

ROUTE EVALUATION STUDY

FOR THE:
**ANGELINA SOLAR PROJECT
PREBLE COUNTY, OHIO**

PREPARED FOR:
**OPEN ROAD RENEWABLES, LLC
1105 NAVASOTA STREET
AUSTIN, TEXAS 78702**

PREPARED BY:
**HULL & ASSOCIATES, INC.
6397 EMERALD PARKWAY, SUITE 200
DUBLIN, OHIO 43016**

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1.0 INTRODUCTION

1.1 Project Description and Purpose

Open Road Renewables, LLC is planning development of the Angelina Solar Project, an approximately 100-megawatt (MW) solar electric generation facility. The Angelina Solar Project is planned to include approximately 800 acres of solar panels, along with associated infrastructure such as access roads, electrical collection lines and a switchyard. The project is located in Dixon and Israel Townships in Preble County, Ohio. A Project Map is included in Appendix A.

The objective of this study is to support an application to the Ohio Power Siting Board (OPSB) for a Certification of Compatibility and Public Need (Certificate Application), as codified at Ohio Administrative Code (OAC) 4906, as follows:

1. OAC 4906-4-06(F)(3): The applicant shall evaluate and describe the anticipated impact to roads and bridges associated with construction vehicles and equipment delivery. Describe measures that will be taken to improve inadequate roads and repair roads and bridges to at least the condition present prior to the project.
2. OAC 4906-4-06(F)(4): The applicant shall list all transportation permits required for construction and operation of the project, and describe any necessary coordination with appropriate authorities for temporary or permanent road closures, lane closures, road access restrictions, and traffic control necessary for construction and operation of the proposed facility.

For the purpose of this report, the following definitions have been used when describing the project (based on OAC 4906-1-01:

- **Project Area** means all land within a contiguous geographic boundary that contains the facility, associated setbacks, and properties under lease or agreement that contain any components of the facility.
- **Facility** means the proposed major utility facility and all associated facilities.
- **Associated Facility** means, for an electric power generation plant or wind farm: rights-of-way, land, permanent access roads, structures, tanks, distribution lines and substations necessary to interconnect the facility to the electric grid, water lines, pollution control equipment, and other equipment used for the generation of electricity.

1.2 Methodology

The solar panels will be located in groups at various locations in the Project Area and access to the proposed solar panels for construction and operation will be from State, county and township roads and, where

necessary, new private gravel access roads. Construction of the facility will cause temporary increases in truck traffic on area roadways due to the delivery of materials and equipment.

This evaluation identifies the probable public routes that can be used to construct and operate the facility. It is assumed that vehicle traffic will originate from an Interstate or 4-lane divided State highway. From these routes, 2-lane State highways will be used to travel to the Project Area. State, county and township roads will be used to access private leased parcels that make up the Project Area.

For purposes of this evaluation, Interstate, 4-lane and 2-lane State highways were not evaluated because it is assumed that these roadways are sufficient to accommodate the construction and operational traffic with respect to load capacity, geometry and condition.

For the County and Township roads, this evaluation includes a desktop study and on-site visual assessment of the probable routes, bridges and culverts in the Project Area. This evaluation includes the general condition based on visual assessment of culverts and bridges, general pavement conditions, vertical changes in grade, and overhead height obstructions. The evaluation identifies locations where improvements to the road are likely needed to accommodate the size of the delivery and construction vehicles. Research for state permits that are necessary for hauling the materials and equipment is also included in the evaluation.

1.3 Vehicle Types

The size and types of vehicles needed to deliver construction equipment, construction materials and facility components include flatbed or tractor-trailer equipment delivery vehicles and multi-axle dump trucks. In addition, typical automobiles and pickup trucks will be used to transport construction staff and other incidental truck trips.

1.4 Design Vehicle Characteristics

Transportation of construction equipment and materials and facility components will be completed using conventional transportation vehicles such as fixed-bed trucks or tractor-semi-trailers (AASHTO WB-50). Construction equipment such as excavators, bull dozers, and wheel tractor-scrapers will be transported to the site on fixed-bed or tractor-semi-trailer low-boy vehicles. Multi-axle dump trucks may also be used. For the vast majority of the vehicles, they will be of legal weight and dimensions. Some limited components such as switchgear or transformers for switchyards and substations may require the use of overweight/oversize vehicles.

2.0 PROBABLE ROUTE EVALUATION

2.1 Roadway Characteristics

An evaluation and visual assessment of the probable routes were conducted by traveling the roadways listed below (see Appendix A for location of probable routes). Table 1 summarizes the existing conditions of the roadways.

**TABLE 1
ROADWAY CHARACTERISTICS**

| Road | From | To | Pavement Width (ft) | No. of Lanes | Pavement Condition | Surface Type | Speed Limit |
|-------------------------------|--|--|---------------------|--------------|--------------------|--------------|-------------|
| State Line Road | State Route 725 | Approx. 2,800 feet south of Paint Creek Four Mile Road | 17 | 2 | Good | Asphalt | NP |
| State Line Road | Approx. 2,800 feet south of Paint Creek Four Mile Road | Paint Creek Four Mile Road | 15 | 1 | Fair | Asphalt | NP |
| Paint Creek Four Mile Road | State Line Road | State Route 177 | 17 | 2 | Good | Asphalt | NP |
| Tony Lybrook Road | US Route 177 | Paint Creek Four Mile Road | 17 | 2 | Good | Asphalt | NP |
| Fairhaven College Corner Road | Paint Creek Four Mile Road | State Route 725 | 17 | 2 | Good | Asphalt | NP |
| Campbell Road | Fairhaven College Corner Road | State Line Road | 13 | 1 | Fair | Asphalt | NP |

Notes:

NP – Not Posted

Lanes are assumed to be a minimum of 8 feet wide

Pavement Condition:

Excellent – recently paved

Good – pavement appears stable with minor cracking

Fair – pavement appears stable but may have a higher amount of cracking, especially at the pavement edge, potholes may be present

Poor – pavement is severely distressed with excessive cracks, potholes, rutting, and deterioration

State Line Road

The majority of this road is in good condition and exhibits normal aging with routine maintenance with some visible pavement repairs. From Paint Creek Four Mile Road to approximately 2,800 feet south of that road, the road is in fair condition and exhibits some rutting and edge deterioration with visible pavement repairs. There is one area of pavement repair just north of State Route 725 and two areas of Pavement repair over a CMP culvert just north and south of the intersection with Campbell Road. The pavement is deteriorated at the intersection with Paint Creek Four Mile Road. There have been recent roadside ditch improvements at this intersection that would presumably improve drainage.

Paint Creek Four Mile Road

This road is in good condition and exhibits normal aging with routine maintenance with some visible pavement repairs. There is one area of pavement depression over a twin RCP culvert.

Tony Lybrook Road

This road is in good condition and exhibits normal aging with routine maintenance with some visible pavement repairs.

Fairhaven College Corner Road

This road is in good condition exhibits normal aging with routine maintenance with some visible pavement repairs. The County Engineer lists one of the two bridges on this road as in poor condition (just north of State Route 725). Additionally, the road grades are steep in the area of this bridge.

Campbell Road

This road is in fair condition and exhibits normal aging with routine maintenance with some visible pavement repairs and recent pavement overlay. There is significant erosion and pavement edge deterioration on the road just west of US Route 127. In addition, there are two bridges between US Route 127 and Camden Road that are in poor condition. This road also has relatively steep grades between US Route 127 and just west of Camden Road.

State Route 725

A bridge is under construction approximately one mile east of State Route 177 and the traffic on this road is currently being detoured. This bridge construction should be completed before the Angelina Solar Project construction begins.

Example areas of concern were photographed and are included in Appendix B.

2.2 Bridge and Road Load Restrictions

The Preble County Engineer was contacted to determine if there are any restrictions on bridges and roadways on the routes that were evaluated. The County Engineer provided the following information:

| | |
|--------------------------------|--|
| State Line Road: | 1 Bridge (structure #6841570) – good condition |
| Fairhaven College Corner Road: | 2 Bridges (structure #6841597 – poor condition) and (structure #6841562 – good condition) |
| Campbell Road: | No bridges |
| Paint Creek Four Mile Road: | 1 Bridge (structure #6841767) – good condition |
| Tony Lybrook Road: | No Bridges |

The County Engineer indicated that there are no load restrictions on any of the bridges in the Project Area.

There were no signs posting load restrictions for bridges or roadways in the Project Area.

2.3 Culvert Characteristics

Culverts (where visible) were visually examined to determine its condition and if adequate cover is present. For purposes of this evaluation, adequate cover means there is more than one foot of cover over the culvert (inclusive of the pavement). The condition of the culvert was limited to a visual review to determine if there is distortion in the shape (e.g., out of round) or evidence of corrosion (for steel culverts). The condition of concrete culverts is limited to evidence of cracking or surface spalling.

State Line Road

There are two corrugated metal pipe (CMP) culverts with minimal cover and have recently had pavement repair above them. There is a reinforced concrete pipe (RCP) culvert with minor pavement depression.

Paint Creek Four Mile Road

There are two locations of RCP culverts with minimal cover and minor pavement depression.

Tony Lybrook Road

There were no culverts noted on this road.

Fairhaven College Corner Road

There are several RCP and CMP culverts on this road. All have good cover and two have minor traverse cracking in the pavement.

Campbell Road

There are two small box culverts on this road that appear to be in fair condition. These culverts are concrete slabs on stone abutments. They are narrow one lane culverts.

2.4 Overhead and Width Restrictions

The roads were also investigated for height limitations. Permanent structures that cross over the road and restrict the clearance for oversized loads (such as bridges and overpasses) were not found along the evaluated routes. For overhead cables, the national standard for minimum clearance over roads is 15.5 feet, and cables cross over the studied routes in numerous locations. The height of the cables was not measured; however, there were no overhead cables that appeared to be obstructive. In the event a cable presents an obstruction, utility providers can temporarily or permanently raise the cables and/or move the poles. Therefore, cables should not be a limiting feature for use of the roads.

2.5 Posted Caution Signs

There were no posted caution signs on the roadways that were reviewed.

3.0 POTENTIAL IMPACTS TO ROADWAYS

The development of a solar electric generating facility has the potential to create transportation impacts because of short-term construction activities. The following sections estimate the traffic for construction vehicles during the project, summarize permitting and road use agreements, and outline steps for mitigating potential impacts to roadways.

3.1 Estimated Future Traffic

To deliver the construction equipment, materials and construction workers during the construction of the facility, the probable routes will experience increased truck traffic. Historic data for construction of solar electric generating facilities indicate that there are 17 to 18 vehicles per MW of power. This project is projected to be 100 MW; therefore, an estimated 1,700 to 1,800 vehicles for the project.

For the vast majority of the vehicles, they will be of legal weight and dimensions. Some limited components such as switchgear or transformers for switchyards and substations may require the use of overweight/oversize vehicles.

A final delivery route has not yet been finalized, but it is likely that delivery of facility components to the Project Area will be from the north by way of Interstate 70 and US Route 127. US Route 127 runs east of the Project Area near Camden, Ohio. State Route 725 (intersects with US Route 127 in Camden, Ohio) will be used to access the Project Area from the east. Near the project area, State Route 725 and 177 will be used to access the Project Area. Within the Project Area, county and township roads and new private gravel access roads will likely be used to deliver equipment and materials.

For the majority of the delivery vehicles that are of legal dimensions, no delays to local traffic should be experienced except where the delivery vehicles may need to travel on narrow roadways (less than 2 lanes in width). However, the delays to local traffic should be minimal due to the low traffic volume in the Project Area. When delivery vehicles are travelling on narrow roadways or when there is an occasional oversized vehicle, traffic control will be utilized to manage local traffic.

Potential access locations to the private leased parcels along the probable routes were identified during the evaluation (see Appendix A). These locations are based on the location of existing driveways on the parcels. In the event existing driveways were not present, the potential access locations were noted where a driveway could be located based on lack of obstructions and relatively flat topography. Due to the relatively flat topography in the Project Area, many other locations are possible along the probable routes.

Final driveway locations should take into consideration the final facility layout, location with respect to other driveways and roadways, topography and vertical and horizontal sight distance.

During operation and maintenance of the facility, there will be very little increase in traffic as solar electric generating facilities are normally unmanned. There will be occasional maintenance vehicles and additional traffic will be negligible.

3.2 Permits and Agreements

Prior to construction, the contractor will obtain all necessary permits from ODOT and the County Engineer. The County Engineer may require a Road Use and Maintenance Agreement (RUMA) for construction activities. This agreement will include procedures for temporary road closures, lane closures, road access restrictions and traffic control. For driveway access on County and Township roads, a permit will be required from the County Engineer.

Road crossing permits (e.g., collection lines) will require a permit from ODOT or the County Engineer.

Special Hauling Permits are required when loads exceed legal dimensions or weights. Table 2 summarizes the characteristics of vehicle characteristics without Special Hauling Permits for State of Ohio highways.

For construction of the Facility, the vast majority of the vehicles will meet current legal dimensions and weights. Therefore, Special Hauling Permits are only anticipated for a few vehicles that may exceed these criteria such as switchgear or transformers.

**TABLE 2
DIMENSIONAL CRITERIA FOR VEHICLES WITHOUT SPECIAL HAULING PERMITS**

| Vehicle Characteristic | State Highway Limit |
|---|------------------------------------|
| Width of vehicle, inclusive of load | 8.5 Feet |
| Height of vehicle, inclusive of load | 13.5 Feet |
| Length of vehicle, inclusive of load and bumpers | 85 Feet |
| Total Weight of vehicle with 3 or more axles | 80,000 Pounds |

3.3 Proposed Mitigation

This study has determined that very little impact to roads associated with construction vehicles and material delivery is anticipated during the project. Final civil engineering design will be necessary prior to construction to ensure all transportation related activities are accounted for and approved by the County Engineer.

All roads should be monitored during construction for deterioration to ensure they are safe for local traffic. The volume and/or weight of construction traffic may cause accelerated pavement deterioration or stress on drainage structures that could necessitate temporary repairs. After completion of construction activities, there may be improvements required to return the roadways and drainage structures to pre-construction conditions. These requirements will be outlined in the RUMA with the County Engineer.

In the event impacts do occur, the following mitigation techniques will be utilized to avoid or minimize transportation-related impacts and/or to provide long-term improvement to the local road system:

3.3.1 Insufficient Roadway Width

- Rerouting over-width vehicles to wider roadways.

3.3.2 Insufficient Vertical Clearance

- Temporarily raising overhead utility lines.
- Rerouting over-height vehicles to roadways with sufficient vertical clearance.

3.3.3 Poor Pavement Condition or Insufficient Pavement Durability

- Roadside drainage improvements
- Pavement Patching
- Replacing pavement prior to construction (may include subgrade improvements).
- Replacing pavement during or after construction if damaged by construction traffic (may include subgrade improvements).
- Rerouting heavy-loaded vehicles to avoid insufficient pavement.

3.3.4 Insufficient Cover over Drainage Structures

- Adding temporary gravel and/or asphalt cover over structures.
- Using bridge jumpers to clear structures.
- Replacing structures during or after construction if damaged by construction traffic.

- Rerouting heavy-loaded vehicles to avoid structures.

3.3.5 Poor Structure Condition

- Replacing structure during or after construction if damaged by construction traffic.
- Using bridge jumpers to clear structures.
- Rerouting heavy-loaded vehicles to avoid structures.

3.3.6 Inadequate Bridge Capacity

- Using bridge jumpers to clear bridges.
- Rerouting heavy-loaded vehicles to avoid bridges.

3.3.7 Insufficient Roadway Geometry

- Rerouting over-sized vehicles to avoid insufficient roadway geometry.
- Profile adjustments to roadways with insufficient vertical geometry.
- Permanent or temporary plan adjustments to roadways with insufficient horizontal geometry.

4.0 CONCLUSIONS

Based on information collected during the field investigation, vehicle assumptions, and information available from ODOT and the County Engineer, sufficient infrastructure exists via Interstate, State and local roads to construct the facility. The vast majority of the vehicles transporting construction equipment, materials and workers are expected to meet legal load and dimensional limits. Some limited components such as switchgear or transformers for switchyards and substations may require overweight and/or oversize vehicles.

In the event overweight and/or oversized loads are necessary for construction, Special Hauling Permits will be obtained from the Ohio Department of Transportation (ODOT). All work will be coordinated and approved by the appropriate regulatory agencies prior to construction.

Once the final facility design is complete and the final vehicle characteristics can be determined, this information will be finalized with the County Engineer as part of a RUMA.

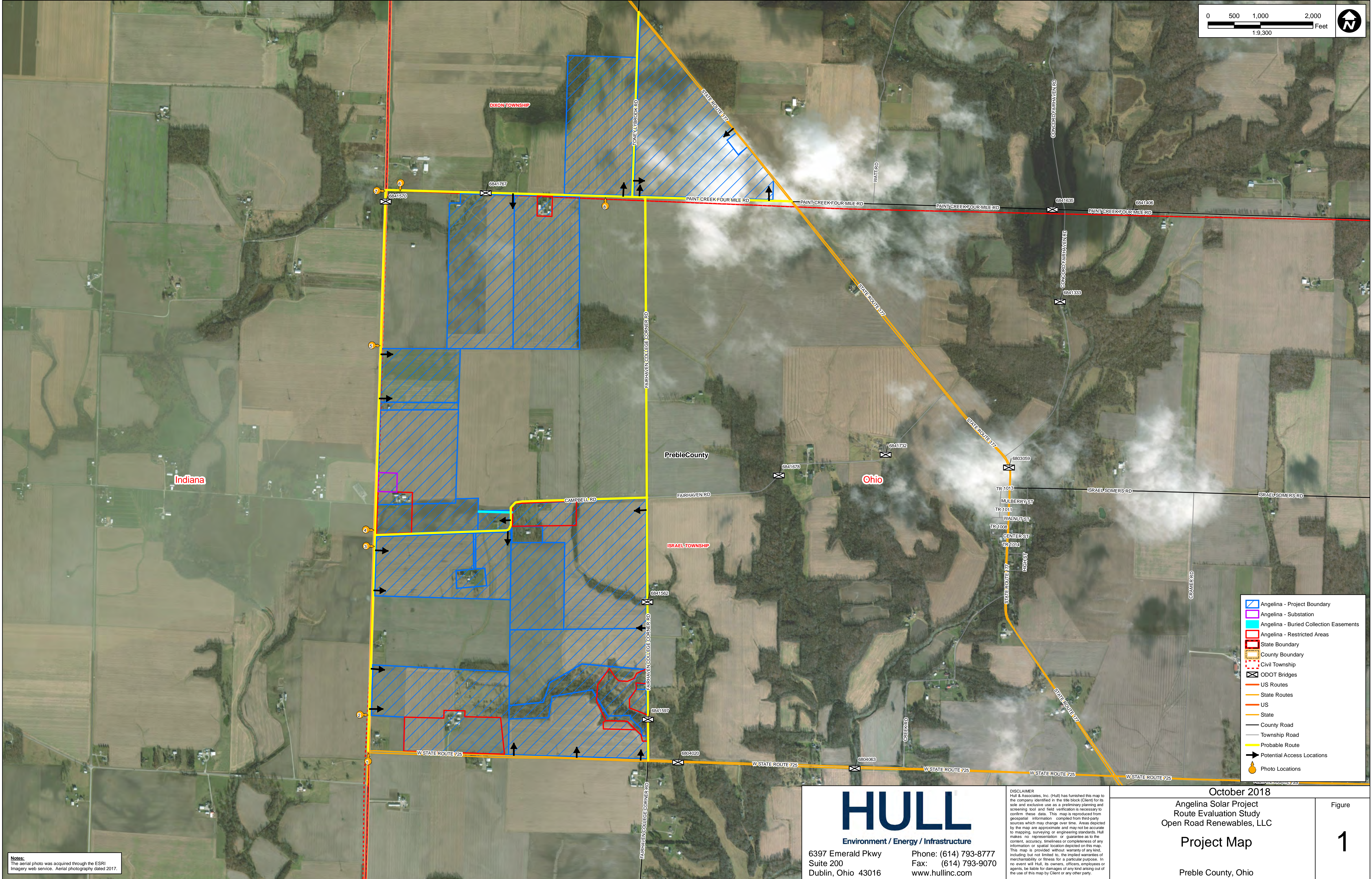
US Route 127 and State Route 725 will be the primary route used to approach the Project Area. Portions of the Project Area can be accessed from State Route 725 on the south side of the Project Area and State Route 177 on the north side of the Project Area.

To the extent possible, the Project Areas should be accessed from State Line, Paint Creek Four Mile, Tony Lybrook, and Fairhaven College Corner Roads. The use of Campbell Road should be limited to the extent possible due to its narrow width and potential damage to drainage structures.

All roads should be monitored during construction for deterioration to ensure they are safe for local traffic. The volume and/or weight of construction traffic may cause accelerated pavement deterioration or stress on drainage structures that could necessitate temporary repairs. After completion of construction activities, there may be improvements required to return the roadways and drainage structures to pre-construction conditions.

APPENDIX A

Project Map



Notes:
The aerial photo was acquired through the ESRI Imagery web service. Aerial photography dated 2017.

HULL
Environment / Energy / Infrastructure

6397 Emerald Pkwy
Suite 200
Dublin, Ohio 43016
Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

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Angelina Solar Project
Route Evaluation Study
Open Road Renewables, LLC
Project Map
Preble County, Ohio

Figure

1

APPENDIX B

Photo Pages



PHOTO 1: View of longitudinal cracking on SR725.



PHOTO 2: Pavement repair on State Line Road just north of State Route 725.

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6397 Emerald Pkwy
Suite 200
Dublin, OH 43016

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Fax: (614) 793-9070
www.hullinc.com

Angelina Solar Project - Route Evaluation Study
Open Road Renewables, LLC

Roadway Photos

Preble County

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PHOTO 3: Pavement repair on State Line Road over CMP culvert just south of Campbell Road.



PHOTO 4: Pavement repair on State Line Road over CMP culvert just north of Campbell Road.

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6397 Emerald Pkwy
Suite 200
Dublin, OH 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

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PHOTO 5: Pavement transition from 17 feet wide to 15 feet wide on State Line Road. Note slight rutting and edge cracking on 15-foot section.



PHOTO 6: Pavement edge deterioration on Paint Creek Four Mile Road at intersection with State Line Road. Note recent drainage ditch improvements.

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Environment / Energy / Infrastructure

6397 Emerald Pkwy
Suite 200
Dublin, OH 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

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PHOTO 7: Pavement deterioration at intersection of State Line and Paint Creek Four Mile Roads.



PHOTO 8: Pavement depression over twin RCP culverts on Paint Creek Four Mile Road.

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6397 Emerald Pkwy
Suite 200
Dublin, OH 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
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Summary: Application Exhibit D electronically filed by Mr. Michael J. Settineri on behalf of Angelina Solar I, LLC