ROUTE EVALUATION STUDY

FOR THE:
DIXON RUN SOLAR PROJECT
JACKSON COUNTY, OHIO

PREPARED FOR:
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1.0 INTRODUCTION

1.1 Project Description and Purpose

This Route Evaluation Study has been prepared for Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. on behalf of SunEnergy1, LLC who is planning development of an up to 140-megawatt AC (MW_{AC}) proposed utility-scale solar electric generation facility (Facility or Project). The Dixon Run Solar Project is planned to include solar panel arrays and setbacks, along with associated infrastructure such as a fenceline, electrical collection lines, inverters, access pathways, substation, operations and maintenance (O&M) building, weather stations, and laydown yards. The Project Area is located in Bloomfield Township in Jackson County, Ohio. The overall Project Area is approximately 2,080 acres. A map of the Project Area 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 Environmental 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 a solar electric generation facility: rights-of-way, land, permanent access pathways, 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

Access to the Project Area for construction will be from US, State, county and township roads and, where necessary, new private access pathways. 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 Interstate or 4-lane divided state highways. State highways include federal highways that are maintained by the state. From these routes, 2-lane state highways will be used to travel to the Project Area. State, county and township roads will be used for primary access within and near the Project Area. The probable routes were selected where state, county and township roads are adjacent to the Project Area or roads that would likely be used to travel to the Project Area. Use of state roads is prioritized over county and township roads, where possible.

For purposes of this evaluation, Interstate, 4-lane state highways, 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 an on-site visual assessment of the probable routes, bridges and culverts leading to and 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. If needed, this evaluation identifies locations where improvements to the road are likely to accommodate the size of the delivery and construction vehicles. A pavement condition index survey was not completed.

Potential access locations from the public roads to the project parcels were also identified. 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. There may be other locations that are possible along the probable routes. Final driveway locations should take into consideration the location with respect to other driveways and roadways, topography, and vertical and horizontal sight distance.

Research for state permits that are necessary for hauling the materials and equipment is also included in the evaluation. Video was collected from all the reviewed probable routes as well as photographs of select features noted during 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 for 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. The vast majority of vehicles will be below the maximum allowable size and weight. 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 on June 29, 2021 by traveling the roadways listed below. In addition, potential access locations from the public road to the project parcels along the probable routes were identified during the evaluation. See Figure 1 in Appendix A for location of probable routes and potential access locations.

The Ohio Department of Transportation (ODOT) Traffic Monitoring Management System (TMMS) was reviewed to determine if existing data on traffic volumes for the probable routes was available.[1] The Annual Average Daily Traffic (AADT) was obtained for each probable route road segment, if available. A detailed roadway capacity analysis was not completed for this study. Based on field observations, we do not expect construction or operation of the Facility to create any significant delays to the traveling public. 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	AADT (2019)	Speed Limit
Dixon Run Road	US35	Luther Jones Road	Varies (~18'-6")	2	Poor	Asphalt	182	NP
Luther Jones Road	Dixon Run Road	2,000 feet from Keystone Furnace Road	Varies (~20'-0")	2	Good	Aggregate	N/A	NP
Luther Jones Road	2,000 feet from Keystone Furnace Road	Keystone Furnace Road	Varies (~16'-0")	<2	Poor	Asphalt	N/A	NP
Keystone Furnace Road	Luther Jones Road	SR327	Varies (~24'-0")	2	Good	Asphalt	298	NP

Notes:

AADT – Annual Average Daily Traffic

NP – not posted

[1] Ohio Department of Transportation, Traffic Monitoring Management System, http://odot.ms2soft.com/

N/A – not available

Lanes are assumed to be a minimum of 8.5 feet wide

Pavement Condition:

Excellent – recently paved.

Good – pavement appears stable with minor cracking and other pavement distress indicators.

Fair – pavement appears stable but may have a higher amount of transverse and longitudinal cracking and other distressed pavement indicators such as edge cracking, rutting, and weathering. Potholes may be present.

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

Dixon Run Road

The road is in poor condition with signs of advanced aging. Severe alligator cracking, bleeding, raveling, potholes, corrugations, rutting, delamination, and edge failure were noted throughout this road segment. This road does not have any striping. The road segment has moderate grades with no abrupt grade changes.

Luther Jones Road

The road segment from Dixon Run Road to approximately 2,000 feet before Keystone Furnace Road is aggregate and in good condition. This road segment has moderate to steep grades with no abrupt grade changes. Approximately 3,000 feet from Dixon Run Road there are two isolated locations with embankment erosion on the south side of the road. The erosion has not affected the road surface, but this area should be monitored for further deterioration. In addition, the discharge from a spring flows along the north side of the road in this same area and is very close to the road surface. This area should also be monitored for further deterioration.

The road segment from Keystone Furnace Road to approximately 2,000 feet south of Keystone Furnace Road is asphalt and in poor condition. Severe delamination and rutting, gravel-filled potholes and edge failure were noted throughout this road segment. This road does not have any striping. The road segment has moderate grades to steep grades with no abrupt grade changes.

Keystone Furnace Road

This road is in fair condition except near the intersection with SR327 where it is in poor condition. The fair section has minor block cracking and periodic delamination and potholes. The poor section has severe delamination, raveling and patching. This road has a centerline. The road has relatively flat grades with no abrupt grade changes.

Summary

All of these roads can be used for equipment delivery and construction traffic in their current condition. However, the following roads likely will require repair after construction due to their current poor condition:

1. Dixon Run Road
2. The asphalt section of Luther Jones Road
3. Keystone Furnace Road

Portions of Luther Jones Road is surfaced with aggregate. This segment of this road can be used for equipment delivery and construction traffic. It should be noted that due to the aggregate surface, this section of the road may likely require additional maintenance compared to roads with asphalt pavement.

Example areas of concern for all the roads were photographed and are included in Appendix B.

2.2 Bridge and Road Load Restrictions

There were no posted load restrictions on the probable routes in the Project Area. There are two bridges on the probable routes near or in the Project Area as follows:

1. Bridge 4034016 is three-sided precast concrete box structure with concrete block wing walls. The bridge and wingwalls were in good condition.
2. Bridge 4000668 is a precast concrete box structure. The bridge was in good condition.

The Jackson County Engineer's office was contacted to determine if there are any restrictions on bridges and roadways on the routes that were evaluated[2]. The Jackson County Engineer's office provided the following information:

1. There are no bridge or road weight restrictions.
2. There is no roadway construction planned in the next two years.

2.3 Culvert Characteristics

Culverts (where visible) were visually examined to determine the 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.

[2] Mark Jenkins, Engineers Assistant, Jackson County Engineers Office, email dated 7/19/21.

Dixon Run Road

There was one corrugated metal pipe (CMP) culvert and two high-density polyethylene (HDPE) culverts noted on this road. The CMP culvert was in fair condition and embankment erosion was noted on the west side of the road near this culvert. The HDPE culverts were in good condition and had stable embankments. The pavement over all three culverts was in poor condition.

Luther Jones Road

There were no culverts noted on this road.

Keystone Furnace Road

There was one CMP culvert and one HDPE culvert noted on this road. Both culverts were in good condition, had adequate cover, stable embankments and the pavement above the culverts was in fair condition.

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. There were no width restrictions noted on the probable 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 was one caution sign posted near the Project Area along Dixon Run Road. The sign "Road May Flood" was posted approximately 0.6 miles north of the US35 intersection.

2.6 Local School and Public Transportation Information

The Facility would be located in Jackson County and is in the Oak Hill Union Local School District. The following information was obtained from the Ohio Educational Directory System (OEDS) Website:[3]

Oak Hill Elementary School

[3] Ohio Department of Education Website, March 2015, https://oeds.ode.state.oh.us/SearchOrg

401 Evans Street
Oak Hill, Ohio 45656
K-5 – enrollment 600 students

Oak Hill Middle/High School
5063 State Route 93
Oak Hill, Ohio 45656
6-12 – enrollment 600 students

The southern boundary of the Project Area is approximately 10 miles from the Oak Hill Union Local School District. Due to the rural area, many of the students are transported by bus. The Project Area is not located near the Oak Hill Union Local Schools and the number of buses and stops within the Project Area would be limited due to the total number of students and lower density of homes. Impacts to school bus routes would be minimal based on:

1. No planned road closings;
2. Many project deliveries would occur in the middle of the day; and
3. Wide loads requiring escorts are negligible.

There are no rail or bus public transit systems in the Project Area.

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

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 west by way of US35 to SR327 that is adjacent to the west side of the Project Area. Within the Project Area, township roads and new private access pathways will likely be used to deliver equipment and materials. The probable routes to the Project Area are shown on Figure 2 in Appendix A.

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 approximately 17 to 18 vehicles per MW of power. This project is projected to be 70 MW; therefore, an estimated total of 1,190 to 1,260 vehicles are anticipated for construction of the project.

The vast majority of vehicles will be below the maximum allowable size and weight. Some limited components such as switchgear or transformers for switchyards and substations may require the use of overweight/oversize vehicles.

For the delivery vehicles that are below the state maximum allowable size and weight, 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). 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. However, the delays to local traffic should be minimal due to the low traffic volume in the Project Area. Because this is an agricultural area, heavier use of roadways by local farmers may occur during certain times of the year. Prior to construction, a Traffic Control Plan will be prepared that describes the procedures that will be used to manage traffic during construction.

During operation and maintenance of the Facility, there will be very little increase in traffic, as solar electric generation facilities require minimal staffing to accommodate daily operations and maintenance. 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 would include procedures for road repairs, 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 crossings by underground or overhead electrical collection and transmission lines will require a permit from ODOT or the County Engineer.

Special Hauling Permits are required when loads exceed maximum 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 be below current maximum 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, 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 be below 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) or County Engineer. All work will be coordinated and approved by the appropriate regulatory agencies prior to delivery.

For the delivery vehicles that are below the maximum allowable size and weight, no delays to local traffic should be experienced except where the delivery vehicles may need to travel on narrow roadways. 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. However, the delays to local traffic should be minimal due to the low number of oversized vehicles. Because this is an agricultural area, heavier use of roadways by local farmers may occur during certain times of the year. Prior to construction, a Traffic Control Plan will be prepared that describes the procedures that will be used to manage traffic during construction, and it will be shared with local law enforcement, schools and local landowners.

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 west by way of US35 to SR327 that is adjacent to the west side of the Project Area. Within the Project Area, township roads and new private access pathways will likely be used to deliver equipment and materials.

All of these roads can be used for equipment delivery and construction traffic in their current condition. However, the following roads likely will require repair after construction due to their current poor condition:

4. Dixon Run Road
5. The asphalt section of Luther Jones Road
6. Keystone Furnace Road

Portions of Luther Jones Road is surfaced with aggregate. This segment of this road can be used for equipment delivery and construction traffic. It should be noted that due to the aggregate surface, this section of the road may likely require additional maintenance compared to roads with asphalt pavement.

On Luther Jones Road (approximately 3,000 feet from Dixon Run Road) there are two isolated locations with embankment erosion on the south side of the road. The erosion has not affected the road surface, but this area should be monitored for further deterioration. In addition, the discharge from a spring flows along the north side of the road in this same area and is very close to the road surface. This area should also be monitored for further deterioration.

Based on caution signs on Dixon Run Road, this road may not be accessible during times of heavy precipitation. These recommendations should be considered in the final route selection.

Once the final Facility layout is complete and the final vehicle characteristics can be determined, the final delivery routes will be finalized with the County Engineer and other local authorities as needed.

All roads should be monitored during construction for deterioration to ensure they remain 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 and Vicinity Maps