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February 28, 2018

Ms. Barcy F. McNeal, Secretary
Ohio Power Siting Board
Docketing Division
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3797

Re: Second Supplement to Application – Alternative Layout for Tracking System

Case No. 17-774-EL-BGN
In the Matter of the Application of Vinton Solar Energy LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Vinton County, Ohio.

Dear Ms. McNeal:

On July 6, 2017, as supplemented on August 16, 2017, Vinton Solar Energy LLC ("Applicant") filed an application with the Ohio Power Siting Board ("Board") for a Certificate of Environmental Compatibility and Public Need to Construct a Solar-Powered Electric Generation Facility in Vinton County, Ohio ("Application").

At this time, the Applicant is filing this Second Supplement to the Application, in order to provide the Board with information regarding an alternative system upon which the solar modules could be mounted, which would require a different layout than the one proposed in the Application. This alternative layout would employ a tracking system to hold the modules, as opposed to the fixed-tilt racking system proposed in the Application (App. at 9 and Figure 03-2). This alternative layout will not replace the layout set forth in the Application, but will be an alternative option. Therefore, the Applicant requests that both the fixed-tilt racking system and the tracking system proposed herein be approved by the Board. The Applicant commits to notify the Board prior to construction regarding which system is chosen.

In support of the alternative tracking system and layout, the Applicant has attached the following documents:

1. **Attachment 1**: Narrative describing the alternative tracking system in accordance with Ohio Administrative Code (O.A.C.) Rule 4906-4-03(B)(1)(a), generation equipment type.

2. **Attachment 2**: Manufacturer specifications for potential solar tracking systems.

3. **Attachment 3**: A map showing the alternative project layout using a tracking system, dated January 11, 2018.

4. **Attachment 4**: The noise analysis for the alternative layout using the tracking system, which was prepared by Hankard Environmental, dated February 9, 2018.

5. **Attachments 5**: The glare analysis for the alternative layout using the tracking system, which was prepared by Forge Solar, dated February 20, 2018

The original of this Second Supplement to the Application has been filed electronically. In addition, 5 complete paper copies and 10 USB drives containing the supplemental information to the Application have been provided.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ *Christine M.T. Pirik*
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Enclosure

Cc: Jon Pawley

CERTIFICATE OF SERVICE

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to this case. In addition, the undersigned certifies that a copy of the foregoing document is also being served upon the person below via electronic mail this 28th day of February, 2018.

/s/ Christine M.T. Pirik
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Administrative Law Judge:

jay.agranoff@puco.ohio.gov

COLUMBUS 39579-29 84810v4

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 1

Application Narrative

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Application Narrative

Ohio Administrative Code Rule 4906-4-03(B)(1)(a)

Generation Equipment Type

If the alternate tracking system is utilized, rather than the fixed-tilt racking, the solar modules will be affixed to a single axis tracking system. The tracking system will be mounted on piles and will be organized in rows. The arrays will be oriented north to south, so that the tracking system allows the panels to tilt from east to west to follow the sun over the course of the day. The tracking system will employ a motor that is programmed on a timer based on the facility's geographic location so that it tracks with the sun. The Applicant anticipates using a NEXTracker SPT or similar system. The system will maintain a minimum ground clearance of 18 inches, but may range up to approximately 36 inches depending on consideration of factors such as site topography, snowfall, natural vegetation growth, and shading from other panels or objects. Manufacturer specifications for the NEXTracker system, as well as for the Soltec and DuraTrack systems, which may also be used, are provided in Attachment 2 to the Second Supplemental Application as examples of possible tracking systems that might be used.[1] If the Applicant utilizes a tracking system that is not included in Attachment 2, the Applicant will provide the specifications to the Board.

[1] These tracking systems are the same examples approved by the Board in *In re Hardin Solar Energy LLC*, Order (Feb. 15, 2018).

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 2

1) NEXTracker

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NEXTracker

POWER ON.

NEXTrackerSPT

INTRODUCING A WHOLE NEW WAY TO TRACK THE SUN

The NEXTracker™ Self-Powered Tracker (SPT) brings self-contained motor power to each row, saving time and money. No more external power wiring. No more UPS backup systems. Safer, more reliable with higher performance.

Independent, Mechanically-Balanced Rows

The NEXTrackerSPT leverages NEXTracker's mechanically-balanced row design, which aligns the PV panels with the tracker's axis of rotation. This alignment greatly reduces torsional load, requiring less energy from the motor to track throughout the day and freeing each row to track independently.

Plug and Play with No Power Wiring

NEXTrackerSPT's independent rows eliminate external AC power source systems, wiring, and associated trenching. Self-contained units on each row include a dedicated 30W PV panel to provide power to the Self-Powered Controller (SPC), which powers the motor and hosts intelligent control electronics to position each tracker. NEXTrackerSPT's wireless power and communication from the SPC enable each row to be truly plug and play.

Higher Performance & Safety

Independently powered rows eliminate parasitic utility draw for a higher net energy yield. Those intelligent, autonomous rows optimize operation and maintenance activities. The tracking system rapidly moves into safe stow positions; an entire site can be stowed in one to two minutes, versus up to 45 minutes for other horizontal trackers. That same quick positioning makes it five times faster to clean.

More Site Flexibility, Less Site Preparation

NEXTrackerSPT's autonomous rows enable maximum flexibility in system design, freeing layouts from the rectilinear constraints of typical linked-row trackers. No East/West grading, reduced access roads, and better utilization of corner areas increase power capacity 10-20% per site while reducing construction timelines. The self-powered rows allow the system to be commissioned without grid power.

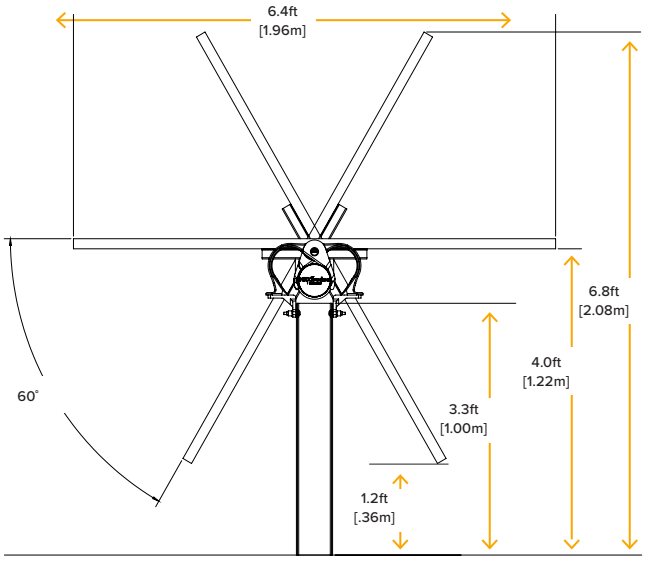
Quicker to track, quicker to commission, quicker to profits.

Document Number: MKT-000002 Revision: 01

NEXTrackerSPT Specifications

Tracking Technology	Horizontal single-axis balanced-mass tracker with independently-driven rows
Tracking Range	Up to 120° (± 60°)
Control System	1 Self-Powered Controller (SPC) per tracker; 1 Network Control Unit per 100 SPCs
Communications	Wireless ZigBee® mesh network/SCADA; no communication wiring required
Drive System	One slew gear, 24VDC motor and self-powered controller w/ dedicated solar panel per row
DC Capacity	23-35kWp per tracker row, depending on module type
System Voltage	Flexible, based on system design
Power Consumption	No grid power required
Ground Coverage Ratio	Any - fully configurable by customer; typical range 33%-50%
Installation Method	Rapid field assembly, no welding required
Foundation Types	Compatible with all major foundation types (driven pier, concrete foundation, ground screw)
Standard Wind Design	100mph/161kph, 3 second gust per ASCE7-10; configurable for higher wind speeds
Safety Stowing	Automated wind and snow stowing with self-contained backup power - no external power required
Torsional Limiter	Included at each foundation/bearing for additional wind & snow load protection
Principal Materials	Galvanized and stainless steel
Grounding Method	Self grounding structure. Separate materials and labor not required
Compliance	Grounding/bonding: UL2703; Structural Design: ASCE7-10
Other Available Options	Snow and flood sensors
Warranty	10 years on structural components, 5 years on drive and control systems
Typical Dimensions	Height 2.1m/6.8ft (@ 60 degrees), Width 2.0m/6.4ft, Length 85m/283ft

Typical 72-cell c-Si configuration: 85m row with 80 modules mounted in portrait:



NEXTracker
6200 Paseo Padre Parkway
Fremont, CA 94555 USA
+1 510 270 2500
nextracker.com

Document Number: MKT-000002 Revision: 01

Attachment 2

2) Soltec Utility Tracker

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SF UTILITY SOLAR TRACKER

Technical Data Sheet

Soltec

SF UTILITY
SOLAR TRACKER

www.soltec-renovables.com

Technical Data Sheet

MAIN FEATURES	
Tracking system	Horizontal
Maximum area of PV Modules	Max. 180 m²
Tracking range	+/- 60º
Drive System	Enclosed Slewing Drive, DC Motor
Rated output speed	0.01 rpm (higher speed available under request)
Power Supply	AC/DC Universal Input | PV-Powered with battery backup
Tracking algorithm	Astronomical with Adaptive Backtracking
Tracking accuracy	+/- 1º
Monitoring and control	MODBUS Communication from Gateway to SCADA
Communication	
Wire	RS485 cable between Trackers and Gateway
Wireless	Wireless Mesh Network
Maximum wind resistance (in any position)	80 km/h
Maximum wind resistance (stow)	220 km/h
Terrain adaptation	
Independent rows	YES
Slope North-South	17%
Slope East-West	Unlimited
Power density per tracker	100%
Power density per MW	510 kW/ha (315W, 72 cells module. GCR: 37.5%)
Ground coverage ratio	Configurable. Typical range: 28-50%
Foundation	Driven pile | Ground screw | Concrete
Modules configuration	
Landscape	2x; 3x; 4x
Portrait	1x; 2x
Typical tracker length	32-46 m

MAINTENANCE	
Self-lubricated bearings	YES
Face to Face Cleaning Mode	YES
Maintenance offered	YES

INSTALLATION	
Tracker installation offered	YES
Supports per MW	275 *ca.*

DRIVE SYSTEM	
Power consumption	Maximum: 75Wh/day per tracker Nominal: 12Wh/day per tracker
International Protection Marking	IP65
Temperature range	-20ºC to +55ºC

WARRANTY	
Structure	10
Motor	5
Electronics	5

AVAILABILITY	>99%

Soltec

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DNV GL Technology Review available
Bankability report
WIND TUNNEL TESTED

TÜVRheinland CERTIFIED
Management System ISO 9001:2008
www.tuv.com ID 9105047415

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 2

3) Dura Track Tracker

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DuraTrack® HZ v3

A (r)evolutionary design that builds on the DuraTrack heritage while adding innovative features engineered to deliver the best LCOE in the industry.

THE (R)EVOLUTION IN TRACKER DESIGN IS HERE.

DuraTrack HZ v3 is not just an evolution of our innovative single-axis horizontal solar tracker, it incorporates revolutionary features found nowhere else in the industry.

HIGHEST POWER DENSITY

In fact, 6% more than our closest competitor. Increase capacity on a reduced footprint, or add to production by cutting down on backtracking.

GREATEST RELIABILITY

Reducing the number of sensitive components has resulted in the highest operational uptime in the industry. An improved driveline design allows for fewer motors—less than two per megawatt. No stow required—a failure-free wind relief management feature takes care of that.

ULTRA-EFFICIENT INSTALLATION

One single-fastener clamp per module streamlines the most labor-intensive step. Per megawatt, this equals 15,000 fewer fasteners than competitive systems, adding up to big savings.

ZERO MAINTENANCE

Gearboxes are sealed and lubricated for life resulting in zero scheduled maintenance. All tracker rows self-calibrate twice daily ensuring that each row is always at the optimal tracking angle.

Array Technologies Inc.

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Albuquerque, NM 87109 USA

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E sales@arraytechinc.com

W arraytechinc.com

DuraTrack HZ v3

THE V3 DELIVERS LOWEST LCOE

Add it up. Working together, all the features of the DuraTrack HZ v3 are designed to result in the best LCOE. When you calculate what you'll save on installation due to the streamlined design, what you won't be spending on O&M due to zero scheduled maintenance, and what you'll add in production due to 99.996% uptime, 6% more density and optimized 52° ROM, you'll discover the value added by going with the industry leader in solar tracking.

With more gigawatts installed, and nearly 30 years dedicated to tracker design and manufacturing, Array's reliability and reputation make it the low-risk choice that you and your financial institution can rely on.

THE ARRAY ADVANTAGE

Array Technologies is the worldwide leader in tracking solutions for utility and commercial solar electric generation systems, with multiple gigawatts across the globe. After more than 28 years in the industry, Array's innovations in solar tracking continue to provide the best levelized cost of electricity through reliable, easy to install and maintain systems. Array Technologies' solutions are engineered in the USA and shipped worldwide.

STRUCTURAL & MECHANICAL FEATURES/SPECIFICATIONS	
Tracking Type	Horizontal single axis
Tilt Angle	0°
kW per Drive Motor	~ 650–800 kW DC
String Voltage	Up to 1,500V DC
Maximum Linked Rows	28
Maximum Row Size	80 modules (crystalline, 1,000V DC) & 90 modules (crystalline, 1,500V DC)
Drive Type	Rotating gear drive
Motor Type	2 HP, 3 PH, 480V AC
Motors per 1 MW AC	Less than 2
East-West / North-South Dimensions	Site / module specific
Array Height	54" standard, adjustable (46" min height above grade)
Ground Coverage Ratio (GCR)	Flexible, 28–45% typical
Modules Supported	Most commercially available, including frameless crystalline and thin film
Tracking Range of Motion	± 52°
Operating Temperature Range	-30°F to 140°F (-34°C to 60°C)
Module Configuration	Single-in-portrait standard. Dual-in-landscape (crystalline), four-in-landscape (thin film) also available.
Module Attachment	Single fastener, high-speed mounting clamps with integrated grounding. Traditional rails for crystalline in landscape, custom racking for thin film and frameless crystalline per manufacturer specs.
Materials	HDG steel and aluminum structural members
Allowable Wind Load (IBC 2012)	135 mph, 3-second gust exposure C
Wind Protection	Passive mechanical system relieves wind and obstruction damage — no power required
ELECTRONIC CONTROLLER FEATURES/SPECIFICATIONS	
Solar Tracking Method	Algorithm with GPS input
Control Electronics	MCU plus Central Controller
Data Feed	MODBUS over Ethernet to SCADA system
Night-time Stow	Yes
Tracking Accuracy	± 2° standard, field adjustable
Backtracking	Yes
INSTALLATION, OPERATION & MAINTENANCE	
PE Stamped Structural Calculations & Drawings	Yes
On-site Training & System Commissioning	Yes
Connection Type	Fully bolted connections, no welding
In-field Fabrication Required	No
Dry Slide Bearings & Articulating Driveline Connections	No lubrication required
Scheduled Maintenance	None required
GENERAL	
Annual Power Consumption (kWh per 1 MW)	400 kWh per MW per year, estimated
Land Area Required per 1 MW	Approx. 5 to 5.75 acres per MW @ 33% GCR (site and design specific)
Energy Gain vs. Fixed-Tilt	Up to 25%, site specific
Warranty	10 year structural, 5 year drive & control components
Patent Numbers	US patent 8,459,249 US patent 9,281,778 US patent 9,581,678 B2 and patents pending
Codes and Standards	UL Certified (3703 & 2703)

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 3

Alternative Project Layout

January 11, 2018

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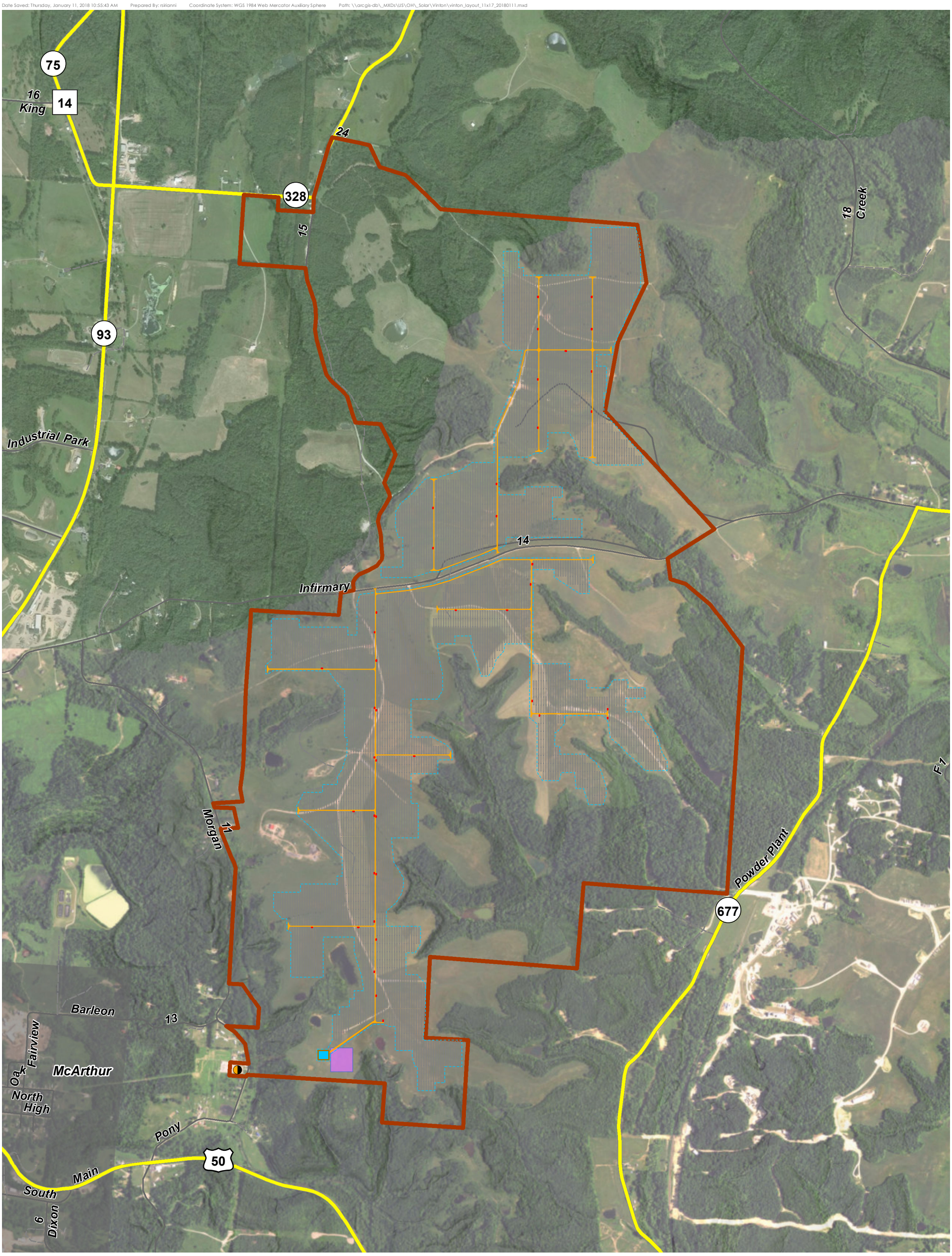
Date Saved: Thursday, January 11, 2018 10:55:43 AM Prepared By: rsirianni Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere Path: \\arcgis-db_MXDs\US\OH_Solar\Vinton\vinton_layout_11x17_20180111.mxd



Legend

- POI
- Inverter
- Substation
- Fence
- Module
- Access Roads

Road Classification

- US/State Route
- County Road
- Local Road
- Dirt/Unpaved Road
- Potential Battery Storage Area

- Proposed Project Boundary

1,200 0 1,200
Feet

Layout Summary

Vinton Solar Energy Center, Vinton County, Ohio

Rev. 00
January 11, 2018

Invenergy

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 4

Noise Analysis for Alternative Layout with Solar Trackers

by Hankard Environmental
February 9, 2018

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HANKARD ENVIRONMENTAL
ACOUSTICS AND VIBRATION CONSULTING

VINTON SOLAR ENERGY CENTER – UPDATED NOISE ANALYSIS ADDING SOLAR TRACKERS

TO:	**Gabe Klooster** – *Invenergy*	**DATE:**	February 9, 2018
FROM:	Jeff Cerjan – *Hankard Environmental*	**PROJECT:**	Vinton Solar Energy Center
SUBJECT:	Updated Noise Analysis Adding Solar Trackers		
CC:	Mike Hankard – *Hankard Environmental*		

Invenergy requested that Hankard Environmental update the report *Pre-Construction Noise Analysis for the Vinton Solar Energy Center, Hankard Environmental, August 7, 2017* to include noise from solar panel tracking motors that are now part of the Project's alternate design. While these motors are small and generate minimal sound, it is estimated that there will be 4,334 of them (one for each single axis tracker). The following provides a description of how the noise analysis was modified to include the solar tracker motors in the noise model and how it affects the predicted operational noise levels. In summary, the addition of the motors does not appreciably change the results of the noise analysis, and noise emissions from the Project are still predicted to be in compliance with applicable noise regulations.

Tracker Motor Sound Power Levels

A total of 4,334 solar tracker motors were added to the noise model of the Project. Each motor was added at the centerpoint of each single axis tracker per the Project's design at a height of six feet above the ground. The sound power levels of each motor are listed in Table 1 and were provided by the manufacturer.

Table 1. Sound Power Levels of Solar Tracker Motor

Equipment (quantity)	Usage (%)	Octave Band Sound Power Level (dB)									Overall Sound Power Level (dBA)
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	
Solar Tracker Motor – Single Axis (4,334)	100%	45	62	60	60	57	56	55	54	50	62

Predicted Operational Noise Levels with Solar Tracker Motors

The addition of the 4,334 single-axis solar tracker motors is predicted to increase the operational noise levels by less than 0.4 dB at the receptors located around the Project. Table 2, below, compares Project noise levels to ambient noise levels. After rounding, there is no difference between these levels and those reported previously. Table 3 provides the updated noise level predictions at each noise receptor location.

Table 2. Comparison of Project and Ambient Noise Levels with Solar Tracker Motors

Receiver	Operational $L_{eq\text{-}1hr}$ (dBA)	Measured Ambient $L_{eq\text{-}1hr}$ (dBA)		Site-Wide Ambient $L_{eq\text{-}1hr}$ + 5 dBA (dBA)	
		Daytime*	Nighttime**	Daytime*	Nighttime**
M1	30	47	41	48	44
M2	35	42	35	48	44
M3	26	45	36	48	44
M4	29	50	47	48	44
M5	27	53	35	48	44

* Daytime: 7:00 am – 7:00 pm ** Nighttime: 7:00 pm – 7:00 am

Table 3. Predicted Operational Noise Levels with Solar Tracker Motors

Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)
M1	30	R036	27	R078	25	R120	27	R162	26
M2	35	R037	20	R079	25	R121	29	R163	28
M3	26	R038	26	R080	25	R122	30	R164	27
M4	29	R039	30	R081	25	R123	30	R165	27
M5	27	R040	26	R082	25	R124	31	R166	26
M6	34	R041	30	R083	25	R125	32	R167	26
Property Line (worst case)	66	R042	33	R084	25	R126	31	R168	26
R001	31	R043	29	R085	25	R127	31	R169	25
R002	26	R044	30	R086	24	R128	28	R170	25
R003	26	R045	32	R087	25	R129	28	R171	26
R004	29	R046	32	R088	25	R130	27	R172	26
R005	29	R047	32	R089	25	R131	28	R173	24
R006	27	R048	32	R090	25	R132	27	R174	25
R007	26	R049	24	R091	25	R133	28	R175	26
R008	29	R050	24	R092	25	R134	28	R176	25
R009	26	R051	24	R093	24	R135	27	R177	25
R010	30	R052	24	R094	24	R136	24	R178	25
R011	31	R053	25	R095	24	R137	23	R179	24
R012	31	R054	25	R096	24	R138	27	R180	24
R013	31	R055	24	R097	25	R139	27	R181	27
R014	31	R056	24	R098	25	R140	28	R182	27
R015	31	R057	24	R099	30	R141	28	R183	27
R016	30	R058	24	R100	32	R142	27	R184	27

Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)	Receiver	L_{eq} (dBA)
R017	30	R059	24	R101	32	R143	27	R185	31
R018	29	R060	24	R102	27	R144	26	R186	27
R019	30	R061	24	R103	28	R145	24	R187	27
R020	30	R062	25	R104	27	R146	25	R188	26
R021	32	R063	25	R105	25	R147	25	R189	26
R022	30	R064	24	R106	29	R148	25	R190	26
R023	30	R065	25	R107	29	R149	25	R191	26
R024	30	R066	25	R108	30	R150	27	R192	25
R025	28	R067	25	R109	27	R151	27	R193	23
R026	32	R068	25	R110	26	R152	27	R194	23
R027	29	R069	25	R111	27	R153	27	R195	23
R028	27	R070	25	R112	26	R154	27	R196	22
R029	27	R071	25	R113	30	R155	28	R197	22
R030	27	R072	25	R114	28	R156	28	R198	22
R031	29	R073	25	R115	34	R157	25	R199	21
R032	27	R074	25	R116	28	R158	26	R200	21
R033	26	R075	25	R117	32	R159	26	R201	21
R034	24	R076	25	R118	31	R160	26	R202	20
R035	27	R077	25	R119	27	R161	31		

Updated Noise Level Contours

The updated operational noise levels are illustrated graphically in Figure 1. Shown are the operational noise level contours of 44 and 48 dBA. In all areas, predicted operational noise levels at residences remain lower than the standards. These results are very similar to the original noise report.

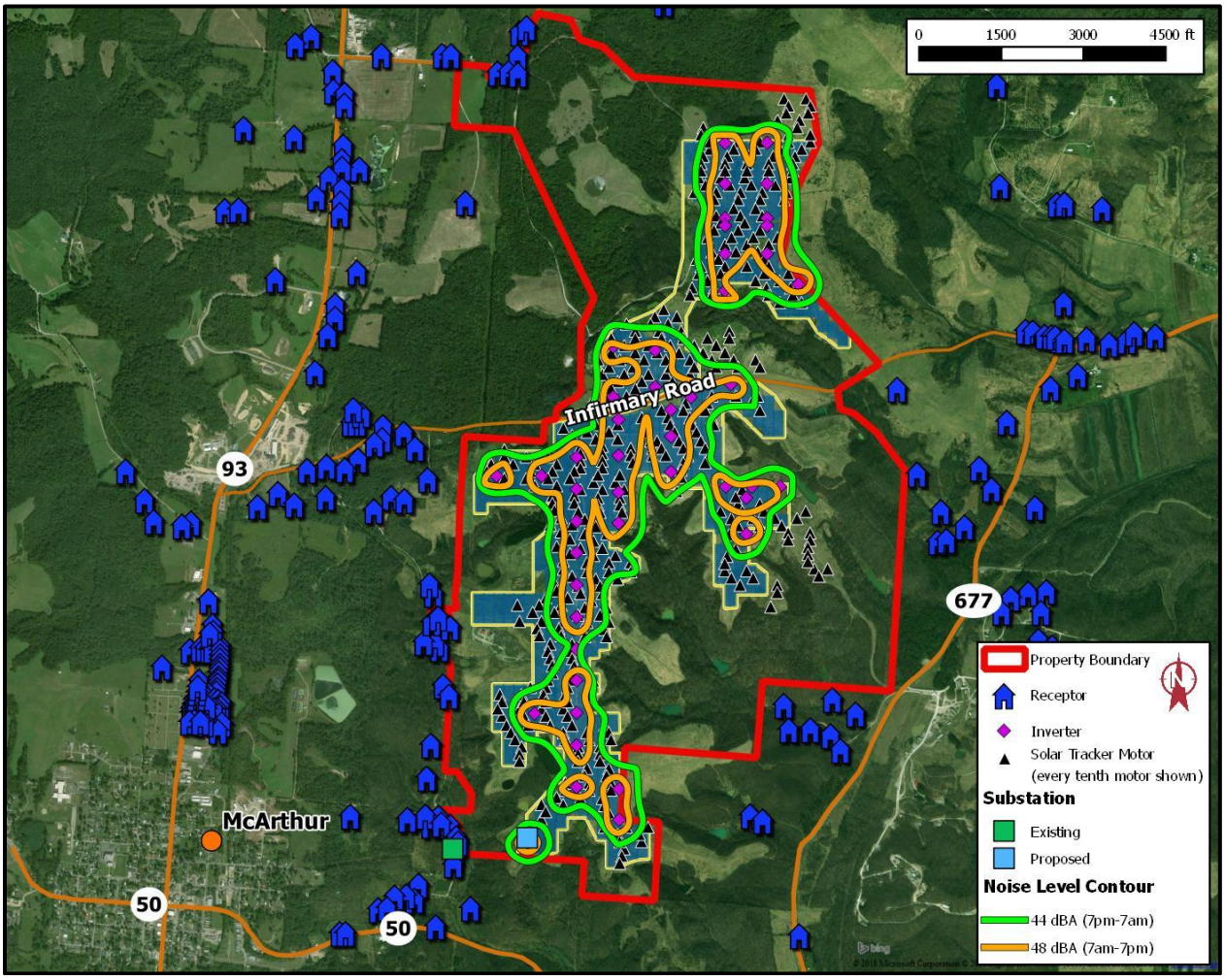

Figure 1. Noise Level Contours for Operation of the Vinton Solar Energy Center with Solar Trackers

Vinton Solar Energy, LLC
Case No. 17-774-EL-BGN
Supplement to Application
February 2018

Attachment 5

Glare Analysis for Alternative Layout with Solar Trackers

by Forge Solar
February 20, 2018

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GlareGauge Glare Analysis Results

Site Configuration: Vinton Solar Tracking

Project site configuration details and results.

Created **Feb. 20, 2018 12:26 p.m.**
Updated **Feb. 20, 2018 12:33 p.m.**
DNI **varies** and peaks at **1,000.0 W/m^2**
Analyze every **1** minute(s)
0.5 ocular transmission coefficient
0.002 m pupil diameter
0.017 m eye focal length
9.3 mrad sun subtended angle
Site Configuration ID: 14948.1286

Summary of Results

Glare with low potential for temporary after-image predicted

PV name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
Vinton Solar Tracking	SA tracking	SA tracking	279	0	-

Component Data

PV Array(s)

Name: Vinton Solar Tracking
Axis tracking: Single-axis rotation
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 0.0 deg
Rated power: -
Panel material: Light textured glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? No
Slope error: 10.0 mrad

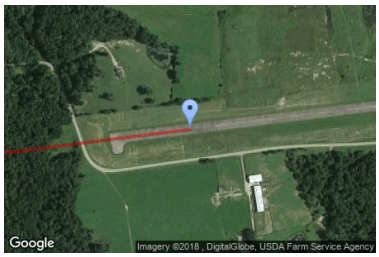
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	39.285387	-82.445569	907.14	0.00	907.14
2	39.284456	-82.443295	932.57	0.00	932.57
3	39.284689	-82.436771	938.85	0.00	938.85
4	39.282231	-82.436299	895.41	0.00	895.41
5	39.280304	-82.436900	896.54	0.00	896.54
6	39.279972	-82.438445	922.17	0.00	922.17
7	39.278311	-82.435484	888.41	0.00	888.41
8	39.276285	-82.434969	893.22	0.00	893.22
9	39.275022	-82.433038	913.99	0.00	913.99
10	39.273494	-82.433252	882.83	0.00	882.83
11	39.273129	-82.434239	853.13	0.00	853.13
12	39.277647	-82.441063	898.58	0.00	898.58
13	39.277314	-82.442179	893.66	0.00	893.66
14	39.276550	-82.442479	895.89	0.00	895.89
15	39.276550	-82.444839	947.57	0.00	947.57
16	39.275986	-82.445354	942.40	0.00	942.40
17	39.275421	-82.445354	925.68	0.00	925.68
18	39.275155	-82.444239	923.14	0.00	923.14
19	39.275587	-82.442436	893.36	0.00	893.36
20	39.275321	-82.441578	878.52	0.00	878.52
21	39.274590	-82.441664	867.33	0.00	867.33
22	39.274524	-82.440333	879.20	0.00	879.20
23	39.272099	-82.435913	828.40	0.00	828.40
24	39.271600	-82.436128	818.37	0.00	818.37
25	39.271368	-82.437544	862.18	0.00	862.18
26	39.271966	-82.439046	895.50	0.00	895.50
27	39.271833	-82.439432	907.51	0.00	907.51
28	39.270670	-82.438188	887.44	0.00	887.44
29	39.270869	-82.435012	851.70	0.00	851.70
30	39.268261	-82.435591	930.48	0.00	930.48
31	39.268145	-82.436750	885.48	0.00	885.48
32	39.271766	-82.443724	925.63	0.00	925.63
33	39.269457	-82.442307	908.65	0.00	908.65
34	39.265919	-82.436514	804.78	0.00	804.78
35	39.262297	-82.435527	879.82	0.00	879.82
36	39.264573	-82.439110	858.24	0.00	858.24
37	39.263859	-82.440784	876.49	0.00	876.49
38	39.261899	-82.438660	893.29	0.00	893.29
39	39.261167	-82.440033	919.12	0.00	919.12
40	39.262164	-82.441320	886.40	0.00	886.40
41	39.260436	-82.442608	886.36	0.00	886.36
42	39.265886	-82.444925	915.24	0.00	915.24
43	39.267215	-82.443638	934.55	0.00	934.55
44	39.268012	-82.445011	944.92	0.00	944.92
45	39.266949	-82.446213	917.35	0.00	917.35
46	39.268810	-82.447844	912.35	0.00	912.35
47	39.268012	-82.448959	888.53	0.00	888.53
48	39.265487	-82.447586	838.56	0.00	838.56
49	39.265022	-82.449903	886.05	0.00	886.05
50	39.264158	-82.448444	921.10	0.00	921.10
51	39.263161	-82.448015	931.38	0.00	931.38
52	39.262364	-82.450247	894.06	0.00	894.06
53	39.259705	-82.447758	919.55	0.00	919.55
54	39.259971	-82.446985	910.27	0.00	910.27
55	39.258110	-82.445698	896.35	0.00	896.35
56	39.258044	-82.447157	908.43	0.00	908.43
57	39.259705	-82.449560	921.66	0.00	921.66

58	39.258576	-82.451706	883.36	0.00	883.36
59	39.254920	-82.448187	881.48	0.00	881.48
60	39.255585	-82.444153	857.95	0.00	857.95
61	39.253857	-82.443895	908.09	0.00	908.09
62	39.252328	-82.448273	875.23	0.00	875.23
63	39.251265	-82.449217	877.06	0.00	877.06
64	39.249005	-82.442694	854.72	0.00	854.72
65	39.247875	-82.443380	836.79	0.00	836.79
66	39.248806	-82.448616	879.97	0.00	879.97
67	39.248141	-82.450762	891.28	0.00	891.28
68	39.251132	-82.451878	881.28	0.00	881.28
69	39.250999	-82.452822	877.36	0.00	877.36
70	39.248540	-82.453766	895.78	0.00	895.78
71	39.249005	-82.456598	890.32	0.00	890.32
72	39.250268	-82.457457	860.97	0.00	860.97
73	39.253325	-82.452822	934.91	0.00	934.91
74	39.255452	-82.454109	925.40	0.00	925.40
75	39.252727	-82.457285	894.39	0.00	894.39
76	39.254322	-82.457972	915.69	0.00	915.69
77	39.258243	-82.459431	833.23	0.00	833.23
78	39.258709	-82.454710	914.86	0.00	914.86
79	39.260769	-82.456598	919.35	0.00	919.35
80	39.260702	-82.460203	880.11	0.00	880.11
81	39.262497	-82.460976	833.35	0.00	833.35
82	39.262829	-82.459860	841.31	0.00	841.31
83	39.262364	-82.458487	855.38	0.00	855.38
84	39.262829	-82.456770	870.53	0.00	870.53
85	39.263892	-82.457457	851.07	0.00	851.07
86	39.265620	-82.453508	929.45	0.00	929.45
87	39.266949	-82.454453	924.79	0.00	924.79
88	39.265553	-82.459688	861.12	0.00	861.12
89	39.267215	-82.459946	927.15	0.00	927.15
90	39.269075	-82.459517	857.23	0.00	857.23
91	39.269540	-82.454453	891.22	0.00	891.22
92	39.272132	-82.452393	869.65	0.00	869.65
93	39.272796	-82.450762	882.06	0.00	882.06
94	39.274192	-82.451363	904.75	0.00	904.75
95	39.277713	-82.445869	902.69	0.00	902.69
96	39.279839	-82.445526	933.26	0.00	933.26
97	39.281168	-82.447071	916.91	0.00	916.91
98	39.281301	-82.449131	921.72	0.00	921.72
99	39.282696	-82.448530	929.54	0.00	929.54
100	39.281633	-82.446985	919.94	0.00	919.94

Flight Path Receptor(s)

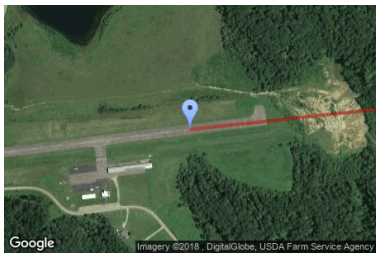
Name: Flight Path 1
Description:
Threshold height: 50 ft
Direction: 82.8 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 180.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	39.327542	-82.445912	945.80	50.00	995.80
2-mile point	39.323894	-82.483034	867.53	681.73	1549.26



Name: Flight Path 2
Description:
Threshold height: 50 ft
Direction: 263.8 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 180.0 deg

Point	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
Threshold	39.328455	-82.436450	933.97	50.00	983.97
2-mile point	39.331558	-82.399244	761.35	776.08	1537.43



Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	ft	ft	ft
OP 1	39.274192	-82.431021	861.09	6.00	867.09
OP 2	39.270438	-82.423296	784.14	6.00	790.14
OP 3	39.257504	-82.431364	773.80	6.00	779.80
OP 4	39.241926	-82.453465	697.61	6.00	703.61
OP 5	39.263859	-82.476254	714.83	6.00	720.83
OP 6	39.278809	-82.468357	777.16	6.00	783.16
OP 7	39.270861	-82.453798	882.28	6.00	888.28

PV Array Results

Vinton Solar Tracking low potential for temporary after-image

Component	Green glare (min)	Yellow glare (min)
FP: Flight Path 1	0	0
FP: Flight Path 2	0	0
OP: OP 1	59	0
OP: OP 2	51	0
OP: OP 3	41	0
OP: OP 4	0	0
OP: OP 5	41	0
OP: OP 6	17	0
OP: OP 7	70	0

Vinton Solar Tracking - Flight Path Receptor (Flight Path 1)

No glare found

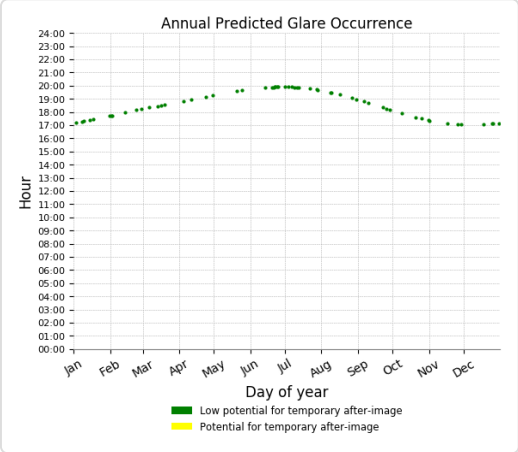
Vinton Solar Tracking - Flight Path Receptor (Flight Path 2)

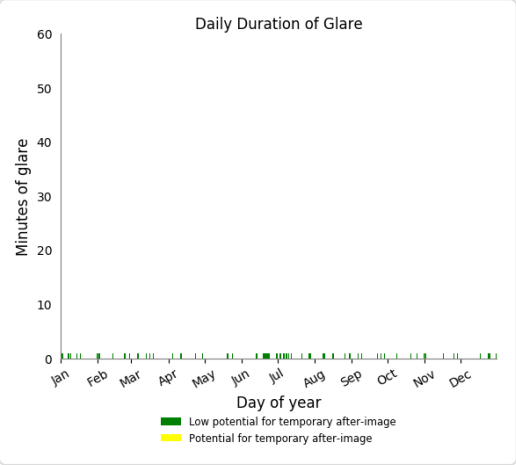
No glare found

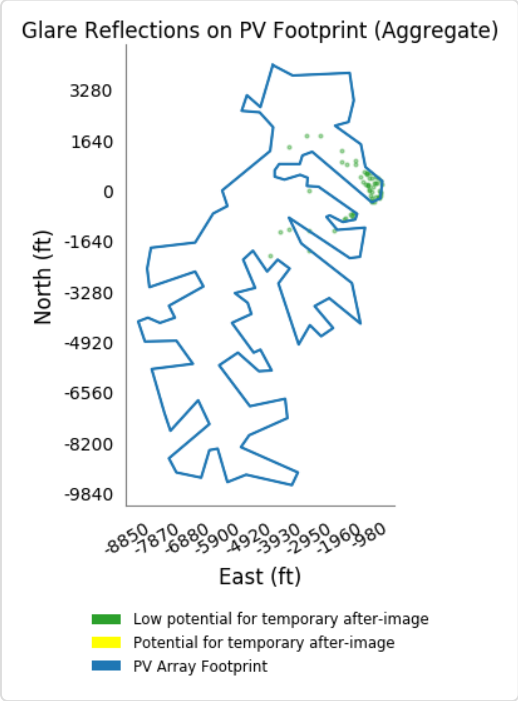
Vinton Solar Tracking - OP Receptor (OP 1)

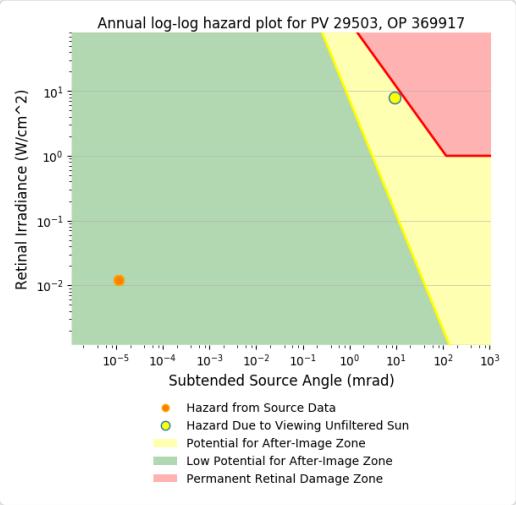
PV array is expected to produce the following glare for receptors at this location:

- 59 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.





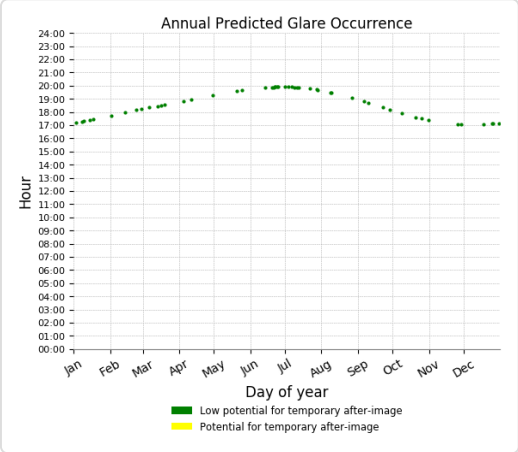


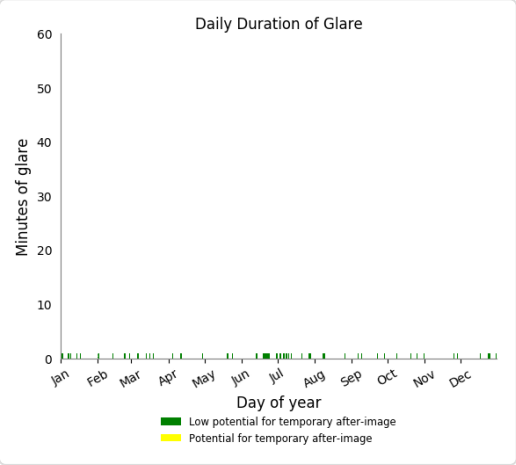


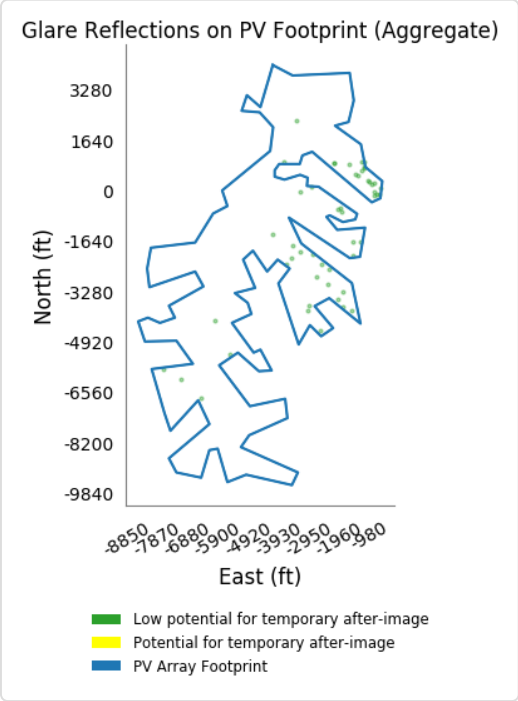
Vinton Solar Tracking - OP Receptor (OP 2)

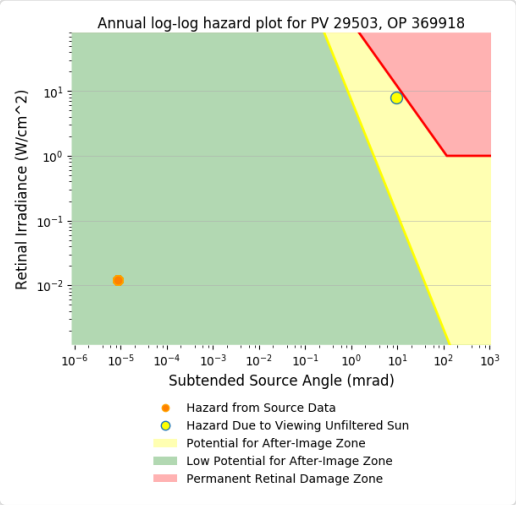
PV array is expected to produce the following glare for receptors at this location:

- 51 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.





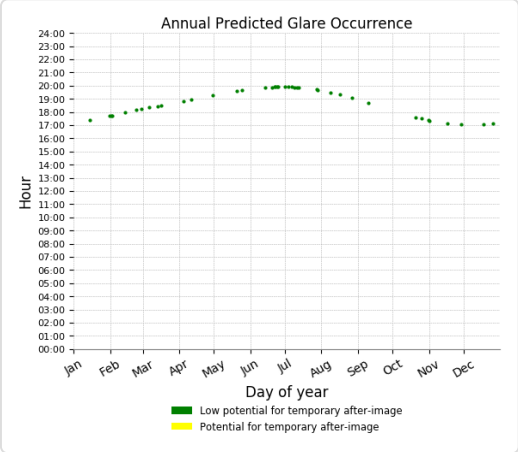


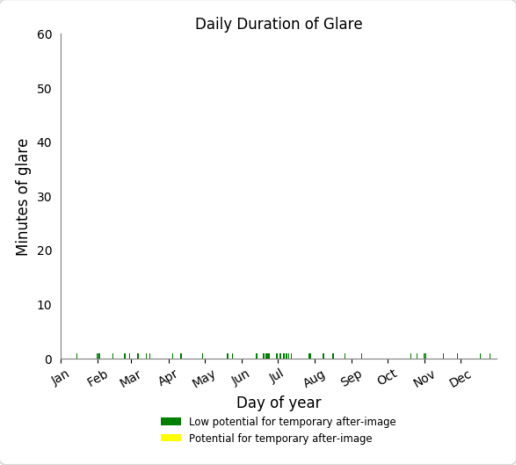


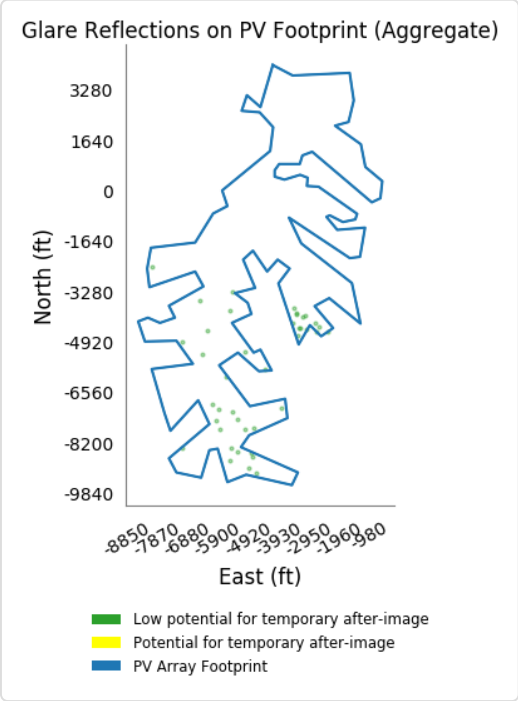
Vinton Solar Tracking - OP Receptor (OP 3)

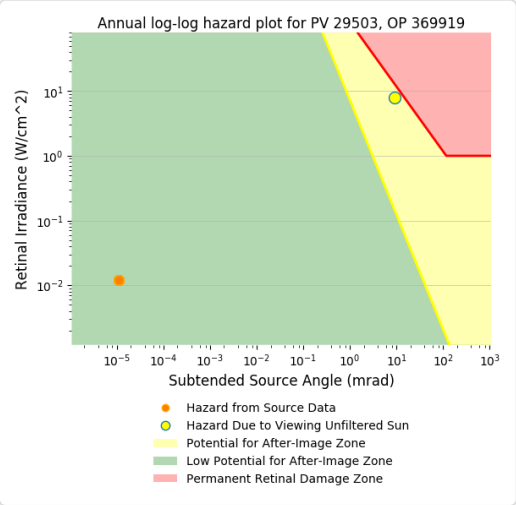
PV array is expected to produce the following glare for receptors at this location:

- 41 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.









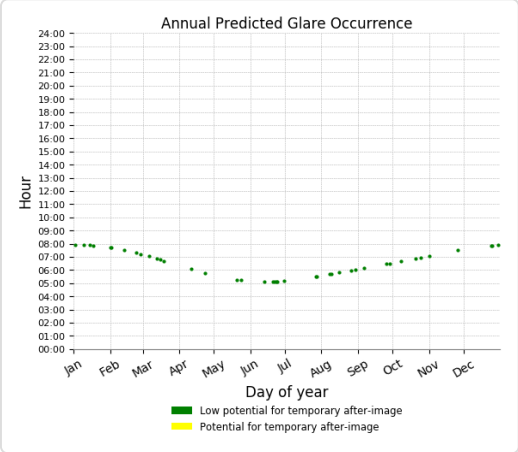
Vinton Solar Tracking - OP Receptor (OP 4)

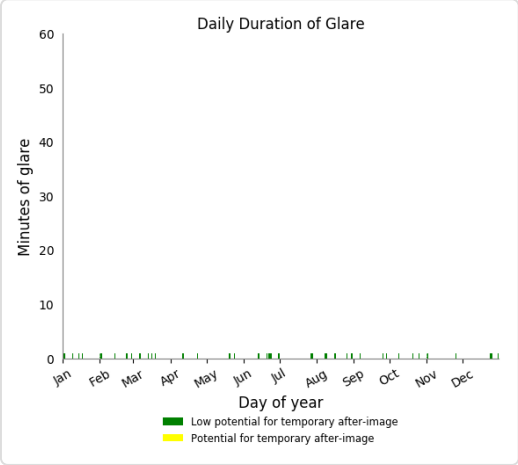
No glare found

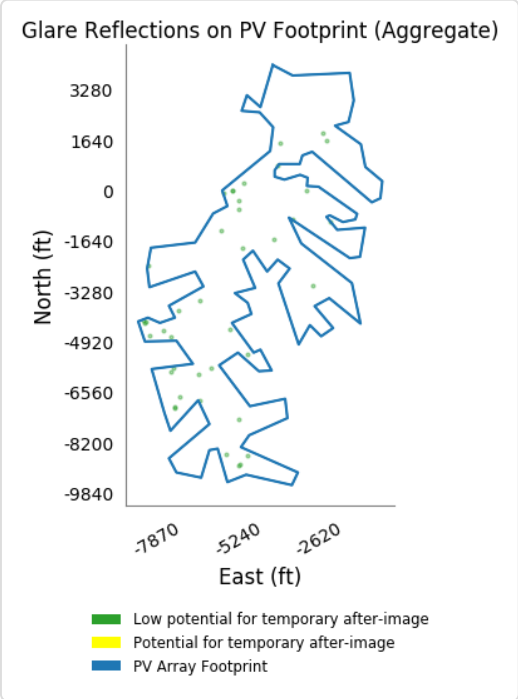
Vinton Solar Tracking - OP Receptor (OP 5)

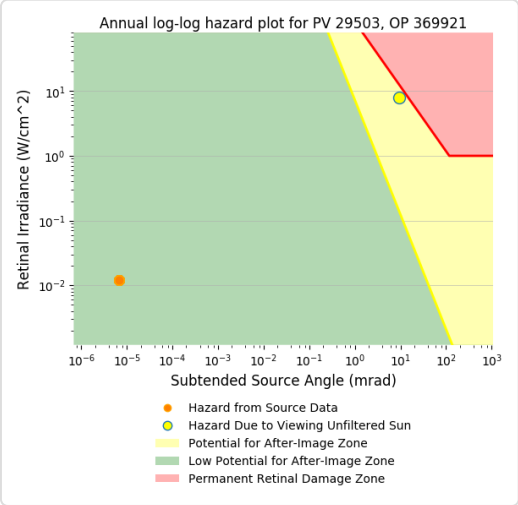
PV array is expected to produce the following glare for receptors at this location:

- 41 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.





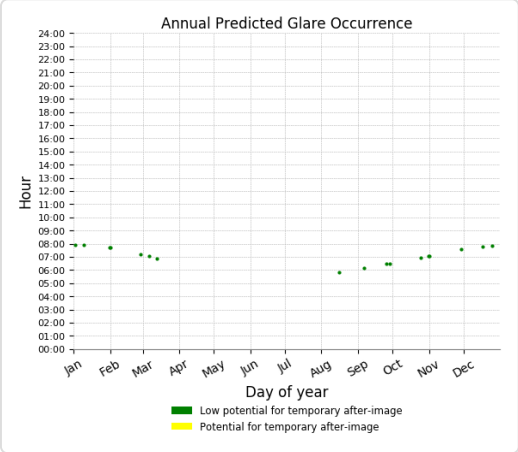


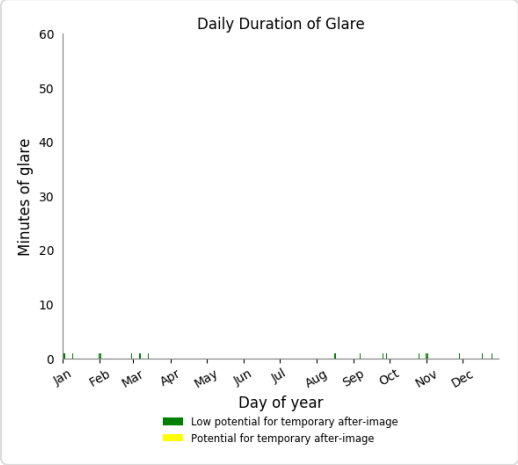


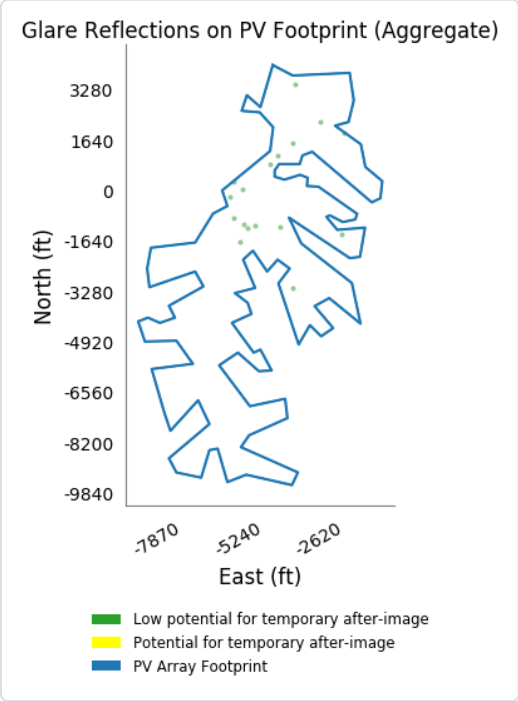
Vinton Solar Tracking - OP Receptor (OP 6)

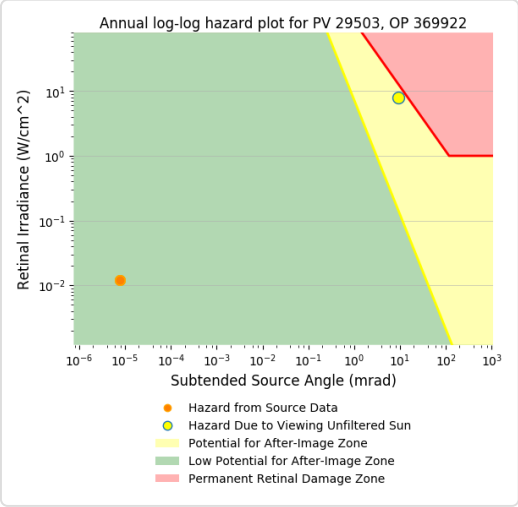
PV array is expected to produce the following glare for receptors at this location:

- 17 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.





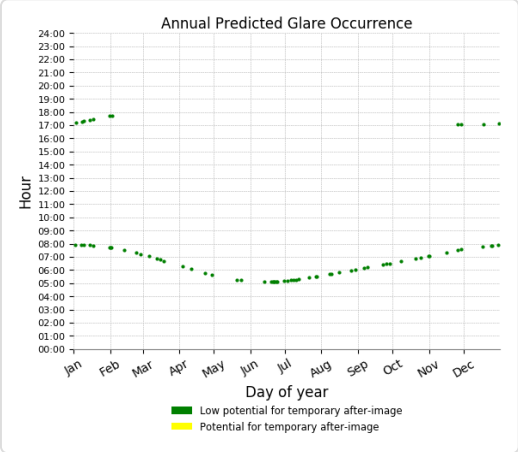


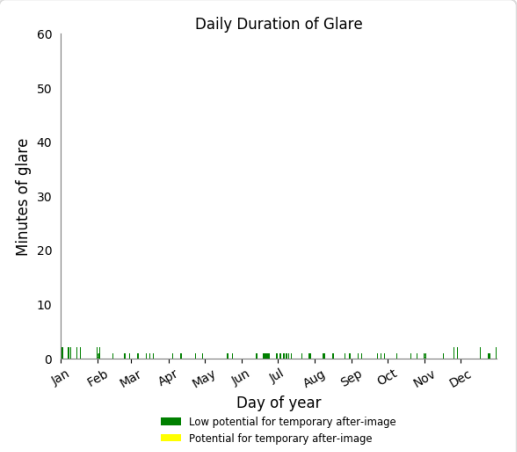


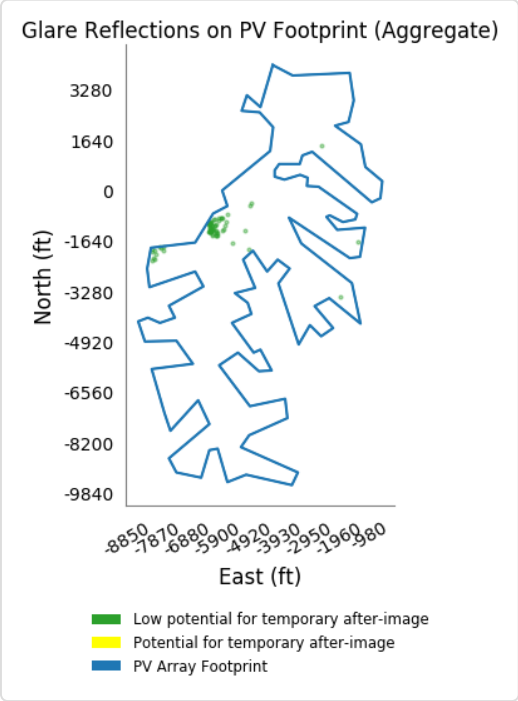
Vinton Solar Tracking - OP Receptor (OP 7)

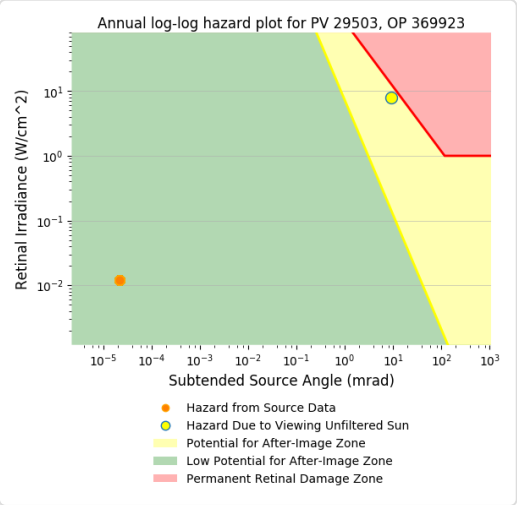
PV array is expected to produce the following glare for receptors at this location:

- 70 minutes of "green" glare with low potential to cause temporary after-image.
- 0 minutes of "yellow" glare with potential to cause temporary after-image.









Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values may differ.
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Summary: Notice Second Supplement to Application – Alternative Layout for Tracking System electronically filed by Christine M.T. Pirik on behalf of Vinton Solar Energy LLC