60640692d0e318.

PRISM Climate Group, Oregon State University. 2024. https://prism.oregonstate.edu, data accessed September 2024.

Sibley, David Allen. 2014.The Sibley Guide to Birds, 2nd Edition. National Audubon Society, 11 March 2014.

E. Apple Snider, Paul M. Cryan, Kenneth R. Wilson, Roost selection by western long-eared myotis (Myotis evotis) in burned and unburned piñon–juniper woodlands of southwestern Colorado, Journal of Mammalogy, Volume 94, Issue 3, 11 June 2013, Pages 640–649

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2024. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed September 2024.

United States Army Corps of Engineers (USACE). 2023. Antecedent Precipitation Tool (APT) Version 2.0.0. [Software] Available for download online at: https://github.com/erdc/Antecedent-Precipitation-Tool. Accessed July 2024.

United States Department of Agriculture (USDA). 2024. List of Hydric Soils. Available online at: https://efotg.sc.egov.usda.gov/references/Public/IL/State_List_NRCS_Hydric_Soils_Report_Dynamic_Data.html.

U.S. Fish and Wildlife Service (USFWS). 2021. Species Status Assessment Report for the Southern Rubber Boa (*Charina umbratica*), Version 1.1. Carlsbad Ecological Services Field Office, Carlsbad, California.

United States Geological Survey (USGS). 2012. Geohydrology of Big Bear Valley, California phase 1—Geologic Framework, Recharge, and Preliminary Assessment of the Source and Age of Groundwater. Available at: https://pubs.usgs.gov/sir/2012/5100/pdf/sir20125100.pdf. Accessed July 2024.

United States Geological Survey (USGS). 2024. USGS The National Map (TNM) National Hydrography Dataset (NHD), at URL https://apps.nationalmap.gov/viewer/.

United States Fish and Wildlife Service (USFWS). 2024a. Critical Habitat. Available at https://www.fws.gov/program/national-wetlands-inventory. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

_____. 2024b. Information for Planning and Conservation (IPaC). Available at https://ipac.ecosphere.fws.gov/. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

_____. 2024c. National Wetlands Inventory (NWI). Available at https://www.fws.gov/program/national-wetlands-inventory. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

APPENDIX A MAPS

FIGURE 1 REGIONAL MAP

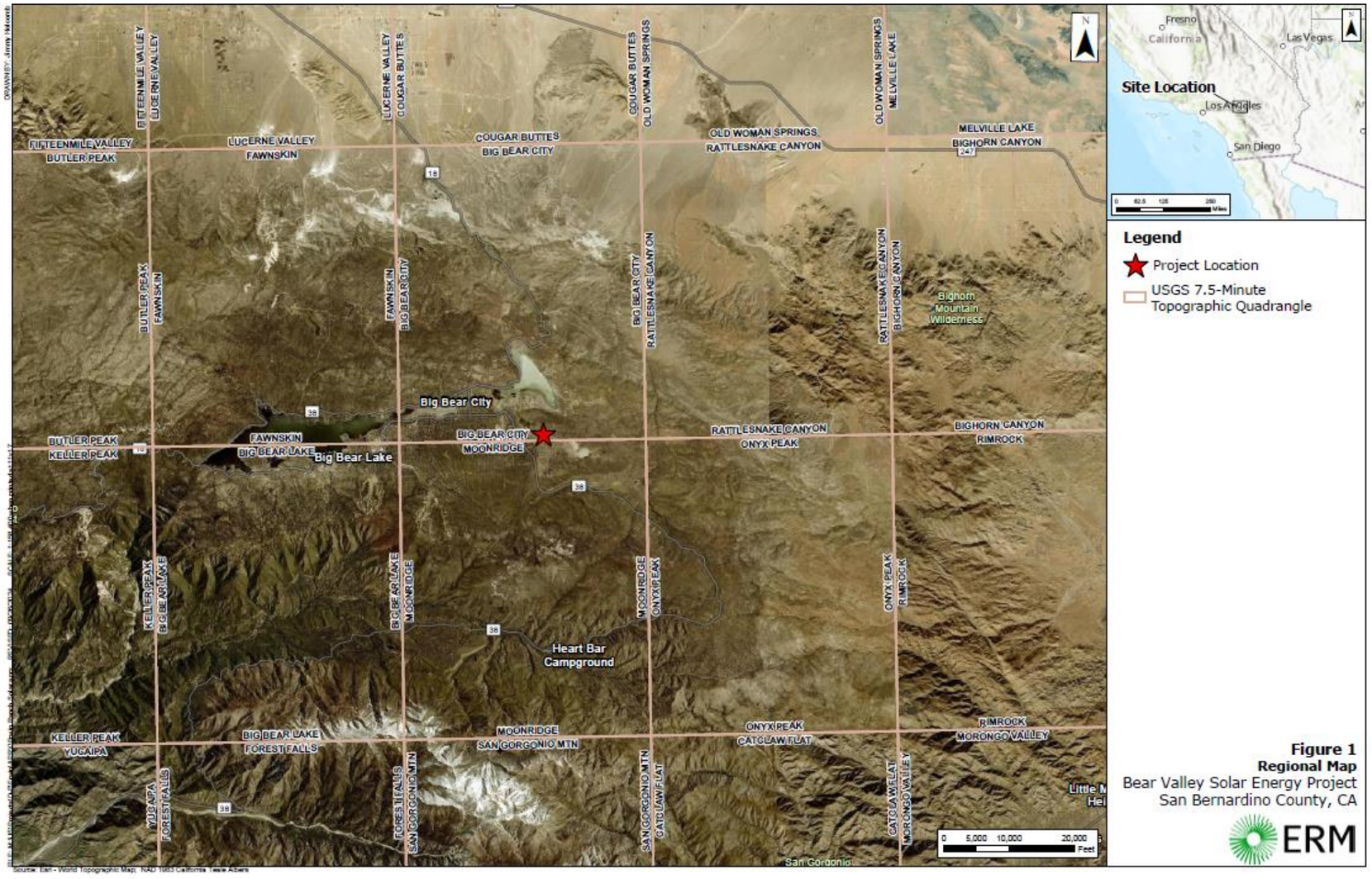

FIGURE 2 VICINITY MAP

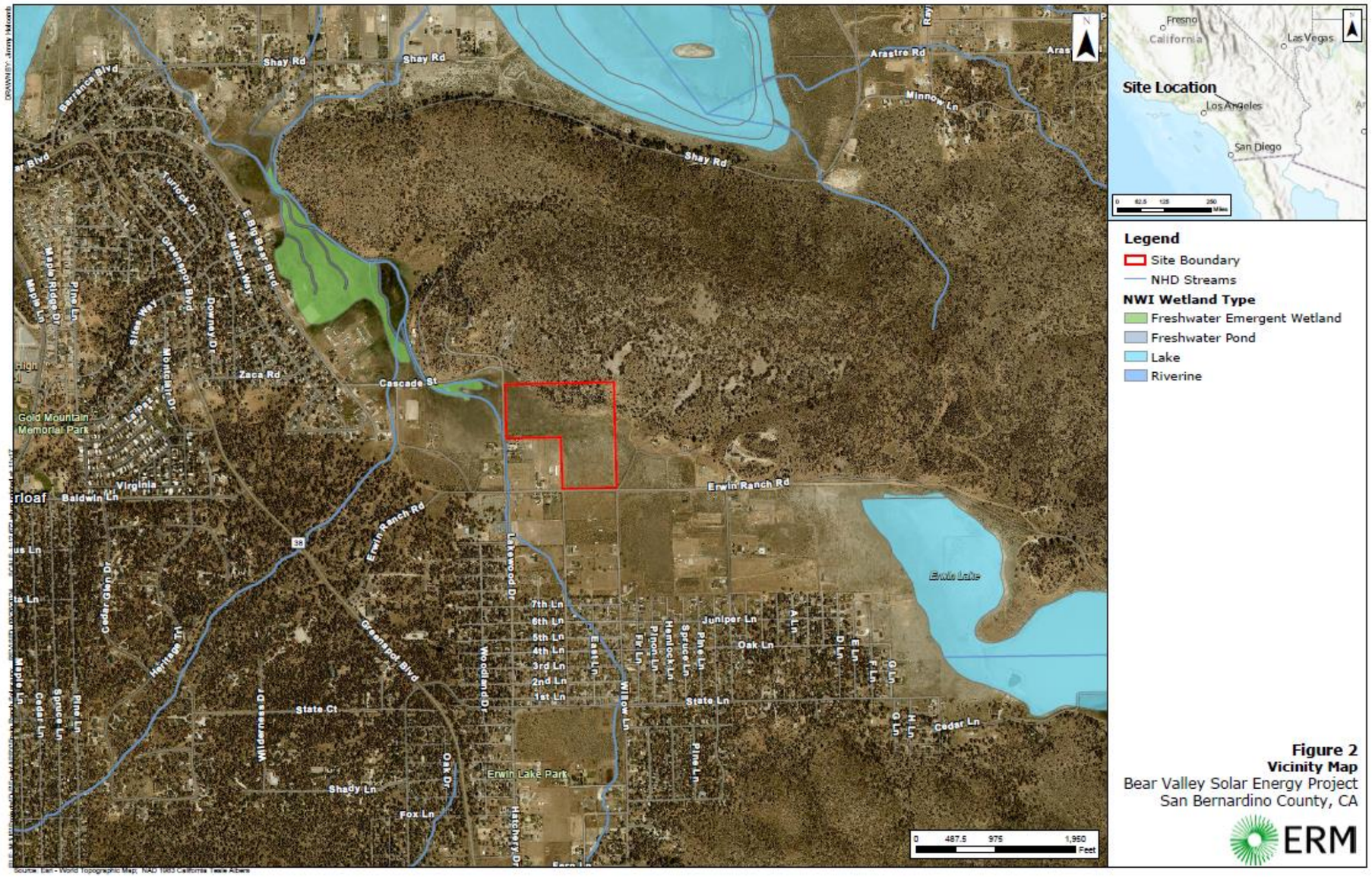

FIGURE 3 PROJECT AREA MAP

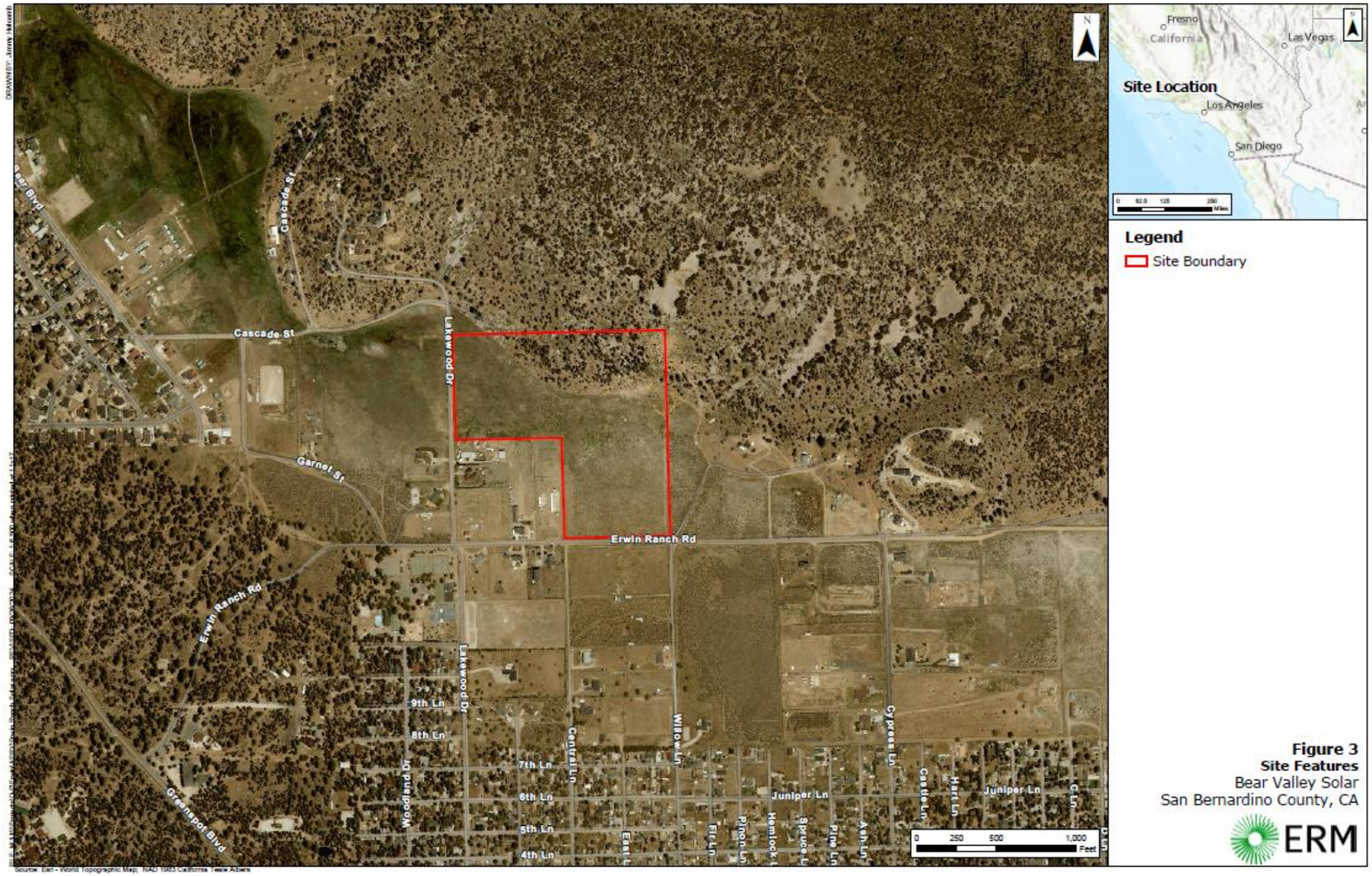

FIGURE 4 SOIL MAP