Appendix G

VISUAL IMPACT ANALYSIS

Barrelhead Solar, LLC

Wayne County, Kentucky

COPPERHEAD
ENVIRONMENTAL CONSULTING

Barrelhead Solar Facility Viewshed Methodology and Analysis

Prepared For:

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INTRODUCTION

Barrelhead Solar, LLC (the Applicant) is proposing the construction of an approximately 54 megawatt (MW) alternating current (AC) solar energy facility (the Project) in Wayne County, Kentucky. The Project would be situated on approximately 307 acres of private land and is located on KY 1009 and Massingale Road, southwest of the city of Monticello, Kentucky.

This viewshed analysis uses Geographic Information Systems (GIS) to attempt to quantify levels of potential visibility for residences within 2,000 feet of the Project (analysis area). The results of the analysis are summarized in this report and displayed in maps found in Appendix A. A viewshed analysis illustrates the predicted visibility that potentially may be expected for a project. It allows one to determine whether and where an object, such as solar arrays, can geographically be seen within a larger regional area. The viewshed model accounts for topography, vegetation, and the general height and surface of the Project infrastructure. Other assumptions used in the analysis are described later in this report.

PROJECT AREA SETTING

The Project Area is currently a mosaic of agricultural and pasture lands in addition to deciduous and mixed forest. The setting in the analysis area is rural. Existing infrastructure within the Project Area includes common features, such as roads, state highways, and electrical and utility transmission. Scattered residential homes, as well as some commercial businesses, surround the Project Area.

Within the analysis area, none of the following occur:

- Wild, scenic, or recreational rivers
- Scenic districts or roads, including areas that may be under a scenic easement or locally designated historic or scenic districts and scenic overlooks
- Parks (federal, state, or local), Recreation Areas, or Wildlife Management Areas
- Historic resources listed or eligible for listing on National or State Registers of Historic Places

A stream and wetland delineation performed by Copperhead Environmental Consulting, Inc. (Copperhead) identified 12 wetlands, 22 streams, and one pond within the Project Area. These consisted primarily of palustrine emergent and palustrine forested wetlands, ephemeral drainages, intermittent streams, and upper perennial streams. Of the 22 streams, only 14 appear to possess a relatively permanent flow of water (Copperhead 2025). The 100-year floodplain (as designated by the Federal Emergency Management Agency (FEMA)) traverses the southern border of the Project Area, but does not fall within the boundary.

Although the character of the analysis area (and outside) is considered rural, there are several existing manmade features that are a part of daily life. The presence of the Project would not

further detract from this rural or natural character and would be consistent with the existing character within the vicinity of the Project.

ANALYSIS INPUTS

The viewshed analysis was performed using Esri ArcGIS Pro version 3.5 with the Spatial Analyst Extension. The tool used is called Visibility. The data inputs and parameters used in this tool included the proposed Project infrastructure, such as the arrays, substations, and fence, a digital elevation model (DEM), receptor locations, and a representative vegetation layer.

The vegetative layer was developed using a combination of the USGS National Land Cover Database (NLCD), aerial imagery, and light detection and ranging (LiDAR) point cloud data. LiDAR data is the best available elevation data for this analysis, as it includes high-resolution ground elevations in addition to building and individual tree heights that represent realistic physical visual impediments in the landscape. LiDAR elevation data was used for the topography-only analysis as well.

The LiDAR data provided two important variables for the analysis:

1. Helped confirm locations of vegetation, including filling gaps where the 30-meter resolution NLCD was too coarse to accurately capture existing vegetation in the Project Area. Areas of trees that are approximately 50 to 60 feet wide were included in the vegetation layer, as that was determined to provide adequate screening potential.
2. Identified a range of vegetation heights to be used for the analysis. The highest and lowest return elevation values pertaining to a variety of locations were gathered to estimate overall canopy height. The majority of calculated tree heights ranged from 50-75 feet in the areas sampled. A conservative estimation of tree height to be used in the tool for the areas where trees would not be removed was approximately 60 feet.

Receptors (residences, churches, commercial properties, etc.) were identified using the 911 Site Structure Address Points for the Commonwealth of Kentucky, which are geographic location data used by 911 dispatchers and emergency services. Altogether, 44 receptors were identified and used in the analysis area. A common receptor height of 5.5 feet was used.

Elevation data collected from KyFromAbove in 2022 and 2023 was stitched together to create a single DEM for the analysis area, which served as a base elevation for vegetation and receptors. The approximate height of these inputs was added to the DEM to yield a total height for the analysis.

The Project infrastructure footprint was represented by gridded point locations with an average spacing of approximately 125 feet. Since the arrays would be fixed (i.e., they would not rotate based on the position of the sun), it was determined that this interval would adequately represent the surface of the arrays that could be visible, as well as other Project infrastructure.

ANALYSIS ASSUMPTIONS

The visibility analysis identifies cells (image pixels) that contain elevation information and computes the differences along the terrain surface between an observer in the landscape and a target (e.g., solar array or other Project features). The model used by the visibility tool analyzes the differences along the terrain surface between an observer and all points within the analysis area. Like any model, several assumptions are used to produce the results:

- The model assumes that the viewer has perfect vision at all distances. Atmospheric conditions, such as haze or inclement weather, cannot be incorporated into the tool parameters. Therefore, a certain amount of reasonable interpretation should be considered because of the limitations of human vision at greater distances. Additionally, an object is naturally smaller and shows much less detail at distances and will have less visual impact. These aspects cannot be conveyed with this analysis.
- Leaf-on conditions of the trees are assumed, and transparency predictions through bare-branched trees or leaf-off conditions cannot be made.
- Thinner stands of trees, single trees, and hedgerows or fencerows are not thought to provide adequate screening. Rows of trees less than approximately 50 to 60 feet wide were not used in the analysis.
- Buildings were not included in the analysis, although any structure between the receptor and the Project would greatly reduce the potential for visibility.
- A receptor height of 5.5 feet above ground was used to assume typical eye level or first-floor level.
- The viewshed analysis depicts areas of visibility over a regional area. The analysis can only predict, geographically on a map, areas where some part of the solar facility arrays might be seen. The analysis does not and cannot determine whether a full-on view or a partial view is seen. Additionally, if the analysis determines that visibility may occur in an area, it may only be a result of glimpsing a portion of an array over the treetop, between a gap in the trees, and not a full-on view. Likewise, there may be understory tree gaps where there may be visibility of the Project.

RESULTS AND DISCUSSION

Visibility is interpreted as being from any location where any portion of the Project may be visible, even if such a view is minimal, partial, or viewed through obstructions. Overall, visibility of the Project is expected generally to be minimal and is not anticipated to result in any adverse impacts on the receptor locations, aesthetic resources, or scenic views. The proposed solar facility is consistent with the existing infrastructure and sights within the vicinity of the Project and would not further detract from the rural character of the area.

Of the 44 receptor locations within the analysis area, one is a church. According to modeled results, visibility of the Project from the church is anticipated to be moderate (approximately

18%). The remaining receptor locations are residences. Visibility of the Project ranges from Low to High, with a decreasing number of receptors impacted as visibility increases (Table 1). All receptor locations are shown in Figure 1, Appendix A.

The greatest percentage of the Project that is anticipated to be seen from any receptor in the analysis area is 41 percent (Receptor 31) (see Table 2). This level of visibility is likely due to factors such as the topography of the analysis area and several of the assumptions described in the previous section. As visualized by the elevation contour lines shown in Figure 2, Appendix A, many of the receptors south of the Project Area are within the same elevation range (approximately 900-1,020 feet above sea level), with a vegetated ravine in between them. Vegetation would normally decrease the potential visibility; however, the vegetation is overall at a lower elevation (generally around or below 900 feet) in comparison to both the Project Area and the receptors.

The Applicant plans to use a landscape plan, which would be installed along the project fenceline. This vegetation is not included in the analysis and is unlikely to have a dramatic effect on the visibility, but would likely further obscure the Project Area from view. Finally, the model assumes perfect vision from the receptor location. Receptor 31 is approximately 985 feet from the fenceline, which represents the nearest piece of infrastructure as part of the Project. Because of the limitations of human vision at greater distances, as well as other analysis assumptions and caveats, and the implementation of the landscape plan, it is anticipated that the percentage visible produced by the model will be much lower in reality.

Table 1. Number of Receptors by Level of Visibility of the Project.

Approx. Percent of the Project Visible	Count of Receptors
0 (No Visibility)	25
1 – 14 (Low Visibility)	15
15 – 28 (Moderate Visibility)	2
29 – 42 (High Visibility)	2

Approximately 19 residential receptors are likely to have some visibility of the Project. Those receptors are shown in Table 2. Visibility does not imply a full-on view, as discussed in the Analysis Assumptions. The visibility analysis and receptor locations are shown in Figure 3, Appendix A.

While the majority of receptors in the analysis area (40 in total) are expected to experience no or low visibility of the Project, approximately 4 receptors are anticipated to experience moderate or greater visibility. This is likely due to a combination of factors, in addition to the analysis assumptions, as described above. For example, the Project is considered to be visible even if only a portion of it may be seen due to vegetative conditions or other structures that may block some,

but not all, of the Project. Distance from the receptor location to the Project was not incorporated into the analysis; however, this factor, in combination with the varying heights of the Project infrastructure, terrain, and vegetation within the analysis area, is an important consideration in interpreting these results.

No schools or public or private parks are found within the analysis area. Two residential neighborhoods [as defined by KRS 278.700(6)] occur within the analysis area. Three receptors within the residential neighborhoods may experience visibility of the Project, which are identified with an asterisk (*) in Table 2. All receptors within these residential neighborhoods are anticipated to experience a low level of visibility of the Project. In total, 11 receptors are in the residential neighborhoods; however, only three receptors are expected to have any visibility of the Project.

Table 2. Modeled Visibility Results at Each Receptor (where visibility is greater than zero).

Receptor #	Approx. Percentage of the Project Visible at Receptor
1	5%
3	0.42%
Fairview Church	18%
4	1%
7	1%
8	2%
10	12%
11	18%
12	0.14%
14	1%
16	2%
20	3%
24	9%
26	3%
27	38%
31	41%
32*	0.71%

Receptor #	Approx. Percentage of the Project Visible at Receptor
37*	7%
42*	5%

* Indicates receptors are within residential neighborhoods, as defined by KRS 278.700(6).

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APPENDIX A

Visibility Analysis Result Maps

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FIGURE 1:
Structures and Design Layout for the
Barrelhead Solar Project,
Wayne County, Kentucky.

Legend

- Occupied Structure
- Fairview Church
- Inverter
- Fence
- Road
- Solar Array
- Substation
- 2000ft Buffer
- Project Boundary

0 750 1,500
US Feet

Scale: 1 in = 1,000 ft

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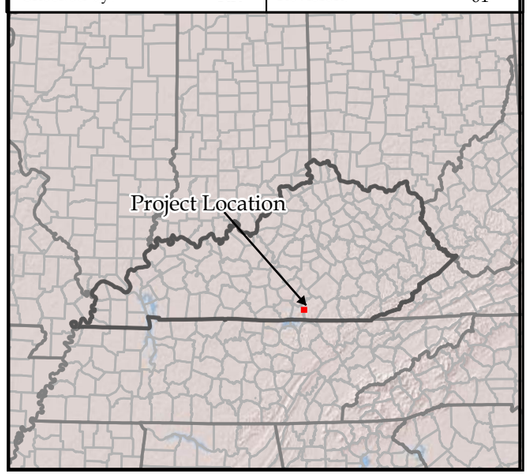
Checked by:	KR	Revision:	01



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Projection: Lambert Conformal Conic
Datum: North American 1983
Sources: USDA, ESRI, USGS, CEC
9/26/2025

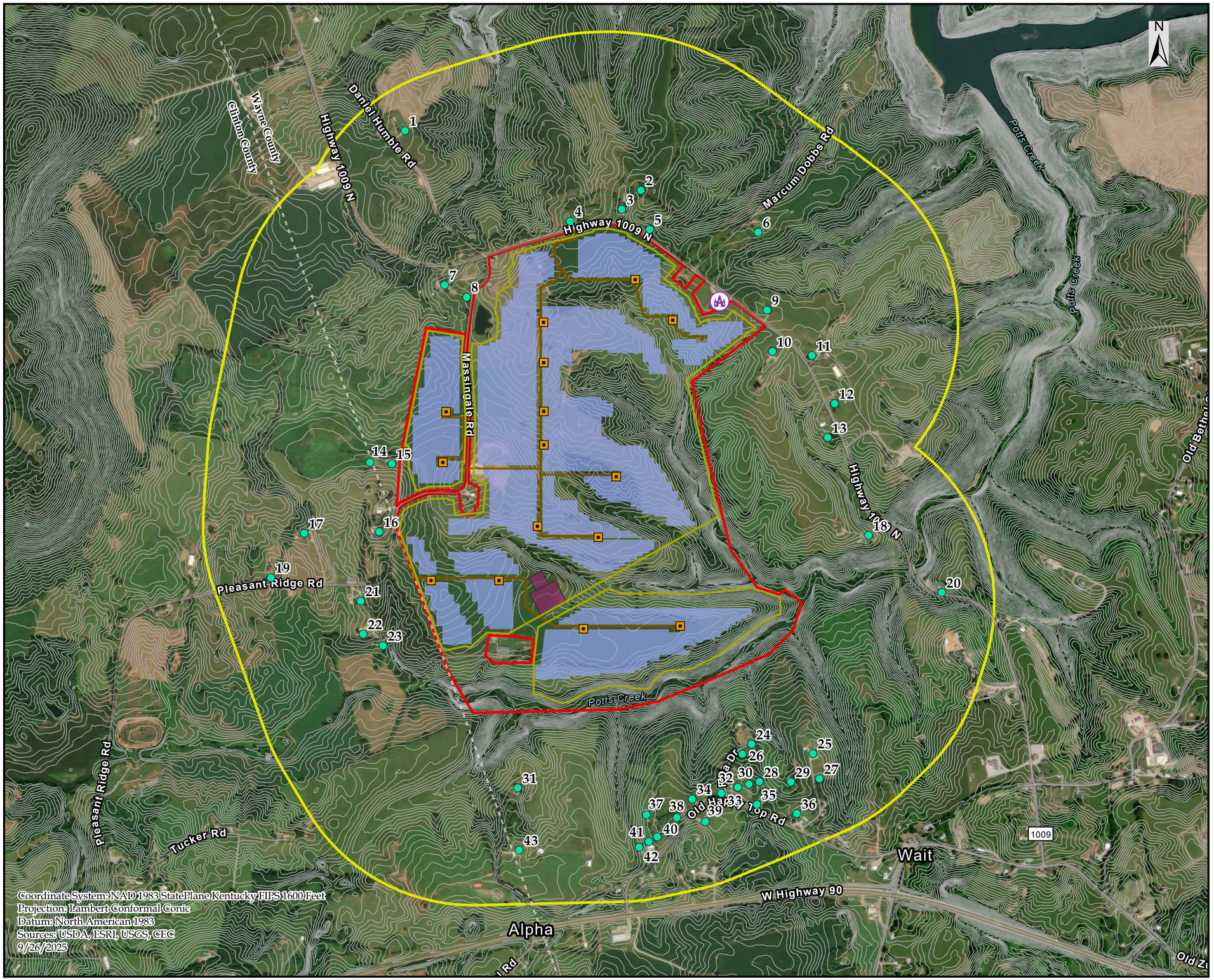

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FIGURE 2:
Structures and Design Layout for the
Barrelhead Solar Project,
Wayne County, Kentucky.

Legend

- Occupied Structure
- Fairview Church
- Inverter
- Elevation Contour
- Fence
- Road
- Solar Array
- Substation
- 2000ft Buffer
- Project Boundary

0 750 1,500
US Feet

Scale: 1 in = 1,000 ft

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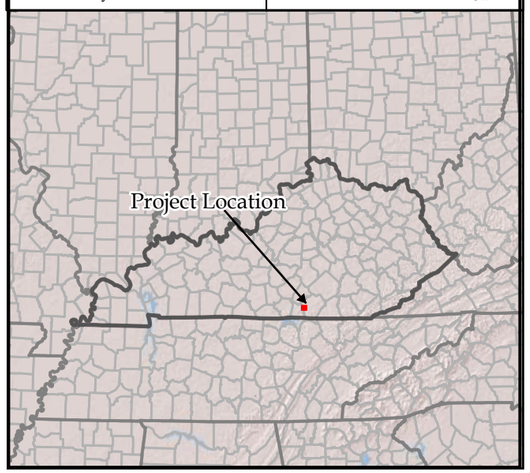

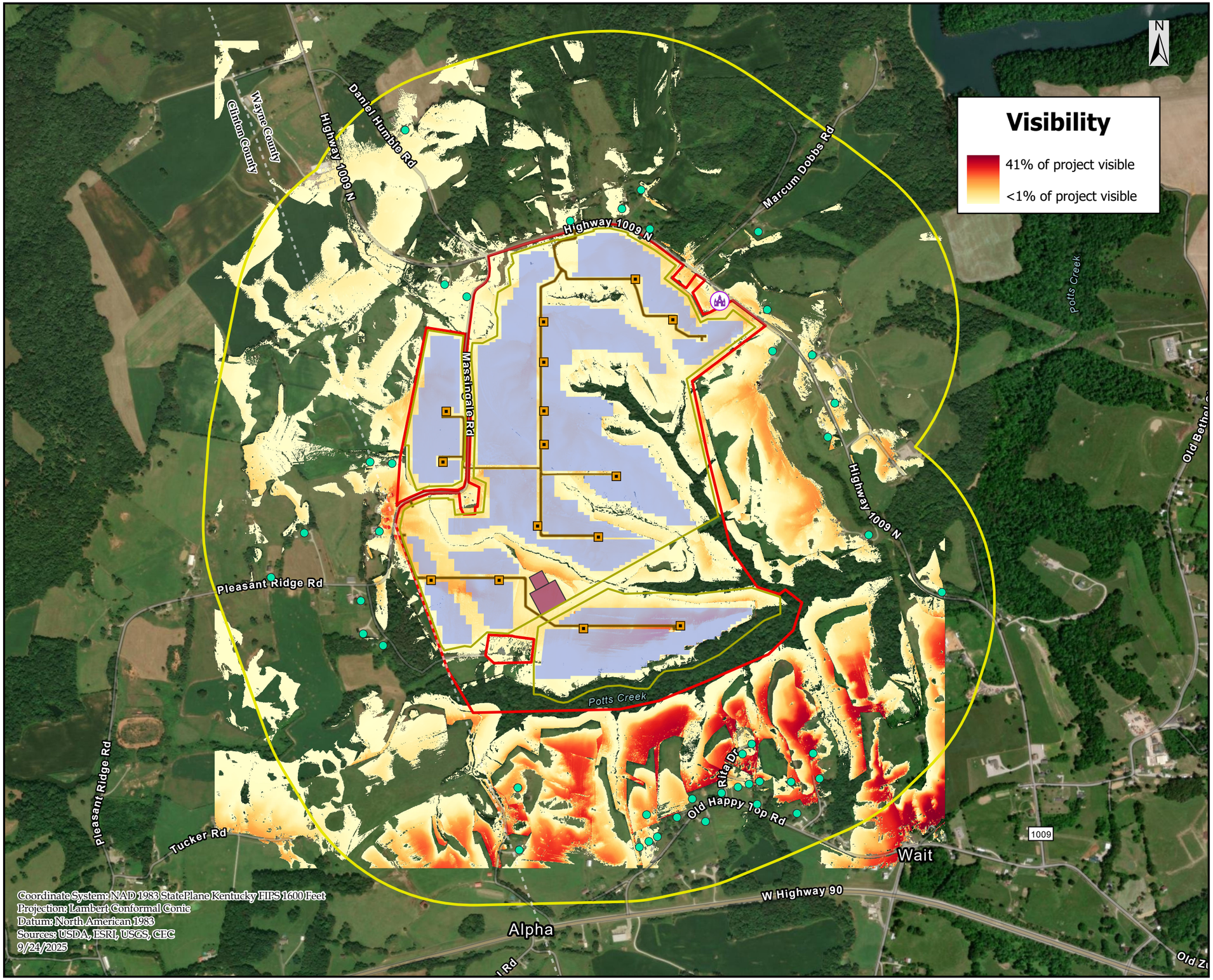

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FIGURE 3:
Structures and Design Layout
with Visibility Overlay for the
Barrelhead Solar Project,
Wayne County, Kentucky.

Legend

- Occupied Structure
- Fairview Church
- Inverter
- Fence
- Road
- Solar Array
- Substation
- 2000ft Buffer
- Project Boundary

0 750 1,500
US Feet

Scale: 1 in = 1,000 ft

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