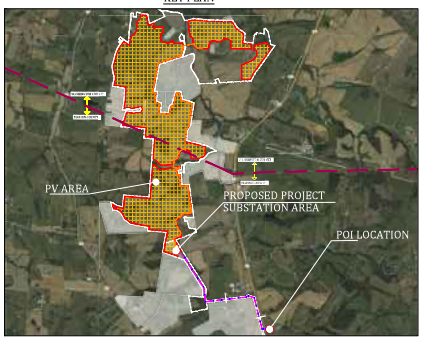
SAR EXHIBIT A

NOT FOR CONSTRUCTION

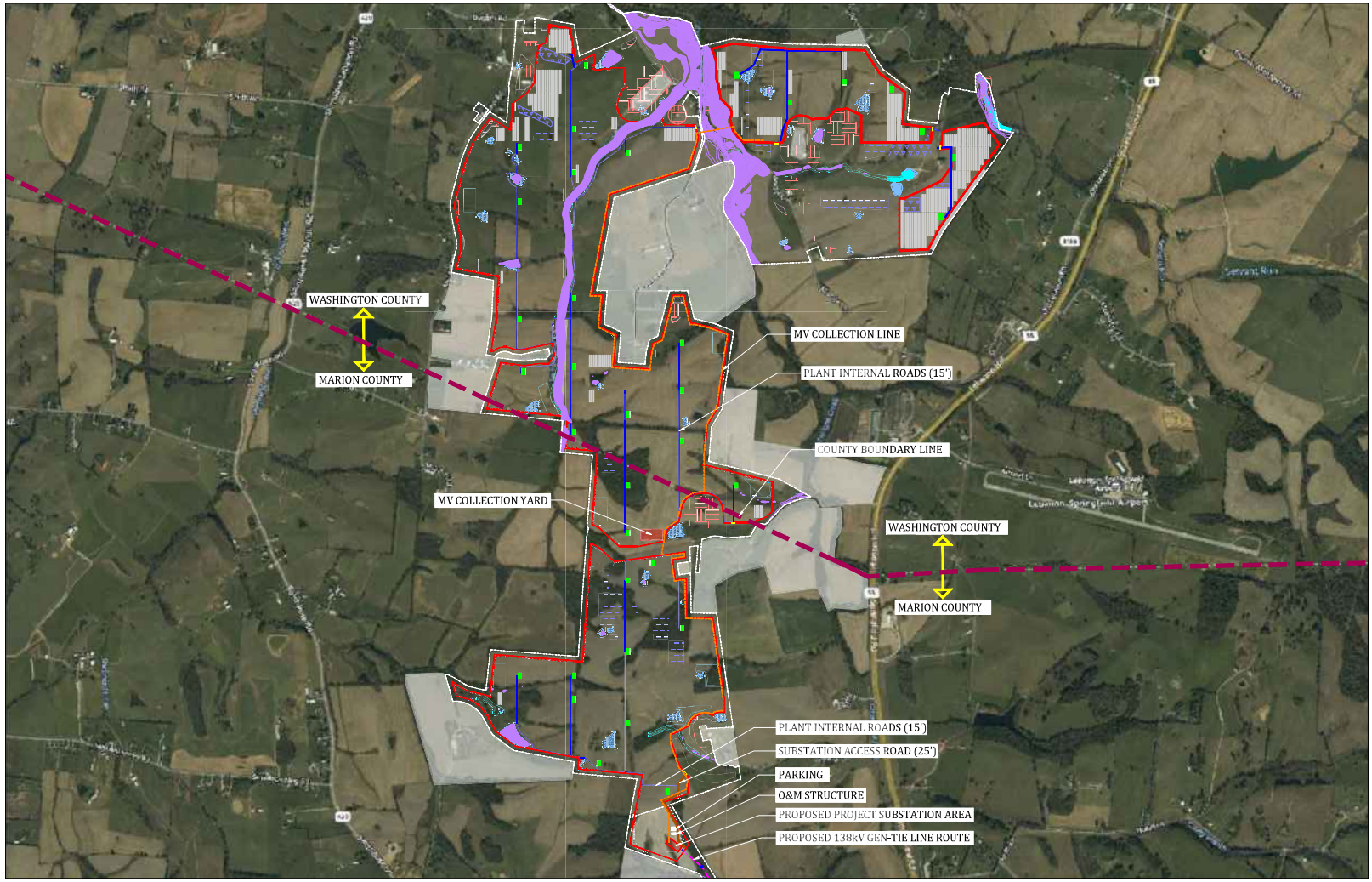
KEY PLAN



LEGEND:-	
SYMBOL	DESCRIPTION
	SITE BOUNDARY
	SITE FENCE
	SETBACK LINE
	COUNTY ROAD
	TRACKER
	INVERTER SKID
	PLANT INTERNAL ROADS (15')
	SUBSTATION ACCESS ROAD (25')
	WETLAND
	UNDULATED AREA
	TREE SHADING AREA
	STORM WATER BASINS
	RESIDENTIAL SETBACK

LEGEND:-	
SYMBOL	DESCRIPTION
	ACCESS GATE
	PROPOSED 138kV GEN-TIE LINE ROUTE
	PROPOSED MV COLLECTION LINE ROUTE
	FLOOD AREA
	NATURAL DRAIN
	COUNTY BOUNDARY LINE
	EXCLUSION AREA
	PROPOSED GEN TIE STRUCTURE

N



Project Details

Site latitude	37°38'18.12"N
Site longitude	85°16'12.91"W
PV DC capacity (max.)	145.119 MWp
PV AC capacity at POI	120 MWac
DC AC ratio at POI	1.209
Evacuation voltage	138 kV
Module wattage	545Wp
Module type	Bifacial
Module quantity	266274
Module per string	27
Total strings	9862
PV Inverter rating	4MWac
PV Inverter Type	Central
PV Inverter quantity	35
Racking type	Tracker
Pitch	24'-11"
Ground coverage ratio	30%
Tracker Quantity_4 String Tracker	2039
Tracker Quantity_3 String Tracker	412
Tracker Quantity_2 String Tracker	235
Total Trackers	2686
Land area used for PV	935 Acres
Site fence length	76461'

Note:-
* All Dimensions Are in Feet.
* Coordinates System :-
UTM84-16N,UTM-WGS 1984 datum, Zone 16 North, Meter; Cent. Meridian 87d W
* Tree cutting considered

DATE	REV.	REVISION HISTORY	DRN. BY	CKD. BY	APPD. BY
2023-12-21	09	LAND BOUNDARY AND CONSTRAINTS REVISED	MA	PS	KP
2023-09-22	08V04	MATTINGLY KEVIN PROPERTY & PINKSTON (KIM) PROPERTY USED	SS	PS	KP
2023-08-29	07	LAND BOUNDARY REVISED	SS	PS	KP
2023-05-06	06	LAND BOUNDARY REVISED	MA	PS	KP
2023-03-27	05V02	DC CAPACITY AND GCR REVISED	MA	PS	KP
2022-10-27	04	NEW PARCEL ADDED & AC CAPACITY REVISED	MA	PS	KP
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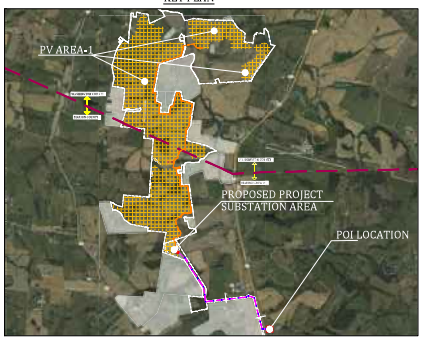
2022-07-27	01	WET LAND DELINEATION ADDED	YS	PS	KP
2022-03-31	00	FIRST ISSUE	MA	PS	KP

BrightNight Power

PROJECT NAME	FRONTIER (FRON)				
DRAWN		TITLE:- PLANT LAYOUT (PV)			
APPROVED		PURPOSE CODE	DRAWING NO.	REV.	SHEET
SCALE	NTS	ISSUE FOR PERMIT	00	09	1 OF 5

NOT FOR CONSTRUCTION

KEY PLAN



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	SETBACK LINE
	COUNTY ROAD
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	INVERTER SKID
	PLANT INTERNAL ROADS (15')
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	UNDULATED AREA
	TREE SHADING AREA
	STORM WATER BASINS
	RESIDENTIAL SETBACK

LEGEND:-	
SYMBOL	DESCRIPTION
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	FLOOD AREA
	NATURAL DRAIN
	COUNTY BOUNDARY LINE
	EXCLUSION AREA
	PROPOSED GEN TIE STRUCTURE

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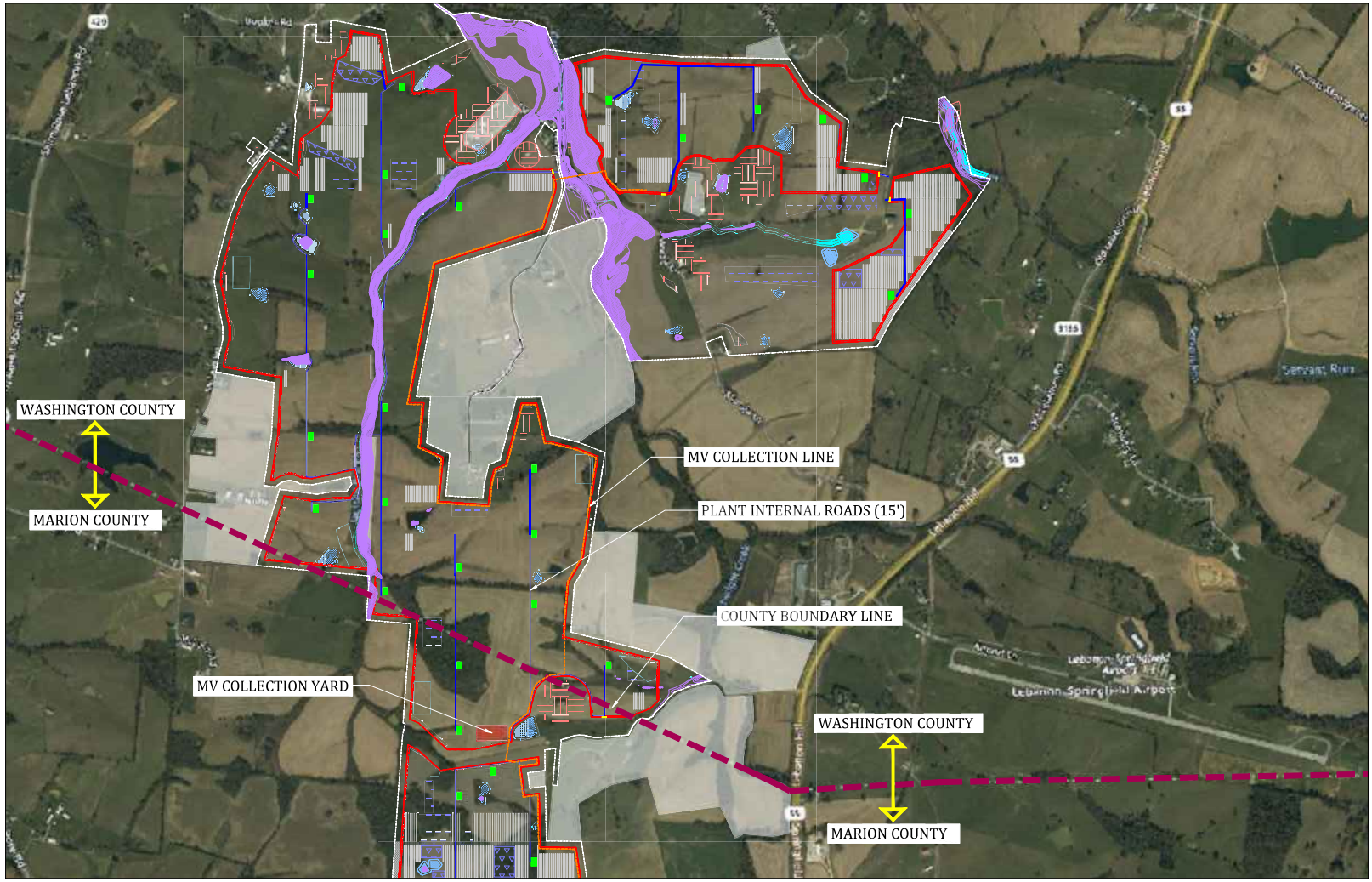

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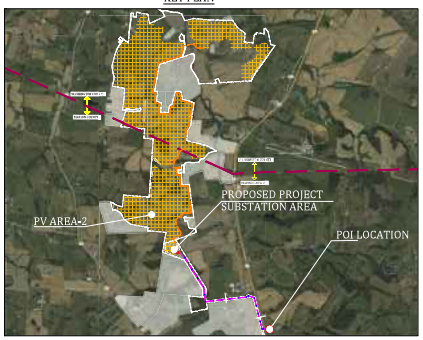
2022-03-31	00	FIRST ISSUE	MA	PS	KP

BrightNight Power

PROJECT NAME	FRONTIER (FRON)				
DRAWN		TITLE:- PLANT LAYOUT (PV)			
APPROVED		PURPOSE CODE	DRAWING NO.	REV.	SHEET
SCALE	NTS	ISSUE FOR PERMIT	00	09	2 OF 5

NOT FOR CONSTRUCTION

KEY PLAN



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	TREE SHADING AREA
	STORM WATER BASINS
	RESIDENTIAL SETBACK

LEGEND:-	
SYMBOL	DESCRIPTION
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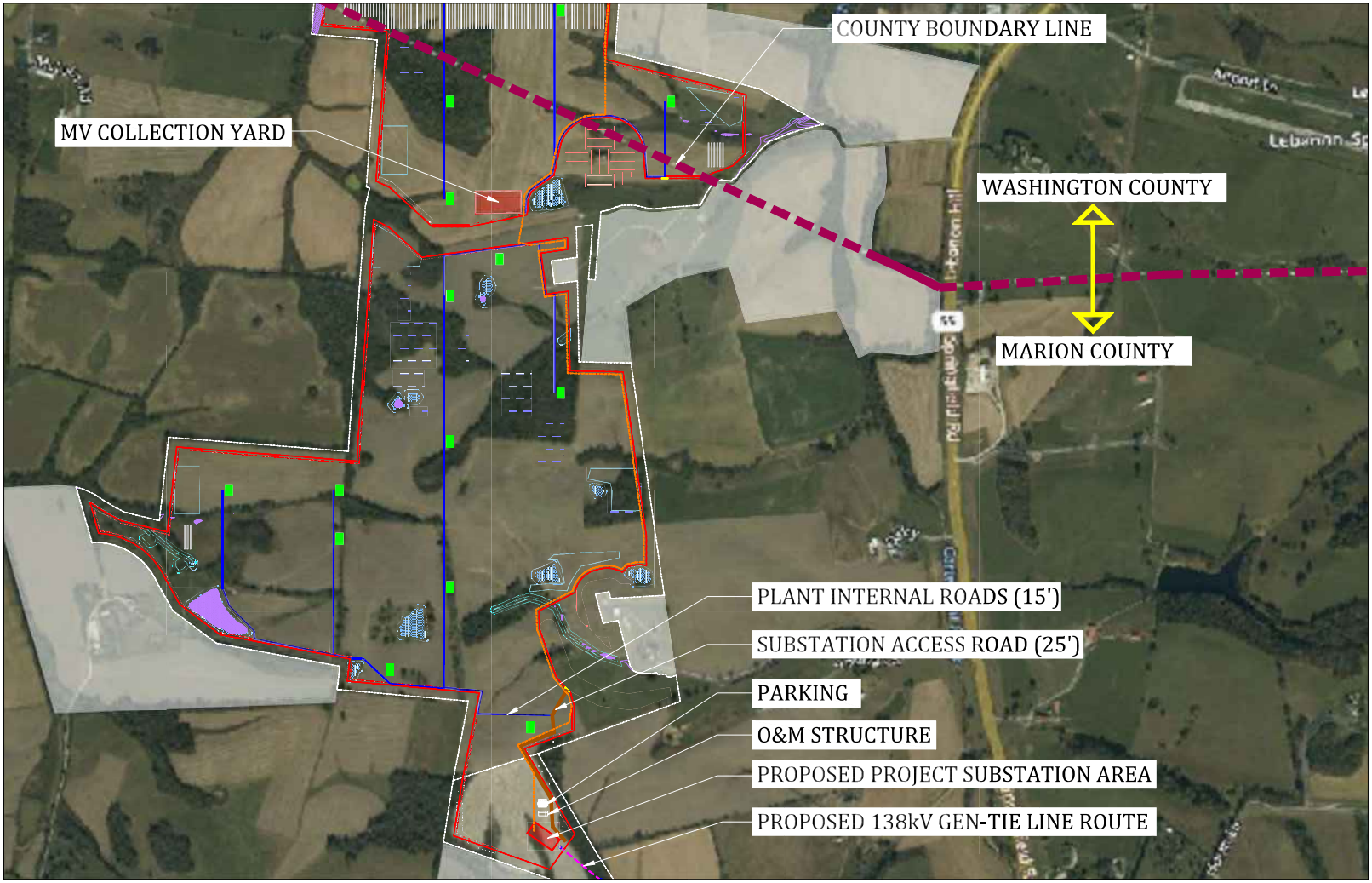
	PROPOSED MV COLLECTION LINE ROUTE
	FLOOD AREA
	NATURAL DRAIN
	COUNTY BOUNDARY LINE
	EXCLUSION AREA
	PROPOSED GEN TIE STRUCTURE



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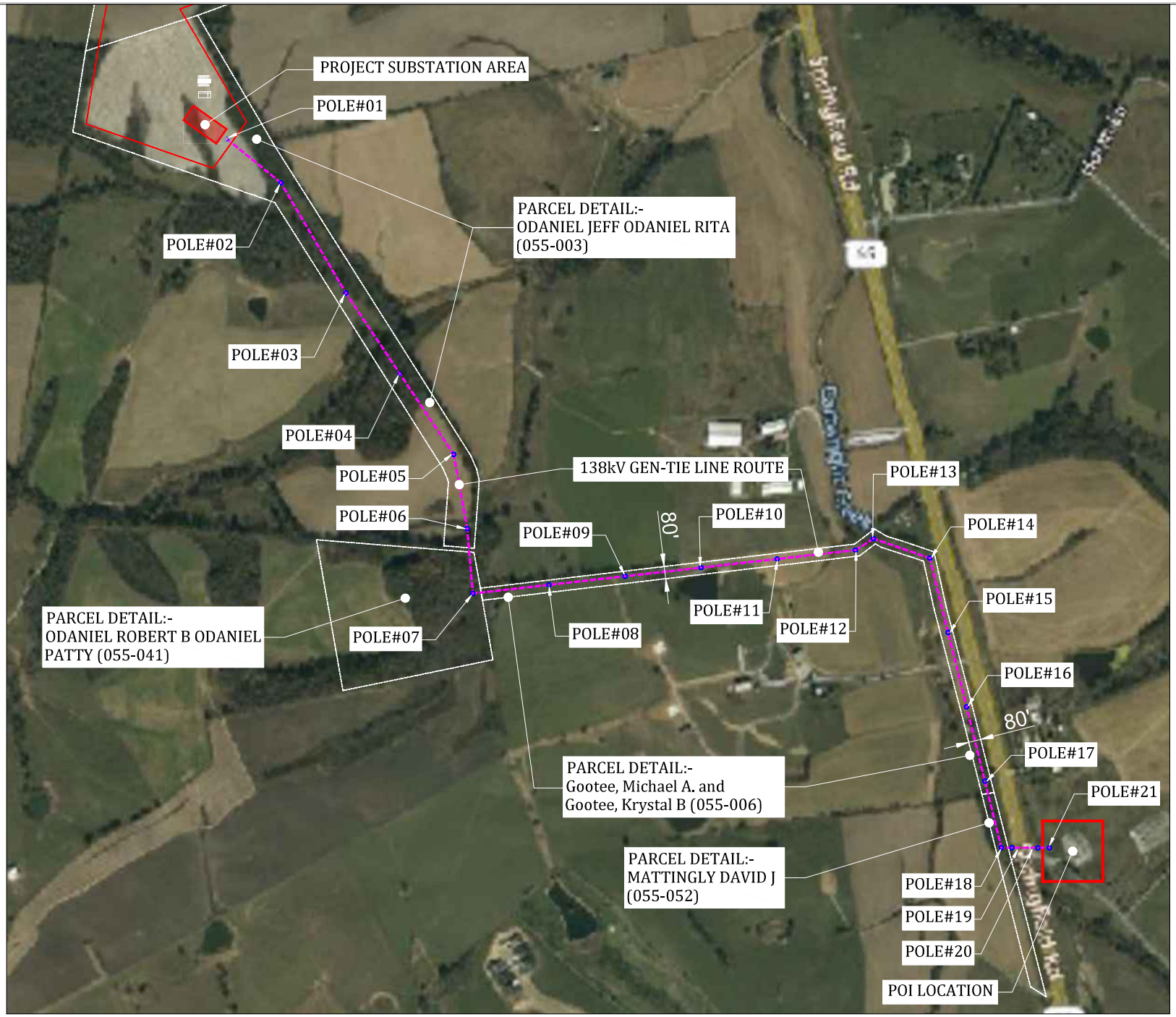
2022-03-31	00	FIRST ISSUE	MA	PS	KP

BrightNight Power

PROJECT NAME	FRONTIER (FRON)				
DRAWN		TITLE:- PLANT LAYOUT (PV)			
APPROVED		PURPOSE CODE	DRAWING NO.	REV.	SHEET
SCALE	NTS	ISSUE FOR PERMIT	00	09	3 OF 5



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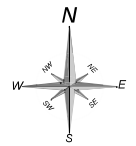

LEGEND:-	
SYMBOL	DESCRIPTION
	SITE BOUNDARY
	SITE FENCE
	PROPOSED 138kV GEN-TIE LINE ROUTE
	PROPOSED GEN TIE STRUCTURE

Note:-
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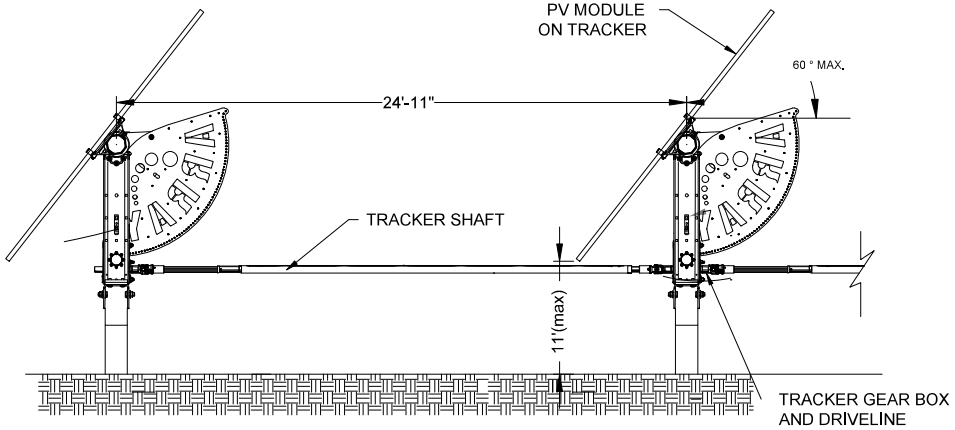
2022-03-31	00	FIRST ISSUE	MA	PS	KP

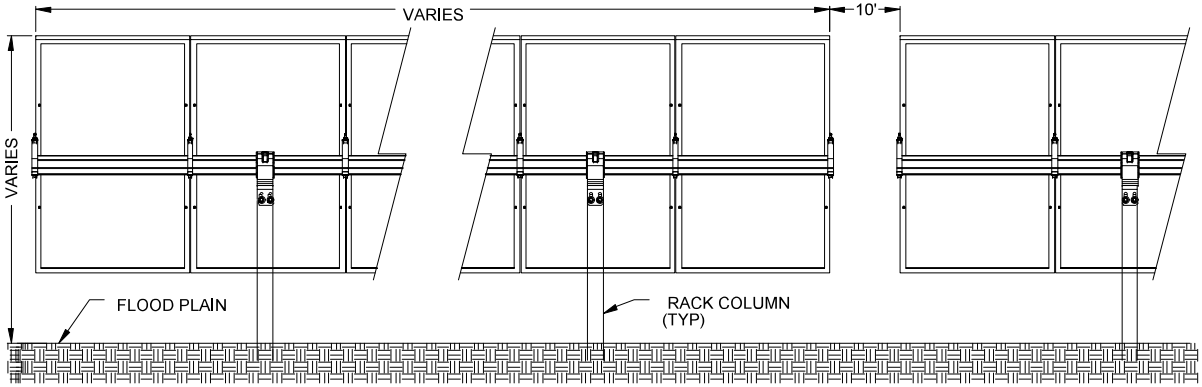
BrightNight Power

PROJECT NAME	FRONTIER (FRON)				
DRAWN		TITLE:- 138kV GEN-TIE LINE ROUTE LAYOUT			
APPROVED		PURPOSE CODE	DRAWING NO.	REV.	SHEET
SCALE	NTS	ISSUE FOR PERMIT	00	09	4 OF 5

NOT FOR CONSTRUCTION



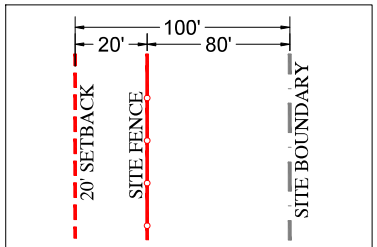
TYPICAL RACK NORTH/SOUTH END ELEVATION



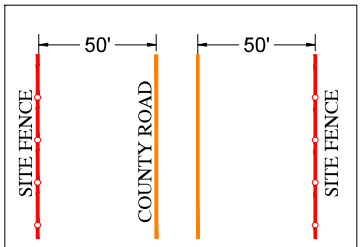
TYPICAL TRACKER RACK EAST/WEST SIDE ELEVATION

TRACKER SPACING

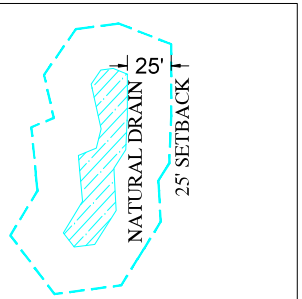
Setback details	
Setback description	Setback value
Plant property line and fence setback	80'
Plant fence and array setback	20'
County road setback	50'
Residential setback	250'
Wetland & Natural drain setback	25'



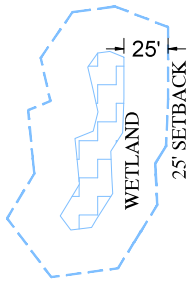
PROPERTY LINE SETBACK DETAIL



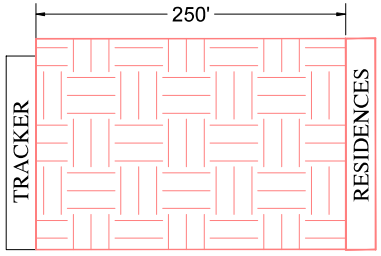
ROAD SETBACK DETAIL



NATURAL DRAIN SETBACK DETAIL



WETLAND SETBACK DETAIL



RESIDENTIAL SETBACK DETAIL

Note:-
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* Coordinates System :-
UTM84-16N,UTM-WGS 1984 datum, Zone 16 North, Meter; Cent. Meridian 87d W
* Tree cutting considered

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BrightNight Power

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APPROVED		PURPOSE CODE	DRAWING NO.	REV.	SHEET
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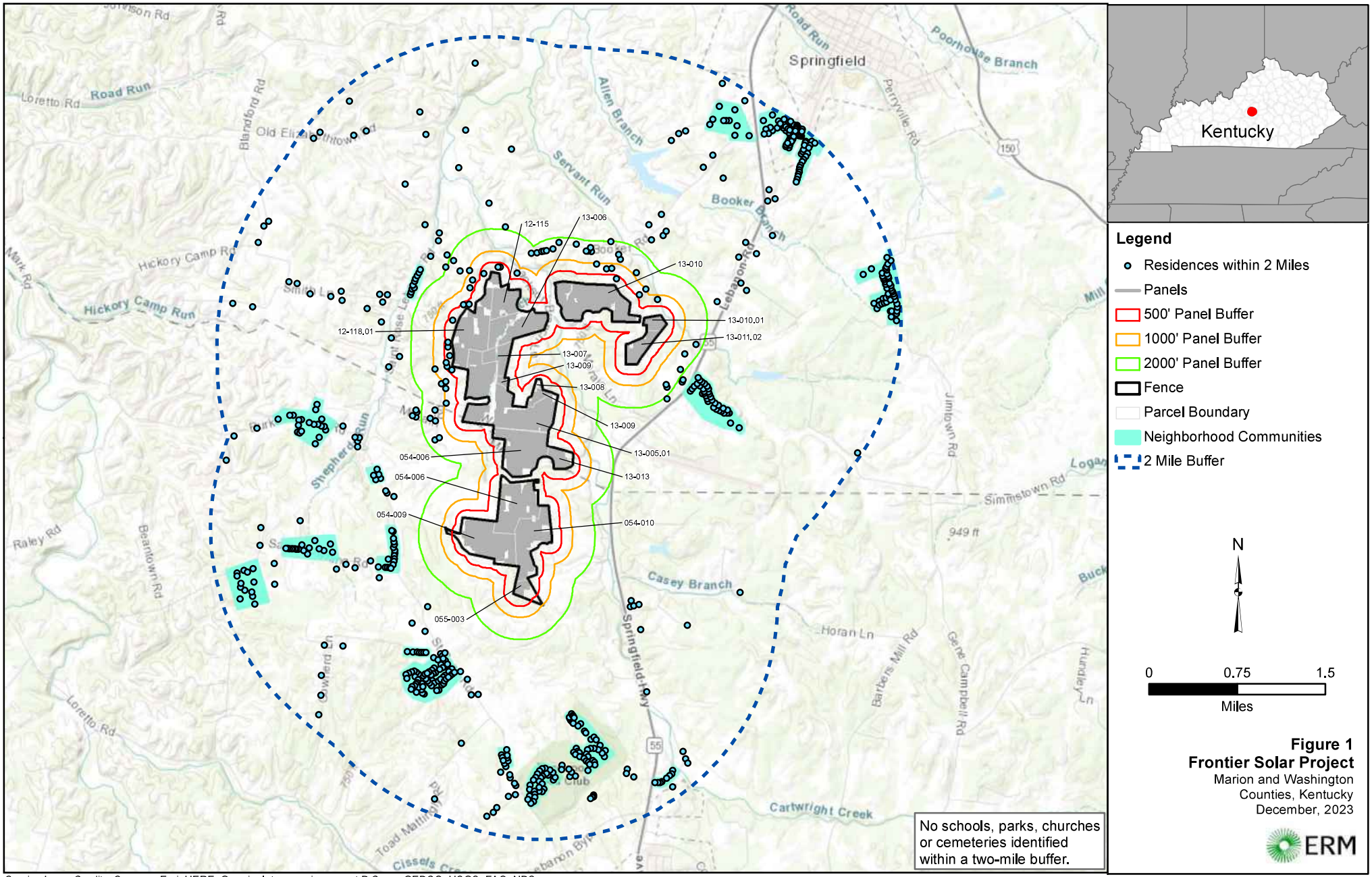


Figure 1
Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

Figure 2
Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Kentucky Division of Geographic Information; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

N

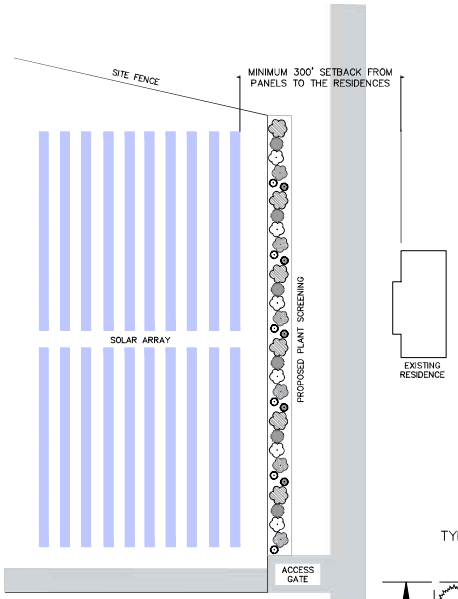
0 300 600

SCALE (IN FEET)

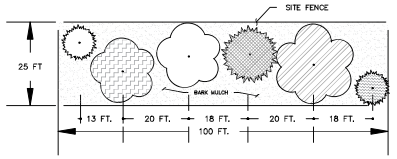
LEGEND

- SITE BOUNDARY
- PROPERTY BOUNDARY
- SITE FENCE
- ACCESS ROAD
- LANDSCAPING
- COUNTY BOUNDARY
- NATURAL DRAIN
- WETLAND
- FLOOD AREA

TYPICAL PLANTING PLAN



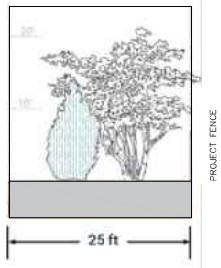
TYPICAL PLANTING DESIGN ARRANGEMENT



(PLAN VIEW)

SYMBOL	SPECIES COMMON NAME/ BOTANICAL NAME	TYPE	HEIGHT	SPREAD
	DWARF EASTERN WHITE PINE/ Pinus strobus "Nana"	EVERGREEN SHRUBS SUITABLE FOR KY	15'	10'
	WAX MYRTLE/Myrica cerifera		15'	20'
	NELLIE STEVENS HOLLY/ Nex X "Nellie R. Stevens"		15'	15'
	JUNIOR GIANT THUJA TREE/ Thuja x "Junior Giant"		15'	10'
	EASTERN REDBUD/ Cercis canadensis	DECIDUOUS SMALL TREES, NATIVE	20'	20'
	FLOWERING DOGWOOD/ Cornus Florida		20'	25'

AT PLANTING, SUCH TREES WILL BE A MINIMUM OF 4' TALL AND 6' APART.



(ELEVATION VIEW)

Rev.	Date	Description	By	Chk

ERM

SITE PLAN
LANDSCAPE PLAN

DESCIPLINE NO.

FRONTIER SOLAR

SPRINGFIELD, KENTUCKY

REV. 0

SCALE	DESIGNED BY	PROJECT NUMBER	SHEET NO.
AS NOTED	MT	0650014	1
DATE DRAWN 12/20/2023	DRAWN BY RG		

Environmental Resources Management

SAR EXHIBIT B

Kirkland
Appraisals, LLC

Richard C. Kirkland, Jr., MAI
9408 Northfield Court
Raleigh, North Carolina 27603
Phone (919) 414-8142
rkirkland2@gmail.com
www.kirklandappraisals.com

December 18, 2023

Ms. Lindsey Hesch, PWS
Bright Night, LLC
FRON bn, LLC
13124 E Emerald Coast Parkway, Suite B #1
Inlet Beach, Florida 32461

RE: Frontier Solar, Moraja Lane, near Springfield, Washington and Marion Counties, KY

Ms. Hesch

At your request, I have considered the impact of a 120 MW solar farm proposed to be constructed on a portion of a 921.72-acre assemblage of land off Moraja Lane, near Springfield in Washington and Marion Counties, Kentucky. Specifically, I have been asked to give my professional opinion on whether the proposed solar farm will have any impact on adjoining property value and whether "the location and character of the use, if developed according to the plan as submitted and approved, will be in harmony with the area in which it is to be located."

To form an opinion on these issues, I have researched and visited existing and proposed solar farms in Kentucky as well as other states, researched articles through the Appraisal Institute and other studies, and discussed the likely impact with other real estate professionals. I have not been asked to assign any value to any specific property.

This letter is a limited report of a real property appraisal consulting assignment. My client is Bright Night, LLC and FRON bn, LLC, represented to me by Ms. Lindsey Hesch. My findings support the Kentucky Siting Board Application. The effective date of this consultation is December 18, 2023.

While based in NC, I am also a Kentucky State Certified General Appraiser #5522.

Conclusion

The adjoining properties are well set back from the proposed solar panels and supplemental vegetation is proposed to enhance the areas where the existing trees do not currently provide a proper screen. The closest non-participating home will be 300 feet from the nearest panel and the average distance will be 1,839 feet.

The matched pair analysis shows no impact on home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land where the solar farm is properly screened and buffered. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all indicate that a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.

Data from the university studies, broker commentary, and other appraisal studies support a finding of no impact on property value adjoining a solar farm with proper setbacks and landscaped buffers.

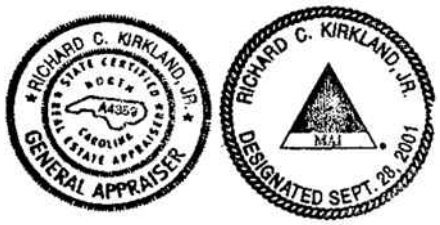
Very similar solar farms in very similar areas have been found by hundreds of towns and counties not to have a substantial negative effect to abutting or adjoining properties, and many of those

findings of no impact have been upheld by appellate courts. Similar solar farms have been approved with adjoining agricultural uses, schools, churches, and residential developments.

Based on the data and analysis in this report, it is my professional opinion that the solar farm proposed at the subject property will have no impact on the value of adjoining or abutting properties and that the proposed use is in harmony with the area in which it is located. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it is quiet, and there is minimal traffic.

If you have any questions please contact me.

Sincerely,



Richard C. Kirkland, Jr., MAI
NC Certified General Appraiser A4359
KY Certified General Appraiser #5522

Table of Contents

I. Proposed Project and Adjoining Uses

Proposed Use Description

This 120 MW solar farm is proposed to be constructed on a portion of a 921.72-acre assemblage of land off Moraja Lane, near Springfield in Washington and Marion Counties, Kentucky.

Adjoining Properties

I have considered adjoining uses and included a map to identify each parcel's location. Based on the current site plan the closest adjoining home will be 300 feet from the closest solar panel and the average distance to adjoining homes will be 1,839 feet to the nearest solar panel.

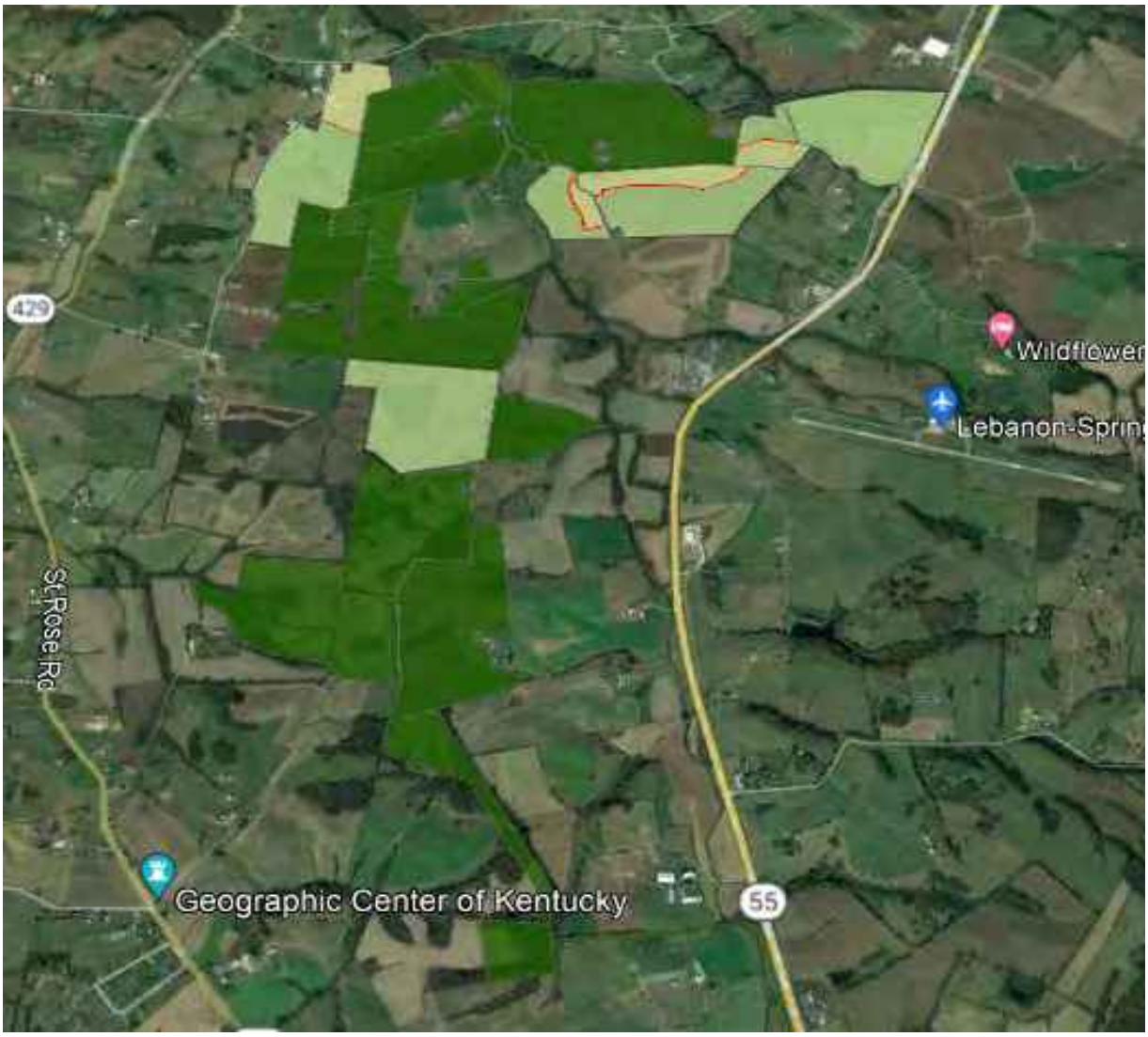
Adjoining land is primarily a mix of residential and agricultural uses, which is very typical of solar farm sites.

The breakdown of those uses by acreage and number of parcels is summarized below.

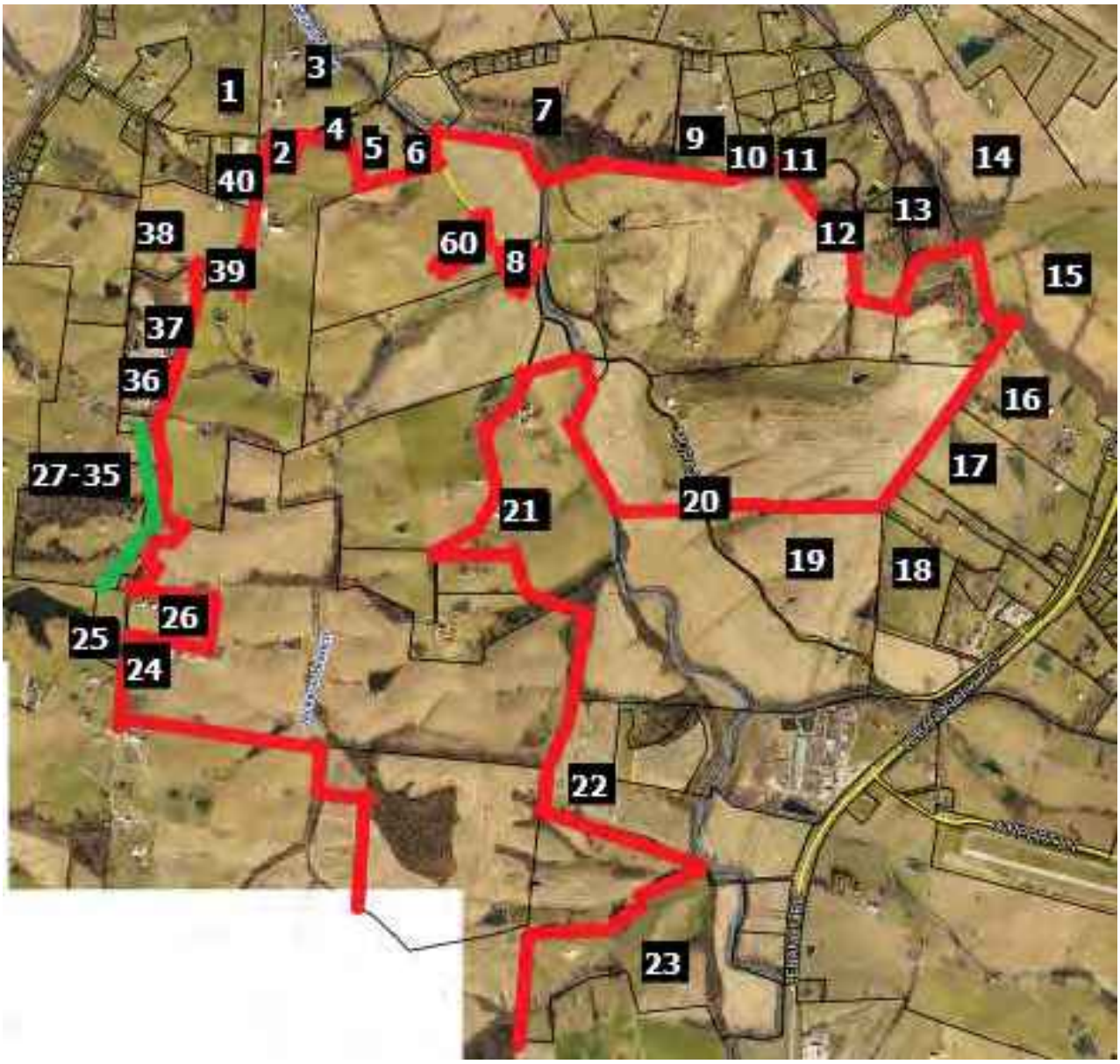
Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	3.65%	53.33%
Agricultural	39.17%	23.33%
Agri/Res	57.18%	23.33%
Total	**100.00%**	**100.00%**

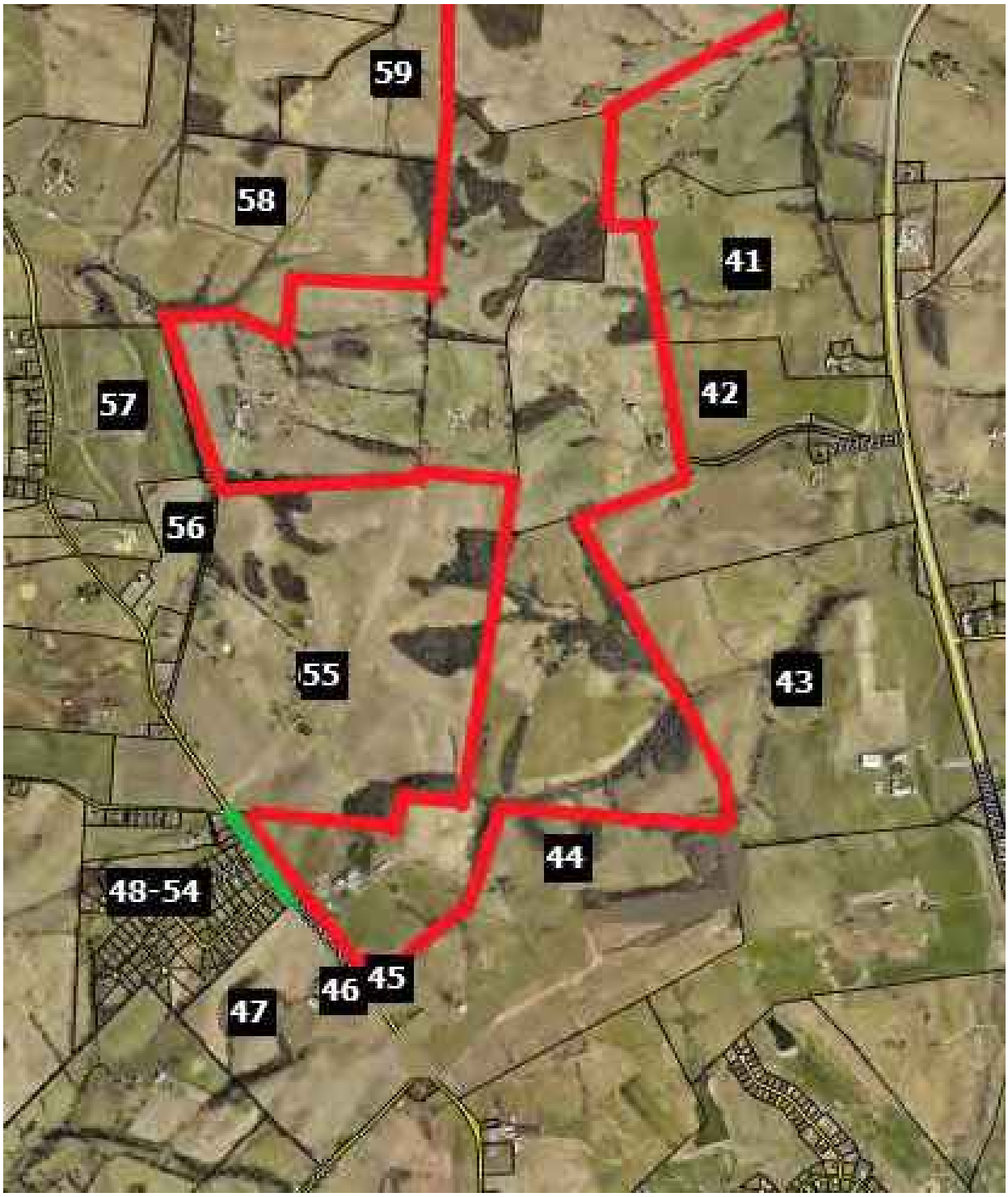
Overall Map


429
Wildflower
Lebanon-Sprin
St Rose Rd
Geographic Center of Kentucky
55

Washington County GIS Map



Marion County GIS Map



Surrounding Uses

#	MAP ID	Owner	GIS Data Acres	Present Use	Adjoin Acres	Adjoin Parcels	Distance (ft) Home/Panel	L.F Adjacent
1	06-074.02	Simms	58.06	Agricultural	2.21%	1.67%	N/A	1
2	12-118	Osborne	1.10	Residential	0.04%	1.67%	315	665
3	12-113	Osborne	75.92	Agricultural	2.90%	1.67%	N/A	430
4	12-117	Harmon	1.26	Residential	0.05%	1.67%	300	515
5	12-116.01	Wheatley	13.46	Residential	0.51%	1.67%	N/A	1340
6	12-116	Wheatley	1.19	Residential	0.05%	1.67%	740	695
7	12-100	Donathan	72.11	Agri/Res	2.75%	1.67%	N/A	2945
8	13-006.01	Mudd	2.00	Residential	0.08%	1.67%	465	1145
9	12-096.04	Cissell	24.69	Agri/Res	0.94%	1.67%	955	890
10	12-096.19	Graves	1.99	Residential	0.08%	1.67%	N/A	410
11	12-096.01	Graves	3.55	Residential	0.14%	1.67%	325	1
12	12-096.11	Nance	22.48	Agri/Res	0.86%	1.67%	580	2745
13	12-096.22	Smith	15.22	Residential	0.58%	1.67%	970	925
14	12-096.09	Hamliton	80.33	Agricultural	3.06%	1.67%	N/A	1605
15	19-002	Pinkston	105.00	Agri/Res	4.00%	1.67%	2,570	1330
16	19-005	Campbell	48.00	Agri/Res	1.83%	1.67%	1,470	2765
17	19-006	Smith	53.78	Agri/Res	2.05%	1.67%	1,765	1255
18	19-012.02	Haydon	34.27	Agricultural	1.31%	1.67%	N/A	140
19	13-012	Moraja Farms	172.00	Agri/Res	6.56%	1.67%	2,035	4300
20	13-011.01	Mattingly	1.61	Residential	0.06%	1.67%	1,470	645
21	13-007	Warren	135.00	Agri/Res	5.15%	1.67%	590	700
22	19-024	Mattingly	59.00	Agricultural	2.25%	1.67%	N/A	880
23	13-013.02	Mattingly	77.32	Agricultural	2.95%	1.67%	N/A	3950
24	13-005	Spaulding	1.30	Residential	0.05%	1.67%	960	875
25	07-020.01	Smith	5.50	Residential	0.21%	1.67%	N/A	95
26	13-004	Smith	13.95	Residential	0.53%	1.67%	945	2515
27	07-019	Sandusky	0.50	Residential	0.02%	1.67%	1,165	150
28	13-003	Spaulding	0.73	Residential	0.03%	1.67%	980	300
29	07-021.01	Spaulding	34.77	Agri/Res	1.33%	1.67%	945	360
30	13-005.02	Spaulding	1.00	Residential	0.04%	1.67%	385	680
31	07-021	Noel	0.81	Residential	0.03%	1.67%	395	160
32	07-022	Mclain	0.35	Residential	0.01%	1.67%	395	95
33	07-024	Spaulding	7.05	Residential	0.27%	1.67%	300	335
34	07-025	Sutherland	39.66	Agri/Res	1.51%	1.67%	325	435
35	07-026	Compton	2.15	Residential	0.08%	1.67%	320	150
36	07-027.01	Edelin	20.89	Agricultural	0.80%	1.67%	N/A	1435
37	07-027	Smith	1.03	Residential	0.04%	1.67%	300	180
38	07-029	Osborne	26.99	Agri/Res	1.03%	1.67%	695	1
39	13-001	Hardin	2.00	Residential	0.08%	1.67%	300	980

Surrounding Uses

#	MAP ID	Owner	GIS Data Acres	Present Use	Adjoin Acres	Adjoin Parcels	Distance (ft) Home/Panel	L.F Adjacent
40	07-030	Osborne	5.00	Residential	0.19%	1.67%	695	800
41	054-011	Mattlingly	119.00	Agricultural	4.54%	1.67%	N/A	1400
42	054-012	Mattlingly	141.10	Agricultural	5.38%	1.67%	N/A	2560
43	055-004	Mattlingly	233.00	Agri/Res	8.89%	1.67%	4,495	3060
44	055-041	Odaniel	110.54	Agricultural	4.22%	1.67%	N/A	4420
45	055-003A	Odaniel	1.00	Residential	0.04%	1.67%	4,830	635
46	055-009-01	Reynolds	1.54	Residential	0.06%	1.67%	4,970	205
47	055-009	Reynolds	100.00	Agricultural	3.81%	1.67%	N/A	230
48	055-010-02-30	Mc clung	0.73	Residential	0.03%	1.67%	4,505	220
49	055-010-02-29	Smith	0.72	Residential	0.03%	1.67%	4,455	200
50	055-010-02-12	Reynolds	0.71	Residential	0.03%	1.67%	4,395	195
51	055-010-02-01	Gonzales	0.69	Residential	0.03%	1.67%	4,365	200
52	055-010	Kraft	0.69	Residential	0.03%	1.67%	4,365	95
53	055-010-05-02	Mattingly	0.73	Residential	0.03%	1.67%	4,335	60
54	055-048	Masterson	0.44	Residential	0.02%	1.67%	4,140	210
55	055-002	Parrott	292.00	Agri/Res	11.14%	1.67%	3,085	10225
56	054-008	Jeffries	20.48	Agricultural	0.78%	1.67%	N/A	170
57	054-008-02	Young	71.02	Agricultural	2.71%	1.67%	N/A	3215
58	054-007	Reynolds	240.00	Agri/Res	9.15%	1.67%	3,805	6935
59	054-005-02	Reynolds	59.17	Agricultural	2.26%	1.67%	N/A	2715
60	12-115	Smith	5.59	Residential	0.21%	1.67%	475	2150
		Total	**2622.166**		**100.00%**	**100.00%**	1,839	

N/A indicates that there is no adjoining home to which to measure. Linear feet of adjacency listed in red means that the property is across a right of way from the subject property. Linear feet of adjacency of 1 foot is assigned where properties meet at a corner.

II. Demographics

I have pulled the following demographics for a 1-mile, 3-mile and 5-mile radius around the proposed solar farm project.

Housing Profile

40069
40069, Springfield, Kentucky
Ring: 1 mile radius

Prepared by Esri
Latitude: 37.64360
Longitude: -85.25973

Population		Households	
2010 Total Population	119	2023 Median Household Income	$54,313
2020 Total Population	114	2028 Median Household Income	$59,830
2023 Total Population	123	2023-2028 Annual Rate	1.95%
2028 Total Population	126		
2023-2028 Annual Rate	0.48%		

	Census 2010		2023		2028	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	34	100.0%	44	100.0%	45	100.0%
Occupied	33	97.1%	43	97.7%	45	100.0%
Owner	27	79.4%	38	86.4%	40	88.9%
Renter	6	17.6%	5	11.4%	5	11.1%
Vacant	1	2.9%	1	2.3%	0	0.0%

	2023		2028	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	38	100.0%	40	100.0%
<$50,000	0	0.0%	0	0.0%
$50,000-$99,999	1	2.6%	1	2.5%
$100,000-$149,999	6	15.8%	5	12.5%
$150,000-$199,999	6	15.8%	6	15.0%
$200,000-$249,999	1	2.6%	1	2.5%
$250,000-$299,999	3	7.9%	3	7.5%
$300,000-$399,999	8	21.1%	9	22.5%
$400,000-$499,999	1	2.6%	1	2.5%
$500,000-$749,999	10	26.3%	12	30.0%
$750,000-$999,999	0	0.0%	0	0.0%
$1,000,000-$1,499,999	2	5.3%	2	5.0%
$1,500,000-$1,999,999	0	0.0%	0	0.0%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$325,000		$344,444	
Average Value	$392,763		$410,000	

Census 2010 Housing Units	Number	Percent
Total	34	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	0	0.0%
Rural Housing Units	34	100.0%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2023 and 2028. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

September 21, 2023

Housing Profile

40069
40069, Springfield, Kentucky
Ring: 3 mile radius

Prepared by Esri
Latitude: 37.64360
Longitude: -85.25973

Population		Households	
2010 Total Population	1,108	2023 Median Household Income	$55,267
2020 Total Population	1,121	2028 Median Household Income	$60,709
2023 Total Population	1,155	2023-2028 Annual Rate	1.90%
2028 Total Population	1,182		
2023-2028 Annual Rate	0.46%		

	Census 2010		2023		2028	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	426	100.0%	474	100.0%	486	100.0%
Occupied	404	94.8%	457	96.4%	474	97.5%
Owner	295	69.2%	330	69.6%	342	70.4%
Renter	109	25.6%	127	26.8%	132	27.2%
Vacant	22	5.2%	17	3.6%	12	2.5%

	2023		2028	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	329	100.0%	343	100.0%
<$50,000	9	2.7%	9	2.6%
$50,000-$99,999	61	18.5%	58	16.9%
$100,000-$149,999	89	27.1%	84	24.5%
$150,000-$199,999	47	14.3%	50	14.6%
$200,000-$249,999	19	5.8%	21	6.1%
$250,000-$299,999	20	6.1%	23	6.7%
$300,000-$399,999	29	8.8%	34	9.9%
$400,000-$499,999	16	4.9%	19	5.5%
$500,000-$749,999	32	9.7%	38	11.1%
$750,000-$999,999	2	0.6%	2	0.6%
$1,000,000-$1,499,999	5	1.5%	5	1.5%
$1,500,000-$1,999,999	0	0.0%	0	0.0%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$155,851		$170,500	
Average Value	$240,957		$253,863	

Census 2010 Housing Units	Number	Percent
Total	426	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	58	13.6%
Rural Housing Units	368	86.4%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2023 and 2028. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

September 21, 2023

Housing Profile

40069
40069, Springfield, Kentucky
Ring: 5 mile radius

Prepared by Esri
Latitude: 37.64360
Longitude: -85.25973

Population		Households	
2010 Total Population	8,142	2023 Median Household Income	$54,647
2020 Total Population	8,601	2028 Median Household Income	$59,782
2023 Total Population	8,811	2023-2028 Annual Rate	1.81%
2028 Total Population	8,983		
2023-2028 Annual Rate	0.39%		

	Census 2010		2023		2028	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	3,582	100.0%	3,872	100.0%	3,953	100.0%
Occupied	3,284	91.7%	3,641	94.0%	3,747	94.8%
Owner	2,235	62.4%	2,520	65.1%	2,611	66.1%
Renter	1,049	29.3%	1,121	29.0%	1,136	28.7%
Vacant	298	8.3%	231	6.0%	206	5.2%

	2023		2028	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	2,519	100.0%	2,611	100.0%
<$50,000	66	2.6%	61	2.3%
$50,000-$99,999	552	21.9%	518	19.8%
$100,000-$149,999	675	26.8%	631	24.2%
$150,000-$199,999	392	15.6%	427	16.4%
$200,000-$249,999	193	7.7%	210	8.0%
$250,000-$299,999	186	7.4%	224	8.6%
$300,000-$399,999	170	6.7%	203	7.8%
$400,000-$499,999	129	5.1%	157	6.0%
$500,000-$749,999	106	4.2%	124	4.7%
$750,000-$999,999	38	1.5%	43	1.6%
$1,000,000-$1,499,999	12	0.5%	13	0.5%
$1,500,000-$1,999,999	0	0.0%	0	0.0%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$147,519		$161,183	
Average Value	$207,483		$220,567	

Census 2010 Housing Units	Number	Percent
Total	3,582	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	1,195	33.4%
Rural Housing Units	2,387	66.6%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2023 and 2028. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

September 21, 2023

III. Methodology and Discussion of Issues

Standards and Methodology

I conducted this analysis using the standards and practices established by the Appraisal Institute and that conform to the Uniform Standards of Professional Appraisal Practice. The analyses and methodologies contained in this report are accepted by all major lending institutions, and they are used in Kentucky and across the country as the industry standard by certified appraisers conducting appraisals, market analyses, or impact studies and are considered adequate to form an opinion of the impact of a land use on neighboring properties. These standards and practices have also been accepted by the courts at the trial and appellate levels and by federal courts throughout the country as adequate to reach conclusions about the likely impact a use will have on adjoining or abutting properties.

The aforementioned standards compare property uses in the same market and generally within the same calendar year so that fluctuating markets do not alter study results. Although these standards do not require a linear study that examines adjoining property values before and after a new use (e.g. a solar farm) is developed, some of these studies do in fact employ this type of analysis. Comparative studies, as used in this report, are considered an industry standard.

The type of analysis employed is a Matched Pair Analysis or Paired Sales Analysis. This methodology is outlined in **The Appraisal of Real Estate**, Twelfth Edition by the Appraisal Institute pages 438-439. It is further detailed in **Real Estate Damages**, Third Edition, pages 33-36 by Randall Bell PhD, MAI. Paired sales analysis is used to support adjustments in appraisal work for factors ranging from the impact of having a garage, golf course view, or additional bedrooms. It is an appropriate methodology for addressing the question of impact of an adjoining solar farm. The paired sales analysis is based on the theory that when two properties are in all other respects equivalent, a single difference can be measured to indicate the difference in price between them. Dr. Bell describes it as comparing a test area to control areas. In the example provided by Dr. Bell he shows five paired sales in the test area compared to 1 to 3 sales in the control areas to determine a difference. I have used 3 sales in the control areas in my analysis for each sale developed into a matched pair.

Determining what is an External Obsolescence

An external obsolescence is a use of property that, because of its characteristics, might have a negative impact on the value of adjacent or nearby properties because of identifiable impacts. Determining whether a use would be considered an external obsolescence requires a study that isolates that use, eliminates any other causing factors, and then studies the sales of nearby versus distant comparable properties. The presence of one or a combination of key factors does not mean the use will be an external obsolescence, but a combination of these factors tend to be present when market data reflects that a use is an external obsolescence.

External obsolescence is evaluated by appraisers based on several factors. These factors include but are not limited to:

1) Traffic. Solar Farms are not traffic generators.

2) Odor. Solar farms do not produce odor.

3) Noise. Solar farms generate no noise concerns. A wide range of noise studies that have been completed have found them consistent with agricultural and residential areas. The noise is even less at night.

4) Environmental. Solar farms do not produce toxic or hazardous waste. Grass is maintained underneath the panels so there is minimal impervious surface area.

5) Appearance/Viewshed. This is the one area that potentially applies to solar farms. However, solar farms are generally required to provide significant setbacks and landscaping buffers to address that concern. Furthermore, any consideration of appearance of viewshed impacts has to be considered in comparison with currently allowed uses on that site. For example if a residential subdivision is already an allowed use, the question becomes in what way does the appearance impact adjoining property owners above and beyond the appearance of that allowed subdivision or other similar allowed uses.

6) Other factors. I have observed and studied many solar farms and have never observed any characteristic about such facilities that prevents or impedes neighbors from fully using their homes or farms or businesses for the use intended.

Market Imperfection

Throughout this analysis, I have specifically considered the influence of market imperfection on data analysis. Market imperfection is the term that refers to the fact that unlike a can of soup at the supermarket or in your online shopping cart, real estate cannot be comparison shopped for the best price and purchased at the best price for that same identical product. Real estate products are always similar and never identical. Even two adjacent lots that are identical in almost every way, have a slight difference in location. Once those lots are developed with homes, the number of differences begin to multiply, whether it is size of the home, landscaping, layout, age of interior upfit, quality of interior upfit, quality of maintenance and so on.

Neoclassical economics indicates a perfectly competitive market as having the following: A large number of buyers and sellers (no one person dominates the market), no barriers or transaction costs, homogeneous product, and perfect information about the product and pricing. Real estate is clearly not homogeneous. The number of buyers and sellers for a particular product in a particular location is limited by geography, financing, and the limited time period within a property is listed. There are significant barriers that limit the liquidity in terms of time, costs and financing. Finally, information on real estate is often incomplete or partial – especially at the time that offers are made and prices set, which is prior to appraisals and home inspections. So real estate is very imperfect based on this definition and the impact of this are readily apparent in the real estate market.

What appear to be near-identical homes that are in the same subdivision will often sell with slight variations in price. When multiple appraisers approach the same property, there is often a slight variation among all of those conclusions of value, due to differences in comparables used or analysis of those comparables. This is common and happens all of the time. In fact, within each appraisal, after making adjustments to the comparables, the appraiser will typically have a range of values that are supported that often vary more than +/-5% from the median or average adjusted value.

Based on this understanding of market imperfection, it is important to note that very minor differences in value within an impact study do not necessarily indicate either a negative or positive impact. When the impacts measured fall within that +/-5%, I consider this to be within typical market variation/imperfection. Therefore it may be that there is a negative or positive impact identified if the impact is within that range, but given that it is indistinguishable from what amounts to the background noise or static within the real estate data, I do not consider indications of +/-5% to support a finding of a negative or positive impact.

Impacts greater than that range are however, considered to be strong indications of impacts that fall outside of typical market imperfection. I have used this as a guideline while considering the impacts identified within this report.

Relative Solar Farm Sizes

Solar farms have been increasing in size in recent years. Much of the data collected is from existing, older solar farms of smaller size, but there are numerous examples of sales adjoining 75 to 80 MW facilities that show a similar trend as the smaller solar farms. This is understandable given that the primary concern relative to a solar farm is the appearance or view of the solar farm, which is typically addressed through setbacks and landscaping buffers. The relevance of data from smaller solar farms to larger solar farms is due to the primary question being one of appearance. If the solar farm is properly screened, then little of the solar farm would be seen from adjoining property regardless of how many acres are involved.

Larger solar farms are often set up in sections where any adjoining owner would only be able to see a small section of the project even if there were no landscaping screen. Once a landscaping screen is in place, the primary view is effectively the same whether you are adjoining a 5 MW, 20 MW or 100 MW facility.

I have split out the data for the matched pairs adjoining larger solar farms only to illustrate the similarities later in this report. I note that I have matched pairs adjoining solar farms up to 500 MWs in size showing no impact on property value.

Steps Involved in the Analysis

The paired sales analysis employed in this report follows the following process:

1. Identify sales of property adjoining existing solar farms.
2. Compare those sales to similar property that does not adjoin an existing solar farm.
3. Confirmation of sales are noted in the analysis write ups.
4. Distances from the homes to panels are included as a measure of the setbacks.
5. Topographic differences across the solar farms themselves are likewise noted along with demographic data for comparing similar areas.

There are a number of Sale/Resale comparables included in the write ups, but most of the data shown is for sales of homes after a solar farm has been announced (where noted) or after a solar farm has been constructed.

IV. Research on Solar Farms

A. Appraisal Market Studies

I have also considered a number of impact studies completed by other appraisers as detailed below.

CohnReznick – Property Value Impact Study: Adjacent Property Values Solar Impact Study: A Study of Eight Existing Solar Facilities

Patricia McGarr, MAI, CRE, FRICS, CRA and Andrew R. Lines, MAI with CohnReznick completed an impact study for a proposed solar farm in Cheboygan County, Michigan completed on June 10, 2020. I am familiar with this study as well as a number of similar such studies completed by CohnReznick. I have not included all of these studies but I submit this one as representative of those studies.

This study addresses impacts on value from eight different solar farms in Michigan, Minnesota, Indiana, Illinois, Virginia and North Carolina. These solar farms are 19.6 MW, 100 MW, 11.9 MW, 23 MW, 71 MW, 61 MW, 40 MW, and 19 MW for a range from 11.9 MW to 100 MW with an average of 31 MW and a median of 31.5 MW. They analyzed a total of 24 adjoining property sales in the Test Area and 81 comparable sales in the Control Area over a five-year period.

The conclusion of this study is that there is no evidence of any negative impact on adjoining property values based on sales prices, conditions of sales, overall marketability, potential for new development or rate of appreciation.

Christian P. Kaila & Associates – Property Impact Analysis – Proposed Solar Power Plant Guthrie Road, Stuarts Draft, Augusta County, Virginia

Christian P. Kaila, MAI, SRA and George J. Finley, MAI developed an impact study as referenced above dated June 16, 2020. This was for a proposed 83 MW facility on 886 acres.

Mr. Kaila interviewed appraisers who had conducted studies and reviewed university studies and discussed the comparable impacts of other development that was allowed in the area for a comparative analysis of other impacts that could impact viewshed based on existing allowed uses for the site. He also discussed in detail the various other impacts that could cause a negative impact and how solar farms do not have such characteristics.

Mr. Kaila also interviewed County Planners and Real Estate Assessor's in eight different Virginia counties with none of the assessor's identifying any negative impacts observed for existing solar projects.

Mr. Kaila concludes on a finding of no impact on property values adjoining the indicated solar farm.

Fred Beck, MAI, CCIM – Impact Analysis in Lincoln County 2013

Mr. Fred Beck, MAI, CCIM completed an impact analysis in 2013 for a proposed solar farm that concluded on a negative impact on value. That report relied on a single cancelled contract for an adjoining parcel where the contracted buyers indicated that the solar farm was the reason for the cancellation. It also relied on the activities of an assessment impact that was applied in a nearby county.

Mr. Beck was interviewed as part of the Christian Kalia study noted above. From that I quote "Mr. Beck concluded on no effect on moderate priced homes, and only a 5% change in his limited research of higher priced homes. His one sale that fell through is hardly a reliable sample. It also was misleading on Mr. Beck's part to report the lower re-assessments since the primary cause of the

re-assesments were based on the County Official, who lived adjacent to the solar farm, appeal to the assessor for reductions with his own home." In that Clay County Case study the noted lack of lot sales after announcement of the solar farm also coincided with the recession in 2008/2009 and lack of lot sales effectively defined that area during that time. I contacted the Clay County Assessor who indicated that there is no set downward adjustment for properties adjoining solar farms in the county at this time.

I further note, that I was present at the hearing where Mr. Beck presented these findings and the predominance of his argument before the Lincoln County Board of Commissioner's was based on the one cancelled sale as well as a matched pair analysis of high-end homes adjoining a four-story call center. He hypothesized that a similar impact from that example could be compared to being adjacent solar farm without explaining the significant difference in view, setbacks, landscaping, traffic, light, and noise. Furthermore, Mr. Beck did have matched pairs adjoining a solar farm in his study that he put in the back of his report and then ignored as they showed no impact on property value.

Also noted in the Christian Kalia interview notes is a response from Mr. Beck indicating that in his opinion "the homes were higher priced homes and had full view of the solar farm." Based on a description of screening so that "the solar farm would not be in full view to adjoining property owners. Mr. Beck said in that case, he would not see any drop in property value."

NorthStar Appraisal Company – Impact Analysis for Nichomus Run Solar, Pilesgrove, NJ, September 16, 2020

Mr. William J. Sapio, MAI with NorthStar Appraisal Company considered a matched pair analysis for the potential impact on adjoining property values to this proposed 150 MW solar farm. Mr. Sapio considered sales activity in a subdivision known as Point of Woods in South Brunswick Township and identified two recent new homes that were constructed and sold adjoining a 13 MW solar farm and compared them to similar homes in that subdivision that did not adjoin the solar farm. These homes sold in the $1,290,450 to $1,336,613 price range and these homes were roughly 200 feet from the closest solar panel.

Based on this analysis, he concluded that the adjoining solar farm had no impact on adjoining property value.

Mary McClinton Clay, MAI – McCracken County Solar Project Value Impact Report, July 10, 2021

Ms. Mary Clay, MAI reviewed a report by Kirkland Appraisals in this case and also provided a differing opinion of impact. She cites a number of other appraisal studies and interestingly finds fault with heavily researched opinions, while praising the results of poorly researched studies that found the opposing view.

Her analysis includes details from solar farms that show no impact on value, but she dismisses those.

She cites the University of Texas study noted later in this report, but she cites only isolated portions of that study to conclude the opposite of what that study specifically concludes.

She cites the University of Rhode Island study noted alter in this report, but specifically excludes the conclusion of that study that in rural areas they found no impact on property value.

She cites lot sales near Spotsylvania Solar without confirming the purchase prices with brokers as indicative of market impact and has made no attempt to compare lot prices that are contemporaneous. In her 5 lot sales that she identifies, all of the lot prices decline with time from 2015 through 2019. This includes the 3 lot sales prior to the approval of the solar farm. The lot sales she cites showing a drop are all related to the original developer of that subdivision 20+ years

ago liquidating all of their lots in that time period and shows significant drops on all of the lots due to it being a liquidation value. More recent lot sales show lot prices over $100,000 with the most recent land sale adjoining the solar farm having sold in December of 2021 for $140,000. I spoke with Chris Kalia, MAI out of VA about these lot sales and he confirmed along with two other appraisers in that market that he connected me with that the lot sales Ms. Clay identified were all related to that liquidation and not related to the solar farm. All three appraisers agreed that they had seen no negative impacts from Spotsylvania Solar and that lot prices among builders and home owners were going up and home prices in the neighborhood were likewise going up. Additional analysis on Spotsylvania Solar is shown later in this report with a new section of homes and new price points significantly higher than historical sales in this subdivision.

She considers data at McBride Place Solar Farm and does a sale/resale analysis based on Zillow Home Value Index, which is not a reliable indication for appreciation in the market. She then adjusted her initial sales prior to the solar farm over 7 years to determine what she believes the home should have appreciated by and then compares that to an actual sale. She has run no tests or any analysis to show that the appreciation rates she is using are consistent with the market but more importantly she has not attempted to confirm any of these sales with market participants. I have spoken with brokers active in the sales that she cites and they have all indicated that the solar farm was not a negative factor in marketing or selling those homes.

She has considered lot sales at Sunshine Farms in Grandy, NC. She indicates that the lots next to the solar farm are selling for less than lots not near the solar farm, but she is actually using lot sales next to the solar farm prior to the solar farm being approved. She also ignores recent home sales adjoining this solar farm after it was built that show no impact on property value.

She also notes a couple of situations where solar developers have purchased adjoining homes and resold them or where a neighbor agreement was paid as proof of a negative impact on property value. Given that there are over 2,500 solar farms in the USA as of 2018 according to the U.S. Energy Information Administration and there are only a handful of such examples, this is clearly not an industry standard but a business decision. Furthermore, solar developers are not in the business of flipping homes and are in a position very similar to a bank that acquires a home as OREO (Other Real Estate Owned), where homes are frequently sold at discounted prices, not because of any drop in value, but because they are not a typically motivated seller. Market value requires an analysis of a typically motivated buyer and seller. So these are not good indicators of market value impacts.

The comments throughout this study are heavy in adjectives, avoids stating facts contrary to the conclusion and shows a strong selection bias.

Kevin T. Meeks, MAI – Corcoran Solar Impact Study, June 19, 2017

Mr. Kevin Meeks, MAI reviewed a report by Kirkland Appraisals in this case and also provided additional research on the topic with additional paired sales. The sales he considered are well presented and show that they were confirmed by third parties and all of the broker commentary is aligned with the conclusion that the adjoining solar farms considered had no impact on the adjoining home values.

Mr. Meeks also researched a 100 MW project in Chisago County, known as North Star Solar Garden in MN. He interviewed local appraisers and a broker who was actively marketing homes adjoining that solar farm to likewise support a finding of no impact on property value.

Conclusion of Impact Studies

Of the six studies noted three included actual sales data to derive an opinion of no impact on value. The two studies to conclude on a negative impact includes the Fred Beck study based on no actual sales data, and he has since indicated that with landscaping screens he would not conclude on a

negative impact. The other study by Mary Clay shows improper adjustments for time, a lack of confirmation of sales comparables, and exclusion of data that does not support her position.

I have relied on these studies as additional support for the findings in this impact analysis.

B. Articles

I have also considered a number of articles on this subject as well as conclusions and analysis as noted below.

Farm Journal Guest Editor, March 22, 2021 – Solar's Impact on Rural Property Values

Andy Ames, ASFMRA (American Society of Farm Managers and Rural Appraisers) published this article that includes a discussion of his survey of appraisers and studies on the question of property value related to solar farms. He discusses the university studies that I have cited as well as Patricia McGarr, MAI.

He also discusses the findings of Donald A. Fisher, ARA, who served six years at the Chair of the ASFMRA's National Appraisal Review Committee. He is also the Executive Vice President of the CNY Pomeroy Appraiser and has conducted several market studies on solar farms and property impact. He is quoted in the article as saying, "Most of the locations were in either suburban or rural areas, and all of those studies found either a neutral impact, or ironically, a positive impact, where values on properties after installation of solar farms went up higher than time trends."

Howard Halderman, AFM, President and CEO of Halderman Real Estate and Farm Management attended the ASFMRA solar talk hosted by the Indiana Chapter of the ASFMRA and he concludes that other rural properties would likely see no impact and farmers and landowners shown even consider possible benefits. "In some cases, farmers who rent land to a solar company will insure the viability of their farming operation for a longer time period. This makes them better long-term tenants or land buyers so one can argue that higher rents and land values will follow due to the positive impact the solar leases offer."

More recently in August 2022, Donald Fisher, ARA, MAI and myself led a webinar on this topic for the ASFMRA discussing the issues, the university studies and specific examples of solar farms having no impact on adjoining property values.

National Renewable Energy Laboratory – Top Five Large-Scale Solar Myths, February 3, 2016

Megan Day reports form NREL regarding a number of concerns neighbors often express. Myth #4 regarding property value impacts addresses specifically the numerous studies on wind farms that show no impact on property value and that solar farms have a significantly reduced visual impact from wind farms. She highlights that the appearance can be addressed through mitigation measures to reduce visual impacts of solar farms through vegetative screening. Such mitigations are not available to wind farms given the height of the windmills and again, those studies show no impact on value adjoining wind farms.

North Carolina State University: NC Clean Energy Technology Center White Paper: Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development (Version 2), May 2019

Tommy Cleveland and David Sarkisian wrote a white paper for NCSU NC Clean Energy Technology Center regarding the potential impacts to agricultural productivity from a solar farm use. I have interviewed Tommy Cleveland on numerous occasions and I have also heard him speak on these issues at length as well. He addresses many of the common questions regarding how solar farms work and a detailed explanation of how solar farms do not cause significant impacts on the soils, erosion and other such concerns. This is a heavily researched paper with the references included.

North Carolina State University: NC Clean Energy Technology Center White Paper: Health and Safety Impacts of Solar Photovoltaics, May 2017

Tommy Cleveland wrote a white paper for NCSU NC Clean Energy Technology Center regarding the health and safety impacts to address common questions and concerns related to solar farms. This is a heavily researched white paper addressing questions ranging from EMFs, fire safety, as well as vegetation control and the breakdown of how a solar farm works.

C. Broker Commentary

In the process of working up the matched pairs used later in this report, I have collected comments from brokers who have actually sold homes adjoining solar farms indicating that the solar farm had no impact on the marketing, timing, or sales price for the adjoining homes. I have comments from brokers noted within the solar farm write ups of this report including brokers from Kentucky, Virginia, Tennessee, and North Carolina. I have additional commentary from other states including New Jersey and Michigan that provide the same conclusion.

V. University Studies

I have also considered the following studies completed by four different universities related to solar farms and impacts on property values.

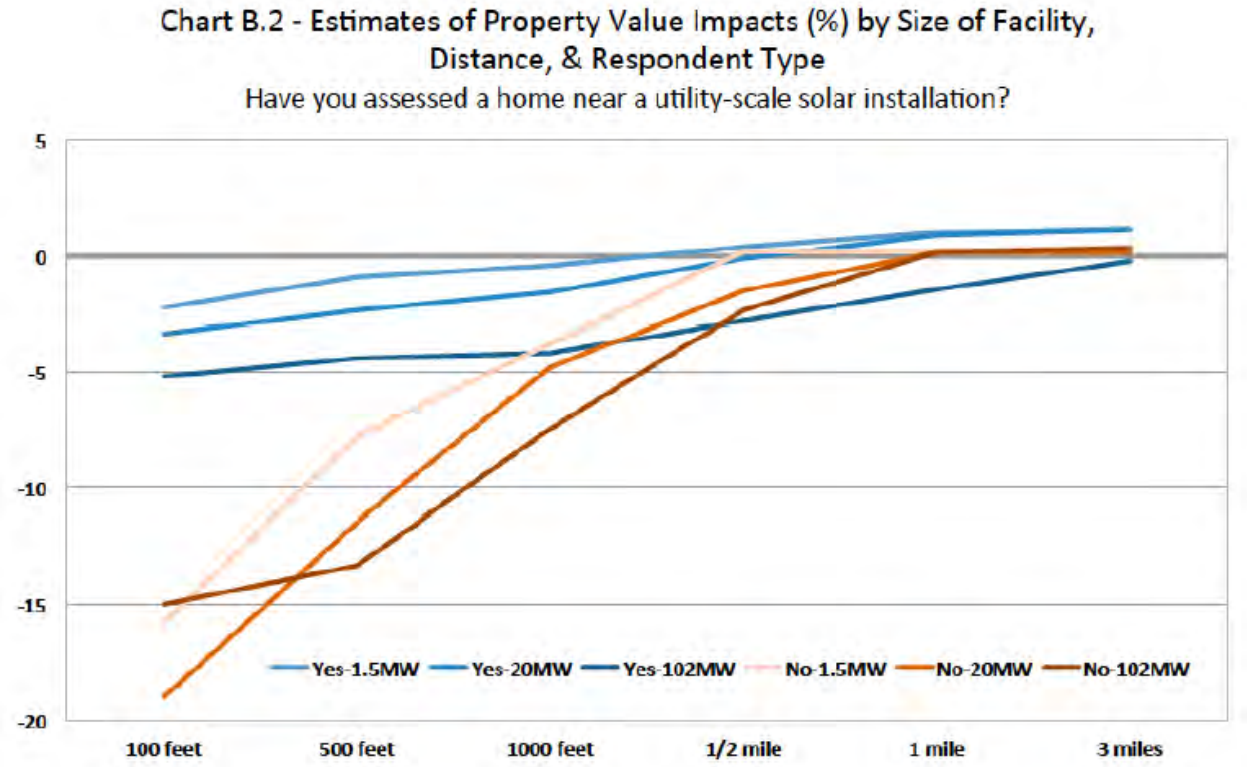
A. University of Texas at Austin, May 2018

An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations

This study considers solar farms from two angles. First it looks at where solar farms are being located and concludes that they are being located primarily in low density residential areas where there are fewer homes than in urban or suburban areas.

The second part is more applicable in that they conducted a survey of appraisers/assessors on their opinions of the possible impacts of proximity to a solar farm. They consider the question in terms of size of the adjoining solar farm and how close the adjoining home is to the solar farm. I am very familiar with this part of the study as I was interviewed by the researchers multiple times as they were developing this. One very important question that they ask within the survey is very illustrative. They asked if the appraiser being surveyed had ever appraised a property next to a solar farm. There is a very noticeable divide in the answers provided by appraisers who have experience appraising property next to a solar farm versus appraisers who self-identify as having no experience or knowledge related to that use.

On Page 16 of that study they have a chart showing the responses from appraisers related to proximity to a facility and size of the facility, but they separate the answers as shown below with appraisers with experience in appraising properties next to a solar farm shown in blue and those inexperienced shown in brown. Even within 100 feet of a 102 MW facility the response from experienced appraisers were -5% at most on impact. While inexperienced appraisers came up with significantly higher impacts. This chart clearly shows that an uninformed response widely diverges from the sales data available on this subject.



Furthermore, the question cited above does not consider any mitigating factors such as landscaping buffers or screens which would presumably reduce the minor impacts noted by experienced appraisers on this subject.

The conclusion of the researchers is shown on Page 23 indicated that "Results from our survey of residential home assessors show that the majority of respondents believe that proximity to a solar installation has either no impact or a positive impact on home values."

This analysis supports the conclusion of this report that the data supports no impact on adjoining property values. The only impact suggested by this study is -5% if a home was within 100 feet of a 100 MW solar farm with little to no landscaping screening. The proposed project has a landscaping screening, is much further setback than 100 feet from adjoining homes, and is less than 100 MW.

B. University of Rhode Island, September 2020

Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island

The University of Rhode Island published a study entitled **Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island** on September 29, 2020 with lead researchers being Vasundhara Gaur and Corey Lang. I have read that study and interviewed Mr. Corey Lang related to that study. This study is often cited by opponents of solar farms but the findings of that study have some very specific caveats according to the report itself as well as Mr. Lang from the interview.

While that study does state in the Abstract that they found depreciation of homes within 1-mile of a solar farm, that impact is limited to non-rural locations. On Pages 16-18 of that study under Section 5.3 Heterogeneity in treatment effect they indicate that the impact that they found was limited to non-rural locations with the impact in rural locations effectively being zero. For the study they defined "rural" as a municipality/township with less than 850 population per square mile.

They further tested the robustness of that finding and even in areas up to 2,000 population per square mile they found no statistically significant data to suggest a negative impact. They have not specifically defined a point at which they found negative impacts to begin, as the sensitivity study stopped checking at the 2,000-population per square mile.

Where they did find negative impacts was in high population density areas that was largely a factor of running the study in Massachusetts and Rhode Island which the study specifically cites as being the 2nd and 3rd most population dense states in the USA. Mr. Lang in conversation as well as in recorded presentations has indicated that the impact in these heavily populated areas may reflect a loss in value due to the scarce greenery in those areas and not specifically related to the solar farm itself. In other words, any development of that site might have a similar impact on property value.

Based on this study I have checked the population for the Springfield Division of Washington County, which has a population of 9,373 population for 2023 based on HomeTownLocator using Census Data and a total area of 213.02 square miles. This indicates a population density of 44 people per square mile which puts this well below the threshold indicated by the Rhode Island Study.

I also looked at the Lebanon Division of Marion County, which has a population of 10,875 for 2023 and a total area of 93.75 square miles for an indicated population density of 116 people per square mile. This is also well below the threshold indicated by the Rhode Island Study.

I therefore conclude that the Rhode Island Study supports the indication of no impact on adjoining properties for the proposed solar farm project.

Springfield Division Data & Demographics (As of July 1, 2023)

POPULATION	
Total Population	9,373 (100%)
Population in Households	9,145 (97.6%)
Population in Families	7,570 (80.8%)
Population in Group Quarters[1]	228 (2.4%)
Population Density	44
Diversity Index[2]	35

HOUSING	
Total HU (Housing Units)	4,069 (100%)
Owner Occupied HU	2,740 (67.3%)
Renter Occupied HU	953 (23.4%)
Vacant Housing Units	376 (9.2%)
Median Home Value	$167,913
Average Home Value	$215,401
Housing Affordability Index[3]	149

INCOME	
Median Household Income	$60,917
Average Household Income	$84,864
% of Income for Mortgage[4]	17%
Per Capita Income	$33,462
Wealth Index[5]	76

HOUSEHOLDS	
Total Households	3,693
Average Household Size	2.48000000000
Family Households	2,499
Average Family Size	3

Lebanon Division Data & Demographics (As of July 1, 2023)

POPULATION	
Total Population	10,875 (100%)
Population in Households	10,440 (96.0%)
Population in Families	8,356 (76.8%)
Population in Group Quarters[1]	435 (4.0%)
Population Density	116
Diversity Index[2]	43

HOUSING	
Total HU (Housing Units)	4,663 (100%)
Owner Occupied HU	3,034 (65.1%)
Renter Occupied HU	1,329 (28.5%)
Vacant Housing Units	300 (6.4%)
Median Home Value	$159,572
Average Home Value	$197,256
Housing Affordability Index[3]	132

INCOME	
Median Household Income	$50,822
Average Household Income	$69,427
% of Income for Mortgage[4]	19%
Per Capita Income	$27,933
Wealth Index[5]	49

HOUSEHOLDS	
Total Households	4,363
Average Household Size	2.39000000000
Family Households	2,748
Average Family Size	3

C. Georgia Institute of Technology, October 2020

Utility-Scale Solar Farms and Agricultural Land Values

This study was completed by Nino Abashidze as Post-Doctoral Research Associate of Health Economics and Analytics Labe (HEAL), School of Economics, Georgia Institute of Technology. This research was started at North Carolina State University and analyzes properties near 451 utility-scale ground-mount solar installations in NC that generate at least 1 MW of electric power. A total of 1,676 land sales within 5-miles of solar farms were considered in the analysis.

This analysis concludes on Page 21 of the study "Although there are no direct effects of solar farms on nearby agricultural land values, we do find evidence that suggests construction of a solar farm may create a small, positive, option -value for land owners that is capitalized into land prices. Specifically, after construction of a nearby solar farm, we find that agricultural land that is also located near transmission infrastructure may increase modestly in value."

This study supports a finding of no impact on adjoining agricultural property values and in some cases could support a modest increase in value.

D. Master's Thesis: ECU by Zachary Dickerson July 2018

A Solar Farm in *My* Backyard? Resident Perspectives of Utility-Scale Solar in Eastern North Carolina

This study was completed as part of a Master of Science in Geography Master's Thesis by Zachary Dickerson in July 2018. This study sets out to address three questions:

1. Are there different aspects that affect resident satisfaction regarding solar farms?

2. Are there variations in satisfaction for residents among different geographic settings, e.g. neighborhoods adjacent to the solar farms or distances from the solar farms?

3. How can insight from both the utility and planning sectors, combined with knowledge gained from residents, fill gaps in communication and policy writing in regard to solar farms?

This was done through survey and interview with adjacent and nearby neighbors of existing solar farms. The positive to neutral comments regarding the solar farms were significantly higher than negative. The researcher specifically indicates on Page 46 "The results show that respondents generally do not believe the solar farms pose a threat to their property values."

The most negative comments regarding the solar farms were about the lack of information about the approval process and the solar farm project prior to construction.

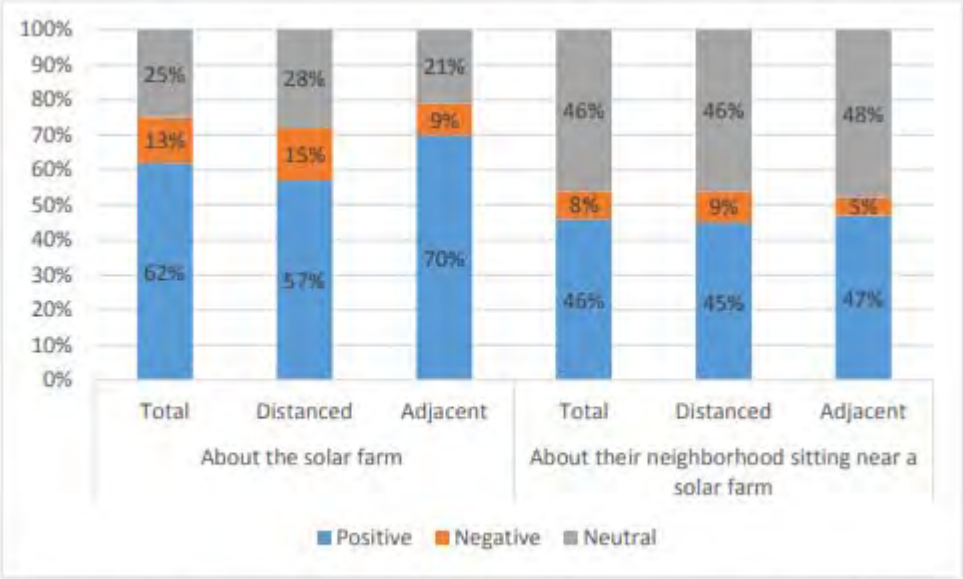
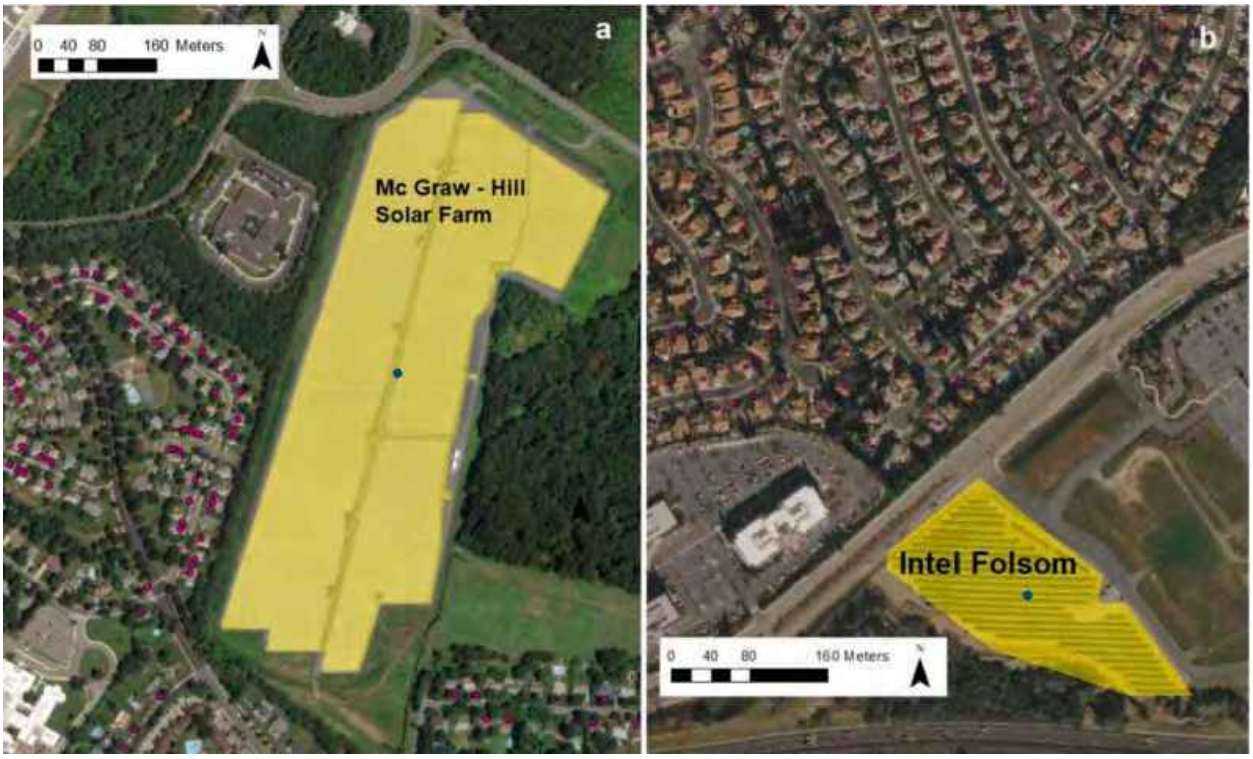


Figure 11: Residents' positive/negative word choices by geographic setting for both questions

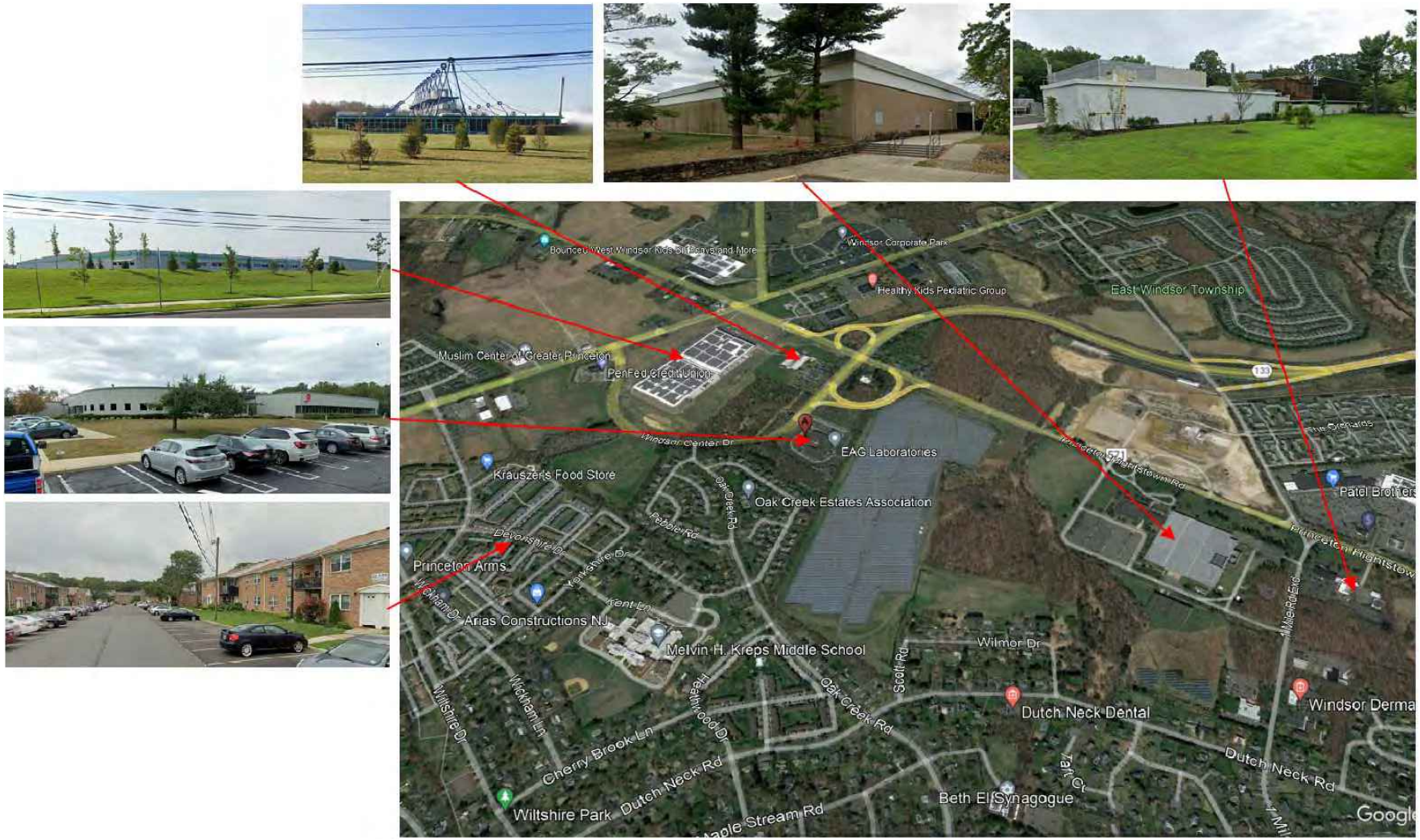
E. Lawrence Berkeley National Lab, March 2023

Shedding light on large-scale solar impacts: An analysis of property values and proximity to photovoltaics across six U.S. states

This study was completed by researchers including Salma Elmallah, Ben Hoen, K. Sydny Fujita, Dana Robson, and Eric Brunner. This analysis considers home sales before and after solar farms were installed within a 1-mile radius and compared them to home sales before and after the solar farms at a 2-4-mile radius. The conclusion found a 1.5% impact within 1 mile of a solar farm as compared to homes 2-4 miles from solar farms. This is the largest study of this kind on solar and addresses a number of issues, but also does not address a number of items that could potentially skew these results. First of all, the study found no impact in the three states with the most solar farm activity and only found impacts in smaller sets of data. The data does not in any way discuss actual visibility of solar farms or address existing vegetation screens. This lack of addressing this is highlighted by the fact that they suggest in the abstract that vegetative shading may be needed to address possible impacts. Another notable issue is the fact that they do not address other possible impacts within the radii being considered. This lack of consideration is well illustrated within the study on Figure A.1 where they show satellite images of McGraw Hill Solar Farm in NJ and Intel Folsom in CA. The Folsom image clearly shows large highways separating the solar farm from nearby housing, but with tower office buildings located closer to the housing being considered. In no place do they address the presence of these towers that essentially block those homes from the solar farm in some places. An excerpt of Fig. A.1. is shown below.



For each of these locations, I have panned out a little further on Google Earth to show the areas illustrated to more accurately reflect the general area. For the McGraw Hill Solar Farm you can see there is a large distribution warehouse to the west along with a large offices and other industrial uses. Further to the west is a large/older apartment complex (Princeton Arms). To the east there are more large industrial buildings. However, it is even more notable that 1.67 miles away to the west is Cranbury Golf Club. Given how this analysis was set up, these homes around the industrial buildings are being compared to homes within this country club to help establish impacts from the solar farm. Even considering the idea that each set is compared to itself before and after the solar farm, it is not a reasonable supposition that homes in each area would appreciate at the same rates even if no solar farm was included. Furthermore the site where the solar farm is located an all of the surrounding uses not improved with residential housing to the south is zoned Research Office (RO) which allows for: manufacturing, preparation, processing or fabrication of products, with all activities and product storage taking place within a completely enclosed building, scientific or research laboratories, warehousing, computer centers, pharmaceutical operations, office buildings, industrial office parks among others. Homes adjoining such a district would likely have impacts and influences not seen in areas zoned and surrounded by zoning strictly for residential uses.


Bounced West Windsor Kids Birthdays and More
Windsor Corporate Park
Healthy Kids Pediatric Group
East Windsor Township
Muslim Center of Greater Princeton
PenFed Credit Union
Windsor Center Dr
EAG Laboratories
Krauszer's Food Store
Oak Creek Estates Association
Princeton Arms
Arias Constructions NJ
Melvin H. Kreps Middle School
Wilmor Dr
Dutch Neck Dental
Windsor Derma
Wiltshire Dr
Cherry Brook Ln
Dutch Neck Rd
Wiltshire Park
Beth El Synagogue
Eagle Stream Rd
Google

COVENTRY AT NATOMA STATION
Center
Natoma Station Elementary School
Waterford Place
NATOMA STATION
Deer Rabbit Mini Park
Elite Scholars
Redfin | Sacramento Real Estate Agents
RBK Architects
Iron Point Rd
El Dorado Fwy
Alder Creek
Safeway
Iron Point Rd
Prairie City Rd
Intel Corporation
Intel - FM7
Intel - FM5
50

On the Intel Folsom map I have shown the images of two of the Intel Campus buildings, but there are roughly 8 such buildings on that site with additional solar panels installed in the parking lot as shown in that image. I included two photos that show the nearby housing having clear and close views of adjoining office parking lots. This illustrates that the homes in that 1-mile radius are significantly more impacted by the adjoining office buildings than a solar farm located distantly that are not within the viewshed of those homes. Also, this solar farm is located on land adjoining the Intel Campus on a tract that is zoned M-1 PD, which is a Light Industrial/Manufacturing zoning. Nearby homes. Furthermore, the street view at the solar farm shows not only the divided four-lane highway that separates the office buildings and homes from the solar farm, but also shows that there is no landscaping buffer at this location. All of these factors are ignored by this study. Below is another image of the Folsom Solar at the corner of Iron Point Road and Intel West Driveway which shows just how close and how unscreened this project is.

Compare that image from the McGraw Hill Street view facing south from County Rte 571. There is a distant view and much of the project is hidden by a mix of berms and landscaping. The analysis makes no distinction between these projects.

The third issue with this study is that it identifies impacts following development in areas where they note that "more adverse home price impacts might be found where LSPVPS (large-scale photovoltaic project) displace green space (consistent with results that show higher property values

near green space." The problem with this statement is that it assumes that the greenspace is somehow guaranteed in these areas, when in fact, they could just as readily be developed as a residential subdivision and have the same impacts. They have made no effort to differentiate loss of greenspace through other development purposes such as schools, subdivisions, or other uses versus the impact of solar farms. In other words, they may have simply identified the impact of all forms of development on property value. This would in fact be consistent with the comments in the Rhode Island study where the researchers noted that the loss of greenspace in the highly urban areas was likely due to the loss of greenspace in particular and not due to the addition of solar panels.

Despite these three shortcomings in the analysis – the lack of differentiating landscape screening, the lack of consideration of other uses within the area that could be impacting property values, and the lack of consideration of alternative development impacts – the study still only found impacts between 0 and 5% with a conclusion of 1.5% within a 1-mile radius. As discussed later in this report, real estate is an imperfect market and real estate transactions typically sell for much wider variability than 5% even where there are no external factors operating on property value.

I therefore conclude that the minor impacts noted in this study support a finding of no impact on property value. Most appraisals show a variation between the highest and lowest comparable sale that is substantially greater than 1.5% and this measured impact for all its flaws would just be lost in the static of normal real estate transactions.

VI. Assessor Surveys

I have completed a survey of assessors in Kentucky, I have excluded responses from assessors with no existing and no pending solar farms in those counties. The breakdown is shown below.

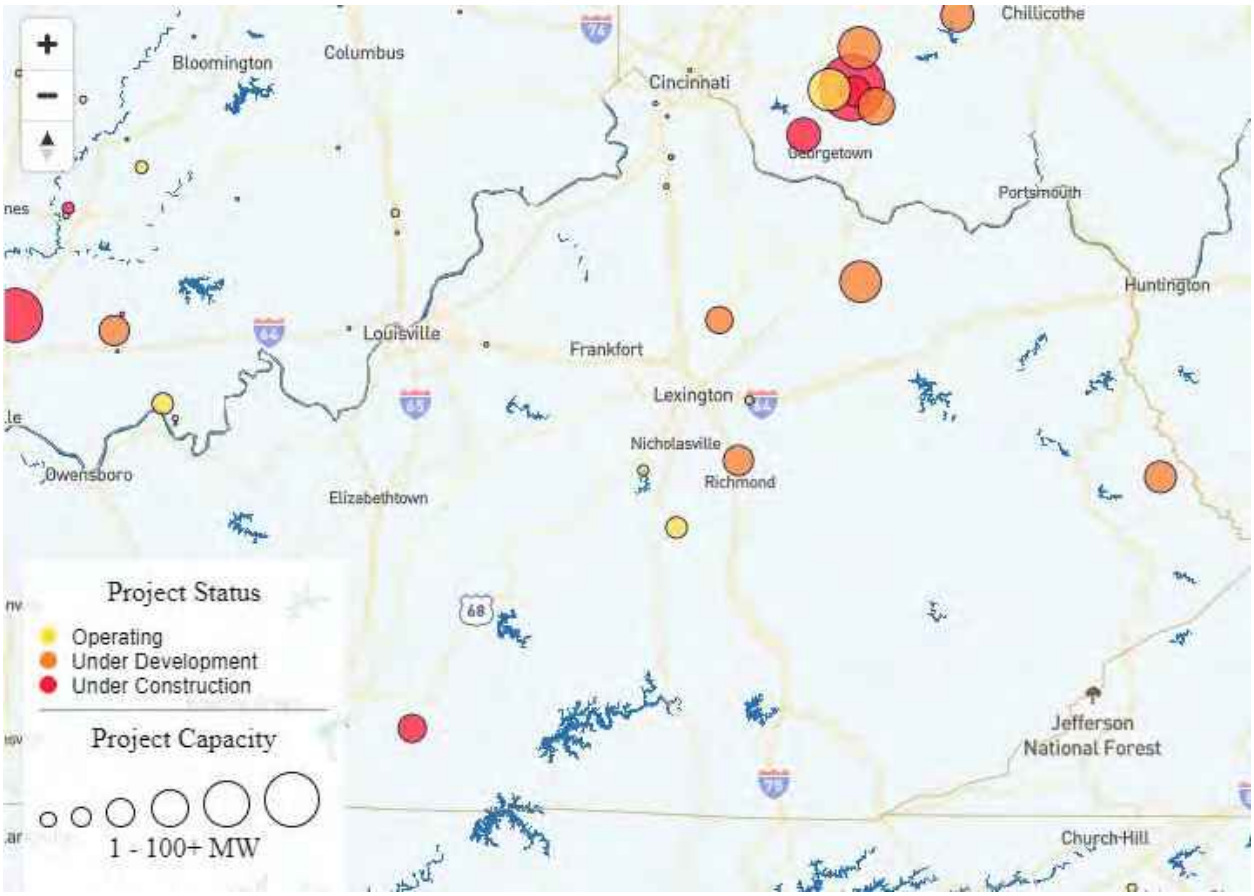
Kentucky Property Valuation Administrator				
		Existing	Proposed	
County	Assessor	Solar	Solar	Impact on Adjacent?
Breckinridge	Dana Bland	0	2	No
Caldwell	Ronald Wood	0	2	No
Christian	Angie Strader	4	n/a	No
Clark	Jada Brady	1	n/a	No response
Green	Sean Curry	0	2	No
Martin	Bobby Hale, Jr.	0	1	No response/hasn't come up yet
Mercer	Jessica Elliott	1	0	No
Russell	Tim Popplewell	0	1	No response/depends on sales after built
Webster	Jeffrey Kelley	0	1	No response/depends on sales after built
Whitley	Ronnie Moses	0	1	No
	Total Responses	10		
	No Impact Responses	6		
	No Response on Impact	4		

I have completed similar surveys in a number of states and I have shown the breakdown of those responses below. I have not had any assessor indicate a negative adjustment due to adjacency to a solar farm in any state. These responses total 188 with 170 definitively indicating no negative adjustments are made to adjoining property values, 18 providing no response to the question, and 0 indicating that they do address a negative impact on adjoining property value.

Summary of Assessor Surveys				
State	**Responses**	**No Impact**	**Yes Impact**	**No Comment**
North Carolina	39	39		
Virginia	16	16		
Indiana	31	31		
Colorado	15	7		8
Georgia	33	33		
Kentucky	10	6		4
Mississippi	4	2		2
New Mexico	5	5		
Ohio	24	20		4
South Carolina	11	11		
Totals	188	170		18

VII. Summary of Solar Projects in Kentucky

I have researched the solar projects in Kentucky. I identified the solar farms through the Solar Energy Industries Association (SEIA) Major Projects List and then excluded the roof mounted facilities. This leaves only six solar farms in Kentucky for analysis at this time. Below is a map pulled from SEIA on Major Projects and it shows projects under development in orange and under construction in red, with yellow dots representing existing solar farms. It was from this map that I have identified a list of existing and under construction solar farms researched in Kentucky.



I have provided a summary of projects below and additional detailed information on the projects on the following pages. I specifically note the similarity in most of the sites in Kentucky in terms of mix of adjoining uses, topography, and distances to adjoining homes to each other as well as to the data identified throughout the southeast.

The number of solar farms currently in Kentucky is low compared to a number of other states and North Carolina in particular. I have looked at solar farms in Kentucky for sales activity, but the small number of sites coupled with the relatively short period of time these solar farms have been in place has not provided as many examples of sales adjoining a solar farm as I am able to pull from other places. I have therefore also considered sales in other states, but I have shown in the summary how the demographics around the solar farms in other locations relate to the demographics around the proposed solar farm to show that generally similar locations are being considered. The similarity of the sites in terms of adjoining uses and surrounding demographics makes it reasonable to compare the lack of significant impacts in other areas would translate into a similar lack of significant impacts at the subject site.

Solar #	Name	County	City	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre			
									Res	Agri	Agri/Res	Com
610	Bowling Green	Warren	Bowling Green	2	17.36	17.36	720	720	1%	64%	0%	36%
611	Cooperative Solar I	Clarky	Winchester	8.5	181.47	63	2,110	2,040	0%	96%	3%	0%
612	Walton 2	Kenton	Walton	2	58.03	58.03	891	120	21%	0%	60%	19%
613	Crittenden	Grant	Crittenden	2.7	181.7	34.1	1,035	345	22%	27%	51%	0%
617	Glover Creek	Metcalfe	Summer Shade	55	968.2	322.44	1,731	175	6%	25%	69%	0%
618	Turkey Creek	Garrard	Lancaster	50	752.8	297.05	976	240	8%	36%	51%	5%
656	Mount Olive Creek	Russell	Russell Springs	60	526.02	420.82	759	150	24%	28%	47%	0%
657	Horseshoe Bend	Greene	Greensburg	60	585.65	395	1,140	285	8%	51%	41%	0%
658	Flat Run	Taylor	Campbellsville	55	518.94	518.94	540	220	11%	70%	18%	0%
659	Cooperative Shelby	Shelby	Simpsonville	4	35	35	N/A	N/A	6%	11%	32%	52%
660	E.W. Brown	Mercer	Harrodsburg	10	50	50	1,026	565	3%	44%	29%	25%
696	Fleming	Fleming	Elizaville	188	2350	2350	1,036	175	12%	37%	50%	0%
700	Ashwood	Lyon	Fredonia	86	1537.7	1537.7	785	170	4%	46%	23%	27%
720	Fleming 1	Fleming	Flemingburgs	98	764.5	598.6	585	150	3%	48%	49%	0%
722	Henderson KY	Henderson	Henderson	50	1113	725.13	1,395	180	14%	57%	28%	1%
770	Bluebird KY	Harrison	Cynthia	90	1943.2	1345	2,056	350	3%	21%	76%	0%
771	Martin	Martin	Threeforks	100	4122		4,029	1,450	5%	94%	2%	0%
794	Russelville	Logan	Russelville	208	1612	1612	1,058	250	4%	51%	45%	0%
				18								
			Average	62.7	962.1	610.6	1287	446	9%	45%	37%	9%
			Median	55.0	669.2	395.0	1035	240	6%	45%	43%	0%
			High	208.0	4122.0	2350.0	4029	2040	24%	96%	76%	52%
			Low	2.0	17.4	17.4	540	120	0%	0%	0%	0%

610: Bowling Green Solar, Bowling Green, KY

This project was built in 2011 and located on 17.36 acres for a 2 MW project on Scotty's Way with the adjoining uses being primarily industrial. The closest dwelling is 720 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	0.58%	10.00%
Agricultural	63.89%	30.00%
Industrial	35.53%	60.00%
Total	**100.00%**	**100.00%**

611: Cooperative Solar I, Winchester, KY

This project was built in 2017 on 63 acres of a 181.47-acre parent tract for an 8.5 MW project with the closest home at 2,040 feet from the closest solar panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	0.15%	11.11%
Agricultural	96.46%	77.78%
Agri/Res	3.38%	11.11%
Total	**100.00%**	**100.00%**

612: Walton 2 Solar, Walton, KY

This project was built in 2017 on 58.03 acres for a 2 MW project with the closest home 120 feet from the closest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	20.84%	47.06%
Agri/Res	59.92%	17.65%
Commercial	19.25%	35.29%
Total	**100.00%**	**100.00%**

613: Crittenden Solar, Crittenden, KY

This project was built in late 2017 on 34.10 acres out of a 181.70-acre tract for a 2.7 MW project where the closest home is 345 feet from the closest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	1.65%	32.08%
Agricultural	73.39%	39.62%
Agri/Res	23.05%	11.32%
Commercial	0.64%	9.43%
Industrial	0.19%	3.77%
Airport	0.93%	1.89%
Substation	0.15%	1.89%
Total	**100.00%**	**100.00%**

617: Glover Creek Solar, Summer Shade, Metcalfe County, KY

This project was built in 2022 on 322.44 acres out of a 968.20-acre parent tract assemblage for a 55 MW project where the closest home is 175 feet from the closest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	5.78%	37.50%
Agricultural	19.81%	12.50%
Agri/Res	74.41%	50.00%
Total	**100.00%**	**100.00%**

I identified a sale of 194 acres adjoining this solar farm on January 22, 2021 for $430,000, or $2,216 per acre. This land was improved with a dwelling from the early 1900s and while 74 acres were in timber, the timber was reserved. Given the reserved timber and the fact that this sold prior to the construction of the solar farm, it is difficult to analyze this sale for impact.

618: Turkey Creek Solar, Lancaster, Garrard County, KY

This project was built in 2022 on 297.05 acres out of a 752.80-acre parent tract assemblage for a 50 MW project where the closest home is 240 feet from the closest panel. This project was announced in 2019 with approvals in 2020.

I identified a sale at 166 Long Branch Drive, Lancaster that sold on November 25, 2020 after the solar farm was announced for $180,000. The prior sale of the property on February 28, 2019 was for $160,000. Adjusting the earlier sale by the FHFA Home Price Index, the anticipated increase in value was $181,000. This is a difference of 1% which is within typical market deviation and supports a finding of no impact on property value due to the announcement of the solar farm. This home is approximately 250 feet from the nearest solar panel.

I also identified 209 Ashlock Drive that sold on June 14, 2022 near the time construction was to be begin at this solar project. This home sold for $500,000 for a 3,968 s.f. home with 4 BR, 4.5 BA built in 1985 on 3.06 acres. This is a unique home and it is over 1,000 feet to the nearest solar panel. It was purchase out of a larger tract that now includes 5 additional lots and this home adjoins an industrial use to the northwest. All of these factors make it difficult to analyze this sale. I have therefore not attempted to do so as any result would be non-credible given these other factors.

I also identified 1439 Stanford Road that sold on June 27, 2023 for $1,300,000 for this 3,400 historic home on 206 acres. The home is over 1,500 feet from the panels and the site includes acreage zoned for commercial use according to the listing. There are too many unique features to this for a valid paired sales analysis. I have not attempted one for this sale.

656: Mount Olive Creek Solar, Russell Springs, Russell County, KY

This project was built in 2022 on 420.82 acres out of a parent tract assemblage of 526.02 acres for this 60 MW project.

The closest adjoining home is 150 feet from the nearest panel.

I identified a home sale at 2985 Highway 1729 that sold on December 2, 2022 for $150,000. This home is around 1,250 feet from the nearest panel which is located to the northeast and through the intersection of Sano Road and Sulpher Creek Road (Highway 1729). It fronts on the highway and adjoins a church. Given these various issues, it would be difficult to complete a paired sales analysis on this home. However, this home did sell on September 18, 2018 for $110,000 prior to the solar farm construction. Adjusting this purchase price upward by the FHFA Home Price Index for the area, this home would have been expected to appreciate to $158,000. This was within 5% of the anticipated sales price and supports a finding of no impact on property value. Still given the distance to the solar farm and the other factors, I will not rely heavily on this indicator.

657: Horseshoe Bend Solar, Greensburg, Green County, KY

This project was built in 2022 on 395 acres out of a parent tract assemblage of 585.65 acres for this 60 MW project.

A home located at 2814 Highway 218, Greensburg sold on March 17, 2023 for $199,500 for a 3BR, 3 bathroom brick range on 3.75 acres located across the Highway and 1,275 feet from the nearest panel. The home is very well screened by trees and very distant and across a highway from the project. It is not a great candidate for testing for solar farm values. Furthermore it was updated since it was purchased in 2018, which minimizes the potential for a Sale/Resale analysis. All I can say is that the home was purchased in 2018 for $127,000 and sold 5 years later at a significantly higher price, though I don't know how much of that is attributable to the updates.

658: Flat Run Solar, Campbellsville, Taylor County, KY

This project is currently proposed to be located on 518.94 acres for this 55 MW project. The closest dwelling was proposed to be 220 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	11.11%	55.56%
Agricultural	70.45%	37.04%
Agri/Res	18.44%	7.41%
Total	**100.00%**	**100.00%**

659: Cooperative Shelby Solar, Simpsonville, KY

This project was built in 2020 on 35 acres for a 0.5 MW project that is approved for expansion up to 4 MW.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	6.04%	44.44%
Agricultural	10.64%	11.11%
Agri/Res	31.69%	33.33%
Institutional	51.62%	11.11%
Total	**100.00%**	**100.00%**

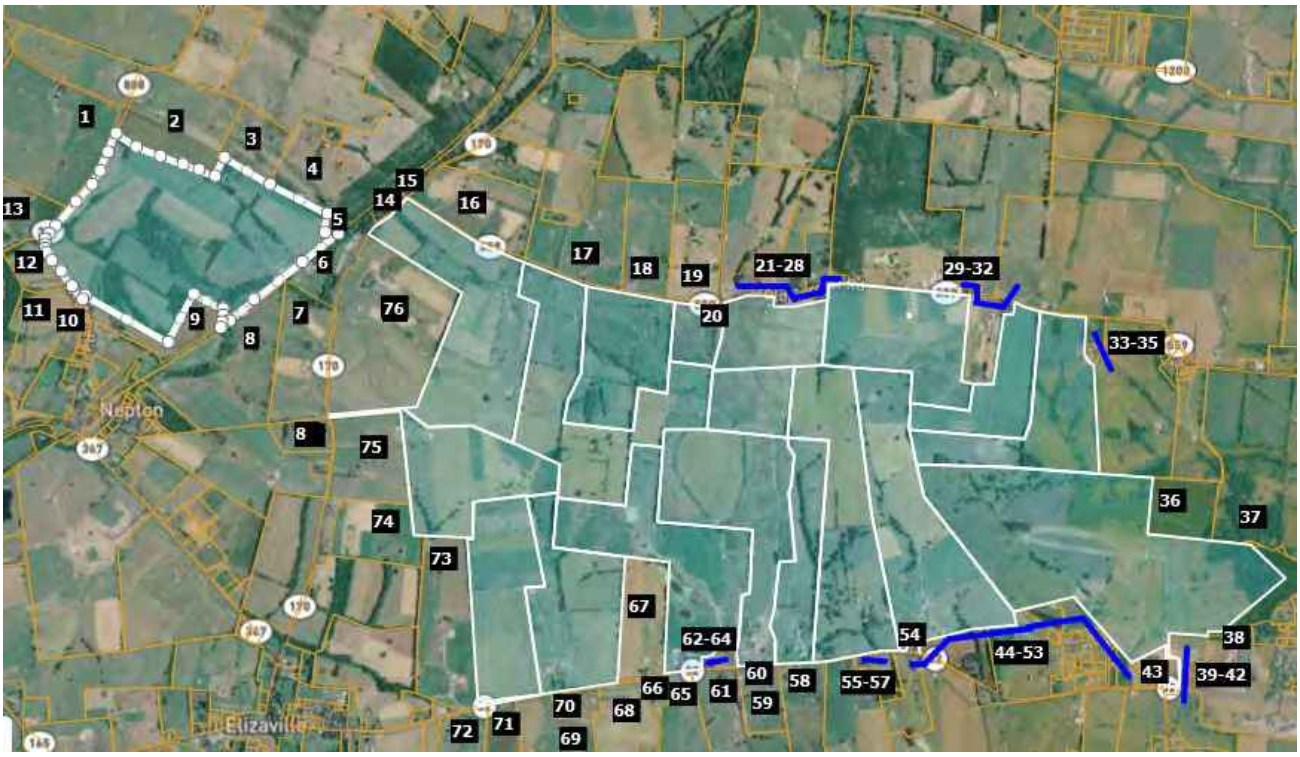
660: E.W. Brown Solar, Harrodsburg, KY

This project was built in 2016 on 50 acres for a 10 MW project. This solar facility adjoins three coal-fired units, which makes analysis of these nearby home sales problematic as it is impossible to extract the impact of the coal plant on the nearby homes especially given the lake frontage of the homes shown.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	2.77%	77.27%
Agricultural	43.92%	9.09%
Agri/Res	28.56%	9.09%
Industrial	24.75%	4.55%
Total	**100.00%**	**100.00%**

696: Fleming Solar, Elizaville, Fleming County, KY



This project is proposed for a 188 MW project on a parent tract of 2,350 acres. The closest adjoining home is to be 175 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	11.80%	48.68%
Agricultural	37.47%	18.42%
Agri/Res	50.22%	30.26%
Religious	0.20%	1.32%
Commercial	0.30%	1.32%
Total	**100.00%**	**100.00%**

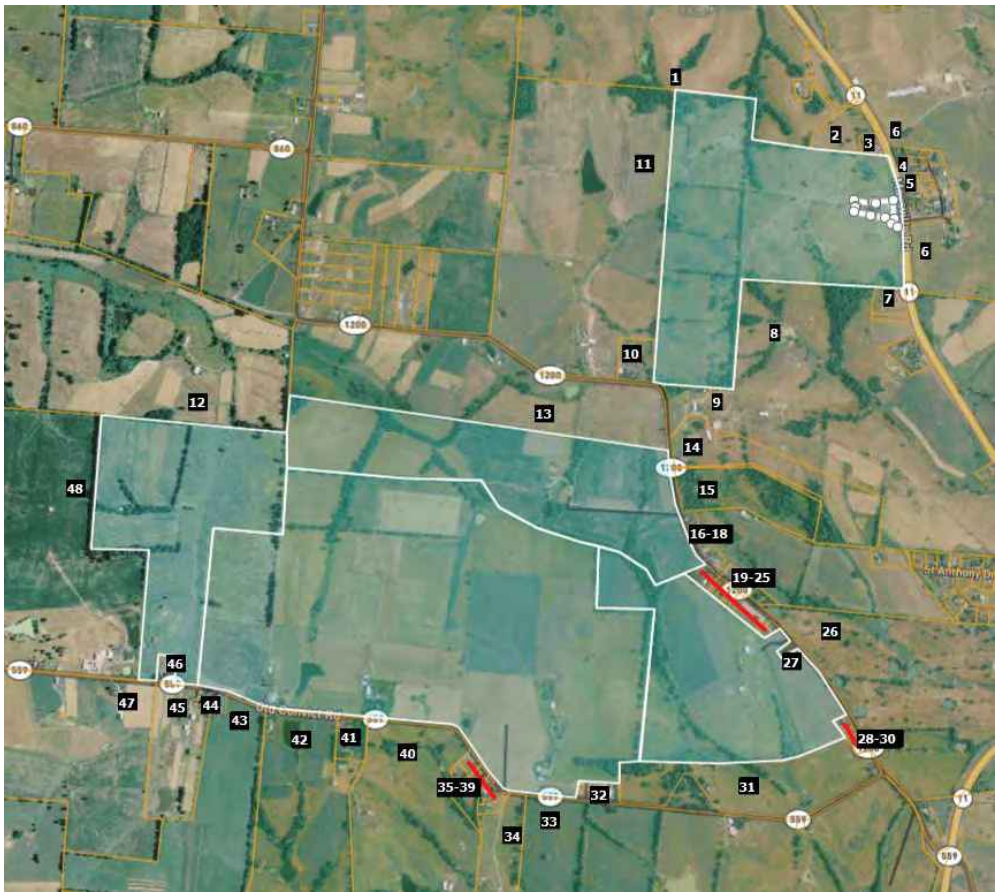
700: Ashwood Solar, Fedonia, Lyon County, KY

This project broke ground in 2023 and is located on 1,537.70 acres for an 86 MW project on Coleman Doles Road near Fredonia. The closest dwelling was proposed to be 170 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	3.70%	54.05%
Agricultural	46.11%	24.32%
Agri/Res	22.99%	18.92%
Correctional	27.20%	2.70%
Total	**100.00%**	**100.00%**

720: Fleming 2 Solar, Flemingsburg, Fleming County, KY

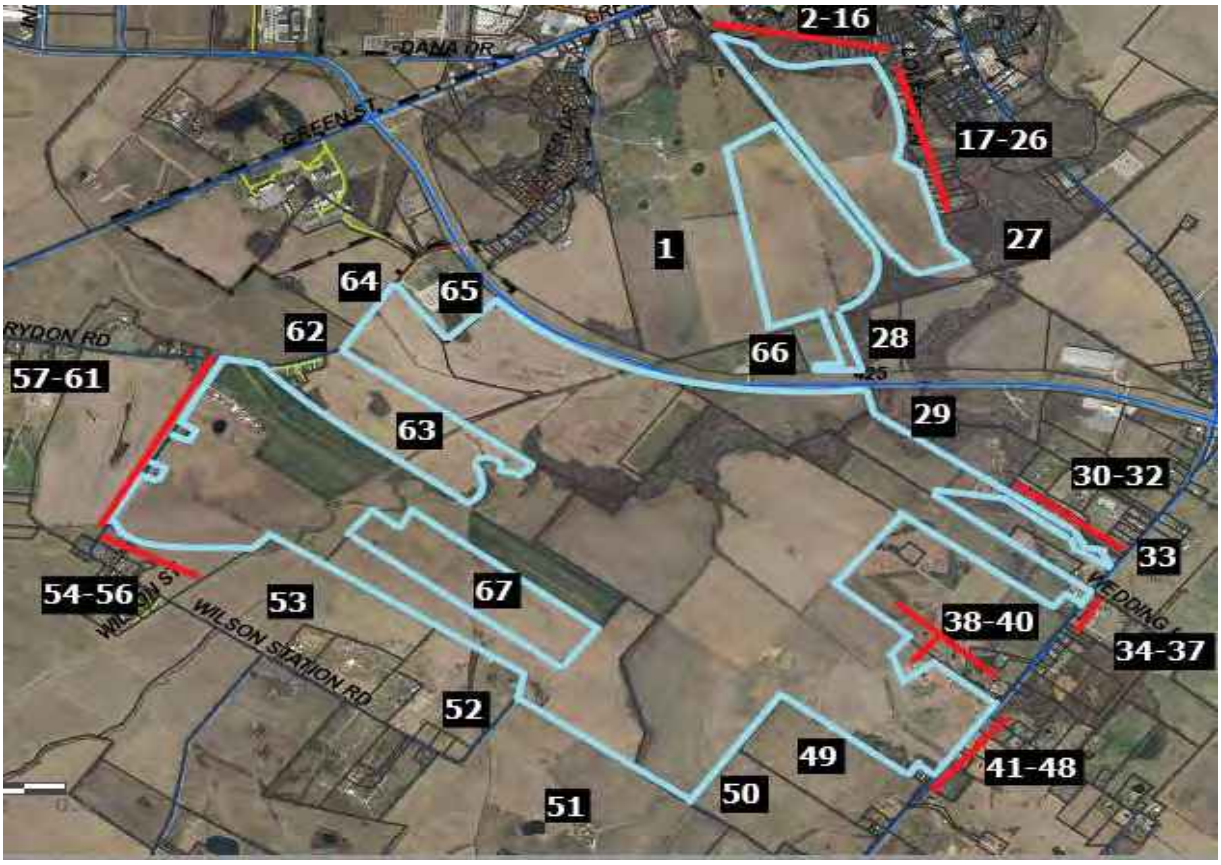


This project is currently proposed to be completed in 2024 and is located on 598.60 acres out of a 764.50-acre assemblage for a 98 MW project on Old Convict Road. The closest dwelling was proposed to be 150 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	2.93%	56.25%
Agricultural	47.56%	20.83%
Agri/Res	49.27%	18.75%
Religious	0.12%	2.08%
Warehouse	0.12%	2.08%
Total	**100.00%**	**100.00%**

722: Henderson County Solar, Henderson, Henderson County, KY

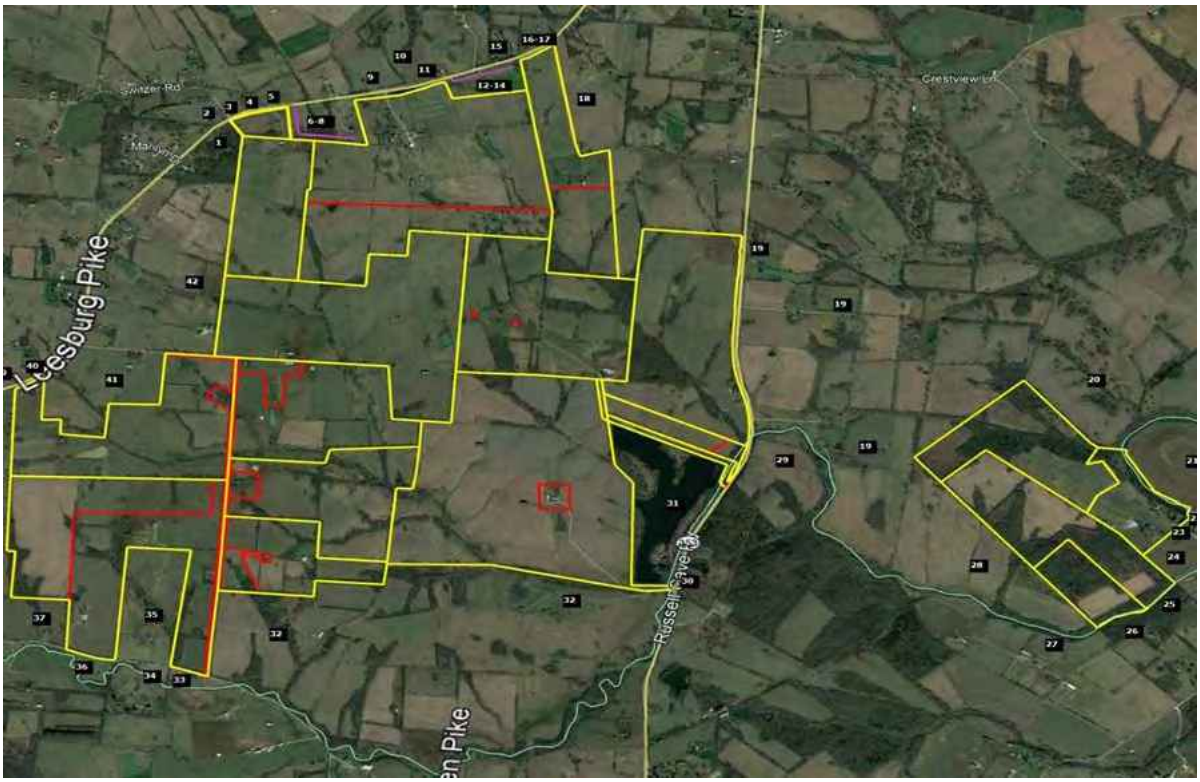


This project is currently proposed to be completed in 2023 and is located on 725.13 acres out of a 1,113.03-acre assemblage for a 50 MW project on Wilson Station Road. The closest dwelling was proposed to be 180 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	12.77%	71.64%
Agricultural	56.98%	14.93%
Agri/Res	27.96%	7.46%
Religious	0.03%	1.49%
School	1.45%	1.49%
Substation	0.45%	1.49%
Cell Tower	0.35%	1.49%
Total	**100.00%**	**100.00%**

770: Bluebird Solar, Cynthia, Harrison County, KY

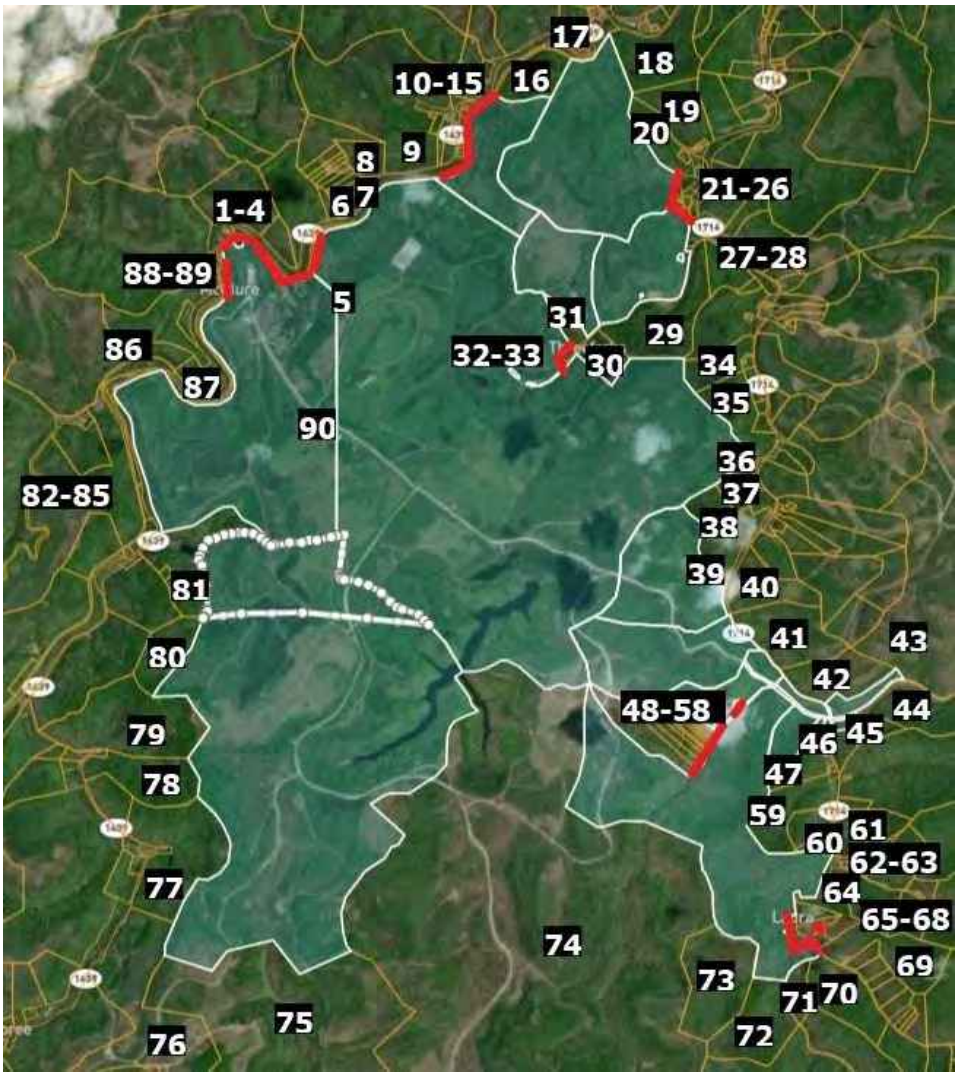


This project is currently proposed to be completed in 2024 and is located on 1,345 acres out of a 1,943.24-acre assemblage for a 90 MW project on Hwy 32 W near Cynthia. The closest dwelling was proposed to be 350 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	3.47%	47.62%
Agricultural	20.51%	26.19%
Agri/Res	76.01%	26.19%
Total	**100.00%**	**100.00%**

771: Martin County Solar, Threeforks, Martin County, KY



This project is under construction on a 2,500-acre assemblage for a 100 MW project. This was the former Martiki Coal Mine land. The closest dwelling was proposed to be 1,450 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	4.65%	60.44%
Agricultural	93.60%	31.87%
Agri/Res	1.69%	2.20%
Cemetery	0.06%	5.49%
Total	**100.00%**	**100.00%**

794: Logan County Solar, Russelville, Logan County, KY

This project is currently proposed to be completed in 2023 and is located on 1,100 acres for a 173 MW project. The closest dwelling was proposed to be 225 feet from the nearest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	3.54%	45.71%
Agricultural	51.29%	37.14%
Agri/Res	45.05%	14.29%
Religious	0.12%	2.86%
Total	**100.00%**	**100.00%**

I identified a May 17, 2022 sale of 528 Watermelon Road for $275,000 for a home on 1.29 acres with 2,370 s.f. with 3 BR and 2 BR built in 1940 with 2 carport spaces. This homes is 1,460 feet from the nearest panel through an existing wooded patch. The distance and age makes it difficult to compare this home in this area to similar properties for a paired sale analysis. This home last sold on September 12, 2016 for $149,000. Using the FHFA Home Price Index the anticipated

appreciated value as of the date of the most recent sale was expected to be $234,000. This Sale/Resale analysis suggests a 17.5% increase in value due to the solar farm.

I also identified 557 J Montgomery Road that sold on December 8, 2021 for $185,000 for a 4 BR, 2 BA with 2,200 s.f. of living space on 1 acre that was built in 1980. This home has a pool that is noted as needing work, but was otherwise in average condition. I spoke with Dewayne Whittaker the listing agent who indicated that the proposed nearby solar farm had no impact on the sales price or marketing of the home. This home previously sold on May 5, 2016 for $114,000 and also on June 17, 2008 for $125,000. The 2008 sales price was higher than the 2016 due to the crash in the housing market in 2008. Adjusting each of these former sales to a December 2021 value expectation based on the FHFA Home Price Index, I derive expectations of $174,000 from the 2016 sale and $210,000 from the 2008 sale. The Sale/Resale difference from the 2008 sale is considered more reliable as it covers a shorter period of time. It shows a 6% increase in value over the expected value and supports a mild increase in value due to the adjacency to the solar farm. This home is over 1,900 feet to the nearest panel through existing woods. Given the distance involved this is not a strong indicator for properties closer to solar panels.

Similarly, 263 Donald Lane sold on October 3, 2022 for $263,400 for a brick ranch with 4 BR, 2.5 BA with 1,704 s.f. of living area on 5 acres. This home is about 1400 feet from the nearest panel through existing woods. This home previously sold in May 2010 for $141,000. Adjusting this for time using the FHFA HPI, I derive an expected value of $262,000. This is within 1% of the actual closed price and strongly supports a finding of no impact at this distance. It is not a strong indicator for properties closer to panels.

VIII. Market Analysis of the Impact on Value from Solar Farms

I have researched hundreds of solar farms in numerous states to determine the impact of these facilities on the value of adjoining properties. This research has primarily been in North Carolina, but I have also conducted market impact analyses in Virginia, South Carolina, Tennessee, Texas, Oregon, Mississippi, Maryland, New York, California, Missouri, Florida, Montana, Georgia, Kentucky, and New Jersey.

I have derived a breakdown of the adjoining uses to show where solar farms are located. A summary showing the results of compiling that data over hundreds of solar farms is shown later in the Scope of Research section of this report.

I also consider whether the properties adjoining a solar farm in one location have characteristics similar to the properties abutting or adjoining the proposed site so that I can make an assessment of market impact on each proposed site. Notably, in most cases solar farms are placed in areas very similar to the site in question, which is surrounded by low density residential and agricultural uses. In my over 700 studies, I have found a striking repetition of that same typical adjoining property use mix in over 90% of the solar farms I have looked at. Matched pair results in multiple states are strikingly similar, and all indicate that solar farms – which generate very little traffic, and do not generate noise, dust or have other harmful effects – do not negatively impact the value of adjoining or abutting properties.

I have previously been asked by the Kentucky Siting Board about how the solar farms and the matched pair sets were chosen. This is the total of all the usable home sales adjoining the 900+ solar farms that I have looked at over the last 15 years. Most of the solar farms that I have looked at are only a few years old and have not been in place long enough for home or land sales to occur next to them for me to analyze. There is nothing unusual about this given the relatively rural locations of most of the solar farms where home and land sales occur much less frequently than they do in urban and suburban areas and the number of adjoining homes is relatively small.

I review the solar farms that I have looked at periodically to see if there are any new sales. If there is a sale I have to be sure it is not an inhouse sale or to a related family member. A great many of the rural sales that I find are from one family member to another, which makes analysis impossible given that these are not "arm's length" transactions. There are also numerous examples of sales that are "arm's length" but are still not usable due to other factors such as adjoining significant negative factors such as a coal fired plant or at a landfill or prison. I have looked at homes that require a driveway crossing a railroad spur, homes in close proximity to large industrial uses, as well as homes adjoining large state parks, or homes that are over 100 years old with multiple renovations. Such sales are not usable as they have multiple factors impacting the value that are tangled together. You can't isolate the impact of the coal fired plant, the industrial building, or the railroad unless you are comparing that sale to a similar property with similar impacts. Matched pair analysis requires that you isolate properties that only have one differential to test for, which is why the type of sales noted above is not appropriate for analysis.

After my review of all sales and elimination of the family transactions and those sales with multiple differentials, I am left with the matched pairs shown in this report to analyze. I do have additional matched pair data in other areas of the United States that were not included in this report due to being states less comparable to Kentucky than those shown. The only other sales that I have eliminated from the analysis are home sales under $100,000, which there haven't been many such examples, but at that price range it is difficult to identify any impacts through matched pair analysis. I have not cherry picked the data to include just the sales that support one direction in value, but I have included all of them both positive and negative with a preponderance of the evidence supporting no impact to mild positive impacts.

A. Kentucky and Adjoining States Data

1. Matched Pair – Crittenden Solar, Crittenden, Grant County, KY

This solar farm was built in December 2017 on a 181.70-acre tract but utilizing only 34.10 acres. This is a 2.7 MW facility with residential subdivisions to the north and south.

I have identified five home sales to the north of this solar farm on Clairborne Drive and one home sale to the south on Eagle Ridge Drive since the completion of this solar farm. The home sale on Eagle Drive is for a $75,000 home and all of the homes along that street are similar in size and price range. According to local broker Steve Glacken with Cutler Real Estate these are the lowest price range/style home in the market. I have not analyzed that sale as it would unlikely provide significant data to other homes in the area.

Mr. Glacken has been selling lots at the west end of Clairborne for new home construction. He indicated in 2020 that the solar farm near the entrance of the development has been a complete non-factor and none of the home sales are showing any concern over the solar farm. Most of the homes are in the $250,000 to $280,000 price range. The vacant residential lots are being marketed for $28,000 to $29,000. The landscaping buffer is considered light, but the rolling terrain allows for distant views of the panels from the adjoining homes along Clairborne Drive.

The first home considered is a bit of an anomaly for this subdivision in that it is the only manufactured home that was allowed in the community. It sold on January 3, 2019. I compared that sale to three other manufactured home sales in the area making minor adjustments as shown on the next page to account for the differences. After all other factors are considered the adjustments show a -1% to +13% impact due to the adjacency of the solar farm. The best indicator is 1250 Cason, which shows a 3% impact. A 3% impact is within the normal static of real estate transactions and therefore not considered indicative of a positive impact on the property, but it strongly supports an indication of no negative impact.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	250 Claiborne	0.96	1/3/2019	$120,000	2000	2,016	$59.52	3/2	Drive	Manuf	
	Not	1250 Cason	1.40	4/18/2018	$95,000	1994	1,500	$63.33	3/2	2-Det	Manuf	Carport
	Not	410 Reeves	1.02	11/27/2018	$80,000	2000	1,456	$54.95	3/2	Drive	Manuf	
	Not	315 N Fork	1.09	5/4/2019	$107,000	1992	1,792	$59.71	3/2	Drive	Manuf	

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	250 Claiborne								$120,000			373
Not	1250 Cason	$2,081		$2,850	$26,144		-$5,000	-$5,000	$116,075	3%		
Not	410 Reeves	$249		$0	$24,615				$104,865	13%		
Not	315 N Fork	-$1,091		$4,280	$10,700				$120,889	-1%		
											5%	

I also looked at three other home sales on this street as shown below. These are stick-built homes and show a higher price range.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	300 Claiborne	1.08	9/20/2018	$212,720	2003	1,568	$135.66	3/3	2-Car	Ranch	Brick
	Not	460 Claiborne	0.31	1/3/2019	$229,000	2007	1,446	$158.37	3/2	2-Car	Ranch	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	Ranch	Brick
	Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	300 Claiborne								$213,000			488
Not	460 Claiborne	-$2,026		-$4,580	$15,457	$5,000			$242,850	-14%		
Not	2160 Sherman	-$5,672		-$2,650	-$20,406				$236,272	-11%		
Not	215 Lexington	$1,072		$3,468	-$2,559	-$5,000			$228,180	-7%		
											-11%	

This set of matched pairs shows a minor negative impact for this property. I was unable to confirm the sales price or conditions of this sale. The best indication of value is based on 215 Lexington, which required the least adjusting and supports a -7% impact.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	350 Claiborne	1.00	7/20/2018	$245,000	2002	1,688	$145.14	3/3	2-Car	Ranch	Brick
	Not	460 Claiborne	0.31	1/3/2019	$229,000	2007	1,446	$158.37	3/2	2-Car	Ranch	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
	Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	350 Claiborne								$245,000			720
Not	460 Claiborne	-$3,223		-$5,725	$30,660	$5,000			$255,712	-4%		
Not	2160 Sherman	-$7,057		-$3,975	-$5,743				$248,225	-1%		
Not	215 Lexington	-$136		$2,312	$11,400	-$5,000			$239,776	2%		
											-1%	

The following photograph shows the light landscaping buffer and the distant view of panels that was included as part of the marketing package for this property. The panels are visible somewhat on the left and somewhat through the trees in the center of the photograph. The first photograph is from the home, with the second photograph showing the view near the rear of the lot.

This set of matched pairs shows a no negative impact for this property. The range of adjusted impacts is -4% to +2%. The best indication is -1%, which as described above is within the typical market static and supports no impact on adjoining property value.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	370 Claiborne	1.06	8/22/2019	$273,000	2005	1,570	$173.89	4/3	2-Car	2-Story	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
	Not	2290 Dry	1.53	5/2/2019	$239,400	1988	1,400	$171.00	3/2.5	2-Car	R/FBsmt	Brick
	Not	125 Lexington	1.20	4/17/2018	$240,000	2001	1,569	$152.96	3/3	2-Car	Split	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	370 Claiborne								$273,000			930
Not	2160 Sherman	$1,831		$0	-$20,161				$246,670	10%		
Not	2290 Dry	$2,260		$20,349	$23,256	$2,500			$287,765	-5%		
Not	125 Lexington	$9,951		$4,800					$254,751	7%		
											4%	

This set of matched pairs shows a general positive impact for this property. The range of adjusted impacts is -5% to +10%. The best indication is +7%. I typically consider measurements of +/-5% to be within the typical variation in real estate transactions. This indication is higher than that and suggests a positive relationship.

The photograph from the listing shows panels visible between the home and the trampoline shown in the picture.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	330 Claiborne	1.00	12/10/2019	$282,500	2003	1,768	$159.79	3/3	2-Car	Ranch	Brick/pool
Not	895 Osborne	1.70	9/16/2019	$249,900	2002	1,705	$146.57	3/2	2-Car	Ranch	Brick/pool
Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	330 Claiborne								$282,500			665
Not	895 Osborne	$1,790		$1,250	$7,387	$5,000		$0	$265,327	6%		
Not	2160 Sherman	$4,288		-$2,650	$4,032			$20,000	$290,670	-3%		
Not	215 Lexington	$9,761		$3,468	$20,706	-$5,000		$20,000	$280,135	1%		
											1%	

This set of matched pairs shows a general positive impact for this property. The range of adjusted impacts is -3% to +6%. The best indication is +6%. I typically consider measurements of +/-5% to be within the typical variation in real estate transactions. This indication is higher than that and suggests a positive relationship. The landscaping buffer on these is considered light with a fair visibility of the panels from most of these comparables and only thin landscaping buffers separating the homes from the solar panels.

I also looked at four sales that were during a rapid increase in home values around 2021, which required significant time adjustments based on the FHFA Housing Price Index. Sales in this time frame are less reliable for impact considerations as the peak buyer demand allowed for homes to sell with less worry over typical issues such as repairs.

The home at 250 Claiborne Drive sold with no impact from the solar farm according to the buyer's broker Lisa Ann Lay with Keller Williams Realty Service. As noted earlier, this is the only manufactured home in the community and is a bit of an anomaly. There was an impact on this sale due to an appraisal that came in low likely related to the manufactured nature of the home. Ms. Lay indicated that there was significant back and forth between both brokers and the appraiser to address the low appraisal, but ultimately, the buyers had to pay $20,000 out of pocket to cover the difference in appraised value and the purchase price. The low appraisal was not attributed to the solar farm, but the difficulty in finding comparable sales and likely the manufactured housing.

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	250 Claiborne	1.05	1/5/2022	$210,000	2002	1,592	$131.91	4/2	Drive	Ranch	Manuf
Not	255 Spillman	0.64	3/4/2022	$166,000	1991	1,196	$138.80	3/1	Drive	Ranch	Remodel
Not	546 Waterworks	0.28	4/29/2021	$179,500	2007	1,046	$171.61	4/2	Drive	Ranch	3/4 Fin B
Not	240 Shawnee	1.18	6/7/2021	$180,000	1977	1,352	$133.14	3/2	Gar	Ranch	N/A

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	250 Claiborne							$210,000			365
Not	255 Spillman	-$379	$9,130	$43,971	$10,000		-$20,000	$208,722	1%		
Not	546 Waterworks	$1,772	-$4,488	$74,958			-$67,313	$184,429	12%		
Not	240 Shawnee	$1,501	$22,500	$25,562		-$10,000		$219,563	-5%		
										3%	

The photograph of the rear view from the listing is shown below.

The home at 260 Claiborne Drive sold with no impact from the solar farm according to the buyer's broker Jim Dalton with Ashcraft Real Estate Services. He noted that there was significant wood rot and a heavy smoker smell about the house, but even that had no impact on the price due to high demand in the market.

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	260 Claiborne	1.00	10/13/2021	$175,000	2001	1,456	$120.19	3/2	Drive	Ranch	N/A
Not	355 Oakwood	0.58	10/27/2020	$186,000	2002	1,088	$170.96	3/2	Gar	Ranch	3/4 Fin B
Not	30 Ellen Kay	0.50	1/30/2020	$183,000	1988	1,950	$93.85	3/2	Gar	2-Story	N/A
Not	546 Waterworks	0.28	4/29/2021	$179,500	2007	1,046	$171.61	4/2	Drive	Ranch	3/4 Fin B

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	260 Claiborne							$175,000			390
Not	355 Oakwood	$18,339	-$930	$50,329		-$10,000	-$69,750	$173,988	1%		
Not	30 Ellen Kay	$31,974	$11,895	-$37,088		-$10,000		$179,781	-3%		
Not	546 Waterworks	$8,420	-$5,385	$56,287			-$67,313	$171,510	2%		
										0%	

The photograph of the rear view from the listing is shown below.

These next two were brick and with unfinished basements which made them easier to compare and therefore more reliable. For 300 Claiborne I considered the sale of a home across the street that did not back up to the solar farm and it adjusted to well below the range of the other comparables. I have included it, but would not rely on that which means this next comparable strongly supports a range of 0 to +3% and not up to +19%.

djoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	300 Claiborne	0.89	12/18/2021	$290,000	2002	1,568	$184.95	3/3	2-Car	Br Rnch	Bsmt
Not	405 Claiborne	0.41	2/1/2022	$267,750	2004	1,787	$149.83	3/2	2-Car	Br Rnch	Bsmt
Not	39 Pinhook	0.68	3/31/2022	$299,000	1992	1,680	$177.98	3/2	2-Car	Br Rnch	Bsmt
Not	5 Pinhook	0.70	4/7/2022	$309,900	1992	1,680	$184.46	3/2	2-Car	Br Rnch	Bsmt

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	300 Claiborne							$290,000			570
Not	405 Claiborne	-$3,384	-$2,678	-$26,251				$235,437	19%		
Not	39 Pinhook	-$8,651	$14,950	-$15,947				$289,352	0%		
Not	5 Pinhook	-$9,576	$15,495	-$16,528				$299,291	-3%		
										5%	

The photograph of the rear view from the listing is shown below.

This same home, 300 Claiborne sold again on October 14, 2022 for $332,000, or $42,000 higher or 15% higher than it had just 10 months earlier. The FHFA Home Price Index indicates an 8.3% increase over that time for the overall market, suggesting that this home is actually increasing in value faster than other properties in the area. An updated photo from the 2022 listing is shown below.

The home at 410 Claiborne included an inground pool with significant landscaping around it that was a challenge. Furthermore, two of the comparables had finished basements. I made no adjustment for the pool on those two comparables and considered the two factors to cancel out

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	410 Claiborne	0.31	2/10/2021	$275,000	2006	1,595	$172.41	3/2	2-Car	Br Rnch	Bsmt/Pool
Not	114 Austin	1.40	12/23/2020	$248,000	1994	1,650	$150.30	3/2	2-Car	Br Rnch	Bsmt
Not	125 Liza	0.29	6/25/2021	$315,000	2005	1,913	$164.66	4/3	2-Car	Br Rnch	Ktchn Bsmt
Not	130 Hannahs	0.42	2/9/2021	$295,000	2007	1,918	$153.81	3/3	2-Car	Br Rnch	Fin Bsmt

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	410 Claiborne							$275,000			1080
Not	114 Austin	$3,413	$14,880	-$6,613			$20,000	$279,680	-2%		
Not	125 Liza	-$11,945	$1,575	-$41,890	-$10,000			$252,740	8%		
Not	130 Hannahs	$83	-$1,475	-$39,743	-$10,000			$243,864	11%		
										6%	

The nine matched pairs considered in this analysis includes five that show no impact on value, one that shows a negative impact on value, and three that show a positive impact. The negative indication supported by one matched pair is -7% and the positive impacts are +6% and +7%. The two neutral indications show impacts of -5% to +5%. The average indicated impact is +2% when all nine of these indicators are blended.

Furthermore, the comments of the local real estate brokers strongly support the data that shows no negative impact on value due to the proximity to the solar farm.

2. Matched Pair – Walton 2, Walton, Kenton County, KY

This project was built in 2017 on 58.03 acres for a 2 MW project with the closest home 120 feet from the closest panel.

The home located on Parcel 1 (783 Jones Road, Walton, KY) in the map above sold on May 4, 2022 for $346,000. This home is 410 feet from the nearest solar panel. I have considered a Sale/Resale analysis of this home as it previously sold on May 7, 2012 for $174,900. This analysis compares that 2012 purchase price and uses the FHFA House Price Index Calculator to identify what real estate values in the area have been appreciating at to determine where it was expected to appreciate to. I have then compared that to the actual sales price to determine if there is any impact attributable to the addition of the solar farm.

As can be seen on the calculator form, the expected value for $174,900 home sold in 2nd quarter 2012 would be $353,000 for 2nd quarter 2022. This is within 2% of the actual sales price and supports a finding of no impact on property value.

I have not attempted a paired sales analysis with other sales, as this property also has the nearby recycling and car lot that would be a potential factor in comparing to other sales. But based on aerial imagery, these same car lots were present in 2012 and therefore has no additional impact when comparing this home sale to itself.


Purchase Quarter
2012 Quarter 2
Purchase Value
$174,900
Valuation Quarter
2022 Quarter 2
Estimated Value for MSA
$353,000
Percentage Change
101.8%
X
Kentucky
Cincinnati, OH-KY-IN
$400,000
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
2012 Q2
2022 Q2
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

3. Matched Pair – Mulberry, Selmer, McNairy County, TN

This 16 MW solar farm was built in 2014 on 208.89 acres with the closest home being 480 feet.

This solar farm adjoins two subdivisions with Central Hills having a mix of existing and new construction homes. Lots in this development have been marketed for $15,000 each with discounts offered for multiple lots being used for a single home site. I spoke with the agent with Rhonda Wheeler and Becky Hearnsberger with United County Farm & Home Realty who noted that they have seen no impact on lot or home sales due to the solar farm in this community.

I have included a map below as well as data on recent sales activity on lots that adjoin the solar farm or are near the solar farm in this subdivision both before and after the announced plan for this solar farm facility. I note that using the same method I used to breakdown the adjoining uses at the subject property I show that the predominant adjoining uses are residential and agricultural, which is consistent with the location of most solar farms.

Adjoining Use Breakdown

	Acreage	Parcels
Commercial	3.40%	0.034
Residential	12.84%	79.31%
Agri/Res	10.39%	3.45%
Agricultural	73.37%	13.79%
Total	**100.00%**	**100.00%**

I have run a number of direct matched comparisons on the sales adjoining this solar farm as shown below. These direct matched pairs include some of those shown above as well as additional more recent sales in this community. In each of these I have compared the one sale adjoining the solar farm to multiple similar homes nearby that do not adjoin a solar farm to look for any potential impact from the solar farm.

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
3	Adjoins	491 Dusty	6.86	10/28/2016	$176,000	2009	1,801	$97.72	3/2	2-Gar	Ranch	
	Not	820 Lake Trail	1.00	6/8/2018	$168,000	2013	1,869	$89.89	4/2	2-Gar	Ranch	
	Not	262 Country	1.00	1/17/2018	$145,000	2000	1,860	$77.96	3/2	2-Gar	Ranch	
	Not	35 April	1.15	8/16/2016	$185,000	2016	1,980	$93.43	3/2	2-Gar	Ranch	

Adjoining Sales Adjusted

Parcel	Solar	Address	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
3	Adjoins	491 Dusty							$176,000		480
	Not	820 Lake Trail	-$8,324	$12,000	-$3,360	-$4,890			$163,426	7%	
	Not	262 Country	-$5,450	$12,000	$6,525	-$3,680			$154,396	12%	
	Not	35 April	$1,138	$12,000	-$6,475	-$13,380			$178,283	-1%	
									Average	6%	

The best matched pair is 35 April Loop, which required the least adjustment and indicates a -1% increase in value due to the solar farm adjacency.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
12	Adjoins	57 Cooper	1.20	2/26/2019	$163,000	2011	1,586	$102.77	3/2	2-Gar	1.5 Story	Pool
	Not	191 Amelia	1.00	8/3/2018	$132,000	2005	1,534	$86.05	3/2	Drive	Ranch	
	Not	75 April	0.85	3/17/2017	$134,000	2012	1,588	$84.38	3/2	2-Crprt	Ranch	
	Not	345 Woodland	1.15	12/29/2016	$131,000	2002	1,410	$92.91	3/2	1-Gar	Ranch	

Adjoining Sales Adjusted

Parcel	Solar	Address	Sales Price	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
12	Adjoins	57 Cooper	$163,000							$163,000		685
	Not	191 Amelia	$132,000	$2,303		$3,960	$2,685	$10,000	$5,000	$155,947	4%	
	Not	75 April	$134,000	$8,029	$4,000	-$670	-$135	$5,000	$5,000	$155,224	5%	
	Not	345 Woodland	$131,000	$8,710		$5,895	$9,811		$5,000	$160,416	2%	
										Average	4%	

The best matched pair is 191 Amelia, which was most similar in time frame of sale and indicates a +4% increase in value due to the solar farm adjacency.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
15	Adjoins	297 Country	1.00	9/30/2016	$150,000	2002	1,596	$93.98	3/2	4-Gar	Ranch	
	Not	185 Dusty	1.85	8/17/2015	$126,040	2009	1,463	$86.15	3/2	2-Gar	Ranch	
	Not	53 Glen	1.13	3/9/2017	$126,000	1999	1,475	$85.42	3/2	2-Gar	Ranch	Brick

Adjoining Sales Adjusted

Parcel	Solar	Address	Sales Price	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
15	Adjoins	297 Country	$150,000							$150,000		650
	Not	185 Dusty	$126,040	$4,355		-$4,411	$9,167	$10,000		$145,150	3%	
	Not	53 Glen	$126,000	-$1,699		$1,890	$8,269	$10,000		$144,460	4%	
										Average	3%	

The best matched pair is 53 Glen, which was most similar in time frame of sale and required less adjustment. It indicates a +4% increase in value due to the solar farm adjacency.

The average indicated impact from these three sets of matched pairs is +4%, which suggests a mild positive relationship due to adjacency to the solar farm. The landscaping buffer for this project is mostly natural tree growth that was retained as part of the development but much of the trees separating the panels from homes are actually on the lots for the homes themselves. I therefore consider the landscaping buffer to be thin to moderate for these adjoining homes.

I have also looked at several lot sales in this subdivision as shown below.

These are all lots within the same community and the highest prices paid are for lots one parcel off from the existing solar farm. These prices are fairly inconsistent, though they do suggest about a $3,000 loss in the lots adjoining the solar farm. This is an atypical finding and additional details suggest there is more going on in these sales than the data crunching shows. First of all Parcel 4 was purchased by the owner of the adjoining home and therefore an atypical buyer seeking to expand a lot and the site is not being purchased for home development. Moreover, using the SiteToDoBusiness demographic tools, I found that the 1-mile radius around this development is expecting a total population increase over the next 5 years of 3 people. This lack of growing demand for lots is largely explained in that context. Furthermore, the fact that finished home sales as shown above are showing no sign of a negative impact on property value makes this data unreliable and inconsistent with the data shown in sales to an end user. I therefore place little weight on this outlier data.

Parcel	Solar	Address	Acres	Date Sold	Sales Price	4/18/2019 Adj for Time	$/AC	4/18/2019 Adj for Time
4	Adjoins	Shelter	2.05	10/25/2017	$16,000	$16,728	$7,805	$8,160
10	Adjoins	Carter	1.70	8/2/2018	$14,000	$14,306	$8,235	$8,415
11	Adjoins	Cooper	1.28	9/17/2018	$12,000	$12,215	$9,375	$9,543
	Not	75 Dusty	1.67	4/18/2019	$20,000	$20,000	$11,976	$11,976
	Not	Lake Trl	1.47	11/7/2018	$13,000	$13,177	$8,844	$8,964
	Not	Lake Trl	1.67	4/18/2019	$20,000	$20,000	$11,976	$11,976

	Adjoins	Per Acre	Not Adjoins	Per Acre	% DIF/Lot	% DIF/AC
Average	$14,416	$8,706	$17,726	$10,972	19%	21%
Median	$14,306	$8,415	$20,000	$11,976	28%	30%
High	$16,728	$9,543	$20,000	$11,976	16%	20%
Low	$12,215	$8,160	$13,177	$8,964	7%	9%

4. Matched Pair – Grand Ridge Solar, Streator, LaSalle County, IL

This solar farm has a 20 MW output and is located on a 160-acre tract. The project was built in 2012.

I have considered the recent sale of Parcel 13 shown above, which sold in October 2016 after the solar farm was built. I have compared that sale to a number of nearby residential sales not in proximity to the solar farm as shown below. Parcel 13 is 480 feet from the closest solar panel. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
13	34-21-237-000	2	Oct-16	$186,000	1997	2,328	$79.90

Not Adjoining Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
712 Columbus Rd	32-39-134-005	1.26	Jun-16	$166,000	1950	2,100	$79.05
504 N 2782 Rd	18-13-115-000	2.68	Oct-12	$154,000	1980	2,800	$55.00
7720 S Dwight Rd	11-09-300-004	1.14	Nov-16	$191,000	1919	2,772	$68.90
701 N 2050th Rd	26-20-105-000	1.97	Aug-13	$200,000	2000	2,200	$90.91
9955 E 1600th St	04-13-200-007	1.98	May-13	$181,858	1991	2,600	$69.95

TAX ID	Date Sold	Adjustments Time	Adjustments Total	$/Sf
34-21-237-000	Oct-16		$186,000	$79.90
32-39-134-005	Jun-16		$166,000	$79.05
18-13-115-000	Oct-12	$12,320	$166,320	$59.40
11-09-300-004	Nov-16		$191,000	$68.90
26-20-105-000	Aug-13	$12,000	$212,000	$96.36
04-13-200-007	May-13	$10,911	$192,769	$74.14

	Adjoins Solar Farm		Not Adjoin Solar Farm	
	Average	Median	Average	Median
Sales Price/SF	$79.90	$79.90	$75.57	$74.14
GBA	2,328	2,328	2,494	2,600

Based on the matched pairs I find no indication of negative impact due to proximity to the solar farm.

The most similar comparable is the home on Columbus that sold for $79.05 per square foot. This is higher than the median rate for all of the comparables. Applying that price per square foot to the subject property square footage indicates a value of $184,000.

There is minimal landscaping separating this solar farm from nearby properties and is therefore considered light.

5. Matched Pair – Portage Solar, Portage, Porter County, IN

This solar farm has a 2 MW output and is located on a portion of a 56-acre tract. The project was built in 2012. As can be seen by the more recent map, Lennar Homes is now developing a new subdivision on the vacant land just west of this solar farm.

I have considered the recent sale of Parcels 5 and 12. Parcel 5 is an undeveloped tract, while Parcel 12 is a residential home. I have compared each to a set of comparable sales to determine if there was any impact due to the adjoining solar farm. This home is 1,320 feet from the closest solar panel. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
12	64-06-19-326-007.000-015	1.00	Sep-13	$149,800	1964	1,776	$84.35

Nearby Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
2501 Architect Dr	64-04-32-202-004.000-021	1.31	Nov-15	$191,500	1959	2,064	$92.78
336 E 1050 N	64-07-09-326-003.000-005	1.07	Jan-13	$155,000	1980	1,908	$81.24
2572 Pryor Rd	64-05-14-204-006.000-016	1.00	Jan-16	$216,000	1960	2,348	$91.99

Adjoining Land Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	$/AC
5	64-06-19-200-003.000-015	18.70	Feb-14	$149,600	$8,000

Nearby Land Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	$/AC
	64-07-22-401-001.000-005	74.35	Jun-17	$520,450	$7,000
	64-15-08-200-010.000-001	15.02	Jan-17	$115,000	$7,658

Residential Sale Adjustment Chart

		Adjustments		
TAX ID	Date Sold	Time	Total	$/Sf
64-06-19-326-007.000-015	Sep-13	$8,988	$158,788	$89.41
64-04-32-202-004.000-021	Nov-15	$3,830	$195,330	$94.64
64-07-09-326-003.000-005	Jan-13	$9,300	$164,300	$86.11
64-05-14-204-006.000-016	Jan-16		$216,000	$91.99

2% adjustment/year
Adjusted to 2017

	Adjoins Solar Farm		Not Adjoin Solar Farm	
	Average	Median	Average	Median
Sales Price/SF	$89.41	$89.41	$90.91	$91.99
GBA	1,776	1,776	2,107	2,064

After adjusting the price per square foot is 2.88% less for the home adjoining the solar farm versus those not adjoining the solar farm. This is within the typical range of variation to be anticipated in any real estate transaction and indicates no impact on property value.

Applying the price per square foot for the 336 E 1050 N sale, which is the most similar to the Parcel 12 sale, the adjusted price at $81.24 per square foot applied to the Parcel 12 square footage yields a value of $144,282.

The landscaping separating this solar farm from the homes is considered light.

Land Sale Adjustment Chart

		Adjustments		
TAX ID	**Date Sold**	**Time**	**Total**	**$/Acre**
64-06-19-200-003.000-015	Feb-14	$8,976	$158,576	$8,480
64-07-22-401-001.000-005	Jun-17		$520,450	$7,000
64-15-08-200-010.000-001	Jan-17		$115,000	$7,658

2% adjustment/year
Adjusted to 2017

	Adjoins Solar Farm		**Not Adjoin Solar Farm**	
	Average	**Median**	**Average**	**Median**
Sales Price/Ac	$8,480	$8,480	$7,329	$7,329
Acres	18.70	18.70	44.68	44.68

After adjusting the price per acre is higher for the property adjoining the solar farm, but the average and median size considered is higher which suggests a slight discount. This set of matched pair supports no indication of negative impact due to the adjoining solar farm.

Alternatively, adjusting the 2017 sales back to 2014 I derive an indicated price per acre for the comparables at $6,580 per acre to $7,198 per acre, which I compare to the unadjusted subject property sale at $8,000 per acre.

6. Matched Pair – Dominion Indy III, Indianapolis, Marion County, IN

This solar farm has an 8.6 MW output and is located on a portion of a 134-acre tract. The project was built in 2013.

There are a number of homes on small lots located along the northern boundary and I have considered several sales of these homes. I have compared those homes to a set of nearby not adjoining home sales as shown below. The adjoining homes that sold range from 380 to 420 feet from the nearest solar panel, with an average of 400 feet. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
2	2013249	0.38	12/9/2015	$140,000	2006	2,412	$58.04
4	2013251	0.23	9/6/2017	$160,000	2006	2,412	$66.33
5	2013252	0.23	5/10/2017	$147,000	2009	2,028	$72.49
11	2013258	0.23	12/9/2015	$131,750	2011	2,190	$60.16
13	2013260	0.23	3/4/2015	$127,000	2005	2,080	$61.06
14	2013261	0.23	2/3/2014	$120,000	2010	2,136	$56.18

Nearby Not Adjoining Residential Sales After Solar Farm Completed

#	TAX ID	Acres	Date Sold	Sales Price	Built	GBA	$/GBA
5836 Sable Dr	2013277	0.14	Jun-16	$141,000	2005	2,280	$61.84
5928 Mosaic Pl	2013845	0.17	Sep-15	$145,000	2007	2,280	$63.60
5904 Minden Dr	2012912	0.16	May-16	$130,000	2004	2,252	$57.73
5910 Mosaic Pl	2000178	0.15	Aug-16	$146,000	2009	2,360	$61.86
5723 Minden Dr	2012866	0.26	Nov-16	$139,900	2005	2,492	$56.14

		Adjustments		
TAX ID	**Date Sold**	**Time**	**Total**	**$/Sf**
2013249	12/9/2015	$5,600	$145,600	$60.36
2013251	9/6/2017		$160,000	$66.33
2013252	5/10/2017		$147,000	$72.49
2013258	12/9/2015	$5,270	$137,020	$62.57
2013260	3/4/2015	$5,080	$132,080	$63.50
2013261	2/3/2014	$7,200	$127,200	$59.55
2013277	6/1/2016	$2,820	$143,820	$63.08
2013845	9/1/2015	$5,800	$150,800	$66.14
2012912	5/1/2016	$2,600	$132,600	$58.88
2000178	8/1/2016	$2,920	$148,920	$63.10
2012866	11/1/2016	$2,798	$142,698	$57.26

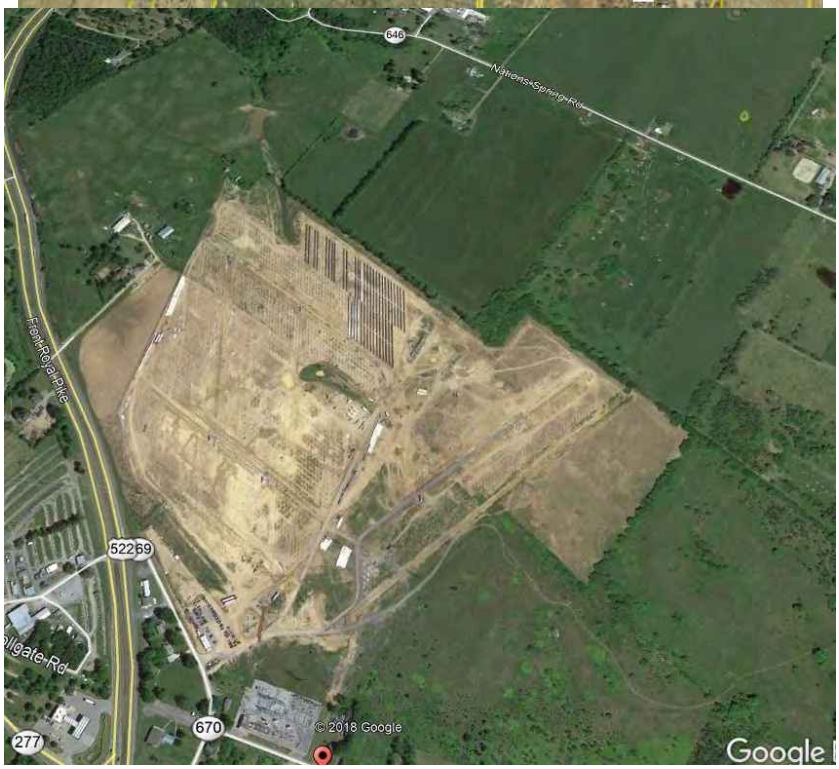
2% adjustment/year
Adjusted to 2017

	Adjoins Solar Farm		Not Adjoin Solar Farm	
	Average	**Median**	**Average**	**Median**
Sales Price/SF	$64.13	$63.03	$61.69	$63.08
GBA	2,210	2,163	2,333	2,280

This set of homes provides very strong indication of no impact due to the adjacency to the solar farm and includes a large selection of homes both adjoining and not adjoining in the analysis.

The landscaping screen is considered light in relation to the homes considered above.

7. Matched Pair – Clarke County Solar, Double Tollgate Road, White Post, Clarke County, VA



This project is a 20 MW facility located on a 234-acre tract that was built in 2017.

I have considered a recent sale or Parcel 3. The home on this parcel is 1,230 feet from the closest panel as measured in the second map from Google Earth, which shows the solar farm under construction.

I've compared this home sale to a number of similar rural homes on similar parcels as shown below. I have used multiple sales that bracket the subject property in terms of sale date, year built, gross living area, bedrooms and bathrooms. Bracketing the parameters insures that all factors are well balanced out in the adjustments. The trend for these sales shows a positive value for the adjacency to the solar farm.

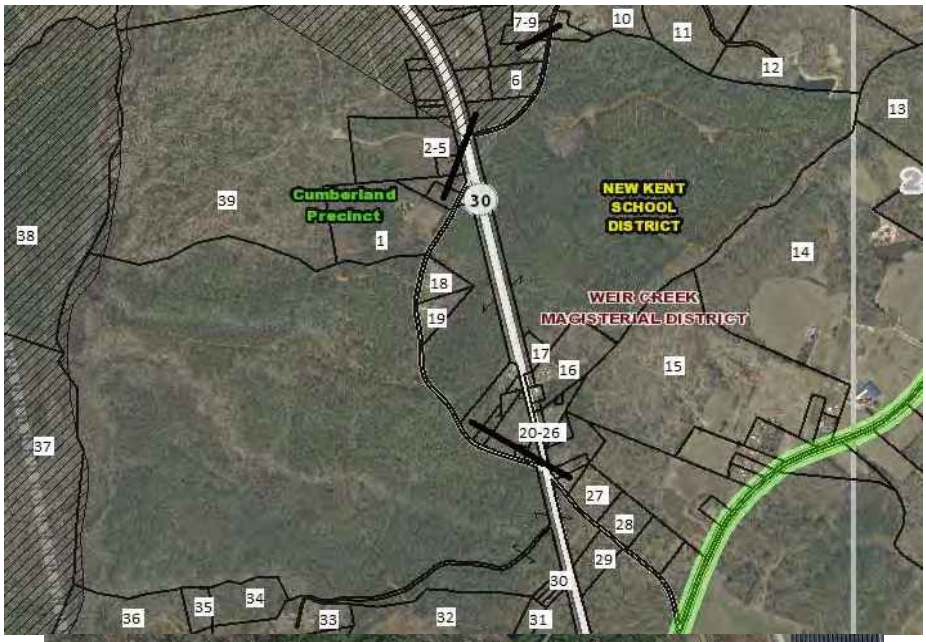
Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	833 Nations Spr	5.13	1/9/2017	$295,000	1979	1,392	$211.93	3/2	Det Gar	Ranch	Unfin bsmt
Not	85 Ashby	5.09	9/11/2017	$315,000	1982	2,333	$135.02	3/2	2 Gar	Ranch	
Not	541 Old Kitchen	5.07	9/9/2018	$370,000	1986	3,157	$117.20	4/4	2 Gar	2 story	
Not	4174 Rockland	5.06	1/2/2017	$300,000	1990	1,688	$177.73	3/2	3 Gar	2 story	
Not	400 Sugar Hill	1.00	6/7/2018	$180,000	1975	1,008	$178.57	3/1	Drive	Ranch	

Adjoining Residential Sales After Solar Farm Approved					Adjoining Sales Adjusted								
Solar	Address	Acres	Date Sold	Sales Price	Time	Acres	YB	GLA	BR/BA	Park	Other	Total	% Diff
Adjoins	833 Nations Spr	5.13	1/9/2017	$295,000								$295,000	
Not	85 Ashby	5.09	9/11/2017	$315,000	-$6,300		-$6,615	-$38,116		-$7,000	$15,000	$271,969	8%
Not	541 Old Kitchen	5.07	9/9/2018	$370,000	-$18,500		-$18,130	-$62,057		-$7,000	$15,000	$279,313	5%
Not	4174 Rockland	5.06	1/2/2017	$300,000			-$23,100	-$15,782		-$12,000	$15,000	$264,118	10%
Not	400 Sugar Hill	1.00	6/7/2018	$180,000	-$9,000	$43,000	$5,040	$20,571	$10,000	$3,000	$15,000	$267,611	9%
											Average		8%

The landscaping screen is primarily a newly planted buffer with a row of existing trees being maintained near the northern boundary and considered light.

8. Matched Pair – Walker-Correctional Solar, Barham Road, Barhamsville, New Kent County, VA



This project was built in 2017 and located on 484.65 acres for a 20 MW with the closest home at 110 feet from the closest solar panel with an average distance of 500 feet.

I considered the recent sale identified on the map above as Parcel 19, which is directly across the street and based on the map shown on the following page is 250 feet from the closest panel. A limited buffering remains along the road with natural growth being encouraged, but currently the

panels are visible from the road. Alex Uminski, SRA with MGMiller Valuations in Richmond VA confirmed this sale with the buying and selling broker. The selling broker indicated that the solar farm was not a negative influence on this sale and in fact the buyer noticed the solar farm and then discovered the listing. The privacy being afforded by the solar farm was considered a benefit by the buyer. I used a matched pair analysis with a similar sale nearby as shown below and found no negative impact on the sales price. Property actually closed for more than the asking price. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	5241 Barham	2.65	10/18/2018	$264,000	2007	1,660	$159.04	3/2	Drive	Ranch	Modular
Not	17950 New Kent	5.00	9/5/2018	$290,000	1987	1,756	$165.15	3/2.5	3 Gar	Ranch	
Not	9252 Ordinary	4.00	6/13/2019	$277,000	2001	1,610	$172.05	3/2	1.5-Gar	Ranch	
Not	2416 W Miller	1.04	9/24/2018	$299,000	1999	1,864	$160.41	3/2.5	Gar	Ranch	

Adjoining Sales Adjusted

Solar	Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
Adjoins	5241 Barham								$264,000		250
Not	17950 New Kent		-$8,000	$29,000	-$4,756	-$5,000	-$20,000	-$15,000	$266,244	-1%	
Not	9252 Ordinary	-$8,310	-$8,000	$8,310	$2,581		-$10,000	-$15,000	$246,581	7%	
Not	2416 W Miller		$8,000	$11,960	-$9,817	-$5,000	-$10,000	-$15,000	$279,143	-6%	
								Average Diff		0%	

I also spoke with Patrick W. McCrerey of Virginia Estates who was marketing a property that sold at 5300 Barham Road adjoining the Walker-Correctional Solar Farm. He indicated that this property was unique with a home built in 1882 and heavily renovated and updated on 16.02 acres. The solar farm was through the woods and couldn't be seen by this property and it had no impact on marketing this property. This home sold on April 26, 2017 for $358,000. I did not set up any matched pairs for this property as it was such a unique property that any such comparison would be difficult to rely on. The broker's comments do support the assertion that the adjoining solar farm had no impact on value. The home in this case was 510 feet from the closest panel.

9. Matched Pair – Sappony Solar, Stony Creek, Sussex County, VA

This project is a 30 MW facility located on a 322.68-acre tract that was built in the fourth quarter of 2017.

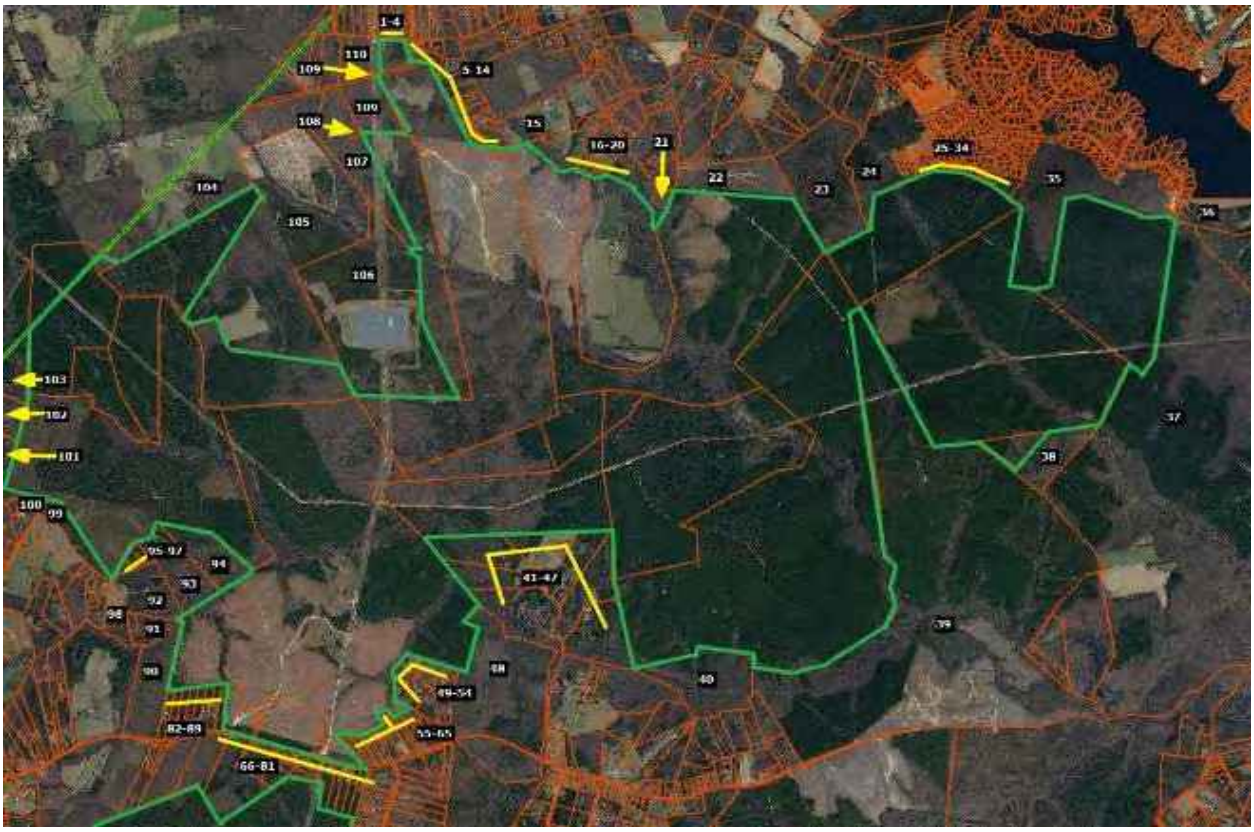
I have considered the 2018 sale of Parcel 17 as shown below. From Parcel 17 the retained trees and setbacks are a light to medium landscaped buffer.

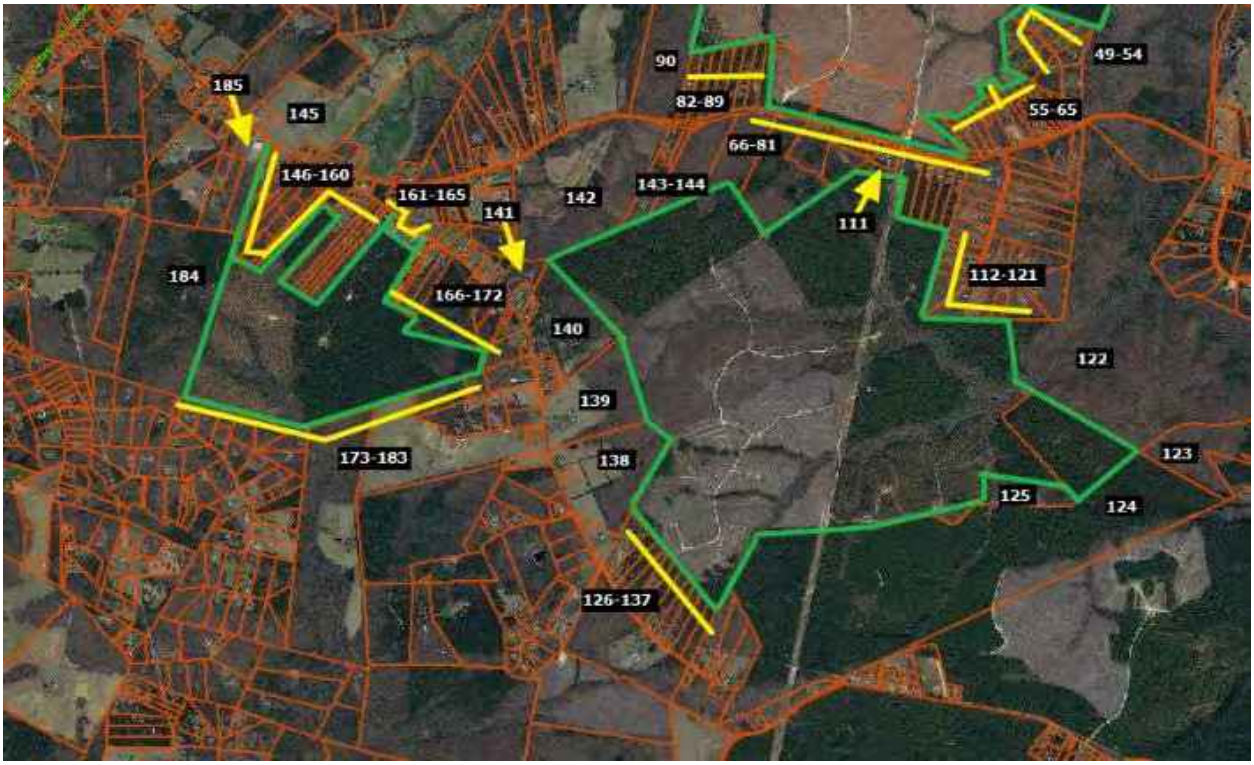
Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
	Adjoins	12511 Palestine	6.00	7/31/2018	$128,400	2013	1,900	$67.58	4/2.5	Open	Manuf	
	Not	15698 Concord	3.92	7/31/2018	$150,000	2010	2,310	$64.94	4/2	Open	Manuf	Fence
	Not	23209 Sussex	1.03	7/7/2020	$95,000	2005	1,675	$56.72	3/2	Det Crpt	Manuf	
	Not	6494 Rocky Br	4.07	11/8/2018	$100,000	2004	1,405	$71.17	3/2	Open	Manuf	

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$128,400			1425
$0		$2,250	-$21,299	$5,000			$135,951	-6%		
-$5,660	$13,000	$3,800	$10,209	$5,000	$1,500		$122,849	4%		
-$843		$4,500	$28,185				$131,842	-3%		
									-1%	

10. Matched Pair – Spotsylvania Solar, Paytes, Spotsylvania County, VA





This solar farm is being built in four phases with the area known as Site C having completed construction in November 2020 after the entire project was approved in April 2019. Site C, also known as Pleinmont 1 Solar, includes 99.6 MW located in the southeast corner of the project and shown on the maps above with adjoining parcels 111 through 144. The entire Spotsylvania project totals 617 MW on 3500 acres out of a parent tract assemblage of 6,412 acres.

I have identified three adjoining home sales that occurred during construction and development of the site in 2020.

The first is located on the north side of Site A on Orange Plank Road. The second is located on Nottoway Lane just north of Caparthin Road on the south side of Site A and east of Site C. The third is located on Post Oak Road for a home that backs up to Site C that sold in September 2020 near the completion of construction for Site C.

Spotsylvania Solar Farm

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	12901 Orng Plnk	5.20	8/27/2020	$319,900	1984	1,714	$186.64	3/2	Drive	1.5	Un Bsmt
Not	8353 Gold Dale	3.00	1/27/2021	$415,000	2004	2,064	$201.07	3/2	3 Gar	Ranch	
Not	6488 Southfork	7.26	9/9/2020	$375,000	2017	1,680	$223.21	3/2	2 Gar	1.5	Barn/Patio
Not	12717 Flintlock	0.47	12/2/2020	$290,000	1990	1,592	$182.16	3/2.5	Det Gar	Ranch	

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
12901 Orng Plnk								$319,900		1270
8353 Gold Dale	-$5,219	$20,000	-$41,500	-$56,298		-$20,000		$311,983	2%	
6488 Southfork	-$401	-$20,000	-$61,875	$6,071		-$15,000		$283,796	11%	
12717 Flintlock	-$2,312	$40,000	-$8,700	$17,779	-$5,000	-$5,000		$326,767	-2%	
							Average Diff		4%	

I contacted Keith Snider to confirm this sale. This is considered to have a medium landscaping screen.

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	9641 Nottoway	11.00	5/12/2020	$449,900	2004	3,186	$141.21	4/2.5	Garage	2-Story	Un Bsmt
Not	26123 Lafayette	1.00	8/3/2020	$390,000	2006	3,142	$124.12	3/3.5	Gar/DtG	2-Story	
Not	11626 Forest	5.00	8/10/2020	$489,900	2017	3,350	$146.24	4/3.5	2 Gar	2-Story	
Not	10304 Pny Brnch	6.00	7/27/2020	$485,000	1998	3,076	$157.67	4/4	2Gar/Dt2	Ranch	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
9641 Nottoway								$449,900		1950
26123 Lafayette	-$2,661	$45,000	-$3,900	$4,369	-$10,000	-$5,000		$417,809	7%	
11626 Forest	-$3,624		-$31,844	-$19,187		-$5,000		$430,246	4%	
10304 Pny Brnch	-$3,030		$14,550	$13,875	-$15,000	-$15,000	-$10,000	$470,396	-5%	
							Average Diff		2%	

I contacted Annette Roberts with ReMax about this transaction. This is considered to have a medium landscaping screen.

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	13353 Post Oak	5.20	9/21/2020	$300,000	1992	2,400	$125.00	4/3	Drive	2-Story	Fn Bsmt
Not	9609 Logan Hgt	5.86	7/4/2019	$330,000	2004	2,352	$140.31	3/2	2Gar	2-Story	
Not	12810 Catharpian	6.18	1/30/2020	$280,000	2008	2,240	$125.00	4/2.5	Drive	2-Story	Bsmt/Nd Pnt
Not	10725 Rbrt Lee	5.01	10/26/2020	$295,000	1995	2,166	$136.20	4/3	Gar	2-Story	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
13353 Post Oak								$300,000		1171
9609 Logan Hgt	$12,070		-$19,800	$5,388		-$15,000	$15,000	$327,658	-9%	
12810 Catharpian	$5,408		-$22,400	$16,000	$5,000		$15,000	$299,008	0%	
10725 Rbrt Lee	-$849		-$4,425	$25,496		-$10,000		$305,222	-2%	
							Average Diff		-4%	

I contacted Joy Pearson with CTI Real Estate about this transaction. This is considered to have a heavy landscaping screen.

All three of these homes are well set back from the solar panels at distances over 1,000 feet and are well screened from the project. All three show no indication of any impact on property value.

There are a couple of recent lot sales located along Southview Court that have sold since the solar farm was approved. The most recent lot sales include 11700 Southview Court that sold on December 29, 2021 for $140,000 for a 0.76-acre lot. This property was on the market for less than 2 months before closing within 6% of the asking price. This lot sold earlier in September 2019 for $55,000 based on a liquidation sale from NTS to an investor.

A similar 0.68-acre lot at 11507 Stonewood Court within the same subdivision located away from the solar farm sold on March 9, 2021 for $109,000. This lot sold for 18% over the asking price within 1 month of listing suggesting that this was priced too low. Adjusting this lot value upward by 12% for very strong growth in the market over 2021, the adjusted indicated value is $122,080 for this lot. This is still showing a 15% premium for the lot backing up to the solar farm.

The lot at 11009 Southview Court sold on August 5, 2019 for $65,000, which is significantly lower than the more recent sales. This lot was sold by NTS the original developer of this subdivision, who was in the process of liquidating lots in this subdivision with multiple lot sales in this time period throughout the subdivision being sold at discounted prices. The home was later improved by the buyer with a home built in 2020 with 2,430 square feet ranch, 3.5 bathrooms, with a full basement, and a current assessed value of $492,300.

I spoke with Chris Kalia, MAI, Mark Doherty, local real estate investor, and Alex Doherty, broker, who are all three familiar with this subdivision and activity in this neighborhood. All three indicated that there was a deep sell off of lots in the neighborhood by NTS at discounted prices under $100,000 each. Those lots since that time are being sold for up to $140,000. The prices paid for the lots below $100,000 were liquidation values and not indicative of market value. Homes are being built in the neighborhood on those lots with home prices ranging from $600,000 to $800,000 with no sign of impact on pricing due to the solar farm according to all three sources.

Fawn Lake Lot Sales

Parcel	Solar?	Address	Acres	Sale Date	Sale Price	Ad. For Time	% Diff
A	Adjoins	11700 Southview Ct	0.76	12/29/2021	$140,000		
1	1 parcel away	11603 Southview Ct	0.44	3/31/2022	$140,000	$141,960	-1.4%
2	Not adjoin	11507 Stonewood Ct	0.68	3/9/2021	$109,000	$118,374	15.4%
3	Not adjoin	11312 Westgate Wy	0.83	10/15/2020	$125,000	$142,000	-1.4%
4	Not adjoin	11409 Darkstone Pl	0.589	9/23/2021	$118,000	$118,000	15.7%

Average	7.1%
Median	7.0%

Least Adjusted	15.7%
2nd Least Adjusted (Parcel 1 off solar farm)	-1.4%

Time Adjustments are based on the FHFA Housing Price Index

11. Matched Pair – Whitehorn Solar, Gretna, Pittsylvania County, VA

This project was built in 2021 for a solar project with 50 MW. Adjoining uses are residential and agricultural. There was a sale located at 1120 Taylors Mill Road that sold on December 20, 2021, which is about the time the solar farm was completed. This sold for $224,000 for 2.02 acres with a 2,079 s.f. mobile home on it that was built in 2010. The property was listed for $224,000 and sold for that same price within two months (went under contract almost exactly 30 days from listing). This sales price works out to $108 per square foot. This home is 255 feet from the nearest panel.

I have compared this sale to an August 20, 2020 sale at 1000 Long Branch Drive that included 5.10 acres with a 1,980 s.f. mobile home that was built in 1993 and sold for $162,000, or $81.82 per square foot. Adjusting this upward for significant growth between this sale date and December 2021 relied on data provided by the FHFA House Pricing Index, which indicates that for homes in the Roanoke, VA MSA would be expected to appreciate from $162,000 to $191,000 over that period of time. Using $191,000 as the effective value as of the date of comparison, the indicated value of this sale works out to $96.46 per square foot. Adjusting this upward by 17% for the difference in year built, but downward by 5% for the much larger lot size at this comparable, I derive an adjusted indication of value of $213,920, or $108 per square foot.

This indicates no impact on value attributable to the new solar farm located across from the home on Taylors Mill Road.

12. Matched Pair – Altavista Solar, Altavista, Campbell County, VA

This project was mostly built in 2021 with final construction finished in 2022. This is an 80 MW facility on 720 acres just north of Roanoke River and west of Altavista. Adjoining uses are residential and agricultural.

I have done a Sale/Resale analysis of 3211 Leesville Road which is approximately 540 feet from the nearest solar panel. There was an existing row of trees between this home and the panels that was supplemented with additional screening for a narrow landscaped buffer between the home and the solar panels.

This home sold in December 2018 for $72,500 for this 1,451 s.f. home built in 1940 with a number of additional outbuildings on 3.35 acres. This was before any announcement of a solar farm. This home sold again on March 28, 2022 for $124,048 after the solar farm was constructed. This shows a 71% increase in value on this property since 2018. There was significant growth in the market between these dates and to accurately reflect that I have considered the FHFA House Price Index that is specific for the Lynchburg area of Virginia (the closest regional category), which shows an expected increase in home values over that same time period of 33.8%, which would suggest a normal growth in value up to $97,000. The home sold for significantly more than this which certainly does not support a finding of a negative impact and in fact suggests a significant positive impact. However, I was not able to discuss this sale with the broker and it is possible that the home also was renovated between 2018 and 2022, which may account for that additional increase in value. Still give that the home increased in value so significantly over the initial amount there is no sign of any negative impact due to the solar farm adjacency.

Similarly, I looked at 3026 Bishop Creek Road that is approximately 600 feet from the nearest solar panel. This home sold on July 16, 2019 for $120,000, which was before construction of the solar farm. This home sold again on February 23, 2022 for $150,000. This shows a 25% increase in value over that time period. Using the same FHFA House Price Index Calculator, the expected increase in value was 29.2% for an indicated expected value of $155,000. This is within 3% of the actual closed price, which supports a finding of no impact from the solar farm. This home has a dense wooded area between it and the adjoining solar farm.

13. Matched Pair – DG Amp Piqua, Piqua, Miami County, OH

This project is located on the southeast corner of Manier Street and N Washington Road, Piqua, OH. There are a number of nearby homes to the north, south and west of this solar farm.

I considered one adjoining sale and one nearby sale (one parcel off) that happened since the project was built in 2019. I did not consider the sale of a home located at Parcel 20 that happened in that time period as that property was marketed with damaged floors in the kitchen and bathroom, rusted baseboard heaters and generally was sold in an As-Is condition that makes it difficult to compare to move-in ready homes. I also did not consider some sales to the north that sold for prices significantly under $100,000. The homes in that community includes a wide range of smaller, older homes that have been selling for prices ranging from $25,000 to $80,000. I have not been tracking home sales under $100,000 as homes in that price range are less susceptible to external factors.

The adjoining sale at 6060 N Washington is a brick range fronting on a main road. I did not adjust the comparables for that factor despite the subdivision exposure on those comparables was superior. I considered the difference in lot size to be balancing factors. If I adjusted further for that main road frontage, then it would actually show a positive impact for adjoining the solar farm.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
22	Adjoins	6060 N Washington	0.80	10/30/2019	$119,500	1961	1,404	$85.11	3/1	2 Gar	Br Rnch	Updates
	Not	1523 Amesbury	0.25	5/7/2020	$119,900	1973	1,316	$91.11	3/2	Gar	Br Rnch	Updates
	Not	1609 Haverhill	0.17	10/17/2019	$114,900	1974	1,531	$75.05	3/1	Gar	Br Rnch	Updates
	Not	1511 Sweetbriar	0.17	8/6/2020	$123,000	1972	1,373	$89.58	4/2	Gar	Br Rnch	Updates

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$119,500			155
-$1,920		-$7,194	$6,414	-$5,000	$7,500	$0	$119,700	0%		
$126		-$7,469	-$7,625		$7,500	$0	$107,432	10%		
-$2,913		-$6,765	$2,222	-$5,000	$7,500	$0	$118,044	1%		
									4%	

I also considered a home fronting on Plymouth Avenue which is one lot to the west of the solar farm with a rear view towards the solar farm. After adjustments this set of matched pairs shows no impact on the value of the property due to proximity to the solar farm.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
	Nearby	1011 Plymouth	0.21	2/24/2020	$113,000	1973	1,373	$82.30	4/2	Gar	1.5 Stry	Fnce/Shd
	Not	1630 Haverhill	0.32	8/18/2019	$94,900	1973	1,373	$69.12	4/2	Gar	1.5 Stry	N/A
	Not	1720 Williams	0.17	12/4/2019	$119,900	1968	1,682	$71.28	4/1	2Gar	1.5 Br	Fnce/Shd
	Not	1710 Cambridge	0.17	1/22/2018	$116,000	1968	1,648	$70.39	4/2	Det 2	1.5 Br	Fnce/Shd

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$113,000			585
$1,519		$0	$0			$10,000	$106,419	6%		
$829		$2,998	-$17,621	$5,000			$111,105	2%		
$7,459		$2,900	-$15,485				$110,873	2%		
									3%	

I considered a home located at 6010 N Washington that sold on August 3, 2021. This property was sold with significant upgrades that made it more challenging to compare, but I focused on similar older brick ranches with updates in the analysis. The comparables suggest an enhancement to this property due to proximity from the solar farm, but it is more likely that the upgrades at the subject were superior. Still this strongly supports a finding of no impact on the value of the property due to proximity to the solar farm.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
24	Adjoins	6010 N Washington	0.80	8/3/2021	$176,900	1961	1,448	$122.17	4/2	2 Gar	Br Ranch	Updates
	Not	1244 Severs	0.19	10/29/2021	$149,900	1962	1,392	$107.69	3/2	Gar	Br Ranch	Updates
	Not	1515 Amesbury	0.19	5/5/2022	$156,500	1973	1,275	$122.75	3/2	2 Gar	Br Ranch	Updates
	Not	1834 Wilshire	0.21	12/3/2021	$168,900	1979	1,265	$133.52	3/2	2 Gar	Br Ranch	Updates

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$176,900			155
-$1,099		-$750	$4,221		$7,000		$159,273	10%		
-$3,627		-$9,390	$16,988				$160,471	9%		
-$1,736		-$14,357	$19,547				$172,354	3%		
									7%	

I considered a home located at 6240 N Washington that sold on October 15, 2021. The paired sale located at 532 Wilson included a sunroom that I did not adjust for. The -4% impact from that sale is related to that property having a superior sunroom and not related to proximity to the solar farm. The other two comparables strongly support that assertion as well as a finding of no impact on the value of the property due to proximity to the solar farm.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
	Adjoins	6240 N Washington	1.40	10/15/2021	$155,000	1962	1,582	$97.98	2/1	Det 3	Ranch	
	Not	1408 Brooks	0.13	8/20/2021	$105,000	1957	1,344	$78.13	3/1	Drive	Ranch	
	Not	532 Wilson	0.14	7/29/2021	$159,900	1948	1,710	$93.51	3/2	Det Gar	Ranch	Sunroom
	Not	424 Pinewood	0.17	5/20/2022	$151,000	1960	1,548	$97.55	4/2	Gar	Ranch	

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$155,000			160
$496		$2,625	$13,016		$15,000		$136,136	12%		
$1,051		$11,193	-$9,575	-$10,000	$8,000		$160,569	-4%		
-$2,761		-$2,265	$2,653	-$10,000	$7,000		$145,627	6%		
									5%	

Based on these four matched pairs, the data at this solar farm supports a finding of no impact on property value due to the proximity of the solar farm for homes as close as 155 feet.

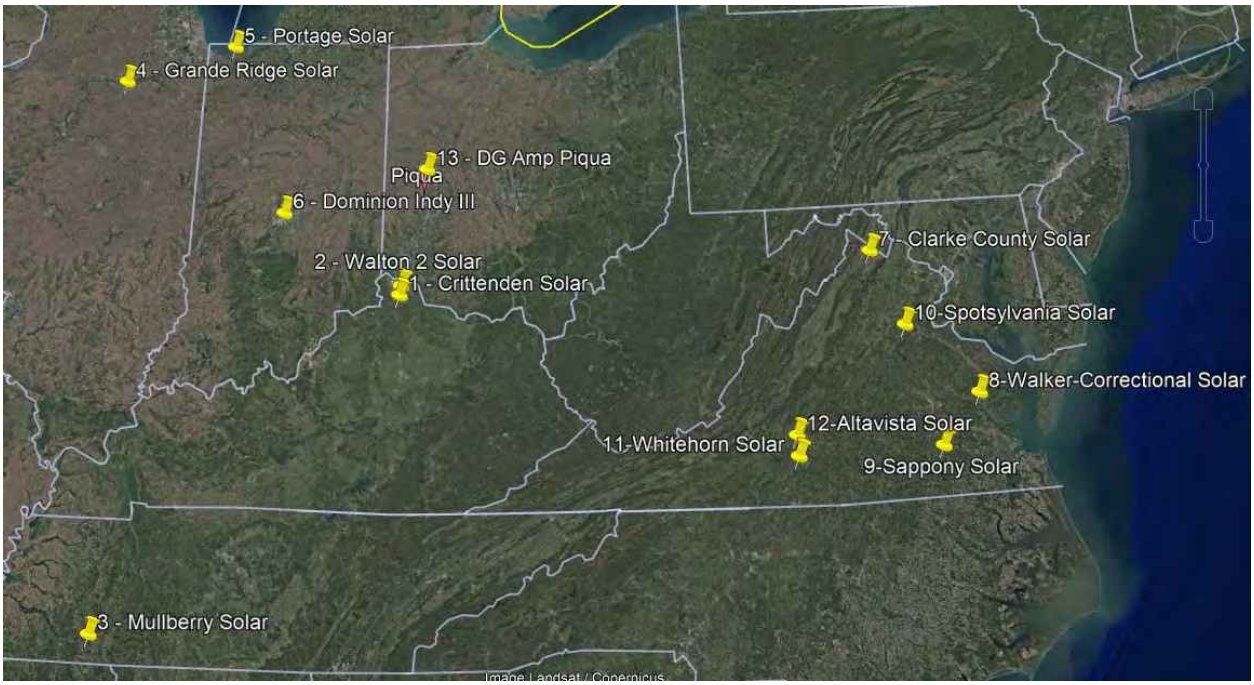
I also identified three new construction home sales on Arrowhead Drive that sold in 2022. I have reached out to the builder regarding those homes, but these homes sold between $250,000 and $275,000 each and were located within 350 feet of the solar farm. These sales show that the presence of the solar farm is not inhibiting new home construction in proximity to the solar farm.

Conclusion

The solar farm matched pairs shown above have similar characteristics to each other in terms of population, but with several outliers showing solar farms in far more urban areas. The median income for the population within 1 mile of a solar farm among this subset of matched pairs is $61,115 with a median housing unit value of $186,463. Most of the comparables are under $300,000 in the home price, with $483,333 being the high end of the set, though I have matched pairs in other states over $1,600,000 in price adjoining large solar farms. The predominate adjoining uses are residential and agricultural. These figures are in line with the larger set of solar farms that I have looked at with the predominant adjoining uses being residential and agricultural and similar to the solar farm breakdown shown for Kentucky and adjoining states as well as the proposed subject property.

Based on the similarity of adjoining uses and demographic data between these sites and the subject property, I consider it reasonable to compare these sites to the subject property.

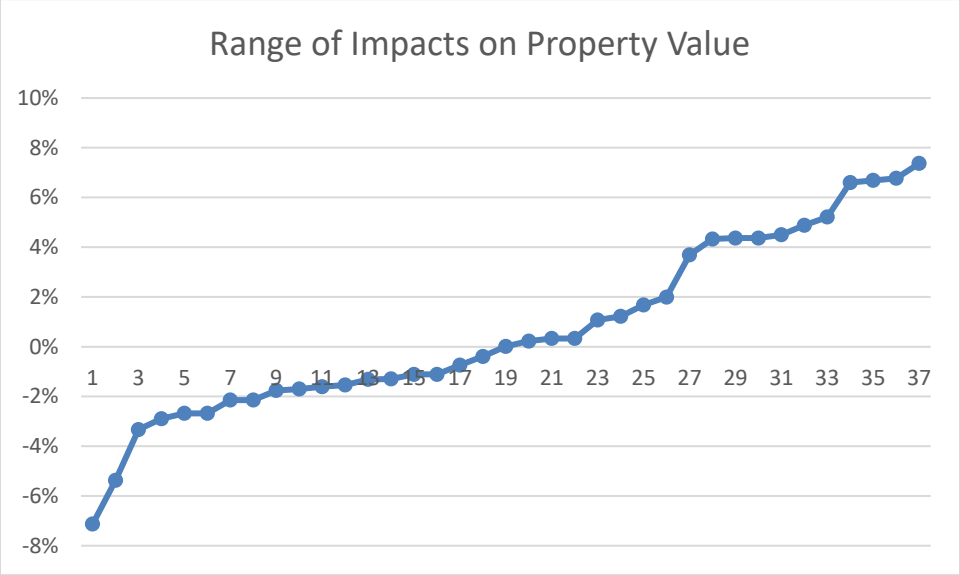
Matched Pair Summary						Adj. Uses By Acreage					1 mile Radius (2010-2022 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Population	Med. Income	Avg. Housing Unit	Veg. Buffer
1	Crittenden	Crittenden	KY	34	2.70	40	22%	51%	27%	0%	1,419	$60,198	$178,643	Light
2	Walton 2	Walton	KY	58	2.00	90	21%	0%	60%	19%	880	$81,709	$277,717	Light
3	Mulberry	Selmer	TN	160	5.00	60	13%	73%	10%	3%	467	$40,936	$171,746	Lt to Med
4	Grand Ridge	Streator	IL	160	20.00	1	8%	87%	5%	0%	96	$70,158	$187,037	Light
5	Portage	Portage	IN	56	2.00	0	19%	81%	0%	0%	6,642	$65,695	$186,463	Light
6	Dominion	Indianapolis	IN	134	8.60	20	3%	97%	0%	0%	3,774	$61,115	$167,515	Light
7	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
8	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
9	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Medium
10	Spotyslvania	Paytes	VA	3,500	500.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
11	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750	None to Lt
12	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667	Light
13	DG Amp Piqua	Piqua	OH	86	12.60	2	26%	16%	58%	0%	6,735	$38,919	$96,555	
	Average			496	57.15	49	16%	60%	22%	2%	1,624	$65,075	$239,166	
	Median			160	20.00	40	14%	68%	11%	0%	467	$61,115	$186,463	
	High			3,500	500.00	160	37%	98%	60%	19%	6,735	$120,861	$483,333	
	Low			34	2.00	0	2%	0%	0%	0%	7	$38,919	$96,555	



These are very similar to the demographics shown around these comparable solar farms.

On the following page is a summary of the 37 matched pairs for all of the solar farms noted above. They show a pattern of results from -7% to +7% with a median of 0% and an average of +1%.

As can be seen in the chart of those results below, most of the data points are between -5% and +5%. This variability is common with real estate and consistent with market imperfection. I therefore conclude that these results strongly support an indication of no impact on property value due to the adjacent solar farm.



Residential Dwelling Matched Pairs Adjoining Solar Farms

Pair	Solar Farm	City	State	Area	MW	Approx Distance	Tax ID/Address	Date	Sale Price	Adj. Sale Price	% Diff	Veg. Buffer
1	Clarke Cnty	White Post	VA	Rural	20	1230	833 Nations Spr	Jan-17	$295,000			Light
							6801 Middle	Dec-17	$249,999	$296,157	0%	
2	Walker	Barhamsville	VA	Rural	20	250	5241 Barham	Oct-18	$264,000			Light
							9252 Ordinary	Jun-19	$277,000	$246,581	7%	
3	Clarke Cnty	White Post	VA	Rural	20	1230	833 Nations Spr	Aug-19	$385,000			Light
							2393 Old Chapel	Aug-20	$330,000	$389,286	-1%	
4	Sappony	Stony Creek	VA	Rural	20	1425	12511 Palestine	Jul-18	$128,400			Medium
							6494 Rocky Branch	Nov-18	$100,000	$131,842	-3%	
5	Spotsylvania	Paytes	VA	Rural	617	1270	12901 Orange Plnk	Aug-20	$319,900			Medium
							12717 Flintlock	Dec-20	$290,000	$326,767	-2%	
6	Spotsylvania	Paytes	VA	Rural	617	1950	9641 Nottoway	May-20	$449,900			Medium
							11626 Forest	Aug-20	$489,900	$430,246	4%	
7	Spotsylvania	Paytes	VA	Rural	617	1171	13353 Post Oak	Sep-20	$300,000			Heavy
							12810 Catharpin	Jan-20	$280,000	$299,008	0%	
8	Crittenden	Crittenden	KY	Suburban	2.7	373	250 Claiborne	Jan-19	$120,000			Light
							315 N Fork	May-19	$107,000	$120,889	-1%	
9	Crittenden	Crittenden	KY	Suburban	2.7	488	300 Claiborne	Sep-18	$213,000			Light
							1795 Bay Valley	Dec-17	$231,200	$228,180	-7%	
10	Crittenden	Crittenden	KY	Suburban	2.7	720	350 Claiborne	Jul-18	$245,000			Light
							2160 Sherman	Jun-19	$265,000	$248,225	-1%	
11	Crittenden	Crittenden	KY	Suburban	2.7	930	370 Claiborne	Aug-19	$273,000			Light
							125 Lexington	Apr-18	$240,000	$254,751	7%	
12	Crittenden	Crittenden	KY	Suburban	2.7	665	330 Claiborne	Dec-19	$282,500			Light
							2160 Sherman	Jun-19	$265,000	$290,680	-3%	
13	Crittenden	Crittenden	KY	Suburban	2.7	390	260 Claiborne	Oct-21	$175,000			Light
							546 Waterworks	Apr-21	$179,500	$171,510	2%	
14	Crittenden	Crittenden	KY	Suburban	2.7	570	300 Claiborne	Dec-21	$290,000			Light
							39 Pinhook	Mar-22	$299,000	$289,352	0%	
15	Crittenden	Crittenden	KY	Suburban	2.7	1080	410 Claiborne	Feb-21	$275,000			Light
							114 Austin	Dec-20	$248,000	$279,680	-2%	
16	White House	Louisa	VA	Rural	20	1400	127 Walnut	Mar-20	$240,000			Light
							126 Woodger	Apr-19	$240,000	$239,967	0%	
17	Whitehorn	Gretna	VA	Rural	50	255	1120 Taylors Mill	Dec-21	$224,000			Light
							1000 Long Branch	Aug-20	$162,000	$213,920	5%	
18	Mulberry	Selmer	TN	Rural	5	400	0900A011	Jul-14	$130,000			Light
							099CA043	Feb-15	$148,900	$136,988	-5%	
19	Mulberry	Selmer	TN	Rural	5	400	099CA002	Jul-15	$130,000			Light
							0990NA040	Mar-15	$120,000	$121,200	7%	
20	Mulberry	Selmer	TN	Rural	5	480	491 Dusty	Oct-16	$176,000			Light
							35 April	Aug-16	$185,000	$178,283	-1%	
21	Mulberry	Selmer	TN	Rural	5	650	297 Country	Sep-16	$150,000			Medium
							53 Glen	Mar-17	$126,000	$144,460	4%	
22	Mulberry	Selmer	TN	Rural	5	685	57 Cooper	Feb-19	$163,000			Medium
							191 Amelia	Aug-18	$132,000	$155,947	4%	
23	Dominion	Indianapolis	IN	Rural	8.6	400	2013249 (Tax ID)	Dec-15	$140,000			Light
							5723 Minden	Nov-16	$139,900	$132,700	5%	
24	Dominion	Indianapolis	IN	Rural	8.6	400	2013251 (Tax ID)	Sep-17	$160,000			Light
							5910 Mosaic	Aug-16	$146,000	$152,190	5%	
25	Dominion	Indianapolis	IN	Rural	8.6	400	2013252 (Tax ID)	May-17	$147,000			Light
							5836 Sable	Jun-16	$141,000	$136,165	7%	
26	Dominion	Indianapolis	IN	Rural	8.6	400	2013258 (Tax ID)	Dec-15	$131,750			Light
							5904 Minden	May-16	$130,000	$134,068	-2%	
27	Dominion	Indianapolis	IN	Rural	8.6	400	2013260 (Tax ID)	Mar-15	$127,000			Light
							5904 Minden	May-16	$130,000	$128,957	-2%	
28	Dominion	Indianapolis	IN	Rural	8.6	400	2013261 (Tax ID)	Feb-14	$120,000			Light
							5904 Minden	May-16	$130,000	$121,930	-2%	
29	Grand Ridge	Streator	IL	Rural	20	480	1497 E 21st	Oct-16	$186,000			Light
							712 Columbus	Jun-16	$166,000	$184,000	1%	
30	Clarke Cnty	White Post	VA	Rural	20	1230	833 Nations Spr	Aug-19	$385,000			Light
							2393 Old Chapel	Aug-20	$330,000	$389,286	-1%	
31	Sappony	Stony Creek	VA	Rural	20	1425	12511 Palestine	Jul-18	$128,400			Medium
							6494 Rocky Branch	Nov-18	$100,000	$131,842	-3%	

Pair	Solar Farm	City	State	Area	MW	Approx Distance	Tax ID/Address	Date	Sale Price	Adj. Sale Price	% Diff	Veg. Buffer
32	DG Amp	Piqua	OH	Suburban	12.6	155	6060 N Washington	Oct-19	$119,500			Light
							1511 Sweetbriar	Aug-20	$123,000	$118,044	1%	
33	DG Amp	Piqua	OH	Suburban	12.6	585	1011 Plymouth	Feb-20	$113,000			Light
							1720 Williams	Dec-19	$119,900	$111,105	2%	
34	Spotsylvania	Paytes	VA	Rural	617	1270	12901 Orange Plnk	Aug-20	$319,900			Medium
							12717 Flintlock	Dec-20	$290,000	$326,767	-2%	
35	Spotsylvania	Paytes	VA	Rural	617	1950	9641 Nottoway	May-20	$449,900			Medium
							11626 Forest	Aug-20	$489,900	$430,246	4%	
36	Spotsylvania	Paytes	VA	Rural	617	1171	13353 Post Oak	Sep-20	$300,000			Heavy
							12810 Catharpin	Jan-20	$280,000	$299,008	0%	
37	Altavista	Altavista	VA	Rural	80	600	3026 Bishop Crk	Feb-22	$150,000			Heavy
							3026 Bishop Crk	Jul-19	$120,000	$155,000	-3%	

	MW	Avg. Distance
Average	111.23	791
Median	8.60	600
High	617.00	1,950
Low	2.70	155

	Indicated Impact
Average	1%
Median	0%
High	7%
Low	-7%

B. Southeastern USA Data – Over 5 MW

Conclusion – SouthEast Over 5 MW

Southeast USA Over 5 MW
Matched Pair Summary

							Adj. Uses By Acreage				1 mile Radius (2010-2022 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Pop.	Med. Income	Avg. Housing Unit	Veg. Buffer
1	AM Best	Goldsboro	NC	38	5.00	2	38%	0%	23%	39%	1,523	$37,358	$148,375	Light
2	Mulberry	Selmer	TN	160	5.00	60	13%	73%	10%	3%	467	$40,936	$171,746	Lt to Med
3	Leonard	Hughesville	MD	47	5.00	20	18%	75%	0%	6%	525	$106,550	$350,000	Light
4	Gastonia SC	Gastonia	NC	35	5.00	48	33%	0%	23%	44%	4,689	$35,057	$126,562	Light
5	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
6	Tracy	Bailey	NC	50	5.00	10	29%	0%	71%	0%	312	$43,940	$99,219	Heavy
7	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
8	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
9	Mariposa	Stanley	NC	36	5.00	96	48%	0%	52%	0%	1,716	$36,439	$137,884	Light
10	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
11	Candace	Princeton	NC	54	5.00	22	76%	24%	0%	0%	448	$51,002	$107,171	Medium
12	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
13	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
14	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
15	Sunfish	Willow Spring	NC	50	6.40	30	35%	35%	30%	0%	1,515	$63,652	$253,138	Light
16	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Light
17	Camden Dam	Camden	NC	50	5.00	0	17%	72%	11%	0%	403	$84,426	$230,288	Light
18	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408	Light
19	Champion	Pelion	SC	100	10.00	N/A	4%	70%	8%	18%	1,336	$46,867	$171,939	Light
20	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
21	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
22	Spotyslvania	Paytes	VA	3,500	617.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Md to Hvy
23	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750	None to Lt
24	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667	Light
	Average			506	58.83	36	25%	47%	22%	6%	883	$62,000	$237,816	
	Median			234	20.00	20	18%	56%	11%	0%	458	$55,049	$230,848	
	High			3,500	617.00	160	76%	98%	94%	44%	4,689	$120,861	$483,333	
	Low			35	5.00	0	2%	0%	0%	0%	7	$35,057	$99,219	

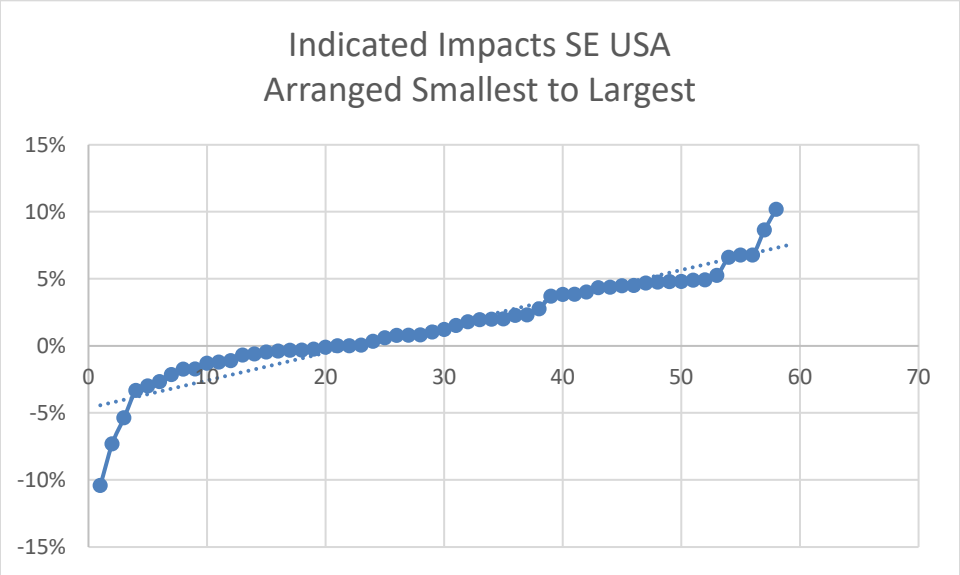
The solar farm matched pairs pulled from the solar farms shown above have similar characteristics to each other in terms of population, but with several outliers showing solar farms in more urban areas. The median income for the population within 1 mile of a solar farm is $55,049 with a median housing unit value of $230,848. Most of the comparables are under $300,000 in the home price, with $483,333 being the high end of the set, though I have matched pairs in multiple states over $1,600,000 adjoining solar farms. The adjoining uses show that residential and agricultural uses are the predominant adjoining uses. These figures are in line with the larger set of solar farms that I have looked at with the predominant adjoining uses being residential and agricultural and similar to the solar farm breakdown shown for Virginia and adjoining states as well as the proposed subject property.

Based on the similarity of adjoining uses and demographic data between these sites and the subject property, I consider it reasonable to compare these sites to the subject property.

I have pulled 59 matched pairs from the above referenced solar farms to provide the following summary of home sale matched pairs and land sales next to solar farms. The summary shows that the range of differences is from -10% to +10% with an average of +1% and median of +1%.

While the range is seemingly wide, the graph below clearly shows that the vast majority of the data falls between -5% and +5% and most of those are clearly in the 0 to +5% range. As noted earlier in this report, real estate is an imperfect market and this 5% variability is typical in real estate. This data strongly supports an indication of no impact on adjoining residential uses to a solar farm.

I therefore conclude that these matched pairs support a finding of no impact on value at the subject property for the proposed project, which as proposed will include a landscaped buffer to screen adjoining residential properties.


Indicated Impacts SE USA
Arranged Smallest to Largest
15%
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-5%
-10%
-15%
0
10
20
30
40
50
60
70

C. Summary of National Data on Solar Farms

I have worked in over 20 states related to solar farms and I have been tracking matched pairs in most of those states. On the following pages I provide a brief summary of those findings showing 38 solar farms over 5 MW studied with each one providing matched pair data supporting the findings of this report.

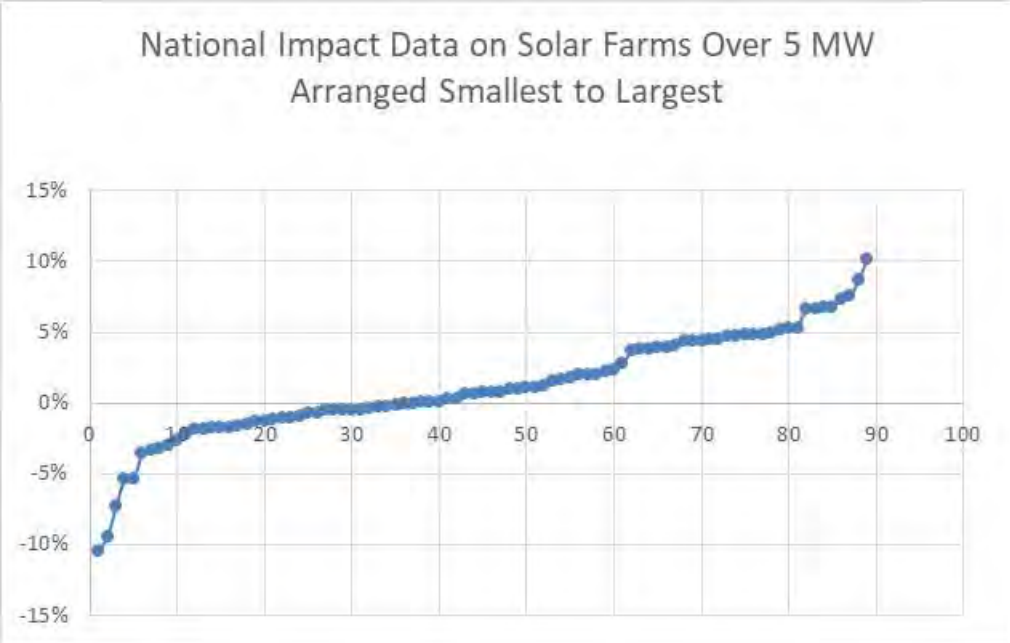
The solar farms summary is shown below with a summary of the matched pair data shown on the following page.

Matched Pair Summary							**Adj. Uses By Acreage**				**1 mile Radius (2020 Data)**			
	Name	**City**	**State**	**Acres**	**MW**	**Topo Shift**	**Res**	**Ag**	**Ag/Res**	**Com/Ind**	**Population**	**Med. Income**	**Avg. Housing Unit**	**Veg. Buffer**
1	AM Best	Goldsboro	NC	38	5.00	2	38%	0%	23%	39%	1,523	$37,358	$148,375	Light
2	Mulberry	Selmer	TN	160	5.00	60	13%	73%	10%	3%	467	$40,936	$171,746	Lt to Med
3	Leonard	Hughesville	MD	47	5.00	20	18%	75%	0%	6%	525	$106,550	$350,000	Light
4	Gastonia SC	Gastonia	NC	35	5.00	48	33%	0%	23%	44%	4,689	$35,057	$126,562	Light
5	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
6	Tracy	Bailey	NC	50	5.00	10	29%	0%	71%	0%	312	$43,940	$99,219	Heavy
7	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
8	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
9	Grand Ridge	Streator	IL	160	20.00	1	8%	87%	5%	0%	96	$70,158	$187,037	Light
10	Dominion	Indianapolis	IN	134	8.60	20	3%	97%	0%	0%	3,774	$61,115	$167,515	Light
11	Mariposa	Stanley	NC	36	5.00	96	48%	0%	52%	0%	1,716	$36,439	$137,884	Light
12	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
13	Flemington	Flemington	NJ	120	9.36	N/A	13%	50%	28%	8%	3,477	$105,714	$444,696	Lt to Med
14	Frenchtown	Frenchtown	NJ	139	7.90	N/A	37%	35%	29%	0%	457	$111,562	$515,399	Light
15	McGraw	East Windsor	NJ	95	14.00	N/A	27%	44%	0%	29%	7,684	$78,417	$362,428	Light
16	Tinton Falls	Tinton Falls	NJ	100	16.00	N/A	98%	0%	0%	2%	4,667	$92,346	$343,492	Light
17	Simon	Social Circle	GA	237	30.00	71	1%	63%	36%	0%	203	$76,155	$269,922	Medium
18	Candace	Princeton	NC	54	5.00	22	76%	24%	0%	0%	448	$51,002	$107,171	Medium
19	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
20	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
21	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
22	Demille	Lapeer	MI	160	28.40	10	10%	68%	0%	22%	2,010	$47,208	$187,214	Light
23	Turrill	Lapeer	MI	230	19.60	10	75%	59%	0%	25%	2,390	$46,839	$110,361	Light
24	Sunfish	Willow Spring	NC	50	6.40	30	35%	35%	30%	0%	1,515	$63,652	$253,138	Light
25	Picture Rocks	Tucson	AZ	182	20.00	N/A	6%	88%	6%	0%	102	$81,081	$280,172	None
26	Avra Valley	Tucson	AZ	246	25.00	N/A	3%	94%	3%	0%	85	$80,997	$292,308	None
27	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Medium
28	Camden Dam	Camden	NC	50	5.00	0	17%	72%	11%	0%	403	$84,426	$230,288	Light
29	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408	Light
30	Champion	Pelion	SC	100	10.00	N/A	4%	70%	8%	18%	1,336	$46,867	$171,939	Light
31	Eddy II	Eddy	TX	93	10.00	N/A	15%	25%	58%	2%	551	$59,627	$139,088	Light
32	Somerset	Somerset	TX	128	10.60	N/A	5%	95%	0%	0%	1,293	$41,574	$135,490	Light
33	DG Amp Piqua	Piqua	OH	86	12.60	2	26%	16%	58%	0%	6,735	$38,919	$96,555	Light
34	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
35	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
36	Spotyslvania	Paytes	VA	3,500	500.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
37	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750	None to Lt
38	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667	Light
39	Hattiesburg	Hattiesburg	MS	400	50.00	N/A	10%	85%	5%	0%	1,065	$28,545	$129,921	Med
	Average			372	40.43	32	24%	53%	19%	6%	1,431	$64,314	$240,236	
	Median			160	20.00	10	15%	59%	6%	0%	551	$60,037	$230,288	
	High			3,500	500.00	160	98%	98%	94%	44%	7,684	$120,861	$515,399	
	Low			35	5.00	0	1%	0%	0%	0%	7	$28,545	$96,555	

From these 39 solar farms, I have derived 89 matched pairs. The matched pairs show no negative impact at distances as close as 105 feet between a solar panel and the nearest point on a home. The range of impacts is -10% to +10% with an average and median of +1%.

	MW	Avg. Distance		% Dif
Average	48.43	569	**Average**	1%
Median	16.00	400	**Median**	1%
High	617.00	2,020	**High**	10%
Low	5.00	145	**Low**	-10%

While the range is broad, the two charts below show the data points in range from lowest to highest. There is only 3 data points out of 89 that show a negative impact. The rest support either a finding of no impact or 9 of the data points suggest a positive impact due to adjacency to a solar farm. As discussed earlier in this report, I consider this data to strongly support a finding of no impact on value as most of the findings are within typical market variation and even within that, most are mildly positive findings.



D. Larger Solar Farms

I have also considered larger solar farms to address impacts related to larger projects. Projects have been increasing in size and most of the projects between 100 and 1000 MW are newer with little time for adjoining sales. I have included a breakdown of solar farms with 20 MW to 80 MW facilities with one 500 MW facility.

Matched Pair Summary - @20 MW And Larger							Adj. Uses By Acreage				1 mile Radius (2010-2020 Data)		
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Population	Med. Income	Avg. Housing Unit
1	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731
2	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667
3	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306
4	Grand Ridge	Streator	IL	160	20.00	1	8%	87%	5%	0%	96	$70,158	$187,037
5	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453
6	Simon	Social Circle	GA	237	30.00	71	1%	63%	36%	0%	203	$76,155	$269,922
7	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076
8	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435
9	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347
10	Demille	Lapeer	MI	160	28.40	10	10%	68%	0%	22%	2,010	$47,208	$187,214
11	Turrill	Lapeer	MI	230	19.60	10	75%	59%	0%	25%	2,390	$46,839	$110,361
12	Picure Rocks	Tucson	AZ	182	20.00	N/A	6%	88%	6%	0%	102	$81,081	$280,172
13	Avra Valley	Tucson	AZ	246	25.00	N/A	3%	94%	3%	0%	85	$80,997	$292,308
14	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208
15	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408
16	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320
17	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571
18	Spotyslvania	Paytes	VA	3,500	500.00	160	37%	52%	11%	0%	74	$120,861	$483,333
19	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750
20	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667
	Average			644	69.08		19%	64%	17%	4%	658	$67,210	$261,914
	Median			347	40.00		12%	68%	2%	0%	203	$66,918	$273,135
	High			3,500	500.00		75%	98%	94%	25%	2,446	$120,861	$483,333
	Low			121	19.60		1%	0%	0%	0%	7	$36,737	$110,361

The breakdown of adjoining uses, population density, median income and housing prices for these projects are very similar to those of the larger set. The matched pairs for each of these were considered earlier and support a finding of no negative impact on the adjoining home values.

I have included a breakdown of solar farms with 50 MW to 617 MW facilities adjoining.

Matched Pair Summary - @50 MW And Larger							Adj. Uses By Acreage				1 mile Radius (2010-2020 Data)		
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Population	Med. Income	Avg. Housing Unit
1	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731
2	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667
3	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306
4	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435
5	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347
6	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320
7	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571
8	Spotyslvania	Paytes	VA	3,500	500.00	160	37%	52%	11%	0%	74	$120,861	$483,333
9	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750
10	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667
	Average			1,095	115.85		19%	58%	23%	1%	646	$67,820	$283,013
	Median			627	75.00		15%	67%	0%	0%	274	$61,858	$279,039
	High			3,500	500.00		41%	97%	94%	3%	2,446	$120,861	$483,333
	Low			347	50.00		2%	0%	0%	0%	7	$36,737	$143,320

The breakdown of adjoining uses, population density, median income and housing prices for these projects are very similar to those of the larger set. The matched pairs for each of these were considered earlier and support a finding of no negative impact on the adjoining home values.

The data for these larger solar farms is shown in the SE USA and the National data breakdowns with similar landscaping, setbacks and range of impacts that fall mostly in the +/-5% range as can be seen earlier in this report.

On the following page I show a summary of 248 projects ranging in size from 50 MW up to 1,000 MW with an average size of 119.7 MW and a median of 80 MW. The average closest distance for an adjoining home is 365 feet, while the median distance is 220 feet. The closest distance is 50 feet. The mix of adjoining uses is similar with most of the adjoining uses remaining residential or agricultural in nature. This is the list of solar farms that I have researched for possible matched pairs and not a complete list of larger solar farms in those states.

Total Number of Solar Farms Researched Over 50 MW 238

	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre			
						Res	Agri	Agri/Res	Com
Average	119.7	1521.4	1223.3	1092	365	10%	68%	18%	4%
Median	80.0	987.3	805.5	845	220	7%	72%	12%	0%
High	1000.0	19000.0	9735.4	6835	6810	98%	100%	100%	70%
Low	50.0	3.0	3.0	241	50	0%	0%	0%	0%

IX. Distance Between Homes and Panels

I have measured distances at matched pairs as close as 105 feet between panel and home to show no impact on value. This measurement goes from the closest point on the home to the closest solar panel. This is a strong indication that at this distance there is no impact on adjoining homes.

However, in tracking other approved solar farms across Kentucky, North Carolina and other states, I have found that it is common for there to be homes within 100 to 150 feet of solar panels. Given the visual barriers in the form of privacy fencing or landscaping, there is no sign of negative impact.

I have also tracked a number of locations where solar panels are between 50 and 100 feet of single-family homes. In these cases the landscaping is typically a double row of more mature evergreens at time of planting. There are many examples of solar farms with one or two homes closer than 100-feet, but most of the adjoining homes are further than that distance.

X. Topography

As shown on the summary charts for the solar farms, I have been identifying the topographic shifts across the solar farms considered. Differences in topography can impact visibility of the panels, though typically this results in distant views of panels as opposed to up close views. The topography noted for solar farms showing no impact on adjoining home values range from as much as 160-foot shifts across the project. Given that appearance is the only factor of concern and that distance plus landscape buffering typically addresses up close views, this leaves a number of potentially distant views of panels. I specifically note that in Crittenden in KY there are distant views of panels from the adjoining homes that showed no impact on value.

General rolling terrain with some distant solar panel views are showing no impact on adjoining property value.

XI. Potential Impacts During Construction

I have previously been asked by the Kentucky Siting Board about potential impacts during construction. This is not a typical question I get as any development of a site will have a certain amount of construction, whether it is for a commercial agricultural use such as large-scale poultry operations or a new residential subdivision. Construction will be temporary and consistent with other development uses of the land and in fact dust from the construction will likely be less than most other construction projects given the minimal grading. I would not anticipate any impacts on property value due to construction on the site.

I note that in the matched pairs that I have included there have been a number of home sales that happened after a solar farm was approved but before the solar farm was built showing no impact on property value. Therefore the anticipated construction had no impact as shown by that data.

XII. Scope of Research

I have researched over 1,000 solar farms and sites on which solar farms are existing and proposed in Kentucky, Illinois, Tennessee, North Carolina, Virginia as well as other states to determine what uses are typically found in proximity with a solar farm. The data I have collected and provide in this report strongly supports the assertion that solar farms are having no negative consequences on adjoining agricultural and residential values.

Beyond these references, I have quantified the adjoining uses for a number of solar farm comparables to derive a breakdown of the adjoining uses for each solar farm. The chart below shows the breakdown of adjoining or abutting uses by total acreage.

Percentage By Adjoining Acreage

	Res	Ag	Res/AG	Comm	Ind	Avg Home	Closest Home	All Res Uses	All Comm Uses
Average	19%	53%	20%	2%	6%	887	344	91%	8%
Median	11%	56%	11%	0%	0%	708	218	100%	0%
High	100%	100%	100%	93%	98%	5,210	4,670	100%	98%
Low	0%	0%	0%	0%	0%	90	25	0%	0%

Res = Residential, Ag = Agriculture, Com = Commercial

Total Solar Farms Considered: 705

I have also included a breakdown of each solar farm by number of adjoining parcels to the solar farm rather than based on adjoining acreage. Using both factors provides a more complete picture of the neighboring properties.

Percentage By Number of Parcels Adjoining

	Res	Ag	Res/AG	Comm	Ind	Avg Home	Closest Home	All Res Uses	All Comm Uses
Average	61%	24%	9%	2%	4%	887	344	93%	6%
Median	65%	19%	5%	0%	0%	708	218	100%	0%
High	100%	100%	100%	60%	78%	5,210	4,670	105%	78%
Low	0%	0%	0%	0%	0%	90	25	0%	0%

Res = Residential, Ag = Agriculture, Com = Commercial

Total Solar Farms Considered: 705

Both of the above charts show a marked residential and agricultural adjoining use for most solar farms. Every single solar farm considered included an adjoining residential or residential/agricultural use.

XIII. Specific Factors Related To Impacts on Value

I have completed a number of Impact Studies related to a variety of uses and I have found that the most common areas for impact on adjoining values typically follow a hierarchy with descending levels of potential impact. I will discuss each of these categories and how they relate to a solar farm.

1. Hazardous material
2. Odor
3. Noise
4. Traffic
5. Stigma
6. Appearance

1. Hazardous material

A solar farm presents no potential hazardous waste byproduct as part of normal operation. Any fertilizer, weed control, vehicular traffic, or construction will be significantly less than typically applied in a residential development and especially most agricultural uses.

The various solar farms that I have inspected and identified in the addenda have no known environmental impacts associated with the development and operation.

2. Odor

The various solar farms that I have inspected produced no odor.

3. Noise

Whether discussing passive fixed solar panels, or single-axis trackers, there is no negative impact associated with noise from a solar farm. The transformer has a hum similar to an HVAC that can only be heard in close proximity and the buffers on the property are sufficient to make emitted sounds effectively inaudible from the adjoining properties. A wide variety of noise studies have been conducted on solar farms to illustrate compatibility between solar properties and nearby residential uses. The noise factor is even less at night.

The various solar farms that I have inspected were inaudible from the roadways.

4. Traffic

The solar farm will have no onsite employee's or staff. The site requires only minimal maintenance. Relative to other potential uses of the site (such as a residential subdivision), the additional traffic generated by a solar farm use on this site is insignificant.

5. Stigma

There is no stigma associated with solar farms and solar farms and people generally respond favorably towards such a use. While an individual may express concerns about proximity to a solar farm, there is no specific stigma associated with a solar farm. Stigma generally refers to things such as adult establishments, prisons, rehabilitation facilities, and so forth.

Solar panels have no associated stigma and in smaller collections are found in yards and roofs in many residential communities. Solar farms are adjoining elementary, middle and high schools as well as churches and subdivisions. I note that one of the solar farms in this report not only adjoins

a church, but is actually located on land owned by the church. Solar panels on a roof are often cited as an enhancement to the property in marketing brochures.

I see no basis for an impact from stigma due to a solar farm.

6. Appearance

I note that larger solar farms using fixed or tracking panels are a passive use of the land that is in keeping with a rural/residential area. As shown below, solar farms are comparable to larger greenhouses. This is not surprising given that a greenhouse is essentially another method for collecting passive solar energy. The greenhouse use is well received in residential/rural areas and has a similar visual impact as a solar farm.

The solar panels are all less than 15 feet high, which means that the visual impact of the solar panels will be similar in height to a typical greenhouse and lower than a single-story residential dwelling. Were the subject property developed with single family housing, that development would have a much greater visual impact on the surrounding area given that a two-story home with attic could be three to four times as high as these proposed panels.

Whenever you consider the impact of a proposed project on viewshed or what the adjoining owners may see from their property it is important to distinguish whether or not they have a protected viewshed or not. Enhancements for scenic vistas are often measured when considering properties that adjoin preserved open space and parks. However, adjoining land with a preferred view today conveys no guarantee that the property will continue in the current use. Any consideration of the impact of the appearance requires a consideration of the wide variety of other uses a property already has the right to be put to, which for solar farms often includes subdivision development, agricultural business buildings such as poultry, or large greenhouses and the like.

Dr. Randall Bell, MAI, PhD, and author of the book **Real Estate Damages**, Third Edition, on Page 146 "Views of bodies of water, city lights, natural settings, parks, golf courses, and other amenities are considered desirable features, particularly for residential properties." Dr. Bell continues on Page

147 that "View amenities may or may not be protected by law or regulation. It is sometimes argued that views have value only if they are protected by a view easement, a zoning ordinance, or covenants, conditions, and restrictions (CC&Rs), although such protections are relatively uncommon as a practical matter. The market often assigns significant value to desirable views irrespective of whether or not such views are protected by law."

Dr. Bell concludes that a view enhances adjacent property, even if the adjacent property has no legal right to that view. He then discusses a "borrowed" view where a home may enjoy a good view of vacant land or property beyond with a reasonable expectation that the view might be partly or completely obstructed upon development of the adjoining land. He follows that with "This same concept applies to potentially undesirable views of a new development when the development conforms to applicable zoning and other regulations. Arguing value diminution in such cases is difficult, since the possible development of the offending property should have been known." In other words, if there is an allowable development on the site then arguing value diminution with such a development would be difficult. This further extends to developing the site with alternative uses that are less impactful on the view than currently allowed uses.

This gets back to the point that if a property has development rights and could currently be developed in such a way that removes the viewshed such as a residential subdivision, then a less intrusive use such as a solar farm that is easily screened by landscaping would not have a greater impact on the viewshed of any perceived value adjoining properties claim for viewshed. Essentially, if there are more impactful uses currently allowed, then how can you claim damages for a less impactful use.

7. Conclusion

On the basis of the factors described above, it is my professional opinion that the proposed solar farm will not negatively impact adjoining property values. The only category of impact of note is appearance, which is addressed through setbacks and landscaping buffers. The matched pair data supports that conclusion.

XIV. Conclusion

The matched pair analysis shows no negative impact in home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. The proposed setbacks are further than those measured showing no impact for similar price ranges of homes and for areas with similar demographics to the subject area. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all support a finding of no impact on property value. Similar paired sales showed no impact from adjoining battery storage facilities.

Very similar solar farms in very similar areas have been found by hundreds of towns and counties not to have a substantial injury to abutting or adjoining properties, and many of those findings of no impact have been upheld by appellate courts. Similar solar farms have been approved adjoining agricultural uses, schools, churches, and residential developments.

I have found no difference in the mix of adjoining uses or proximity to adjoining homes based on the size of a solar farm and I have found no significant difference in the matched pair data adjoining larger solar farms versus smaller solar farms. The data in the Southeast is consistent with the larger set of data that I have nationally, as is the more specific data located in and around Kentucky.

Based on the data and analysis in this report, it is my professional opinion that the solar farm proposed at the subject property will have no negative impact on the value of adjoining or abutting property. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it's quiet, and there is no traffic.

XV. Certification

I certify that, to the best of my knowledge and belief:

1. The statements of fact contained in this report are true and correct;

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, unbiased professional analyses, opinions, and conclusions;

3. I have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved;

4. I have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment;

5. My engagement in this assignment was not contingent upon developing or reporting predetermined results;

6. My compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of the appraisal;

7. The reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute;

8. My analyses, opinions and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice.

9. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives;

10. I have not made a personal inspection of the property that is the subject of this report, and;

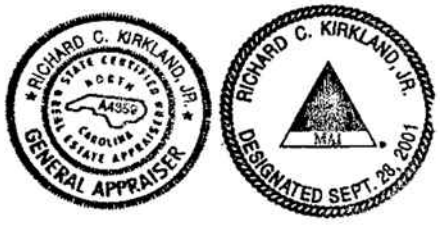
11. No one provided significant real property appraisal assistance to the person signing this certification.

12. As of the date of this report I have completed the continuing education program for Designated Members of the Appraisal Institute;

13. I have not performed services, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.

Disclosure of the contents of this appraisal report is governed by the bylaws and regulations of the Appraisal Institute and the National Association of Realtors.

Neither all nor any part of the contents of this appraisal report shall be disseminated to the public through advertising media, public relations media, news media, or any other public means of communications without the prior written consent and approval of the undersigned.



Richard C. Kirkland, Jr., MAI
State Certified General Appraiser

Kirkland Appraisals, LLC

Richard C. Kirkland, Jr., MAI
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Professional Experience

Kirkland Appraisals, LLC, Raleigh, N.C. — 2003 – Present
Commercial appraiser

Hester & Company, Raleigh, N.C.
Commercial appraiser — 1996 – 2003

Professional Affiliations

MAI (Member, Appraisal Institute) designation #11796 — 2001
NC State Certified General Appraiser # A4359 — 1999
VA State Certified General Appraiser # 4001017291
SC State Certified General Appraiser # 6209
FL State Certified General Appraiser # RZ3950
GA State Certified General Appraiser # 321885
MI State Certified General Appraiser # 1201076620
PA State Certified General Appraiser # GA004598
OH State Certified General Appraiser # 2021008689
IN State Certified General Appraiser # CG42100052
KY State Certified General Appraiser # 5522

Education

Bachelor of Arts in English, University of North Carolina, Chapel Hill — 1993

Continuing Education

Pennsylvania State Mandated Law for Appraisers	2023
What NOT to Do (NCDOT Course)	2023
The Income Approach – A Scope of Work Decision	2023
Valuation of Residential Solar	2022
Residential Property Measurement and ANSI	2022
Business Practices and Ethics	2022
Uniform Standards of Professional Appraisal Practice Update	2022
Sexual Harassment Prevention Training	2021
Appraisal of Land Subject to Ground Leases	2021
Michigan Appraisal Law	2020
Uniform Standards of Professional Appraisal Practice Update	2020
Uniform Appraisal Standards for Federal Land Acquisitions (Yellow Book)	2019
The Cost Approach	2019
Income Approach Case Studies for Commercial Appraisers	2018
Introduction to Expert Witness Testimony for Appraisers	2018
Appraising Small Apartment Properties	2018
Florida Appraisal Laws and Regulations	2018
Uniform Standards of Professional Appraisal Practice Update	2018
Appraisal of REO and Foreclosure Properties	2017

Appraisal of Self Storage Facilities	2017
Land and Site Valuation	2017
NCDOT Appraisal Principles and Procedures	2017
Uniform Standards of Professional Appraisal Practice Update	2016
Forecasting Revenue	2015
Wind Turbine Effect on Value	2015
Supervisor/Trainee Class	2015
Business Practices and Ethics	2014
Subdivision Valuation	2014
Uniform Standards of Professional Appraisal Practice Update	2014
Introduction to Vineyard and Winery Valuation	2013
Appraising Rural Residential Properties	2012
Uniform Standards of Professional Appraisal Practice Update	2012
Supervisors/Trainees	2011
Rates and Ratios: Making sense of GIMs, OARs, and DCFs	2011
Advanced Internet Search Strategies	2011
Analyzing Distressed Real Estate	2011
Uniform Standards of Professional Appraisal Practice Update	2011
Business Practices and Ethics	2011
Appraisal Curriculum Overview (2 Days – General)	2009
Appraisal Review - General	2009
Uniform Standards of Professional Appraisal Practice Update	2008
Subdivision Valuation: A Comprehensive Guide	2008
Office Building Valuation: A Contemporary Perspective	2008
Valuation of Detrimental Conditions in Real Estate	2007
The Appraisal of Small Subdivisions	2007
Uniform Standards of Professional Appraisal Practice Update	2006
Evaluating Commercial Construction	2005
Conservation Easements	2005
Uniform Standards of Professional Appraisal Practice Update	2004
Condemnation Appraising	2004
Land Valuation Adjustment Procedures	2004
Supporting Capitalization Rates	2004
Uniform Standards of Professional Appraisal Practice, C	2002
Wells and Septic Systems and Wastewater Irrigation Systems	2002
Appraisals 2002	2002
Analyzing Commercial Lease Clauses	2002
Conservation Easements	2000
Preparation for Litigation	2000
Appraisal of Nonconforming Uses	2000
Advanced Applications	2000
Highest and Best Use and Market Analysis	1999
Advanced Sales Comparison and Cost Approaches	1999
Advanced Income Capitalization	1998
Valuation of Detrimental Conditions in Real Estate	1999
Report Writing and Valuation Analysis	1999
Property Tax Values and Appeals	1997
Uniform Standards of Professional Appraisal Practice, A & B	1997
Basic Income Capitalization	1996

SAR EXHIBIT C

EXHIBIT A

Property Description

Gootee, Michael A. and Gootee, Krystal B

Marion County, Kentucky

County Parcel Number 055-006

Only that portion depicted below of the following described land:

LOCATED in Marion County, Kentucky on the Lebanon-Springfield Highway approximately three (3) miles North of Lebanon, Kentucky, being more particularly described as follows:

BEGINNING at the Southeast corner of the tract and in the middle of the Lebanon-Springfield Turnpike, and thence with said Turnpike N. 23½ W. 30-1/3 poles, N. 16 W. 21-1/5 poles, N. 12½ W. 45 poles to a corner of Humphrey land, thence N. 72½ W. 29-2/3 poles to a stone on East bank of Cartwright's Creek, thence S. 47^8 W. 7^5 poles to stone on West side of said Creek, thence S. 79 W. 147 poles to stone, thence S. 10 E. 64 poles to stone, thence S. 61 W. 77½ poles to stone in Paul I. McElroy's line, thence with said line S. 29 E. 67½ poles to stone, thence N. 44 E. 81½ poles to stone, N. 78-3/4 poles to stone, thence N. 80 E. 139-3/4 poles to a stone, N. 77½ E. 15¼ poles to stone, N. 77¼ E. 15¼ poles to the place of beginning.

HOWEVER, THERE IS EXCEPTED from the foregoing that portion thereof conveyed the Commonwealth of Kentucky, Department of Highways, by deed dated January 25, 1927 of record In Deed Book 47, page 275 In the Marion County Court Clerk's office, and by deed dated October 27, 1978 of record in Deed Book 116, page 622 therein.

Being the real estate conveyed to Michael A. Gootee and Krystal B. Gootee, husband and wife, Deed Book 326, Page 114, filed in the Register of Deeds Office of Marion County, KY.

Containing 147.00 acres, more or less


55
55

Graves, George and Graves, Glenna

Description of Property

Parcel #	County	Legal Description	Acreage
13-010	Washington	See attached "Exhibit A continued" for further description of property.	165.007
TOTAL PROPERTY:			**165.007**
EXCEPTED PROPERTY:			**3**
TOTAL LEASED:			**162.007**

Washington County, Kentucky

County Parcel Number 13-010 (Partial)

A certain tract or parcel of land together with the improvements thereon, situated about 3 miles South of Springfield on a private road near Booker-St. Mary Road, and on the waters of Cartwright Creek, and more particularly described as follows: Beginning on the west bank of Cartwright's Creek corner to Baron Mattingly; thence up the creek, with Mattingly's line crossing same south 8 degrees east 44.8 poles to a twin sycamore stump corner to same; thence leaving the creek with Mattingly's line as follows: south 71½ degree east 7.2 poles to a turn in stone wall, south 69½ degrees east 6.16 poles to a post, south 28½ degrees east 20.2 poles to a walnut stump, south 5 degrees east 9.16 poles to end of rock fence corner to Moraja; thence with his line north 68 degrees east 16.8 poles south 69 degrees east 17 poles north 88½ degrees east 102 poles north 79 degrees east 34.6 poles a corner to J. K. Wall; thence with his line north 2 degrees east 38 poles corner to A. Willett; thence with his line south 88 degrees west 72 poles north 7 degrees east 60.72 poles corner to J. and H. Smith; thence with their line south 81½ degrees west 104 poles, south 8½ degrees east 6.52 poles, south 88½ degrees west 52.32 poles to the Beginning containing 93.44 acres, more or less.

Being the real estate conveyed to George Benny Graves and Glenna Jean Graves, husband and wife by Deed Book 140, Page 121, filed in the Register of Deeds Office of Washington County, KY.

ALSO, A CERTAIN TRACT OR PARCEL OF LAND situated about 2 ½ miles South from Springfield on the Springfield and St. Mary's Road, and described as follows: BEING TRACT #4 - BEGINNING at a stone, corner to J. K. Wall and Tract No. 3 and running thence S 89 ½ W 19.2 poles to a fence post, corner to J. R. Smith in Carrico's line: thence with fence S 5 W 46 poles to fence post, and S 7 W 36.4 poles to fence post, corner to Cambron, thence with fence N 89 E 74.76 poles to an ash tree in Wall's line, and thence with said Wall's line N 1/2 W 32.2 poles to a stone, thence N 8 W 4 poles to a stone, thence N 53 W 36 poles to a stone, and N 35 W 30 poles to the beginning, containing 27 3/4 acres.

ALSO, TWO TRACTS OF LAND situated on the Springfield and St. Mary's Turnpike about 3½ miles Southwest of Springfield, Kentucky, and described as follows:

TRACT NO. 1 - BEGINNING at a fence post in Carrico's line corner (1) to Willett thence with Carrico's line S 89½ W 68.3 poles to a stone corner (2) to Carrico's land, thence N 85 W 43.7 poles to a stone in O'Bryan's heirs line corner (3) to J. Rich Smith's 11 acres tract bought of Cambron, thence with line of 11 acre tract S 9

E 41.3 poles to corner (4) to Cambron on line of said 11 acre tract, thence N 81 E 106 poles to a stake in line of Willett corner (5) to Cambron, thence N 5 E 19.2 poles to the beginning, containing twenty two and one half acres (22½).

TRACT NO. 3 - A CERTAIN TRACT OF LAND situated in Washington County, Kentucky, on the waters of Cartwright Creek and bounded as follows: BEGINNING at (1) a stone on South bank of said creek corner to J. Rich Smith, thence up the side of said creek S 14 E 34.6 poles to a point in center of said creek corner (2) to J. Rich Smith and Mattingly, thence up the center of said creek S 5 E 4 poles to a point in said creek corner (3) to Mattingly and Cambron, thence N 89 E 50 poles to a stone corner (4) to Cambron; thence N 9 W 10.7 poles to corner (5) Cambron and Joseph Herman Smith's 22½ acre tract, same course continued 41.3 poles, making whole line 52 poles to corner (5) to J. Rich Smith in O'Bryan's line, thence N 85 W 13.8 poles to a fence post corner (6) to O'Bryan and J. E. Smith, thence S 74 W 42 poles to the beginning, containing eleven acres by survey made by F. R. Neale Nov 25, 1919.

Being the real estate conveyed to George Benny Graves and Glenna Jean Graves by Deed Book 239, Page 688, filed in the Register of Deeds Office of Washington County, KY.

ALSO, A certain tract of land located near Springfield in Washington County, Kentucky, and being more particularly described as follows: Being Tract #3 as described in the plat of Booker Heights Subdivision of record Plat Cabinet A, Slide 292 in the Office of The Washington County Clerk, said Tract #3 containing 39.67 acres.

Being the real estate conveyed to George Graves and Glenna Graves, his wife by Deed Book 286, Page 318, filed in the Register of Deeds Office of Washington County, KY.

THE FOLLOWING DESCRIBED TRACT OF LAND IS A PART OF COUNTY PARCEL NUMBER 13-010 BUT IS HEREIN EXCEPTED: A certain tract of land located in Springfield in Washington County, Kentucky, and being more particularly described as follows: Being Lot #15, Phase I, Block "C" of the Booker Hills Subdivision, containing 2.003 acres, as recorded in Plat Cabinet A, Slide 220, in the Washington County Court Clerk's Office.

Being the real estate conveyed to George B. Graves and Glenna J. Graves, his wife by Deed Book 302, Page 163, filed in the Register of Deeds Office of Washington County, KY.

LESS AND EXCEPT the following tract of land:

Located at the end of Columbus Lane-Agricultural Road From DB 286 PG 318 and as Shown in PC-A, Slot 292 Washington County, Kentucky, All reference to rebar (found) are ½ "X18" rebar capped PLS #3066
Tract #3-3 - Remaining Ag Tract
Beginning at rebar (found) and Southeast corner to Nance Addition Tract #3-1 (DB 282 PG 220) and northeast corner to George Graves 09.08 ACRE Addition Tract #3-3. Thence leaving Graves and with Nance to rebar (found), N 11 18' 0l" E 162.00 feet; N 14 05' 06" E 96.35 feet; N l7 42' 04" E 105.45 feet; N 23 52' 12" E 99.97 feet; N 02 33' 10" E 33.50 feet; N 34 20' 43" W 31.55 feet; N 54 41' 34" W 37.12 feet to rebar (found) at Columbus Lane-Ag Road tum-a-round. Thence with curve to the left having Delta Angle of 100 33' 38"; radius of 50 feet; cord bearing N 55 l7' 07" W 76.92 feet and an arc distance of 87.70 feet to rebar (found). Thence continuing with Ag road, N 05 16' 11" W 49.92 feet to corner of Nance Tract #2 (PC-A, Slot 246). Thence leaving Nance and crossing Columbus Ag Road, N 84 54' 11" E 50.06 feet to rebar (found) and corner to WESCO Properties Tract #1 (PC-A, Slot 246). Thence leaving Ag Road and with WESCO, S 76 31' 42" E

877.57 feet crossing Servant Run Creek to rebar (found) in fence line of Dalmon Pinkston (DB 100 PG 539). Thence leaving WESCO and with Pinkston as fenced on the east side of creek, S 09 35' 54" E 531.63 feet to rebar (found) at post; S 71 20' 02" E 349.07 feet to rebar (found) at crooked Cherry and corner to Campbell (DB 171 PG 055). Thence leaving Pinkston and with Campbell as fenced S 42 56' 10" W 77.81 feet crossing Servant Run to rebar (found) at post; S 37 50' 12" W 653.66 feet to stone (found) and corner to Wesley Smith (DB 313 PG 608). Thence leaving Campbell and with Smith as fenced, N 83 l7' 04" W 1022.70 feet to rebar (found) and corner to 09.08 Acre Graves Addition Tract #3-2. Thence leaving Smith and with Tract #3-2, N 11 16' 47" E 684.20 feet to the beginning. Containing 30.59 ACRES. The above described Tracts #3-2 and #3-3 are by survey of Reed Spaulding PLS #3066 as performed 3/10/10 and as shown on plat by same dated 3/11/10.

The above described Tract #3-3 is subject to r/w easement in favor of George and Glenna Graves Farm. Said easement is 50 feet in width at all points and east of and parallel to the east side lines of Tract #301 and Tract #3-2 as it leads from the end of Columbus Ag Road to the intersection of Wesley and Abigail Smith Farm (DB 313 PG608).

LESS, EXCEPT AND EXCLUDING that portion depicted herein by Landlord containing 1 acre, more or less. No legal description exists at present date for said Landlord 1 acre exclusion; however, said Landlord exclusion will be surveyed at a later date per the rights granted within this agreement.

Containing 162.077 acres, more or less after said Landlord exclusion.

Exhibit A-1
Do Not Disturb Area

Hagan, Jonathan

Washington County, Kentucky

County Parcel Number 13-008

A CERTAIN TRACT OR PARCEL OF LAND located .4 miles south of Jackson Branch Road on Joe Blandford Farm Road in Springfield, Washington County, Kentucky, and being more particularly described as follows:

BEGINNING at a point on the centerline of M. Blandford Road and north side of concrete cattle guard at midpoint, in the fenced line of Warren. Thence leaving the centerline and with the fenced line of Warren, N 87-17-54E 36.94 feet to a post; S 85-45-00 E 437.12 feet to a post; S 87-10-49 E 402.70 feet to a corner post; S 14-09-23 E 498.40 feet to a post and new corner to the remaining land of Joe M. Blandford. Thence leaving Warren and with a new line, N 87-49-23 W 1039.55 feet to set corner spike on the centerline of Blandford farm road. Thence with said farm road centerline, N 03-07-53 E 446.28 feet to a spike, and N 19-47-34 E 51.68 feet to the beginning. Containing 10.7598 acres by survey of Reed Spaulding, III, LS, dated 9/16/1993.

Being the real estate conveyed to Jonathan Michael Hagan by Deed Book 352, Page 111, filed in the Register of Deeds Office of Washington County, KY.

County Parcel Number 13-009

A tract of land lying in Washington County, KY 5.2 miles southwest of Springfield on the waters of Cartwright's Creek and once known as the Lucas Moore farm heretofore being composed of two tracts hereby combined into one tract in the following description:

BEGINNING at a fence, corner to Charlie Spalding and Herman Warren; thence along Warren's line, South 14 degrees east 497.5 feet to a fence corner; thence along Warren's line and Cecil Moraja, south 69 ½ degrees east 689 feet to a fence corner; thence along Moraja's line and the line of Jude Kidwell, south 7 degrees west 1439 feet to a corner to Kidwell; thence along Kidwell south 28 degrees west 464 feet to a corner to Tom Mackin; thence along said Mackin and Joe Spalding, north 84 degrees west 2540 feet to a walnut, corner to Joe Spalding; thence along Joe Spalding's line, north 18 degrees east 109 feet; north 7 degrees west 124 feet; north 25 degrees west 64 feet and north 4 degrees east 2028 feet along Joe Spalding and the line of Mrs. Emmett Spalding to a fence, corner to Charlie Spalding; thence south 89 degrees east 2030 feet along Charlie Spalding's line, to the beginning, and containing 145.5 acres, more or less.

LESS AND EXCEPTED FROM THE ABOVE BOUNDARY and not conveyed hereby is a certain lot previously conveyed to Joseph Jude Hagan and Debbie Hagan, his wife, by deed dated December 30, 1993, by Joseph M. Blanford and Linda Blanford, his wife, of record in the Clerk's Office of the Washington County Court in Deed Book 230, Page 170, and more particularly described as follows:

A CERTAIN TRACT OR PARCEL OF LAND located .4 miles south of Jackson Branch Road on Joe Blandford Farm Road in Springfield, Washington County, Kentucky, and being more particularly described as follows:

BEGINNING at a point on the centerline of M. Blandford Road and north side of concrete cattle guard at midpoint, in the fenced line of Warren. Thence leaving the centerline and with the fenced line of Warren, N 87-17-54 E 36.94 feet to a post; S 85-45-00 E 437.12 feet to a post; S 87-10-49 E 402.70 feet to a corner post; S 14-09-23 E 498.40 feet to a post and new corner to the remaining land of Joe M. Blandford. Thence leaving Warren and with a new line, N 87-49-23 W 1039.55 feet to a set corner spike on the centerline of Blandford farm road. Thence with said farm road centerline, N 03-07-53 E 446.28 feet to a spike, and N 19-47-34 E 51.68 feet to the beginning. Containing 10.7598 acres by survey of Reed Spaulding III, LS, dated 9/16/1993.

ALSO LESS AND EXCEPTED FROM THE ABOVE BOUNDARY and not conveyed hereby is a certain lot previously conveyed to Austin G. Spalding and Karen M. Spalding, his wife, by deed dated January 22, 2002, by Joseph M. Blanford and Linda A. Blanford, his wife, of record in the Clerk's Office of the Washington County Court in Deed Book 275, Page 327, and more particularly described as follows:

A LARGE AGRICULTURE TRACT located at the end of Jackson Branch Road, 5.2 miles southwest of Springfield, Washington County, Kentucky, and more particularly described as follows:

FROM the end of Jackson Branch Road at a concrete cattle guard in the fenced line between Blanford and Jon P. Warren & Jeanine Warren, D.B. 127, P. 163, proceed due west along the fenced line approximately 1150 ft., to the fenced line of Joseph Larry Spalding, D.B. 183, P. 282; Thence, with the fenced line of Spalding, S 04°W approximately 493 ft. to an iron pin, set this survey at the intersection of an old tract fence of Blanford, for a Point of beginning, Thence, leaving the line of Joseph Larry Spalding, with new lines across Blanford, each call to an iron pin, set this survey, N 87°07'33"E.; along the old tract fence, 307.27 ft.; S 64°40'53" E 363.76 ft.; S 64°24'49"E 305.30 ft.; S 11°04'57"W 228.62 ft.; S 06°00'29"W 312.64 ft. to a point below a pond; S 86°47'00"E 439.09 ft.; S 87°53'48"E 436.59 ft., crossing a broad ridge; N 00°34'38"W 213.31 ft.; N 64°10'42"E 493.45 ft.; N 59°50'45"E 528.21 ft. to a point in the line of J.C. Moraja, D.B. 224, P. 275 ft. at the base of an 18-inch hickory; Thence, with the fenced line of Moraja, S 74°32'06"E 265.69 ft. to an iron pin (set) at a corner fence post in a hollow drain leading to Cartwright Creek; Continuing with the fenced line up the hollow drain, S 07°45'34"W 1,050.24 ft. to an iron pin (set) at a corner with David Jerome Mattingly, D.B. 215, P. 057; Thence, leaving Moraja, with the fenced line of Mattingly, S 08°25'22"W 391.10 ft. to an iron pin (set); S 29°48'12" W 464.19 ft. to an iron pin (set) at the intersection of two fence lines; N 86°17'39" W 24.87 ft. to an iron pin (set) against an old fence post at a corner with Mackin Farms, Inc., D.B. 216, P. 720; Thence leaving Mattingly, with the fenced lines of Mackin, N 84°37'43"W 989.14 ft., to an iron pin (set) at a cross fence of Mackin; N 85°07'01"W 1,000.73 ft. to an iron pin (set) at a corner with Joseph Earl Spalding and Mary Generose Spalding, D.B. III, P. 360; Thence, leaving Mackin with the fenced lines of Spalding N 83°36'38"W 530.51 ft. to an iron pin (set) at the base of a 24-inch walnut near Jackson Branch of Cartwright Creek and near the Washington County-Marion County line; Thence, continuing with the fenced lines of Spalding, down Jackson Branch, N 17°53"12'E 109.14 ft. to an iron pin (set) in the Branch; N 09°36'24"W 124.29 ft. to an iron pin (set) on the bank of the Branch; N 21°04'57"W 62.97 ft. to an iron pin (set); N 04°05'42"E (passing

the corner of Joseph Earl Spalding and Mary Generose Spalding with Joseph Larry Spalding, D.B. 183, P. 282 at 1521.85 ft.) for a total distance of 1,535.83 ft. to the beginning, containing 98.338 acres per survey performed December 28, 29, 2001, by L.S. Hardin, Licensed Professional Land Surveyor No. 527.

Being the real estate conveyed to Jonathan Michael Hagan by Deed Book 352, Page 106, filed in the Register of Deeds Office of Washington County, KY.

LESS AND EXCEPT that portion depicted herein by Landlord which is excluded from this agreement. No legal description exists at present date for said Landlord exclusion; however, said Landlord exclusion will be surveyed at a later date per the rights granted within this agreement.

Containing 24.5 acres, more or less

Description of Property

Parcel #	**County**	**Legal Description**	**Acreage**
13-009 and 13-008	Washington	See attached "Exhibit A continued" for further description of property.	46.99
TOTAL PROPERTY:			**46.99**
EXCEPTED PROPERTY:			**22.49**
TOTAL LEASED:			**24.5**

Exhibit A-1
Do Not Disturb Area

Johnson, Matthew

Parcel 1:

Tax ID No: 12-115

A TRACT OF LAND situated in Washington County, Kentucky, on the South or West side of Cartwright's Creek and bounded and described as follows: BEGINNING at a sycamore tree on a branch on the west side of Cartwright's Creek, corner to John E. Smith; thence N 1 1/2 W 32.3 poles to a sugar tree corner to same, thence N 24 W 6. 6 poles to a stone corner to same, thence N 72 E 11 poles to a corner to same in H. Smith line, thence N 40 1/4 W 36 poles to a Burr Oak corner to J. E. Smith, thence N 71 W 34.4 poles to a sycamore on the North side of creek, thence N 86 1/2 W 27 poles to a large sycamore on North bank of Creek, thence N 63 1/2 W 31.4 poles to an oak stump on the South Bank of Cartwright's Creek at the turnpike Road and corner to J. E. Smith, thence with the center of the road S 53 W 13 poles to corner to the land sold by J. Rich Smith to Al Smith, thence leaving the road and with Al Smith line S 54 E 19.3 poles, S 56 1/2 E 16 poles, S 31 E 24 poles to corner to same, thence with same S 65 W 62 poles to corner to same and J. S. Osburne, thence with line of same S 2 W 81.2 poles to corner to same in Barton Mattingly line, thence with line of said Mattingly N 86 1/2 E 140 poles to an oak stump on branch, corner to J. E. Smith; thence with his line N 53 E 27.6 poles to the Beginning, Containing 85 Acres, more or less.

EXCEPTING

Tract One (5.59) acres of the Minor Plat for Matt Johnson, as shown on plat of same of record in Plat Cabinet C, Slide 291, in the Office of the Washington County Court Clerk.

Parcel contains 79.41 acres, more or less

Parcel 2:

Tax ID No: 13-006
A certain tract of land in Washington County, Kentucky, on Cartwrights Creek and bounded and described as follows: Beginning at (1) a corner post at the N. W. corner of the tract, a corner to J. Rich Smith and Osbourn; thence with Osbourn's line S 3 W 86.8 poles to (2) a 24 inch black oak corner to Osbourn in Moraja's line; thence N 70 E 227 poles to (3) a stone in Cambron's line; thence with Cambron's line N 27 ¾ W 20 poles to (4) a stone; thence N 76 W 38 poles to (5) the center of Cartwrights Creek; thence down the Creek in the middle thereof N 4 W 43 ½ poles to (6) a mark in the bed of the Creek corner to Cambron and Smith; thence with Smith's line N 5 W 4 poles to (7) a chisel mark in the middle of the Creek bed; thence N 78 W 10 ½ poles to (8) a sycamore, corner to Smith; thence S 54 W 28 ½ poles to (9) an ash stump; thence S 69 ¼ W 135.4 poles to the Beginning, Containing 95.77 acres.

EXCEPTING

From the junction of Booker CR and Jackson Branch CR, proceed southwardly with Jackson Branch Lane CR 0.50 miles to rebar (set) on the west side of Jackson Branch Lane CR (15 feet from centerline) and 15 feet south of existing farm gravel road centerline, as witnessed by top of water hydrant at N58-22-45W 387.34 feet and P.O.B. (All reference to rebar (set) are ½" X 18" rebar (set), I.D. capped Spaulding PLS #3066). Thence with west CR R.O.W., S68-31-39E 39.333 feet to rebar (set); S49-10-22E 99.96 feet to rebar (set); S 04-11-57E 100.58 feet to rebar (set); S07-15-12W 100.39 feet; S02-04-42W 131.94 feet to rebar (set) and corner to remaining Smith Farm. Thence with new lines to remaining Smith, S89-07-22W 197.01 feet to corner rebar (set); N12-12-24W 295.35 feet to corner rebar (set) 15 feet from centerline of farm road and south side of 30 feet in width R.O.W. easement. Thence with south side of R.O.W. easement, N55-35-28E 100.53 feet, and N47-07-22E 101.46 feet to the P.O.B. Containing 2.006 acres.

EXCEPTING

A SMALL TRACT OR PARCEL OF LAND, lying and being on the waters of Cartwrights Creek and bounded and described as follows: BEGINNING at a stone comer to Tract No. 1; thence S 50 yards, more or less; thence East across Creek to the land of Herman Warren; thence North to the lands of the Richard Cambron heirs; thence back to the Beginning, Containing One (1) Acre, more or less and being sold by the boundary irrespective of the number of acres contained therein.

Parcel contains 93.76 acres, more or less

Being the same properties conveyed to Matthew Lyle Johnson by Deed Book 378, Page 579.

The Premises contains 173.17 acres, more or less

Kevin Dale Mattingly and Amanda Catherine Mattingly, his wife

Parcel 1:

Tax ID No: 13-013.01

TRACT 8 of the Mackin Farms, Inc. Farm Division as per plat of record at Plat Cabinet A, Slide 552, in the office of the Washington County Court Clerk and dually recorded at Plat Cabinet 3, Slide 433 in the office of the Marion County Court Clerk.

Parcel contains 92.72 acres, more or less

Being the same property conveyed to Kevin Dale Mattingly and Amanda Catherine Mattingly, his wife by Deed Book 326, Page 465 of the Washington County, Kentucky Clerk's Office.

The Premises contains 92.72 acres, more or less

Mackin Farm IV, LLC

Washington County, Kentucky

County Parcel Number 13-013

Tract 7 of the Mackin Farms, Inc. Farm Division as per plat of record at Plat Cabinet A, Slide 552, in the office of the Washington County Court Clerk and dually recorded at Plat Cabinet 3, Slide 433 in the office of the Marion County Court Clerk.

Also conveyed herein is a one-third (1/3) undivided interest in the roadway parcel from Point "A" to Point "E" as shown on plat and an one-half (1/2) undivided interest in the roadway parcel from Point "E" to Point "F".

Being the real estate conveyed to Mackin IV, LLC, by Deed Book 305, Page 636, filed in the Register of Deeds Office of Marion County, KY.

Containing 39.207 acres, more or less

Mattingly, David and Mattingly, Alice

Marion County, Kentucky

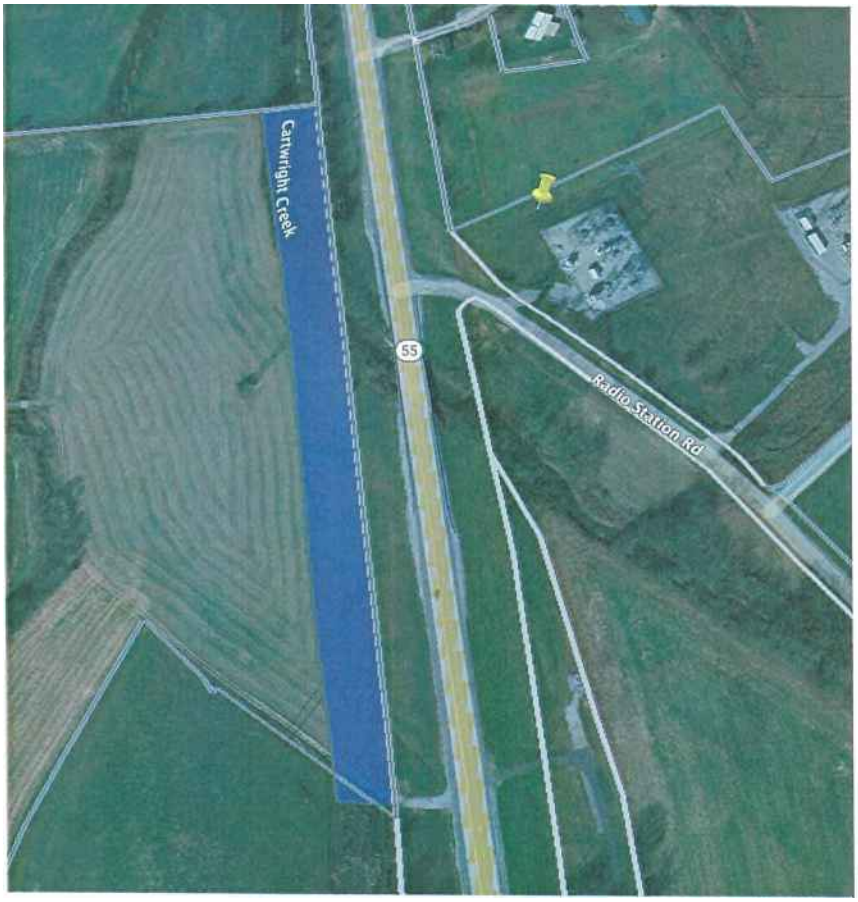
County Parcel Number 055-052

Being all of Tract 2 shown on the plat of record in Deed Book 140, at page 516 in the Office of the Marion County Court Clerk.

Being the same property conveyed to David Jerome Mattingly by Deed dated April 30st 1991 in Deed Book 158, at page 455.

Easement Area

The approximately 2.8 acres highlighted in blue below to be surveyed at a later date:



Washington County, Kentucky

County Parcel Number 19-024

A certain tract of land located on the west side of Ky. Hwy. 55 about 4.5 miles south of U.S. Hwy. 150 at Springfield, near the Marion County line in Washington County, Kentucky, and more particularly described as follows:

BEGINNING at a R/W post, corner to Tract 2 in the west R/W line of Ky. Hwy. 55, said post being on the south side of a drain; thence with the R/W of Ky. 55 as fenced through the following calls; S 36-49-41 W. 49.45 ft. to a R/W post; thence S. 18-20-22 W. 587.55 ft. to a R/W post; thence S. 06-45-16 W. 9.86 ft. to a R/W post in the west line of Ky. 55, corner to Mackin; thence leaving the road with Mackin along the north side of a dirt road S. 81-49-24 W. 913.39 ft. to a gate post, corner to Mackin; thence with Mackin as fenced through the following calls; N. 50-47-08 W. 70.33 ft. to a steel post; thence N. 30-56-56 W. 71.89 ft. to a post; thence N. 62-09-03 W. 474.22 ft. to a post; thence N. 62-03-19 W. 332.25 ft. to a post; thence N. 63-02-58 W. 13.27 ft. to a post; thence N. 77-54-30 W. 425.87 ft. to a post; thence N. 77-28-56 W. 532.26 ft. to a 10 inch maple; thence N. 77-35-54 W. 375.39 ft. to a post corner to Mackin; thence with Mackin along a fence N. 04-47-53 E. 435.09 ft. to a post, corner to Mackin and Blandford; thence with Blandford as fenced through the following calls; N. 85-37-19 E. 12.22 ft. to a 4 inch maple; thence N. 54-12-56 E. 24.63 ft. to a 3 inch maple; thence N. 26-53-10 E. 445.19 ft. to a 20 inch walnut; thence N. 05-18-17 E. 394.75 ft. to an iron pin (set) in the fence, in the east line of Blandford, corner to Moraja; thence with Moraja along a fence N. 89-12-27 E. 521.78 ft. to a post; thence N. 89-26-53 E. 228.50 ft. to an iron pin (set), in the south line of Moraja, corner to Tract 2; thence with Tract 2; S. 13-17-43 W. 921.07 ft. to an iron pin, corner to Tract 2; thence with Tract 2 S. 75-11-08 E. 1200.00 ft., crossing Cartwright Creek at about 1120 ft., to a square iron pipe in a fence, corner to Tract 2; thence with Tract 2 along a fence N. 18-33-50 E. 217.08 ft. to a square iron pipe on the south side of a drain, corner to Tract 2; thence with Tract 2 along the south side of said drain S. 53-09-00 E. 196.65 ft. to an iron pin (set); thence S. 80-23-01 E. 1021.50 ft. to the point of beginning, containing 59.28 acres by survey of Stephen W. Hibbs, PLS 2981, dated 28 February 1991.

Being the same property conveyed to David Jerome Mattingly by Deed dated March 6, 1991, in Deed Book 215, at page 57.

County Parcel Number 19-013.02

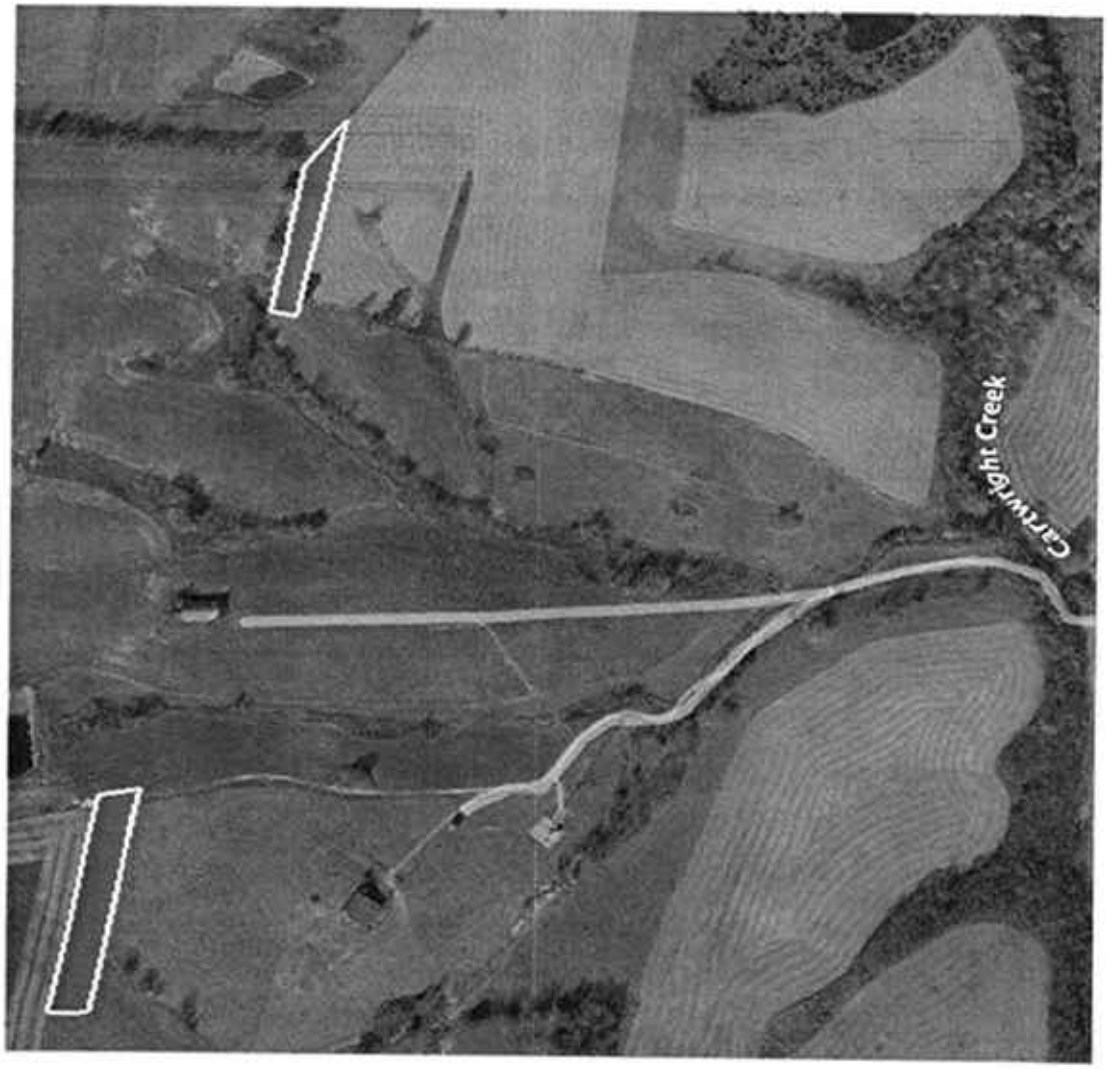
Tract 6 of the Mackin Farms, Inc. Division as per plat of record in Plat Cabinet A, Slide 552, in the office of the Washington County Court Clerk and dually recorded at Plat Cabinet 3, Slide 433 in the office of the Marion County Court Clerk.

Being the same property conveyed to David Jerome Mattingly and Alice M. Mattingly, husband and wife, by Deed dated July 13, 2006, in Deed Book 305, at page 322.

Exhibit A-1

Easement Area

The area outlined below to be surveyed at a later date



Morris, Gregory Thomas and Morris, Ann Michelle

Marion County, Kentucky

County Parcel Number 054-006

Parcel 1:

Tract 9 of the Mackin Farms, Inc. Farm Division as per plat of record at Plat Cabinet A, Slide 552, in the office of the Washington County Court Clerk and dually recorded at Plat Cabinet 3, Slide 433 In the office of the Marion County Court Clerk.

Together with an one-third (1/3) undivided interest in the roadway parcel from Point "A" to Point "E" and an one-half (1/2) undivided interest In the roadway parcel from Point "E" to Point "F" as shown on plat of record at Plat Cabinet A, Slide 552, in the office of the Washington County Court Clerk and dually recorded at Plat Cabinet 3, Slide 433 In the office of the Marion County Court Clerk.

Containing in all 94.99 acres, more or less, according to the Marion County Property Valuation Administration records.

County Parcel Identification Number 054-009

County Parcel Number 054-009

Parcel 2:

Certain Tracts of Land on the waters of Cartwright's Creek in Marion County, Kentucky, and described thus:

PARCEL A: BEGINNING at a stone and mulberry corner to C. S. Hill in Ben Wheatley's line, thence N. 31 poles to a stake, corner to Mrs. Stachie Shircliff, thence with her line N. 8-3/4 W. 95-1/5 poles, thence S. 1-1/2 W. 42 poles, thence N. 80 W. 24 poles; thence N. 62-1/2 W. 9-3/5 poles thence N. 68-1/2 W. 14-3/4 poles thence N. 77 W. 8 poles, thence N. 87-1/2 W. 16-1/2 poles thence S. 86 W. 12-1/2 poles thence S. 20 W. 11-2/5 poles thence S. 85 W. 17-2/5 poles thence S. 85 W. 17-2/5 poles to white oak, corner to Hamilton place in said Shircliff's line thence S. 21 W. 123-1/4 poles to stone in old road, thence N. 83-1/4 E. 157-2/5 poles to the beginning, containing 135-1/2 acres.

PARCEL B: ALSO another tract in said County and State, four miles north of Lebanon, KY, on the waters of Cartwright Creek bounded as follows: BEGINNING at a stake, corner to C.S. Hill (now Wallace Parrott) thence S. 88 W. 67 poles and 10 links to stone near a fence, corner to Hill and Murphy thence with Murphy's line N. 10 W. 93 poles to stone, thence N. 88 W. 54 poles and 10 links to stone in a lane, thence south with center of lane 87 poles and 13 links to the beginning, containing 35 acres.

PARCEL C: ALSO ANOTHER TRACT of land situated in the same County and State and bounded as follows: BEGINNING at stone in the Lebanon-St. Rose Turnpike road and running North to white oak tree at north line of T. J. Carrico and containing 1 acre, more or less, and being a strip 13-1/2 feet wide and being on the side of T. J. Carrico and between his land and the Cordelia Hill land.

THERE IS EXPRESSLY NOT CONVEYED BUT EXCEPTED AND CARVED OUT a certain tract sold and conveyed C. W. Parrott on Nov. 8, 1916 of record in Deed Book 38 at Page 56 in the office of the Clerk of the Marion County Court to which reference is made said tract being carved out of the 135-1/2 acre tract and described thus: BEGINNING at a stone in the line of C. W. Parrott at a branch thence S 86-1/2 W. 11 poles to stone, Young's corner, thence N. 19-1/4 W. 113 poles to stone, Young's corner in Will Osborn's line thence N. 86-1/2 E. 14-2/5 poles to stone in Osborn's line at hickory; thence S. 17-3/4 8B. 111-4/5 poles to the beginning, containing 8-9/10 acre.

Containing in all 165.48 acres, more or less, according to the Marion County Property Valuation Administration records.

EXCEPTING from all of the above-described lands, 64.5 acres, more or less, in which the Landlord has predetermined. No legal description of said Landlord exception exists of record exists at the time; however, per Section 2, (G), (v) of the original Agreement, a survey will be obtained by the Lessee during the Option Period to depict said Landlord exception and actual lease acreage.

Containing after said Landlord exception, 195.97 acres, more or less

Exhibit A
Property

Description of Property

Parcel #	County	Legal Description	Acreage
054-006 and 054-009	Marion	See attached "Exhibit A continued" for further description of property.	260.47
TOTAL PROPERTY:			**260.47**
EXCEPTED PROPERTY:			**64.5**
TOTAL LEASED:			**195.97**

Exhibit A-1
Do Not Disturb Area

Nally, Mark Raymond and Nally, Francis Leo

Marion County, Kentucky

County Parcel Number 054-010

A certain tract of land on the waters of Cartwright's Creek in Marion County, Kentucky, bounded and described as follows: BEGINNING at a point, thence N 11 E 50 poles, thence N 8 W 98 poles to a stake, thence N 15 E 45 poles to a stake, thence East 51 poles to a stake, thence N 1-1/2 W 42-1/2 poles to a stake, thence E 31-1/2 poles to a stake, thence S 6 E 205 poles to a stake, thence S 75-1/2 W 105 poles to the point of beginning, containing 110 acres, more or less.

EXCEPTING from all of the above-described lands, 5 acres, more or less, in which the Landlord has predetermined. No legal description of said Landlord exception exists of record exists at the time; however, per Section 2, (G), (v) of the original Agreement, a survey will be obtained by the Lessee during the Option Period to depict said Landlord exception and actual lease acreage.

Containing after said Landlord exception, 105 acres, more or less

Being the real estate conveyed to Mark Raymond Nally, by Deed Book 350, Page 350, filed in the Register of Deeds Office of Marion County, KY.

Exhibit A-1
Do Not Disturb Area

O'Daniel, Robert B, O'Daniel, Patricia, Mark G. and O'Daniel, Bernadette B

Tax ID No: 055-041 (part)

The approximately **17.97-acre** portion of the following described real property as generally depicted below:

Tract I:

That certain tract of land lying in Marion County, Kentucky about two miles North of Lebanon and bounded and described as follows:

BEGINNING at the most western corner of farm, in center of St. Rose Pike: and thence running N. 46-1/2 degrees E 90-2/3 poles to a post: thence N. 15-1/2 degrees E. 69.4 poles to a post, thence S 87-1/2 degrees E. 159.46 poles to a stake, thence S. 9-3/4 degrees E. 44.15 poles to a mulberry tree in the old line, a corner to the tract sold to W. E. Dorsey, thence a new line, S. 77 degrees W. 116.2 poles to a corner post: thence S. 8 degrees E. 17.24 poles to a slake; thence S. 52 degrees W. 21.68 poles to a post: thence S. 45 degrees W. 5 poles to a locust stump; thence S. 62 degrees W. 29.72 poles to a post at a chicken house, corner to the 50-acre tract; thence with line of the 50-acre tract. S. 42-1/2 degrees W. 78.6 poles to the center of said pike; thence with the center of pike N. 34 degrees W. 62-4/5 poles to the beginning.

LESS AND EXCEPT the following described parcel of land lying in Marion County, Kentucky and fronting on KY Highway 429 as follows: BEGINNING at a corner of Rodger Parrott at the right-of-way of KY 429 (St. Rose Pike) and thence along Parrott's line, this being an existing fence. North 47-1/2 degrees East 424 feet to a fence corner; thence severing the land of William L. Hamilton and Joseph E. Hamilton North 32-1/4 degrees West 477 feet along a partial fence to an iron stake; thence South 60-1/2 degrees West 438.5 feet (this line is 3 feet north of an existing barn) to an iron stake at the right-of-way of the St. Rose Pike; thence along said right-of-way South 33-1/2 degrees East 475 feet and South 39.00 degrees East 100 feet to the beginning.

THERE IS ALSO RESERVED a 15-foot road easement along the line of Rodger Parrott for purposes of egress and ingress.

Tract II:

A parcel of land lying in Marion County, Kentucky and fronting on KY Highway 429 as follows: BEGINNING at a corner of Rodger Parrott at the right-of-way of KY 429 (St. Rose Pike) and thence along Parrott's line, this being an existing fence. North 47-1/2 degrees East 424 feet to a fence corner; thence severing the land of William L. Hamilton and Joseph E. Hamilton North 32-1/4 degrees West 477 feet along a partial fence to an iron stake; thence South 60-1/2 degrees West 438.5 feet (this line is 3 feet north of an existing barn) to an iron stake at the right-of-way of the St. Rose Pike; thence along said right-of-way South 33-1/2 degrees East 475 feet and South 39.00 degrees East 100 feet to the beginning.

THERE IS EXCEPTED that portion of the above-described real property conveyed to Glen E. Anderson and Colleen Anderson, his wife, by Deed dated August 18, 1976, and recorded in Deed Book 107, Page 408, in the Marion County Clerk's office, and described as follows: A certain house and lot situated on the east side of KY Highway 429 (St. Rose Road) and thus bounded and described: BEGINNING at fence post on east right of way of KY 429 (St. Rose Road); then along fence line N. 60 degrees 30' E. 438.5 feet to fence post for corner; thence S. 33 degrees 30' E. 200 feet along fence line to stake in fence line; thence S. 60 degrees 30' W. 438.5 feet to stake in fence line and on east right of way of St. Rose Road; then along said right of way N. 33 degrees 30' W. 200 feet to the point of beginning.

THERE IS FURTHER EXCEPTED that portion of the above-described Parcel conveyed to the Commonwealth of Kentucky for the use and benefit of the Transportation Cabinet, department of Highways, by Deed dated March 7, 2014, and recorded in Deed Book 301, Page 401, in the Marion County Clerk's office, and described as follows:

Parcel 8 Tract A

Being a track of land in Marion County along KY 429 at the Toad Mattingly intersection and more particularly described as follows:

Beginning at a point 20.00 feet left of KY 429 Centerline at Station 37+40.00 thence S 41°50'37" E a distance of 111.39 feet to a point 33.15 feet left of KY 429 Centerline at Station 38+50.00 thence S 37°00'00" E a distance of 290.35 feet to a point 53.30 feet left of KY 429 Centerline at Station 41+38.39 thence S 61°30'03" W a distance of 33.38 feet to a point 20.00 feet left of KY 429 Centerline at Station 41+36.06 thence N 32°29'55" W a distance of 128.30 feet to a point 20.00 feet left of KY429 Centerline at Station 40+07.76 thence along an arc 268.88 feet to the left, having a radius of 4770.00 feet, the chord of which is N 34°06'491" W for a distance of 268.85 feet and the POINT OF BEGINNING.

Parcel 8 Tract B

Being a track of land in Marion County along KY 429 at the Toad Mattingly intersection and more particularly described as follows:

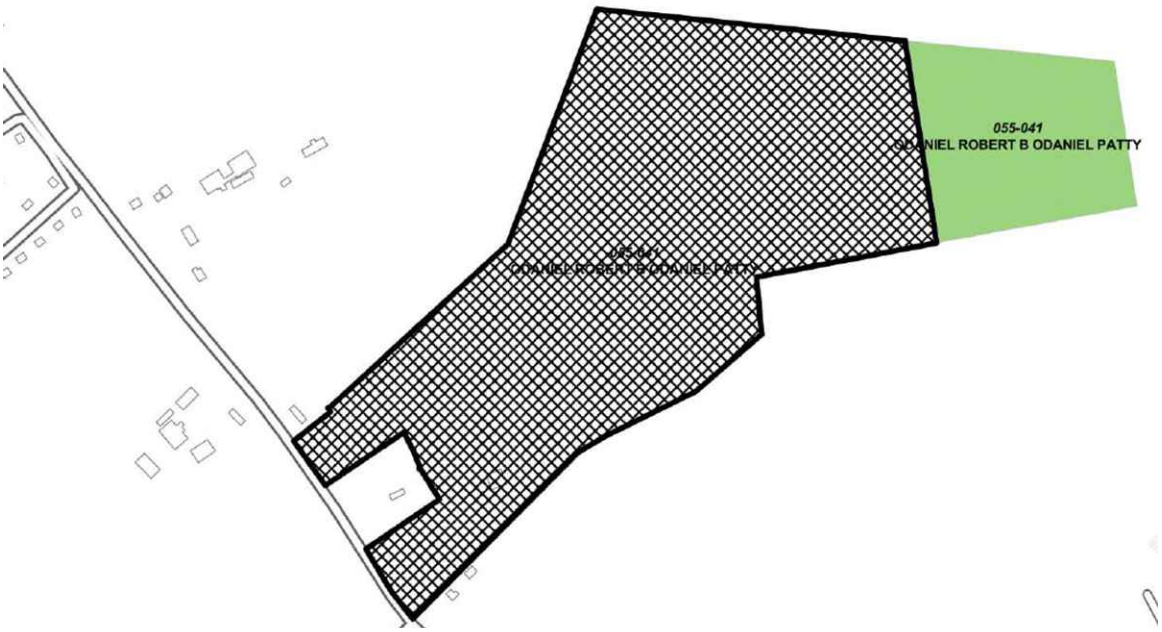
Beginning at a point 20.00 feet left of KY 429 Centerline at Station 43+36.05 thence N 61°29'55" E a distance of 35.09 feet to a point 55.00 feet left of KY 429 Centerline at Station 43+38.50 thence S 32°29'55" E a distance of 61.50 feet to a point 55.00 feet left of KY 429 Centerline at Station 44+00.00 thence S 32°33'05" E a distance of 254.69 feet to a point 45.00 feet left of KY 429 Centerline at Station 46+60.00 thence S 33°40'42" E a distance of 81.60 feet to a point 35.82 feet left of KY 429 Centerline at Station 47+43.00 thence S 43°39'33" W a distance of 15.87 feet to a point 20.00 feet left of KY 429 Centerline at Station 47+44.36 thence along an arc 273.04 feet to the right, having a radius of 1730.00 feet, the chord of which is N 37°01'12" W for a distance of 272.75 feet, to a point 20.00 feet left of KY 429 Centerline at Station 44+68.16 thence N 32°29'55" W a distance of 132.11 feet to a point 20.00 feet left of KY 429 Centerline at Station 43+36.05 and the POINT OF BEGINNING.

Parcel 8 Tract C

Being a tract of land in Marion County along KY 429 at the Toad Mattingly intersection and more particularly described as follows:

Beginning at a point 45.00 feet left of KY 429 Centerline at Station 46+60.00 thence S 43°10'21" E a distance of 79.73 feet to a point 49.25 feet left of KY 429 Centerline at Station 47+41.83 thence S 43°39'33" W a distance of 13.48 feet to a point 35.82 feet left of KY 429 Centerline at Station 47+43.00 thence N 33°40'42" W a distance of 81.60 feet to a point 45.00 feet left of KY 429 Centerline at Station 46+60.00 and the Point of Beginning.

Being part of the same real estate conveyed to Robert B. O'Daniel and Patricia B. O'Daniel, his wife, by Deed Book 102, Page 510 and Deed Book 106, Page 34 as well as being conveyed to Mark G. O'Daniel and Bernadette B. O'Daniel, his wife, by Deed Book 322, Page 387 filed in the Register of Deeds Office of Marion County, KY.



Tax ID No: 055-041 (part)

The Property contains 17.97 acres

O'Daniel, Rita Ann Trust, O'Daniel, Jeff, O'Daniel , Robert B, O'Daniel, O'Daniel, Patricia, O'Daniel, Mark and O'Daniel, Bernadette

Tax ID No: 055-003 (part)

The approximately **32.03-acre** portion of the following described real property as more generally depicted below:

That certain tract of land lying in Marion County, Kentucky about two miles North of Lebanon and bounded and described as follows:

Beginning at a stone in the Lebanon and St. Rose Pike, corner to Wallace Parrott, running thence with his line N. 88 E. 112 poles to a stone; thence N. 6 E. 21 poles to stone in the drain; another corner to Parrott; thence S. 80 E. 67 poles to a stone, another corner to Parrott; thence N. 10 E. 191 poles to a stone, corner to Bland; thence with Bland's line N. 73 E. 46 1/2 poles to a stone; corner to Tom Harmon; thence with his line S. 32 E. 212 poles to a stake; thence S. 6 E. 29 poles to a stone; corner to Whitehouse; thence N. 88 W. 139 poles to a stone, another of his corners; thence S. 19 W. 68 poles to a stone, another corners; thence S. 43 W. 129 poles to stone in the Lebanon and St. Rose Pike; thence with the pike N. 32 W. 36 poles and N. 38 W. 161 poles to the place of beginning, containing 281 acres, more or less.

THERE IS EXCEPTED and not conveyed herein that portion of the above-described real property conveyed to William M. Osborne and Ann Lynette Osborne, his wife, by Deed dated July 19, 1976, and recorded in Deed Book 107, Page 235, and described as follows: BEGINNING at a stake where the old Parrott corner post stood thence with the Parrott line S. 88 E. 242 feet to a post; thence with land being retained by First Party S. 22 W. 19 feet to a post; thence with land being retained by First Parties S. 54 W. 178 feet to a post in the east line of the St. Rose Road; thence with said road N. 34 W. 161 feet to the point of beginning, containing approximately 18,880 square feet.

ALSO LESS AND EXCEPT and not conveyed herein that portion of the above-described real property conveyed to Mark G. O'Daniel and Bernadette B. O'Daniel, his wife, by Deed dated September 30, 1980, and recorded in Deed Book 124, Page 100, and described as follows: A 1-acre tract, more or less located approximately 2-1/2 ± miles north of Lebanon on St. Rose Road (Hwy. No. 429), this tract being described as follows: BEGINNING at a post on N. E. right-of-way of St. Rose Road and being 2-1/2± miles from Lebanon (corner to old Hamilton tract now Robby O'Daniel), thence down said R.O.W. N. 39 degrees with fence 150 feet to stake, then leaving said R.O.W. N. 48 degrees 30 minutes E. 291 feet to stake, then S. 39 degrees E. parallel with said R.O,W. 150 feet to fence, (at old Hamilton tract line) thence with said fence S. 48 degrees 30 minutes W. 291 feet back to the point of beginning and containing one acre more or less.

ALSO LESS AND EXCEPT A house and lot located at 2665 St. Rose Road and described as follows: Beginning at a post in line of St. Rose Road then with same S. 38 degrees 30' E, 230 feet to stake near utility pole; thence N. 51 degrees 30' E. 254 feet to stake; then N. 38 degrees 30' W. 206 feet to post in barn lot line; then with fence S. 56 degrees 53' W. 254 feet to post at St. Rose Road point of beginning, containing 1.27 acres, more or less, as per survey of C. M. Probus, dated April 21, 1976.

Being part of the same real estate conveyed to Jeff O'Daniel and Rita Ann O'Daniel, his wife, by Deed Book 83, Page 44, as well as conveyed to the Rita Ann O'Daniel Testamentary Trust by Will Book 44, Page 598, as well as conveyed to Robert B. O'Daniel and Patricia B. O'Daniel, his wife, by Deed Book 322, Page 391, as well as being conveyed to Mark G. O'Daniel and Bernadette B. O'Daniel, his wife, by Deed Book 322, Page 378 filed in the Register of Deeds Office of Marion County, KY.

Tax ID No: 055-003 (part)

The Property contains 32.03 acres

Spalding, Austin

County Parcel Identification Number 13-005.01

The following described real estate situated in Washington County, Kentucky

PARCEL 1:

TRACT NO. 1 - Bounded and Described as follows:
A SMALL STRIP OF LAND, lying and being in Washington County, Kentucky, on the waters of Cartwright Creek, bounded as follows: BEGINNING at the gatepost on the side of the Turnpike Road, and on the south side of the road, leading from the pike to the First Party's residence; thence running in an Eastern direction 270 feet to a stone at gate post; thence in a southern direction 144 feet to a stone, corner to first party, thence in a Western direction 270 feet to a stone at fence on edge of right of way of Turnpike road; thence in a Northern direction 144 feet to the beginning, containing 38,880 square feet.

THERE IS ALSO CONVEYED to the party of the second part the right to use of the Highway lying on the North side of this tract.

TRACT NO. 2 - ADJOINING TRACT NO. 1 and bounded and described as follows: A TRACT OF LAND lying and being in Washington County, Kentucky, In the Spalding Lane Road about 4 ½ miles from Springfield on both sides of Spalding Lane, bounded on the North by Emmett Spalding, on the West by Willie Mattingly and Tom Mackin, on the South by Mrs. Earl Spalding and Sammy and Harry Spalding, and on the West by Mrs. Evelyn Smith, containing 105 acres.

LESS AND EXCEPTED from the above-described property are the following tracts of land:

(1) A CERTAIN TRACT which was conveyed to Phil Hamilton and Carol Hamilton, his wife, by deed dated January 10, 1992, containing one acres, more or less, recorded in said Clerk's office in Deed Book 219, page 449.

(2) A CERTAIN TRACT which was conveyed to Austin G. Spalding and Karen A. Mudd by deed dated March 13, 1992, containing one acre, more or less, recorded in said Clerk's Office in Deed Book 219, page 449.

(3) ALSO, LESS AND EXCEPTED from the above is the house and 1.300 acre tract which shall be retain by the Grantor, a copy of the plat attached hereto, more particularly described as follows: A CERTAIN RESIDENCE LOT located at 1204 McLain Road, near Springfield, Washington County, Kentucky, at the Marion County Line, and more particularly described as follows: FROM the Southwest corner of the parent tract, located approximately 11 ft., East of the centerline of McLain Road, and being a corner with Richard G. Spalding and Karen Spalding, D.B. 150, p. 129 (Marion County Records), proceed N 05°04' 57" E 737.26 ft. with the East R/W line of McLain Road to an iron pin set 22 ft. East of the centerline at the end of a cross-fence, for a Point of Beginning; Thence, with new lines across Joseph Earl Spalding and Mary Generose Spalding, S 80° 35' 03" E 360.33 ft., along the cross fence to an iron pin, set; N 12° 04' 48" E 147.53 ft., crossing the lawn and driveway to an iron pin set in another cross-fence; N 78° 37' 02" W 376.50 ft., with the

second cross-fence, to an iron pin set in the East R/W line of McLain Road, 15 ft. East of the centerline; Thence, with the East R/W line of McLain Road, S
06° 10' 12" W 160.55 ft. to the beginning, containing 1.300 acres per survey performed January 30, 1999, by L.S. Hardin, P.L.S. No. 527, dated February 23, 1999.

ALSO, Grantor hereby grants to Grantees an easement over the existing driveway as shown on the plat attached hereto and made a part hereof; said easement shall be only for the Grantors' use and not for the benefit of their heirs and assigns.

PARCEL 2:

A LARGE AGRICULTURE TRACT located at the end of Jackson Branch Road. 5.2 miles southwest of Springfield, Washington County, Kentucky, and more particularly described as follows: FROM the end of Jackson Branch Road at a concrete cattle guard in the fenced line between Blanford and John P. Warren & Jeanine Warren, D.B. 127, P. 163, proceed due west along the fenced line approximately 1150 ft., to the fenced line of Joseph Larry Spalding, D.B. 183, P. 282; Thence, with the fenced line of Spalding, S 04° W approximately 493 ft. to an iron pin, set this survey at the intersection of an old tract fence of Blanford, for a Point of beginning, Thence, leaving the line of Joseph Larry Spalding, with new lines across Blanford, each call to an iron pin, set this survey, N 87° 07' 33" E., along the old tract fence, 307.27 ft.; S 64° 40' 53" E 363.76 ft.; S 64° 24' 49" E 305.30 ft.; S 11° 04' 57" W 228.62 ft.; S 06° 00' 29" W 312.64 ft. to a point below a pond; S 86° 47' 00" E 439.09 ft.: S 87° 53' 48" E 436.59 ft., crossing a broad ridge; N 00° 34' 38" W 213.31 ft.; N 64° 10' 42" E 493.45 ft.; N 59° 50' 45" E 528.21 ft. to a point in the line of J.C. Moraja, D.B. 224, P. 275 ft. at the base of an 18-inch hickory; Thence, with the fenced line of Moraja, S 74° 32' 06" E 265.69 ft. to an iron pin (set) at a corner fence post in a hollow drain leading to Cartwright Creek: Continuing with the fenced line up the hollow drain, S 07° 45' 34" W 1,050.24 ft. to an iron pin (set) at a corner with David Jerome Mattingly, D.B. 215, P. 057; Thence, leaving Moraja, with the fenced line of Mattingly, S 08° 25' 22" W 391.10 ft. to an iron pin (set); S 29° 48' 12" W 464.19 fi. to an iron pin (set) at the intersection of two fence lines; N 86° 17' 39" W 24.87 ft. to an iron pin (set) against an old fence post at a corner with Mackin Farms, Inc., D.B. 216, P. 720; Thence leaving Mattingly, with the fenced lines of Mackin, N 84° 37' 43" W 989.14 ft., to an iron pin (set) at a cross fence of Mackin: N 85° 07' 01" W 1,000.73 ft. to an iron pin (set) at a corner with Joseph Earl Spalding and Mary Generose Spalding, D.B. 111, P. 360: Thence, leaving Mackin with the fenced lines of Spalding N 83° 36' 38" W 530.51 ft. to an iron pin (set) at the base of a 24-inch walnut near Jackson Branch of Cartwright Creek and near the Washington County-Marion County line; Thence, continuing with the fenced lines of Spalding, down Jackson Branch, N 17° 53' 12" E 109.14 ft. to an iron pin (set) in the Branch; N 09° 36' 24" W 124.29 ft. to an iron pin (set) on the bank of the Branch; N 21° 04' 57" W 62.97 ft. to an iron pin (set); N 04° 05' 42" E (passing the corner of Joseph Earl Spalding and Mary Generose Spalding with Joseph Larry Spalding, D.B. 183, P. 282 at 1521.85 ft.) for a total distance of 1,535.83 ft. to the beginning., containing 98.338 acres per survey performed December 28, 29, 2001, by L.D. Hardin, Licensed Professional Land Surveyor No. 527.

PARCEL 3:

AN AGRICULTURAL TRACT located in southern Washington County. and more particularly described as follows: FROM a point on the east R/W line of McLain Road, located approximately 5 miles southwest of Springfield and 1,000 ft. north from the Marion County Line, proceed along the fenced line between Joseph Larry Spalding, D.B. 183, P. 282 and Austin G. Spalding and Karen M.

Spalding, D.B. 275, P. 333 eastward approximately 1.000 ft. to an iron pin set at a fence corner; thence, along a property line fence, N 07 degrees 40' 42" E 138.43 ft. to an iron pin set at a fence corner for a point of beginning; thence leaving Austin G. Spalding and Karen Spalding, with a new fenced line across Joseph Larry Spalding, N 02 degrees 31' 46" E 601.82 ft. to an iron pin set at the southeast fenced corner of J. Sidney Osbourne and Ruth Ann Osbourne, D.B. 117. P. 528; Thence, with the fence lines of Osbourne 02 degrees 58' 27" E 328.38 ft. to an iron pin set in a found stone, N 02 degrees 17' 25" E: 825.84 ft. to an iron pin set at a fence intersection; S 80 degrees 43' 40" E 175.06 ft. to an iron pin set at a tract corner of J. Sidney Osbourne and Ruth Ann Osbourne D.B. 111, P. 580, Thence leaving Osbourne Deed Book 117, P. 528, and running with the fenced line of Osbourne D.B. 111, P. 580; S 67 degrees 37' 50" E 486.42 ft. to an iron pin set at a corner with John P. Warren and Jeannine C. Warren, D.B. 127, P. 163; Thence, leaving Osbourne with the fenced lines of Warren, S 02 degrees 42' 37" W 608.17 ft. to an iron pin set at a fence corner, N 79 degrees 51' 59" E 645.29 feet. To an iron pin set at an angle point; S 74 degrees 36' 51" E 62.37 feet., crossing Jackson Branch to an iron pin set at a fence corner, S 01 degrees 10' 12" E 584.99 ft. to an iron pin set at a corner with Joseph M. Blandford and Linda A. Blandford, D.B. 147, P.084; Thence, leaving Warren, with the fenced line of Blandford, S 02 degrees 11' 07" W 492.00 ft. to an iron pin found at a corner with Austin G. Spalding and Karen M. Spalding, D.B. 275. P. 327; Thence, leaving Blandford, with Austin G. Spalding and Karen M. Spalding, S 00 degrees 05' 07" W 14.99 ft. to an iron pin set by a gate post at a corner with Austin G. Spalding and Karen M. Spalding, D.B. 275, P. 333; Thence, leaving Spalding D.B. 275, P. 327. and running with the fenced line of Spalding D.B. 275, P. 333, N 87 degrees 25' 51" W 1,360.32 ft. to the beginning, containing 41.397 acres per survey performed October 17, 2004. by L.S. Hardin, Licensed Professional Land Surveyor No. 527; Plat recorded in Plat Cabinet A, Slide 521.

PARCEL 4:

TWO CERTAIN TRACTS OF LAND located in Washington County, Kentucky, and more particularly described as follows:

TRACT NO. 1 - BEGINNING at a stone in the county road, thence along the same N 24 E 12 poles, thence N 26 ¾ E 17 ½ poles to a stone, thence N 11 ½ E 24 ½ poles to a stone in said road, corner to Thomas Medley: thence with the line S 81 E 46 ½ poles to a stone corner to Medley; thence N 2 E 20 poles toa stone in Medley's line, thence S 87 ¾ E 32 ¾, poles to a stone, thence N 75 ¾ E 46 ½ poles to the center of the branch; thence up the branch S 3 ½ E 38 ½ poles to a stone, thence S 1 W 30 ¼ poles to a stone corner to Frank Mattingly, thence N 88 ½ W 81 ½ poles corner to same, thence S 6 W 8 poles, 3 links to a Stone, corner to same, thence N 88 ¾ W 60 ¾ poles to the beginning, containing 45 ½ acres and 25 square poles, the same more or less.

TRACT NO. 3 - BEGINNING at a stone corner (1) to Thos Medley, thence S 80 E 10.7 poles to a stone, corner (2) to Mattingly and Medley, thence S 68 ½ E 29.2 poles to a stone, corner (3) to Mattingly, thence S 2 W 37 poles to a stone, a division corner (4) to Frank Spaulding, thence S 75 ¾ W 5 poles to a stone, corner (5) to said Spaulding, thence N 89 W 32.8 poles to a stone corner (6) to Spaulding and Thos Medley, thence N 1 ¼ W 49.7 poles to the beginning, containing ten (10) acres, two (2) roods and 10 poles.

LESS AND EXCEPTED from the above tracts are the following:

TRACT 1 - A CERTAIN TRACT OF LAND which was conveyed to Carl Mattingly and Denise Mattingly, his wife, by deed dated January 11, 1190, from Joseph Larry Spalding, single person, recorded in the office of the clerk of the Washington County Court in Deed Book 210, page 129, more particularly described as follows: A CERTAIN HOUSE AND LOT located on Spalding Lane in Washington County, Kentucky, and more particularly described as follows: BEGINNING at point in the road right of way at the Spalding line. Thence in the Westerly direction for a distance of 152 feet to a marker. Thence in the Southerly direction for a distance of 233 feet to a marker. Thence in the Easterly direction for a distance of 112 feet to a point on the edge of the right of way. Thence in the Northerly direction for a distance of 279 feet to the point of beginning, at the Spalding line.

ALSO, TRACT 2 - A CERTAIN TRACT OF LAND which was conveyed to Austin G. Spalding and Karen Spalding, his wife, by deed dated December 2, 2004 from Joseph Larry Spalding, a single person, recorded in the said Clerk's office in Deed Book 294, page 524, being AN AGRICULTURAL TRACT located in southern Washington County, and more particular described as follows: FROM a point on the east R/W line of McLain Road, located approximately 5 miles southwest of Springfield and 1,000 ft. north from the Marion County Line, proceed along the fenced line between Joseph Larry Spalding, D.B. 183, P. 282 and Austin G. Spalding and Karen M. Spalding, D.B. 275, P. 333 eastward approximately 1.000 ft. to an iron pin set at a fence corner; thence, along a property line fence, N 07 degrees 40' 42" E 138.43 ft. to an iron pin set at a fence corner for a point of beginning; thence leaving Austin G. Spalding and Karen Spalding, with a new fenced line across Joseph Larry Spalding, N 02 degrees 31' 46" E 601.82 ft. to an iron pin set at the southeast fenced corner of J. Sidney Osbourne and Ruth Ann Osbourne, D.B. 117. P. 528; Thence, with the fence lines of Osbourne 02 degrees 58' 27" E 328.38 ft. to an iron pin set in a found stone, N 02 degrees 17' 25" E: 825.84 ft. to an iron pin set at a fence intersection; S 80 degrees 43' 40" E 175.06 ft. to an iron pin set at a tract corner of J. Sidney Osbourne and Ruth Ann Osbourne D.B. 111, P. 580, Thence leaving Osbourne Deed Book 117, P. 528, and running with the fenced line of Osbourne D.B. 111, P. 580; S 67 degrees 37' 50" E 486.42 ft. to an iron pin set at a corner with John P. Warren and Jeannine C. Warren, D.B. 127, P. 163; Thence, leaving Osbourne with the fenced lines of Warren, S 02 degrees 42' 37" W 608.17 ft. to an iron pin set at a fence corner, N 79 degrees 51' 59" E 645.29 feet. To an iron pin set at an angle point; S 74 degrees 36' 51" E 62.37 feet., crossing Jackson Branch to an iron pin set at a fence corner, S 01 degrees 10' 12" E 584.99 ft. to an iron pin set at a corner with Joseph M. Blandford and Linda A. Blandford, D.B. 147, P.084; Thence, leaving Warren, with the fenced line of Blandford, S 02 degrees 11' 07" W 492.00 ft. to an iron pin found at a corner with Austin G. Spalding and Karen M. Spalding, D.B. 275. P. 327; Thence, leaving Blandford, with Austin G. Spalding and Karen M. Spalding, S 00 degrees 05' 07" W 14.99 ft. to an iron pin set by a gate post at a corner with Austin G. Spalding and Karen M. Spalding, D.B. 275, P. 333; Thence, leaving Spalding D.B. 275, P. 327. and running with the fenced line of Spalding D.B. 275, P. 333, N 87 degrees 25' 51" W 1,360.32 ft. to the beginning, containing 41.397 acres per survey performed October 17, 2004. by L.S. Hardin, Licensed Professional Land Surveyor No. 527; Plat recorded in Plat Cabinet A, Slide 521.

FURTHER LESS AND EXCEPT portion of land conveyed from Austin G. Spalding, single to Preston L. Smith and Mary D. Smith, husband and wife, by Deed dated October 13, 2020 and recorded October 22, 2020 in Deed Book 367 Page 451, of Washington County Records.

FURTHER LESS AND EXCEPT portion of land conveyed from Austin G. Spalding and Karen M. Spalding, his wife to Frederick L. Spalding, a single person, by deed dated May 6, 2021, and recorded June 10, 2011 in/as Deed Book 329 Page 181, of Washington County Records.

Containing in all 238.418 acres, more or less, according to the Washington County Property Valuation Administration records.

EXCEPTING from all of the above-described lands, 54 acres, more or less, in which the Landlord has predetermined. No legal description of said Landlord exception exists of record exists at the time; however, per Section 2, (G), (v) of the original Agreement, a survey will be obtained by the Lessee during the Option Period to depict said Landlord exception and actual lease acreage.

Containing after said Landlord exception, 184.418 acres, more or less

Exhibit A-1
Do Not Disturb Area

Warren, John P. and Warren, Jeannine

Description of Property

Parcel #	County	Legal Description	Acreage
13-007	Washington	See attached "Exhibit A continued" for further description of property.	146.02
TOTAL PROPERTY:			**146.02**
EXCEPTED PROPERTY:			**115.02**
TOTAL LEASED (Leased Portion):			**31.00**

Washington County, Kentucky

County Parcel Number 13-007

A certain tract of land lying and being on the Booker and Cartwright's Creek Road about five miles southwest of Springfield, bounded and described as follows: Beginning at a point where a walnut tree is called for now (now gone), thence N 10 W 8-1/2 poles to a point near a black ash in Henry Smith's line, thence S 69-1/2 W 201 poles to a stone in a branch near a honey locust and burr-oak, thence S 67 W 37 poles to a stone corner to Barton Mattingly, thence S 2 W 37 poles to a stone in a branch in Spalding's line, thence N 75-3/4 E 41.7 poles to a stob in branch, corner to Frank Spalding; thence S 4 E 41-1/2 poles to a stone corner to Luke Moore and J. R. Smith, thence N 86-1/2 E 125 poles to a stone in line of Dower of Wilson Heirs, thence with said line N 21-1/2 W 54-1/2 poles to a black oak and stone, corner to Dower; thence N 70 E 59 poles to a stone on west side of Cartwright's Creek, corner to Wilson; thence down the creek N 10 E 39 poles to an elm on the east bank of said creek, corner to Wilson; thence N 36 E 32.6 poles to the beginning, containing 96 acres and 157 square poles, more or less.

EXCEPT about one acre and described as thus: Beginning at a stone on the west side of said creek and running thence in an easterly direction to the Henry Smith (now Richard Cambron) line, thence in a southern direction up the creek to a stone in the Moraja line, thence crossing the creek to a stone on the bank of same, thence about 35 yards to the beginning.

Being the real estate conveyed to John P. Warren and Jeannine M. Warrant, husband and wife by Deed Book 127, Page 163, filed in the Register of Deeds Office of Washington County, KY.

LESS, EXCEPT AND EXCLUDING that portion depicted herein by Landlord containing 115.02 acres, more or less. No legal description exists at present date for said Landlord 115.02 acre exclusion; however, said Landlord exclusion will be surveyed at a later date per the rights granted within this agreement.

Containing 31.00 acres, more or less after said Landlord exclusion.

Exhibit A-1
Do Not Disturb Area

Smith, Stephen Wesley and Smith, Susan Abigail

Parcel 1:

Tax ID No: 13-010.01

The following described property located in Washington County, Kentucky, and more particularly described as follows:

Located at the end of Columbus Lane-Agricultural Road From DB 286 PG 318 and as Shown in PC-A, Slot 292 Washington County, Kentucky All reference to rebar (found) are ½"X18" rebar capped PLS #3066

Tract #3-3 – Remaining Ag Tract Beginning at rebar (found) and Southeast corner to Nance Addition Tract #3-1 (DB 282 PG 220) and northeast corner to George Graves 09.08 ACRE Addition Tract #3-3. Thence leaving Graves and with Nance to rebar (found), N11 18'01"E 162.00 feet; N14 05'06"E 96.35 feet; N17 42'04"E 105.45 feet; N23 52'12"E 99.97 feet; N02 33'10"E 33.50 feet; N34 20'43"W 31.55 feet; N54 41'34"W 37.12 feet to rebar (found) at Columbus Lane-Ag Road turn-a-round. Thence with curve to the left having Delta Angle of 100 33'38"; radius of 50 feet; cord bearing N55 17'07"W 76.92 feet and an arc distance of 87.70 feet to rebar (found). Thence continuing with Ag road, N05 16'11"W 49.92 feet to corner of Nance Tract #2 (PC-A, Slot 246). Thence leaving Nance and crossing Columbus Ag Road, N84 54'11"E 50.06 feet to rebar (found) and corner to WESCO Properties Tract #1 (PC-A, Slot 246). Thence leaving Ag Road and with WESCO, S76 31'42"E 877.57 feet crossing Servant Run Creek to rebar (found) in fenceline of Dalmon Pinkston (DB 100 PG 539). Thence leaving WESCO and with Pinkston as fenced on the east side of creek, S09 35'54"E 531.63 feet to rebar (found) at post; S71 20'02"E 349.07 feet to rebar (found) at crooked Cherry and corner to Campbell (DB 171 PG 055). Thence leaving Pinkston and with Campbell as fenced S42 56'10"W 77.81 feet crossing Servant Run to rebar (found) at post; S37 50'12"W 653.66 feet to stone (found) and corner to Wesley Smith (DB 313 PG 608). Thence leaving Campbell and with Smith as fenced, N83 17'04"W 1022.70 feet to rebar (found) and corner to 09.08 Acre Graves Addition Tract #3-2. Thence leaving Smith and with Tract #3-2, N11 16'47"E 684.20 feet to the beginning. Containing 30.59 ACRES. The above described Tracts #3-2 and #3-3 are by survey of Reed Spaulding PLS #3066 as performed 3/10/10 and as shown on plat by same dated 3/11/10.

Being the real estate conveyed to Stephen Wesley Smith and Susan Abigail Smith, his wife, by Warranty Deed dated March 26, 2010, at Deed Book 324, Page 356, filed in the Register of Deeds Office of Washington County, KY.

Parcel contains 30.59 acres, more or less

Parcel 2:

Tax ID No: 13-011.02

The following described property located in Washington County, Kentucky, and more particularly described as follows:

An Agricultural Tract
A Part of Dan and Don Smith Farm (Warren Tract)

Located about 350 feet from the end of the Jackson Branch Spur on the east side of Maraja Lane from DB 168 PG 161 in Washington County, Kentucky.

All reference to rebar (Set) or (found) are ½"x24" rebar, I.D. caped PLS #3066

Beginning at rebar (Set) on the east side of Maraja Lane (20 feet from centerline), corner to remaining Smith and being about 350 feet from the end of the pavement of Jackson Branch Spur and also being S85 degrees 22'15"E 504.60 feet from hydrant on the south side of Jackson Spur. Thence leaving Majara Lane east r/w and with new line to remaining Smith, N32 degrees 50'21"E 61.30 feet to rebar (set) in line of Graves (DB 239 PG 688) as witnessed by 36" Ash, North at 09.58 feet. Thence leaving Smith and with Graves as fenced, S76 degrees 46'01"E 384.69 feet to steel post; S86 degrees 42'41"E 164.46 feet to steel post; S87 degrees 21'51"E 660.99 feet to 72" Oak; S87 degrees 45'32"E 684.23 feet; N83 degrees 19'25"E 559.57 feet to rebar (found) and corner to Graves (PC"A", Slide 292). Thence continuing with Graves, S84 degrees 00'30"E 535.40 feet to rebar (found), and S83 degrees 17'04"E 1022.70 feet to stone (found) in the line of Bob Campbell (DB 171 PG 055). Thence leaving Graves and with Campbell as fenced, S37 degrees 46'52"W 347.95 feet to rebar (Set) and corner to Ola Lawson (DB 150 PG 037). thence leaving Campbell and with Lawson as fenced, S37 degrees 56'42"W 410.30 to rebar (Set), and S37 degrees 08'29"W 703.96 feet to rebar (Set) at post and corner to Bess Haydon (DB 259 PG 245). Thence leaving Lawson and with Haydon as fenced, S37 degrees 31'52"W 526.71 feet to corner rebar (set)

at 28" Walnut in line of Maraja (DB 224 PG 275. Thence leaving Haydon and with Maraja as fenced, N88 degrees 58'21"W 1809.27 feet to rebar (found) and corner to Guenther Lot (DB 256 PG 448). Thence leaving Maraja and with Guenther as fenced, N14 degrees 08'00"W 322.70 feet to 2" corner pipe, and S74 degrees 13'41"W 249.29 feet to 2" corner pipe on the east r/w of Maraja Lane 20 feet from centerline). Thence leaving Guenther and with the east side of Majara Lane to rebar (Set), N58 degrees 35'26"W 61.64 feet; N63 degrees 56'35"W 112.79 feet; N34 degrees 34'41"W 82.64 feet; N18 degrees 37' 13"W 144.34 feet; N24 degrees 57'03"W 109.29 feet; N22 degrees 38'02"W 114.83 feet; N02 degrees 11'45"E 55.02 feet; N20 degrees 47'42"E 70.64 feet; N06 degrees 32'08"E 58.53 feet; N17 degrees 25'19"W 45.90 feet; N34 degrees 06'10"W 106.53 feet; N50 degrees 58'02"W 157.61 feet to the beginning. Containing 115.726 ACRES by survey of Reed Spaulding PLS #3066 as performed 10/24-26/07 and as shown on plat dated 10/29/07. See Attachment "A".

Less and Excepted from the above described 115.726 ACRE Tract is the Brown Family Cemetery containing 00.056 ACRES, as shown on plat (Attachment A) for record.

Being the real estate conveyed to Stephen Wesley Smith and Susan Abigail Smith, his wife, by Warranty Deed dated January 10, 2008, at Deed Book 313, Page 608, filed in the Register of Deeds Office of Washington County, KY.

Parcel contains 115.67 acres, more or less

Parcel 3:

Tax ID No: 13-011

The following described property located in Washington County, Kentucky, and more particularly described as follows:

A SMALL TRACT OR PARCEL OF LAND, lying and being on the waters of Cartwrights Creek and bounded and described as follows:

BEGINNING at a stone corner to Tract No. 1; thence S 50 yards, more or less; thence East across Creek to the land of Herman Warren; thence North to the lands of the Richard Cambron heirs; thence back to the Beginning, Containing One (1) Acre, more or less and being sold by the boundary irrespective of the number of acres contained therein.

ALSO:

A CERTAIN TRACT OR PARCEL OF LAND situated on the Waters of Cartswright Creek and bounded and described as follows: In Washington County, Kentucky:

BEGINNING at a corner to Al Smith formerly an oak tree; thence S 18 l/2 E 45 poles to corner to John McClain, thence with same course, making 84 poles in all to an old call for a white oak; thence S 75 E 13 poles to an elm tree near a small walnut, corner to Tract No. 2 of the division; thence with the division line N 61 l/2 E 22.88 poles to a stake, thence N 55 l/2 E 34 poles to a burr oak; thence N 73 E 9.28 poles to a sycamore, across the creek; thence N 4 l/4 E 6.4 poles to a cherry tree; thence N 29 W 14.2 poles; thence N 11 l/2 W

10.44 poles; thence N 86 ½ E 187 poles to a walnut tree, corner to Ed Landford; thence N 33 l/2 E 120 poles to corner to J. K. Wall; thence N 88 l/4 W 93.52 poles to corner to Richard Cambron; thence with his line S 79 W 34.6 poles to a post; thence S 88 l/2 W 102.6 poles to a post; thence N 69 W 17 poles to the edge of road; thence S 68 W 16.8 poles to the end of stone fence corner to Smith; thence S 29 l/4 W 17.52 poles; S 34 l/2 W 5.48 poles; S 21 l/2 W 24.2 poles; S 7 W 22.4 poles crossing the creek; thence S 7 l/2 W 58.8 poles to the Beginning, containing 193.3 acres, according to a survey made by T. J. Settles in August, 1934.

LESS AND EXCEPTED from the above boundaries and not conveyed hereby is a certain tract of land conveyed to John P. Warren and Jeannine C. Warren, husband and wife, by deed dated January 4, 1984, of record in Deed Book 168, page 165, and more particularly described as follows:

A CERTAIN TRACT OF LAND located in Washington County, Kentucky about four miles from Springfield off the Booker County Road and on the Jackson Branch County Road. Said Tract is bounded in the north by John Warren, in the east by Herman Warren (Home Tract) and Cecil Moraja; in the south by Cecil Moraja; in the west by Mickey Blandford and John Warren and more particularly described as follows:

BEGINNING on a gate post ten feet from the center line of Jackson Branch Road and a corner to John Warren S 12-30 E 894 feet to a post and corner to Mickey Blandford. Thence along line of Blandford S 12-30 E 483.3 feet to a corner post; S 66-30 E 220.1 to a walnut snag line of Mickey Blandford and corner to C. Moraja. Thence along line of Moraja N 67 E 373.5 feet to a white oak; N 59 E 583.4 feet to a huge White Oak beside Cartwright Creek. Thence across said Creek N 49 E 221.3 feet to a cherry and corner to Moraja. Thence continuing along line of Moraja N 25 W 241.5 feet to a post; N 8 W 176.2 feet to a post and corner to Herman Warren Home tract. Thence along line of Warren tract N 8 W 59 feet to a box elder; N 12 W 91.9 feet to a hackberry; N 24-30 W 329.2 feet to a stake, three feet from a small ash, and corner to Warren Home tract. Thence across Cartwright Creek S 64 W

185.5 feet to a post and corner to Warren Home Tract; N 25 W 388.1 to a post, corner to John Warren. Thence along line of John Warren S 72 30 W 948.4 feet to a post 20 feet from the center line of Jackson Branch County Road; S 42 30 W 21.2 feet to the beginning, containing 39.33 acres, per Reed Spaulding checked and approved by James Goatley, Reg. Land Surveyor No., 1119, dated January 18, 1982.

Being the real estate conveyed to Stephen Wesley Smith and Susan Abigail Smith, his wife, by Warranty Deed dated December 14, 2011, at Deed Book 331, Page 275, filed in the Register of Deeds Office of Washington County, KY.

Being the real estate conveyed to Stephen Wesley Smith and Susan Abigail Smith, his wife, by Warranty Deed dated October 21, 2011, at Deed Book 330, Page 499, filed in the Register of Deeds Office of Washington County, KY.

Parcel contains 39.33 acres, more or less

The Premises contains 185.59 acres, more or less

Osbourne, Robert H. and Osbourne, Denise C

Parcel 1:

Tax ID No: 12-118.01

ONE TRACT OF LAND, situated on the waters of Cartwrights's Creek and Shepherd's Run in Washington County, Kentucky, bounded as follows:

TRACT #1 - BEGINNING at a stone, corner to Al Smith and J. Rich Smith; thence S 65 W 27.64 poles to a stone, corner to J. Rich Smith; thence S 2 W 8l.2 poles to a stone, corner to said Smith and Barton Mattingly; thence same course continued 86.8 poles, making the whole line l68 poles to a stob, corner to Mattingly; thence S 67 W 14.7 poles to a stone, corner to John E. Smith; thence N 68 ½ W 29.2 poles to a stone, corner to J. E. Smith and Medley; thence N 2 E 66.3 poles to a stone, corner to Medley; thence N 88 3/4 W 6.4 poles to a stone, corner to Medley; thence N l/2 E 73 poles to a stone in the Raywick Road, corner to Medley; thence N 5 l/2 E 46 poles to a stob in the center of said road, corner to same; thence N 15 E 25.4 poles to a stob in center of St. Mary's Pike at mouth of Raywick Road, corner to Medley and W. Riney; thence with center of old road as it meanders N 87 l/2 E 30 l/4 poles, N 85 l/4 E 5 poles, N 57 ½ E l5 ½ poles, N 68 E 12 poles to a stone in Al Smith's line, thence S 11 ¼ E 52 poles to the beginning, containing sixty eight acres, 3 roods and l6 poles; BUT EXCEPTED OUT OF SAID TRACT and not conveyed hereby is the following boundary:

BEGINNING at the center of the St. Mary's Turnpike, corner to Al Smith; thence running in southern direction with Smith's line 70 yards to a stone, corner to same in said line; thence in a westerly course parallel with said pike 70 yards to a stone corner, thence in a northerly direction and parallel with first line 70 yards to the center of the pike, thence with the center of the pike to the beginning, containing one acre, and being the School House Lot.

ALSO, LESS AND EXCEPTED from the above boundary and not conveyed hereby is the following described tract of land being retained by the Grantors:

A TRACT OF LAND LOCATED on Booker Road in Washington County, Kentucky, more particularly described as follows:

BEGINNING at a point on the center line of Booker Road 170.7 feet from a steel pin on the center point of the junction of Booker Road and Old Raywick Road (Spalding Lane); bearing S 3-30 W 232.9 feet to a post; S 83 E 185.4 feet to a post; N 3 E 285.7 feet to a point on the center line of Booker Road. Thence along center line of said road S 80-30 W 188.6 feet to the beginning, lot containing 1.096 acres, according to survey made by Reed Spaulding, III, approved by James Goatley, Registered Land Surveyor No. 1119 dated February 7, 1980.

A PARCEL OR TRACT OF LAND situated in Washington County, Kentucky, on the waters of Cartwrights Creek and Shepard's Run and bounded as follows:

BEGINNING at a stone; thence N 61 degrees W 1 ½ poles to offset No. 1 on the Raywick Road; thence with the center of said road S 36 degrees W 54 poles to offset No. 2, 1 ¼ poles West of a stone planted; thence S 25 degrees W 28 poles to offset No. 3, ¾ poles west of a stone planted; thence S 14 degrees W 18 poles to offset No. 4, ½ pole west of a stone planted; thence S 10 ½ degrees W 38 poles to offset No. 5, ½ pole east of a stone planted; thence S ½ degree E 5 ½ poles to another stone; thence S 13 ½ degrees E 40 poles to another stone on the east side of said road; thence S 7 ½ degrees W 31 ¾ poles to an offset on said road ½ pole west of a stone

planted; thence leaving said road S 82 degrees E 47 poles to another stone on Peter W. Brown's (now Emmett Spalding) line; thence with same N 70 poles; thence S 81 ½ E 10 ½ poles to a stone near a hickory corner to Peter Brown and Wilham L. Carrico (now Emmett Spalding and J. Sidney Osbourne) thence with J. Sidney Osbourne's line N 1 degree E 66 poles to a hickory and stone; thence west 6 ½ poles to a small sassafras and stone; thence N 71 poles to the beginning, containing by survey fifty four (54) acres of land, more or less.

LESS AND EXCEPTED from the above described property is a certain tract of land which was conveyed to James Robert Greene and Shirley Greene, his wife, by deed dated April 2, 1974, from J. Sidney Osbourne and Ruth Ann Osbourne, his wife, as recorded in the office of the Clerk of the Washington County Clerk in Deed Book 118, Page 154, more particularly described as follows:

A CERTAIN TRACT OR PARCEL OF LAND located in Washington County, Kentucky, about 4 ½ miles southwest of Springfield, Kentucky, on Spalding Lane and bounded as follows:

BEGINNING at a point on the edge of the said Spalding Lane in line of Sidney Osbourne. Thence with the center line of the road S 40 W 557 feet to a point in the center of the road at corner of the yard. Thence leaving road with a new line along the yard fence S 73 E 202 feet to a gate post, thence leaving fence with a new line S 83 ½ E 156 feet to a large walnut tree in line of Sidney Osbourne. Thence N ½ E 503 feet to the point of beginning, containing 2.09 acres, more or less.

ALSO CONVEYED HEREIN:

A BARN LOT located on McLain Road, Springfield, Washington County, Kentucky, and more particularly described as follows:

FROM the intersection with Booker Road approximately 5 ½ miles southwest of Springfield, proceed southwardly along McLain Road approximately 1800 ft. to an iron pin, set this survey in the west R/W line of the road, 20 ft. west of the center line, in the line of Joseph George Edelen, D.B. 266, P. 117 for a Point of Beginning; thence, leaving Edelen, with the west R/W line of McLain Road, N 35°-59'-34" E 123.82 ft. to an iron pin set this survey at the south line of a passway leading to the retained land of Tony A. Osbourne and Tammy Osbourne and 6.73 ft. south from an iron pin set this survey in the line of Scottie Earl Caldwell and Shannon Marie Shell, D.B. 280, P. 264; thence, leaving the west R/W line of McLain Road, with the south line of the passway, parallel with Caldwell, N 54°-08'-01" W 68.67 ft. to an iron pin set this survey by a fence post at a corner with Edelen; thence, leaving the south line of the passway, with Edelen, running parallel to and 8 ft. west of the existing barn, S 35°-37'-58" W 123.80 ft. to an iron pin set this survey at a corner with Edelen; thence, continuing with Edelen, running parallel to and 3 ft. south of the barn, S 54°-07'-24" E 67.90 ft. to the beginning; containing 8,453 square feet per survey performed January 29, 2007, by L. S. Hardin, Licensed Professional Land Surveyor No. 527.

Being the same property conveyed to Robert H. Osbourne and Denise C. Osbourne, his wife by Deed Book 333, Page 362.

ALSO

LOCATED in Washington County, Kentucky, more particularly described as follows:

AND BEING Tracts 1 and 2 of the William Wayne Smith and Martha Elaine Smith Property Division as per plat thereof of record in Plat Cabinet A, Slide 158, in the Washington County Court Clerk's Office.

Parcel contains 118.50 acres, more or less

Kentucky Utilities Co.

Marion County, Kentucky

Parcel 1:

Tax ID No: 063-016

Parcel 1

BEGINNING at a point at the Southeast corner of the tract of land herein conveyed; thence N.45 degrees 15 minutes East (in old deed N.40 degrees E.) along the North side of a private road belonging to Will Murphy a distance of 287 feet to an iron pin; thence N.28 degrees 15 minutes West with the present line of fence a distance of 650 feet to an iron pin; thence S.60 degrees 28 minutes West to an iron pin set in the fence on the Eastern side of the said Lebanon-Springfield Road a distance of 523 feet; thence along the East side of said road S.32 degrees 35 minutes East a distance of 70 feet; S. 42 degrees East a distance of 56 feet; S.45 degrees 20 minutes East a distance of 148 feet; S.53 degrees East a distance of 225 feet; S.48 degrees 45 minutes, east a distance of 267 feet to the point of beginning containing 6.65 acrds, and being a part of the same property acquired by

Parcel 2

BEGINNING at an iron pin on the northwest side of the private drive leading from the Lebanon-Springfield Highway to lands of Clarence Murphy, corner to the property owned by Kentucky Utilities Company; thence with the line of Kentucky Utilities Company N. 31 degrees 8' W. 448.5 feet to an iron pin on the southeast side of Kentucky Utilities Company tower line N. 57 degrees 38' E. 415 feet to an iron stake in the southeast line of right of way of the above mentioned tower line; thence a division line in the lands of the grantors S. 30 degrees 15' E. 334.5 feet to an iron stake on the northwest of the aforementioned private road; thence with northwest side of same S. 40 degrees 53' W. 172.5 feet; thence S. 43 degrees W. 225 feet to the beginning, containing 3.739 acres.

Being the same property conveyed to Kentucky Utilities Company, Inc., by Deed Book 67, Page 200, and conveyed to East Kentucky Rural Electric Cooperative Corporation by Deed Book 79, Page 363 in the office of the Marion County, Kentucky Court Clerk.

SAR EXHIBIT D

Frontier Solar Project

Noise Assessment Report

21 December 2023

Project No.: 0650014

The business of sustainability

ERM

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1.3	03	Michael Tincher			2023-12-21	Address based on BrightNight and FBT comments

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Acronyms and Abbreviations

Name	Description
AC	Alternating Current
ANSI	American National Standards Institute
dB	decibels
dB(A)	A-weighted decibels
DC	Direct Current
E	East
ERM	Environmental Resources Management, Inc.
FHWA	Federal Highway Administration
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
ISO	Organization for Standardization
L_{eq}	The equivalent noise level
L_{dn}	The day-night noise level
LOD	Level of Disturbance
MVA	Mega-volt Ampere
MW	Megawatts
N	North
NE	Northeast
NSA	Noise Sensitive Area
NW	Northwest
S	South
SE	Southeast
SW	Southwest
W	West

1. INTRODUCTION

1.1 Scope of Report

This report presents the results of a noise assessment conducted for the FRON bn, LLC (Client) Frontier Solar Project (Project) in Marion and Washington Counties, Kentucky. This report has been undertaken by Environmental Resources Management, Inc. (ERM) on behalf of the Client and includes the results of construction and operational noise predictions. The noise assessment was carried out to understand the noise levels that would be generated from the operation of the Project's inverters and transformers, which will be the main noise sources associated with the Project. This report also provides general information on noise and comparisons of the expected Project noise levels to estimated existing ambient conditions and guidelines.

1.2 General Information on Noise

Noise is defined as unwanted sound. Excessive noise can cause annoyance and adverse health effects. Annoyance can include sleep disturbance and speech interference. It can also distract attention and make activities more difficult to perform (EPA, 1974).

The range of pressures that cause the vibrations that create noise is large. Noise is therefore measured on a logarithmic scale, expressed in decibels (dB). The frequency of a sound is the "pitch". The unit for frequency is hertz (Hz), or cycles per second. Most sounds are composed of a composite of frequencies. The human ear can usually distinguish frequencies from 20 Hz (low frequency) to about 20,000 Hz (high frequency), although people are most sensitive to frequencies between 500 and 4000 Hz. The individual frequency bands can be combined into one overall dB level.

Noise is typically measured on the A-weighted scale (dBA). The A-weighting scale has been shown to provide a good correlation with the human response to sound and is the most widely used descriptor for community noise assessments (Harris, 1991). The faintest sound that can be heard by a healthy ear is about 0 dBA, while an uncomfortably loud sound is about 120 dBA. In order to provide a frame of reference, ERM has listed some common sound levels below.

- Pile Driver at 100 feet 90 to 100 dBA
- Chainsaw at 30 feet 90 dBA
- Truck at 100 feet 85 dBA
- Noisy Urban Environment 75 dBA
- Lawn Mower at 100 feet 65 dBA
- Average Speech 60 dBA
- Average Office 50 dBA
- Rural Residential During the Day 40 dBA
- Quiet Suburban nighttime 35 dBA
- Soft Whisper at 15 feet 30 dBA

Common terms used in this noise analysis are defined below.

L_{eq} - The equivalent noise level over a specified period of time (i.e., 1-hour). It is a single value of sound that includes all of the varying sound energy in a given duration.

L_{dn} - the day-night noise level, is the A-weighted Leq sound level over a 24-hour period with an additional 10 dB penalty imposed on sounds that occur between 10 p.m. and 7 a.m. to account for the increased sensitivity to noise during these periods.

1.3 Project Description

The Project evaluated herein would be capable of generating approximately 120 MW of electricity and would consist of 266,274 photovoltaic modules located on approximately 935 acres. The main noise generating components include 35 DC to AC power inverters, 35 auxiliary transformers, and one 150 MVA main step-up transformers. Noise sensitive areas (NSAs) consist of light density residential uses around the Project site. A review of aerial photography identified 21 NSAs in proximity to the Project that were evaluated in the noise assessment. ERM has provided the NSA receptor locations, distances/directions from the property line of participating landowners, and distances to the nearest Project fence line, solar panel, inverter, and substation in Table 1 and has depicted the NSAs on Figure 1.

Table 1: Noise Sensitive Area Receptors

Receiver	Land Use Type	Approximate Distance (ft)/Direction from Property Line	Distance to Fence (ft)	Distance to Panel (ft)	Distance to Inverter (ft)	Distance to Substation (ft)
NSA 1	Residential	260 / N	890	940	1,550	15,090
NSA 2	Residential	120 / N	310	370	980	14,710
NSA 3	Residential	185 / N	530	620	710	14,290
NSA 4	Residential	115 / NE	3,860	3,920	4,690	16,990
NSA 5	Residential	230 / E	1,460	1,480	1,870	12,850
NSA 6	Residential	60 / E	1,600	1,670	1,850	11,230
NSA 7	Residential	90 / SE	2,050	2,130	2,940	3,250
NSA 8	Residential	320 / SE	3,940	4,670	4,820	4,710
NSA 9	Residential	50 / SE	4,530	5,470	5,860	5,450
NSA 10	Residential	1,520 / S	2,440	2,510	3,080	2,960
NSA 11	Residential	210 / SW	2,400	3,110	3,570	6,350
NSA 12	Residential	45 / SW	3,030	3,800	4,080	7,690
NSA 13	Residential	75 / W	840	970	1,380	9,230
NSA 14	Residential	110 / W	920	960	1,370	9,840
NSA 15	Residential	120 / W	200	400	1,320	10,530
NSA 16	Residential	100 / NW	660	720	1,440	13,910
NSA 17	Residential	25 / NW	300	350	1,170	14,440
NSA 18	Residential	60 / NW	580	640	830	14,220
NSA 19	Residential	75 / N	370	450	1,430	12,990
NSA 20	Residential	170 / S	530	630	950	11,290
NSA 21	Residential	70 / S	1,470	1,500	2,300	10,660

1.4 Applicable Noise Standards and Guidelines

1.4.1 Noise Ordinances and Standards

No local noise ordinances or state of Kentucky noise standards applicable to the Project were identified.

1.4.2 United States Environmental Protection Agency Guideline

In 1974, the U.S. Environmental Protection Agency (EPA) published its document entitled "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety" (EPA, 1974). This publication evaluated the effects of environmental noise with respect to health and safety. The U.S. EPA recommended in the document that environmental noise levels should not exceed a day-night sound level (L_{dn}) of 55 A-weighted decibels (dBA). A 55 dBA L_{dn} noise level equates to a continuous sound level of 48.6 dBA (i.e., a facility that does not exceed a continuous noise level of 48.6 dBA for a 24-hour period will not exceed 55 dBA L_{dn}). This level was developed for "outdoor residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use". The USEPA considers this level as protective of the public health and welfare from the effects of environmental noise and notes that this criterion was developed without regard to technical or economic feasibility and contains a margin of safety.

2. EXISTING CONDITIONS

Existing sources of noise in the area include vehicular traffic noise from Route 55 and Route 429, vehicular traffic on other roadways in the area, and natural sounds (e.g., birds and insects). The Lebanon-Springfield Airport is located east and adjacent to the site. Existing ambient noise levels in the area were estimated by determining the land uses in the area and the aforementioned noise sources. General ambient noise levels by land use have been estimated by the USEPA (USEPA 1978). However, a more detailed estimate is provided in ANSI standard 12.9-2013/Part 3 (ANSI, 2013). The standard provides estimates of existing noise levels based on detailed descriptions of land use categories. The levels are in general agreement with those published by USEPA. The ANSI standard noise estimation divides land uses into six (6) distinct categories. These categories, their descriptions, and the estimated existing daytime and nighttime L_{eq} sound levels, are provided in Table 2.

Table 2: Land Use Categories for Estimating Ambient Noise Levels

Category	Land Use	Description	Estimated Existing Daytime L_{eq}	Estimated Existing Nighttime L_{eq}
1	Noisy Commercial and Industrial Areas	Very heavy traffic conditions, such as in busy downtown commercial areas, at intersections of mass transportation and other vehicles, including trains, heavy motor trucks and other heavy traffic, and street corners where motor buses and heavy trucks accelerate.	66	58
2	Moderate Commercial and Industrial Areas, and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1 but with somewhat less traffic, routes of relatively heavy or fast automobile traffic but where heavy truck traffic is not extremely dense, and motor bus routes.	61	54
3	Quiet Commercial, Industrial Areas, and Normal Urban and Noisy Residential Areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at low speeds. Residential areas and commercial streets and intersections with little traffic comprise this category.	55	49

Category	Land Use	Description	Estimated Existing Daytime L_{eq}	Estimated Existing Nighttime L_{eq}
4	Quiet Urban and Normal Residential Areas	These areas are similar to Category 3 above but, for this group, the background is either distant traffic or is unidentifiable.	50	44
5	Quiet Suburban Residential Areas	Isolated areas, far from significant sources of sound.	45	39
6	Very Quiet, Sparse Suburban or Rural Areas	These areas are similar to Category 5 above but are usually in unincorporated areas and, for this group, there are few if any near neighbors.	40	34

(1) ANSI 2013

Existing ambient noise levels at the NSAs in the area were estimated utilizing the ANSI standard. Based upon a review of the land uses, the NSAs in the area would fall into a Category 5 land use (Quiet Suburban Areas), with estimated daytime L_{eq} sound levels of 45 dBA and nighttime L_{eq} sound levels of 39 dBA.

3. NOISE MODELING

3.1 Operational Noise Modeling Methodology

ERM performed computer modeling to calculate noise levels that would be generated during Project operation and used the commercially available CadnaA model developed by DataKustik GmBH (2006) for the analysis. The software has the ability to account for spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is standards-based. ERM used the International Organization for Standardization (ISO) 9613 standard for air absorption and other noise propagation calculations (ISO 1996). ERM included a partially acoustically absorptive ground surface (0.5 setting in the model). A setting of “0” corresponds to an acoustically reflective surface, such as pavement or water, while a setting of 1.0 corresponds to loose soils and grassy surfaces. ERM also included area topography. ERM did not take credit for any vegetation or foliage that may provide attenuation of noise.

Modeling was conducted for daytime and nighttime operation with Project sources in operation at full load conditions. All sources were included for daytime operation. The inverters would not operate at night when no electricity is being produced, and inverter noise was therefore not included in the nighttime model. Discrete model receptors were placed at the location of the NSA locations. Noise contours were also produced such that noise levels at any location, including along the property line of participating land owners, could be visualized.

ERM has provided a summary of the equipment sources included in the noise modeling assessment and their height above grade in Table 3. Table 4 provides the noise emissions data at maximum load and the derivation of each.

Table 3: Equipment Source Listing

Source	Number of Each	Height Above Grade (feet)
Inverter	35	7
4 MVA Auxiliary Transformer	35	5

Source	Number of Each	Height Above Grade (feet)
150 MVA Main Step-Up Transformer	1	10

Table 4: Noise Emissions Derivation for Project Sources

Equipment	Noise Emissions Data[1]	Data Source/Vendor
Inverter	81 dBA at 3 feet	SMA [1]
4 MVA Auxiliary Transformer	59 dBA at 3 feet	IEEE [2]
150 MVA Main Step-Up Transformer	82 dBA at 3 feet	IEEE [2]

(1) SMA Solar Technology AG
(2) Emissions data developed utilizing Institute of Electrical and Electronics Engineers Standard C57.12.90-2010 based on transformer MVA rating.

3.2 Operational Noise Model Results

Model results for Project operation with Project sources operating simultaneously at full load conditions are provided in Table 5 for both daytime and nighttime conditions at all NSA locations and at the property line of participating landowners. The modeled levels are also compared to the estimated existing ambient conditions and to the USEPA's impact guideline. While the USEPA guideline is not a regulatory requirement, it is useful as a guide to evaluate potential noise impacts.

Table 5: Noise Model Results

Receiver	Modeled Daytime Noise Level (dBA)	Estimated Daytime Ambient (dBA)	Modeled Nighttime Noise Level (dBA)	Estimated Nighttime Ambient (dBA)	USEPA Recommended Protective Guideline (dBA)
NSA 1	25	45	14	39	48.6
NSA 2	29	45	15	39	48.6
NSA 3	34	45	19	39	48.6
NSA 4	15	45	0	39	48.6
NSA 5	25	45	15	39	48.6
NSA 6	23	45	17	39	48.6
NSA 7	32	45	31	39	48.6
NSA 8	28	45	27	39	48.6
NSA 9	26	45	26	39	48.6
NSA 10	33	45	33	39	48.6
NSA 11	25	45	24	39	48.6
NSA 12	23	45	21	39	48.6
NSA 13	27	45	19	39	48.6
NSA 14	27	45	19	39	48.6
NSA 15	28	45	18	39	48.6
NSA 16	26	45	15	39	48.6
NSA 17	27	45	15	39	48.6
NSA 18	27	45	15	39	48.6
NSA 19	33	45	18	39	48.6
NSA 20	30	45	18	39	48.6
NSA 21	25	45	18	39	48.6

Receiver	Modeled Daytime Noise Level (dBA)	Estimated Daytime Ambient (dBA)	Modeled Nighttime Noise Level (dBA)	Estimated Nighttime Ambient (dBA)	USEPA Recommended Protective Guideline (dBA)
Property Line of Participating Landowners [1]	55	N/A[2]	55	N/A[2]	N/A[2]

(1) Highest modeled noise level for any location along the property line of participating landowners.
(2) No NSAs located near this property line location.

As provided in Table 5, daytime operational noise levels at the NSA locations are shown to range from 15 dBA to 34 dBA, well below the estimated existing daytime ambient noise levels. Much lower nighttime noise levels, ranging from 0 dBA to 33 dBA, were modeled due to the Project inverters not being operational at night. Nighttime operational noise levels are also shown to be well below the estimated existing condition. Project generated noise levels for daytime and nighttime operation are well below the USEPA's recommended protective noise level of 48.6 dBA for 24-hour operation at the NSA locations.

The highest noise level modeled for any location along the property lines of participating landowners is 55 dBA. This location is associated with Parcel ID #055-003 and adjacent to the Project substation. Notably, no NSAs are present in the vicinity of this location. All modeled noise levels assume Project sources operating at full load conditions. There will often be times when sources are operating at lower loads, with subsequently lower noise levels at the NSAs and the property line.

Provided in Figures 2 and 3 are noise contour maps, depicting the modeled noise levels for daytime and nighttime operating conditions, respectively.

3.3 Construction Noise

3.3.1 General Construction

Construction typically includes the following phases:

- Site preparation
- Excavation
- Foundation Construction
- Building Construction
- Restoration/Finishing

The construction equipment utilized will differ from phase to phase but will include dozers, pile drivers, cranes, cement mixers, dump trucks, and loaders. Noise is generated during construction primarily from diesel engines, which power the equipment. Exhaust noise usually is the predominant source of diesel engine noise, which is the reason that maintaining functional mufflers on all equipment will be a requirement.

Noise levels of construction equipment that may be used for the Project are summarized in Table 6 (FHWA, 2006). Noise transmitted from the site will be attenuated by a variety of mechanisms. The most significant of these mechanisms is the divergence of the sound waves with distance (attenuation by divergence). In general, this mechanism will result in a six dBA decrease in the sound level with every doubling of distance from the source. Additional reductions in noise are achieved through absorption by the atmosphere.

Table 1 provided the closest distance any NSA would be to the LOD. However, the Project site covers a very large area. The actual sound levels that will be experienced by NSAs surrounding the site during construction will be a function of distance and which equipment are in operation. As such, no one existing NSA will be exposed to the same sound levels over an extended period of time, as construction progresses through the site. For example, a few residences are located 100 feet or less from the LOD. These same NSAs will be two miles or more away from equipment when construction is occurring at more distant areas of the site.

An analysis was performed to calculate construction noise levels at various distances from where NSAs would be located from areas within the Project site and is also provided in Table 6. Notably, the below analysis does not include the effect of topographic conditions, which will act to reduce the actual noise level that will be experienced.

Table 6: Construction Noise Assessment (dBA)

Equipment Type	Maximum Sound Level [1]	Calculated Sound Level at Various Distances			
	50 Feet	500 Feet	1,000 Feet	5,000 Feet	10,000 Feet
Cement Trucks	79	58	50	29	17
Front End Loaders	79	58	50	29	17
Graders	85	64	56	35	23
Dozers	82	61	53	32	20
Pickup Trucks	55	34	26	5	0
Backhoes	78	57	49	28	16
Concrete Mixers	79	58	50	29	17
Air Compressor	78	57	49	28	16
Dump Trucks	77	56	48	27	15
Cranes	81	60	52	31	19
Flatbed Trucks	74	53	45	24	12
Pile Driving	101	80	73	52	39

(1) Source: FHWA, 2006

As noted above, the project site covers a very large area, and the noise levels experienced at any NSAs will vary depending on what areas of the site are being constructed at any given time. As shown in Table 6, construction-related noise levels will vary widely depending on where construction is occurring. It is important to note that all of the equipment listed is not used in all phases of construction. Further, the equipment used generally is not operated continuously, nor is the equipment always operated simultaneously or at full load conditions.

Construction is a temporary activity, and there are no known noise limits applicable to construction. Exhaust noise from diesel engines that power the equipment is usually the predominant source of construction equipment noise. Accordingly, maintaining functional mufflers on all diesel-powered equipment will be a mitigation measure and a requirement of the project. As an additional mitigation measure, construction will only occur during daytime hours.

3.3.2 Pile Driving

Pile driving will occur for installation of the solar panels. A total of approximately 39,000 piles will be installed. The installation of each pile occurs very quickly, usually requiring 90 seconds or less per pile. It is estimated that pile driving will occur over a 40-day period.

Maximum sound level (Lmax) pile driving noise levels of 101 dBA at 50 feet were obtained from the Federal Highway Administration's Roadway Construction Noise Model, presented in Table 6 above. No usage factors were incorporated into the analysis so that Lmax sound levels would be calculated at the various distances rather than time-averaged sound levels.

The maximum expected pile driving noise level at each NSA is provided in Table 7. The noise level presented is for the nearest approach any one single pile driver will be to the respective NSA. As provided in Table 7, pile driving will generate the highest noise levels during construction, and will exceed the estimated ambient condition. However, as previously discussed, construction will occur over a very large area, and no one NSA will experience the same or a constant noise level. The highest noise level experienced at any one NSA will occur when pile driving occurs at the closest point to the NSA. As piles are quickly installed, noise levels will decrease as piles are installed at greater distances away from an NSA. As was presented in Table 6, at very large distances (e.g., 10,000 feet), pile driving noise levels would be below the estimated ambient levels. As a noise mitigation measure, no nighttime pile driving will be conducted, with pile driving scheduled to only occur between the hours of 8 a.m. and 8 p.m. Additionally, NSAs within 1,500 feet of where pile driving will occur will be notified prior to commencing construction.

Table 7: Maximum Expected Pile Driving Noise Levels (dBA)

Receiver	Maximum Pile Driving Noise Level (dBA)
NSA 1	72
NSA 2	81
NSA 3	76
NSA 4	53
NSA 5	65
NSA 6	62
NSA 7	60
NSA 8	51
NSA 9	49
NSA 10	58
NSA 11	55
NSA 12	53
NSA 13	67
NSA 14	70
NSA 15	80
NSA 16	70
NSA 17	81
NSA 18	76
NSA 19	79
NSA 20	72
NSA 21	63

4. CONCLUSION

This report presents the results of the noise assessment ERM conducted for FRON bn, LLC's Frontier Solar Project in Marion and Washington Counties, Kentucky. The assessment included a noise model of the major facility noise generating equipment operating under full load conditions during both daytime and nighttime operating conditions. ERM evaluated the operational noise model results against estimated existing ambient conditions and the USEPA noise guidance. Construction related noise was also evaluated.

The operational noise assessment revealed that Project-generated noise levels would be well below estimated existing conditions at all identified NSA locations during daytime hours with all equipment in operation at full load. Much lower operational noise levels, well below the estimated ambient condition, would occur during nighttime hours when the Project inverters are not in operation. Modeled levels were also shown to be well below the USEPA recommended protective noise level at all nearby NSAs during both daytime and nighttime operating conditions.

Construction-related noise would result in a wide range of noise levels at area NSAs due to the very large Project site. While construction noise levels will at times exceed ambient conditions, no one existing NSA will be exposed to the same sound levels over an extended period of time, as construction progresses through the site. Construction noise mitigation will include requiring functional mufflers on all diesel-powered equipment and limiting construction, and in particular pile driving, to only occur between the hours 8 a.m. and 8 p.m. Additionally, FRON bn, LLC proposes to notify NSAs within 1,500 feet of where pile driving will occur prior to commencing construction.

5. REFERENCES

American National Standards Institute (ANSI) 2013. S12.9-2013/Part 3 (Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: Short-Term Measurements with an Observer Present).

DataKustik GmbH. 2006. Computer Aided Noise Abatement Model CadnaA. Munich, Germany.

Federal Highway Administration [FHWA]. 2006. FHWA Roadway Construction Noise Model User's Guide

Harris, *Handbook of Acoustical Measurements and Noise Control*, Third Edition (McGraw-Hill, Inc., 1991).

IEEE, 2010. Institute of Electrical and Electronics Engineers. Standard C57.12.90-1999. General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

ISO, 1996. International Organization for Standardization. Standard ISO 9613-2 Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2 General Method of Calculation. Geneva, Switzerland.

United States Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement & Control. Report Number EPA 550/9-74-009. Washington, D. C. 20460

United States Environmental Protection Agency, 1978. Protective Noise Levels. Office of Noise Abatement & Control. Report Number EPA 550/9-79-100. Washington, D. C. 20460.

FIGURES

SAR EXHIBIT E

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MEMO

TO	FRON bn, LLC
FROM	Michael Tincher, Duncan Quinn
DATE	20 December 2023
REFERENCE	Frontier Solar Project (Washington and Marion Counties, Kentucky)
SUBJECT	Glare Analysis Memorandum

1. INTRODUCTION

FRON bn, LLC (FRON) proposes to construct and operate the Frontier Solar Project (Project or Site), a photovoltaic (PV) solar facility planned in Washington and Marion Counties, Kentucky. FRON requested that ERM conduct a glare analysis to evaluate whether the Project may cause glare that could impact observers along nearby roadways, residences, or affect aircraft operations. This memorandum summarizes the methodologies utilized and results of the glare analysis. Glare analysis documentation is provided in Appendix A.

2. PROJECT AND SITE DESCRIPTION

The proposed Project footprint is approximately 935 acres within the Project fence line and contains four adjacent areas of PV arrays. The Site is located west of KY Highway 55 (Lebanon Rd / Springfield Hwy), approximately 2.2 miles south-southwest of Springfield, KY and 2.3 miles north of Lebanon, KY (Figures 1 and 2). Cartwright Creek, Jackson Branch, and Servant Run cross the Site generally flowing south to north. The Project will have an alternating current (AC) generation capacity of 120 megawatts (MW).

FRON plans for the PV system to contain single-axis rotation panels oriented due south with a tracking angle range of motion of +/-60 degrees. The average height of center of the PV panels above ground will be approximately 5.0 feet. The ground coverage ratio (GCR) of the PV panels is anticipated to be 0.30 (30%). The PV panels will contain smooth glass with anti-reflective coating. The PV panel tracking system will implement a shade and slope-aware backtracking strategy with the shallowest possible angle of east/west rotation during backtracking of 0 degrees.

The Site currently consists of agricultural fields and pastures interspersed with some small, forested areas. Scattered residences along McLain Road, Booker Road, Jackson Branch Lane, and Moraja Lane are located adjacent to or near the Site. Land use in the

Project vicinity primarily consists of agricultural fields and pastures with widely scattered residences. The Lebanon–Springfield Airport and Rosewood Golf Club are located approximately 0.6 mile east and 0.6 mile south of the Site, respectively. The Site contains small, rolling hills and ranges in elevation from approximately 700 to 870 feet above mean sea level.

3. VIEWPOINT SUMMARY AND DISCUSSION

A representative sample of potential viewpoints was identified within a one-mile radius of the proposed Project. Viewpoints are locations from which the Project may be visible to human receptors, such as residents, motorists, pilots, recreationists, and tourists. Such viewers may be sensitive to potential glare caused by the PV panels. These viewpoints, referred to as "receptors" in the glare analysis results (Appendix A), were identified during review of aerial imagery, topographic maps, and other publicly available online mapping resources.

Based on ERM's review of the Federal Aviation Administration (FAA) database,[1] one public use aircraft facility, the Lebanon–Springfield Airport (6I2), is located within 5 nautical miles of the Project. Per FAA guidelines, ERM included 2-mile-long straight approach flight paths (FP 1 and FP 2) with a glide slope of 3 degrees to this facility as part of the glare analysis. The Lebanon–Springfield Airport does not have an air traffic control tower (ATCT). During the review of aerial imagery and maps, ERM did not observe other airstrips or helipads near the Project.

ERM identified nine residences and one previously recorded architectural resource eligible for listing on the National Register of Historic Places (NRHP),[2] the Cartwright Creek Bridge on Booker Road (OP 6), to serve as representative viewpoints for the glare analysis (OP 1 though OP 10). These representative viewpoints are located along McLain Road, Booker Road, Jackson Branch Lane, Moraja Lane, and KY Highway 55 (as shown on Figures 1 and 2. In addition, McLain Road, Booker Road, Jackson Branch Lane, and Moraja Lane were evaluated as route receptors to determine whether glare could potentially be observed by motorists travelling these roads. Due to topographic features and distances between the PV arrays, KY Highway 55, and the McMurtry Home, an historic dwelling meeting NHRP criteria, KY Highway 55 and the McMurtry Home were eliminated from further consideration in the glare analysis.

4. GLARE ANALYSIS

FRON requested a glare analysis of the Project to evaluate the potential for glare at nearby residences, along roadways, and along flight approach paths to runways. This

[1] Federal Aviation Administration. Circle Search for Airports. Available online https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=showCircleSearchAirportsForm. Accessed 13 September 2023.
[2] ERM Memo to FRON. Critical Issues Analysis for the Frontier Solar Project, Kentucky. 04 August 2022.

glare analysis is based on design parameters provided by FRON for single-axis rotation PV panels as detailed above in section 2.

It is important to note that glare would not be experienced if the solar panels are screened by topography, structures, or vegetation. Therefore, locations where glare may occur would be limited to areas with views of the proposed Project. Potential visibility could change over time due to planting or removal of vegetation or construction or removal of structures. The ForgeSolar tool does not, by default, consider the screening effects of vegetation, artificial structures, or topographic features between a PV array and sensitive receptors.

4.1 BACKGROUND

PV panels are designed to absorb rather than reflect sunlight to maximize energy capture. Many PV panels may utilize textured glass and/or have anti-reflective coatings to further minimize reflectivity. Based on information provided by FRON, the glare analysis assumed the Project's PV panels will contain smooth glass with an anti-reflective coating.

PV solar projects often do not produce harmful or nuisance levels of glare, defined as a continuous source of bright light that may be visible to nearby residents, motorists, or pilots. The absorbing, rather than reflecting, nature of PV technology allows PV panels to be commonly and safely installed adjacent to roadways and on airport properties nationwide.

The amount of glare reflected from solar panels depends on several factors, including the amount of sunlight hitting the panel surface, the surface's reflectivity (based on variables such as the presence of textured glass and/or anti-reflective coatings), the geographic location, time of year, weather conditions, and solar panel orientation. These factors affect the angle of incidence of the sun relative to sensitive viewers, and the amount of glare experienced.[3] With respect to glare, angle of incidence is the angle at which light deviates from perpendicular to a surface. The angle of incidence changes as the sun moves across the sky and is generally lowest at solar noon (when the sun is at its highest point above the horizon and is reflected toward the sky) and highest at dawn and dusk (when the sun is low in the sky and is reflected at a high angle of incidence in the opposite direction).

[3] Federal Aviation Administration. 2018. *Technical Guidance for Evaluating Selected Solar Technologies on Airports.* Version 1.1, April 2018. Available online https://www.faa.gov/sites/faa.gov/files/airports/environmental/FAA-Airport-Solar-Guide-2018.pdf.

4.2 METHODOLOGY

The industry standard ForgeSolar GlareGauge[4] tool was used to assess potential glare and ocular impact at the 10 viewpoints, four route receptors, and two flight approach paths as shown on Figures 1 and 2. The tool calculates ocular impact from anticipated levels of retinal irradiance (amount of light received by the retina) and the subtended angle (size and distance) of the glare source. The ForgeSolar tool uses three categories to report potential ocular hazards ranging from retinal burns to temporary after-image, defined as a visual phenomenon in which glare persists in the viewer's vision, even after looking away from the source. These categories include:

- "Green" ratings indicate a low potential to cause after-image (flash blindness);
- "Yellow" ratings indicate potential to cause temporary after-image; and
- "Red" ratings indicate potential to cause retinal burn and permanent eye damage.[5]

When simulating glare, the ForgeSolar tool modifies the vertex elevations of a PV array so that all points of the PV array reside on a single planar surface. Therefore, to enhance the accuracy of the glare analysis (and prevent the flattening of hills, for example), the four areas of PV arrays were further divided into a total of 16 smaller PV arrays to account for variations in topographic slope and aspect associated with the hilly terrain of the Site.

The ForgeSolar tool considers the direction the PV panels face throughout the day and the slope of the PV array, based on the underlying topography, elevation, and height above ground of both the PV arrays and sensitive receptors. However, the tool does not, by default, consider the screening effects of vegetation, artificial structures, or topographic features *between* a PV array and sensitive receptors. To account for this limitation, ERM manually interpreted the glare analysis results presented in the following section to exclude potential glare generated by specific PV arrays where significant topographic features and/or distances would prevent glare from being observed at specific ground-based viewpoints.

Analysis of potential glare observed from stationary viewpoints is based on a 360-degree field of view. By comparison, the route-based analyses along the road segments are calculated using a 100-degree field of view (50 degrees to the left and right) centered on the direction of travel (in both directions) along the routes. This

[4] ForgeSolar Glare Analysis tool. Available online https://www.forgesolar.com/. Accessed 18 December 2023.
[5] ForgeSolar. Fundamentals: About Glint and Glare. Available online https://www.forgesolar.com/help/#glare. Accessed 13 September 2023.

default value is based on FAA research, which determined that the impact of glare beyond a 100-degree field of view is mitigated.[6]

4.3 RESULTS

As mentioned previously, ERM manually interpreted the raw glare analysis results in Appendix A to exclude potential glare generated by specific PV arrays where significant topographic features and/or distances would prevent glare from being observed at specific ground-based viewpoints. However, no adjustments were made to glare calculations along the two flight paths (FP 1 and FP 2). Glare calculations for ground-based viewpoints included and discussed in this section are highlighted orange in Appendix A.

It should be noted that glare potentially observed at each viewpoint from multiple PV arrays may occur simultaneously, particularly glare emanating from adjacent PV arrays. As a result, total annual hours of potential glare likely to be observed may be less than the totals reported in tables 1 and 2 for viewpoints that have predicted glare emanating from more than one PV array.

Furthermore, the glare analysis does not consider potential cloud cover, so the values in Tables 1 and 2 represent total potential amounts of glare assuming no cloud cover. NOAA's Comparative Climatic Data[7] database lists the closest weather station in Louisville, KY (located 44 miles northwest of the Site) having recorded an average of 55 percent possible sunshine on an annual basis over the period 1965-2016. This would suggest that potential glare would typically only occur about 55 percent of the time on average throughout the year, reducing the predicted amounts of glare presented in the tables by approximately 45 percent.

The glare analysis predicts the Project will not generate red glare at any of the viewpoints assessed. The glare analysis results in tables 1 and 2 predict the potential of over 2,300 hours of green glare and over 500 hours of yellow glare per year along FP 1 (the flight approach path to Runway 11 at the Lebanon–Springfield Airport). This finding is not surprising considering that the 2-mile-long FP 1 crosses directly over PV arrays 10, 11, and 12 and is within several hundred horizontal feet of PV arrays 9, 13, and 14. The results predict 65 hours of green glare and no yellow glare along FP 2, the flight approach path to Runway 29 located on the east side of the airport.

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[6] Rogers, J. A., et al. 2015. "Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach." Federal Aviation Administration, Office of Aerospace Medicine. Report No. DOT/FAA/AM-15/12. Available online https://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2010s/media/201512.pdf.

[7] NOAA's National Centers for Environmental Information. Comparative Climatic Data (CCD-2018) Dataset. Available online https://www.ncei.noaa.gov/products/land-based-station/comparative-climatic-data. Accessed 7 November 2023.

Portions of all four routes analyzed (McLain Road, Booker Road, Jackson Branch Lane, and Moraja Lane) will potentially experience between 20 and 131 hours of green glare annually. Potential amounts of yellow glare on these routes range from approximately 10 to 122 hours annually. The analysis indicates that Jackson Branch Lane is expected to receive the greatest annual hours of both green and yellow glare among the four routes assessed. This is a result of this road being located between multiple PV arrays and the southern part of the road occupying a relatively high landscape position along a ridge. Parts of Jackson Branch Lane may receive glare from PV arrays on both sides of the road at different times of the day and year. Figures indicating which parts of each route could be impacted by glare from various PV arrays are included in Appendix A. Motorists traveling these routes, however, would likely only experience a few moments of glare before the vehicle moves into a position from which glare is no longer visible.

The glare analysis did not predict glare of any type at the Cartwright Creek Bridge on Booker Rd (OP 6), the NHRP-eligible architectural resource. Of the 9 representative residences in the Project vicinity analyzed, green glare was predicted at OP 1, OP 3, OP 4, OP 5, OP 7, OP 8, and OP 9, ranging between 2 and 17 hours annually. The results predict yellow glare of 1.1, 0.5, and 4.7 hours annually at OP 4, OP 5, and OP 9, respectively.

4.4 CONCLUSIONS

Although the Project is anticipated to generate significant amounts of both green and yellow glare along flight path FP 1 (and to a lesser extent green glare predicted along FP 2) at the Lebanon–Springfield Airport, impacts on pilots are expected to be minimal. In 2021, the FAA issued an updated policy regarding reviews of solar projects on federally obligated airport property in which the FAA concluded that in most cases "glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass facade buildings, parking lots, and similar features."[8] The focus of the FAA policy is potential impacts on crews in ATCTs, which would not apply to airports without ATCTs such as the Lebanon–Springfield Airport. In addition, pilots on final approach would likely experience only a few moments of glare before the aircraft moves into a position from which glare is no longer visible.

As discussed earlier, the ForgeSolar tool does not, by default, consider the screening effects of vegetation, artificial structures, or topographic features between a PV array and viewpoints. To address this limitation, a more in-depth visual assessment that includes a viewshed analysis and field reconnaissance photos from selected viewpoints to document existing conditions is recommended. This visual assessment would help further refine the viewpoints from which the Project would be visible and provide a

[8] FAA. 2021. Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports. 86 FR 25801.

more accurate assessment of which viewpoints may or may not be impacted by potential glare.

Table 1: Annual Hours of Green Glare Predicted *

Viewpoints	PV Arrays																Totals
	PV 1	PV 2	PV 4	PV 5	PV 6	PV 6-B	PV 7	PV 8	PV 9	PV 10	PV 11	PV 12	PV 13	PV 14	PV 15	PV 16	
Booker Rd					19.8												**19.8**
Jackson Branch Ln		20.4			51.8			8.8	36.3		9.2	4.0					**130.5**
McLain Rd					48.1	8.9	8.0	0.3									**65.3**
Moraja Ln		9.3						3.5				16.1					**28.9**
FP 1		32.0	0.9						76.7	603.4	441.2	405.7	476.0	294.2			**2330.1**
FP 2						5.7	14.5		18.0		7.4	5.1		14.1		0.4	**65.2**
OP 1				7.0													**7.0**
OP 2																	**0.0**
OP 3												1.9					**1.9**
OP 4								4.7									**4.7**
OP 5					9.7												**9.7**
OP 6																	**0.0**
OP 7							7.2										**7.2**
OP 8		2.2						1.6									**3.8**
OP 9									9.5		3.9	3.7					**17.1**
OP 10																	**0.0**

* Manual adjustments to the raw glare analysis in Appendix A were made by ignoring predicted glare received at ground-based viewpoints from PV arrays which would not be visible due to topography and/or distance. Glare potentially observed at each viewpoint from multiple PV arrays may occur simultaneously.

Table 2: Annual Hours of Yellow Glare Predicted *

Viewpoints	PV Arrays																Totals
	PV 1	PV 2	PV 4	PV 5	PV 6	PV 6-B	PV 7	PV 8	PV 9	PV 10	PV 11	PV 12	PV 13	PV 14	PV 15	PV 16	
Booker Rd					43.1												**43.1**
Jackson Branch Ln		1.0			72.1			25.6	22.9								**121.6**
McLain Rd						1.3	8.5										**9.8**
Moraja Ln		6.2						27.1				1.5					**34.8**
FP 1									5.3	302.8	38.0	89.6	73.1				**508.8**
FP 2																	**0.0**
OP 1																	**0.0**
OP 2																	**0.0**
OP 3																	**0.0**
OP 4								1.1									**1.1**
OP 5					0.5												**0.5**
OP 6																	**0.0**
OP 7																	**0.0**
OP 8																	**0.0**
OP 9									2.6			2.1					**4.7**
OP 10																	**0.0**

* Manual adjustments to the raw glare analysis in Appendix A were made by ignoring predicted glare received at ground-based viewpoints from PV arrays which would not be visible due to topography and/or distance. Glare potentially observed at each viewpoint from multiple PV arrays may occur simultaneously.

FIGURES

M:\US\Projects\A-C\Brightnight\Frontier\ArcGIS\Frontier Glare Analsis.aprx\Glare Analysis-Aerial, REVISED: 11/08/2023, SCALE: 1:40,000 when printed at 8.5x11

Drawn By: Casey.Brotman

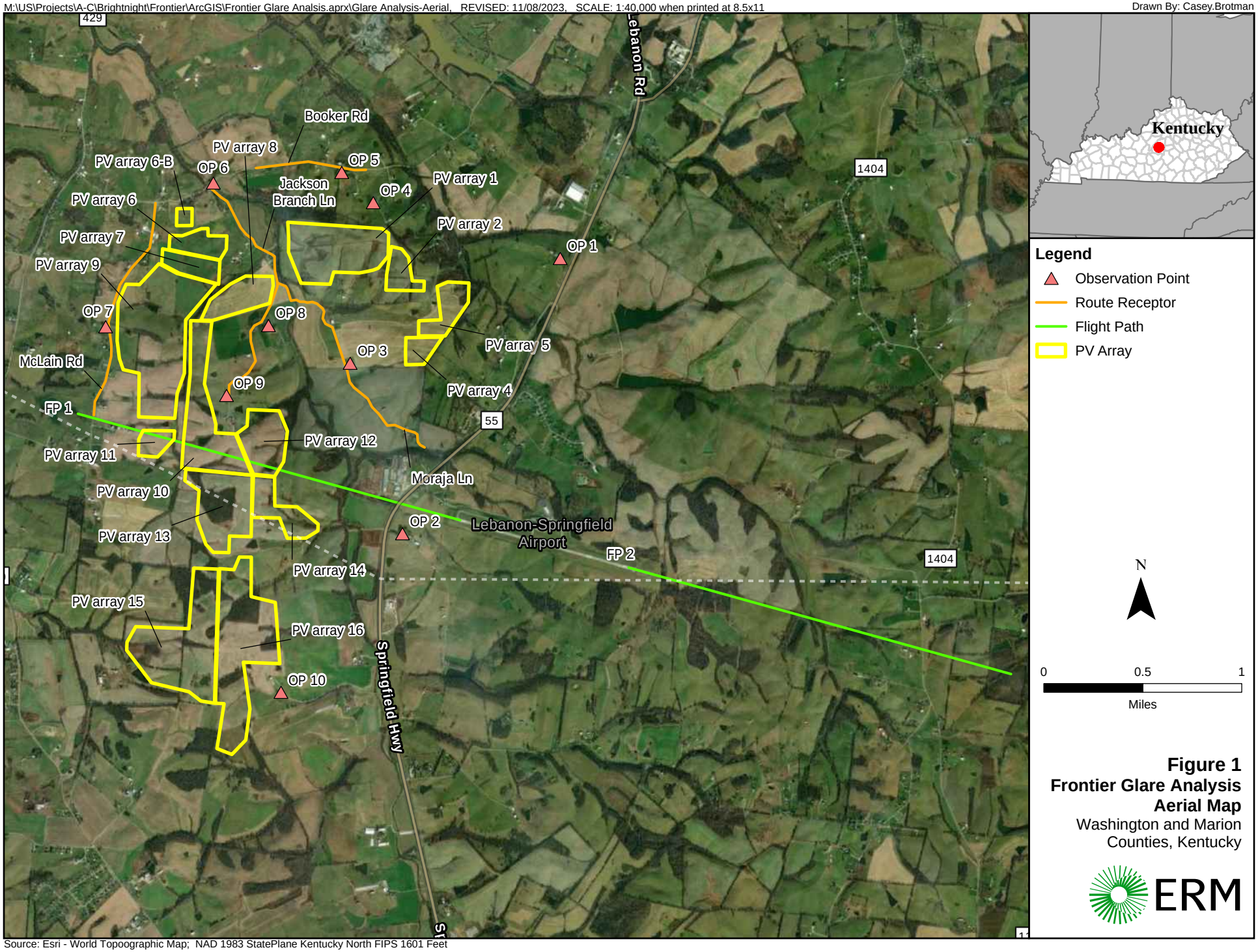

Figure 1
Frontier Glare Analysis
Aerial Map
Washington and Marion Counties, Kentucky

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

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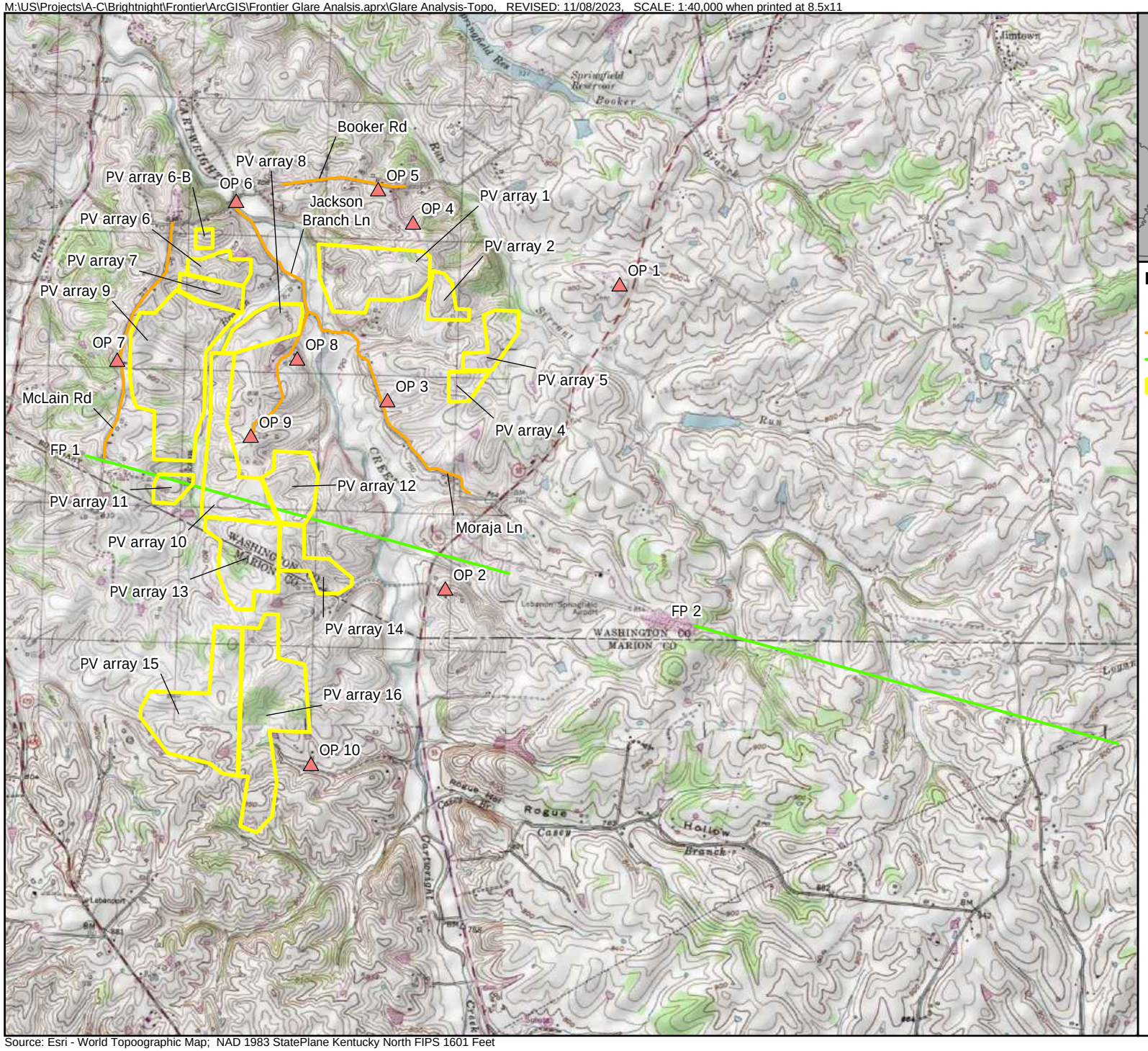
Drawn By: Casey.Brotman



Legend

- Observation Point
- Route Receptor
- Flight Path
- PV Array

N

0 0.5 1

Miles

Figure 2
Frontier Glare Analysis
Topographic Map
Washington and Marion Counties, Kentucky

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

APPENDIX A - FORGESOLAR GLARE ANALYSIS RESULTS

FORGESOLAR GLARE ANALYSIS

Project: **Frontier**
Site configuration: **SSBT to 0_2023-12-13_rev**

Client: BrightNight

Created 18 Dec, 2023
Updated 18 Dec, 2023
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 108234.17496

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

Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 10	SA tracking	SA tracking	36,204	603.4	18,165	302.8	-
PV array 11	SA tracking	SA tracking	28,371	472.9	2,283	38.0	-
PV array 12	SA tracking	SA tracking	26,746	445.8	5,628	93.8	-
PV array 13	SA tracking	SA tracking	28,770	479.5	4,388	73.1	-
PV array 14	SA tracking	SA tracking	18,496	308.3	0	0.0	-
PV array 15	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 16	SA tracking	SA tracking	26	0.4	0	0.0	-
PV array 1-adj	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	5,524	92.1	437	7.3	-
PV array 4-adj	SA tracking	SA tracking	55	0.9	0	0.0	-
PV array 5-adj	SA tracking	SA tracking	417	7.0	0	0.0	-
PV array 6-adj	SA tracking	SA tracking	7,785	129.8	6,943	115.7	-
PV array 6-B	SA tracking	SA tracking	925	15.4	78	1.3	-
PV array 7-adj	SA tracking	SA tracking	2,954	49.2	682	11.4	-
PV array 8-adj	SA tracking	SA tracking	1,129	18.8	3,229	53.8	-
PV array 9	SA tracking	SA tracking	9,976	166.3	1,979	33.0	-

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
Booker Rd	1,578	26.3	2,718	45.3
Jackson Branch Ln	7,828	130.5	7,297	121.6
McLain Rd	5,823	97.0	627	10.4
Moraja Ln	4,259	71.0	2,266	37.8
FP 1	139,803	2,330.1	30,529	508.8
FP 2	3,913	65.2	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 1	560	9.3	0	0.0
OP 2	0	0.0	0	0.0
OP 3	111	1.9	0	0.0
OP 4	495	8.2	66	1.1
OP 5	722	12.0	28	0.5
OP 6	0	0.0	0	0.0
OP 7	868	14.5	0	0.0
OP 8	391	6.5	0	0.0
OP 9	1,027	17.1	281	4.7
OP 10	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 10
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.649573	-85.272817	784.47	5.00	789.47
2	37.649590	-85.274769	727.41	5.00	732.41
3	37.645682	-85.274769	752.07	5.00	757.07
4	37.640721	-85.275327	765.61	5.00	770.61
5	37.638801	-85.275456	768.47	5.00	773.47
6	37.638393	-85.268933	824.39	5.00	829.39
7	37.641332	-85.270542	813.50	5.00	818.50
8	37.641400	-85.272388	793.28	5.00	798.28
9	37.642012	-85.272345	807.85	5.00	812.85
10	37.643167	-85.272731	794.57	5.00	799.57
11	37.644968	-85.273439	788.59	5.00	793.59

Name: PV array 11
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.641519	-85.279039	799.25	5.00	804.25
2	37.640874	-85.279426	799.98	5.00	804.98
3	37.639667	-85.279469	792.36	5.00	797.36
4	37.639582	-85.277688	774.87	5.00	779.87
5	37.640891	-85.276186	773.86	5.00	778.86
6	37.641502	-85.276143	769.87	5.00	774.87

Name: PV array 12
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.641349	-85.270435	810.80	5.00	815.80
2	37.638410	-85.268847	824.43	5.00	829.43
3	37.638257	-85.266894	815.44	5.00	820.44
4	37.639344	-85.266079	810.25	5.00	815.25
5	37.641587	-85.265757	777.06	5.00	782.06
6	37.643065	-85.266551	765.23	5.00	770.23
7	37.643133	-85.269405	774.24	5.00	779.24
8	37.641927	-85.269469	784.85	5.00	789.85

Name: PV array 13
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.638325	-85.268954	826.49	5.00	831.49
2	37.638716	-85.275070	770.52	5.00	775.52
3	37.637883	-85.275156	777.83	5.00	782.83
4	37.637169	-85.273825	807.42	5.00	812.42
5	37.635028	-85.273997	816.74	5.00	821.74
6	37.633227	-85.273160	810.04	5.00	815.04
7	37.632649	-85.272473	817.12	5.00	822.12
8	37.632632	-85.271014	834.01	5.00	839.01
9	37.633856	-85.270993	838.56	5.00	843.56
10	37.633822	-85.268997	809.39	5.00	814.39

Name: PV array 14
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.638325	-85.268847	826.61	5.00	831.61
2	37.638206	-85.266894	816.11	5.00	821.11
3	37.636099	-85.266851	791.00	5.00	796.00
4	37.636048	-85.264792	789.33	5.00	794.33
5	37.634790	-85.262839	745.18	5.00	750.18
6	37.634315	-85.262860	745.20	5.00	750.20
7	37.633771	-85.263933	759.68	5.00	764.68
8	37.633737	-85.265671	778.54	5.00	783.54
9	37.635215	-85.266401	786.31	5.00	791.31
10	37.635232	-85.268933	809.26	5.00	814.26

Name: PV array 15
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.631426	-85.271958	833.79	5.00	838.79
2	37.631477	-85.274254	833.63	5.00	838.63
3	37.627041	-85.274641	841.68	5.00	846.68
4	37.627143	-85.279533	838.28	5.00	843.28
5	37.626005	-85.280305	807.78	5.00	812.78
6	37.625410	-85.280327	803.97	5.00	808.97
7	37.623048	-85.278009	818.61	5.00	823.61
8	37.622419	-85.274555	856.29	5.00	861.29
9	37.621756	-85.273460	858.83	5.00	863.83
10	37.621603	-85.272194	849.06	5.00	854.06

Name: PV array 16
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.631460	-85.271873	833.15	5.00	838.15
2	37.621603	-85.272109	848.37	5.00	853.37
3	37.621569	-85.271315	832.83	5.00	837.83
4	37.618289	-85.271915	816.04	5.00	821.04
5	37.617864	-85.270542	814.39	5.00	819.39
6	37.618935	-85.269276	820.13	5.00	825.13
7	37.621212	-85.268933	841.17	5.00	846.17
8	37.624628	-85.269577	813.18	5.00	818.18
9	37.624560	-85.266229	814.52	5.00	819.52
10	37.629030	-85.266701	822.65	5.00	827.65
11	37.629438	-85.268933	827.83	5.00	832.83
12	37.632327	-85.268954	818.97	5.00	823.97
13	37.632327	-85.270049	828.27	5.00	833.27
14	37.631392	-85.270542	820.50	5.00	825.50

Name: PV array 1-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.656844	-85.265886	746.12	5.00	751.12
2	37.655655	-85.265886	717.22	5.00	722.22
3	37.654686	-85.265843	714.17	5.00	719.17
4	37.652427	-85.264663	724.54	5.00	729.54
5	37.652393	-85.263461	777.67	5.00	782.67
6	37.652325	-85.261959	757.24	5.00	762.24
7	37.653259	-85.261659	774.43	5.00	779.43
8	37.653191	-85.259298	766.88	5.00	771.88
9	37.653293	-85.258655	787.86	5.00	792.86
10	37.653412	-85.258032	803.51	5.00	808.51
11	37.653599	-85.257539	803.53	5.00	808.53
12	37.654482	-85.256659	803.69	5.00	808.69
13	37.656147	-85.256638	852.27	5.00	857.27
14	37.656487	-85.257238	857.41	5.00	862.41

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.653106	-85.256788	790.05	5.00	795.05
2	37.651985	-85.256831	788.51	5.00	793.51
3	37.651968	-85.253333	812.55	5.00	817.55
4	37.652665	-85.253312	787.07	5.00	792.07
5	37.652682	-85.254406	805.36	5.00	810.36
6	37.654381	-85.254771	830.35	5.00	835.35
7	37.655009	-85.255415	831.81	5.00	836.81
8	37.655179	-85.256359	833.56	5.00	838.56

Name: PV array 4-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.648570	-85.254857	822.16	5.00	827.16
2	37.647585	-85.254900	801.29	5.00	806.29
3	37.646583	-85.254921	785.32	5.00	790.32
4	37.646583	-85.253247	809.54	5.00	814.54
5	37.648587	-85.251574	787.96	5.00	792.96

Name: PV array 5-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.649760	-85.253784	804.32	5.00	809.32
2	37.648655	-85.253784	823.54	5.00	828.54
3	37.648672	-85.251338	787.95	5.00	792.95
4	37.651170	-85.249170	760.36	5.00	765.36
5	37.652597	-85.249170	742.63	5.00	747.63
6	37.652597	-85.251123	798.29	5.00	803.29
7	37.652342	-85.252110	798.23	5.00	803.23
8	37.649862	-85.252239	813.34	5.00	818.34

Name: PV array 6-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.655842	-85.275392	772.26	5.00	777.26
2	37.655791	-85.276743	784.19	5.00	789.19
3	37.654805	-85.276786	807.78	5.00	812.78
4	37.654058	-85.272130	760.35	5.00	765.35
5	37.654805	-85.271508	766.08	5.00	771.08
6	37.655825	-85.271529	759.23	5.00	764.23
7	37.655825	-85.273267	743.35	5.00	748.35
8	37.655842	-85.274169	759.33	5.00	764.33

Name: PV array 6-B
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.657768	-85.274755	797.94	5.00	802.94
2	37.656528	-85.274733	767.87	5.00	772.87
3	37.656545	-85.276128	764.85	5.00	769.85
4	37.657768	-85.276150	783.15	5.00	788.15

Name: PV array 7-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.654856	-85.277430	808.57	5.00	813.57
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
2	37.653718	-85.277462	772.95	0.00	772.95
3	37.653055	-85.275864	758.34	5.00	763.34
4	37.652291	-85.272216	719.19	5.00	724.19
5	37.654024	-85.272130	760.27	5.00	765.27

Name: PV array 8-adj
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.649658	-85.274040	747.70	5.00	752.70
2	37.651136	-85.273010	749.94	5.00	754.94
3	37.652291	-85.271186	739.00	5.00	744.00
4	37.652937	-85.269984	721.89	5.00	726.89
5	37.652920	-85.267238	730.46	5.00	735.46
6	37.652240	-85.267216	729.31	5.00	734.31
7	37.650932	-85.267538	726.42	5.00	731.42
8	37.649624	-85.272795	783.59	5.00	788.59

Name: PV array 9
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.3
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.652291	-85.272452	721.23	5.00	726.23
2	37.653038	-85.276078	762.62	5.00	767.62
3	37.653735	-85.277752	778.73	5.00	783.73
4	37.652189	-85.279533	786.13	5.00	791.13
5	37.652206	-85.280756	795.78	5.00	800.78
6	37.650847	-85.281486	797.88	5.00	802.88
7	37.648061	-85.281529	811.26	5.00	816.26
8	37.646769	-85.281314	797.67	5.00	802.67
9	37.645954	-85.280949	798.98	5.00	803.98
10	37.645699	-85.279469	794.42	5.00	799.42
11	37.642505	-85.279469	806.31	5.00	811.31
12	37.642437	-85.276143	766.49	5.00	771.49
13	37.644255	-85.275950	754.42	5.00	759.42
14	37.645716	-85.275306	749.96	5.00	754.96
15	37.649641	-85.275241	738.65	5.00	743.65

Route Receptors

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.660774	-85.258789	791.24	6.00	797.24
2	37.660740	-85.259819	819.41	6.00	825.41
3	37.661318	-85.264110	779.45	6.00	785.45
4	37.660808	-85.268917	742.13	6.00	748.13

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.659428	-85.273241	708.54	6.00	714.54
2	37.658638	-85.272093	706.92	6.00	712.92
3	37.658349	-85.271535	711.24	6.00	717.24
4	37.656430	-85.270258	720.23	6.00	726.23
5	37.655937	-85.269743	720.00	6.00	726.00
6	37.655606	-85.269153	720.78	6.00	726.78
7	37.655096	-85.268831	719.39	6.00	725.39
8	37.654519	-85.267426	722.32	6.00	728.32
9	37.654349	-85.267114	726.82	6.00	732.82
10	37.653848	-85.267104	731.53	6.00	737.53
11	37.653270	-85.267071	728.32	6.00	734.32
12	37.652412	-85.266814	716.59	6.00	722.59
13	37.652166	-85.266825	716.99	6.00	722.99
14	37.650807	-85.267415	722.55	6.00	728.55
15	37.649558	-85.268241	755.43	6.00	761.43
16	37.649261	-85.268906	758.28	6.00	764.28
17	37.648827	-85.269260	764.26	6.00	770.26
18	37.648105	-85.269217	783.99	6.00	789.99
19	37.646687	-85.268745	794.82	6.00	800.82
20	37.645846	-85.269389	767.63	6.00	773.63
21	37.645208	-85.270322	785.29	6.00	791.29
22	37.645166	-85.270805	795.31	6.00	801.31
23	37.644894	-85.271170	799.81	6.00	805.81
24	37.644019	-85.271170	814.14	6.00	820.14

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.658167	-85.278143	833.09	6.00	839.09
2	37.656468	-85.278315	811.72	6.00	817.72
3	37.654871	-85.278615	813.79	6.00	819.79
4	37.653376	-85.280289	798.29	6.00	804.29
5	37.652153	-85.281319	796.03	6.00	802.03
6	37.650556	-85.281963	805.87	6.00	811.87
7	37.649367	-85.282349	816.75	6.00	822.75
8	37.647722	-85.282049	811.07	6.00	817.07
9	37.646906	-85.282049	808.42	6.00	814.42
10	37.645071	-85.282564	811.46	6.00	817.46
11	37.643576	-85.283508	815.41	6.00	821.41
12	37.642591	-85.283593	793.18	6.00	799.18

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

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.652414	-85.266817	716.86	6.00	722.86
2	37.652178	-85.266063	713.99	6.00	719.99
3	37.652004	-85.265915	714.91	6.00	720.91
4	37.651129	-85.265572	712.17	6.00	718.17
5	37.651197	-85.265063	711.76	6.00	717.76
6	37.651053	-85.264719	712.00	6.00	718.00
7	37.651061	-85.264328	711.83	6.00	717.83
8	37.650998	-85.264065	712.79	6.00	718.79
9	37.651057	-85.263598	713.97	6.00	719.97
10	37.650925	-85.263164	716.01	6.00	722.01
11	37.650581	-85.262627	721.56	6.00	727.56
12	37.650356	-85.262498	720.11	6.00	726.11
13	37.649919	-85.262622	734.84	6.00	740.84
14	37.649460	-85.262353	762.02	6.00	768.02
15	37.649214	-85.261710	777.88	6.00	783.88
16	37.646015	-85.260294	750.03	6.00	756.03
17	37.645208	-85.260063	757.00	6.00	763.00
18	37.644818	-85.259666	764.59	6.00	770.59
19	37.644011	-85.258384	754.20	6.00	760.20
20	37.643407	-85.257992	752.03	6.00	758.03
21	37.642906	-85.257354	768.35	6.00	774.35
22	37.642069	-85.256565	764.70	6.00	770.70
23	37.642112	-85.255868	756.58	6.00	762.58
24	37.641768	-85.254892	756.27	6.00	762.27
25	37.641577	-85.254028	749.38	6.00	755.38
26	37.641436	-85.253787	754.96	6.00	760.96
27	37.641199	-85.253765	760.35	6.00	766.35
28	37.640893	-85.253738	752.01	6.00	758.01
29	37.640663	-85.253508	746.41	6.00	752.41
30	37.640498	-85.253111	746.89	6.00	752.89

Flight Path Receptors

Name: FP 1
Description:
Threshold height: 50 ft
Direction: 105.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	37.635190	-85.249760	822.09	50.00	872.09
Two-mile	37.642673	-85.285067	777.25	648.27	1425.52

Name: FP 2
Description:
Threshold height: 50 ft
Direction: 285.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	37.631853	-85.234204	870.67	50.00	920.67
Two-mile	37.624360	-85.198901	891.03	583.07	1474.10

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	37.654493	-85.240815	837.43	8.00
OP 2	2	37.634219	-85.255063	816.02	8.00
OP 3	3	37.646653	-85.260052	767.92	8.00
OP 4	4	37.658433	-85.258085	824.05	8.00
OP 5	5	37.660616	-85.261020	823.38	8.00
OP 6	6	37.659741	-85.272832	708.21	8.00
OP 7	7	37.649128	-85.282601	819.46	8.00
OP 8	8	37.649347	-85.267610	771.18	8.00
OP 9	9	37.644199	-85.271402	808.23	8.00
OP 10	10	37.622511	-85.266086	795.13	8.00

Glare Analysis Results

Summary of Results

Glare with potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 10	SA tracking	SA tracking	36,204	603.4	18,165	302.8	-
PV array 11	SA tracking	SA tracking	28,371	472.9	2,283	38.0	-
PV array 12	SA tracking	SA tracking	26,746	445.8	5,628	93.8	-
PV array 13	SA tracking	SA tracking	28,770	479.5	4,388	73.1	-
PV array 14	SA tracking	SA tracking	18,496	308.3	0	0.0	-
PV array 15	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 16	SA tracking	SA tracking	26	0.4	0	0.0	-
PV array 1-adj	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	5,524	92.1	437	7.3	-
PV array 4-adj	SA tracking	SA tracking	55	0.9	0	0.0	-
PV array 5-adj	SA tracking	SA tracking	417	7.0	0	0.0	-
PV array 6-adj	SA tracking	SA tracking	7,785	129.8	6,943	115.7	-
PV array 6-B	SA tracking	SA tracking	925	15.4	78	1.3	-
PV array 7-adj	SA tracking	SA tracking	2,954	49.2	682	11.4	-
PV array 8-adj	SA tracking	SA tracking	1,129	18.8	3,229	53.8	-
PV array 9	SA tracking	SA tracking	9,976	166.3	1,979	33.0	-

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
Booker Rd	1,578	26.3	2,718	45.3
Jackson Branch Ln	7,828	130.5	7,297	121.6
McLain Rd	5,823	97.0	627	10.4
Moraja Ln	4,259	71.0	2,266	37.8

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
FP 1	139,803	2,330.1	30,529	508.8
FP 2	3,913	65.2	0	0.0
OP 1	560	9.3	0	0.0
OP 2	0	0.0	0	0.0
OP 3	111	1.9	0	0.0
OP 4	495	8.2	66	1.1
OP 5	722	12.0	28	0.5
OP 6	0	0.0	0	0.0
OP 7	868	14.5	0	0.0
OP 8	391	6.5	0	0.0
OP 9	1,027	17.1	281	4.7
OP 10	0	0.0	0	0.0

PV: PV array 10 potential temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	36,204	603.4	18,165	302.8
FP 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 10 and Route: Booker Rd

No glare found

PV array 10 and Route: Jackson Branch Ln

No glare found

PV array 10 and Route: McLain Rd

No glare found

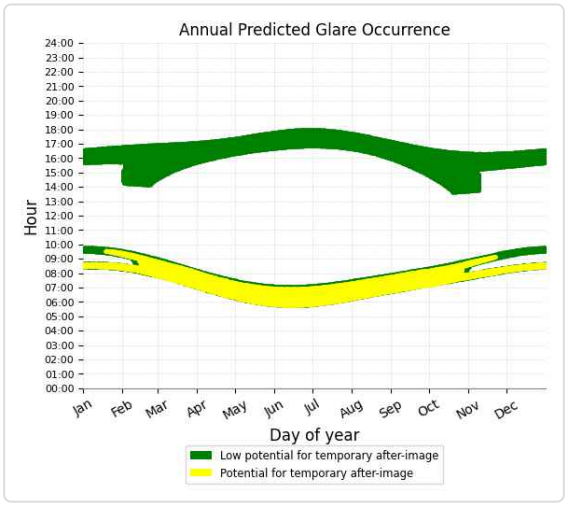
PV array 10 and Route: Moraja Ln

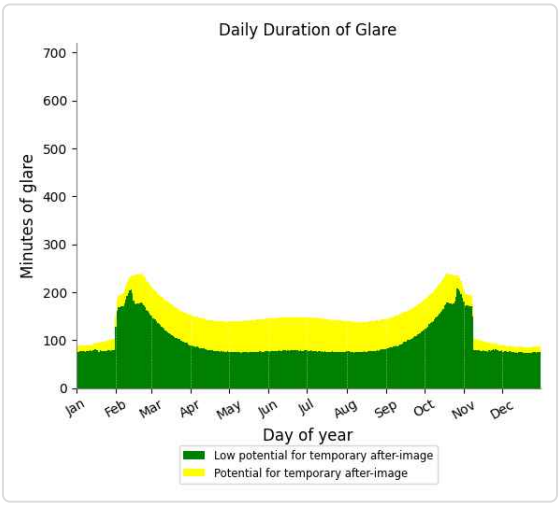
No glare found

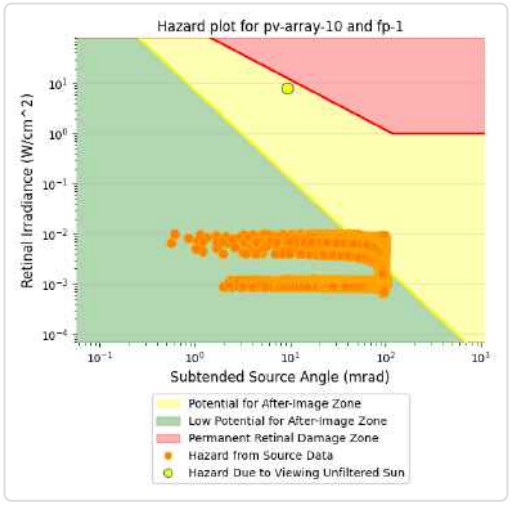
PV array 10 and FP: FP 1

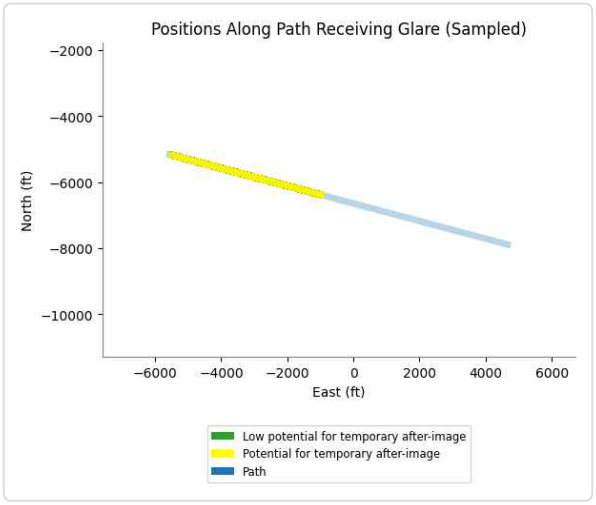
Yellow glare: 18,165 min.

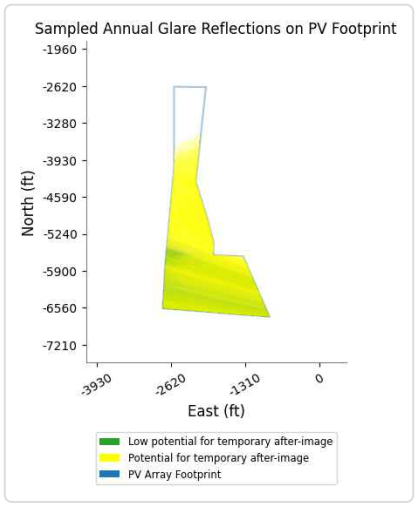
Green glare: 36,204 min.

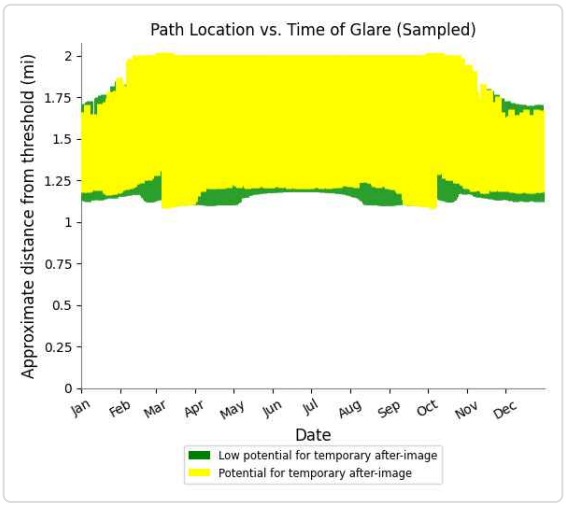












PV array 10 and FP: FP 2

No glare found

PV array 10 and OP 1

No glare found

PV array 10 and OP 2

No glare found

PV array 10 and OP 3

No glare found

PV array 10 and OP 4

No glare found

PV array 10 and OP 5

No glare found

PV array 10 and OP 6

No glare found

PV array 10 and OP 7

No glare found

PV array 10 and OP 8

No glare found

PV array 10 and OP 9

No glare found

PV array 10 and OP 10

No glare found

PV: PV array 11 potential temporary after-image

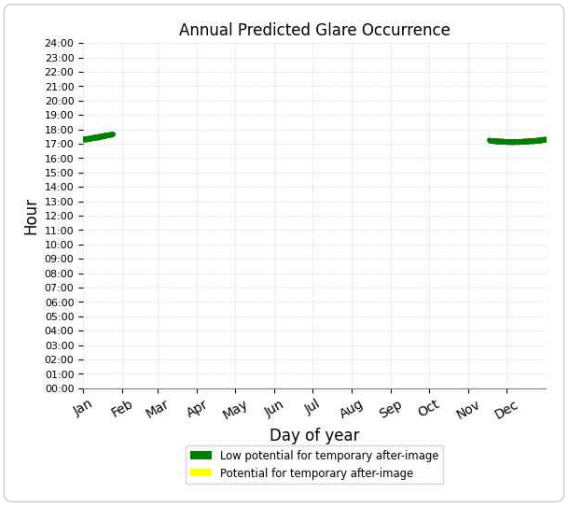
Receptor results ordered by category of glare

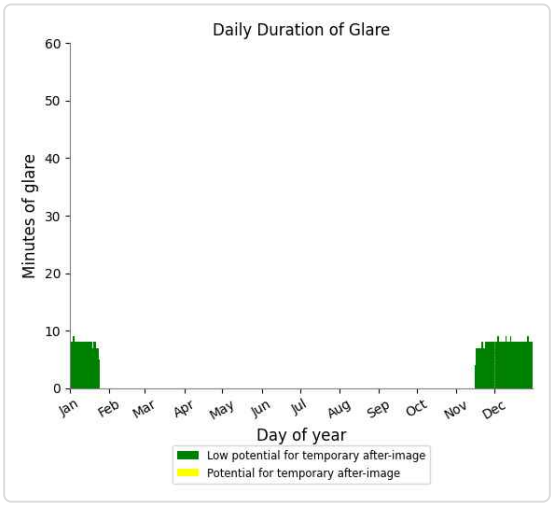
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Jackson Branch Ln	552	9.2	0	0.0
Moraja Ln	672	11.2	0	0.0
Booker Rd	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
FP 1	26,471	441.2	2,283	38.0
FP 2	442	7.4	0	0.0
OP 9	234	3.9	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

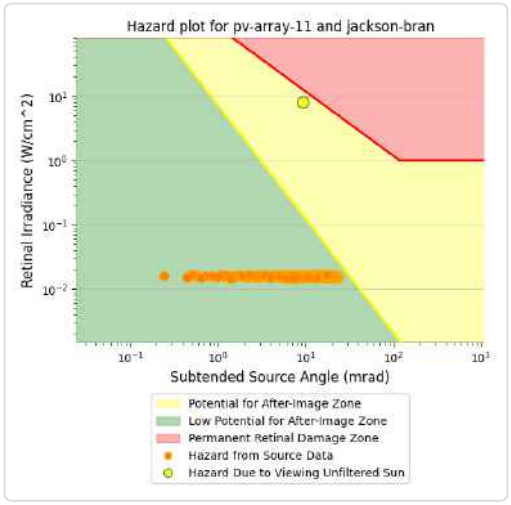
PV array 11 and Route: Jackson Branch Ln

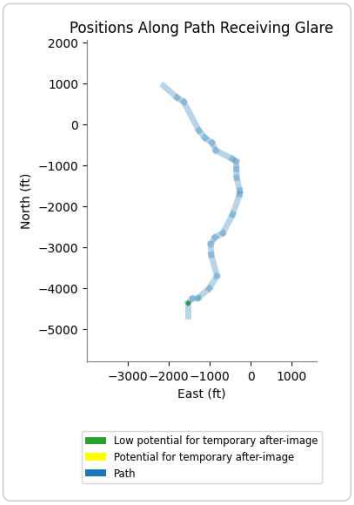
Yellow glare: none

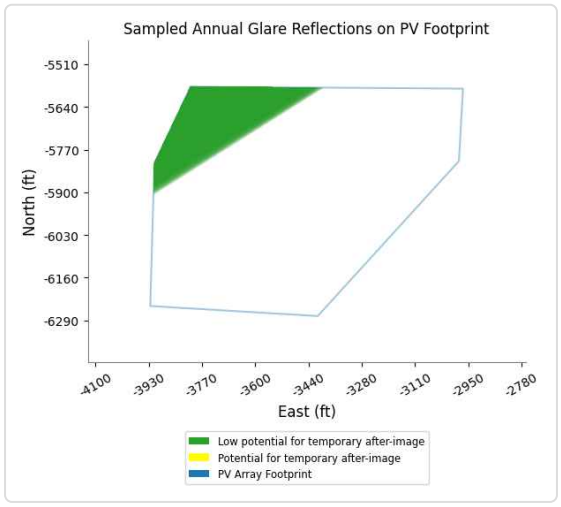
Green glare: 552 min.







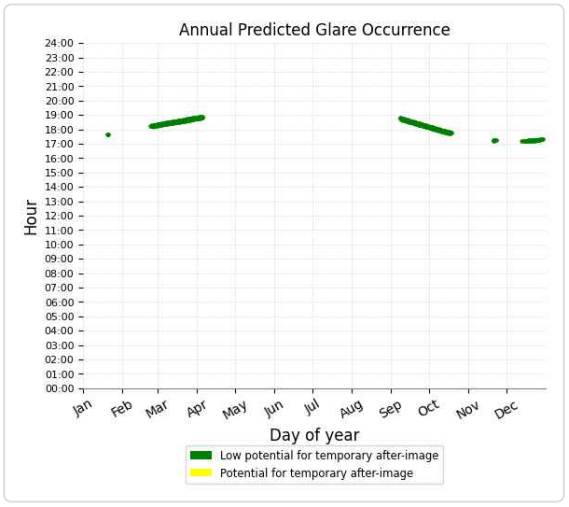


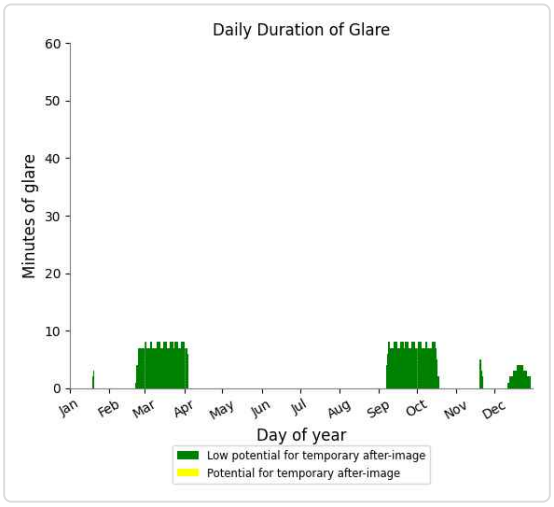


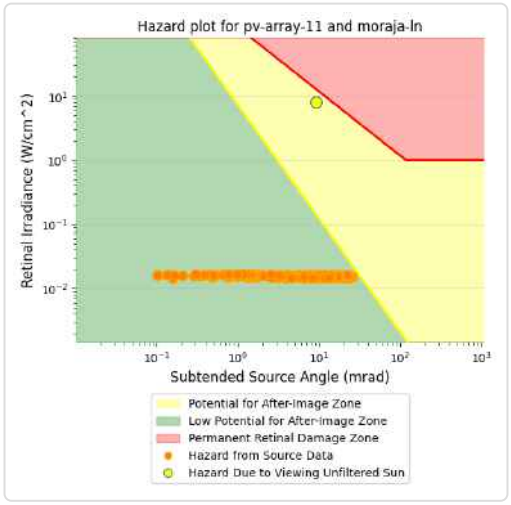
PV array 11 and Route: Moraja Ln

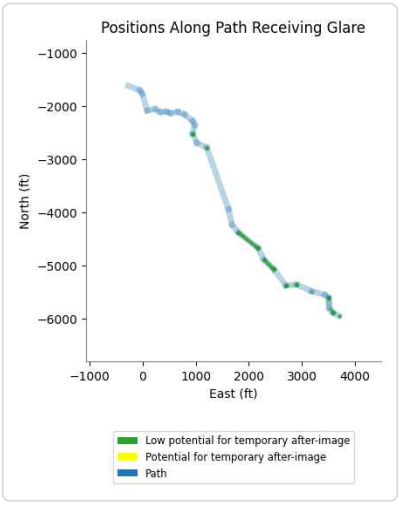
Yellow glare: none

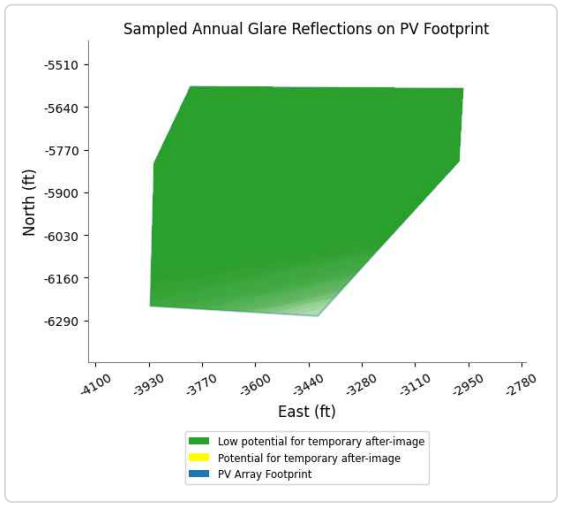
Green glare: 672 min.











PV array 11 and Route: Booker Rd

No glare found

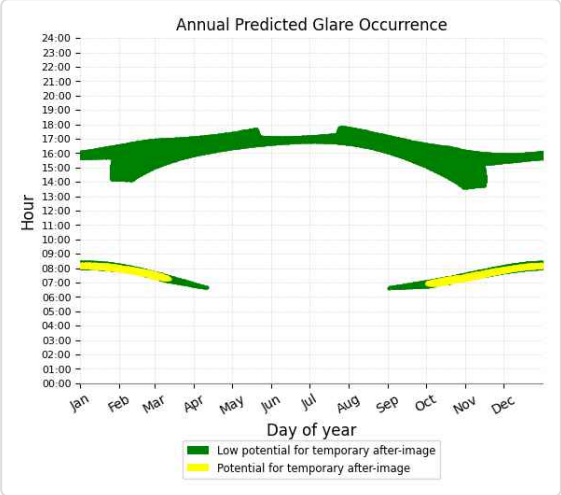
PV array 11 and Route: McLain Rd

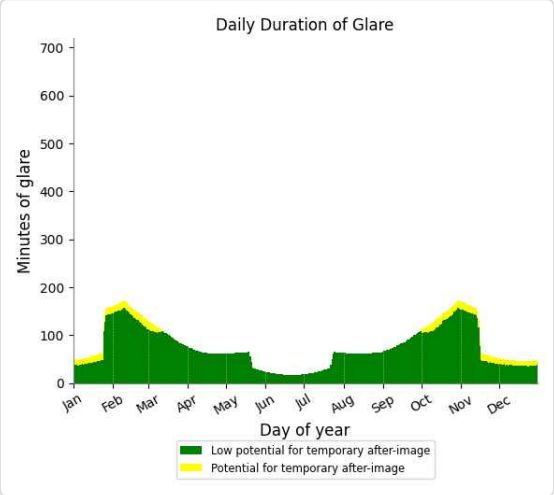
No glare found

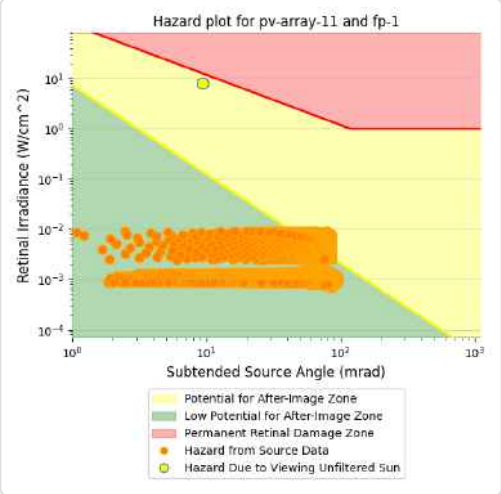
PV array 11 and FP: FP 1

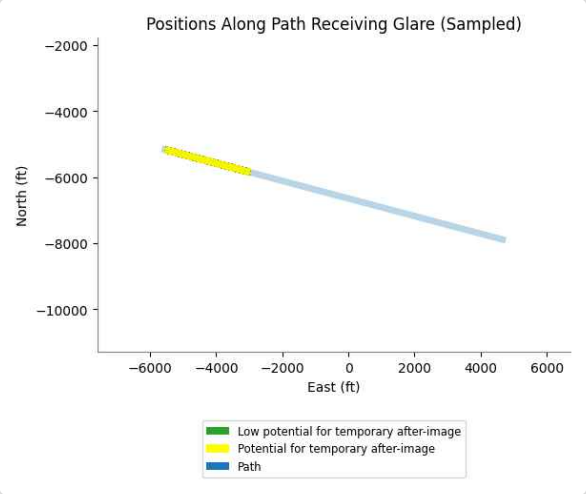
Yellow glare: 2,283 min.

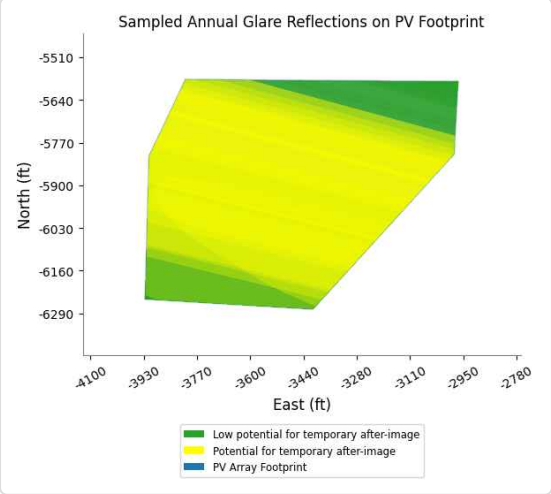
Green glare: 26,471 min.

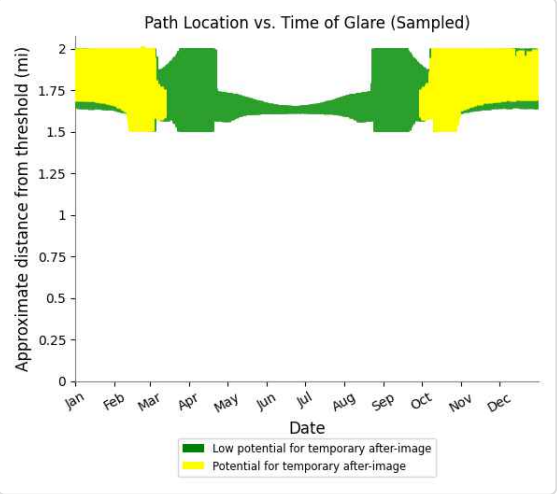








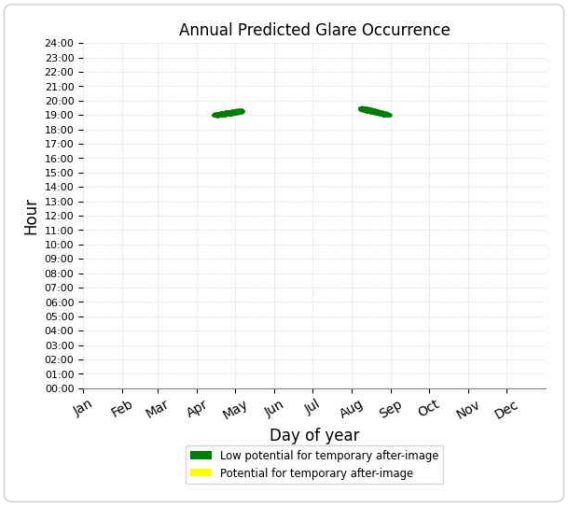


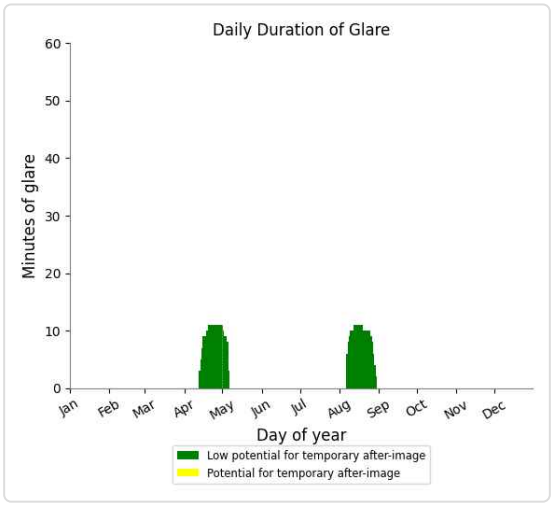


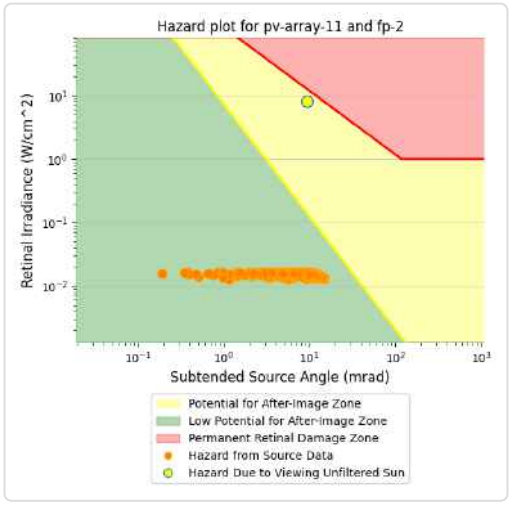
PV array 11 and FP: FP 2

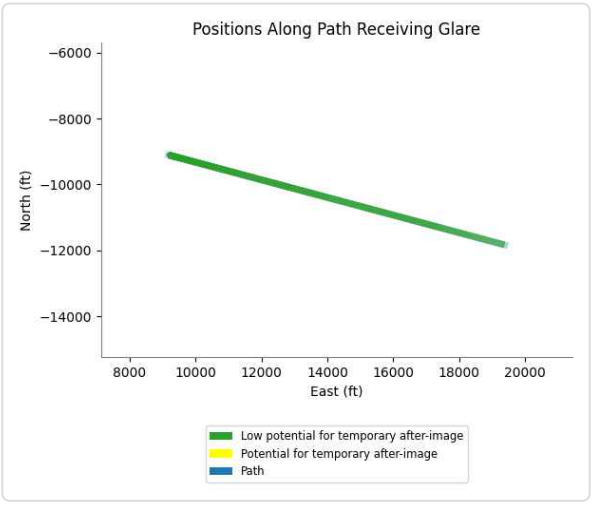
Yellow glare: none

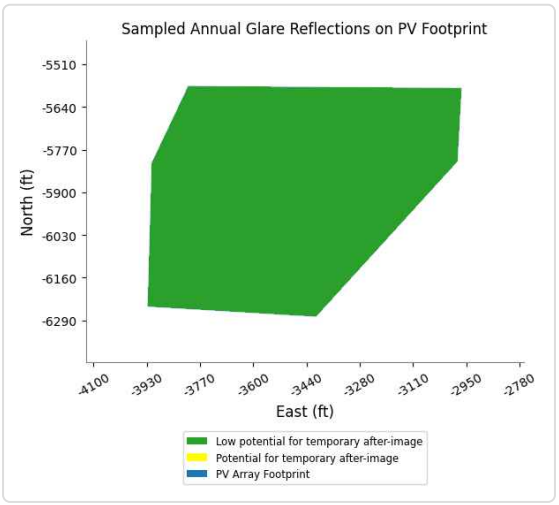
Green glare: 442 min.

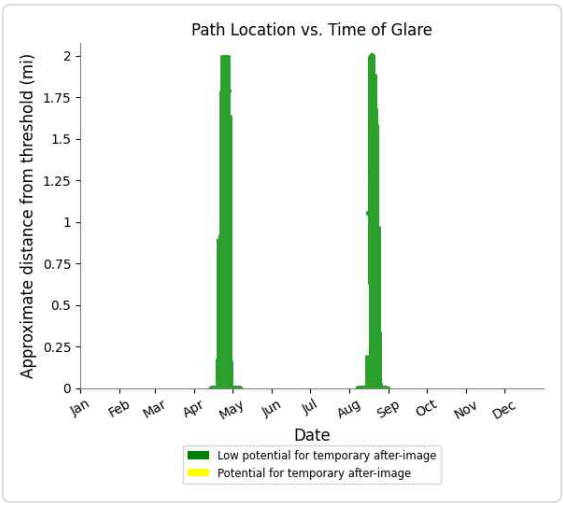






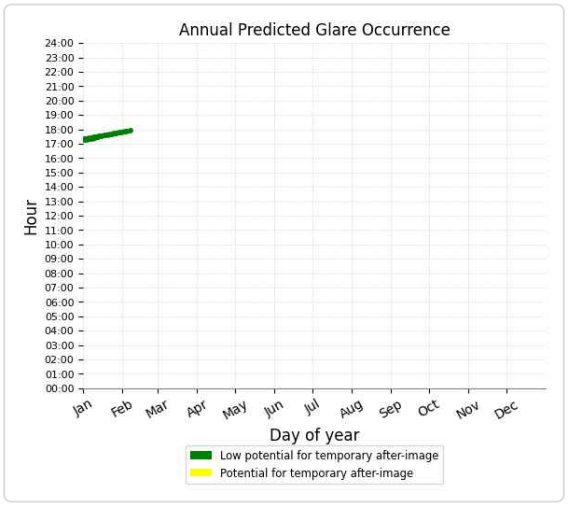


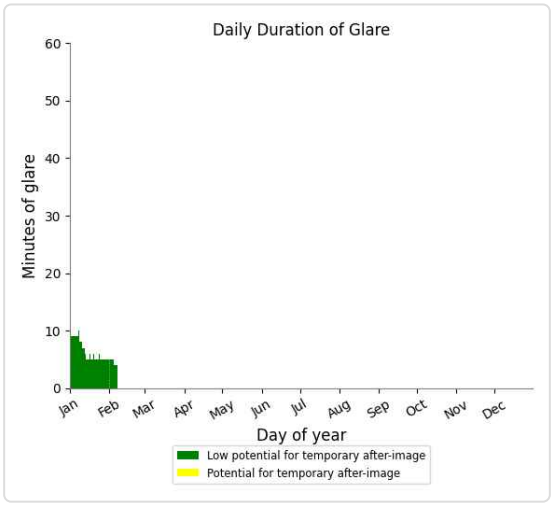


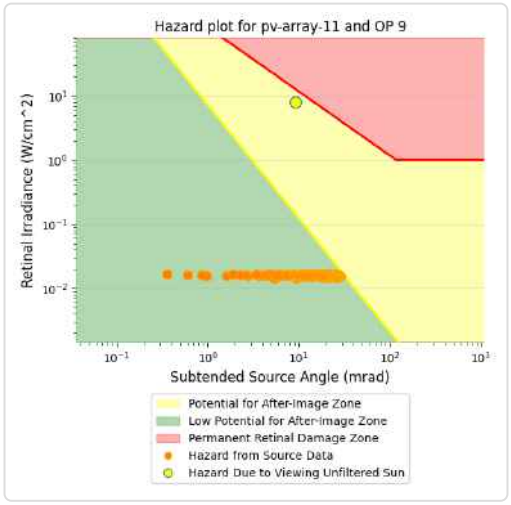


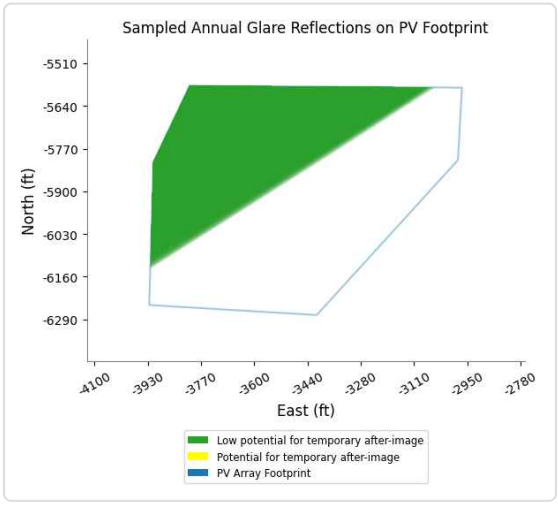
PV array 11 and OP 9

Yellow glare: none
Green glare: 234 min.









PV array 11 and OP 1

No glare found

PV array 11 and OP 2

No glare found

PV array 11 and OP 3

No glare found

PV array 11 and OP 4

No glare found

PV array 11 and OP 5

No glare found

PV array 11 and OP 6

No glare found

PV array 11 and OP 7

No glare found

PV array 11 and OP 8

No glare found

PV array 11 and OP 10

No glare found

PV: PV array 12 potential temporary after-image

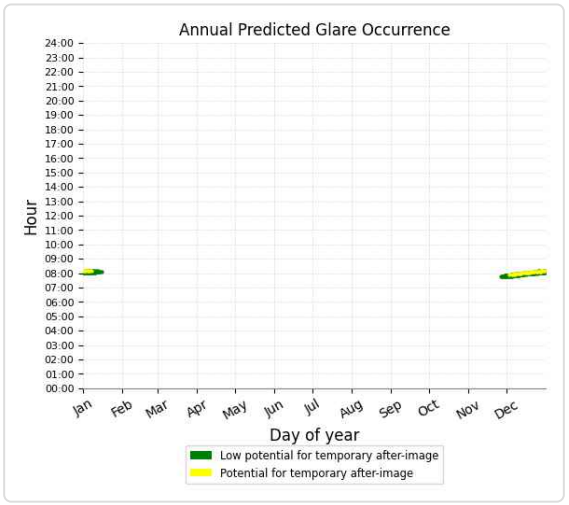
Receptor results ordered by category of glare

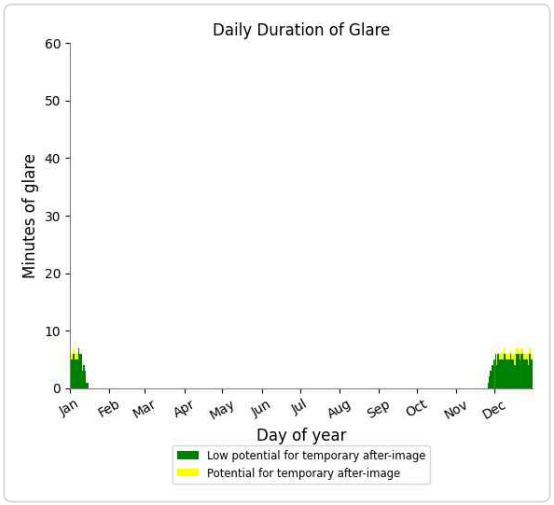
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
McLain Rd	243	4.0	37	0.6
Moraja Ln	965	16.1	92	1.5
Jackson Branch Ln	240	4.0	0	0.0
Booker Rd	0	0.0	0	0.0
FP 1	24,344	405.7	5,374	89.6
FP 2	307	5.1	0	0.0
OP 9	221	3.7	125	2.1
OP 1	99	1.6	0	0.0
OP 3	111	1.9	0	0.0
OP 7	216	3.6	0	0.0
OP 2	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

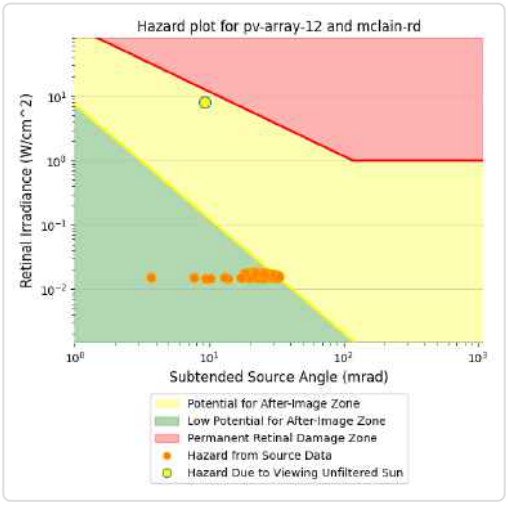
PV array 12 and Route: McLain Rd

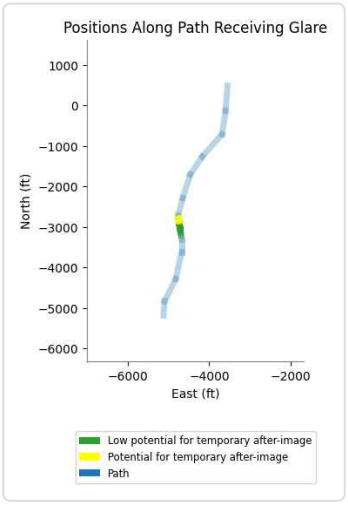
Yellow glare: 37 min.

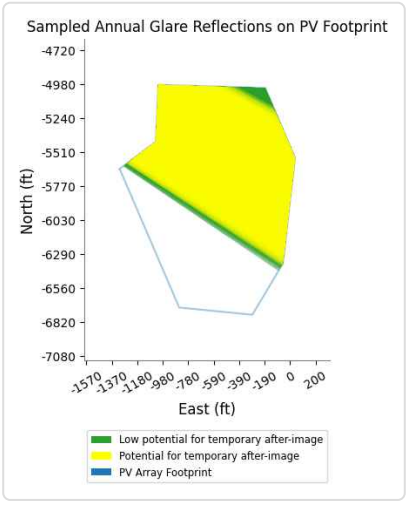
Green glare: 243 min.







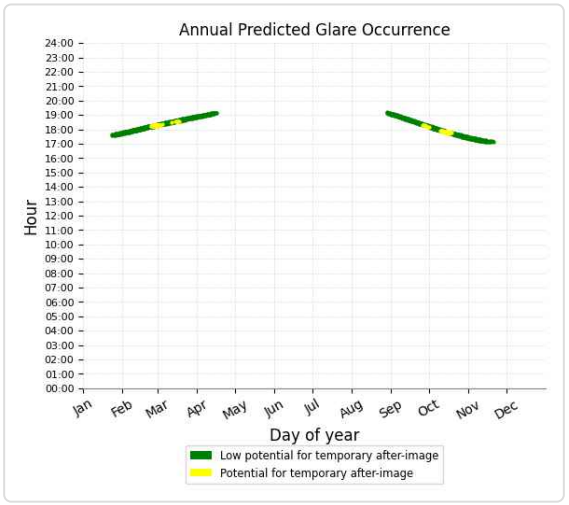


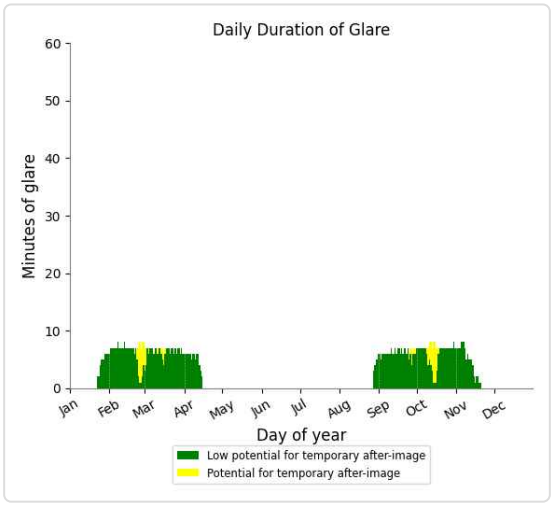


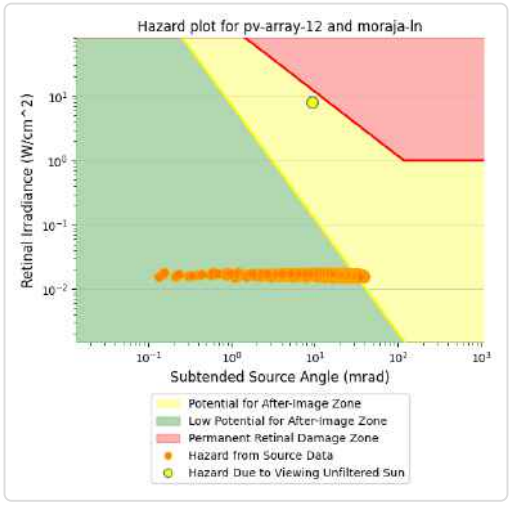
PV array 12 and Route: Moraja Ln

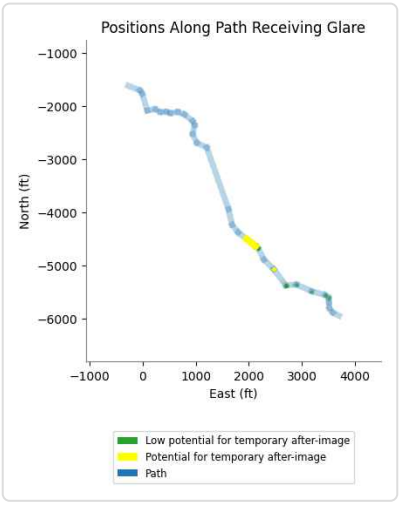
Yellow glare: 92 min.

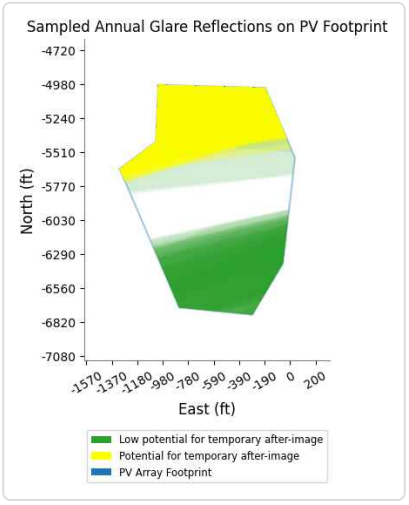
Green glare: 965 min.







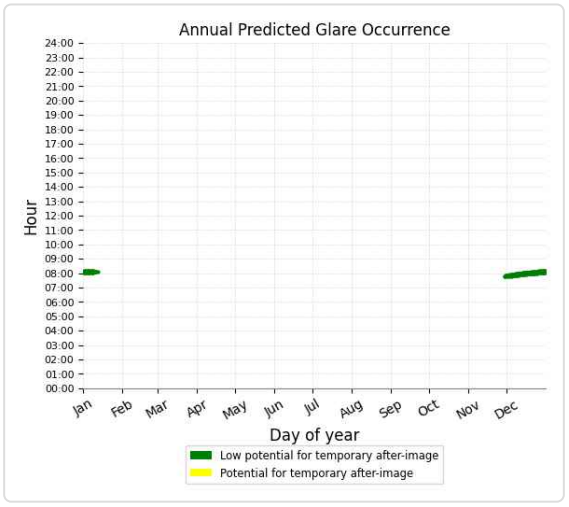


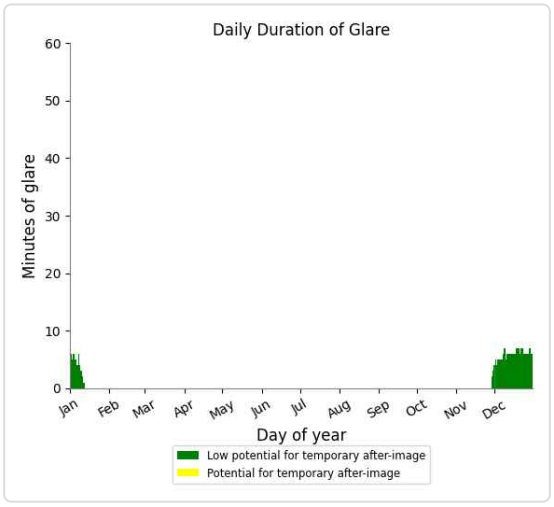


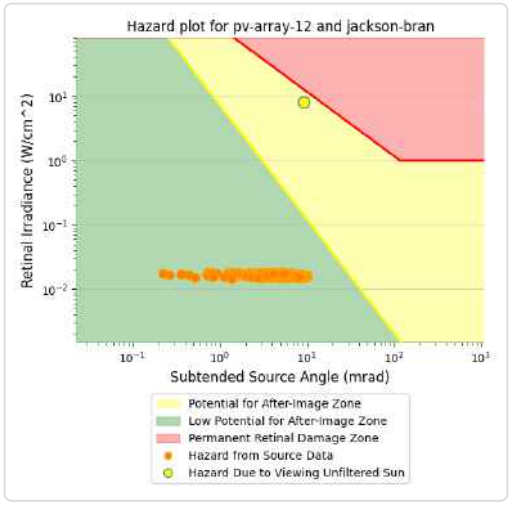
PV array 12 and Route: Jackson Branch Ln

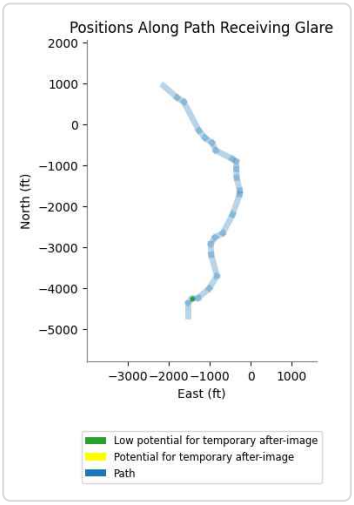
Yellow glare: none

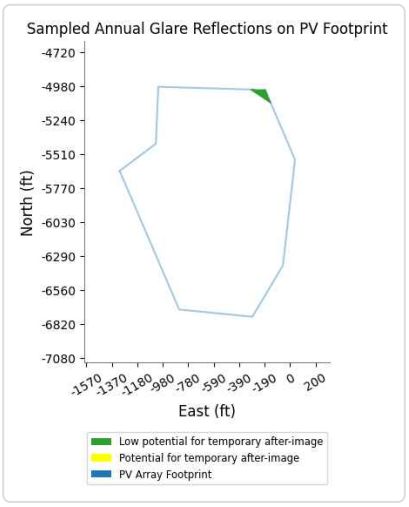
Green glare: 240 min.











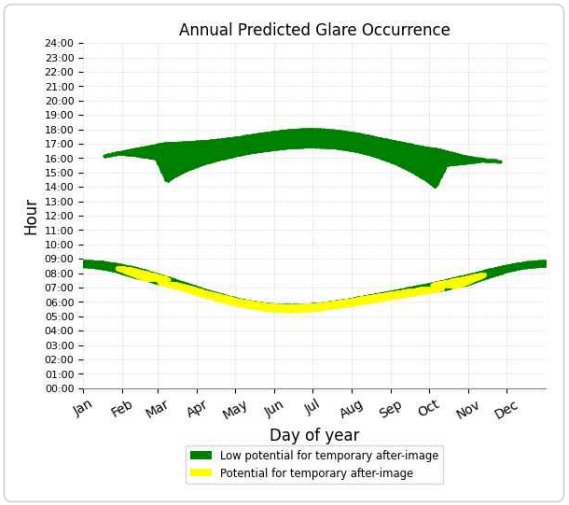
PV array 12 and Route: Booker Rd

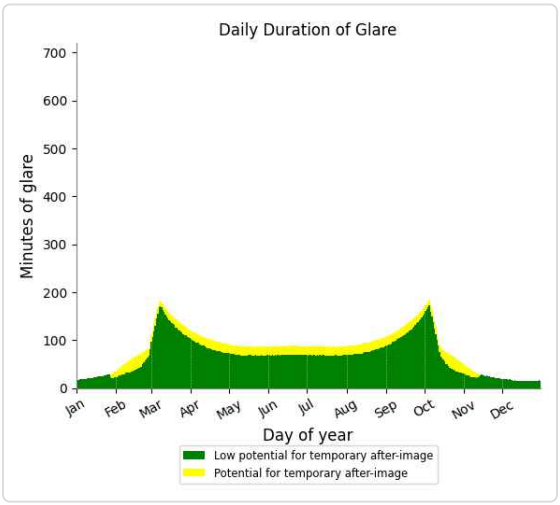
No glare found

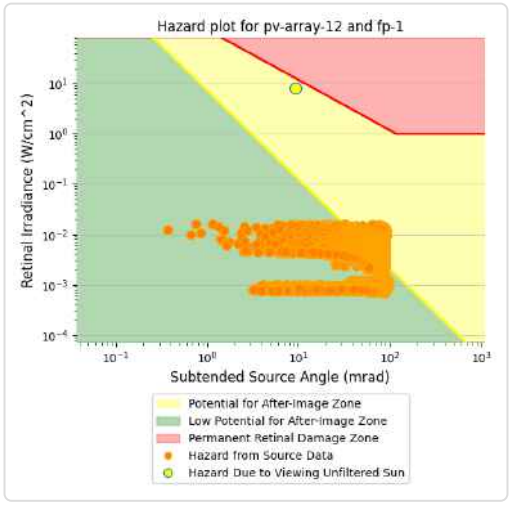
PV array 12 and FP: FP 1

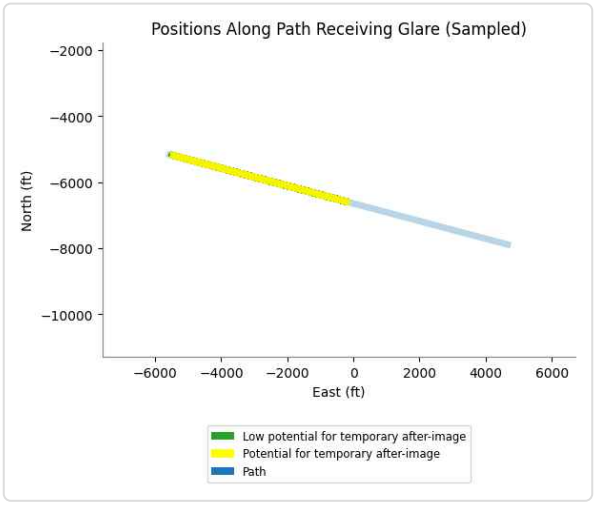
Yellow glare: 5,374 min.

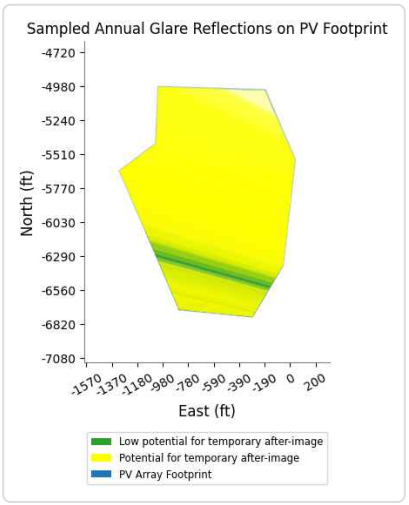
Green glare: 24,344 min.

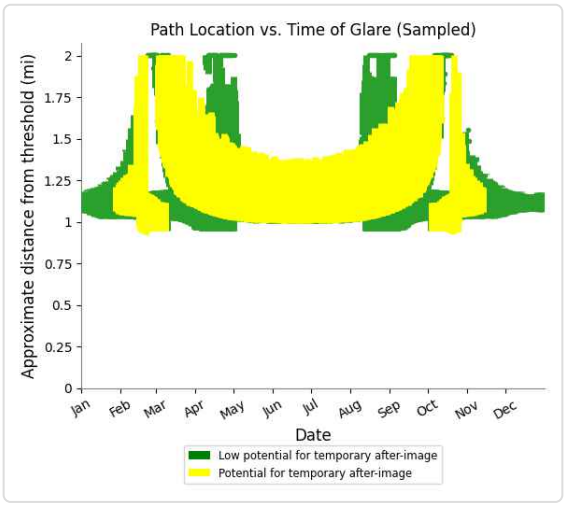








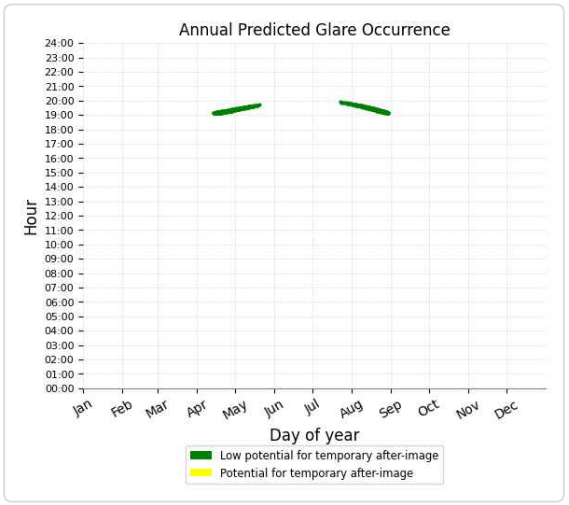


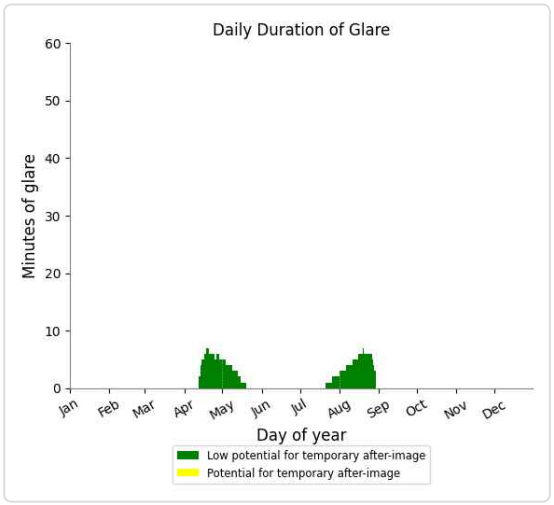


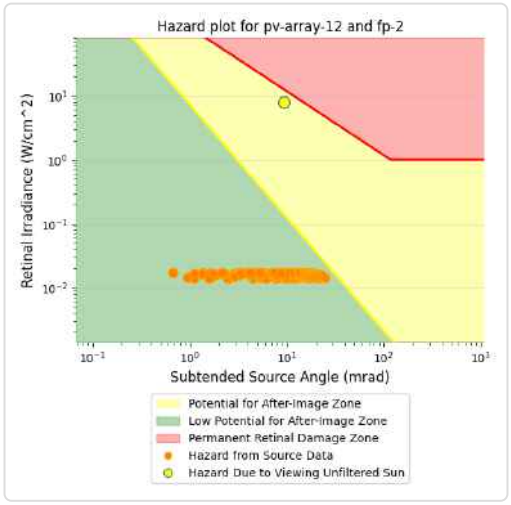
PV array 12 and FP: FP 2

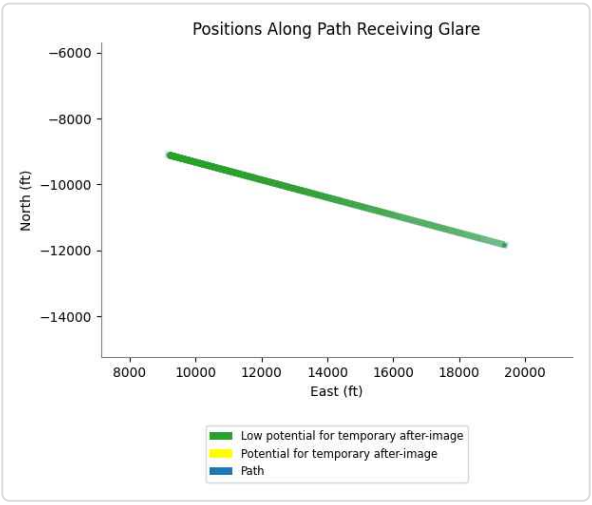
Yellow glare: none

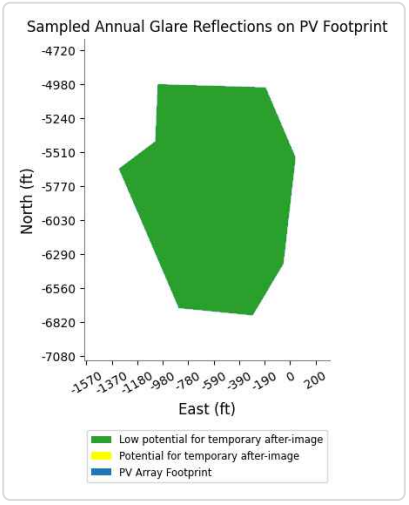
Green glare: 307 min.

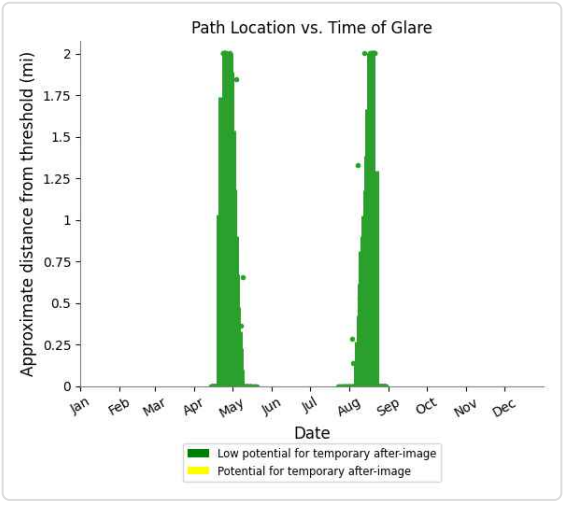








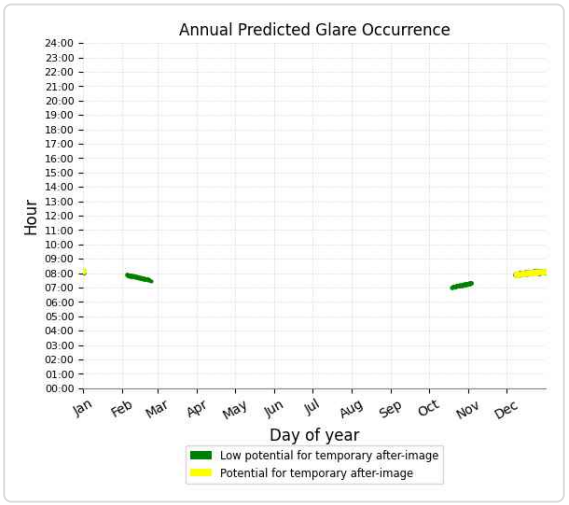


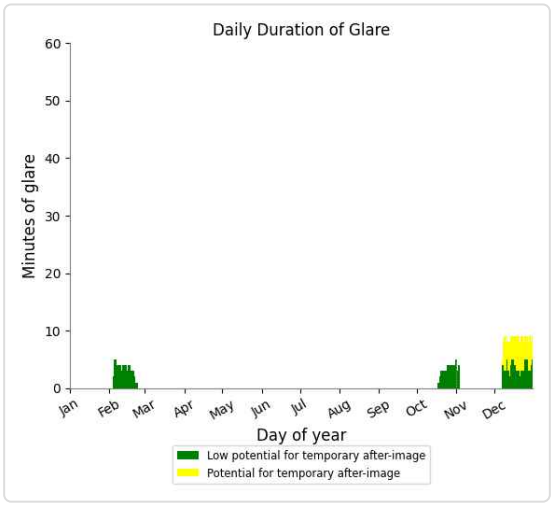


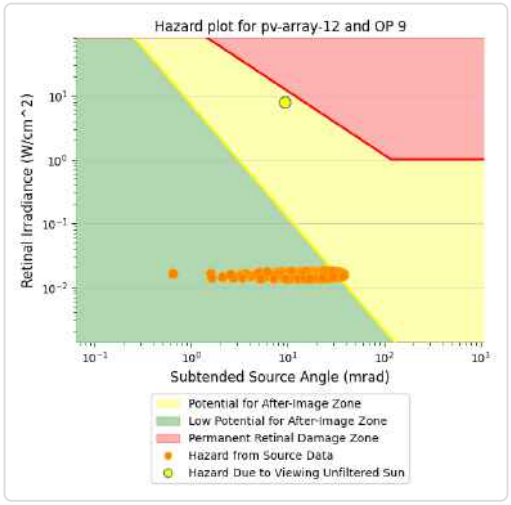
PV array 12 and OP 9

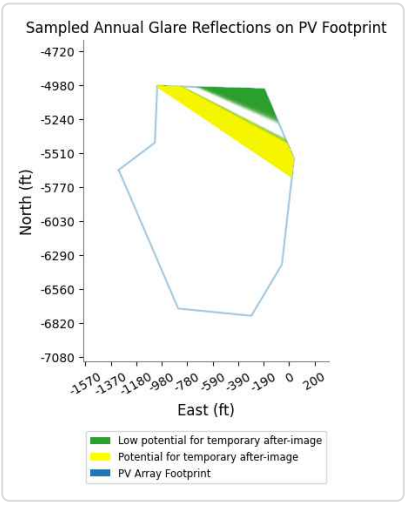
Yellow glare: 125 min.

Green glare: 221 min.





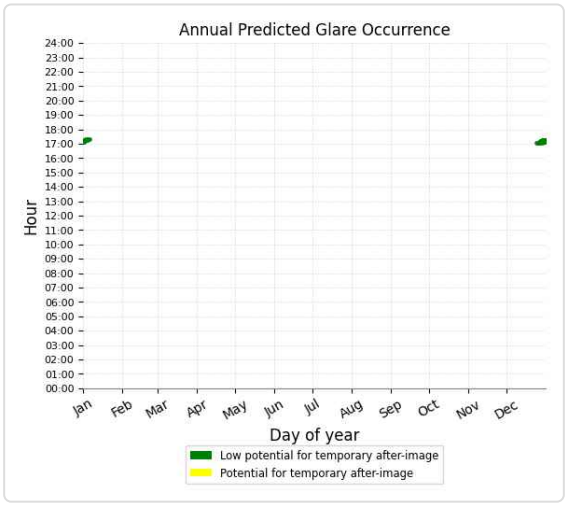


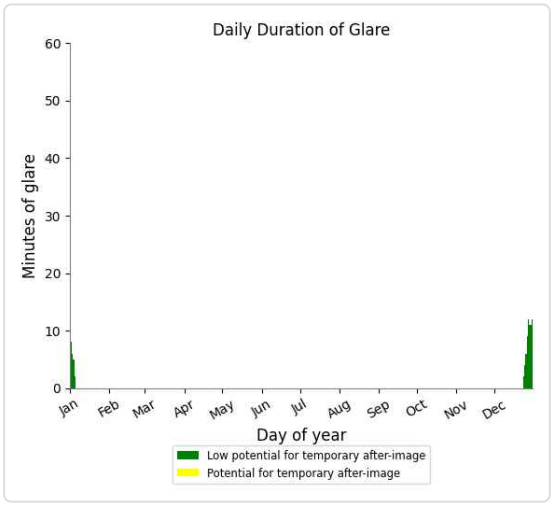


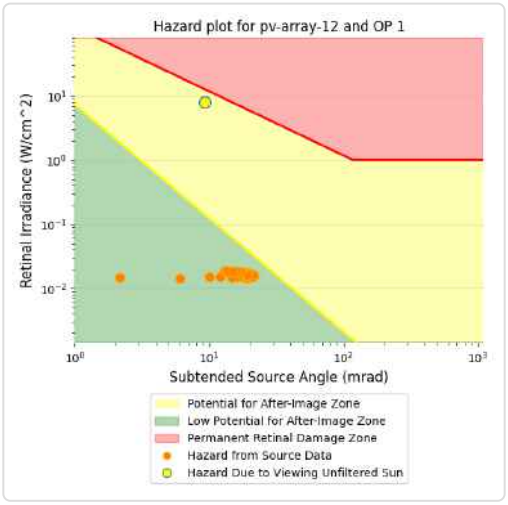
PV array 12 and OP 1

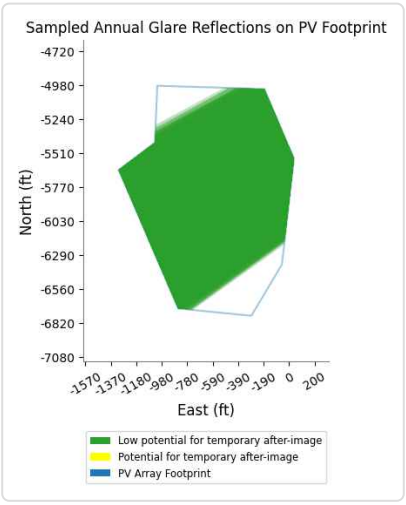
Yellow glare: none

Green glare: 99 min.





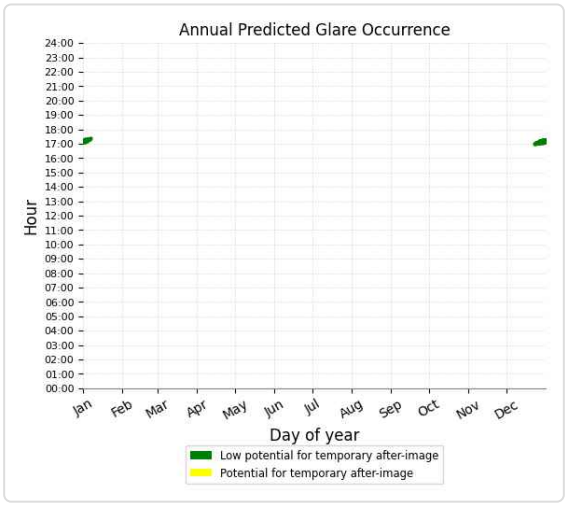


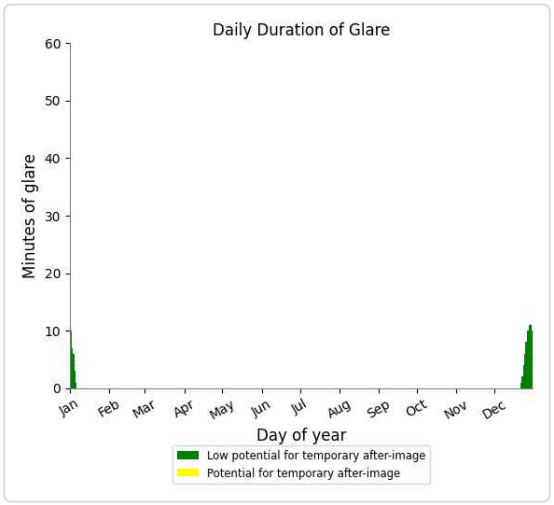


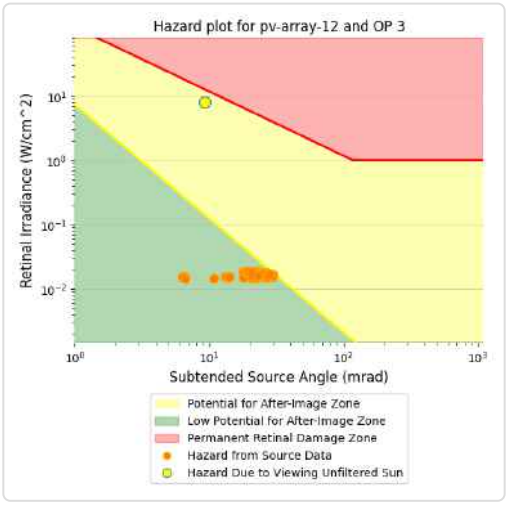
PV array 12 and OP 3

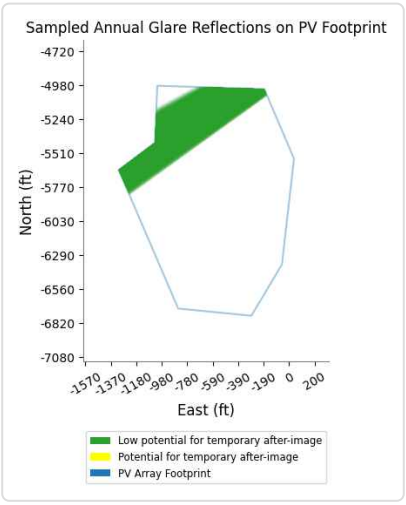
Yellow glare: none

Green glare: 111 min.



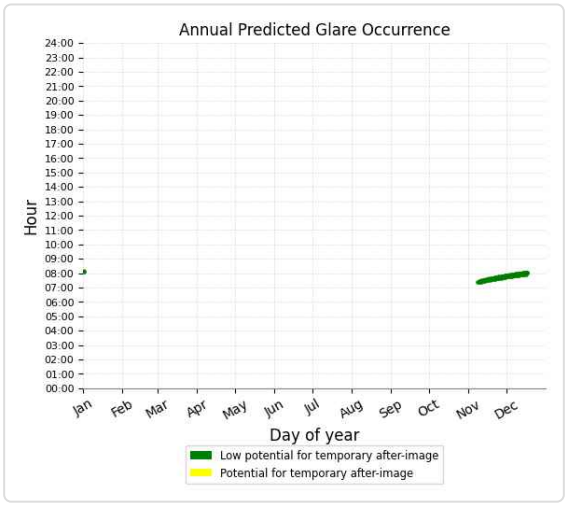


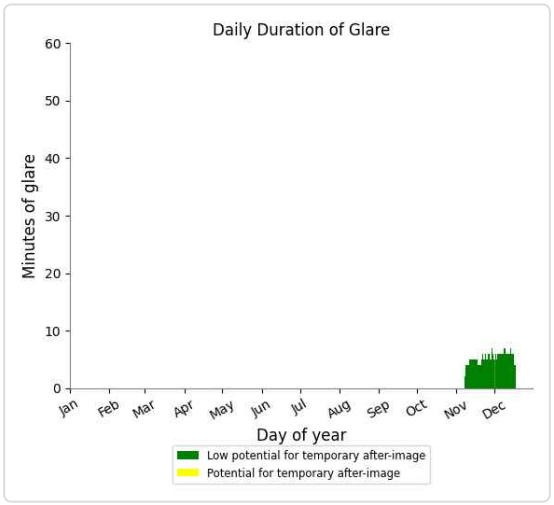


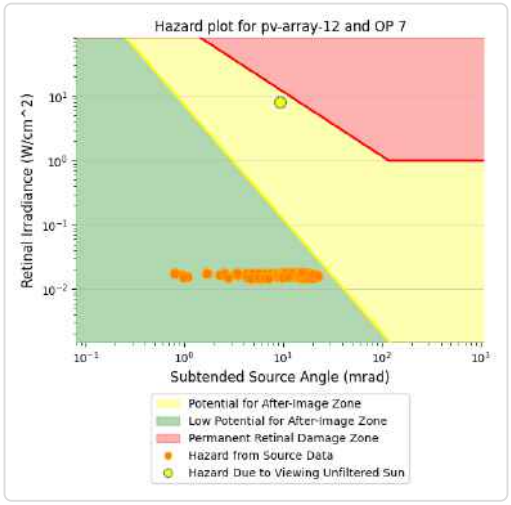


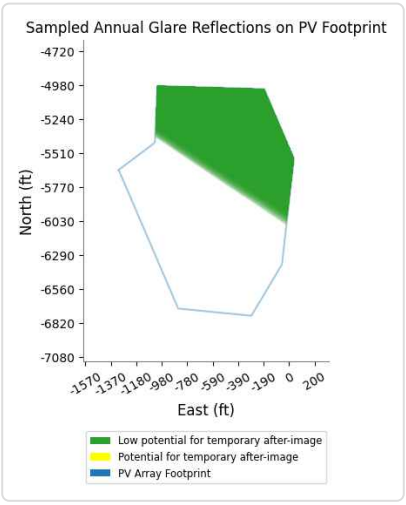
PV array 12 and OP 7

Yellow glare: none
Green glare: 216 min.









PV array 12 and OP 2

No glare found

PV array 12 and OP 4

No glare found

PV array 12 and OP 5

No glare found

PV array 12 and OP 6

No glare found

PV array 12 and OP 8

No glare found

PV array 12 and OP 10

No glare found

PV: PV array 13 potential temporary after-image

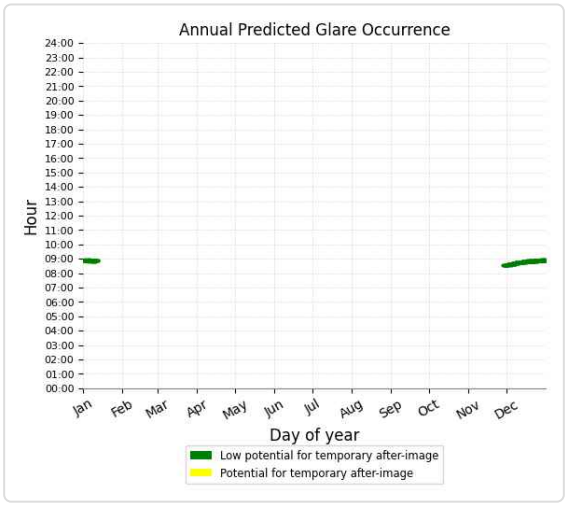
Receptor results ordered by category of glare

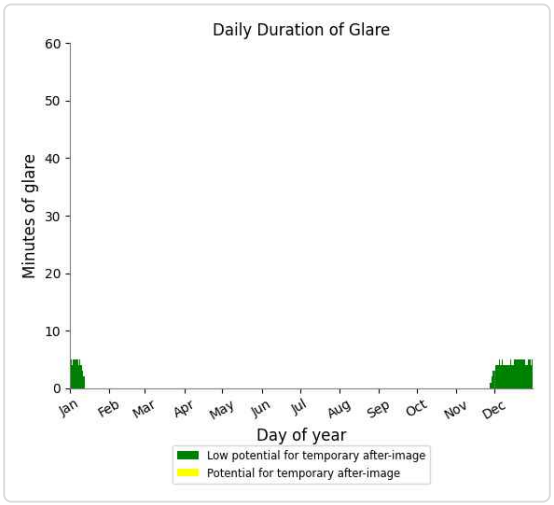
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
McLain Rd	195	3.2	0	0.0
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	28,560	476.0	4,388	73.1
FP 2	0	0.0	0	0.0
OP 1	15	0.2	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

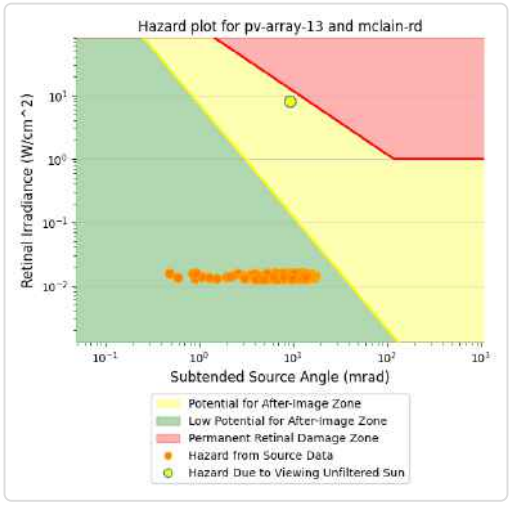
PV array 13 and Route: McLain Rd

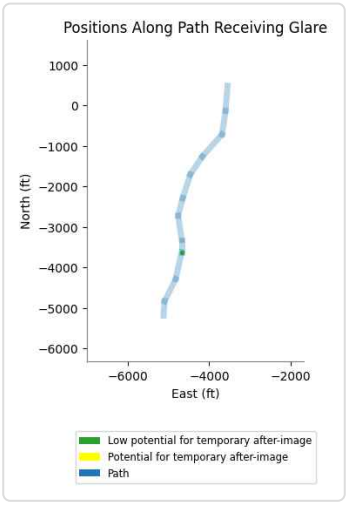
Yellow glare: none

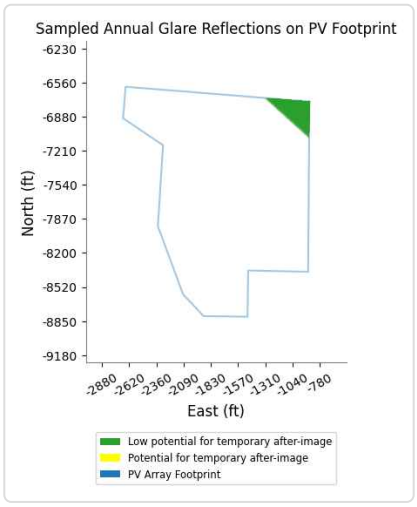
Green glare: 195 min.











PV array 13 and Route: Booker Rd

No glare found

PV array 13 and Route: Jackson Branch Ln

No glare found

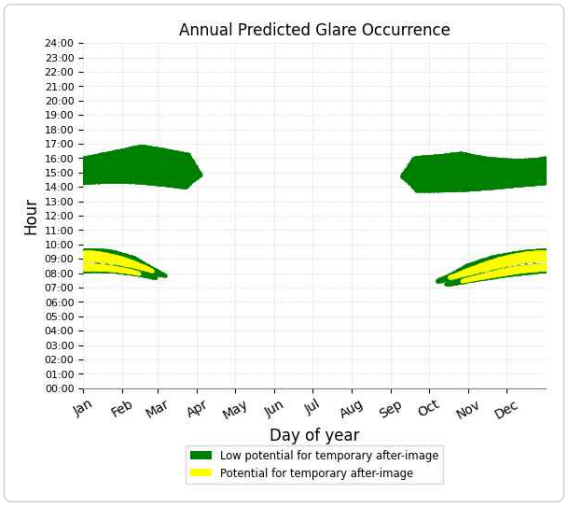
PV array 13 and Route: Moraja Ln

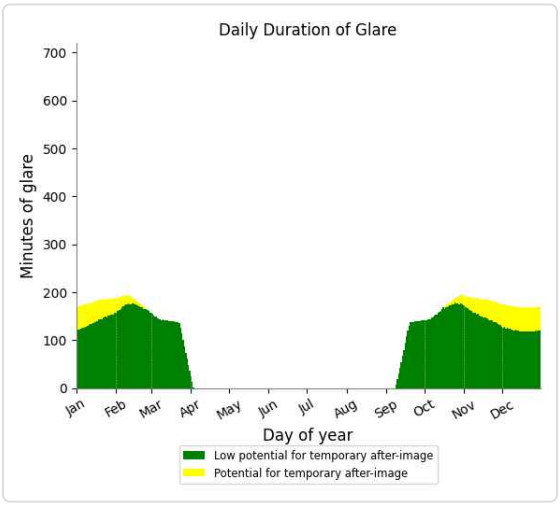
No glare found

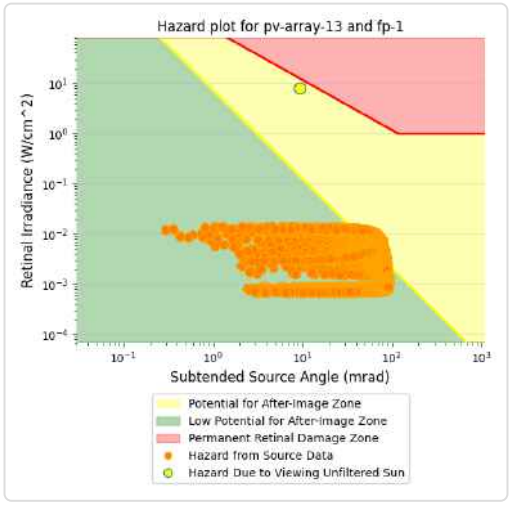
PV array 13 and FP: FP 1

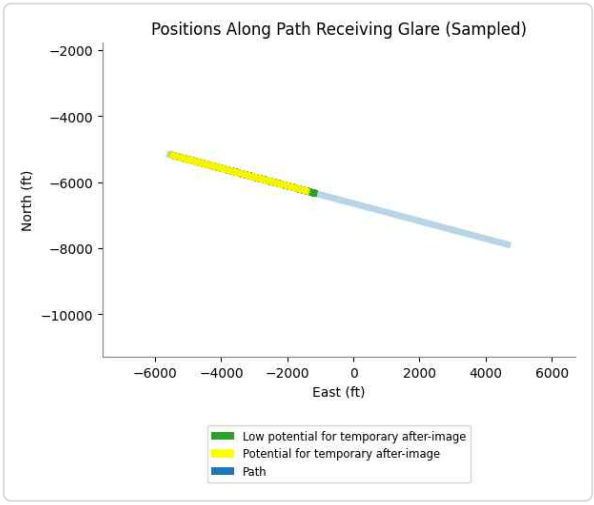
Yellow glare: 4,388 min.

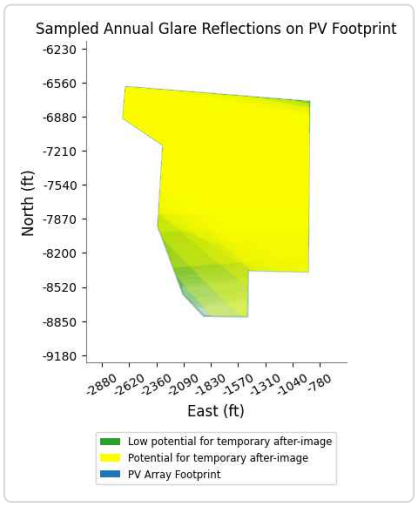
Green glare: 28,560 min.

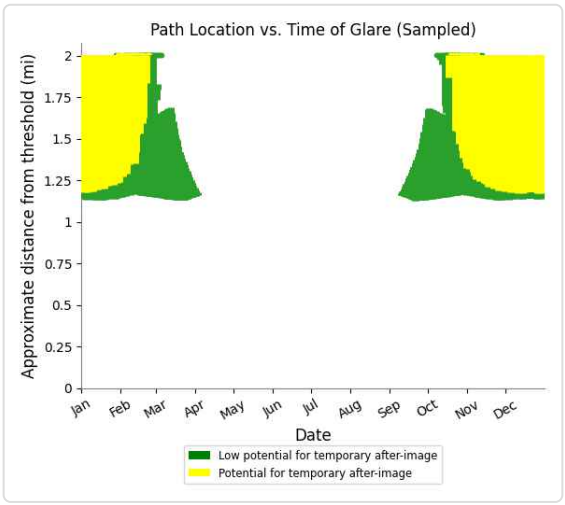










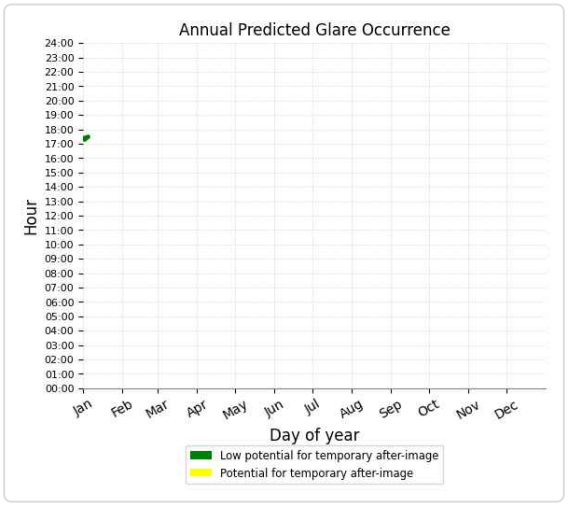


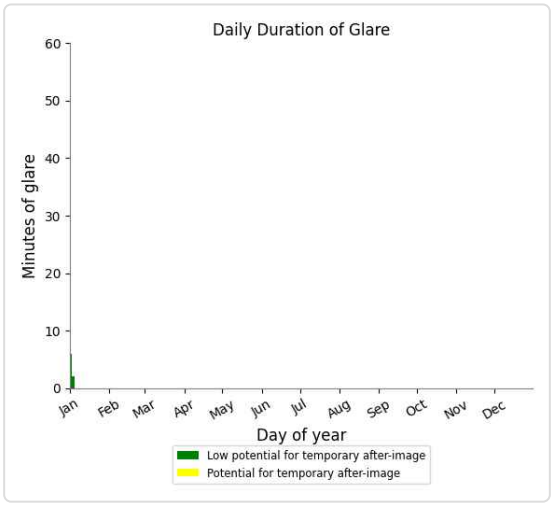
PV array 13 and FP: FP 2

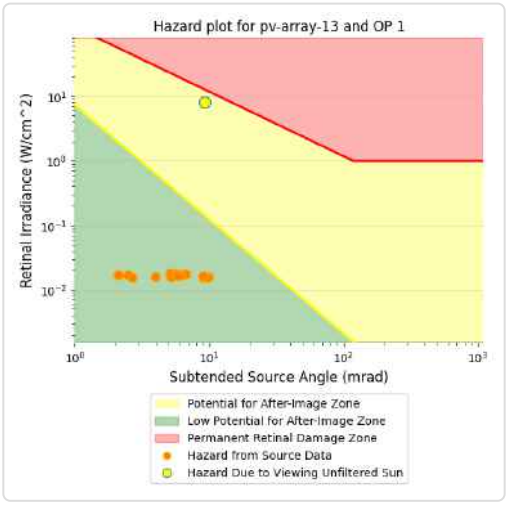
No glare found

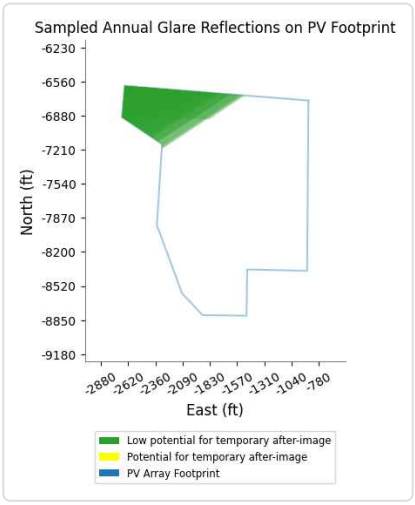
PV array 13 and OP 1

Yellow glare: none
Green glare: 15 min.









PV array 13 and OP 2

No glare found

PV array 13 and OP 3

No glare found

PV array 13 and OP 4

No glare found

PV array 13 and OP 5

No glare found

PV array 13 and OP 6

No glare found

PV array 13 and OP 7

No glare found

PV array 13 and OP 8

No glare found

PV array 13 and OP 9

No glare found

PV array 13 and OP 10

No glare found

PV: PV array 14 low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	17,651	294.2	0	0.0
FP 2	845	14.1	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 14 and Route: Booker Rd

No glare found

PV array 14 and Route: Jackson Branch Ln

No glare found

PV array 14 and Route: McLain Rd

No glare found

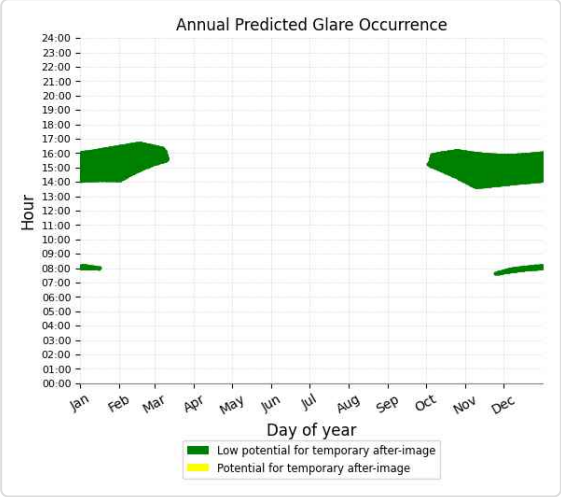
PV array 14 and Route: Moraja Ln

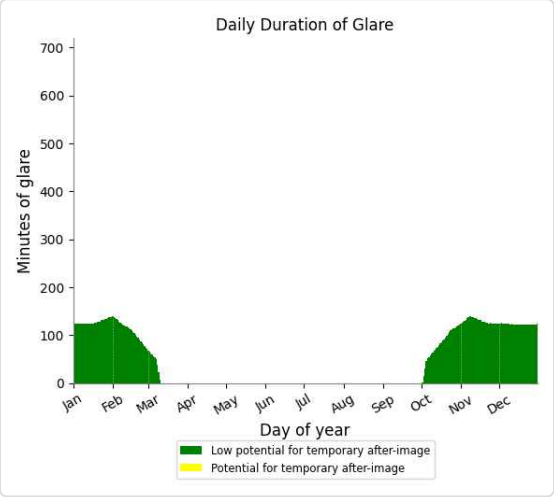
No glare found

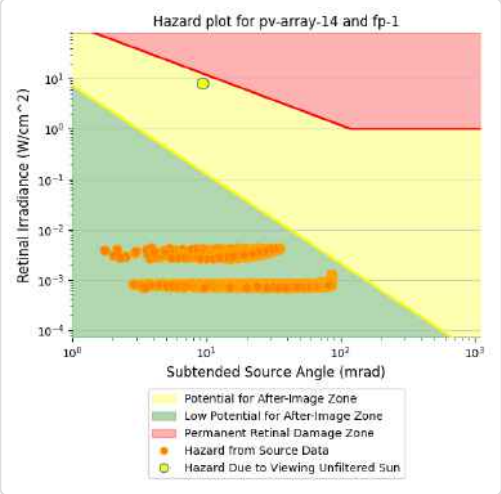
PV array 14 and FP: FP 1

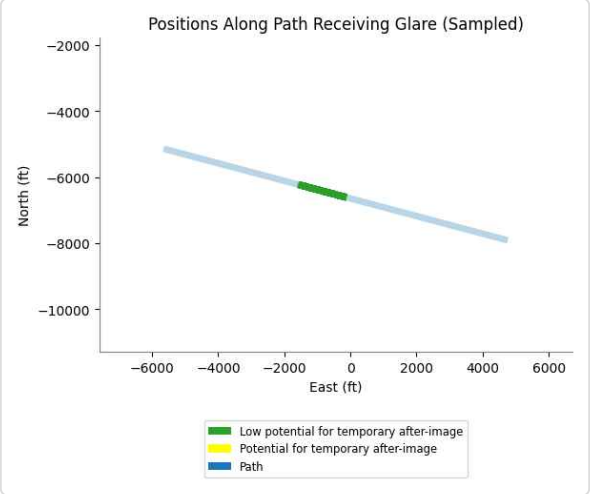
Yellow glare: none

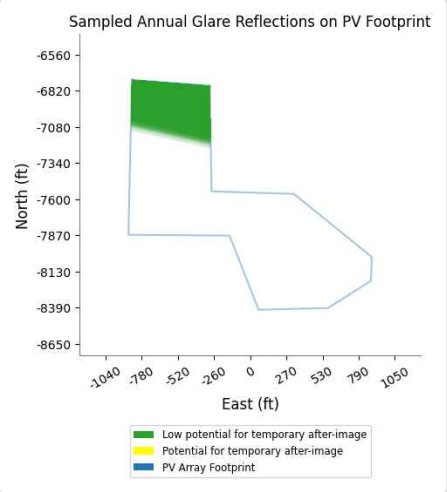
Green glare: 17,651 min.

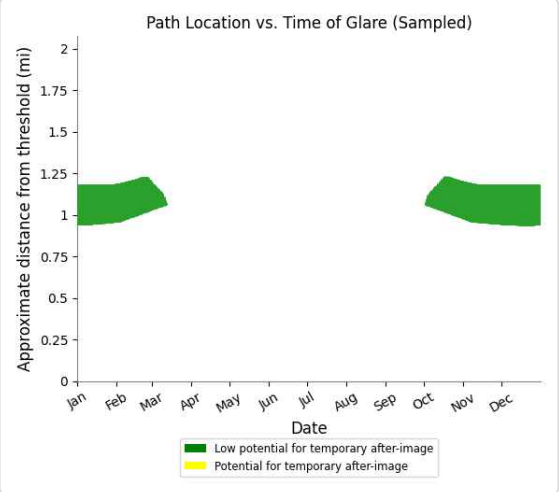








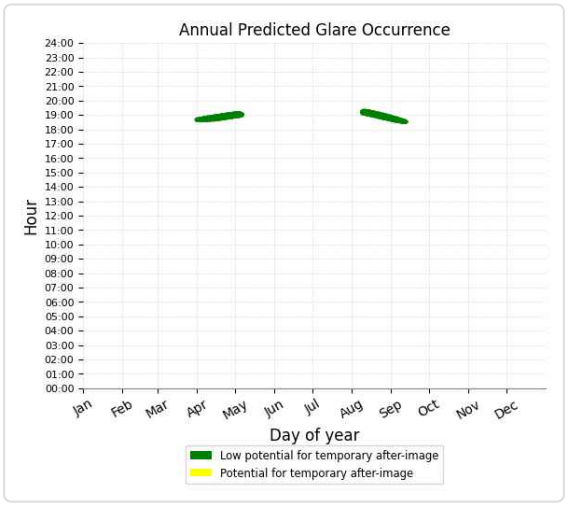


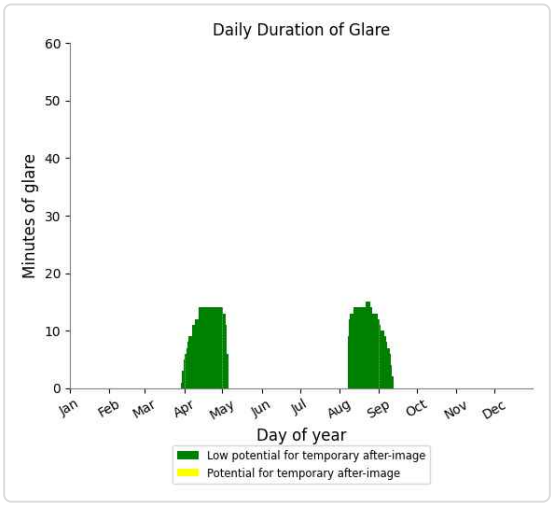


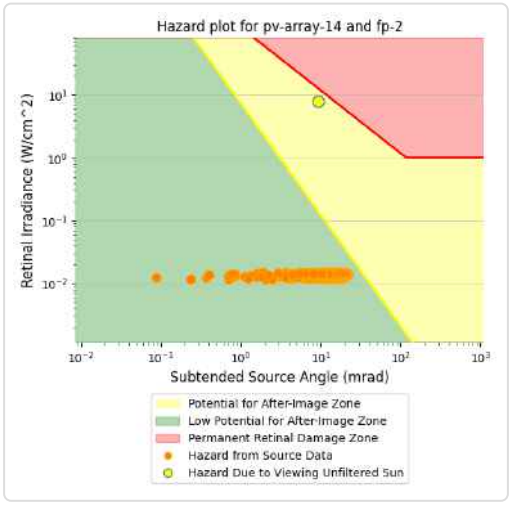
PV array 14 and FP: FP 2

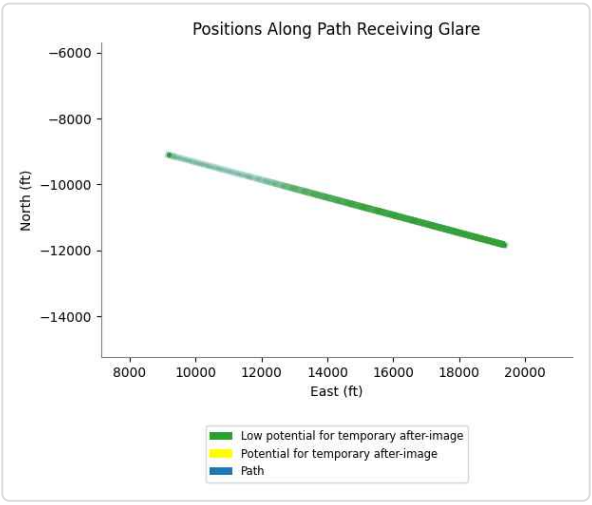
Yellow glare: none

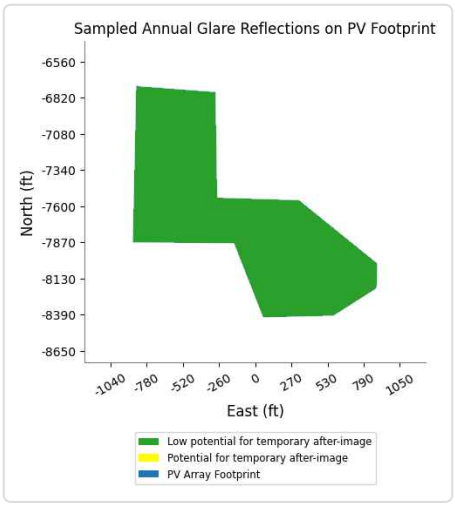
Green glare: 845 min.

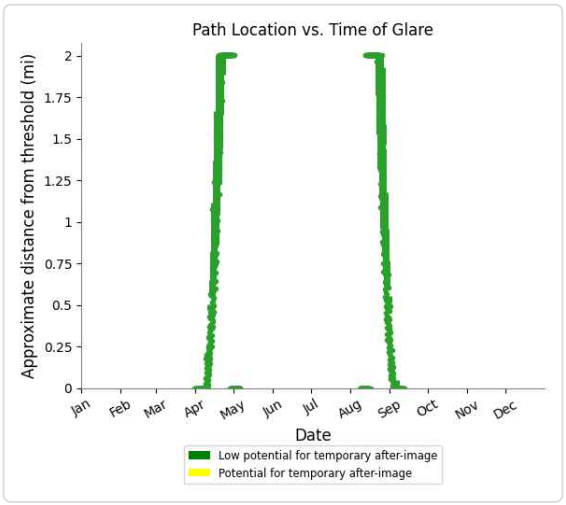












PV array 14 and OP 1

No glare found

PV array 14 and OP 2

No glare found

PV array 14 and OP 3

No glare found

PV array 14 and OP 4

No glare found

PV array 14 and OP 5

No glare found

PV array 14 and OP 6

No glare found

PV array 14 and OP 7

No glare found

PV array 14 and OP 8

No glare found

PV array 14 and OP 9

No glare found

PV array 14 and OP 10

No glare found

PV: PV array 15 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 15 and Route: Booker Rd

No glare found

PV array 15 and Route: Jackson Branch Ln

No glare found

PV array 15 and Route: McLain Rd

No glare found

PV array 15 and Route: Moraja Ln

No glare found

PV array 15 and FP: FP 1

No glare found

PV array 15 and FP: FP 2

No glare found

PV array 15 and OP 1

No glare found

PV array 15 and OP 2

No glare found

PV array 15 and OP 3

No glare found

PV array 15 and OP 4

No glare found

PV array 15 and OP 5

No glare found

PV array 15 and OP 6

No glare found

PV array 15 and OP 7

No glare found

PV array 15 and OP 8

No glare found

PV array 15 and OP 9

No glare found

PV array 15 and OP 10

No glare found

PV: PV array 16 low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 2	26	0.4	0	0.0
FP 1	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 16 and Route: Booker Rd

No glare found

PV array 16 and Route: Jackson Branch Ln

No glare found

PV array 16 and Route: McLain Rd

No glare found

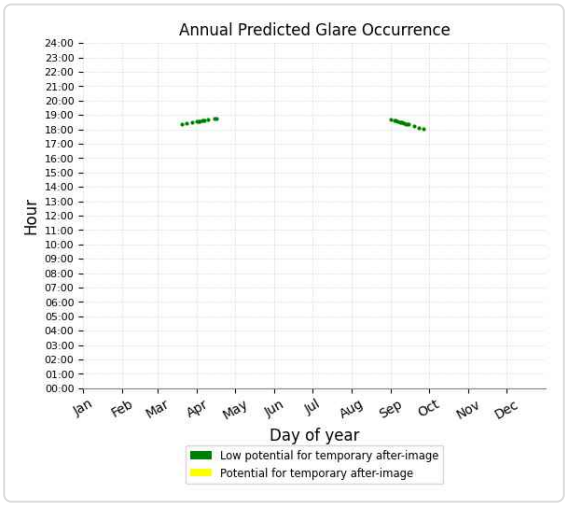
PV array 16 and Route: Moraja Ln

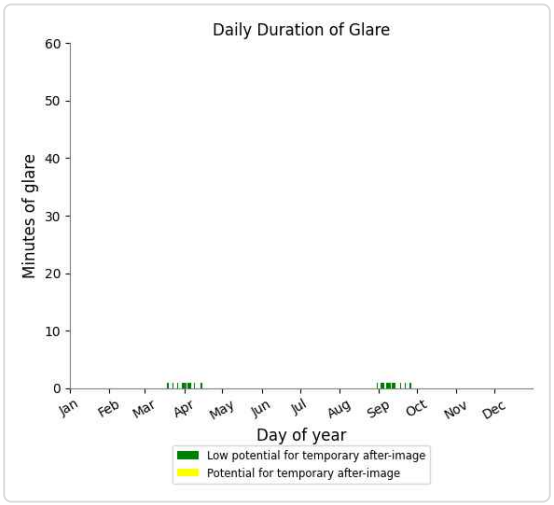
No glare found

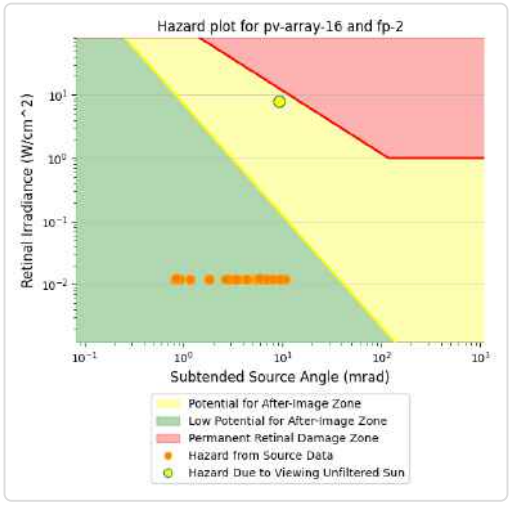
PV array 16 and FP: FP 2

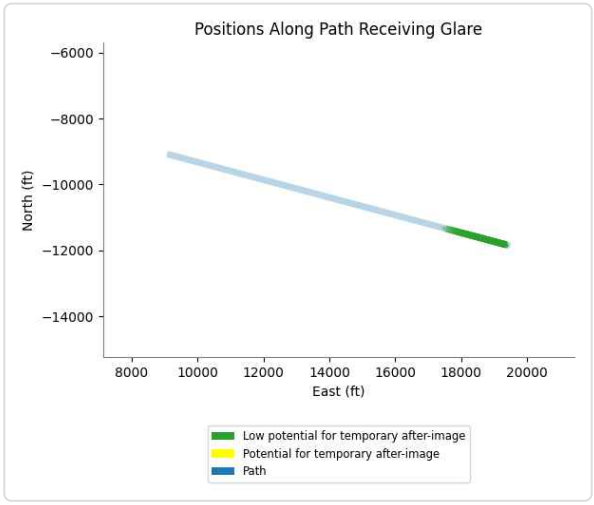
Yellow glare: none

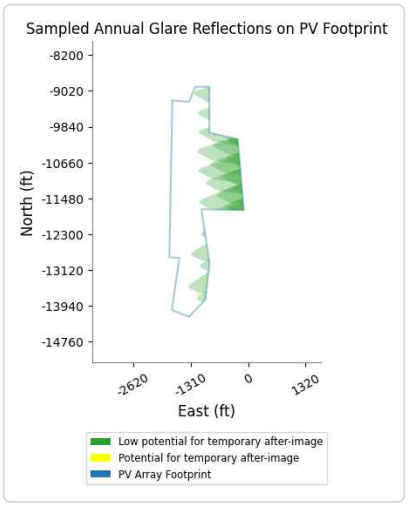
Green glare: 26 min.

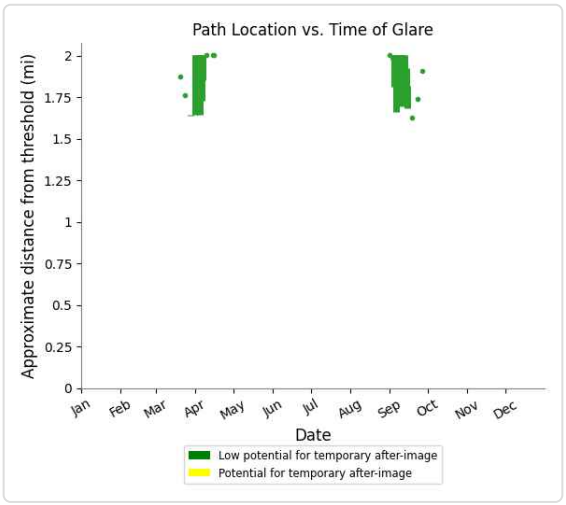












PV array 16 and FP: FP 1

No glare found

PV array 16 and OP 1

No glare found

PV array 16 and OP 2

No glare found

PV array 16 and OP 3

No glare found

PV array 16 and OP 4

No glare found

PV array 16 and OP 5

No glare found

PV array 16 and OP 6

No glare found

PV array 16 and OP 7

No glare found

PV array 16 and OP 8

No glare found

PV array 16 and OP 9

No glare found

PV array 16 and OP 10

No glare found

PV: PV array 1-adj no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 1-adj and Route: Booker Rd

No glare found

PV array 1-adj and Route: Jackson Branch Ln

No glare found

PV array 1-adj and Route: McLain Rd

No glare found

PV array 1-adj and Route: Moraja Ln

No glare found

PV array 1-adj and FP: FP 1

No glare found

PV array 1-adj and FP: FP 2

No glare found

PV array 1-adj and OP 1

No glare found

PV array 1-adj and OP 2

No glare found

PV array 1-adj and OP 3

No glare found

PV array 1-adj and OP 4

No glare found

PV array 1-adj and OP 5

No glare found

PV array 1-adj and OP 6

No glare found

PV array 1-adj and OP 7

No glare found

PV array 1-adj and OP 8

No glare found

PV array 1-adj and OP 9

No glare found

PV array 1-adj and OP 10

No glare found

PV: PV array 2 potential temporary after-image

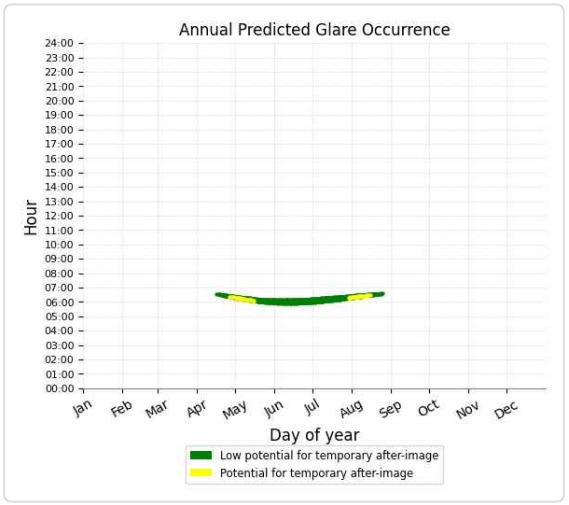
Receptor results ordered by category of glare

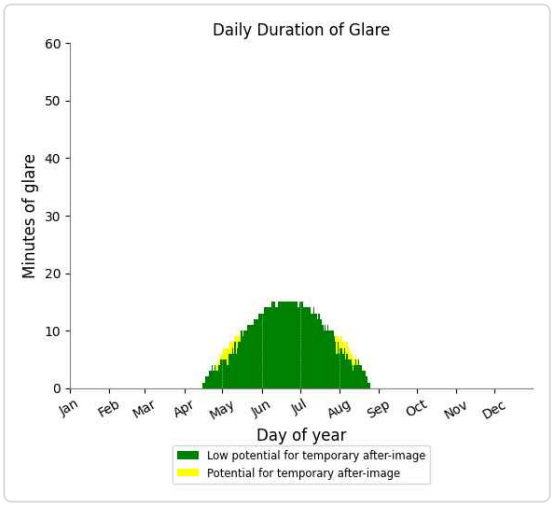
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Jackson Branch Ln	1,226	20.4	62	1.0
Moraja Ln	559	9.3	375	6.2
McLain Rd	1,469	24.5	0	0.0
Booker Rd	0	0.0	0	0.0
FP 1	1,918	32.0	0	0.0
FP 2	0	0.0	0	0.0
OP 7	217	3.6	0	0.0
OP 8	135	2.2	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

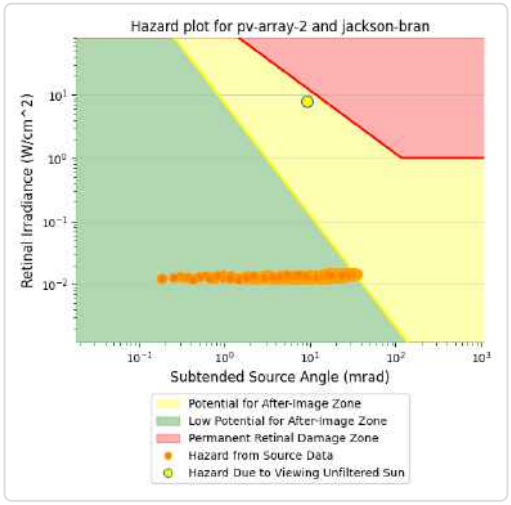
PV array 2 and Route: Jackson Branch Ln

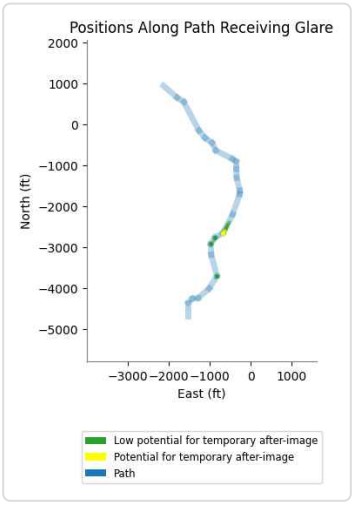
Yellow glare: 62 min.

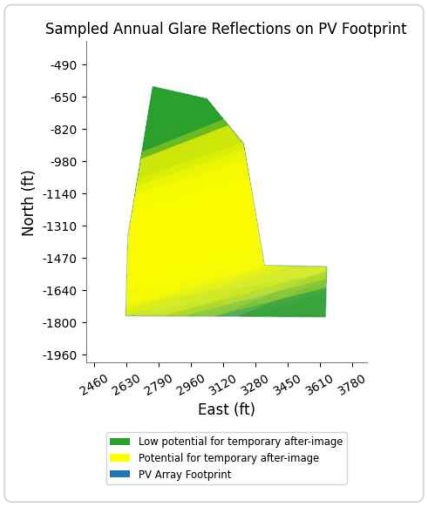
Green glare: 1,226 min.







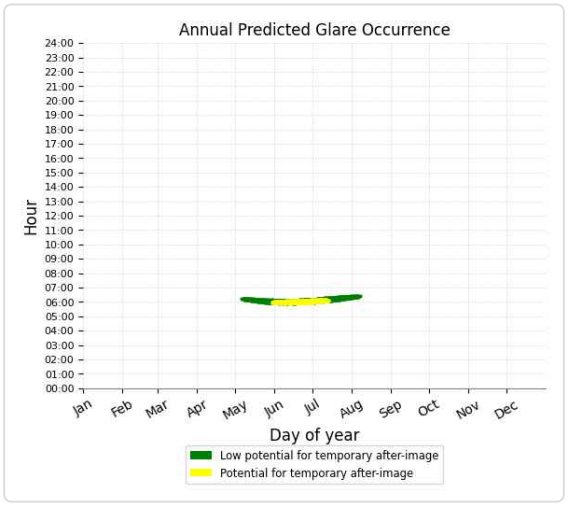


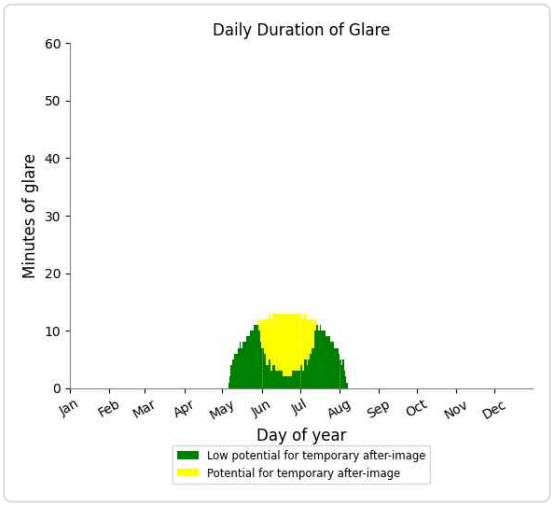


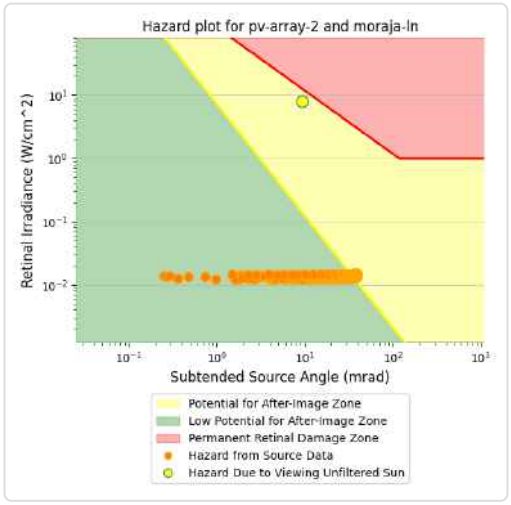
PV array 2 and Route: Moraja Ln

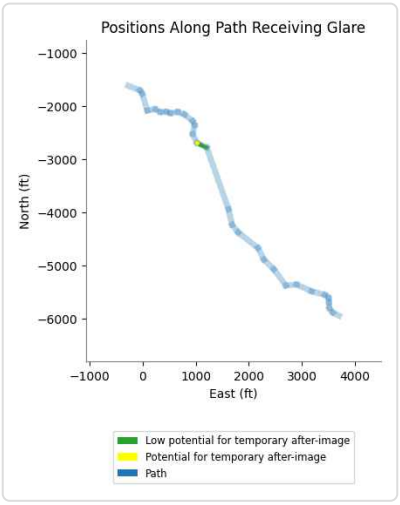
Yellow glare: 375 min.

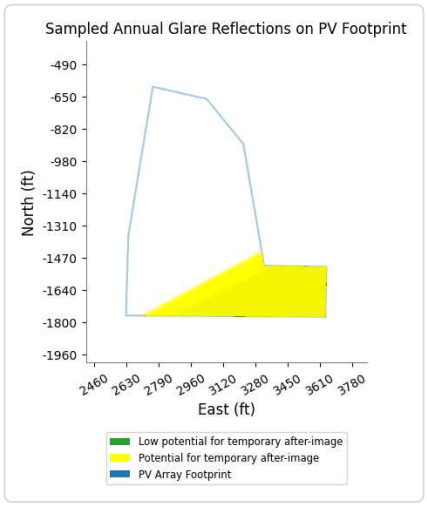
Green glare: 559 min.







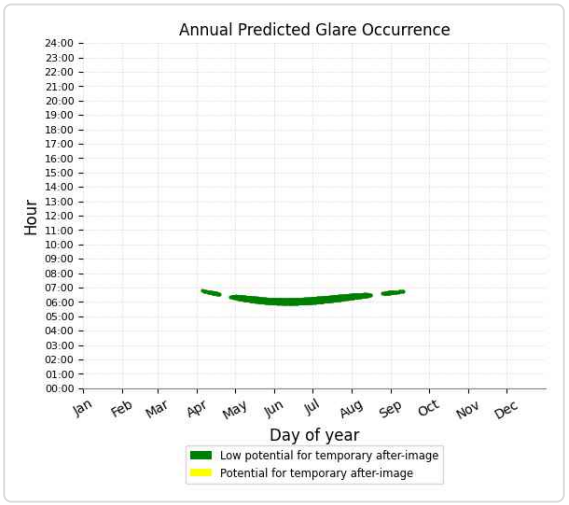


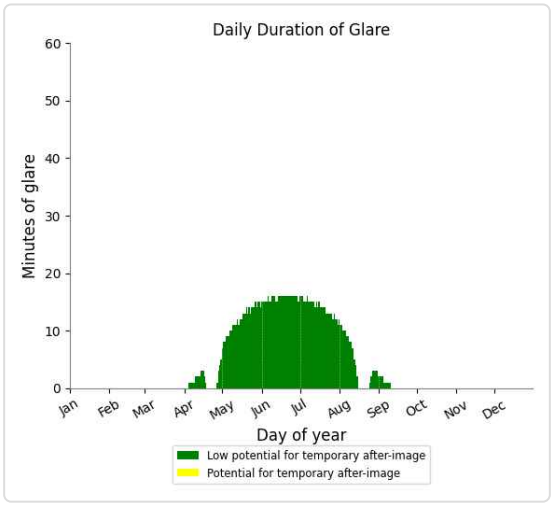


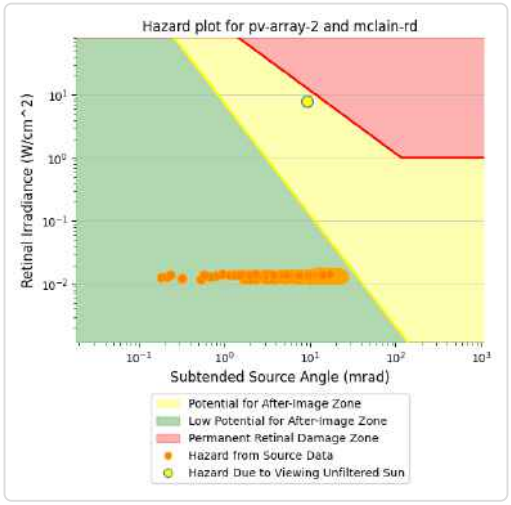
PV array 2 and Route: McLain Rd

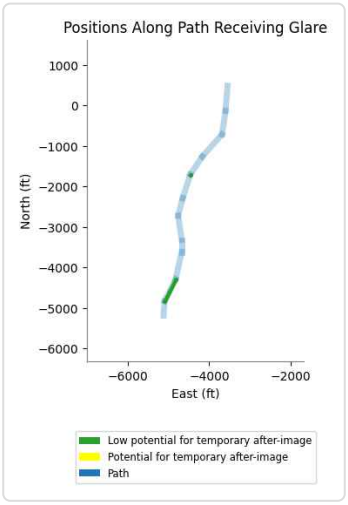
Yellow glare: none

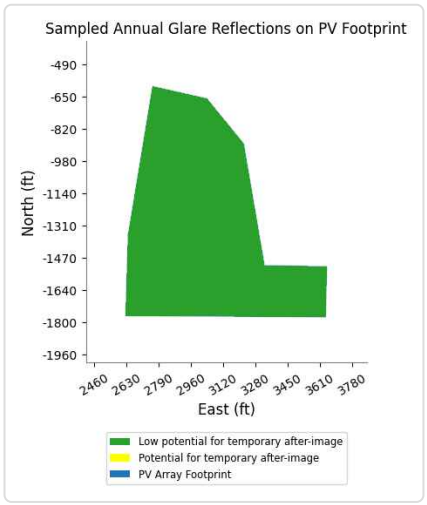
Green glare: 1,469 min.











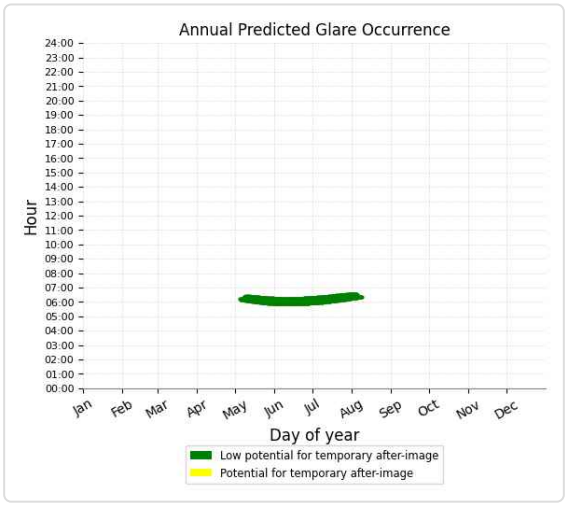
PV array 2 and Route: Booker Rd

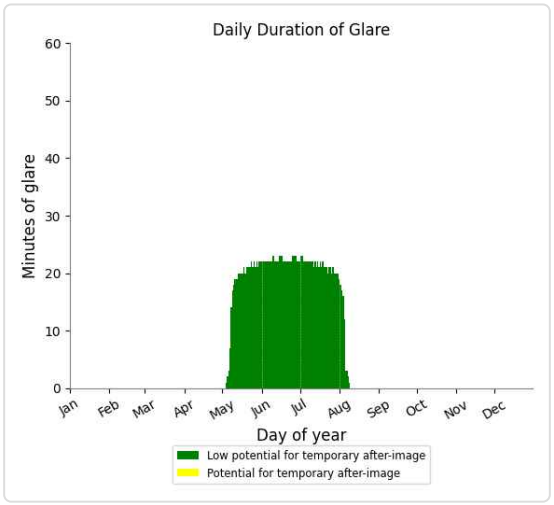
No glare found

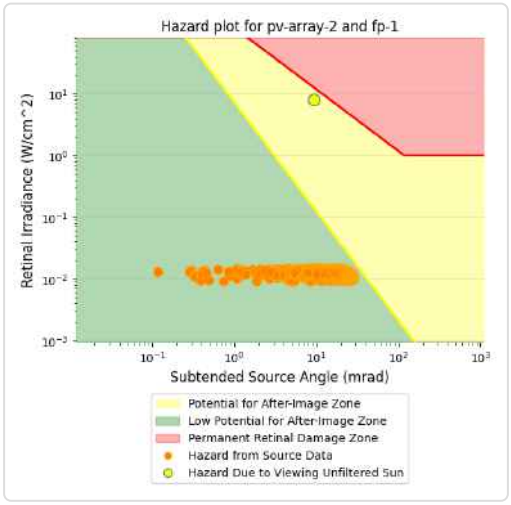
PV array 2 and FP: FP 1

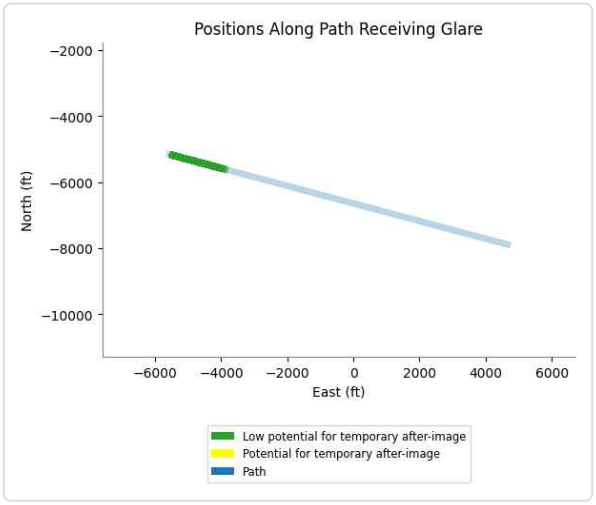
Yellow glare: none

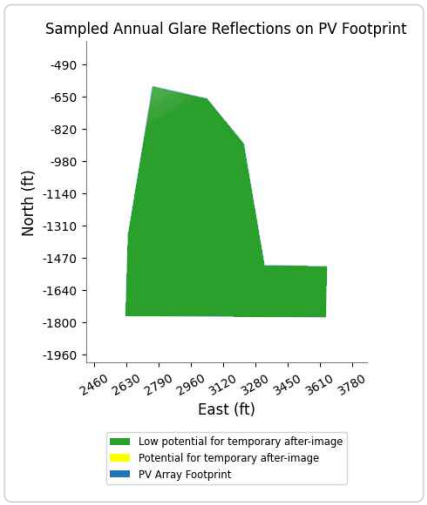
Green glare: 1,918 min.

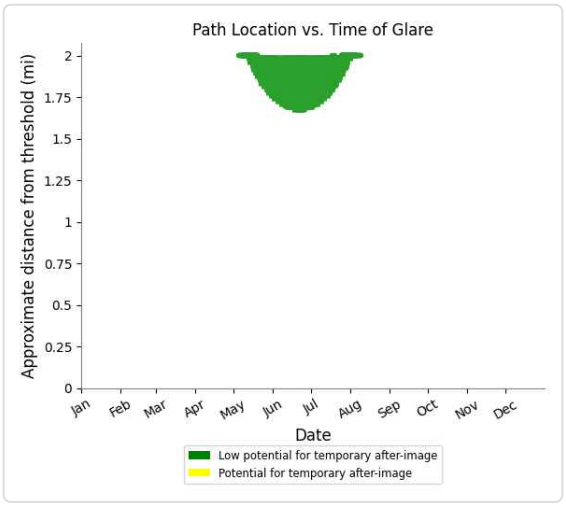












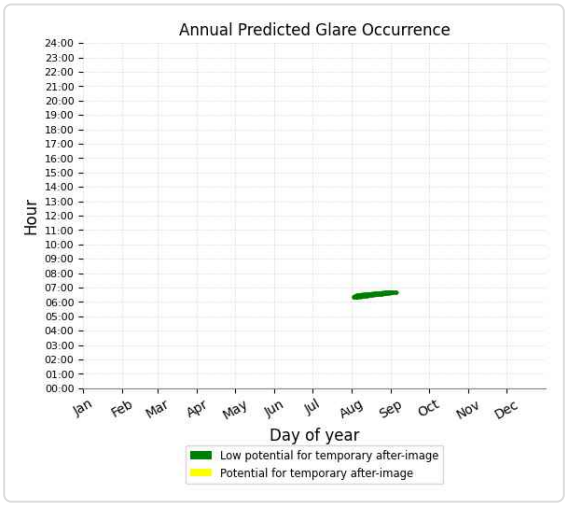
PV array 2 and FP: FP 2

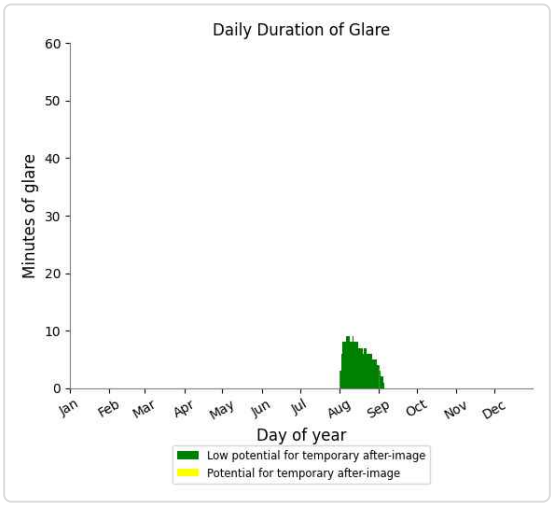
No glare found

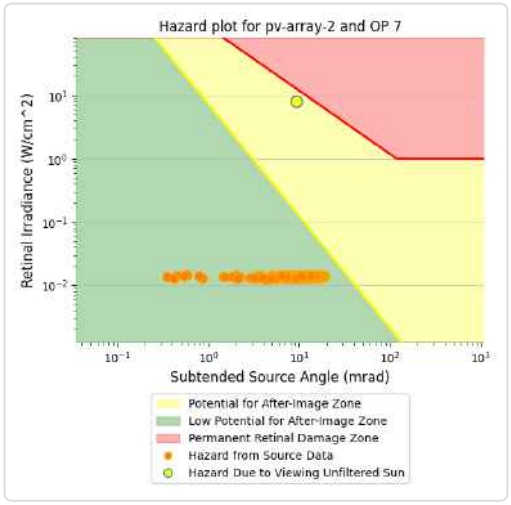
PV array 2 and OP 7

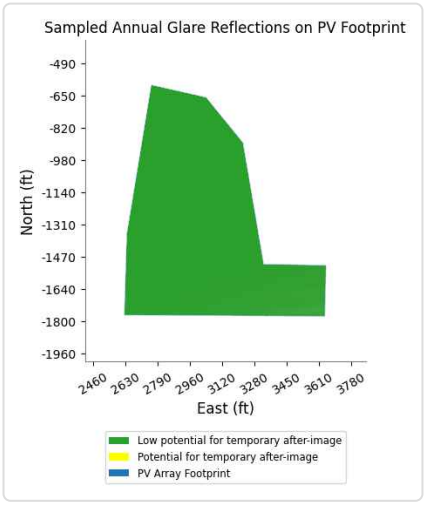
Yellow glare: none

Green glare: 217 min.



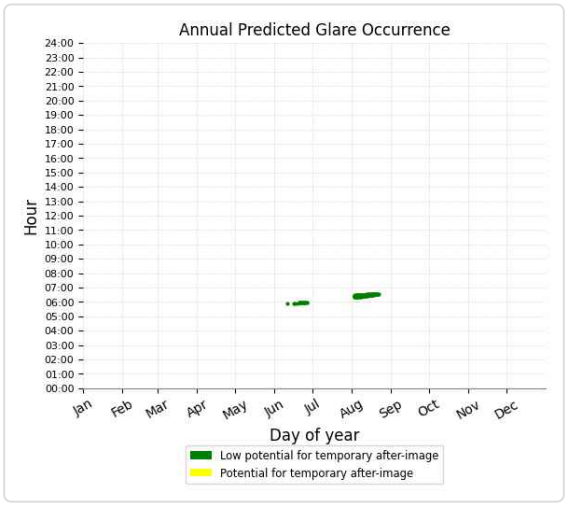


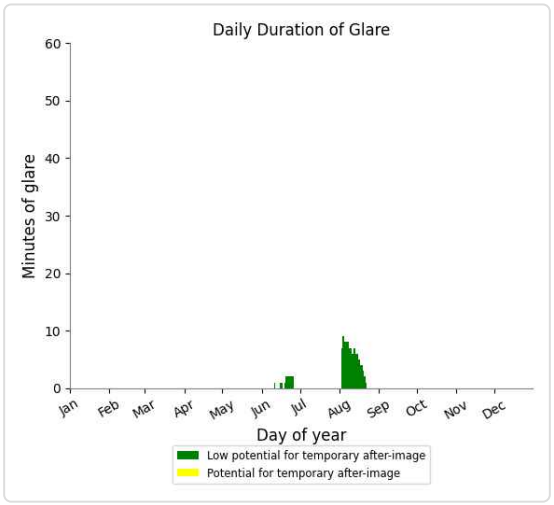


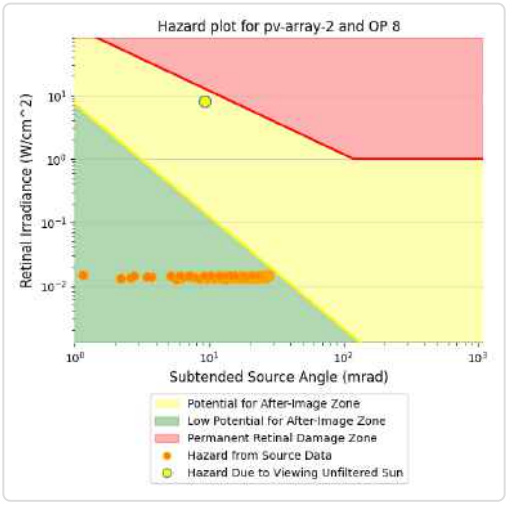


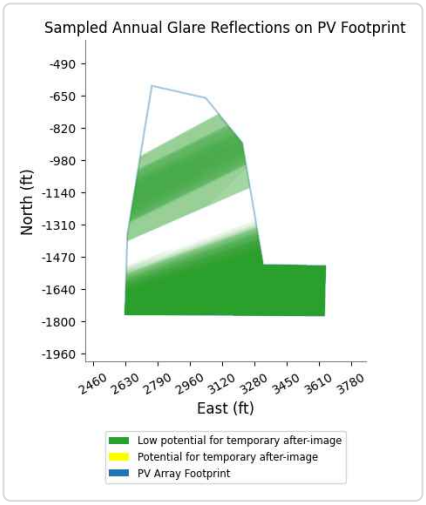
PV array 2 and OP 8

Yellow glare: none
Green glare: 135 min.









PV array 2 and OP 1

No glare found

PV array 2 and OP 2

No glare found

PV array 2 and OP 3

No glare found

PV array 2 and OP 4

No glare found

PV array 2 and OP 5

No glare found

PV array 2 and OP 6

No glare found

PV array 2 and OP 9

No glare found

PV array 2 and OP 10

No glare found

PV: PV array 4-adj low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	55	0.9	0	0.0
FP 2	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 4-adj and Route: Booker Rd

No glare found

PV array 4-adj and Route: Jackson Branch Ln

No glare found

PV array 4-adj and Route: McLain Rd

No glare found

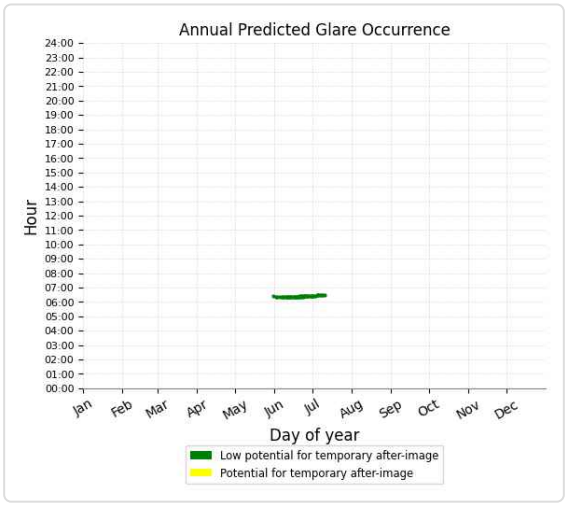
PV array 4-adj and Route: Moraja Ln

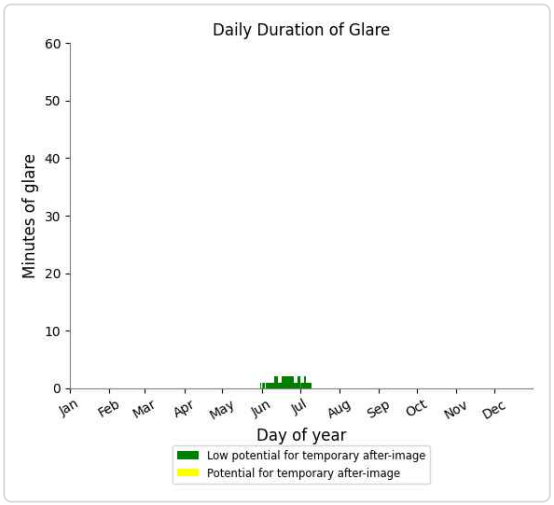
No glare found

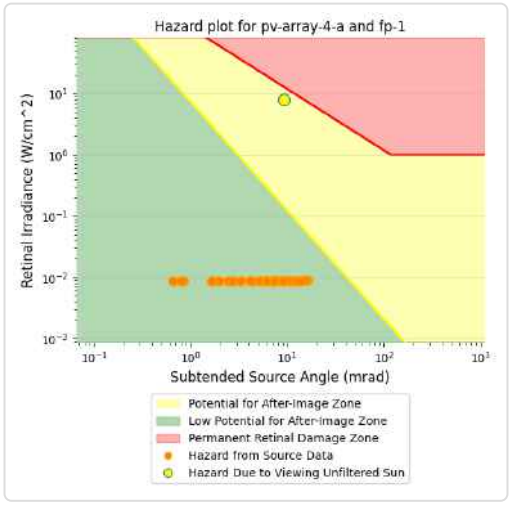
PV array 4-adj and FP: FP 1

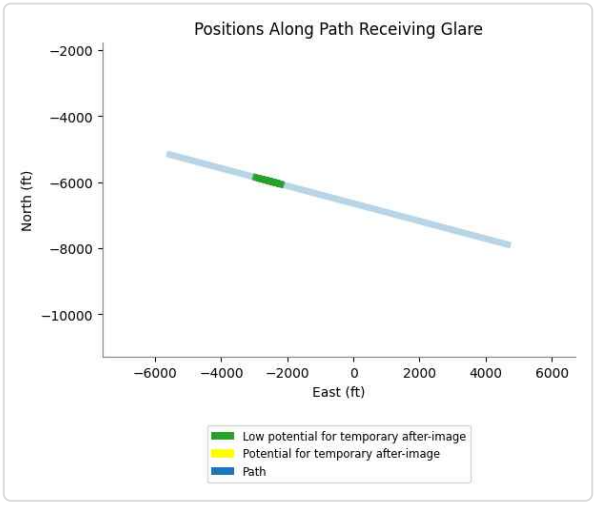
Yellow glare: none

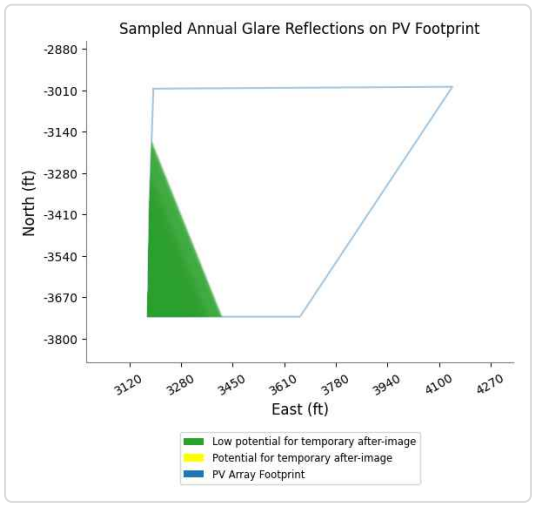
Green glare: 55 min.

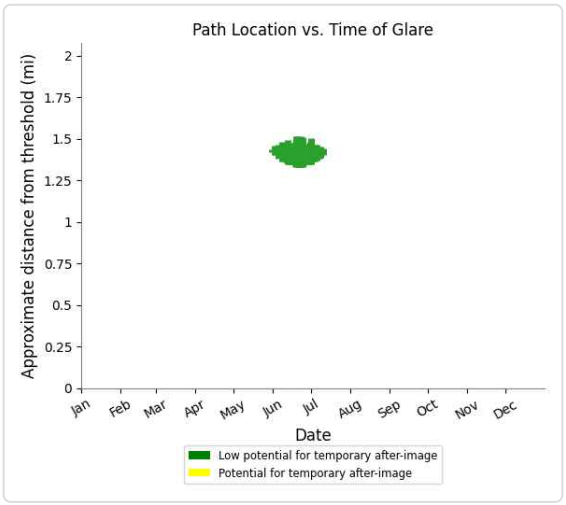












PV array 4-adj and FP: FP 2

No glare found

PV array 4-adj and OP 1

No glare found

PV array 4-adj and OP 2

No glare found

PV array 4-adj and OP 3

No glare found

PV array 4-adj and OP 4

No glare found

PV array 4-adj and OP 5

No glare found

PV array 4-adj and OP 6

No glare found

PV array 4-adj and OP 7

No glare found

PV array 4-adj and OP 8

No glare found

PV array 4-adj and OP 9

No glare found

PV array 4-adj and OP 10

No glare found

PV: PV array 5-adj low potential for temporary after-image

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
McLain Rd	0	0.0	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
OP 1	417	7.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

PV array 5-adj and Route: Booker Rd

No glare found

PV array 5-adj and Route: Jackson Branch Ln

No glare found

PV array 5-adj and Route: McLain Rd

No glare found

PV array 5-adj and Route: Moraja Ln

No glare found

PV array 5-adj and FP: FP 1

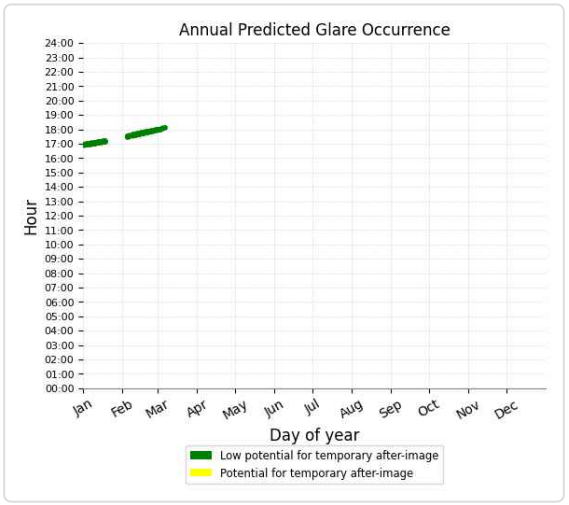
No glare found

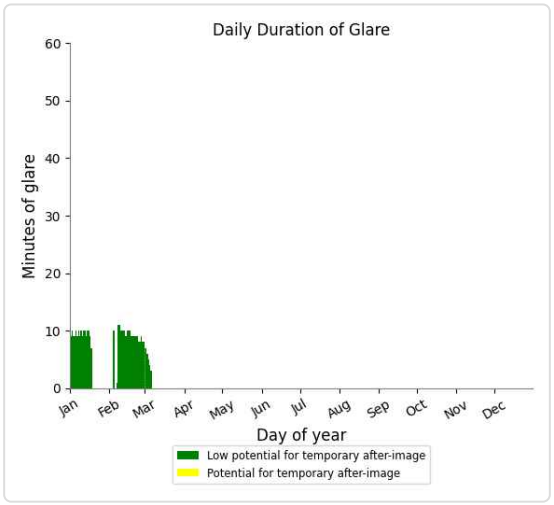
PV array 5-adj and FP: FP 2

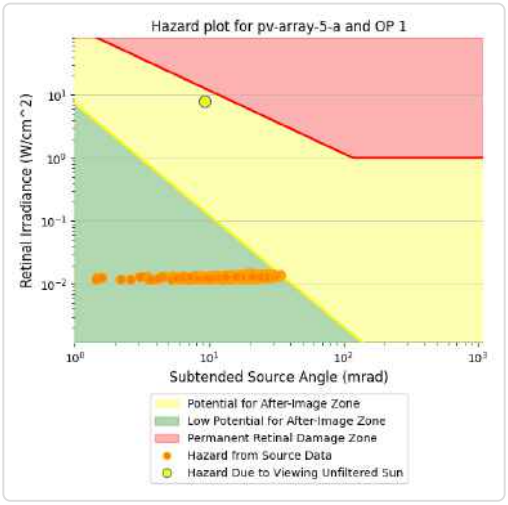
No glare found

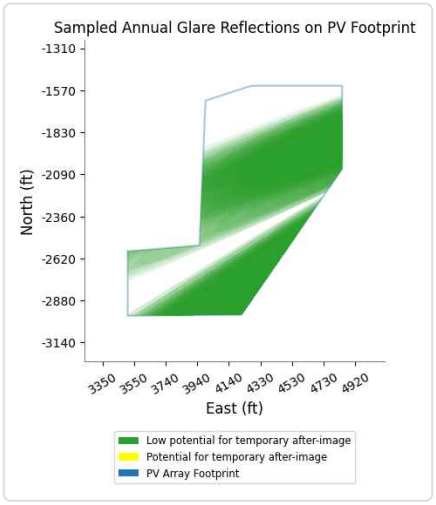
PV array 5-adj and OP 1

Yellow glare: none
Green glare: 417 min.









PV array 5-adj and OP 2

No glare found

PV array 5-adj and OP 3

No glare found

PV array 5-adj and OP 4

No glare found

PV array 5-adj and OP 5

No glare found

PV array 5-adj and OP 6

No glare found

PV array 5-adj and OP 7

No glare found

PV array 5-adj and OP 8

No glare found

PV array 5-adj and OP 9

No glare found

PV array 5-adj and OP 10

No glare found

PV: PV array 6-adj potential temporary after-image

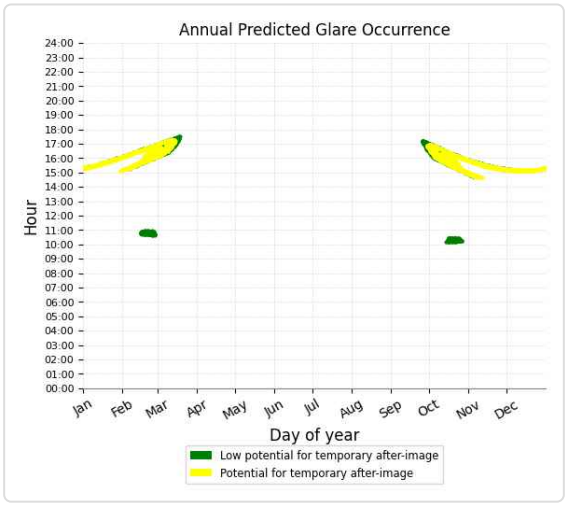
Receptor results ordered by category of glare

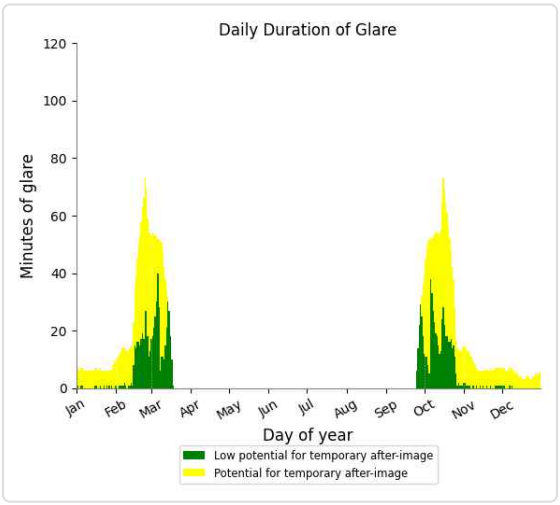
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	1,189	19.8	2,589	43.1
Jackson Branch Ln	3,106	51.8	4,326	72.1
McLain Rd	2,889	48.1	0	0.0
Moraja Ln	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
OP 5	583	9.7	28	0.5
OP 4	18	0.3	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

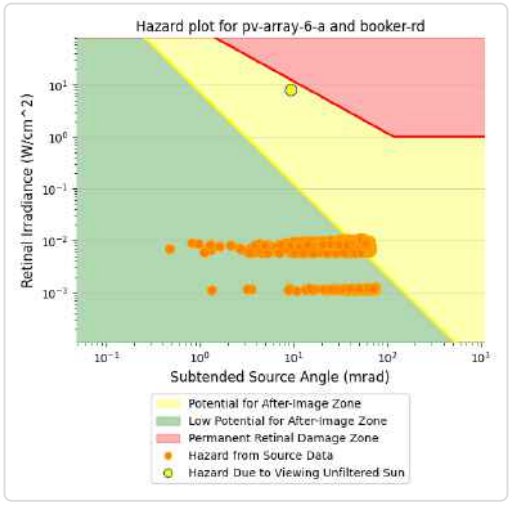
PV array 6-adj and Route: Booker Rd

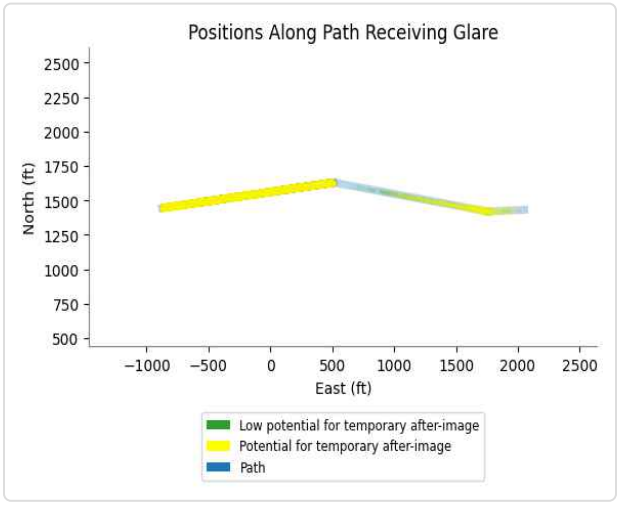
Yellow glare: 2,589 min.

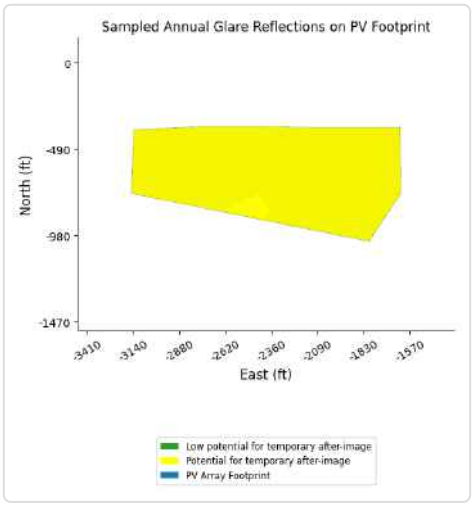
Green glare: 1,189 min.







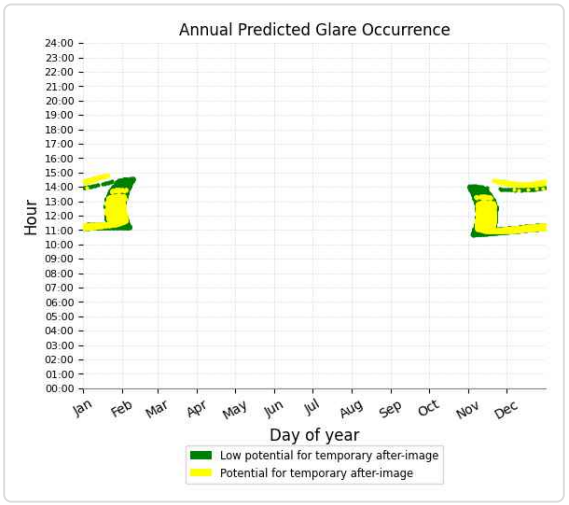


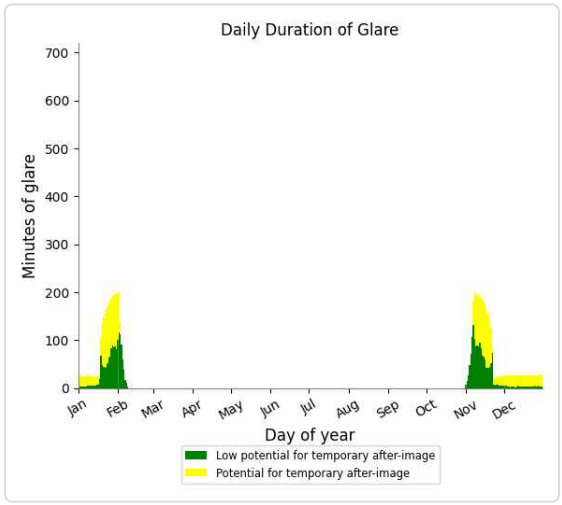


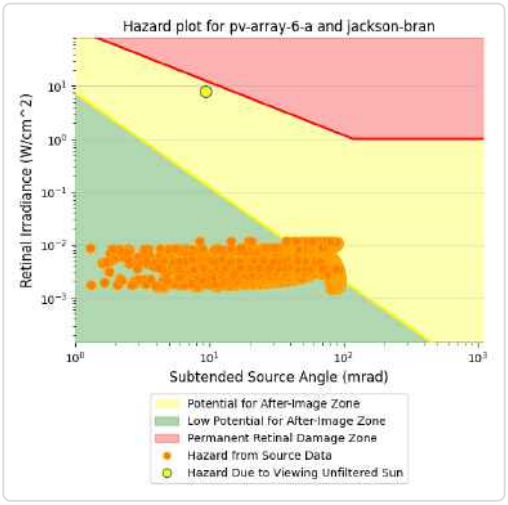
PV array 6-adj and Route: Jackson Branch Ln

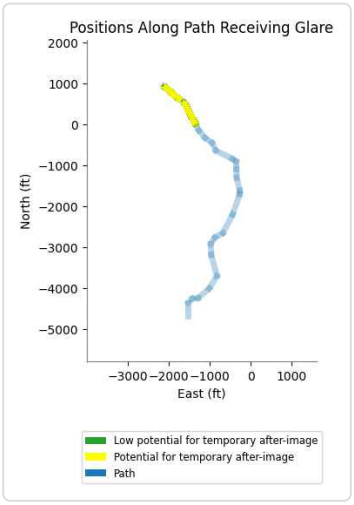
Yellow glare: 4,326 min.

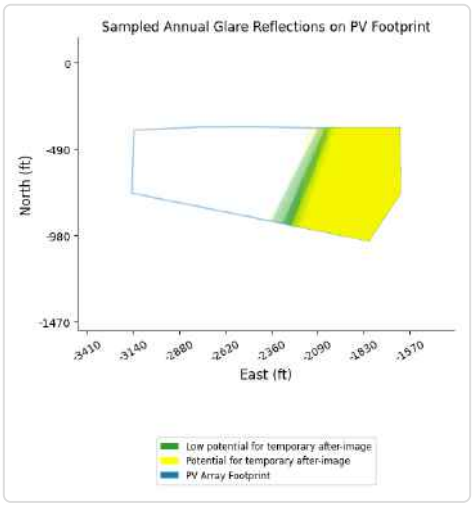
Green glare: 3,106 min.







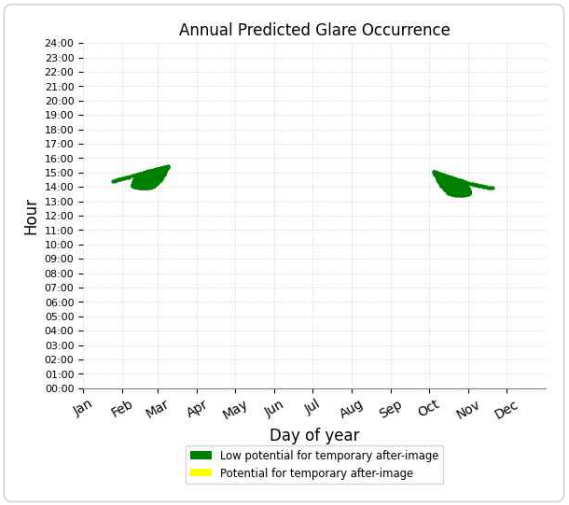


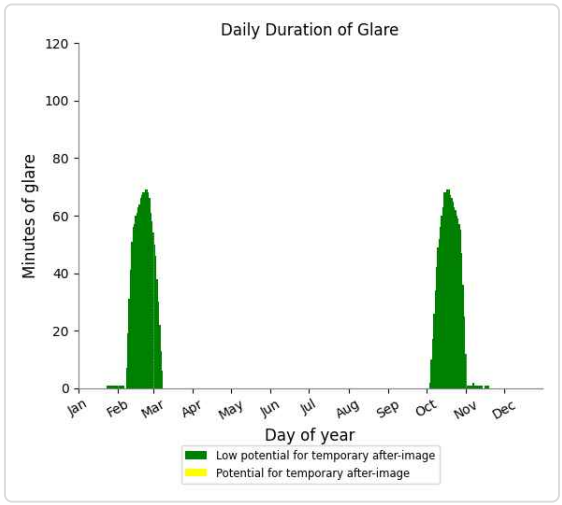


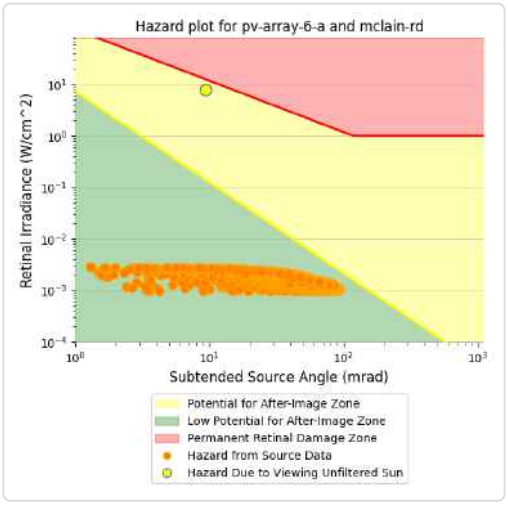
PV array 6-adj and Route: McLain Rd

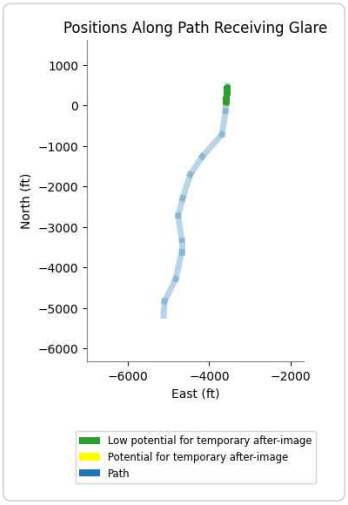
Yellow glare: none

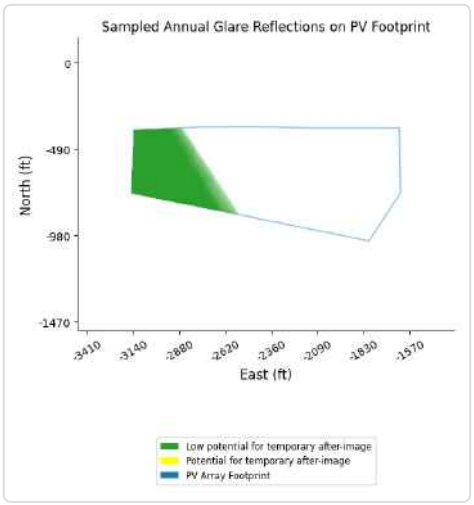
Green glare: 2,889 min.











PV array 6-adj and Route: Moraja Ln

No glare found

PV array 6-adj and FP: FP 1

No glare found

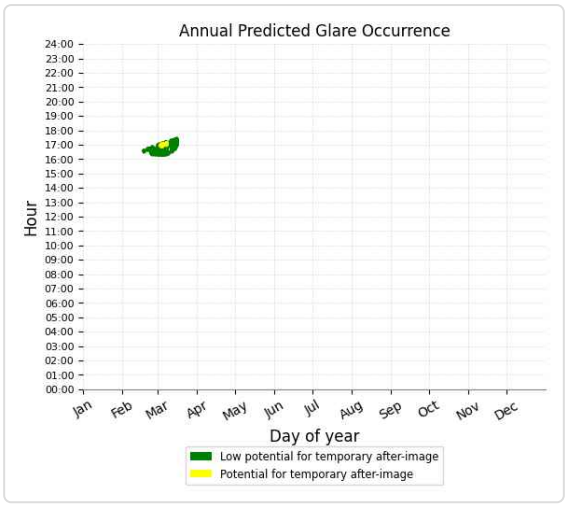
PV array 6-adj and FP: FP 2

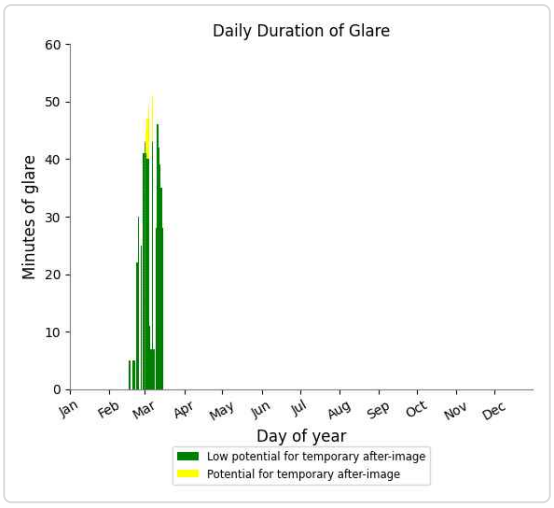
No glare found

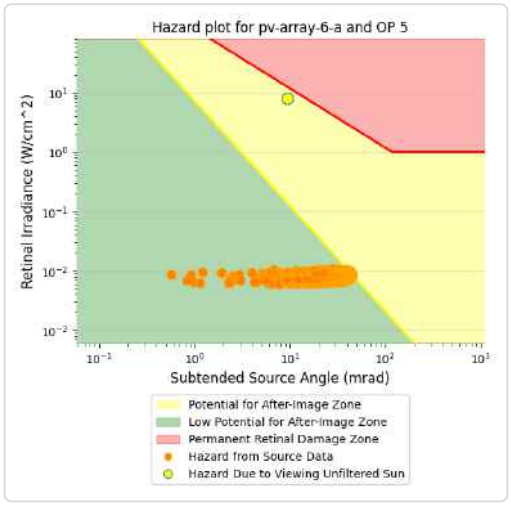
PV array 6-adj and OP 5

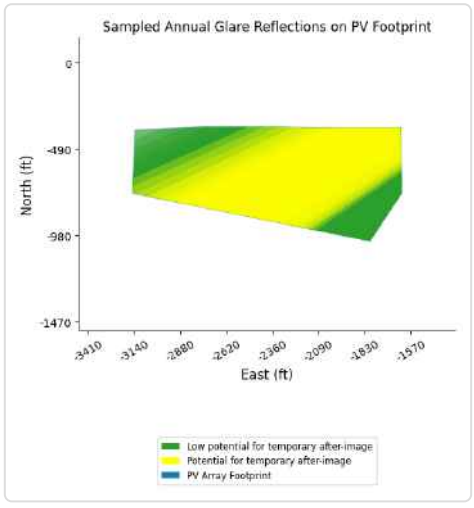
Yellow glare: 28 min.

Green glare: 583 min.



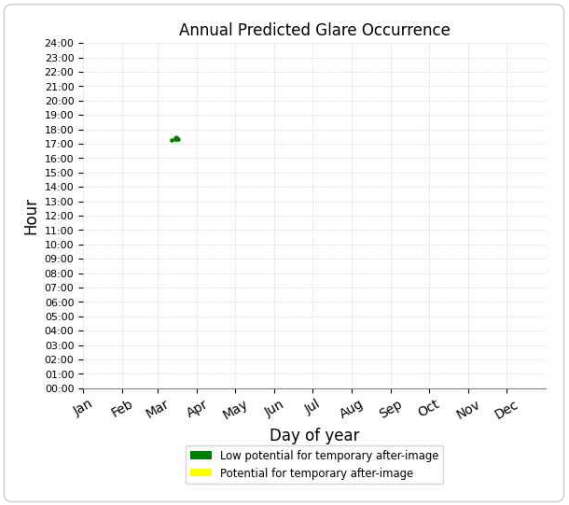


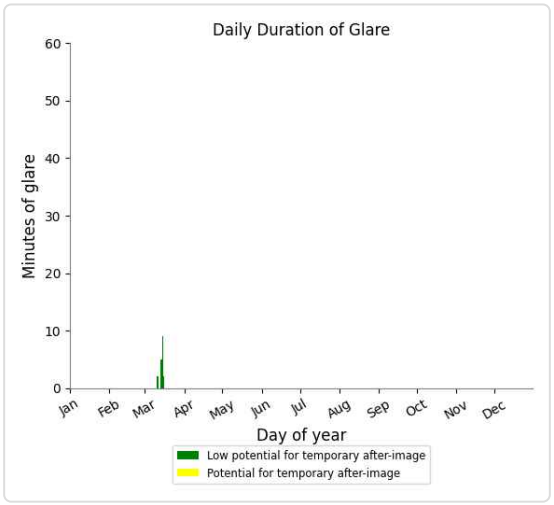


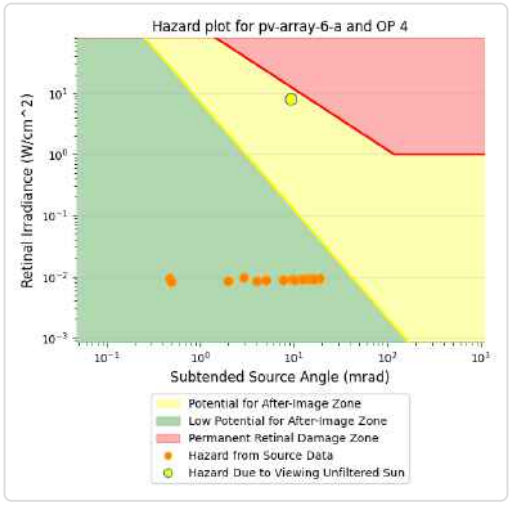


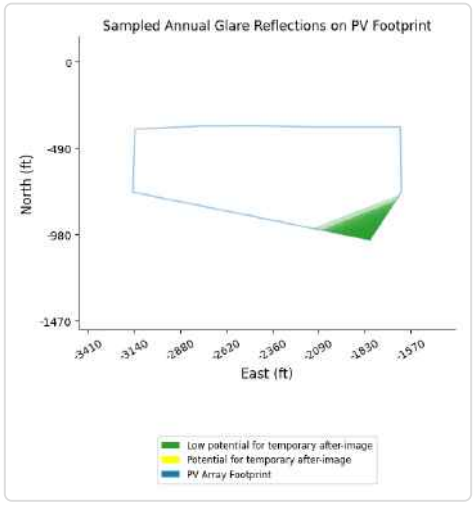
PV array 6-adj and OP 4

Yellow glare: none
Green glare: 18 min.









PV array 6-adj and OP 1

No glare found

PV array 6-adj and OP 2

No glare found

PV array 6-adj and OP 3

No glare found

PV array 6-adj and OP 6

No glare found

PV array 6-adj and OP 7

No glare found

PV array 6-adj and OP 8

No glare found

PV array 6-adj and OP 9

No glare found

PV array 6-adj and OP 10

No glare found

PV: PV array 6-B potential temporary after-image

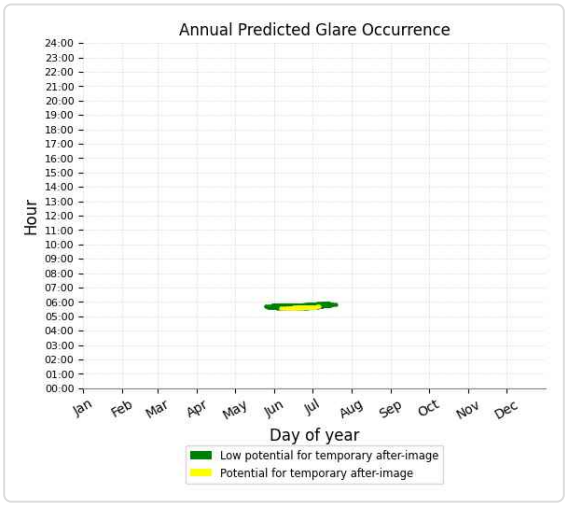
Receptor results ordered by category of glare

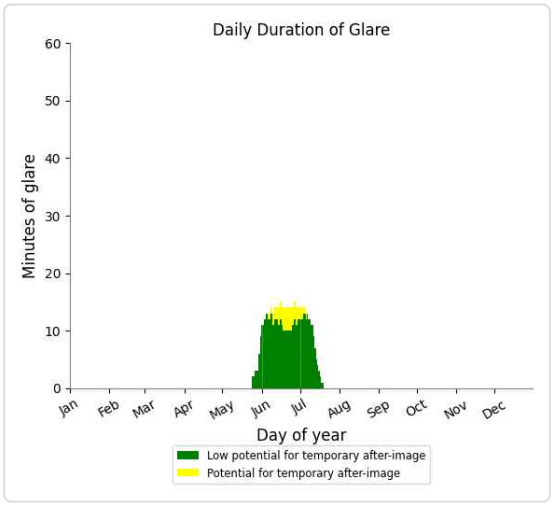
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
McLain Rd	532	8.9	78	1.3
Moraja Ln	49	0.8	0	0.0
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
FP 2	344	5.7	0	0.0
FP 1	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

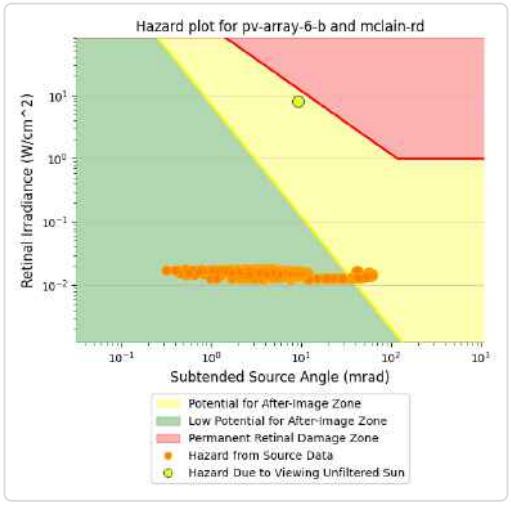
PV array 6-B and Route: McLain Rd

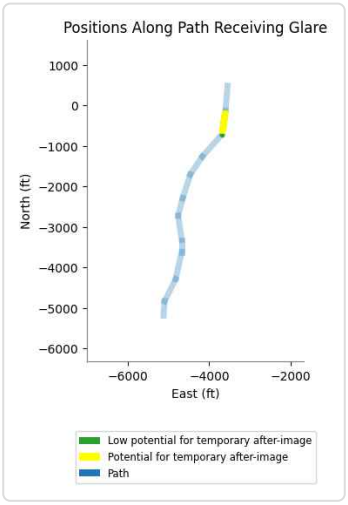
Yellow glare: 78 min.

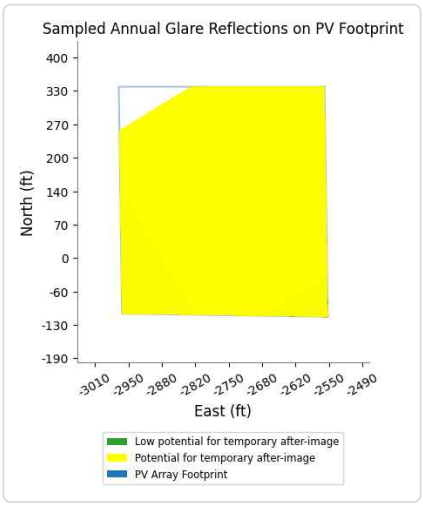
Green glare: 532 min.







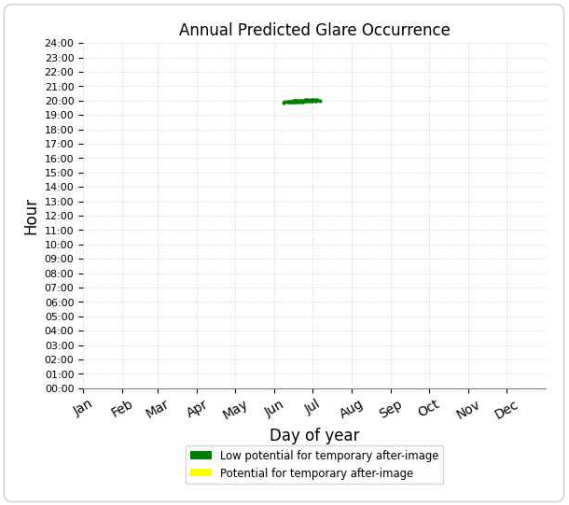


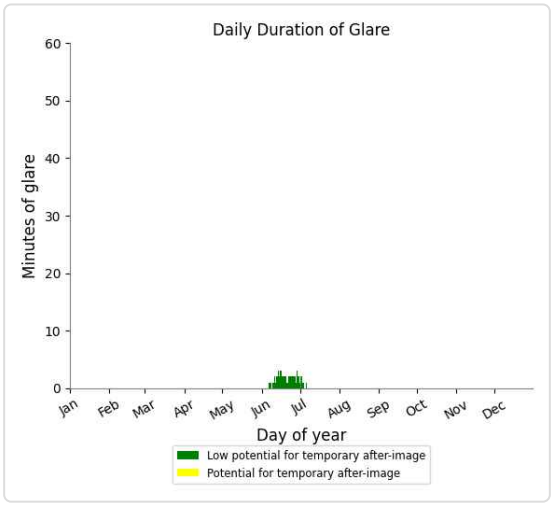


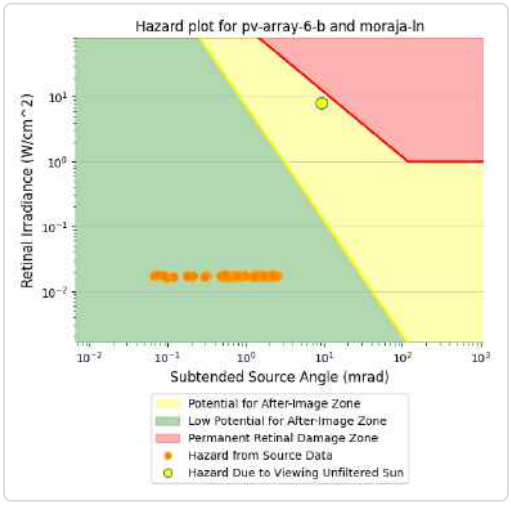
PV array 6-B and Route: Moraja Ln

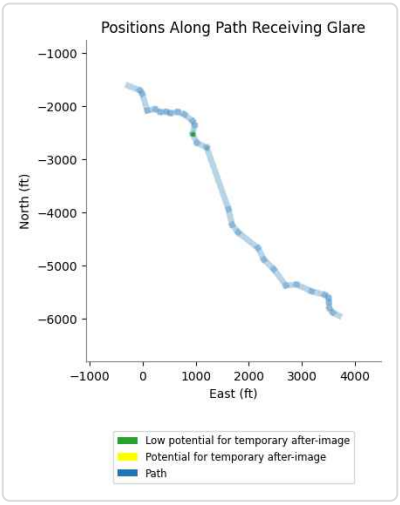
Yellow glare: none

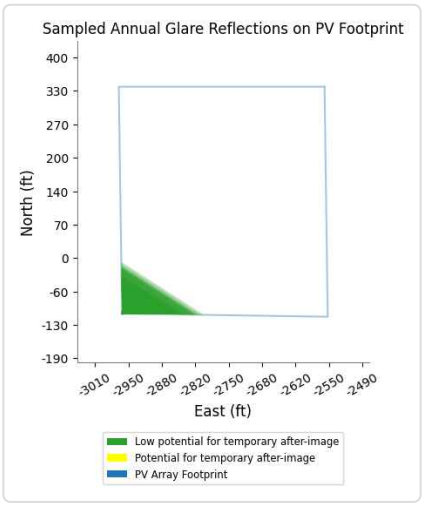
Green glare: 49 min.











PV array 6-B and Route: Booker Rd

No glare found

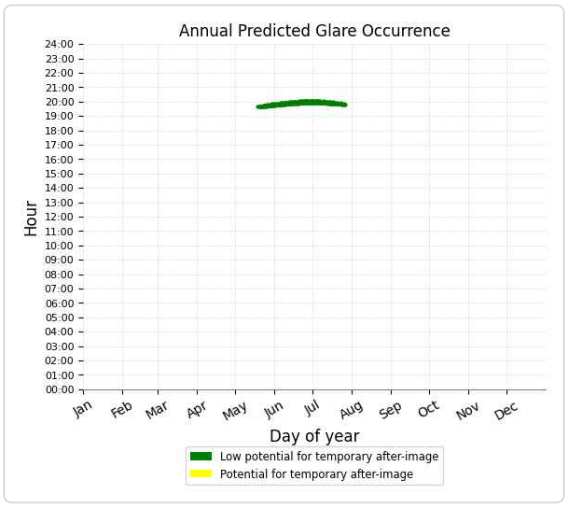
PV array 6-B and Route: Jackson Branch Ln

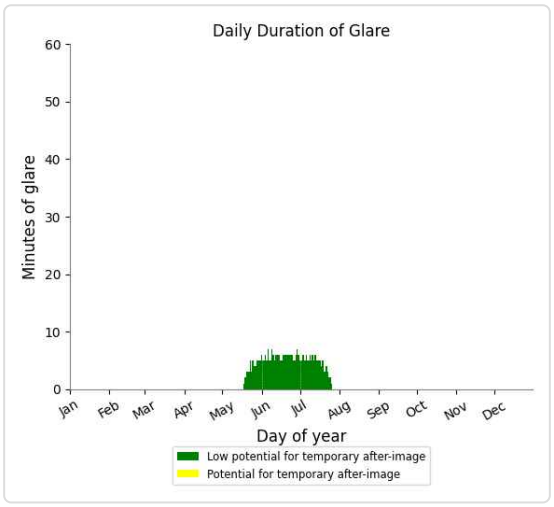
No glare found

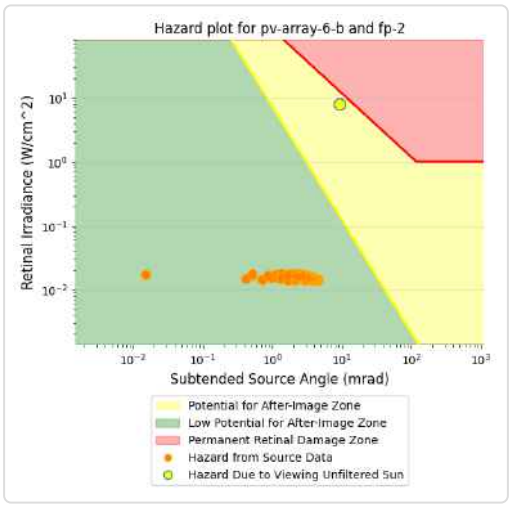
PV array 6-B and FP: FP 2

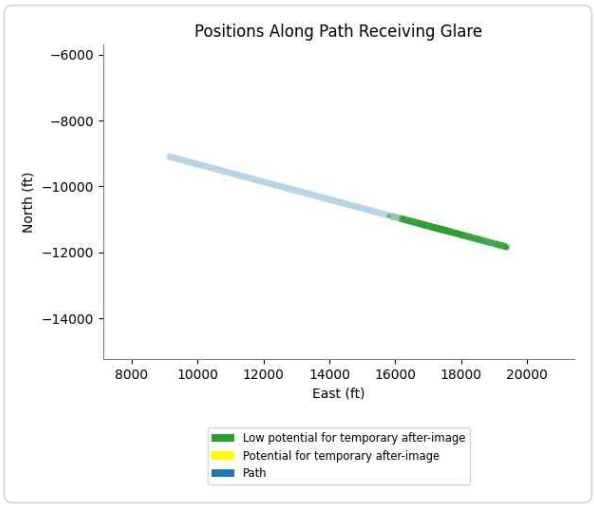
Yellow glare: none

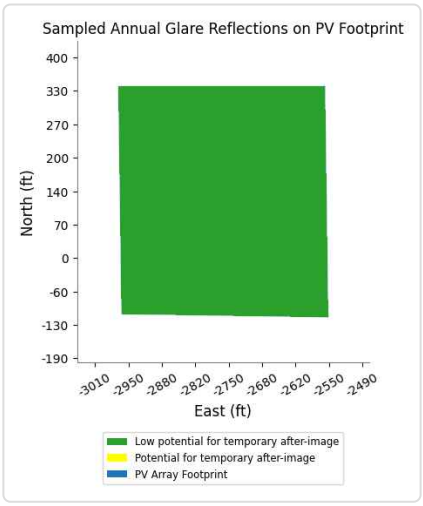
Green glare: 344 min.

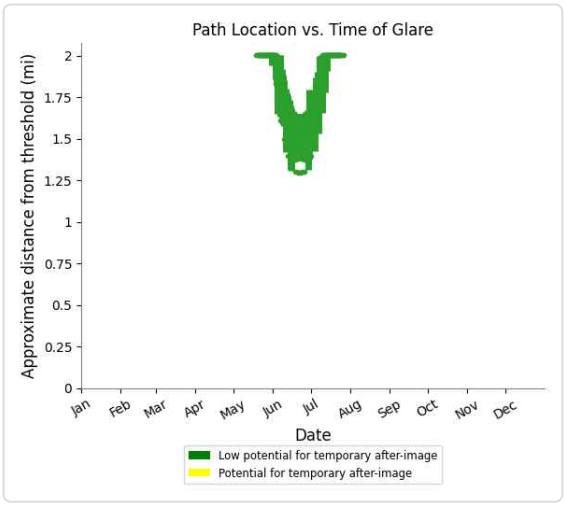












PV array 6-B and FP: FP 1

No glare found

PV array 6-B and OP 1

No glare found

PV array 6-B and OP 2

No glare found

PV array 6-B and OP 3

No glare found

PV array 6-B and OP 4

No glare found

PV array 6-B and OP 5

No glare found

PV array 6-B and OP 6

No glare found

PV array 6-B and OP 7

No glare found

PV array 6-B and OP 8

No glare found

PV array 6-B and OP 9

No glare found

PV array 6-B and OP 10

No glare found

PV: PV array 7-adj potential temporary after-image

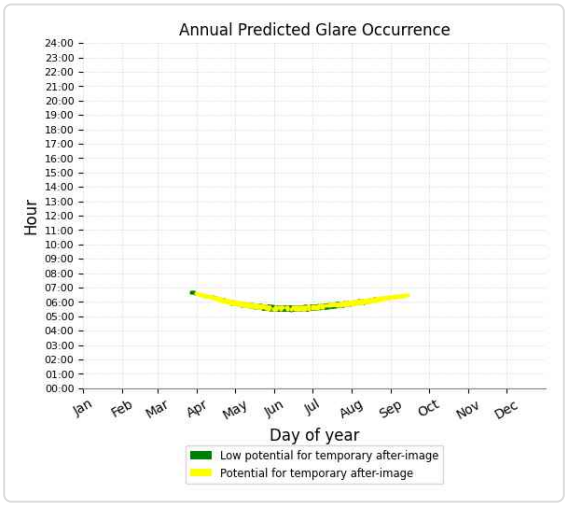
Receptor results ordered by category of glare

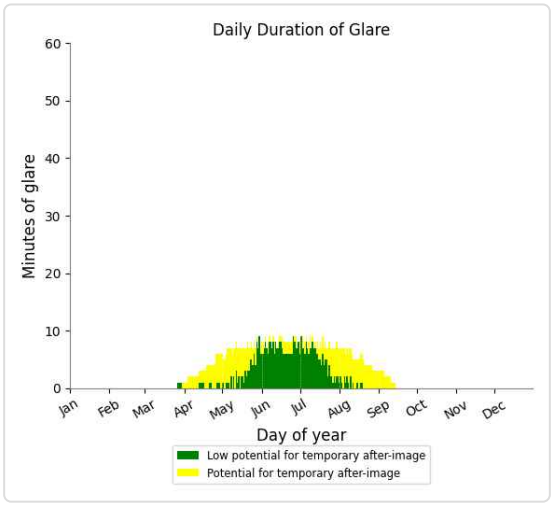
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
McLain Rd	479	8.0	512	8.5
Moraja Ln	1,172	19.5	170	2.8
Booker Rd	0	0.0	0	0.0
Jackson Branch Ln	0	0.0	0	0.0
FP 2	868	14.5	0	0.0
FP 1	0	0.0	0	0.0
OP 7	435	7.2	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

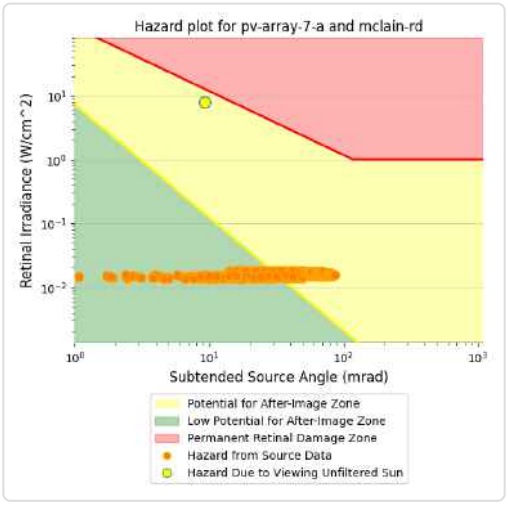
PV array 7-adj and Route: McLain Rd

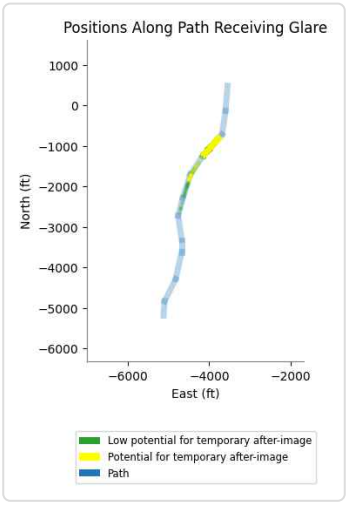
Yellow glare: 512 min.

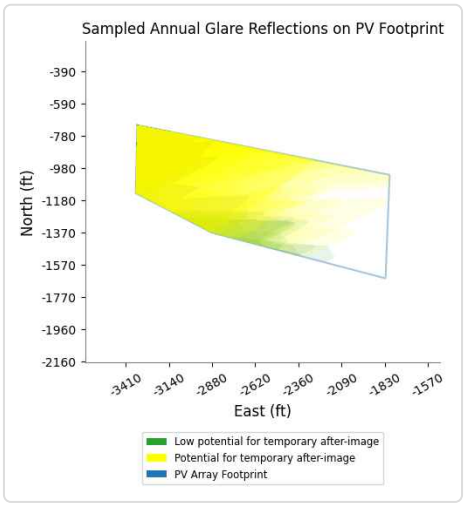
Green glare: 479 min.







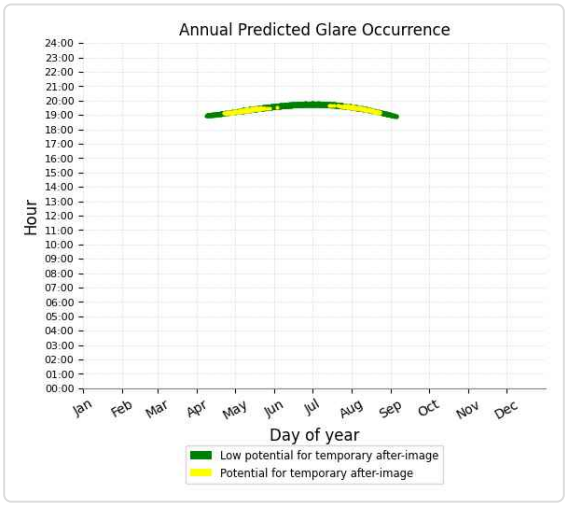


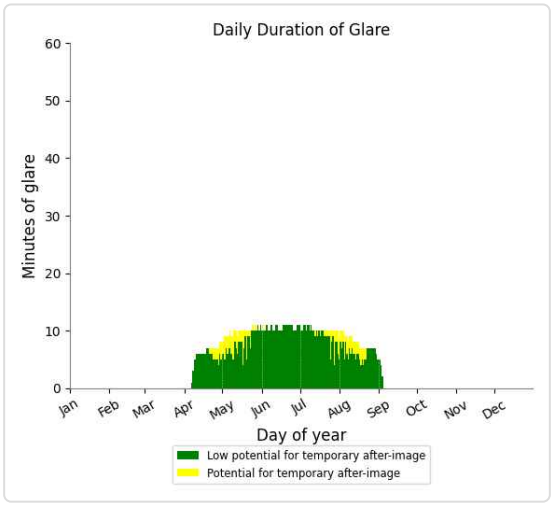


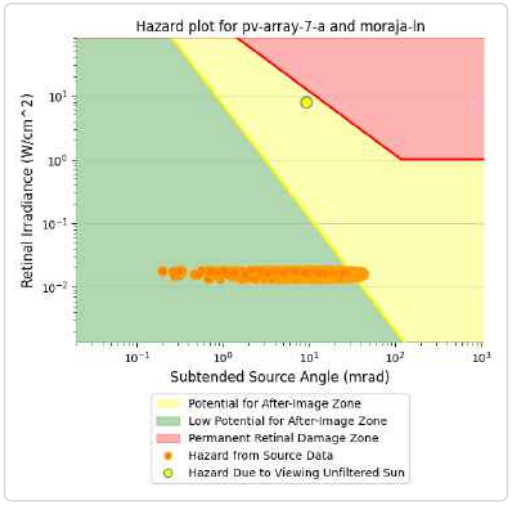
PV array 7-adj and Route: Moraja Ln

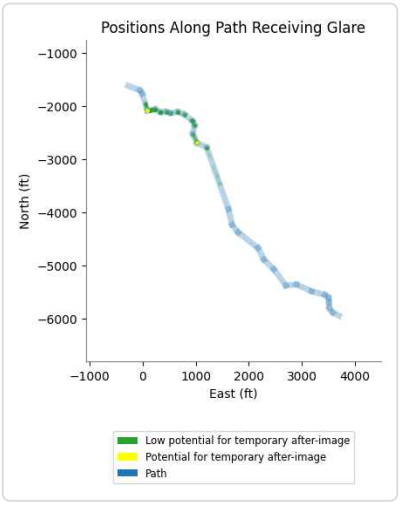
Yellow glare: 170 min.

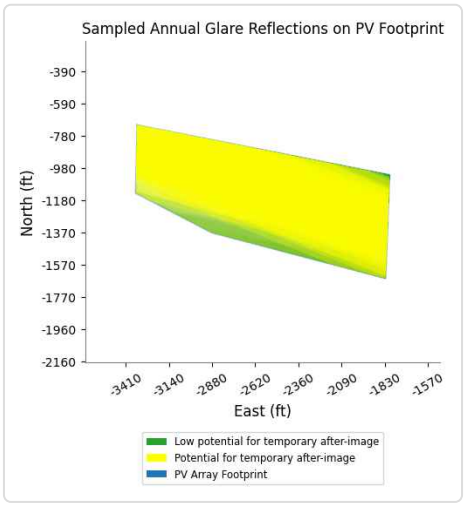
Green glare: 1,172 min.











PV array 7-adj and Route: Booker Rd

No glare found

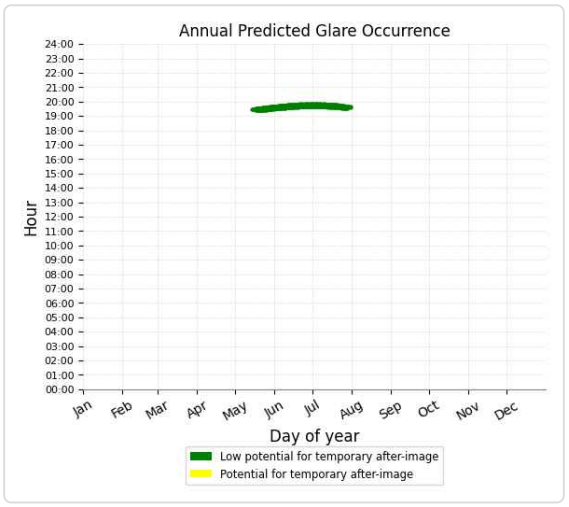
PV array 7-adj and Route: Jackson Branch Ln

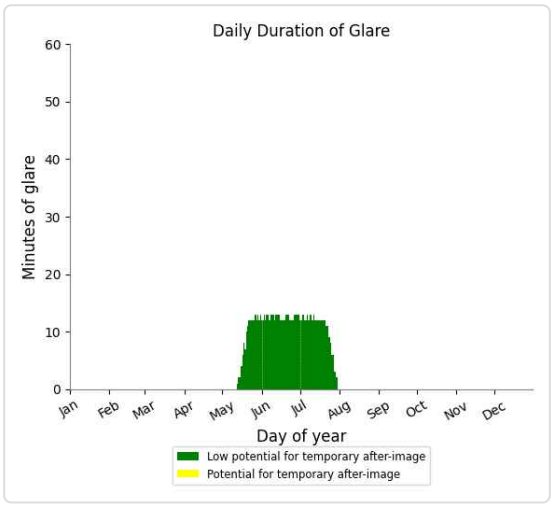
No glare found

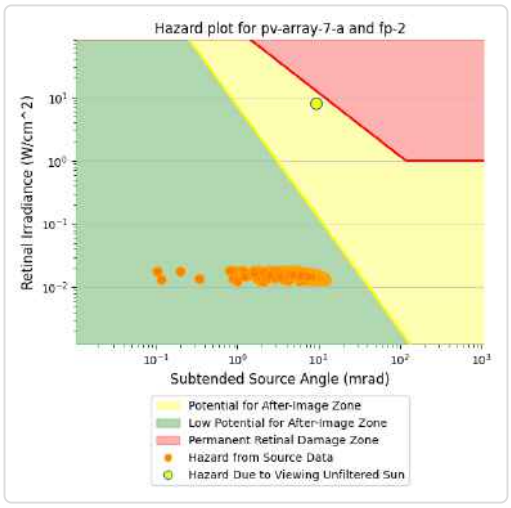
PV array 7-adj and FP: FP 2

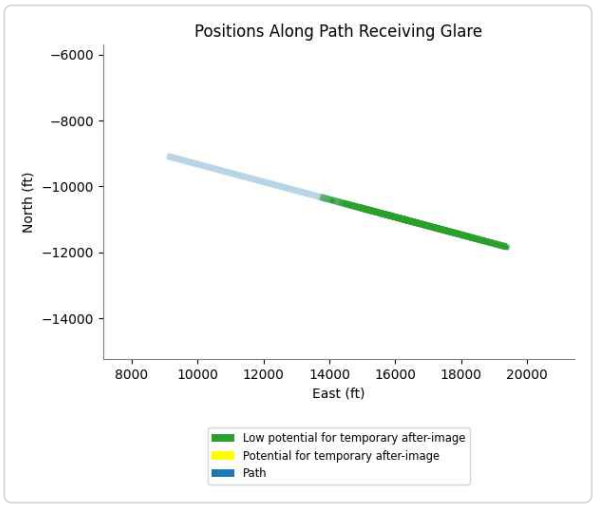
Yellow glare: none

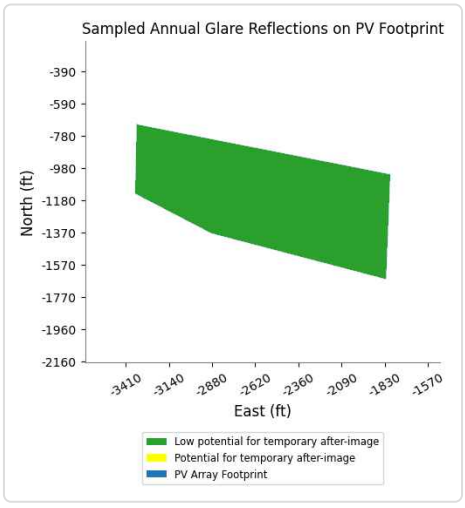
Green glare: 868 min.

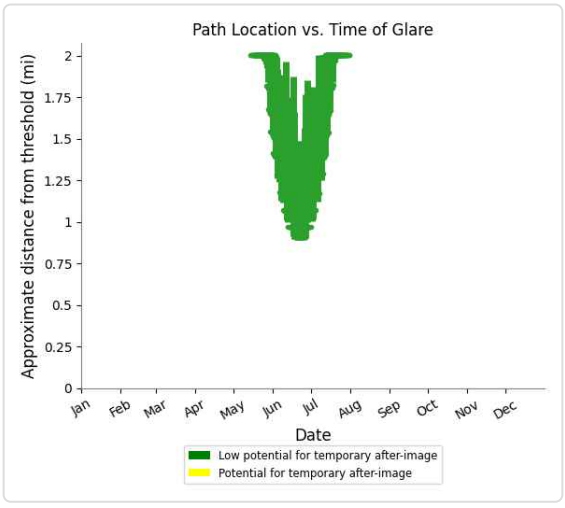










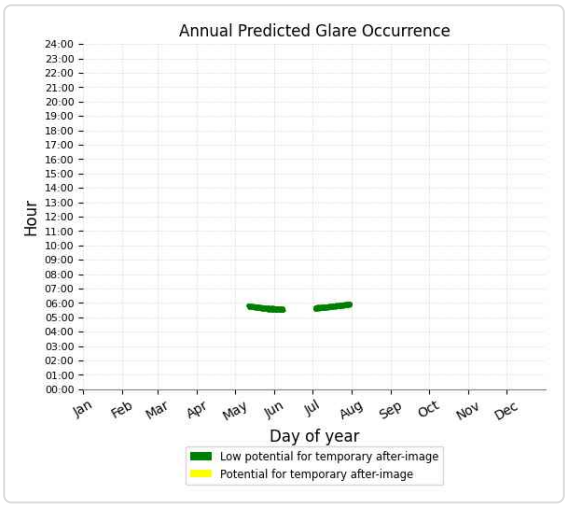


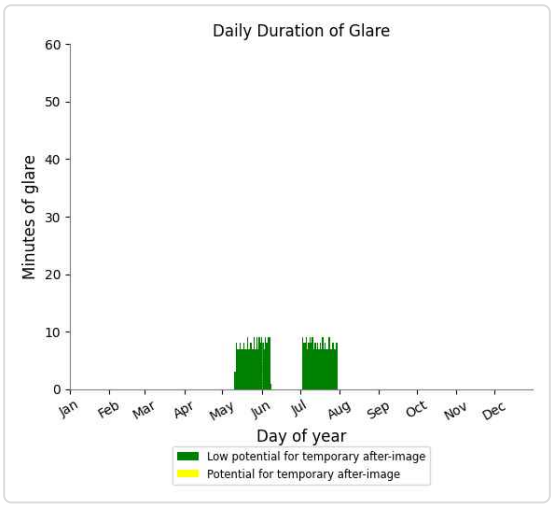
PV array 7-adj and FP: FP 1

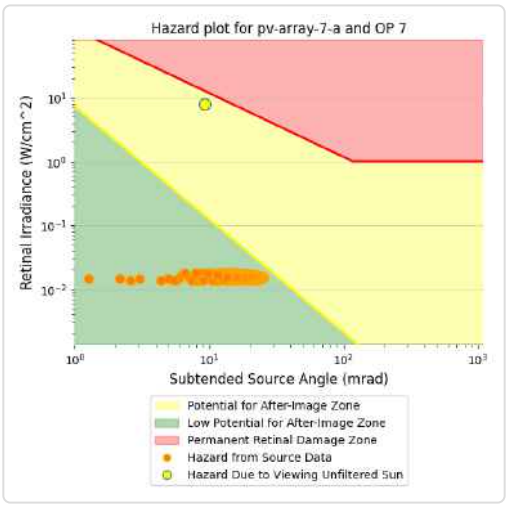
No glare found

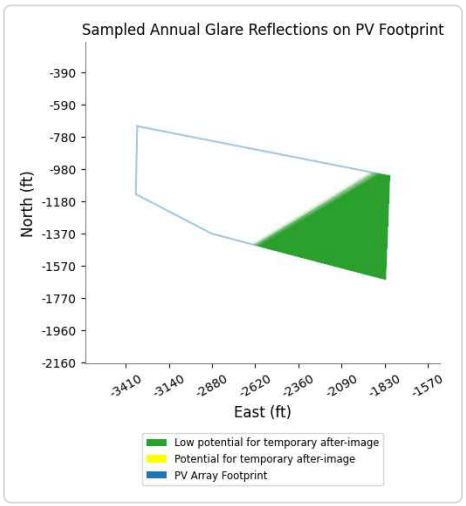
PV array 7-adj and OP 7

Yellow glare: none
Green glare: 435 min.









PV array 7-adj and OP 1

No glare found

PV array 7-adj and OP 2

No glare found

PV array 7-adj and OP 3

No glare found

PV array 7-adj and OP 4

No glare found

PV array 7-adj and OP 5

No glare found

PV array 7-adj and OP 6

No glare found

PV array 7-adj and OP 8

No glare found

PV array 7-adj and OP 9

No glare found

PV array 7-adj and OP 10

No glare found

PV: PV array 8-adj potential temporary after-image

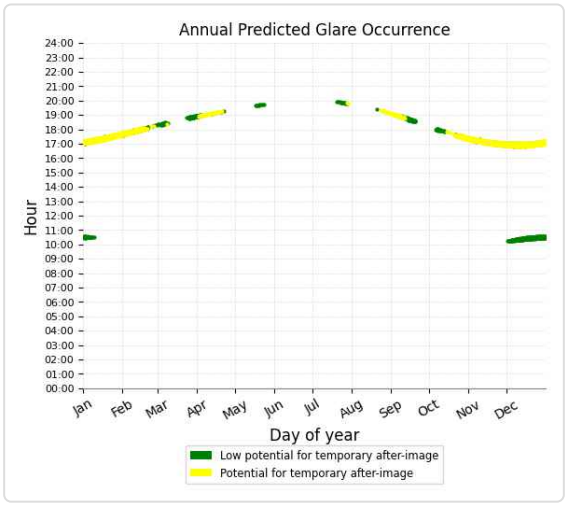
Receptor results ordered by category of glare

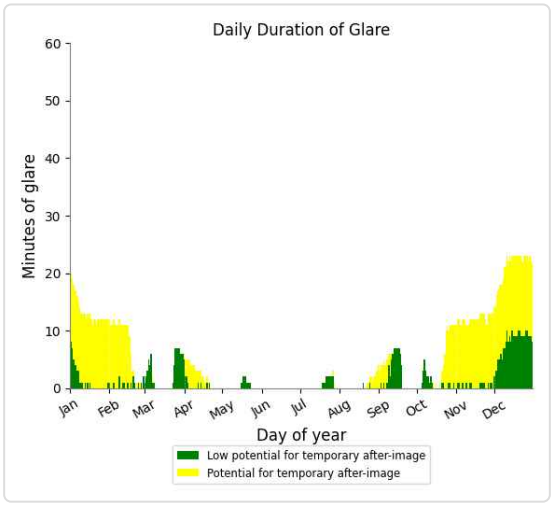
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Jackson Branch Ln	528	8.8	1,534	25.6
Moraja Ln	210	3.5	1,629	27.1
McLain Rd	16	0.3	0	0.0
Booker Rd	0	0.0	0	0.0
FP 1	0	0.0	0	0.0
FP 2	0	0.0	0	0.0
OP 4	281	4.7	66	1.1
OP 8	94	1.6	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

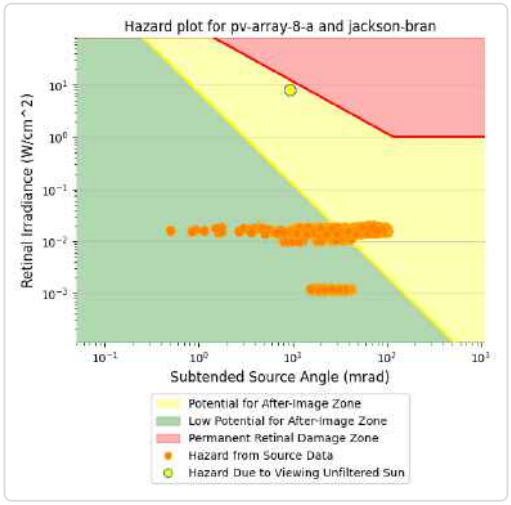
PV array 8-adj and Route: Jackson Branch Ln

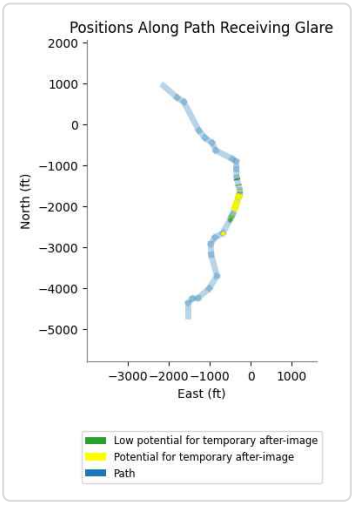
Yellow glare: 1,534 min.

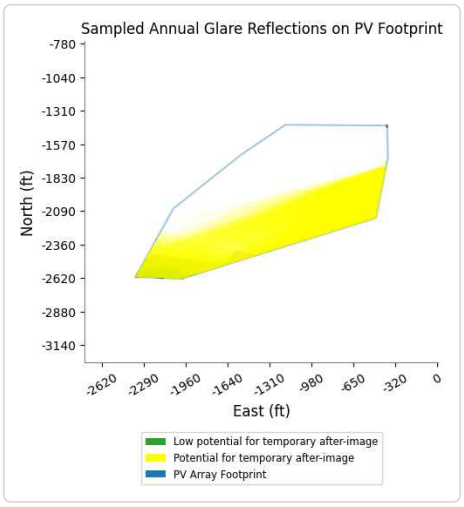
Green glare: 528 min.







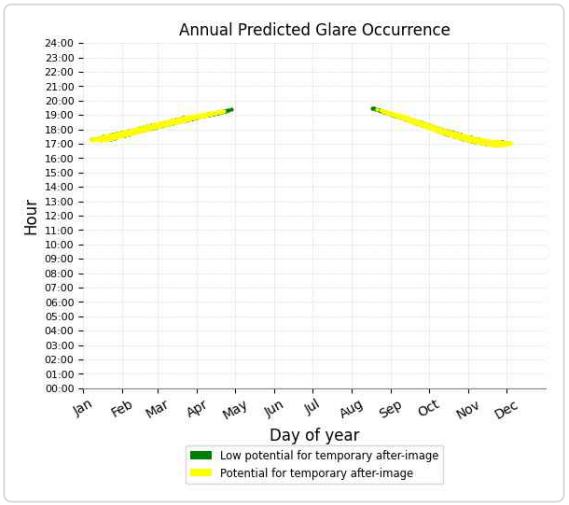


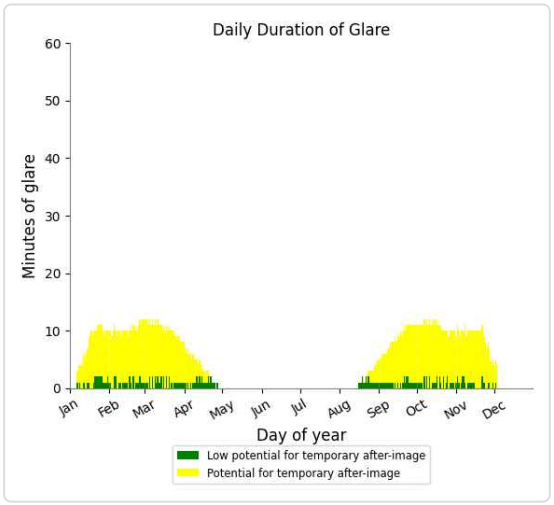


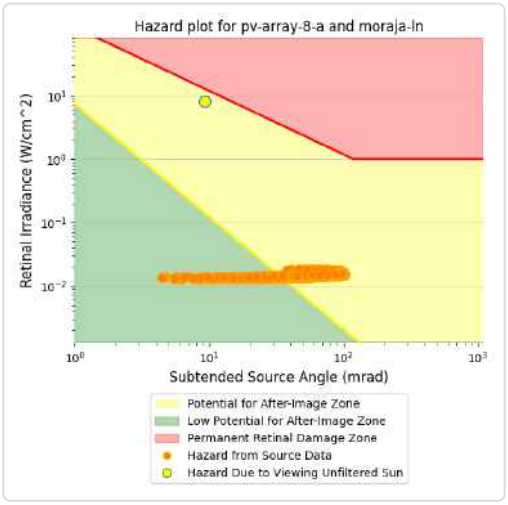
PV array 8-adj and Route: Moraja Ln

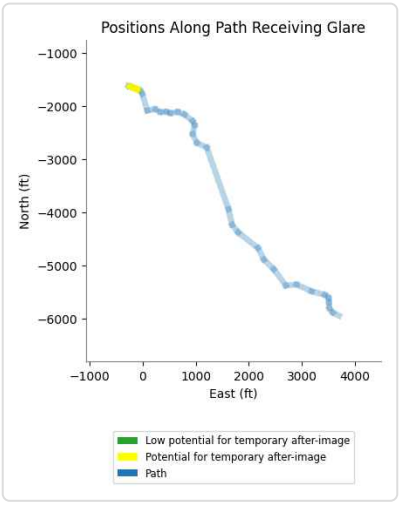
Yellow glare: 1,629 min.

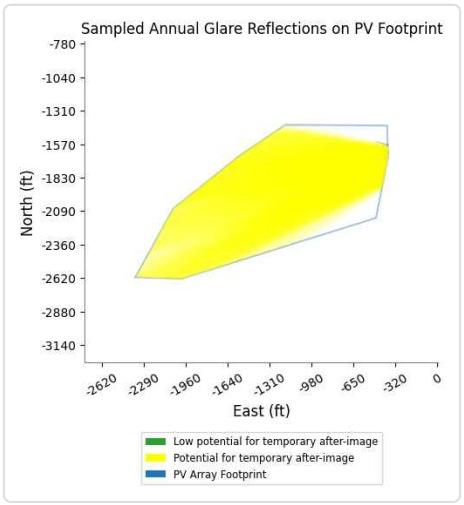
Green glare: 210 min.







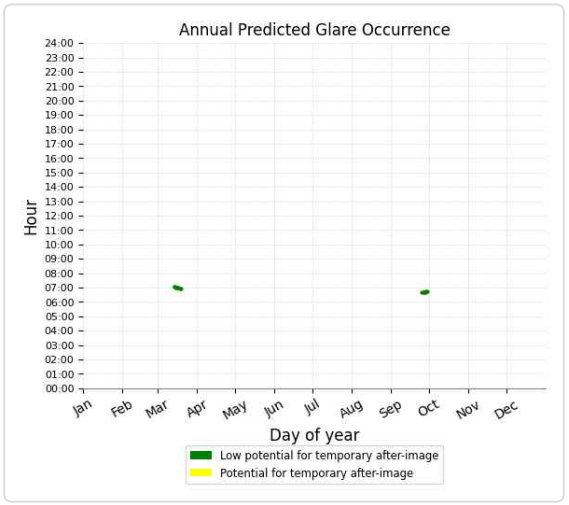


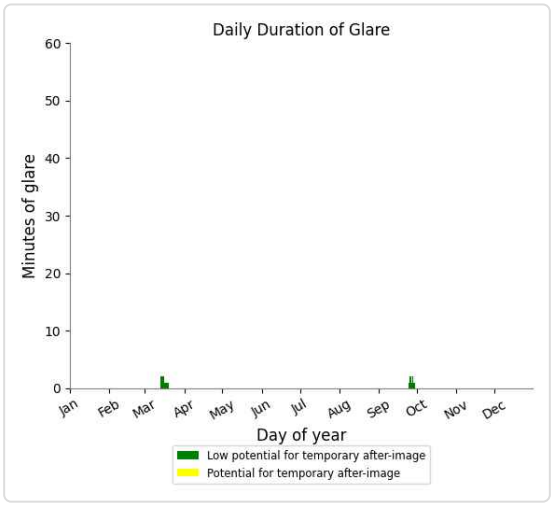


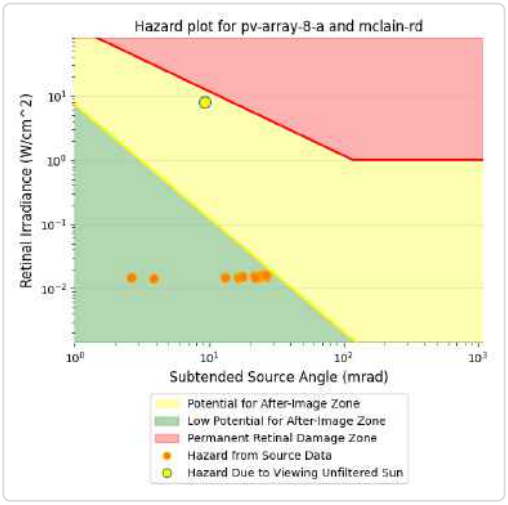
PV array 8-adj and Route: McLain Rd

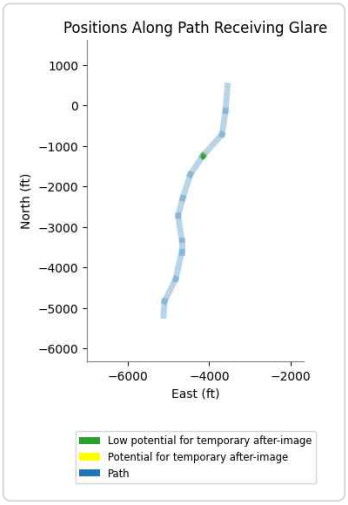
Yellow glare: none

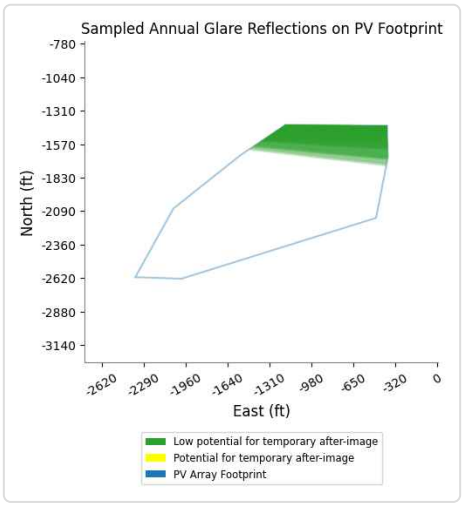
Green glare: 16 min.











PV array 8-adj and Route: Booker Rd

No glare found

PV array 8-adj and FP: FP 1

No glare found

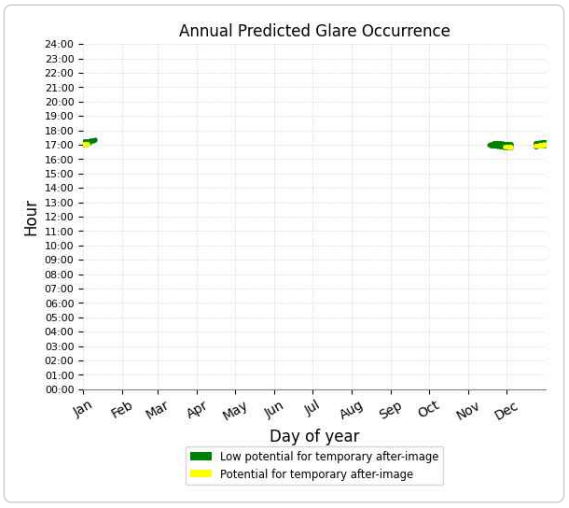
PV array 8-adj and FP: FP 2

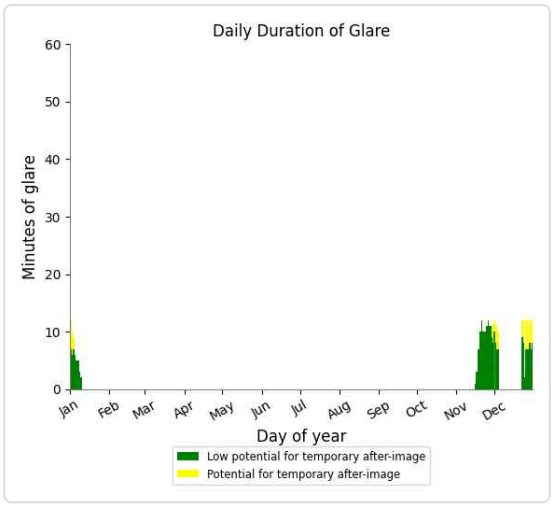
No glare found

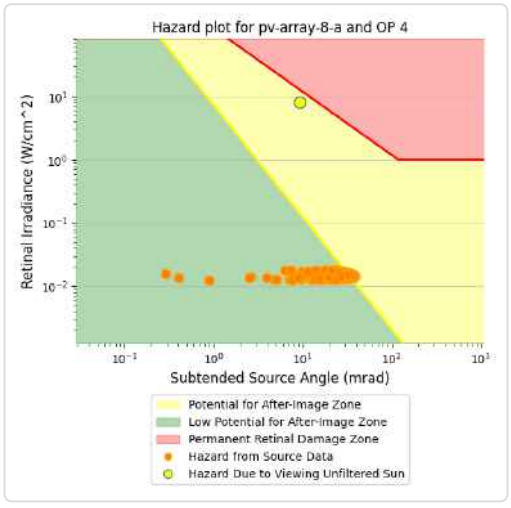
PV array 8-adj and OP 4

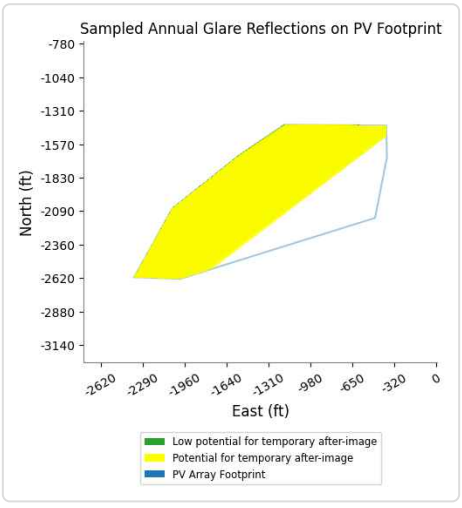
Yellow glare: 66 min.

Green glare: 281 min.



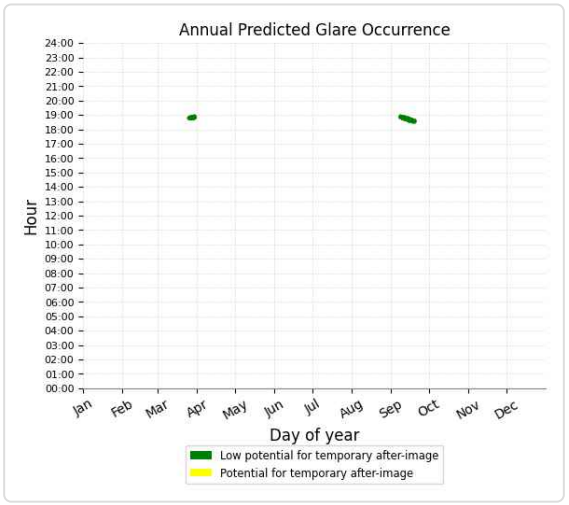


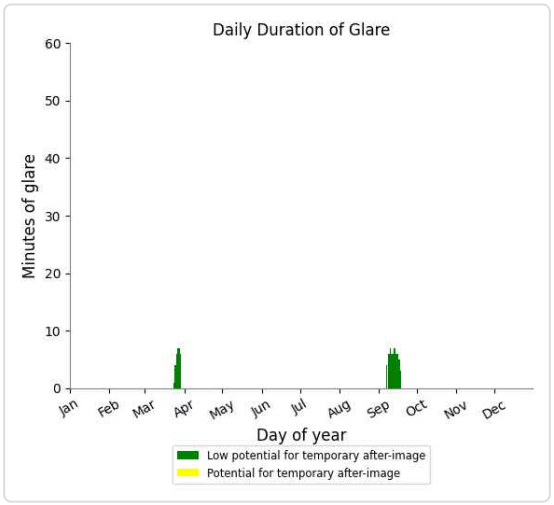


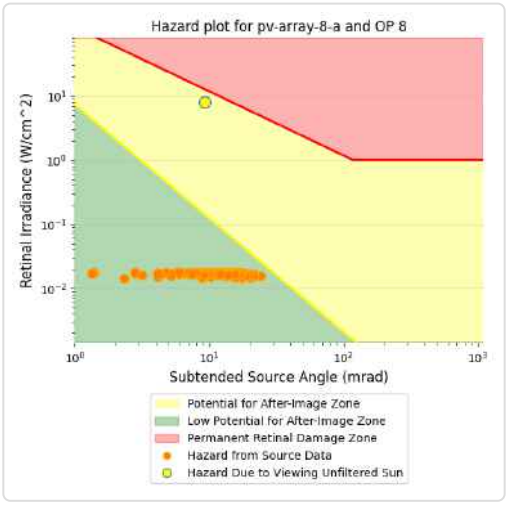


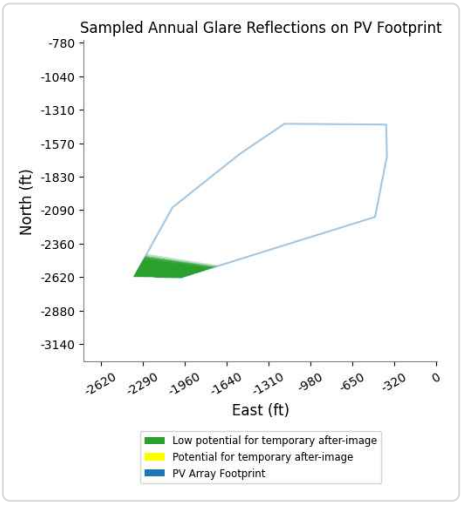
PV array 8-adj and OP 8

Yellow glare: none
Green glare: 94 min.









PV array 8-adj and OP 1

No glare found

PV array 8-adj and OP 2

No glare found

PV array 8-adj and OP 3

No glare found

PV array 8-adj and OP 5

No glare found

PV array 8-adj and OP 6

No glare found

PV array 8-adj and OP 7

No glare found

PV array 8-adj and OP 9

No glare found

PV array 8-adj and OP 10

No glare found

PV: PV array 9 potential temporary after-image

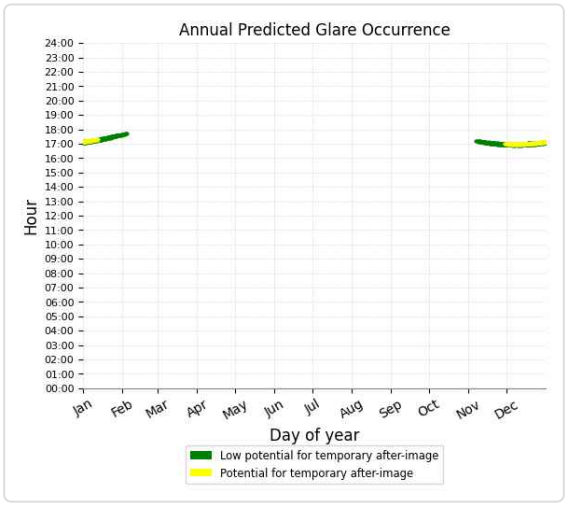
Receptor results ordered by category of glare

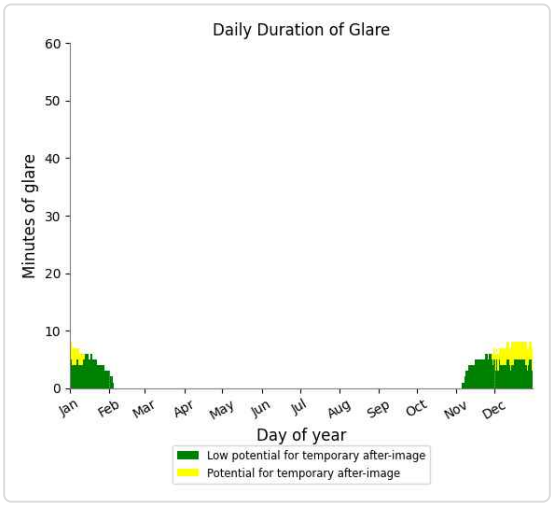
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Booker Rd	389	6.5	129	2.1
Jackson Branch Ln	2,176	36.3	1,375	22.9
Moraja Ln	632	10.5	0	0.0
McLain Rd	0	0.0	0	0.0
FP 1	4,600	76.7	319	5.3
FP 2	1,081	18.0	0	0.0
OP 9	572	9.5	156	2.6
OP 1	29	0.5	0	0.0
OP 4	196	3.3	0	0.0
OP 5	139	2.3	0	0.0
OP 8	162	2.7	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 10	0	0.0	0	0.0

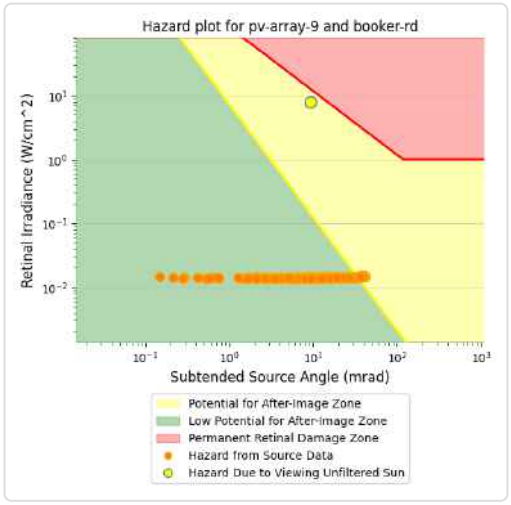
PV array 9 and Route: Booker Rd

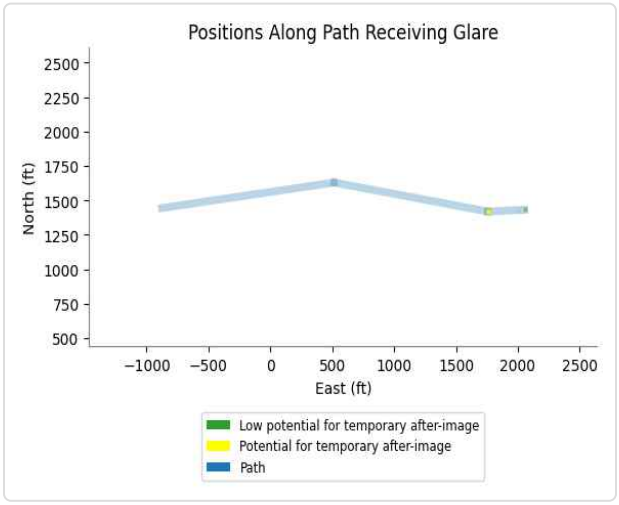
Yellow glare: 129 min.

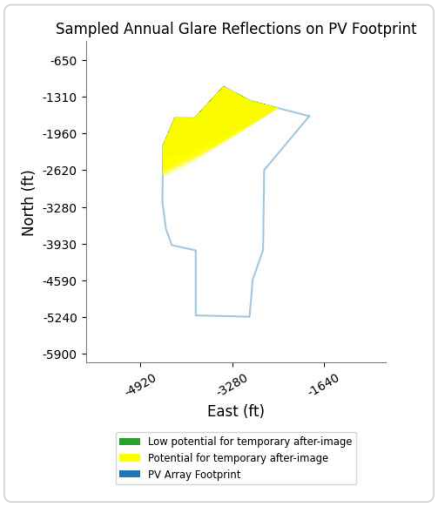
Green glare: 389 min.







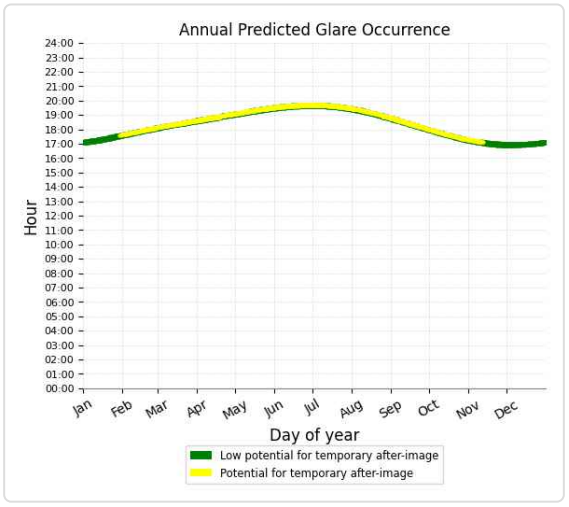


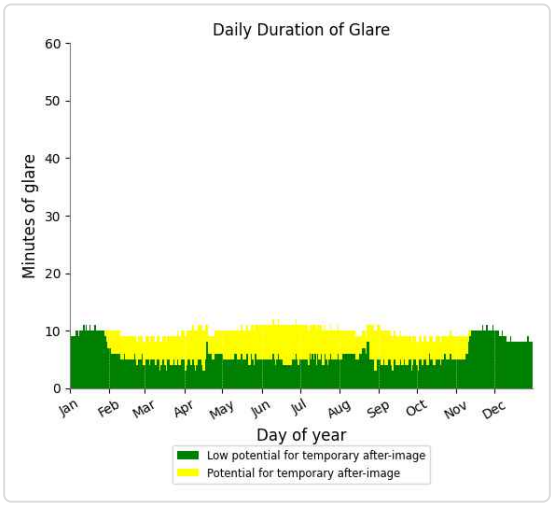


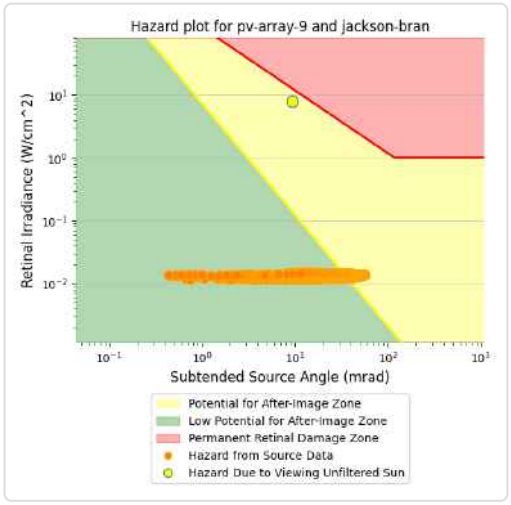
PV array 9 and Route: Jackson Branch Ln

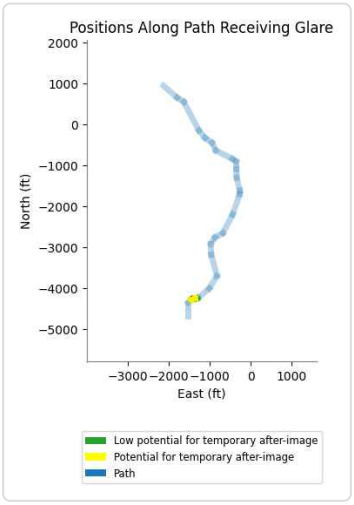
Yellow glare: 1,375 min.

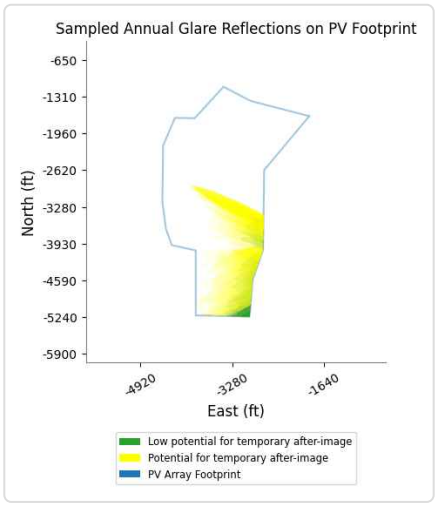
Green glare: 2,176 min.







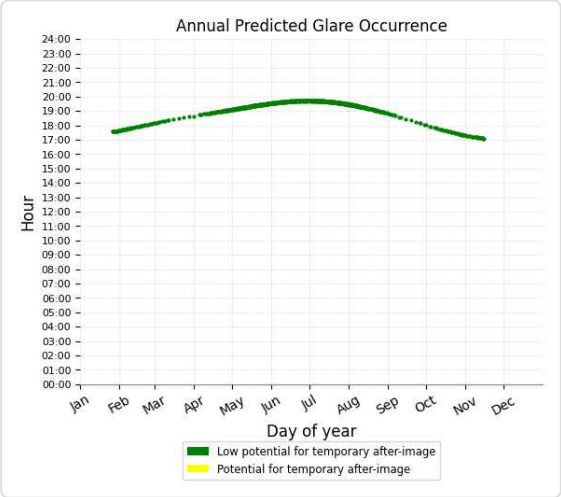


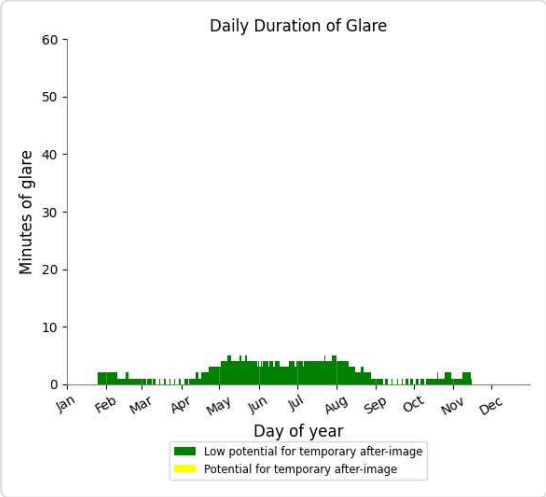


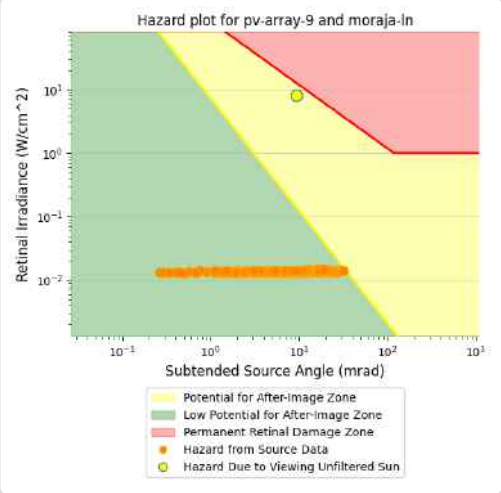
PV array 9 and Route: Moraja Ln

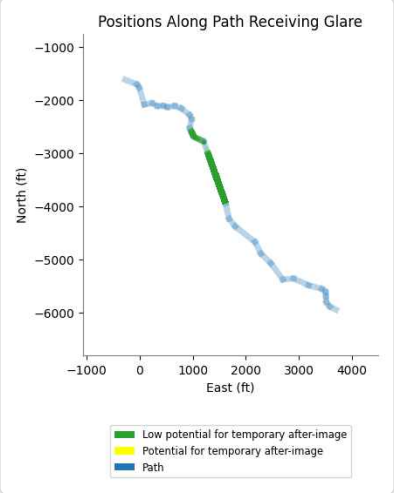
Yellow glare: none

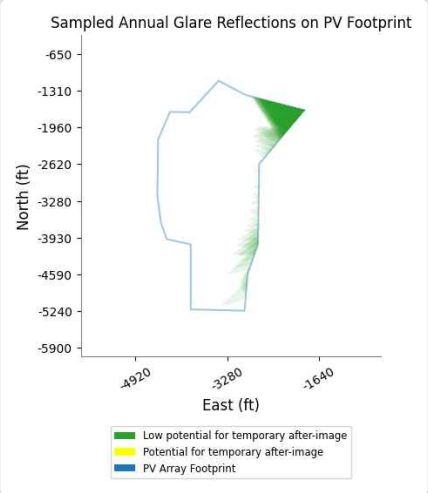
Green glare: 632 min.











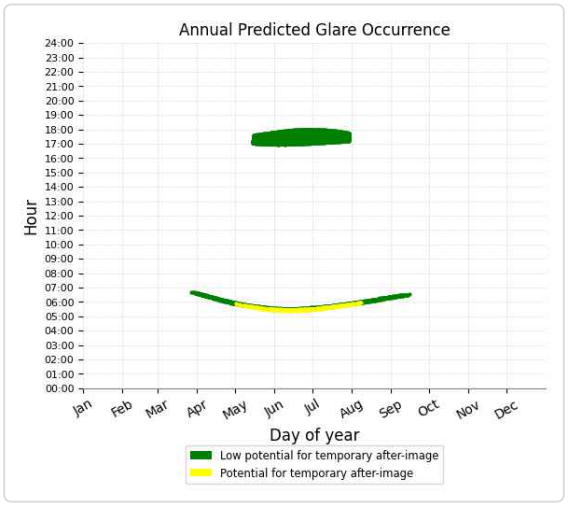
PV array 9 and Route: McLain Rd

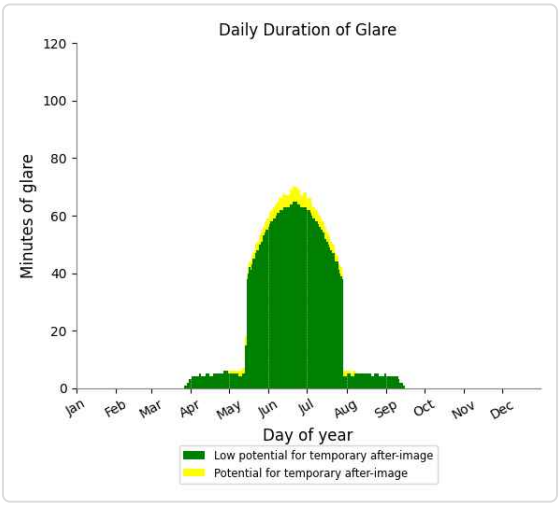
No glare found

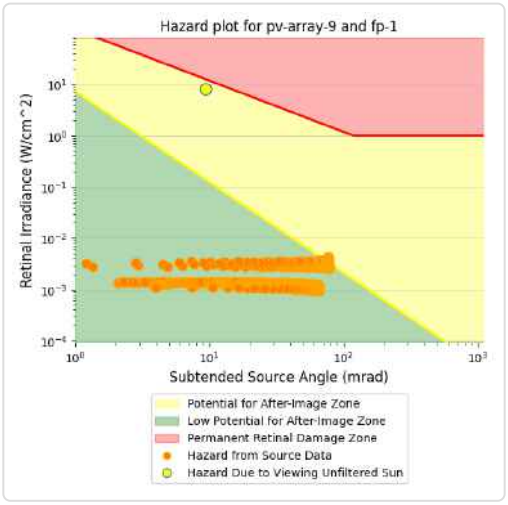
PV array 9 and FP: FP 1

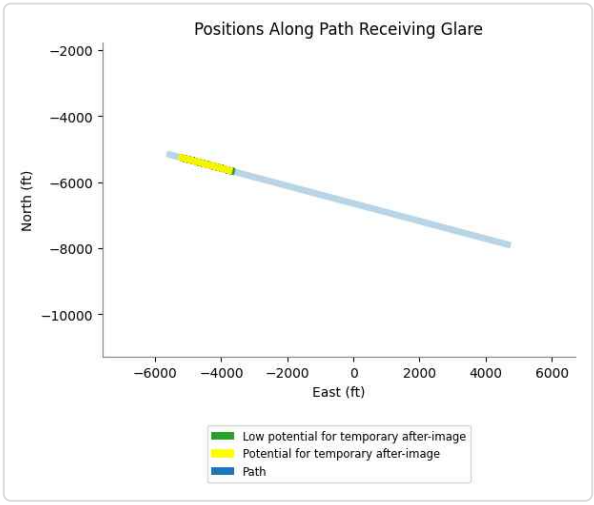
Yellow glare: 319 min.

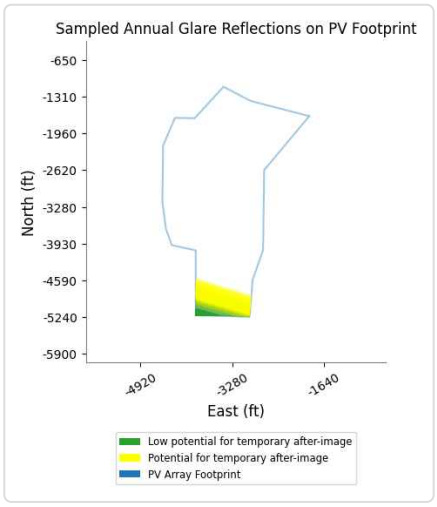
Green glare: 4,600 min.

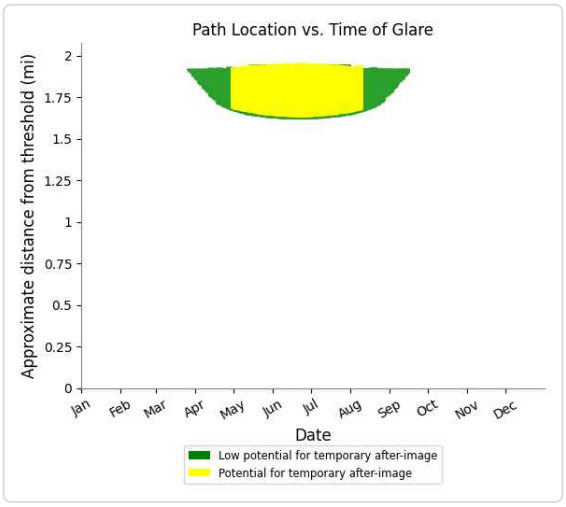








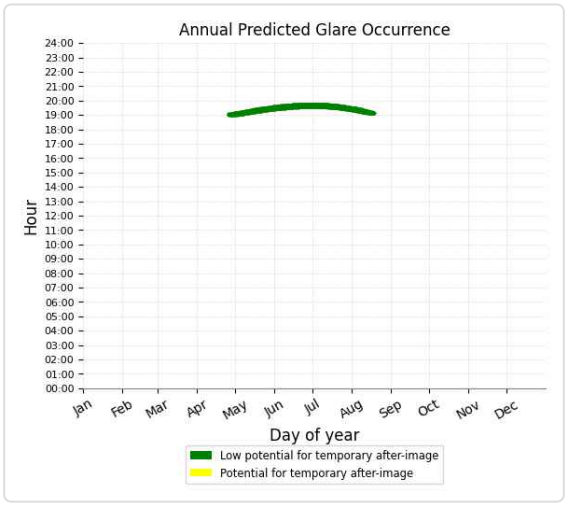


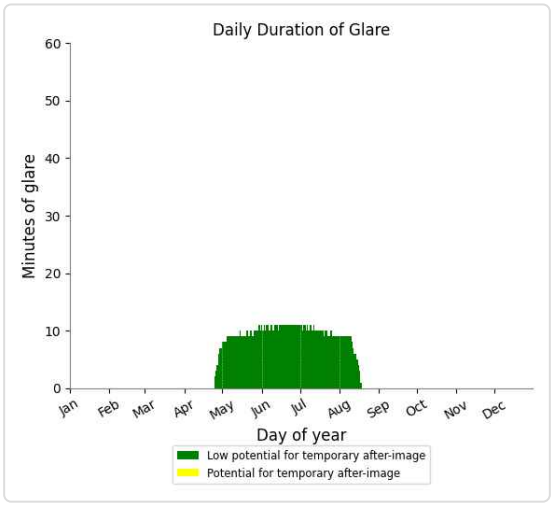


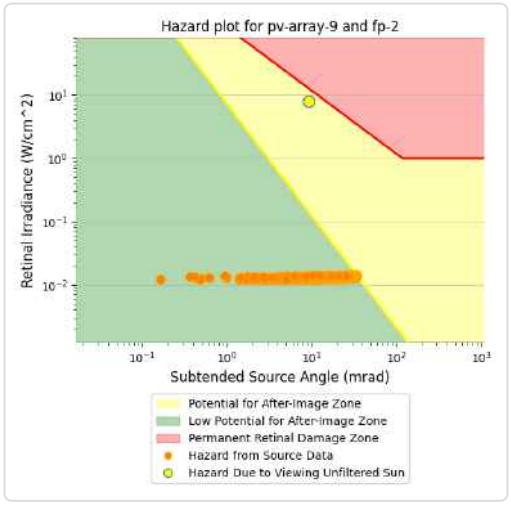
PV array 9 and FP: FP 2

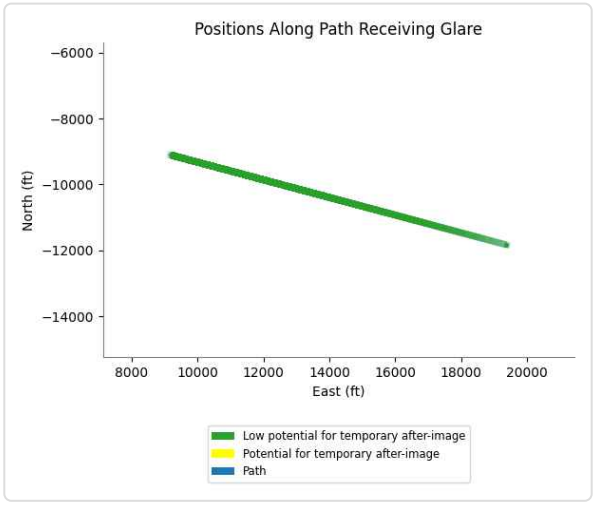
Yellow glare: none

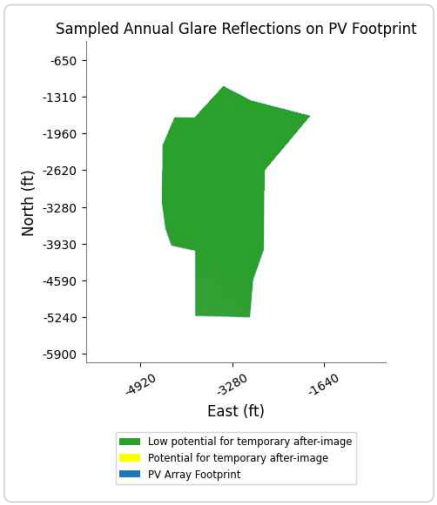
Green glare: 1,081 min.

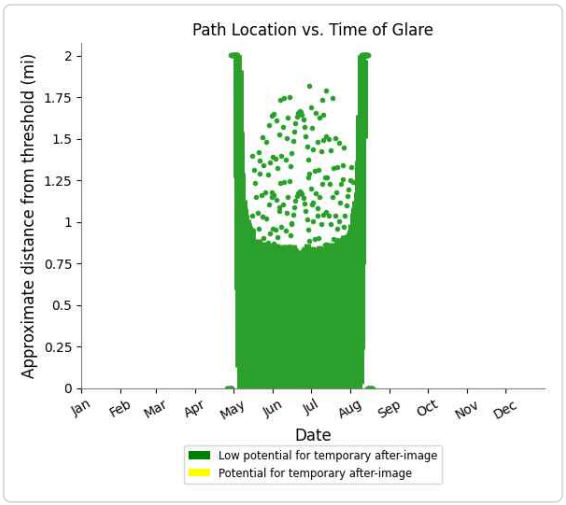








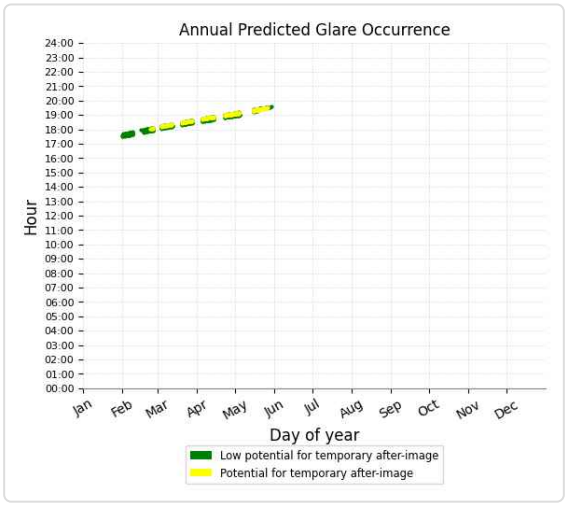


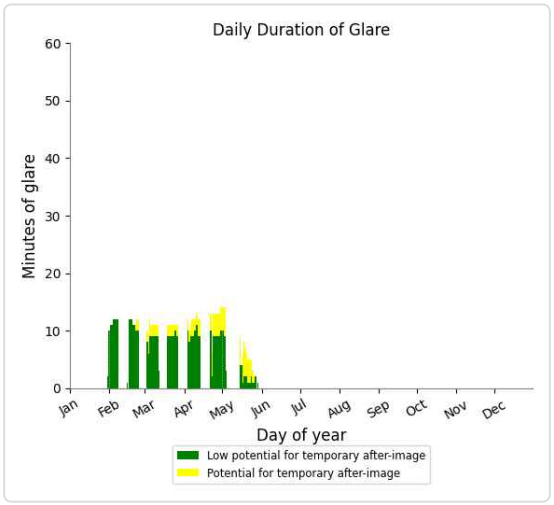


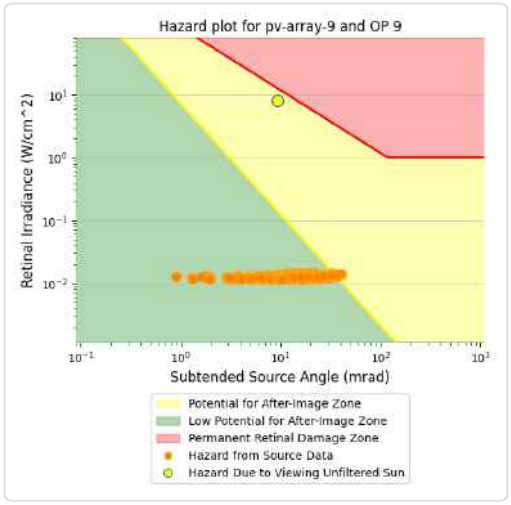
PV array 9 and OP 9

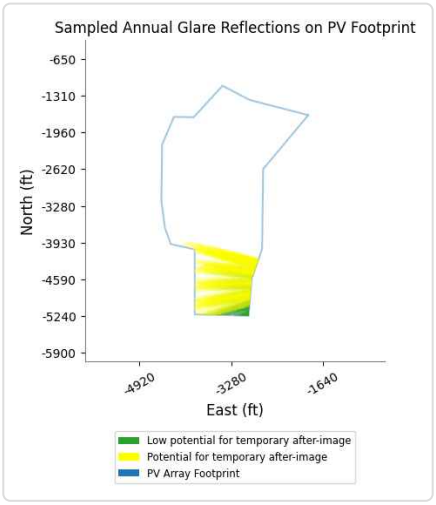
Yellow glare: 156 min.

Green glare: 572 min.





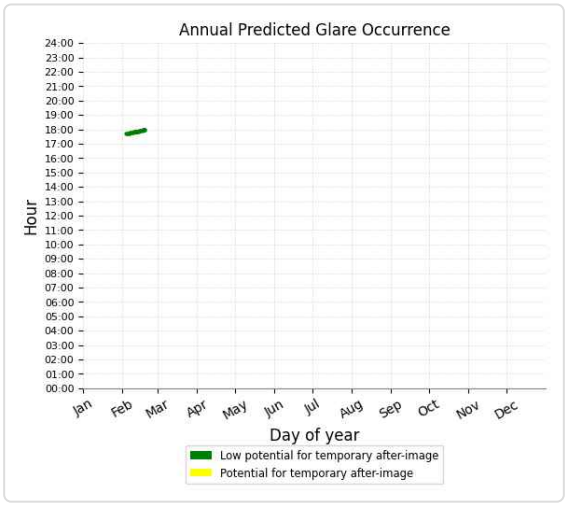


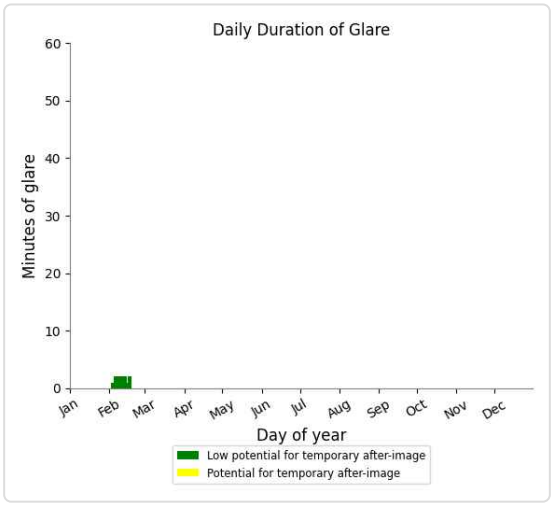


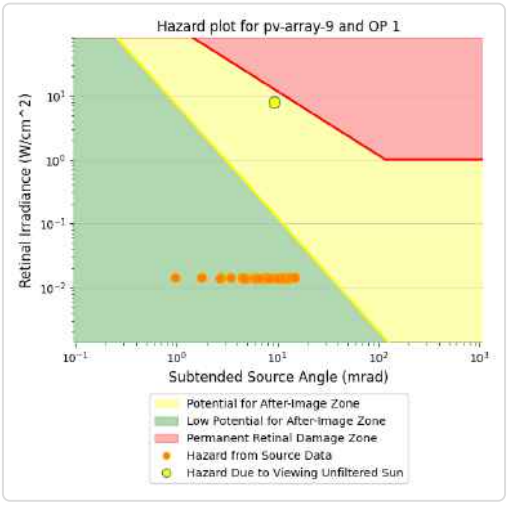
PV array 9 and OP 1

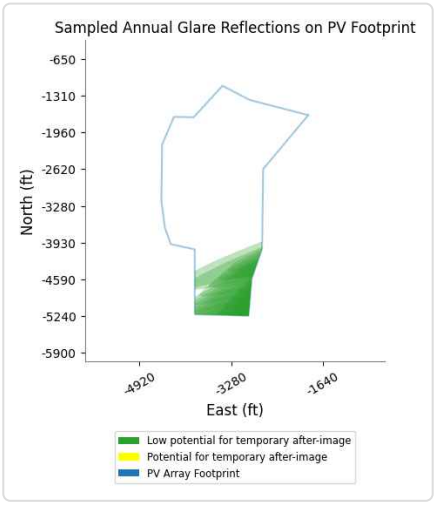
Yellow glare: none

Green glare: 29 min.





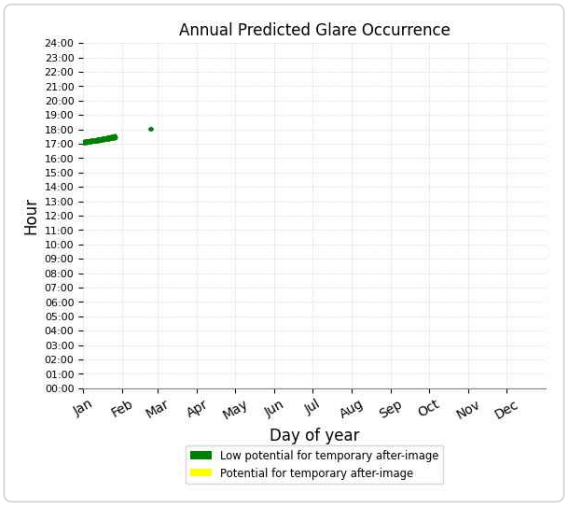


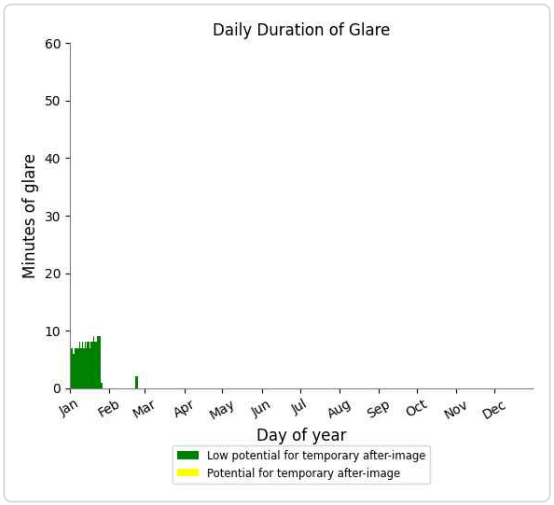


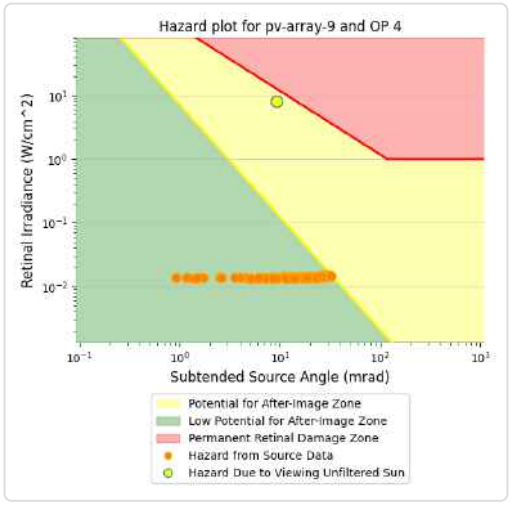
PV array 9 and OP 4

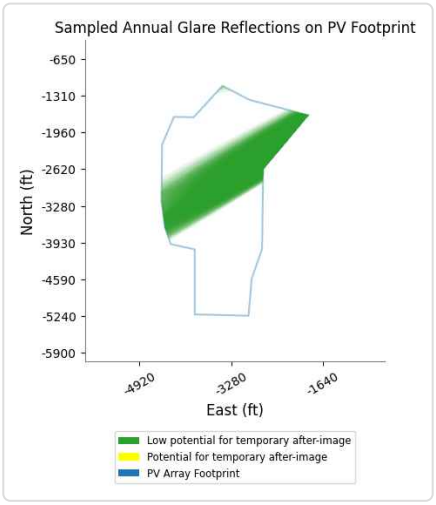
Yellow glare: none

Green glare: 196 min.





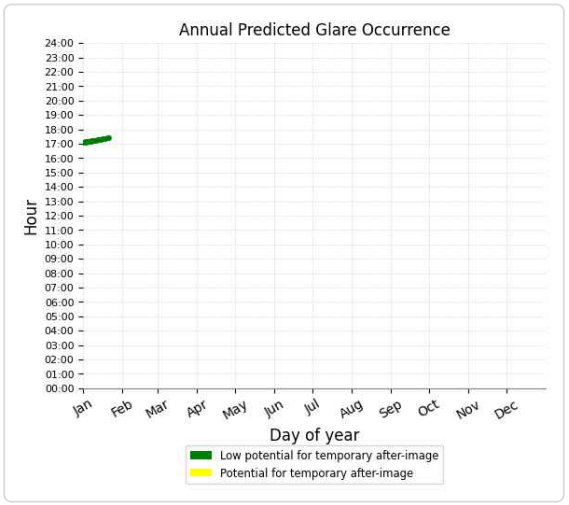


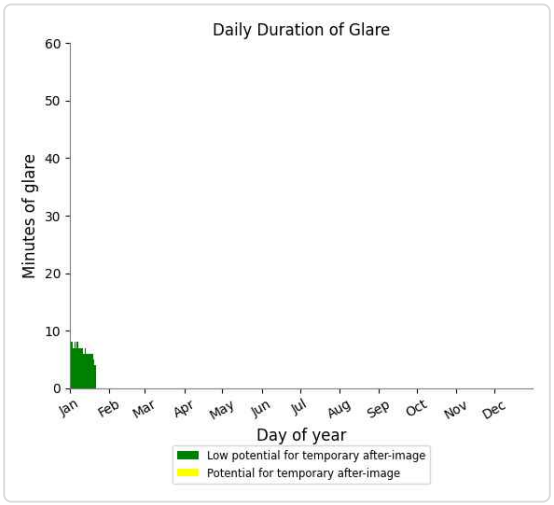


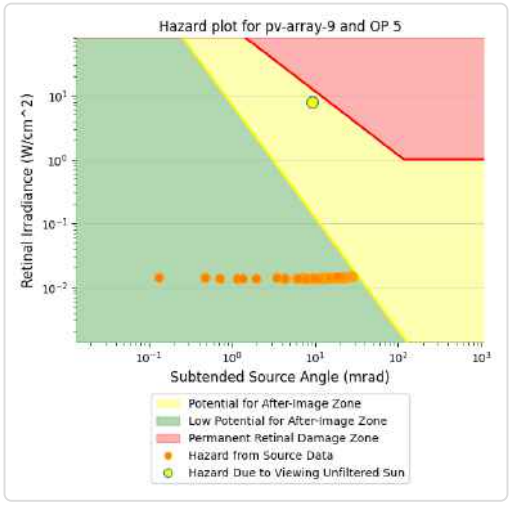
PV array 9 and OP 5

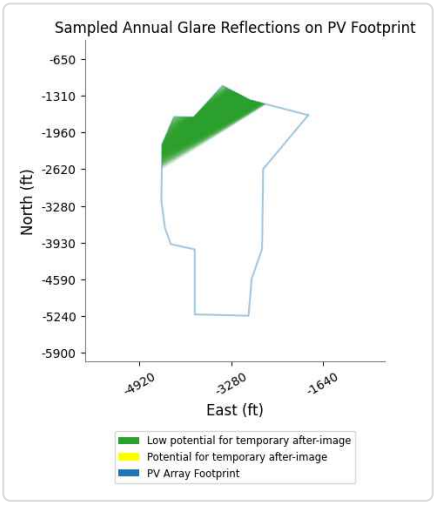
Yellow glare: none

Green glare: 139 min.



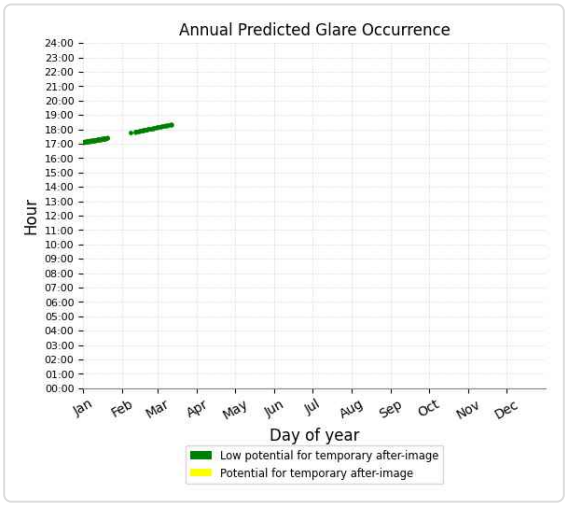


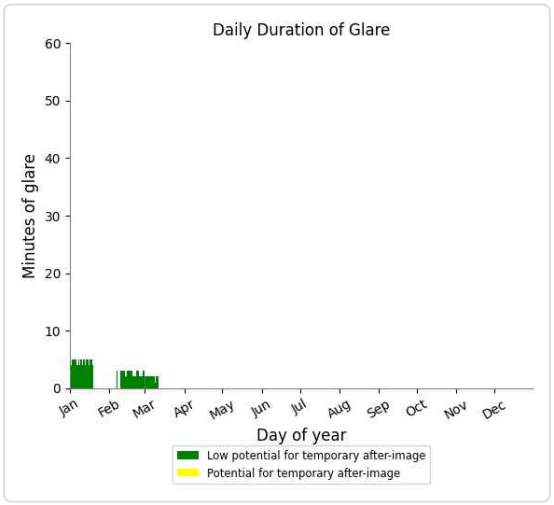


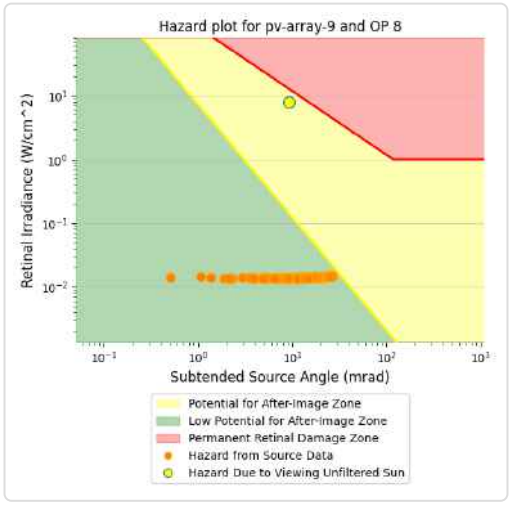


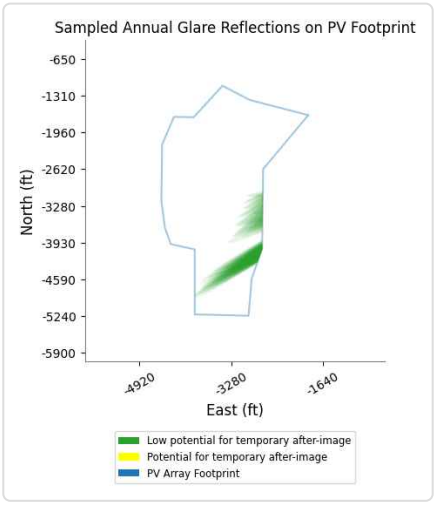
PV array 9 and OP 8

Yellow glare: none
Green glare: 162 min.









PV array 9 and OP 2

No glare found

PV array 9 and OP 3

No glare found

PV array 9 and OP 6

No glare found

PV array 9 and OP 7

No glare found

PV array 9 and OP 10

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

SAR EXHIBIT F

Road Traffic Assessment

For Frontier Solar Project Marion and Washington County, Kentucky

PREPARED FOR
FRON bn, LLC

DATE
20 December 2023

REFERENCE
0650014

CONTENTS

ACRONYMS AND ABBREVIATIONS

FRON	FRON bn, LLC
Project Site or Site	Project location on approximately 1,411 acres of land in both Marion and Washington County
SAR	Site Assessment Report
KYTC	Kentucky Transportation Cabinet
AADT	Average Annual Daily Traffic
SHV	Specialized Hauling Vehicles
AASHTO	American Association of State Highway and Transportation Officials
FHWA	Federal Highway Administration
NBIS	National Bridge Inspection Standards
SUV	Single Unit Vehicle

1. INTRODUCTION

This Road Traffic Assessment is provided on behalf of FRON bn, LLC (FRON) in support of its Site Assessment Report (SAR). KRS 278.708(3)(e) specifies that the SAR must include an evaluation of "the impact of the facility's operation on road and rail traffic to and within the facility, including anticipated levels of fugitive dust created by the traffic and any anticipated degradation of roads and lands in the vicinity of the facility." The traffic evaluation will be submitted to the Kentucky Public Service Commission (KRS 278.706). The Project would be located on approximately 1,411 acres of land (Project Site or Site) in both Marion and Washington County (Figure 1). This report has been prepared to identify and assess the existing public road facilities that would serve the construction, operation, and decommissioning phases of the proposed solar facility in Marion and Washington County. The tasks associated with this assessment included:

- Review of data and documents provided by FRON;
- Obtaining available geometric (roadway widths, intersection control, etc.), road condition, and speed limit data via a review of aerial imagery and site-specific photography available through Google Earth and County GIS systems, as well as a field visit conducted on September 6, 2023.
- Obtaining available Kentucky Transportation Cabinet (KYTC) traffic data, speed limits and bridge information for roads near the site;
- Calculating site-generated traffic based on Project-specific information and knowledge of other solar projects;
- Evaluating traffic impacts anticipated as a result of the site-generated traffic; and
- Proposing potential mitigation measures to address impacts.

2. EXISTING CONDITIONS

ERM compiled roadway conditions for facilities in the immediate area of the Project in both Marion and Washington County. The site is located west of Kentucky State Highway 55 (KY 55) and east of KY 429. The project location and road and bridge network are shown in Attachments 1 and 2.

2.1 AFFECTED ROADWAYS

Descriptions of roadways near the site are provided below. Average Annual Daily Traffic (AADT) volumes are from KYTC (2023a). Attachment 3 provides images of road conditions in the vicinity of the Project site. The primary state highway providing access to the Project area will be KY 55 to the east of the Project Site.

Speed limits are not displayed on many secondary roadways adjacent to the Project site. According to Kentucky Revised Statues 189.390. Speed limits are as follows:

- Sixty-five (65) miles per hour on interstate highways and parkways;
- Fifty-five (55) miles per hour on all other state highways;
- Thirty-five (35) miles per hour in a business or residential district.[1]

KY 55 Lebanon Road (State Highway 55) is a two-lane to three-lane, paved road with a typical paved width of 45 feet, paved shoulders, and visible striping and road markings. KY 55 connects to local roads providing access to the Project Site. The posted speed limit is 55 mph (KYTC 2023b). The 2022 AADT on KY 55 east of the project site was 9,598 vehicles. The pavement is generally in good condition (Attachment 3.1).

St. Rose Road (State Highway 429) is a two-lane, paved road with a typical paved width of 20 feet, no shoulders, and visible striping and road markings. KY 429 has a speed limit of 55 mph (KYTC 2023b). The 2021 AADT on KY 429 west of the Project site was 623 vehicles. The pavement is in fair condition with moderate alligator cracking (Attachment 3.2).

Old Lebanon Road (State Highway 3165) east of the Project Site is a two-lane paved road with a typical paved width of 12 feet, no striping or road markings, and no posted speed limit. The 2022 AADT on Old Lebanon Road adjacent to the Project site was 34 vehicles. The pavement is in fair condition with moderate alligator cracking (Attachment 3.1).

Booker Road (County Road 1214) north of the Project Site is a paved road with a typical paved width of 18 feet, no striping or road markings, and no posted speed limit. The 2022 AADT on Booker Road was 418 vehicles (Attachment 3.3).

Moraja Lane is a gravel road with a surface width of approximately 10 to 12 feet that begins at the terminus of Old Lebanon Road and provides access through the Project site (Attachment 3.1).

[1] "Business district" means the territory contiguous to and including a highway if, within six hundred (600) feet along the highway, there are buildings in use for business or industrial purposes that occupy three hundred (300) feet of frontage on one (1) side or three hundred (300) feet collectively on both sides of the highway; "Residential district" means the territory contiguous to and including a highway not comprising a business district if the property on the highway for a distance of three hundred (300) feet or more is improved with residences or residences and buildings in use for business.

Jackson Branch Lane and Jackson Branch Spur are paved roads that provide access through the Project site and have surface width of approximately 12 feet with no striping or road markings (Attachment 3.3). Jackson Branch Spur is about 1,000 feet long, connecting Jackson Branch Lane to Moraja Lane.

McLain Road is a paved road adjacent to the Project Site with a typical paved width of 12 feet and no striping or road markings (Attachment 3.3).

Jenny Road has a width of 10-12 feet and terminates in a dead end within the Project site.

Veterans Memorial Highway (State Highway 2154) located South of the Project Site perpendicular to KY 429 and KY 55 is a two-lane, paved road with a typical paved width of 50 feet, and visible striping and road markings. Route 2154 has a speed limit of 55 mph (KYTC 2023b) and the 2020 AADT (the most recent available data) on Veterans Memorial Highway was 6,683.

US Highway 150 (US 150) is north of the site, intersecting with KY 55 within the City of Springfield, and would likely connect the Project Site with the regional highway network. US 150 is a two-lane, paved highway with a typical paved width of 45 feet, with paved shoulders, visible striping and road markings, and a posted speed limit of 55 mph (KYTC 2023b). The 2022 AADT on US 150 was 6,675 vehicles. The pavement is in good condition.

US Highway 68 (US 68) is south of the site, intersecting KY 55 within the City of Lebanon, and is also a key roadway connecting the Project Site with the regional highway network. US 68 is a two-lane, paved highway with a typical paved width of 45 feet, with paved shoulders, visible striping and road markings, and a posted speed limit of 55 mph (KYTC 2023b). The 2020 AADT on US 68 within Lebanon was 8,711.

2.2 BRIDGES AND CULVERTS

Attachment 2 shows the location of road bridges in the vicinity of the Project site (KYTC 2023c) and **Table 1** shows the conditions and weight limits of bridges in the vicinity of the Project Site (KYTC 2023d). KY 429 (St. Rose Road) east of the Project site has three bridges in the vicinity of the Project site. One bridge is in fair condition and has no weight restrictions. The other two bridges on KY 429 have weight restrictions as shown in **Table 1**; one is located near the intersection with McLain Road and the other is on KY 429 north of Booker Road.

Booker Road north of the Project site has two bridges in the vicinity of the Project site located in Washington County. All bridges on Booker Road are reported as being in Fair condition and having no weight restrictions (KYTC 2023c and 2023d). The bridges are built over Cartwright Creek and Servant Run River.

Lastly, there are two bridges east of the Project Site on KY 55 (Lebanon Road) and on Old Lebanon Road both built over Servant Run River. The bridge located on KY 55 is in fair condition and has no weight restrictions; however, the bridge on Old Lebanon Road is in poor condition with a gross weight limit of 12 tons (KYTC 2023c and 2023d).

Images of the bridges on KY 429 (over Shepherds Run River), Booker Road (over Cartwright Creek and Servant Run Creek), and Old Lebanon Road (over Servant Run Creek) are provided in Attachment 4.

TABLE 1 BRIDGES NEAR PROJECT SITE—WASHINGTON AND MARION COUNTY, KENTUCKY

County	Route Location	Bridge ID	Condition	Weight Limit (Tons)[a]	Waterbody
Washington	KY 429	115B00018N	Fair	22 tons	Shepherds Run
Marion	KY 429	078B00062N	Poor	Truck Type 1—20 tons Truck Type 2—21 tons Truck Type 3—23 tons Truck Type 4—33 tons SUV 5—25 tons SUV 6—25 tons SUV 7—26 tons	Shepherds Run
Marion	KY 429	078B00050N	Fair	Open—No Restrictions	Shepherds Run
Washington	Booker Road	115C00041N	Fair	Open—No Restrictions	Cartwright Creek
Washington	Booker Road	115C00047N	Fair	Open—No Restrictions	Servant Run Creek
Washington	KY 55	115B00048N	Fair	Open—No Restrictions	Servant Run Creek
Washington	Old Lebanon Road	115B00017N	Poor	Gross—12 tons	Servant Run Creek

Source: KYTC 2023c and KYTC 2023d

[a] Kentucky Administrative Regulations, 603 KAR 5:066 Section 1 (2) establishes the following vehicle types:

Type 1: A single unit truck with two single axles.

Type 2: A single unit truck with one steering axle and two axles in tandem arrangement.

Type 3: A single unit truck with one steering axle and three axles in tridem arrangement

Type 4: A tractor-semitrailer combination truck with five or more axles.

As described in the KYTC Bridge and Weight Limit Maps, Specialized Hauling Vehicles (SHVs) are defined by AASHTO (American Association of State Highway and Transportation Officials) and required to be rated and posted by FHWA (Federal Highway Administration) under NBIS (National Bridge Inspection Standards). SHVs are closely spaced multi-axle Single Unit Vehicles (SUV) trucks introduced by the trucking industry in the last decade. Examples include dump trucks, construction vehicles, solid waste trucks and other hauling trucks. SUVs are defined as follows: SUV 5: 5 Axles; SUV 6: 6 Axles; SUV 7: 7+ Axles.

2.3 RAILROAD CROSSINGS

No railroad crossings occur on roads described above in the vicinity of the Project site.

3. SITE ACCESS

3.1 ACCESS DRIVEWAYS

The Project will include a network of internal plant roads accessed by 6 gates providing openings through the perimeter fence as shown on the site plan. Possible road access for each access gate is described below. The local private lanes are paved or unpaved and generally about 10 feet wide.

The first gate in Washington County provides access to an existing private lane. The proposed gate is approximately 0.62 miles east of the lane's intersection with Moraja Lane. Moraja Lane and Old Lebanon Road provide access from the private lane to KY 55, 1.1 miles to the east.

The second gate in Washington County provides access to an existing private lane. The proposed gate is approximately 0.7 miles east of the lane's intersection with Moraja Lane. Moraja Lane and Old Lebanon Road provide access from the private lane to KY 55, 1.2 miles to the east.

The third gate in Washington County is proposed within a field approximately 715 feet northeast of the intersection of Jackson Branch Spur and Moraja Lane. An access road would need to be built outside the perimeter fence and could connect to an existing private driveway to access Moraja Lane or cross the private driveway and connect with Moraja Lane directly.

The fourth gate in Washington County is proposed within a field approximately 75 feet west of Jackson Branch Lane. The access road would need to continue outside the perimeter fence across the field to intersect Jackson Branch Lane. Jackson Branch Lane and other local roads provide access to KY 55, 1.6 miles to the east.

The fifth gate is in Marion County, within a field near two existing private lanes. An access road would need to be constructed outside the perimeter fence and is most likely to connect with one of the private lanes, which both intersect KY 55 about 0.5 miles to the east of Gate 5.

The sixth gate, also in Marion County, will provide access to the substation as well as a portion of the solar energy facility. Gate 6 is proposed within a field and will require a continuation of the access lane across other properties, possibly using existing private lanes, to connect to KY 55, 0.7 miles to the east of the gate.

3.2 ROUTES TO PROJECT

Specific delivery or commuting routes would depend on the origin point of the component, supply, or workers. Major highways serving the Project area include U.S. Route 152 to the north and U.S. Route 68 to the south, both connected to the Project area via KY 55. U.S. Route 152 connects the Project site with the Interstate highway system in Louisville, Kentucky, about 60 miles to the north. KY 9002 connects U.S. 152 to I-65 in Elizabethtown, about 45 miles to the west.

KY 55 has capacity, width, and conditions favorable for accommodating Project deliveries. KY 429 may be used for commuter traffic but should be avoided as a delivery route due to its narrow width and weight-limited bridges. From KY 55, local, single-lane roads as described in Section 3.1 would be used to reach the Project site. These roads may require surface improvements as described in Section 4, Traffic Mitigation.

4. PROJECT GENERATED TRAFFIC

4.1 CONSTRUCTION

Construction traffic during an estimated 22-month construction period would consist of workforce commuting and truck deliveries. Temporary laydown and parking areas within the Project site would accommodate parking, storage, and truck circulation. Equipment such as skid steers, ATVs, and forklifts will be driven to or delivered to the site and used throughout construction. Deliveries for different phases of construction include:

- Site preparation, grading, driveway and pad installation: equipment and materials delivery; arrival of equipment such as bulldozers, graders and rollers for site preparation and grading.
- Electrical, pile, racking and panel installation: Delivery of cabling, piles, racks, panels and inverters; arrival of equipment such as pile drivers and skid steers.
- Substation and electric line installation: delivery of poles, cables, and substation components; arrival of equipment such as a large truck crane, smaller cranes, bucket trucks, and a drill rig.

The size of the on-site construction workforce would vary at different phases of construction but is estimated to peak at approximately 200 on-site workers. The applicant assumes that ride sharing would limit the volume of worker commuting vehicles to less than 150 round trips daily even when the peak workforce is needed.

The Applicant estimates that 59,000 vehicles round trips would be required during the construction period, or 118,000 one-way trips on the local road network. Over a 22-month construction period, assuming 5 workdays weekly, this would result in an average of approximately 124 round trips daily, or 248 one-way trips on the local road network. An estimated daily average of 10 to 25 daily round trips would be truck deliveries and the remaining 100 to 115 round trips would be personnel travel.

Oversize loads are anticipated for the utility poles. The Project contractor will obtain the necessary permits for these loads and any other components that are overweight or oversize from the KYTC and county road authorities, and will comply with applicable requirements of those permits.

4.2 OPERATIONS

Typical solar operational traffic is minimal and is anticipated to have a negligible impact on the existing traffic counts and network system. Following Project construction, operations-related traffic will be limited to approximately 6 to 10 monthly vehicle trips (3 to 5 monthly site visits) for inspection and maintenance. In the rare event of a major solar equipment failure, additional workers and deliveries may be necessary.

4.3 DECOMMISSIONING

Following its operational life, the Frontier Solar Project will be decommissioned. The system owner will be responsible for removal of all equipment from the site and returning the site to its "predeveloped" condition, which includes re-seeding and re-vegetating the disturbed area. This decommissioning activity would generate two main traffic flows:

- Employee traffic—Employees are expected to arrive during the prevailing morning peak hours and depart during the prevailing afternoon peak; mid-day traffic is anticipated to be minimal.
- Heavy vehicle traffic—Initially, typical grading and excavation equipment will be brought to the site for grading and removal of features such as foundations, support systems, and internal roads. Subsequently, heavy vehicle traffic will include multi-axle trucks/trailers to remove equipment from the site and to bring re-seeding equipment and materials.

The volume and characteristics of heavy vehicle traffic during decommissioning is expected to be similar to construction traffic. Traffic control measures similar to those used during construction would be coordinated with the counties and Kentucky Transportation Cabinet.

5. TRAFFIC MITIGATION

Based on existing roadway conditions, locations for proposed access points, and the average daily traffic on KY 55 of about 9,600 vehicle trips, the anticipated construction traffic volumes would not exceed roadway capacity on KY 55. Average peak hour traffic for Project construction is expected to be no more than 150 passenger vehicles arriving and departing during the morning and evening peak hour. This additional traffic is not anticipated to result in traffic delays or congestion. Truck deliveries will occur throughout the day, avoiding concentrations of traffic during a single time period. On-site parking, staging, and truck circulation areas will be provided so that trucks do not stop or queue along local roads.

Minor improvements to local County roads may be needed prior to construction to prepare the road surface for a greater number of heavy truck trips. FRON will coordinate with Washington and Marion Counties to prepare road surfaces as needed and to contribute to road repairs at the completion of construction if any road surface damage is attributable to construction traffic. FRON will plan delivery routes to avoid bridges or road surfaces insufficient to sustain truck loads.

Throughout Project construction, FRON and its general contractor will coordinate with representatives from the counties and KYTC to respond to traffic concerns that arise during construction and to determine the appropriate traffic management measures such as signage and potential time-of-day restrictions.

ERM recommends the following mitigation and management measures be implemented as determined necessary by Washington or Marion County and/or KYTC:

- Provision of designated on-site parking and staging areas with adequate room for worker parking, truck unloading and turnaround, and storage of materials and equipment.
- Development of a traffic management plan that specifies delivery routes and addresses scheduling, traffic control measures, and dust and sediment control. Include routes and logistics for oversized loads.
- Evaluation of local road surfaces and alignment to be used for deliveries. Determine adequacy for weight and size of delivery trucks; provide initial surface improvements.
- Documentation of pavement conditions on County and State roads within the Project area prior to and upon completion of construction, due to the potential for construction traffic to impact the surface condition of the road network.

- Implementation of temporary traffic control measures to address the anticipated slower entering/exiting speeds of Project traffic. This will include installation of pertinent warning signage upon commencement of construction and (where necessary, safe, and appropriate) use of human traffic flaggers to facilitate traffic and minimize impacts to traffic on KY 52 and local roads.
- Use of vehicle cleaning stations, water trucks, and dust screens to control dust and ensure that sediment is not tracked from the Project site onto the road network.
- Upon completion of construction, contribution to repairs of adjacent roads specifically degraded by Project construction, pursuant to discussions and agreement with Washington or Marion County and the KYTC.

No mitigation measures are recommended for Project operation and maintenance.

6. CONCLUSIONS

Based on our review of available data relating to the site, the adjacent roadways, and anticipated traffic associated with the construction of the site, the following conclusions are offered:

- The Frontier Solar Project will be serviced by 4 proposed gates into the Project in Washington County and two in Marion County. The access routes from these gates to the public road system have not yet been identified but will be planned in coordination with state and county authorities.
- Based on existing traffic volumes, the state roads described above have available capacity to accommodate Project construction and operations traffic.
- A traffic management plan will be prepared for the construction phase.
- Construction traffic may impact the surface condition of the road network in the immediate vicinity of the solar project. Pavement conditions should be documented prior to construction, a post-construction road assessment should be completed, and repairs should be made to address Project-related wear to road surfaces.

7. REFERENCES

Kentucky Transportation Cabinet (KYTC). 2023a. Traffic Counts: Average Annual Daily Traffic Available at: CTS - Query Page (ky.gov). Accessed October 30, 2023.

Kentucky Transportation Cabinet (KYTC). 2023b. KyGovMaps Open Data Portal: KYTC State Road Speed Limits Available at: CTS - Query Page (ky.gov). Accessed October 31, 2023.

Kentucky Transportation Cabinet (KYTC). 2023c. Bridge Data Miner Available at: Bridge Data Miner (ky.gov). Accessed October 31, 2023.

Kentucky Transportation Cabinet (KYTC). 2023d. Bridge Weight Limits Data Available at: Bridge Weight Limits (ky.gov). Accessed October 31, 2023.

ATTACHMENT 1 ROAD MAPS

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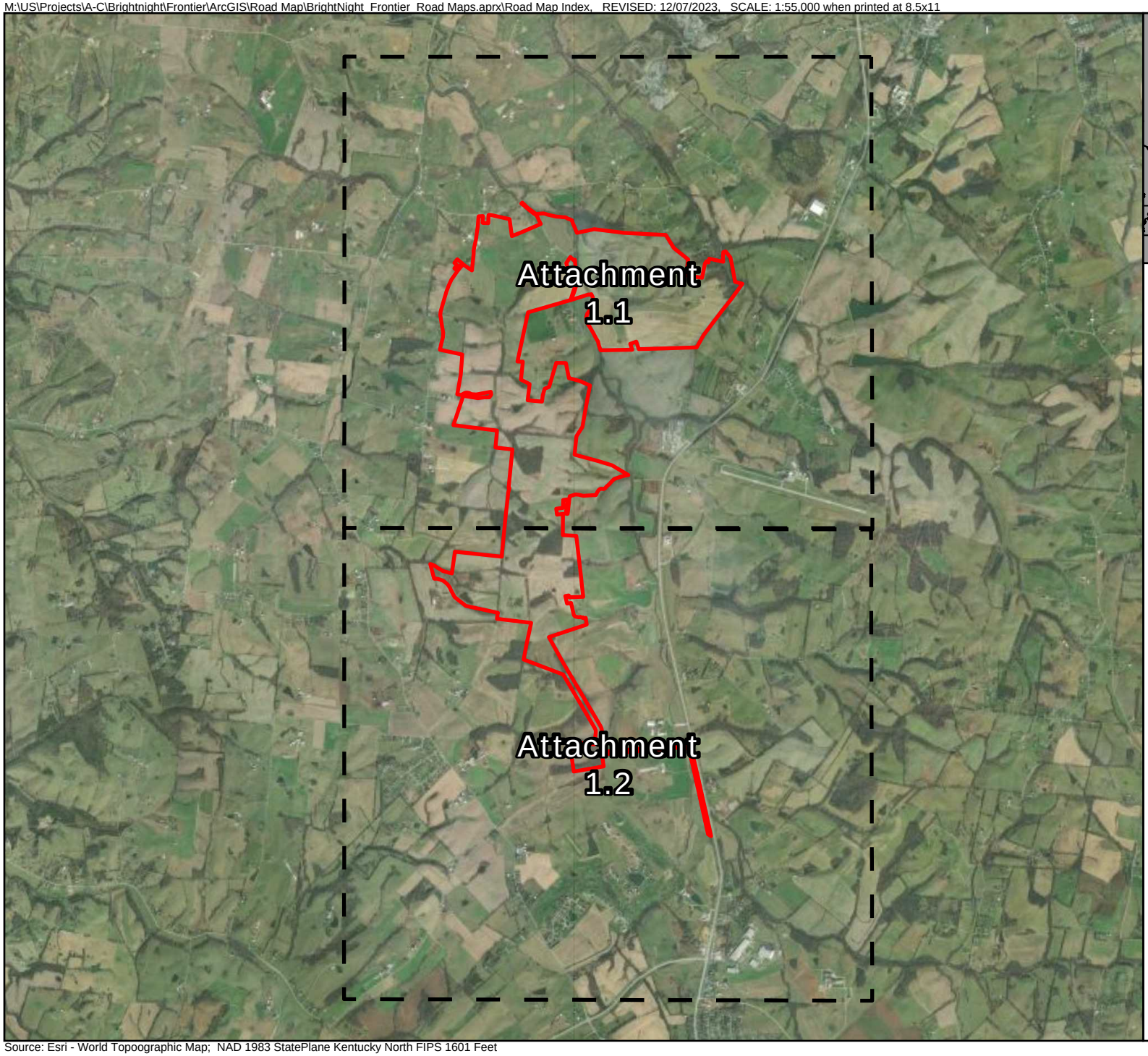

Legend

- Project Boundary
- Index Page

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Figure 1
Road Index Map
Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

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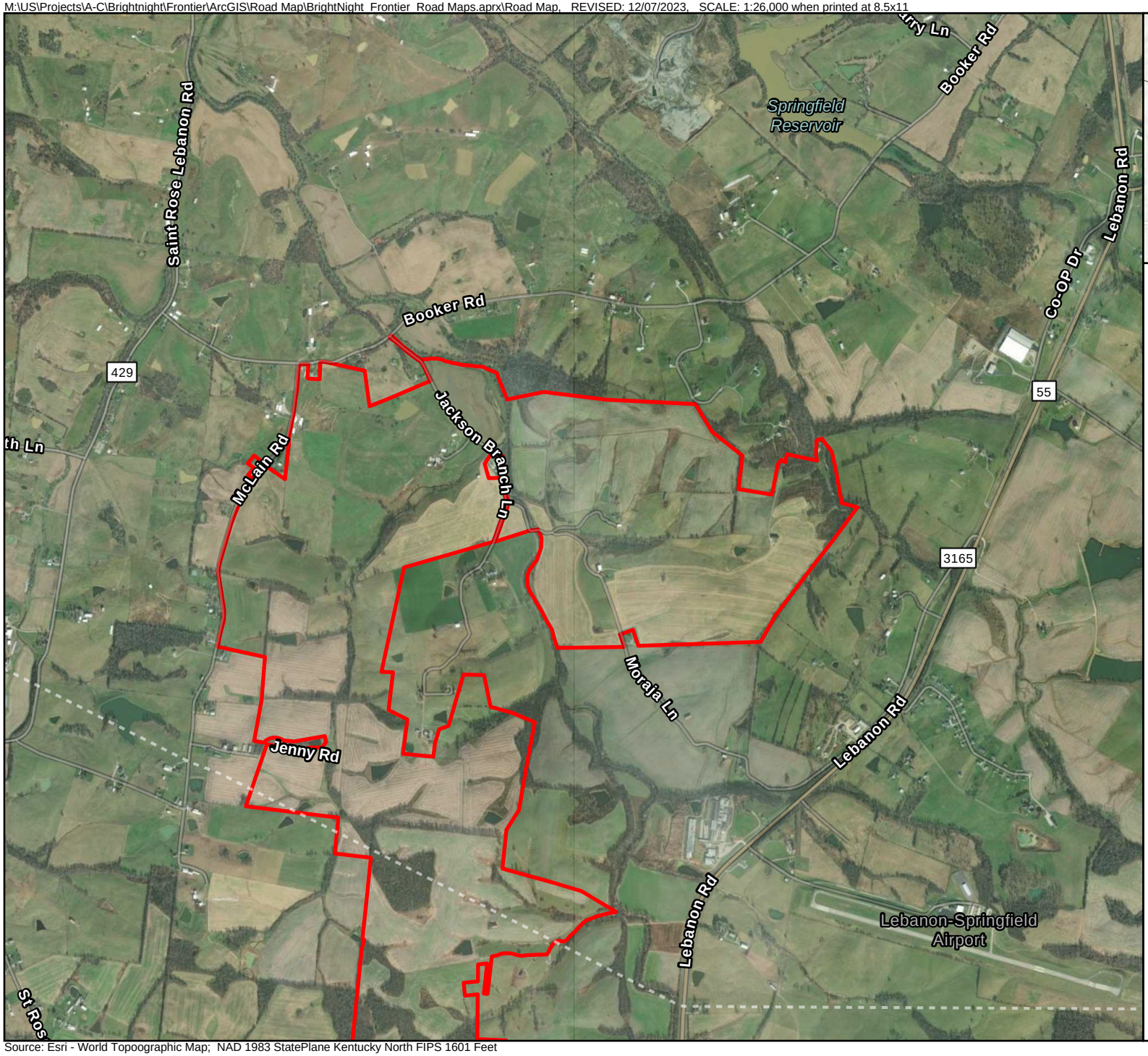

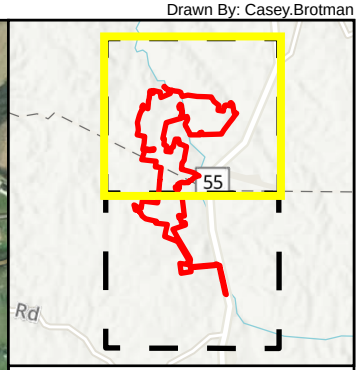

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Project Boundary

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Feet

Figure 1.1
Road Map
Frontier Solar Project
Marion and Washington Counties, Kentucky
November, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

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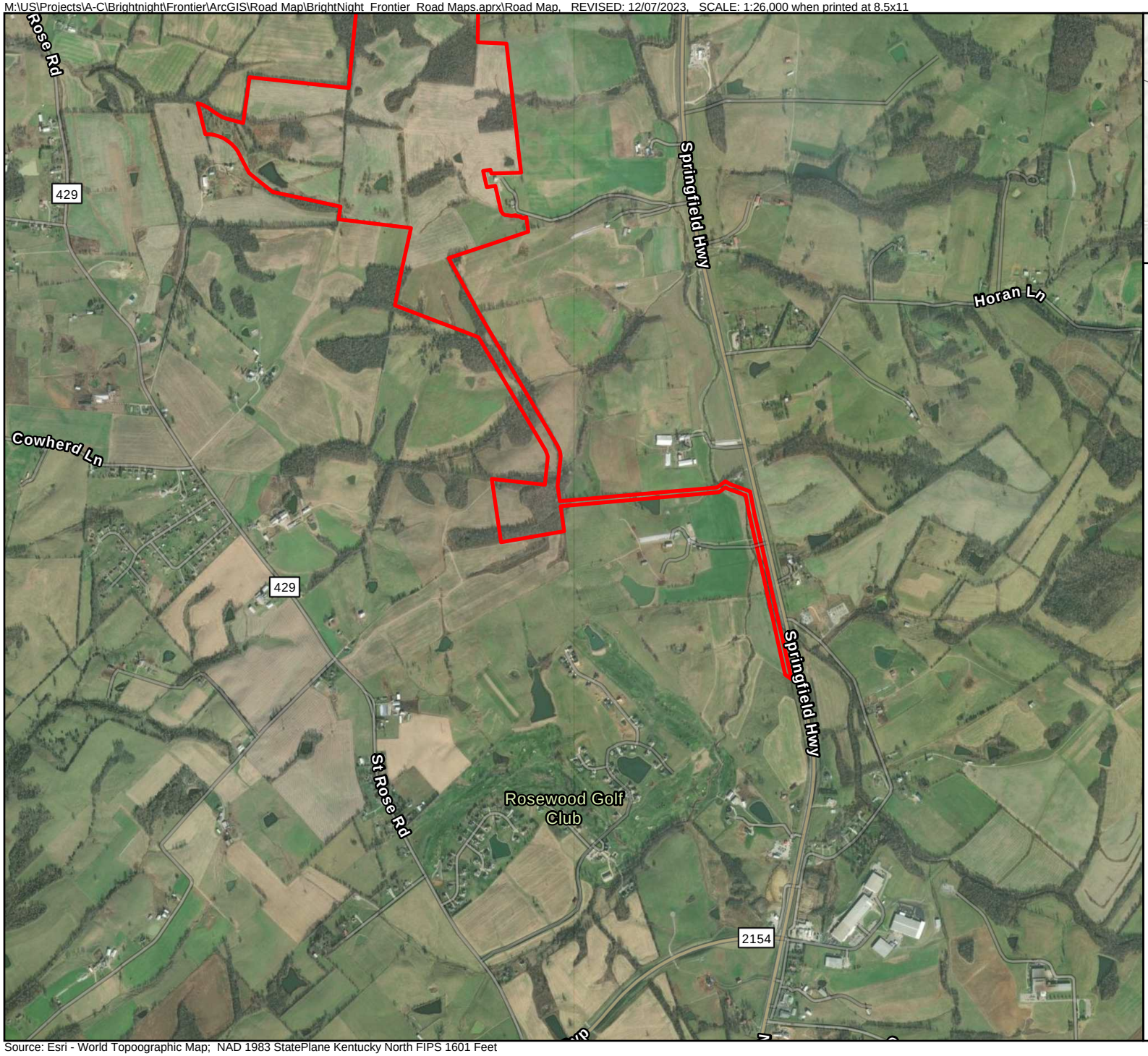

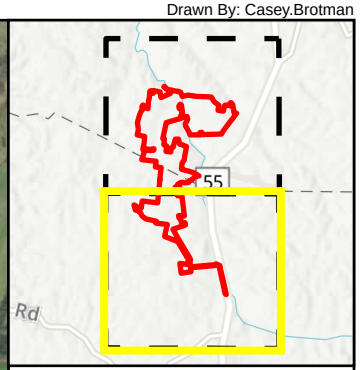

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Project Boundary

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Figure 1.2
Road Map
Frontier Solar Project
Marion and Washington
Counties, Kentucky
November, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

ATTACHMENT 2 BRIDGE MAPS

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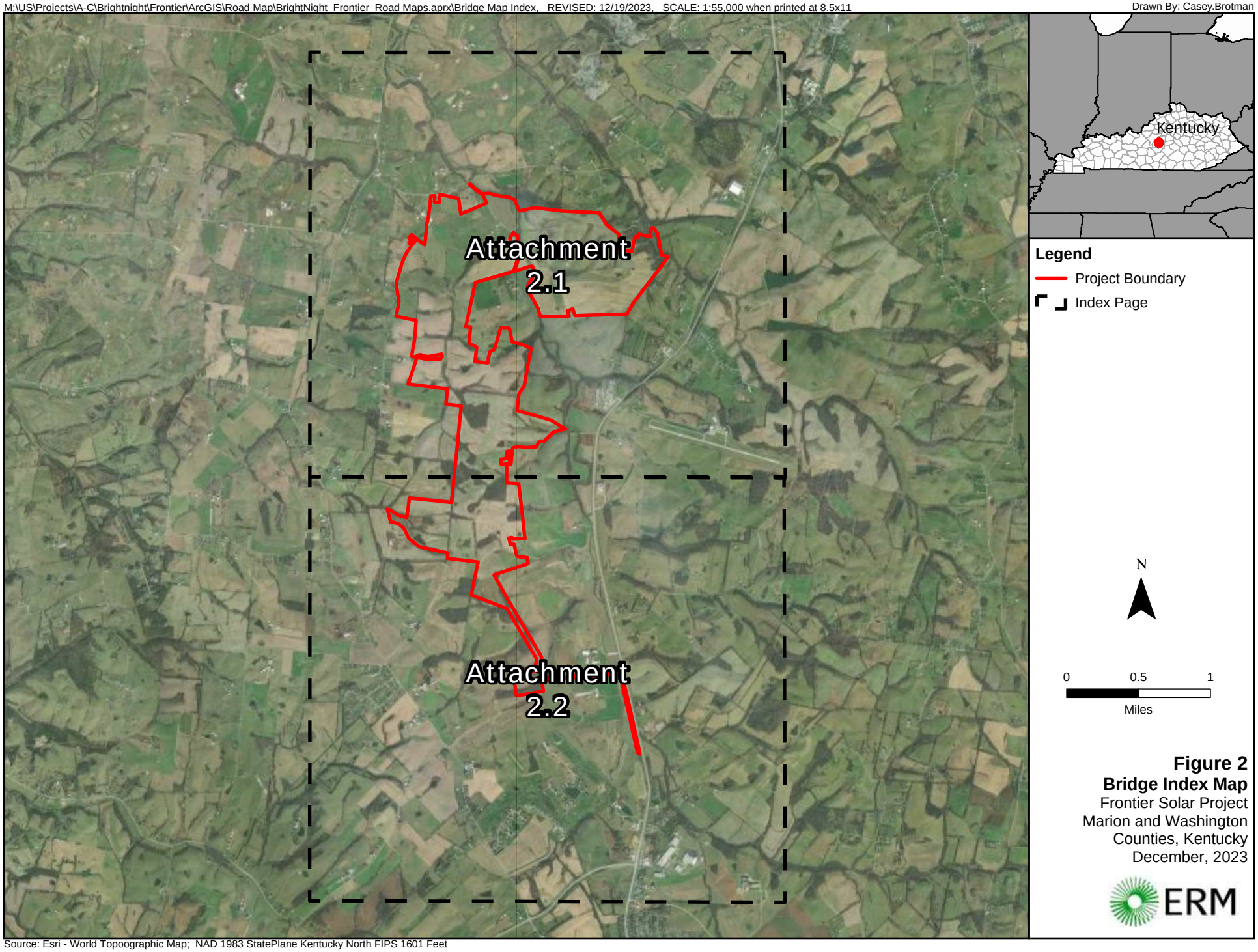

Figure 2
Bridge Index Map
Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

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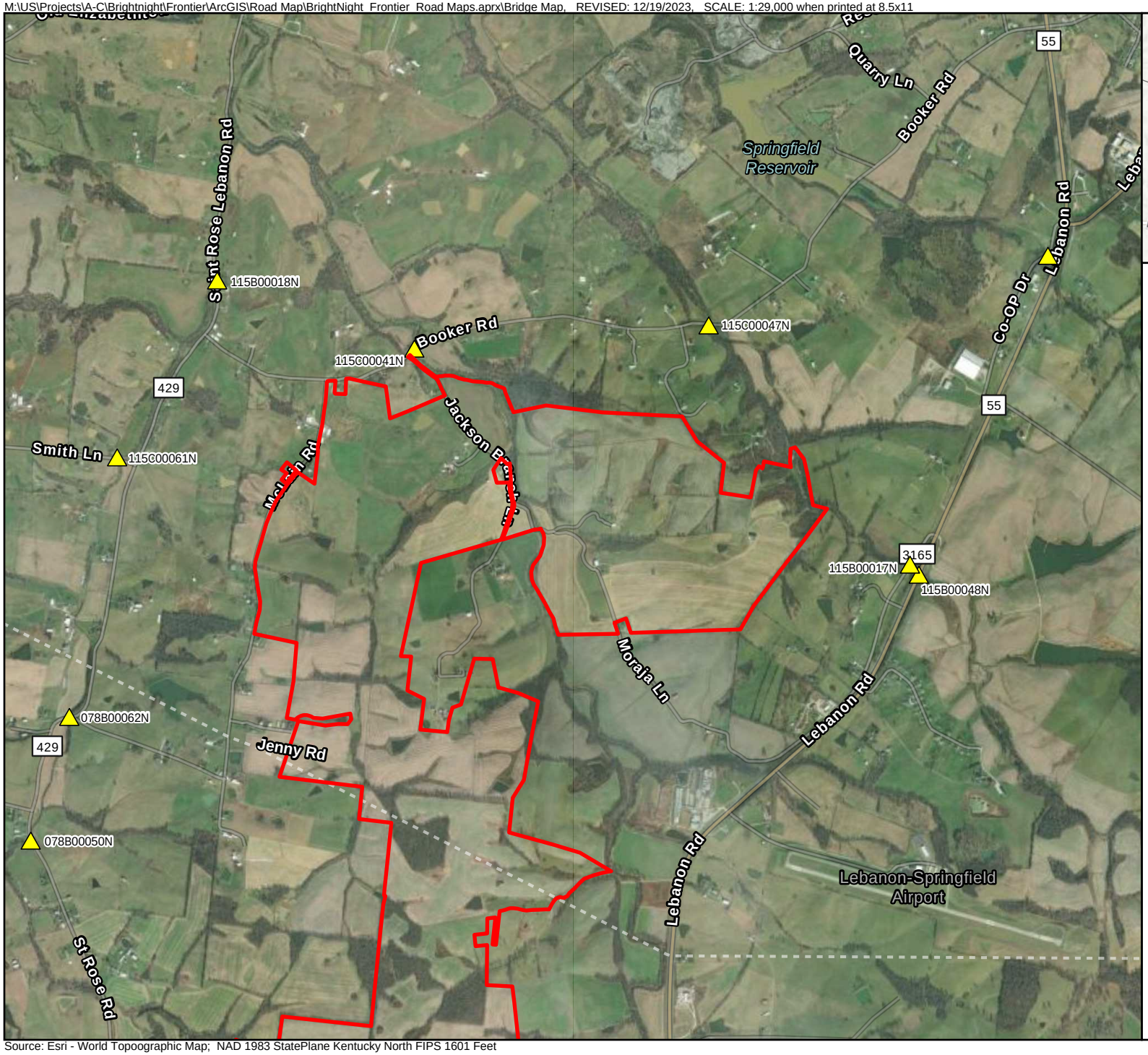

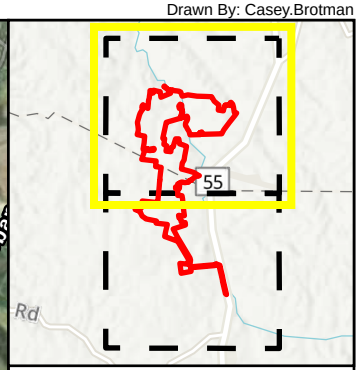

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- Project Boundary
- Bridge

Source: KYTC Bridge Data Miner

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Bridge Map

Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

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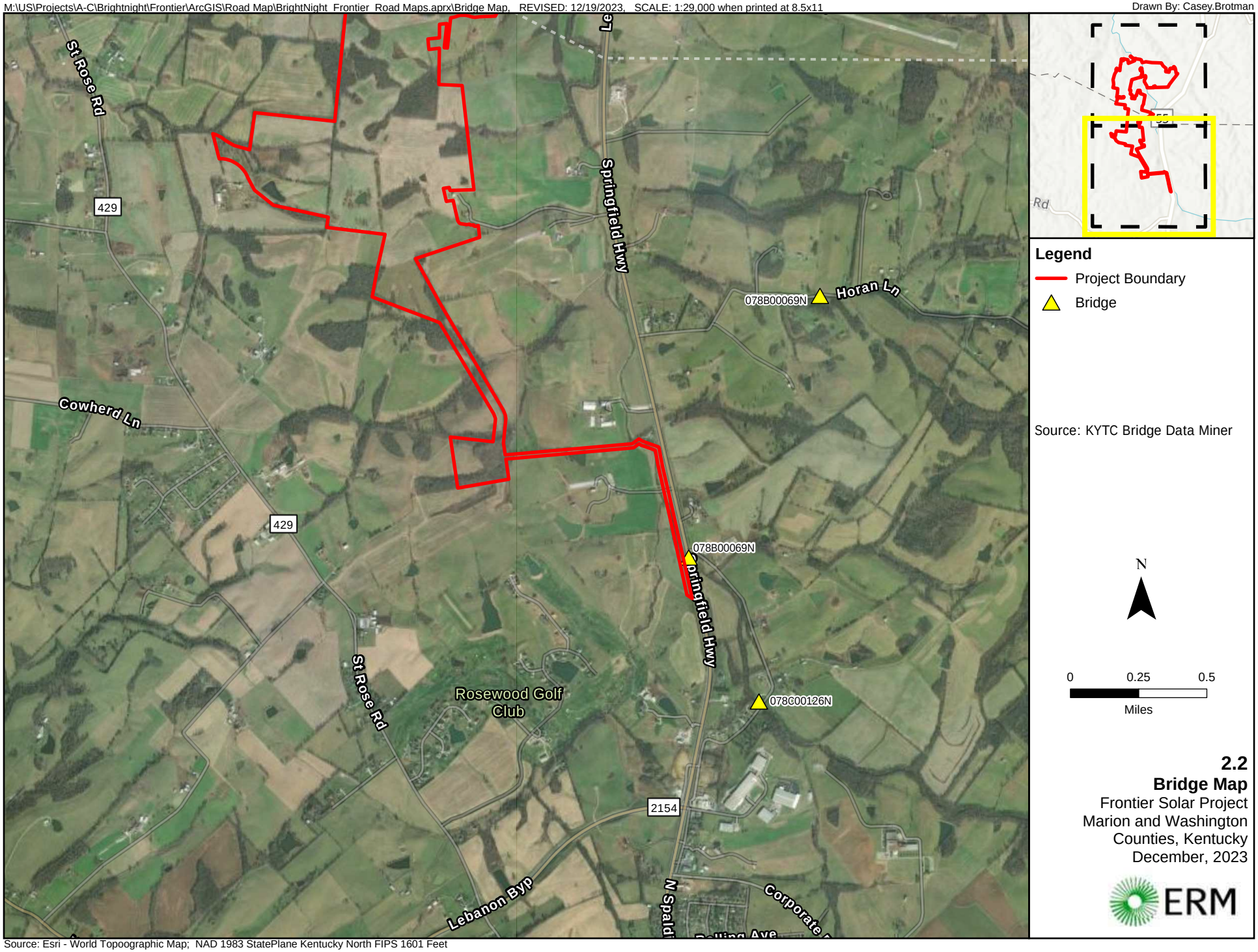

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- Project Boundary
- Bridge

Source: KYTC Bridge Data Miner

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Bridge Map

Frontier Solar Project
Marion and Washington Counties, Kentucky
December, 2023

ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

ATTACHMENT 3 ROAD CONDITION

North along KY 55 toward intersection with Route 3165 (Old Lebanon Road)

North along Route 3165, with KY 55 to the left

South along KY 55 with Booker Road to the right

West along Moraja Lane from point near terminus of Route 3165

Attachment 3.1 Road Conditions

Image source: Google Earth 2023.

Frontier Solar Project

Washington and Marion Counties, Kentucky

ERM

Southwest along KY 429, viewing the intersection with Booker Road to the left

Northeast along KY 429, towards the intersection with McLain Road to the right

East along McLain Road from KY 429

Attachment 3.2 Road Conditions

Image source: Google Earth 2023.

Frontier Solar Project

Washington and Marion Counties, Kentucky

ERM

East along Booker Road toward McLain Road to the right.

South along Jackson Branch Lane from Booker Road

South along McLain Road from Booker Road

Attachment 3.3 Road Conditions

Image source: Google Earth 2023.

Frontier Solar Project

Washington and Marion Counties, Kentucky

ERM

ATTACHMENT 4 BRIDGES

Route 3165 bridge over Servant Run Creek

Booker Road bridge over Cartwright Creek

Booker Road bridge over Servant Run Creek

Attachment 4.1 Bridges

Image source: Google Earth 2023.

Frontier Solar Project

Washington and Marion Counties, Kentucky

ERM

KY 429 Bridge 115B00018N over Shepherds Run

KY 429 Bridge 078B00062N over Shepherds Run

KY 429 Bridge 078B00050N over Shepherds Run

Attachment 4.2 Bridges

Image source: Google Earth 2023.

Frontier Solar Project

Washington and Marion Counties, Kentucky

ERM