

Circleville Solar, LLC
Case No. 22-0117-EL-BTX

Exhibit C Route Selection Study/Siting Study



> **TRANSMISSION LINE SITING STUDY**
CIRCLEVILLE SOLAR TRANSMISSION LINE
PICKAWAY COUNTY, OHIO

May 2022
ECT No. 210330

Circleville Solar, LLC

ECT

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List of Acronyms and Abbreviations

AC	Alternating current
ACEP	Agricultural Conservation Easement Program
ALE	Agricultural Land Easements
CRP	Conservation Reserve Program
ECT	Environmental Consulting & Technology, Inc.
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
IPaC	Information for Planning and Consultation
IPP	Independent Power Provider
kV	Kilovolt
MOU	Memorandum of Understanding
MW	megawatt
NCED	National Conservation Easement Database
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NGO	Non-governmental organization
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NLEB	Northern long-eared bat
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
ODOT	Ohio Department of Transportation
ODNR	Ohio Department of Natural Resources
OH NHD	ODNR Natural Heritage Database
OHPO	Ohio Historic Preservation Office
OPSB	Ohio Power Siting Board
PAD-US	Protected Areas Database of the United States
POI	Point of Interconnect
PV	Photovoltaic
ROW	Right-of-way
T&E	Threatened and endangered
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRE/WRP	Wetland Reserve Easement/Wetland Reserve Program

Executive Summary

Environmental Consulting & Technology, Inc. (ECT) was contracted by Circleville Solar, LLC (Circleville Solar) to conduct a transmission line Siting Study in order to facilitate selection of a Preferred Route for the 138-kV (kilovolt) transmission line between the proposed collector substation associated with the Circleville Solar generation facility and the existing Circleville Substation. The Project is part of the Circleville Solar 70-megawatt (MW) alternating current (AC) photovoltaic (PV) solar generation facility in Pickaway County, Ohio. The Circleville Solar Transmission Line (Project) is constituent to the proposed Circleville Solar generation facility that is planned to be located in Jackson and Wayne Townships. The purpose of the Project is to connect the Circleville Solar generation facility to a substation (Circleville Substation).

The intent of this Siting Study was to identify and compare potential opportunities and constraints to constructing a transmission line and to facilitate selection of a Preferred Route. The Siting Study included the identification of a Study Area encompassing 5,323-acres that was primarily driven by locations of the Project collector substation and the point of interconnection (POI) at the Circleville Substation. After the Study Area was determined, constraints data was collected and reviewed, conceptual routes were developed and discussed and then a route analysis was conducted, which led to the selection of a Preferred Route. Through this process, quantitative and qualitative considerations were given to environmental, cultural, social, land use, and engineering constraints.

The results of the Siting Study identified that Alternative Route A is the most suitable route, minimizing the proximity and associated visual impacts to residences by paralleling roads in rural, low-density development areas that have existing overhead distribution and electric transmission lines constructed along the road, minimizing impacts to agricultural land by paralleling major transportation corridors in the Project vicinity instead of crossing through the middle of agricultural fields, and considers landowner input, which is critical for this Project as Circleville Solar, LLC is an Independent Power Producer (IPP) and not a public utility company and an IPP cannot use the power of eminent domain during the process to secure land for projects. As such, Alternative Route A was selected as the Preferred Route.

1.0 Introduction

1.1 Project Description

The scope of the Project includes the construction of an approximately three to four mile 138-kV transmission line between the POI at the existing Circleville Substation and the proposed collector substation located in Jackson Township on the south side of State Route 56 (SR-56), approximately three miles west of the City of Circleville. An overview map of the Project is presented in **Figure 1 (Appendix A)**.

The Project Area is generally flat, agricultural land with low-density residential uses along the major transportation corridors, including SR-56, SR-104, and US-22. The POI for the Project, the Circleville Substation, is located in the western extent of the City of Circleville, which is developed with high-density residential uses and commercial uses to the north and southeast of the intersection of Canal Street and West Mound Street. The Scioto River meanders through the eastern portion of the Project Area with adjacent undeveloped, wooded riparian corridors. Several existing distribution line and overhead electric transmission lines are also mapped in the Project Area and an active railroad, owned by CSX, is mapped running north to south to the east of the Scioto River and west of US-23. Project plans for the 138-kV transmission line include 100-foot right-of-way (ROW) corridor and will be constructed primarily using direct embed wood poles. However, in some locations, including areas prone to flooding in the Project Area and at the Scioto River, railroad, and highway crossings, steel poles may be needed with either concrete foundations or drilled pier foundations. Maximum structure height is not anticipated to exceed 65.5 feet.

Note that throughout this report, the terms “Project Area” and “Study Area” will be used. The Project Area is approximately 76 acres and includes the footprint of both the alternate and preferred route 100-foot ROW corridors, two laydown yards, 20-foot-wide access road corridors, and a portion of the Circleville Substation. Note that the collector substation footprint is not included in the Project Area because the collector substation is part of the Circleville Solar generation facility project and was included in the Ohio Power Siting Board (OPSB) application for the generation facility. The Study Area is a much larger area, approximately 5,323 acres, which was developed based on the Project endpoints, and is used as a guideline to set boundaries for potential conceptual routes for the Project. Detailed information on the Study Area is documented in Section 3.2 of this Siting Study.

1.2 Project Timeline

Circleville Solar commenced the interconnection feasibility and system impact studies in 2017 for the Circleville Solar generation facility, initiating the multi-year study process at the Circleville Substation. This process is anticipated to end in June 2022 with an interconnection agreement for the Project. Preliminary engineering and design were conducted for the Circleville Solar generation facility in late 2021 and for the Circleville Solar Transmission Line from December 2021 through June 2022., The siting process started in late 2021/early 2022 during which a desktop review of the constraints in the Project Area was conducted. Conceptual routes were initially developed and evaluated by the multi-disciplinary Project team, including the siting, environmental, development, land, and engineering teams, to identify alternative routes to present to the public. These alternative routes were presented at the Project open house meeting on March 10, 2022.

Circleville Solar anticipates filing a standard application to the OPSB in April 2022 for the Circleville Solar Transmission Line. A separate application to the OPSB was submitted in late-December 2021 for the Circleville Solar generation facility under case number 21-1090-EL_BGN. Pending approval from the OPSB, construction will begin on the transmission line in late 2022 to early 2023 and is expected to be placed in service by late 2023.

2.0 Route Evaluation Process

2.1 Route Selection Methodology Overview

The methodology for the transmission line Siting Study included the identification of the Project endpoints within a Study Area. Next, constraints were collected within the Study Area utilizing data collection from publicly available sources, supplemented with information from agencies and localities. Once the Project endpoints and Study Area constraints were identified, route alternatives were assessed and compared with natural and cultural resources, land uses, transportation facilities, and existing utility and linear features. Ultimately, through a quantitative and qualitative analysis and comparison of the alternative routes, a Preferred Route was identified, which is considered the most suitable route that meets the goal of the Siting Study.

2.2 **Data Collection**

Publicly available information and geospatial data from multiple sources including federal, state, and local agencies were utilized for preparation of this Siting Study to obtain constraint details for existing and historic land uses, natural resources, cultural resources, transportation facilities, and utilities and other linear features in the Study Area. Two primary sources of aerial imagery were used to aid in the route selection process and conduct a desktop review of the Study Area, including ESRI World Imagery, dated January 2021 for the Project Area, and Google Earth, dated March 2021 for the Project Area. A detailed list of data sources used for this Siting Study is included in **Appendix B**.

2.2.1 **Federal and State Government Coordination**

As part of the Siting Study process, Circleville Solar contacted various local, state, and federal agencies and officials to discuss the Project and request data to assist in the development of the alternative routes. The agencies/officials contacted are listed below:

Federal Agencies/Officials

- The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (Information for Planning and Consultation - IPaC) Tool and USFWS review letters
- The United States Army Corps of Engineers (USACE) – Huntington District

State Agencies/Officials

- Ohio Department of Natural Resources (ODNR)
- Ohio Department of Transportation (ODOT)

Local Agencies/Officials

- Village of Williamsport
- Pickaway County

2.2.2 **Site Reconnaissance**

A windshield survey was conducted in the Fall 2021 to verify key features, including the locations of occupied structures, in the Study Area. Prior to the windshield survey a preliminary desktop review was conducted to document key features, such as occupied structures and cemeteries, in the Study

Area from the United States Geological Survey (USGS) 7.5-minute topographic maps and publicly available aerial imagery. These features were then reviewed by driving the Study Area and taking notes and photos from public roads and other points of access to field-verify location, type of structure, and use.

2.2.3 Environmental Considerations

Considerations were given to the natural environment during the route selection process to minimize impacts to wetlands and waterbodies, threatened and endangered species, federal and state lands, and floodplains. Data included publicly available information from the USFWS, the Federal Emergency Management Agency (FEMA), the USGS National Hydrography Dataset (NHD), National Land Cover Database (NLCD), USFWS (IPaC), and the ODNR. Data requests were submitted to USFWS and ODNR in mid-2021 and responses were received in July 2021 and March 2022 and May and September 2021, respectively for USFWS and ODNR. Copies of the agency coordination responses received for the Project are attached in **Appendix C**. Note that the agency requests sent to USFWS and ODNR covered the entirety of both the Circleville Solar generation facility and this Project.

2.2.4 Existing Land Uses and Land Ownership Considerations

The route selection process considered potential impacts to existing land uses, land ownerships, public amenities, existing infrastructure, and known historic and archaeological resources. Data included publicly available information from Pickaway County, ODOT, United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), ODNR, the National Register of Historic Places (NRHP) and the Ohio Historic Preservation Office (OHPO) Online Mapping System (OMS).

For this Project, landowner input is critical to the route development process due to Circleville Solar, LLC being an IPP and not a public utility company. An IPP cannot use the power of eminent domain during the process to secure land for projects. Therefore, it was crucial that Circleville Solar, LLC started communications early with the landowners to obtain easement rights on the necessary properties for the Project.

2.2.5 Engineering and Cost Considerations

Engineering standards, such as the North American Electric Reliability Corporation (NERC) reliability standards and National Electric Safety Code (NESC) standards, were also taken into consideration during the route selection process to evaluate the design limitations and constructability of the routes and the potential impacts or mitigation requirements when building near or crossing existing infrastructure. Detailed cost estimates for the Project have not been prepared as part of this Siting Study. However, construction, social, and environmental costs were evaluated indirectly during the Siting Study. Examples of cost considerations that were incorporated include but are not limited to tree clearing, line length and structure types and locations.

3.0 Route Evaluation

3.1 Qualitative and Quantitative Siting Criteria

Both qualitative (e.g., maintenance considerations, constructability, and public and landowner input) and quantitative (e.g., acreage of tree clearing, number of parcels crossed, number of residences within a specified distance) comparative evaluations were done on all the alternative routes to assist in the selection of the final Preferred Route. These siting criteria, include, but are not limited to identifying routes that:

- Minimize length of/across or avoid:
 - access roads
 - steep slopes
 - waterbody crossings (lakes, rivers, wetland complexes)
 - conservation areas (protected local, state, national lands and parks)
 - critical and protected habitats for threatened and endangered species
 - areas of high-density development, specifically residential
 - flood zones
- Minimize or avoid impacts to occupied structures (residences, hospitals, schools, etc.) and other sensitive cultural features and land uses (cemeteries, historic resources, designated landmarks, recreational areas, etc.) by maximizing the separation distance

- Minimize or avoid negative impacts or conflict with future development in the Project Area with a proposed plan in place prior to the Project construction and existing designated public facilities (such as airports)
- Minimize or avoid visual impacts to scenic resources
- Evaluate the feasibility of paralleling potential existing infrastructure ROWs, such as roads, transmission lines, distribution lines, and pipelines and identify potential limitations, mitigation requirements, and reliability issues
- Evaluate the feasibility of paralleling existing land use breaks or parcel property lines
- Evaluate landowner input
- Evaluate the impact of route length, structure locations, number of structures, and types of structures on construction and maintenance costs to the Project
- Evaluate safety and construction implications of the Project, including potential outages, access roads, traffic control on surrounding roadways, and distance to and crossings of existing infrastructure (railroad, pipelines, fi-optic, electric transmission lines, distribution lines, etc.)
- Evaluate the local and state regulatory siting and permitting needs and standards

3.2 Study Area Description

The Project endpoints include the proposed Project collector substation, situated on the western end of the Project on the south side of SR-56, and the existing Circleville Substation mapped inside the western extent of the City of Circleville between northbound United States Highway 23 (US-23) and the railroad parallel with Canal Street. The boundaries of the Study Area were determined primarily by the locations of the prospective Project collector substation and the existing Circleville Substation, as described above. Alternative locations for the proposed Project collector substation were not part of this Siting Study.

The Study Area is approximately 5,323 acres in size and is bounded to the north by the Big Darby Creek, to the east generally by the POI at the Circleville Substation, to the south by the abandoned railroad corridor that runs generally east to west, and to the west by the Circleville generation facility and collector substation proposed locations to the west of SR-104. Existing land uses in the Study Area are primarily agricultural uses and low-density residential uses with the exception of the

eastern edge where the City of Circleville intersects the Study Area. The major transportation corridors in the Study Area are SR-56 and US-22, which run generally east to west, and SR-104, which generally runs north to south. Existing transmission and distribution infrastructure is located along these major transportation corridors, including a 138-kV overhead electric transmission line along US-22. The terrain in the Study Area is relatively flat, gradually sloping towards the Scioto River that runs through the eastern portion of the Study Area, with elevation ranging from 650 to 700 feet above sea level.

3.3 Siting Constraints and Opportunities Data Collection

Publicly available data within the Study Area was collected and reviewed for environmental, land use, social, and engineering features. Generally, features in the Study Area can be classified as either a siting constraint or a siting opportunity. Constraints are features or areas that should be avoided or impacts should be minimized to during the route selection process. Opportunity features can include features such as existing infrastructure corridors and compatible land use corridors, and parcel boundaries in the Study Area. Siting opportunities for this Project include the existing transportation corridors associated with SR-56 and US-22 running east to west, an abandoned rail corridor along the southern boundary of the Siting Study that runs east to west, and the existing 138-kV electric transmission line that runs along US-22.

During the preliminary siting process, the high-level constraints are first considered, which typically include densely populated areas, NRHP locations, larger recreational areas or scenic resources, larger natural resource features (rivers, wetland complexes, and flood zones), critical habitat areas, larger conservation or designated federal and state parks, and any larger areas pre-designated for future land use development. Smaller, site-specific, constraints are identified later in the siting process to assist in the refinement of conceptual routes. These constraints typically include specific locations of occupied structures and other buildings in the Project Area, cemeteries, cultural resources, smaller natural resource features (streams and smaller wetlands), communication and radio towers, oil and gas wells, and drinking water wells. The constraints identified in the Study Area are discussed in more details in the sections below. An overview of the Study Area and the high-level constraints are shown in **Figure 2 (Appendix A)**.

3.3.1 Environmental Constraints

Several larger environmental constraints were considered within the Study Area. The Big Darby Creek was used as the northern limits for the Study Area as it is a designated national and scenic river and is managed under the National Park Service (NPS), Midwest Regional Office and the ODNR, Division of Natural Areas and Preserves. This river has been classified as “Exceptional Warmwater Habitat” by the state of Ohio under the Clean Water Act and as “Outstanding State Waters,” the highest level of protection under the state’s anti-degradation policy. The Scioto River runs through the eastern portion of the Study Area and is unavoidable to cross to connect the collector substation with the POI at the Circleville Substation. Large complexes of wetlands and forested areas, associated with potential habitat for protected species, are mapped along the Scioto River. Wide areas of FEMA floodway and floodplain extend to the west of the Scioto River on the north side of US-22 and on both sides of the river to the south of US-22.

The USFWS IPaC tool was reviewed for records of known federally threatened and endangered plant and animal species and state-threatened, endangered, or rare plant and animal species as part of the Study Area assessment. The T&E species list from IPaC indicates that Pickaway County is within the range (i.e., contain documented records and/or has the potential to harbor critical habitat) of two bat species, one fish species, and five freshwater mussel species (**Appendix D, Table 3-1**). The ODNR Natural Heritage Database (OH NHD) indicated that the Project is within range of documented occurrences of 19 freshwater mussel species, nine fish species, and two plant species (**Appendix D, Table 3-2**).

ECT conducted on-site ecological field surveys in May 2021, December 2021, and February 2022 to determine if suitable habitat exists within the Project Area for the species listed by the USFWS and ODNR. The field assessment confirmed potential bat habitat for the Indiana bat and the northern long-eared bat (NLEB) within the Project Area are primarily focused along the Scioto River corridor. While most streams and ditches have been heavily channelized/straightened with no areas of riffle/pool complexes, the Scioto River likely provides suitable habitat for federally listed aquatic species. However, no in-water work is planned for the Project.

The Project Area was reviewed for bald eagle nests during on-site surveys in May 2021, December 2021, and February 2022. No bald eagles or bald eagle nests were observed within the Project Area during the field surveys. Additionally, the USFWS did not indicate known records of bald eagles during preliminary coordination completed in July of 2021 for the Circleville Solar generation facility and Project.

Impacts to threatened and endangered species and wildlife within the Project Area are anticipated to be minimized through the avoidance of suitable habitat to the extent practicable and through the implementation of seasonal clearing recommendations. Additional details regarding habitat and the plant and animal species in the Project Area is provided in the Biological Habitat Assessment report presented under separate cover from this Siting Study.

Several inactive surface mining areas (sand and gravel) are mapped in the central portion of the Study Area, including one on the north side of SR-56 and one mapped to the southwest of the intersection of Canal Road and US-22. Several active surface mining areas (sand and gravel) are mapped along Canal Road and the Scioto River in the southeastern portion of the Study Area. Water wells are mapped throughout the Study Area, primarily near residential, commercial, or agricultural structures. The Village of Williamsport owns a property in the central portion of the Study Area that has two water wells onsite. The inner and outer groundwater protection areas are mapped crossing the Project Area.

3.3.2 Land Use Constraints

Land use constraints considered within the Study Area along each alternative route consisted of existing developed and undeveloped land use, land cover, conservation easements and protected lands, state lands, water wells, oil and gas wells, and surface and underground mines.

Land use within the Study Area consists mostly of agricultural and undeveloped land with pockets of wooded areas and rural residential areas scattered throughout along the major transportation corridors, including SR-104, SR-56, and US-22.

A wetland reserve program (WRP) area is mapped in the west-central portion of the Study Area, on the west side of SR-104. The Fleming Bend Wetland Restoration Project is mapped in the southeastern portion of the Study Area and extends from the from the south and east sides of the Scioto River, where it meanders to the south of US-22 and east of Canal Road, all the way to the railroad. This restoration project is financed by an Ohio Environmental Protection Agency Water Resource Restoration Sponsor Program Loan that specifically precludes new rights-of-way on the property. The Elmon Richards Scioto River Wildlife Area is mapped approximately 300 feet to the north of the Project Area in the east-central portion of the Study Area, on the north side of US-22 and directly adjacent to the west of the Scioto River.

3.3.3 Social Constraints

Social constraints evaluated within the Study Area along each alternative route included cemeteries, churches, schools, recreational areas, residential structures, archaeological sites eligible for listing under the NRHP, and historic sites eligible for listing under the NRHP.

Two cemeteries are mapped in the Study Area, including the Van Meter Cemetery on the west side of SR-104, in the west-central portion of the Study Area, and the Owen Campbell Cemetery, mapped along the south-central boundary of the Study Area. Three parks are mapped in the Study Area. Canal Park and Calamus Swamp Park are mapped in the southern portion of the Study Area along Canal Road and SR-104, respectively. Smith Memorial Park is mapped in the southeastern corner of the Study Area. The Canal Trail, which traverses along Canal Road and terminates at Canal Park, is owned by the Pickaway County Historical Society. The Pickaway Trail, owned by the Pickaway County Park District, runs along the southern boundary of the Study Area. An area of high-density development with associated churches, schools, parks, and historical structures, is mapped to the east of the Study Area in the City of Circleville. No churches or schools are located within the Study Area.

One historical/architectural resource that was identified in the Study Area is recommended as eligible for inclusion in the NRHP for its architectural significance. The resource eligible for inclusion in the NRHP is the Ohio & Erie Canal Southern Descent Historic District. Four archaeological sites were identified in the Project Area. ECT recommends that none of these sites are eligible for the

NRHP. The detailed summary and results from the Phase I archaeological and architectural resource surveys performed are included in the cultural reports (Phase I Archaeology Survey Report and Phase I Historic/Architecture Survey Report) for the Project provided under separate cover from this Siting Study.

The Study Area is primarily large contiguous stretches of agricultural land with scattered residences. A small cluster of residences and commercial buildings are located around the intersection of US-22 and SR-56. The eastern extent of the Study Area has higher density residential uses associated with the City of Circleville.

3.3.4 Engineering Constraints

Engineering constraints that were considered within the Study Area along each alternative route included existing transmission line ROWs, road ROWs, existing pipeline ROWs, oil and gas wells, communication towers, railroads crossed, steep slopes >20% crossed by the ROW, heavy angles >30%, and number of vertexes.

The major transportation corridors in the Study Area are two-lane highways, including SR-104, SR-56, and US-22. Circleville Solar, LLC has been in coordination with ODOT, who manages these transportation corridors, to obtain future expansion plans and communicate the design details of the Project to avoid any potential conflicts. A railroad corridor, owned by CSX, traverses the entirety of the eastern portion of the Study Area from north to south. Circleville Solar, LLC is in the process of obtaining the necessary permits and authorization from CSX to build an overhead transmission line crossing over the tracks.

Existing overhead distribution lines run parallel to SR-104, SR-56, and US-22 in the Study Area. A 138-kV overhead electric transmission line runs along US-22 and several other overhead electric transmission lines cut through the eastern extent of the Study Area, terminating at the Circleville Substation. Engineering must consider existing easements, if applicable, minimum setback and design requirements, and the potential to either overbuild distribution or need to offset and parallel if not feasible when building in an area with existing overhead distribution and electric transmission lines. No oil or gas pipelines are mapped in the Study Area. Oil and gas wells are mapped primarily

on the northern half of the Study Area, north of SR-56 and US-22 in the interior areas of agricultural fields. No communication towers are mapped in the Study Area.

Steep slopes are not a constraint in the Study Area, as the topography is relatively flat. During field surveys conducted in January through March 2022, significant flooding was observed in the eastern half of the Study Area near the Scioto River and along the roadways in adjacent agricultural fields. As discussed in Section 3.3.1, the floodway and floodplain associated with the Scioto River and the Big Darby Creek are very wide and cover approximately $\frac{3}{4}$ of the Study Area. Engineering design must consider the high flood probability in the Project Area when finalizing the transmission line design, including pole type and locations. Another consideration is the sag height specifications that are required when crossing the Scioto River.

3.4 Routing Concepts

Conceptual routes considered during the preliminary siting process for the Project are depicted in **Figures 3A-3G (Appendix A)**.

The east to west running transportation corridors were recognized as a major siting opportunity in the Study Area as discussed in Section 3.3. Conceptual routes were developed to consider the SR-104, SR-56, and US-22 corridors and also the abandoned railroad corridor that runs along the southern Study Area boundary. The three main conceptual routes identified for the Project included 1) a route that would traverse south on the SR-104 corridor and then east on US-22, 2) a route that would traverse east on the SR-56 corridor and then east on US-22, and 3) a route that would traverse south on the SR-104 corridor and then east on the abandoned railroad corridor.

After further review of the SR-104 corridor, it was recognized that the existing distribution lines that run along SR-104 and the existing land uses create pinchpoints that reduce the feasibility of a potential route that utilizes the length of this corridor down to US-22. Two residences are mapped within less than 75 feet from the edge of road pavement on the west side of SR-104, south of SR-56. Building a transmission line through this corridor would require either the overbuild of the existing distribution lines in the area or utilizing the east side of the road, which is feasible; however, further south on SR-104 on the east side of the road is a residence that is mapped approximately 100 feet

off the edge of road pavement. A transmission line alignment in this area would either need to cross to the west side of the road in this area, which would require overbuilding the existing distribution or offsetting the distribution line and pushing further into the agricultural fields, or the ROW of the line would likely be within 20 to 30 feet of this residence due to the need to construct outside the existing road ROW as set forth by ODOT. An existing piece of land enrolled in the wetland reserve program is located on the west side of SR-104 between the two residences, which the Project was designed to avoid. Another pinchpoint along this corridor is mapped further south along SR-104 at the intersection of US-22. Distribution lines are mapped on all four corners of the intersection of SR-104 and US-22 with the exception of the northeast corner where a gas station is located. Traversing this intersection would either require overbuilding or offsetting existing distribution, cutting across the gas station property, or designing an alignment that crosses behind the gas station through an agricultural field.

The US-22 corridor between SR-104 and SR-56 was also reviewed for feasibility of a potential route. Existing overhead distribution and a 138-kV overhead transmission line runs along primarily the south side of US-22. The transmission line starts along US-22 approximately 0.75 mile east of the intersection of SR-104 and US-22, and the distribution appears to be underbuilt on this transmission line going east along US-22. Several potential structure encroachments were identified along this portion of US-22, including a commercial outbuilding on the south side that is mapped approximately 20 feet off edge of road pavement, a residence on the north side that is mapped approximately 50 feet off edge of road pavement, and another residence on the south side of US-22 that is mapped approximately 100 feet off edge of road pavement. A transmission line alignment in this stretch of US-22 where these structures are located would need to jump to the opposite side of the road as the existing 138-kV transmission line or offset the line, which are not feasible options with the commercial outbuilding and residence on the north side of the road being so close to road ROW. Two pinchpoints were identified along this corridor at the intersection of US-22 and Mill Road and to the south of the intersection of US-22 and SR-56. The existing 138-kV transmission line traverses the north side of US-22 and then crosses over SR-56, just west of the intersection of SR-56 and US-22 and continues on the north side of US-22. Numerous distribution lines are mapped in this area of the Project, along portions of US-22, Canal Road, and Mill Road. Traversing this area, specifically along Mill Road, would either require overbuilding or offsetting existing distribution or utilizing the opposite side of the road where existing infrastructure isn't located. However, the

existing commercial, residential, and associated outbuildings located in this area of the Project are mapped very close to the road ROW, in some cases less than 20 feet.

Due to the constraints discussed above, primarily existing overhead distribution and electric transmission lines and potential structure encroachments, any conceptual routes, including conceptual route one (1), that would utilize the entire length of SR-104 from SR-56 to US-22 and the length of US-22 from SR-104 to SR-56 were eliminated as they were deemed not feasible routes for the Project. Therefore, the third conceptual route that would utilize the SR-104 corridor going south to the abandoned railroad corridor going east was also eliminated, too. Moreover, the abandoned railroad corridor abuts the Fleming Bend Wetland Restoration Project Area. This wetland restoration area is contained to the south and east of the Scioto River, north of the abandoned railroad corridor, and generally to the east by the active CSX railroad corridor. The Project was designed to avoid this area, which is designated for protection and restoration of high-quality streams and wetlands in Ohio. Even if the potential Project route utilized the agricultural field to the south of this wetland restoration area to avoid impacts, the existing 69-kV overhead transmission line would cause a further offset into the agricultural field, causing difficulty finding an alignment to navigate back to the POI at the Circleville substation to the north. There are several existing overhead electric transmission lines traversing the area, along with the north to south running CSX railroad and US-23, and north of the abandoned railroad the density of residential development increases inside the City of Circleville boundaries.

The first and third conceptual routes that traverse SR-104 to US-22 and SR-104 to the abandoned railroad corridor were also significantly longer than the conceptual route that traverses SR-56 to US-22 at approximately 4.8 and 5.5 miles, respectively. The second conceptual route that follows SR-56 to US-22 is approximately 3.6 miles and was also reviewed for constructability during the preliminary siting process. Two potential encroachments were identified along the south side of SR-56 where a commercial outbuilding is mapped approximately 40 feet off the edge of road pavement and a residence is mapped approximately 50 feet off the edge of road pavement. Existing overhead distribution lines run along the south side of SR-56 in this stretch of the Project. No existing infrastructure is located on the north side of the road, making the north side of the road a feasible option for a route alignment. The closest mapped structure on the north side of SR-56 between SR-104 and US-22 is a residence that is mapped approximately 160 feet off the edge of road pavement.

As discussed previously, there is a pinchpoint to the south of the intersection of SR-56 and US-22. However, there are no structures located on the north side of SR-56 or US-22 in this area of the Project. An existing 138-kV transmission line is mapped on the north side of US-22, which would have to be offset further into the agricultural fields. This stretch of the conceptual route that would need to be offset from the existing transmission line is mapped on one landowner's parcel for approximately 0.75 miles.

The existing overhead electric transmission line alignments and NRHP-eligible Ohio & Erie Canal Southern Descent Historic District, which is mapped crossing the Scioto River to the south of where this conceptual route crosses, make it difficult to potentially cross the Scioto River further south. The Elmon Richards Scioto River Fish Access point on the Elmon Richards Scioto River Wildlife Area, owned by the ODNR, is mapped to the north of where this conceptual route crosses. Based on the constraints to the north and south, crossing the Scioto River and the railroad corridor at the proposed location for this conceptual route appears to be least impactful to sensitive land uses in the Project Area. The Project team reviewed the potential to utilize a routing study segment that would jump to the south side of US-22, to the east side of the intersection of SR-56 and US-22, however, this option was eliminated as a feasible option due to the large amounts of tree clearing this option would require along with the engineering conflict of the existing overhead distribution line that runs along the south side of US-22 and the difficulties with crossing the Scioto River on the south side as described above with the existing overhead transmission lines and the NRHP-eligible historic district. .

No other major siting opportunities were identified in the Study Area. The parcels in the area are generally made up of large, agricultural land uses that are contiguous fields owned by the same landowner. Therefore, following parcel lines for this Project, particularly where the adjacent parcel(s) are owned by the same landowner and the land use is agricultural uses, (that do not parallel existing roads) do not minimize impacts to land uses and would potentially result in more significant impacts and conflicts with farming of cropland in the Project Area. Based on the Project team's conceptual route evaluations, the second conceptual route that runs from the collector substation along the north side of SR-56 primarily and then continues along the north side of US-22 was chosen as an Alternative Route, Alternative Route A, to move forward with in the Siting Study. The Project Team then reviewed the Study Area around this Alternative Route A to develop a second Alternative Route.

There seemed to be few options to veer off of Alternative Route A in the eastern half of the Project, specifically starting at the intersection of SR-56 and US-22, due to the commercial and residential development to the south of the intersection and the large amounts of potential environmental and cultural impacts to the south of US-22 with the Scioto River and associated riparian corridors and wooded areas. Therefore, the Project team focused efforts on the western half of the Alternative Route A to develop another alternative.

To develop an Alternative Route to the north of Alternative Route A, along SR-56, would require veering off the route between the intersection of SR-56 and SR-104 and the residences mapped on the north side of SR-56 to avoid any impacts to these existing uses. There are no parcel lines that run east to west generally in this area, so an alignment through this portion of the Study Area would require bisecting agricultural fields off parcel lines, which would likely result in larger impacts to agricultural land uses, such as crop cultivation. There is also an unnamed tributary of the Scioto River mapped to the north of SR-56 that would have to be crossed or paralleled. The Project team reviewed the options to develop an Alternative Route to the south of Alternative Route A, north of US-22, and identified east to west running parcel lines through agricultural fields. Utilizing the SR-104 corridor south, from the intersection of SR-104 and SR-56, to then traverse east along these parcel lines provided another Alternative Route option, Alternative Route B, that does not impact any existing structures or result in additional stream impacts and appears to be the most feasible second Alternative Route option available in the Study Area given all the environmental, land use, social, and engineering constraints identified during the desktop and field reviews.

3.5 Alternative Routes

Two Alternative Routes were developed for analysis and comparison and include Alternative Routes A and B. The two Alternative Routes have approximately 68 percent common alignments, starting at the collector substation (western Project endpoint) and ending at the intersection of SR-56 and SR-104 and then starting at the merging point of the two routes approximately 1.2 miles east-southeast of the intersection of SR-56 and SR-104 to the eastern Project endpoint at the Circleville Substation. Alternative Route A continues to follow SR-56 past the intersection of SR-104, whereas Alternative Route B veers to the south along SR-104 from SR-56 for approximately 0.5 mile before turning due east through agricultural fields to reconnect with Alternative Route A along SR-56.

Note that the Alternative Routes are described below and shown in more detail on **Figures 4A-4F, Appendix A.**

3.6 Alternative Route Comparison

The Alternative Routes comparison provides a quantitative and qualitative analysis of potential impacts to the environment, social and land use, as well as engineering concerns. The routes were reviewed in detail and compared using GIS data sources, supporting documents, and a previous field reconnaissance of the Project Area.

As described in Section 3.4, limited opportunities were identified in the Study Area for conceptual routes for the Project due to so many environmental, land use, social, and engineering constraints. As a result, both Alternative Routes share a 68 percent commonality. Therefore, the qualitative rather than the quantitative analysis in this Siting Study is very important in understanding the pros and cons between the two Alternative Routes.

3.6.1 Environmental

The Siting Study goal is to avoid or minimize impacts on environmental features to the extent practicable during construction and operation and maintenance of the transmission facilities. A comparison of environmental considerations for the Alternative Routes is presented in **Table 3-3.**

3.6.1.1 Geological, Soil, and Water

Alternative Route Comparison

Wetlands and other surface waters were reviewed using wetland and stream delineation data collected during fieldwork completed in May and December 2021 and early 2022. Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops. Soils that do not meet the prime farmland category but are still recognized for the productivity by states may qualify as soils of statewide importance. According to the ODNR GIS data, no mines intersect the Alternative Route ROWs. However, one inactive surface mine (sand and gravel) is

mapped adjacent to the north of SR-56 and parallels approximately 0.5 mile of the Alternative Route A and 0.3 mile of the common portion of Alternative Routes A and B ROW.

As shown in **Table 3-3**, the common portion of Alternative Routes A and B ROW crosses the same acreages of floodway and floodplain associated with the Scioto River and have the same alignment crossing the Scioto River. Both routes also cross two streams, including the Scioto River and an unnamed tributary of the Scioto River. Two water wells that are identified as monitoring wells in the ODNR data are mapped inside the common portion of Alternative Route A and B ROW between the Circleville Substation and US-23. This portion of the Project is anticipated to be an underground cable to the POI.

The non-common portions of the Alternative Routes do not have significant differences in potential impacts to geological, soil, or water resources. Alternative Route A crosses approximately 1.5 more acres of 100-year floodplain than Alternative Route B. Alternative Route B crosses approximately 1.5 acres more of prime farmland than Alternative Route A. Alternative Route A crosses through the inner groundwater protection area associated with the Village of Williamsport groundwater wells located on the north side of US-22. The water wells are mapped between 300 and 350 feet outside the Alternative Route A 100-foot ROW corridor. As discussed in Section 3.3.1, Circleville Solar, LLC has been in communication with the Village of Williamsport in regard to the construction, operation, and maintenance activities for the Project and how they are not anticipated to impact the water wells or access to the equipment.

3.6.1.2 Wildlife Habitat

Alternative Route Comparison

Both Alternative Routes require tree removal, which may contain potential summer roosting and foraging habitat for federal and state-listed T&E bat species. The non-common portions of the Alternative Routes do not have significant differences in potential impacts to wildlife habitat as the majority of the tree clearing for both routes is adjacent to the Scioto River crossing, where the routes share a common alignment.

Table 1-3. Environmental Evaluation Criteria

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
General				
Length	miles	2.3	1.3	1.6
ROW	acres	29.7	14.5	17.7
Water Resources				
Total streams crossed by centerline	count	2	0	0
Palustrine forested wetlands (PFO) within the ROW	acres	1.2	0	0
Palustrine emergent wetlands (PEM) within the ROW	acres	3.5	0	<0.1
FEMA-designated floodway crossed by ROW	acres	11.7	0	0
FEMA-designated floodplain crossed by ROW	acres	9.2	3.0	1.5
Groundwater Protection Area (inner management zone)	acres	0	1.9	0
Groundwater Protection Area (outer management zone)	acres	0	4.0	3.4
Water wells within ROW	count	2	0	0
<i>The Alternative Route ROWs do not cross any palustrine scrub-shrub (PSS) wetlands or waterbodies</i>				
Geological and Soil Resources				
Prime and unique farmland soil within the ROW	acres	23.4	13.5	15.4
<i>The Alternative Routes and Alternative Route ROWs do not cross any karst topography, known mining areas (aboveground or underground), or farmland of statewide importance and the centerlines are not mapped within 0.25-mile of any known caves or mine shaft openings</i>				
Wildlife and Habitat				
Tree clearing within the ROW (digitized based on aerial photography)	acres	1.7	0	0

3.6.2 Land Use and Social

The Siting Study goal is to avoid or minimize conflicts with existing land uses that are not compatible with a new transmission line. A comparison of land use and social considerations for the Alternative Routes are presented in **Table 3-4**.

3.6.2.1 Existing Developed Land Use

Alternative Route Comparison

There are three occupied structures within 250 feet of both the Alternative Route centerlines. Two of the three residences mapped within 250 feet of the Alternative Route A centerline are approximately 108 feet to the south of the route, on the south side of SR-56, and approximately 150 feet to the north of the route on the north side of SR-56, respectively. The third residence is mapped approximately 235 feet to the southeast of the common portion of the Alternative Routes, to the east of the intersection of US-22 and Canal Road. The remaining two residences mapped within 250 feet of the Alternative Route B centerline are approximately 110 feet and 135 feet to the west of the route, on the west side of SR-104.

There are two commercial structures mapped approximately 135 feet and 155 feet south of the common portion of the Alternative Routes, on the south side of SR-56 to the west of the intersection of SR-56 and US-22. A commercial outbuilding is mapped approximately 100 feet south of the Alternative Route A, on the south side of SR-56 and two agricultural outbuildings are mapped approximately 50 feet and 125 feet south of the Alternative Route B on the east side of SR-104.

There is no significant difference in impacts on existing structures within 250 feet of the Alternative Routes. However, the Alternative Route A has several more structures mapped within 500 feet, along SR-56, compared to Alternative Route B, which traverses agricultural fields instead of along a road ROW where structures are more likely to be located.

3.6.2.2 Agricultural and Forestry Resources

Alternative Route Comparison

Approximately 66 percent of the entirety of the Alternative Route A ROW is cultivated cropland and approximately 79 percent of the entirety of the Alternative Route B ROW is cultivated cropland. Note that approximately 22 percent of the Alternative Route A ROW and approximately 17 percent of the Alternative Route B ROW are comprised of overlapping areas with public road ROW. If those overlapping areas of road ROW are removed from the total ROW acreage, the Alternative Route A ROW is approximately 85 percent cultivated cropland and the Alternative Route B ROW is approximately 95 percent cultivated cropland.

As shown in **Table 3-4**, there is no significant difference in tree clearing acreage between the two Alternative Routes due to the areas that require tree clearing being located within the common portion of the Alternative Routes.

3.6.2.3 Recreation and Conservation Lands

Several conservation areas are mapped in the Study Area. An Agricultural Conservation Easement Program (ACEP) Wetland Reserve Easement (WRE) is mapped adjacent to the west of the Project Area on the west side of SR-104. The ACEP is a federally funded conservation program to help conserve agricultural lands and wetlands and their related benefits. The Agricultural Land Easements (ALE, formerly the Farm and Ranch Lands Protection Program) prevent the conversion of prime/unique farmlands, statewide/locally important soils, and historic and archaeological features on farmlands and ranches to non-agricultural uses. The USDA works cooperatively with state, tribal, and local governments as well as non-governmental organizations (NGOs) to preserve valuable farmlands under the ACEP-ALE in Ohio. WRE's (formerly the Wetlands Reserve Program [WRP]) protect, restore, and enhance wetlands through the purchase of easements on private and tribal-owned land. The National Conservation Easement Database (NCED) identified several additional ACEP-WREs boundaries along Big Darby Creek and Scioto River. The identified easements are currently under private management by the UDSA-NRCS. The Fleming Bend Wetland Restoration Project area is mapped to the south of the Project Area.

No Project facilities are sited within the ACEP-WRE areas or the wetland restoration area.

A Conservation Reserve Program (CRP) easement is crossed by the eastern portion of the Project Area, west of the Scioto River on the north side of US-22. The CRP is a federally funded conservation program that provides farmers with assistance and resources to convert highly erodible land to resource-conserving vegetative cover to enhance the environmental quality of the surrounding region.

Recreation and conservation areas are shown on **Figure 2 (Appendix A)**.

Alternative Route Comparison

As shown in **Table 3-4**, there is no significant difference in impacts to recreation and conservation lands between the two Alternative Routes due to the CRP easements being located on the common portion of the Alternative Routes.

3.6.2.4 Cultural Resources

Alternative Route Comparison

As shown in **Table 3-4**, there is no significant difference in impacts to architectural resources between the two Alternative Routes due to the NRHP-listed and eligible architectural resources being mapped within 1-mile of the common portion of the Alternative Routes. Twenty-six out of 28 of these resources are mapped to the east of the Project in the City of Circleville. One other NRHP-listed and eligible architectural resource, the Ohio and Erie Canal Southern Descent Historic District, is mapped crossing the Scioto River to the south of US-22 bridge, respectively. The other NRHP-listed and eligible architectural resource is mapped approximately 0.35 mile west-northwest of the collector substation, on the south side of SR-56. Both Alternative Routes have one archaeological site mapped within the ROW. These archaeological sites are not recommended for eligibility for the NRHP by ECT.

Table 3-2. Land Use and Social Evaluation Criteria

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
General				
Length	miles	2.3	1.3	1.6
ROW	acres	29.7	14.5	17.7
Number of parcels crossed by ROW ¹	count	NA	<p>17 parcels crossed total</p> <p>5 of the 17 parcels crossed are only crossed by Alternative Route A</p> <p>2 of the 17 parcels crossed are where the two Alternative</p>	<p>18 parcels crossed total</p> <p>6 of the 17 parcels crossed are only crossed by the Alternative Route B</p> <p>2 of the 18 parcels crossed are where the</p>

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
			<p>Routes split and merge</p> <p>1 parcel is crossed by both the non-common portions of both Alternative Routes</p> <p>9 parcels are crossed by the Common Portion of both routes</p>	<p>two Alternative Routes split and merge</p> <p>1 parcel is crossed by both the non-common portions of both Alternative Routes</p> <p>9 parcels are crossed by the Common Portion of both routes</p>
Landowners within ROW ¹	count	NA	<p>14 landowners crossed total</p> <p>4 of the 14 landowners crossed are only crossed by Alternative Route A</p> <p>2 of the 14 landowners crossed are where the two Alternative Routes split and merge</p> <p>1 landowner is crossed by both the non-common portions of both Alternative Routes</p> <p>7 landowners</p>	<p>12 landowners crossed total</p> <p>2 of the 12 landowners crossed are only crossed by Alternative Route A</p> <p>2 of the 12 landowners crossed are where the two Alternative Routes split and merge</p> <p>1 landowner is crossed by both the non-common portions of both Alternative Routes</p> <p>7 landowners</p>

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
			are crossed by the Common Portion of both routes	are crossed by the Common Portion of both routes
Residential				
Residences/single-family dwellings within 250 feet of centerline	count	1	2	2
Residences/single-family dwellings within 500 feet of centerline	count	2	4	3
<i>No outbuildings or residences are mapped within the Alternative Route ROWs.</i>				
Community/Recreational Facilities				
<i>No known cemeteries are mapped within 250 feet of the Alternative Route centerlines and no known designated places of worship or schools are mapped within 500 feet of the Alternative Route centerlines.</i>				
Commercial/Industrial				
Commercial/industrial buildings within 250 feet of centerline	count	2	2 (outbuildings)	0
Commercial/industrial buildings within 500 feet of centerline	count	10	4 (3 outbuildings)	0
<i>No commercial/industrial buildings are mapped within the Alternative Route ROWs.</i>				
Protected Land				
Federal or State land crossed by ROW (ODNR property)	acres	0.2	0	0
Conservation easements (CRP) crossed by ROW	acres	3.6	0	0
Agricultural Resources				
Cropland crossed by ROW (based on aerial interpretation and parcel land use code)	acres	21.4	7.7	16.0
<i>The Alternative Route ROWs do not cross any agricultural district land parcels or pastureland/rangeland.</i>				
Cultural Resources				
NRHP-listed and eligible architectural resources within 1-mile of the centerline	count	28	0	0
Archaeological sites	count	0	1	1

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
mapped in ROW				
Archaeological sites mapped within 250 feet of the centerline	count	0	2	2

¹When counting the parcels crossed and landowners, the Cargill and AEP properties on the eastern end of the Project were included in these counts, although this portion of the transmission line will be underground.

3.6.3 Engineering and Constructability

The Siting Study goal is to consider potential engineering and construction challenges associated with constructing, operating, and maintaining a transmission line. A comparison of engineering considerations for the Alternative Routes are presented in **Table 3-5**.

The east to west running transportation corridors were recognized as a major siting opportunity in the Study Area as discussed in Section 3.3. The Project infrastructure, including the transmission line wires and wood and steel poles, can be a stark contrast to a project landscape. However, for the Project, there are existing overhead distribution and electric transmission lines in the Project vicinity along the transportation corridors where the Alternative Routes are mapped. The primary vantage points of the Project are along SR-56 and US-22 where the routes parallel the road ROWs. These transportation corridors in the Project area are primarily agricultural land with very few residences in close proximity to the Project. Existing distribution lines run along the southern side of SR-56 for approximately half of the length of the portion of Alternative Route A that runs along SR-56 and existing distribution or electric transmission lines run the entire length of US-22 where the Common Portion of Alternative Routes A and B parallel the highway.

Affected local roads are moderate to lightly traveled and generally serve local residences and farmsteads. US-22 and US-23 are the most heavily travelled roads within the Project Area. US-22 is an east/west regional transportation corridor that connects the City of Circleville with the Village of Williamsport. US-23 is a north/south regional transportation corridor that connects the City of Circleville to Columbus to the north and Chillicothe to the south. SR-56 is another east/west regional transportation corridor that parallels the western and central portions of the Facility. SR-104 is a north/south regional transportation corridor that parallels Alternative Route B. Local roads in the vicinity of the Project include Mill Road and Canal Road. The eastern end of the Project at the

existing Circleville Substation will be visible from the western extent of the City of Circleville. There is a higher density of commercial and residential uses around the intersection of SR-56 and US-22 in the central portion of the Project Area. However, the western extent of the City of Circleville and the intersection of SR-56 and US-22 are already developed with existing infrastructure, such as the Circleville Substation and overhead electric transmission lines and distribution lines. Since the Project is not introducing new human-made elements on the landscape where they do not already exist, the new gen-tie line is not anticipated to result in a significant aesthetic impact to nearby residences or commercial uses in these areas because its only creating a minor incremental visual change in the existing visual setting.

Steep topography is generally not a challenge for this Project due to the relatively flat topography throughout the agricultural landscape. No major constructability geotechnical issues are expected from high-level reviews; however, core bore investigations should be conducted before final design. Typically, if an Alternative Route parallels existing roads, the amount of potential access road impacts is minimized because most of the structures can be accessed from the side of the road. However, for both Alternative Routes A and B, it is unlikely construction entrances would be permitted along certain location of US-22 without coordination and a permit from ODOT.

Paralleling an existing overhead distribution or electric transmission line requires coordination with the company who owns and operates the infrastructure to design the transmission line alignment so there are no adverse effects on either utility and to avoid any potential compliance issues.

Access road development can also be considered an engineering constraint for transmission line construction depending on the topography in the project area, length of the transmission line, number of sensitive land use and ecological features in the ROW, and landowner sentiment regarding the project. Optimally, access roads are developed to avoid or minimize impacts to environmental, land use, and social features in the Study Area, just as the routes are developed. Due to the Project being in an area that is primarily agricultural land and relatively flat and that both alternative routes parallel public roads, access road development for the routes is not anticipated to be considered a constraint for the Project.

Alternative Route Comparison

As shown in **Table 3-5**, there is no significant difference in transportation resource impacts due to the common portion of the Alternative Routes crossing US-22 two times and the CSX railroad corridor once. Both Alternative Routes also cross a state highway two times and have the same number of heavy turn angles based on the current designs. Due to the rural nature of the Project vicinity, neither of the Alternative Routes require many heavy turn angles to avoid encroachments or sensitive land uses.

The majority of both Alternative Routes A and B parallel public roads. However, 77 percent of the non-common portion of Alternative Route A parallels public roads with existing overhead distribution or electric transmission lines, whereas only 31 percent of Alternative Route B parallels public roads with existing infrastructure. This is because Alternative Route A continues along SR-56 for the length of the where the two routes divert, and Alternative Route B continues along SR-104 and then veers off-road through agricultural fields before merging back with Alternative Route A.

Table 3-3. Engineering Evaluation Criteria

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
General				
Length	miles	2.3	1.3	1.6
ROW	acres	29.7	14.5	17.7
Transportation Resources				
U.S. highways crossed ¹	count	2	0	0
State highways crossed	count	0	2	2
Local roads and streets crossed	count	0	0	0
Railroads crossed	count	1	0	0
<i>No known public airports are mapped within a mile of the Alternative Routes.</i>				
Utility Resources				
<i>The Alternative Routes do not cross any existing overhead electric transmission lines or oil and gas pipelines, and no known oil or gas wells are mapped within the Alternative Route ROWs. No known communication towers are mapped within 1,000 feet of the Alternative Route centerlines.</i>				
Engineering and Geotechnical Considerations				
Heavy angles	count	3	2	2
Steep slopes, greater than 20 percent contained in ROW	acres	<0.1	0	0
Rights-of-Way Parallel				
Interstate highways, U.S. highways, state highways, and local roads paralleled (only	miles	1.3	1.0	0.5

Alternative Route	Unit	Common Portion of Routes A and B	Non-Common Portion of Route A	Non-Common Portion of Route B
accounts for miles where there is existing distribution or electric transmission lines paralleling the road corridor)				
Interstate highways, U.S. highways, state highways, and local roads paralleled (where there is no existing distribution or electric transmission lines paralleling the road corridor)	miles	0.9	0.3	0.1
No road ROW paralleled	miles	0.1	0	1.00
Total percentage paralleled by road with existing infrastructure	percent	57	77	31
Total percentage paralleled by road with no existing infrastructure	percent	39	23	6
Total percentage that does not parallel road ROW	percent	4	0	63

¹ The crossing of US-23 is anticipated to be an underground crossing facilitated by boring underneath the railroad and highway corridors to the Circleville Substation.

4.0 Identification of Proposed Route

The goal in selecting a suitable route for the Project is to minimize overall impacts on natural and human environments while avoiding special design requirements, unreasonable costs, and long and indirect Alternative Routes. There are often inherent tradeoffs in potential impacts to environmental, social, land use, and engineering constraints and the goal is to reach a reasonable balance between minimizing potential impacts on one resource versus increasing potential impacts to another.

Following data gathering, route development, and comparative analysis process, Alternative Route A was identified as the Preferred Route (**Figure 5, Appendix A**). The selection of the Preferred Route was primarily driven by the review of constraints and limited opportunities in the Study Area, as discussed in Section 3.4. The Project team believes that the Preferred Route 1) reasonably minimizes adverse impacts on area land uses and the natural and cultural environment; 2) is most consistent

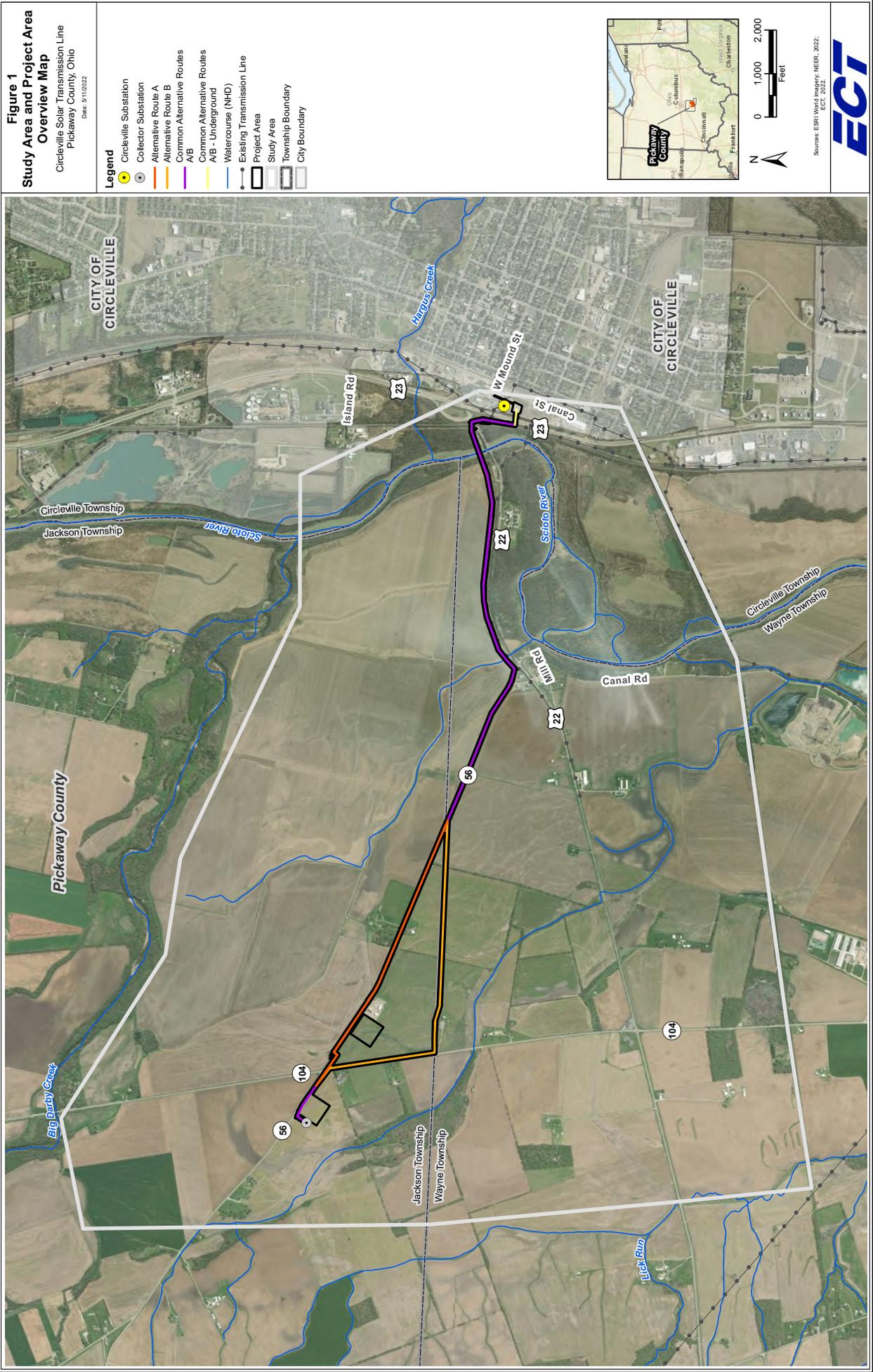
with the siting guidelines; 3) is constructable and can be operated in a safe, timely, and reliable manner; and 4) minimizes unreasonable costs and special design requirements.

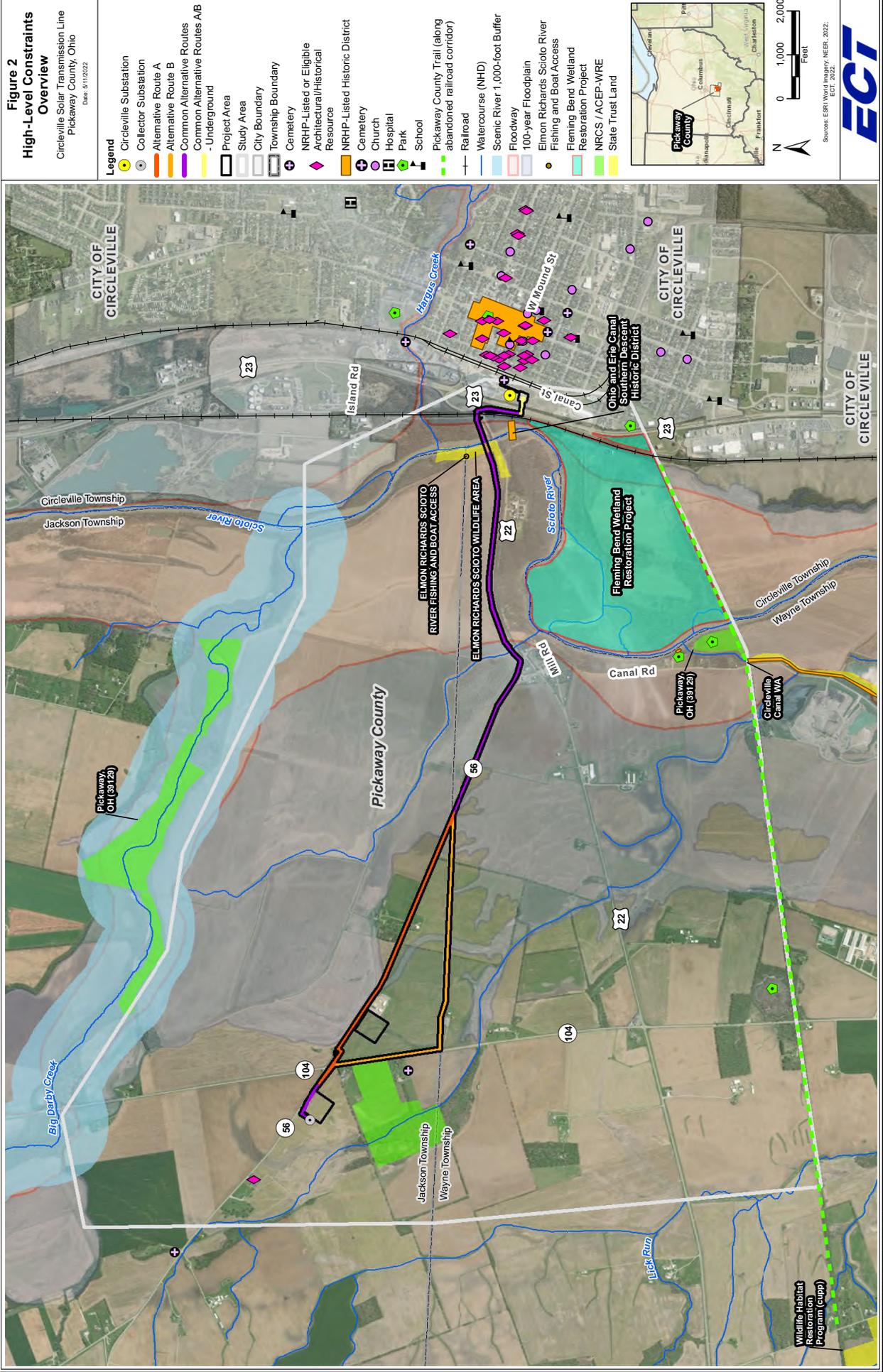
Overall, based on the qualitative and quantitative review of the information obtained from GIS data, supplemented with information from agencies and localities, and field reconnaissance, Alternative Route A was selected as the Preferred Route for the following reasons:

- Minimizes the proximity and associated visual impacts to residences by paralleling roads in rural, low-density development areas that have existing overhead distribution and electric transmission lines constructed along the road.
- Minimizes impacts to agricultural land by paralleling major transportation corridors in the Project vicinity instead of crossing through the middle of agricultural fields.
- Considers landowner input and concerns, which is highly important in this Project because as discussed in Section 2.2.4, landowner input is critical to the route development process due to Circleville Solar, LLC being an IPP and not a public utility company. An IPP cannot use the power of eminent domain during the process to secure land for projects, so landowner buy in is very important to a project's viability.

Appendix A Figures

Figure 1.	Study Area and Project Area Overview Map
Figure 2.	High-Level Constraints Overview
Figure 3A-3G.	Conceptual Routes
Figures 4A-4F.	Constraints Maps
Figure 5.	Preferred Route Overview





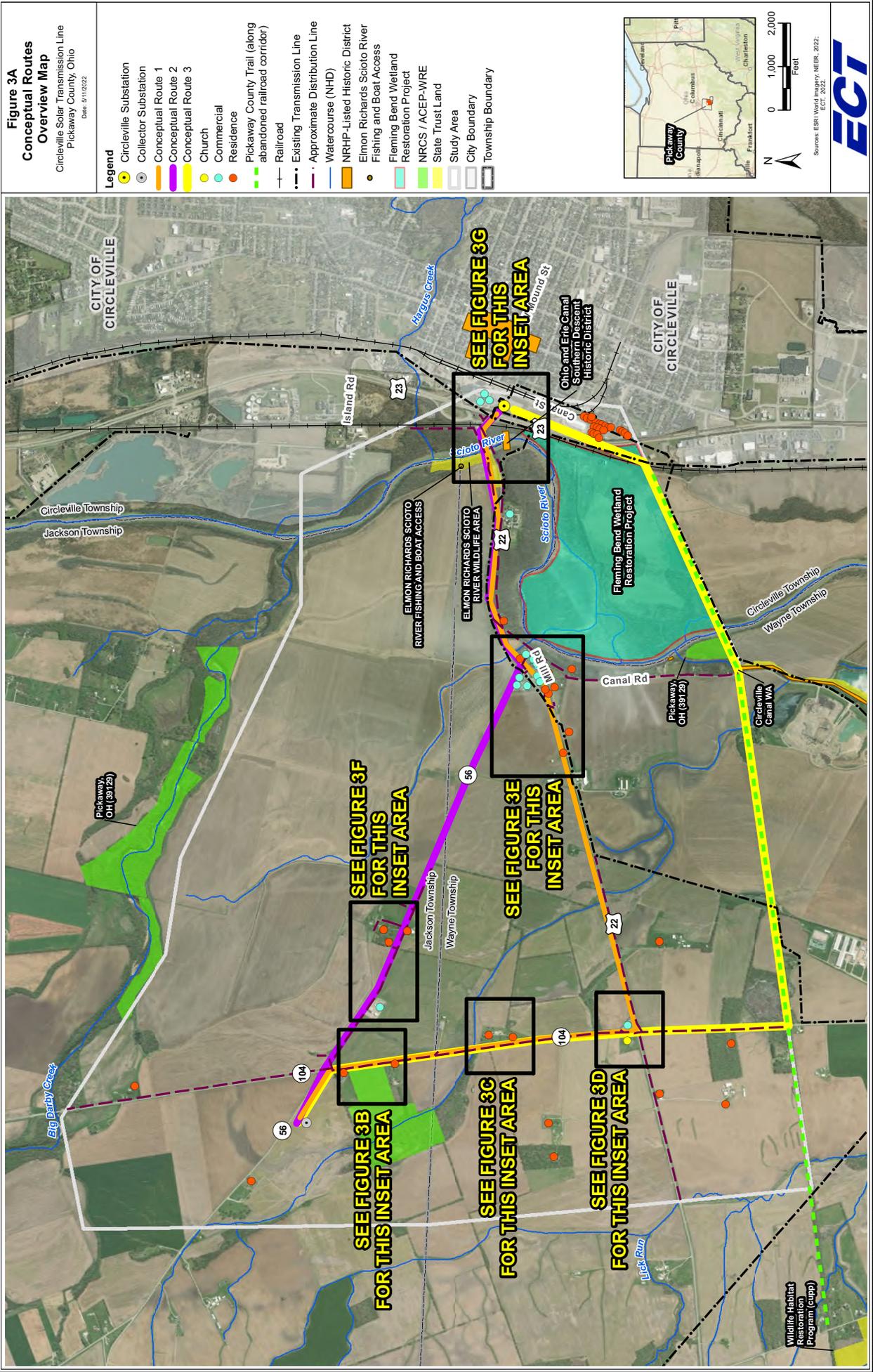
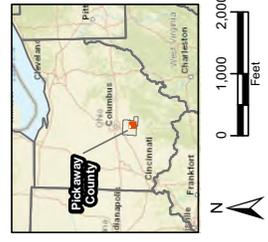


Figure 3A
Conceptual Routes
Overview Map
 Circleville Solar Transmission Line
 Pickaway County, Ohio
 Date: 9/17/2022

- Legend**
- Circleville Substation
 - Collector Substation
 - Conceptual Route 1
 - Conceptual Route 2
 - Conceptual Route 3
 - Church
 - Commercial
 - Residence
 - Pickaway County Trail (along abandoned railroad corridor)
 - Railroad
 - Existing Transmission Line
 - - - Approximate Distribution Line
 - Watercourse (NHD)
 - NHRP-Listed Historic District
 - Elmon Richards Scioto River Fishing and Boat Access
 - Fleming Bend Wetland
 - Restoration Project
 - NRCS / ACEP-WRE
 - State Trust Land
 - Study Area
 - City Boundary
 - Township Boundary



Sources: ESR1 World Imagery; NEER, 2022; ECT, 2022.

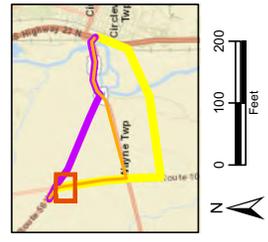


Business Confidential: Not for Public Distribution



Figure 3B
Conceptual Routes
Inset Map
Circleville Solar Transmission Line
Pickaway County, Ohio
Date: 9/17/2022

- Legend**
- Conceptual Route 1
 - Conceptual Route 2
 - Conceptual Route 3
 - Residence
 - Approximate Distribution Line
 - Study Area
 - Township Boundary



Sources: ESRI World Imagery; NEER, 2022;
ECT, 2022.





Figure 3C
Conceptual Routes
Inset Map

Circleville Solar Transmission Line
Pickaway County, Ohio
Date: 9/17/2022

- Legend**
- Conceptual Route 1
 - Conceptual Route 3
 - Residence
 - Approximate Distribution Line
 - Study Area
 - Township Boundary



Source: ESRI World Imagery, NEER, 2022;
ECT, 2022.



Figure 3D Conceptual Routes Inset Map

Circleville Solar Transmission Line
Pickaway County, Ohio
Date: 9/12/2022

- Legend**
- Conceptual Route 1
 - Conceptual Route 3
 - Church
 - Commercial
 - Approximate Distribution Line
 - Study Area
 - Township Boundary



Sources: ESRI World Imagery; NEER, 2022;
ECT, 2022.



Business Confidential: Not for Public Distribution

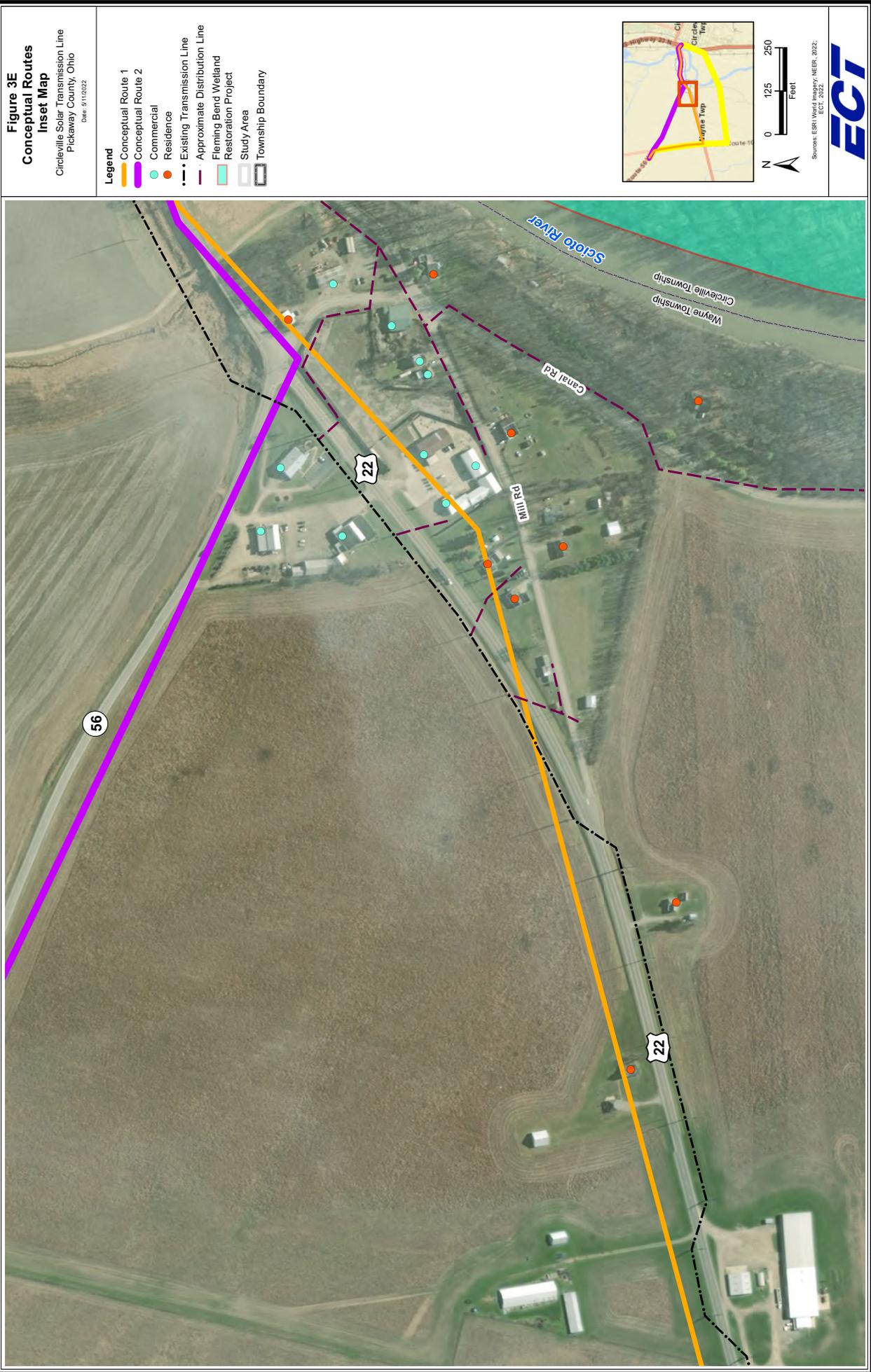




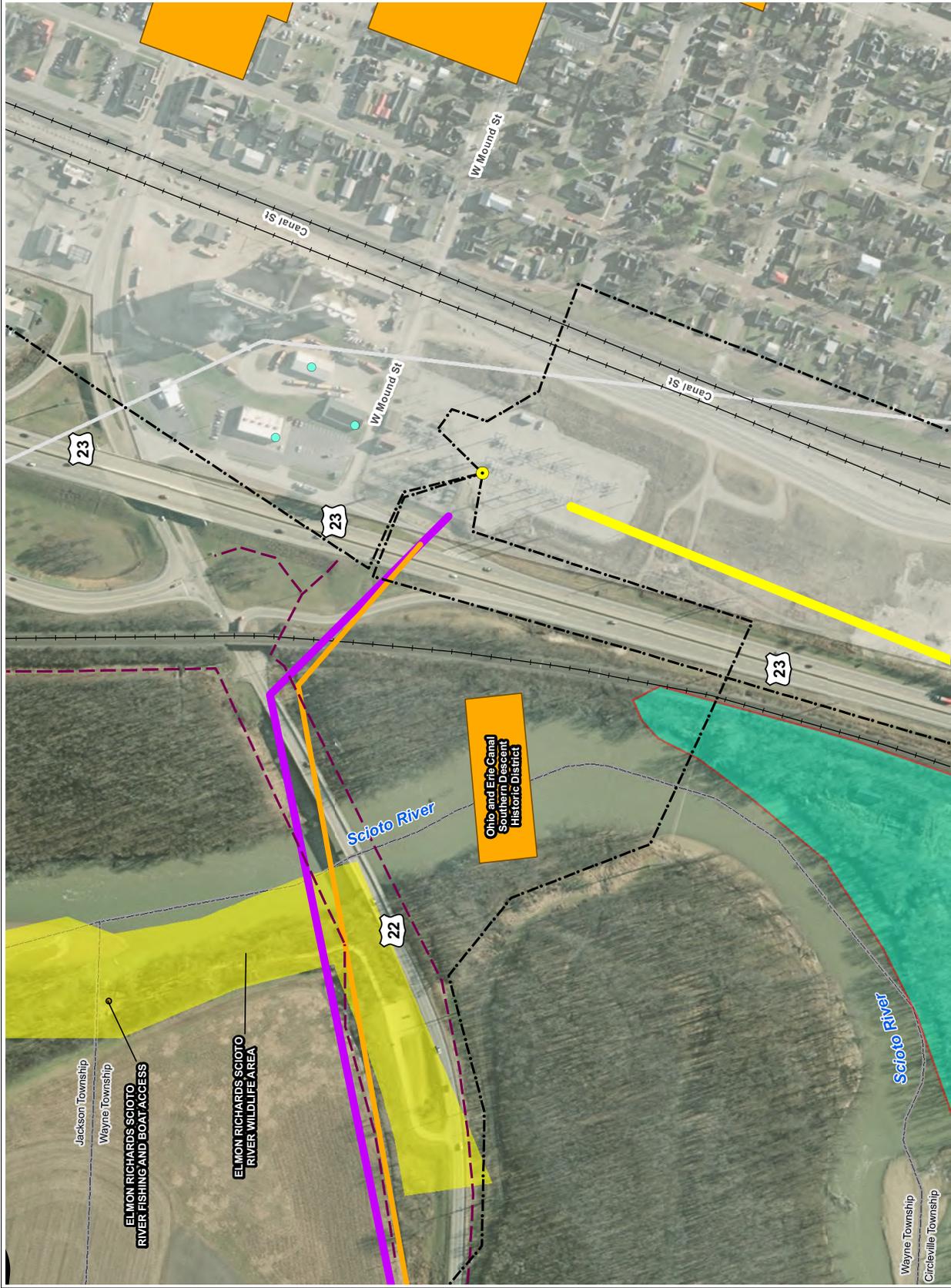
Figure 3G Conceptual Routes Inset Map

Circleville Solar Transmission Line
Pickaway County, Ohio
Date: 9/17/2022

- Legend**
- Circleville Substation
 - Conceptual Route 1
 - Conceptual Route 2
 - Conceptual Route 3
 - Commercial
 - Railroad
 - Existing Transmission Line
 - Approximate Distribution Line
 - NRHP-Listed Historic District
 - Elmon Richards Scioto River Fishing and Boat Access
 - Fleming Bend Wetland
 - Restoration Project
 - State Trust Land
 - Study Area
 - City Boundary
 - Township Boundary

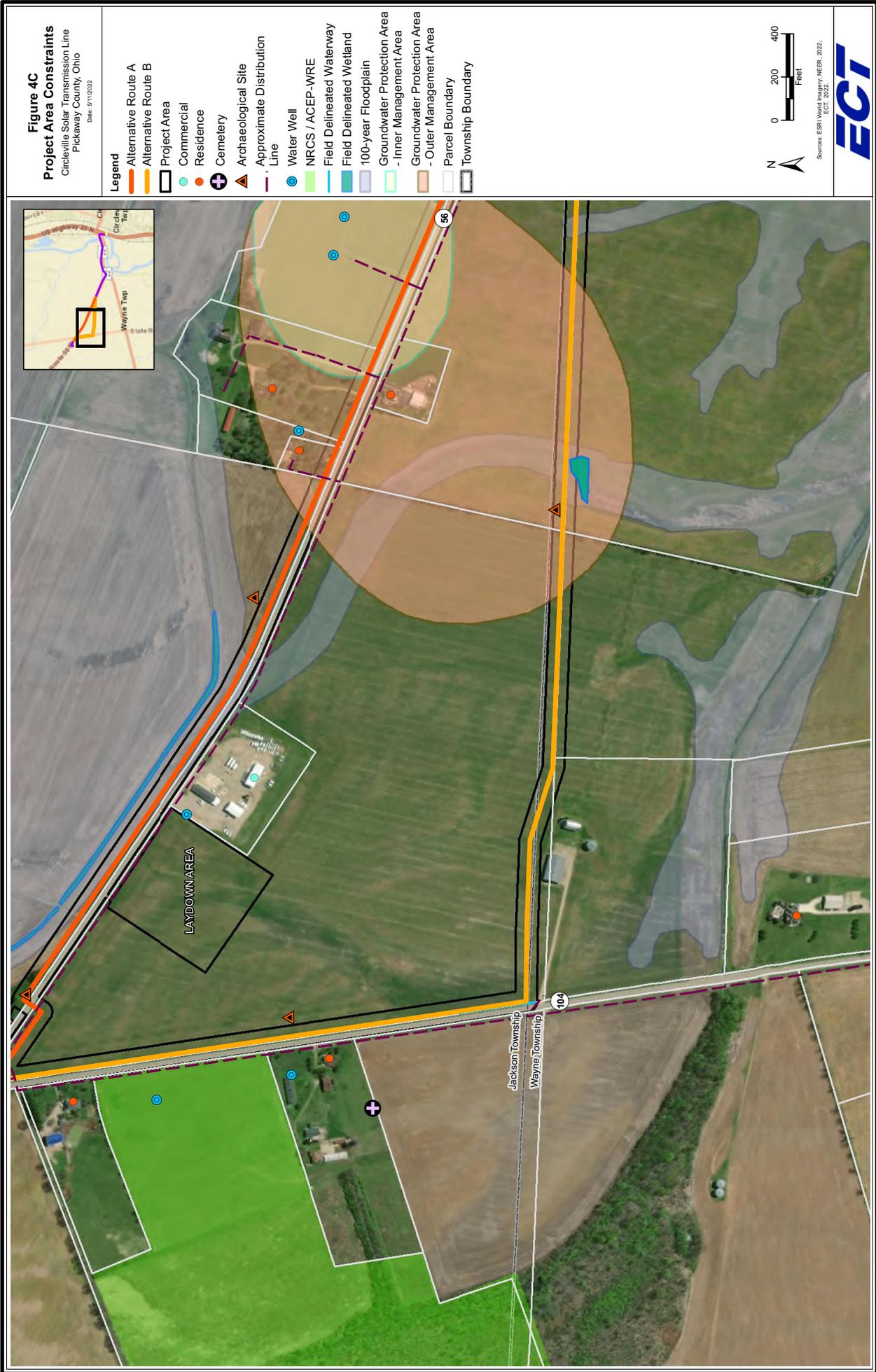


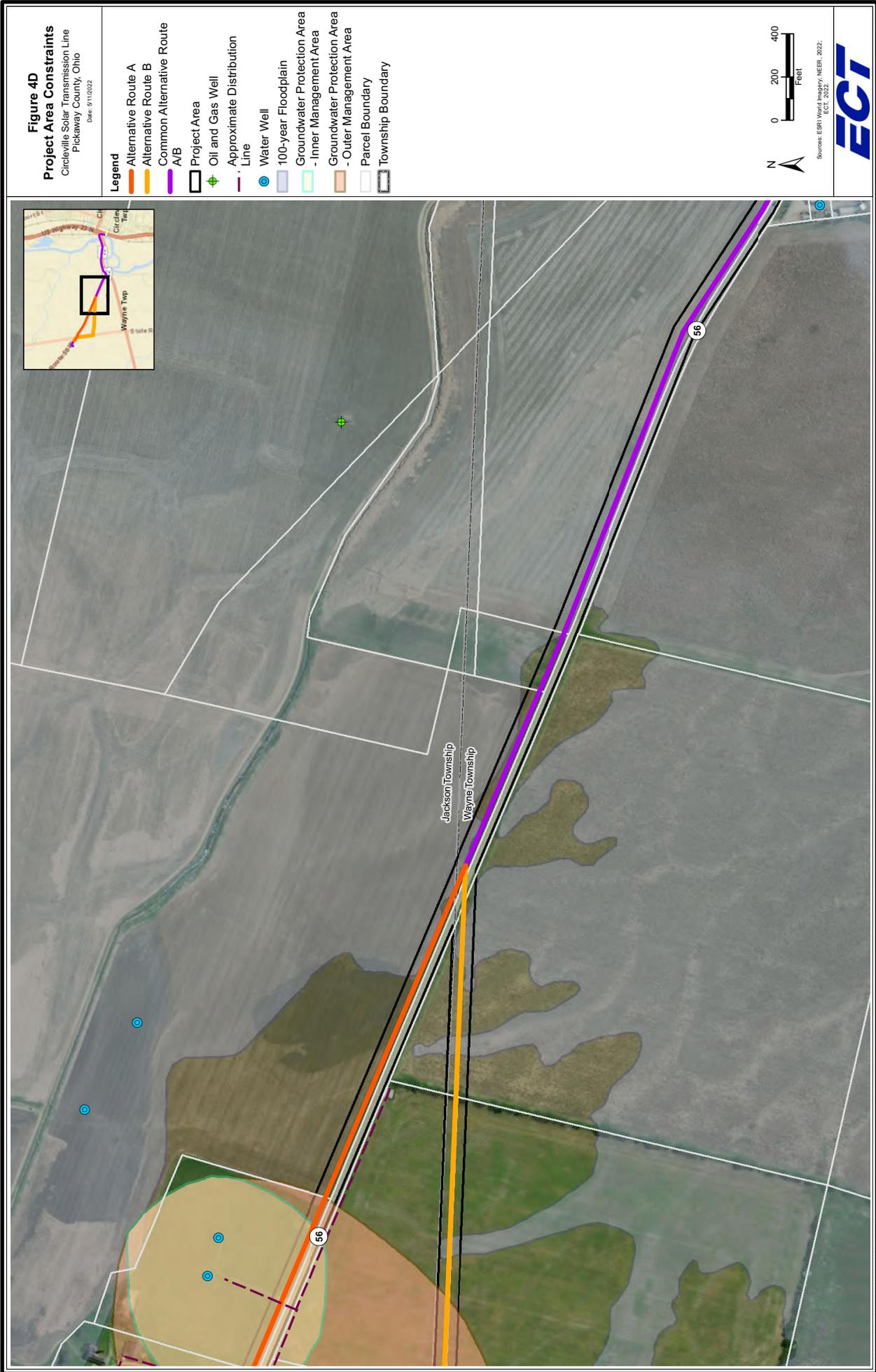
Sources: ESRI World Imagery; NEER, 2022;
ECT, 2022.





Business Confidential: Not for Public Distribution





Business Confidential: Not for Public Distribution

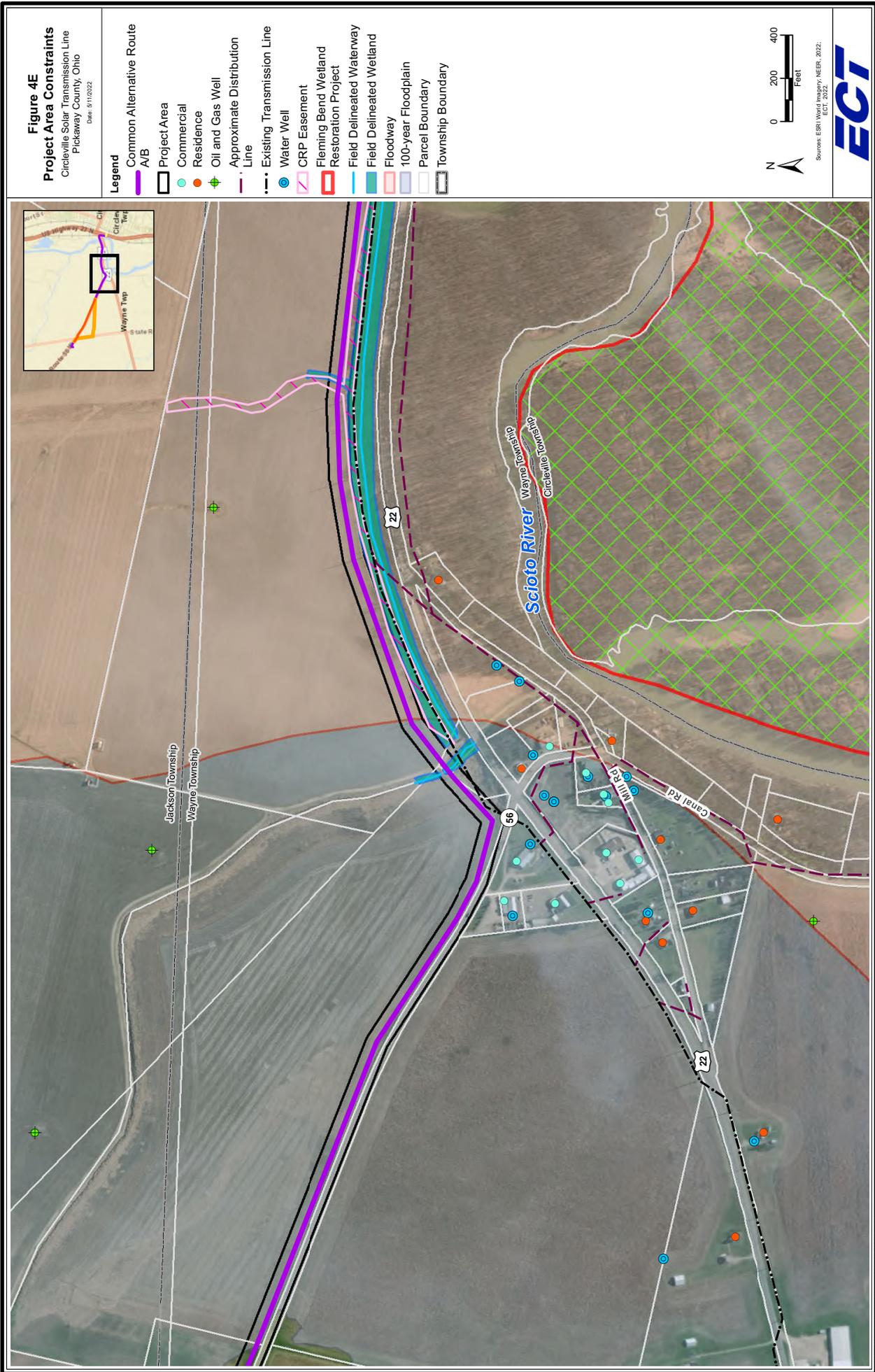


Figure 4F
Project Area Constraints
 Circleville Solar Transmission Line
 Pickaway County, Ohio
 Date: 9/17/2022

- Legend**
- Circleville Substation
 - Common Alternative Route A/B
 - Common Alternative Route A/B - Underground
 - Project Area
 - Commercial
 - Church
 - School
 - NRHP-Listed or Eligible Architectural/Historical Resource
 - Architectural/Historical Resource (Not NRHP-Listed or Eligible)
 - NRHP-Listed Historic District
 - Archaeological Site
 - Railroad
 - Approximate Distribution Line
 - Existing Transmission Line
 - Water Well
 - Elmon Richards Scioto River Fishing and Boat Access
 - CRP Easement
 - Fleming Bend Wetland Restoration Project
 - State Trust Land
 - Field Delineated Waterway
 - Field Delineated Wetland
 - Floodway
 - 100-year Floodplain
 - Parcel Boundary
 - City Boundary
 - Township Boundary



Source: ESRI World Imagery, NEER, 2022; ECT, 2022.

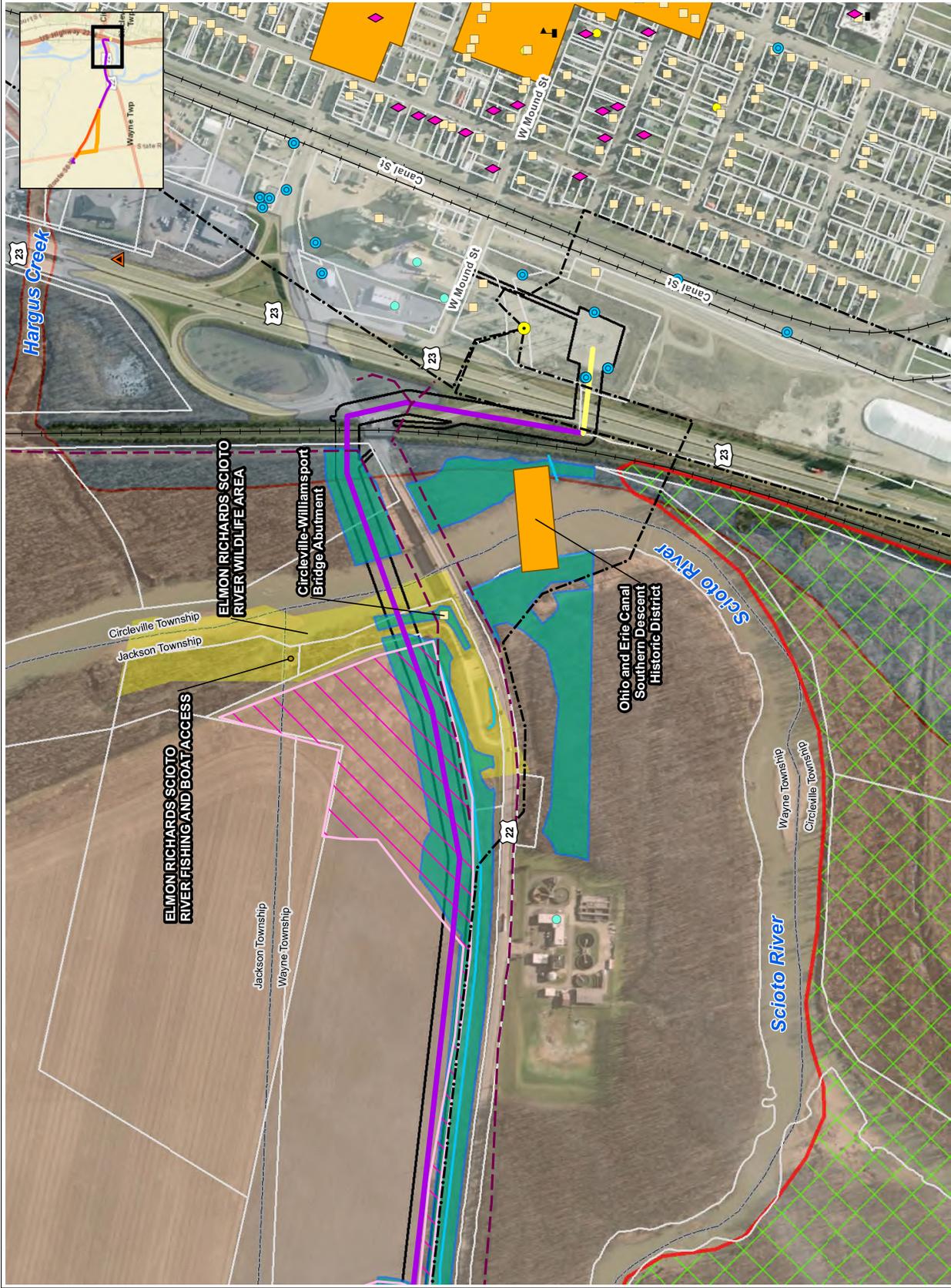




Figure 5
Preferred Route

Circleville Solar Transmission Line
Pickaway County, Ohio
Date: 4/7/2022

- Legend**
- Circleville Substation
 - Collector Substation
 - Preferred Route
 - Watercourse (NHD)
 - Township Boundary
 - City Boundary



Source: ESRI World Imagery; NEER, 2022;
ECT, 2022.



Appendix B GIS Data Sources

Table 2-1. Data Sources

Data	Data Source	Date Accessed/Downloaded
Environmental Data		
Waterways	NWI ECT Field Delineation	January 2022 January-March 2022
Waterbodies	NWI ECT Field Delineation	January 2022 January-March 2022
Wetlands	NWI ECT Field Delineation	January 2022 January-March 2022
FEMA Flood Hazard Data	FEMA	April/September 2021
Groundwater Protection Areas	Ohio EPA	January 2020
Water Wells	ODNR	January 2022
Prime Farmland	USDA Soils	January 2022
Mining/Caves	ODNR	January 2022
Tre Clearing	Aerial interpretation from ESRI World Imagery and Google Earth, Windshield field survey	January 2021 (ESRI World Imagery) March 2021 (Google Earth) Fall 2021
Scenic Rivers	ODOT TIMS	January 2022
Land Use/Social Data		
Parcels	Pickaway County	January 2022
Landowners	Pickaway County	January 2022
Residences	Pickaway County data, Aerial interpretation from ESRI World Imagery and Google Earth, Windshield field survey	January 2022 January 2021 (ESRI World Imagery) March 2021 (Google Earth) Fall 2021
Structures within 1-mile of Project (schools, churches, commercial and industrial uses, etc.)	USGS GNIS Pickaway County data Aerial interpretation from ESRI World Imagery and Google Earth, Windshield field survey	2013 January 2022 January 2021 (ESRI World Imagery) March 2021 (Google Earth) Fall 2021
Recreational Areas	Pickaway County USGS GNIS	January 2022 2013
Federal/State Land Conservation Lands (ACEP, WRP/WRE, CRP, etc)	NCED Database USGS Protected Areas Database (PADUS)	January 2022 January 2022
Cropland/Pastureland	NLCD Aerial interpretation from ESRI World Imagery and Google Earth	2019 January 2021 (ESRI World Imagery) March 2021 (Google Earth)
Known Archaeological Resources Sites	OHPO Field Survey	March 2022 January-March 2022
NRHP	OHPO Field Survey	March 2022 January-March 2022
Boundaries (city, township, county)	ODOT TIMS	January 2022
Engineering Data		
Roads	North American Detailed Streets	January 2022
Railroads	ESRI, USGS	January 2022

Data	Data Source	Date Accessed/Downloaded
Pipelines	National Pipeline Mapping System U.S. Energy Info Admin.	January 2022 April 2020
Oil/Gas Wells	ODNR	January 2022
Slopes	USDA Soils	January 2022
Transmission Lines	Homeland Infrastructure Foundation-Level Data (HIFLD) Aerial interpretation from ESRI World Imagery and Google Earth	January 2020 January 2021 (ESRI World Imagery) March 2021 (Google Earth)
Distribution Lines	Aerial interpretation from ESRI World Imagery and Google Earth	January 2021 (ESRI World Imagery) March 2021 (Google Earth)
Communication Towers	FCC antenna registration data	January 2022
Airports and Heliports	FAA, USDA NRCS, ODOT TIMS	January 2022

Appendix C Agency Coordination Letters



UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
Ecological Services Office
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / Fax (614) 416-8994



TAILS# 03E15000-2021-TA-1717

Dear Ms. Miller,

The U.S Fish and Wildlife Service (Service) has received your recent correspondence requesting information about the subject proposal. We offer the following comments and recommendations to assist you in minimizing and avoiding adverse impacts to threatened and endangered species pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq), as amended (ESA).

Federally Threatened and Endangered Species: The endangered Indiana bat (*Myotis sodalis*) and threatened northern long-eared bat (*Myotis septentrionalis*) occur throughout the State of Ohio. The Indiana bat and northern long-eared bat may be found wherever suitable habitat occurs unless a presence/absence survey has been performed to document absence. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and breed that may also include adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, woodlots, fallow fields, and pastures. Roost trees for both species include live and standing dead trees ≥ 3 inches diameter at breast height (dbh) that have any exfoliating bark, cracks, crevices, hollows and/or cavities. These roost trees may be located in forested habitats as well as linear features such as fencerows, riparian forests, and other wooded corridors. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. In the winter, Indiana bats and northern long-eared bats hibernate in caves, rock crevices and abandoned mines.

Should the proposed site contain trees ≥ 3 inches dbh, we recommend that trees be saved wherever possible. If any caves or abandoned mines may be disturbed, further coordination with this office is requested to determine if fall or spring portal surveys are warranted. **The Service requests additional information on the extent of tree clearing proposed so that we may evaluate the potential for the project to effect the Indiana and northern long-eared bat and recommend appropriate minimization measures. Please provide estimated acreages of forest clearing as well as maps indicating areas to be cleared.**

Section 7 Coordination: If there is a federal nexus for the project (e.g., federal funding provided, federal permits required to construct), then no tree clearing should occur on any portion of the project area until consultation under section 7 of the ESA, between the Service and the federal action agency, is completed. We recommend the federal action agency submit a determination of effects to this office, relative to the Indiana bat and northern long-eared bat, for our review and concurrence. This letter provides technical assistance only and does not serve as a completed section 7 consultation document.

Stream and Wetland Avoidance: Over 90% of the wetlands in Ohio have been drained, filled, or modified by human activities, thus is it important to conserve the functions and values of the remaining wetlands in Ohio (https://epa.ohio.gov/portals/47/facts/ohio_wetlands.pdf). We recommend avoiding and minimizing project impacts to all wetland habitats (e.g., forests, streams, vernal pools) to the maximum extent possible in order to benefit water quality and fish and wildlife habitat. Additionally, natural buffers around streams and wetlands should be preserved to enhance beneficial functions. If streams or wetlands will be impacted, the U.S. Army Corps of Engineers should be contacted to determine whether a Clean Water Act section 404 permit is required. Best management practices should be used to minimize erosion, especially on slopes. Disturbed areas should be mulched and revegetated with native plant species. In addition, prevention of non-native, invasive plant establishment is critical in maintaining high quality habitats.

Due to the project type, size, and location, we do not anticipate adverse effects to any other federally endangered, threatened, or proposed species, or proposed or designated critical habitat. Should the project design change, or additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, coordination with the Service should be initiated to assess any potential impacts.

Thank you for your efforts to conserve listed species and sensitive habitats in Ohio. We recommend coordinating with the Ohio Department of Natural Resources due to the potential for the proposed project to affect state listed species and/or state lands. Contact Mike Pettegrew, Acting Environmental Services Administrator, at (614) 265-6387 or at mike.pettegrew@dnr.state.oh.us.

If you have questions, or if we can be of further assistance in this matter, please contact our office at (614) 416-8993 or ohio@fws.gov.

Sincerely,

A handwritten signature in blue ink, reading "Patrice M. Ashfield". The signature is fluid and cursive, with a large initial "P" and a long, sweeping underline.

Patrice M. Ashfield
Field Office Supervisor

cc: Nathan Reardon, ODNR-DOW
Kate Parsons, ODNR-DOW



Ohio Department of Natural Resources

MIKE DeWINE, GOVERNOR

MARY MERTZ, DIRECTOR

Jeff Johnson, Chief
Division of Natural Areas & Preserves
2045 Morse Rd, Building A
Columbus, Ohio 43229

20 May 2021

Jessica Miller
Environmental Consulting & Technology, Inc.
161 E. Aurora Rd.
Northfield, OH 44067

Dear Ms. Miller,

I have reviewed the Natural Heritage Database for the Circleville Commercial Development Revised project area, including a one mile radius, in Jackson, Wayne and Circleville Townships, Pickaway County, Ohio. The numbers/letters on the list below correspond to the areas marked on the accompanying map. Common name, scientific name and status are given for each species. Statuses are defined as: E = state endangered; T = state threatened; P = state potentially threatened; SC = state species of concern; FE = federal endangered, and FT = federal threatened.

- A. Big Darby Creek State Scenic River
- B. Richards 1 Scenic River Easement – ODNR Scenic Rivers Program
- C. Richards 3 Scenic River Easement – ODNR Scenic Rivers Program
- D. Elmon Richards Scioto River Wildlife Area – ODNR Division of Wildlife
- E. Calamus Swamp – Columbus Audubon Society
- F. Circleville Canal Wildlife Area – ODNR Division of Wildlife
- 1. *Alasmodonta marginata* – Elktoe, SC
- Cyclonaias tuberculata* – Purple Wartback, SC
- Elliptio crassidens* – Elephant-ear, E
- Epioblasma rangiana* – Northern Riffleshell, E, FE
- Epioblasma triquetra* – Snuffbox, E, FE
- Etheostoma maculatum* – Spotted Darter, E
- Etheostoma tippecanoe* – Tippecanoe Darter, T
- Ichthyomyzon fossor* – Northern Brook Lamprey, E
- Lampsilis fasciola* – Wavy-rayed Lampmussel SC
- Ligumia recta* – Black Sandshell, T
- Megalonaias nervosa* – Washboard, E
- Mussel Bed
- Noturus stigmosus* – Northern Madtom, E
- Pleurobema clava* – Clubshell, E, FE
- Pleurobema sintoxia* – Round Pigtoe, SC
- Ptychobranhus fasciolaris* – Kidneyshell, SC
- Theliderma cylindrical* – Rabbitsfoot, E, FT
- Truncilla donaciformis* – Fawnsfoot, T
- Truncilla truncata* – Deertoe, SC

2. *Erimyzon claviformis* – Western Creek Chubsucker, SC
3. *Alasmidonta marginata* – Elktoe, SC
- Cycleptus elongatus* – Blue Sucker, T
- Cyclonaias tuberculata* – Purple Wartback, SC
- Cyperus acuminatus* – Pale Umbrella-sedge, P
- Cyprogenia stegaria* – Fanshell, E, FE
- Elliptio crassidens* – Elephant-ear, E
- Epioblasma rangiana* – Northern Riffleshell, E, FE
- Epioblasma triquetra* – Snuffbox, E, FE
- Etheostoma maculatum* – Spotted Darter, E
- Etheostoma tippecanoe* – Tippecanoe Darter, T
- Fusconaia subrotunda* – Long-solid, E
- Hiodon alosoides* – Goldeye, E
- Lampsilis abrupta* – Pink Mucket, E, FE
- Lampsilis fasciola* – Wavy-rayed Lampmussel SC
- Lampsilis ovata* – Pocketbook, E
- Ligumia recta* – Black Sandshell, T
- Noturus stigmosus* – Northern Madtom, E
- Obliquaria reflexa* – Threehorn Wartback, T
- Pleurobema clava* – Clubshell, E, FE
- Pleurobema sintoxia* – Round Pigtoe, SC
- Polyodon spathula* – Paddlefish, T
- Ptychobranthus fasciolaris* – Kidneyshell, SC
- Theliderma cylindrical* – Rabbitsfoot, E, FT
- Truncilla donaciformis* – Fawnsfoot, T
- Truncilla truncata* – Deertoe, SC
4. Breeding Amphibian Site
5. *Erimyzon sucetta* – Lake Chubsucker, T

If this project is located within 1000 feet of a state designated scenic river, the approval of the Director of ODNR may be required in accordance with Ohio Revised Code section 1547.82. Please contact Scenic River Program Manager Bob Gable at 614-265-6814 for further information.

We are unaware of any geologic features, state nature preserves, parks or forests or national wildlife refuges, parks or forests within a one mile radius of the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. This letter only represents a review of rare species and natural features data within the Ohio Natural Heritage Database. It does not fulfill coordination under the National Environmental Policy Act (NEPA) or the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S. C. 661 et seq.) and does not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

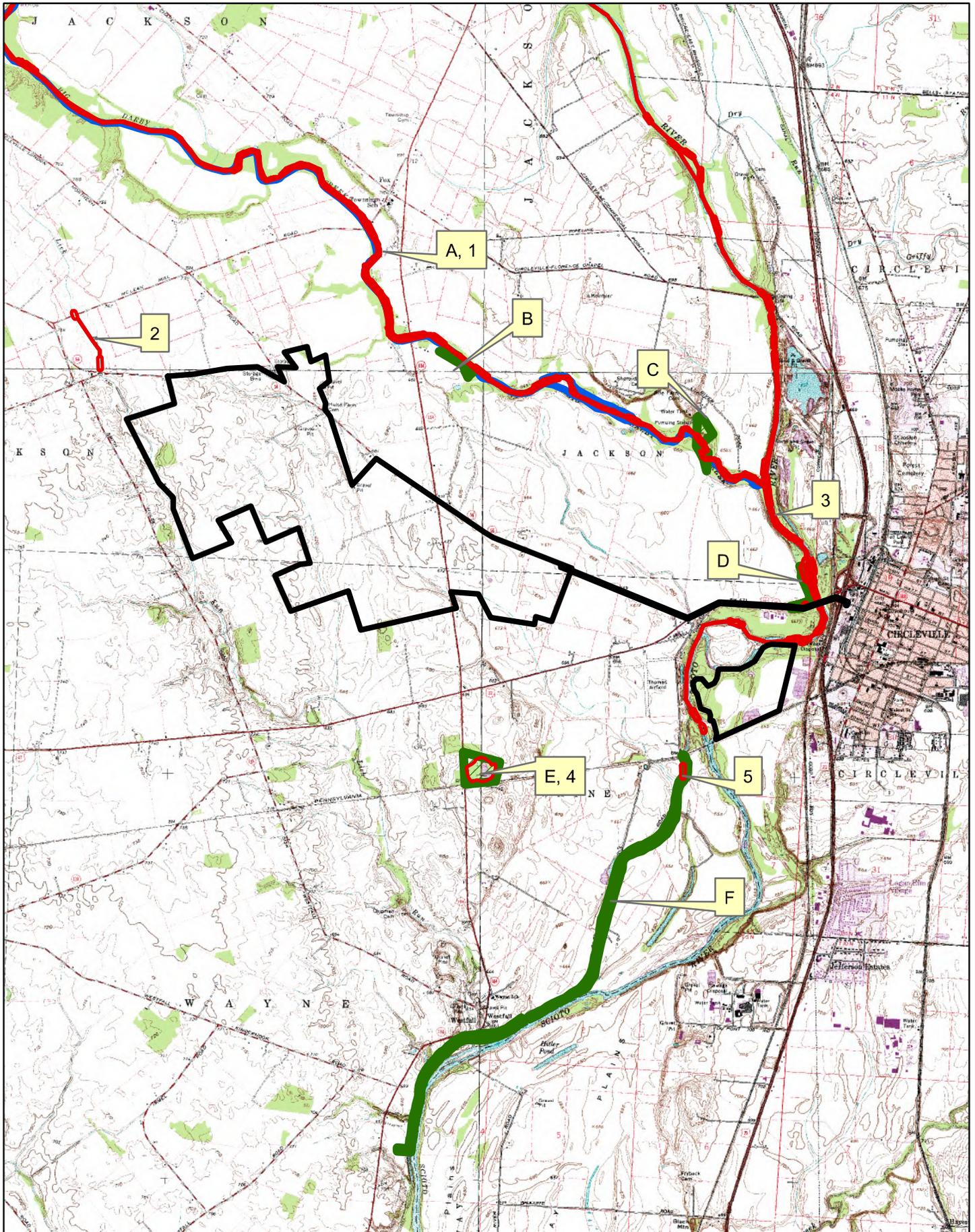
Please contact me at 614-265-6818 if I can be of further assistance.

Sincerely,



Debbie Woischke
Ohio Natural Heritage Program

Circleville Commercial Development





Ohio Department of Natural Resources

MIKE DEWINE, GOVERNOR

MARY MERTZ, DIRECTOR

Office of Real Estate
John Kessler, Chief
2045 Morse Road – Bldg. E-2
Columbus, OH 43229
Phone: (614) 265-6621
Fax: (614) 267-4764

September 1, 2021

Jessica Miller
Environmental Consulting & Technology, Inc.
161 East Aurora Road
Northfield, OH 44067

Re: 21-0714; Circleville Solar Project

Project: The proposed project includes construction activities, including the installation of foundations, project facilities (e.g., solar panels and electric collection lines), and infrastructure necessary for safe and continuous operation and access to the project.

Location: The proposed project is located in Circleville Township, Pickaway County, Ohio.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

Natural Heritage Database: The Natural Heritage Database provided a data request response on May 20, 2021 as included in the submitted project documentation. The Natural Heritage Database has the following data at or within a one mile radius of the project area:

Big Darby Creek State Scenic River
Richards 1 Scenic River Easement – ODNR Scenic Rivers Program
Richards 3 Scenic River Easement – ODNR Scenic Rivers Program
Elmon Richards Scioto River Wildlife Area – ODNR Division of Wildlife
Calamus Swamp – Columbus Audubon Society
ircleville Canal Wildlife Area – ODNR Division of Wildlife
Alasmidonta marginata – Elktoe, SC
Cyclonaias tuberculata – Purple Wartyback, SC
Elliptio crassidens – Elephant-ear, E
Epioblasma rangiana – Northern Riffleshell, E, FE
Epioblasma triquetra – Snuffbox, E, FE
Etheostoma maculatum – Spotted Darter, E
Etheostoma tippecanoe – Tippecanoe Darter, T
Ichthyomyzon fossor – Northern Brook Lamprey, E
Lampsilis fasciola – Wavy-rayed Lampmussel SC

Ligumia recta – Black Sandshell, T
Megalonaias nervosa – Washboard, E
 Mussel Bed
Noturus stigmosus – Northern Madtom, E
Pleurobema clava – Clubshell, E, FE
Pleurobema sintoxia – Round Pigtoe, SC
Ptychobranhus fasciolaris – Kidneyshell, SC
Theliderma cylindrical – Rabbitsfoot, E, FT
Truncilla donaciformis – Fawnsfoot, T
Truncilla truncata – Deertoe, SC
Erimyzon claviformis – Western Creek Chubsucker, SC
Alasmidonta marginata – Elktoe, SC
Cycleptus elongatus – Blue Sucker, T
Cyclonaias tuberculata – Purple Wartyback, SC
Cyperus acuminatus – Pale Umbrella-sedge, P
Cyprogenia stegaria – Fanshell, E, FE
Elliptio crassidens – Elephant-ear, E
Epioblasma rangiana – Northern Riffleshell, E, FE
Epioblasma triquetra – Snuffbox, E, FE
Etheostoma maculatum – Spotted Darter, E
Etheostoma tippecanoe – Tippecanoe Darter, T
Fusconaia subrotunda – Long-solid, E
Hiodon alosoides – Goldeye, E
Lampsilis abrupta – Pink Mucket, E, FE
Lampsilis fasciola – Wavy-rayed Lampmussel SC
Lampsilis ovata – Pocketbook, E
Ligumia recta – Black Sandshell, T
Noturus stigmosus – Northern Madtom, E
Obliquaria reflexa – Threehorn Wartyback, T
Pleurobema clava – Clubshell, E, FE
Pleurobema sintoxia – Round Pigtoe, SC
Polyodon spathula – Paddlefish, T
Ptychobranhus fasciolaris – Kidneyshell, SC
Theliderma cylindrical – Rabbitsfoot, E, FT
Truncilla donaciformis – Fawnsfoot, T
Truncilla truncata – Deertoe, SC
 Breeding Amphibian Site
Erimyzon sucetta – Lake Chubsucker, T

Statuses are defined as: E = state endangered; T = state threatened; P = state potentially threatened; SC = state species of concern; FE = federal endangered, and FT = federal threatened.

The review was performed on the project area specified in the request as well as an additional one mile radius. Records searched date from 1980. This information is provided to inform you of features present within your project area and vicinity. Additional comments on some of the features may be found in pertinent sections below.

Please note that Ohio has not been completely surveyed and we rely on receiving information from many sources. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Although all types of plant communities have been surveyed, we only maintain records on the highest quality areas.

Fish and Wildlife: The Division of Wildlife (DOW) has the following comments.

The DOW recommends that impacts to streams, wetlands and other water resources be avoided and minimized to the fullest extent possible, and that Best Management Practices be utilized to minimize erosion and sedimentation.

The Division of Wildlife is working closely with our partners at Ohio Pollinator Habitat Initiative (OPHI) to create and enhance pollinator habitat at solar power installations. The OPHI Solar Pollinator Program Advisory Team has developed the Ohio Solar Site Pollinator Habitat Planning and Assessment Form and is available for your use. The form can be found at the following: <http://nebula.wsimg.com/7cf0240c398d5819e3e6ff011f0ba456?AccessKeyId=570E4FC7FCD2E D2F0C1A&disposition=0&alloworigin=1>. We recommend that the areas between and around the solar panels be planted with legumes and wildflowers (i.e. forbs) that are beneficial to pollinators and other wildlife and reduce use of non-native grass and gravel. The recommended legumes and forbs listed below are low-growing so as not to cast shadows on the solar panels and would only require one to two mowings a year for maintenance, which should minimize maintenance costs. For other areas of the installation where vegetation does not have to be low-growing, alternative pollinator mixes are available with a more diverse array of flowering plants. This perennial vegetation will provide beneficial foraging habitat to songbirds and pollinators while reducing storm water runoff, standing water, and erosion. Please contact the Ohio Pollinator Habitat Initiative <http://www.ophi.info/>, and specifically Mike Retterer mretterer@pheasantsforever.org for further information on solar power facility pollinator plantings.

Recommended low-growing grasses and forbs may include:

Little Bluestem	<i>Schizachyrium scoparium</i>
Sideoats Grama	<i>Bouteloua curtipendula</i>
Alfalfa	<i>Medicago spp.</i>
Alsike Clover	<i>Trifolium hybridum</i>
Brown-eyed Susan	<i>Rudbeckia triloba</i>
Butterfly Milkweed	<i>Asclepias tuberosa</i>
Lanceleaf Coreopsis	<i>Coreopsis lanceolata</i>
Partridge Pea	<i>Chamaecrista fasciculata</i>
Timothy	<i>Phleum pratense</i>
Orchardgrass	<i>Dactylis glomerata</i>
Crimson Clover	<i>Trifolium incarnatum</i>
Ladino or White Clover	<i>Trifolium repens</i>

The entire state of Ohio is within the range of the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), a state endangered and federally threatened species, the little brown bat (*Myotis lucifugus*), a state endangered species, and the tricolored bat (*Perimyotis subflavus*), a state endangered species. During the spring and summer (April 1 through September 30), these species of bats predominately roost in trees behind loose, exfoliating bark, in crevices and cavities, or in the leaves. However, these species are also dependent on the forest structure surrounding roost trees. If trees are present within the project area, and trees must be cut, the DOW recommends cutting only occur from October 1 through March 31, conserving trees with loose, shaggy bark and/or crevices, holes, or cavities, as well as trees with DBH ≥ 20 if possible. If trees are present within the project area, and trees must be cut during the summer months, the DOW recommends a mist

net survey or acoustic survey be conducted from June 1 through August 15, prior to any cutting. Mist net and acoustic surveys should be conducted in accordance with the most recent version of the “OHIO DIVISION OF WILDLIFE GUIDANCE FOR BAT SURVEYS AND TREE CLEARING”. If state listed bats are documented, DOW recommends cutting only occur from October 1 through March 31. However, limited summer tree cutting may be acceptable after consultation with the DOW (contact Erin Hazelton at Erin.hazelton@dnr.ohio.gov).

The DOW also recommends that a desktop habitat assessment is conducted, followed by a field assessment if needed, to determine if a potential hibernaculum is present within the project area. Direction on how to conduct habitat assessments can be found in the current USFWS “Range-wide Indiana Bat Survey Guidelines.” If a habitat assessment finds that a potential hibernaculum is present within 0.25 miles of the project area, please send this information to Erin Hazelton for project recommendations. If a potential or known hibernaculum is found, the DOW recommends a 0.25-mile tree cutting and subsurface disturbance buffer around the hibernaculum entrance, however, limited summer or winter tree cutting may be acceptable after consultation with the DOW. If no tree cutting or subsurface impacts to a hibernaculum are proposed, this project is not likely to impact these species.

The project is within the range of the following listed mussel species.

Federally Endangered

clubshell (*Pleurobema clava*)
fanshell (*Cyprogenia stegaria*)
northern riffleshell (*Epioblasma torulosa rangiana*)
purple cat’s paw (*Epioblasma o. obliquata*)
rayed bean (*Villosa fabalis*)
snuffbox (*Epioblasma triquetra*)

Federally Threatened

rabbitsfoot (*Quadrula cylindrica cylindrica*)

State Endangered

butterfly (*Ellipsaria lineolata*)
ebonyshell (*Fusconaia ebenus*)
elephant-ear (*Elliptio crassidens*)
long-solid (*Fusconaia maculata maculata*)
Ohio pigtoe (*Pleurobema cordatum*)
pyramid pigtoe (*Pleurobema rubrum*)
sharp-ridged pocketbook (*Lampsilis ovata*)
washboard (*Megaloniais nervosa*)

State Threatened

black sandshell (*Ligumia recta*)
fawnsfoot (*Truncilla donaciformis*)
pondhorn (*Unio merus tetralasmus*)
threehorn wartyback (*Obliquaria reflexa*)

Due to the location, and that there is no in-water work proposed in a perennial stream of sufficient size, this project is not likely to impact these species.

The project is within the range of the following listed fish species.

Federally Endangered

Scioto madtom (*Noturus trautmani*)

State Endangered

bigeye shiner (*Notropis boops*)

goldeye (*Hiodon alosoides*)

northern brook lamprey (*Ichthyomyzon fossor*)

northern madtom (*Noturus stigmosus*)

shortnose gar (*Lepisosteus platostomus*)

spotted darter (*Etheostoma maculatum*)

shovelnose sturgeon (*Scaphirhynchus platyrhynchus*)

State Threatened

blue sucker (*Cypleptus elongatus*)

lake chubsucker (*Erimyzon sucetta*)

paddlefish (*Polyodon spathula*)

Tippecanoe darter (*Etheostoma tippecanoe*)

The DOW recommends no in-water work in perennial streams from March 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat. If no in-water work is proposed in a perennial stream, this project is not likely to impact these or other aquatic species.

The project is within the range of the lark sparrow (*Chondestes grammacus*), a state endangered bird. This sparrow nests in grassland habitats with scattered shrub layers, disturbed open areas, as well as patches of bare soil. In the Oak Openings area west of Toledo, lark sparrows occupy open grass and shrubby fields along sandy beach ridges. These summer residents normally migrate out of Ohio shortly after their young fledge or leave the nest. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of May 1 through July 31. If this habitat will not be impacted, this project is not likely to impact this species.

The project is within the range of the least bittern (*Ixobrychus exilis*), a state threatened bird. This secretive marsh species prefers dense emergent wetlands with thick stands of cattails, sedges, sawgrass or other semiaquatic vegetation interspersed with woody vegetation and open water. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of May 1 through July 31. If this type of habitat will not be impacted, this project is not likely to impact this species.

The project is within the range of the northern harrier (*Circus hudsonis*), a state endangered bird. This is a common migrant and winter species. Nesters are much rarer, although they occasionally breed in large marshes and grasslands. Harriers often nest in loose colonies. The female builds a nest out of sticks on the ground, often on top of a mound. Harriers hunt over grasslands. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 through July 31. If this habitat will not be impacted, this project is not likely to impact this species.

The project is within the range of the sandhill crane (*Grus canadensis*), a state threatened species. Sandhill cranes are primarily a wetland-dependent species. On their wintering grounds, they will utilize agricultural fields; however, they roost in shallow, standing water or moist bottomlands. On breeding grounds they require a rather large tract of wet meadow, shallow marsh, or bog for nesting. If grassland, prairie, or wetland habitat will be impacted, construction

should be avoided in this habitat during the species' nesting period of April 1 through August 31. If this habitat will not be impacted, this project is not likely to have an impact on this species.

The project is within the range of the upland sandpiper (*Bartramia longicauda*), a state endangered bird. Nesting upland sandpipers utilize dry grasslands including native grasslands, seeded grasslands, grazed and ungrazed pasture, hayfields, and grasslands established through the Conservation Reserve Program (CRP). If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 through July 31. If this type of habitat will not be impacted, this project is not likely to impact this species.

Due to the potential of impacts to federally listed species, as well as to state listed species, we recommend that this project be coordinated with the US Fish & Wildlife Service.

Geological Survey: The Division of Geological Survey has the following comments.

Physiographic Region

The proposed project area is in Jackson and Wayne Townships, Pickaway County. This area is in the Columbus Lowland physiographic region. This region is characterized by lowland terrain surrounded by relative uplands. There is a broad slope towards the Scioto Valley and many large streams throughout the region. The geology of the region consists of loamy Wisconsinan-age till and extensive outwash in the Scioto Valley covering underlying bedrock (Ohio Department of Natural Resources, Division of Geological Survey, 1998).

Surficial/Glacial Geology

The project area lies within the glaciated margin of the state and includes several Wisconsinan-age glacial features. The western portion of the project area is covered by flat to gently undulating ground moraine made of silty loam till. The eastern portion of the project area is covered by valley train outwash deposited by meltwater exiting the Wisconsinan glaciers (Pavey et al, 1999). Glacial drift throughout most of the study area is between 82 and 158 feet thick. Drift is variable throughout the project area, but thickest along the south-central edge (Powers and Swinford, 2004).

Bedrock Geology

The uppermost bedrock unit in the project area is the Ohio and Olentangy Shales Undivided. This unit is Devonian-age and consists of greenish gray to gray shale. The unit is clayey and often contains disseminated pyrite. Locally this unit may contain lenses or nodules of limestone as well as thin beds of brownish-black shale in the upper portion. It should be noted that bedrock is not exposed at the surface within the boundaries of the project area due to significant glacial drift. Underlying the Ohio and Olentangy Shales Undivided is the Devonian-age Columbus Limestone. This unit is characterized by bluish gray to brown fossiliferous limestone. The unit may be dolomitic in places and frequently contains solution features. It should be noted that bedrock is not exposed at the surface within the boundaries of the project area due to significant glacial drift (Slucher et al, 2006).

Oil, Gas and Mining

ODNR has record of 46 oil and gas wells within one mile of the proposed project area. Most of these wells are listed as final restoration or producing. Thirteen of the wells are actively producing oil. These wells produce out of the Copper Ridge Dolomite, Rose Run Sandstone, Knox Dolomite, or the Trempealeau Formation. Many of the wells are a part of the Lick Run oil field which has an average producing depth of 2490 feet. Additionally, there are five active

injection wells within one mile of the project area. There are two recently permitted wells; one that has been drilled but not yet producing and another has yet to be drilled. The remaining oil and gas wells are either restored, plugged and abandoned, or permitted but never drilled and now have expired permits (Ohio Department of Natural Resources, Division of Oil and Gas, Ohio Oil and Gas Wells Locator).

ODNR does not have record of any mining operations within the project area. The nearest mine to the project area is the Stevenson Site, a former sand and gravel quarry that was previously operated by Richards Farms Inc. The Stevenson Site is located adjacent to the northeastern edge of the project area (Ohio Department of Natural Resources, Division of Mineral Resources, Mines of Ohio).

Seismic Activity

Several small earthquakes have historically been recorded near the site. The three events closest to the site are listed in the chart below (Ohio Department of Natural Resources, Division of Geological Survey, Ohio Earthquake Epicenters):

Date	Magnitude	Distance to Site Boundary	County	Township
October 21, 2013	2.0	3.4 miles	Pickaway	Jackson
November 12, 1899	3.1	20.6 miles	Ross	Scioto
January 16, 1870	2.9	21.9 miles	Fairfield	Berne

Soils

According to the USDA Web Soil Survey, the project area consists primarily of soils derived from loess and outwash. Eldean, Warsaw, and Kokomo are the most common soil series found within the boundaries of the project area. Predominately found in the eastern half of the project area these soils make up over 47% of the project area and are loams derived from outwash and glacial fluvial deposits. The Crosby, Miamian, and Westland Soils, common on the western half of the project area, account for 42% of the project area and are silt and clay loams derived from loess and till glacial till (USDA Web Soil Survey).

There is a low risk of shrink-swell potential in these soils. Slope variable, with slope seldom exceeding a 18% grade. Slopes are greatest along stream valleys (Ker and Christman, 1980 and USDA Web Soil Survey).

Groundwater

Groundwater resources vary throughout the project area. Wells developed in the underlying limestone bedrock are likely to yield up to 100 gallons per minute. The principle confined aquifer is the Columbus Limestone beneath the Ohio and Olentangy Shales Undivided. Yields up to 100 gallons per minute have been obtained from solution cavities at depths greater than 225 feet. Consolidated bedrock aquifer yields increase as the Ohio and Olentangy Shales thin to the west and the Columbus Limestone becomes more accessible and recharge to the Columbus Limestone increases (Schmidt, 1990 and Ohio Department of Natural Resources, Division of Water, Bedrock Aquifer Map, 2000). Wells developed in unconsolidated glacial material are likely to yield 5 to 500 gallons per minute. The main unconsolidated aquifer is the Scioto Buried Valley Aquifer, a thick deposit of sand and gravel. The Scioto Buried Valley Aquifer, located in the east half of the project area can produce yields between 100 and 500 gallons per minute. The western half of the project area contains the Prairie Complex Aquifer which is characterized by relatively thick clay layers interbedded with water-bearing deposits of sand and gravel. These sand and gravel deposits may yield between 5 and 25 gallons per minute (Ohio Department of Natural Resources, Division of Water, Statewide Unconsolidated Aquifer Map, 2000).

ODNR has record of 133 water wells drilled within one mile of the project area. These wells range in depth from 26 to 252 feet deep, with an average depth of 77.7 feet. The most common aquifer listed is sand and gravel. Sand and gravel aquifers account for 124 of the water wells. The remaining wells are bedrock wells with four wells producing out of limestone, four wells producing out of shale, and one record listing rock as the aquifer. Sustainable yields of 4 to 78 gallons per minute have been recorded from wells drilled in this area based on well log records. The average sustainable yield from these records within one mile was 18.3 gallons per minute. This is based on records from 40 wells within one mile of the project area that contain sustainable yield data. (Ohio Department of Natural Resources, Division of Geological Survey, Ohio Water Wells).

Water Resources: The Division of Water Resources has the following comment.

The local floodplain administrator should be contacted concerning the possible need for any floodplain permits or approvals for this project. Your local floodplain administrator contact information can be found at the website below.

http://water.ohiodnr.gov/portals/soilwater/pdf/floodplain/Floodplain%20Manager%20Community%20Contact%20List_8_16.pdf

ODNR appreciates the opportunity to provide these comments. Please contact Mike Pettegrew at mike.pettegrew@dnr.ohio.gov if you have questions about these comments or need additional information.

Mike Pettegrew
Environmental Services Administrator (Acting)

From: Richard.Gardner@dnr.ohio.gov <Richard.Gardner@dnr.ohio.gov>
Sent: Monday, April 11, 2022 7:10 AM
To: Valerie Locker <vlocker@ectinc.com>
Cc: Beth Wilburn <bwilburn@ectinc.com>
Subject: RE: Circleville Solar (21-0714) Pale Umbrella Sedge

Valerie,

I apologize for not responding sooner. I think our staff member used an old data set when she did the ONHD search. *Cyperus acuminatus* is no longer listed. We downgraded the species in 2020 for being secure. You will not need to do any surveys for this species.

I apologize for the unnecessary work.

Sincerely,



Rick Gardner (he,him,his)
Chief Botanist
Division of Natural Areas & Preserves
Department of Natural Resources
2045 Morse Road, H-3
Columbus, OH 43229

office: (614) 265-6419
richard.gardner@dnr.ohio.gov
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Thank you.*

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From: Valerie Locker <vlocker@ectinc.com>
Sent: Sunday, April 10, 2022 8:46 PM
To: Gardner, Richard <Richard.Gardner@dnr.ohio.gov>
Cc: Beth Wilburn <bwilburn@ectinc.com>
Subject: RE: Circleville Solar (21-0714) Pale Umbrella Sedge

Good evening Rick, I wanted to follow up with you on the request that Mike Pettegrew forwarded your way last week. As indicated below, we are hoping the DNR would provide additional information on the pale umbrella sedge (*Cyperus acuminatus*), which was listed on the attached Environmental Review for the Circleville Solar project and associated transmission line (No. 21-0714). There is potentially suitable habitat for the species along the transmission line route and we would like to both verify the listing status of this species and to discuss guidance and next steps.

If you could give me a call back on my mobile at (860) 305-9110 at your earliest convenience I would greatly appreciate it!

Val Locker, CPESC

Project Manager & Scientist
Natural Resources

Environmental Consulting & Technology, Inc. | ectinc.com
M: 860.305.9110

From: Valerie Locker
Sent: Monday, April 4, 2022 6:11 PM
To: Mike.Pettegrew@dnr.ohio.gov
Cc: Beth Wilburn <bwilburn@ectinc.com>
Subject: RE: Circleville Solar (21-0714) Pale Umbrella Sedge

Thank you, Mike. I appreciate the fast response and will look for a message from Rick.

Val Locker, CPESC

Project Manager & Scientist
Natural Resources

Environmental Consulting & Technology, Inc. | ectinc.com
M: 860.305.9110

From: Mike.Pettegrew@dnr.ohio.gov <Mike.Pettegrew@dnr.ohio.gov>
Sent: Monday, April 4, 2022 4:01 PM
To: Valerie Locker <vlocker@ectinc.com>
Cc: Beth Wilburn <bwilburn@ectinc.com>
Subject: RE: Circleville Solar (21-0714) Pale Umbrella Sedge

Val

I forwarded your request for guidance on this species to Rick Gardner (Chief Botanist for ODNR) of DNAP. Please let me know if you don't hear back from him in the next few days. Thanks.

	<p>Mike Pettegrew <i>Environmental Services Administrator</i> Ohio Department of Natural Resources, Office of Real Estate & Land Management 2045 Morse Road, Building E-2 Columbus, Ohio 43229 Office: (614) 265-6387 mike.pettegrew@dnr.ohio.gov https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/safety-conservation/about-ODNR/real-estate/environmental-review/</p>
<p><small>This message is intended solely for the addressee(s). Should you receive this message by mistake, we would be grateful if you informed us that the message has been sent to you in error. In this case, we also ask that you delete this message and any attachments from your mailbox, and do not forward it or any part of it to anyone else. Thank you for your cooperation and understanding.</small></p>	

From: Valerie Locker <vlocker@ectinc.com>
Sent: Monday, April 4, 2022 3:33 PM
To: Pettegrew, Mike <Mike.Pettegrew@dnr.ohio.gov>
Cc: Beth Wilburn <bwilburn@ectinc.com>
Subject: Circleville Solar (21-0714) Pale Umbrella Sedge

Good afternoon Mike,
I just left you a voicemail and wanted to follow up in writing. We are wondering whether the DNR could provide additional information on the pale umbrella sedge (*Cyperus acuminatus*), which was listed on the attached Environmental Review for the Circleville Solar project and associated transmission line (No. 21-0714). There is potentially suitable habitat for the species along the transmission line route and we would like to both verify the listing status of this species and to discuss guidance and next steps.

If you could give me a call back on my mobile at (860) 305-9110 I would greatly appreciate it!

Val Locker, CPESC
Project Manager & Scientist
Natural Resources
M: 860.305.9110



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Appendix D Threatened and Endangered Species Tables

Table 3-1. Federally Listed Species within the Vicinity of the Facility

Common Name	Scientific Name	General Habitat	Federal Status ¹	State Status ²
Bats				
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Forested regions. Forages in upland and lowlands woods and along floodplain forests.	LT	SE
Indiana Bat	<i>Myotis sodalis</i>	Forested regions. Forages on hillsides, ridge forests, and riparian and floodplain forests.	LE	SE
Fish				
Scioto Madtom	<i>Noturus trautmani</i>	Stream riffles of moderate flow over sandy gravel bottom.	LE	SE
Insects				
Monarch Butterfly	<i>Danaus plexippus</i>	Grasslands with variety of flowering plants and milkweeds, the larval host plant.	C	-
Mussels				
Northern Riffleshell	<i>Epioblasma torulosa rangiana</i>	A variety of streams (from large to small) with bottoms of firmly packed sand or gravel.	LE	ST
Snuffbox Mussel	<i>Epioblasma triquetra</i>	Small to medium creeks or rivers, inhabiting areas with a swift current.	LE	SE
Clubshell	<i>Pleurobema clava</i>	Small streams and rivers, often below the sediment surface.	LE	ST
Rabbitsfoot	<i>Quadrula cylindrica</i>	Small to medium streams and larger rivers, often in shallow areas along the bank.	LE	SE
Rayed Bean	<i>Villosa fabalis</i>	Lakes and small to large streams.	LE	SE

¹Federal Status Key: LT=federally threatened; LE=federally endangered; C= Candidate.

²State Status Key: SE=state-endangered ST=state-threatened

Table 3-2. State-Listed Species within the Vicinity of the Facility

Common Name	Scientific Name	General Habitat	State Status ¹	Federal Status ²
Mussels				
Elephant Ear	<i>Elliptio crassidens</i>	Large rivers in mud, sand, or fine gravel.	SE	-
Northern Riffleshell	<i>Epioblasma rangiana</i>	A variety of streams (from large to small) with bottoms of firmly packed sand or gravel.	SE	LE
Snuffbox	<i>Epioblasma triquetra</i>	Small to medium creeks or rivers, inhabiting areas with a swift current.	SE	LE
Long solid	<i>Fusconaia subrotunda</i>	Streams and small rivers with clear water and sand or gravel substrates; may also be found in coarse gravel and cobble in larger rivers.	SE	-

Common Name	Scientific Name	General Habitat	State Status ¹	Federal Status ²
Pink Mucket	<i>Lampsilis abrupta</i>	Mud and sand and in shallow riffles and shoals swept free of silt in major rivers and tributaries.	SE	LE
Pocketbook	<i>Lampsilis ovata</i>	Small to large rivers with gravel and coarse sand substrates mixed with some silt or mud; usually found in moderate to strong current but can survive in standing water.	SE	-
Washboard	<i>Megaloniais nervosa</i>	Large rivers with slow current and muddy to coarse gravel substrates; may also be found in medium to small rivers.	SE	-
Clubshell	<i>Pleurobema clava</i>	Clean, loose sand and gravel in medium to small rivers and streams.	SE	LE
Rabbitsfoot	<i>Theliderma cylindrica</i>	Small to medium sized rivers of moderate current with clear, relatively shallow water and a mixture of sand and gravel substrates.	SE	LE
Fanshell	<i>Cyprogenia stegaria</i>	Medium to large rivers, with sand or gravel substrates.	SE	LE
Black Sandshell	<i>Ligumia recta</i>	Varying sizes of creeks, rivers, and lakes with sand and gravel bottoms and moderate current.	ST	-
Threehorn Wartyback	<i>Obliquaria reflexa</i>	Medium to large rivers with slackwater conditions to swift currents and substrates of gravel to muddy sand.	ST	-
Fawnsfoot	<i>Truncilla donaciformis</i>	Small to large rivers and lakes with gravel or sand substrates.	ST	-
Elktoe	<i>Alasmidonta marginata</i>	Small to large streams and small to medium rivers with swifter currents over packed sand and gravel substrates.	SC	-
Purple Wartyback	<i>Cyclonaias tuberculata</i>	Medium to large rivers with gravel or mixed sand and gravel substrates.	SC	-
Wavy-rayed Lampmussel	<i>Lampsilis fasciola</i>	Small-medium sized shallow streams, in and near riffles, with good current. Prefers sand or gravel substrates.	SC	-
Round Pigtoe	<i>Pleurobema sintoxia</i>	Mud, sand, or gravel substrates of medium to large rivers.	SC	-
Kidneyshell	<i>Ptychobranhus fasciolaris</i>	Creeks, rivers, and lakes with moderate to swift currents, high water quality, and sand or gravel substrates.	SC	-
Deertoe	<i>Truncilla truncata</i>	Rivers and lakes with a moderately swift current and firm sand or gravel substrates.	SC	-
Fish				
Spotted Darter	<i>Etheostoma maculatum</i>	Medium-sized rivers and streams, typically in areas of swift current at the end of a riffle where there are many very large boulders.	SE	-

Common Name	Scientific Name	General Habitat	State Status ¹	Federal Status ²
Northern Madtom	<i>Noturus stigmosus</i>	Deep swift riffles of large rivers, usually found in and around cobbles and boulders.	SE	-
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	Adults found in clear brooks with fast flowing water and either sand or gravel bottoms. Juveniles found in slow moving water buried in soft substrate of medium to large streams.	SE	-
Goldeye	<i>Hiodon alosoides</i>	Large rivers, often with turbid waters from clay silts. Often found in areas with swift currents, including below dams.	SE	-
Tippecanoe Darter	<i>Etheostoma tippecanoe</i>	Medium to large streams and rivers in riffles of moderate current with a substrate of gravel and small cobble-sized rocks.	ST	-
Blue Sucker	<i>Cycleptus elongatus</i>	Deep, swift water in channels of large rivers with sand, gravel, or rubble bottoms.	ST	-
Lake Chubsucker	<i>Erimyzon sucetta</i>	Moderately clear lakes, oxbow lakes, sloughs of weedy lakes and their associated marshy streams dense with organic debris over bottoms of cobble, sand, boulders, mud, or silt.	ST	-
Paddlefish	<i>Polyodon spathula</i>	Large, deep, slow-moving rivers, lakes, and reservoirs.	ST	-
Western Creek Chubsucker	<i>Erimyzon claviformis</i>	Clear headwaters, creeks, and small rivers of prairies; typically streams with sand and gravel.	SC	-
Plants				
Pale Umbrella-sedge	<i>Cyperus acuminatus</i>	Disturbed, wet, sandy, or muddy shores of lakes, ponds, and streams, on mud flats and sloughs.	P	-
Running Buffalo Clover	<i>Trifolium stoloniferum</i>	Mesic habitats with partial to filtered sunlight, where there is a prolonged pattern of moderate, periodic disturbance, such as mowing, trampling, or grazing.	SE	- ³

¹State Status Key: ST=state-threatened; SE=state-endangered; P=state-potentially threatened; SC=state species of concern

²Federal Status Key: FE=federally endangered; FT=federally threatened;

³Recently delisted from the ESA list in August 2021

**This foregoing document was electronically filed with the Public Utilities
Commission of Ohio Docketing Information System on**

6/8/2022 11:50:01 AM

in

Case No(s). 22-0117-EL-BTX

Summary: Application Exhibit C - Route Selection Study/Siting Study electronically
filed by Teresa Orahod on behalf of Dylan F. Borchers