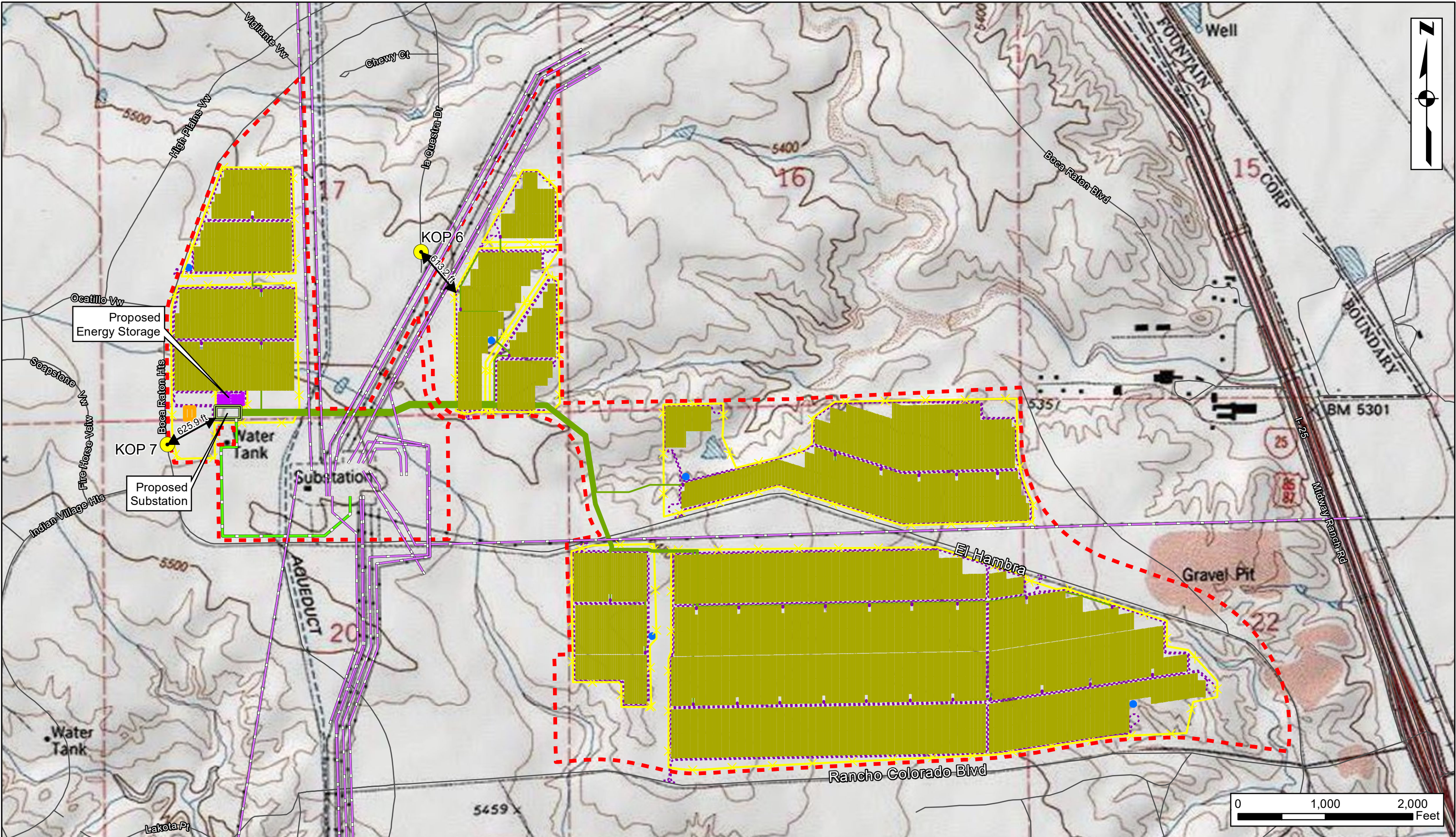


Visual Simulations

Front Range-Midway Solar Project Amendment

For this Major Amendment for the Front Range-Midway Solar Project WSEO-20-1, two key observation points (KOP) were added to the photo simulations to account for the new site layout. KOP 6 and KOP 7 were selected to also account for recent construction of houses adjacent to the north side of the Project and the substation location on the west side of the Project, respectively. The new photo simulations for the amended FRMW Project are provided first, with the photo simulations from 2017 provided second.




- FRMW WSE-O Plan Boundary
- Key Observation Point
- Proposed Solar Array
- Proposed Energy Storage
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Collection Line
- Proposed Fencing
- Proposed MET Unit
- Proposed O&M Building
- Proposed Access Road
- Existing Transmission Line

Front Range-Midway Solar Project

Key Observation Points - 2020 Amendment

El Paso County, Colorado



CIVIL ENGINEERING
DEVELOPMENT CONSULTING
NATURAL RESOURCES CONSULTING
LAND SURVEYING
303.703.4444
1950 W. Littleton Blvd., Ste. 109
Littleton, CO 80120

CORE Project #: 19-177

Date: 8/21/2020

Front Range-Midway Solar Project - Key Observation Point 6

Existing View



0572

Proposed View



0572- SIMULATION

KOP 6

Name

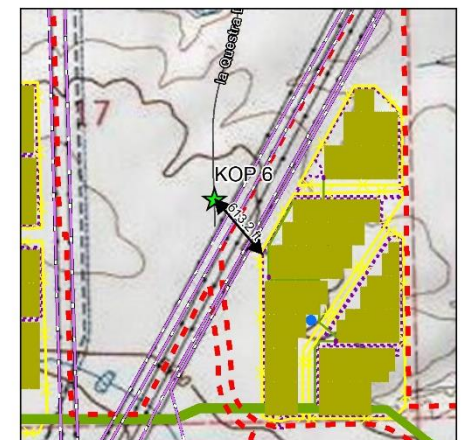
La Questa Dr

Latitude/Longitude

38.568036/-104.687371

Direction/Distance

Northwest /613 ft



Vicinity Map



CORE
CONSULTANTS

Project #19-177
Date 08/18/2020

Front Range-Midway Solar Project - Key Observation Point 7

Existing View



Proposed View



KOP 7

Name

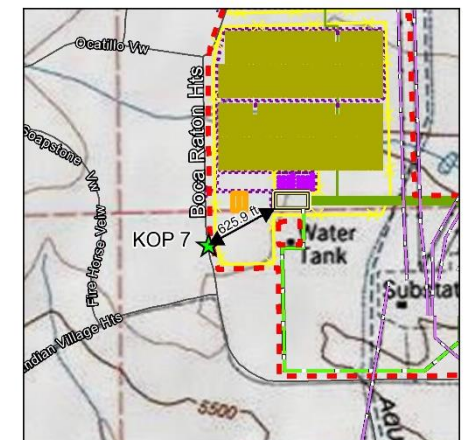
Boca Raton Dr

Latitude/Longitude

38.562061/-104.697592

Direction/Distance

Southwest / 625 ft



Vicinity Map

Front Range-Midway Solar Project - Key Observation Point 1

Existing View



KOP 1

Name
Boca Raton Heights & Rancho
Colorado Blvd

Latitude/Longitude
38.5508/-104.6507

Direction/Distance
East / 2,000 ft



Vicinity Map

Proposed View



Front Range-Midway Solar Project - Key Observation Point 2

Existing View



KOP 2

Name

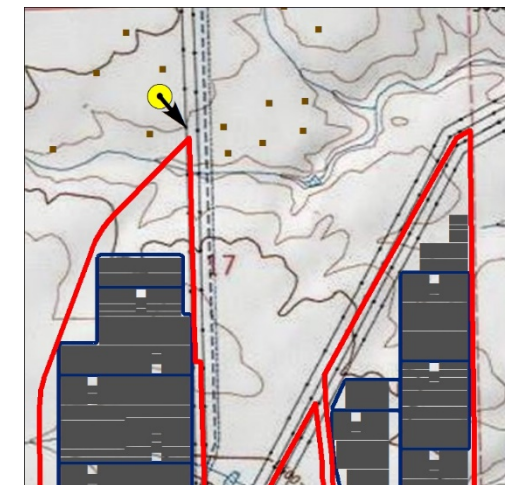
High Plains View

Latitude/Longitude

38.5739/-104.6918

Direction/Distance

North / 1,700 ft



Vicinity Map

Proposed View



CORE
CONSULTANTS

Project #17-012
Date 08/17/2017

Front Range-Midway Solar Project - Key Observation Point 3

Existing View



KOP 3

Name

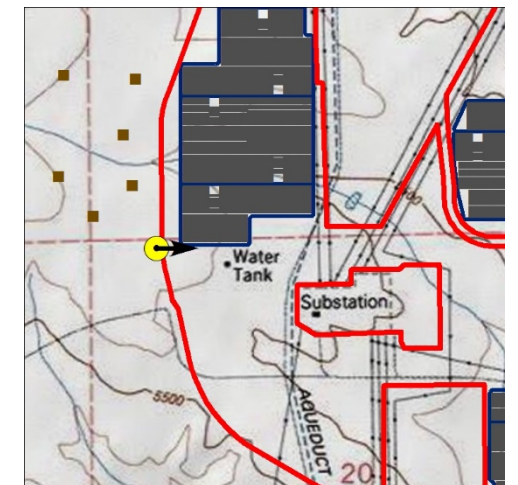
Boca Raton Heights Mailboxes

Latitude/Longitude

38.5620/-104.6974

Direction/Distance

West / 250 ft



Vicinity Map

Proposed View



Project #17-012
Date 08/17/2017



Front Range-Midway Solar Project - Key Observation Point 4

Existing View



KOP 4

Name

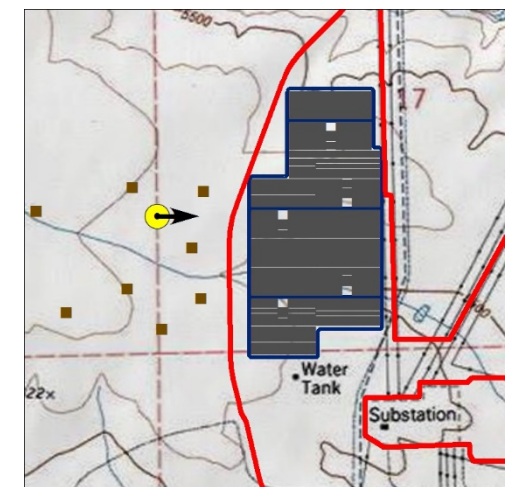
High Plains View

Latitude/Longitude

38.5665/-104.7001

Direction/Distance

West / 800 ft



Vicinity Map

Proposed View



Project #17-012
Date 08/17/2017



Front Range-Midway Solar Project - Key Observation Point 5

Existing View



KOP 5

Name

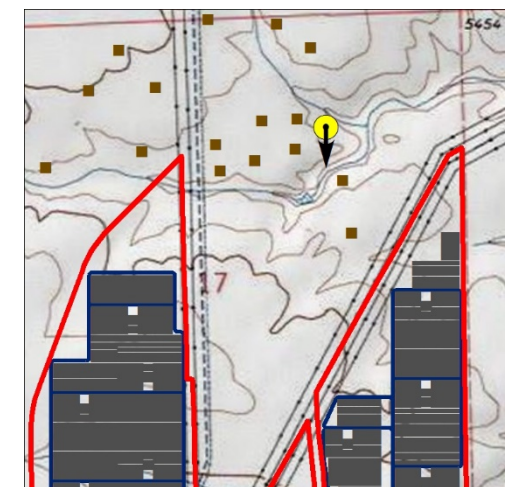
Chewy Ct & La Questa Dr

Latitude/Longitude

38.5723/-104.6845

Direction/Distance

North / ½ Mile



Vicinity Map

Proposed View



CORE
CONSULTANTS

Project #17-012
Date 08/17/2017

Solar Glare Hazard Analysis Report

Generated Aug. 18, 2017, 11:20 a.m.

No glare found

 Print



Inputs

Analysis name	FrontRange
PV array axis tracking	single
Tilt of tracking axis (deg)	0.0
Orientation of tracking axis (deg)	180.0
Offset angle of module (deg)	0.0
Limit rotation angle?	True
Maximum tracking angle (deg)	45.0

Rated power (kW)	5000.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-7.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m ²)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Correlate slope error with material	False
Slope error (mrad)	10.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	38.5716559845	-104.693312645	5471.92	7.0	5478.92
2	38.570179661	-104.694943428	5496.34	7.0	5503.34
3	38.5685019839	-104.695887566	5515.5	7.0	5522.5
4	38.5651465122	-104.696745872	5513.98	7.0	5520.98
5	38.5625291354	-104.696745872	5519.27	7.0	5526.27
6	38.5626633622	-104.692025185	5505.4	7.0	5512.4
7	38.5625962489	-104.68644619	5489.12	7.0	5496.12
8	38.5558845972	-104.686102867	5470.32	7.0	5477.32

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
9	38.5558174775	-104.690136909	5496.67	7.0	5503.67
10	38.5518573054	-104.689793587	5476.13	7.0	5483.13
11	38.5524614135	-104.675374031	5456.85	7.0	5463.85
12	38.5526627818	-104.658293724	5341.78	7.0	5348.78
13	38.5526627818	-104.654688835	5341.59	7.0	5348.59
14	38.555683238	-104.655461311	5358.58	7.0	5365.58
15	38.5576968049	-104.658722878	5375.59	7.0	5382.59
16	38.558300864	-104.660868645	5379.33	7.0	5386.33
17	38.5593076178	-104.663443565	5388.72	7.0	5395.72
18	38.5625962489	-104.663786888	5363.87	7.0	5370.87
19	38.5625291354	-104.671511165	5427.96	7.0	5434.96
20	38.5610526245	-104.674086571	5441.48	7.0	5448.48
21	38.5599116634	-104.68018055	5483.89	7.0	5490.89
22	38.5599787793	-104.682154655	5492.73	7.0	5499.73
23	38.5713875643	-104.681982994	5451.43	7.0	5458.43
24	38.5713875643	-104.684729576	5464.65	7.0	5471.65
25	38.564206952	-104.687905312	5499.01	7.0	5506.01
26	38.564206952	-104.691252708	5495.96	7.0	5502.96
27	38.5723270305	-104.691510201	5459.83	7.0	5466.83

Observation Points

Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)
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1	38.5858137277	-104.668786526	5331.29	5.5
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No glare found.

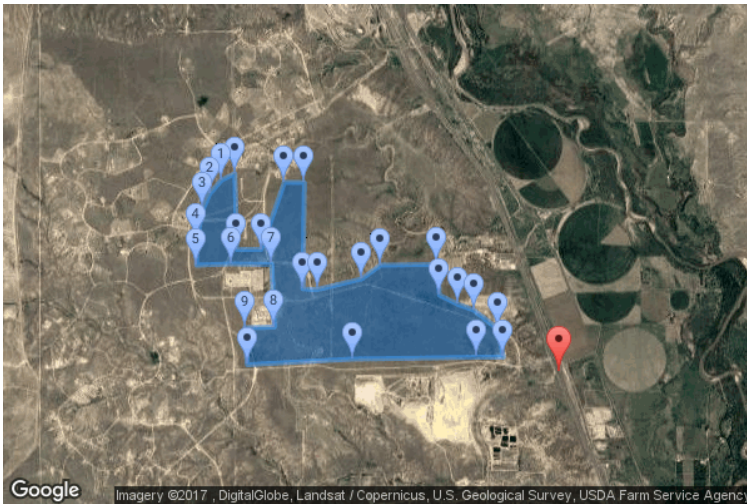
©1997-2014 Sandia Corporation

Solar Glare Hazard Analysis Report

Generated Aug. 18, 2017, 11:20 a.m.

No glare found

 Print



Inputs

Analysis name	FrontRange
PV array axis tracking	single
Tilt of tracking axis (deg)	0.0
Orientation of tracking axis (deg)	180.0
Offset angle of module (deg)	0.0
Limit rotation angle?	True
Maximum tracking angle (deg)	45.0

Rated power (kW)	5000.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-7.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m ²)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Correlate slope error with material	False
Slope error (mrad)	10.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	38.5716559845	-104.693312645	5471.92	7.0	5478.92
2	38.570179661	-104.694943428	5496.34	7.0	5503.34
3	38.5685019839	-104.695887566	5515.5	7.0	5522.5
4	38.5651465122	-104.696745872	5513.98	7.0	5520.98
5	38.5625291354	-104.696745872	5519.27	7.0	5526.27
6	38.5626633622	-104.692025185	5505.4	7.0	5512.4
7	38.5625962489	-104.68644619	5489.12	7.0	5496.12
8	38.5558845972	-104.686102867	5470.32	7.0	5477.32

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
9	38.5558174775	-104.690136909	5496.67	7.0	5503.67
10	38.5518573054	-104.689793587	5476.13	7.0	5483.13
11	38.5524614135	-104.675374031	5456.85	7.0	5463.85
12	38.5526627818	-104.658293724	5341.78	7.0	5348.78
13	38.5526627818	-104.654688835	5341.59	7.0	5348.59
14	38.555683238	-104.655461311	5358.58	7.0	5365.58
15	38.5576968049	-104.658722878	5375.59	7.0	5382.59
16	38.558300864	-104.660868645	5379.33	7.0	5386.33
17	38.5593076178	-104.663443565	5388.72	7.0	5395.72
18	38.5625962489	-104.663786888	5363.87	7.0	5370.87
19	38.5625291354	-104.671511165	5427.96	7.0	5434.96
20	38.5610526245	-104.674086571	5441.48	7.0	5448.48
21	38.5599116634	-104.68018055	5483.89	7.0	5490.89
22	38.5599787793	-104.682154655	5492.73	7.0	5499.73
23	38.5713875643	-104.681982994	5451.43	7.0	5458.43
24	38.5713875643	-104.684729576	5464.65	7.0	5471.65
25	38.564206952	-104.687905312	5499.01	7.0	5506.01
26	38.564206952	-104.691252708	5495.96	7.0	5502.96
27	38.5723270305	-104.691510201	5459.83	7.0	5466.83

Observation Points

Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)
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2	38.55105182	-104.646942616	5272.08	5.5
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No glare found.

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Solar Glare Hazard Analysis Flight Path Report

Generated Aug. 18, 2017, 11:21 a.m.

Flight path: 1

No glare found

 Print



Analysis & PV array parameters

Analysis name	FrontRange
PV array axis tracking	single
Tilt of tracking axis (deg)	0.0
Orientation of tracking axis (deg)	180.0
Offset angle of module (deg)	0.0
Limit rotation angle?	True
Maximum tracking angle (deg)	45.0
Rated power (kW)	5000.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-7.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m ²)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Correlate slope error with material	False
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	312.81
Glide slope (deg)	3.0
Consider pilot visibility from cockpit	False

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	38.5716559845	-104.693312645	5471.92	7.0	5478.92
2	38.570179661	-104.694943428	5496.34	7.0	5503.34
3	38.5685019839	-104.695887566	5515.5	7.0	5522.5
4	38.5651465122	-104.696745872	5513.98	7.0	5520.98
5	38.5625291354	-104.696745872	5519.27	7.0	5526.27
6	38.5626633622	-104.692025185	5505.4	7.0	5512.4
7	38.5625962489	-104.68644619	5489.12	7.0	5496.12
8	38.5558845972	-104.686102867	5470.32	7.0	5477.32
9	38.5558174775	-104.690136909	5496.67	7.0	5503.67
10	38.5518573054	-104.689793587	5476.13	7.0	5483.13
11	38.5524614135	-104.675374031	5456.85	7.0	5463.85
12	38.5526627818	-104.658293724	5341.78	7.0	5348.78
13	38.5526627818	-104.654688835	5341.59	7.0	5348.59
14	38.555683238	-104.655461311	5358.58	7.0	5365.58
15	38.5576968049	-104.658722878	5375.59	7.0	5382.59
16	38.558300864	-104.660868645	5379.33	7.0	5386.33
17	38.5593076178	-104.663443565	5388.72	7.0	5395.72
18	38.5625962489	-104.663786888	5363.87	7.0	5370.87
19	38.5625291354	-104.671511165	5427.96	7.0	5434.96
20	38.5610526245	-104.674086571	5441.48	7.0	5448.48
21	38.5599116634	-104.68018055	5483.89	7.0	5490.89

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
22	38.5599787793	-104.682154655	5492.73	7.0	5499.73
23	38.5713875643	-104.681982994	5451.43	7.0	5458.43
24	38.5713875643	-104.684729576	5464.65	7.0	5471.65
25	38.564206952	-104.687905312	5499.01	7.0	5506.01
26	38.564206952	-104.691252708	5495.96	7.0	5502.96
27	38.5723270305	-104.691510201	5459.83	7.0	5466.83

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	38.6733820132	-104.750390053	5788.11	50.0	No
1/4 mi	38.6709262238	-104.746990394	5770.49	136.8	No
1/2 mi	38.6684704344	-104.743590736	5754.69	221.79	No
3/4 mi	38.6660146451	-104.740191077	5728.09	317.55	No
1 mi	38.6635588557	-104.736791418	5724.7	390.12	No
1 1/4 mi	38.6611030663	-104.73339176	5692.08	491.93	No
1 1/2 mi	38.658647277	-104.729992101	5700.45	552.73	No
1 3/4 mi	38.6561914876	-104.726592443	5655.73	666.64	No
2 mi	38.6537356982	-104.723192784	5678.93	712.61	No

No glare found.

Solar Glare Hazard Analysis Flight Path Report

Generated Aug. 18, 2017, 11:21 a.m.

Flight path: 2

No glare found

 Print



Analysis & PV array parameters

Analysis name	FrontRange
PV array axis tracking	single
Tilt of tracking axis (deg)	0.0
Orientation of tracking axis (deg)	180.0
Offset angle of module (deg)	0.0
Limit rotation angle?	True
Maximum tracking angle (deg)	45.0
Rated power (kW)	5000.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-7.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m ²)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Correlate slope error with material	False
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	159.94
Glide slope (deg)	3.0
Consider pilot visibility from cockpit	False

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	38.5716559845	-104.693312645	5471.92	7.0	5478.92
2	38.570179661	-104.694943428	5496.34	7.0	5503.34
3	38.5685019839	-104.695887566	5515.5	7.0	5522.5
4	38.5651465122	-104.696745872	5513.98	7.0	5520.98
5	38.5625291354	-104.696745872	5519.27	7.0	5526.27
6	38.5626633622	-104.692025185	5505.4	7.0	5512.4
7	38.5625962489	-104.68644619	5489.12	7.0	5496.12
8	38.5558845972	-104.686102867	5470.32	7.0	5477.32
9	38.5558174775	-104.690136909	5496.67	7.0	5503.67
10	38.5518573054	-104.689793587	5476.13	7.0	5483.13
11	38.5524614135	-104.675374031	5456.85	7.0	5463.85
12	38.5526627818	-104.658293724	5341.78	7.0	5348.78
13	38.5526627818	-104.654688835	5341.59	7.0	5348.59
14	38.555683238	-104.655461311	5358.58	7.0	5365.58
15	38.5576968049	-104.658722878	5375.59	7.0	5382.59
16	38.558300864	-104.660868645	5379.33	7.0	5386.33
17	38.5593076178	-104.663443565	5388.72	7.0	5395.72
18	38.5625962489	-104.663786888	5363.87	7.0	5370.87
19	38.5625291354	-104.671511165	5427.96	7.0	5434.96
20	38.5610526245	-104.674086571	5441.48	7.0	5448.48
21	38.5599116634	-104.68018055	5483.89	7.0	5490.89

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
22	38.5599787793	-104.682154655	5492.73	7.0	5499.73
23	38.5713875643	-104.681982994	5451.43	7.0	5458.43
24	38.5713875643	-104.684729576	5464.65	7.0	5471.65
25	38.564206952	-104.687905312	5499.01	7.0	5506.01
26	38.564206952	-104.691252708	5495.96	7.0	5502.96
27	38.5723270305	-104.691510201	5459.83	7.0	5466.83

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	38.5433321269	-104.504957199	5147.91	50.0	No
1/4 mi	38.5467266389	-104.50654385	5157.94	109.15	No
1/2 mi	38.5501211509	-104.508130501	5166.84	169.44	No
3/4 mi	38.5535156628	-104.509717151	5177.21	228.24	No
1 mi	38.5569101748	-104.511303802	5167.8	306.82	No
1 1/4 mi	38.5603046868	-104.512890453	5189.91	353.9	No
1 1/2 mi	38.5636991988	-104.514477104	5204.66	408.32	No
1 3/4 mi	38.5670937107	-104.516063754	5215.57	466.6	No
2 mi	38.5704882227	-104.517650405	5223.75	527.59	No

No glare found.