Arche Solar Project

Case No. 20-0979-EL-BGN

7X.energy™

Exhibit C

Route Evaluation Study

ROUTE EVALUATION STUDY

FOR THE:
ARCHE ENERGY PROJECT
FULTON COUNTY, OHIO

PREPARED FOR:
7X ENERGY, INC.
3809 JUNIPER TRACE, SUITE 100
AUSTIN, TEXAS 78738

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

APRIL 2020

HULL
Environment / Energy / Infrastructure

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Project Description and Purpose

7X Energy, Inc. is planning development of the Arche Energy Project, an approximately 107-megawatt AC (MW_{AC}) utility-scale solar electric generation facility. The Arche Energy Project is planned to include approximately 675 acres of solar panels and setbacks, along with associated infrastructure such as access roads, electrical collection lines and a switchyard. The project is located in Gorham Township near the town of Fayette in Fulton County, Ohio. The overall Project Area is approximately 1,065 acres. 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. A pavement condition index survey was not completed. The evaluation identifies locations where improvements to the road are likely to accommodate the size of the delivery and construction vehicles, if needed. 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 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 March 23, 2020 by traveling the roadways listed below (see Appendix A for location of probable routes). Existing data on traffic volumes for the probable routes was obtained from the Ohio Department of Transportation (ODOT) Traffic Monitoring Management System (TMMS).[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 and the AADT (which are relatively low and consistent with rural areas), we do not expect the project 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	Speed Limit
CR 23	US Route 20	CR R	20'-10"	2	Good	Asphalt	819	NP
CR 22	US Route 20	CR R	20'-0"	2	Fair	Asphalt	173	NP
CR 22	CR R	Project Boundary	17'-0"	2	Fair	Chip and Seal	116	NP
CR R	CR 22	CR 21-2	15'-0"	1.5	Fair	Asphalt	70	NP
CR 21-2	CR R	Project Boundary	15'-0"	1.5	Fair	Asphalt	64	NP

Notes:

CR23 is maintained by Fulton County

CR22, CR R, and CR 21-2 are maintained by Gorham Township

AADT – Annual Average Daily Traffic (2019)

NP – not posted

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.

[1] Ohio Department of Transportation, Traffic Monitoring Management System, http://odot.ms2soft.com/, April 24, 2020.

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.

CR 23

This road is in good condition and exhibits normal aging with routine maintenance with some visible pavement repairs (patching). There is some transverse and longitudinal pavement cracking along the entire road segment. It has centerline and shoulder striping.

CR 22

This road is in fair condition and exhibits normal aging with routine maintenance with some visible pavement repairs (patching). There are several areas where there is distressed pavement along the edges (edge cracking). From US 20 to Bridge 2634732 the pavement is asphalt and has no striping. South of the bridge to the Project Area boundary, the pavement is asphalt with a chip and seal and has centerline striping.

CR R

This road is in fair condition and exhibits normal aging with routine maintenance with some visible pavement repairs (patching). This road exhibits moderate edge cracking, varying pavement widths and multiple locations with depressions but should be able to be used for construction and material delivery.

CR 21-2

This road is in fair condition and exhibits normal aging with routine maintenance with some visible pavement repairs (patching). This road exhibits moderate edge cracking, varying pavement widths and multiple locations with depressions but should be able to be used for construction and material delivery.

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

2.2 Bridge and Road Load Restrictions

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

The Fulton 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 County Engineer's office provided the following information:

[2] Brooke Longnecker, Office of Fulton County Engineer, via email, April 9, 2020.

1. Bridge 2634821 (Road 23, 0.2 miles north of Road R) is currently load rated at 107% of Ohio legal trucks but will be reanalyzed this year for additional trucks to meet Federal Highway Administration requirements. It is expected to have to be load posted for weight restrictions for several truck configurations.
2. Bridge 2634732 (Road 22, 0.9 miles north of Road N) is currently load rated at 117% of Ohio legal trucks but will be reanalyzed this year for additional trucks to meet Federal Highway Administration requirements. It is expected to have to be load posted for weight restrictions for several truck configurations.
3. Bridge 2631717 (Road R, 0.0 miles west of Road 21-2) is currently load rated at 216% of Ohio legal trucks and is not scheduled to be reanalyzed this year for additional trucks to meet Federal Highway Administration requirements. However, it is not expected to have to be load posted for weight restrictions when additional analysis is completed in the future.

The County Engineers Office indicated that they plan to resurface CR23 from CR J to US20 in 2022, there are no load restrictions on any of the roads in the Project Area; and there are no bridge or culvert construction projects planned in the next 2 years.

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.

CR 23

There were no culverts noted on this road segment.

CR 22

There were two culverts on this road. One culvert is an RCP pipe and the pavement condition above the culvert is in good condition. The second culvert is a relatively new concrete box culvert. The pavement condition above this culvert is a new repair (patching).

CR R

There was one CMP culvert on this road in fair condition. The pavement condition above this culvert was good with a slight crack above the culvert.

CR 21-2

There were no culverts noted on this road segment.

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.

2.6 Local School and Public Transportation Information

The Project Area is within the Fayette Local School District. This school district has an elementary school (K-6) and a High School (7-12) that are located at 400 East Gamble Road in Fayette, Ohio, approximately 0.77 miles from the Project Area (along CR R). The number of enrolled students include 250 (K-6) and 226 (7-12).[3] Due to the rural area, many of the students are transported by bus. The number of buses and stops within the Project Area would be limited due to the total number of students and low 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] Ohio Educational Directory System (OEDS) Website, http://oeds.ode.state.oh.us, Last updated May 22, 2018.

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 approximately 17 to 18 vehicles per MW of power. This project is projected to be 107 MW; therefore, an estimated 1,819 to 1,926 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 south by way of Interstate 80/90 to State Route 66 to US Route 20. An alternate route would be from the east or west directly on US Route 20 that bisects the Project Area. The majority of the Project Area will be accessed via US Route 20. Within the Project Area, county and township roads and new private gravel access roads will likely be used to deliver equipment and materials. The probable routes are shown on Figure 1 in Appendix A.

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. Because this is an agricultural area, heavier use of roadways by local farmers during planting and harvest seasons will occur. 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.

Potential access locations to the private leased parcels along the probable routes where 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 roads, a permit will be required from the County Engineer.

Road and County-maintained ditch crossings (e.g., underground or overhead collection and transmission 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.

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. 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. Because this is an agricultural area, heavier use of roadways by local farmers during planting and harvest seasons will occur. 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.

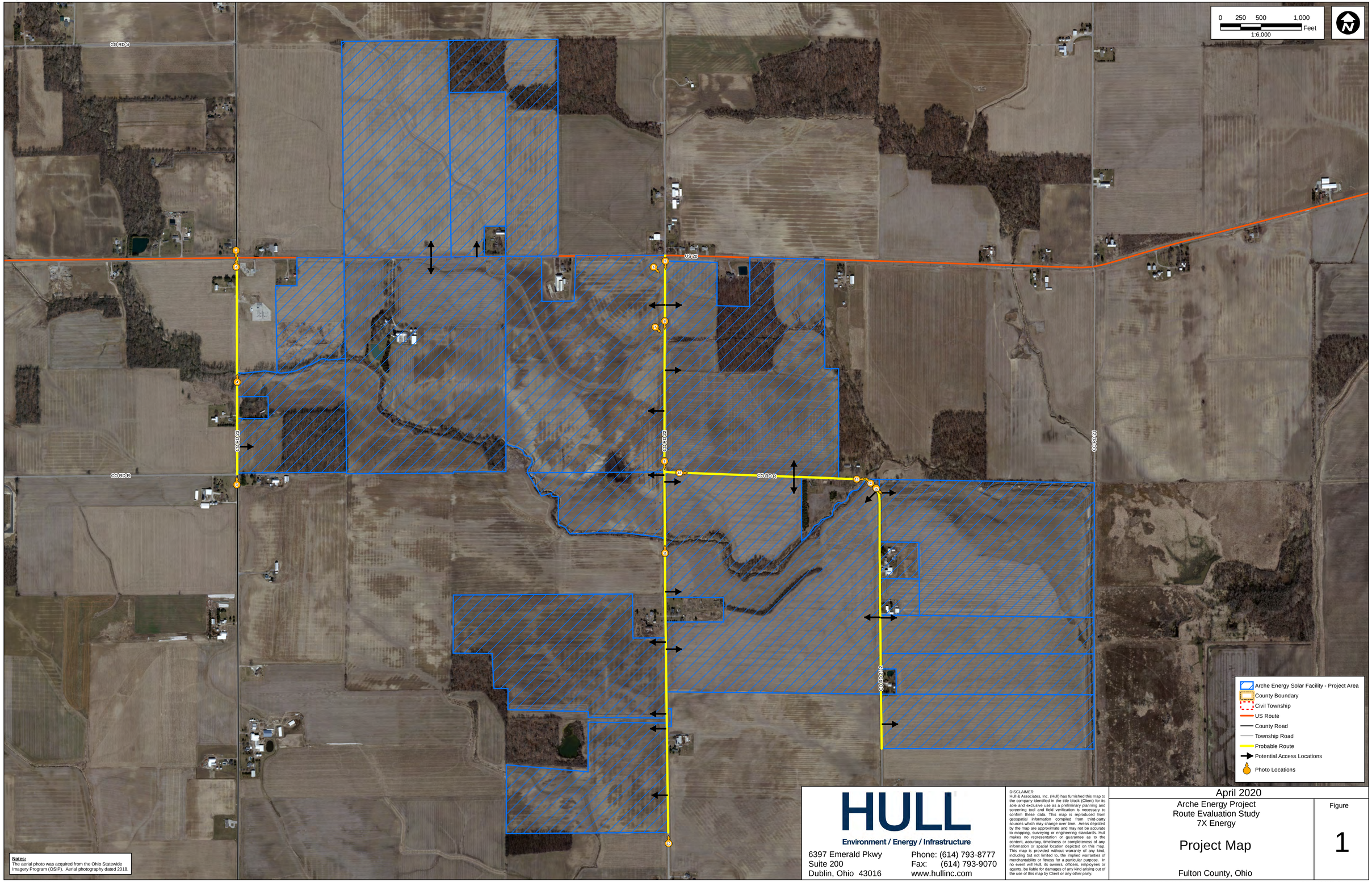
Interstate 80/90 to State Route 66 to US Route 20 will be the primary route used to approach the project. As an alternative, US Route 20 could be used to approach the project from the east or west. The majority of the Project Area will be accessed via US Route 20. Within the Project Area, county and township roads and new private gravel access roads will likely be used to deliver equipment and materials. Portions of CR 22, 23, R and 21-2 are the recommended routes.

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.

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 from the Ohio Statewide Imagery Program (OSIP). Aerial photography dated 2018.

Produced using ArcGIS 10.7

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

April 2020

Arche Energy Project
Route Evaluation Study
7X Energy

Project Map

Fulton County, Ohio

Figure 1

File Name: XEN002_01_Fig01_Transportation.mxd

Edited: 4/3/2020 By: rkaip

APPENDIX B

Photo Pages

PHOTO 1: Intersection of US20 and CR23, looking south.

PHOTO 2: Intersection of US20 and CR23, looking north.

HULL Environment / Energy / Infrastructure	Arche Energy Project – Route Evaluation Study 7X Energy, Inc. Roadway Photographs Fulton County, Ohio	Date: APRIL 2020 Project Number: XEN002 File Name: XEN002.0001.XLSX

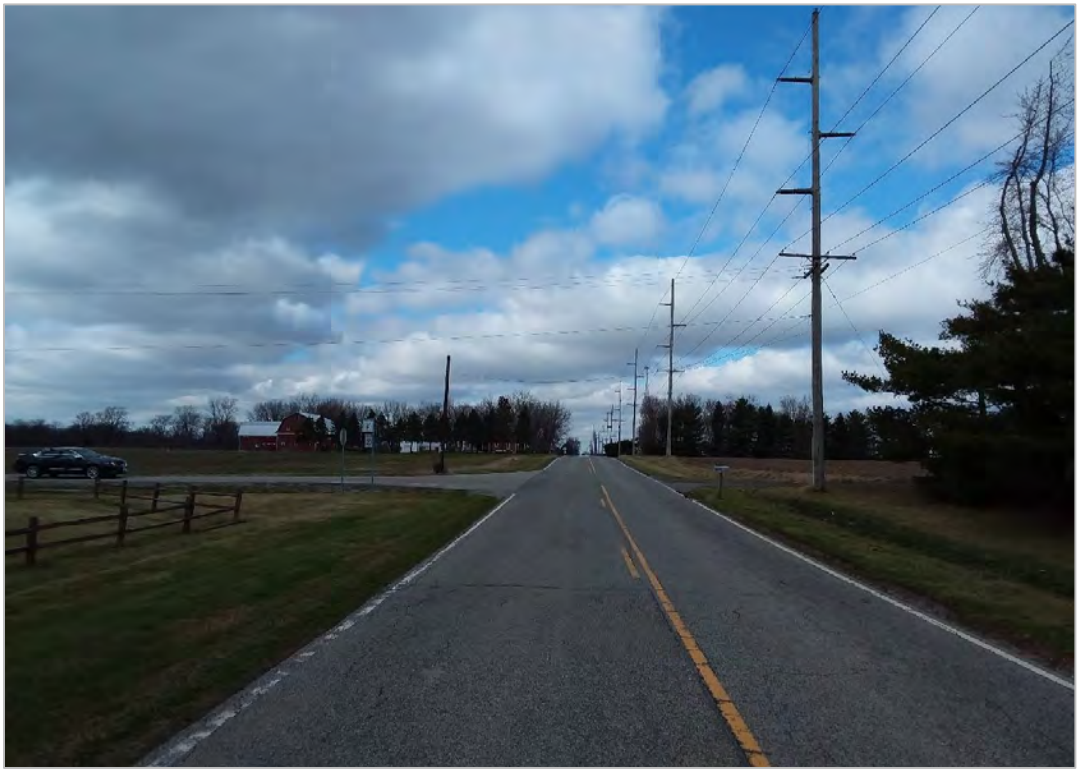


PHOTO 3: Intersection of CR23 and CR R, looking north.

PHOTO 4: Bridge 2634821, looking north.

PHOTO 5: Distressed pavement (edge cracking) on CR22 near US 20, looking south.

PHOTO 6: RCP culvert on CR22.

PHOTO 7: Concrete box culvert on CR22.

PHOTO 8: Pavement repair (patch) over concrete box culvert on CR22.

PHOTO 9: Intersection of CR22 and CR R, looking south.

PHOTO 10: CR22 at southern project boundary, looking north.

HULL Environment / Energy / Infrastructure	Arche Energy Project – Route Evaluation Study 7X Energy, Inc. Site Photographs Fulton County, Ohio	Date: APRIL 2020 Project Number: XEN002 File Name: XEN002.0001.XLSX

PHOTO 11: Bridge 2634732, looking north.

PHOTO 12: CMP culvert on CR R near CR 22.

PHOTO 13: Bridge 2631717, looking east.

PHOTO 14: Bridge 2631717, looking northwest.

HULL Environment / Energy / Infrastructure	Arche Energy Project – Route Evaluation Study 7X Energy, Inc. Site Photographs Fulton County, Ohio	Date: APRIL 2020 Project Number: XEN002 File Name: XEN002.0001.XLSX

PHOTO 15: CR21-2 just east of Bridge 2631717, looking southeast.