# Appendix 8-B (Attachment C): Solar Glare Analysis Report – Revision 1

## North Seneca Solar Project

**Towns of Junius and Waterloo, Seneca County, New York**

Prepared for:

NORTH SENECA SOLAR PROJECT

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**Revision 1**

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## 1.0 PROJECT OVERVIEW

North Seneca Solar Project, LLC (the Applicant) is proposing to construct the North Seneca Solar Project, an up to 90 megawatt (MW) solar powered electric generation facility located in the Towns of Junius and Waterloo, Seneca County, New York (hereafter referred to as the Facility; see Figure 1). This report provides an assessment of the potential for reflected glare and glint from the proposed photovoltaic (PV) arrays to be experienced at receptors (residences, commercial buildings, etc.), airports, and roadways located near the proposed Facility Site.

The Applicant is proposing the use of single-axis tracking PV array racking structures. Each PV array will be comprised of linear rows of PV modules oriented in a north-south direction and equipped with electric motors that slowly rotate the PV modules to track the movement of the sun and minimize the angle of incidence between the sun and the array. The PV arrays will use interval backtracking and have a resting angle of 60 degrees with a maximum tracking angle of 52 degrees. The height of the arrays will vary as the structures tilt to follow the sun throughout the day. At their tallest position, the PV modules will be up to 12 feet tall. For this analysis, the Facility layout was split or combined into 11 named PV arrays which covered a total of approximately 384 acres of land within the Facility Site (Figure 2).

Topography in the vicinity of the Facility Site is relatively level, with elevations ranging from approximately 470 feet above mean sea level (amsl) to 560 feet amsl. Land cover in the vicinity of the Facility is dominated by agriculture/residential lands, with farms and single-family residences generally located along road frontage, as well as vacant lands.

**Figure 1. Regional Facility Location**

**Figure 2. Proposed Facility Layout**

## 2.0 BACKGROUND

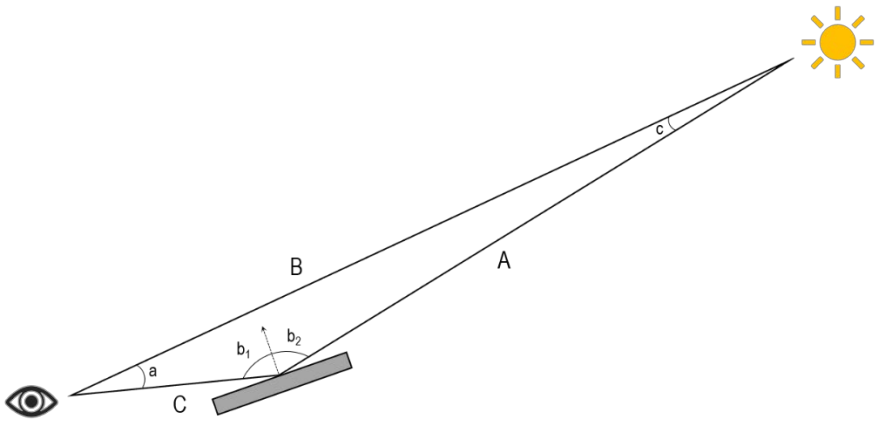
Glare and glint are closely related, but distinct, solar experiences. Glare is defined as a continuous source of bright light, whereas glint is defined as a momentary flash of bright light. Both glint and glare are common in the existing environment. The sun and artificial light sources can cause glare or glint either directly (such as from a sunset when driving westbound) or indirectly (such as from the sun's reflection off a lake or glass window). Glare can be received by observers that are either stationary or moving, whereas glint is generally possible only when the observer is moving rapidly, as is often the case with motorists and aviators. As an example, a motorist traveling along a lake with a forested shoreline may have only brief glimpses of sunlight reflected off of the water at sunset (i.e., glint), whereas an adjacent home with visibility of the water through a break in the foliage may have a continuous source of bright light when sunlight strikes the water at a certain angle (i.e., glare).

The potential effects of glare include annoyance impacts, such as distraction, after-image in the viewer's vision, or temporary avoidance of a view due to the presence of reflected light (Dwyer, 2017; Slana, 2018); safety impacts, such as the potential to disorient motorists or pilots (Auffray et al., 2008; Ho et al., 2011; Riley and Olson, 2011); and human health impacts, such as permanent retinal damage (Ho et al., 2009). Although less pronounced when compared to glare, the effects of glint are similar and have been conservatively treated the same in all analyses presented in this report. Accordingly, reflected light from the PV arrays is collectively referred to as glare in the remainder of this report.

As there is an inverse correlation between light absorption and reflection, PV modules are designed to absorb as much of the solar spectrum as possible to maximize efficiency. Virtually all PV modules installed in recent years have at least one anti-reflective coating to minimize reflection and maximize absorption. However, the front-facing surfaces of PV modules are smooth, specular surfaces that have the potential to reflect incoming solar radiation at high incidence angles, much like windows on a building or the surface of a pond or lake at sunrise or sunset (Parretta et al., 1999).

Under clear sky conditions, fixed-tilt PV arrays can produce glare in the early morning and evening when the sun is low on the horizon and the incidence angle between the PV modules and the sun is approximately 60 degrees or greater (Riley and Olsen, 2011). Unlike fixed-tilt systems, single-axis tracking PV arrays maintain relatively low incidence angles as they rotate to track the sun through the course of the day and thereby minimize the potential for glare to be produced. Incidence angle is the angle between the direct component of insolation (i.e., the sun) and a ray perpendicular to the PV panel (angle b2 in Figure 3). The Incidence Angle is equal to the Reflectance Angle.

**Figure 3. Trigonometric Depiction**



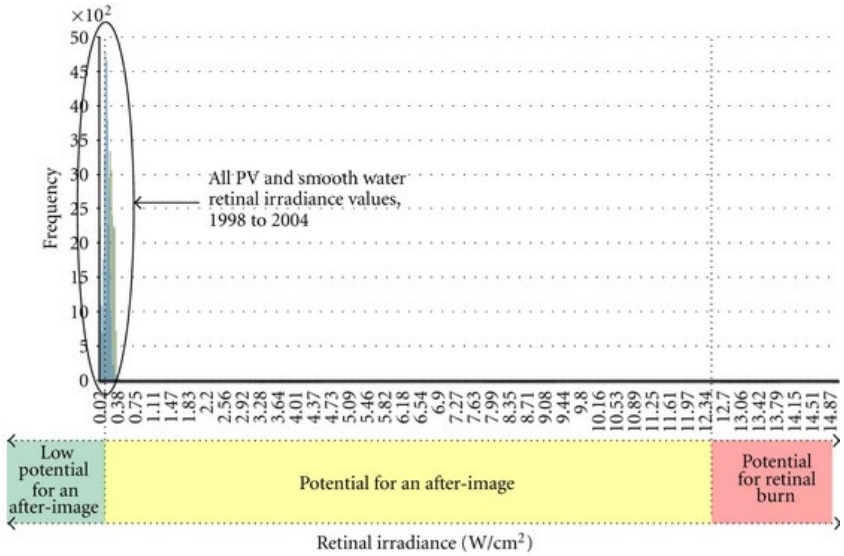

Trigonometric depiction of a receptor, a PV panel, and the sun. Reflectance Angle = $b_1$; Incidence Angle = $b_2$. The distance between the sun and the earth (sides A and B; approximately 91 million miles) is great enough, relative to side C (less than 1,500 feet or 0.28 miles), that angle c is effectively 0°.

The potential effects of glare, as described above, can be dependent on the magnitude or category of glare that is produced. Glare that may be produced by a flat-plate PV array can be separated into two general categories: glare with a potential to cause a temporary after-image (i.e., "yellow glare") and glare with a low potential to produce an after-image (i.e., "green glare")[1]. After-image is when an image continues to appear in the eyes after the exposure has occurred. Green glare is relatively low in intensity and is unlikely to produce an after-image. Yellow glare is similar in intensity to glare received from other sources regularly encountered by motorists (e.g., the rising or setting sun and the reflection of the sun off water features, windows, curtain wall buildings, and other smooth surfaces), and has the potential to temporarily affect nearby receptors.

It is important to note that human health impacts are typically only associated with concentrating solar power plants or other convex reflective surfaces (e.g., convex curtain wall buildings) that concentrate the incoming solar radiation. Flat-plate photovoltaic systems, such as the proposed Facility, are incapable of producing the retinal irradiance levels necessary to result in retinal damage. Figure 4 provides a linear distribution of retinal irradiance showing PV panels and still water. Solar panels generally have a retinal irradiance of 0.23-0.45 Watts/centimeter$^2$ (W/cm$^2$), with smooth still water being similar at 0.13-0.38 W/cm$^2$ and on the bottom end of the retinal irradiance scale for having potential for an after image (Riley and Olson, 2011). In comparison, staring directly at the sun has a retinal irradiance of 8 W/cm$^2$ (Ho et al., 2011).

[1] "Red" glare, which is glare that has the potential to cause eye damage, is typically not possible for non-concentrating solar energy facilities such as the proposed Project.

**Figure 4. Distribution of Retinal Irradiance**




Graphic of linear distribution of retinal irradiance from Riley and Olson, 2011.

In modeling the potential for glare to be received at a residence, the receptor can be assumed to be a relatively static point with known attributes. Road users travel in multiple directions on a three-dimensional surface at differing velocities. For all road users, glare from the sun is a common and well-studied phenomena (e.g., Auffray et al., 2008; Redweik, 2019). As evidence of this, all vehicles sold in the United States come standard with features intended to help a road user cope with glare received from the sun or other sources (sun visors and shade bands). In consideration of these factors, the use of single axis tracking PV arrays, and the Applicant's planned vegetative mitigation strategy, road users travelling through the Facility area will generally not be exposed to glare in a manner that would impede traffic movements or create safety hazards.

In order to accurately determine the occurrence, duration, and intensity of glare produced by a photovoltaic system at a given observation point, the following information is needed:

(1) Location, orientation, and reflectance of the PV modules;

(2) Location of the observation point;

(3) Position of the sun; and

(4) Direct Normal Irradiance (DNI – see definition below).

With these inputs, the location and duration of glare can be predicted using computer modeling programs together with follow-up visibility and climatological analyses, as needed.

The following terms are used throughout this assessment.

| | |
|---|---|
| Direct Normal Irradiance (DNI) | The amount of solar radiation received per unit area by a surface that is always held perpendicular to the rays that come in a straight line from the sun at its current position in the sky. |
| Diffuse Solar Radiation: | Solar radiation scattered by molecules and particles in the atmosphere. |
| Direct Solar Radiation: | Solar radiation that has travelled from the sun to the earth's surface in a straight line without scattering. Direct radiation is the component of solar radiation that causes visible glare from flat-plate photovoltaic systems. |
| Glare: | A source of bright reflected light. |
| Incidence Angle: | The angle between the direct component of insolation (i.e., the sun) and a ray perpendicular to the PV module. |
| PV modules: | Photovoltaic panels that are fixed to a ground-mounted racking system. On this Facility, a single-axis tracking system is proposed. |
| PV Array: | A contiguous group of PV modules which collectively will be enclosed by security fencing and landscape screening plantings, where applicable. |
| Specular Reflection: | The mirror-like reflection of waves, such as light, from a surface. |

## 3.0 METHODS

ForgeSolar, an industry standard commercial software based on the Solar Glare Hazard Analysis Tool (SGHAT) that was developed by Sandia National Laboratories, was used to evaluate the potential for glare for this Facility. This software was initially developed for use by the Federal Aviation Administration (FAA) in evaluating safety impacts to pilots while landing aircraft (Ho et al., 2015). The scope of SGHAT's analytical capabilities has expanded to include the potential for a PV system to produce glare that may be received by terrestrial receptors, such as residences and motorists.

ForgeSolar provides a quantified assessment of when and where glare may occur throughout the year from solar installations, as well as identifying the potential effects on the human eye when glare does occur. However, the application of this tool in determining the occurrence, duration, and intensity of glare ensures a conservative analysis since it is based on a completely clear sky and bare earth model (i.e., it does not take into account atmospheric conditions that scatter incoming solar radiation and terrestrial obstructions that visually block the receipt of glare by an observer). Accordingly, SGHAT outputs represent the worst-case scenario.

No consistent national, state, county, or local standards exist that set parameters that could be used to guide the development of a study area for assessing solar glare. However, standards developed in other countries may provide some guidance. In Germany and Switzerland, solar glare assessments must be conducted for all dwellings that are located within 100 meters of a solar energy generating facility

(Zehndorfer Engineering, 2019). For this Facility, glare was analyzed for the following potentially sensitive receptors:[2]

1. A total of 101 receptors[3] (e.g., residences, commercial buildings, etc.) that were determined by viewshed analysis to have potential visibility of the Facility (see Appendix A for a list of receptors assessed in SGHAT model);
2. Six (6) road corridors located within or adjacent to the Facility; and
3. Airports; however, no airports are located within two (2) miles of the Facility Site. The nearest airport is approximately 6 miles southeast (Finger Lakes Regional Airport).

In evaluating the nearest receptor locations and road corridors, it is assumed that additional receptors and roadways at a greater distance within a 2-mile radius of the Facility would experience less glare than the nearest receptors and roadways so a full analysis of glare was not conducted beyond the resources identified above.

Receptors and travel routes evaluated in this analysis are labeled and shown in Figure 5. Input variables and assumptions used for solar glare modeling calculations for the proposed Facility are described in Table 1 and in detail in Appendix B.

[2] Although a study area with a 2-mile radius is used in many glare reports in assessing impacts to airports, the FAA has no recommendations for study areas. A 2-mile radius was selected in this case as ForgeSolar's modeling software uses a 2-mile approach/departure distance (i.e., the selected study area is large enough to include not only adjacent airports, but potential approach/departure routes that intersect the Project as well).

[3] Receptors include any residences, outdoor public facilities and areas, hospitals, schools, libraries, parks, camps, summer camps, places of worship, cemeteries, any historic resources listed or eligible for listing on the State or National Register of Historic Place (S/NRHP), and Federal and State Lands, that were identified within 1,500 feet of the Facility. The modeling software limits input of receptors to 40 discrete locations, thus the nearest 40 receptors were modeled to evaluate the potential for glare related impacts.

**Figure 5. Receptors and Road Segments**

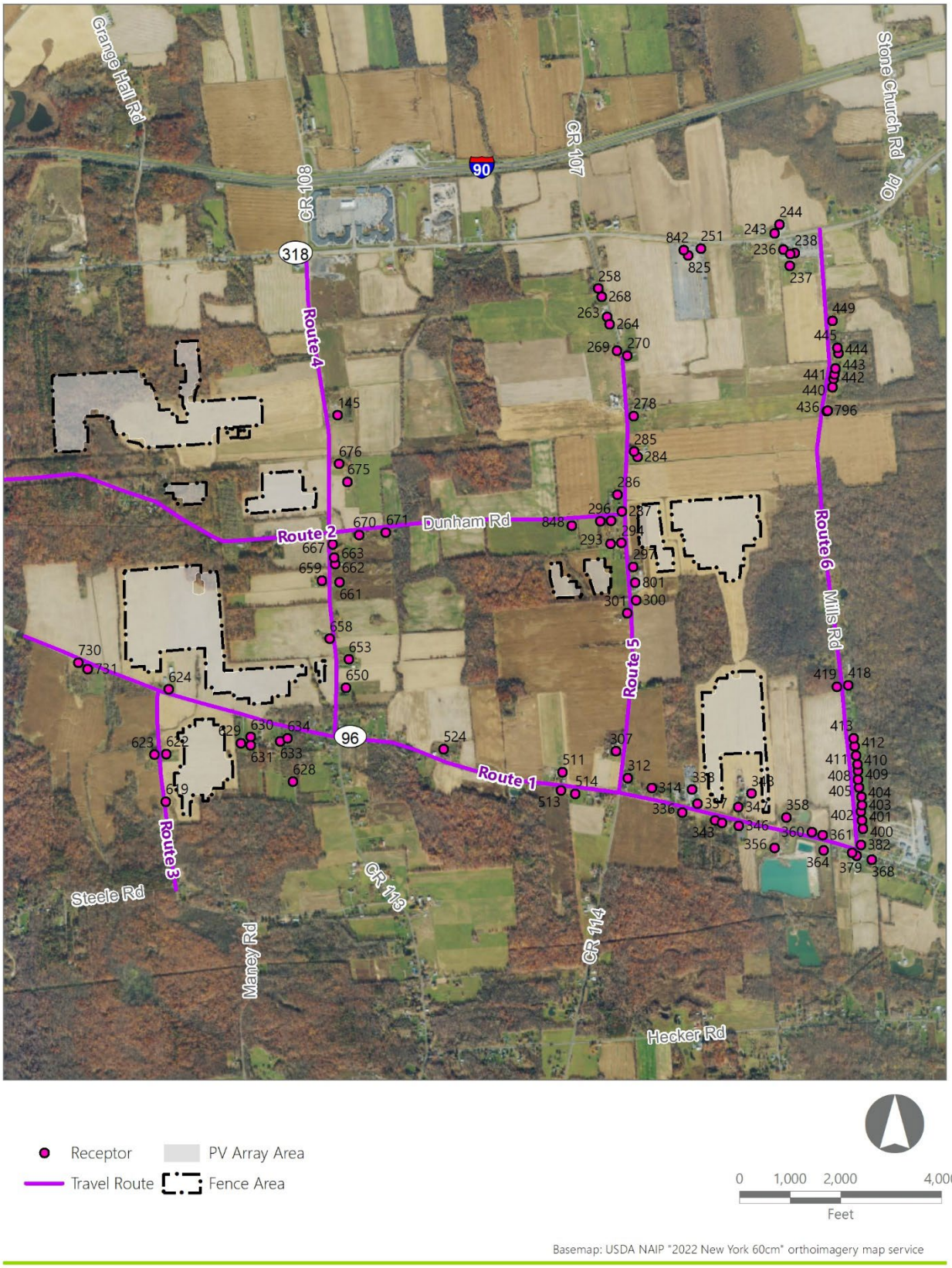


**Table 1. Summary of SGHAT Model Inputs**

| Parameter | | Purpose | Value |
|---|---|---|---|
| DNI: | | The maximum DNI at the given location at solar noon. This variable is given in units Watts (W)/$m^2$. The peak DNI at solar noon is approximately 1,000 W/$m^2$ on a clear, sunny day. | Variable, based on sun position |
| Receptor height: | | Height above ground of the average human eye viewing level. | 5.4 feet |
| Array height: | | Height above ground for the highest height and average height of the solar panels. | 12 feet (maximum) |
| Axis tracking: | | Indicates the type of tracking used by the panels (if any). | Single-axis tracking |
| Backtracking method | | Rotate the modules away from the sun to reduce shading | Shade |
| Ground Cover Ratio (GCR) | | Ratio between the PV module area and total ground area | 43.5 |
| Fixed-Tilt | Orientation of array: | Orientation of the array in degrees, measured clockwise from true north. | N/A (tracking arrays used) |
| | Tilt of solar panels: | Tilt (elevation angle) of the modules in degrees, where 0° is facing up and 90° is facing horizontally. | N/A (tracking arrays used) |
| Single-Axis Tracking | Tilt of tracking axis: | The elevation angle of the tracking axis in degrees, where 0° is facing up and 90° is facing horizontally. The panels rotate about the tracking axis. | 0° |
| | Orientation of tracking axis: | The orientation of the tracking axis in degrees, measured clockwise from true north. Panels facing south at solar noon would have an orientation of 180°. Panels facing east at solar noon would have an orientation of 90°. | 180° |
| | Offset angle of module: | The vertical offset angle between the tracking axis and the panel (if any). | 0° |
| | Maximum tracking angle: | The maximum angle the panel will rotate in both the clockwise and counterclockwise directions. | 52° |
| | Resting angle: | The angle at which the panel will rest overnight. | 60° |
| Module surface material: | | The type of material comprising the PV modules. | Light textured glass w/ anti-reflection coating |

## 4.0 RESULTS

Results from the glare analysis determined that no glare is modeled to be received at any of the identified residences or travel routes. Given that glare is not predicted at any of the nearby receptors and travel routes identified, it is not expected that glare would occur at receptors or roadways at a greater distance. As the Facility is proposing single-axis tracking PV arrays, this result is not unexpected. As discussed above, single-axis tracking PV arrays maintain low incidence angles relative to the sun, significantly limiting the amount of incoming solar radiation that can be reflected by the arrays in the morning and evening when the receipt

of solar glare by nearby residences is most likely. Attachment B provides a detailed breakdown of the results for each receptor evaluated.

## 5.0 CONCLUSIONS

The Applicant conducted a baseline solar glare analysis using ForgeSolar's SGHAT software to identify potential glare impacts that may result from operation of the Facility. This analysis was conducted using industry standard methods and model inputs and was conducted to comply with the requirements of the Section 94-c regulations. The results of this analysis indicate that none of the potentially sensitive receptors located within or adjacent to the North Seneca Solar Project will receive glare from the Facility.

This result is consistent with the Facility's proposed use of tracking PV arrays. As noted above, tracking PV arrays maintain low incidence angles by following the sun's position throughout the day. This increases the amount of incoming solar radiation absorbed by the panels and limits the amount reflected. For this reason, tracking PV arrays rarely reflect enough sunlight to produce retinal irradiance values ($W/m^2$) sufficient to result in either green or yellow glare.

Because the Facility is not anticipated to result in any glare impacts to identified receptors, no impact avoidance or mitigation measures are necessary.

## 6.0 REFERENCES


Auffray, B., Monsere, C.M. and Bertini, R.L., 2008, January. An empirical investigation of the impacts of sun-related glare on traffic flow. In *Proc., 87th Annual Meeting of Transportation Research Board (CD-ROM), Transportation Research Board, Washington, DC*.

Dwyer, C. (2017). *Solar Glare: Guidelines and best practice for assessing solar glare in the City of London (Rep.)*. Available at: http://preview.cityoflondon.contensis.cloud/assets/Services-Environment/solar-glare-planning-advice-note.pdf.

Ho, C.K., Ghanbari, C.M. and Diver, R.B., 2009. Hazard Analyses of Glint and Glare from Concentrating Solar Power Plants (No. SAND2009-4131C). Sandia National Lab.(SNL-NM), Albuquerque, NM (United States).

Ho, C. K., C. M. Ghanbari, R. B. Diver. 2011. *Methodology to assess potential glint and glare hazards from concentrating solar power plants: Analytical models and experimental validation*. Journal of Solar Energy Engineering 133:1-9.

Ho, C. K., C. A. Sims, J. Yellowhair, E. Bush. 2015. *Solar Glare Hazard Analysis Tool (SGHAT) Technical Reference Manual.* Sandia National Laboratories. Available at: https://share-ng.sandia.gov/glare-tools/references/SGHAT_Technical_Reference-v6.pdf.

Parretta, A., Sarno, A., Tortora, P., et al., "Angle-dependent reflectance measurements on photovoltaic materials and solar cells," Optics Communications, vol. 172, no. 1, pp. 139–151, 1999.

Slana, J. (2018). Solar Glare Catalogue Development For Solar Photovoltaic Project Proposals (Unpublished report). University of Calgary, Calgary, AB.

Redweik, P., Catita, C., Henriques, F. and Rodrigues, A. 2019. S*olar Glare Vulnerability Analysis of Urban Road Networks—A Methodology*. Energies 12:4779.

Riley, E., S. Olson. 2011. *A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems*. ISRN Renewable Energy 2011: Article ID 651857, 6 pages.

Zehndorfer Engineering (2019). Solar Glare and Glint Project. Report ZE19060-AUC produced for the Alberta Utilities Commission.

# Appendix A

List of Receptors Assessed in SGHAT Model

| Receptor ID | Receptor Type | Street Address | Print Key | Latitude | Longitude | Elevation (feet) |
|---|---|---|---|---|---|---|
| 145 | Occupied Residence | 1500 Mills Rd | 14-1-20.2 | 42.94526 | -76.922774 | 542 |
| 236 | Commercial | 1500 Mills Rd | 14-1-09.2/2011 | 42.953783 | -76.889558 | 516 |
| 237 | Occupied Residence | 1500 Mills Rd | 14-1-09.2/2011 | 42.952884 | -76.88911 | 513 |
| 238 | Commercial | 1500 Mills Rd | 14-1-09.2/2011 | 42.953579 | -76.888752 | 513 |
| 240 | Commercial | 1500 Mills Rd | 14-1-09.2/2011 | 42.953515 | -76.889079 | 514 |
| 243 | Occupied Residence | 1117 Rt 318 | 15-1-01.2 | 42.95467 | -76.890213 | 522 |
| 244 | Commercial | 50 W Stoever Ave | 15-1-02.2 | 42.955145 | -76.88981 | 513 |
| 251 | Commercial | 863 Smith Rd | 14-1-27.1 | 42.953921 | -76.895651 | 502 |
| 258 | Occupied Residence | 1526 Whiskey Hill Rd | 14-1-17 | 42.951862 | -76.903319 | 558 |
| 263 | Occupied Residence | 1558 Whiskey Hill Rd | 14-1-15.2 | 42.950316 | -76.902694 | 561 |
| 264 | Commercial | 582 Dublin Rd | 14-1-15.12 | 42.949915 | -76.902546 | 559 |
| 268 | Occupied Residence | 1536 Whiskey Hill Rd | 14-1-16.2 | 42.9514 | -76.903082 | 561 |
| 269 | Occupied Residence | 1594 Whiskey Hill Rd | 14-1-13.1 | 42.948459 | -76.902024 | 554 |
| 270 | Occupied Residence | 1603 Whiskey Hill Rd | 14-1-14.2 | 42.948185 | -76.901289 | 553 |
| 278 | Occupied Residence | 1667 Whiskey Hill Rd | 14-1-11 | 42.944899 | -76.900898 | 532 |
| 284 | Commercial | PO Box 744 | 15-1-06 | 42.942664 | -76.900676 | 508 |
| 285 | Occupied Residence | PO Box 744 | 15-1-06 | 42.942968 | -76.900904 | 511 |
| 286 | Occupied Residence | 1756 Whiskey Hill Rd | 15-1-05.11 | 42.940645 | -76.902194 | 511 |
| 287 | Occupied Residence | 1772 Whiskey Hill Rd | 15-1-05.12 | 42.939721 | -76.90191 | 513 |
| 293 | Commercial | 1806 Whiskey Hill Rd | 15-1-31.111 | 42.937986 | -76.902785 | 517 |
| 294 | Occupied Residence | 1806 Whiskey Hill Rd | 15-1-31.111 | 42.938013 | -76.901977 | 520 |
| 296 | Occupied Residence | 1806 Whiskey Hill Rd | 15-1-31.12 | 42.939228 | -76.902702 | 516 |
| 297 | Occupied Residence | 1831 Whiskey Hill Rd | 15-1-07.1 | 42.936706 | -76.901133 | 517 |
| 300 | Occupied Residence | 2801 Miller Rd | 15-1-08 | 42.93489 | -76.900988 | 513 |
| 301 | Occupied Residence | 1882 Whiskey Hill Rd | 15-1-32 | 42.93419 | -76.90165 | 515 |
| 307 | Occupied Residence | 2038 Whiskey Hill Rd | 15-1-21.1 | 42.926715 | -76.902681 | 524 |
| 312 | Occupied Residence | 2061 Whiskey Hill Rd | 15-1-19.2 | 42.925237 | -76.901854 | 520 |
| 314 | Occupied Residence | 4281 McDougal Rd | 15-1-17 | 42.924689 | -76.900112 | 513 |
| 336 | Occupied Residence | 1010 Rt 96 | 18-1-80 | 42.923305 | -76.897867 | 503 |
| 337 | Occupied Residence | 1025 Rt 96 | 15-1-13 | 42.923782 | -76.896737 | 511 |
| 338 | Commercial | 1025 Rt 96 | 15-1-13 | 42.924543 | -76.897133 | 516 |
| 343 | Occupied Residence | 1048 Rt 96 | 18-1-09.12 | 42.92285 | -76.895459 | 497 |
| 344 | Occupied Residence | 1056 Rt 96 | 18-1-09.2 | 42.922713 | -76.894943 | 496 |
| 346 | Public | 28 Hillcrest Ave | 18-1-10.2 | 42.922542 | -76.893712 | 488 |
| 347 | Occupied Residence | 1067 Rt 96 | 15-1-09 | 42.923534 | -76.893729 | 501 |

| Receptor ID | Receptor Type | Street Address | Print Key | Latitude | Longitude | Elevation (feet) |
|---|---|---|---|---|---|---|
| 348 | Commercial | 1067 Rt 96 | 15-1-09 | 42.924263 | -76.892722 | 501 |
| 356 | Commercial | 1130 Rt 96 | 18-1-10.112 | 42.921279 | -76.891117 | 485 |
| 358 | Occupied Residence | 1300 Rt 96 | 16-1-28.2 | 42.922943 | -76.890176 | 489 |
| 360 | Occupied Residence | 1155 Rt 96 | 18-1-20 | 42.9221 | -76.888347 | 489 |
| 361 | Occupied Residence | 1163 Rt 96 | 18-1-12 | 42.921935 | -76.887522 | 490 |
| 364 | Commercial | 2206 Brewer Rd | 18-1-10.12 | 42.921104 | -76.887473 | 489 |
| 368 | Occupied Residence | 1222 Rt 96 | 18-1-15 | 42.920535 | -76.883935 | 492 |
| 379 | Commercial | 1184 Rt 96 | 18-1-14.21 | 42.920767 | -76.885043 | 485 |
| 382 | Occupied Residence | 1205 Rt 96 | 19-1-01.1 | 42.92136 | -76.884735 | 493 |
| 400 | Occupied Residence | 2129 Mills Rd | 19-1-01.22 | 42.922239 | -76.884537 | 495 |
| 401 | Occupied Residence | 2115 Mills Rd | 19-1-01.211 | 42.922677 | -76.884595 | 498 |
| 402 | Occupied Residence | 2107 Mills Rd | 19-1-01.212 | 42.923156 | -76.884661 | 502 |
| 403 | Occupied Residence | 2099 Mills Rd | 19-1-55 | 42.923515 | -76.884603 | 504 |
| 404 | Occupied Residence | 2089 Mills Rd | 16-1-71 | 42.923978 | -76.884617 | 504 |
| 405 | Occupied Residence | 2075 Mills Rd | 16-1-72 | 42.924465 | -76.884761 | 503 |
| 408 | Occupied Residence | 2063 Mills Rd | 16-1-70 | 42.924895 | -76.884826 | 502 |
| 409 | Occupied Residence | 2061 Mills Rd | 16-1-76 | 42.925388 | -76.88481 | 500 |
| 410 | Occupied Residence | 2059 Mills Rd | 16-1-29.111 | 42.925747 | -76.88486 | 498 |
| 411 | Occupied Residence | 2047 Mills Rd | 16-1-29.112 | 42.926212 | -76.884959 | 497 |
| 412 | Occupied Residence | 2035 Mills Rd | 16-1-69.1 | 42.926716 | -76.885036 | 495 |
| 413 | Occupied Residence | 1236 State Route 96 | 16-1-69.2 | 42.927152 | -76.885087 | 495 |
| 418 | Occupied Residence | 1965 Mills Rd | 16-1-69.7 | 42.930052 | -76.885411 | 492 |
| 419 | Occupied Residence | 831 Sierk Rd | 16-1-27.1 | 42.929978 | -76.886253 | 497 |
| 436 | Utility | 1633 Mills Rd | 15-1-46 | 42.944957 | -76.886605 | 502 |
| 440 | Occupied Residence | 1633 Mills Rd | 15-1-46 | 42.946261 | -76.886127 | 501 |
| 441 | Occupied Residence | 1623 Mills Rd | 15-1-45.112 | 42.946702 | -76.88604 | 499 |
| 442 | Occupied Residence | 1617 Mills Rd | 15-1-45.12 | 42.946952 | -76.885967 | 500 |
| 443 | Occupied Residence | 1613 Mills Rd | 15-1-45.2 | 42.947259 | -76.88589 | 500 |
| 444 | Occupied Residence | 1597 Mills Rd | 15-1-45.111 | 42.948084 | -76.885659 | 502 |
| 445 | Occupied Residence | 1589 Mills Rd | 15-1-44 | 42.948379 | -76.885731 | 504 |
| 449 | Occupied Residence | 1561 Mills Rd | 15-1-03.12 | 42.949852 | -76.886041 | 502 |
| 511 | Commercial | 885 Rt 96 | 15-1-22 | 42.92564 | -76.906664 | 514 |
| 513 | Occupied Residence | 2038 Whiskey Hill Rd | 18-1-04.2 | 42.924655 | -76.906811 | 511 |
| 514 | Occupied Residence | 2038 Whiskey Hill Rd | 18-1-05.111 | 42.924449 | -76.905773 | 509 |
| 524 | Commercial | 1914 Nine Foot Rd | 15-1-23 | 42.927023 | -76.915431 | 496 |
| 619 | Uninhabitable Structure | 1649 Lester Rd | 17-1-08.2 | 42.924452 | -76.936058 | 490 |
| 622 | Occupied Residence | 2031 Bonnell Rd | 17-1-08.4 | 42.927054 | -76.93596 | 511 |
| 623 | Occupied Residence | 2032 Bonnell Rd | 17-1-07.2 | 42.927018 | -76.936824 | 512 |

| Receptor ID | Receptor Type | Street Address | Print Key | Latitude | Longitude | Elevation (feet) |
|---|---|---|---|---|---|---|
| 624 | Occupied Residence | 16 North Newark St | 14-1-27.2 | 42.930548 | -76.935657 | 525 |
| 628 | Occupied Residence | 2078 Edwards Rd | 17-1-09.13 | 42.925407 | -76.926609 | 516 |
| 629 | Occupied Residence | 542 Rt 96 | 17-1-09.10 | 42.927549 | -76.930398 | 536 |
| 630 | Occupied Residence | 292 Mason St | 17-1-09.9 | 42.927873 | -76.92967 | 529 |
| 631 | Occupied Residence | 292 Mason St | 17-1-09.9 | 42.927438 | -76.929695 | 538 |
| 633 | Occupied Residence | 580 Rt 96 | 17-1-09.71 | 42.927611 | -76.927502 | 541 |
| 634 | Occupied Residence | PO Box 458 | 17-1-09.72 | 42.927758 | -76.926971 | 539 |
| 650 | Occupied Residence | 1965 Nine Foot Rd | 15-1-27.12 | 42.930458 | -76.922556 | 508 |
| 653 | Occupied Residence | 1937 Nine Foot Rd | 15-1-27.21 | 42.931987 | -76.922299 | 511 |
| 658 | Occupied Residence | 1914 Nine Foot Rd | 14-1-24 | 42.933129 | -76.92371 | 522 |
| 659 | Occupied Residence | 1850 Nine Foot Rd | 14-1-23.2 | 42.936297 | -76.924181 | 520 |
| 661 | Occupied Residence | 1849 Nine Foot Rd | 15-1-47 | 42.936197 | -76.922895 | 504 |
| 662 | Occupied Residence | 1831 Nine Foot Rd | 15-1-30.22 | 42.937184 | -76.923201 | 504 |
| 663 | Occupied Residence | 1831 Nine Foot Rd | 15-1-30.21 | 42.93754 | -76.923242 | 503 |
| 667 | Occupied Residence | 1821 Nine Foot Rd | 15-1-30.111 | 42.938245 | -76.923338 | 496 |
| 670 | Occupied Residence | 11031 Calumet Dr | 15-1-30.121 | 42.938743 | -76.921364 | 498 |
| 671 | Occupied Residence | 684 Dunham Rd | 15-1-30.122 | 42.938849 | -76.91938 | 492 |
| 675 | Commercial | 1721 Nine Foot Rd | 15-1-03.2 | 42.941634 | -76.922158 | 510 |
| 676 | Occupied Residence | 1721 Nine Foot Rd | 15-1-02 | 42.942621 | -76.922764 | 516 |
| 730 | Commercial | 374 Rt 96 | 14-1-62 | 42.932108 | -76.942322 | 506 |
| 731 | Occupied Residence | 374 Rt 96 | 14-1-62 | 42.931752 | -76.941635 | 509 |
| 785 | Historic | Dunham Rd | 15-1-31.2 | 42.93923 | -76.90351 | 521 |
| 796 | Utility | 1633 Mills Rd | 15-1-46 | 42.944982 | -76.886548 | 502 |
| 801 | Commercial | 2042 Daboll Rd | 15-1-07.212 | 42.935844 | -76.901019 | 512 |
| 825 | Commercial | 863 Smith Rd | 14-1-27.1 | 42.953557 | -76.896621 | 501 |
| 838 | Uninhabitable Structure | 1184 Rt 96 | 18-1-14.21 | 42.920927 | -76.885366 | 487 |
| 842 | Commercial | 863 Smith Rd | 14-1-27.1 | 42.953854 | -76.896951 | 500 |
| 848 | Occupied Residence | 710 Whiskey Hill Rd | 15-1-31.112 | 42.939004 | -76.905611 | 506 |

# Appendix B

ForgeSolar Glare Analysis

# FORGESOLAR GLARE ANALYSIS

Project: **North Seneca Solar**
Site configuration: **North Seneca Glare Analysis R1**

**Created** 21 Oct, 2024
**Updated** 21 Oct, 2024
**Time-step** 1 minute
**Timezone offset** UTC-5
**Minimum sun altitude** 0.0 deg
**DNI** peaks at 1,000.0 W/m$^2$
**Category** 100 MW to 1 GW
**Site ID** 131898.18888

**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 No glare predicted

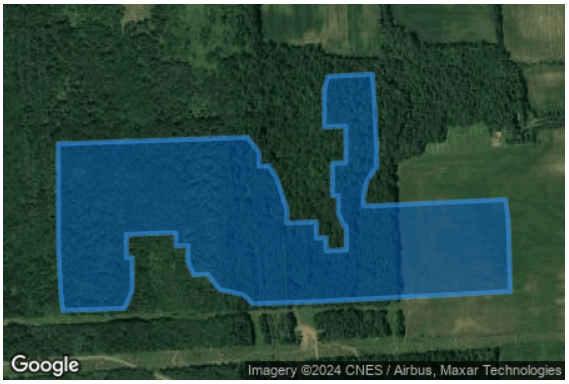
| PV Array | Tilt | Orient | Annual Green Glare | | Annual Yellow Glare | | Energy |
|---|---|---|---|---|---|---|---|
| | ° | ° | min | hr | min | hr | kWh |
| 1 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 10 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 11 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 12 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 2 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 4 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 5 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 6 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 7 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 8 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 9 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |

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

| Receptor | Annual Green Glare | | Annual Yellow Glare | |
|---|---|---|---|---|
| | min | hr | min | hr |
| Route 1 | 0 | 0.0 | 0 | 0.0 |
| Route 2 | 0 | 0.0 | 0 | 0.0 |
| Route 3 | 0 | 0.0 | 0 | 0.0 |
| Route 4 | 0 | 0.0 | 0 | 0.0 |
| Route 5 | 0 | 0.0 | 0 | 0.0 |
| Route 6 | 0 | 0.0 | 0 | 0.0 |
| OP 145 | 0 | 0.0 | 0 | 0.0 |
| OP 236 | 0 | 0.0 | 0 | 0.0 |
| OP 237 | 0 | 0.0 | 0 | 0.0 |
| OP 238 | 0 | 0.0 | 0 | 0.0 |
| OP 240 | 0 | 0.0 | 0 | 0.0 |
| OP 243 | 0 | 0.0 | 0 | 0.0 |
| OP 244 | 0 | 0.0 | 0 | 0.0 |
| OP 251 | 0 | 0.0 | 0 | 0.0 |
| OP 258 | 0 | 0.0 | 0 | 0.0 |
| OP 263 | 0 | 0.0 | 0 | 0.0 |
| OP 264 | 0 | 0.0 | 0 | 0.0 |
| OP 268 | 0 | 0.0 | 0 | 0.0 |
| OP 269 | 0 | 0.0 | 0 | 0.0 |
| OP 286 | 0 | 0.0 | 0 | 0.0 |
| OP 287 | 0 | 0.0 | 0 | 0.0 |
| OP 293 | 0 | 0.0 | 0 | 0.0 |
| OP 294 | 0 | 0.0 | 0 | 0.0 |
| OP 296 | 0 | 0.0 | 0 | 0.0 |
| OP 297 | 0 | 0.0 | 0 | 0.0 |
| OP 300 | 0 | 0.0 | 0 | 0.0 |
| OP 301 | 0 | 0.0 | 0 | 0.0 |
| OP 337 | 0 | 0.0 | 0 | 0.0 |
| OP 338 | 0 | 0.0 | 0 | 0.0 |
| OP 343 | 0 | 0.0 | 0 | 0.0 |
| OP 344 | 0 | 0.0 | 0 | 0.0 |
| OP 346 | 0 | 0.0 | 0 | 0.0 |
| OP 347 | 0 | 0.0 | 0 | 0.0 |
| OP 348 | 0 | 0.0 | 0 | 0.0 |
| OP 358 | 0 | 0.0 | 0 | 0.0 |
| OP 619 | 0 | 0.0 | 0 | 0.0 |
| OP 622 | 0 | 0.0 | 0 | 0.0 |
| OP 623 | 0 | 0.0 | 0 | 0.0 |
| OP 624 | 0 | 0.0 | 0 | 0.0 |
| OP 629 | 0 | 0.0 | 0 | 0.0 |
| OP 630 | 0 | 0.0 | 0 | 0.0 |
| OP 631 | 0 | 0.0 | 0 | 0.0 |
| OP 650 | 0 | 0.0 | 0 | 0.0 |

| Receptor | Annual Green Glare | | Annual Yellow Glare | |
|---|---|---|---|---|
| | min | hr | min | hr |
| OP 653 | 0 | 0.0 | 0 | 0.0 |
| OP 658 | 0 | 0.0 | 0 | 0.0 |
| OP 801 | 0 | 0.0 | 0 | 0.0 |

**Name**: 1
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |
| 2 | 42.945812 | -76.928368 | 514.10 | 12.00 | 526.10 |
| 3 | 42.944016 | -76.928297 | 521.50 | 12.00 | 533.50 |
| 4 | 42.943902 | -76.931272 | 512.40 | 12.00 | 524.40 |
| 5 | 42.943764 | -76.934962 | 532.80 | 12.00 | 544.80 |
| 6 | 42.943709 | -76.937153 | 521.90 | 12.00 | 533.90 |
| 7 | 42.943931 | -76.937457 | 519.10 | 12.00 | 531.10 |
| 8 | 42.944070 | -76.938299 | 508.50 | 12.00 | 520.50 |
| 9 | 42.944452 | -76.938703 | 512.20 | 12.00 | 524.20 |
| 10 | 42.944441 | -76.939180 | 511.00 | 12.00 | 523.00 |
| 11 | 42.944769 | -76.939384 | 508.30 | 12.00 | 520.30 |
| 12 | 42.945170 | -76.939386 | 509.20 | 12.00 | 521.20 |
| 13 | 42.945159 | -76.939790 | 508.20 | 12.00 | 520.20 |
| 14 | 42.945491 | -76.939792 | 509.40 | 12.00 | 521.40 |
| 15 | 42.945448 | -76.941495 | 507.40 | 12.00 | 519.40 |
| 16 | 42.944860 | -76.941492 | 519.60 | 12.00 | 531.60 |
| 17 | 42.944864 | -76.941290 | 516.40 | 12.00 | 528.40 |
| 18 | 42.944053 | -76.941285 | 516.70 | 12.00 | 528.70 |
| 19 | 42.943595 | -76.941552 | 517.30 | 12.00 | 529.30 |
| 20 | 42.943541 | -76.943679 | 534.40 | 12.00 | 546.40 |
| 21 | 42.943991 | -76.943749 | 545.20 | 12.00 | 557.20 |
| 22 | 42.945056 | -76.943823 | 548.70 | 12.00 | 560.70 |
| 23 | 42.947719 | -76.943838 | 531.40 | 12.00 | 543.40 |
| 24 | 42.947885 | -76.937334 | 507.40 | 12.00 | 519.40 |
| 25 | 42.947493 | -76.936928 | 504.80 | 12.00 | 516.80 |
| 26 | 42.947162 | -76.936927 | 506.10 | 12.00 | 518.10 |
| 27 | 42.947169 | -76.936590 | 506.30 | 12.00 | 518.30 |
| 28 | 42.946843 | -76.936320 | 504.50 | 12.00 | 516.50 |
| 29 | 42.946397 | -76.936115 | 501.80 | 12.00 | 513.80 |
| 30 | 42.946067 | -76.935979 | 506.80 | 12.00 | 518.80 |
| 31 | 42.945736 | -76.935977 | 512.70 | 12.00 | 524.70 |
| 32 | 42.945761 | -76.934969 | 509.10 | 12.00 | 521.10 |
| 33 | 42.945359 | -76.934967 | 513.40 | 12.00 | 525.40 |
| 34 | 42.945368 | -76.934630 | 510.90 | 12.00 | 522.90 |
| 35 | 42.945038 | -76.934629 | 513.50 | 12.00 | 525.50 |
| 36 | 42.945062 | -76.933933 | 513.50 | 12.00 | 525.50 |
| 37 | 42.945652 | -76.933937 | 513.10 | 12.00 | 525.10 |
| 38 | 42.945650 | -76.934004 | 512.10 | 12.00 | 524.10 |
| 39 | 42.945976 | -76.934207 | 510.50 | 12.00 | 522.50 |
| 40 | 42.946427 | -76.934210 | 511.90 | 12.00 | 523.90 |
| 41 | 42.946419 | -76.934412 | 510.50 | 12.00 | 522.50 |
| 42 | 42.947230 | -76.934416 | 502.30 | 12.00 | 514.30 |
| 43 | 42.947247 | -76.933946 | 503.90 | 12.00 | 515.90 |
| 44 | 42.948168 | -76.933951 | 503.20 | 12.00 | 515.20 |
| 45 | 42.948142 | -76.934690 | 501.40 | 12.00 | 513.40 |
| 46 | 42.949072 | -76.934696 | 502.50 | 12.00 | 514.50 |
| 47 | 42.949410 | -76.934563 | 502.70 | 12.00 | 514.70 |
| 48 | 42.949467 | -76.933033 | 501.20 | 12.00 | 513.20 |
| 49 | 42.948685 | -76.932962 | 506.10 | 12.00 | 518.10 |
| 50 | 42.947621 | -76.932888 | 504.70 | 12.00 | 516.70 |
| 51 | 42.947142 | -76.932886 | 507.60 | 12.00 | 519.60 |
| 52 | 42.946797 | -76.933220 | 507.70 | 12.00 | 519.70 |
| 53 | 42.946421 | -76.933340 | 514.20 | 12.00 | 526.20 |
| 54 | 42.946155 | -76.933339 | 512.70 | 12.00 | 524.70 |
| 55 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |

**Name**: 10
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |
| 2 | 42.937279 | -76.898155 | 490.20 | 12.00 | 502.20 |
| 3 | 42.936468 | -76.898151 | 489.80 | 12.00 | 501.80 |
| 4 | 42.936411 | -76.899337 | 493.10 | 12.00 | 505.10 |
| 5 | 42.937141 | -76.899408 | 493.30 | 12.00 | 505.30 |
| 6 | 42.937475 | -76.899477 | 493.10 | 12.00 | 505.10 |
| 7 | 42.937802 | -76.899479 | 493.50 | 12.00 | 505.50 |
| 8 | 42.937747 | -76.900621 | 500.70 | 12.00 | 512.70 |
| 9 | 42.938119 | -76.900691 | 504.40 | 12.00 | 516.40 |
| 10 | 42.938769 | -76.900694 | 502.30 | 12.00 | 514.30 |
| 11 | 42.939340 | -76.900697 | 498.70 | 12.00 | 510.70 |
| 12 | 42.940078 | -76.900633 | 496.70 | 12.00 | 508.70 |
| 13 | 42.940149 | -76.899178 | 493.10 | 12.00 | 505.10 |
| 14 | 42.939418 | -76.899107 | 492.30 | 12.00 | 504.30 |
| 15 | 42.939085 | -76.899038 | 491.50 | 12.00 | 503.50 |
| 16 | 42.938343 | -76.898968 | 491.50 | 12.00 | 503.50 |
| 17 | 42.938244 | -76.898960 | 491.40 | 12.00 | 503.40 |
| 18 | 42.937979 | -76.898831 | 491.00 | 12.00 | 503.00 |
| 19 | 42.937648 | -76.898829 | 490.80 | 12.00 | 502.80 |
| 20 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |

**Name**: 11
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |
| 2 | 42.940257 | -76.896370 | 496.70 | 12.00 | 508.70 |
| 3 | 42.940363 | -76.893549 | 494.80 | 12.00 | 506.80 |
| 4 | 42.940431 | -76.891754 | 492.20 | 12.00 | 504.20 |
| 5 | 42.939619 | -76.891750 | 488.10 | 12.00 | 500.10 |
| 6 | 42.939614 | -76.891884 | 488.30 | 12.00 | 500.30 |
| 7 | 42.939026 | -76.891882 | 488.30 | 12.00 | 500.30 |
| 8 | 42.939033 | -76.891680 | 489.40 | 12.00 | 501.40 |
| 9 | 42.938103 | -76.891675 | 488.70 | 12.00 | 500.70 |
| 10 | 42.938087 | -76.892146 | 490.30 | 12.00 | 502.30 |
| 11 | 42.937752 | -76.892144 | 490.70 | 12.00 | 502.70 |
| 12 | 42.937724 | -76.892951 | 496.60 | 12.00 | 508.60 |
| 13 | 42.936654 | -76.892945 | 491.40 | 12.00 | 503.40 |
| 14 | 42.936647 | -76.893214 | 493.90 | 12.00 | 505.90 |
| 15 | 42.936312 | -76.893212 | 492.40 | 12.00 | 504.40 |
| 16 | 42.935855 | -76.893344 | 494.70 | 12.00 | 506.70 |
| 17 | 42.935819 | -76.894330 | 504.80 | 12.00 | 516.80 |
| 18 | 42.936271 | -76.894332 | 509.70 | 12.00 | 521.70 |
| 19 | 42.936256 | -76.894735 | 503.40 | 12.00 | 515.40 |
| 20 | 42.936587 | -76.894737 | 510.90 | 12.00 | 522.90 |
| 21 | 42.936530 | -76.896282 | 490.40 | 12.00 | 502.40 |
| 22 | 42.936862 | -76.896284 | 491.60 | 12.00 | 503.60 |
| 23 | 42.936848 | -76.896687 | 490.30 | 12.00 | 502.30 |
| 24 | 42.937249 | -76.896689 | 491.90 | 12.00 | 503.90 |
| 25 | 42.937226 | -76.897294 | 490.60 | 12.00 | 502.60 |
| 26 | 42.937559 | -76.897363 | 490.80 | 12.00 | 502.80 |
| 27 | 42.938318 | -76.897367 | 491.00 | 12.00 | 503.00 |
| 28 | 42.938313 | -76.897501 | 490.70 | 12.00 | 502.70 |
| 29 | 42.938668 | -76.897503 | 490.90 | 12.00 | 502.90 |
| 30 | 42.938644 | -76.898175 | 490.70 | 12.00 | 502.70 |
| 31 | 42.939376 | -76.898246 | 491.30 | 12.00 | 503.30 |
| 32 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |

**Name**: 12
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |
| 2 | 42.923228 | -76.891904 | 490.00 | 12.00 | 502.00 |
| 3 | 42.925411 | -76.891982 | 506.60 | 12.00 | 518.60 |
| 4 | 42.926478 | -76.891988 | 513.30 | 12.00 | 525.30 |
| 5 | 42.926441 | -76.894968 | 524.90 | 12.00 | 536.90 |
| 6 | 42.925402 | -76.894895 | 520.60 | 12.00 | 532.60 |
| 7 | 42.924258 | -76.894890 | 507.60 | 12.00 | 519.60 |
| 8 | 42.923856 | -76.894955 | 503.30 | 12.00 | 515.30 |
| 9 | 42.923850 | -76.895469 | 504.20 | 12.00 | 516.20 |
| 10 | 42.924251 | -76.895471 | 510.30 | 12.00 | 522.30 |
| 11 | 42.924249 | -76.895759 | 508.70 | 12.00 | 520.70 |
| 12 | 42.924580 | -76.895883 | 512.70 | 12.00 | 524.70 |
| 13 | 42.925363 | -76.895887 | 520.10 | 12.00 | 532.10 |
| 14 | 42.925360 | -76.896089 | 520.40 | 12.00 | 532.40 |
| 15 | 42.925693 | -76.896157 | 523.00 | 12.00 | 535.00 |
| 16 | 42.927543 | -76.896234 | 513.80 | 12.00 | 525.80 |
| 17 | 42.929817 | -76.896246 | 489.40 | 12.00 | 501.40 |
| 18 | 42.929829 | -76.895292 | 488.90 | 12.00 | 500.90 |
| 19 | 42.930217 | -76.895301 | 487.80 | 12.00 | 499.80 |
| 20 | 42.930553 | -76.895033 | 488.20 | 12.00 | 500.20 |
| 21 | 42.930560 | -76.894361 | 491.50 | 12.00 | 503.50 |
| 22 | 42.930894 | -76.894362 | 490.50 | 12.00 | 502.50 |
| 23 | 42.930920 | -76.892235 | 487.20 | 12.00 | 499.20 |
| 24 | 42.930590 | -76.891897 | 488.60 | 12.00 | 500.60 |
| 25 | 42.929808 | -76.891826 | 495.00 | 12.00 | 507.00 |
| 26 | 42.928741 | -76.891753 | 503.10 | 12.00 | 515.10 |
| 27 | 42.927626 | -76.891680 | 512.30 | 12.00 | 524.30 |
| 28 | 42.926559 | -76.891608 | 512.30 | 12.00 | 524.30 |
| 29 | 42.925443 | -76.891535 | 506.70 | 12.00 | 518.70 |
| 30 | 42.924377 | -76.891463 | 495.30 | 12.00 | 507.30 |
| 31 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |

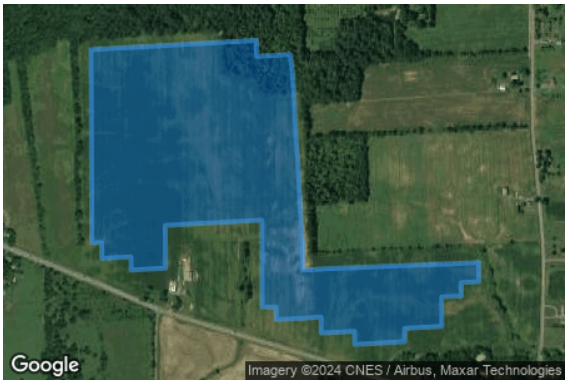
**Name**: 2
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |
| 2 | 42.940940 | -76.932584 | 543.70 | 12.00 | 555.70 |
| 3 | 42.940936 | -76.932853 | 542.20 | 12.00 | 554.20 |
| 4 | 42.940602 | -76.932851 | 540.00 | 12.00 | 552.00 |
| 5 | 42.940584 | -76.933776 | 529.30 | 12.00 | 541.30 |
| 6 | 42.940572 | -76.934760 | 513.90 | 12.00 | 525.90 |
| 7 | 42.940894 | -76.934761 | 517.80 | 12.00 | 529.80 |
| 8 | 42.940893 | -76.935048 | 515.60 | 12.00 | 527.60 |
| 9 | 42.941224 | -76.935050 | 517.80 | 12.00 | 529.80 |
| 10 | 42.941212 | -76.935655 | 513.60 | 12.00 | 525.60 |
| 11 | 42.941691 | -76.935657 | 520.50 | 12.00 | 532.50 |
| 12 | 42.941724 | -76.933981 | 531.00 | 12.00 | 543.00 |
| 13 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |

**Name**: 4
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.941198 | -76.924474 | 494.40 | 12.00 | 506.40 |
| 2 | 42.941054 | -76.924473 | 494.82 | 12.00 | 506.82 |
| 3 | 42.940290 | -76.924542 | 496.43 | 12.00 | 508.43 |
| 4 | 42.940194 | -76.926220 | 498.43 | 12.00 | 510.43 |
| 5 | 42.940073 | -76.928315 | 505.90 | 12.00 | 517.90 |
| 6 | 42.939998 | -76.929626 | 515.19 | 12.00 | 527.19 |
| 7 | 42.940809 | -76.929631 | 514.58 | 12.00 | 526.58 |
| 8 | 42.940878 | -76.928441 | 510.53 | 12.00 | 522.53 |
| 9 | 42.942142 | -76.928448 | 515.71 | 12.00 | 527.71 |
| 10 | 42.942304 | -76.925648 | 497.89 | 12.00 | 509.89 |
| 11 | 42.941983 | -76.925445 | 497.76 | 12.00 | 509.76 |
| 12 | 42.941225 | -76.925441 | 497.07 | 12.00 | 509.07 |
| 13 | 42.941281 | -76.924483 | 494.34 | 12.00 | 506.34 |

**Name**: 5
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |
| 2 | 42.931203 | -76.926081 | 519.20 | 12.00 | 531.20 |
| 3 | 42.930867 | -76.926079 | 517.90 | 12.00 | 529.90 |
| 4 | 42.930842 | -76.926751 | 527.40 | 12.00 | 539.40 |
| 5 | 42.930105 | -76.926747 | 529.40 | 12.00 | 541.40 |
| 6 | 42.930055 | -76.928024 | 544.70 | 12.00 | 556.70 |
| 7 | 42.929720 | -76.928022 | 544.60 | 12.00 | 556.60 |
| 8 | 42.929650 | -76.929746 | 522.10 | 12.00 | 534.10 |
| 9 | 42.929981 | -76.929748 | 523.80 | 12.00 | 535.80 |
| 10 | 42.929935 | -76.930891 | 516.80 | 12.00 | 528.80 |
| 11 | 42.930337 | -76.930893 | 522.60 | 12.00 | 534.60 |
| 12 | 42.930273 | -76.932438 | 511.90 | 12.00 | 523.90 |
| 13 | 42.930587 | -76.932440 | 513.80 | 12.00 | 525.80 |
| 14 | 42.930586 | -76.932917 | 514.90 | 12.00 | 526.90 |
| 15 | 42.932769 | -76.932930 | 520.10 | 12.00 | 532.10 |
| 16 | 42.932635 | -76.936246 | 530.20 | 12.00 | 542.20 |
| 17 | 42.931565 | -76.936239 | 526.40 | 12.00 | 538.40 |
| 18 | 42.931517 | -76.937426 | 509.80 | 12.00 | 521.80 |
| 19 | 42.931848 | -76.937428 | 514.20 | 12.00 | 526.20 |
| 20 | 42.931808 | -76.938436 | 502.10 | 12.00 | 514.10 |
| 21 | 42.932209 | -76.938438 | 501.90 | 12.00 | 513.90 |
| 22 | 42.932195 | -76.938774 | 499.60 | 12.00 | 511.60 |
| 23 | 42.934127 | -76.938785 | 508.40 | 12.00 | 520.40 |
| 24 | 42.935498 | -76.938793 | 510.20 | 12.00 | 522.20 |
| 25 | 42.937043 | -76.938802 | 505.60 | 12.00 | 517.60 |
| 26 | 42.937278 | -76.933113 | 523.00 | 12.00 | 535.00 |
| 27 | 42.936877 | -76.933110 | 525.20 | 12.00 | 537.20 |
| 28 | 42.936924 | -76.931961 | 525.80 | 12.00 | 537.80 |
| 29 | 42.936591 | -76.931892 | 523.80 | 12.00 | 535.80 |
| 30 | 42.935812 | -76.931820 | 526.50 | 12.00 | 538.50 |
| 31 | 42.934748 | -76.931747 | 524.30 | 12.00 | 536.30 |
| 32 | 42.934082 | -76.931676 | 522.30 | 12.00 | 534.30 |
| 33 | 42.932967 | -76.931603 | 527.70 | 12.00 | 539.70 |
| 34 | 42.932236 | -76.931531 | 529.80 | 12.00 | 541.80 |
| 35 | 42.931517 | -76.931527 | 530.00 | 12.00 | 542.00 |
| 36 | 42.931554 | -76.930621 | 537.40 | 12.00 | 549.40 |
| 37 | 42.931704 | -76.925479 | 515.00 | 12.00 | 527.00 |
| 38 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |

**Name**: 6
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |
| 2 | 42.930725 | -76.924167 | 516.80 | 12.00 | 528.80 |
| 3 | 42.930715 | -76.924480 | 514.50 | 12.00 | 526.50 |
| 4 | 42.931048 | -76.924549 | 515.40 | 12.00 | 527.40 |
| 5 | 42.931377 | -76.924550 | 514.60 | 12.00 | 526.60 |
| 6 | 42.931371 | -76.924752 | 513.30 | 12.00 | 525.30 |
| 7 | 42.931849 | -76.924755 | 518.00 | 12.00 | 530.00 |
| 8 | 42.931862 | -76.924375 | 520.70 | 12.00 | 532.70 |
| 9 | 42.931940 | -76.924375 | 522.60 | 12.00 | 534.60 |
| 10 | 42.931941 | -76.924009 | 525.00 | 12.00 | 537.00 |
| 11 | 42.931672 | -76.924008 | 519.80 | 12.00 | 531.80 |
| 12 | 42.931672 | -76.924105 | 519.40 | 12.00 | 531.40 |
| 13 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |

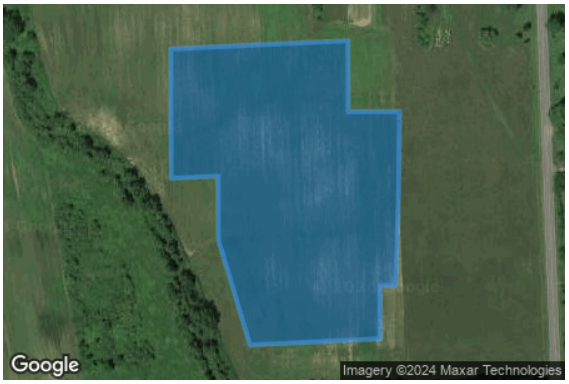
**Name**: 7
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |
| 2 | 42.928905 | -76.932392 | 511.00 | 12.00 | 523.00 |
| 3 | 42.928572 | -76.932390 | 514.00 | 12.00 | 526.00 |
| 4 | 42.928584 | -76.931651 | 513.60 | 12.00 | 525.60 |
| 5 | 42.927135 | -76.931642 | 525.70 | 12.00 | 537.70 |
| 6 | 42.927136 | -76.931508 | 524.80 | 12.00 | 536.80 |
| 7 | 42.926742 | -76.931102 | 518.00 | 12.00 | 530.00 |
| 8 | 42.926077 | -76.931032 | 506.00 | 12.00 | 518.00 |
| 9 | 42.925599 | -76.931029 | 497.70 | 12.00 | 509.70 |
| 10 | 42.925587 | -76.931768 | 496.40 | 12.00 | 508.40 |
| 11 | 42.925136 | -76.931765 | 491.50 | 12.00 | 503.50 |
| 12 | 42.925122 | -76.932639 | 491.80 | 12.00 | 503.80 |
| 13 | 42.924788 | -76.932637 | 489.40 | 12.00 | 501.40 |
| 14 | 42.924785 | -76.932906 | 489.50 | 12.00 | 501.50 |
| 15 | 42.924451 | -76.932904 | 488.60 | 12.00 | 500.60 |
| 16 | 42.924445 | -76.933284 | 487.70 | 12.00 | 499.70 |
| 17 | 42.924777 | -76.933286 | 488.40 | 12.00 | 500.40 |
| 18 | 42.924764 | -76.934116 | 488.80 | 12.00 | 500.80 |
| 19 | 42.924431 | -76.934114 | 484.30 | 12.00 | 496.30 |
| 20 | 42.924429 | -76.934248 | 484.20 | 12.00 | 496.20 |
| 21 | 42.923694 | -76.934244 | 486.40 | 12.00 | 498.40 |
| 22 | 42.923686 | -76.934758 | 482.00 | 12.00 | 494.00 |
| 23 | 42.924019 | -76.934828 | 484.10 | 12.00 | 496.10 |
| 24 | 42.924751 | -76.934832 | 484.50 | 12.00 | 496.50 |
| 25 | 42.924749 | -76.935033 | 484.70 | 12.00 | 496.70 |
| 26 | 42.925081 | -76.935035 | 488.80 | 12.00 | 500.80 |
| 27 | 42.925076 | -76.935371 | 488.10 | 12.00 | 500.10 |
| 28 | 42.926006 | -76.935377 | 500.50 | 12.00 | 512.50 |
| 29 | 42.926010 | -76.935041 | 499.50 | 12.00 | 511.50 |
| 30 | 42.926344 | -76.935042 | 504.60 | 12.00 | 516.60 |
| 31 | 42.926350 | -76.934639 | 504.50 | 12.00 | 516.50 |
| 32 | 42.927724 | -76.934647 | 513.10 | 12.00 | 525.10 |
| 33 | 42.927717 | -76.935050 | 509.20 | 12.00 | 521.20 |
| 34 | 42.928195 | -76.935053 | 504.00 | 12.00 | 516.00 |
| 35 | 42.928201 | -76.934650 | 506.30 | 12.00 | 518.30 |
| 36 | 42.928535 | -76.934652 | 505.10 | 12.00 | 517.10 |
| 37 | 42.928548 | -76.933778 | 513.70 | 12.00 | 525.70 |
| 38 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |

**Name**: 8
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |
| 2 | 42.935449 | -76.907085 | 505.70 | 12.00 | 517.70 |
| 3 | 42.935780 | -76.907154 | 505.10 | 12.00 | 517.10 |
| 4 | 42.936173 | -76.907291 | 505.00 | 12.00 | 517.00 |
| 5 | 42.936985 | -76.907295 | 504.10 | 12.00 | 516.10 |
| 6 | 42.937013 | -76.906511 | 504.60 | 12.00 | 516.60 |
| 7 | 42.936681 | -76.906443 | 505.90 | 12.00 | 517.90 |
| 8 | 42.936281 | -76.906440 | 508.90 | 12.00 | 520.90 |
| 9 | 42.936302 | -76.905903 | 509.00 | 12.00 | 521.00 |
| 10 | 42.935970 | -76.905901 | 507.60 | 12.00 | 519.60 |
| 11 | 42.935989 | -76.905363 | 505.40 | 12.00 | 517.40 |
| 12 | 42.935657 | -76.905362 | 511.40 | 12.00 | 523.40 |
| 13 | 42.935666 | -76.905093 | 506.30 | 12.00 | 518.30 |
| 14 | 42.935386 | -76.904994 | 506.10 | 12.00 | 518.10 |
| 15 | 42.935128 | -76.904993 | 507.40 | 12.00 | 519.40 |
| 16 | 42.935122 | -76.906029 | 509.40 | 12.00 | 521.40 |
| 17 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |

**Name**: 9
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |
| 2 | 42.936207 | -76.902792 | 509.20 | 12.00 | 521.20 |
| 3 | 42.935643 | -76.902816 | 509.70 | 12.00 | 521.70 |
| 4 | 42.935641 | -76.902950 | 509.40 | 12.00 | 521.40 |
| 5 | 42.935307 | -76.902949 | 509.70 | 12.00 | 521.70 |
| 6 | 42.935269 | -76.904068 | 506.70 | 12.00 | 518.70 |
| 7 | 42.935598 | -76.904204 | 505.90 | 12.00 | 517.90 |
| 8 | 42.935926 | -76.904340 | 504.00 | 12.00 | 516.00 |
| 9 | 42.936327 | -76.904343 | 506.20 | 12.00 | 518.20 |
| 10 | 42.936313 | -76.904746 | 506.00 | 12.00 | 518.00 |
| 11 | 42.937124 | -76.904750 | 508.20 | 12.00 | 520.20 |
| 12 | 42.937176 | -76.903227 | 513.10 | 12.00 | 525.10 |
| 13 | 42.936731 | -76.903225 | 510.90 | 12.00 | 522.90 |
| 14 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |

## Route Receptors

**Name**: Route 1
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.933610 | -76.946237 | 507.50 | 5.40 | 512.90 |
| 2 | 42.932766 | -76.943518 | 508.60 | 5.40 | 514.00 |
| 3 | 42.932186 | -76.941814 | 503.20 | 5.40 | 508.60 |
| 4 | 42.931607 | -76.940111 | 496.70 | 5.40 | 502.10 |
| 5 | 42.930986 | -76.937933 | 506.40 | 5.40 | 511.80 |
| 6 | 42.930444 | -76.936184 | 515.60 | 5.40 | 521.00 |
| 7 | 42.929792 | -76.933288 | 506.50 | 5.40 | 511.90 |
| 8 | 42.929156 | -76.930380 | 515.10 | 5.40 | 520.50 |
| 9 | 42.928598 | -76.927966 | 533.30 | 5.40 | 538.70 |
| 10 | 42.928017 | -76.924640 | 526.30 | 5.40 | 531.70 |
| 11 | 42.927781 | -76.923245 | 521.30 | 5.40 | 526.70 |
| 12 | 42.927436 | -76.919276 | 504.40 | 5.40 | 509.80 |
| 13 | 42.927059 | -76.917645 | 501.60 | 5.40 | 507.00 |
| 14 | 42.926304 | -76.915220 | 500.50 | 5.40 | 505.90 |
| 15 | 42.925362 | -76.911122 | 492.50 | 5.40 | 497.90 |
| 16 | 42.925079 | -76.908247 | 500.60 | 5.40 | 506.00 |
| 17 | 42.924796 | -76.905371 | 510.20 | 5.40 | 515.60 |
| 18 | 42.924466 | -76.902431 | 507.60 | 5.40 | 513.00 |
| 19 | 42.923916 | -76.899309 | 506.60 | 5.40 | 512.00 |
| 20 | 42.923303 | -76.896101 | 502.30 | 5.40 | 507.70 |
| 21 | 42.922518 | -76.892046 | 484.80 | 5.40 | 490.20 |
| 22 | 42.921899 | -76.888574 | 488.00 | 5.40 | 493.40 |
| 23 | 42.921522 | -76.886729 | 488.60 | 5.40 | 494.00 |
| 24 | 42.921129 | -76.885077 | 486.40 | 5.40 | 491.80 |

**Name**: Route 2
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.942053 | -76.950011 | 508.80 | 5.40 | 514.20 |
| 2 | 42.942179 | -76.945441 | 545.00 | 5.40 | 550.40 |
| 3 | 42.942367 | -76.942501 | 527.90 | 5.40 | 533.30 |
| 4 | 42.942226 | -76.941600 | 519.70 | 5.40 | 525.10 |
| 5 | 42.941456 | -76.938939 | 506.30 | 5.40 | 511.70 |
| 6 | 42.940781 | -76.936364 | 509.30 | 5.40 | 514.70 |
| 7 | 42.939791 | -76.934412 | 519.50 | 5.40 | 524.90 |
| 8 | 42.938801 | -76.932159 | 524.20 | 5.40 | 529.60 |
| 9 | 42.938550 | -76.931408 | 525.40 | 5.40 | 530.80 |
| 10 | 42.938613 | -76.929176 | 513.60 | 5.40 | 519.00 |
| 11 | 42.938801 | -76.925099 | 498.10 | 5.40 | 503.50 |
| 12 | 42.938896 | -76.923533 | 492.20 | 5.40 | 497.60 |
| 13 | 42.939336 | -76.916623 | 494.20 | 5.40 | 499.60 |
| 14 | 42.939477 | -76.912418 | 489.70 | 5.40 | 495.10 |
| 15 | 42.939398 | -76.907053 | 498.70 | 5.40 | 504.10 |
| 16 | 42.939493 | -76.904028 | 515.70 | 5.40 | 521.10 |
| 17 | 42.939603 | -76.901689 | 509.30 | 5.40 | 514.70 |

**Name**: Route 3
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.919689 | -76.935418 | 480.00 | 5.40 | 485.40 |
| 2 | 42.922250 | -76.935869 | 495.00 | 5.40 | 500.40 |
| 3 | 42.924324 | -76.936148 | 488.80 | 5.40 | 494.20 |
| 4 | 42.925927 | -76.936384 | 496.90 | 5.40 | 502.30 |
| 5 | 42.928676 | -76.936555 | 502.20 | 5.40 | 507.60 |
| 6 | 42.929792 | -76.936555 | 514.30 | 5.40 | 519.70 |
| 7 | 42.930216 | -76.936512 | 515.90 | 5.40 | 521.30 |
| 8 | 42.930515 | -76.936427 | 515.60 | 5.40 | 521.00 |

**Name**: Route 4
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.927844 | -76.923485 | 521.90 | 5.40 | 527.30 |
| 2 | 42.929132 | -76.923378 | 522.00 | 5.40 | 527.40 |
| 3 | 42.931017 | -76.923227 | 513.90 | 5.40 | 519.30 |
| 4 | 42.932133 | -76.923249 | 518.10 | 5.40 | 523.50 |
| 5 | 42.934128 | -76.923528 | 518.20 | 5.40 | 523.60 |
| 6 | 42.935118 | -76.923635 | 513.20 | 5.40 | 518.60 |
| 7 | 42.936406 | -76.923614 | 509.20 | 5.40 | 514.60 |
| 8 | 42.937914 | -76.923614 | 501.00 | 5.40 | 506.40 |
| 9 | 42.938935 | -76.923592 | 491.70 | 5.40 | 497.10 |
| 10 | 42.940867 | -76.923528 | 493.30 | 5.40 | 498.70 |
| 11 | 42.942422 | -76.923485 | 505.30 | 5.40 | 510.70 |
| 12 | 42.944397 | -76.923464 | 529.50 | 5.40 | 534.90 |
| 13 | 42.945575 | -76.923678 | 543.40 | 5.40 | 548.80 |
| 14 | 42.948025 | -76.924150 | 500.40 | 5.40 | 505.80 |
| 15 | 42.949910 | -76.924536 | 487.30 | 5.40 | 492.70 |
| 16 | 42.951481 | -76.924794 | 490.90 | 5.40 | 496.30 |
| 17 | 42.954103 | -76.924880 | 499.50 | 5.40 | 504.90 |

**Name**: Route 5
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.948088 | -76.901641 | 552.50 | 5.40 | 557.90 |
| 2 | 42.944224 | -76.901341 | 515.00 | 5.40 | 520.40 |
| 3 | 42.941146 | -76.901598 | 498.90 | 5.40 | 504.30 |
| 4 | 42.939638 | -76.901684 | 509.00 | 5.40 | 514.40 |
| 5 | 42.937658 | -76.901620 | 512.30 | 5.40 | 517.70 |
| 6 | 42.934312 | -76.901362 | 512.70 | 5.40 | 518.10 |
| 7 | 42.932066 | -76.901298 | 513.70 | 5.40 | 519.10 |
| 8 | 42.930086 | -76.901555 | 513.80 | 5.40 | 519.20 |
| 9 | 42.927289 | -76.901984 | 521.60 | 5.40 | 527.00 |
| 10 | 42.924477 | -76.902521 | 508.00 | 5.40 | 513.40 |

**Name**: Route 6
**Path type**: Two-way
**Observer view angle**: 50.0°


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.921111 | -76.885028 | 486.70 | 5.40 | 492.10 |
| 2 | 42.922918 | -76.885157 | 493.50 | 5.40 | 498.90 |
| 3 | 42.924301 | -76.885286 | 494.30 | 5.40 | 499.70 |
| 4 | 42.925196 | -76.885393 | 494.10 | 5.40 | 499.50 |
| 5 | 42.927883 | -76.885693 | 492.10 | 5.40 | 497.50 |
| 6 | 42.930114 | -76.885908 | 495.60 | 5.40 | 501.00 |
| 7 | 42.931438 | -76.886064 | 486.50 | 5.40 | 491.90 |
| 8 | 42.933433 | -76.886364 | 500.00 | 5.40 | 505.40 |
| 9 | 42.937597 | -76.886987 | 494.40 | 5.40 | 499.80 |
| 10 | 42.940628 | -76.887223 | 489.80 | 5.40 | 495.20 |
| 11 | 42.942859 | -76.887416 | 497.60 | 5.40 | 503.00 |
| 12 | 42.945341 | -76.886879 | 499.30 | 5.40 | 504.70 |
| 13 | 42.947492 | -76.886321 | 502.30 | 5.40 | 507.70 |
| 14 | 42.949927 | -76.886515 | 498.60 | 5.40 | 504.00 |
| 15 | 42.952157 | -76.886686 | 494.80 | 5.40 | 500.20 |
| 16 | 42.954843 | -76.886858 | 503.60 | 5.40 | 509.00 |

## Discrete Observation Point Receptors

| Name | ID | Latitude (°) | Longitude (°) | Elevation (ft) | Height (ft) |
|---|---|---|---|---|---|
| OP 145 | 145 | 42.945260 | -76.922774 | 541.71 | 5.40 |
| OP 236 | 236 | 42.953783 | -76.889558 | 515.51 | 5.40 |
| OP 237 | 237 | 42.952884 | -76.889110 | 513.45 | 5.40 |
| OP 238 | 238 | 42.953579 | -76.888752 | 512.90 | 5.40 |
| OP 240 | 240 | 42.953515 | -76.889079 | 514.03 | 5.40 |
| OP 243 | 243 | 42.954670 | -76.890213 | 521.89 | 5.40 |
| OP 244 | 244 | 42.955145 | -76.889810 | 513.18 | 5.40 |
| OP 251 | 251 | 42.953921 | -76.895651 | 501.80 | 5.40 |
| OP 258 | 258 | 42.951862 | -76.903319 | 557.86 | 5.40 |
| OP 263 | 263 | 42.950316 | -76.902694 | 560.96 | 5.40 |
| OP 264 | 264 | 42.949915 | -76.902546 | 558.86 | 5.40 |
| OP 268 | 268 | 42.951400 | -76.903082 | 560.51 | 5.40 |
| OP 269 | 269 | 42.948459 | -76.902024 | 554.48 | 5.40 |
| OP 286 | 286 | 42.940645 | -76.902194 | 511.43 | 5.40 |
| OP 287 | 287 | 42.939721 | -76.901910 | 512.83 | 5.40 |
| OP 293 | 293 | 42.937986 | -76.902785 | 517.25 | 5.40 |
| OP 294 | 294 | 42.938013 | -76.901977 | 519.63 | 5.40 |
| OP 296 | 296 | 42.939228 | -76.902702 | 515.57 | 5.40 |
| OP 297 | 297 | 42.936706 | -76.901133 | 516.53 | 5.40 |
| OP 300 | 300 | 42.934890 | -76.900988 | 512.54 | 5.40 |
| OP 301 | 301 | 42.934190 | -76.901650 | 514.54 | 5.40 |
| OP 337 | 337 | 42.923782 | -76.896737 | 510.87 | 5.40 |
| OP 338 | 338 | 42.924543 | -76.897133 | 516.41 | 5.40 |
| OP 343 | 343 | 42.922850 | -76.895459 | 496.59 | 5.40 |
| OP 344 | 344 | 42.922713 | -76.894943 | 495.60 | 5.40 |
| OP 346 | 346 | 42.922542 | -76.893712 | 488.26 | 5.40 |
| OP 347 | 347 | 42.923534 | -76.893729 | 500.60 | 5.40 |
| OP 348 | 348 | 42.924263 | -76.892722 | 500.53 | 5.40 |
| OP 358 | 358 | 42.922943 | -76.890176 | 489.31 | 5.40 |
| OP 619 | 619 | 42.924452 | -76.936058 | 489.90 | 5.40 |
| OP 622 | 622 | 42.927054 | -76.935960 | 511.26 | 5.40 |
| OP 623 | 623 | 42.927018 | -76.936824 | 511.85 | 5.40 |
| OP 624 | 624 | 42.930548 | -76.935657 | 524.54 | 5.40 |
| OP 629 | 629 | 42.927549 | -76.930398 | 536.36 | 5.40 |
| OP 630 | 630 | 42.927873 | -76.929670 | 529.46 | 5.40 |
| OP 631 | 631 | 42.927438 | -76.929695 | 538.08 | 5.40 |
| OP 650 | 650 | 42.930458 | -76.922556 | 508.43 | 5.40 |
| OP 653 | 653 | 42.931987 | -76.922299 | 511.41 | 5.40 |
| OP 658 | 658 | 42.933129 | -76.923710 | 522.38 | 5.40 |
| OP 801 | 801 | 42.935844 | -76.901019 | 511.95 | 5.40 |

# FORGESOLAR GLARE ANALYSIS

Project: **North Seneca Solar**
Site configuration: **North Seneca Glare Analysis R2**

**Created** 21 Oct, 2024
**Updated** 21 Oct, 2024
**Time-step** 1 minute
**Timezone offset** UTC-5
**Minimum sun altitude** 0.0 deg
**DNI** peaks at 1,000.0 W/m$^2$
**Category** 100 MW to 1 GW
**Site ID** 131899.18888

**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

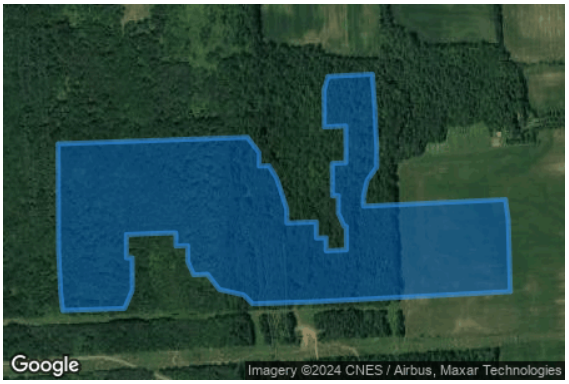
## Summary of Results No glare predicted

| PV Array | Tilt | Orient | Annual Green Glare | | Annual Yellow Glare | | Energy |
|---|---|---|---|---|---|---|---|
| | ° | ° | min | hr | min | hr | kWh |
| 1 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 10 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 11 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 12 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 2 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 4 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 5 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 6 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 7 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 8 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 9 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |

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

| Receptor | Annual Green Glare | | Annual Yellow Glare | |
|---|---|---|---|---|
| | min | hr | min | hr |
| OP 270 | 0 | 0.0 | 0 | 0.0 |
| OP 278 | 0 | 0.0 | 0 | 0.0 |
| OP 284 | 0 | 0.0 | 0 | 0.0 |
| OP 285 | 0 | 0.0 | 0 | 0.0 |
| OP 307 | 0 | 0.0 | 0 | 0.0 |
| OP 312 | 0 | 0.0 | 0 | 0.0 |
| OP 314 | 0 | 0.0 | 0 | 0.0 |
| OP 336 | 0 | 0.0 | 0 | 0.0 |
| OP 356 | 0 | 0.0 | 0 | 0.0 |
| OP 360 | 0 | 0.0 | 0 | 0.0 |
| OP 361 | 0 | 0.0 | 0 | 0.0 |
| OP 364 | 0 | 0.0 | 0 | 0.0 |
| OP 368 | 0 | 0.0 | 0 | 0.0 |
| OP 379 | 0 | 0.0 | 0 | 0.0 |
| OP 382 | 0 | 0.0 | 0 | 0.0 |
| OP 400 | 0 | 0.0 | 0 | 0.0 |
| OP 401 | 0 | 0.0 | 0 | 0.0 |
| OP 402 | 0 | 0.0 | 0 | 0.0 |
| OP 403 | 0 | 0.0 | 0 | 0.0 |
| OP 404 | 0 | 0.0 | 0 | 0.0 |
| OP 405 | 0 | 0.0 | 0 | 0.0 |
| OP 408 | 0 | 0.0 | 0 | 0.0 |
| OP 409 | 0 | 0.0 | 0 | 0.0 |
| OP 410 | 0 | 0.0 | 0 | 0.0 |
| OP 411 | 0 | 0.0 | 0 | 0.0 |
| OP 412 | 0 | 0.0 | 0 | 0.0 |
| OP 413 | 0 | 0.0 | 0 | 0.0 |
| OP 418 | 0 | 0.0 | 0 | 0.0 |
| OP 419 | 0 | 0.0 | 0 | 0.0 |
| OP 436 | 0 | 0.0 | 0 | 0.0 |
| OP 440 | 0 | 0.0 | 0 | 0.0 |
| OP 441 | 0 | 0.0 | 0 | 0.0 |
| OP 442 | 0 | 0.0 | 0 | 0.0 |
| OP 443 | 0 | 0.0 | 0 | 0.0 |
| OP 444 | 0 | 0.0 | 0 | 0.0 |
| OP 445 | 0 | 0.0 | 0 | 0.0 |
| OP 449 | 0 | 0.0 | 0 | 0.0 |
| OP 511 | 0 | 0.0 | 0 | 0.0 |
| OP 513 | 0 | 0.0 | 0 | 0.0 |
| OP 514 | 0 | 0.0 | 0 | 0.0 |

**Name**: 1
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |
| 2 | 42.945812 | -76.928368 | 514.10 | 12.00 | 526.10 |
| 3 | 42.944016 | -76.928297 | 521.50 | 12.00 | 533.50 |
| 4 | 42.943902 | -76.931272 | 512.40 | 12.00 | 524.40 |
| 5 | 42.943764 | -76.934962 | 532.80 | 12.00 | 544.80 |
| 6 | 42.943709 | -76.937153 | 521.90 | 12.00 | 533.90 |
| 7 | 42.943931 | -76.937457 | 519.10 | 12.00 | 531.10 |
| 8 | 42.944070 | -76.938299 | 508.50 | 12.00 | 520.50 |
| 9 | 42.944452 | -76.938703 | 512.20 | 12.00 | 524.20 |
| 10 | 42.944441 | -76.939180 | 511.00 | 12.00 | 523.00 |
| 11 | 42.944769 | -76.939384 | 508.30 | 12.00 | 520.30 |
| 12 | 42.945170 | -76.939386 | 509.20 | 12.00 | 521.20 |
| 13 | 42.945159 | -76.939790 | 508.20 | 12.00 | 520.20 |
| 14 | 42.945491 | -76.939792 | 509.40 | 12.00 | 521.40 |
| 15 | 42.945448 | -76.941495 | 507.40 | 12.00 | 519.40 |
| 16 | 42.944860 | -76.941492 | 519.60 | 12.00 | 531.60 |
| 17 | 42.944864 | -76.941290 | 516.40 | 12.00 | 528.40 |
| 18 | 42.944053 | -76.941285 | 516.70 | 12.00 | 528.70 |
| 19 | 42.943595 | -76.941552 | 517.30 | 12.00 | 529.30 |
| 20 | 42.943541 | -76.943679 | 534.40 | 12.00 | 546.40 |
| 21 | 42.943991 | -76.943749 | 545.20 | 12.00 | 557.20 |
| 22 | 42.945056 | -76.943823 | 548.70 | 12.00 | 560.70 |
| 23 | 42.947719 | -76.943838 | 531.40 | 12.00 | 543.40 |
| 24 | 42.947885 | -76.937334 | 507.40 | 12.00 | 519.40 |
| 25 | 42.947493 | -76.936928 | 504.80 | 12.00 | 516.80 |
| 26 | 42.947162 | -76.936927 | 506.10 | 12.00 | 518.10 |
| 27 | 42.947169 | -76.936590 | 506.30 | 12.00 | 518.30 |
| 28 | 42.946843 | -76.936320 | 504.50 | 12.00 | 516.50 |
| 29 | 42.946397 | -76.936115 | 501.80 | 12.00 | 513.80 |
| 30 | 42.946067 | -76.935979 | 506.80 | 12.00 | 518.80 |
| 31 | 42.945736 | -76.935977 | 512.70 | 12.00 | 524.70 |
| 32 | 42.945761 | -76.934969 | 509.10 | 12.00 | 521.10 |
| 33 | 42.945359 | -76.934967 | 513.40 | 12.00 | 525.40 |
| 34 | 42.945368 | -76.934630 | 510.90 | 12.00 | 522.90 |
| 35 | 42.945038 | -76.934629 | 513.50 | 12.00 | 525.50 |
| 36 | 42.945062 | -76.933933 | 513.50 | 12.00 | 525.50 |
| 37 | 42.945652 | -76.933937 | 513.10 | 12.00 | 525.10 |
| 38 | 42.945650 | -76.934004 | 512.10 | 12.00 | 524.10 |
| 39 | 42.945976 | -76.934207 | 510.50 | 12.00 | 522.50 |
| 40 | 42.946427 | -76.934210 | 511.90 | 12.00 | 523.90 |
| 41 | 42.946419 | -76.934412 | 510.50 | 12.00 | 522.50 |
| 42 | 42.947230 | -76.934416 | 502.30 | 12.00 | 514.30 |
| 43 | 42.947247 | -76.933946 | 503.90 | 12.00 | 515.90 |
| 44 | 42.948168 | -76.933951 | 503.20 | 12.00 | 515.20 |
| 45 | 42.948142 | -76.934690 | 501.40 | 12.00 | 513.40 |
| 46 | 42.949072 | -76.934696 | 502.50 | 12.00 | 514.50 |
| 47 | 42.949410 | -76.934563 | 502.70 | 12.00 | 514.70 |
| 48 | 42.949467 | -76.933033 | 501.20 | 12.00 | 513.20 |
| 49 | 42.948685 | -76.932962 | 506.10 | 12.00 | 518.10 |
| 50 | 42.947621 | -76.932888 | 504.70 | 12.00 | 516.70 |
| 51 | 42.947142 | -76.932886 | 507.60 | 12.00 | 519.60 |
| 52 | 42.946797 | -76.933220 | 507.70 | 12.00 | 519.70 |
| 53 | 42.946421 | -76.933340 | 514.20 | 12.00 | 526.20 |
| 54 | 42.946155 | -76.933339 | 512.70 | 12.00 | 524.70 |
| 55 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |

**Name**: 10
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |
| 2 | 42.937279 | -76.898155 | 490.20 | 12.00 | 502.20 |
| 3 | 42.936468 | -76.898151 | 489.80 | 12.00 | 501.80 |
| 4 | 42.936411 | -76.899337 | 493.10 | 12.00 | 505.10 |
| 5 | 42.937141 | -76.899408 | 493.30 | 12.00 | 505.30 |
| 6 | 42.937475 | -76.899477 | 493.10 | 12.00 | 505.10 |
| 7 | 42.937802 | -76.899479 | 493.50 | 12.00 | 505.50 |
| 8 | 42.937747 | -76.900621 | 500.70 | 12.00 | 512.70 |
| 9 | 42.938119 | -76.900691 | 504.40 | 12.00 | 516.40 |
| 10 | 42.938769 | -76.900694 | 502.30 | 12.00 | 514.30 |
| 11 | 42.939340 | -76.900697 | 498.70 | 12.00 | 510.70 |
| 12 | 42.940078 | -76.900633 | 496.70 | 12.00 | 508.70 |
| 13 | 42.940149 | -76.899178 | 493.10 | 12.00 | 505.10 |
| 14 | 42.939418 | -76.899107 | 492.30 | 12.00 | 504.30 |
| 15 | 42.939085 | -76.899038 | 491.50 | 12.00 | 503.50 |
| 16 | 42.938343 | -76.898968 | 491.50 | 12.00 | 503.50 |
| 17 | 42.938244 | -76.898960 | 491.40 | 12.00 | 503.40 |
| 18 | 42.937979 | -76.898831 | 491.00 | 12.00 | 503.00 |
| 19 | 42.937648 | -76.898829 | 490.80 | 12.00 | 502.80 |
| 20 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |

**Name**: 11
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |
| 2 | 42.940257 | -76.896370 | 496.70 | 12.00 | 508.70 |
| 3 | 42.940363 | -76.893549 | 494.80 | 12.00 | 506.80 |
| 4 | 42.940431 | -76.891754 | 492.20 | 12.00 | 504.20 |
| 5 | 42.939619 | -76.891750 | 488.10 | 12.00 | 500.10 |
| 6 | 42.939614 | -76.891884 | 488.30 | 12.00 | 500.30 |
| 7 | 42.939026 | -76.891882 | 488.30 | 12.00 | 500.30 |
| 8 | 42.939033 | -76.891680 | 489.40 | 12.00 | 501.40 |
| 9 | 42.938103 | -76.891675 | 488.70 | 12.00 | 500.70 |
| 10 | 42.938087 | -76.892146 | 490.30 | 12.00 | 502.30 |
| 11 | 42.937752 | -76.892144 | 490.70 | 12.00 | 502.70 |
| 12 | 42.937724 | -76.892951 | 496.60 | 12.00 | 508.60 |
| 13 | 42.936654 | -76.892945 | 491.40 | 12.00 | 503.40 |
| 14 | 42.936647 | -76.893214 | 493.90 | 12.00 | 505.90 |
| 15 | 42.936312 | -76.893212 | 492.40 | 12.00 | 504.40 |
| 16 | 42.935855 | -76.893344 | 494.70 | 12.00 | 506.70 |
| 17 | 42.935819 | -76.894330 | 504.80 | 12.00 | 516.80 |
| 18 | 42.936271 | -76.894332 | 509.70 | 12.00 | 521.70 |
| 19 | 42.936256 | -76.894735 | 503.40 | 12.00 | 515.40 |
| 20 | 42.936587 | -76.894737 | 510.90 | 12.00 | 522.90 |
| 21 | 42.936530 | -76.896282 | 490.40 | 12.00 | 502.40 |
| 22 | 42.936862 | -76.896284 | 491.60 | 12.00 | 503.60 |
| 23 | 42.936848 | -76.896687 | 490.30 | 12.00 | 502.30 |
| 24 | 42.937249 | -76.896689 | 491.90 | 12.00 | 503.90 |
| 25 | 42.937226 | -76.897294 | 490.60 | 12.00 | 502.60 |
| 26 | 42.937559 | -76.897363 | 490.80 | 12.00 | 502.80 |
| 27 | 42.938318 | -76.897367 | 491.00 | 12.00 | 503.00 |
| 28 | 42.938313 | -76.897501 | 490.70 | 12.00 | 502.70 |
| 29 | 42.938668 | -76.897503 | 490.90 | 12.00 | 502.90 |
| 30 | 42.938644 | -76.898175 | 490.70 | 12.00 | 502.70 |
| 31 | 42.939376 | -76.898246 | 491.30 | 12.00 | 503.30 |
| 32 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |

**Name**: 12
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |
| 2 | 42.923228 | -76.891904 | 490.00 | 12.00 | 502.00 |
| 3 | 42.925411 | -76.891982 | 506.60 | 12.00 | 518.60 |
| 4 | 42.926478 | -76.891988 | 513.30 | 12.00 | 525.30 |
| 5 | 42.926441 | -76.894968 | 524.90 | 12.00 | 536.90 |
| 6 | 42.925402 | -76.894895 | 520.60 | 12.00 | 532.60 |
| 7 | 42.924258 | -76.894890 | 507.60 | 12.00 | 519.60 |
| 8 | 42.923856 | -76.894955 | 503.30 | 12.00 | 515.30 |
| 9 | 42.923850 | -76.895469 | 504.20 | 12.00 | 516.20 |
| 10 | 42.924251 | -76.895471 | 510.30 | 12.00 | 522.30 |
| 11 | 42.924249 | -76.895759 | 508.70 | 12.00 | 520.70 |
| 12 | 42.924580 | -76.895883 | 512.70 | 12.00 | 524.70 |
| 13 | 42.925363 | -76.895887 | 520.10 | 12.00 | 532.10 |
| 14 | 42.925360 | -76.896089 | 520.40 | 12.00 | 532.40 |
| 15 | 42.925693 | -76.896157 | 523.00 | 12.00 | 535.00 |
| 16 | 42.927543 | -76.896234 | 513.80 | 12.00 | 525.80 |
| 17 | 42.929817 | -76.896246 | 489.40 | 12.00 | 501.40 |
| 18 | 42.929829 | -76.895292 | 488.90 | 12.00 | 500.90 |
| 19 | 42.930217 | -76.895301 | 487.80 | 12.00 | 499.80 |
| 20 | 42.930553 | -76.895033 | 488.20 | 12.00 | 500.20 |
| 21 | 42.930560 | -76.894361 | 491.50 | 12.00 | 503.50 |
| 22 | 42.930894 | -76.894362 | 490.50 | 12.00 | 502.50 |
| 23 | 42.930920 | -76.892235 | 487.20 | 12.00 | 499.20 |
| 24 | 42.930590 | -76.891897 | 488.60 | 12.00 | 500.60 |
| 25 | 42.929808 | -76.891826 | 495.00 | 12.00 | 507.00 |
| 26 | 42.928741 | -76.891753 | 503.10 | 12.00 | 515.10 |
| 27 | 42.927626 | -76.891680 | 512.30 | 12.00 | 524.30 |
| 28 | 42.926559 | -76.891608 | 512.30 | 12.00 | 524.30 |
| 29 | 42.925443 | -76.891535 | 506.70 | 12.00 | 518.70 |
| 30 | 42.924377 | -76.891463 | 495.30 | 12.00 | 507.30 |
| 31 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |

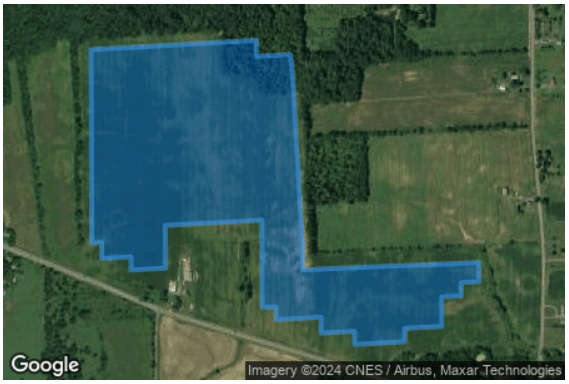
**Name**: 2
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |
| 2 | 42.940940 | -76.932584 | 543.70 | 12.00 | 555.70 |
| 3 | 42.940936 | -76.932853 | 542.20 | 12.00 | 554.20 |
| 4 | 42.940602 | -76.932851 | 540.00 | 12.00 | 552.00 |
| 5 | 42.940584 | -76.933776 | 529.30 | 12.00 | 541.30 |
| 6 | 42.940572 | -76.934760 | 513.90 | 12.00 | 525.90 |
| 7 | 42.940894 | -76.934761 | 517.80 | 12.00 | 529.80 |
| 8 | 42.940893 | -76.935048 | 515.60 | 12.00 | 527.60 |
| 9 | 42.941224 | -76.935050 | 517.80 | 12.00 | 529.80 |
| 10 | 42.941212 | -76.935655 | 513.60 | 12.00 | 525.60 |
| 11 | 42.941691 | -76.935657 | 520.50 | 12.00 | 532.50 |
| 12 | 42.941724 | -76.933981 | 531.00 | 12.00 | 543.00 |
| 13 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |

**Name**: 4
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.941198 | -76.924474 | 494.40 | 12.00 | 506.40 |
| 2 | 42.941054 | -76.924473 | 494.82 | 12.00 | 506.82 |
| 3 | 42.940290 | -76.924542 | 496.43 | 12.00 | 508.43 |
| 4 | 42.940194 | -76.926220 | 498.43 | 12.00 | 510.43 |
| 5 | 42.940073 | -76.928315 | 505.90 | 12.00 | 517.90 |
| 6 | 42.939998 | -76.929626 | 515.19 | 12.00 | 527.19 |
| 7 | 42.940809 | -76.929631 | 514.58 | 12.00 | 526.58 |
| 8 | 42.940878 | -76.928441 | 510.53 | 12.00 | 522.53 |
| 9 | 42.942142 | -76.928448 | 515.71 | 12.00 | 527.71 |
| 10 | 42.942304 | -76.925648 | 497.89 | 12.00 | 509.89 |
| 11 | 42.941983 | -76.925445 | 497.76 | 12.00 | 509.76 |
| 12 | 42.941225 | -76.925441 | 497.07 | 12.00 | 509.07 |
| 13 | 42.941281 | -76.924483 | 494.34 | 12.00 | 506.34 |

**Name**: 5
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |
| 2 | 42.931203 | -76.926081 | 519.20 | 12.00 | 531.20 |
| 3 | 42.930867 | -76.926079 | 517.90 | 12.00 | 529.90 |
| 4 | 42.930842 | -76.926751 | 527.40 | 12.00 | 539.40 |
| 5 | 42.930105 | -76.926747 | 529.40 | 12.00 | 541.40 |
| 6 | 42.930055 | -76.928024 | 544.70 | 12.00 | 556.70 |
| 7 | 42.929720 | -76.928022 | 544.60 | 12.00 | 556.60 |
| 8 | 42.929650 | -76.929746 | 522.10 | 12.00 | 534.10 |
| 9 | 42.929981 | -76.929748 | 523.80 | 12.00 | 535.80 |
| 10 | 42.929935 | -76.930891 | 516.80 | 12.00 | 528.80 |
| 11 | 42.930337 | -76.930893 | 522.60 | 12.00 | 534.60 |
| 12 | 42.930273 | -76.932438 | 511.90 | 12.00 | 523.90 |
| 13 | 42.930587 | -76.932440 | 513.80 | 12.00 | 525.80 |
| 14 | 42.930586 | -76.932917 | 514.90 | 12.00 | 526.90 |
| 15 | 42.932769 | -76.932930 | 520.10 | 12.00 | 532.10 |
| 16 | 42.932635 | -76.936246 | 530.20 | 12.00 | 542.20 |
| 17 | 42.931565 | -76.936239 | 526.40 | 12.00 | 538.40 |
| 18 | 42.931517 | -76.937426 | 509.80 | 12.00 | 521.80 |
| 19 | 42.931848 | -76.937428 | 514.20 | 12.00 | 526.20 |
| 20 | 42.931808 | -76.938436 | 502.10 | 12.00 | 514.10 |
| 21 | 42.932209 | -76.938438 | 501.90 | 12.00 | 513.90 |
| 22 | 42.932195 | -76.938774 | 499.60 | 12.00 | 511.60 |
| 23 | 42.934127 | -76.938785 | 508.40 | 12.00 | 520.40 |
| 24 | 42.935498 | -76.938793 | 510.20 | 12.00 | 522.20 |
| 25 | 42.937043 | -76.938802 | 505.60 | 12.00 | 517.60 |
| 26 | 42.937278 | -76.933113 | 523.00 | 12.00 | 535.00 |
| 27 | 42.936877 | -76.933110 | 525.20 | 12.00 | 537.20 |
| 28 | 42.936924 | -76.931961 | 525.80 | 12.00 | 537.80 |
| 29 | 42.936591 | -76.931892 | 523.80 | 12.00 | 535.80 |
| 30 | 42.935812 | -76.931820 | 526.50 | 12.00 | 538.50 |
| 31 | 42.934748 | -76.931747 | 524.30 | 12.00 | 536.30 |
| 32 | 42.934082 | -76.931676 | 522.30 | 12.00 | 534.30 |
| 33 | 42.932967 | -76.931603 | 527.70 | 12.00 | 539.70 |
| 34 | 42.932236 | -76.931531 | 529.80 | 12.00 | 541.80 |
| 35 | 42.931517 | -76.931527 | 530.00 | 12.00 | 542.00 |
| 36 | 42.931554 | -76.930621 | 537.40 | 12.00 | 549.40 |
| 37 | 42.931704 | -76.925479 | 515.00 | 12.00 | 527.00 |
| 38 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |

**Name**: 6
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |
| 2 | 42.930725 | -76.924167 | 516.80 | 12.00 | 528.80 |
| 3 | 42.930715 | -76.924480 | 514.50 | 12.00 | 526.50 |
| 4 | 42.931048 | -76.924549 | 515.40 | 12.00 | 527.40 |
| 5 | 42.931377 | -76.924550 | 514.60 | 12.00 | 526.60 |
| 6 | 42.931371 | -76.924752 | 513.30 | 12.00 | 525.30 |
| 7 | 42.931849 | -76.924755 | 518.00 | 12.00 | 530.00 |
| 8 | 42.931862 | -76.924375 | 520.70 | 12.00 | 532.70 |
| 9 | 42.931940 | -76.924375 | 522.60 | 12.00 | 534.60 |
| 10 | 42.931941 | -76.924009 | 525.00 | 12.00 | 537.00 |
| 11 | 42.931672 | -76.924008 | 519.80 | 12.00 | 531.80 |
| 12 | 42.931672 | -76.924105 | 519.40 | 12.00 | 531.40 |
| 13 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |

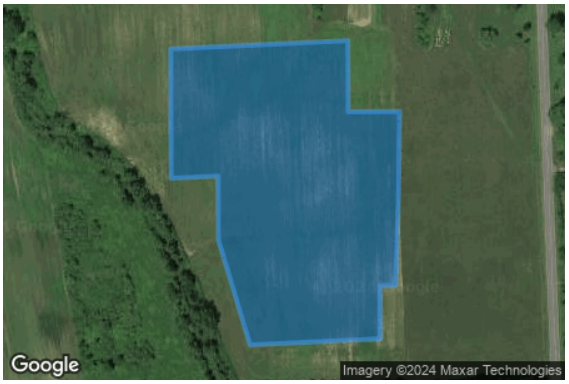
**Name**: 7
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |
| 2 | 42.928905 | -76.932392 | 511.00 | 12.00 | 523.00 |
| 3 | 42.928572 | -76.932390 | 514.00 | 12.00 | 526.00 |
| 4 | 42.928584 | -76.931651 | 513.60 | 12.00 | 525.60 |
| 5 | 42.927135 | -76.931642 | 525.70 | 12.00 | 537.70 |
| 6 | 42.927136 | -76.931508 | 524.80 | 12.00 | 536.80 |
| 7 | 42.926742 | -76.931102 | 518.00 | 12.00 | 530.00 |
| 8 | 42.926077 | -76.931032 | 506.00 | 12.00 | 518.00 |
| 9 | 42.925599 | -76.931029 | 497.70 | 12.00 | 509.70 |
| 10 | 42.925587 | -76.931768 | 496.40 | 12.00 | 508.40 |
| 11 | 42.925136 | -76.931765 | 491.50 | 12.00 | 503.50 |
| 12 | 42.925122 | -76.932639 | 491.80 | 12.00 | 503.80 |
| 13 | 42.924788 | -76.932637 | 489.40 | 12.00 | 501.40 |
| 14 | 42.924785 | -76.932906 | 489.50 | 12.00 | 501.50 |
| 15 | 42.924451 | -76.932904 | 488.60 | 12.00 | 500.60 |
| 16 | 42.924445 | -76.933284 | 487.70 | 12.00 | 499.70 |
| 17 | 42.924777 | -76.933286 | 488.40 | 12.00 | 500.40 |
| 18 | 42.924764 | -76.934116 | 488.80 | 12.00 | 500.80 |
| 19 | 42.924431 | -76.934114 | 484.30 | 12.00 | 496.30 |
| 20 | 42.924429 | -76.934248 | 484.20 | 12.00 | 496.20 |
| 21 | 42.923694 | -76.934244 | 486.40 | 12.00 | 498.40 |
| 22 | 42.923686 | -76.934758 | 482.00 | 12.00 | 494.00 |
| 23 | 42.924019 | -76.934828 | 484.10 | 12.00 | 496.10 |
| 24 | 42.924751 | -76.934832 | 484.50 | 12.00 | 496.50 |
| 25 | 42.924749 | -76.935033 | 484.70 | 12.00 | 496.70 |
| 26 | 42.925081 | -76.935035 | 488.80 | 12.00 | 500.80 |
| 27 | 42.925076 | -76.935371 | 488.10 | 12.00 | 500.10 |
| 28 | 42.926006 | -76.935377 | 500.50 | 12.00 | 512.50 |
| 29 | 42.926010 | -76.935041 | 499.50 | 12.00 | 511.50 |
| 30 | 42.926344 | -76.935042 | 504.60 | 12.00 | 516.60 |
| 31 | 42.926350 | -76.934639 | 504.50 | 12.00 | 516.50 |
| 32 | 42.927724 | -76.934647 | 513.10 | 12.00 | 525.10 |
| 33 | 42.927717 | -76.935050 | 509.20 | 12.00 | 521.20 |
| 34 | 42.928195 | -76.935053 | 504.00 | 12.00 | 516.00 |
| 35 | 42.928201 | -76.934650 | 506.30 | 12.00 | 518.30 |
| 36 | 42.928535 | -76.934652 | 505.10 | 12.00 | 517.10 |
| 37 | 42.928548 | -76.933778 | 513.70 | 12.00 | 525.70 |
| 38 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |

**Name**: 8
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |
| 2 | 42.935449 | -76.907085 | 505.70 | 12.00 | 517.70 |
| 3 | 42.935780 | -76.907154 | 505.10 | 12.00 | 517.10 |
| 4 | 42.936173 | -76.907291 | 505.00 | 12.00 | 517.00 |
| 5 | 42.936985 | -76.907295 | 504.10 | 12.00 | 516.10 |
| 6 | 42.937013 | -76.906511 | 504.60 | 12.00 | 516.60 |
| 7 | 42.936681 | -76.906443 | 505.90 | 12.00 | 517.90 |
| 8 | 42.936281 | -76.906440 | 508.90 | 12.00 | 520.90 |
| 9 | 42.936302 | -76.905903 | 509.00 | 12.00 | 521.00 |
| 10 | 42.935970 | -76.905901 | 507.60 | 12.00 | 519.60 |
| 11 | 42.935989 | -76.905363 | 505.40 | 12.00 | 517.40 |
| 12 | 42.935657 | -76.905362 | 511.40 | 12.00 | 523.40 |
| 13 | 42.935666 | -76.905093 | 506.30 | 12.00 | 518.30 |
| 14 | 42.935386 | -76.904994 | 506.10 | 12.00 | 518.10 |
| 15 | 42.935128 | -76.904993 | 507.40 | 12.00 | 519.40 |
| 16 | 42.935122 | -76.906029 | 509.40 | 12.00 | 521.40 |
| 17 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |

**Name**: 9
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |
| 2 | 42.936207 | -76.902792 | 509.20 | 12.00 | 521.20 |
| 3 | 42.935643 | -76.902816 | 509.70 | 12.00 | 521.70 |
| 4 | 42.935641 | -76.902950 | 509.40 | 12.00 | 521.40 |
| 5 | 42.935307 | -76.902949 | 509.70 | 12.00 | 521.70 |
| 6 | 42.935269 | -76.904068 | 506.70 | 12.00 | 518.70 |
| 7 | 42.935598 | -76.904204 | 505.90 | 12.00 | 517.90 |
| 8 | 42.935926 | -76.904340 | 504.00 | 12.00 | 516.00 |
| 9 | 42.936327 | -76.904343 | 506.20 | 12.00 | 518.20 |
| 10 | 42.936313 | -76.904746 | 506.00 | 12.00 | 518.00 |
| 11 | 42.937124 | -76.904750 | 508.20 | 12.00 | 520.20 |
| 12 | 42.937176 | -76.903227 | 513.10 | 12.00 | 525.10 |
| 13 | 42.936731 | -76.903225 | 510.90 | 12.00 | 522.90 |
| 14 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |

## Discrete Observation Point Receptors

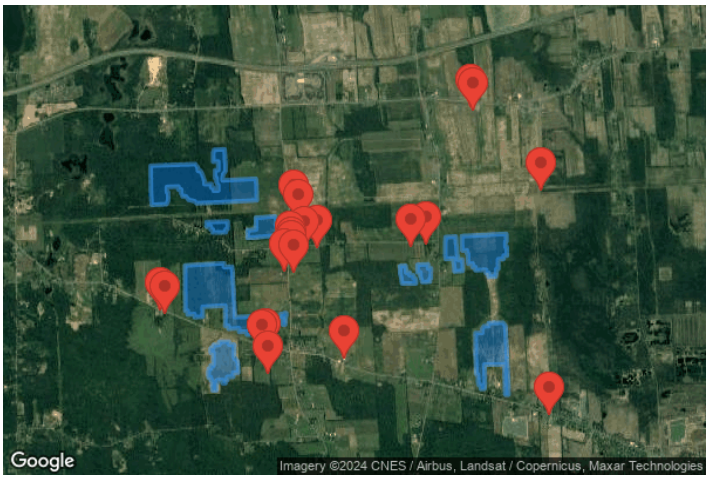
| Name | ID | Latitude (°) | Longitude (°) | Elevation (ft) | Height (ft) |
|---|---|---|---|---|---|
| OP 270 | 270 | 42.948185 | -76.901289 | 552.85 | 5.40 |
| OP 278 | 278 | 42.944899 | -76.900898 | 532.47 | 5.40 |
| OP 284 | 284 | 42.942664 | -76.900676 | 507.58 | 5.40 |
| OP 285 | 285 | 42.942968 | -76.900904 | 511.36 | 5.40 |
| OP 307 | 307 | 42.926715 | -76.902681 | 524.29 | 5.40 |
| OP 312 | 312 | 42.925237 | -76.901854 | 520.41 | 5.40 |
| OP 314 | 314 | 42.924689 | -76.900112 | 513.14 | 5.40 |
| OP 336 | 336 | 42.923305 | -76.897867 | 502.71 | 5.40 |
| OP 356 | 356 | 42.921279 | -76.891117 | 485.30 | 5.40 |
| OP 360 | 360 | 42.922100 | -76.888347 | 488.94 | 5.40 |
| OP 361 | 361 | 42.921935 | -76.887522 | 490.22 | 5.40 |
| OP 364 | 364 | 42.921104 | -76.887473 | 488.67 | 5.40 |
| OP 368 | 368 | 42.920535 | -76.883935 | 491.86 | 5.40 |
| OP 379 | 379 | 42.920767 | -76.885043 | 485.38 | 5.40 |
| OP 382 | 382 | 42.921360 | -76.884735 | 492.55 | 5.40 |
| OP 400 | 400 | 42.922239 | -76.884537 | 495.10 | 5.40 |
| OP 401 | 401 | 42.922677 | -76.884595 | 497.54 | 5.40 |
| OP 402 | 402 | 42.923156 | -76.884661 | 501.57 | 5.40 |
| OP 403 | 403 | 42.923515 | -76.884603 | 504.10 | 5.40 |
| OP 404 | 404 | 42.923978 | -76.884617 | 503.98 | 5.40 |
| OP 405 | 405 | 42.924465 | -76.884761 | 503.24 | 5.40 |
| OP 408 | 408 | 42.924895 | -76.884826 | 501.61 | 5.40 |
| OP 409 | 409 | 42.925388 | -76.884810 | 499.97 | 5.40 |
| OP 410 | 410 | 42.925747 | -76.884860 | 498.46 | 5.40 |
| OP 411 | 411 | 42.926212 | -76.884959 | 497.08 | 5.40 |
| OP 412 | 412 | 42.926716 | -76.885036 | 494.58 | 5.40 |
| OP 413 | 413 | 42.927152 | -76.885087 | 495.43 | 5.40 |
| OP 418 | 418 | 42.930052 | -76.885411 | 491.84 | 5.40 |
| OP 419 | 419 | 42.929978 | -76.886253 | 497.00 | 5.40 |
| OP 436 | 436 | 42.944957 | -76.886605 | 502.02 | 5.40 |
| OP 440 | 440 | 42.946261 | -76.886127 | 500.79 | 5.40 |
| OP 441 | 441 | 42.946702 | -76.886040 | 499.34 | 5.40 |
| OP 442 | 442 | 42.946952 | -76.885967 | 499.59 | 5.40 |
| OP 443 | 443 | 42.947259 | -76.885890 | 499.77 | 5.40 |
| OP 444 | 444 | 42.948084 | -76.885659 | 502.18 | 5.40 |
| OP 445 | 445 | 42.948379 | -76.885731 | 503.86 | 5.40 |
| OP 449 | 449 | 42.949852 | -76.886041 | 502.42 | 5.40 |
| OP 511 | 511 | 42.925640 | -76.906664 | 514.13 | 5.40 |
| OP 513 | 513 | 42.924655 | -76.906811 | 511.46 | 5.40 |
| OP 514 | 514 | 42.924449 | -76.905773 | 509.11 | 5.40 |

# FORGESOLAR GLARE ANALYSIS

Project: **North Seneca Solar**
Site configuration: **North Seneca Glare Analysis R3**

**Created** 21 Oct, 2024
**Updated** 21 Oct, 2024
**Time-step** 1 minute
**Timezone offset** UTC-5
**Minimum sun altitude** 0.0 deg
**DNI** peaks at 1,000.0 W/m$^2$
**Category** 100 MW to 1 GW
**Site ID** 131901.18888

**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



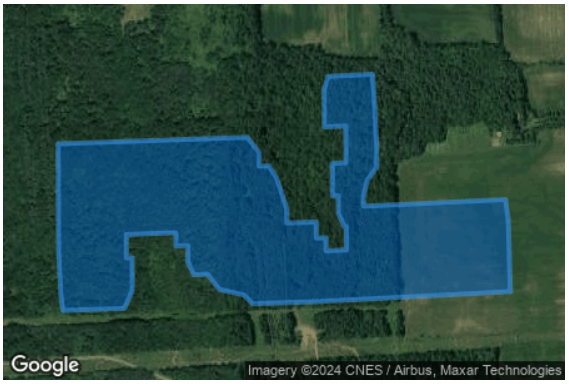

## Summary of Results No glare predicted

| PV Array | Tilt | Orient | Annual Green Glare | | Annual Yellow Glare | | Energy |
|---|---|---|---|---|---|---|---|
| | ° | ° | min | hr | min | hr | kWh |
| 1 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 10 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 11 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 12 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 2 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 4 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 5 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 6 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 7 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 8 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |
| 9 | SA tracking | SA tracking | 0 | 0.0 | 0 | 0.0 | - |

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

| Receptor | Annual Green Glare | | Annual Yellow Glare | |
|---|---|---|---|---|
| | min | hr | min | hr |
| OP 524 | 0 | 0.0 | 0 | 0.0 |
| OP 628 | 0 | 0.0 | 0 | 0.0 |
| OP 633 | 0 | 0.0 | 0 | 0.0 |
| OP 634 | 0 | 0.0 | 0 | 0.0 |
| OP 659 | 0 | 0.0 | 0 | 0.0 |
| OP 661 | 0 | 0.0 | 0 | 0.0 |
| OP 662 | 0 | 0.0 | 0 | 0.0 |
| OP 663 | 0 | 0.0 | 0 | 0.0 |
| OP 667 | 0 | 0.0 | 0 | 0.0 |
| OP 670 | 0 | 0.0 | 0 | 0.0 |
| OP 671 | 0 | 0.0 | 0 | 0.0 |
| OP 675 | 0 | 0.0 | 0 | 0.0 |
| OP 676 | 0 | 0.0 | 0 | 0.0 |
| OP 730 | 0 | 0.0 | 0 | 0.0 |
| OP 731 | 0 | 0.0 | 0 | 0.0 |
| OP 785 | 0 | 0.0 | 0 | 0.0 |
| OP 796 | 0 | 0.0 | 0 | 0.0 |
| OP 825 | 0 | 0.0 | 0 | 0.0 |
| OP 838 | 0 | 0.0 | 0 | 0.0 |
| OP 842 | 0 | 0.0 | 0 | 0.0 |
| OP 848 | 0 | 0.0 | 0 | 0.0 |

**Name**: 1
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |
| 2 | 42.945812 | -76.928368 | 514.10 | 12.00 | 526.10 |
| 3 | 42.944016 | -76.928297 | 521.50 | 12.00 | 533.50 |
| 4 | 42.943902 | -76.931272 | 512.40 | 12.00 | 524.40 |
| 5 | 42.943764 | -76.934962 | 532.80 | 12.00 | 544.80 |
| 6 | 42.943709 | -76.937153 | 521.90 | 12.00 | 533.90 |
| 7 | 42.943931 | -76.937457 | 519.10 | 12.00 | 531.10 |
| 8 | 42.944070 | -76.938299 | 508.50 | 12.00 | 520.50 |
| 9 | 42.944452 | -76.938703 | 512.20 | 12.00 | 524.20 |
| 10 | 42.944441 | -76.939180 | 511.00 | 12.00 | 523.00 |
| 11 | 42.944769 | -76.939384 | 508.30 | 12.00 | 520.30 |
| 12 | 42.945170 | -76.939386 | 509.20 | 12.00 | 521.20 |
| 13 | 42.945159 | -76.939790 | 508.20 | 12.00 | 520.20 |
| 14 | 42.945491 | -76.939792 | 509.40 | 12.00 | 521.40 |
| 15 | 42.945448 | -76.941495 | 507.40 | 12.00 | 519.40 |
| 16 | 42.944860 | -76.941492 | 519.60 | 12.00 | 531.60 |
| 17 | 42.944864 | -76.941290 | 516.40 | 12.00 | 528.40 |
| 18 | 42.944053 | -76.941285 | 516.70 | 12.00 | 528.70 |
| 19 | 42.943595 | -76.941552 | 517.30 | 12.00 | 529.30 |
| 20 | 42.943541 | -76.943679 | 534.40 | 12.00 | 546.40 |
| 21 | 42.943991 | -76.943749 | 545.20 | 12.00 | 557.20 |
| 22 | 42.945056 | -76.943823 | 548.70 | 12.00 | 560.70 |
| 23 | 42.947719 | -76.943838 | 531.40 | 12.00 | 543.40 |
| 24 | 42.947885 | -76.937334 | 507.40 | 12.00 | 519.40 |
| 25 | 42.947493 | -76.936928 | 504.80 | 12.00 | 516.80 |
| 26 | 42.947162 | -76.936927 | 506.10 | 12.00 | 518.10 |
| 27 | 42.947169 | -76.936590 | 506.30 | 12.00 | 518.30 |
| 28 | 42.946843 | -76.936320 | 504.50 | 12.00 | 516.50 |
| 29 | 42.946397 | -76.936115 | 501.80 | 12.00 | 513.80 |
| 30 | 42.946067 | -76.935979 | 506.80 | 12.00 | 518.80 |
| 31 | 42.945736 | -76.935977 | 512.70 | 12.00 | 524.70 |
| 32 | 42.945761 | -76.934969 | 509.10 | 12.00 | 521.10 |
| 33 | 42.945359 | -76.934967 | 513.40 | 12.00 | 525.40 |
| 34 | 42.945368 | -76.934630 | 510.90 | 12.00 | 522.90 |
| 35 | 42.945038 | -76.934629 | 513.50 | 12.00 | 525.50 |
| 36 | 42.945062 | -76.933933 | 513.50 | 12.00 | 525.50 |
| 37 | 42.945652 | -76.933937 | 513.10 | 12.00 | 525.10 |
| 38 | 42.945650 | -76.934004 | 512.10 | 12.00 | 524.10 |
| 39 | 42.945976 | -76.934207 | 510.50 | 12.00 | 522.50 |
| 40 | 42.946427 | -76.934210 | 511.90 | 12.00 | 523.90 |
| 41 | 42.946419 | -76.934412 | 510.50 | 12.00 | 522.50 |
| 42 | 42.947230 | -76.934416 | 502.30 | 12.00 | 514.30 |
| 43 | 42.947247 | -76.933946 | 503.90 | 12.00 | 515.90 |
| 44 | 42.948168 | -76.933951 | 503.20 | 12.00 | 515.20 |
| 45 | 42.948142 | -76.934690 | 501.40 | 12.00 | 513.40 |
| 46 | 42.949072 | -76.934696 | 502.50 | 12.00 | 514.50 |
| 47 | 42.949410 | -76.934563 | 502.70 | 12.00 | 514.70 |
| 48 | 42.949467 | -76.933033 | 501.20 | 12.00 | 513.20 |
| 49 | 42.948685 | -76.932962 | 506.10 | 12.00 | 518.10 |
| 50 | 42.947621 | -76.932888 | 504.70 | 12.00 | 516.70 |
| 51 | 42.947142 | -76.932886 | 507.60 | 12.00 | 519.60 |
| 52 | 42.946797 | -76.933220 | 507.70 | 12.00 | 519.70 |
| 53 | 42.946421 | -76.933340 | 514.20 | 12.00 | 526.20 |
| 54 | 42.946155 | -76.933339 | 512.70 | 12.00 | 524.70 |
| 55 | 42.946324 | -76.928465 | 511.80 | 12.00 | 523.80 |

**Name**: 10
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |
| 2 | 42.937279 | -76.898155 | 490.20 | 12.00 | 502.20 |
| 3 | 42.936468 | -76.898151 | 489.80 | 12.00 | 501.80 |
| 4 | 42.936411 | -76.899337 | 493.10 | 12.00 | 505.10 |
| 5 | 42.937141 | -76.899408 | 493.30 | 12.00 | 505.30 |
| 6 | 42.937475 | -76.899477 | 493.10 | 12.00 | 505.10 |
| 7 | 42.937802 | -76.899479 | 493.50 | 12.00 | 505.50 |
| 8 | 42.937747 | -76.900621 | 500.70 | 12.00 | 512.70 |
| 9 | 42.938119 | -76.900691 | 504.40 | 12.00 | 516.40 |
| 10 | 42.938769 | -76.900694 | 502.30 | 12.00 | 514.30 |
| 11 | 42.939340 | -76.900697 | 498.70 | 12.00 | 510.70 |
| 12 | 42.940078 | -76.900633 | 496.70 | 12.00 | 508.70 |
| 13 | 42.940149 | -76.899178 | 493.10 | 12.00 | 505.10 |
| 14 | 42.939418 | -76.899107 | 492.30 | 12.00 | 504.30 |
| 15 | 42.939085 | -76.899038 | 491.50 | 12.00 | 503.50 |
| 16 | 42.938343 | -76.898968 | 491.50 | 12.00 | 503.50 |
| 17 | 42.938244 | -76.898960 | 491.40 | 12.00 | 503.40 |
| 18 | 42.937979 | -76.898831 | 491.00 | 12.00 | 503.00 |
| 19 | 42.937648 | -76.898829 | 490.80 | 12.00 | 502.80 |
| 20 | 42.937677 | -76.898224 | 489.90 | 12.00 | 501.90 |

**Name**: 11
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |
| 2 | 42.940257 | -76.896370 | 496.70 | 12.00 | 508.70 |
| 3 | 42.940363 | -76.893549 | 494.80 | 12.00 | 506.80 |
| 4 | 42.940431 | -76.891754 | 492.20 | 12.00 | 504.20 |
| 5 | 42.939619 | -76.891750 | 488.10 | 12.00 | 500.10 |
| 6 | 42.939614 | -76.891884 | 488.30 | 12.00 | 500.30 |
| 7 | 42.939026 | -76.891882 | 488.30 | 12.00 | 500.30 |
| 8 | 42.939033 | -76.891680 | 489.40 | 12.00 | 501.40 |
| 9 | 42.938103 | -76.891675 | 488.70 | 12.00 | 500.70 |
| 10 | 42.938087 | -76.892146 | 490.30 | 12.00 | 502.30 |
| 11 | 42.937752 | -76.892144 | 490.70 | 12.00 | 502.70 |
| 12 | 42.937724 | -76.892951 | 496.60 | 12.00 | 508.60 |
| 13 | 42.936654 | -76.892945 | 491.40 | 12.00 | 503.40 |
| 14 | 42.936647 | -76.893214 | 493.90 | 12.00 | 505.90 |
| 15 | 42.936312 | -76.893212 | 492.40 | 12.00 | 504.40 |
| 16 | 42.935855 | -76.893344 | 494.70 | 12.00 | 506.70 |
| 17 | 42.935819 | -76.894330 | 504.80 | 12.00 | 516.80 |
| 18 | 42.936271 | -76.894332 | 509.70 | 12.00 | 521.70 |
| 19 | 42.936256 | -76.894735 | 503.40 | 12.00 | 515.40 |
| 20 | 42.936587 | -76.894737 | 510.90 | 12.00 | 522.90 |
| 21 | 42.936530 | -76.896282 | 490.40 | 12.00 | 502.40 |
| 22 | 42.936862 | -76.896284 | 491.60 | 12.00 | 503.60 |
| 23 | 42.936848 | -76.896687 | 490.30 | 12.00 | 502.30 |
| 24 | 42.937249 | -76.896689 | 491.90 | 12.00 | 503.90 |
| 25 | 42.937226 | -76.897294 | 490.60 | 12.00 | 502.60 |
| 26 | 42.937559 | -76.897363 | 490.80 | 12.00 | 502.80 |
| 27 | 42.938318 | -76.897367 | 491.00 | 12.00 | 503.00 |
| 28 | 42.938313 | -76.897501 | 490.70 | 12.00 | 502.70 |
| 29 | 42.938668 | -76.897503 | 490.90 | 12.00 | 502.90 |
| 30 | 42.938644 | -76.898175 | 490.70 | 12.00 | 502.70 |
| 31 | 42.939376 | -76.898246 | 491.30 | 12.00 | 503.30 |
| 32 | 42.940187 | -76.898250 | 493.30 | 12.00 | 505.30 |

**Name**: 12
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |
| 2 | 42.923228 | -76.891904 | 490.00 | 12.00 | 502.00 |
| 3 | 42.925411 | -76.891982 | 506.60 | 12.00 | 518.60 |
| 4 | 42.926478 | -76.891988 | 513.30 | 12.00 | 525.30 |
| 5 | 42.926441 | -76.894968 | 524.90 | 12.00 | 536.90 |
| 6 | 42.925402 | -76.894895 | 520.60 | 12.00 | 532.60 |
| 7 | 42.924258 | -76.894890 | 507.60 | 12.00 | 519.60 |
| 8 | 42.923856 | -76.894955 | 503.30 | 12.00 | 515.30 |
| 9 | 42.923850 | -76.895469 | 504.20 | 12.00 | 516.20 |
| 10 | 42.924251 | -76.895471 | 510.30 | 12.00 | 522.30 |
| 11 | 42.924249 | -76.895759 | 508.70 | 12.00 | 520.70 |
| 12 | 42.924580 | -76.895883 | 512.70 | 12.00 | 524.70 |
| 13 | 42.925363 | -76.895887 | 520.10 | 12.00 | 532.10 |
| 14 | 42.925360 | -76.896089 | 520.40 | 12.00 | 532.40 |
| 15 | 42.925693 | -76.896157 | 523.00 | 12.00 | 535.00 |
| 16 | 42.927543 | -76.896234 | 513.80 | 12.00 | 525.80 |
| 17 | 42.929817 | -76.896246 | 489.40 | 12.00 | 501.40 |
| 18 | 42.929829 | -76.895292 | 488.90 | 12.00 | 500.90 |
| 19 | 42.930217 | -76.895301 | 487.80 | 12.00 | 499.80 |
| 20 | 42.930553 | -76.895033 | 488.20 | 12.00 | 500.20 |
| 21 | 42.930560 | -76.894361 | 491.50 | 12.00 | 503.50 |
| 22 | 42.930894 | -76.894362 | 490.50 | 12.00 | 502.50 |
| 23 | 42.930920 | -76.892235 | 487.20 | 12.00 | 499.20 |
| 24 | 42.930590 | -76.891897 | 488.60 | 12.00 | 500.60 |
| 25 | 42.929808 | -76.891826 | 495.00 | 12.00 | 507.00 |
| 26 | 42.928741 | -76.891753 | 503.10 | 12.00 | 515.10 |
| 27 | 42.927626 | -76.891680 | 512.30 | 12.00 | 524.30 |
| 28 | 42.926559 | -76.891608 | 512.30 | 12.00 | 524.30 |
| 29 | 42.925443 | -76.891535 | 506.70 | 12.00 | 518.70 |
| 30 | 42.924377 | -76.891463 | 495.30 | 12.00 | 507.30 |
| 31 | 42.923233 | -76.891457 | 491.10 | 12.00 | 503.10 |

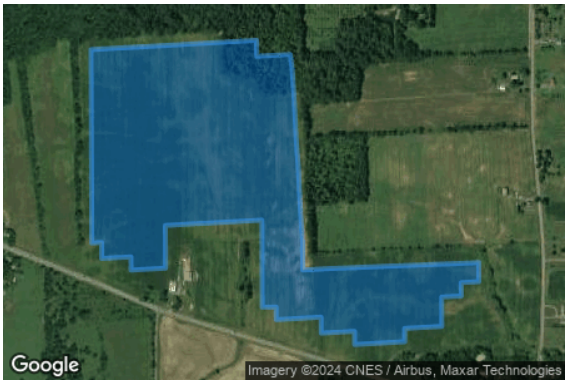
**Name**: 2
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |
| 2 | 42.940940 | -76.932584 | 543.70 | 12.00 | 555.70 |
| 3 | 42.940936 | -76.932853 | 542.20 | 12.00 | 554.20 |
| 4 | 42.940602 | -76.932851 | 540.00 | 12.00 | 552.00 |
| 5 | 42.940584 | -76.933776 | 529.30 | 12.00 | 541.30 |
| 6 | 42.940572 | -76.934760 | 513.90 | 12.00 | 525.90 |
| 7 | 42.940894 | -76.934761 | 517.80 | 12.00 | 529.80 |
| 8 | 42.940893 | -76.935048 | 515.60 | 12.00 | 527.60 |
| 9 | 42.941224 | -76.935050 | 517.80 | 12.00 | 529.80 |
| 10 | 42.941212 | -76.935655 | 513.60 | 12.00 | 525.60 |
| 11 | 42.941691 | -76.935657 | 520.50 | 12.00 | 532.50 |
| 12 | 42.941724 | -76.933981 | 531.00 | 12.00 | 543.00 |
| 13 | 42.941751 | -76.932589 | 531.50 | 12.00 | 543.50 |

**Name**: 4
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.941198 | -76.924474 | 494.40 | 12.00 | 506.40 |
| 2 | 42.941054 | -76.924473 | 494.82 | 12.00 | 506.82 |
| 3 | 42.940290 | -76.924542 | 496.43 | 12.00 | 508.43 |
| 4 | 42.940194 | -76.926220 | 498.43 | 12.00 | 510.43 |
| 5 | 42.940073 | -76.928315 | 505.90 | 12.00 | 517.90 |
| 6 | 42.939998 | -76.929626 | 515.19 | 12.00 | 527.19 |
| 7 | 42.940809 | -76.929631 | 514.58 | 12.00 | 526.58 |
| 8 | 42.940878 | -76.928441 | 510.53 | 12.00 | 522.53 |
| 9 | 42.942142 | -76.928448 | 515.71 | 12.00 | 527.71 |
| 10 | 42.942304 | -76.925648 | 497.89 | 12.00 | 509.89 |
| 11 | 42.941983 | -76.925445 | 497.76 | 12.00 | 509.76 |
| 12 | 42.941225 | -76.925441 | 497.07 | 12.00 | 509.07 |
| 13 | 42.941281 | -76.924483 | 494.34 | 12.00 | 506.34 |

**Name**: 5
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |
| 2 | 42.931203 | -76.926081 | 519.20 | 12.00 | 531.20 |
| 3 | 42.930867 | -76.926079 | 517.90 | 12.00 | 529.90 |
| 4 | 42.930842 | -76.926751 | 527.40 | 12.00 | 539.40 |
| 5 | 42.930105 | -76.926747 | 529.40 | 12.00 | 541.40 |
| 6 | 42.930055 | -76.928024 | 544.70 | 12.00 | 556.70 |
| 7 | 42.929720 | -76.928022 | 544.60 | 12.00 | 556.60 |
| 8 | 42.929650 | -76.929746 | 522.10 | 12.00 | 534.10 |
| 9 | 42.929981 | -76.929748 | 523.80 | 12.00 | 535.80 |
| 10 | 42.929935 | -76.930891 | 516.80 | 12.00 | 528.80 |
| 11 | 42.930337 | -76.930893 | 522.60 | 12.00 | 534.60 |
| 12 | 42.930273 | -76.932438 | 511.90 | 12.00 | 523.90 |
| 13 | 42.930587 | -76.932440 | 513.80 | 12.00 | 525.80 |
| 14 | 42.930586 | -76.932917 | 514.90 | 12.00 | 526.90 |
| 15 | 42.932769 | -76.932930 | 520.10 | 12.00 | 532.10 |
| 16 | 42.932635 | -76.936246 | 530.20 | 12.00 | 542.20 |
| 17 | 42.931565 | -76.936239 | 526.40 | 12.00 | 538.40 |
| 18 | 42.931517 | -76.937426 | 509.80 | 12.00 | 521.80 |
| 19 | 42.931848 | -76.937428 | 514.20 | 12.00 | 526.20 |
| 20 | 42.931808 | -76.938436 | 502.10 | 12.00 | 514.10 |
| 21 | 42.932209 | -76.938438 | 501.90 | 12.00 | 513.90 |
| 22 | 42.932195 | -76.938774 | 499.60 | 12.00 | 511.60 |
| 23 | 42.934127 | -76.938785 | 508.40 | 12.00 | 520.40 |
| 24 | 42.935498 | -76.938793 | 510.20 | 12.00 | 522.20 |
| 25 | 42.937043 | -76.938802 | 505.60 | 12.00 | 517.60 |
| 26 | 42.937278 | -76.933113 | 523.00 | 12.00 | 535.00 |
| 27 | 42.936877 | -76.933110 | 525.20 | 12.00 | 537.20 |
| 28 | 42.936924 | -76.931961 | 525.80 | 12.00 | 537.80 |
| 29 | 42.936591 | -76.931892 | 523.80 | 12.00 | 535.80 |
| 30 | 42.935812 | -76.931820 | 526.50 | 12.00 | 538.50 |
| 31 | 42.934748 | -76.931747 | 524.30 | 12.00 | 536.30 |
| 32 | 42.934082 | -76.931676 | 522.30 | 12.00 | 534.30 |
| 33 | 42.932967 | -76.931603 | 527.70 | 12.00 | 539.70 |
| 34 | 42.932236 | -76.931531 | 529.80 | 12.00 | 541.80 |
| 35 | 42.931517 | -76.931527 | 530.00 | 12.00 | 542.00 |
| 36 | 42.931554 | -76.930621 | 537.40 | 12.00 | 549.40 |
| 37 | 42.931704 | -76.925479 | 515.00 | 12.00 | 527.00 |
| 38 | 42.931225 | -76.925477 | 515.10 | 12.00 | 527.10 |

**Name**: 6
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |
| 2 | 42.930725 | -76.924167 | 516.80 | 12.00 | 528.80 |
| 3 | 42.930715 | -76.924480 | 514.50 | 12.00 | 526.50 |
| 4 | 42.931048 | -76.924549 | 515.40 | 12.00 | 527.40 |
| 5 | 42.931377 | -76.924550 | 514.60 | 12.00 | 526.60 |
| 6 | 42.931371 | -76.924752 | 513.30 | 12.00 | 525.30 |
| 7 | 42.931849 | -76.924755 | 518.00 | 12.00 | 530.00 |
| 8 | 42.931862 | -76.924375 | 520.70 | 12.00 | 532.70 |
| 9 | 42.931940 | -76.924375 | 522.60 | 12.00 | 534.60 |
| 10 | 42.931941 | -76.924009 | 525.00 | 12.00 | 537.00 |
| 11 | 42.931672 | -76.924008 | 519.80 | 12.00 | 531.80 |
| 12 | 42.931672 | -76.924105 | 519.40 | 12.00 | 531.40 |
| 13 | 42.931058 | -76.924101 | 516.20 | 12.00 | 528.20 |

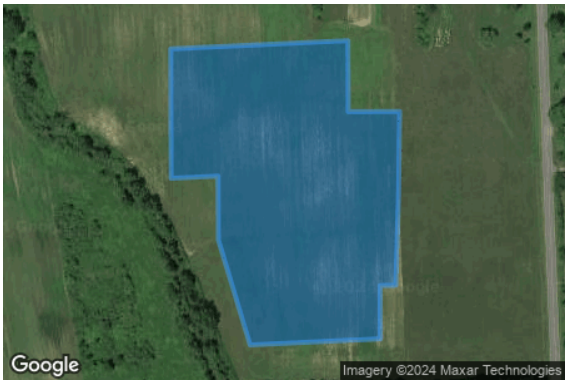
**Name**: 7
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Reflectivity**: Vary with sun
**Slope error**: correlate with material


| Vertex | Latitude (°) | Longitude (°) | Ground elevation (ft) | Height above ground (ft) | Total elevation (ft) |
|---|---|---|---|---|---|
| 1 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |
| 2 | 42.928905 | -76.932392 | 511.00 | 12.00 | 523.00 |
| 3 | 42.928572 | -76.932390 | 514.00 | 12.00 | 526.00 |
| 4 | 42.928584 | -76.931651 | 513.60 | 12.00 | 525.60 |
| 5 | 42.927135 | -76.931642 | 525.70 | 12.00 | 537.70 |
| 6 | 42.927136 | -76.931508 | 524.80 | 12.00 | 536.80 |
| 7 | 42.926742 | -76.931102 | 518.00 | 12.00 | 530.00 |
| 8 | 42.926077 | -76.931032 | 506.00 | 12.00 | 518.00 |
| 9 | 42.925599 | -76.931029 | 497.70 | 12.00 | 509.70 |
| 10 | 42.925587 | -76.931768 | 496.40 | 12.00 | 508.40 |
| 11 | 42.925136 | -76.931765 | 491.50 | 12.00 | 503.50 |
| 12 | 42.925122 | -76.932639 | 491.80 | 12.00 | 503.80 |
| 13 | 42.924788 | -76.932637 | 489.40 | 12.00 | 501.40 |
| 14 | 42.924785 | -76.932906 | 489.50 | 12.00 | 501.50 |
| 15 | 42.924451 | -76.932904 | 488.60 | 12.00 | 500.60 |
| 16 | 42.924445 | -76.933284 | 487.70 | 12.00 | 499.70 |
| 17 | 42.924777 | -76.933286 | 488.40 | 12.00 | 500.40 |
| 18 | 42.924764 | -76.934116 | 488.80 | 12.00 | 500.80 |
| 19 | 42.924431 | -76.934114 | 484.30 | 12.00 | 496.30 |
| 20 | 42.924429 | -76.934248 | 484.20 | 12.00 | 496.20 |
| 21 | 42.923694 | -76.934244 | 486.40 | 12.00 | 498.40 |
| 22 | 42.923686 | -76.934758 | 482.00 | 12.00 | 494.00 |
| 23 | 42.924019 | -76.934828 | 484.10 | 12.00 | 496.10 |
| 24 | 42.924751 | -76.934832 | 484.50 | 12.00 | 496.50 |
| 25 | 42.924749 | -76.935033 | 484.70 | 12.00 | 496.70 |
| 26 | 42.925081 | -76.935035 | 488.80 | 12.00 | 500.80 |
| 27 | 42.925076 | -76.935371 | 488.10 | 12.00 | 500.10 |
| 28 | 42.926006 | -76.935377 | 500.50 | 12.00 | 512.50 |
| 29 | 42.926010 | -76.935041 | 499.50 | 12.00 | 511.50 |
| 30 | 42.926344 | -76.935042 | 504.60 | 12.00 | 516.60 |
| 31 | 42.926350 | -76.934639 | 504.50 | 12.00 | 516.50 |
| 32 | 42.927724 | -76.934647 | 513.10 | 12.00 | 525.10 |
| 33 | 42.927717 | -76.935050 | 509.20 | 12.00 | 521.20 |
| 34 | 42.928195 | -76.935053 | 504.00 | 12.00 | 516.00 |
| 35 | 42.928201 | -76.934650 | 506.30 | 12.00 | 518.30 |
| 36 | 42.928535 | -76.934652 | 505.10 | 12.00 | 517.10 |
| 37 | 42.928548 | -76.933778 | 513.70 | 12.00 | 525.70 |
| 38 | 42.928882 | -76.933780 | 505.70 | 12.00 | 517.70 |

**Name**: 8
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |
| 2 | 42.935449 | -76.907085 | 505.70 | 12.00 | 517.70 |
| 3 | 42.935780 | -76.907154 | 505.10 | 12.00 | 517.10 |
| 4 | 42.936173 | -76.907291 | 505.00 | 12.00 | 517.00 |
| 5 | 42.936985 | -76.907295 | 504.10 | 12.00 | 516.10 |
| 6 | 42.937013 | -76.906511 | 504.60 | 12.00 | 516.60 |
| 7 | 42.936681 | -76.906443 | 505.90 | 12.00 | 517.90 |
| 8 | 42.936281 | -76.906440 | 508.90 | 12.00 | 520.90 |
| 9 | 42.936302 | -76.905903 | 509.00 | 12.00 | 521.00 |
| 10 | 42.935970 | -76.905901 | 507.60 | 12.00 | 519.60 |
| 11 | 42.935989 | -76.905363 | 505.40 | 12.00 | 517.40 |
| 12 | 42.935657 | -76.905362 | 511.40 | 12.00 | 523.40 |
| 13 | 42.935666 | -76.905093 | 506.30 | 12.00 | 518.30 |
| 14 | 42.935386 | -76.904994 | 506.10 | 12.00 | 518.10 |
| 15 | 42.935128 | -76.904993 | 507.40 | 12.00 | 519.40 |
| 16 | 42.935122 | -76.906029 | 509.40 | 12.00 | 521.40 |
| 17 | 42.935116 | -76.907016 | 505.20 | 12.00 | 517.20 |

**Name**: 9
**Axis tracking**: Single-axis rotation
**Backtracking**: Shade
**Tracking axis orientation**: 180.0°
**Max tracking angle**: 52.0°
**Resting angle**: 60.0°
**Ground Coverage Ratio**: 0.43
**Rated power**: -
**Panel material**: Light textured 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 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |
| 2 | 42.936207 | -76.902792 | 509.20 | 12.00 | 521.20 |
| 3 | 42.935643 | -76.902816 | 509.70 | 12.00 | 521.70 |
| 4 | 42.935641 | -76.902950 | 509.40 | 12.00 | 521.40 |
| 5 | 42.935307 | -76.902949 | 509.70 | 12.00 | 521.70 |
| 6 | 42.935269 | -76.904068 | 506.70 | 12.00 | 518.70 |
| 7 | 42.935598 | -76.904204 | 505.90 | 12.00 | 517.90 |
| 8 | 42.935926 | -76.904340 | 504.00 | 12.00 | 516.00 |
| 9 | 42.936327 | -76.904343 | 506.20 | 12.00 | 518.20 |
| 10 | 42.936313 | -76.904746 | 506.00 | 12.00 | 518.00 |
| 11 | 42.937124 | -76.904750 | 508.20 | 12.00 | 520.20 |
| 12 | 42.937176 | -76.903227 | 513.10 | 12.00 | 525.10 |
| 13 | 42.936731 | -76.903225 | 510.90 | 12.00 | 522.90 |
| 14 | 42.936732 | -76.902783 | 511.30 | 12.00 | 523.30 |

## Discrete Observation Point Receptors

| Name | ID | Latitude (°) | Longitude (°) | Elevation (ft) | Height (ft) |
|---|---|---|---|---|---|
| OP 524 | 524 | 42.927023 | -76.915431 | 496.37 | 5.40 |
| OP 628 | 628 | 42.925407 | -76.926609 | 515.73 | 5.40 |
| OP 633 | 633 | 42.927611 | -76.927502 | 540.99 | 5.40 |
| OP 634 | 634 | 42.927758 | -76.926971 | 538.67 | 5.40 |
| OP 659 | 659 | 42.936297 | -76.924181 | 520.19 | 5.40 |
| OP 661 | 661 | 42.936197 | -76.922895 | 503.93 | 5.40 |
| OP 662 | 662 | 42.937184 | -76.923201 | 504.24 | 5.40 |
| OP 663 | 663 | 42.937540 | -76.923242 | 502.81 | 5.40 |
| OP 667 | 667 | 42.938245 | -76.923338 | 495.79 | 5.40 |
| OP 670 | 670 | 42.938743 | -76.921364 | 498.29 | 5.40 |
| OP 671 | 671 | 42.938849 | -76.919380 | 492.23 | 5.40 |
| OP 675 | 675 | 42.941634 | -76.922158 | 510.11 | 5.40 |
| OP 676 | 676 | 42.942621 | -76.922764 | 515.80 | 5.40 |
| OP 730 | 730 | 42.932108 | -76.942322 | 505.58 | 5.40 |
| OP 731 | 731 | 42.931752 | -76.941635 | 508.77 | 5.40 |
| OP 785 | 785 | 42.939230 | -76.903510 | 520.74 | 5.40 |
| OP 796 | 796 | 42.944982 | -76.886548 | 502.20 | 5.40 |
| OP 825 | 825 | 42.953557 | -76.896621 | 501.23 | 5.40 |
| OP 838 | 838 | 42.920927 | -76.885366 | 487.26 | 5.40 |
| OP 842 | 842 | 42.953854 | -76.896951 | 500.03 | 5.40 |
| OP 848 | 848 | 42.939004 | -76.905611 | 506.22 | 5.40 |

### 9 and OP 842

No glare found

### 9 and OP 848

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