Visual Resource Assessment

Dixon Run Solar Project

Bloomfield Township, Jackson County, Ohio

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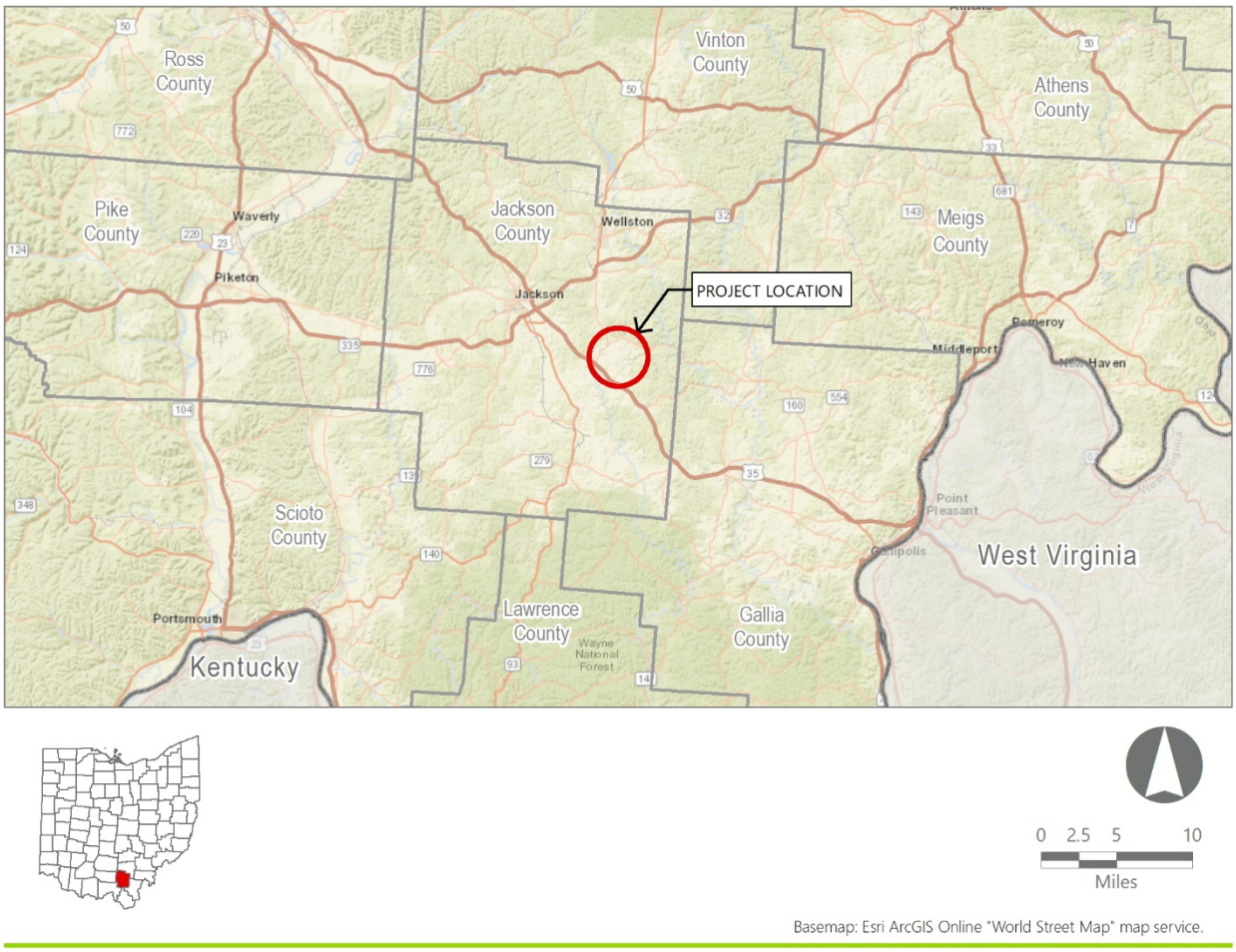
1.0 INTRODUCTION

1.1 Purpose of the Investigation

Environmental Design & Research, D.P.C. (EDR) was retained by Dixon Run Solar, LLC (the Applicant) to prepare a Visual Resource Assessment (VRA) for the up to 140 megawatt (MW) Dixon Run Solar Project (the Project), proposed to be located in Bloomfield township, Jackson County, Ohio (see Figure 1.1).

Figure 1.1. Regional Project Location



This report has been prepared to satisfy the portions of Ohio Administrative Code (OAC) 4906-4-08(D) that relate to the identification of visually sensitive resources (VSRs), Project visibility, and potential visual impacts resulting from construction of the proposed solar-powered electric generation facility.

Recognizing these requirements, this VRA will:

- Describe the visible components of the proposed Project.
- Define the visual character of the visual study area (VSA).

- Inventory the existing VSRs within the VSA.
- Evaluate the potential visibility of the Project within the VSA.
- Create photographic simulations of the proposed Project from representative locations.
- Assess the visual impacts associated with the Project.
- Describe proposed mitigation measures that would be implemented to reduce/minimize potential visual impacts.

This VRA was prepared by a team of experienced visual resource experts in accordance with the policies, procedures, and guidelines contained in established visual resource assessment methodologies.

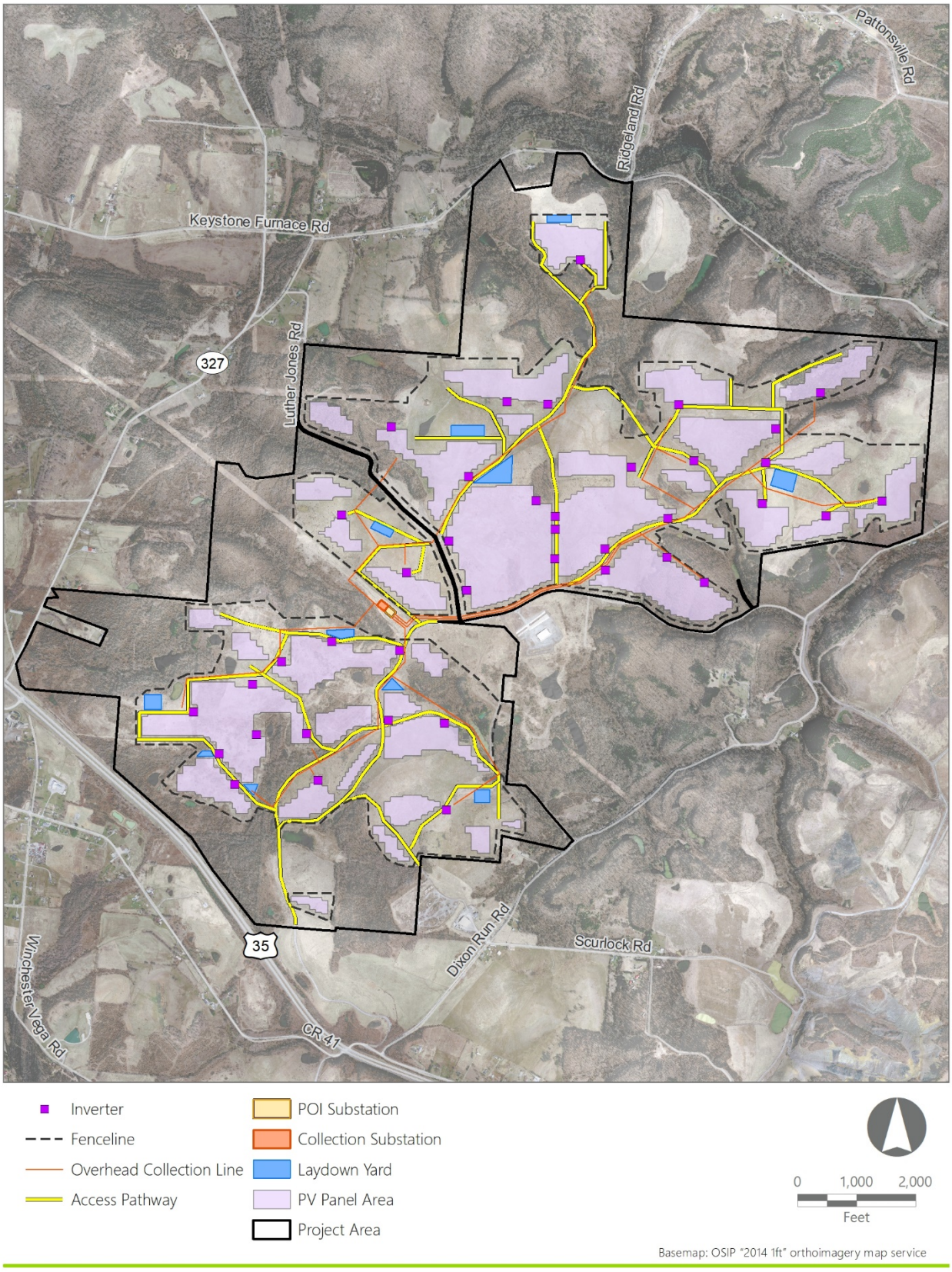
1.2 Project Location and Description

The Project is proposed to be located primarily on active pastureland in Bloomfield township, Jackson County, Ohio. The parcels being considered for construction of the Project total approximately 2,085 acres (the Project Area). It is anticipated that the actual amount of land required to accommodate the Project will be approximately 1,219 acres.

The proposed Project is a solar-powered electric generation facility with a generating capacity of up to 140 MW. The Project will use arrays of ground-mounted photovoltaic (PV) modules, commonly known as solar panels, to provide renewable energy to the Ohio bulk power transmission system to serve the needs of electric utilities and their customers. Solar panels will be affixed to a metal racking system mounted on piles that will be driven or screwed into the ground in rows, commonly referred to as arrays. The arrays will generally follow the existing topography of the Project Area with minimal grading or alteration of existing contours. Arrays will be grouped in separate, contiguous clusters, which will be fenced and gated for equipment security and public safety.

The PV arrays proposed for the Project will utilize a fixed-tilt system installed in linear arrays. The panel arrays will be connected to inverters which will convert the direct current (DC) electricity generated by the solar panels to alternating current (AC). From the inverters, a series of above-ground interconnection cables will deliver the electricity to a proposed collection substation. At the substation the voltage will be stepped-up in order to allow connection to the regional electrical grid, via a new point of interconnection (POI) switchyard, on the existing AEP Rio – Lick County 138 kilovolt (kV) circuit. Associated support facilities include access roads within the array areas. The location of proposed Project components is illustrated in.

Figure 1.2. Preliminary Project Layout



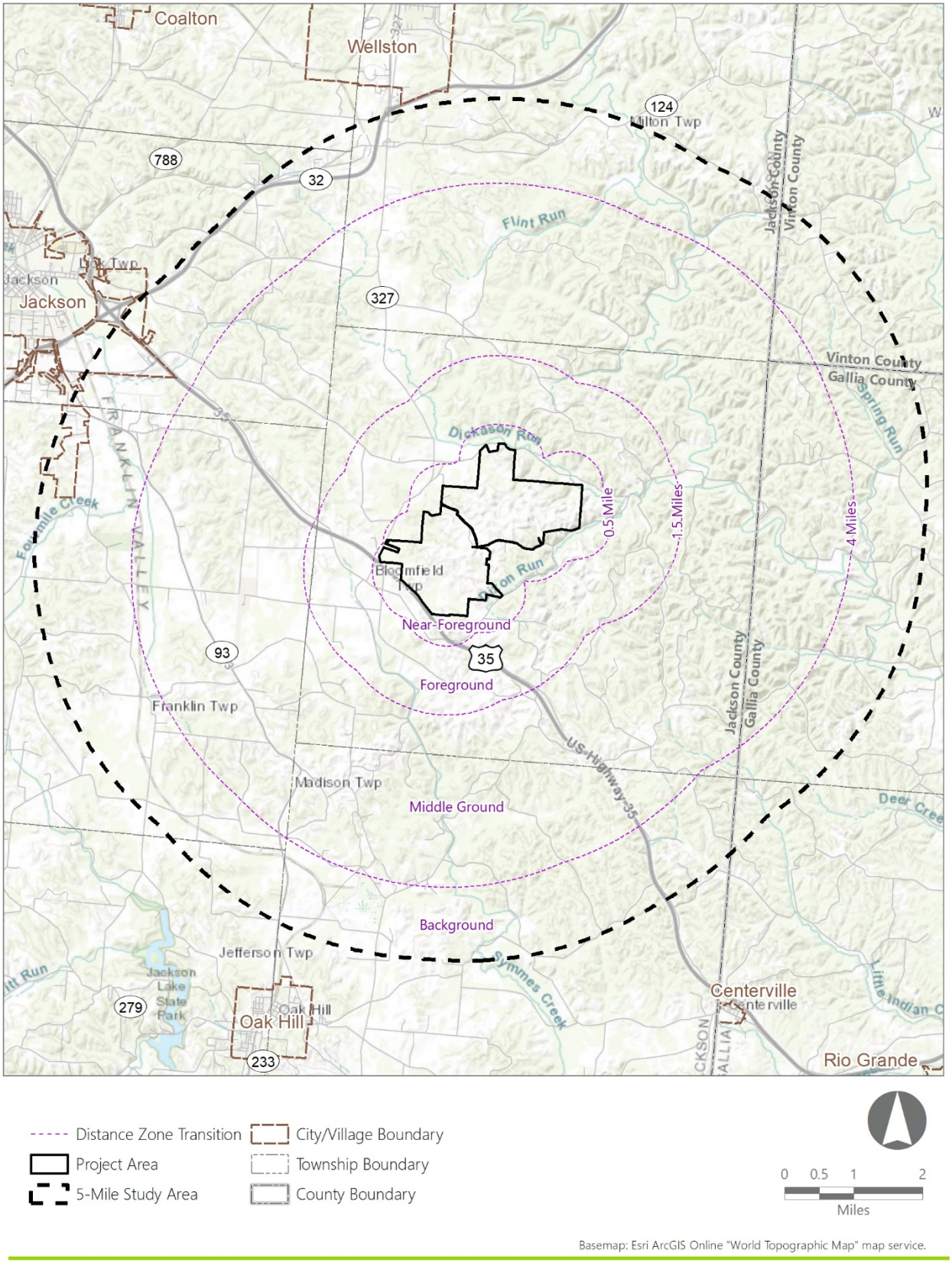
1.2.1 Visual Study Area

OAC 4906-4-08(D) requires that visual impacts to recreational, scenic, and historic resources from a proposed electric generating facility be evaluated within a 10-mile radius. However, based on the low profile of the proposed equipment, and the results of the visibility analysis presented herein, it was determined that 10 miles would be an excessive VSA for a solar generation project.

To define an appropriately sized VSA, a viewshed analysis was conducted to better understand the Project's area of potential effect (see Section 2.1.1). This viewshed analysis indicates that areas of potential Project visibility diminish rapidly after 1.5 miles, with isolated scattered patches of potential visibility located between 1.5 and 5 miles.

Based on the results of the viewshed analysis, and the influence of the variable terrain surrounding the Project, it was determined that a 5-mile radius from the Project would be a sufficient VSA for the purposes of this study. Beyond the distance of 5 miles, the PV panels and overhead collection lines will generally be either fully screened by existing vegetation and topography, or indistinguishable due to the limits of human visual acuity. The resulting VSA encompasses a total of approximately 123.8 square miles. The location and extent of the VSA is illustrated in Figure 1.3.

Figure 1.3. Visual Study Area



1.2.2 Landscape Character

Definition of landscape character within a given VSA provides a useful framework for the analysis of a facility's potential visual effects. The 2016 USGS National Land Cover Database (NLCD) was used to help define the character and location of various Landscape Types (LT) within the VSA (see Figure 1.4). The LTs defined within the VSA are presented in Table 1.1.

Table 1.1. Landscape Types Within the Visual Study Area

Landscape Type	Total Area within the VSA (square miles)	Percent of VSA
Forest	84.0	67.9%
Cropland/Pasture	26.5	21.4%
Developed	6.4	5.2%
Grassland/Shrubland	5.3	4.3%
Open Water/Wetland	0.8	0.6%
Barren Land	0.8	0.6%
Total	123.8	100%

The Project components are proposed to be built almost entirely within the Cropland/Pasture LT and the Grassland/Shrubland LT. The Cropland/Pasture LT, which consists primarily of open rolling land that is used for grazing cattle, makes up approximately 21.4% of the VSA. Agricultural land within the VSA typically offers the greatest potential for long-distance views due to the presence of open fields and minimal screening features. As such, the Cropland/Pasture LT is likely to have the greatest opportunities for views of the Project. Additionally, the Grassland/Shrubland LT, which is typically found in conjunction with the pastureland condition described for the Cropland/Pasture LT, makes up 4.3% of the VSA, occurs in scattered clusters throughout the VSA, including within the proposed Project Area.

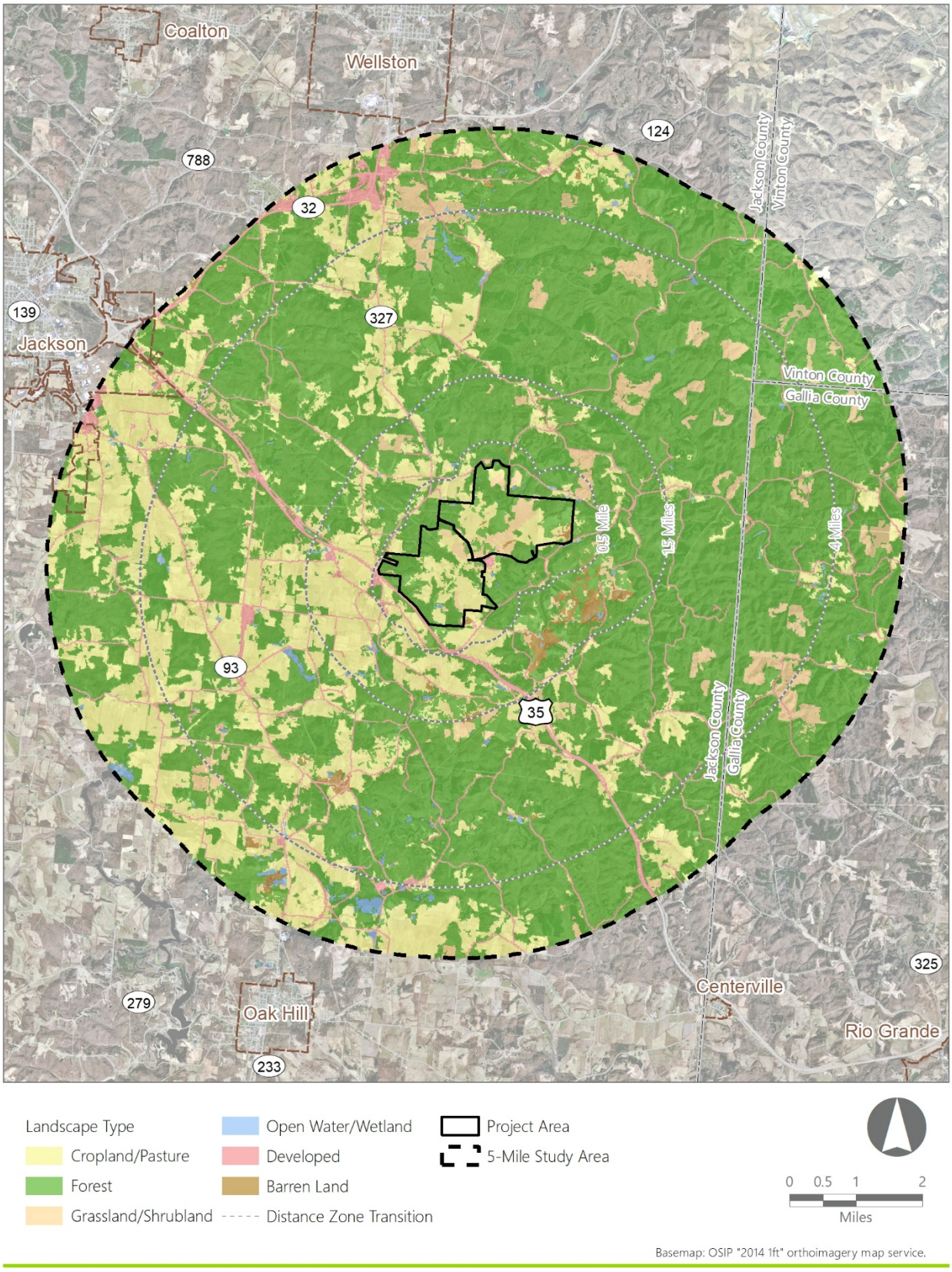
The Forest LT comprises 67.9% of the VSA. Views of the Project from within the Forest LT will typically be limited by the presence of dense vegetation; although during leaf-off conditions, narrow or sparsely vegetated woodlots may not provide enough screening to fully obscure views of the Project. Even with minimal vegetation, partial screening will be provided by tree trunks and branches; therefore, views of the PV panels would still be significantly obstructed. Additionally, visibility of PV panels may occur within the Forest LT on rare occasions. For example, a parking lot situated on the edge of a wooded area, or a road that runs perpendicular to the Project Area, may have direct views of the Project.

The Developed LT makes up a small portion (5.2%) of the VSA and consists of areas of concentrated human settlement/development, including the outskirts of the City of Jackson, the James A Rhodes Airport along State Route 93, and development surrounding State Route 32 south of the City of Wellston. Developed LT

areas may have outward views across landscaped yards, parking lots, recreational fields, and planted vegetation, but such views are often limited due to the presence of street/yard trees, closely situated buildings, utility poles, or other built features. It should be noted that the NLCD identifies all paved roads as "developed." While these roads are technically developed from the standpoint of cover type, they often occur in other landscapes (e.g., open agricultural land) and therefore are not consistent with the visual character of Developed LT as described above. As such, the Developed LT area within the VSA is over inclusive and may slightly overstate the actual presence of developed land within the VSA.

The Open Water/Wetland and Barren Land LTs each comprise less than one percent (0.8%) of the VSA. Open surface excavation for mining and quarrying east, south-east, and north of the Project accounts for the majority of Open Water/Wetland and Barren Land within the VSA.

Figure 1.4. Landscape Types Within the Visual Study Area



1.2.3 Distance Zones

Distance zones are typically defined in visual studies to divide the VSA into distinct sub-areas based on the various levels of landscape detail that can be perceived by a viewer. Four distinct distance zones were defined within the VSA. To define these zones, EDR consulted several well-established agency protocols, including those published by the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and U.S. Department of Transportation (USDOT), to determine the appropriate extent of each distance zone. Due to the characteristics of the specific landscape being evaluated in this VRA, EDR defined distance zones within the VSA (as measured from the proposed Project) as follows:

- **Near-Foreground:** 0 to 0.5 mile. At this distance, a viewer is able to perceive details of an object with clarity. Surface textures, small features, and the full intensity and value of color can be seen on foreground objects.
- **Foreground:** 0.5 to 1.5 miles. At this distance, elements in the landscape tend to retain visual prominence, but detailed textures become less distinct. Larger scale landscape elements remain as a series of recognizable and distinguishable landscape patterns, colors, and textures.
- **Middle ground:** 1.5 to 4.0 miles. The middle ground is usually the predominant distance at which landscapes are seen. At these distances, a viewer can perceive individual structures and trees but not in great detail. This is the zone where the parts of the landscape start to join together; individual hills become a range, individual trees merge into a forest, and buildings appear as simple geometric forms. Colors will be distinguishable but subdued by a bluish cast and softer tones than those in the foreground. Contrast in texture between landscape elements will also be reduced.
- **Background:** Over 4.0 miles. The background defines the broader regional landscape within which a view occurs. Within this distance zone, the landscape is simplified; only broad landforms are discernable, and atmospheric conditions often render the landscape an overall bluish color. Texture has generally disappeared, and color has flattened, but large patterns of vegetation are discernable. Silhouettes of one land mass set against another and/or the skyline are often the dominant visual characteristics in the background. The background contributes to scenic quality by providing a softened backdrop for foreground and middle ground features, an attractive vista, or a distant focal point.

The area of each LT falling within each distance zone in the VSA is summarized in Table 1.2. As shown in this table, the distribution of LTs within the individual distance zones is relatively uniform. The Forest LT makes up between 58.4% and 74.1% of each of the distance zones, while the Cropland/Pasture LT comprises between 17.0% and 26.4% of each distance zone. The Developed LT, where the majority of residents and VSRs occur, makes up between 4.1% and 6.6% of each distance zone.

The middle ground distance zone contains the highest portion of Forest LT (74.1%) and the lowest portion of the Cropland/Pasture LT (17.0%) when compared to the other distance zones. These data suggest that a greater amount of screening of potential views will take place in the middle ground when compared to the other distance zones.

Table 1.2. Distance Zones by Landscape Type

Landscape Type	Total Area (square miles) of Landscape Type and Percent of Distance Zone[1]			
	Near-Foreground (0 – 0.5 mile)	Foreground (0.5 – 1.5 miles)	Middle Ground (1.5 – 4.0 miles)	Background (>4.0 miles)
Forest	4.2 (58.4%)	8.3 (61.3%)	45.0 (74.1%)	26.5 (62.5%)
Cropland/Pasture	1.9 (26.4%)	3.4 (25.1%)	10.3 (17.0%)	10.8 (25.6%)
Developed	0.4 (5.7%)	0.7 (5.3%)	2.5 (4.1%)	2.8 (6.6%)
Grassland/Shrubland	0.6 (8.2%)	0.6 (4.4%)	2.5 (4.1%)	1.7 (3.9%)
Open Water/Wetland	<0.1 (0.5%)	0.1 (0.5%)	0.3 (0.5%)	0.3 (0.8%)
Barren Land	0.1 (0.9%)	0.5 (3.4%)	0.1 (0.2%)	0.1 (0.3%)
Total Distance Zone Area[2]	7.2	13.5	60.8	42.3

[1]The calculations used to generate this table were based on unrounded numbers, therefore, the rounded results may not add up precisely.
[2]The VSA includes approximately 123.8 square miles, or approximately 79,206 acres.

1.2.4 Visually Sensitive Resources

VSRs within the VSA were identified per the requirements of OAC 4906-4-08(D). The categories of VSRs that are typically required for consideration in a VRA include the following:

- **Properties of Historic Significance:** National Historic Landmarks (NHLs), sites listed on the National Register of Historic Places (NRHP), sites determined eligible for listing on the NRHP, Ohio Historic Inventory (OHI) structures, Ohio Department of Transportation (ODOT) designated historic bridges, Ohio Genealogical Society (OGS) cemeteries, and Ohio historic state markers.
- **Designated Scenic Resources:** Rivers designated as national or state wild, scenic, or recreational; sites, areas, lakes, reservoirs or highways designated or eligible for designation as scenic; other designated scenic resources.
- **Public Lands and Recreational Resources:** National parks, recreation areas, seashores, and/or forests; national natural landmarks; national wildlife refuges; heritage areas; state parks; state nature preserves or wildlife areas; state forests; state fishing/waterway access sites; other state lands, designated trails; local parks and recreation areas; publicly accessible conservation lands/easements; rivers and streams with public access; named lakes, ponds, and reservoirs.
- **High Use Public Areas:** State, US, and Interstate highways, schools, cities, and villages.

To identify VSRs within the VSA, EDR consulted a variety of data sources including digital geospatial data obtained primarily through the Ohio Geographically Referenced Information Program (OGRIP) or Esri; numerous national, state, county, and local agency/program websites as well as websites specific to

identified resources; and web mapping services such as Google Maps. Table 1.3 provides a count of the various types of VSRs identified within the 5-mile radius VSA.

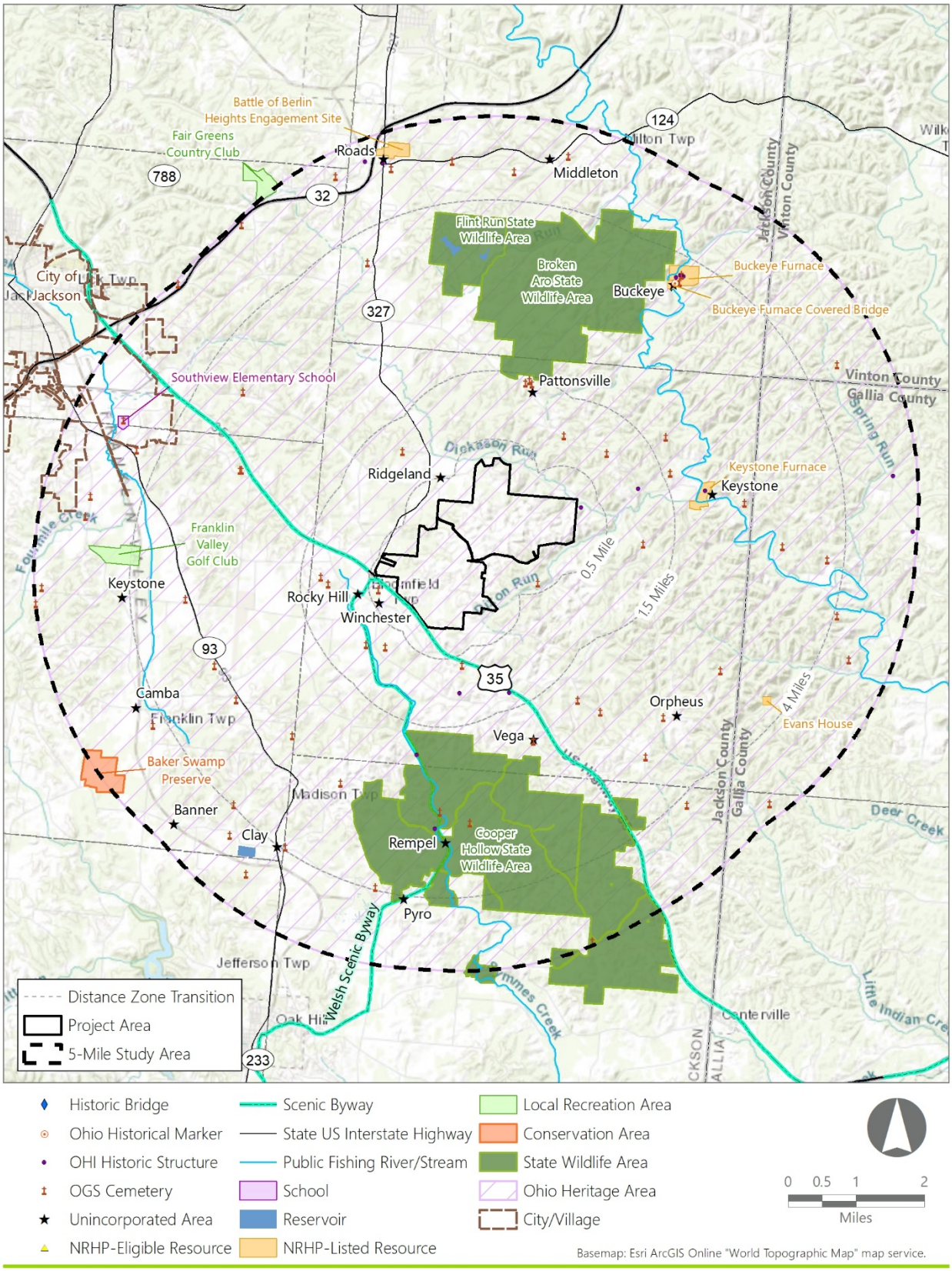
Table 1.3. Visually Sensitive Resources

Type of Visually Sensitive Resource	Number Identified within the VSA
Properties of Historic Significance	89
Designated Scenic Resources	1
Public Lands and Recreational Resources	12
High Use Public Areas	23
Total	125

The locations of mapped VSRs within the VSA are illustrated in Figure 1.5, and presented at a larger scale in Appendix B[1]. Additional information regarding the specific VSRs included in the VSA, and potential Project visibility from these VSRs, is included in Section 2.1.3 and Appendix E.

[1] The "Unincorporated Area" designation in Figure 1.5 connotes smaller settlements that do not have their own municipal governance structure.

Figure 1.5. Location of Visually Sensitive Resources



Documented Visual Resources and Preferences of the Community

EDR also reviewed existing plans, policies, and regulations of the various political subdivisions (Counties, Townships and Cities) within the VSA to identify and document visual resources or visual preferences of the community. Gallia County and Vinton County are the only political subdivisions within the VSA with documented land use plans.

The 2012 Grow Gallia Strategic Plan

This plan's vision statement states "Gallia County is a thriving and socially engaged river community, promoting its strengths in health care, education, and infrastructure, to lead the region in industry growth, business opportunities, and the recreational and cultural enrichment of its citizens, while preserving its agricultural and historical heritage." (Gallia County, 2012, p. 1). Though the county is within the 5-mile VSA, the Project is not proposed to be located in Gallia County and potential views of the Project are not anticipated to be available from Gallia County. Even if potentially visible, the Project would not conflict with the goals listed in the 2012 Grow Gallia Strategic Plan.

The 2016 Vinton County: Future Focus 2020

This plan has a mission of "working together for a better Vinton County". The Plan states that the county values natural beauty, a pristine environment, and its rural character (Vinton County, 2016, p. 24) aiming to accommodate growth responsibly by implementing regulatory tools that preserve rural character and unique land and forestry areas. Recreational activities and tourism are centered around the county's natural resources that include forests (over 80% of total land area), three lakes, numerous state parks, and clean air and water (Vinton County, 2016, p. 6-8). These natural resources contribute to a good quality of life for residents and generate tourism-based income for the county. Additionally, to build upon tourism opportunities in the county, the plan seeks to develop self-guided driving tours of historical sites and resources (e.g., cemeteries, churches) throughout the county. Vinton County comprises the western portion of the middle ground and background within the VSA. Through the county is within the 5-mile VSA, the Project is not proposed to be located in Vinton County and potential views of the Project are not anticipated from Vinton County. Even if potentially visible, the Project would not conflict with the values and goals of the 2016 Vinton County: Future Focus 2020 plan.

2.0 VISUAL RESOURCE ASSESSMENT

The specific techniques used to assess potential Project visibility and visual effects, along with the results of those assessments, are described below.

2.1 Potential Project Visibility

2.1.1 Viewshed Methodology

PV Panel Viewshed Analysis

A digital surface model (DSM) viewshed analysis, which considers the screening effects of existing topography, structures, and vegetation, was conducted to identify areas where views of the proposed PV panel arrays (including PV panels, inverters, and perimeter fencing) would potentially be available. A viewshed analysis based on topography alone is not provided because the results of such an analysis do not accurately represent conditions within the VSA. The DSM viewshed analysis for the proposed PV arrays was prepared using: 1) a DSM derived from the Ohio Statewide Imagery Program's (OSIP) 2007 lidar data for the Counties of Jackson, Gallia, and Vinton, Ohio; 2) sample points to represent solar panel locations placed 200 feet apart in a grid pattern throughout all proposed PV panel arrays; 3) an assumed maximum solar panel height of 11.5 feet applied to each sample point; 4) an assumed viewer height of 6 feet; and 5) Esri ArcGIS Pro® software with the Spatial Analyst extension.

A few modifications were made to the lidar-derived DSM prior to analysis. Transmission lines and road-side utility lines that are included in the lidar data are mis-represented in the DSM as opaque screening features. In order to correct this inaccuracy, DSM elevation values within transmission line corridors and within 50 feet of road centerlines were replaced with bare earth elevation values. It is important to note that this clearing of the DSM may also eliminate legitimate screening features such as road-side vegetation and structures, which may result in an overstatement of potential Project visibility along road corridors within the VSA. Additionally, areas within 55 feet of proposed fence lines, PV arrays, access roads, and collection substation, overhead collection lines, and POI were set at bare earth elevations to reflect approximate Project-related clearing. This modified DSM was then used as a base layer for the viewshed analysis. Once the viewshed analysis was complete, PV panel visibility was set to zero in locations where the DSM elevation exceeded the bare earth elevation by 6 feet or more, indicating the presence of vegetation or structures that exceed viewer height. This was done for two reasons: 1) in locations where trees or structures are present in the DSM, the viewshed would reflect visibility from the vantage point of standing on the treetop or building roof, which is not the intent of this analysis, and 2) to reflect the fact that ground-level vantage points within buildings or areas of vegetation exceeding 6 feet in height will generally be screened from views of the Project.

Because it accounts for the screening provided by topography, vegetation and structures, the DSM viewshed analysis is a very accurate representation of potential Project visibility. However, it is worth noting that because certain characteristics of the Project and the VSA that may serve to restrict visibility (e.g., color, atmospheric/weather conditions, and distance from viewer) are not taken into consideration in the analysis, being located within the DSM viewshed does not necessarily equate to actual Project visibility, nor does it

indicate that adverse visual impacts will occur within these geographic locations. There is also the possibility of the DSM overstating screening/underestimating visibility in locations where views are available through trees during the dormant season. Potential changes to the landscape that have occurred since the 2007 date of lidar collection could also lead to minor inaccuracies in the analysis. To minimize the chance of this occurring, any noticeable changes to the landscape that were observed during field visits or in review of updated aerial imagery were incorporated into the lidar data.

Above-Ground Electrical Component Viewshed Analysis

A DSM viewshed analysis was also conducted for the overhead collection lines, collection substation, and POI switchyard. Precise locations of the overhead collection line structures and the interior components of the substation and switchyard are not known at this time. Therefore, the analysis was based on sample points conservatively spaced 200 feet apart along the overhead collection line with an assigned height of 45 feet (the maximum structure height under consideration) and 8 sample points within the overall footprint of the POI/Collection substation with an assigned height of 65 feet (the maximum height of the proposed lightning masts). All other data sources and assumptions used in the above-ground electrical component viewshed analysis are as described above for the PV panel viewshed analysis.

2.1.2 Viewshed Results

PV Panel Viewshed Analysis

Potential visibility of the proposed PV panels, as indicated by the DSM viewshed analysis, is illustrated in Figure 2.1, Figure 2.2, and 2.3 and summarized in Table 2.1. As indicated by this analysis, the PV arrays will be screened from approximately 94.8% of the VSA by intervening vegetation and structures.

Table 2.1. PV Panel Viewshed Analysis Results Summary

Analysis	VSA (square miles)	Visibility by Distance Zone[1] (square miles of visibility and percent of distance zone)			
		Near-Foreground 0-0.5 Mile	Foreground 0.5-1.5 Mile	Middle Ground 1.5-4.0 Mile	Background 4.0-5.0 Mile
Total Area	123.8	7.2	13.5	60.8	42.3
DSM Viewshed Visibility	6.5 (5.2%)	3.3 (45.5%)	2.3 (16.9%)	0.8 (1.3%)	0.1 (0.3%)

[1]The calculations used to generate this table were based on unrounded numbers, therefore, the rounded results may not add up precisely.

Figure 2.1 and Figure 2.2 illustrate the results of the DSM viewshed analysis for a 5-mile radius and a 1.5-mile focused radius, respectively. These viewshed maps illustrate how potential views of the Project will include a smaller portion of the proposed PV panel arrays as one moves farther from the Project Area.

The near-foreground distance zone has the largest area of potential visibility within the VSA, with 45.5% of the area out to 0.5 mile from the Project Area indicated as having potential views of some portion of the PV arrays. Views from areas in the foreground distance zone (0.5-1.5 miles) experience significantly more screening due to intervening forests, vegetation, topography, and structures, and therefore less than 17%of

the foreground distance zone is indicated as having the potential for views of the PV panels. The DSM viewshed analysis indicates that potential Project visibility is drastically reduced at distances beyond the foreground. Due to the dense forest areas and abundant hills and ridges within the near-foreground and foreground, potential views of PV panels from the middle ground (at distances between 1.5 and 4 miles) are very limited (1.3%). At background distances (between 4 and 5 miles away), the viewshed analysis indicates that less than half of one percent (0.3%) of the VSA is expected to have potential views of the PV panels.

Within the near-foreground and foreground of the VSA the landscape is characterized by numerous hills as well as unincorporated settlements, and potential views are strongly influenced by changes in topography. Southwest of U.S. Route 35, residences in the hamlet of Winchester are projected to have potential views of the Project where PV panels are located on hillsides that face toward the hamlet. The scattered areas of potential Project visibility indicated within the middle ground and background result from localized topographic conditions and an absence of intervening vegetation that allows an unobstructed line of site toward the Project Area in discrete locations.

It should be noted that the viewshed analysis treats all structures and vegetation as if they were opaque, and therefore, small woodlots and hedgerows are assumed to fully screen views of the PV arrays. This will likely be the case during leaf-on conditions; however, during leaf-off conditions, narrow or sparsely vegetated hedgerows and woodlots may not provide enough screening to fully obscure views of the Project. Partial screening will be provided by tree trunks and branches in these locations during leaf-off conditions; therefore, views of the PV panels would be at least partially obstructed. It is also important to note that the lidar data used in this analysis are from 2006, and the analysis does not reflect any changes that may have occurred since that time. However, based on review of recent aerial photography (2021) and field review, the lidar data appear to accurately reflect current vegetative screening conditions within the VSA.

In addition, proposed mitigation plantings will provide additional screening and soften the visible effects of the PV arrays in certain areas within the near foreground and foreground distance zones. These proposed plantings are not accounted for in the viewshed analysis.

Figure 2.1. PV Panel Viewshed Analysis Results Within the VSA

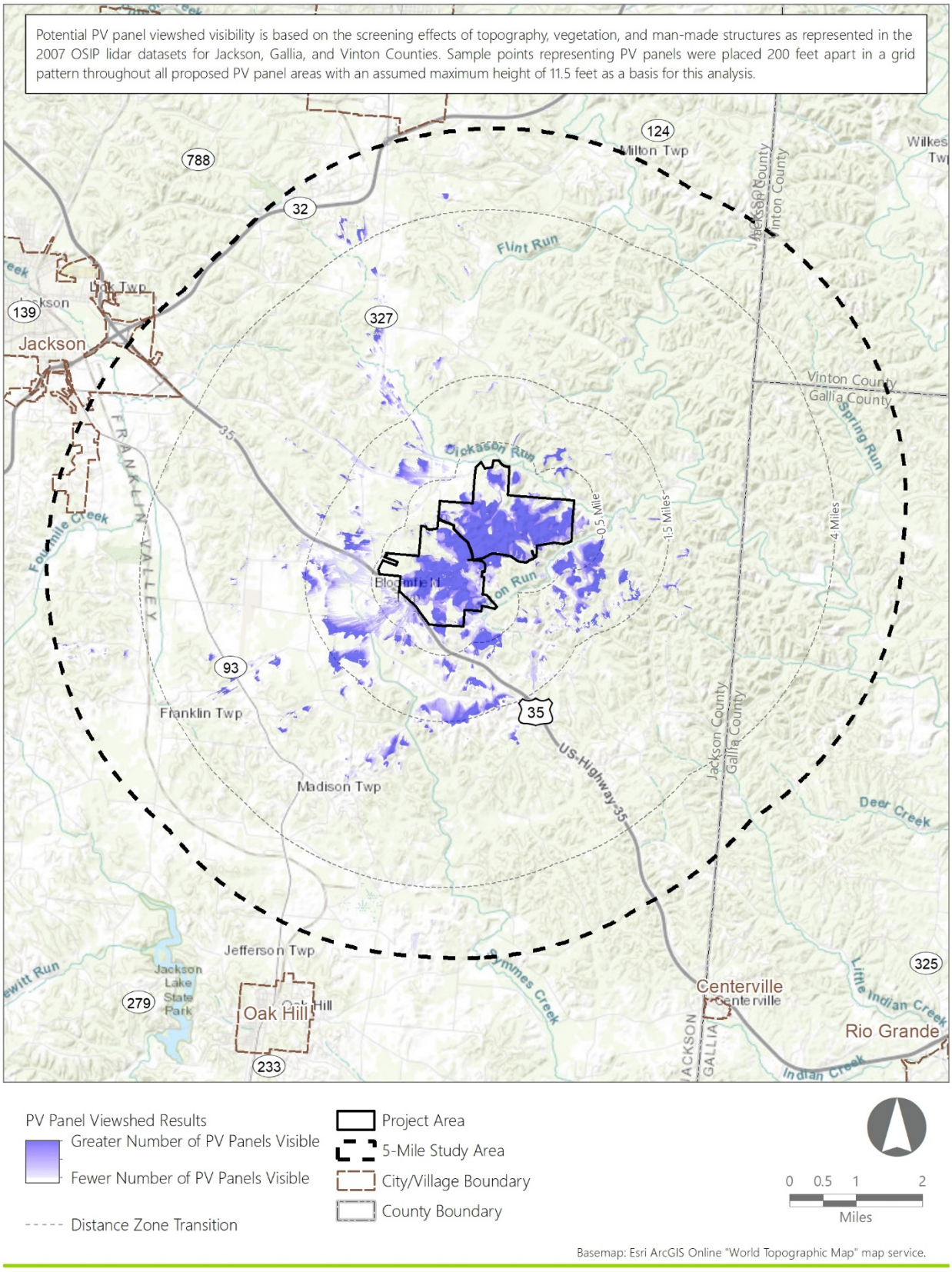
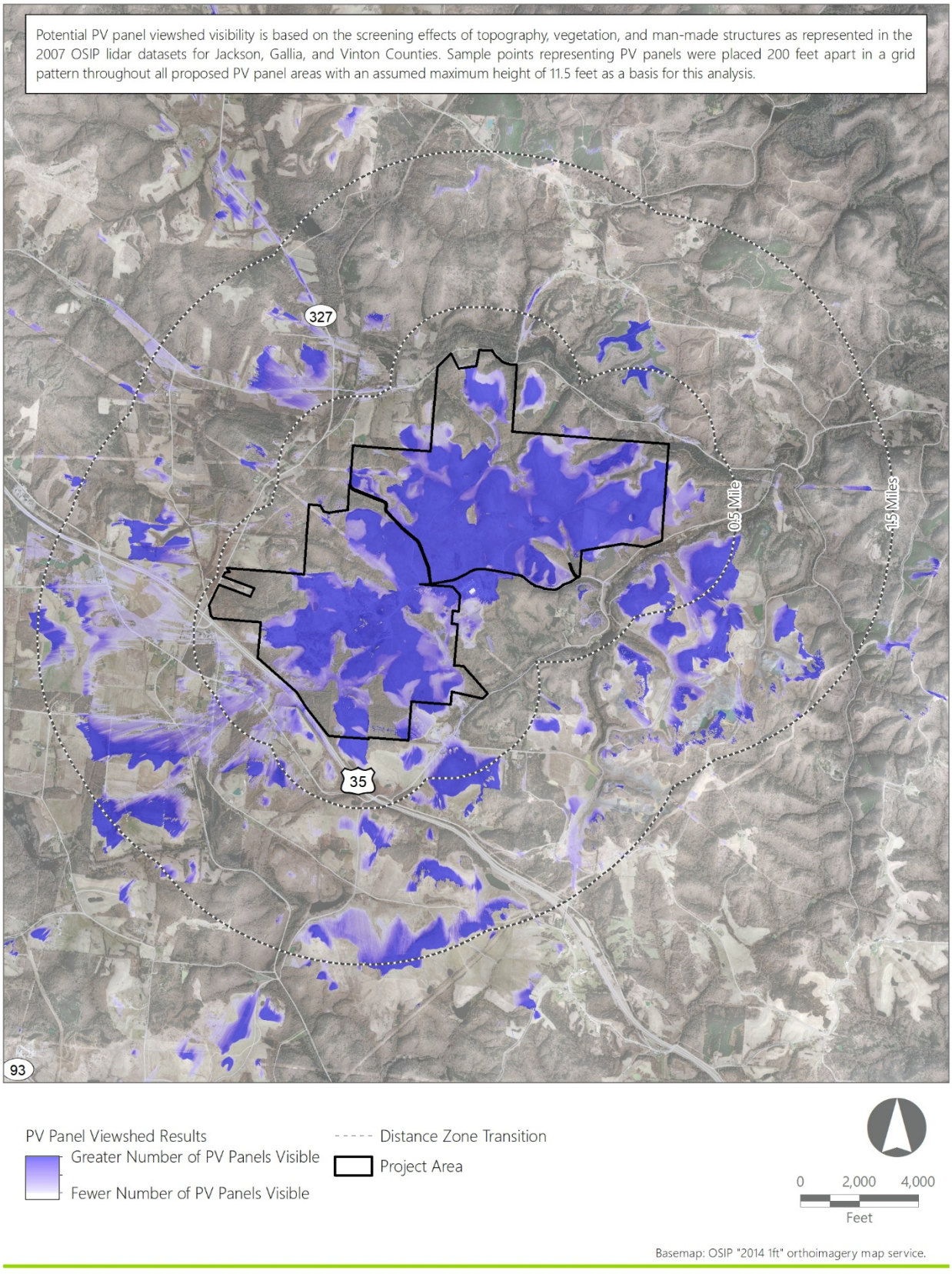


Figure 2.2. PV Panel Viewshed Analysis Results Within the Foreground Distance Zone



Above-Ground Electrical Component Viewshed Analysis

Potential visibility of the above-ground electrical components, as indicated by the DSM viewshed analysis, is illustrated in Figure 2.3 and summarized in Table 2.2. As indicated by this analysis, these components of the Project will be screened from approximately 94.9% of the VSA by intervening topography, vegetation, and structures.

Table 2.2. Above-Ground Electrical Component Viewshed Analysis Results

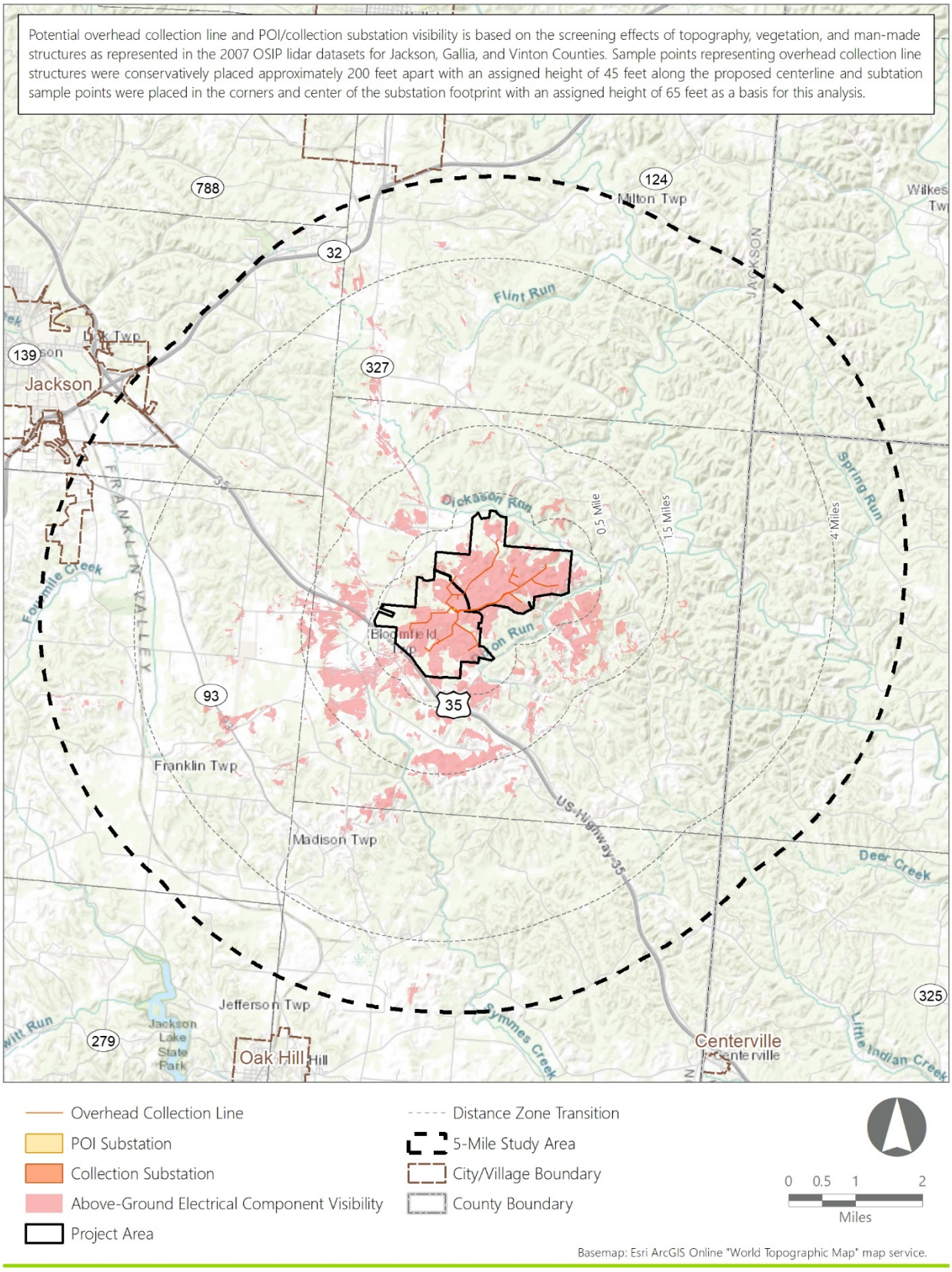
Analysis	VSA (square miles)	Visibility by Distance Zone (square miles of visibility and percent of distance zone)			
		Near-Foreground 0-0.5 Mile	Foreground 0.5-1.5 Miles	Middle Ground 1.5-4.0 Miles	Background 4.0-5.0 Miles
Total Area	123.8	7.2	13.5	60.8	42.3
DSM Viewshed Visibility	6.3 (5.1%)	3.0 (41.6%)	2.3 (17.0%)	0.9 (1.5%)	0.1 (0.3%)

[1]The calculations used to generate this table were based on unrounded numbers, therefore, the rounded results may not precisely reconcile.

Potential visibility for the above-ground electrical components is nearly identical (5.1%) to the potential visibility of the PV panels (5.2%).

It is important to keep in mind that the above-ground electrical component viewshed analysis presents theoretical visibility. It ignores the narrow profile and neutral color of the collection line structures and lightning masts which are likely to blend in with the background landscape and be difficult to discern at distances beyond the foreground. In addition, analysis of potential substation/switchyard visibility is based on a height significantly taller than most of the internal substation structures. These lower interior structures will generally be screened by intervening vegetation and structures at viewpoints outside the near foreground distance zone.

Figure 2.3. Above-Ground Electrical Component Viewshed Analysis Results Within the VSA



2.1.3 Visibility Results from Visually Sensitive Resources

The DSM viewshed analysis suggests that 23 of the 124 VSRs identified within the VSA (18%) may have views of both the PV panels and the above-ground electrical components of the Project. An additional three of these resources (2%) may have views of only the PV panels. No VSRs are indicated as having above-ground electrical component visibility only (see Table 2.3).

Table 2.3. Visually Sensitive Resources with Potential Project Visibility

Visually Sensitive Resources	Total Number of Resources within the VSA	Total Resources with Project Visibility[1]		
		Both PV Panels and Above-Ground Electrical Components Visible	Only PV Panels Visible	Only Above-Ground Electrical Components Visible
Properties of Historic Significance	89	9	3	-
Sites Listed on National Register of Historic Places (NRHP)	5	-	-	-
Ohio Historic Structures	19	-	1	-
Historic Bridges	1	-	-	-
OGS Cemeteries	63	9	2	-
Ohio Historical Marker	1	-	-	-
Designated Scenic Resources	1	1	-	-
Sites, Areas, Lakes, Reservoirs or Highways Designated or Eligible for Designation as Scenic	1	1	-	-
Public Lands and Recreational Resources	11	5	-	-
Heritage Areas	1	1	-	-
Wildlife Areas	3	3	-	-
Local Parks and Recreation Areas	2	-	-	-
Publicly Accessible Conservation Lands/Easements	1	-	-	-
Rivers and Streams with Public Access	3	1	-	-

Visually Sensitive Resources	Total Number of Resources within the VSA	Total Resources with Project Visibility[1]		
		Both PV Panels and Above-Ground Electrical Components Visible	Only PV Panels Visible	Only Above-Ground Electrical Components Visible
Named Lakes, Ponds, and Reservoirs	1	-	-	-
High-Use Public Areas	23	8	-	-
State, US, and Interstate Highways	5	3	-	-
Schools	1	-	-	-
Cities, Villages, Unincorporated Areas	17	5	-	-
Total Number of Visually Sensitive Resources	124	23	3	-

[1]See Appendix E for additional detail on VSR visibility.

The following section describes the individual VSRs with potential Project visibility, their distance from the Project, and potential views of the proposed PV panels and/or above-ground electrical components based on the DSM viewshed results.

Properties of Historic Significance

OHI Historic Structures

Oglesbee 1 (Keystone Furnace Road) is an open pit iron ore quarry located 0.3 mile east of the nearest PV panel array in the near-foreground distance zone. The site has potential visibility of the PV panels views of the Project will be softened by scattered vegetation between this site and the facility, however, research conducted for the Project revealed that this resource may no longer be extant.

OGS Cemeteries

Of the 63 OGS Cemeteries occuring within the VSA, 11 are indicated as having potential Project visibility. One cemetery, the Winchester Cemetery, is located in the near foreground distance zone, 0.3 mile southwest of the Project on Winchester Cemetery Road, to the west of State Route 35. Potential intermittent views of the Project from the cemetery are anticipated through gaps in existing roadside vegetation (see Inset 2.2).

Six OGS Cemeteries are located within the foreground distance zone. Marcum Cemetery is approximately 0.6 mile south of the nearest PV panels and there is the potential for limited Project visibility from within the cemetery. However, roadside vegetation along State Route 35, several woodlots, and scattered buildings

are located between the cemetery and the Project and will obscure views of the PV panels. In addition, visual clutter along State Route 35 may draw viewer attention away from the Project. Andrews Cemetery and Pattonsville-Pattonsville Cemetery are approximately 0.9 mile and 1.4 miles northeast of the nearest PV Panel array, respectively. Both of these sites are located along Pattonsville Road and are indicated as having some degree of Project visibility. Partial screening will be provided by woodlots, undulating terrain, and residential developments. Additional vegetation along Keystone Furnace Road to the southwest will likely further obscure views of the Project from these cemeteries. Ward Cemetery, McClure Cemetery, and Six Brothers Cemetery are all located between 0.9 mile and 1.2 miles southwest of the nearest PV Panel. While some visibility is anticipated, screening from woodlots, residential development, and heavy existing roadside vegetation along both State Route 35 and Dixon Run Road will soften and partially obscure views of the Project.

Four cemeteries with potential Project visibility are located within the middle ground distance zone. Keystone Cemetery is located approximately 1.6 miles northeast of the nearest PV panel array, Zoar Cemetery and Buckley Cemetery are located approximately 2.7 and 3.0 miles southwest of the nearest PV Panel Array, respectively, and McGhee Cemetery (which is indicated as having potential views of both the PV panels and the above-ground electrical components) is approximately 3.5 miles to the northwest of the nearest PV panel array. These cemeteries may have limited pockets of Project visibility, but due to distance, as well as screening provided by intervening vegetation, undulating terrain, and development, the Project will be obscured or will blend with the background, making them difficult to perceive from within these sites.

Designated Scenic Resources

Sites, Areas, Lakes, Reservoirs or Highways Designated as Scenic

The Welsh Scenic Byway, the nearest portions of which fall within the near-foreground distance zone approximately 0.1 mile southwest from the nearest PV panel array, could have potential visibility of the PV panels and the proposed above-ground electrical components. Potential Project visibility along the scenic byway will vary based on proximity to the Project, elevation, and roadway orientation. Potential views of the Project will be available along the scenic byway to the southwest of the Project with intermittent views between forested areas along the roadside. While portions of the Project may be visible these views will be softened by the existing vegetative screening between the byway and the proposed Project.

Public Lands and Recreational Resources

Heritage Areas

Ohio's Hill Country Heritage Area is an approximately 15,500-square-mile heritage area, encompassing the majority of southeast Ohio, that highlights Ohio's Appalachian culture, environment, and history. The Project will be located within the Heritage area and will be visible from several locations within the area in the near-foreground, foreground, middle ground, and background distance zones. However, views from the surrounding heritage area will be softened or obscured, depending on distance, by existing vegetation, development, and the undulating terrain in the region and will only be visible from close proximity to the Project.

Wildlife Areas

There are three wildlife areas located in the middle ground distance zone that have potential visibility of the PV panels and the proposed above-ground electrical components. Broken Aro State Wildlife Area is located 2.7 miles north of the nearest PV panel array. Views of the Project from this area will be limited to localized pockets, with most potential visibility occurring along the southern border. Even within these pockets, views will likely be obscured by existing woodlots, roadside vegetation, development, and the uneven terrain in the region.

Flint Run State Wildlife Area is approximately 2.6 miles north of the nearest PV panel array, directly adjacent to Broken Aro State Wildlife Area. Flint Run will have similar localized pockets of visibility, screening from existing woodlots, development, and terrain, with additional softening based on increased distance from Project components. Cooper Hollow State Wildlife Area is located approximately 1.6 miles south of the nearest PV Panel array. Views of the Project from this site will be limited to small pockets of visibility along its northern border. Project visibility will be limited by existing woodlots, development, uneven terrain, roadside vegetation, and visual clutter along State Route 35.

Rivers and Streams with Public Fishing Access

Symmes Creek runs within the foreground distance zone approximately 0.7 mile from the nearest proposed Project component. The creek has potential for intermittent views at points where shoreline vegetation does not preclude views across open agricultural fields, but is otherwise screened by existing residential development, forested areas and woodlots, and roadside vegetation along State Route 35 to the north.

High-Use Public Areas

State, U.S., and Interstate Highways

Project visibility from roadways within the VSA will vary considerably based on proximity to the Project, elevation, and roadway orientation. U.S. and state highways that have potential PV panel and/or above-ground electrical component visibility and their length and usage within the VSA are listed in Table 2.4, below.

Table 2.4. High-Use Roadways within the VSA

Road/Highway	Average Vehicles/Day Range on Segments within the VSA[1]	Total Length within the VSA (miles)	Length (miles) and Percent within the PV Panel Viewshed	Length (miles) and Percent within the Substation Viewshed
State Route 32	10,659 – 11,464	4.7	0	0
State Route 93	4,729 – 6,512	9.0	0.2 (2.2%)	0.2 (1.9%)
State Route 124	944 – 3,453	4.4	0	0
State Route 327	1,325 – 9,519	6.8	1.8 (26.7%)	1.9 (28.8%)

U.S. Highway 35	14,142 – 14,209	11.9	1.2 (10.4%)	1.0 (8.8%)

[1] Source: Ohio Department of Transportation, 2018

Views of the Project from moving vehicles will generally be fleeting, peripheral to the orientation of the drivers' primary view, and not the primary focus of driver attention.

Cities, Villages, and Unincorporated Areas

One unincorporated (hamlet) area is indicated as having views of only the PV panel arrays, and four are indicated as having views of both the PV panel arrays and above-ground electrical components associated with the Project.

The hamlets of Winchester, Ridgeland, and Rocky Hill are located within the near-foreground distance zone, approximately 0.2, 0.3, and 0.5 mile from the nearest PV panel arrays, respectively. Winchester and Rocky Hill are located southwest of the Project, and Project visibility is anticipated for both communities along roadway corridors, in residential areas along Dixon Run Road, across open agricultural fields, and from structures adjacent to State Route 35. These communities will be partially screened from the Project by existing development, intermittent woodlots, and forested areas on the northern side of State Route 35. Ridgeland is located to the northwest of the Project, with potential visibility mostly limited to a roadway corridor along Keystone Furnace Road and open agricultural fields to the west. These views will be partially obscured by existing woodlots and development between the community and the Project, as well as by the undulating terrain in the area.

The hamlet of Vega is located in the middle ground distance zone, approximately 1.8 miles southeast of the nearest PV panel array. This community is indicated as having very limited pockets of potential Project visibility. Due to distance, frontage development along the roadways, woodlots, and intervening vegetation, discerning the Project from within this area will likely be difficult.

2.1.4 Field Verification Methodology

EDR conducted site visits to the VSA on June 14 and July 15, 2021. The purpose of this field review was to verify potential visibility of the Project (as suggested by the viewshed analysis), document the visual character of the various LTs within the VSA, identify the type and extent of existing visual screening, and obtain photographs for subsequent use in the development of visual simulations.

During the site visits, EDR staff members drove public roads, visited public vantage points within the VSA, and obtained photographs from 32 individual viewpoints utilizing a digital SLR camera with a lens setting of 24 and 33 mm (equivalent to settings at 45 and 55 mm on a standard 35 mm full frame camera). Viewpoint locations were recorded using a camera-integrated global positioning system (GPS) unit, and all field notes, GPS points, focal length parameters, times, and dates were documented electronically. Viewpoint locations and representative photographs from each viewpoint are shown in Appendix A.

2.1.5 Field Verification Results

Field verification generally confirmed the results of the viewshed analysis (see the Viewpoint Location Map and Photo Log in Appendix A). Open views of the fields where PV arrays are proposed are most available directly adjacent to the Project along Luther Jones Road where the road borders open agricultural fields (Viewpoints 2, 10, 11, 25, 26, 27, 28, and 29). Additional areas with potential views out to 0.5 mile occur along Luther Jones Road (Viewpoints 30, 3, and 24), U.S. Route 35 (Viewpoints 9 and 31), Dixon Run Road (Viewpoints 7, 8, and 23), and Winchester Cemetery Road (Viewpoint 22). All potential views from these roads and adjacent areas will be partially screened by existing roadside vegetation, woodlots, or development.

Additional areas with potential views occur out to 1.5 miles. However, most views toward the Project Area from these more distant portions of the VSA are well screened by forested areas, woodlots, hedgerows, and structures, as well as by the rolling topography of the region. These open views are generally fleeting and along narrow corridors that are tightly framed by screening features (refer to Viewpoint 13 on Pattonsville Road, Viewpoint 21 on Dixon Run Road, Viewpoint 19 on Keystone Furnace Rd, Viewpoint 17 on State Route 327, and Viewpoint 32 on State Route 35).

Field review from middle ground distance zones, beyond 1.5 miles, indicates that potential views of the Project would likely be available from segments of State Route 93 and along State Route 327 (Viewpoint 18, north of the Project Area). Beyond 4.0 miles, into the background distance zone, potential visibility could continue to be available along State Route 327. However, based on observations of existing solar facilities with similar topography, while visibility is potentially possible from these more distant locations, the actual ability to discern the Project will be significantly diminished due to factors such as visual acuity, lack of color contrast with background vegetation, atmospheric perspective, and partial screening from intervening vegetation and structures. In addition, views beyond 1.5 miles will generally only include a small portion of the Project and views of the Project will likely go unnoticed by most casual observers.

As noted in Section 2.1.1, the viewshed analysis did not consider potential screening provided by vegetation and structures within 50 feet of road centerlines. As such, the visibility from along roads may be overstated. This was confirmed during field review, which documented numerous areas where roadside trees provide additional screening not considered in the viewshed analysis. The combination of relatively low panel height, along with existing roadside vegetation and structures, will reduce the extent of Project visibility indicated by the viewshed analysis.

2.2 Visual Simulations

Visual simulations from representative locations were produced to illustrate the appearance of the Project and to evaluate the potential visual impact on existing landscape features and viewers within the VSA.

2.2.1 Viewpoint Selection

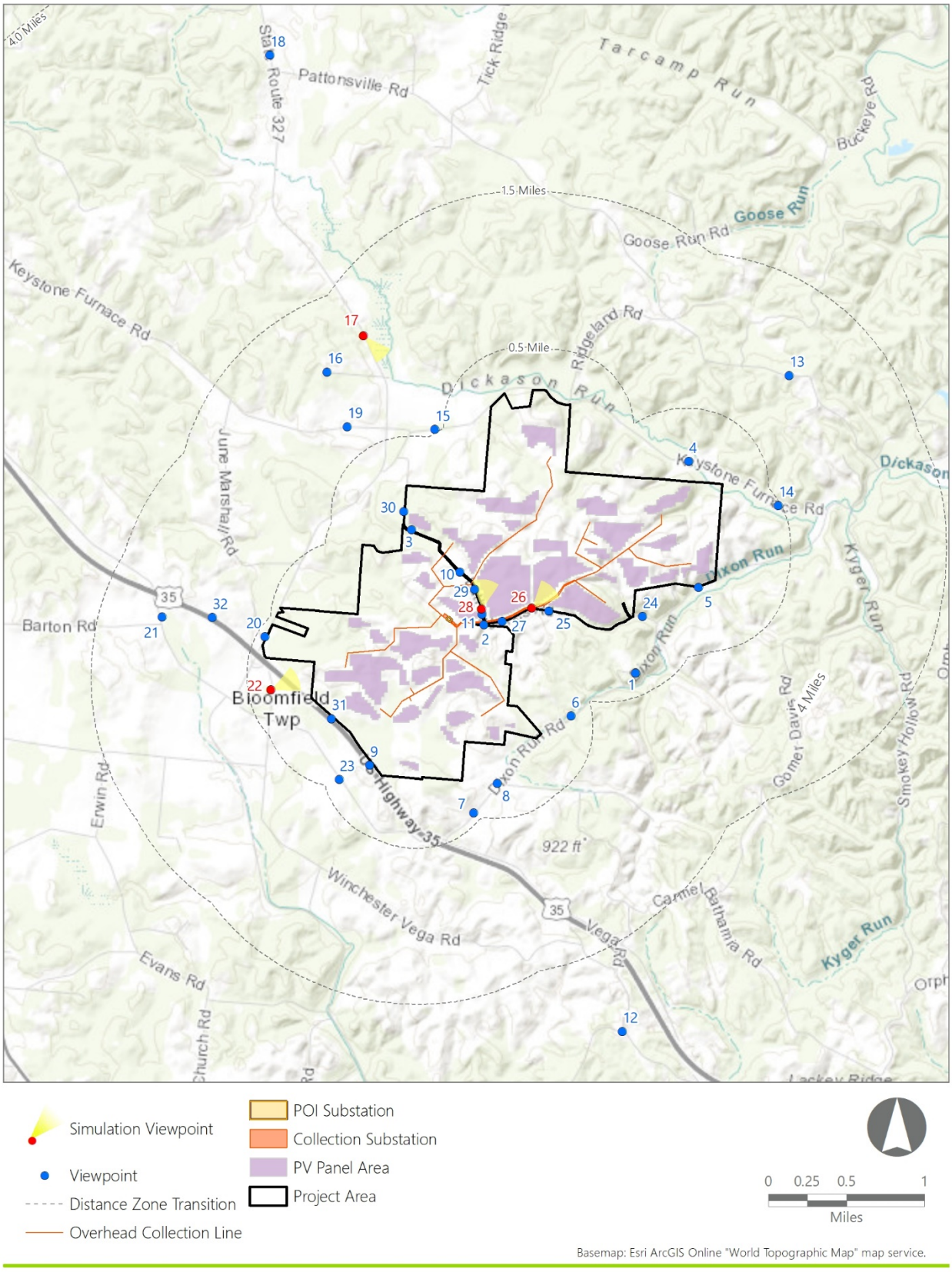
Based on the viewshed analysis results and field verification results, a total of four representative viewpoints were selected for the development of visual simulations. Each of the four viewpoints were selected based

upon the following criteria:

- They provide open near foreground ("worst case") views of proposed Project components (as indicated by field verification and viewshed analysis).
- They illustrate Project visibility from identified VSRs where views of the Project will be available.
- They illustrate typical views from LTs where views of the Project will be available.
- They illustrate typical views of the proposed Project that will be available to representative viewer/user groups within the VSA, including adjacent residences, travelers, and recreational users.
- They illustrate typical views of different numbers of PV panels, from a variety of directions and lighting/sky conditions, to illustrate a typical range of panel positions and light exposures.
- The selected photos generally displayed good composition, lighting, and exposure.

The location and orientation of the viewpoints selected for the production of visual simulations are illustrated in Figure 2.4.

Figure 2.4 Visual Simulation Location Map



2.2.2 Visual Simulation Methodology

Visual simulations of the proposed Project were developed by constructing a three-dimensional (3D) computer model of the proposed PV arrays and overhead collection lines, based on specifications, dimensions, and locations provided by the Applicant. Next, the camera specifications used to take the selected photograph in the field were replicated in the 3D model. This was accomplished by positioning the 3D camera in the same real-world coordinate system as the Project model using GPS coordinates collected at each photo location. The camera was then aligned, and the camera's target position (view direction) adjusted until the modeled 3D elements aligned exactly with the elements in the photograph. Once this step was complete, the Project was added to the photograph at the correct location, perspective, and scale. At this point, the appropriate sun angle was simulated based on the specific date, time, and location (latitude and longitude) at which the photograph was taken. This information allowed the program to realistically illustrate highlights, shading, and shadows for all Project components shown in the view. All PV panel simulations include fixed-tilt arrays with the panels oriented perpendicular to the sun, on an east-west axis, in north-south aligned arrays.

2.2.3 Visual Simulation Results

The visual simulations and a discussion of the potential visual effects associated with the Project are summarized below. Full-sized images are presented in Appendix D.

Viewpoint 17 – State Route 327

Inset 2.1. Left: Existing Conditions. Right: Visual Simulation

Existing Conditions

Viewpoint 17 is located on State Route 327 in Bloomfield Township, Jackson County, approximately 1.16 miles from the nearest proposed Project component. This viewpoint is representative of the Forest LT and provides typical views available to local residents and drivers. The existing view to the southeast from this location features a paved road (State Route 327) flanked by mowed shoulders, angling across the view, from the immediate foreground on the left side of the photo, to the middle ground on the right. An agricultural fence follows the road edge and is partially obscured by roadside vegetation. Beyond the fence line, the landscape transitions to a mix of woodlots and open fields which rise gently to the horizon. Trees in the

woodlots and hedgerows block views of the open fields, although small glimpses of open agricultural fields are available amongst the trees in the middle ground and background. A series of steel lattice transmission towers follows the horizon line above the treetops. Despite the presence of the road and transmission structures, the landscape appears largely undeveloped with strong rural character and moderate scenic value.

Proposed Project

With the proposed Project in place, the PV panel arrays are barely visible as a thin black line along the horizon where there are gaps in the tree canopy. The view remains essentially unchanged and fully retains its rural character and scenic value.

Viewpoint 22 – Winchester Cemetery Road

Inset 2.2. Left: Existing Conditions. Right: Visual Simulation

Existing Conditions

Viewpoint 22 is located on Winchester Cemetery Road adjacent to both Winchester Cemetery and the Winchester Methodist Church in Bloomfield Township, Jackson County, approximately 1,500 feet from the nearest proposed PV array. This viewpoint is also representative of the Pasture/Cropland LT. From the edge of a paved road (Winchester Cemetery Road) in the near-foreground the existing view to the east features a green hayfield (with scattered round haybales) that extends toward State Route 35 where it terminates at a row of shrubs and tall grasses along the edge of the highway. State Route 35 is a divided highway that runs across the middle of the view and is the focus of viewer attention. Immediately beyond the highway, rolling hills with broken forest cover block views of more distant landscape features. The existing view includes significant man-made features, but is dominated by fields and forest on rolling topography, which gives the view a rural character and moderate scenic value.

Proposed Project

With the proposed Project in place, an array of PV panels is visible as a saw-toothed grey structure along a portion of the ridgeline that forms the horizon on the right side of the view. Portions of the tree canopy have been removed from this portion of the hillside to accommodate the Project, although the height of the hill still precludes views of more distant landscape features. The Project is clearly visible, and its novel form and position on the horizon line attract viewer attention. However, the field, forested hills and Route

35 remain the dominant features of this view. The Project does not significantly alter the character of the landscape or its scenic quality.

Viewpoint 26 – Luther Jones Road

Inset 2.3. Left: Existing Conditions. Right: Visual Simulation

Existing Conditions

Viewpoint 26 is located on Luther Jones Road in Bloomfield Township, Jackson County, directly adjacent to a proposed PV panel array. This viewpoint is representative of the Cropland/Pasture LT. The existing view to the northeast from this location features open pastureland on rolling topography. The immediate foreground is characterized by old field vegetation, including grasses, forbs, and a few small to medium sized shrubs and saplings. This area extends across the photo, sloping gently upwards on the left where it ends at a wood post and wire agricultural fence. Beyond the fence line rolling pastures/open grass fields extend to the horizon on the left. In the center of the view a few small trees, as well as more agricultural fencing along the horizon line in the middle ground. A dirt road paralleled by hedgerows and an overhead utility line is a focal point on the right side of the photo. The road rises into view out of a valley and disappears from view as it crests the middle ground hill. The rolling landform, lack of man-made structures, and broad expanse of open fields gives the view a strong rural agricultural character and high scenic value.

Proposed Project

With the proposed Project in place, the pasture featured in the existing view is now occupied by PV panels and the agricultural fencing has been replaced by a perimeter chain link fence. The PV panels follow the rolling lay of the land, but from this orientation their uniform gray color and almost complete coverage of the ground surface reduce the rolling character of the landform. The panels also extend above the horizon line, further reducing visibility of the surrounding open fields. The existing road and roadside vegetation on the right remain intact, however, overhead collection lines and support structures along the road add significant visual clutter to the landscape and sky. The PV panels and collection lines are now the dominant features in this view. Their presence diminishes scenic quality and changes the perceived land use from rural-agricultural to solar energy production.

Viewpoint 28 – Luther Jones Road

Inset 2.4. Left: Existing Conditions. Right: Visual Simulation

Existing Conditions

Viewpoint 28 is located on Luther Jones Road in Bloomfield Township, Jackson County, approximately 172 feet from the nearest proposed Project component. This viewpoint is representative of the most open expansive views within the Pasture/Cropland LT. The existing view to the north from this location features a gravel road (Luther Jones Road.) which takes up a majority of the immediate foreground. As the road reaches the middle ground it turns to the right, through an agricultural gate, and is lined by round haybales wrapped in white plastic. The road and adjacent line of white bales proceed away from the viewer before disappearing from view behind a low hill in the center of an open field. A wood post and wire agricultural fence parallels the road to the right, partially obscured by dense roadside vegetation comprised of grasses and forbs. Beyond the fence line a large open pasture extends from the foreground into the middle ground before dipping in elevation and disappearing from view. The field encompasses the full field of view and gives this viewpoint is open agricultural character. Transmission towers are visible along the far side of the field. Behind the towers in the background, rolling forested hills form a distant horizon line. The view has a working agricultural feel with moderate scenic value.

Proposed Project

With the proposed Project in place, the pastures on both sides of Luther Jones Road are now occupied by arrays of PV panels, and the agricultural fencing has been replaced with a perimeter chain link fence set back further from the roadside. The PV panels arrays are form an orderly grey mass that extends across the middle of the view. An overhead collection line runs parallel to the existing road in the middle ground (now largely obscured by the panels), bisecting the extensive panel arrays. The transmission towers and forested hills remain visible beyond the PV panels, and the horizon line remains intact, except for a small portion on the far-right side of the photo. However, the dominant focal point is now the PV panel arrays. The dirt road on the left side of the view, areas of remnant open fields between the viewer and the panels, and visibility of the forested horizon line helps retain some of the open rural character. However, with the Project in place, the perceived land use has changed from agriculture to solar energy production.

Summary

The simulations demonstrate that the visual impact of the Project is strongest when viewed in the near-

foreground but diminishes quickly with distance. In locations where the PV panel arrays are directly adjacent to roads and/or residences, the proposed arrays will alter the scenic quality and/or existing landscape character by introducing substantial solar energy infrastructure to the landscape. However, when viewed at greater distances, significant portions of the Project will be screened and/or blend in well with the background features of the landscape.

3.0 CONCLUSIONS

3.1 Visual Resource Assessment Summary

Based on the analyses described above, the following conclusions can be drawn regarding the visibility and visual effect of the proposed Dixon Run Solar Project.

The PV panel viewshed analysis indicates that the proposed solar arrays will be screened from view throughout approximately 94.8% of the VSA. PV panel visibility is highest (45.5%) within the near-foreground (up to 0.5 mile) distance zone. However, significant portions of the near-foreground views are within the Project Area itself. Potential visibility is significantly reduced in the foreground distance zone (0.5 to 1.5 miles) due to screening provided by intervening topography, forest vegetation, and structures; with 16.9% of this zone having potential views of the Project. These features have even more of a screening effect in the middle ground distance zone (1.5 to 4 miles), where potential Project visibility diminishes substantially to (1.3%), and in the background zone (4 miles to 5 miles) where visibility is further reduced to 0.1%.

The above-ground electrical components viewshed analysis indicates that the tallest proposed structures (collection line poles and lightning masts) will have potential visibility from 5.1% of the VSA (i.e., visibility is fully screened from 94.9% of the VSA). Beyond foreground distances (i.e., over 1.5 miles) actual visibility of these components will be less than suggested by the viewshed analysis due to the effects of distance in combination with narrow profile of these components, which will help them blend with the background vegetation and sky.

Viewshed analysis of the 124 identified VSRs within the VSA indicates that three resources (2%) could have views of the PV panels only, 23 (18%) could have views of both the PV panels and the above-ground electrical components, and none are indicated as having potential views of the above-ground electrical components only. Of the 26 resources with potential PV panel visibility, 17 (65%) are located outside of the near-foreground distance zone (>0.5 mile). Viewshed results suggest that areas of potential visibility from VSRs in the middle ground and background will generally be limited to small areas within the VSR property and/or include only a limited number of PV panel arrays.

Field review generally confirmed the results of the viewshed analysis and further suggests that visibility of the Project will be largely restricted to areas within the near-foreground distance zone. Beyond 0.5 mile, screening provided by forested areas and variable terrain will significantly limit Project visibility.

As illustrated in the visual simulations, when viewed from near foreground locations the Project could result in a substantial change in landscape character and scenic quality. However, even at these distances varying

levels of visual impact are likely based on the sensitivity of affected viewers, the degree of screening available, as well as the distance of panel setbacks from roads and nearby residences. Project visibility and potential visual impact diminishes rapidly as the Project is viewed from greater distances, where the effectiveness of screening by vegetation and topography increases and the PV arrays tend to blend more with features in the background. Consequently, it is anticipated that impacts will be largely limited to areas with and directly adjacent to the Project Area.

4.0 MITIGATION

The Applicant is proposing vegetative mitigation intended to partially screen and soften views of the solar arrays along specific portions of Dixon Run Road (see Figure 4.1, below). The conceptual mitigation developed for this Project utilizes staggered rows of coniferous trees (see Figure 4.2, below) to maximize the screening potential in areas where mitigation may be required to minimize potential visibility from private residences. Where present, the plantings are anticipated to provide significant screening and also serve to break up the horizontal lines and man-made texture and form presented by the PV panels and fence line. The mitigation is also proposed in locations where existing vegetation already provides significant screening of large portions of the Project and the mitigation serves to fill in gaps between existing woodlots and established hedgerows. This will help provide more complete, year-round screening of the proposed Project from specific locations. Due to the lack of public vantage points surrounding the mitigation areas, the mitigation is not represented in the visual simulations.

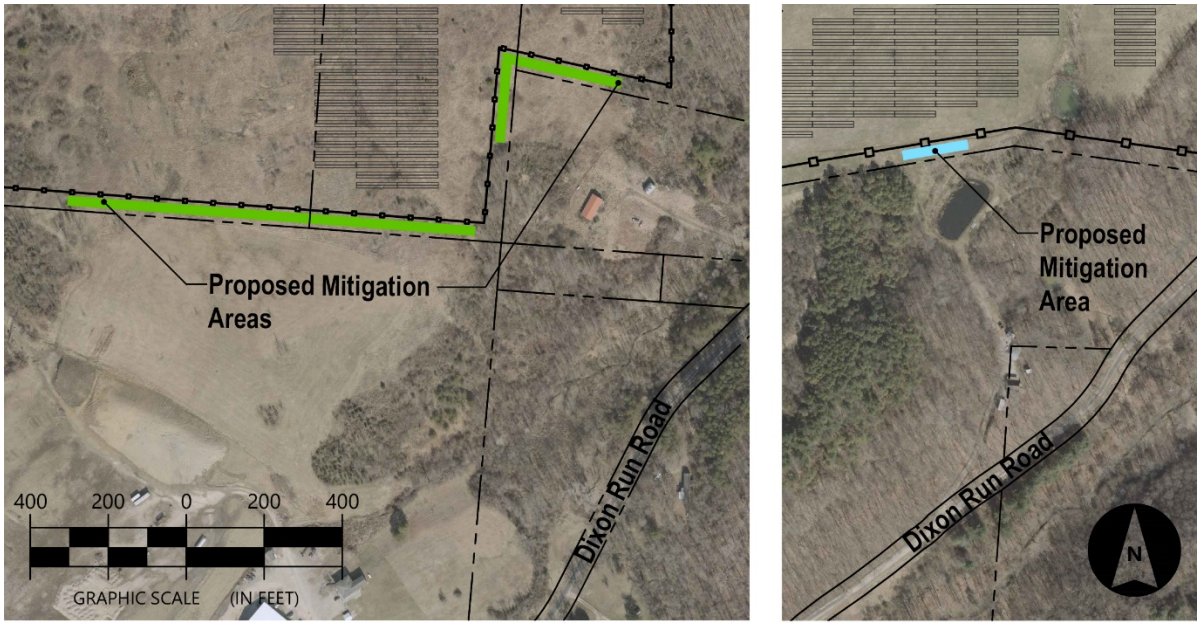


Figure 4.1 Location of Proposed Mitigation

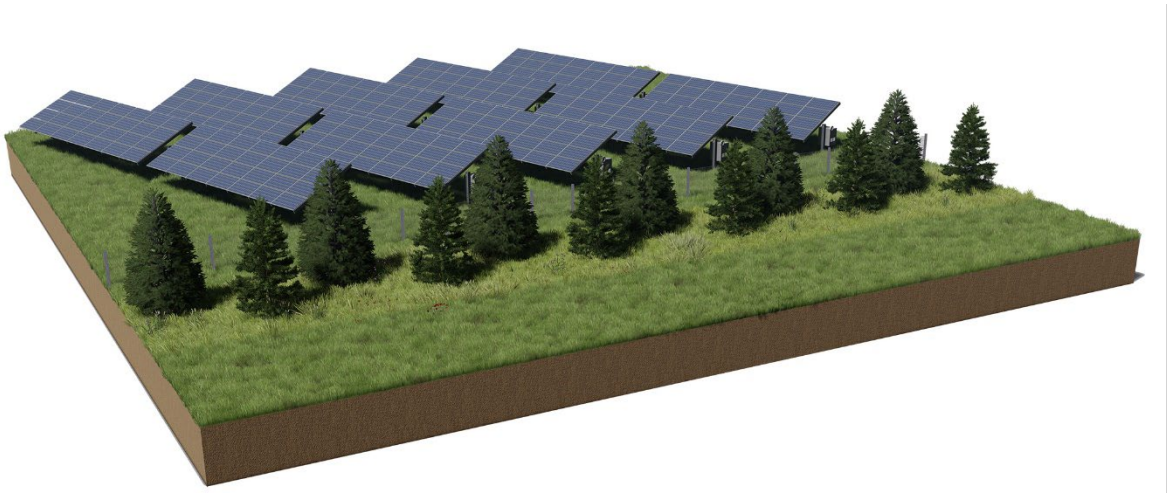


Figure 4.2 Illustration of Proposed Mitigation Concept

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Appendix A
Viewpoint Location Map and Photo Log