

VISUAL IMPACT STATEMENT

2150 DRYDEN ROAD SOLAR PROJECTS

Location of Proposed Activity:

2150 Dryden Road,
Town of Dryden, NY

Prepared for:
SUN8 PDC LLC
c/o Distributed Sun LLC
601 13th Street NW
Suite 450 South
Washington, DC 20005

Labella Number: 2170026



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May 31, 2017

Project Name and Location:

2150 Dryden Road - Multiple 2MW Solar PV Arrays
Town of Dryden, NY

Tax Map reference numbers:**Developer Name and Address:**

SUN8 PDC LLC
c/o Distributed Sun LLC
601 13th Street NW
Suite 450 South
Washington, DC 20005

Contact:

Bharath Srinivasan,
Senior Vice President of Operations
Bharath@distributedsun.com

Introduction

SUN8 PDC LLC has proposed to construct and operate solar photovoltaic arrays in the Town of Dryden in Tompkins County, New York as part of New York State's Community Distributed Generation program. As part of this proposal, SUN8 is proposing solar arrays at 2150 Dryden Road, on property owned by Scott Pinney. SUN8 is proposing separate solar arrays north of Stevenson Road, west of Turkey Hill Road, and east of Dodge Road on lands owned by Cornell University.

Labella Associates, D.P.C. has been engaged by SUN8 to perform engineering services, including a visual impact assessment, for the Special Use Permit application in the Town of Dryden. This report provides supplemental information to the Special Use Permit application, specifically on visual impact.

SUN8 also engaged Trowbridge Wolfe Michaels Landscape Architects LLP to provide an assessment of visual impact, review site conditions, develop a 3D model of the site with solar arrays, provide a planting plan to mitigate visual impact and to generate renderings to illustrate the mitigative measures.

Guidelines

The New York State Department of Environmental Conservation published the Program Policy document titled Assessing and Mitigating Visual Impacts (DEP-00-2) on July 31, 2000. The document provides guidance on methodology to assess visual impacts. The DEC describes the procedure to verify the inventory of aesthetic resources, verify the visual assessment using either graphic view shed and line-of-sight analyses, determine the significance of the impact, and confirm reasonability or propose mitigation. This impact statement follows above-mentioned guidelines.

Description of Proposed Solar Arrays

The proposed solar arrays use PV panels. A typical PV panel measures 77" by 39". The panels are made of silicon cells, enclosed by glass on the top and an off-white polymer back sheet. Several PV panels are mounted onto a metal rack. The rack is made of galvanized steel and aluminum components. The modules are securely fastened to the racks using bolted clips. The entire structure is designed to meet all applicable safety and code requirements. The

components are expected to have a 30+ year operational lifetime. Wiring within the array fence is secured underneath the PV panels, or buried in a trench. After construction, a carefully chosen seed mix is used to ensure good ground cover. The lower edge of the rack will be 24 inches off the grade and the higher end will be 8 ft off the grade. No significant grading is proposed.

A fence is required by the national electric code for safety and security. The components within the array are valuable both for secondary use and for scrap value. The arrays operate at 1000V and are required to be fenced to allow access only to qualified personnel. SUN8 also proposes to use sheep for grazing and maintaining the vegetative cover on the ground – these sheep need to be contained and protected from predators. The proposed fence is a 7-foot high (6-ft fence with string wire on top) woven wire fence on wood posts (also called an agricultural fence). No barbed wire or razor wire is being proposed.

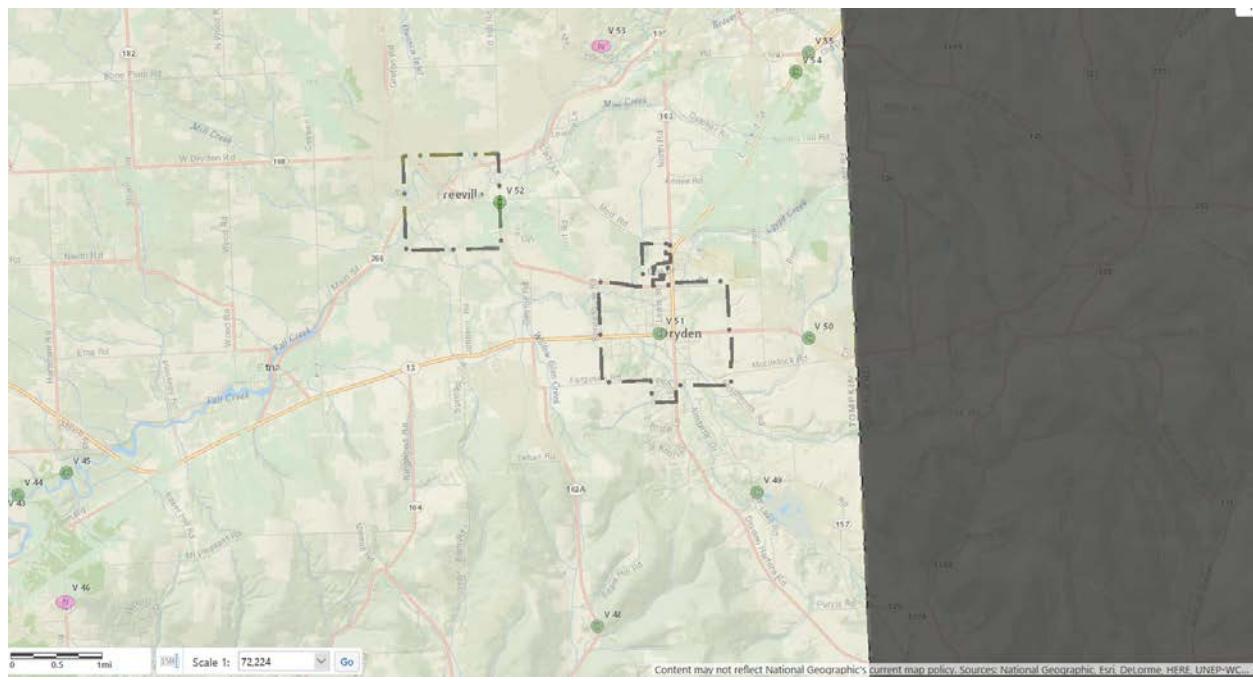
The low profile of the solar arrays (8ft) does not impose a significant impact on the view shed. The view of the horizon is not affected because of the low profile.



Photo showing a neighbor's view shed from a recently installed solar array in Ledyard, NY.

Project Locations

Labella reviewed the tax parcel 38.-1-3.1 to verify whether it is listed DEC databases for visual inventory. No registered, officially designated, public view sheds were listed on the DEC inventory for these properties. Several locations (described as scenic and noteworthy) identified in the Tompkins County Scenic Resources Inventory are located within 5 miles of the project site. From our review, the project is not visible from any of the scenic or noteworthy viewpoints. Portions of arrays will be visible, if no vegetative buffer is provided, from the Willow Glen Cemetery, from the Osmeloski property and from Route 13. An excerpt of the map from the Tompkins County GIS system, centered around the project site, is provided below.



Views from vantage points within the Cemetery

Locations of existing view/vantage points are provided below.



View (panoramic) from north of existing building looking north from the cemetery towards the proposed arrays.



View looking west from the eastern edge of the property boundary



View from the cemetery looking north towards proposed arrays



View looking west from the Osmeloski property



View from Route 13 (Westbound lane) looking west

The above photos capture the view points along the property line and from within the cemetery. The low profile of the structures will not impact views from any viewpoints at a distance.

The following performance criteria was used to develop a customized mitigation plan:

Given the adjacency of the Willow Glen Cemetery to the project site, several major criteria were considered for the selection of a plant palette that will function as a visual buffer and add aesthetic value:

1. The potential visual impacts to the view shed from Willow Glen Cemetery.

2. The nature of the existing cemetery and its current planting regime.
3. The broader surrounding landscape, land use, and historical approach to planting in the area.
4. The potential for shadows cast from any plantings to negatively impact the solar photovoltaic production.

To minimize the view shed concern the following mitigation measures are proposed:

Evergreen conifers were selected to provide year-round screening, while seasonal interest is provided by deciduous trees. The deciduous specimens selected are multi-stem, which shall provide more screening than typical single-trunk trees. The selected install size is specified to be 14-16 feet tall so that the plants are sufficiently large at the time of installation to provide screening, but not too large such that they would be difficult to procure, prohibitively expensive, or overly prone to transplant shock.

The following species were selected for plantings:

- Acer rubrum – Red maple
- Amelanchier laevis – Allegheny Serviceberry
- Juniperus virginiana ‘Burkii’ – Burkii Juniper
- Pinus flexilis ‘vanderwolf’s Pyramid’ – Vanderwolf’s Pyramid Pine

The planting plan attached to this document provides the layout of the proposed vegetative buffer.

Additional reasoning behind the selection of these species is described below:

1. Central to the planting concept is an effort to complement and enhance the existing natural beauty of the area and to provide a diverse, long-lived, resilient and dense bank of vegetation.
2. None of the selected species are on the New York State Department of Environmental Conservation Nuisance or Invasive Species lists or the Tompkins County invasive species list (2009).
3. Species have been selected for both winter and summer interest, offering maximum seasonal visual density.
4. All selected species reach a mature height of approximately 30-feet, are long-lived, and have historically proven to be relatively disease-free.
5. All selected species are readily available from local distributors.

Additional efforts to mitigate visual impact:

1. Setbacks, buffers and offsets. (per Note 3 in the DEC workbook)
 - a. Array 4 is set back by at least 130 ft away from the property line to the south.
 - b. The planting plan has been modified to use plants/bushes (immediately behind the building at the Cemetery) of (6'-8') in height at planting, reaching maturity at 8'-10' to retain the vista view. Trees proposed in this section originally will be replaced with bushes.
 - c. Arrays are set back by at least 140 ft away from the western edge of the property line
 - d. Array 5 is set back at least 50 ft away from the neighboring property line and from the limit of the Rt. 13 highway easement. Both sides of the array 5 (facing the neighboring property and Rt. 13) will be buffered by vegetative screens. The vegetative buffer at the Osmeloski property line will consist of trees (10'-12') height at planting, reaching maturity between 25-30' in height. The vegetative buffer at the Rt. 13 easement limit will consist of bushes (4'-6') height at planting reaching maturity between 8'-10' in height

Rendered images of the proposed solar arrays with no vegetative buffer, with the vegetative buffer at the time of planting and with the grown vegetative buffer are attached as exhibits to this statement.

Solar Glare Hazard Analysis

A glare analysis was performed using SGHAT, a web application published by Sandia National Laboratories. Data was input into the SGHAT, including the fact that the specified modules have an anti-reflective coating, the 8ft top-elevation metric, the 20° tilt, and the site layout over a web-based mapping program. The program uses the input data of photovoltaic structural design and determines the effect on a human pupil based on a clear-sky sun. Several vantage points in the neighborhood of the array were analyzed, all at 6ft above ground surface elevation, approximating the height of an above-average person.

The results provided by the SGHAT are included in Table 1, below. SGHAT provides its output in three categories: low potential for temporary after-image, potential for temporary after-image and potential for Permanent Eye Damage – no vantage point was found to have objectionable glare from the solar arrays. It should also be noted that the SGHAT performs analysis with publicly available topographic data, but it assumes no existing or proposed vegetation in between the array and the vantage point. The analysis was performed for all the arrays as a group. The analysis does not distinguish between direct sunlight and reflected sunlight when the sun is visible through the space between the rows (east-west line in the space between a norther and southern row of panels).

Table - SGHAT Results of vantage points surrounding arrays at 2150 Dryden Road (before mitigation)

Description	Latitude (°N) Longitude (°W)	Result of Analysis	Sensitive Time of Day	Sensitive Time of Year
Dryden Road towards the SW corner of the array	42.4871310507 76.3414406776	Low potential for after-image	5:45am- 6:00am	May – Aug.
Dryden Road traveling west from the intersection of George Rd and Rt. 13	42.4896311155 76.3295102119	Potential for temporary after-image	5:45pm- 6:15pm	Mar. – Sep.
House at 2180 Dryden Road	42.4905883924 76.329934001	Low potential for after-image	6:00pm- 6:30pm	Mar. – Sep.
House at 334 George Road	42.4946546777 76.3297516108	Low potential for after-image	6:00pm-6:30pm	Mar. – Sep.
Willow Glen Cemetery (property section to the west of the proposed arrays)	42.4886817356 76.3379538059	Potential for temporary after-image	6:00am – 6:30am	Apr. – Aug.

For the view point from Rt. 13 (heading west), the tool does not account for the existing vegetation in the wetlands, or the new vegetation proposed on the west of the solar arrays. During the hours of 5:45 – 6:15 pm (Mar – Sep), the elevation of the sun is at an angle lower than the height of the existing vegetation (west of the cemetery).

For the view point from the cemetery section to the west of the proposed arrays, the elevation of the sun during the hours 6:00-6:30am does not account for the existing vegetation (a) in the wetlands, (b) to the east of the solar arrays (trees on the Osmeloski property line), or (c) the trees along the N-S property line between the cemetery and the proposed project site.

Glare Simulation for the Ithaca-Tompkins County Airport

The FAA policy for evaluating ocular impact from solar arrays is based on the ‘Technical Guidance for Evaluating Selected Solar Technologies’ dated November 2010. This document is binding and obligates sponsors of solar projects on the airport property to comply with it, but the **guidelines are neither binding on nor obligatory for projects that are off-airport property to comply**. The proposed 2150 Dryden Road solar projects are not on the airport property, or within any designated runway protection zone, or object free zone and therefore is not required

to comply with the guide. However, SUN8 has proactively performed the recommended analyses in compliance with this guide using the SGHAT tool. The guide specifies that projects must demonstrate (a) No potential for glint or glare in the existing or planned airport traffic control tower (ATCT) cab (b) No potential for glare or “low potential for afterimage” along the final approach path for any landing thresholds.

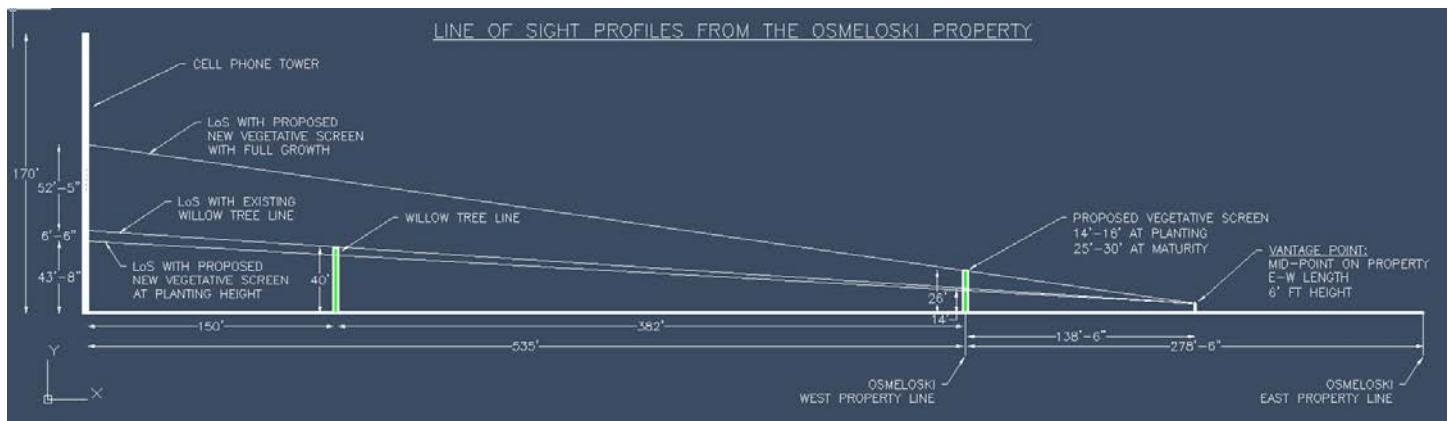
A glare analysis using SGHAT was performed specifically with regard to the Ithaca-Tompkins County airport and the solar arrays proposed at 2150 Dryden Road (> 5 miles away, approximately 60° off the centerline of the runway). The resulting SGHAT simulation provided a “no glare” outcome for the flight path from 0 miles to 1 ¾ miles from the landing threshold; a “low potential for temporary after image” outcome for the control tower and the flight path between 1 ¾ miles to 2 miles. No adverse impact is expected at the airport (for the control tower or its flight approach path). SGHAT simulation results for the airport are included as Exhibit – D. The SGHAT analysis was conducted for the tower with the view point at a total elevation of 1,075' and the solar array elevations ranging between 1,061.41' and 1,150'. While the relative topography was accounted for, existing vegetation located between (> 5 miles) the project site and the control tower was not. Consequently, while the tool shows low potential for a temporary after-image, the vegetation in between makes any ocular impact from the solar arrays from 5 miles away improbable.

It is pertinent to note that a 1.76MW solar PV array is operating since September 2013 on a property adjoining the Ithaca-Tompkins County airport runway, to the north of the runway. Amongst other airports, in June 2008, the Fresno airport constructed a solar array on the airport property within the runway protection zone (approximately 30 degrees of the centerline of the runway). In 2013, the Burlington airport has constructed a solar array on the airport property immediately adjacent to the runway. No adverse impact has been reported from the above-mentioned operational solar arrays.

Removal of the Willow Trees along Array 5 (near the proposed cellular tower)

A cellular tower has been approved to be sited on the 2150 Dryden Road property. Part of the visual mitigation for the cellular tower relied on vegetation on the property, specifically a hedge row of Willow trees along a stream bank, outside the footprint leased by the cellular tower developer. SUN8 through a lease agreement with the landlord has the right to and proposes to remove this hedgerow. An analysis of several line of sight profiles was conducted to determine if a viable alternate solution can be proposed to remove the existing hedgerow of Willow trees and replace it with a new hedgerow near the Osmeloski property line. As demonstrated below, the proposed new hedgerow, provides better visual cover over the long-term.

A line of sight profile from the Osmeloski property was created (excerpted below) with a vantage point at 6 ft in height (average view of a human) in the middle of the property (mid-point between the eastern and western boundaries) and included as Exhibit – E.



The existing hedgerow of Willow trees is mature and averages approximately 40' in height. The hedgerow is in between the proposed tower and the Osemloski property line; 150' away from the cellular tower and 382' from the Osemloski property line. The LoS profiles show the impact of a proposed new vegetative buffer, consisting of native trees (designated as non-invasive in NY), planted along the Osmeloski property line with a height of 14'-16' at the time of planting (14' height used in the analysis, 16' would make the new buffer indifferent to existing). The Willow tree hedgerow provides visual cover for the lower 50'2" of tower height (leaving the upper 119'-8" visible). The new hedgerow provides visual cover for the lower 43'-8" of tower height (leaving the upper 126' 4" visible). Replacing the old willow hedgerow with the new vegetative screen offers a nominal exposure of an additional 6'6" of the tower at the time of planting - approximately 3.8% of the tower's entire height. However, the new vegetative screen can grow approximately 1ft each year (after year 1, accounting for transplant shock) until it reaches a mature height of approximately 24-26'. The additional exposure of 6'6" can be visually covered by the growth of the proposed new vegetative screen by 1'2" (to total height of 15'2") – expected by end of year 2. This analysis shows that in the long-term, the new vegetative buffer at a mature height of 26' at the property line can offer significantly better visual mitigation by covering the lower 102'7" of the tower.

Conclusion

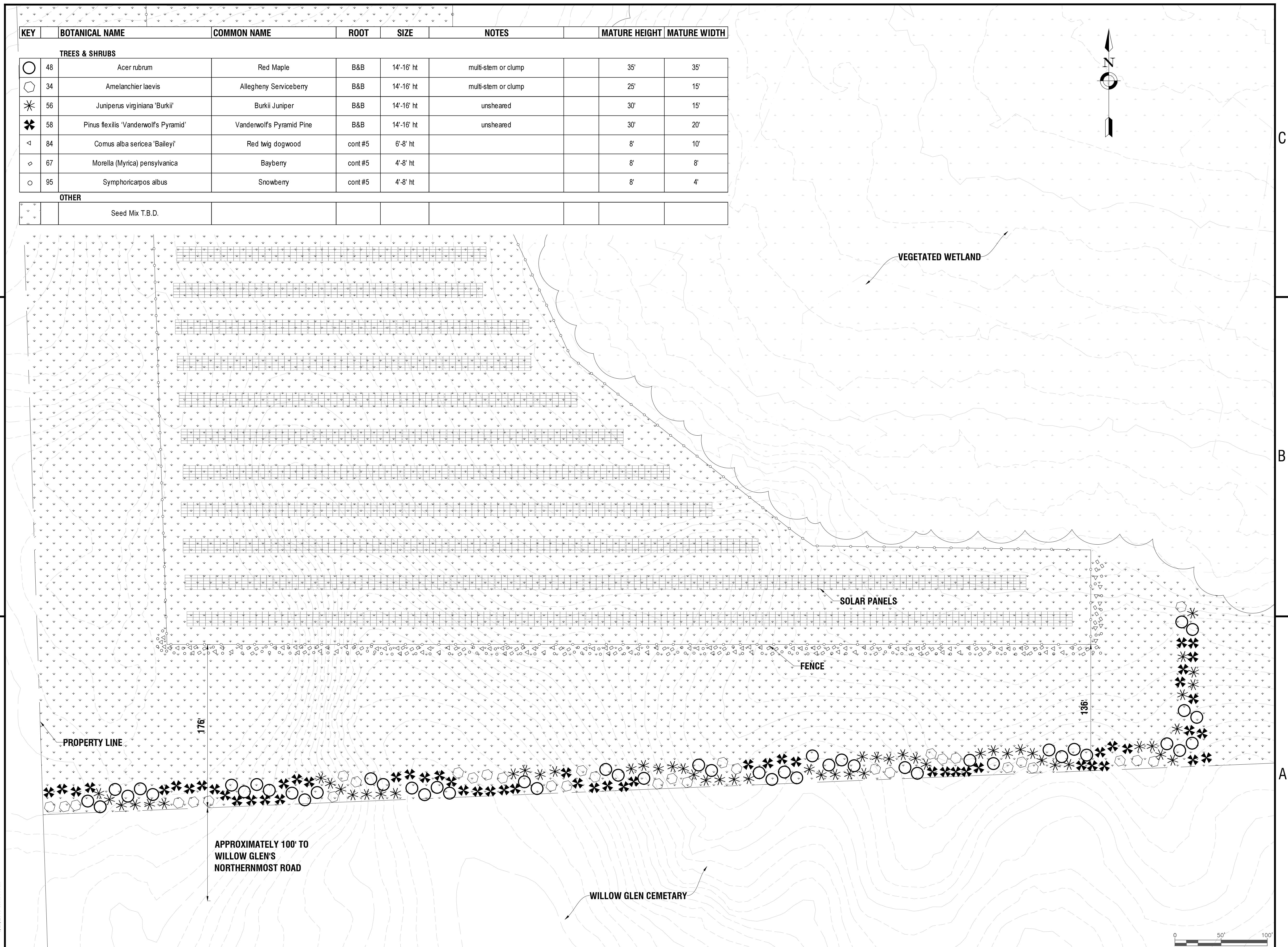
Labella Associates, D.P.C. has performed an assessment of visual impact per the guidelines of the DEC's Assessing and Mitigating Visual Impacts guidance document. Based on the proposed changes in the layout, setbacks, vegetative screens, the visual impact from the solar arrays can be effectively mitigated.

Trowbridge Wolfe Michaels Landscape Architects has reviewed actual site conditions, proposed array locations and has developed a proposed planting plan. Based on simulated renderings, the arrays are buffered from views at the cemetery property line.

EXHIBIT – A TO VISUAL IMPACT STATEMENT ON 2150 DRYDEN ROAD PROJECTS

PLANTING PLAN FOR VISUAL BUFFER AT PROPERTY BOUNDARY

SIMULATED VIEWS FROM THE WILLOW GLEN CEMETARY PROPERTY



It is a violation of New York Education Law Article 145 Sec. 7209, for any person, unless acting under the direction of a licensed architect, professional engineer, or land surveyor, to alter an item in any way, if an item bearing the seal of an architect, engineer, or land surveyor is altered; the altering architect, engineer, or land surveyor shall affix to the item their seal and notation "altered by" followed by their signature and date of such alteration, and a specific description of the alteration.

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SOLAR PHOTOVOLTAIC PLANTS

sun8 PDC LLC

DISTRIBUTED SUN

2150 DRYDEN ROAD PROJECT

DRYDEN, N.Y. 13068

REVISIONS
NO: _____ DATE: _____ DESCRIPTION: _____

PROJECT NUMBER: 2170026

DRAWN BY: BRD

REVIEWED BY:

ISSUED FOR:

DATE: 04/11/2017

DRAWING NAME:

PROPOSED PLANTING PLAN

DRAWING NUMBER:

L-101

View 1 from Cemetery – Existing Conditions



View 1 from Cemetery – Before Buffer



View 1 from Cemetery – With Buffer at Planting (Winter View)



View 1 from Cemetery – With Grown Buffer (Winter View)



View 2 from Cemetery – Existing Conditions



View 2 from Cemetery – Before Buffer



View 2 from Cemetery – With Buffer at Planting (Winter View)



View 2 from Cemetery – With Grown Buffer (Winter View)



View 3 from Cemetery – Existing Conditions



View 3 from Cemetery – Before Buffer



View 3 from Cemetery – with First Buffer

Shrub Buffer Shown at 4' Height. Estimated Height is 4'-8' at Planting



View 3 from Cemetery – with First & Second Buffer (Winter View)

Shrub Buffer Shown at 4' Height. Estimated Height is 4'-8' at Planting



View 4 from Cemetery – Existing Conditions



View 4 from Cemetery – Before Buffer



View 4 from Cemetery – With Modified Buffer

With a mix of low height shrubs and trees to tailored to the topography to minimize impact on vista views



EXHIBIT – B TO VISUAL IMPACT STATEMENT ON 2150 DRYDEN ROAD PROJECTS

SIMULATED VIEWS FROM ROUTE 13 LOOKING WEST

View 5 from Route 13 – Before Buffer



View 5 from Route 13 – with Buffer (Winter View)



View 5 from Route 13 – with Grown Buffer (Winter View)



EXHIBIT – C TO VISUAL IMPACT STATEMENT ON 2150 DRYDEN ROAD PROJECTS

LINE OF SIGHT CALCULATION FROM THE OSMELOSKI PROPERTY

LINE OF SIGHT PROFILES FROM THE OSMELOSKI PROPERTY



EXHIBIT – D TO VISUAL IMPACT STATEMENT ON 2150 DRYDEN ROAD PROJECTS

RESULTS OF THE GLARE ANALYSIS FOR THE AIRPORT FROM THE SGHAT

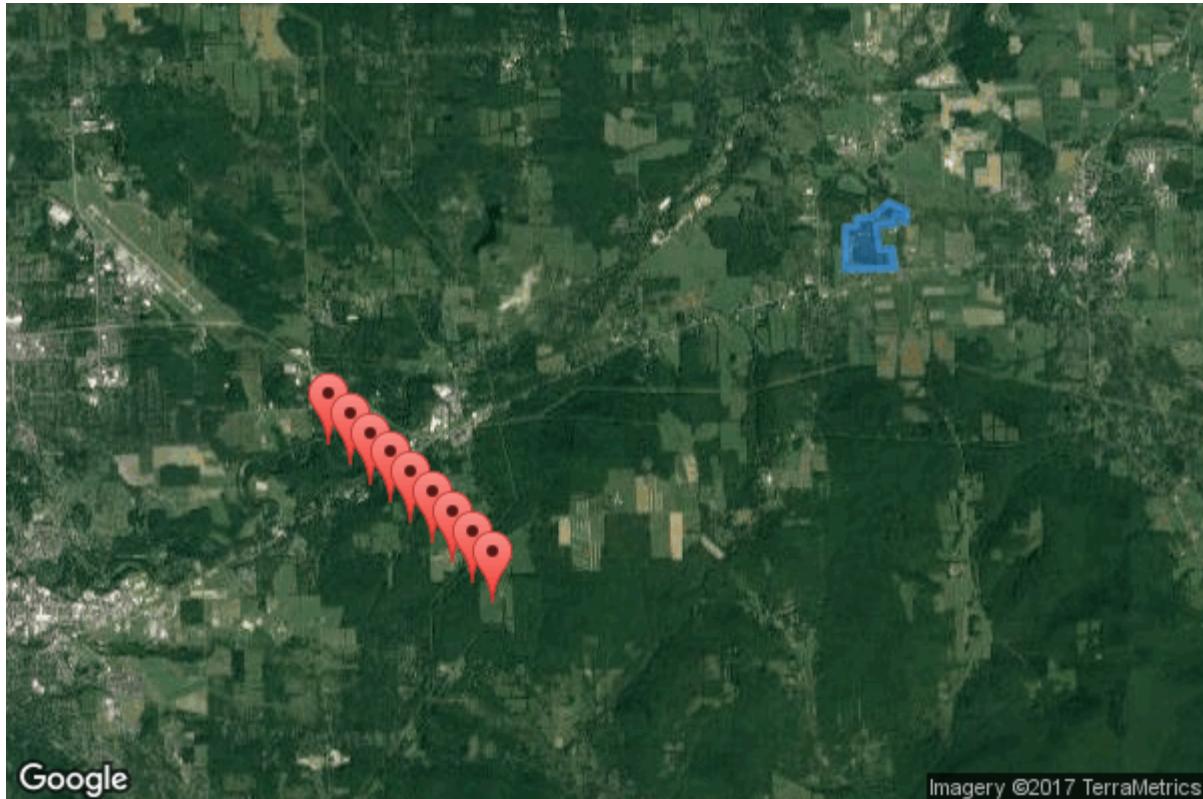
Solar Glare Hazard Analysis Flight Path Report

Generated March 30, 2017, 11:33 a.m.

Flight path: 1

Glare found

 Print



Analysis & PV array parameters

Analysis name	2150 Dryden Road
PV array axis tracking	none
Orientation of array (deg)	180.0
Tilt of solar panels (deg)	20.0
Rated power (kW)	16500.0
Vary reflectivity	True
PV surface material	Smooth glass with ARC

Timezone offset	-5.0
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)	134.02
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	42.4900108635	-76.3306689262	1131.73	8.0	1139.73
2	42.4898209898	-76.3392949104	1142.07	8.0	1150.07
3	42.4952638067	-76.3392949104	1063.34	8.0	1071.34
4	42.4953903782	-76.3373637199	1070.42	8.0	1078.42
5	42.4964029409	-76.3372778893	1059.6	8.0	1067.6
6	42.4965295101	-76.3346600533	1071.44	8.0	1079.44
7	42.4984280173	-76.3317418098	1047.94	8.0	1055.94
8	42.4974154873	-76.3287806511	1085.34	8.0	1093.34
9	42.4958333764	-76.3287806511	1062.24	8.0	1070.24
10	42.4967193634	-76.3306260109	1053.41	8.0	1061.41
11	42.4955802349	-76.3306260109	1062.73	8.0	1070.73
12	42.4953587353	-76.3338446617	1090.43	8.0	1098.43
13	42.4924158802	-76.3333725929	1099.19	8.0	1107.19
14	42.4925424574	-76.331140995	1108.1	8.0	1116.1

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	42.4475280987	-76.3994407654	1520.04	50.0	No
1/4 mi	42.4500393232	-76.4029665656	1484.78	154.43	No
1/2 mi	42.4525505476	-76.4064923658	1364.82	343.58	No

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
3/4 mi	42.4550617721	-76.4100181661	1440.41	337.16	No
1 mi	42.4575729965	-76.4135439663	1464.0	382.74	No
1 1/4 mi	42.460084221	-76.4170697665	1438.07	477.86	Yes
1 1/2 mi	42.4625954454	-76.4205955667	1118.06	867.04	Yes
1 3/4 mi	42.4651066699	-76.4241213669	963.55	1090.75	Yes
2 mi	42.4676178943	-76.4276471672	965.85	1157.62	Yes

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

Threshold

No glare

1/4 mi

No glare

1/2 mi

No glare

3/4 mi

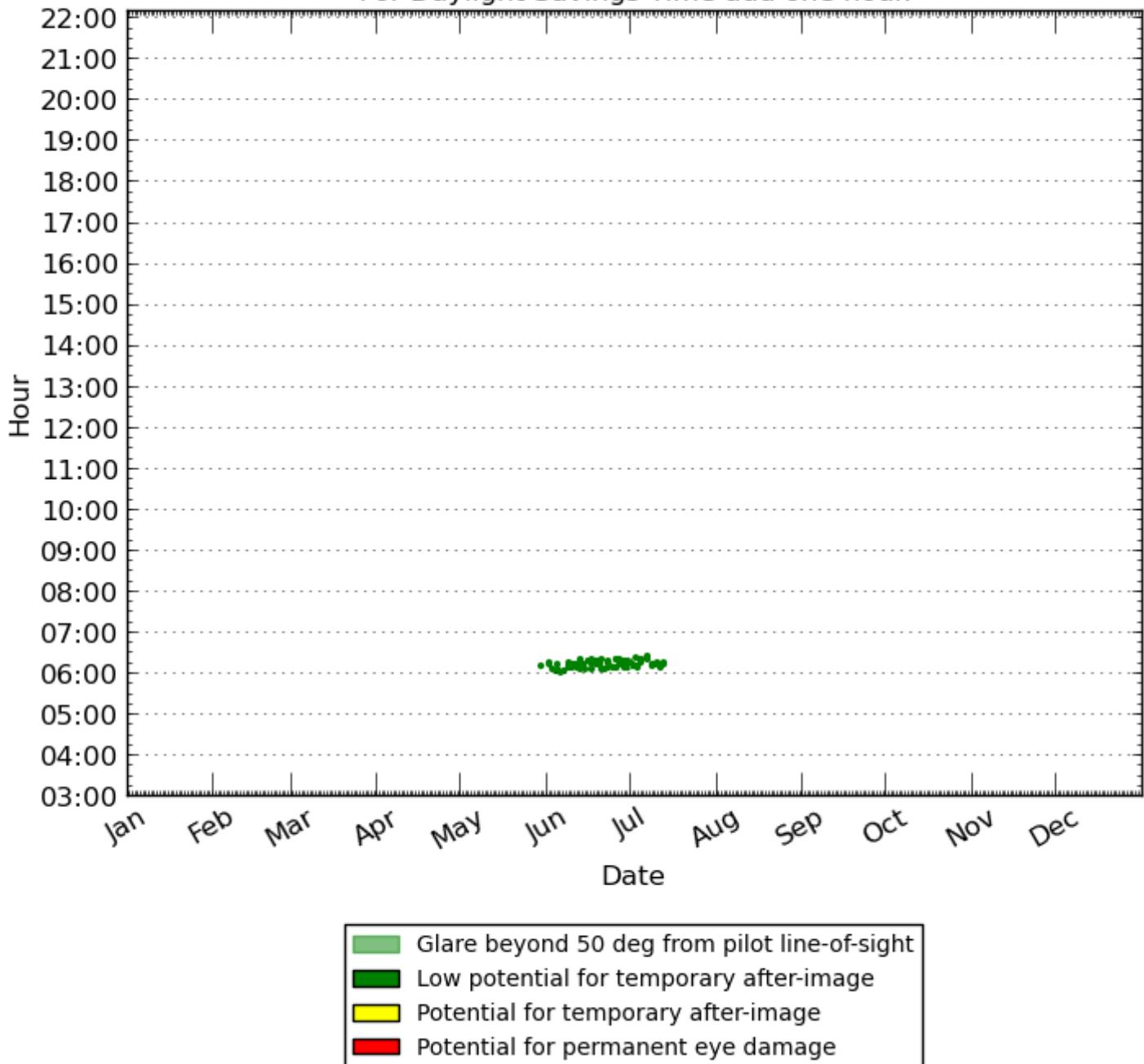
No glare

1 mi

No glare

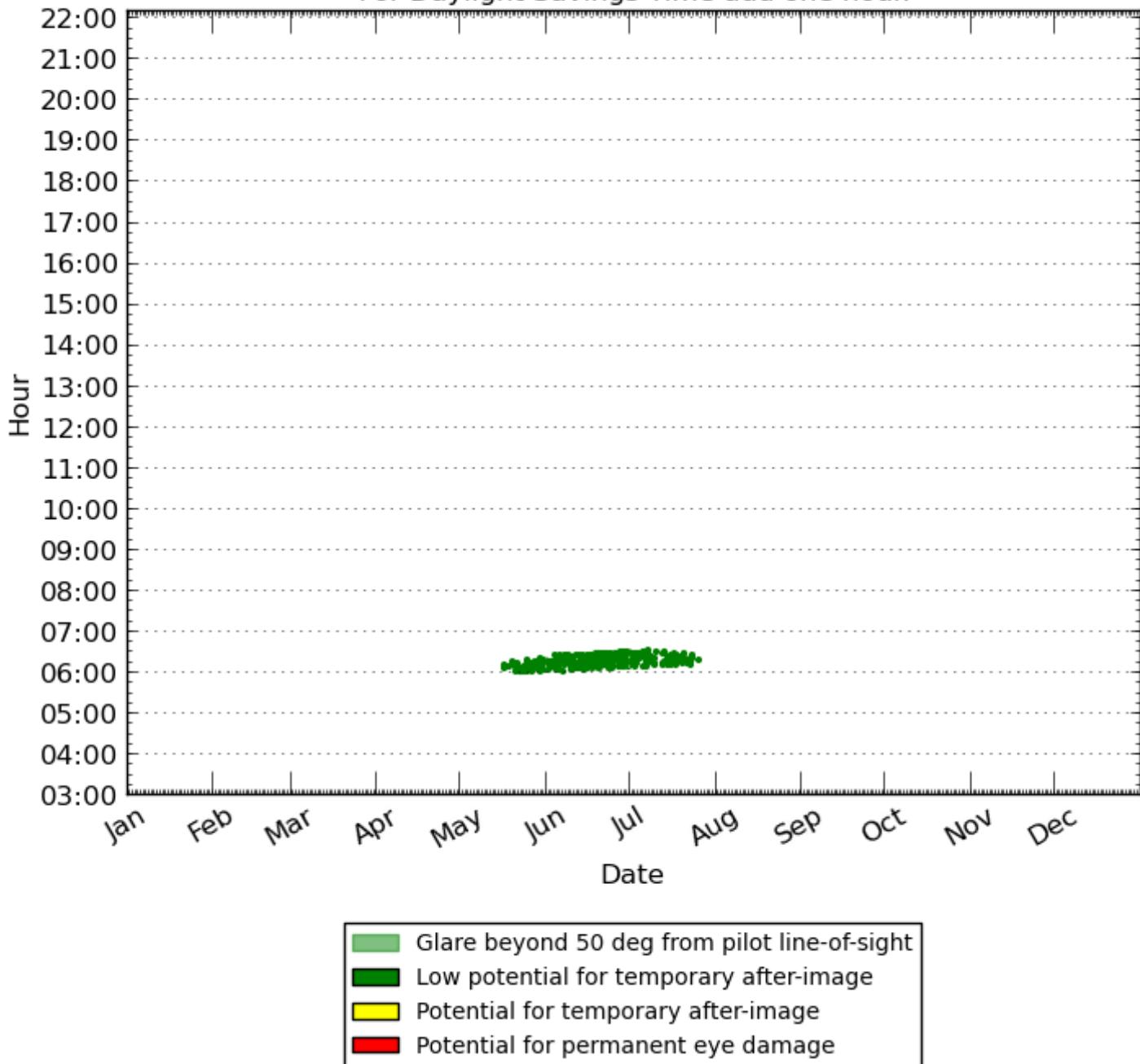
1 1/4 mi

1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.



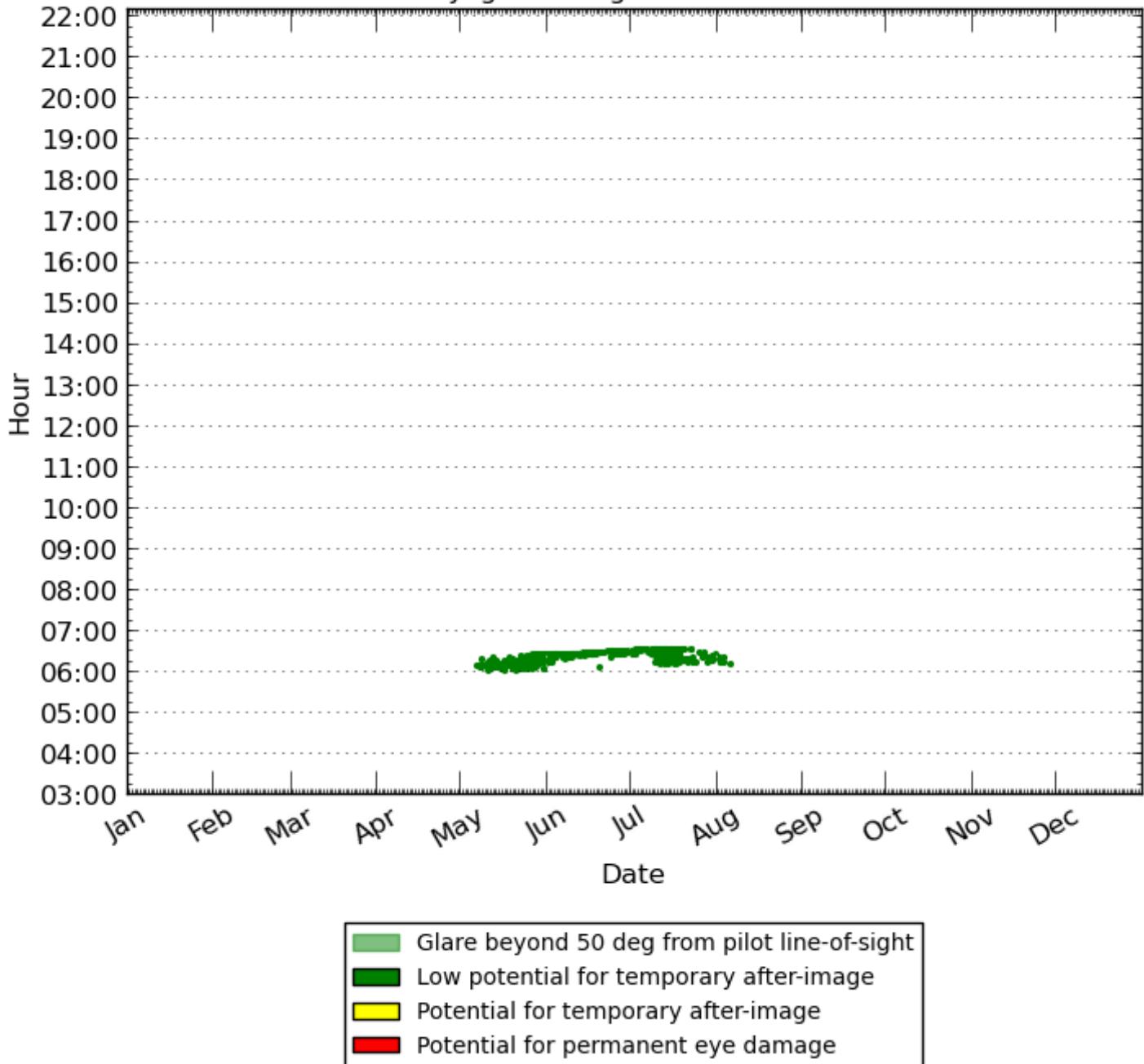
1 1/2 mi

1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.



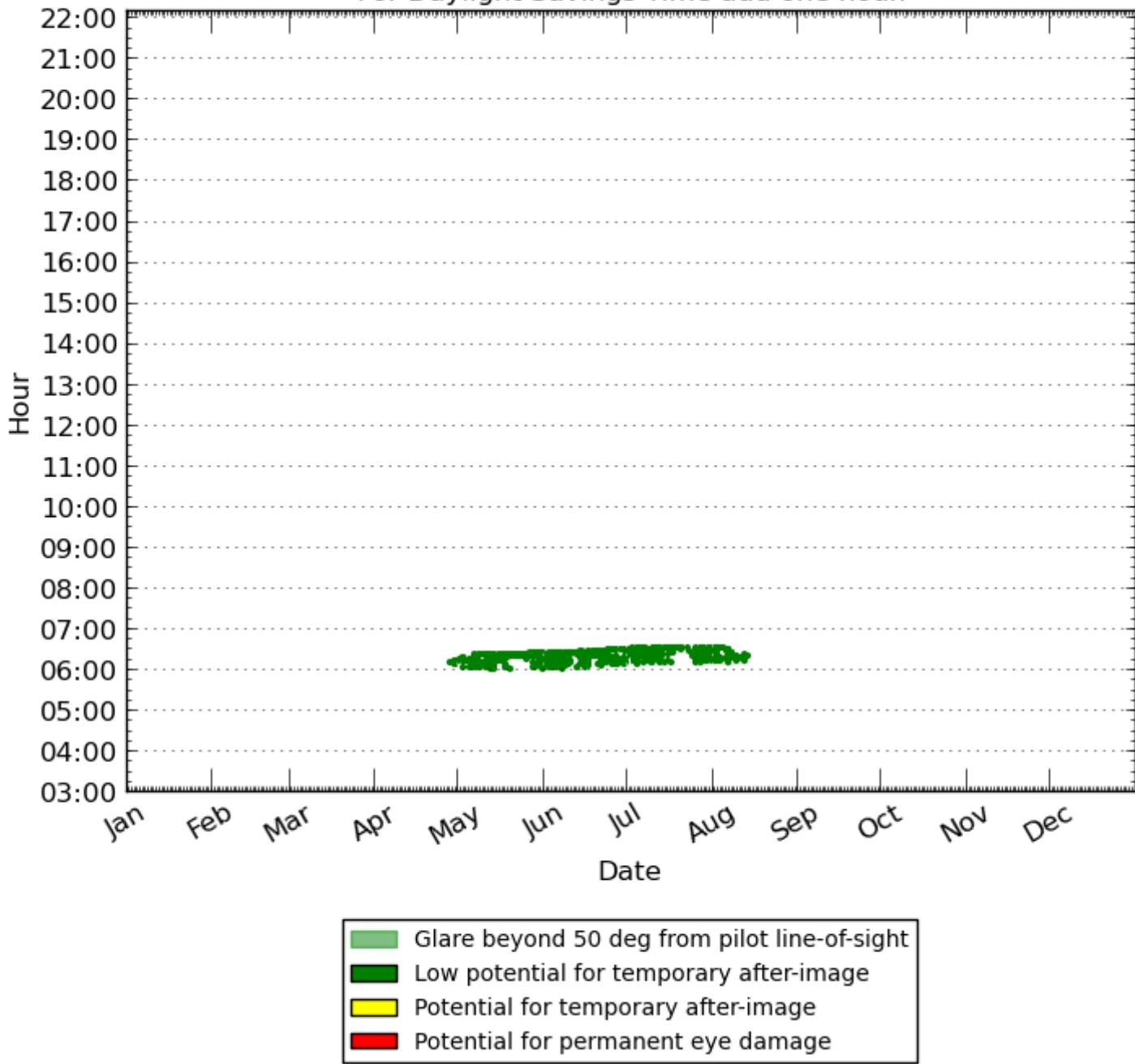
1 3/4 mi

1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.



2 mi

1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.

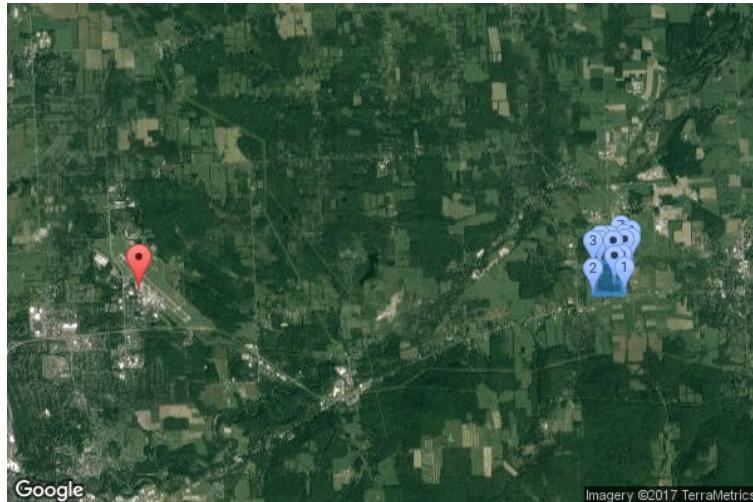


Solar Glare Hazard Analysis Report

Generated May 31, 2017, 4:51 p.m.

Glare found

 Print



Inputs

Analysis name	2150 Dryden Road
PV array axis tracking	none
Orientation of array (deg)	180.0
Tilt of solar panels (deg)	20.0
Rated power (kW)	16500.0
Vary reflectivity	True
PV surface material	Smooth glass with ARC

Timezone offset	-5.0
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)
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5	42.4964029409	-76.3372778893	1059.6	8.0	1067.6
6	42.4965295101	-76.3346600533	1071.44	8.0	1079.44
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14	42.4925424574	-76.331140995	1108.1	8.0	1116.1

Observation Points

Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)
8	42.4908463011	-76.4634361272	1065.1

Glare Occurrence Plot

All times are in standard time. For Daylight Savings Time add one hour.

1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.

