BEFORE
THE OHIO POWER SITING BOARD

In The Matter of the Application of **South Branch Solar, LLC** for a Certificate of Environmental Compatibility and Public Need For a Generation Tie Transmission Line in Washington Township, Hancock County, Ohio	)))))	Case No. 23-373-EL-BTX

AFFIDAVIT OF CHIEF DEVELOPMENT OFFICER OF LEEWARD RENEWABLE ENERGY, LLC

STATE OF ILLINOIS :
: ss.
COUNTY OF COOK :

I, John Wieland, being duly sworn and cautioned, state that I am over 18 years of age and competent to testify to the matters stated in this affidavit and further state the following based upon my personal knowledge:

1. I am the Chief Development Officer of Leeward Renewable Energy, LLC ("Leeward"), which indirectly owns South Branch Solar, LLC ("South Branch"). I am making this statement in my capacity as an officer of Leeward and not in my individual capacity.

2. South Branch's Application to the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need ("Application") to develop, construct, and operate an approximately 2.4-mile, 138-kV overhead gen-tie transmission line was prepared and reviewed by employees and contractors of Leeward, on whom I reasonably rely as subject matter experts.

3. To the best of my knowledge, information, and belief, the information and materials contained in the above-referenced Application are true and accurate.

4. To the best of my knowledge, information, and belief, the above-referenced Application is complete.

John Wieland
Chief Development Officer
Leeward Renewable Energy, LLC

Sworn to before and signed in my presence this 5 day of June 2023.

Colin Gilford
Notary Public

[SEAL]

COLIN GILFORD
OFFICIAL SEAL
Notary Public, State of Illinois
My Commission Expires
November 20, 2024

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Acronyms and Abbreviations

ACSR	aluminum conduct steel reinforced
AEP	American Electric Power
amsl	above mean sea level
Applicant	South Branch Solar, LLC
Application	Application for a Certificate of Environmental Compatibility and Public Need
BMP	Best Management Practice
CR	County Road
dBA	A-weighted decibels
dbh	diameter at breast height
ELF	extremely low frequency
EMF	electric and magnetic fields
EMF RAPID	Electric and Magnetic Fields Research and Public Information Dissemination
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
Gen-Tie	electric transmission line
GW	gigawatt
HDD	horizontal directional drilling
HHEI	Ohio Headwater Habitat Evaluation Index
IARC	International Agency for Research on Cancer
ICES	International Conference on Environmental Systems
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
ISA	Interconnection Service Agreement
kcmil	thousand circular mills
kHz	kilohertz
kV	kilovolt
kV/m	kilovolts per meter
LRE	Leeward Renewable Energy, LLC

mG	milliGauss
NERC	North American Electric Reliability Corporation
NHD	National Hydrography Dataset
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OAC	Ohio Administrative Code
OAI	Ohio Archaeological Inventory
ODNR	Ohio Department of Natural Resources
OHI	Ohio Historic Inventory
OHPO	Ohio State Historic Preservation Office
OPBS	Ohio Power Siting Board
OPGW	optical ground wire
ORAM	Ohio Rapid Assessment Method
OSHA	Occupational Health and Safety Administration
OWI	Ohio Wetland Inventory
POI	point of interconnection
PVC	polyvinyl chloride
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheet
SPT	standard penetration test
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
TR	Township Road
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WHO	World Health Organization

4906-5-01 Purpose and Scope

(A) Requirements for Filing of Standard Certificate Applications for Electric Transmission Facilities and Gas Pipelines

South Branch Solar, LLC (the Applicant) is proposing to construct a 138-kilovolt (kV) electric transmission line (the Gen-Tie) and substation (Project Substation) to serve the previously approved (Case No. 21-0669-EL-BGN) South Branch Solar project (the Generating Facility). The Applicant is a wholly owned subsidiary of Leeward Renewable Energy, LLC (LRE). The materials contained in this Application for a Certificate of Environmental Compatibility and Public Need (the Application) are prepared in accordance with the requirements for the filing of standard certificate applications for electric generation facilities, as prescribed in Chapter 4906-5 of the Ohio Administrative Code (OAC).

(B) Waivers

The Ohio Power Siting Board (OPSB or Board) may, upon an application or motion filed by a party, waive any requirement of its rules other than a requirement mandated by statute. The Applicant is not requesting any waivers at this time.

4906-5-02 Project Summary and Applicant Information

(A) PROJECT SUMMARY

The Applicant, a wholly owned subsidiary of LRE, is proposing to construct a 138-kV Gen-Tie and Project Substation to serve the South Branch Solar Generating Facility. The Gen-Tie and Project Substation (shown in Figures 02-1 and Figure 02-2) (collectively, the Project) are located entirely within Washington Township, Hancock County, Ohio.

The Generating Facility, with an on-site electrical interconnection, including a substation/switchyard, was approved by the OPSB under a separate Application (Case No. 21-0669-EL-BGN). The submission of this OPSB application and potential approval of this proposed Gen-Tie is not intended to supersede the authorized interconnection under our existing certificate. In the event the OPSB approves this Project application, South Branch Solar, LLC will then determine how to proceed and make a related filing in each docket dictating which point of interconnection the Project intends to use. If this proposed Gen-Tie is selected, the currently authorized interconnection would not be used, and the need for a utility switchyard at the Generating Facility would be eliminated; the Project Substation located within the Generating Facility would shift to align with the Gen-Tie corridor. No change in the approved development area footprint for the Generating Facility is proposed.

The Gen-Tie is proposed to deliver the electricity generated by the Generating Facility to the existing American Electric Power (AEP) Fostoria Central Substation, located approximately 2.3 miles to the northeast. The Applicant seeks a Certificate for the Gen-Tie and Project Substation. The Application has been prepared in accordance with 4906.06 of the Ohio Revised Code (Revised Code) and OAC Chapter 4906-5.

(1) General Purpose of the Facility

The sole purpose of the Gen-Tie and Project Substation is to deliver electricity generated by the Generating Facility to the regional power grid.

(2) Facility Location, Size, and Operating Characteristics

The Gen-Tie will consist of a new 138-kV electric transmission line that will deliver electricity from the Generating Facility to the regional power grid. In addition, the Generating Facility's approved substation will be relocated within the approved development area to be adjacent to the proposed Gen-Tie (Project Substation). No additional on-site utility switchyard will be required with the proposed Gen-Tie; thus, it would be eliminated from the Generating Facility layout.

A preferred and alternative right-of-way (ROW) for the Gen-Tie (the Preferred ROW and the Alternate ROW) have been identified (as shown on Figure 02-1) and are evaluated in this Application. Both ROWs begin at the Project Substation location within the Generating Facility property and extend easterly to the point of interconnection (POI) at the existing AEP Fostoria Central Substation, where interconnection to the electrical grid will be made within AEP's existing fenced area. Each component of the Gen-Tie is further described below.

The Preferred ROW has a total distance of 2.38 miles, and traverses overhead for approximately 2.17 miles of the existing Norfolk Southern rail line easement, north of the railroad tracks, with about 0.2 miles underground to reach the POI. The Alternate ROW has a total distance of 4.46 miles, and traverses overhead for approximately 2.46 miles of the existing Norfolk Southern rail line easement, south of the railroad tracks, to reach the POI.

In either the Preferred or Alternate ROW, the ROW width will be kept to a minimum. It is expected that a 50-foot-wide ROW will be maintained for the Gen-Tie. No permanent access

corridors are proposed for the Gen-Tie along either the Preferred or Alternate ROWs. Several monopole structure types will be used for the Gen-Tie due to different requirements along both ROWs. All of the aboveground structures for both ROWs are anticipated to utilize a monopole design, which will minimize the amount of soil disturbance and visual impact, as compared to double-pole, H-frame designs. As noted above, the Preferred ROW incorporates approximately 0.2 miles of underground installation.

A total of 37 aboveground structures are shown in the preliminary design along the Preferred ROW, spaced strategically to control line movement and span the limited ecological resources that occur within the Norfolk Southern easement. Structures will range in height from approximately 60 to 75 feet above ground, with direct-embedded concrete foundations, and will be constructed of wood and steel. For the portion of the Preferred ROW east of County Road (CR) 261, the electrical line will be installed underground in order to minimize impacts on the small cluster of nearby residences.

The Alternate ROW preliminary design reflects a total of 41 aboveground structures. The Alternative ROW would cross over the existing rail lines to access and return from the southerly portion of the railroad property.

No change from the design approved in the Generating Facility Certificate is suggested for the Alternate Project Substation. Simply, the location will shift to be proximate to the proposed Gen-Tie. Mapping for the Gen-Tie included in the Application illustrates and discusses the area within 1,000 feet of the adjusted Project Substation location. However, because the Project Substation has been approved as a part of the Generating Facility, the new scope and impacts have been focused on the Gen-Tie design.

(3) Suitability of the Preferred and Alternate Routes

The suitability of a direct tie-in to the AEP Central Fostoria Substation was determined based on studies completed by PJM,[1] reflected by Queue Position AD1-070, and supplementary AG1-076 and AG2-579 Queue Positions (see Appendix A).

The Applicant has identified the Preferred ROW and the Alternate ROW, which are set forth and analyzed in this Application. Field studies were completed within the areas for which the Applicant has obtained landowner permission. Where landowner permission was not available, observations from within public ROW or from Norfolk Southern property were made in order to develop field survey information within 100 feet of the Gen-Tie centerline. Secondary source review has occurred for an area of 1,000 feet from the centerline of the Preferred and Alternate ROWs and from the adjusted Project Substation location (the Study Area).

Limited options exist for routing the Gen-Tie between the Generating Facility site and the POI. To minimize environmental and community impacts associated with the Gen-Tie, the Applicant strongly prefers the use of the Norfolk Southern property. The Preferred and Alternate ROWs were primarily selected to minimize total route length; however, other factors were also considered. The ability to minimize the number of parcels, agricultural fields, and residences spanned, obtain agreements with landowners, and provide flexibility and avoidance measures to environmental features were significant to route selection. A summary of the environmental considerations reflected in the selection of the location of the Gen-Tie and of the

[1] PJM is the regional independent transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states (including Ohio) and the District of Columbia. Its name results from its original serving Pennsylvania (P), New Jersey (J), and Maryland (M).

socioeconomic benefit of the overall Generating Facility that is supported by the Gen-Tie is provided below.

(a) Land Use Impacts

The Gen-Tie is substantially surrounded by open, agricultural land. Small patches of wooded areas and fencerows, as well as rural residences, are scattered throughout the Study Area. Existing electric transmission and natural gas pipeline corridors, existing roadways, and the Norfolk Southern rail lines reflect developed features within the Study Area. Farther east, near the POI but outside the Study Area, reservoir areas provide larger water features, and development becomes more commercial and industrial in nature.

There are 36 residential structures within the Study Area for the Preferred ROW, and 37 residential structures within the Study Area for the Alternate ROW. No sensitive land uses, such as recreational or institutional, were identified within the Study Area for either the Preferred or Alternate ROW. Within either the Preferred or Alternate ROW, no impact would occur to agricultural uses, as both are located entirely within railroad property.

(b) Economic Impacts

The Gen-Tie will be dedicated to the purpose of delivering electricity produced by the Generating Facility to the regional power grid. Therefore, the benefits associated with the Generating Facility are also benefits associated with the Gen-Tie. Thus, construction, employment, and purchase or easement payments to landowners will result in a significant positive impact to the local economy. Construction of the Generating Facility is estimated to produce a total economic

impact of over $125 million, with an annual economic output of $3.9 million over the Generating Facility's lifespan. An easement purchase payment will be provided to Norfolk Southern, on whose property the Gen-Tie will be located. It is also important to note that the Generating Facility and the Gen-Tie will have minimal to no need for municipal or local government services.

(c) Ecological Impacts

On-site field studies and a desktop assessment were completed for the ecological resources of the Preferred ROW, including delineation of wetlands and streams, as well as characterization of existing vegetation and habitat. The Alternate ROW was characterized through field observations, as well as desktop assessment.

No wetland or stream impacts are proposed along either the Preferred ROW or Alternate ROW, as structures have been located specifically to avoid impacts to such resources, as well as to drain tiles. The Preferred and Alternate ROWs are both located within property owned and in use by Norfolk Southern; therefore, even where natural resources exist, they are within a currently disturbed corridor.

No unique habitat areas listed within the Study Area for the Gen-Tie, and no specific species were identified by the Ohio Department of Natural Resources (ODNR) or United States Fish and Wildlife Service (USFWS), with the exception of the Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and the tri-colored bat (*Perimyotis subflavus),* that potentially occur within this range. USFWS stated in a letter dated 10 April 2023 that no impacts are anticipated to the three bat species if seasonal tree cutting is implemented (Appendix B). Tree clearing will be minimized and will be restricted

to occur only from October 1 through March 31 to avoid the potential for impact to these summer-roosting species. No other material issues were identified by ODNR in its letter dated 10 May 2023 (also provided in Appendix B); additional discussion regarding potential species issues is provided in Section 4906-05-08(C)(1).

(d) Cultural Impacts

No impact is expected to occur to archaeological resources due to the location of the Gen-Tie within the existing Norfolk Southern rail line property. Consideration has also been given to the potential for impacts to historic structures. Given the lack of eligible resources, limited structure height, use of an existing infrastructure corridor, and other infrastructure visible in the surrounding area, no impact is expected to architectural history. The Ohio State Historic Preservation Office (OHPO) has reviewed cultural resource studies for both the Preferred and Alternate ROW, and has concurred that no impacts are expected and that no further work is required, as provided in Appendix C.

(4) Project Schedule

The schedule for construction of the Gen-Tie is based on commencement of commercial operation of the Generating Facility in 2025. Therefore, the Gen-Tie must be available in time to support early operation of portions of the Generating Facility. To meet this schedule, the Applicant is requesting issuance of the Certificate by the first quarter of 2024 to support commercial and financing activities, as well as final Generating Facility design and commencement of construction in 2024.

(B) APPLICANT INFORMATION

The Applicant is a wholly owned affiliate of LRE. LRE is a leading North American renewable energy producer, dedicated to sustainable power production. LRE, headquartered in Dallas, Texas, currently owns and operates 25 renewable energy facilities across nine states, with a total installed capacity of more than 2,700 megawatts. LRE has 25 gigawatts under development, spanning more than 100 projects. If this proposed Gen-Tie is approved and selected as the POI for the Project, then the Applicant intends to develop, construct, and operate the Gen-Tie over the Generating Facility's entire operating life.

4906-5-03 Review of Need and Schedule

(A) NEED FOR THE FACILITY

(1) Purpose of the Proposed Facility

The purpose of the Gen-Tie is to deliver electricity generated by the Generating Facility to the nearby AEP 138-kV Fostoria Central Substation. The Gen-Tie will allow the renewable energy power generated by the Generating Facility to be distributed through the AEP system to the regional power grid, which supports the energy needs of the people and businesses reliant on that system.

(2) System Conditions, Local Requirements, and Other Pertinent Factors

The Generating Facility will help provide renewable load to meet the energy demand in this region. The Gen-Tie will deliver the generated electricity to the regional grid, allowing it to be dispersed where needed.

(3) Load Flow Studies and Contingency Analysis

Because the Gen-Tie will be used to connect the Generating Facility to the regional power grid, detailed studies have been and are being completed by the transmission operator, PJM. These studies will evaluate the proposed POI at the existing 138-kV Fostoria Central Substation to determine if there is a need for associated system improvement associated with that POI.

Figure 03-1 shows the location of the Generating Facility and the POI at the AEP Fostoria Central Substation. The PJM Facility Study (Appendix A) was completed in February 2022. Upgrades and system reinforcements identified in the Facility Study will be accomplished as a part of the fully executed Interconnection Service Agreement (ISA), effective March 18, 2022, which commits that system reliability and all contingencies will be met.

The Gen-Tie will be engineered and constructed to comply with all applicable electrical safety codes and good engineering practices. The Generating Facility will interconnect and operate in conformance with the requirements of PJM and AEP. These requirements will also meet the reliability criteria and standards for the North American Electric Reliability Corporation (NERC).

(4) System Performance Transcription Diagrams

The Gen-Tie will serve solely as a method of interconnection for the Generating Facility with the AEP Central Fostoria Substation. A one-line diagram is provided as Figure 03-2.

(5) Natural Gas Transmission Line Base Case Data

Since the Gen-Tie does not include installation of any gas transmission facilities, this section is not applicable.

(B) CONSISTENCY WITH REGIONAL EXPANSION PLANS

(1) Consistency with Long-Term Forecast and Regional Plans

The Applicant is not an electric distribution company or an electric distribution utility, and as such, it does not have transmission and distribution planning responsibilities for franchised service areas. Therefore, the Applicant does not maintain or file long-term electric forecast reports, and this section is not applicable.

As indicated above, the Feasibility, System Impact, and Facility Studies completed by PJM have determined that the Generating Facility and the Gen-Tie will have no significant adverse impact on grid reliability.

(2) Gas Transmission Long-Term Forecasting

This section is not applicable, as the Gen-Tie does not involve gas transmission facilities.

(C) SYSTEM ECONOMY AND RELIABILITY

The Generating Facility will help meet energy demand in the region by providing additional renewable generation. The Gen-Tie will streamline the delivery of the generated energy to the electrical grid.

(D) OPTIONS TO ELIMINATE NEED FOR THE PROPOSED FACILITY

The purpose of the Gen-Tie is to deliver electricity generated by the Generating Facility directly to the AEP Central Fostoria Substation. While an existing interconnection with an existing overhead electric transmission line that extends across the Generating Facility site was approved in the Generating Facility Certificate, a direct POI into the AEP Central Fostoria Substation reduces the need for additional system upgrades and more directly and efficiently contributes energy to the regional grid, with minimized energy losses. The opportunity to co-locate the Gen-Tie within the existing Norfolk Southern rail line provides that direct POI connection and simultaneously eliminates the need for new infrastructure corridors through the community, as well as the utility switchyard within the Generating Facility.

(E) FACILITY SELECTION RATIONALE

The Gen-Tie is required to deliver electricity generated by the Generating Facility to the regional transmission grid in the most efficient manner possible. Delivering electricity by the Generating Facility to the regional transmission grid via the Preferred ROW and associated Project Substation will serve the public convenience and necessity and minimize required upgrades to the bulk electric grid, meeting energy demand in this area. The Preferred ROW and associated Project Substation were selected as the most direct and least impactful way to achieve this interconnection. Other alternatives would have greater environmental and social impacts, and/or would be more expensive and disruptive.

(F) PROJECT SCHEDULE

This section describes the anticipated schedule for the Project's permitting and construction. Figure 03-3 depicts the estimated schedule in a bar chart format. As additional information becomes available, the OPSB will be informed of the actual dates of construction commencement, construction completion, and commencement of operation.

(1) Major Activities and Milestones

(a) Preparation of the Certificate Application

Preparation of the Application (including feasibility studies) occurred in the third quarter of 2022 through spring 2023, with data and analyses added as various studies or designs were completed. A public information meeting was held on May 3rd, 2023, and community feedback received at that meeting, such as drain tile location, vegetation, and access, was incorporated into the preliminary design.

(b) Submittal of the Application for Certificate

The schedule is based on submittal of the Application in the second quarter of 2023.

(c) Issuance of the Certificate

In order to meet the proposed schedule, the Applicant requests that the Certificate be issued by the first quarter of 2024.

(d) Receipt of Grid Interconnection Studies and Other Critical Path Milestones for Construction

The ISA for the Gen-Tie interconnection was fully executed by PJM, AEP, and South Branch Solar, LLC on March 18th, 2022. Utility design and construction coordination will be initiated in early 2024, pending an approved OPSB Certificate for the Gen-Tie and Project Substation.

(e) Acquisition of Rights-of-Way and Land Rights for the Certified Facility

Acquisition of land rights and ROW for the Gen-Tie's Preferred ROW began in early 2022, with a fully executed easement agreement currently in place.

(f) Preparation of the Final Design

It is expected that final design and detailed construction drawings will be completed following financial close (anticipated first quarter of 2024) and prior to construction.

(g) Construction of the Facility

Construction is anticipated to begin in 2024 and will be completed within approximately eight to 12 months.

(h) Placement of the Facility in Service

The Gen-Tie will be placed in service upon completion of construction, timed to support the need for interconnection by the Generating Facility. Operation of both the Gen-Tie/Project Substation and Generating Facility is anticipated to occur in 2025. As-built specifications will be provided to the OPSB within one year of the commencement of commercial operation.

(2) Impact of Critical Delays

Critical delays may have material, adverse effects on the financing of both the Project and the associated Generating Facility, including the Applicant's ability to procure equipment, hire qualified contractors, and obtain delivery of other associated components. The Gen-Tie must be completed to enable energizing and testing of the Generating Facility prior to commercial operation. Such delays would impact the in-service date of the Generating Facility and thus would delay its ability to start producing energy for the grid.

4906-5-04 Route Alternatives Analysis

(A) ROUTE SELECTION STUDY

(1) Study Area Description and Rationale

The route selection study area (Route Study Area) considered the two end points of the desired corridor: the Generating Facility site and the interconnection point that has been evaluated by PJM at the AEP Fostoria Central Substation (the POI). Therefore, the Route Study Area lies between those features, entirely within Hancock County.

(2) Study Area Map

Figure 04-1 presents the Route Study Area used to identify the preferred and alternate ROWs. Figure 04-2 shows, for the Route Study Area, various constraints used in consideration of route selection, including land use features (including infrastructure and residences), property boundaries, desktop information regarding wetlands and streams, and floodplain mapping.

(3) Map of Study Area and Routes Evaluated

As will be discussed in the following sections, the shortest reasonable route is desirable both from the perspective of community impact and overall Applicant cost. While the Route Study Area considered was relatively expansive, reasonable routes within that area are limited. Potential routes attempted to use existing infrastructure corridors or follow property lines to the greatest extent possible to minimize interference with landowner activities. As shown in Figure 04-2, which illustrates various routing options contemplated, the potential routes are of varying distances, and many would require considerable efforts to obtain the rights for use of the identified areas. Additional discussion regarding consideration and elimination of various options is addressed below.

(4) Siting Criteria

The following siting criteria were considered in route selection:

- Ability to obtain site control – The Gen-Tie location must have landowners willing to grant land easements to accommodate the transmission line infrastructure.
- Provide adequate route width – A corridor of at least 50 feet was identified as desired for the Gen-Tie, with additional temporary workspace required for options that involve extra turns or other construction issues.
- Minimize total length of transmission line – A minimal length reduces cost (including easement purchase payments, design, engineering, materials, and construction), as well as the potential to for environmental and community impacts.
- Co-locate with existing infrastructure – Use of existing infrastructure would minimize impacts on surrounding land uses and the community.
- Minimize number of route turns – Minimizing the number of turns of the line relates to cost, design/construction complexity, and efficiency, and – as noted above – the potential need for additional workspaces.
- Minimize number of parcels crossed – This factor relates to cost, including lease payments, as well as the feasibility of entering into agreements. Confining impacts to fewer landowner parcels would be expected to minimize community impacts.
- Minimize crossing of streets and railroads – Fewer crossing of transportation features would result in less potential disruption to transportation.

- Minimize clearing – Avoiding or minimizing tree clearing would be expected to minimize impacts to diverse species habitat, including those for potential tree-roosting bats.
- Minimize crossing of wetlands, streams, and other water bodies – Avoiding and minimizing such impacts would typically also minimize impacts to diverse ecological communities, potentially minimize impacts to habitat for rare species, and minimize the need for additional permitting.
- Minimize floodplains impact – Avoiding or minimizing equipment in floodplain areas would facilitate accessibility and typically results in stream avoidance.
- Minimize proximity to residences and other sensitive land uses, such as schools, churches, hospitals, cemeteries, historic sites, recreation areas, parks, and preserves.

Identifying routes that minimize both impacts and costs requires balancing and prioritizing many factors. In general, the Applicant prioritized corridors that extended along existing infrastructure or property lines to minimally disrupt existing landowner activities or future development. Ohio law is written such that land ownership by private parties on either side of a public road extends to the center of the transportation infrastructure. Thus, utilizing existing roads appears to require involving numerous parties, other than just the public entity, which would require additional time and consideration.

(5) Siting Process for the Preferred and Alternate Routes

The evaluation of the various routing options included a comparison based on the social, environmental, and engineering factors listed above in Section 4906-5-04(A)(4). These factors were utilized to identify and evaluate the Preferred ROW and the Alternate ROW, as described

below. Secondary sources and general information were used in this analysis, including United States Geological Survey (USGS) topographic maps, National Hydrography Dataset (NHD) data, National Wetland Inventory (NWI) data, Ohio Wetland Inventory (OWI) data, National Register of Historic Places (NRHP) data, Ohio Historic Inventory (OHI) resources, Federal Emergency Management Agency (FEMA) floodplain data, USFWS data, and GoogleEarth mapping. The Applicant's familiarity with the general area, as a result of activities associated with the Generating Facility, was also utilized to inform the route selection process, including knowledge of likely interest in entering into a lease agreement. Locations were sought within the routing study area that would minimize both community and environmental impacts.

Two alternatives were dismissed relatively early in the evaluation process. Alternative Route 4, which would extend from the north of the Generating Facility along Township Road (TR) 218, appeared unlikely to result in landowner agreements that would allow this use. In addition, it was anticipated that positioning a Project Substation within the relatively narrow northern portion of the Generating Facility property would be a challenge. For these reasons, this routing alternative was eliminated from further consideration.

Alternative 5, and similar potential routing, was eliminated from further consideration, as it is more than twice as long as other potential alternatives. Another factor in eliminating Alternative 5 was its origination much closer to the more densely settled Village of Arcadia than other options.

The remaining identified potential routes were further screened to determine which should be carried forward in the evaluation.

All areas considered were expected to have available the minimum width required, although not all locations were likely to result in landowner agreements that would support the

uses across private land. The only routes for which landowner permission and adequate access have been obtained or are very likely are the Preferred Route and Alternative Route 6.

Based upon consideration of various factors and routes, it was determined that the ROW would be best suited to extend from the southeastern corner of the Generating Facility site to the existing AEP Fostoria Central Substation. Thus, every identified option further considered would need to either utilize the rail corridor or cross the rail corridor.

- The Preferred Route reflects an agreement with Norfolk Southern to allow the Gen-Tie to be located within its existing property north of the rail lines. This route would allow all activities to be within property controlled by a single landowner and would constitute a relatively direct path to the POI.
- A modification of the Preferred Route was identified as Alternative Route 1, which would extend the Gen-Tie along the rail corridor for approximately 1.2 miles before traversing north along private property to follow along TR 218 and reaching the POI. This option adds an additional mile in length, compared to other more direct routes, and also incorporates four turns, resulting in a less efficient path to the POI. In addition, this route was considered to have the potential for greater community disruption, as there would be nine residences located within 200 feet of Alternative Route 1, and the route would extend across agricultural and rural, residential land. Therefore, this potential route was eliminated.
- Alternative Route 2 would cross the rail corridor, heading south to meet the State Route (SR) 12 corridor, continuing along SR 12, and turning north to cross the rail corridor again and access the POI. In addition to the need to cross the rail lines twice, this potential route reflected the potential to be proximate to 20 residences

within 200 feet (located on both sides of the road). The uncertainty of land rights to reach the location parallel to SR 12, the increased proximity to additional residential structures, and the anticipated crossing complexities and encroachment within existing electrical infrastructure were other factors considered when eliminating this option.

- A modification of Alternative Route 2 was considered as Alternative Route 3. Under this scenario, the route would extend south to SR 12 and travel east to pass beyond a wooded area before returning north to parallel the southern railroad track. Given the issues noted above, including the residential density even along that smaller portion of SR 12, this alternative was also eliminated.
- Alternative Route 4 was eliminated, as explained above.
- Alternative Route 5 was eliminated, as explained above.
- Alternative Route 6 was considered along the southern boundary of the rail corridor. While this alternative shares with the Preferred ROW a single landowner to reach the POI, it involves crossing the railroad tracks twice (once near the Generating Facility and once near the POI to return to the north side of the railroad lines). In addition to the rail crossings, this increases the number of turns involved in the routing. A greater area of residential density also exists to the south of the existing rail lines. However, particularly given the relatively direct routing and single receptive landowner, this option was considered the most feasible route to carry forward the additional analyses as the Alternative ROW.

Using these parameters, the Preferred ROW was selected, and Alternative Route 6 was selected as the Alternate ROW for further evaluation and field reconnaissance. Both routes are further described in the balance of this Application.

(6) Route Descriptions and Rationale for the Selection

Further evaluations were undertaken to compare potential impacts associated with the Preferred and Alternate ROWs, as reflected in the remaining portion of this Application. The following provides a summary of the conducted comparison with regard to the identified siting criteria:

- Ability to obtain site control – Both the Preferred and Alternate ROW are owned by a property owner willing to consider a lease agreement with the Applicant. In fact, Norfolk Southern has entered into an agreement with the Applicant for the proposed use of the Preferred ROW.
- Adequate route width – Adequate width is available within the Preferred ROW to accommodate the Gen-Tie. This has been verified through a surveying effort to confirm the available width without encroaching onto land owned by non-participating landowners to the north. A similar land width appears to be present along the Alternate ROW, although a confirmatory survey has not been conducted.
- Minimize total length of transmission line – Both ROWs are approximately the same length (the Preferred ROW is 2.37 miles, and the Alternate ROW is 2.46 miles). The longer distance for the Alternate ROW reflects the need to cross the railroad tracks at both ends to accommodate use of the southern portion of the property.

- Co-locate with existing infrastructure – Both ROWs are located within railroad property and parallel existing active railroad infrastructure.
- Minimize number of route turns – The Preferred ROW is superior, as it requires only turns at either end of the route. The Alternative ROW would involve more turns, as it extends to the southern portion of the rail easement and turns back.
- Minimize number of parcels – Both the Preferred and Alternate ROWs traverse land owned by a single landowner, Norfolk Southern. Keeping the Gen-Tie within an existing developed corridor is expected to minimize community impact.
- Minimize crossings of streets and railroads – The Preferred ROW crosses a total of five streets (TR 256, CR 109, CR 257, TR 261, and TR 218) and no rail lines, as it is entirely to the north of the rail infrastructure. The Alternate ROW, in addition to the roads noted above, would be required to span across the railroad lines twice in order to access the southern portion of the rail property and to return to the POI. Note that public roads are expected to be spanned by the Gen-Tie for either the Preferred or Alternate ROW.
- Minimize clearing – The Preferred ROW is not expected to involve the need for material tree clearing, while the Alternate ROW could require more tree clearing in association with various wooded areas that come close to the property, particularly just west of CR 109.
- Minimize crossing of wetlands, streams, and other water bodies – The Preferred and Alternate ROW both can be designed to span the two mapped intermittent streams and corresponding mapped riverine wetlands identified within the railroad property.

- Minimize floodplain impact – Neither the Preferred ROW or Alternate ROW lie within the mapped 100-year floodplain; therefore, no crossings or activities associated with the Gen-Tie are proposed within mapped floodplains.
- Minimize proximity to residences and other sensitive land uses – The Preferred and Alternate ROW both pass within 100 feet of three residences, although the Preferred ROW will be underground when proximate to two of the residences. The Alternate ROW has several other residences in relative proximity. No schools, churches, hospitals, cemeteries, historic sites, recreation areas, parks, or preserves were identified within the Study Area for either ROW.

While both were identified as potential routes, landowner and land use considerations led the Applicant to select the route along the northern Norfolk Southern corridor as the Preferred ROW, with the southern route along the Norfolk Southern corridor evaluated as the Alternate ROW.

(B) SUMMARY TABLE

No additional routes or sites were formally evaluated. A summary of key characteristics of the selected Preferred and Alternate ROWs is provided in Section 4906-5-04(A)(6).

(C) PUBLIC INVOLVEMENT

Work within the community associated with the Generating Facility has been ongoing since spring 2021, when informal discussions with interested parties began while exploring properties. While an on-site interconnection was authorized in the Generating Facility Certificate, information regarding the potential for the Facility was reflected in supporting materials.

In addition to the involvement reflected by the Generating Facility process, a Public Information Meeting was held on May 3rd, 2023 to specifically introduce the Project to the local

community. A total of seven attendees signed in, with at least an additional eight people in attendance. The information displayed during the meeting is included in Appendix D.

During the meeting, the majority of questions and comments focused on accessibility, proximity to property lines, drain tile and existing vegetation impacts, etc. Each of these issues is addressed in the Application in the appropriate sections.

In addition to this formal meeting, the Applicant has continued to meet with local public officials and reach out to proximate neighbors.

4906-5-05 Project Description

(A) DESCRIPTION OF THE PROJECT AREA

(1) Geography and Topography

A map series of at least 1:24,000 scale showing the proposed Project within the Preferred and Alternate ROW and their respective Study Areas is presented in Figure 05-1. The mapping shows (to the extent found within the Study Areas): the Gen-Tie alignments; the Project Substation location; roads and railroad routes; major institutions, parks, and recreational areas that are publicly identified and publicly owned; existing gas pipeline and electric transmission line corridors; named lakes, reservoirs, streams, canals, and rivers; and population centers and legal boundaries of cities, villages, townships, and counties. The figure was developed using USGS topographic maps, NHD data, NWI data, OWI data, NRHP data, OHI resources, FEMA floodplain data, and USFWS data.

The Preferred and Alternate ROW ranges in elevation from 780 to 800 feet above mean sea level (amsl). Both the Preferred and Alternate ROW crosses two mapped NHD unnamed streams, and two mapped NWI riverine wetlands. Both the Preferred and Alternate ROWs also cross two natural gas pipelines.

(2) Proposed ROW, Transmission Length, and Properties Crossed

The Preferred ROW is approximately 2.37 miles long and will be located within an area approximately 50 feet wide, resulting in total acreage of 14.78 acres. The entire length of the Preferred ROW, once leaving the Generating Facility site, is within property owned by Norfolk Southern until the route reaches the POI within AEP's property. The Preferred ROW will extend from the southeastern corner of the Generating Facility and will transverse northeasterly along the north side of the existing rail corridor for 2.25 miles before turning north to access

the POI. The Preferred ROW reflects aboveground structures for the first 2.05 miles, until reaching CR 261. At that point, the Gen-Tie will be installed underground, using trenching, horizontal directional drilling (HDD), or equivalent techniques to reach the POI. The pole locations within the Preferred ROW and the underground segment of the proposed Gen-Tie are shown on Figure 03-1. Additional details can also be found in Appendix E. The Preferred ROW is located entirely within Washington Township, Hancock County.

The Alternate ROW is approximately 2.46 miles long and can also be located within an area approximately 50 feet wide, resulting in no more than a total acreage of 14.97 acres. However, that constructable area within that easement is more constrained than the preferred ROW, which would result in a complex and prolonged construction period. The Alternate ROW crosses overhead to the southern side of the Norfolk Southern rail lines, and stays within the railroad property's southern boundary, crossing back to the north to extend along the north side of the railroad property to reach the POI. The pole locations within the Alternate ROW are shown on Figure 03-1. The Alternate ROW is located entirely within Washington Township, Hancock County.

(B) LAYOUT AND CONSTRUCTION

The following paragraphs provide data on the layout, engineering design process, and construction of the proposed Gen-Tie. Additionally, Section 4906-5-08(B) of this Application provides data relating to vegetation removal during construction of the proposed Gen-Tie.

(1) Proposed Clearing, Construction Methods, and Reclamation Operations

(a) Surveying and Soil Testing

A field survey was completed along the Preferred ROW to confirm the width of the available workspace between the closest railroad track and the northern boundary of the Norfolk Southern property. It was confirmed that adequate

separation exists to allow for a corridor in which to accommodate the Gen-Tie within the Preferred ROW.

Preliminary geotechnical investigations were also completed at four locations along the Preferred ROW to confirm soil and subsurface conditions to support conceptual design efforts. The geotechnical survey results are provided in Appendix F. Similar detailed surveys were not performed for the Alternate ROW. Given the relative proximity of the two ROWs, subsurface conditions are not expected to be substantially different.

Prior to final design, additional geotechnical investigations will be conducted in specific locations where structure foundations are proposed and/or where underground elements are proposed, as well as for the Project Substation.

(b) Grading and Excavation

No significant grading is anticipated to construct the Gen-Tie in either the Preferred or Alternate ROW or the Project Substation. The existing terrain within the Preferred ROW and the Alternate ROW generally provides a suitable surface for construction vehicle operations, with additional workspace provided from vehicles on the adjacent rail. Excavation will occur for pole foundations and areas where underground installation does not use HDD or equivalent methods, as necessary.

(c) Construction of Temporary and Permanent Access Roads and Trenches

No temporary or permanent access roads are proposed in association with the proposed Gen-Tie within either the Proposed ROW or Alternate ROW. Rather, access will utilize the existing rail line, public roads, and/or railroad property in a

manner that limits disturbance to the greatest extent possible. Trenches or HDD (or equivalent) may be utilized for the underground portions of the Preferred ROW, dependent upon soil condition requirements of Norfolk Southern. Where trenching may occur along the short segment of underground conduit, an excavator would be used to dig the trench. The conduit would be laid in the trench and concrete poured over and around the conduit. The trench would be backfilled and compacted per railroad requirements, and the topsoil preserved to restore to approximate original conditions. Disturbance would be limited to the width of the excavated trench.

(d) Stringing of Cable and/or Laying of Pipe

Installation for the Gen-Tie may be accomplished using the tension stringing method or other suitable method, as deemed appropriate after detailed engineering design. Lightweight guy cables or ropes will be fed through the stringing sheaves of the sections of line that require stringing. Conductors will then be pulled through under sufficient tension to keep the conductor in the air. This protects the conductor from surface damage.

Temporary guard or clearance poles will be used as a safety precaution as necessary. The locations and heights of clearance poles will be such that the conductors are held clear of power and communication circuits, vehicular traffic, and other structures. The stringing operation will be conducted under the observation of crew members at all times. The observers will be in contact, either via radio and/or visual, with the operator of the stringing equipment.

Approximately 0.2 miles of the northern segment of the Preferred ROW is planned to utilize underground conduit installation. Underground cables are

anticipated to be installed in a duct bank for 0.16 miles of the ROW. It is then expected that HDD or similar jack-and-bore techniques will be used to cross under TR 218, with appropriate precautions for monitoring in the event of unanticipated impacts. An HDD Contingency Plan is provided in Appendix G. Any existing drain tiles or underground utilities will be identified and avoided to the greatest extent possible. If a drain tile is broken or damaged during construction, the Applicant will work with the drain tile's owner to promptly reroute or repair the tile system to restore adequate drainage. Prior to commencement of work, the Applicant will coordinate with utility companies to identify and flag pipeline for avoidance measures.

(e) Installation of Electric Transmission Line Poles, Structures, and Foundations

Installation of each transmission pole will require a machine-drilled hole and a reinforced concrete foundation. A portion of the excavated soil will be recompacted and used for backfill. Excavated soil backfill will be tamped around the pole in layers. Crushed rock backfill may be required where normal soil conditions are not suitable for excavated soil backfill. The excess material will either be placed around the structure or hauled off site.

The foundations will be designed for the specific loading conditions of the structure. The permanent impact area for the majority of the structure foundations is approximately 5 square feet. There will be two steel poles at each end of the Gen-Tie that would require larger foundations (approximately 30 to 50 square feet).

Construction is expected to utilize equipment on the adjacent rail line via rail cart, as well as through use of equipment traveling within the railroad property

within the pole locations. Workspace is estimated to be approximately 20 feet by 50 feet around each pole location; work plans will be refined pending final design and coordination with Norfolk Southern. To the extent that pull pads are necessary, they will be located within railroad property in upland locations where no additional tree clearing is necessary. Following construction, temporary workspace would be restored such that the permanent impact is limited to the individual pole locations and underground cabling.

(f) Post-Construction Reclamation

After construction, certain drainage and erosion control aspects of the Gen-Tie will be removed and the property will be restored to conditions similar to those existing prior to construction (in coordination with the landowner and consistent with applicable requirements). This could include such measures as seeding or stabilization of disturbed non-cultivated areas. Once vegetative cover has been established, temporary erosion and sedimentation control measures will be removed.

(2) Facility Layout

The following paragraphs provide data on the layout of the Gen-Tie and Project Substation.

(a) Mapping of Routes and Associated Facilities

Figure 03-1 is a map of at least 1:12,000 scale that shows the design proposed for the Gen-Tie at the Preferred ROW and Alternate ROW, respectively. Additional details can be found in Appendix E. Construction is not expected to materially alter the grades along the ROW.

(i) Temporary and Permanent Access Roads, Staging Areas, and Laydown Areas

No temporary or permanent access roads are proposed for the Gen-Tie. Staging and laydown for the Gen-Tie is expected to occur off site in a railroad siding or within the Generating Facility site, with equipment and materials delivery to installation locations in coordination with Norfolk Southern.

Temporary and permanent access roads for the Project Substation will be those used for the Generating Facility. Staging and laydown areas for the Project Substation is expected to be entirely within the Generating Facility site.

(ii) Proposed Location of Major Structures

The pole locations are as shown on Figure 03-1 and in Appendix E. No other major structures or buildings will be associated with the Gen-Tie.

(iii) Fenced-in or Secured Areas

As approved as a part of the Generating Facility Certificate, the Project Substation will be fully enclosed by a chain link fence, with signs posted to restrict access and protect the public. Once constructed, the previously approved dimensions of the Project Substation will be approximately 375 feet by 250 feet.

There are no plans for fencing to be installed along the Gen-Tie ROW. Signs will be posted along the ROW to restrict access and protect the public.

(b) Reasons for Proposed Layout and Unusual Features

The proposed layout is the most efficient and least disruptive approach. There are no unusual features associated with construction of the Gen-Tie, other than its location within active railroad property. The Preferred ROW proposes the use of

underground installation for the easternmost 0.16 miles to minimize impacts to a small cluster of residences in that area.

(c) Plans for Future Layout Modifications

Current plans do not include installing additional lines or equipment within the Gen-Tie.

(C) TRANSMISSION EQUIPMENT

(1) Electric Transmission Line Information

(a) Design Voltage

The Gen-Tie will be designed and constructed to operate at 138-kV nominal phase to phase voltage.

(b) Tower Designs, Pole Structures, Conductor Size and Number Per Phase, and Insulator Arrangement

Monopole structures are proposed along the Gen-Tie, spaced strategically to span ecological resources and to use a narrow corridor along existing infrastructure. A total of 37 pole locations are proposed for the Preferred ROW and 41 pole locations for the Alternate ROW. Structures will range in height from approximately 60 to 75 feet above ground, with either direct embedded foundations or drilled pier foundations with a diameter of 5 square feet to 30 to 50 feet in diameter (for the two end poles) and will be constructed of wood or tubular steel. Typical pole designs are illustrated on the first page of Appendix E.

The structures will be designed to support a single 138-kV circuit and one overhead ground wire that also contains fiber optic communication cable. For tangent and light angle configurations, single wood pole tangent structures (shown on the first page of Appendix E) will be used. These typical tangent structures will

consist of a single steel pole with three braced post insulators to support the transmission conductors.

For structures with a dead-end configuration, shown conceptually on the first page of Appendix E, a single steel pole structure with three dead end attachment insulators is used to support the transmission conductors. The anticipated structure locations for the Preferred ROW and the Alternate ROW are shown on Figure 03-1 and in Appendix E.

The conductors used for both the Preferred ROW and the Alternate ROW will be designed and constructed for 138-kV operation and will be one 1,272 thousand circular mills (kcmil) aluminum conduct steel reinforced (ACSR) per phase. Tangent structures will be in a vertical configuration with braced post insulators. The ground wire to be installed will be optical ground wire (OPGW). The phase conductors and overhead ground wires will be installed in accordance with the latest version of the National Electrical Safety Code and Institute of Electrical and Electronics Engineers (IEEE) 524. The conductors will be supported by aluminum clamps attached to the polymer horizontal post insulators. Aluminum clamps will also support the overhead ground wire. At dead-ends, bolted-type dead-end clamps will be used on the conductor and on the ground wire.

(c) Base and Foundation Design

Each pole will either be direct embedded with concrete backfill or be set on a reinforced concrete foundation cast in a drilled hole. Excavated soil backfill will be tamped around the pole in layers. Crushed rock backfill or concrete backfill may be required where normal soil conditions are not suitable for excavated soil backfill.

Foundations will be designed for the specific loading conditions of the structures. The permanent impact area for each structure foundation is estimated to be approximately 5 square feet for the majority of the poles, with foundations approximately 30 to 50 square feet required for the dead-end structures at each end.

(d) Underground Cable Type and Size

The underground portion of the Gen-Tie within the Preferred ROW is expected to consist of 138-kV, 2,500-kcmil conductors in three 6-inch SCH 40 polyvinyl chloride (PVC) conduits with one 6-inch spare. Design and installation will be in accordance with applicable safety standards. Additional 2-inch conduits will be used to contain the continuous ground and communications cable. Details are shown in Appendix E.

(e) Other Major Equipment or Special Structures

No other major equipment or special structures, other than those previously described, are anticipated in association with the Gen-Tie.

(2) Electric Transmission Substation Information

The Gen-Tie will connect from the Generating Facility directly into the AEP Central Fostoria Substation. At the Generating Facility property, the Project Substation (as previously approved) will serve as the collection point for all electricity generated. The Project Substation, as described in the Generating Facility Certificate, will be approximately 375 feet by 250 feet, covering approximately 2 acres in area, and will be fully enclosed by a chain link fence. Associated grading is expected to be limited due to the relatively flat grades; the detailed design will be prepared prior to construction. Access to the Project Substation will be via internal roadways associated with the Generating Facility, as it will be located within the Generating Facility property.

In addition to the electrical equipment, Supervisory Control and Data Acquisition (SCADA) systems and associated equipment will be located in a 20-foot by 50-foot on-site control/operation and maintenance building, which will be utilized to service the entire Generating Facility.

Table 05-1 provides information regarding design features expected to be included in the Project Substation; Figure 03-2 provides a one-line diagram. Note that this information is preliminary and is subject to final design changes based on constraints and equipment availability.

TABLE 05-1: Project Substation Equipment

Equipment	Project Substation
Transformers	✓
Buswork	✓
Dead End/Terminal Structures or Poles	✓
Insulators/Conductors	✓
Concrete Foundations	✓
Perimeter Fencing	✓
Control House	✓
Switches/circuit breakers	✓
Surge arrestors	✓
Metering Equipment	✓

(3) Gas Pipeline Information

This section is not applicable, as the Gen-Tie does not include a gas transmission line.

4906-5-06 Economic Impact and Public Interaction

(A) OWNERSHIP OF PROPOSED FACILITY

The Applicant will develop, construct, own, and operate the proposed Gen-Tie. The Applicant currently holds an option for an easement for the Preferred ROW, as well as an option for purchase of the Generating Facility property upon which Facility Switchyard will be located. The Applicant is within the corporate organizational structure of LRE.

(B) ESTIMATES OF CAPITAL AND INTANGIBLE COSTS

Table 06-1 presents estimated capital and intangible costs information for development and construction of the Gen-Tie.

TABLE 06-1: Estimated Capital and Intangible Costs

Description	Cost		
	Project Substation	Preferred ROW	Alternate ROW
Land and land rights	--	$1,500,000	TBD
Overhead Transmission Equipment (Structures and improvements, poles and fixtures, overhead conductors)	--	$1,537,000	$1,750,000
Substation equipment	$9,000,000		
Underground Transmission Equipment (underground conductors and insulation, underground-to-overhead conversion equipment, directional boring, duct bank)	--	$136,400	$136,400
ROW clearing and roads, trails, or other access (Railcar rental, siding yard, fuel)	--	$1,703,020	$1,703,020

(C) GAS CAPITAL AND INTANGIBLE COSTS

This section is not applicable, as the Gen-Tie does not include a natural gas pipeline.

(D) PUBLIC INTERACTION AND ECONOMIC IMPACT INFORMATION

(1) Counties, Townships, Villages, and Cities within 1,000 Feet of the Preferred and Alternate Routes

The entire Gen-Tie is wholly located within Hancock County. Both the Preferred and Alternate Gen-Tie ROW are located approximately 0.6 miles north of the City of Arcadia and approximately 0.9 miles south of the City of Fostoria.

(2) Public Officials Contacted

South Branch Solar, LLC began community outreach in February 2021. Early activities were focused on providing basic information on the concept of utility-scale solar development and facts related to project planning to local stakeholder organizations and elected officials, including but not limited to Arcadia Public Schools, the Village of Arcadia, Hancock County Soil & Water District, Hancock County Economic Development, Hancock County Commissioners, Washington Township Fire Department, and the Washington Township Board of Trustees. Recently, additional outreach in association with the Gen-Tie has been made with Dan Sheaffer at Hancock County Economic Development (123 East Main Cross Street, Findlay, Ohio 45840). The new Project lead for the Applicant has made an introduction and attempted initial outreach to the Hancock County Commissioners, with the intent of soliciting feedback and gaining introductions to the Washington Township Trustees.

(3) Public Information Programs

Work within the community associated with the Generating Facility has been ongoing since spring 2021, when informal discussions with interested parties began while exploring potential property. The Generating Facility permitting process has included reference to the potential for the Gen-Tie.

The Applicant has created a website (www.southbranchsolar.com) as a means of keeping the community informed, and the Applicant is committed to continuing local outreach activities. On March 14, 2023, a pre-application conference was held with the OPSB Staff to confirm plans to move forward with an Application for the Gen-Tie and review applicable information. On May 3, 2023, the Applicant held a Public Information Meeting as required by OAC Rule 4906-3-03. The meeting was properly noticed in the local newspapers. Representatives, including the Applicant and consultants staffed the meeting, which included an information display and an opportunity to speak one-on-one with Applicant representatives. The Preferred ROW and Alternate ROW were shown in the presentation materials.

The Applicant and its representatives have also held meetings with local public officials and proximate neighbors.

The Applicant will continue to engage in active public outreach prior to, during, and after construction. Once the Generating Facility and Gen-Tie are in commercial operation, the Applicant intends to continue to maintain a high level of community involvement.

During the construction phase for the Gen-Tie, an on-site construction manager will be available to respond to local issues.

A complaint resolution procedure will be implemented (see Appendix H) to ensure that any complaints regarding construction or operation of the Gen-Tie are adequately investigated and resolved. All complaints received will be investigated by the Applicant and/or Generating Facility staff.

Notification requirements will be established with affected property owners to notify them and any associated tenants at least seven days prior to start of construction.

(4) Liability Compensation

The Applicant will carry significant amounts of liability insurance. The Gen-Tie will be covered under the Applicant's liability insurance programs for general commercial liability insurance and automobile liability insurance during construction and operation of the Gen-Tie.

(5) Estimate of Increase in Tax Revenues

Tax revenues will be addressed as a part of the Payment in Lieu of Taxes (PILOT) agreement negotiated for the Generating Facility.

4906-5-07 Health and Safety, Land Use, and Regional Development

(A) ROUTE ALTERNATIVE HEALTH AND SAFETY INFORMATION

(1) Compliance with Safety Regulations

Safety is the Applicant's highest priority. Therefore, the Applicant will ensure that the Gen-Tie will be designed, constructed, and operated to comply with the requirements specified in the NERC mandatory Reliability Standards, the National Electrical Safety Code, and the Public Utilities Commission of Ohio. During the construction and operation of the Gen-Tie, all applicable safety standards established by the Occupational Safety and Health Administration (OSHA) will be adhered to.

(2) Electric and Magnetic Fields

One residence is located within 100 feet of the aboveground portion of the Preferred ROW centerline, and two residences are located within 100 feet of the Alternate ROW centerline. Thus, details are provided regarding electric and magnetic fields (EMF).

On average, electric fields within a residential structure range from 0 to 10 volts per meter. Electric fields directly beneath power lines may vary from a few volts per meter for some overhead distribution lines to several thousands of volts per meter for extra high-voltage power lines. Electric fields from power lines rapidly weaken with distance and can be greatly reduced by walls and roofs of buildings.[2,3]

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[2] NIH, 2002. Electric and Magnetic Fields Associated with the Use of Electric Power, Questions and Answers. June 2002. Prepared by the National Institute of Environmental Health Sciences National Institutes of Health.
[3] EPRI, 2019. EMF and Your Health, Electric Power Research Institute. 2019 Update.

In contrast, magnetic fields are not blocked by most materials. Magnetic fields encountered in homes vary greatly and exponentially weaken with distance from the source. Magnetic fields close to electrical appliances are often much stronger than those from other sources, such as magnetic fields directly under power lines.

(a) Calculated EMF Levels

Calculations have been conducted (Appendix I) to estimate the field effects of this transmission line and compare the results to applicable standards and guidelines. EMF was analyzed at the minimum conductor height under maximum line operating conditions, 5 percent over-voltage, and maximum current; summer and winter variability in load conditions would not be expected.

Note that only one residence is located within 100 feet of the overhead portion of the Gen-Tie. As required by the OPSB, EMF strength levels were calculated at 1 meter above ground and were completed for 5-foot increments within the ROW, representing the requirement to assess both the location under the conductors and the edge of the ROW.

The maximum EMF calculated is well within the industry standard, even at the center point of the ROW. The calculated magnetic field is less than 80 milligauss (mG), which is far below the reference levels recommended for the general public by the International Conference on Environmental Systems (ICES) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (9,040 mG and 2,000 mG, respectively), and will also conform with IEEE standards. The highest calculated electric field on the ROW is 1.8 kV/m, decreasing with distance.

This is also well below the reference levels recommended for the general public by ICES and ICNIRP (5.0 kilovolts per meter [kV/m] and 4.2 kV/m, respectively).

(b) EMF Health Effects

Due to public concern that use of electricity, electrically powered devices, and electrical power distribution networks may adversely affect health, numerous research studies and scientific reviews have been conducted to address this topic. Initial concerns were raised in the late 1970s, and scientists continue to investigate possible relationships between EMF and positive or negative health effects. However, there is no conclusive evidence that exposure to EMF causes health effects.

As part of the National Energy Policy Act of 1992, U.S. Congress enacted the Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) program. The NIEHS was charged with overseeing health research and conducting an EMF risk evaluation. In its final report to Congress, issued in 1999, the National Institute of Environmental Health Sciences (NIEHS) concluded that "[power frequency] EMF exposure cannot be recognized at this time as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard." Nonetheless, the report stated, "this finding is insufficient to warrant aggressive regulatory concern."[4]

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[4] NIEHS, 1999. Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields, Prepared in Response to the 1992 Energy Policy Act (PL- 102-486, Section 2118). National Institute of Health Sciences National Institutes of Health, Dr. Kenneth Olden, Director, NIH Publication No. 99-4493. May 4.

Additionally, EMFs exist anywhere electrical current flows, from places like our homes, schools, workplaces, and even from the earth itself. EMF produced by electricity is non-ionizing radiation, meaning the radiation has enough energy to move atoms in a molecule around (experienced as heat), but not enough energy to remove electrons from an atom or molecule (ionize) or to damage DNA. Humans are all exposed to EMF throughout our daily lives, such as TVs, cell phones, refrigerators etc.

In summary, some studies have reported an association between long-term magnetic field exposure and particular types of health effects, while other studies have not. The nature of the reported association remains uncertain, as no known mechanism or laboratory animal data exists to support the cause-and-effect relationship. It has, however, been determined by NIEHS that EMF levels from facilities such as those proposed are insufficient to warrant concern.

In view of the scientific evidence, the IEEE and other organizations have established guidelines limiting EMF exposure for workers in a controlled environment and for the public. These guidelines focus on prevention of acute neural stimulation. No limits have been established to address potential long-term EMF effects, as the guideline organizations consider the scientific evidence insufficient to form the basis for such action. For power-frequency EMF, IEEE Standard C95.6-2002 recommends the following limits as shown in Table 7-1.[5]

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[5] IEEE, 2002. IEEE Standard C95.6-2002 - IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz.

TABLE 07-1: Recommended Power Frequency EMF Limits

	General Public	Controlled Environment
Electric Field Limit (kV/m)	5.0	20.0*
Magnetic Field Limit (mG)	9,040	27,100
**10.0 kV/m within power line ROW*		

To address public concerns about EMF, the Government of Canada in 2012 updated its website with the latest knowledge on the subject. It contains the following statements on the EMF health related risks: "Health Canada does not consider that any precautionary measures are needed regarding daily exposures to EMFs at ELFs. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those just outside the boundaries of power line corridors."[6] Similarly, the WHO concludes, on its website: "to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health."[7]

(c) EMF Design Considerations

The Gen-Tie has demonstrated EMF levels that are not harmful to human health. Additionally, a few unassociated design features inherently reduce EMF levels at the edge of the ROW, compared to a lower horizontal arrangement of a traditional high-voltage (HV) line. Due to the clearance requirements of the Gen-Tie to the top

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[6] Healthy Canadians. 2012. Electric and magnetic fields from power lines and electrical appliances. http://healthycanadians.gc.ca/healthy-living-vie-saine/environment-environnement/homemaison/emf-cem-eng.php.
[7] World Health Organization. 2016. Questions and answers/Radiation: Electronic fields dated 4 August. https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields#:~:text=Despite%20extensive%20research%2C%20to%20date,at%20power%20line%20and%20radiofrequencies. Accessed June 6, 2023.

of rail and ground, along with the compact nature of a vertically arranged three-phase circuit, an intrinsic reduction in EMF at the edge of ROW results. Note that the conductors have been designed to be oriented as far from the edge of the ROW as possible, while still maintaining adequate clearance to the railroad.

(i) Procedures for Addressing Public Inquiries Regarding EMF

The established complaint resolution procedure (Appendix H) will be used to address inquiries or complaints, including those regarding EMF.

(3) Estimation of Radio, Television, and Communications Interference

An analysis of the potential effect on communications systems is provided in Appendix I, demonstrating that no effect will occur within approximately 60 to 100 feet of the Gen-Tie centerline, depending on the frequency. In addition, most communications have transitioned to modern, digital signals, which have considerably less interference from features such as the Gen-Tie.

(4) Noise Generation

(a) Construction Impacts

Major construction work will typically occur during the day, between the hours of 7 a.m. and 7 p.m. (or until dusk when sunset occurs after 7 p.m.). Some construction activities, such as extended concrete pours or minor construction work, may extend earlier or later. Construction is expected to be intermittent. Work on the Project Substation will be within the Generating Facility property and at least 1,000 feet from the nearest residence. With time-of-day restrictions on louder construction activities and the limited duration of construction, construction noise will not create an undue adverse impact.

If blasting or rock breaking is required in association with the Gen-Tie, it will occur during normal business hours, and neighbors will be provided with the phone number of the site supervisor should they have any questions or complaints.

During construction of the Gen-Tie, a temporary increase in noise will result from truck and rail cart traffic in the area, the equipment used for site preparation, as well as pole and equipment installation. Standard construction techniques will be used. The total duration of construction for the Gen-Tie is estimated to be approximately eight to 12 months. As a result, the noise impact on nearby sensitive areas is anticipated to be minimal.

(b) Operation and Maintenance Impacts

Calculations were performed to estimate the field and corona effects (audible effects of ionization of air particles under some conditions) and audible noise of the Gen-Tie to compare the results to applicable standards and guidelines (Appendix I).

There are two main sources of noise from electrical transmission systems: the transmission line and the substation. High-voltage transmission lines can generate noise during corona discharges. This occurs primarily in foul weather when water droplets form on the conductors. Dirty conductors can also lead to corona discharge.

Predicting audible noise from overhead power lines has been done primarily through empirical formulas based on measurements of existing power lines. For the Gen-Tie, an average conductor height above ground per phase (25 feet) was used. Maximum calculated audible levels within the ROW were 22 A-weighted decibels (dBA) at 25 feet from the center line of the Gen-Tie, which is quieter than a whisper

(30 dB) and is well below the typical United States Environmental Protection Agency (USEPA) guidelines of 55 dBA for a day-night average outdoors.

As documented in Appendix J, a noise evaluation of the Project Substation confirms that, while the sound levels associated with the Project Substation would shift to a different portion of the Generating Facility site, the estimated increases in sound levels over daytime ambient are 1 dB or less, and no estimated impacts in sound level over the nighttime ambient levels, as reflected in the authorized Generating Facility Certificate, will result.

(c) Mitigation Procedures

Conductors were sized to meet the line rating requirements, as well as industry accepted surface gradient requirements, to minimize audible noise and high-frequency electromagnetic signal interference. Mitigation procedures during construction will include properly maintained construction equipment and construction activities typically limited to occur during daylight hours to the extent feasible, and noise-related procedures conducted according to OSHA requirements. No additional noise mitigation is expected, as noise sources are primarily associated with operation of construction equipment and will be temporary in nature.

(B) LAND USE

(1) Map of the Site and Route Alternatives

Figure 07-1 provides a map of at least 1:24,000 scale that provides the following information with the Study Areas: the ROWs and centerlines associated with the Gen-Tie;

the proposed Project Substation location; land use (residential, commercial, industrial, institutional, recreational, agricultural, and vacant); road names; structures (as points on the maps including residences, commercial centers or buildings, industrial buildings and installations, schools, hospitals, churches, civic buildings, and other occupied places); and incorporated areas and population centers.

Both the Preferred and Alternate ROW Study Areas are predominantly agricultural fields with smaller amounts of residential areas, forested lands, railroad corridors, and commercial uses. Both the Preferred and Alternate ROW will be fully within the railroad property, which consists of disturbed land with herbaceous vegetation and gravel.

(2) Impact on Identified Land Uses

Table 07-2 presents the area of land use types within the Preferred and Alternate ROW Study Areas, as well as the percentage of each Study Area reflected by each category.

TABLE 07-2: Land Use Within the Gen-Tie Study Areas

Land Use Category	Preferred ROW Study Area		Alternate ROW Study Area		Project Substation Study Area	
	Approximate Acres	Approximate Percentage	Approximate Acres	Approximate Percentage	Approximate Acres	Approximate Percentage
Residential	50.0	7.6	50.1	7.6	1.4	1.3
Commercial	6.9	1.0	6.9	1.0	0	0
Industrial	9.8	1.5	9.8	1.5	0	0
Institutional	0	0	0	0	0	0
Recreational	0	0	0	0	0	0
Agricultural	495.3	75.0	500.21	75.3	93.1	90.0
Forest	24.6	3.7	23.2	3.5	0	0
Vacant	0	0	0	0	0	0
Other (Railroad)	44.0	6.7	43.9	6.6	7.5	7.3
Other (Road ROW)	29.9	4.5	30.3	4.6	1.5	1.5

The temporary and permanent disturbance areas associated with the Gen-Tie have been calculated based on the following assumptions:

- All work will occur within railroad property;
- Temporary workspace is assumed to reflect approximately 20 by 50 square feet for each pole location for aboveground structures, with other work limited to access from the existing rail(s) and short-term equipment driving between structures;
- Temporary workspace for underground work is assumed to involve a 10-foot-wide workspace, assuming trenching; and
- Permanent impact is based on no impact for the underground Gen-Tie, 5 square feet of impact for each interior pole, and 50 square feet of impact for each of the two dead-end poles.

The Project Substation footprint has not been modified and remains within the approved Generation Facility footprint. The impacts associated with the Project Substation were thus evaluated to be consistent with those identified in the approved Generating Facility Certificate.

No temporary or permanent disturbance within residential, commercial, industrial, institutional, recreational, forest, or vacant land is anticipated. Temporary disturbance is anticipated to occur on approximately 2.16 acres of agricultural land (within the Generating Facility) and approximately 13.48 acres of Other (Railroad ROW) land use for access and construction of the Facility Substation and Gen-Tie.

TABLE 07-3: Anticipated Temporary and Permanent Impact Areas

Project Element	Temporary Disturbance (acres)	Permanent Alteration (acres)	Temporary Disturbance (acres)	Permanent Alteration (acres)
	Preferred ROW		Alternate ROW	
Agricultural				
Gen-Tie Pole Locations, Equipment	0	2.16	0	2.16
Access Roads	0.1	0.1	0.1	0.1
Laydown	0	0	0	0
Railroad ROW				
Gen-Tie Pole Equipment	1.08	0.007	0.96	0.009
Access Roads	0	0	0	0
Laydown	12.34	0	12.34	0

(3) Impact on Identified Nearby Structures

(a) Structures within 200 Feet

Structures within 200 feet of the proposed facility ROW have been identified (as shown on Figure 07-2 and Table 07-3). No structures are located within the proposed 50-foot ROW for the Preferred ROW or Alternate ROW. Sixteen structures (six houses, five garages, and five outbuildings) were identified as located within 200 feet of the Preferred ROW. Seventeen structures (seven houses, five garages, and five outbuildings) were identified as located within 200 feet of the alternate route ROW.

TABLE 07-4: Structures Within 200 Feet of ROW

Structure Type	Distance to Preferred ROW	Distance to Alternate ROW	Underlying Parcel Status
Garage	11	20	Non-Participating
Garage	30	39	Non-Participating
House	65	75	Non-Participating
House	109	117	Non-Participating
Outbuilding	14	24	Non-Participating
Garage	132	140	Non-Participating
House	148	159	Non-Participating
Garage	72	81	Non-Participating
House	49	59	Non-Participating
Outbuilding	64	74	Non-Participating
Garage	184	195	Non-Participating
House	154	164	Non-Participating
Outbuilding	128	137	Non-Participating
House	--	94	Non-Participating
Outbuilding	164	52	Non-Participating
Garage	14	23	Non-Participating
House	53	62	Non-Participating
Outbuilding	27	36	Non-Participating
Barn	61	70	Non-Participating

(b) Structures to be Removed or Acquired

No structures will be removed or acquired for either the proposed route or alternate route.

(c) Proposed Mitigation Measures

The landowners located proximate to the Gen-Tie will be notified prior to construction, and construction fencing will be installed along the workspace laydown areas to facilitate limiting all work activities within the railroad property. No future structures are proposed within the ROW, as is discussed in the option and will be established in the formal lease agreement with Norfolk Southern. Vegetative clearing and maintenance activities are expected to be limited, due to the property's current use as an

active rail line. However, to the extent necessary, such activities will be coordinated with Norfolk Southern and workers will remain within the Gen-Tie or railroad property.

(C) AGRICULTURAL DISTRICTS AND IMPACTS TO AGRICULTURAL LAND

(1) Mapping of Agricultural Land

As shown on Figure 07-3, no agricultural land (specifically cultivated crops) is located along either the Preferred or Alternate ROW, with the exception of the portion that extends across the Generating Facility Project Area. No agricultural districts were identified as mapped within the Preferred or Alternate Study Area.

(2) Agricultural Information

Approximately 495 acres of agricultural land are considered as part of the Preferred ROW Study Area, while approximately 500 acres are considered as part of the Alternate ROW Study Area. Approximately 0.26 acres of agricultural land is located within both the Preferred ROW and Alternate ROW, reflecting the portion of the Gen-Tie ROW that extends within the Generating Facility Project Area; as such, this does not reflect new impacts.

(3) Agricultural Impacts

During construction and operation, all activities will remain within the railroad property; therefore, field operations will not be interrupted for the adjacent agricultural fields. There are no known irrigation systems within the proposed ROW for the preferred and alternate routes, which is proposed on land currently in use by an active rail line.

Construction of the Gen-Tie is not anticipated to result in impacts to drain tile systems in the area. Limited drain tiles have been identified in the adjacent area, which will be field-located prior to and avoided during construction to a reasonably practicable extent. Should

inadvertent damage to drain tiles be caused, the Applicant will work with applicable landowners to reroute, repair, or replace the tiles, as appropriate.

Overland drainage within the Gen-Tie and Project Substation is not anticipated to be meaningfully altered, with appropriate minor grading and stormwater management integrated into the design. The majority of the railroad property will be restored to approximate original condition, with only the specific locations of the monopole structures remaining above ground following construction. No mapped floodplains are located within the Project Area (as shown on Figure 07-4.

(4) Agricultural Mitigation Practices

The proposed structures for the Preferred and Alternate ROW will not be placed within agricultural land. Therefore, no specific mitigation has been identified.

(D) REGIONAL LAND USE PLANS AND DEVELOPMENT

(1) Impacts to Regional Development

The proposed Project is expected to support the development in Hancock County through the increased reliability and availability of electric power to the surrounding area by supporting the Generating Facility. Given its type and location, the Project is not expected to affect the regional population or development; therefore, no significant impact on local public services and facilities is anticipated.

(2) Compatibility of Proposed Facility with Current Regional Land Use Plans

Hancock County, and Washington Township, have adopted regional plans to guide future development. Given its type and location, the proposed Project is not expected to negatively affect the goals and objectives identified in the regional plans. The Project will not impact the surrounding agricultural uses.

(E) CULTURAL AND ARCHAEOLOGICAL RESOURCES

(1) Cultural Resources Map

Cultural resources studies were conducted for both the Preferred and Alternate ROWs (Appendix C). These studies included a literature review that utilizes publicly available data and files from the OHPO.

Locations of recreational areas, recreational trails, scenic rivers, scenic routes or byways, and registered landmarks of historic, religious, archaeological, scenic, natural, or other cultural significance are shown on Figure 07-5. Based on the available data, no recreational areas, scenic routes, or culturally significant areas were found to occur within 1,000 feet of the Preferred or Alternate ROWs.

(2) Cultural Resources Studies and Consultation

Phase I Cultural Resource surveys were conducted by Weller & Associates, Inc. (Weller), within the APE of the preferred and alternate routes, respectively, as provided in Appendix C. Prior to the site visit, a literature review was conducted within a 1,000-foot-radius from the boundary of the Gen-Tie. The literature review included resources such as NRHP files, and the OHI files and Ohio Archaeological Inventory (OAI).

The field survey, conducted in April 2023, identified no structures within either APE as NRHP eligible. No archaeological resources were found within the ROW corridor, as the area is previously disturbed. OHPO has reviewed the reports and concurred that no impact is expect and no further work is required (Appendix C).

(3) Construction, Operations, and Maintenance Impacts on Cultural Resources

Based on the results of the cultural resources studies, no impacts to known significant cultural resources associated with construction, operations, and maintenance of the Project are anticipated.

(4) Mitigation Procedures

Based on the results of the cultural resources studies, no impacts to known significant cultural resources associated are anticipated; therefore, no mitigation procedures are proposed for the Project.

(5) Aesthetic Impact

(a) Visibility from Sensitive Vantage Points

No scenic landmarks, lookout points, or waterways are located within 1,000 feet of the Project area. While the overhead portions of the proposed Project will be visible in the immediate surrounding area, its presence within an existing infrastructure corridor and within a setting where other overhead electric lines are present is not expected to materially change the character of the Project Area. An approximately 0.16-mile portion of the Preferred ROW, where it is proximate to a small cluster of residences, is proposed to be installed underground, which will further reduce visibility impacts.

(b) Effect on Aesthetic Quality

The Project is located within a rural area, surrounded by agricultural land interspersed with some residential homes. The existing rail line, roadways, and existing utility easements (including overhead electric transmission lines) extend through the general area. Although the aboveground portions of the Gen-Tie line will be visible from nearby viewers, the monopoles will be installed within an already disturbed area

associated with the existing active railroad. Additionally, the overhead portion will utilize a slim, monopole design rather than a larger H-frame or lattice design, to further blend into the existing environment. It is not anticipated that the Project will have a material impact on the overall aesthetic quality within the area.

(c) Measures to Minimize Visual Impacts

Potential visual impacts have been mitigated through the route selection process. In addition to being located where no scenic landmarks, lookout points, or waterways are located within the Study Area, the Gen-Tie is located within an existing active infrastructure corridor. Further, the Preferred ROW incorporates a 0.16-mile section that is proposed to be installed underground to further minimize visual impacts near a small cluster of residences.

4906-5-08 Ecological Information and Compliance with Permitting Requirements

(A) ECOLOGICAL MAP

A map series of at least 1:24,000 scale showing the proposed Gen-Tie line with the Preferred and Alternate ROW Study Areas with mapped wetland and other ecological features is included on Figure 08-1. The map shows, to the extent present in the Study Areas, the Gen-Tie components, mapped NHD streams, mapped NWI wetlands, mapped OWI wetlands, erodible soils, delineated wetlands, and delineated streams.

(B) FIELD SURVEY REPORT FOR VEGETATION AND SURFACE WATERS

(1) Vegetative Communities

Vegetative communities were evaluated within the field survey area during the wetland delineation activities in September 2022. As shown on Figure 08-2, the predominant vegetative community present within the field survey area is agricultural lands. The remainder of the field survey area is residential areas, railroad property, and forested areas.

Active agricultural fields located within the field survey area for the Study Areas consisted of row crop planted with either soybean (*Glycine max)* or corn (*Zea mays).* Small, forested areas are located within the field survey areas. These areas generally consisted of red maple (*Acer rubrum),* tuliptree (*Liriodendron tulipifera,)* and Japanese honeysuckle (*Lonicera japonica)*. Herbaceous vegetation within the railroad property included field horsetail (*Equisetum arvense),* narrow-leaf cattail (*Tyhpa angustifolia),* and Japanese bristle grass *(Setaria faberi).*

(2) Wetland and Stream Features

A Wetland and Stream Delineation Report has been completed for the Preferred and Alternate ROW Study Areas and are provided in Appendix K. The ecological field survey for the

Preferred ROW was completed on 27 September 2022. The field survey for the Alternate ROW was also completed during this time, where land permissions were allowed. Delineated features are shown on Figure 08-3.

The field investigation for the Preferred ROW identified six wetlands and two streams within the field survey area. The two streams were delineated as intermittent features that have been modified and culverted through the Study Area. Two of the wetlands (Wetland RMA and Wetland RMB) are located between the Norfolk Southern railbeds. Wetland RMA is an emergent wetland, while Wetland RMB has portions of both shrub/scrub and emergent vegetation. Four wetlands (Wetland RMC, Wetland RMD, Wetland RME, and Wetland RMF) are emergent wetlands located within a depressional feature within an active agricultural field. Wetland RMA and Wetland RMB are presumed to be jurisdictional, as they both drain to an unnamed tributary to South Branch Portage River. Wetland RMC, Wetland RMD, Wetland RME, and Wetland RMF are considered to be isolated wetlands.

In addition to identifying aquatic resources throughout the Study Area using mapping resources and field confirmation, preliminary data was collected to initiate the evaluation of identified wetlands using the Ohio Rapid Assessment Method (ORAM). ORAM scores provide a functional assessment of wetland quality, with Category 3 wetlands being of the highest quality, and Category 1 wetlands being of the lowest quality. No Category 3 wetlands were documented during the field investigations; all delineated wetlands were classified as Category 1.

Preliminary data were also recorded to initiate the evaluation of identified stream feature quality using the Ohio Headwater Habitat Evaluation Index (HHEI) scoring method. This method yields a numerical score that indicates the probable existing aquatic life use of each stream. HHEI

scoring classifies streams from Class III (indicating the highest quality) to Class I (indicating the lowest quality) of headwater stream habitat. Based on the evaluation conducted, the delineated streams were determined to have HHEI scores high enough to be considered a modified Class II (Stream RM2) and modified Class III (Stream RM1) waterbodies, largely based on the bank-to-bank dimensions.

(3) Construction Impacts on Vegetation and Surface Waters

There are no construction-related impacts to recreational areas, parks, wildlife areas, nature preserves, or other conservation areas anticipated in association with the Project. The closest park is the Fostoria Country Club, which is located approximately 0.9 miles east of the northern portion of the Study Areas for the Preferred and Alternate ROWs.

Through careful design and avoidance measures, the Applicant anticipates no impact to delineated wetlands and minimal impact to streams in association with the Project. Impacts to the wetlands and streams will be avoided by placing transmission line structures outside of the wetland and stream boundaries. Temporary impacts to wetlands or streams due to construction access are not anticipated at this time; should such impact be required appropriate coordination with the United States Army Corps of Engineers (USACE) will occur. To minimize soil erosion and sedimentation impacts during construction, best management practices, including silt fences and mats, will be implemented as required.

(4) Operations and Maintenance Impacts on Vegetation and Surface Water

Once operational, no additional ecological impacts from the Preferred or Alternate ROW are anticipated. The Applicant has sited the Project to avoid wetlands and streams to the maximum extent practicable, and no additional impacts to these resources are anticipated following

construction. The Project will not result in physical disturbances or impacts to recreational areas, parks, wildlife areas, nature preserves, or other conservation areas.

Periodic mowing or maintenance along the proposed 50-foot ROW may occur and is not anticipated to result in a significant environmental impact to the vegetation, particularly because the Preferred and Alternate ROWs are already in a disturbed area.

(5) Mitigation Procedures

The following mitigation procedures will be utilized during construction, operations, and maintenance of the proposed Project to minimize the impact on vegetation, surface waters, and listed species. A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented as required and will be available on site during construction.

(a) Site Restoration and Stabilization of Disturbed Soils

Restoration activities are anticipated to include the following:

- Soil above the underground transmission line will be restored to preconstruction contours as necessary and allowed to regenerate naturally.
- Disturbed soils within the Project's ROW will be reseeded with a low-growth, native seed mix to stabilize exposed soils and control sedimentation and erosion.
- The laydown yards will be de-compacted, topsoil redistributed, and seeded with a low-growth, native seed mix to stabilize exposed soils and control sedimentation and erosion.

All waste material and debris will be stockpiled in designated locations. Each stockpile will be transported off site to either a recycling center, when feasible, or to an approved landfill depending on the material type. Debris will be broken down into manageable sizes to aid in their transportation.

Surface water runoff during construction will be minimized, as Best Management Practices (BMPs) will be implemented, and stormwater controls will be kept in place through the completion of construction and removed once permanent stabilization measures have been installed.

The objectives of reclamation and revegetation are to allow for the efficient establishment of vegetation within the Project Area. In excavated areas, topsoil and subsoil will be segregated and separately backfilled, and soil will be treated, as necessary, to preserve approximate pre-construction capability.

(b) Frac-Out Contingency Plan

The majority of the Gen-Tie will span sensitive resources such as wetlands, streams, or roadways. However, a small portion of the Gen-Tie is proposed to be installed underground. HDD or similar techniques may be used when installing collection lines, in combination with open trenching, where necessary. An HDD Contingency Plan has been developed (Appendix G). As noted in the plan, notification to abutters will be given prior to the work commencement and an environmental specialist would be present for such activities as an additional assurance that continencies would be effectively met.

(c) Methods to Demarcate Surface Waters and Wetlands

The boundaries of streams and wetlands within and immediately adjacent to the construction limits of disturbance will be demarcated by silt/exclusionary fencing to clearly indicate avoidance areas. These will also be marked on final construction documents. All contractors and subcontractors working on the site will be provided

with training to understand the significance of the types of indicators used, and the importance of staying within defined limits of work areas.

(d) Inspection Procedures for Erosion Control Measures

A SWPPP, outlining details for erosion control and stormwater management, and regular inspection of erosion control measures, will be developed and implemented, as further described below.

Erosion and sediment control measures will be inspected by a qualified individual through the construction phase to assure that they are functioning properly. These features will be inspected until 70 percent permanent vegetated cover has been established across disturbed areas. Disturbed areas and areas used for storage of materials that are exposed to precipitation will be inspected for evidence of, or the potential for, pollutants entering the drainage system. Locations where vehicles enter or exit the Project Area will be inspected for evidence of off-site vehicle tracking. Inspections will be conducted at least once every seven calendar days, and within 24 hours after any storm event with 0.5 inches or greater of rain. The inspection frequency may be reduced to once every month if the Project Area is temporarily stabilized and runoff is unlikely due to weather conditions such as snow, ice, or frozen ground.

Following each inspection, the qualified inspector will complete and sign a checklist and inspection report. At a minimum, the inspection report will include:

- The inspection date;
- Names, titles, and qualifications of personnel making the inspection;

- Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection), including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
- Weather information and a description of any discharge occurring at the time of the inspection;
- Locations of any BMPs that need to be maintained; and
- Any corrective actions recommended.

The inspection report will be distributed to the contractor, and any corrective actions will be promptly addressed by on-site staff to ensure permit compliance.

(e) Measures to Divert Stormwater Runoff

During construction, BMPs will be employed to divert stormwater runoff from fill slopes and other exposed surfaces until stabilization measures have been established.

(f) Measures to Protect Vegetation

The Gen-Tie will be installed within active railroad property, which limits the potential to disturb natural vegetation.

No mature trees are located within the Preferred ROW. Both the Preferred and Alternate ROWs have limited areas of trees located along the fringe of the railroad property, with a greater number found along the Alternate ROW. Should tree trimming be necessary, it would only occur from October 1 through March 31 to avoid potential impact to listed bat species.

Other measures to protect vegetation include identifying sensitive areas, such as wetlands where no disturbance or vehicular activities will be allowed, limiting areas of disturbance to the smallest size practicable, educating the construction workers on respecting and adhering to the physical boundaries of off-limit areas, and employing BMPs during construction. A benefit of the Project is that ground disturbance will be extremely limited due to the existing relatively flat terrain, and previously disturbed land.

Following construction activities, temporarily disturbed areas will be re-established with native vegetation. Seed mixes for the Project will incorporate suggestions from ODNR and Ohio Pollinator Habitat Initiative to reestablish vegetative cover in these areas.

(g) Options for Clearing Methods and Disposal of Brush

No tree clearing is anticipated for the Project, as the Preferred and Alternate ROWs would be located within the already disturbed Norfolk Southern railroad property. If trimming of trees with a greater than 3-inch-diameter at breast height (dbh) is necessary, it will be completed from October 1 through March 31 to avoid potential impacts to listed bat species. Disposal of cleared or downed trees and shrubs will likely consist of chipping or grinding, then using as woodchips for temporary ground cover or mulch. Off-site transport of woody material is not anticipated; however, if necessary, such disposal will be completed by a qualified contractor in accordance with local, state, and federal regulations.

(h) Use of Herbicides for Maintenance

Given the current active use of the railroad property, the need for substantial vegetation maintenance is not anticipated. However, if necessary, limited spot treatments of herbicides may be applied.

(C) PLANT AND ANIMAL LIFE POTENTIALLY AFFECTED BY THE FACILITY

(1) Anticipated Species

A literature survey of plants and animals, anticipated to occur in the Preferred and Alternate ROW Study Areas, has been completed reflecting aquatic and terrestrial plant and animal species of commercial and recreational value, as well as species designated as endangered or threatened, as discussed below.

Commercial species are generally considered to be those that are harvested and sold at a market price. Desktop review did not indicate the potential presence of specific commercially valuable species in the vicinity of the Project. It is anticipated that commercially valuable species potentially present in the vicinity of the Project are common throughout Ohio and could include agricultural species (crops and livestock), timber species, and furbearers. While timber species such as maples and oaks may occur in the Study Area, forested lots are very limited in size, and timber harvesting does not appear to be a viable long-term commercial activity. Likewise, furbearers such as raccoons, coyotes, and foxes may occur in the Study Areas, but habitat to support commercial trapping operations is not present. The vast majority of the Study Areas is devoted to row crops (corn and soybean), and these are the only significant commercial species known to occur within the Study Area. Because of the prevalence of cropland within the region and the

location of the Gen-Tie entirely within railroad property, no significant impacts to commercial crop species are anticipated.

Recreational species are those that support common outdoor recreational activities. In Ohio such activities generally include hunting, fishing, wildlife viewing (e.g., birdwatching), and foraging for mushrooms or plants, such as ginseng.

Game species in the vicinity of the Study Area are likely to include white-tailed deer, eastern cottontail rabbits, squirrels, ring-necked pheasant, wild turkey, and mourning doves. However, according to the DNR's Public Hunting and Wildlife Area Maps[8], no public hunting areas or wildlife areas are located in Hancock County. Cornell Labs' map of birding hotspots[9] and the Birding Hotspots website[10] include information about popular birding areas in Hancock County. No popular birding areas were indicated within or proximate to the Study Areas. Accordingly, hunting and wildlife viewing within the Study Areas are likely to be limited to private landowners and any impacts to game species from the Project are expected to be minimal.

No waters large enough to support common gamefish species, such as largemouth bass, catfish, or panfish species appear to be present within the Study Areas. As a result, no impacts to these recreational fish species will occur because of the Project.

Little information is available regarding foraging for mushrooms or wild plants within Hancock County. However, the lack of public land and small amount of undisturbed

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[8] https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/wildlife/documents-publications/hunting-area-maps
[9] https://ebird.org/hotspots?hs=L3786568&yr=all&m=
[10] https://birdinghotspots.org/

land within the Study Areas indicates the Project is unlikely to disturb any recreational foraging for wild species.

Based on consultation with the USFWS (Appendix B), the Study Areas were identified as being within the range of the endangered Indiana bat (*Myotis sodalis),* endangered northern-long-eared bat (*Myotis septentrionalis),* and the proposed endangered tri-colored bat (*Perimyotis subflavus)*. USFWS noted that due to the Project type, size and the proposed implementation of seasonal tree clearing between October 1 and March 31 to avoid impacts to these species, no adverse impacts are anticipated.

ODNR consultation (Appendix B) indicated that no records of state or federally listed plans or animals were noted within one mile of the Study Areas. Their letter reiterates that the entire state of Ohio is within the range of the Indiana bat (also state endangered), the northern long-eared bat (also state endangered), and the tri-colored bat (state endangered); in addition, the little brown bat (*Myotis lucifugus*) is a state-endangered species with the potential to occur throughout Ohio. ODNR recommends that tree cutting occur only from October 1 through March 31, as is proposed for the Project. A desktop habitat assessment is also recommended to determine if a potential hibernaculum is present. A desktop assessment was completed, including a review of aerial photography, topographic mapping, ODNR mapping of known mine openings, and ODNR's karst interactive map. No such resources or significant forests were identified within 3 miles; in addition, the Gen-Tie's location on an active railroad property would indicate that hibernacula are not present. ODNR also notes that the Project is in the range of several mussel species and the western banded killifish (*Fundulus diaphanous menona*); it concludes that, given there is no in-water work proposed in a perennial stream of sufficient

size, that the Project is not likely to impact those species. Other species identified as potentially occurring in this part of Ohio but unlikely to be impacted are the Kirtland's snake (*Clonophis kirtlandii*), norther harrier (*Circus hudsonius*), and upland sandpiper (*Bartramia longicauda*).

Animal life was noted during the wetland delineation activities conducted in September 2022. Table 8-1 shows species observed during the field investigations, as well as identified as likely through desktop review. Land use within the Study Areas of the Preferred and Alternate ROW is largely agricultural land, with the exception of the active rail, roadways, and some scattered residences.

TABLE 08-1: Representative Study Area Animal Species

Common Name	Latin Binomial	Classification
Red-winged blackbird	*Agelaius phoeniceus*	Bird
Wood duck	*Aix sponsa*	Bird
Mallard	*Anas platyrhynchos*	Bird
Canada goose	*Branta canadensis*	Bird
Red-tailed hawk	*Buteo jamaicensis*	Bird
Coyote	*Canis latrans*	Mammal
Northern cardinal	*Cardinalis cardinalis*	Bird
Turkey vulture	*Cathartes aura*	Bird
Killdeer	*Charadrius vociferous*	Bird
Northern flicker	*Colaptes auratus*	Bird
American crow	*Corvus brachyrhynchos*	Bird
Blue jay	*Cyanocitta cristata*	Bird
Downy woodpecker	*Dryobates pubescens*	Bird
Pileated woodpecker	*Dryocopus pileatus*	Bird
Green frog	*Lithobates clamitans*	Amphibian
Woodchuck	*Marmota monax*	Mammal
White-tailed deer	*Odocoileus virginianus*	Mammal
Raccoon	*Procyon lotor*	Mammal
Eastern grey squirrel	*Sciurus carolinensis*	Mammal
Field sparrow	*Spizella pusilla*	Bird
Eastern chipmunk	*Tamias striatus*	Mammal
American robin	*Turdus migratorius*	Bird

Common Name	Latin Binomial	Classification
Mourning dove	*Zenaida macroura*	Bird
Common earthworm	*Lumbricus terrestris*	Invertebrate

Common avian species are likely utilizing the Preferred and Alternate ROW Study Areas for nesting in spring and summer months. Migratory bird species are also likely utilizing the Study Areas for foraging during spring and fall migration periods; non-migratory resident species may also be present.

Mammals utilizing the Preferred and Alternate ROW Study Areas include herbivorous species, such as white-tailed deer (*Odocoileus virginianus*) and eastern gray squirrels (*Sciurus carolinensis*), and omnivores such as raccoons (*Procyon lotor*). Shagbark hickory and shellbark hickory trees are present in woodlots and along field edges in the Study Areas and the exfoliating bark observed on these trees has the potential to provide roosting habitat for tree-roosting bat species.

Common reptiles and amphibian species would be expected to occur within the Preferred and Alternate ROW Study Areas. The extensive upland agricultural habitat present throughout the Study Areas would generally be considered poor habitat for many reptiles and amphibians (e.g., salamander and turtle species).

Common invertebrate species (i.e., insects) would be expected to occur within the Preferred and Alternate ROW Study Areas. These insects likely to be present would include the common earthworm (*Lumbricus terrestris)* and various millipede species. These are very common species in Ohio and within agricultural farmlands.

(2) Construction Impacts

Limited to no tree clearing is anticipated for the Project. If tree clearing occurs, restrictions protective of listed bat species (from October 1 through March 31) will be

implemented, and no impacts the Indiana bat, northern long-eared bat, or tri-colored bat are anticipated to occur. Construction impacts are not anticipated to impact protected species, based on the habitat of the Preferred and Alternate ROWs and surrounding area. This is considered especially true, given the current and ongoing active use of the rail corridor within which the Gen-Tie will be located.

(3) Operations and Maintenance Impacts

Minimal impacts are anticipated to wildlife during operation and maintenance of the Gen-Tie line. Periodic maintenance of the Gen-Tie is not anticipated to impact wildlife significantly, as the Gen-Tie will be located within an already disturbed area, limiting the available habitat for species.

(4) Mitigation Procedures

Based on consultations with ODNR and USFWS, given implementation of seasonal clearing restrictions for trees greater than or equal to 3 inches dbh, it is unlikely that any state or federally listed species will be impacted by the Project. No post-construction wildlife monitoring is proposed. Coordination letters are included in Appendix B.

The Applicant will contact OPSB Staff and the applicable federal or state agency within 24 hours if federal- or state-listed species are encountered during construction activities. Construction activities that could adversely impact the identified plants or animals will be halted until an appropriate course of action has been agreed upon by the Applicant, OPSB Staff, and other applicable agencies.

(D) SITE GEOLOGY

The Study Area for the Preferred and Alternate ROW is located within the Till Plains section and Eastern Lake section of the Central Lowlands physiographic province in northern

Ohio. The Central Lowlands include glacial deposits overlying largely horizontal Silurian sandstones, shales, limestones, conglomerates, and coals.[11]

The bedrock geologic map of Ohio[12] indicates thin glacial deposits covering Silurian age rocks of the following formations:[13, 14]

- Quarternary Period: clayey till ground moraine
- Silurian Period: Tymochtee and Greenfield dolomites, undivided, and Lockport dolomite

Additional detail and mapping can be found in the preliminary geotechnical report provided as Appendix F.

Based upon review of boring logs and laboratory testing results associated with the preliminary geotechnical investigation, as well as available geological maps and literature, expansive soils are not expected to be encountered within the majority of Gen-Tie site and can be considered a low risk. Therefore, an embedment depth of approximately 13 feet should be sufficient to resist upheaval associated with soil expansion over time, particularly given the lightly loaded nature of the structures proposed. Average frost penetration depth in this region is approximately 3.5 feet.[14]

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[11]National Park Service, Central Lowland, accessed October 27th, 2022, at: https://www.npsgov/articles/centrallowlandprovince.html.

[12] Quarternary Geologic Atlas of the United States, Lake Erie 4x6 Quadrangle, Miscellaneous investigations series, Map I-1420 (NK-17), Department of the Interior, U.S. Geological Survey; state and province compilations by David S. Fullerton (et al.); edited and integrated by David S. Fullerton and Gerald M. Richmond; prepared in cooperation with the Ontario Geological Survey (et al.). 1991, 1:1,000,000

[13] Bedrock geologic map of Ohio, Slucher, E.R., Swinford, E.M., Larsen, G.E., Schumacher, G.A., Shrake, D.L., Rice, C.L., Caudill, M.R., Rea, R.G., and Powers, D.M., Ohio Division of Geological Survey, Series and Number: Digital Map Series BG-1, 2006, 1:500,000.

[14] U.S. Army Corps of Engineers, Engineering Manual 1110-1-1905, "Bearing Capacity of Soils," Washington DC, 1992.

The potential for soil corrosion was also considered, as concrete exposed to high levels of sulfate and chlorides could require design adjustments. According to Natural Resources Conservation Service (NRCS) data, the near surface soils present generally exhibit a low to moderate corrosion potential for concrete and a high corrosion potential for unprotected metals. This will be factored into the Gen-Tie design.

The Gen-Tie area does include some carbonate rock; however, based on the subsurface investigations completed, no indications of karst were observed (e.g., loss of water/air and/or dropping of rock coring tooling) that would indicate a presence of voids or solutions cavities. In addition, based on aerial imagery, no surface depressions were visible that would indicate karstic activity. Therefore, karst potential can be considered low.

Figure 08-1 illustrates soils with slopes greater than 12 percent and highly erodible soils. As can be seen, no highly erodible soils are mapped within either the Preferred or Alternate ROW Study Areas, and the only steep slopes are immediately proximate to drainage features. In general, the terrain exhibits gradual to moderate slopes. It is not anticipated that slope stability will be a major concern given the site characteristics and project type. Mapped soil communities are shown on Figure 08-4.

A subsurface exploration and geotechnical engineering evaluation was conducted consisting of geotechnical borings, standard penetration tests (SPTs), split spoon sampling, and laboratory testing. Four boring locations (as shown on Figure 2 in Appendix F) were selected along the Preferred ROW, to provide representative information in locations where access was readily available. Borings were drilled from 30.5 to 50.5 feet below existing grade.

Both the Preferred and Alternate ROW are located within property currently in use for active rail lines. Although the location of the Gen-Tie would be outside of the active rail area, it is

expected that some disturbance has occurred within the entire property associated with the construction, operations, and use of the property over time. Based on historical aerial imagery and topographic mapping, the rail lines have been in place since before the 1900s. Subsurface stratigraphy was evaluated with boring logs. Topsoil, primarily consisting of medium-stiff to hard lean clay with varying amounts of silt, sand, and gravel, varies from 8 to 11 inches thick. Subsequent strata generally consist of medium-stiff to hard, lean clay with varying amounts of silt, sand, and gravel; medium-stiff to hard silt with varying amounts of sand; and medium-dense to dense sand. Complete boring logs are provided in Appendix F.

Subsurface soil properties were laboratory tested, indicating the native soils possess in-situ moisture contents in the range from about 10 to 22 percent, with an average of 16 percent. Based on laboratory results, surficial soils exhibit "negligible" sulfate content, which indicates that Type I cement can be considered acceptable for use in foundation concrete. Details regarding soil analysis can be found in Appendix F.

Typical drilled shafts and directly embedded poles are feasible for the gen-tie foundations. No known geohazards or unsuitable soil conditions were identified that would significantly impact the design or construction.

Groundwater was encountered at 20 feet or deeper at the time of drilling and immediately after completion of the drilling operations. Based on these observations, as well as historical water data for the region, static groundwater should not have an impact on foundation design. Nearby historic wells logs[15] indicate that static groundwater levels were reported to be between 10 and 20

[15] Ohio Department of Natural Resources, Water Wells Database, accessed October 17, 2022, at https://waterwells.ohiodnr.gov/search.

feet below the ground surface. The shallowest groundwater level was recorded in the years 2007 and 2020 at about 10 feet below ground surface at Well ID Nos. 2011539 and 2081439 (shown on Figure 8 of Appendix F). Shallower groundwater does have the potential to be encountered in association with perched water tables.

According to the Geotech report and soil boring records for this Study Area, bedrock was not encountered in the top 30.5 to 50 feet of the borings. The typical foundation depth of HV poles is no deeper than 20 feet, thus rock is not anticipated to be present at the pole foundations. Therefore, rock quality (RQ) and the percent recovery were not able to be analyzed, as there was no presence of rock found, and were eliminated as a critical design constraint. RQ and percent recovery is not anticipated to impact the Gen-Tie design, since the foundations will be drilled into and supported by the soil layers at the associated pole locations.

The risk of seismic hazard was also considered and determined to be low for the Gen-Tie.

(E) ENVIRONMENTAL AND AVIATION COMPLIANCE INFORMATION

The following sections discuss Project compliance with environmental and aviation regulations.

(1) List and Discussion of Permits Required

In addition to approval from the OPSB and local coordination with regards to crossing of roads and use of construction equipment, environmental permitting needs are expected to be limited. No access roads are required. Therefore, no Nationwide Permit coverage is anticipated to be necessary, as wetlands and streams will be spanned by the Gen-Tie. The Gen-Tie will be approximately 75 feet in height; therefore, it is not anticipated to be considered a hazard navigation, as it is substantially less than the 200-foot height typically requiring review by the Federal Aviation Administration (FAA).

(2) Description, Quantification, Characterization, Removal, and Disposal of Construction Debris

During construction, limited amounts of non-hazardous solid waste or debris will be reused, recycled, or disposed in accordance with applicable state and federal requirements. During construction, the site will be kept clean of debris and other waste materials. All waste material and debris will be stockpiled in designated locations. Each stockpile will be transported off site to either a recycling center, when feasible, or to an approved landfill depending on the material type. Debris will be broken down into manageable sizes to aid in their transportation.

(3) Stormwater and Erosion Controls During Construction and Restoration of Soils, Wetlands, and Streams Disturbed as a Result of Construction of the Facility

As stated in section 4906-5-08, a SWPPP will be prepared for the Project and BMPs will be implemented to minimize discharge during construction. The SWPPP will identify potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharges associated with construction activities. The SWPPP will also describe and ensure the implementation of BMPs that reduce pollutants in stormwater discharges during construction.

BMPs based on evaluation of topography, flow direction, and locations of soil-disturbing activities, will be used to protect topsoil and adjacent resources and to minimize soil erosion, whether the erosion is caused by water or wind. Practices may include containment of excavated material, protection of exposed soil, stabilization of restored material, implementation of rock pads at construction exits, and treating stockpiles to control fugitive dust.

On-site investigations were conducted to establish the locations of streams and wetlands. The proposed Project Gen-Tie structures were placed specifically to avoid impacts to these resources to the maximum extent practicable.

(4) Plans for Disposition of Contaminated Soil and Hazardous Materials Generated or Encountered During Construction

All materials on site will be stored in an orderly manner in their appropriate and original containers. Manufacturer's recommendations for proper use and disposal will be followed as necessary. Safety Data Sheets (SDSs) will be available on site at all times when required for specific chemicals.

Construction of the Project is not anticipated to generate any hazardous waste. If contaminated soils are encountered during construction, this will be reported to the environmental coordinator and the Project manager to determine the appropriate means for handling and disposal.

All contractors will be required to follow federal and state mandated material handling requirements.

(5) Maximum Height of Aboveground Structures

The height of the tallest aboveground structure will be 75 feet tall. The nearest airport, Rutter Private Airport, is located approximately 1.6 miles south of the Preferred and Alternate Study Areas. The nearest public airport, Fostoria Community Hospital Airport, is located approximately 2.4 miles northeast of the Preferred and Alternate Study Areas. Airports are shown on Figure 08-5.

The FAA typically requires review of structures 200 feet tall or greater. Since the structure heights are below this threshold, the Project is not expected to require FAA coordination and thus does not intent to file at this time.

(6) Plans for Construction During Excessively Dusty or Muddy Soil Conditions

The construction site will be kept clean from dust that may result from construction activities. If dry periods occur during construction, dust suppression will be implemented, when necessary, through irrigation or mulching. Construction entrances and access roads will be established and timber-matted or graveled to the extent necessary to prevent excessive muddy soil conditions.

This foregoing document was electronically filed with the Public Utilities

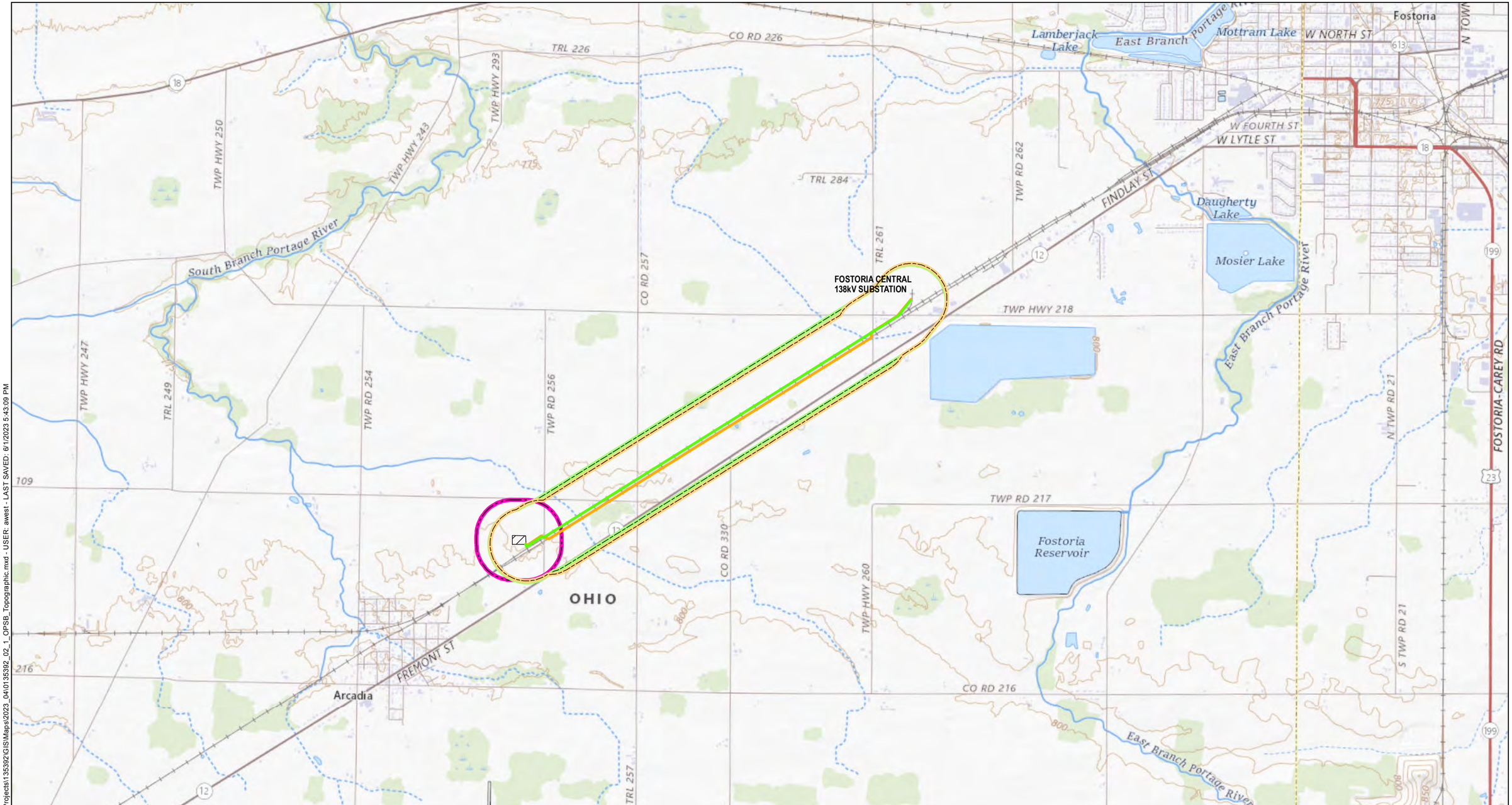
Commission of Ohio Docketing Information System on

6/7/2023 2:53:37 PM

in

Case No(s). 23-0373-EL-BTX

Summary: Application of South Branch Solar, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Gen-Tie Transmission Line electronically filed by Teresa Orahood on behalf of Sommer Sheely.



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LEGEND

- Alternate Study Area
- Preferred Study Area
- Substation Study Area
- Project Substation
- Preferred Route
- Alternate Route

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: USGS

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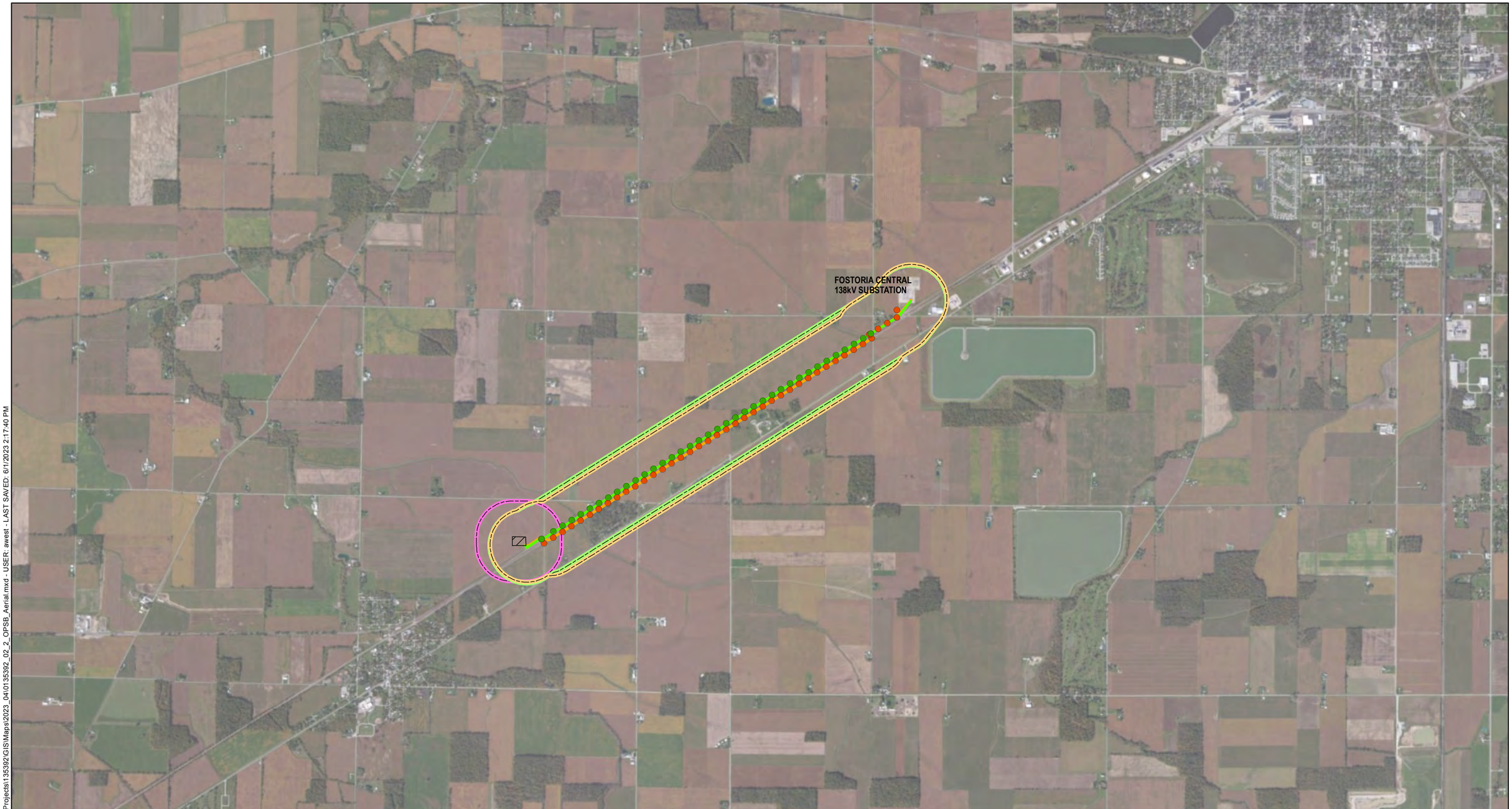
SCALE IN FEET

HALEY ALDRICH

Figure 02-1
Project Location on Topographic Map

South Branch Gen-Tie
Hancock County, Ohio



LEGEND

- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Project Substation
- Preferred Route
- Alternate Route
- Proposed Structure Location - Preferred Route
- Proposed Structure Location - Alternate Route

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

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SCALE IN FEET

HALEY ALDRICH

Figure 02-2
Project Location on Aerial Map

South Branch Gen-Tie
Hancock County, Ohio

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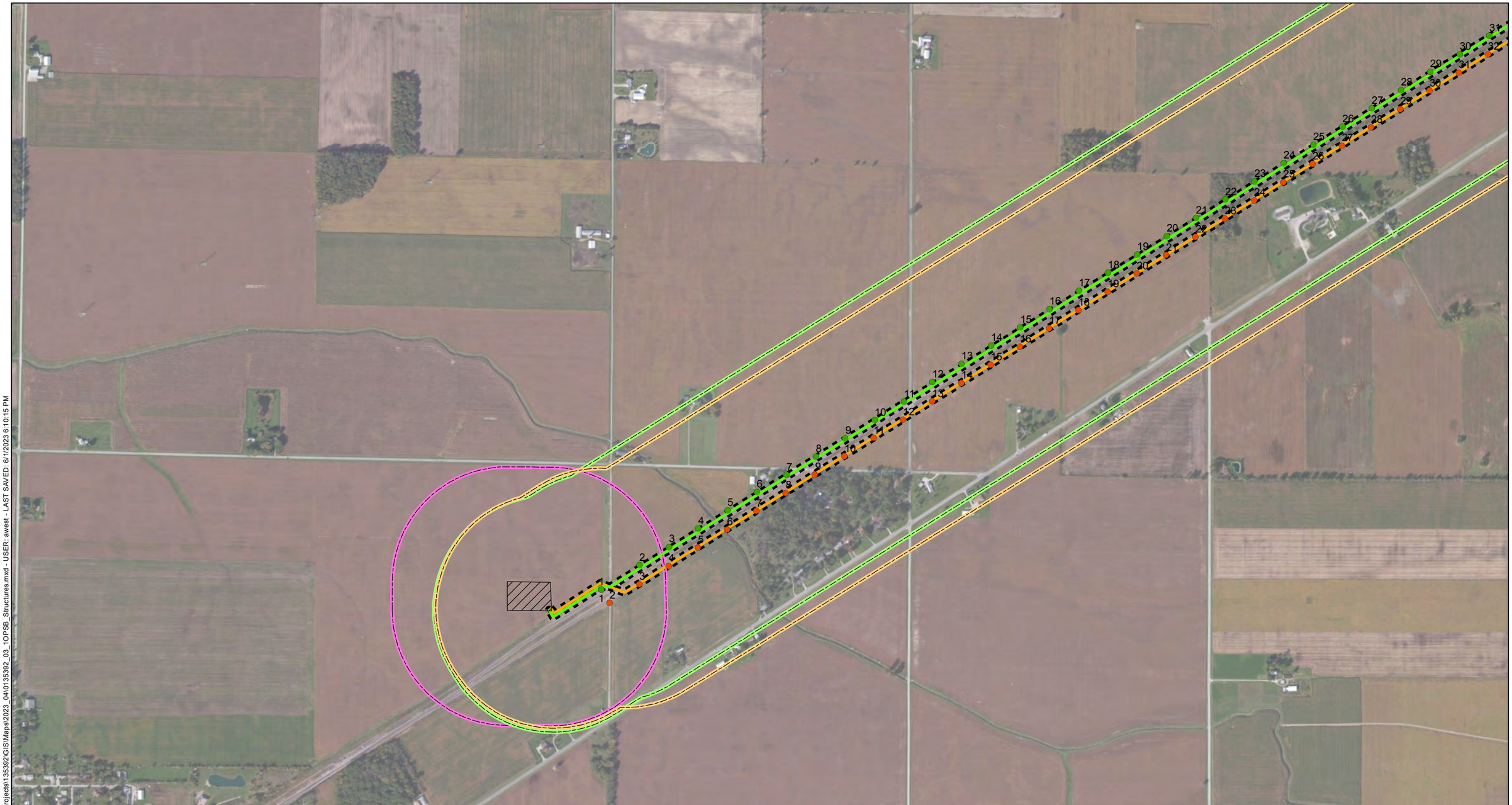

LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Proposed Structure Location - Preferred Route
- Proposed Structure Location - Alternate Route
- Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

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HALEY ALDRICH

Figure 03-1a
South Branch Gen-Tie

South Branch Gen-Tie
Hancock County, Ohio

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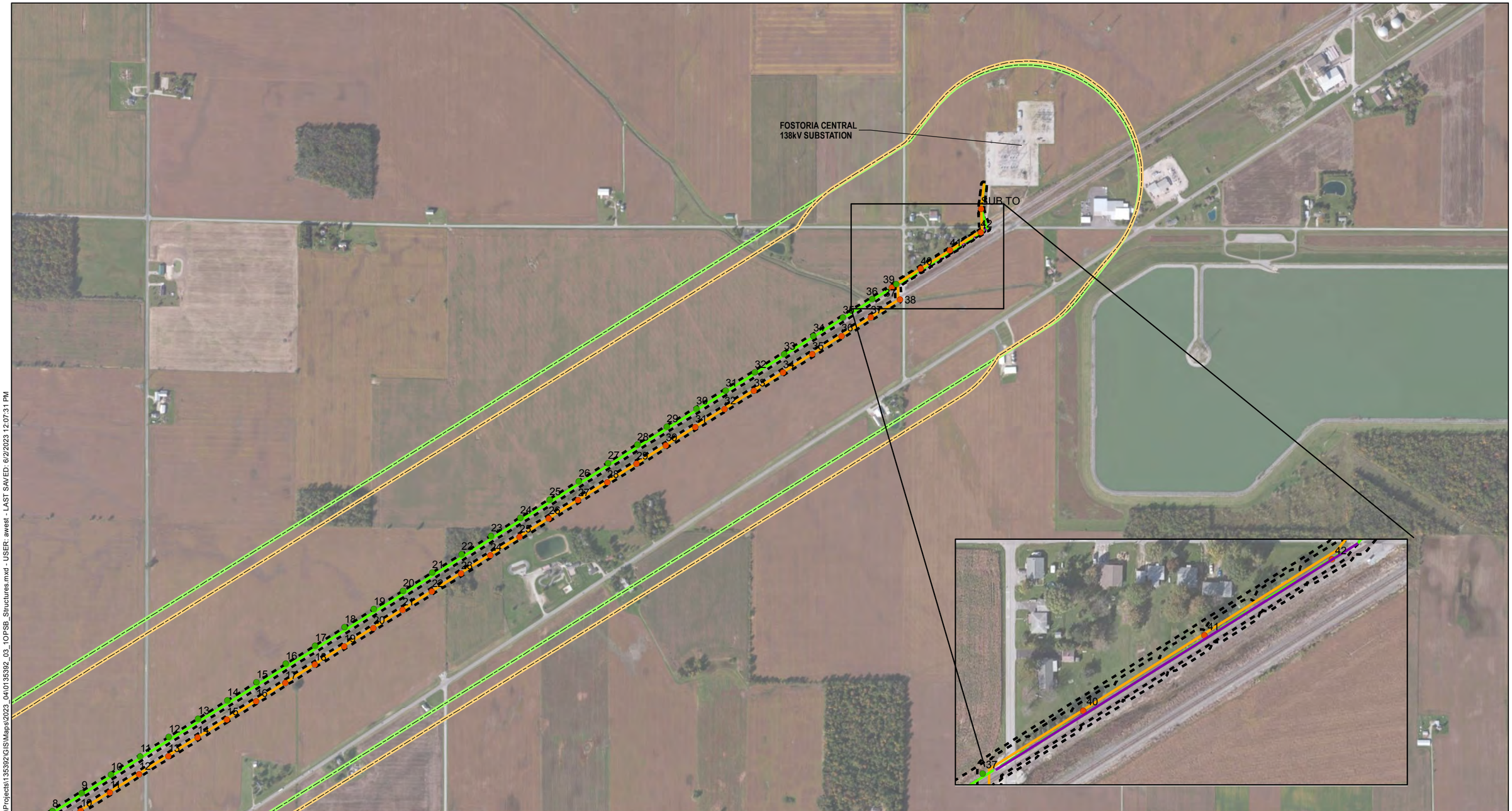

LEGEND

- Alternate Study Area
- Preferred Study Area
- Proposed Structure Location - Preferred Route
- Proposed Structure Location - Alternate Route
- Gen-Tie Underground Portion
- Alternate Route
- Preferred Route
- 50 Foot ROW

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

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SCALE IN FEET

HALEY ALDRICH

Figure 03-1b
South Branch
Gen-Tie

South Branch Gen-Tie
Hancock County, Ohio

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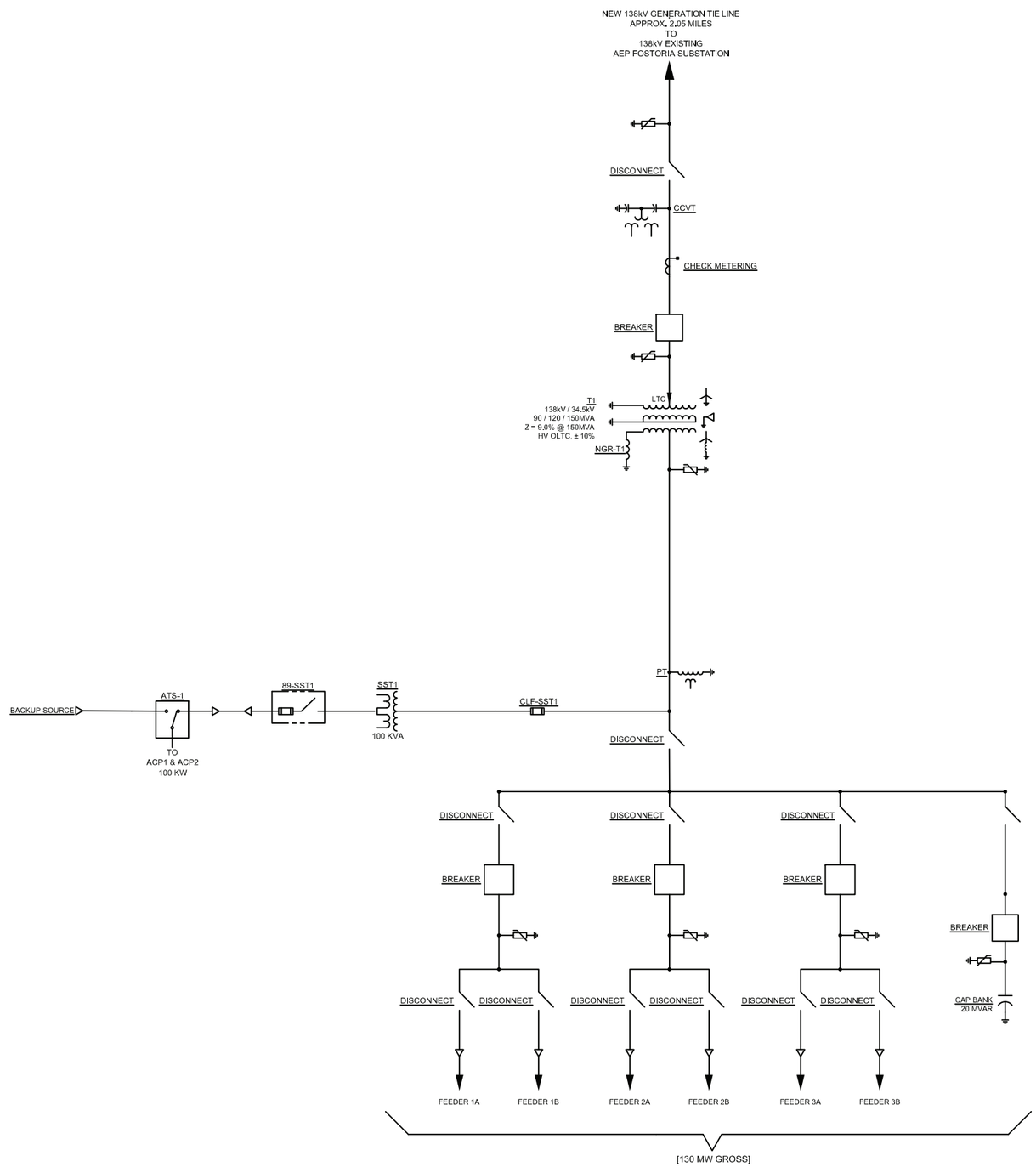


PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

REVISIONS				
NO.	DATE	DWN.	CHK.	
A	5/31/2023	JCM	NCW	ISSUED FOR INTERCONNECTION

SOUTH BRANCH SOLAR

SUBSTATION
INTERCONNECTION ONE-LINE DIAGRAM

LEEWARD renewable energy

DATE 5/31/2023
SCALE NTS
JOB NO.

Figure 03-2

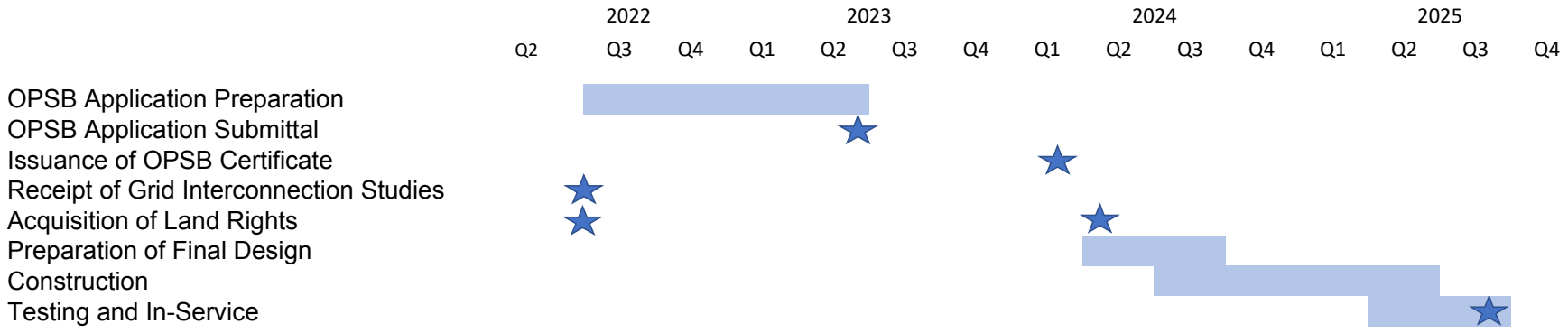
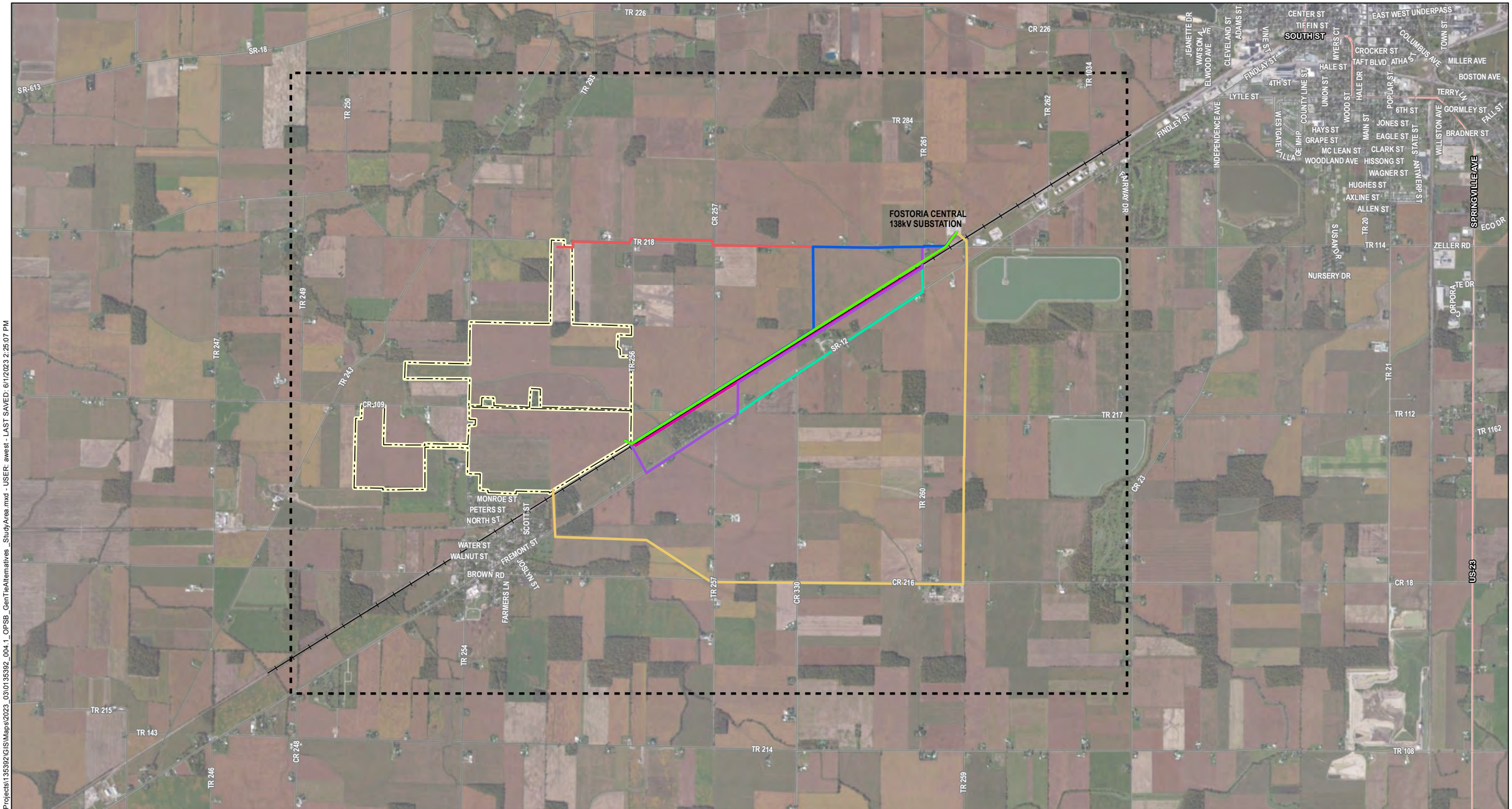


Figure 03-3 Estimated Schedule



LEGEND

- RAILROAD
- PROJECT AREA
- Preferred Route Option
- Alt Route 1
- Alt Route 2
- Alt Route 3
- Alt Route 4
- Alt Route 5
- Alt Route 6
- Study Area

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ELECTRIC TRANSMISSION LINES DATA SOURCE: DEPARTMENT OF HOMELAND SECURITY (DHS) HOMELAND INFRASTRUCTURE FOUNDATION-LEVEL DATA (HIFLD)
3. NATURAL GAS PIPELINES DATA SOURCE: DIGITIZED AT 1:24,000 FROM UNITED STATES DEPARTMENT OF TRANSPORTATION (U.S. DOT) NATIONAL PIPELINE MAPPING SYSTEM (NPMS)
4. STREAMS, RIVERS, AND WATERBODIES DATA SOURCE: USGS NATIONAL HYDROGRAPHY DATASET (NHD)
5. WETLANDS DATA SOURCE: USFWS NATIONAL WETLANDS INVENTORY (NWI)
6. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
7. TOWNSHIP BOUNDARIES DATA SOURCE: OHIO ENVIRONMENTAL MANAGEMENT AGENCY (OEMA)
8. AERIAL IMAGERY SOURCE: ESRI

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Miles

HALEY ALDRICH

Figure 04-1
Gen-Tie Alternatives Study Area

South Branch Gen-Tie
Hancock County, Ohio

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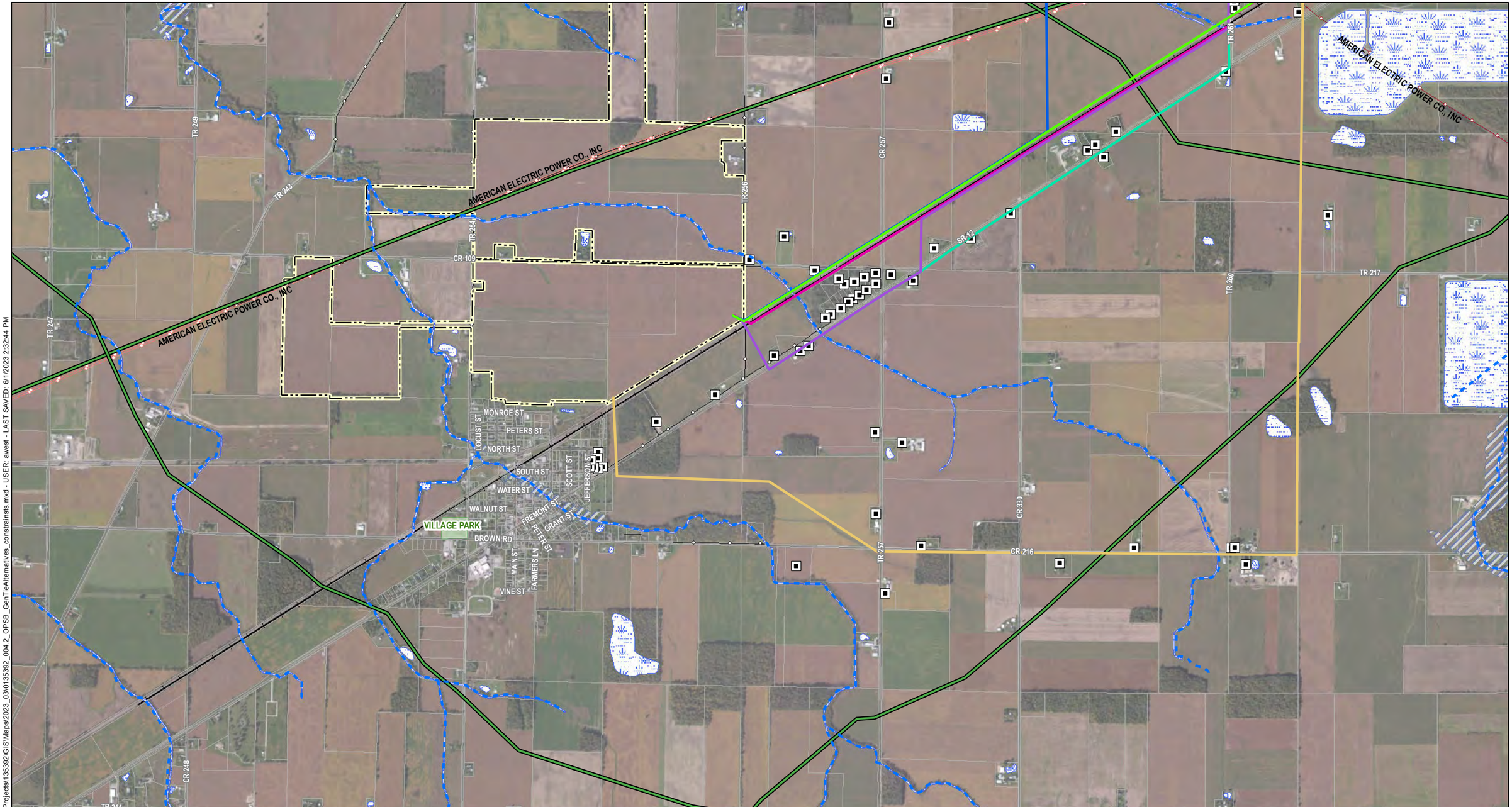

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LEGEND

- 138kV TRANSMISSION LINE
- 345kV TRANSMISSION LINE
- RAILROAD
- PROJECT AREA
- TRANSMISSION LINE, UNKNOWN VOLTAGE
- Mapped NHD Stream
- NATURAL GAS PIPELINE
- RESIDENCE
- NWI Mapped Wetlands
- Preferred Route Option
- Alt Route 1
- Alt Route 2
- Alt Route 3
- Alt Route 5
- Alt Route 6
- FEMA Mapped Floodplain
- Parcel Boundary

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. ELECTRIC TRANSMISSION LINES DATA SOURCE: DEPARTMENT OF HOMELAND SECURITY (DHS) HOMELAND INFRASTRUCTURE FOUNDATION-LEVEL DATA (HIFLD)

3. NATURAL GAS PIPELINES DATA SOURCE: DIGITIZED AT 1:24,000 FROM UNITED STATES DEPARTMENT OF TRANSPORTATION (U.S. DOT) NATIONAL PIPELINE MAPPING SYSTEM (NPMS)

4. STREAMS, RIVERS, AND WATERBODIES DATA SOURCE: USGS NATIONAL HYDROGRAPHY DATASET (NHD)

5. WETLANDS DATA SOURCE: USFWS NATIONAL WETLANDS INVENTORY (NWI)

6. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)

7. TOWNSHIP BOUNDARIES DATA SOURCE: OHIO ENVIRONMENTAL MANAGEMENT AGENCY (OEMA)

8. AERIAL IMAGERY SOURCE: ESRI

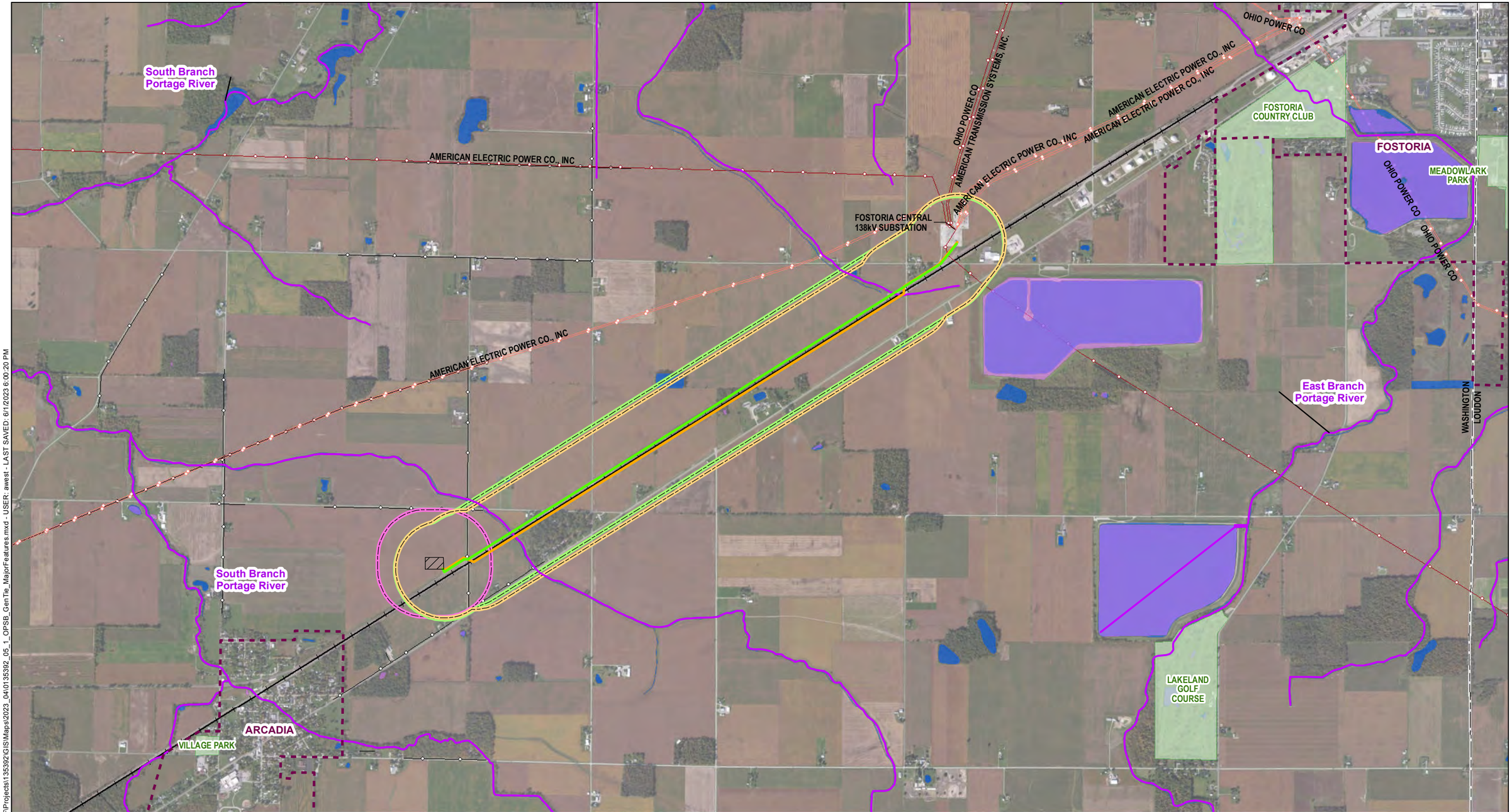
N

0 0.2 0.4
Miles

HALEY ALDRICH

Figure 04-2
Gen-Tie Options Constraint Map

South Branch Gen-Tie
Hancock County, Ohio



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- 138kV TRANSMISSION LINE
- 345kV TRANSMISSION LINE
- RAILROAD
- TOWNSHIP BOUNDARY
- TRANSMISSION LINE, UNKNOWN VOLTAGE
- Mapped NHD Stream
- Mapped NHD Waterbody
- NWI Mapped Wetlands
- Project Substation
- City Boundaries

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

N

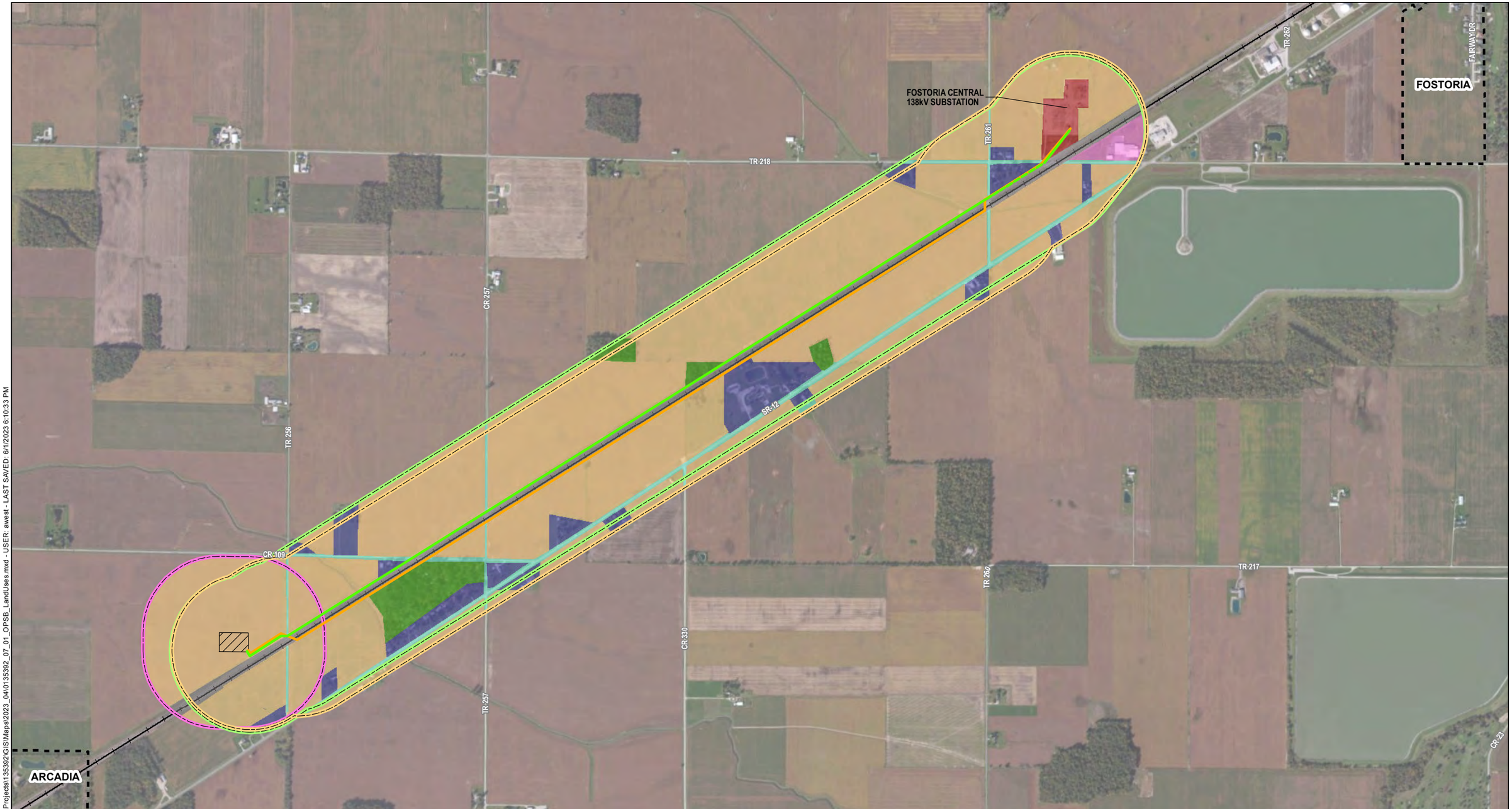
0 1,800 3,600
SCALE IN FEET

HALEY ALDRICH

Figure 05-1
South Branch Gen-Tie
And Major Features

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\0135392_05_1_OPSB_GenTie_MajorFeatures.mxd - USER: awest - LAST SAVED: 6/1/2023 6:00:20 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Agrilcultural Use
- Business Use
- Forested
- Railroad
- Residential
- Road
- Existing Substation
- City Limits
- Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

N

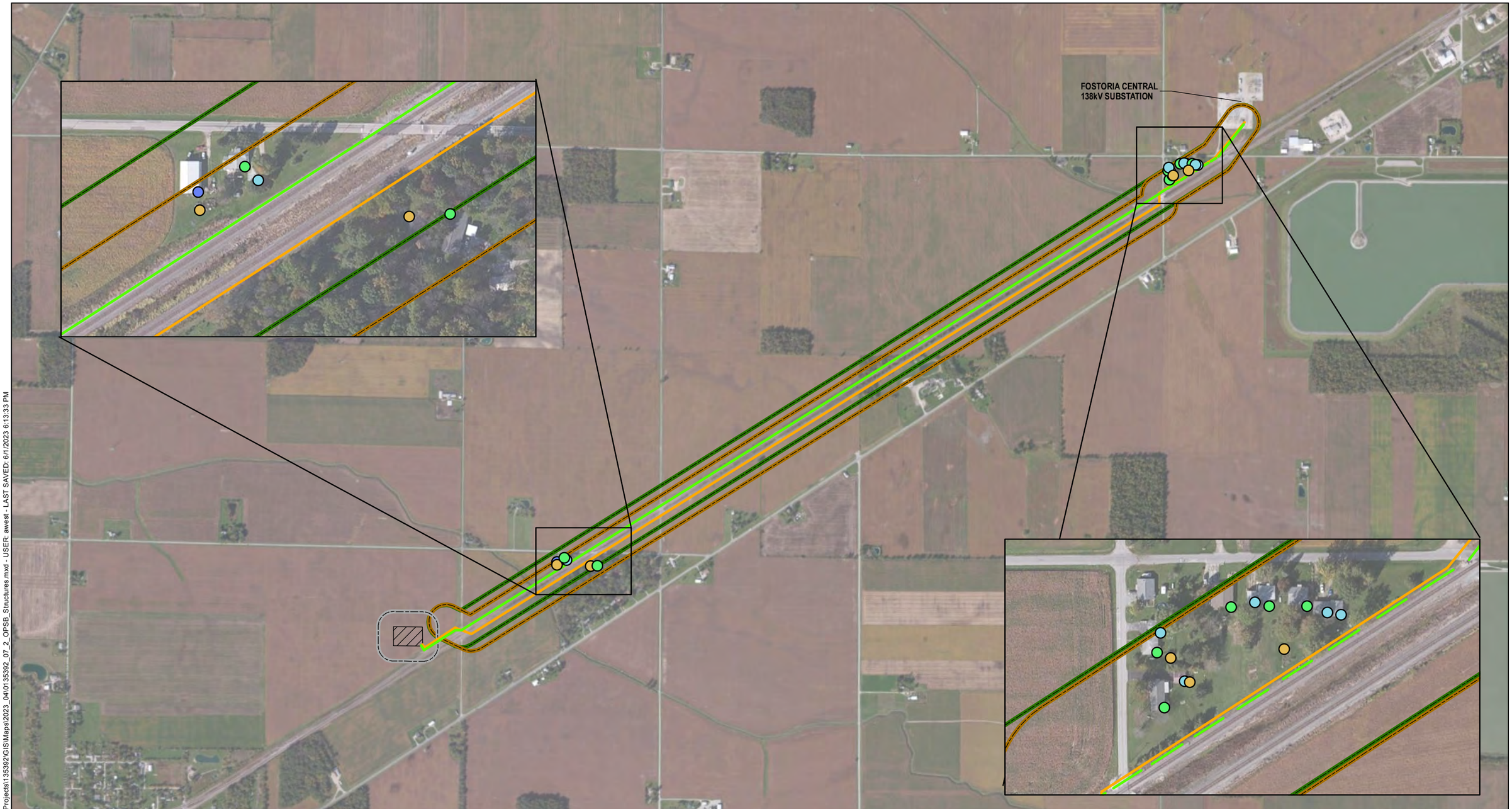
0 1,100 2,200
SCALE IN FEET

HALEY ALDRICH

Figure 07-1
Land Use Mapping

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CP\Projects\135392\GIS\Maps\2023_04\0135392_07_01_OPSB_LandUses.mxd - USER: awest - LAST SAVED: 6/1/2023 6:10:33 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation 200 Feet from Boundary
- Alternate Route 200 Feet From ROW
- Preferred Route 200 Feet from ROW
- Barn
- Garage
- House
- Outbuilding
- Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI

N

0 1,100 2,200
SCALE IN FEET

HALEY ALDRICH

Figure 07-2
Structures within 200 Feet of Gen-Tie ROW

South Branch Gen-Tie
Hancock County, Ohio

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LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Hay field
- Pasture
- Row crop
- Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

No Agricultural Districts in this Area

N

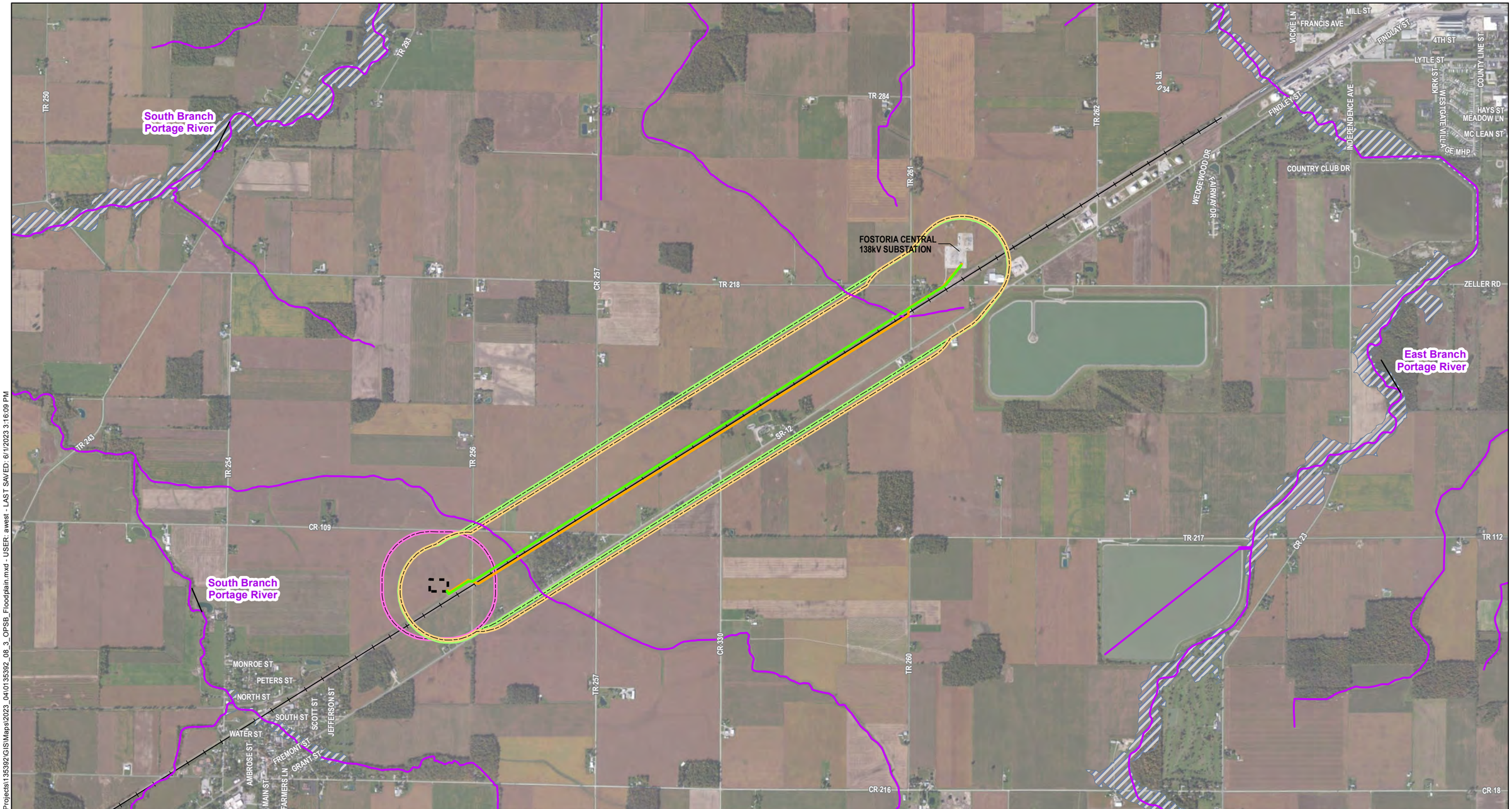
0 1,800 3,600
SCALE IN FEET

HALEY ALDRICH

Figure 07-3
Agricultural Districts and Agricultural Land

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CFProjects\135392\GIS\Maps\2023_04\0135392_07_3_OPSB_Agricultural.mxd - USER: awest - LAST SAVED: 6/1/2023 6:16:50 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Mapped NHD Stream
- Project Substation
- Mapped 100 Year Floodplain

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. FLOODPLAIN SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) NATIONAL FLOODPLAIN HAZARD LAYER (NFHL)
3. NHD STREAM SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS) NATIONAL HYDROGRAPHY DATASET (NHD)
4. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
5. AERIAL IMAGERY SOURCE: ESRI

N

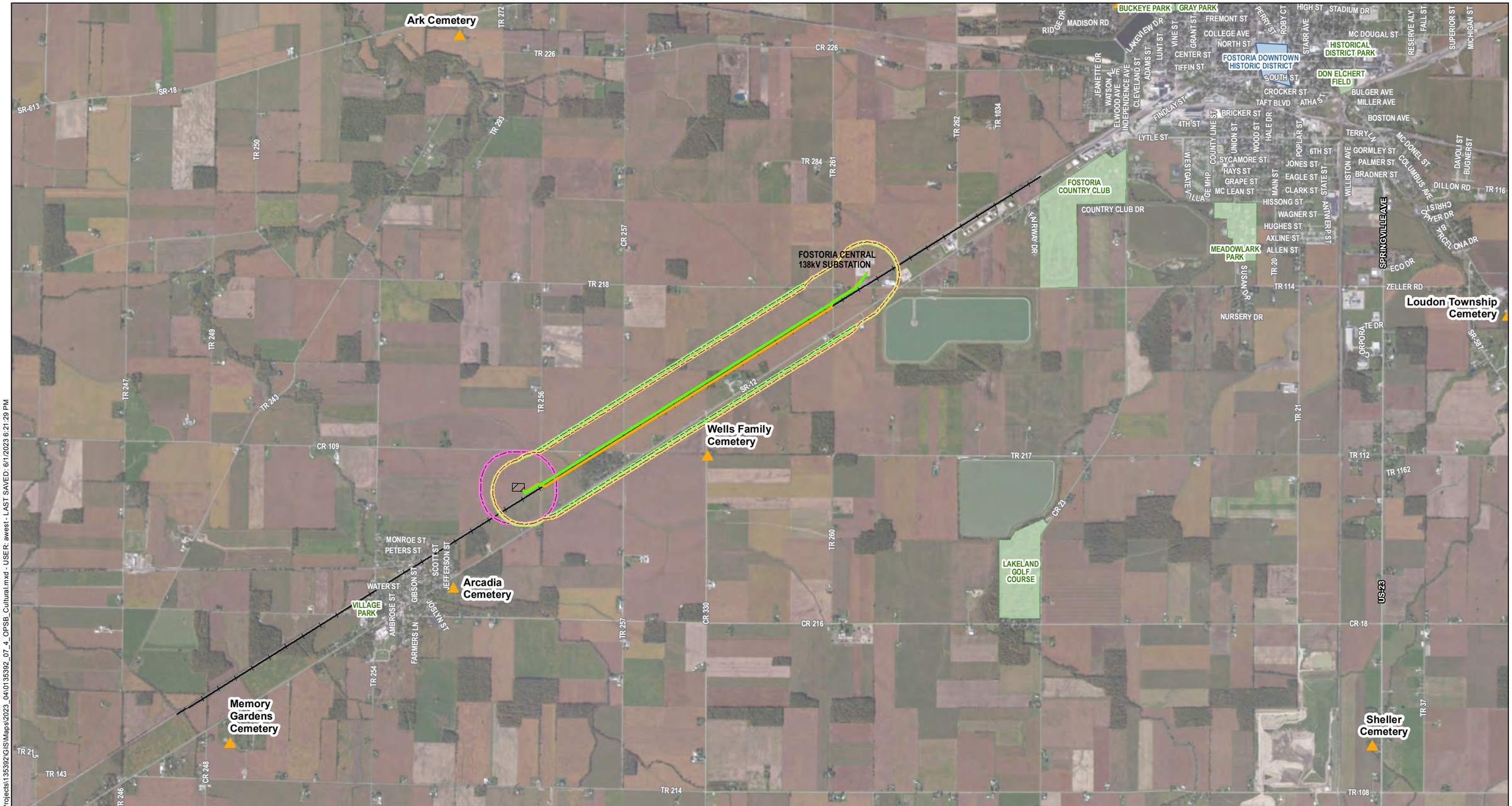
0 1,800 3,600
SCALE IN FEET

HALEY ALDRICH

Figure 07-4
Mapped Floodplains and Streams

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CFI\Projects\135392\GIS\Maps\2023_04\0135392_08_3_OPSB_Floodplain.mxd - USER: awest - LAST SAVED: 6/1/2023 3:16:09 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Cemetery
- National Register Historic District
- Project Substation

No recreational trails found near study area

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. CULTURAL RESOURCES DATA SOURCE: NATIONAL PARK SERVICE (NPS)
3. RECREATION AREAS DATA SOURCE: ESRI AND UNITED STATES GEOLOGICAL SURVEY (USGS) PROTECTED AREAS DATABASE (PAD)
4. TRAILS DATA SOURCE: OHIO DEPARTMENT OF NATIONAL RESOURCES (ODNR)
5. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
6. AERIAL IMAGERY SOURCE: ESRI

N

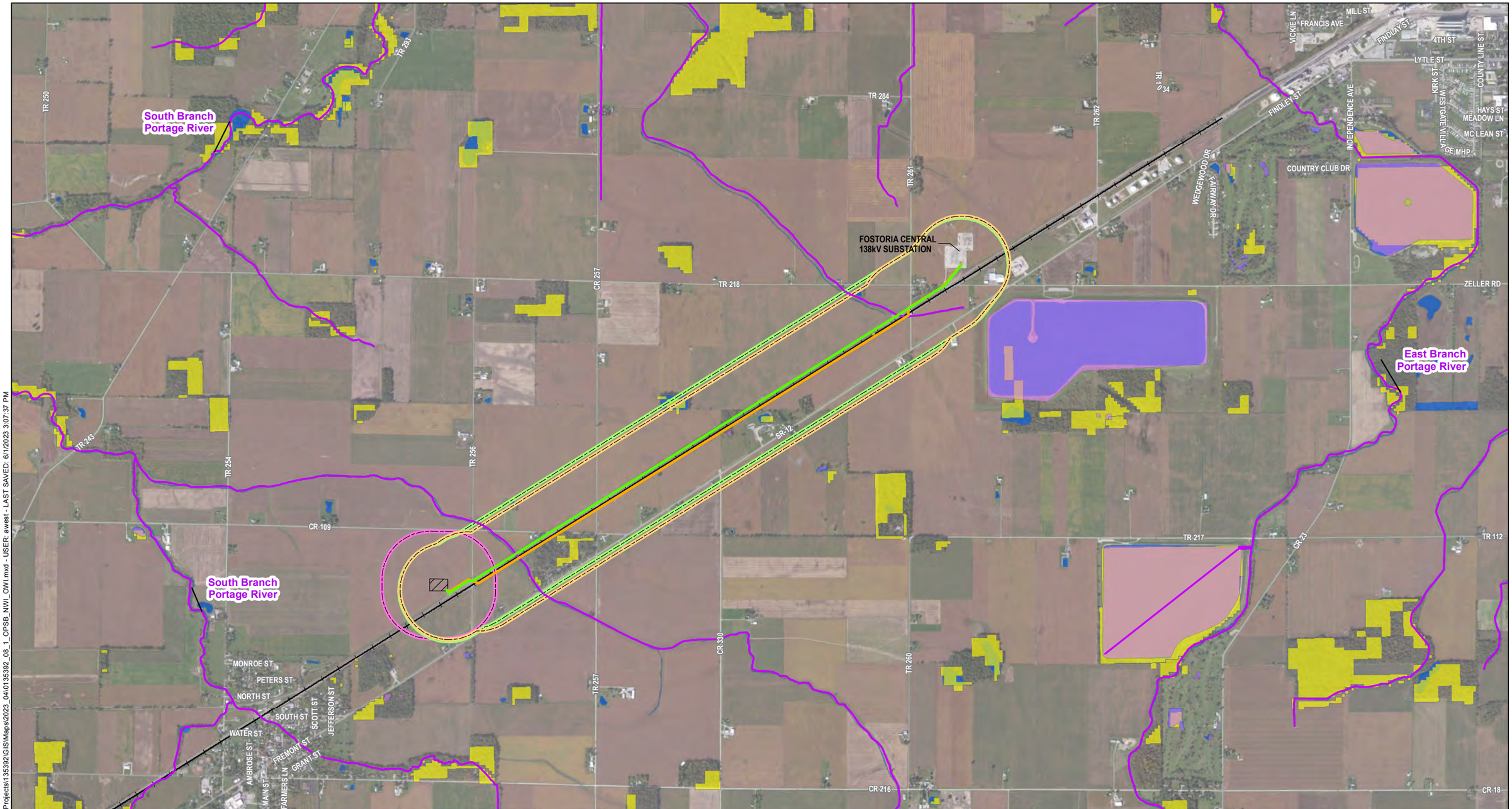
0 2,800 5,600
SCALE IN FEET

HALEY ALDRICH

Figure 07-5
Cultural and Recreational Resources

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CFI\Projects\135392\GIS\Maps\2023_04\0135392_07_4_OPSB_Cultural.mxd - USER: awest - LAST SAVED: 6/1/2023 6:21:29 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Mapped NHD Stream
- Mapped NHD Waterbody
- Mapped OWI Wetlands
- NWI Mapped Wetlands
- Project Substation

No soils greater than 12% found within or near study area

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. NWI WETLANDS SOURCE: UNITED STATES FISH AND WILDLIFE SERVICE (USFWS) NATIONAL WETLAND INVENTORY (NWI)
3. NHD STREAM SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS) NATIONAL HYDROGRAPHY DATASET (NHD)
4. OWI WETLAND SOURCE: OHIO DEPARTMENT OF NATURAL RESOURCES (ODNR) DIVISION OF WILDLIFE (DOW) OHIO WETLAND INVENTORY (OWI)
5. SOILS DATA SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS) SOIL SURVEY GEOGRAPHIC DATABASE (SSURGO)
6. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
7. AERIAL IMAGERY SOURCE: ESRI

N

0 1,800 3,600
SCALE IN FEET

HALEY ALDRICH

Figure 08-1
Ecological Information

South Branch Gen-Tie
Hancock County, Ohio

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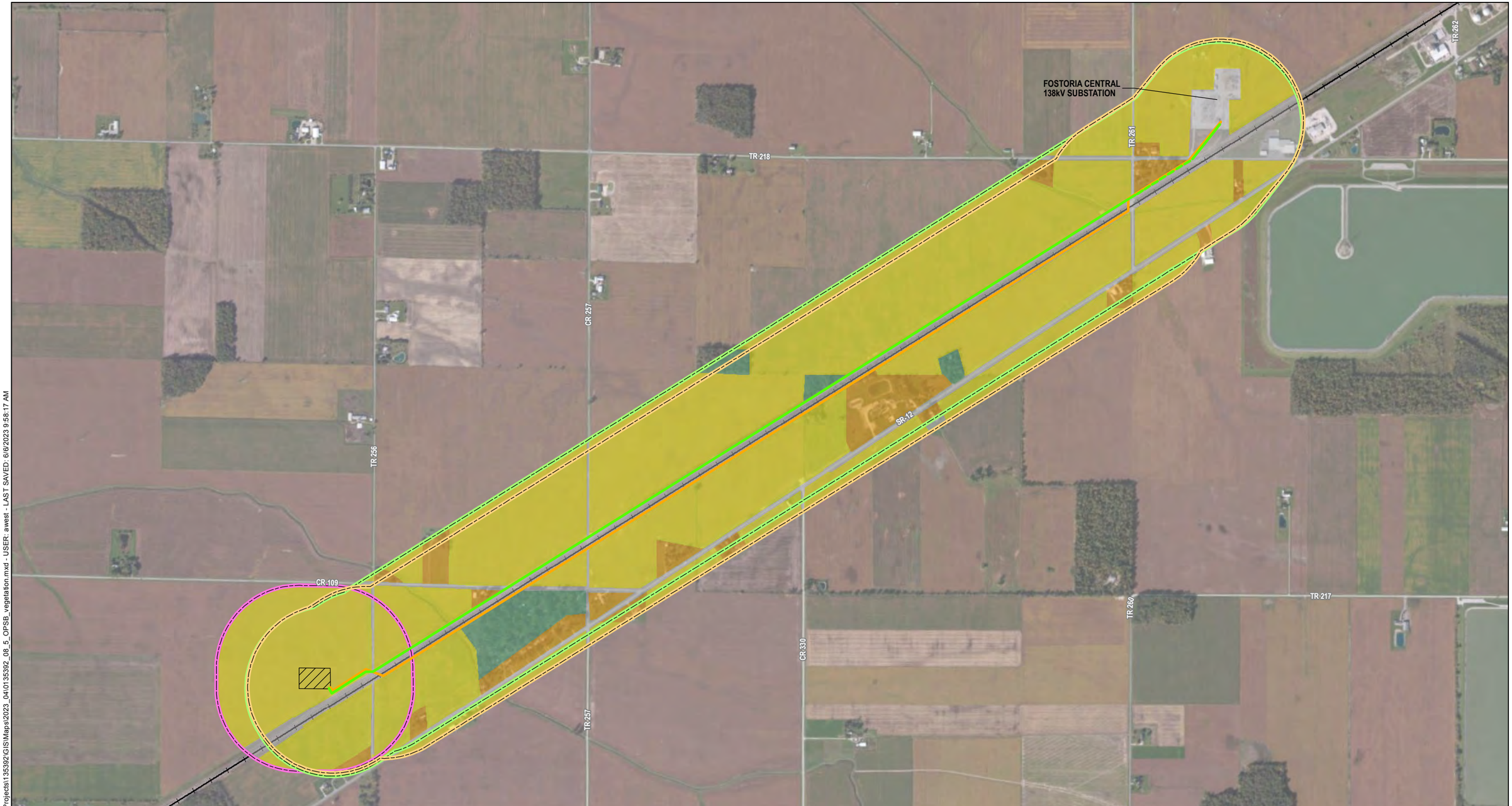

LEGEND

- RAILROAD
- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Project Substation
- Agricultural Land
- Urban
- Forest
- Maintained Lawn

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

N

0 1,000 2,000
SCALE IN FEET

HALEY ALDRICH

Figure 08-2
Vegetative Communities

South Branch Gen-Tie
Hancock County, Ohio

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LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- RAILROAD
- Culvert
- Delineated Stream
- Delineated Wetland
- Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

N

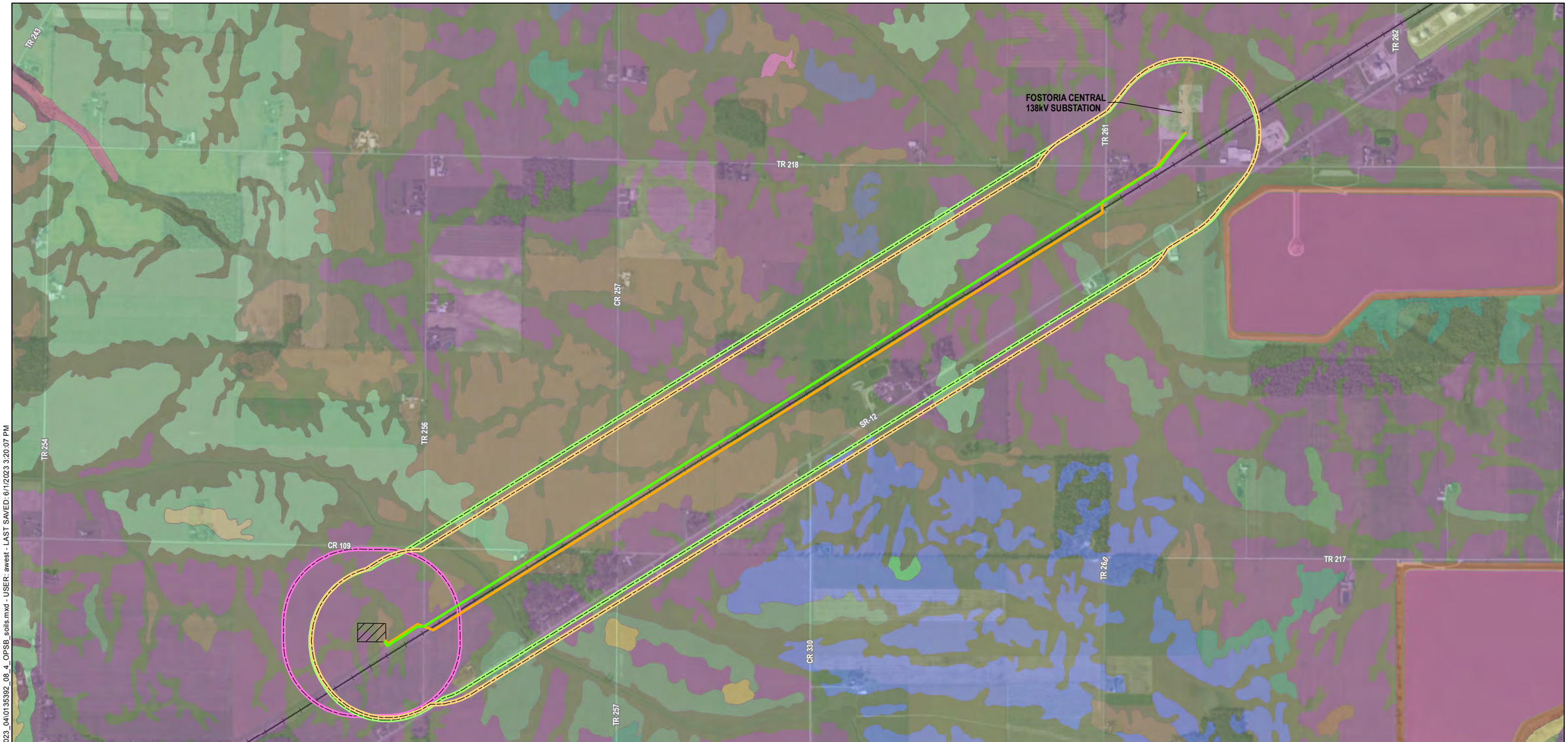
0 1,100 2,200
SCALE IN FEET

HALEY ALDRICH

Figure 08-3
Delineated Wetlands and Streams

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\0135392_08_2_OPSB_DelineatedWetlands.mxd - USER: awest - LAST SAVED: 6/1/2023 3:12:25 PM



Blount loam, ground moraine, 0 to 2 percent slopes
Blount silt loam, ground moraine, 0 to 2 percent slopes
Blount silt loam, ground moraine, 2 to 4 percent slopes
Blount-Houcktown complex, 0 to 3 percent slopes
Blount-Jenera complex, 0 to 3 percent slopes
Del Rey-Blount complex, 0 to 3 percent slopes
Glynwood clay loam, ground moraine, 2 to 6 percent slopes, eroded
Glynwood clay loam, ground moraine, 6 to 12 percent slopes, eroded
Glynwood silt loam, ground moraine, 2 to 6 percent slopes
Glynwood-Blount-Houcktown complex, 1 to 4 percent slopes
Houcktown loam, 2 to 6 percent slopes
Houcktown-Glynwood-Jenera complex, 1 to 4 percent slopes
Jenera fine sandy loam, 2 to 6 percent slopes
Mermill loam, 0 to 1 percent slopes
Pewamo silty clay loam, 0 to 1 percent slopes
Shinrock, till substratum-Glynwood complex, 1 to 4 percent slopes
Shoals silt loam, 0 to 2 percent slopes, occasionally flooded
Sloan silty clay loam, 0 to 1 percent slopes, occasionally flooded
Udorthents, loamy, 0 to 2 percent slopes
Udorthents, loamy, 2 to 25 percent slopes
Water

LEGEND

Preferred Route
Alternate Route
Substation Study Area
Alternate Study Area
Preferred Study Area
Railroad
Project Substation

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SOILS SOURCE: NATIONAL RESOURCE CONSERVATION SERVICE (NRCS) WEB SOIL SURVEY
3. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
4. AERIAL IMAGERY SOURCE: ESRI

N

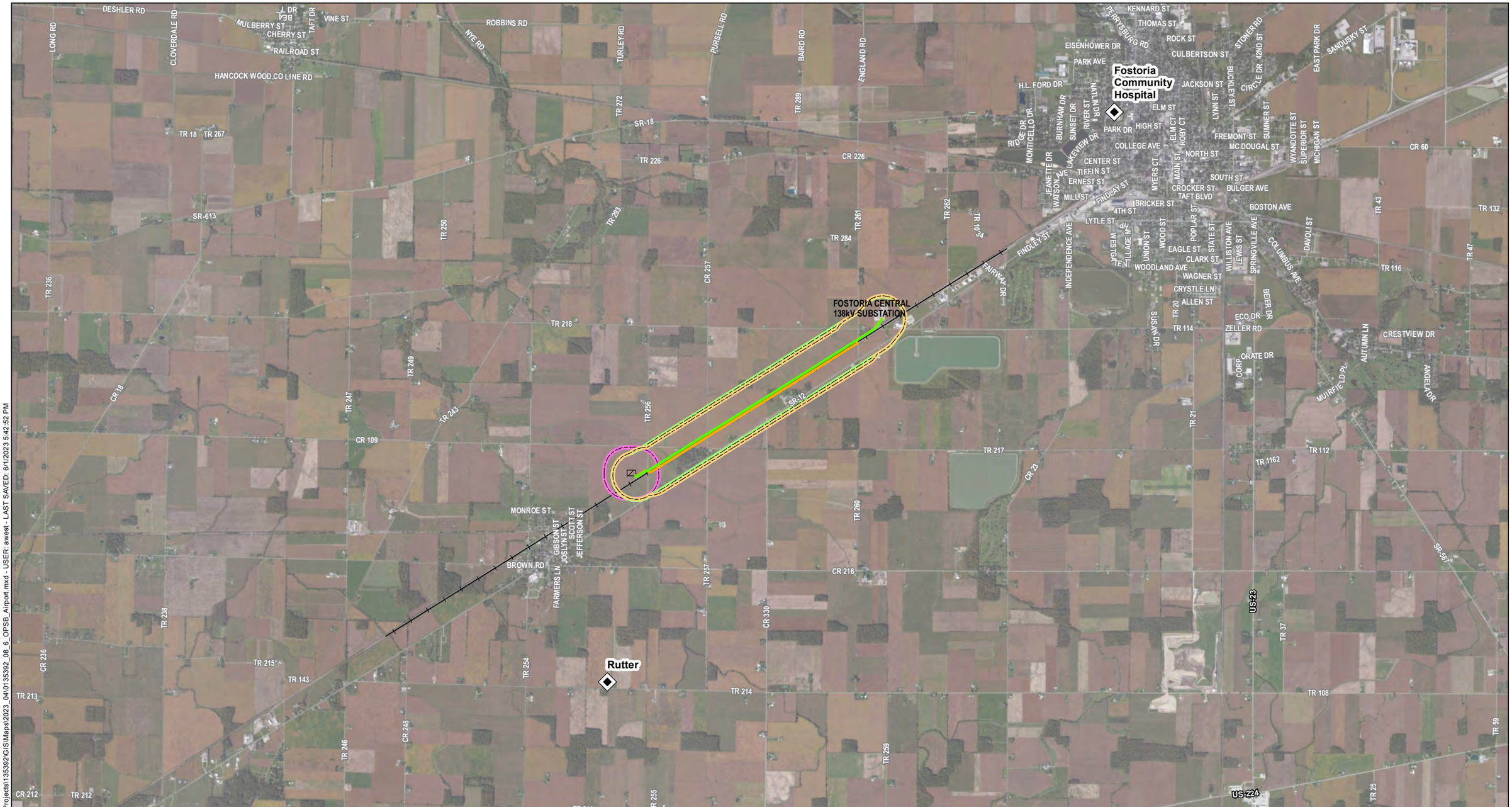
0 1,250 2,500
SCALE IN FEET

HALEY ALDRICH

Figure 08-4
Mapped Soil Communities

South Branch Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CP\Projects\135392\GIS\Maps\2023_04\0135392_08_4_OPSB_soils.mxd - USER: awest - LAST SAVED: 6/1/2023 3:20:07 PM



LEGEND

- Preferred Route
- Alternate Route
- Substation Study Area
- Alternate Study Area
- Preferred Study Area
- Railroad
- Project Substation
- Airport

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AIRPORT SOURCE: OHIO DEPARTMENT OF TRANSPORTATION
3. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
4. AERIAL IMAGERY SOURCE: ESRI

N

0 3,900 7,800
SCALE IN FEET

HALEY ALDRICH

Figure 08-5
Air Transportation Facilities

South Branch Gen-Tie
Hancock County, Ohio

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in

Case No(s). 23-0373-EL-BTX

Summary: Application Figures electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX A

PJM STUDIES

- Interconnection Service Agreement (AD1-070/AG1-076), March 2022
- Interconnection Construction Service Agreement (AD1-070/AG1-076), March 2022
- Generation Interconnection Facilities Study Report (AD1-070/AG1-076), February 2022
- Generation Interconnection Revised System Impact Study Report (Queue Position AC1-170), April 2021
- Generation Interconnection Feasibility Study Report (Queue Position AC1-170), January 2018

Original Service Agreement No. 6399
Effective Date: March 18, 2022

(PJM Queue #AD1-070/AG1-076)

INTERCONNECTION SERVICE AGREEMENT
Among
PJM INTERCONNECTION, L.L.C.
And
SOUTH BRANCH SOLAR, LLC
And
AEP OHIO TRANSMISSION COMPANY, INC.

Original Service Agreement No. 6399

INTERCONNECTION SERVICE AGREEMENT
By and Among
PJM Interconnection, L.L.C.
And
South Branch Solar, LLC
And
AEP Ohio Transmission Company, Inc.
(PJM Queue Position #AD1-070/AG1-076)

1.0 Parties. This Interconnection Service Agreement ("ISA") including the Specifications, Schedules and Appendices attached hereto and incorporated herein, is entered into by and between PJM Interconnection, L.L.C., the Regional Transmission Organization for the PJM Region (hereinafter "Transmission Provider" or "PJM"), South Branch Solar, LLC ("Interconnection Customer") and AEP Ohio Transmission Company, Inc. ("Interconnected Transmission Owner" or "AEP"). All capitalized terms herein shall have the meanings set forth in the appended definitions of such terms as stated in Part I of the PJM Open Access Transmission Tariff ("Tariff").

2.0 Authority. This ISA is entered into pursuant to Part VI of the Tariff. Interconnection Customer has requested an Interconnection Service Agreement under the Tariff, and Transmission Provider has determined that Interconnection Customer is eligible under the Tariff to obtain this ISA. The standard terms and conditions for interconnection as set forth in Appendix 2 to this ISA are hereby specifically incorporated as provisions of this ISA. Transmission Provider, Interconnected Transmission Owner and Interconnection Customer agree to and assume all of the rights and obligations of the Transmission Provider, Interconnected Transmission Owner and Interconnection Customer, respectively, as set forth in Appendix 2 to this ISA.

3.0 Customer Facility Specifications. Attached are Specifications for the Customer Facility that Interconnection Customer proposes to interconnect with the Transmission System. Interconnection Customer represents and warrants that, upon completion of construction of such facilities, it will own or control the Customer Facility identified in section 1.0 of the Specifications attached hereto and made a part hereof. In the event that Interconnection Customer will not own the Customer Facility, Interconnection Customer represents and warrants that it is authorized by the owner(s) thereof to enter into this ISA and to represent such control.

4.0 Effective Date. Subject to any necessary regulatory acceptance, this ISA shall become effective on the date it is executed by all Interconnection Parties, or, if the agreement is filed with FERC unexecuted, upon the date specified by FERC. This ISA shall terminate on such date as mutually agreed upon by the parties, unless earlier terminated in accordance with the terms set forth in Appendix 2 to this ISA. The term of the ISA shall be as provided in Section 1.3 of Appendix 2 to this ISA. Interconnection Service shall commence as provided in Section 1.2 of Appendix 2 to this ISA.

5.0 Security. In accord with Section 212.4 of the Tariff, Interconnection Customer shall provide the Transmission Provider (for the benefit of the Interconnected Transmission Owner) with a letter of credit from an agreed provider or other form of security reasonably acceptable to the Transmission Provider and that names the Transmission Provider as beneficiary ("Security") in the amount of $1,218,029. This amount represents the sum of the estimated Costs, determined in accordance with Sections 212 and 217 of the Tariff, for which the Interconnection Customer will be responsible, less any Costs already paid by Interconnection Customer. Interconnection Customer acknowledges that its ultimate cost responsibility in accordance with Section 217 of the Tariff will be based upon the actual Costs of the facilities described in the Specifications, whether greater or lesser than the amount of the payment security provided under this section.

Should Interconnection Customer fail to provide security at the time the Interconnection Customer executes this ISA, or, if deferred, by the end of the 120-day period, this ISA shall be terminated.

6.0 Project Specific Milestones. In addition to the milestones stated in Section 212.5 of the Tariff, as applicable, during the term of this ISA, Interconnection Customer shall ensure that it meets each of the following development milestones:

6.1 Site permits. On or before February 28, 2023, Interconnection Customer must demonstrate that it has obtained any necessary local, county, and state site permits.

6.2 Acquisition of major electrical equipment. On or before December 31, 2024, Interconnection Customer must demonstrate that it has signed a memorandum of understanding for the acquisition of major equipment.

6.3 Substantial Site work completed. On or before September 30, 2025, Interconnection Customer must demonstrate completion of at least 20% of project site construction. At this time, Interconnection Customer must submit to Interconnected Transmission Owner and Transmission Provider initial drawings, certified by a professional engineer, of the Customer Interconnection Facilities.

6.4 Delivery of major electrical equipment. On or before September 30, 2025, Interconnection Customer must demonstrate that 75 MWac generating units have been delivered to Interconnection Customer's project site.

6.5 Commercial Operation. (i) On or before December 31, 2025, Interconnection Customer must demonstrate commercial operation of 130 MWac generating units. (ii) On or before June 30, 2026, Interconnection Customer must demonstrate commercial operation of 75 MWac additional generating units. Demonstrating commercial operation includes achieving Initial Operation in accordance with Section 1.4 of Appendix 2 to this ISA and making commercial sales or use of energy, as well as, if applicable, obtaining capacity qualification in accordance with the requirements of the Reliability Assurance Agreement Among Load Serving Entities in the PJM Region.

6.6 Within one (1) month following commercial operation of generating unit(s), Interconnection Customer must provide certified documentation demonstrating that "as-built" Customer Facility and Customer Interconnection Facilities are in accordance with applicable PJM studies and agreements. Interconnection Customer must also provide PJM with "as-built" electrical modeling data or confirm that previously submitted data remains valid.

Interconnection Customer shall demonstrate the occurrence of each of the foregoing milestones to Transmission Provider's reasonable satisfaction. Transmission Provider may reasonably extend any such milestone dates, in the event of delays that Interconnection Customer (i) did not cause and (ii) could not have remedied through the exercise of due diligence. The milestone dates stated in this ISA shall be deemed to be extended coextensively with any suspension of work initiated by Interconnection Customer in accordance with the Interconnection Construction Service Agreement.

7.0 Provision of Interconnection Service. Transmission Provider and Interconnected Transmission Owner agree to provide for the interconnection to the Transmission System in the PJM Region of Interconnection Customer's Customer Facility identified in the Specifications in accordance with Part IV and Part VI of the Tariff, the Operating Agreement of PJM Interconnection, L.L.C. ("Operating Agreement"), and this ISA, as they may be amended from time to time.

8.0 Assumption of Tariff Obligations. Interconnection Customer agrees to abide by all rules and procedures pertaining to generation and transmission in the PJM Region, including but not limited to the rules and procedures concerning the dispatch of generation or scheduling transmission set forth in the Tariff, the Operating Agreement and the PJM Manuals.

9.0 Facilities Study. In analyzing and preparing the Facilities Study, and in designing and constructing the Attachment Facilities, Local Upgrades and/or Network Upgrades described in the Specifications attached to this ISA, Transmission Provider, the Interconnected Transmission Owner(s), and any other subcontractors employed by Transmission Provider have had to, and shall have to, rely on information provided by Interconnection Customer and possibly by third parties and may not have control over the accuracy of such information. Accordingly, NEITHER TRANSMISSION PROVIDER, THE INTERCONNECTED TRANSMISSION OWNER(s), NOR ANY OTHER SUBCONTRACTORS EMPLOYED BY TRANSMISSION PROVIDER OR INTERCONNECTED TRANSMISSION OWNER MAKES ANY WARRANTIES, EXPRESS OR IMPLIED, WHETHER ARISING BY OPERATION OF LAW, COURSE OF PERFORMANCE OR DEALING, CUSTOM, USAGE IN THE TRADE OR PROFESSION, OR OTHERWISE, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO THE ACCURACY, CONTENT, OR CONCLUSIONS OF THE FACILITIES STUDY OR THE SYSTEM IMPACT STUDY IF A FACILITIES STUDY WAS NOT REQUIRED OR OF THE ATTACHMENT FACILITIES, THE LOCAL UPGRADES AND/OR THE NETWORK UPGRADES, PROVIDED,

HOWEVER, that Transmission Provider warrants that the Transmission Owner Interconnection Facilities and any Merchant Transmission Upgrades described in the Specifications will be designed and constructed (to the extent that Interconnected Transmission Owner is responsible for design and construction thereof) and operated in accordance with Good Utility Practice, as such term is defined in the Operating Agreement. Interconnection Customer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

10.0 Construction of Transmission Owner Interconnection Facilities

10.1. Cost Responsibility. Interconnection Customer shall be responsible for and shall pay upon demand all Costs associated with the interconnection of the Customer Facility as specified in the Tariff. These Costs may include, but are not limited to, an Attachment Facilities charge, a Local Upgrades charge, a Network Upgrades charge and other charges. A description of the facilities required and an estimate of the Costs of these facilities are included in Sections 3.0 and 4.0 of the Specifications to this ISA.

10.2. Billing and Payments. Transmission Provider shall bill the Interconnection Customer for the Costs associated with the facilities contemplated by this ISA, estimates of which are set forth in the Specifications to this ISA, and the Interconnection Customer shall pay such Costs, in accordance with Section 11 of Appendix 2 to this ISA and the applicable Interconnection Construction Service Agreement. Upon receipt of each of Interconnection Customer's payments of such bills, Transmission Provider shall reimburse the applicable Interconnected Transmission Owner. Pursuant to Section 212.4 of the Tariff, Interconnection Customer requests that Transmission Provider provide a quarterly cost reconciliation:

___X___ Yes

_____ No

10.3. Contract Option. In the event that the Interconnection Customer and Interconnected Transmission Owner agree to utilize the Negotiated Contract Option provided by the Interconnection Construction Service Agreement to establish, subject to FERC acceptance, non-standard terms regarding cost responsibility, payment, billing and/or financing, the terms of Sections 10.1 and/or 10.2 of this Section 10.0 shall be superseded to the extent required to conform to such negotiated terms, as stated in a schedule attached to the parties' Interconnection Construction Service Agreement relating to interconnection of the Customer Facility.

10.4 In the event that the Interconnection Customer elects to construct some or all of the Transmission Owner Interconnection Facilities under the Option to Build of the Interconnection Construction Service Agreement, billing and payment for the Costs

associated with the facilities contemplated by this ISA shall relate only to such portion of the Interconnection Facilities as the Interconnected Transmission Owner is responsible for building.

11.0 Interconnection Specifications

11.1 Point of Interconnection. The Point of Interconnection shall be as identified on the one-line diagram attached as Schedule B to this ISA.

11.2 List and Ownership of Interconnection Facilities. The Interconnection Facilities to be constructed and ownership of the components thereof are identified in Section 3.0 of the Specifications attached to this ISA.

11.3 Ownership and Location of Metering Equipment. The Metering Equipment to be constructed, the capability of the Metering Equipment to be constructed, and the ownership thereof, are identified on the attached Schedule C to this ISA.

11.4 Applicable Technical Standards. The Applicable Technical Requirements and Standards that apply to the Customer Facility and the Interconnection Facilities are identified in Schedule D to this ISA.

12.0 Power Factor Requirement.

Consistent with Section 4.7 of Appendix 2 to this ISA, the power factor requirement is as follows:

The Generation Interconnection Customer shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the high side of the facility substation transformers.

13.0 Charges. In accordance with Sections 10 and 11 of Appendix 2 to this ISA, the Interconnection Customer shall pay to the Transmission Provider the charges applicable after Initial Operation, as set forth in Schedule E to this ISA. Promptly after receipt of such payments, the Transmission Provider shall forward such payments to the appropriate Interconnected Transmission Owner.

14.0 Third Party Beneficiaries. No third party beneficiary rights are created under this ISA, except, however, that, subject to modification of the payment terms stated in Section 10 of this ISA pursuant to the Negotiated Contract Option, payment obligations imposed on Interconnection Customer under this ISA are agreed and acknowledged to be for the benefit of the Interconnected Transmission Owner(s). Interconnection Customer expressly agrees that the Interconnected Transmission Owner(s) shall be entitled to take such legal recourse as it deems appropriate against Interconnection Customer for the payment of any Costs or charges authorized under this ISA or the Tariff with respect to Interconnection Service for which Interconnection Customer fails, in whole or in part, to pay as provided in this ISA, the Tariff and/or the Operating Agreement.

15.0 Waiver. No waiver by either party of one or more defaults by the other in performance of any of the provisions of this ISA shall operate or be construed as a waiver of any other or further default or defaults, whether of a like or different character.

16.0 Amendment. This ISA or any part thereof, may not be amended, modified, or waived other than by a written document signed by all parties hereto.

17.0 Construction With Other Parts Of The Tariff. This ISA shall not be construed as an application for service under Part II or Part III of the Tariff.

18.0 Notices. Any notice or request made by either party regarding this ISA shall be made, in accordance with the terms of Appendix 2 to this ISA, to the representatives of the other party and as applicable, to the Interconnected Transmission Owner(s), as indicated below:

Transmission Provider:

PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403

Interconnection Customer:

South Branch Solar, LLC
6688 N. Expressway, Suite 500
Dallas, TX 75206
ian.sharpe@leewardengery.com
legal@leewardengery.com

Interconnected Transmission Owner:

Robert Pennybaker, Director – System Interconnections
American Electric Power Service Corporation
212 E 6th St. – 4th Floor
Tulsa, OK 74119
rlpennybaker@aep.com

Cc: John W. Seidensticker, Senior Counsel
American Electric Power Service Corporation
1 Riverside Plaza – 29th Floor
Columbus, OH 43215
jwseidensticker@aep.com

19.0 Incorporation Of Other Documents. All portions of the Tariff and the Operating Agreement pertinent to the subject matter of this ISA and not otherwise made a part hereof are hereby incorporated herein and made a part hereof.

20.0 Addendum of Non-Standard Terms and Conditions for Interconnection Service. Subject to FERC approval, the parties agree that the terms and conditions set forth in Schedule F hereto are hereby incorporated herein by reference and be made a part of this ISA. In the event of any conflict between a provision of Schedule F that FERC has accepted and any provision of Appendix 2 to this ISA that relates to the same subject matter, the pertinent provision of Schedule F shall control.

21.0 Addendum of Interconnection Customer's Agreement to Conform with IRS Safe Harbor Provisions for Non-Taxable Status. To the extent required, in accordance with Section 24.1 of Appendix 2 to this ISA, Schedule G to this ISA shall set forth the Interconnection Customer's agreement to conform with the IRS safe harbor provisions for non-taxable status.

22.0 Addendum of Interconnection Requirements for all Wind or Non-synchronous Generation Facilities. To the extent required, Schedule H to this ISA sets forth interconnection requirements for a wind or non-synchronous generation facilities and is hereby incorporated by reference and made a part of this ISA.

23.0 All interconnection parties agree to comply with all infrastructure security requirements of the North American Electric Reliability Corporation.

IN WITNESS WHEREOF, Transmission Provider, Interconnection Customer and Interconnected Transmission Owner have caused this ISA to be executed by their respective authorized officials.

(PJM Queue Position #AD1-070/AG1-076)

Transmission Provider: **PJM Interconnection, L.L.C.**

By: /s/ *Jason Shoemaker* Manager, Interconnection Projects 3/18/2022
Name Title Date

Printed name of signer: Jason Shoemaker

Interconnection Customer: **South Branch Solar, LLC**

By: /s/ *Jason Allen* Chief Executive Officer 3/8/2022
Name Title Date

Printed name of signer: Jason Allen

Interconnected Transmission Owner: **AEP Ohio Transmission Company, Inc.**

By: /s/ *Robert W. Bradish* Vice President 3/17/2022
Name Title Date

Printed name of signer: Robert W. Bradish

SPECIFICATIONS FOR
INTERCONNECTION SERVICE AGREEMENT
By and Among
PJM INTERCONNECTION, L.L.C.
And
South Branch Solar, LLC
And
AEP Ohio Transmission Company, Inc.
(PJM Queue Position # AD1-070/AG1-076)

1.0 Description of generating unit(s) (the Customer Facility) to be interconnected with the Transmission System in the PJM Region:

a. Name of Customer Facility:

South Branch Solar

b. Location of Customer Facility:

Hancock County, Ohio
GPS Coordinates: 41.115671, -83.507212

c. Size in megawatts of Customer Facility:

For Generation Interconnection Customer:

Maximum Facility Output of 205 MW

d. Description of the equipment configuration:

205 MWac solar photovoltaic facility.

2.0 Rights

2.1 Capacity Interconnection Rights:

Pursuant to and subject to the applicable terms of the Tariff, the Interconnection Customer shall have Capacity Interconnection Rights at the Point(s) of Interconnection specified in this Interconnection Service Agreement in the amount of 82 MW.

2.1a To the extent that any portion of the Customer Facility described in section 1.0 is not a Capacity Resource with Capacity Interconnection Rights, such portion of the Customer Facility shall be an Energy Resource. PJM reserves the right to limit total injections to the Maximum Facility Output in the event reliability would be affected by output greater than such quantity.

2.3 Incremental Deliverability Rights:

Pursuant to Section 235 of the Tariff, Interconnection Customer shall have Incremental Deliverability Rights at each indicated Point of Interconnection in the following quantity(ies):

None

2.4 Incremental Available Transfer Capability Revenue Rights:

Pursuant to Section 233 of the Tariff, Interconnection Customer shall have Incremental Available Transfer Capability Revenue Rights at each indicated Point of Interconnection in the following quantities:

None

2.5 Incremental Auction Revenue Rights:

Pursuant to Section 231 of the Tariff, Interconnection Customer shall have Incremental Auction Revenue Rights in the following quantities:

None

2.6 Incremental Capacity Transfer Rights:

Pursuant to Section 234 of the Tariff, Interconnection Customer shall have Incremental Capacity Transfer Rights between the following associated source(s) and sink(s) in the indicated quantities:

None

3.0 Construction Responsibility and Ownership of Interconnection Facilities

a. Interconnection Customer.

(1) Interconnection Customer shall construct and, unless otherwise indicated, shall own, the following Interconnection Facilities:

- One (1) 138/34.5 kV grounded wye / grounded wye main step-up transformer;
- One (1) 138 kV circuit breaker;
- 138 kV generator lead transmission line from the step-up transformer to the Point of Interconnection;

- Dual fiber-optic cable from the Point of Interconnection to the generator collector station.

- Relay and protective equipment, supervisory control and data acquisition (SCADA) equipment, fiber-optic equipment, and telecommunications equipment; and

- Necessary metering equipment as specified in Schedule C of this ISA.

(2) In the event that, in accordance with the Interconnection Construction Service Agreement, Interconnection Customer has exercised the Option to Build, it is hereby permitted to build in accordance with and subject to the conditions and limitations set forth in that Section, the following portions of the Transmission Owner Interconnection Facilities which constitute or are part of the Customer Facility:

None

Ownership of the facilities built by Interconnection Customer pursuant to the Option to Build shall be as provided in the Interconnection Construction Service Agreement.

b. Interconnected Transmission Owner

<u>Attachment Facilities:</u>

- Construct one (1) 138 kV generator lead transmission line from the Fostoria Central 138 kV Station to the Point of Interconnection, including the first four (4) structures outside the Fostoria Central 138 kV Station, install 138 kV revenue meter, and extend dual fiber-optic from the Point of Interconnection to Fostoria Central 138 kV Station control house. **(PJM Network Upgrade n7962)**

<u>Non-Direct Connection Network Upgrades:</u>

- Expand the Fostoria Central 138 kV Station, including the addition of one (1) 138 kV circuit breaker, installation of associated protection and control equipment, 138 kV line risers, and supervisory control and data acquisition (SCADA) equipment. **(PJM Network Upgrade n7963)**

4.0 Subject to modification pursuant to the Negotiated Contract Option and/or the Option to Build under the Interconnection Construction Service Agreement, Interconnection Customer shall be subject to the estimated charges detailed below, which shall be billed and paid in accordance with Appendix 2, Section 11 of this ISA and the applicable Interconnection Construction Service Agreement.

4.1 Attachment Facilities Charge: $1,486,503

4.2 Network Upgrades Charge: $846,403

4.3 Local Upgrades Charge: $0

4.4 Other Charges: $0

4.5 Cost breakdown:

$1,233,813	Direct Labor
$691,734	Direct Material
$261,345	Indirect Labor
$146,014	Indirect Material
$2,332,906	Total

4.6 Security Amount Breakdown:

$846,403 Estimated Cost of Non-Direct Connection Local Upgrades and/or Non-Direct Connection Network Upgrades

plus $371,626 Estimated cost of the work (for the first three months after construction commences in earnest) on the required Attachment Facilities, Direct Connection Local Upgrades, and Direct Connection Network Upgrades

plus $0 Option to Build Security for Transmission Owner Attachment Facilities and Direct Connection Network Upgrades (including Cancellation Costs)

$1,218,029 Total Security required with ISA

less $0 Costs already paid by Interconnection Customer

$1,218,029 Total Security required with ISA

APPENDICES:

- **APPENDIX 1 - DEFINITIONS**
- **APPENDIX 2 - STANDARD TERMS AND CONDITIONS FOR INTERCONNECTIONS**

SCHEDULES:

- **SCHEDULE A - CUSTOMER FACILITY LOCATION/SITE PLAN**
- **SCHEDULE B - SINGLE-LINE DIAGRAM**
- **SCHEDULE C - LIST OF METERING EQUIPMENT**
- **SCHEDULE D - APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS**
- **SCHEDULE E - SCHEDULE OF CHARGES**
- **SCHEDULE F - SCHEDULE OF NON-STANDARD TERMS & CONDITIONS**
- **SCHEDULE G - INTERCONNECTION CUSTOMER'S AGREEMENT TO CONFORM WITH IRS SAFE HARBOR PROVISIONS FOR NON-TAXABLE STATUS**
- **SCHEDULE H - INTERCONNECTION REQUIREMENTS FOR A WIND GENERATION FACILITY**
- **SCHEDULE I – INTERCONNECTION SPECIFICATIONS FOR AN ENERGY STORAGE RESOURCE**
- **SCHEDULE J – SCHEDULE OF TERMS AND CONDITIONS FOR SURPLUS INTERCONNECTION SERVICE**
- **SCHEDULE K – REQUIREMENTS FOR INTERCONNECTION SERVICE BELOW FULL ELECTRICAL GENERATING CAPABILITY**

APPENDIX 1

DEFINITIONS

From the PJM Tariff accepted for filing by the Commission as of the effective date of this agreement

Unless the context otherwise specifies or requires, capitalized terms used in this Agreement shall have the respective meanings set forth below. Unless otherwise specified, all references herein to sections, Schedules or Appendices are to sections, Schedules or Appendices of this Agreement.

Abnormal Condition:

"Abnormal Condition" shall mean any condition on the Interconnection Facilities which, determined in accordance with Good Utility Practice, is: (i) outside normal operating parameters such that facilities are operating outside their normal ratings or that reasonable operating limits have been exceeded; and (ii) could reasonably be expected to materially and adversely affect the safe and reliable operation of the Interconnection Facilities; but which, in any case, could reasonably be expected to result in an Emergency Condition. Any condition or situation that results from lack of sufficient generating capacity to meet load requirements or that results solely from economic conditions shall not, standing alone, constitute an Abnormal Condition.

Affected System:

"Affected System" shall mean an electric system other than the Transmission Provider's Transmission System that may be affected by a proposed interconnection or on which a proposed interconnection or addition of facilities or upgrades may require modifications or upgrades to the Transmission System.

Affiliate:

"Affiliate" shall mean any two or more entities, one of which Controls the other or that are under common Control. "Control," as that term is used in this definition, shall mean the possession, directly or indirectly, of the power to direct the management or policies of an entity. Ownership of publicly-traded equity securities of another entity shall not result in Control or affiliation for purposes of the Tariff or Operating Agreement if the securities are held as an investment, the holder owns (in its name or via intermediaries) less than 10 percent (10%) of the outstanding securities of the entity, the holder does not have representation on the entity's board of directors (or equivalent managing entity) or vice versa, and the holder does not in fact exercise influence over day-to-day management decisions. Unless the contrary is demonstrated to the satisfaction of the Members Committee, Control shall be presumed to arise from the ownership of or the power to vote, directly or indirectly, ten percent or more of the voting securities of such entity.

Ancillary Services:

"Ancillary Services" shall mean those services that are necessary to support the transmission of capacity and energy from resources to loads while maintaining reliable operation of the Transmission Provider's Transmission System in accordance with Good Utility Practice.

Applicable Laws and Regulations:

"Applicable Laws and Regulations" shall mean all duly promulgated applicable federal, State

and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority having jurisdiction over the relevant parties, their respective facilities, and/or the respective services they provide.

Applicable Regional Entity:

"Applicable Regional Entity" shall mean the Regional Entity for the region in which a Network Customer, Transmission Customer, New Service Customer, or Transmission Owner operates.

Applicable Standards:

"Applicable Standards" shall mean the requirements and guidelines of NERC, the Applicable Regional Entity, and the Control Area in which the Customer Facility is electrically located; the PJM Manuals; and Applicable Technical Requirements and Standards.

Applicable Technical Requirements and Standards:

"Applicable Technical Requirements and Standards" shall mean those certain technical requirements and standards applicable to interconnections of generation and/or transmission facilities with the facilities of an Interconnected Transmission Owner or, as the case may be and to the extent applicable, of an Electric Distributor, as published by Transmission Provider in a PJM Manual provided, however, that, with respect to any generation facilities with maximum generating capacity of 2 MW or less *(synchronous) or 5 MW or less (inverter-based)* for which the Interconnection Customer executes a Construction Service Agreement or Interconnection Service Agreement on or after March 19, 2005, "Applicable Technical Requirements and Standards" shall refer to the "PJM Small Generator Interconnection Applicable Technical Requirements and Standards." All Applicable Technical Requirements and Standards shall be publicly available through postings on Transmission Provider's internet website.

Attachment Facilities:

"Attachment Facilities" shall mean the facilities necessary to physically connect a Customer Facility to the Transmission System or interconnected distribution facilities.

Behind The Meter Generation:

"Behind The Meter Generation" shall refer to a generation unit that delivers energy to load without using the Transmission System or any distribution facilities (unless the entity that owns or leases the distribution facilities has consented to such use of the distribution facilities and such consent has been demonstrated to the satisfaction of the Office of the Interconnection); provided, however, that Behind The Meter Generation does not include (i) at any time, any portion of such generating unit's capacity that is designated as a Generation Capacity Resource; or (ii) in an hour, any portion of the output of such generating unit that is sold to another entity for consumption at another electrical location or into the PJM Interchange Energy Market.

Breach:

"Breach" shall mean the failure of a party to perform or observe any material term or condition of Tariff, Part IV or Tariff, Part VI, or any agreement entered into thereunder as described in the relevant provisions of such agreement.

Breaching Party:

"Breaching Party" shall mean a party that is in Breach of Tariff, Part IV or Tariff, Part VI and/or an agreement entered into thereunder.

Business Day:

"Business Day" shall mean a day in which the Federal Reserve System is open for business and is not a scheduled PJM holiday.

Cancellation Costs:

"Cancellation Costs" shall mean costs and liabilities incurred in connection with: (a) cancellation of supplier and contractor written orders and agreements entered into to design, construct and install Attachment Facilities, Direct Assignment Facilities and/or Customer-Funded Upgrades, and/or (b) completion of some or all of the required Attachment Facilities, Direct Assignment Facilities and/or Customer-Funded Upgrades, or specific unfinished portions and/or removal of any or all of such facilities which have been installed, to the extent required for the Transmission Provider and/or Transmission Owner(s) to perform their respective obligations under Tariff, Part IV and/or Part VI.

Capacity:

"Capacity" shall mean the installed capacity requirement of the Reliability Assurance Agreement or similar such requirements as may be established.

Capacity Interconnection Rights:

"Capacity Interconnection Rights" shall mean the rights to input generation as a Generation Capacity Resource into the Transmission System at the Point of Interconnection where the generating facilities connect to the Transmission System.

Capacity Resource:

"Capacity Resource" shall have the meaning provided in the Reliability Assurance Agreement.

Commencement Date:

"Commencement Date" shall mean the date on which Interconnection Service commences in accordance with an Interconnection Service Agreement.

Confidential Information:

"Confidential Information" shall mean any confidential, proprietary, or trade secret information of a plan, specification, pattern, procedure, design, device, list, concept, policy, or compilation relating to the present or planned business of a New Service Customer, Transmission Owner, or other Interconnection Party or Construction Party, which is designated as confidential by the party supplying the information, whether conveyed verbally, electronically, in writing, through inspection, or otherwise, and shall include, without limitation, all information relating to the producing party's technology, research and development, business affairs and pricing, and any information supplied by any New Service Customer, Transmission Owner, or other Interconnection Party or Construction Party to another such party prior to the execution of an Interconnection Service Agreement or a Construction Service Agreement.

Consolidated Transmission Owners Agreement, PJM Transmission Owners Agreement or Transmission Owners Agreement:

"Consolidated Transmission Owners Agreement," "PJM Transmission Owners Agreement" or "Transmission Owners Agreement" shall mean the certain Consolidated Transmission Owners Agreement dated as of December 15, 2005, by and among the Transmission Owners and by and between the Transmission Owners and PJM Interconnection, L.L.C. on file with the Commission, as amended from time to time.

Constructing Entity:

"Constructing Entity" shall mean either the Transmission Owner or the New Services Customer, depending on which entity has the construction responsibility pursuant to Tariff, Part VI and the applicable Construction Service Agreement; this term shall also be used to refer to an Interconnection Customer with respect to the construction of the Customer Interconnection Facilities.

Construction Party:

"Construction Party" shall mean a party to a Construction Service Agreement. "Construction Parties" shall mean all of the Parties to a Construction Service Agreement.

Construction Service Agreement:

"Construction Service Agreement" shall mean either an Interconnection Construction Service Agreement or an Upgrade Construction Service Agreement.

Contingent Facilities:

"Contingent Facilities" shall mean those unbuilt Interconnection Facilities and Network Upgrades upon which the Interconnection Request's costs, timing, and study findings are dependent and, if delayed or not built, could cause a need for restudies of the Interconnection

Request or a reassessment of the Interconnection Facilities and/or Network Upgrades and/or costs and timing.

Control Area:

"Control Area" shall mean an electric power system or combination of electric power systems bounded by interconnection metering and telemetry to which a common automatic generation control scheme is applied in order to:

(1) match the power output of the generators within the electric power system(s) and energy purchased from entities outside the electric power system(s), with the load within the electric power system(s);

(2) maintain scheduled interchange with other Control Areas, within the limits of Good Utility Practice;

(3) maintain the frequency of the electric power system(s) within reasonable limits in accordance with Good Utility Practice; and

(4) provide sufficient generating capacity to maintain operating reserves in accordance with Good Utility Practice.

Controllable A.C. Merchant Transmission Facilities:

"Controllable A.C. Merchant Transmission Facilities" shall mean transmission facilities that (1) employ technology which Transmission Provider reviews and verifies will permit control of the amount and/or direction of power flow on such facilities to such extent as to effectively enable the controllable facilities to be operated as if they were direct current transmission facilities, and (2) that are interconnected with the Transmission System pursuant to Tariff, Part IV and Part VI.

Costs:

As used in Tariff, Part IV, Part VI and related attachments, "Costs" shall mean costs and expenses, as estimated or calculated, as applicable, including, but not limited to, capital expenditures, if applicable, and overhead, return, and the costs of financing and taxes and any Incidental Expenses.

Customer Facility:

"Customer Facility" shall mean Generation Facilities or Merchant Transmission Facilities interconnected with or added to the Transmission System pursuant to an Interconnection Request under Subpart A of Tariff, Part IV.

Customer Interconnection Facilities:

"Customer Interconnection Facilities" shall mean all facilities and equipment owned and/or controlled, operated and maintained by Interconnection Customer on Interconnection Customer's side of the Point of Interconnection identified in the appropriate appendices to the Interconnection Service Agreement and to the Interconnection Construction Service Agreement, including any modifications, additions, or upgrades made to such facilities and equipment, that are necessary to physically and electrically interconnect the Customer Facility with the Transmission System.

Default:

As used in the Interconnection Service Agreement and Construction Service Agreement, "Default" shall mean the failure of a Breaching Party to cure its Breach in accordance with the applicable provisions of an Interconnection Service Agreement or Construction Service Agreement.

Emergency Condition:

"Emergency Condition" shall mean a condition or situation (i) that in the judgment of any Interconnection Party is imminently likely to endanger life or property; or (ii) that in the judgment of the Interconnected Transmission Owner or Transmission Provider is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the Transmission System, the Interconnection Facilities, or the transmission systems or distribution systems to which the Transmission System is directly or indirectly connected; or (iii) that in the judgment of Interconnection Customer is imminently likely (as determined in a non-discriminatory manner) to cause damage to the Customer Facility or to the Customer Interconnection Facilities. System restoration and black start shall be considered Emergency Conditions, provided that a Generation Interconnection Customer is not obligated by an Interconnection Service Agreement to possess black start capability. Any condition or situation that results from lack of sufficient generating capacity to meet load requirements or that results solely from economic conditions shall not constitute an Emergency Condition, unless one or more of the enumerated conditions or situations identified in this definition also exists.

Energy Resource:

"Energy Resource" shall mean a Generating Facility that is not a Capacity Resource.

Energy Storage Resource:

"Energy Storage Resource" shall mean a resource capable of receiving electric energy from the grid and storing it for later injection to the grid that participates in the PJM Energy, Capacity and/or Ancillary Services markets as a Market Participant.

Facilities Study:

"Facilities Study" shall be an engineering study conducted by the Transmission Provider (in

coordination with the affected Transmission Owner(s)) to: (1) determine the required modifications to the Transmission Provider's Transmission System necessary to implement the conclusions of the System Impact Study; and (2) complete any additional studies or analyses documented in the System Impact Study or required by PJM Manuals, and determine the required modifications to the Transmission Provider's Transmission System based on the conclusions of such additional studies. The Facilities Study shall include the cost and scheduled completion date for such modifications, that will be required to provide the requested transmission service or to accommodate a New Service Request. As used in the Interconnection Service Agreement or Construction Service Agreement, Facilities Study shall mean that certain Facilities Study conducted by Transmission Provider (or at its direction) to determine the design and specification of the Customer Funded Upgrades necessary to accommodate the New Service Customer's New Service Request in accordance with Tariff, Part VI, section 207.

Federal Power Act:

"Federal Power Act" shall mean the Federal Power Act, as amended, 16 U.S.C. §§ 791a, et seq.

FERC or Commission:

"FERC" or "Commission" shall mean the Federal Energy Regulatory Commission or any successor federal agency, commission or department exercising jurisdiction over the Tariff, Operating Agreement and Reliability Assurance Agreement.

Generating Facilities:

"Generating Facilities" shall mean Interconnection Customer's device for the production and/or storage for later injection of electricity identified in the Interconnection Request, but shall not include the Interconnection Customer's Interconnection Facilities.

Generation Interconnection Customer:

"Generation Interconnection Customer" shall mean an entity that submits an Interconnection Request to interconnect a new generation facility or to increase the capacity of an existing generation facility interconnected with the Transmission System in the PJM Region.

Generation Interconnection Request:

"Generation Interconnection Request" shall mean a request by a Generation Interconnection Customer pursuant to Tariff, Part IV, subpart A, to interconnect a generating unit with the Transmission System or to increase the capacity of a generating unit interconnected with the Transmission System in the PJM Region.

Good Utility Practice:

"Good Utility Practice" shall mean any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period,

or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather is intended to include acceptable practices, methods, or acts generally accepted in the region; including those practices required by Federal Power Act, section 215(a)(4).

Governmental Authority:

"Governmental Authority" shall mean any federal, state, local or other governmental, regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, arbitrating body, or other governmental authority having jurisdiction over any Interconnection Party or Construction Party or regarding any matter relating to an Interconnection Service Agreement or Construction Service Agreement, as applicable.

Hazardous Substances:

"Hazardous Substance" shall mean any chemicals, materials or substances defined as or included in the definition of "hazardous substances," "hazardous wastes," "hazardous materials," "hazardous constituents," "restricted hazardous materials," "extremely hazardous substances," "toxic substances," "radioactive substances," "contaminants," "pollutants," "toxic pollutants" or words of similar meaning and regulatory effect under any applicable Environmental Law, or any other chemical, material or substance, exposure to which is prohibited, limited or regulated by any applicable Environmental Law.

Incremental Auction Revenue Rights:

"Incremental Auction Revenue Rights" shall mean the additional Auction Revenue Rights, not previously feasible, created by the addition of Incremental Rights-Eligible Required Transmission Enhancements, Merchant Transmission Facilities, or of one or more Customer-Funded Upgrades.

Incremental Available Transfer Capability Revenue Rights:

"Incremental Available Transfer Capability Revenue Rights" shall mean the rights to revenues that are derived from incremental Available Transfer Capability created by the addition of Merchant Transmission Facilities or of one of more Customer-Funded Upgrades.

Incremental Capacity Transfer Right:

"Incremental Capacity Transfer Right" shall mean a Capacity Transfer Right allocated to a Generation Interconnection Customer or Transmission Interconnection Customer obligated to fund a transmission facility or upgrade, to the extent such upgrade or facility increases the transmission import capability into a Locational Deliverability Area, or a Capacity Transfer

Right allocated to a Responsible Customer in accordance with Tariff, Schedule 12A.

Incremental Deliverability Rights (IDRs):

"Incremental Deliverability Rights" or "IDRs" shall mean the rights to the incremental ability, resulting from the addition of Merchant Transmission Facilities, to inject energy and capacity at a point on the Transmission System, such that the injection satisfies the deliverability requirements of a Capacity Resource. Incremental Deliverability Rights may be obtained by a generator or a Generation Interconnection Customer, pursuant to an IDR Transfer Agreement, to satisfy, in part, the deliverability requirements necessary to obtain Capacity Interconnection Rights.

Initial Operation:

"Initial Operation" shall mean the commencement of operation of the Customer Facility and Customer Interconnection Facilities after satisfaction of the conditions of Tariff, Attachment O-Appendix 2, section 1.4 (an Interconnection Service Agreement).

Interconnected Entity:

"Interconnected Entity" shall mean either the Interconnection Customer or the Interconnected Transmission Owner; Interconnected Entities shall mean both of them.

Interconnected Transmission Owner:

"Interconnected Transmission Owner" shall mean the Transmission Owner to whose transmission facilities or distribution facilities Customer Interconnection Facilities are, or as the case may be, a Customer Facility is, being directly connected. When used in an Interconnection Construction Service Agreement, the term may refer to a Transmission Owner whose facilities must be upgraded pursuant to the Facilities Study, but whose facilities are not directly interconnected with those of the Interconnection Customer.

Interconnection Construction Service Agreement:

"Interconnection Construction Service Agreement" shall mean the agreement entered into by an Interconnection Customer, Interconnected Transmission Owner and the Transmission Provider pursuant to Tariff, Part VI, Subpart B and in the form set forth in Tariff, Attachment P, relating to construction of Attachment Facilities, Network Upgrades, and/or Local Upgrades and coordination of the construction and interconnection of an associated Customer Facility. A separate Interconnection Construction Service Agreement will be executed with each Transmission Owner that is responsible for construction of any Attachment Facilities, Network Upgrades, or Local Upgrades associated with interconnection of a Customer Facility.

Interconnection Customer:

"Interconnection Customer" shall mean a Generation Interconnection Customer and/or a

Transmission Interconnection Customer.

Interconnection Facilities:

"Interconnection Facilities" shall mean the Transmission Owner Interconnection Facilities and the Customer Interconnection Facilities.

Interconnection Party:

"Interconnection Party" shall mean a Transmission Provider, Interconnection Customer, or the Interconnected Transmission Owner. Interconnection Parties shall mean all of them.

Interconnection Request:

"Interconnection Request" shall mean a Generation Interconnection Request, a Transmission Interconnection Request and/or an IDR Transfer Agreement.

Interconnection Service:

"Interconnection Service" shall mean the physical and electrical interconnection of the Customer Facility with the Transmission System pursuant to the terms of Tariff, Part IV and Tariff, Part VI and the Interconnection Service Agreement entered into pursuant thereto by Interconnection Customer, the Interconnected Transmission Owner and Transmission Provider.

Interconnection Service Agreement:

"Interconnection Service Agreement" shall mean an agreement among the Transmission Provider, an Interconnection Customer and an Interconnected Transmission Owner regarding interconnection under Tariff, Part IV and Tariff, Part VI.

List of Approved Contractors:

"List of Approved Contractors" shall mean a list developed by each Transmission Owner and published in a PJM Manual of (a) contractors that the Transmission Owner considers to be qualified to install or construct new facilities and/or upgrades or modifications to existing facilities on the Transmission Owner's system, provided that such contractors may include, but need not be limited to, contractors that, in addition to providing construction services, also provide design and/or other construction-related services, and (b) manufacturers or vendors of major transmission-related equipment (e.g., high-voltage transformers, transmission line, circuit breakers) whose products the Transmission Owner considers acceptable for installation and use on its system.

Load Serving Entity (LSE):

"Load Serving Entity" or "LSE" shall have the meaning specified in the Reliability Assurance Agreement.

Local Upgrades:

"Local Upgrades" shall mean modifications or additions of facilities to abate any local thermal loading, voltage, short circuit, stability or similar engineering problem caused by the interconnection and delivery of generation to the Transmission System. Local Upgrades shall include:

(i) Direct Connection Local Upgrades which are Local Upgrades that only serve the Customer Interconnection Facility and have no impact or potential impact on the Transmission System until the final tie-in is complete; and

(ii) Non-Direct Connection Local Upgrades which are parallel flow Local Upgrades that are not Direct Connection Local Upgrades.

Material Modification:

"Material Modification" shall mean any modification to an Interconnection Request that has a material adverse effect on the cost or timing of Interconnection Studies related to, or any Network Upgrades or Local Upgrades needed to accommodate, any Interconnection Request with a later Queue Position.

Maximum Facility Output:

"Maximum Facility Output" shall mean the maximum (not nominal) net electrical power output in megawatts, specified in the Interconnection Service Agreement, after supply of any parasitic or host facility loads, that a Generation Interconnection Customer's Customer Facility is expected to produce, provided that the specified Maximum Facility Output shall not exceed the output of the proposed Customer Facility that Transmission Provider utilized in the System Impact Study.

Maximum State of Charge:

"Maximum State of Charge" shall mean the maximum State of Charge that should not be exceeded, measured in units of megawatt-hours.

Merchant A.C. Transmission Facilities:

"Merchant A.C. Transmission Facility" shall mean Merchant Transmission Facilities that are alternating current (A.C.) transmission facilities, other than those that are Controllable A.C. Merchant Transmission Facilities.

Merchant D.C. Transmission Facilities:

"Merchant D.C. Transmission Facilities" shall mean direct current (D.C.) transmission facilities that are interconnected with the Transmission System pursuant to Tariff, Part IV and Tariff, Part

VI.

Merchant Network Upgrades:

"Merchant Network Upgrades" shall mean additions to, or modifications or replacements of, physical facilities of the Interconnected Transmission Owner that, on the date of the pertinent Transmission Interconnection Customer's Upgrade Request, are part of the Transmission System or are included in the Regional Transmission Expansion Plan.

Merchant Transmission Facilities:

"Merchant Transmission Facilities" shall mean A.C. or D.C. transmission facilities that are interconnected with or added to the Transmission System pursuant to Tariff, Part IV and Tariff, Part VI and that are so identified in Tariff, Attachment T, provided, however, that Merchant Transmission Facilities shall not include (i) any Customer Interconnection Facilities, (ii) any physical facilities of the Transmission System that were in existence on or before March 20, 2003 ; (iii) any expansions or enhancements of the Transmission System that are not identified as Merchant Transmission Facilities in the Regional Transmission Expansion Plan and Tariff, Attachment T, or (iv) any transmission facilities that are included in the rate base of a public utility and on which a regulated return is earned.

Merchant Transmission Provider:

"Merchant Transmission Provider" shall mean an Interconnection Customer that (1) owns, controls, or controls the rights to use the transmission capability of, Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities that connect the Transmission System with another control area, (2) has elected to receive Transmission Injection Rights and Transmission Withdrawal Rights associated with such facility pursuant to Tariff, Part IV, section 36, and (3) makes (or will make) the transmission capability of such facilities available for use by third parties under terms and conditions approved by the Commission and stated in the Tariff, consistent with Tariff, Part IV, section 38.

Metering Equipment:

"Metering Equipment" shall mean all metering equipment installed at the metering points designated in the appropriate appendix to an Interconnection Service Agreement.

Minimum State of Charge:

"Minimum State of Charge" shall mean the minimum State of Charge that should be maintained in units of megawatt-hours.

NERC:

"NERC" shall mean the North American Electric Reliability Corporation or any successor thereto.

Network Upgrades:

"Network Upgrades" shall mean modifications or additions to transmission-related facilities that are integrated with and support the Transmission Provider's overall Transmission System for the general benefit of all users of such Transmission System. Network Upgrades shall include:

(i) **Direct Connection Network Upgrades** which are Network Upgrades that are not part of an Affected System; only serve the Customer Interconnection Facility; and have no impact or potential impact on the Transmission System until the final tie-in is complete. Both Transmission Provider and Interconnection Customer must agree as to what constitutes Direct Connection Network Upgrades and identify them in the Interconnection Construction Service Agreement, Schedule D. If the Transmission Provider and Interconnection Customer disagree about whether a particular Network Upgrade is a Direct Connection Network Upgrade, the Transmission Provider must provide the Interconnection Customer a written technical explanation outlining why the Transmission Provider does not consider the Network Upgrade to be a Direcct Connection Network Upgrade within 15 days of its determination.

(ii) **Non-Direct Connection Network Upgrades** which are parallel flow Network Upgrades that are not Direct Connection Network Upgrades.

New Service Request:

"New Service Request" shall mean an Interconnection Request, a Completed Application, or an Upgrade Request.

New Services Queue:

"New Services Queue" shall mean all Interconnection Requests, Completed Applications, and Upgrade Requests that are received within each six-month period ending on March 31 and September 30 of each year shall collectively comprise a New Services Queue.

Nominal Rated Capability:

"Nominal Rated Capability" shall mean the nominal maximum rated capability in megawatts of a Transmission Interconnection Customer's Customer Facility or the nominal increase in transmission capability in megawatts of the Transmission System resulting from the interconnection or addition of a Transmission Interconnection Customer's Customer Facility, as determined in accordance with pertinent Applicable Standards and specified in the Interconnection Service Agreement.

Operating Agreement of the PJM Interconnection, L.L.C., Operating Agreement or PJM Operating Agreement:

"Operating Agreement of the PJM Interconnection, L.L.C.," "Operating Agreement" or "PJM Operating Agreement" shall mean the Amended and Restated Operating Agreement of PJM

Interconnection, L.L.C. dated as of April 1, 1997 and as amended and restated as of June 2, 1997, including all Schedules, Exhibits, Appendices, addenda or supplements hereto, as amended from time to time thereafter, among the Members of the PJM Interconnection, L.L.C., on file with the Commission.

Option to Build:

"Option to Build" shall mean the option of the New Service Customer to build certain Customer-Funded Upgrades, as set forth in, and subject to the terms of, the Construction Service Agreement.

Part I:

"Part I" shall mean the Tariff Definitions and Common Service Provisions contained in Tariff, Part I, sections 1 through 12A.

Part II:

"Part II" shall mean Tariff, Part II, sections 13 through 27A pertaining to Point-To-Point Transmission Service in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part III:

"Part III" shall mean Tariff, Part III, sections 28 through 35 pertaining to Network Integration Transmission Service in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part IV:

"Part IV" shall mean Tariff, Part IV, sections 36 through 112C pertaining to generation or merchant transmission interconnection to the Transmission System in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part VI:

"Part VI" shall mean Tariff, Part VI, sections 200 through 237 pertaining to the queuing, study, and agreements relating to New Service Requests, and the rights associated with Customer-Funded Upgrades in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Parties:

"Parties" shall mean the Transmission Provider, as administrator of the Tariff, and the Transmission Customer receiving service under the Tariff. PJMSettlement shall be the

Counterparty to Transmission Customers.

PJM:

"PJM" shall mean PJM Interconnection, L.L.C., including the Office of the Interconnection as referenced in the PJM Operating Agreement. When such term is being used in the RAA it shall also include the PJM Board.

PJM Manuals:

"PJM Manuals" shall mean the instructions, rules, procedures and guidelines established by the Office of the Interconnection for the operation, planning, and accounting requirements of the PJM Region and the PJM Interchange Energy Market.

PJM Region:

"PJM Region" shall have the meaning specified in the Operating Agreement.

PJM Tariff, Tariff, O.A.T.T., OATT or PJM Open Access Transmission Tariff:

"PJM Tariff," "Tariff," "O.A.T.T.," "OATT," or "PJM Open Access Transmission Tariff" shall mean that certain PJM Open Access Transmission Tariff, including any schedules, appendices or exhibits attached thereto, on file with FERC and as amended from time to time thereafter.

Point of Interconnection:

"Point of Interconnection" shall mean the point or points where the Customer Interconnection Facilities interconnect with the Transmission Owner Interconnection Facilities or the Transmission System.

Project Finance Entity:

"Project Finance Entity" shall mean: (a) a holder, trustee or agent for holders, of any component of Project Financing; or (b) any purchaser of capacity and/or energy produced by the Customer Facility to which Interconnection Customer has granted a mortgage or other lien as security for some or all of Interconnection Customer's obligations under the corresponding power purchase agreement.

Provisional Interconnection Service:

"Provisional Interconnection Service" shall mean interconnection service provided by Transmission Provider associated with interconnecting the Interconnection Customer's Generating Facility to Transmission Provider's Transmission System and enabling that Transmission System to receive electric energy and capacity from the Generating Facility at the Point of Interconnection, pursuant to the terms of the Interconnection Service Agreement and, if applicable, the Tariff.

Queue Position:

"Queue Position" shall mean the priority assigned to an Interconnection Request, a Completed Application, or an Upgrade Request pursuant to applicable provisions of Tariff, Part VI.

Reasonable Efforts:

"Reasonable Efforts" shall mean, with respect to any action required to be made, attempted, or taken by an Interconnection Party or by a Construction Party under Tariff, Part IV or Tariff, Part VI, an Interconnection Service Agreement, or a Construction Service Agreement, such efforts as are timely and consistent with Good Utility Practice and with efforts that such party would undertake for the protection of its own interests.

Regional Entity:

"Regional Entity" shall have the same meaning specified in the Operating Agreement.

Regional Transmission Expansion Plan:

"Regional Transmission Expansion Plan" shall mean the plan prepared by the Office of the Interconnection pursuant to Operating Agreement, Schedule 6 for the enhancement and expansion of the Transmission System in order to meet the demands for firm transmission service in the PJM Region.

Reliability Assurance Agreement or PJM Reliability Assurance Agreement:

"Reliability Assurance Agreement" or "PJM Reliability Assurance Agreement" shall mean that certain Reliability Assurance Agreement Among Load Serving Entities in the PJM Region, on file with FERC as PJM Interconnection L.L.C. Rate Schedule FERC No. 44, and as amended from time to time thereafter.

Schedule of Work:

"Schedule of Work" shall mean that schedule attached to the Interconnection Construction Service Agreement setting forth the timing of work to be performed by the Constructing Entity pursuant to the Interconnection Construction Service Agreement, based upon the Facilities Study and subject to modification, as required, in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

Scope of Work:

"Scope of Work" shall mean that scope of the work attached as a schedule to the Interconnection Construction Service Agreement and to be performed by the Constructing Entity(ies) pursuant to the Interconnection Construction Service Agreement, provided that such Scope of Work may be modified, as required, in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

Secondary Systems:

"Secondary Systems" shall mean control or power circuits that operate below 600 volts, AC or DC, including, but not limited to, any hardware, control or protective devices, cables, conductors, electric raceways, secondary equipment panels, transducers, batteries, chargers, and voltage and current transformers.

Security:

"Security" shall mean the security provided by the New Service Customer pursuant to Tariff, section 212.4 or Tariff, Part VI, section 213.4 to secure the New Service Customer's responsibility for Costs under the Interconnection Service Agreement or Upgrade Construction Service Agreement and Tariff, Part VI, section 217.

Service Agreement:

"Service Agreement" shall mean the initial agreement and any amendments or supplements thereto entered into by the Transmission Customer and the Transmission Provider for service under the Tariff.

Site:

"Site" shall mean all of the real property, including but not limited to any leased real property and easements, on which the Customer Facility is situated and/or on which the Customer Interconnection Facilities are to be located.

State:

"State" shall mean the District of Columbia and any State or Commonwealth of the United States.

State of Charge:

"State of Charge" shall mean the operating parameter that represents the quantity of physical energy stored (measured in units of megawatt-hours) in an Energy Storage Resource Model Participant in proportion to its maximum State of Charge capability. State of Charge is quantified as defined in the PJM Manuals.

Station Power:

"Station Power" shall mean energy used for operating the electric equipment on the site of a generation facility located in the PJM Region or for the heating, lighting, air-conditioning and office equipment needs of buildings on the site of such a generation facility that are used in the operation, maintenance, or repair of the facility. Station Power does not include any energy (i) used to power synchronous condensers; (ii) used for pumping at a pumped storage facility; (iii) used in association with restoration or black start service; or (iv) that is Direct Charging Energy.

Surplus Interconnection Customer:

"Surplus Interconnection Customer" shall mean either an Interconnection Customer whose Generating Facility is already interconnected to the PJM Transmission System or one of its affiliates, or an unaffiliated entity that submits a Surplus Interconnection Request to utilize Surplus Interconnection Service within the Transmission System in the PJM Region. A Surplus Interconnection Customer is not a New Service Customer.

Surplus Interconnection Request:

"Surplus Interconnection Request" shall mean a request submitted by a Surplus Interconnection Customer, pursuant to Tariff, Attachment RR, to utilize Surplus Interconnection Service within the Transmission System in the PJM Region. A Surplus Interconnection Request is not a New Service Request.

Surplus Interconnection Service:

"Surplus Interconnection Service" shall mean any unneeded portion of Interconnection Service established in an Interconnection Service Agreement, such that if Surplus Interconnection Service is utilized, the total amount of Interconnection Service at the Point of Interconnection would remain the same.

Switching and Tagging Rules:

"Switching and Tagging Rules" shall mean the switching and tagging procedures of Interconnected Transmission Owners and Interconnection Customer as they may be amended from time to time.

System Impact Study:

"System Impact Study" shall mean an assessment by the Transmission Provider of (i) the adequacy of the Transmission System to accommodate a Completed Application, an Interconnection Request or an Upgrade Request, (ii) whether any additional costs may be incurred in order to provide such transmission service or to accommodate an Interconnection Request, and (iii) with respect to an Interconnection Request, an estimated date that an Interconnection Customer's Customer Facility can be interconnected with the Transmission System and an estimate of the Interconnection Customer's cost responsibility for the interconnection; and (iv) with respect to an Upgrade Request, the estimated cost of the requested system upgrades or expansion, or of the cost of the system upgrades or expansion, necessary to provide the requested incremental rights.

System Protection Facilities:

"System Protection Facilities" shall refer to the equipment required to protect (i) the Transmission System, other delivery systems and/or other generating systems connected to the Transmission System from faults or other electrical disturbance occurring at or on the Customer Facility, and (ii)

the Customer Facility from faults or other electrical system disturbance occurring on the Transmission System or on other delivery systems and/or other generating systems to which the Transmission System is directly or indirectly connected. System Protection Facilities shall include such protective and regulating devices as are identified in the Applicable Technical Requirements and Standards or that are required by Applicable Laws and Regulations or other Applicable Standards, or as are otherwise necessary to protect personnel and equipment and to minimize deleterious effects to the Transmission System arising from the Customer Facility.

Transmission Facilities:

"Transmission Facilities" shall have the meaning set forth in the Operating Agreement.

Transmission Injection Rights:

"Transmission Injection Rights" shall mean Capacity Transmission Injection Rights and Energy Transmission Injection Rights.

Transmission Interconnection Customer:

"Transmission Interconnection Customer" shall mean an entity that submits an Interconnection Request to interconnect or add Merchant Transmission Facilities to the Transmission System or to increase the capacity of Merchant Transmission Facilities interconnected with the Transmission System in the PJM Region or an entity that submits an Upgrade Request for Merchant Network Upgrades (including accelerating the construction of any transmission enhancement or expansion, other than Merchant Transmission Facilities, that is included in the Regional Transmission Expansion Plan prepared pursuant to Operating Agreement, Schedule 6).

Transmission Owner:

"Transmission Owner" shall mean a Member that owns or leases with rights equivalent to ownership Transmission Facilities and is a signatory to the PJM Transmission Owners Agreement. Taking transmission service shall not be sufficient to qualify a Member as a Transmission Owner.

Transmission Owner Attachment Facilities:

"Transmission Owner Attachment Facilities" shall mean that portion of the Transmission Owner Interconnection Facilities comprised of all Attachment Facilities on the Interconnected Transmission Owner's side of the Point of Interconnection.

Transmission Owner Interconnection Facilities:

"Transmission Owner Interconnection Facilities" shall mean all Interconnection Facilities that are not Customer Interconnection Facilities and that, after the transfer under Tariff, Attachment P, Appendix 2, section 5.5 to the Interconnected Transmission Owner of title to any Transmission Owner Interconnection Facilities that the Interconnection Customer constructed,

are owned, controlled, operated and maintained by the Interconnected Transmission Owner on the Interconnected Transmission Owner's side of the Point of Interconnection identified in appendices to the Interconnection Service Agreement and to the Interconnection Construction Service Agreement, including any modifications, additions or upgrades made to such facilities and equipment, that are necessary to physically and electrically interconnect the Customer Facility with the Transmission System or interconnected distribution facilities.

Transmission Provider:

The "Transmission Provider" shall be the Office of the Interconnection for all purposes, provided that the Transmission Owners will have the responsibility for the following specified activities:

(a) The Office of the Interconnection shall direct the operation and coordinate the maintenance of the Transmission System, except that the Transmission Owners will continue to direct the operation and maintenance of those transmission facilities that are not listed in the PJM Designated Facilities List contained in the PJM Manual on Transmission Operations;

(b) Each Transmission Owner shall physically operate and maintain all of the facilities that it owns; and

(c) When studies conducted by the Office of the Interconnection indicate that enhancements or modifications to the Transmission System are necessary, the Transmission Owners shall have the responsibility, in accordance with the applicable terms of the Tariff, Operating Agreement and/or the Consolidated Transmission Owners Agreement to construct, own, and finance the needed facilities or enhancements or modifications to facilities.

Transmission Service:

"Transmission Service" shall mean Point-To-Point Transmission Service provided under Tariff, Part II on a firm and non-firm basis.

Transmission System:

"Transmission System" shall mean the facilities controlled or operated by the Transmission Provider within the PJM Region that are used to provide transmission service under Tariff, Part II and Part III.

Transmission Withdrawal Rights:

"Transmission Withdrawal Rights" shall mean Firm Transmission Withdrawal Rights and Non-Firm Transmission Withdrawal Rights.

APPENDIX 2

STANDARD TERMS AND CONDITIONS FOR INTERCONNECTIONS

1 Commencement, Term of and Conditions Precedent to Interconnection Service

1.1 Commencement Date:

The effective date of an Interconnection Service Agreement shall be the date provided in Section 4.0 of the Interconnection Service Agreement. Interconnection Service under this Interconnection Service Agreement shall commence upon the satisfaction of the conditions precedent set forth in Section 1.2 below.

1.2 Conditions Precedent:

The following conditions must be satisfied prior to the commencement of Interconnection Service under this Interconnection Service Agreement:

(a) This Interconnection Service Agreement, if filed with FERC, shall have been accepted for filing by the FERC;

(b) All requirements for Initial Operation as specified in Section 1.4 below shall have been met and Initial Operation of the Customer Facility shall have been completed.

(c) Interconnection Customer shall be in compliance with all Applicable Technical Requirements and Standards for interconnection under the Tariff (as determined by the Transmission Provider).

1.3 Term:

This Interconnection Service Agreement shall remain in full force and effect until it is terminated in accordance with Section 16 of this Appendix 2.

1.4 Initial Operation:

The following requirements shall be satisfied prior to Initial Operation of the Customer Facility:

1.4.1 The construction of all Interconnection Facilities necessary for the interconnection of the Customer Facility has been completed;

1.4.2 The Interconnected Transmission Owner has accepted any Interconnection Facilities constructed by Interconnection Customer pursuant to the Interconnection Construction Service Agreement;

1.4.3 The Interconnection Customer and the Interconnected Transmission Owner have all necessary systems and personnel in place to allow for parallel operation of their respective facilities;

1.4.4 The Interconnected Transmission Owner has received all applicable documentation for the Interconnection Facilities built by the Interconnection Customer, certified as correct, including,

but not limited to, access to the field copy of marked-up drawings reflecting the as-built condition, pre-operation test reports, and instruction books; and

1.4.5 Interconnection Customer shall have received any necessary authorization from Transmission Provider to synchronize with the Transmission System or to energize, as applicable per the determination of Transmission Provider, the Customer Facility and Interconnection Facilities.

1.4A Other Interconnection Options

1.4A.1 Limited Operation:

If any of the Transmission Owner Interconnection Facilities are not reasonably expected to be completed prior to the Interconnection Customer's planned date of Initial Operation, and provided that the Interconnected Transmission Owner has accepted the Customer Interconnection Facilities pursuant to the Interconnection Construction Service Agreement, Transmission Provider shall, upon the request and at the expense of Interconnection Customer, perform appropriate power flow or other operating studies on a timely basis to determine the extent to which the Customer Facility and the Customer Interconnection Facilities may operate prior to the completion of the Transmission Owner Interconnection Facilities consistent with Applicable Laws and Regulations, Applicable Reliability Standards, Good Utility Practice, and the Interconnection Service Agreement. In accordance with the results of such studies and subject to such conditions as Transmission Provider determines to be reasonable and appropriate, Transmission Provider shall (a) permit Interconnection Customer to operate the Customer Facility and the Customer Interconnection Facilities, and (b) grant Interconnection Customer limited, interim Interconnection Rights commensurate with the extent to which operation of the Customer Facility is permitted.

1.4A.2 Provisional Interconnection Service:

Upon the request of Interconnection Customer, and prior to completion of requisite Interconnection Facilities, Network Upgrades, Local Upgrades, or system protection facilities Interconnection Customer may request limited Interconnection Service at the discretion of Transmission Provider based upon an evaluation that will consider the results of available studies, which terms shall be memorialized in the Interconnection Service Agreement. Consistent with Tariff, Part VI, Subpart B, section 212.4, Interconnection Customer may execute the Interconnection Service Agreement, request dispute resolution or request that the Interconnection Service Agreement be filed unexecuted with the Commission. Transmission Provider shall determine, through available studies or additional studies as necessary, whether stability, short circuit, thermal, and/or voltage issues would arise if Interconnection Customer interconnects without modifications to the Generating Facility or the Transmission System. Transmission Provider shall determine whether any Interconnection Facilities, Network Upgrades, Local Upgrades, or system protection facilities that are necessary to meet the requirements of NERC, or any applicable Regional Entity for the interconnection of a new, modified and/or expanded Generating Facility are in place prior to the commencement of Interconnection Service from the Generating Facility. Where available studies indicate that such Interconnection Facilities, Network Upgrades, Local Upgrades, and/or system protection

facilities that are required for the interconnection of a new, modified and/or expanded Generating Facility are not currently in place, Transmission Provider will perform a study, at the Interconnection Customer's expense, to confirm the facilities that are required for Provisional Interconnection Service. The maximum permissible output of the Generating Facility shall be studied and updated annually and at the Interconnection Customer's expense. The results will be communicated to the Interconnection Customer in writing upon completion of the study. Interconnection Customer assumes all risk and liabilities with respect to the Provisional Interconnection Service, including changes in output limits and Interconnection Facilities, Network Upgrades, Local Upgrades, and/or system protection facilities cost responsibilities.

1.5 Survival:

The Interconnection Service Agreement shall continue in effect after termination to the extent necessary to provide for final billings and payments; to permit the determination and enforcement of liability and indemnification obligations arising from acts or events that occurred while the Interconnection Service Agreement was in effect; and to permit each Interconnection Party to have access to the real property, including but not limited to leased property and easements of the other Interconnection Parties pursuant to Section 16 of this Appendix 2 to disconnect, remove or salvage its own facilities and equipment.

2 Interconnection Service

2.1 Scope of Service:

Interconnection Service shall be provided to the Interconnection Customer at the Point of Interconnection (a), in the case of interconnection of the Customer Facility of a Generation Interconnection Customer, up to the Maximum Facility Output, and (b), in the case of interconnection of the Customer Facility of a Transmission Interconnection Customer, up to the Nominal Rated Capability. The location of the Point of Interconnection shall be mutually agreed by the Interconnected Entities, provided, however, that if the Interconnected Entities are unable to agree on the Point of Interconnection, the Transmission Provider shall determine the Point of Interconnection, provided that Transmission Provider shall not select a Point of Interconnection that would impose excessive costs on either of the Interconnected Entities and shall take material system reliability considerations into account in such selection. Specifications for the Customer Facility and the location of the Point of Interconnection shall be set forth in an appendix to the Interconnection Service Agreement and shall conform to those stated in the Facilities Study.

2.2 Non-Standard Terms:

The standard terms and conditions of this Appendix 2 shall not apply, to such extent as Transmission Provider determines to be reasonably necessary to accommodate such circumstances, in the event that the Interconnection Customer acquires an ownership interest in facilities which, under the standard terms and conditions of the Interconnection Construction Service Agreement would be part of the Transmission Owner Interconnection Facilities. In such circumstances and to the extent determined by Transmission Provider to be reasonably necessary, non-standard terms and conditions mutually agreed upon by all Interconnection Parties shall apply,

subject to FERC and any other necessary regulatory acceptance or approval. In addition, a Generation Interconnection Customer that acquires an ownership interest in such facilities shall become, and shall remain for so long as it retains such interest, a signatory to the Consolidated Transmission Owners Agreement.

2.3 No Transmission Services:

The execution of an Interconnection Service Agreement does not constitute a request for transmission service, or entitle Interconnection Customer to receive transmission service, under Part II or Part III of the Tariff. Nor does the execution of an Interconnection Service Agreement obligate the Interconnected Transmission Owner or Transmission Provider to procure, supply or deliver to Interconnection Customer or the Customer Facility any energy, capacity, Ancillary Services or Station Power (and any associated distribution services).

2.4 Use of Distribution Facilities:

To the extent that a Generation Interconnection Customer uses distribution facilities for the purpose of delivering energy to the Transmission System, Interconnection Service under this Tariff shall include the construction and/or use of such distribution facilities. In such cases, to such extent as Transmission Provider determines to be reasonably necessary to accommodate such circumstances, the Interconnection Service Agreement may include non-standard terms and conditions mutually agreed upon by all Interconnection Parties as needed to conform with Applicable Laws and Regulations and Applicable Standards relating to such distribution facilities.

2.5 [Reserved]

3 Modification Of Facilities

3.1 General:

Subject to Applicable Laws and Regulations and to any applicable requirements or conditions of the Tariff and the Operating Agreement, either Interconnected Entity may undertake modifications to its facilities. In the event that an Interconnected Entity plans to undertake a modification that reasonably may be expected upon completion to have a permanent material impact on the other Interconnected Entity's facilities, that Interconnected Entity, in accordance with Good Utility Practice, shall provide the other Interconnection Parties with sufficient information regarding such modification, so that the other Interconnection Parties may evaluate the potential impact of such modification prior to commencement of the work. The Interconnected Entity desiring to perform such modification shall provide the relevant drawings, plans, and specifications to the other Interconnection Parties at least ninety days, or such shorter period to which the Interconnection Parties receiving the information may agree (which agreement shall not unreasonably be withheld, conditioned, or delayed), in advance of the beginning of the work. The Interconnection Customer shall notify Transmission Provider and Interconnected Transmission Owner of the proposed modifications and Transmission Provider shall provide, within sixty days of receipt of the relevant drawings and specifications (or within such other time upon which the Interconnection Parties may agree), an estimate of any modifications to the Transmission System that would be necessary to

accommodate the proposed modifications by Interconnection Customer and a good faith estimate of the costs thereof.

3.2 Interconnection Request:

This Section 3 shall not apply to any proposed modifications by Interconnection Customer to its facilities for which Interconnection Customer must make an Interconnection Request under the Tariff. In such circumstances, the Interconnection Customer and Transmission Provider shall follow the requirements of Subpart A of Part IV of the Tariff.

3.3 Standards:

Any additions, modifications, or replacements made to an Interconnected Entity's facilities shall be constructed and operated in accordance with Good Utility Practice, Applicable Standards and Applicable Laws and Regulations.

3.4 Modification Costs:

Unless otherwise required by Applicable Laws and Regulations or this Appendix 2 and, with respect to a Transmission Interconnection Customer, subject to the terms of Section 236.2 of the Tariff:

(a) Interconnection Customer shall not be responsible for the costs of any additions, modifications, or replacements that the Interconnected Transmission Owner in its discretion or at the direction of Transmission Provider makes to the Interconnection Facilities or the Transmission System in order to facilitate the interconnection of a third party to the Interconnection Facilities or the Transmission System, or to provide transmission service under the Tariff to a third party.

(b) Interconnection Customer shall be responsible for the costs of any additions, modifications, or replacements to the Interconnection Facilities or the Transmission System that are required, in accord with Good Utility Practice and/or to maintain compliance with Applicable Laws and Regulations or Applicable Standards, in order to accommodate additions, modifications, or replacements made by Interconnection Customer to the Customer Facility or to the Customer Interconnection Facilities.

(c) Interconnection Customer shall be responsible for the costs of any additions, modifications, or replacements to the Customer Interconnection Facilities or the Customer Facility that are required, in accord with Good Utility Practice and/or to maintain compliance with Applicable Laws and Regulations or Applicable Standards, in order to accommodate additions, modifications, or replacements that Transmission Provider or the Interconnected Transmission Owner makes to the Transmission System or to the Transmission Owner Interconnection Facilities, but only to the extent that Transmission Provider's or the Interconnected Transmission Owner's changes to the Transmission System or the Transmission Owner Interconnection Facilities are made pursuant to Good Utility Practice and/or to maintain compliance with Applicable Laws and Regulations or Applicable Standards.

4 Operations

4.1 General:

Each Interconnected Entity shall operate, or shall cause operation of, its facilities in a safe and reliable manner in accord with (i) the terms of this Appendix 2; (ii) Applicable Standards; (iii) applicable rules, procedures and protocols set forth in the Tariff and the Operating Agreement, as any or all may be amended from time to time; (iv) Applicable Laws and Regulations, and (v) Good Utility Practice.

4.1.1 Interconnection Customer Drawings:

Within one hundred twenty (120) days after the date of Initial Operation, unless the Interconnection Parties agree on another mutually acceptable deadline, the Interconnection Customer shall deliver to the Transmission Provider and the Interconnected Transmission Owner final, "as-built" drawings, information and documents regarding the Customer Interconnection Facilities, including, as and to the extent applicable: a one-line diagram, a site plan showing the Customer Facility and the Customer Interconnection Facilities, plan and elevation drawings showing the layout of the Customer Interconnection Facilities, a relay functional diagram, relaying AC and DC schematic wiring diagrams and relay settings for all facilities associated with the Interconnection Customer's step-up transformers, the facilities connecting the Customer Facility to the step-up transformers and the Customer Interconnection Facilities, and the impedances (determined by factory tests) for the associated step-up transformers and the Customer Facility. As applicable, the Interconnection Customer shall provide Transmission Provider and the Interconnected Transmission Owner specifications for the excitation system, automatic voltage regulator, Customer Facility control and protection settings, transformer tap settings, and communications.

4.2 [Reserved.]

4.3 Interconnection Customer Obligations:

Interconnection Customer shall obtain Transmission Provider's approval prior to either synchronizing with the Transmission System or energizing, as applicable per the determination of Transmission Provider, the Customer Facility or, except in an Emergency Condition, disconnecting the Customer Facility from the Transmission System, and shall coordinate such synchronizations, energizations, and disconnections with the Interconnected Transmission Owner.

4.4 Transmission Interconnection Customer Obligations:

A Transmission Interconnection Customer that will be a Merchant Transmission Provider is subject to the terms and conditions in Tariff, Section 38.

4.5 Permits and Rights-of-Way:

Each Interconnected Entity at its own expense shall maintain in full force and effect all permits, licenses, rights-of-way and other authorizations as may be required to maintain the Customer Facility and the Interconnection Facilities that the entity owns, operates and maintains and, upon reasonable request of the other Interconnected Entity, shall provide copies of such permits, licenses, rights-of-way and other authorizations at its own expense to the requesting party.

4.6 No Ancillary Services:

Except as provided in Section 4.7 of this Appendix 2, nothing in this Appendix 2 is intended to obligate the Interconnection Customer to supply Ancillary Services to either Transmission Provider or the Interconnected Transmission Owner.

4.7 Reactive Power and Primary Frequency Response

4.7.1 Reactive Power

4.7.1.1 Reactive Power Design Criteria

4.7.1.1.1 New Facilities:

For all new Generating Facilities to be interconnected pursuant to the Tariff, other than wind-powered and other non-synchronous generation facilities, the Generation Interconnection Customer shall design its Customer Facility to maintain a composite power delivery at continuous rated power output at a power factor of at least 0.95 leading to 0.90 lagging. For all new wind-powered and other non-synchronous generation facilities the Generation Interconnection Customer shall design its Customer Facility with the ability to maintain a composite power delivery at a power factor of at least 0.95 leading to 0.95 lagging across the full range of continuous rated power output. For all wind-powered and other non-synchronous generation facilities entering the New Service Queue on or after November 1, 2016, the power factor requirement shall be measured at the high-side of the facility substation transformers. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two. For all wind-powered and other non-synchronous generation facilities entering the New Service Queue on or after May 1, 2015, and before November 1, 2016, the power factor requirement shall be measured at the generator's terminals. For new generation resources of more than 20 MW, other than wind-powered and other non-synchronous Generating Facilities, the power factor requirement shall be measured at the generator's terminals. For new generation resources of 20 MW or less, and all wind-powered and other non-synchronous generation facilities entering the New Service Queue prior to May 1, 2015, the power factor requirement shall be measured at the Point of Interconnection. Any different reactive power design criteria that Transmission Provider determines to be appropriate for a wind-powered or other non-synchronous generation facility shall be stated in the Interconnection Service Agreement. A Transmission Interconnection Customer interconnecting Merchant D.C. Transmission Facilities and/ or Controllable A.C. Merchant Transmission Facilities shall design its Customer Facility to maintain a power factor at the Point of Interconnection of at least 0.95 leading and 0.95 lagging, when the Customer Facility

is operating at any level within its approved operating range.

4.7.1.1.2 Increases in Generating Capacity or Energy Output:

All increases in the capacity or energy output of any generation facility interconnected with the Transmission System, other than wind-powered and other non-synchronous Generating Facilities, shall be designed with the ability to maintain a composite power delivery at continuous rated power output at a power factor for all incremental MW of capacity or energy output, of at least 1.0 (unity) to 0.90 lagging. Wind-powered generation facilities and other non-synchronous generation facilities entering the New Service Queue on or after November 1, 2016, shall be designed with the ability to maintain a composite power delivery at a power factor for all incremental MW of capacity or energy output of at least 0.95 leading to 0.95 lagging measured at the high-side of the facility substation transformers across the full range of continuous rated power output. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two. Wind-powered generation facilities and other non-synchronous generation facilities entering the New Service Queue on or after May 1, 2015, and before November 1, 2016, shall be designed with the ability to maintain a composite power delivery at a power factor for all incremental MW of capacity or energy output, of at least 0.95 leading to 0.95 lagging measured at the generator's terminals under conditions in which a wind-powered generation facility's real power output exceeds 25 percent of its continuous rated power output and, for all other non-synchronous generation facilities, across the full range of continuous rated power output. Wind-powered generation facilities and other non-synchronous generation facilities entering the New Service Queue prior to May 1, 2015 shall be designed with the ability to maintain a composite power delivery at continuous rated power output at a power factor for all incremental MW of capacity of energy output of at least 1.0 (unity) to 0.95 lagging measured at the generator's terminals. The power factor requirement associated with increases in capacity or energy output of more than 20 MW to synchronous generation facilities interconnected with the Transmission System shall be measured at the generator's terminals. The power factor requirement associated with increases in capacity or energy output of 20 MW or less to synchronous generation facilities interconnected to the Transmission System shall be measured at the Point of Interconnection.

4.7.1.2 Obligation to Supply Reactive Power:

Interconnection Customer agrees, as and when so directed by Transmission Provider or when so directed by the Interconnected Transmission Owner acting on behalf or at the direction of Transmission Provider, to operate the Customer Facility to produce reactive power within the design limitations of the Customer Facility pursuant to voltage schedules, reactive power schedules or power factor schedules established by Transmission Provider or, as appropriate, the Interconnected Transmission Owner. Transmission Provider shall maintain oversight over such schedules to ensure that all sources of reactive power in the PJM Region, as applicable, are treated in an equitable and not unduly discriminatory manner. Interconnection Customer agrees that Transmission Provider and the Interconnected Transmission Owner, acting on behalf or at the direction of Transmission Provider, may make changes to the schedules that they respectively establish as necessary to maintain the reliability of the Transmission System.

4.7.1.3 Deviations from Schedules:

In the event that operation of the Customer Facility of an Interconnection Customer causes the Transmission System or the Interconnected Transmission Owner's facilities to deviate from appropriate voltage schedules and/or reactive power schedules as specified by Transmission Provider or the Interconnected Transmission Owner's operations control center (acting on behalf or at the direction of Transmission Provider), or that otherwise is inconsistent with Good Utility Practice and results in an unreasonable deterioration of the quality of electric service to other customers of Transmission Provider or the Interconnected Transmission Owner, the Interconnection Customer shall, upon discovery of the problem or upon notice from Transmission Provider or the Interconnected Transmission Owner, acting on behalf or at the direction of Transmission Provider, take whatever steps are reasonably necessary to alleviate the situation at its expense, in accord with Good Utility Practice and within the reactive capability of the Customer Facility. In the event that the Interconnection Customer does not alleviate the situation within a reasonable period of time following Transmission Provider's or the Interconnected Transmission Owner's notice thereof, the Interconnected Transmission Owner, with Transmission Provider's approval, upon notice to the Interconnection Customer and at the Interconnection Customer's expense, may take appropriate action, including installation on the Transmission System of power factor correction or other equipment, as is reasonably required, consistent with Good Utility Practice, to remedy the situation cited in Transmission Provider's or the Interconnected Transmission Owner's notice to the Interconnection Customer under this section.

4.7.1.4 Payment for Reactive Power:

Any payments to the Interconnection Customer for reactive power shall be in accordance with Schedule 2 of the Tariff.

4.7.2 Primary Frequency Response:
Section 4.7.2 of this ISA and its subsections apply to New Service Requests received on or after October 1, 2018.

Generation Interconnection Customer shall ensure the primary frequency response capability of its Customer Facility by installing, maintaining, and operating a functioning governor or equivalent controls. The term "functioning governor or equivalent controls" as used herein shall mean the required hardware and/or software that provides frequency responsive real power control with the ability to sense changes in system frequency and autonomously adjust the Customer Facility's real power output in accordance with the droop and deadband parameters and in the direction needed to correct frequency deviations. Generation Interconnection Customer is required to install a governor or equivalent controls with the capability of operating: (1) with a maximum 5 percent droop and ±0.036 Hz deadband; or (2) in accordance with the relevant droop, deadband, and timely and sustained response settings from an approved NERC Reliability Standard providing for equivalent or more stringent parameters. The droop characteristic shall be: (1) based on the nameplate capacity of the Customer Facility, and shall be linear in the range of frequencies between 59 to 61 Hz that are outside of the deadband parameter; or (2) based an approved NERC Reliability Standard providing for an equivalent or more stringent parameter. The deadband parameter shall be: the range of frequencies above and below nominal (60 Hz) in which the

governor or equivalent controls is not expected to adjust the Customer Facility's real power output in response to frequency deviations. The deadband shall be implemented: (1) without a step to the droop curve, that is, once the frequency deviation exceeds the deadband parameter, the expected change in the Customer Facility's real power output in response to frequency deviations shall start from zero and then increase (for under-frequency deviations) or decrease (for over-frequency deviations) linearly in proportion to the magnitude of the frequency deviation; or (2) in accordance with an approved NERC Reliability Standard providing for an equivalent or more stringent parameter. Generation Interconnection Customer shall notify Transmission Provider that the primary frequency response capability of the Customer Facility has been tested and confirmed during commissioning. Once Generation Interconnection Customer has synchronized the Customer Facility with the Transmission System, Generation Interconnection Customer shall operate the Customer Facility consistent with the provisions specified in sections 4.7.2.1 and 4.7.2.2 of this agreement. The primary frequency response requirements contained herein shall apply to both synchronous and non-synchronous Customer Facilities.

4.7.2.1 Governor or Equivalent Controls:

Whenever the Customer Facility is operated in parallel with the Transmission System, Generation Interconnection Customer shall operate the Customer Facility with its governor or equivalent controls in service and responsive to frequency. Generation Interconnection Customer shall: (1) in coordination with Transmission Provider and/or the relevant balancing authority, set the deadband parameter to: (1) a maximum of ±0.036 Hz and set the droop parameter to a maximum of 5 percent; or (2) implement the relevant droop and deadband settings from an approved NERC Reliability Standard that provides for equivalent or more stringent parameters. Generation Interconnection Customer shall be required to provide the status and settings of the governor or equivalent controls to Transmission Provider and/or the relevant balancing authority upon request. If Generation Interconnection Customer needs to operate the Customer Facility with its governor or equivalent controls not in service, Generation Interconnection Customer shall immediately notify Transmission Provider and the relevant balancing authority, and provide both with the following information: (1) the operating status of the governor or equivalent controls (i.e., whether it is currently out of service or when it will be taken out of service); (2) the reasons for removing the governor or equivalent controls from service; and (3) a reasonable estimate of when the governor or equivalent controls will be returned to service. Generation Interconnection Customer shall make Reasonable Efforts to return its governor or equivalent controls into service as soon as practicable. Generation Interconnection Customer shall make Reasonable Efforts to keep outages of the Customer Facility's governor or equivalent controls to a minimum whenever the Customer Facility is operated in parallel with the Transmission System.

4.7.2.2 Timely and Sustained Response:

Generation Interconnection Customer shall ensure that the Customer Facility's real power response to sustained frequency deviations outside of the deadband setting is automatically provided and shall begin immediately after frequency deviates outside of the deadband, and to the extent the Customer Facility has operating capability in the direction needed to correct the frequency deviation. Generation Interconnection Customer shall not block or otherwise inhibit the ability of the governor or equivalent controls to respond and shall ensure that the response is not

inhibited, except under certain operational constraints including, but not limited to, ambient temperature limitations, physical energy limitations, outages of mechanical equipment, or regulatory requirements. The Customer Facility shall sustain the real power response at least until system frequency returns to a value within the deadband setting of the governor or equivalent controls. A Commission-approved Reliability Standard with equivalent or more stringent requirements shall supersede the above requirements.

4.7.2.3 Exemptions:

Customer Facilities that are regulated by the United States Nuclear Regulatory Commission shall be exempt from sections 4.7.2, 4.7.2.1, and 4.7.2.2 of this agreement. Customer Facilities that are behind the meter generation that is sized-to-load (i.e., the thermal load and the generation are near-balanced in real-time operation and the generation is primarily controlled to maintain the unique thermal, chemical, or mechanical output necessary for the operating requirements of its host facility) shall be required to install primary frequency response capability in accordance with the droop and deadband capability requirements specified in section 4.7.2, but shall be otherwise exempt from the operating requirements in sections 4.7.2, 4.7.2.1, 4.7.2.2, and 4.7.2.4 of this agreement.

4.7.2.4 Energy Storage Resources:

Generation Interconnection Customer interconnecting an Energy Storage Resource shall establish an operating range in Schedule I of this ISA that specifies a minimum state of charge and a maximum state of charge between which the Energy Storage Resource will be required to provide primary frequency response consistent with the conditions set forth in sections 4.7.2, 4.7.2.1, 4.7.2.2, and 4.7.2.3 of this agreement. Schedule I shall specify whether the operating range is static or dynamic, and shall consider (1) the expected magnitude of frequency deviations in the interconnection; (2) the expected duration that system frequency will remain outside of the deadband parameter in the interconnection; (3) the expected incidence of frequency deviations outside of the deadband parameter in the interconnection; (4) the physical capabilities of the Energy Storage Resource; (5) operational limitations of the Energy Storage Resource due to manufacturer specifications; and (6) any other relevant factors agreed to by Transmission Provider and Generation Interconnection Customer, and in consultation with the relevant transmission owner or balancing authority as appropriate. If the operating range is dynamic, then Schedule I must establish how frequently the operating range will be reevaluated and the factors that may be considered during its reevaluation.

Generation Interconnection Customer's Energy Storage Resource is required to provide timely and sustained primary frequency response consistent with section 4.7.2.2 of this agreement when it is online and dispatched to inject electricity to the Transmission System and/or receive electricity from the Transmission System. This excludes circumstances when the Energy Storage Resource is not dispatched to inject electricity to the Transmission System and/or dispatched to receive electricity from the Transmission System. If Generation Interconnection Customer's Energy Storage Resource is charging at the time of a frequency deviation outside of its deadband parameter, it is to increase (for over-frequency deviations) or decrease (for under-frequency deviations) the rate at which it is charging in accordance with its droop parameter. Generation

Interconnection Customer's Energy Storage Resource is not required to change from charging to discharging, or vice versa, unless the response necessitated by the droop and deadband settings requires it to do so and it is technically capable of making such a transition.

4.8 Under- and Over-Frequency and Under- and Over- Voltage Conditions:

The Generation Interconnection Customer shall ensure "frequency ride through" capability and "voltage ride through" capability of its Customer Facility. The Generation Interconnection Customer shall enable these capabilities such that its Customer Facility shall not disconnect automatically or instantaneously from the system or equipment of the Transmission Provider and any Affected Systems for a defined under-frequency or over-frequency condition, or an under-voltage or over-voltage condition, as tested pursuant to Section 1.4.4 of Appendix 2 of this Interconnection Service Agreement. The defined conditions shall be in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other Generating Facilities in the PJM Region on a comparable basis. The Customer Facility's protective equipment settings shall comply with the Transmission Provider's automatic load-shed program. The Transmission Provider shall review the protective equipment settings to confirm compliance with the automatic load-shed program. The term "ride through" as used herein shall mean the ability of a Customer Facility to stay connected to and synchronized with the system or equipment of the Transmission Provider and any Affected Systems during system disturbances within a range of conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other Generating Facilities in the Balancing Authority on a comparable basis. The term "frequency ride through" as used herein shall mean the ability of a Generation Interconnection Customer's Customer Facility Customer Facility to stay connected to and synchronized with the Transmission System or equipment of the Transmission Provider and any Affected Systems during system disturbances within a range of under-frequency and over-frequency conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other Generating Facilities in the PJM Region on a comparable basis. The term "voltage ride through" as used herein shall mean the ability of a Customer Facility to stay connected to and synchronized with the system or equipment of the Transmission Provider and any Affected Systems during system disturbances within a range of under-voltage and over-voltage conditions, in accordance with Good Utility Practice and consistent with any standards and guidelines that are applied to other Generating Facilities in the PJM Region on a comparable basis.

The Transmission System is designed to automatically activate a load-shed program as required by NERC and each Applicable Regional Entity in the event of an under-frequency system disturbance. A Generation Interconnection Customer shall implement under-frequency and over-frequency relay set points for the Customer Facility as required by NERC and each Applicable Regional Entity to ensure "frequency ride through" capability of the Transmission System. The response of a Generation Interconnection Customer's Customer Facility to frequency deviations of predetermined magnitudes, both under-frequency and over-frequency deviations shall be studied and coordinated with the Transmission Provider in accordance with Good Utility Practice.

4.9 System Protection and Power Quality

4.9.1 System Protection:

Interconnection Customer shall, at its expense, install, operate and maintain such System Protection Facilities as may be required in connection with operation of the Customer Facility and the Customer Interconnection Facilities consistent with Applicable Technical Requirements and Standards. Interconnected Transmission Owner shall install any System Protection Facilities that may be required, as determined by Transmission Provider, on the Transmission Owner Interconnection Facilities or the Transmission System in connection with the operation of the Customer Facility and the Customer Interconnection Facilities. Responsibility for the cost of any System Protection Facilities required on the Transmission Owner Interconnection Facilities or the Transmission System shall be allocated as provided in Section 217 of the Tariff.

4.9.2 Power Quality:

The Customer Facility and Customer Interconnection Facilities shall not cause excessive deviations from the power quality criteria set forth in the Applicable Technical Requirements and Standards.

4.10 Access Rights:

Each Interconnected Entity shall provide the other Interconnected Entity access to areas under its control as reasonably necessary to permit the other Interconnected Entity to perform its obligations under this Appendix 2, including operation and maintenance obligations. An Interconnected Entity that obtains such access shall comply with all safety rules applicable to the area to which access is obtained. Each Interconnected Entity agrees to inform the other Interconnected Entity's representatives of safety rules applicable to an area.

4.11 Switching and Tagging Rules:

The Interconnected Entities shall comply with applicable Switching and Tagging Rules in obtaining clearances for work or for switching operations on equipment. Such Switching and Tagging Rules shall be developed in accordance with OSHA standards codified at 29 C.F.R. Part 1910, or successor standards. Each Interconnected Entity shall provide the other Interconnected Entity a copy of its Switching and Tagging Rules that are applicable to the other Interconnected Entity's activities.

4.12 Communications and Data Protocol:

The Interconnected Entities shall comply with any communications and data protocol that the Transmission Provider may establish.

4.13 Nuclear Generating Facilities:

In the event that the Customer Facility is a nuclear Generating Facility, the Interconnection Parties shall agree to such non-standard terms and conditions as are reasonably necessary to accommodate

the Interconnection Customer's satisfaction of Nuclear Regulatory Commission requirements relating to the safety and reliability of operations of such facilities.

5 Maintenance

5.1 General:

Each Interconnected Entity shall maintain, or shall cause the maintenance of, its facilities in a safe and reliable manner in accord with (i) the terms of this Appendix 2; (ii) Applicable Standards; (iii) applicable rules, procedures and protocols set forth in the Tariff and the Operating Agreement, as any or all may be amended from time to time; (iv) Applicable Laws and Regulations, and (v) Good Utility Practice.

5.2 [Reserved.]

5.3 Outage Authority and Coordination

5.3.1 Coordination:

The Interconnection Parties agree to confer regularly to coordinate the planning, scheduling and performance of preventive and corrective maintenance on the Customer Facility, the Customer Interconnection Facilities and any Attachment Facilities owned by the Interconnected Transmission Owner.

5.3.2 Authority:

Each Interconnected Entity may, in accordance with Good Utility Practice, remove from service its facilities that may affect the other Interconnected Entity's facilities in order to perform maintenance or testing or to install or replace equipment. Except in the event of an Emergency Condition, the Interconnection Customer proposing to remove such facilities from service shall provide prior notice of such activities to the Transmission Provider and the Interconnected Transmission Owner, and the Interconnected Entities shall coordinate all scheduling of planned facility outages with Transmission Provider, in accordance with applicable sections of the Operating Agreement, the PJM Manuals and any other applicable operating guidelines or directives of the Transmission Provider. Subject to the foregoing, the Interconnected Entity scheduling a facility outage shall use Reasonable Efforts to coordinate such outage with the other Interconnected Entity's scheduled outages.

5.3.3 Outages Required for Maintenance:

Subject to any necessary approval by Transmission Provider, each Interconnected Entity shall provide necessary equipment outages to allow the other Interconnected Entity to perform periodic maintenance, repair or replacement of its facilities and such outages shall be provided at mutually agreeable times, unless conditions arise which an Interconnected Entity believes, in accordance with Good Utility Practice, may endanger persons or property.

5.3.4 Rescheduling of Planned Outages:

To the extent so provided by the Tariff, the Operating Agreement, and the PJM Manuals, an Interconnected Entity may seek compensation from Transmission Provider for any costs related to rejection by Transmission Provider of a request of such Interconnected Entity for a planned maintenance outage.

5.3.5 Outage Restoration:

If an outage on an Interconnected Entity's facilities adversely affects the other Interconnected Entity's facilities, the Interconnected Entity that owns or controls the facility that is out of service shall use Reasonable Efforts to restore the facility to service promptly.

5.4 Inspections and Testing:

Each Interconnected Entity shall perform routine inspection and testing of its facilities and equipment in accordance with Good Utility Practice as may be necessary to ensure the continued interconnection of the Customer Facility with the Transmission System in a safe and reliable manner. Each Interconnected Entity shall have the right, upon advance written notice, to request reasonable additional testing of an Interconnected Entity's facilities for good cause, as may be in accordance with Good Utility Practice.

5.5 Right to Observe Testing:

Each Interconnected Entity shall notify the other Interconnected Entity in advance of its performance of tests of its portion of the Interconnection Facilities. The other Interconnected Entity shall, at its own expense, have the right, but not the obligation, to:

(a) Observe the other Party's tests and/or inspection of any of its system protection facilities and other protective equipment, including power system stabilizers;

(b) Review the settings of the other Party's system protection facilities and other protective equipment;

(c) Review the other Party's maintenance record relative to the Interconnection Facilities, system protection facilities and other protective equipment; and

(d) Exercise these rights from time to time as it deems necessary upon reasonable notice to the other Party.

5.6 Secondary Systems:

Each Interconnected Entity agrees to cooperate with the other in the inspection, maintenance, and testing of those Secondary Systems directly affecting the operation of an Interconnected Entity's facilities and equipment which may reasonably be expected to affect the other Interconnected Entity's facilities. Each Interconnected Entity shall provide advance notice to the other

Interconnected Entity before undertaking any work on such equipment, especially in electrical circuits involving circuit breaker trip and close contacts, current transformers, or potential transformers.

5.7 Access Rights:

Each Interconnected Entity shall provide the other Interconnected Entity access to areas under its control as reasonably necessary to permit the other Interconnected Entity to perform its obligations under this Appendix 2, including operation and maintenance obligations. An Interconnected Entity that obtains such access shall comply with all safety rules applicable to the area to which access is obtained. Each Interconnected Entity agrees to inform the other Interconnected Entity's representatives of safety rules applicable to an area.

5.8 Observation of Deficiencies:

If an Interconnection Party observes any Abnormal Condition on, or becomes aware of a lack of scheduled maintenance and testing with respect to, an Interconnection Party's facilities and equipment that might reasonably be expected to adversely affect the observing Interconnection Party's facilities and equipment, the observing Interconnection Party shall provide prompt notice under the circumstances to the appropriate Interconnection Party, and such Interconnection Party shall consider such notice in accordance with Good Utility Practice. Any Interconnection Party's review, inspection, and approval related to the other Interconnection Party's facilities and equipment shall be limited to the purpose of assessing the safety, reliability, protection and control of the Transmission System and shall not be construed as confirming or endorsing the design of such facilities and equipment, or as a warranty of any type, including safety, durability or reliability thereof. Notwithstanding the foregoing, the observing Interconnection Party shall have no liability whatsoever for failure to give a deficiency notice to the other Interconnection Party and the Interconnected Entity that owns the relevant Interconnection Facilities shall remain fully liable for its failure to determine and correct deficiencies and defects in its facilities and equipment.

6 Emergency Operations

6.1 Obligations:

Subject to Applicable Laws and Regulations, each Interconnection Party shall comply with the Emergency Condition procedures of NERC, the Applicable Regional Entity, Transmission Provider, the Interconnected Transmission Owner and Interconnection Customer.

6.2 Notice:

Each Interconnection Party shall notify the other parties promptly when it becomes aware of an Emergency Condition that may reasonably be expected to affect operation of the Customer Facility, the Customer Interconnection Facilities, the Transmission Owner Interconnection Facilities, or the Transmission System. To the extent information is known, the notification shall describe the Emergency Condition, the extent of the damage or deficiency, the expected effect on the facilities and/or operation thereof, its anticipated duration and the corrective action taken and/or to be taken. The initial notice shall be followed as soon as practicable with written notice.

6.3 Immediate Action:

An Interconnection Party becoming aware of an Emergency Condition may take such action, including disconnection of the Customer Facility from the Transmission System, as is reasonable and necessary in accord with Good Utility Practice (i) to prevent, avoid, or mitigate injury or danger to, or loss of, life or property; (ii) to preserve the reliability of, in the case of Interconnection Customer, the Customer Facility, or, in the case of Transmission Provider or the Interconnected Transmission Owner, the Transmission System and interconnected sub-transmission and distribution facilities; or (iii) to expedite restoration of service. Unless, in Interconnection Customer's reasonable judgment, immediate action is required to prevent imminent loss of life or property, Interconnection Customer shall obtain the consent of Transmission Provider and the Interconnected Transmission Owner prior to performing any manual switching operations at the Customer Facility or the Generation Interconnection Facilities. Each Interconnection Party shall use Reasonable Efforts to minimize the effect of its actions during an Emergency Condition on the facilities and operations of the other Interconnection Parties.

6.4 Record-Keeping Obligations:

Each Interconnection Party shall keep and maintain records of actions taken during an Emergency Condition that may reasonably be expected to affect the other parties' facilities and make such records available for audit in accordance with Section 19.3 of this Appendix 2.

7 Safety

7.1 General:

Each Interconnected Entity shall perform all work under this Appendix 2 that may reasonably be expected to affect the other Interconnected Entity in accordance with Good Utility Practice and all Applicable Laws and Regulations pertaining to the safety of persons or property. An Interconnected Entity performing work within the boundaries of the other Interconnected Entity's facilities must abide by the safety rules applicable to the site. Each party agrees to inform the other party's representatives of applicable safety rules that must be obeyed on the premises.

7.2 Environmental Releases:

Each Interconnected Entity shall notify the other Interconnection Parties, first orally and promptly thereafter in writing, of the release of any Hazardous Substances, any asbestos or lead abatement activities, or any type of remediation activities, related to the Customer Facility or the Interconnection Facilities, any of which may reasonably be expected to affect one or both of the other parties. The notifying party shall (i) provide the notice as soon as possible; (ii) make a good faith effort to provide the notice within twenty-four (24) hours after the party becomes aware of the occurrence; and (iii) promptly furnish to the other parties copies of any publicly available reports filed with any governmental agencies addressing such events.

8 Metering

8.1 General:

Interconnection Customer shall have the right to install, own, operate, test and maintain the necessary Metering Equipment. In the event that Interconnection Customer exercises this option, the Interconnected Transmission Owner shall have the right to install its own check meter(s), at its own expense, at or near the location of the Metering Equipment. If both Interconnection Customer and Interconnected Transmission Owner install meters, the meter installed by the Interconnection Customer shall control unless it is determined by testing to be inaccurate. If the Interconnection Customer does not exercise the option provided by the first sentence of this section, the Interconnected Transmission Owner shall have the option to install, own, operate, test and maintain all necessary Metering Equipment at Interconnection Customer's expense. If the Interconnected Transmission Owner does not exercise this option, the Interconnection Customer shall install, own, operate, test and maintain all necessary Metering Equipment. Transmission Provider shall determine the location where the Metering Equipment shall be installed, after consulting with Interconnection Customer and the Interconnected Transmission Owner. All Metering Equipment shall be tested prior to any operation of the Customer Facility. Power flows to and from the Customer Facility shall be compensated to the Point of Interconnection, or, upon the mutual agreement of the Interconnected Transmission Owner and the Interconnection Customer, to another location.

8.2 Standards:

All Metering Equipment installed pursuant to this Appendix 2 to be used for billing and payments shall be revenue quality Metering Equipment and shall satisfy applicable ANSI standards and Transmission Provider's metering standards and requirements. Nothing in this Appendix 2 precludes the use of Metering Equipment for any retail services of the Interconnected Transmission Owner provided, however, that in such circumstances Applicable Laws and Regulations shall control.

8.3 Testing of Metering Equipment:

The Interconnected Entity that, pursuant to Section 8.1 of this Appendix 2, owns the Metering Equipment shall operate, maintain, inspect and test all Metering Equipment upon installation and at least once every two years thereafter. Upon reasonable request by the other Interconnected Entity, the owner of the Metering Equipment shall inspect or test the Metering Equipment more frequently than every two years, but in no event more frequently than three times in any 24-month period. The owner of the Metering Equipment shall give reasonable notice to the Interconnection Parties of the time when any inspection or test of the owner's Metering Equipment shall take place, and the other parties may have representatives present at the test or inspection. If Metering Equipment is found to be inaccurate or defective, it shall be adjusted, repaired or replaced in order to provide accurate metering. Where the Interconnected Transmission Owner owns the Metering Equipment, the expense of such adjustment, repair or replacement shall be borne by the Interconnection Customer, except that the Interconnection Customer shall not be responsible for such expenses where the inaccuracy or defect is caused by the Interconnected Transmission Owner. If Metering Equipment fails to register, or if the measurement made by Metering

Equipment during a test varies by more than one percent from the measurement made by the standard meter used in the test, the owner of the Metering Equipment shall inform Transmission Provider, and the Transmission Provider shall inform the other Interconnected Entity, of the need to correct all measurements made by the inaccurate meter for the period during which the inaccurate measurements were made, if the period can be determined. If the period of inaccurate measurement cannot be determined, the correction shall be for the period immediately preceding the test of the Metering Equipment that is equal to one-half of the time from the date of the last previous test of the Metering Equipment, provided that the period subject to correction shall not exceed nine (9) months.

8.4 Metering Data:

At Interconnection Customer's expense, the metered data shall be telemetered (a) to a location designated by Transmission Provider; (b) to a location designated by the Interconnected Transmission Owner, unless the Interconnected Transmission Owner agrees otherwise; and (c) to a location designated by Interconnection Customer. Data from the Metering Equipment at the Point of Interconnection shall be used, under normal operating conditions, as the official measurement of the amount of energy delivered from or to the Customer Facility to the Point of Interconnection, provided that the Transmission Provider's rules applicable to Station Power as set forth at Tariff, Attachment K-Appendix, section 1.7.10(d) shall control with respect to a Generation Interconnection Customer's consumption of Station Power.

8.5 Communications

8.5.1 Interconnection Customer Obligations:

Interconnection Customer shall install and maintain satisfactory operating communications with Transmission Provider's system dispatcher or its other designated representative and with the Interconnected Transmission Owner. Interconnection Customer shall provide standard voice line, dedicated voice line and facsimile communications at its Customer Facility control room through use of the public telephone system. Interconnection Customer also shall provide and maintain backup communication links with both Transmission Provider and Interconnected Transmission Owner for use during abnormal conditions as specified by Transmission Provider and Interconnected Transmission Owner, respectively. Interconnection Customer further shall provide the dedicated data circuit(s) necessary to provide Interconnection Customer data to the Transmission Provider and Interconnected Transmission Owner as necessary to conform with Applicable Technical Requirements and Standards.

8.5.2 Remote Terminal Unit:

Unless otherwise deemed unnecessary by Transmission Provider and Interconnected Transmission Owner, as indicated in the Interconnection Service Agreement, prior to any operation of the Customer Facility, a remote terminal unit, or equivalent data collection and transfer equipment acceptable to the Interconnection Parties, shall be installed by Interconnection Customer, or by the Interconnected Transmission Owner at Interconnection Customer's expense, to gather accumulated and instantaneous data to be telemetered to the location(s) designated by Transmission Provider

and Interconnected Transmission Owner through use of a dedicated point-to-point data circuit(s) as indicated in Section 8.5.1 of this Appendix 2. Instantaneous, bi-directional real power and, with respect to a Generation Interconnection Customer's Customer Facility, reactive power flow information, must be telemetered directly to the location(s) specified by Transmission Provider and the Interconnected Transmission Owner.

8.5.3. Phasor Measurement Units (PMUs):

An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). PMUs shall be installed on the Customer Facility low side of the generator step-up transformer, unless it is a non-synchronous generation facility, in which case the PMUs shall be installed on the Customer Facility side of the Point of Interconnection. The PMUs must be capable of performing phasor measurements at a minimum of 30 samples per second which are synchronized via a high-accuracy satellite clock. To the extent Interconnection Customer installs similar quality equipment, such as relays or digital fault recorders, that can collect data at least at the same rate as PMUs and which data is synchronized via a high-accuracy satellite clock, such equipment would satisfy this requirement. As provided for in the PJM Manuals, an Interconnection Customer shall be required to install and maintain, at its expense, PMU equipment which includes the communication circuit capable of carrying the PMU data to a local data concentrator, and then transporting the information continuously to the Transmission Provider; as well as store the PMU data locally for thirty days. Interconnection Customer shall provide to Transmission Provider all necessary and requested information through the Transmission Provider synchrophasor system, including the following: (a) gross MW and MVAR measured at the Customer Facility side of the generator step-up transformer (or, for a non-synchronous generation facility, to be measured at the Customer Facility side of the Point of Interconnection); (b) generator terminal voltage; (c) generator terminal frequency; and (d) generator field voltage and current, where available. The Transmission Provider will install and provide for the ongoing support and maintenance of the network communications linking the data concentrator to the Transmission Provider. Additional details regarding the requirements and guidelines of PMU data and telecommunication of such data are contained in the PJM Manuals.

9 Force Majeure

9.1 Notice:

An Interconnection Party that is unable to carry out an obligation imposed on it by this Appendix 2 due to Force Majeure shall notify the other parties in writing or by telephone within a reasonable time after the occurrence of the cause relied on.

9.2 Duration of Force Majeure:

An Interconnection Party shall not be responsible, or considered to be in Breach or Default under this Interconnection Service Agreement, for any non-performance, any interruption or failure of service, deficiency in the quality or quantity of service, or any other failure to perform any

obligation hereunder to the extent that such failure or deficiency is due to Force Majeure. An Interconnection Party shall be excused from whatever performance is affected only for the duration of the Force Majeure and while the Interconnection Party exercises Reasonable Efforts to alleviate such situation. As soon as the non-performing Interconnection Party is able to resume performance of its obligations excused because of the occurrence of Force Majeure, such Interconnection Party shall resume performance and give prompt notice thereof to the other parties.

9.3 Obligation to Make Payments:

Any Interconnection Party's obligation to make payments for services shall not be suspended by Force Majeure.

9.4 Definition of Force Majeure:

For the purposes of this section, an event of force majeure shall mean any cause beyond the control of the affected Interconnection Party or Construction Party, including but not restricted to, acts of God, flood, drought, earthquake, storm, fire, lightning, epidemic, war, riot, civil disturbance or disobedience, labor dispute, labor or material shortage, sabotage, acts of public enemy, explosions, orders, regulations or restrictions imposed by governmental, military, or lawfully established civilian authorities, which, in any of the foregoing cases, by exercise of due diligence such party could not reasonably have been expected to avoid, and which, by the exercise of due diligence, it has been unable to overcome. Force majeure does not include (i) a failure of performance that is due to an affected party's own negligence or intentional wrongdoing; (ii) any removable or remediable causes (other than settlement of a strike or labor dispute) which an affected party fails to remove or remedy within a reasonable time; or (iii) economic hardship of an affected party.

10 Charges

10.1 Specified Charges:

If and to the extent required by the Interconnected Transmission Owner, after the Initial Operation of the Customer Facility, Interconnection Customer shall pay one or more of the types of recurring charges described in this section to compensate the Interconnected Transmission Owner for costs incurred in performing certain of its obligations under this Appendix 2. All such charges shall be stated in Schedule E of the Interconnection Service Agreement. Interconnected Transmission Owner shall provide Transmission Provider and Interconnection Customer with appropriate cost data, schedules and/or written testimony in support of any charges under this section in such manner and at such time as to allow Transmission Provider to include such materials in its filing of the Interconnection Service Agreement with the FERC. Transmission Provider will deliver a copy of such filing to Interconnection Customer. Permissible charges under this section may include:

(a) Administration Charge — Any such charge may recover only the costs and expenses incurred by the Interconnected Transmission Owner in connection with administrative obligations such as the preparation of bills, the processing of Customer Facility-specific data on energy delivered at the Point of Interconnection and costs incurred in similar types of

administrative processes related to Interconnection Customer's Interconnection Service. An Administration Charge shall not be permitted to the extent that the Interconnected Transmission Owner's other charges to the Interconnection Customer under the same Interconnection Service Agreement include an allocation of Interconnected Transmission Owner's administrative and general expenses and/or other corporate overhead costs.

(b) Metering Charge — Any such charge may recover only the Interconnected Transmission Owner's costs and expenses associated with operation, maintenance, inspection, testing, and carrying or capital replacement charges for any Metering Equipment that is owned by the Interconnected Transmission Owner.

(c) Telemetering Charge — Any such charge may recover only the Interconnected Transmission Owner's costs and expenses associated with operation, maintenance, inspection, testing, and carrying or capital replacement charges for any telemetering equipment that is owned by the Interconnected Transmission Owner and that is used exclusively in conjunction with Interconnection Service for the Interconnection Customer.

(d) Customer Facility Operations and Maintenance Charge — Any such charge may recover only the Interconnected Transmission Owner's costs and expenses associated with operation, maintenance, inspection, testing, modifications, taxes and carrying or capital replacement charges for Attachment Facilities related to the Interconnection Customer's Interconnection Service and that are owned by the Interconnected Transmission Owner, provided that

(i) any such charge shall exclude costs and expenses associated with Transmission Owner Interconnection Facilities owned by the Interconnected Transmission Owner that are radial line facilities that serve load in addition to an Interconnection Customer; and

(ii) except as otherwise provided by Applicable Laws and Regulations, any such charge may include only an allocated share, derived in accordance with the allocations contained in the Facilities Study, of costs and expenses associated with Transmission Owner Interconnection Facilities owned by the Interconnected Transmission Owner that are radial line facilities that serve more than one Interconnection Customer. At the discretion of the affected Interconnected Entities, a Customer Facility Operations and Maintenance Charge authorized under this section may apply on a per-incident basis or on a monthly or other periodic basis.

(e) Other Charges — Any other charges applicable to the Interconnection Customer, as mutually agreed upon by the Interconnection Customer and the Interconnected Transmission Owner and as accepted by the FERC as part of an Interconnection Service Agreement.

10.2 FERC Filings:

To the extent required by law or regulation, each Interconnection Party shall seek FERC acceptance or approval of its respective charges or the methodology for the calculation of such charges.

11 Security, Billing And Payments

11.1 Recurring Charges Pursuant to Section 10:

The following provisions shall apply with respect to recurring charges applicable to Interconnection Service after Initial Operation of the Customer Facility pursuant to Section 10 of this Appendix 2.

11.1.1 General:

Except as, and to the extent, otherwise provided in the Interconnection Service Agreement, billing and payment of any recurring charges applicable to Interconnection Service after Initial Operation of the Customer Facility pursuant to Section 10 of this Appendix 2 shall be in accordance with Section 7 of the Tariff. The Interconnected Transmission Owner shall provide Transmission Provider with all necessary information and supporting data that Transmission Provider may reasonably require to administer billing for and payment of applicable charges under this Appendix 2. Transmission Provider shall remit to the Interconnected Transmission Owner revenues received in payment of Interconnected Transmission Owner's charges to Interconnection Customer under this Appendix 2 upon Transmission Provider's receipt of such revenues. At Transmission Provider's reasonable discretion, charges to Interconnection Customer and remittances to Interconnected Transmission Owner under this Appendix 2 may be netted against other amounts owed by or to such parties under the Tariff.

11.1.2 Billing Disputes:

In the event of a billing dispute between Transmission Provider and Interconnection Customer, Transmission Provider shall continue to provide interconnection service under this Appendix 2 as long as Interconnection Customer (i) continues to make all payments not in dispute, and (ii) pays to Transmission Provider or into an independent escrow account the portion of the invoice in dispute, pending resolution of such dispute. If Interconnection Customer fails to meet these two requirements for continuation of service, then Transmission Provider shall so inform the Interconnection Parties and may provide notice to Interconnection Customer of a Breach pursuant to Section 15 of this Appendix 2. Within thirty days after the resolution of the dispute, the Interconnection Party that owes money to the other Interconnection Party shall pay the amount due with interest calculated in accord with Section 11.4.

11.2 Costs for Transmission Owner Interconnection Facilities:

The following provisions shall apply with respect to charges for the Costs of the Interconnected Transmission Owner for which the Interconnection Customer is responsible.

11.2.1 Adjustments to Security:

The Security provided by Interconnection Customer at or before execution of the Interconnection Service Agreement (a) shall be reduced as portions of the work are completed, and/or (b) shall be

increased or decreased as required to reflect adjustments to Interconnection Customer's cost responsibility, as determined in accordance with Section 217, to correspond with changes in the Scope of Work developed in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

11.2.2 Invoice:

The Interconnected Transmission Owner shall provide Transmission Provider a quarterly statement of the Interconnected Transmission Owner's scheduled expenditures during the next three months for, as applicable (a) the design, engineering and construction of, and/or for other charges related to, construction of the Interconnection Facilities for which the Interconnected Transmission Owner is responsible under the Interconnection Service Agreement and the Interconnection Construction Service Agreement, or (b) in the event that the Interconnection Customer exercises the Option to Build pursuant to Tariff, Attachment P, Appendix 2, section 3.2.3.1, for the Interconnected Transmission Owner's oversight costs (i.e. costs incurred by the Transmission Owner when engaging in oversight activities to satisfy itself that the Interconnection Customer is complying with the Transmission Owner's standards and specifications for the construction of facilities) associated with Interconnection Customer's building Transmission Owner Attachment Facilities and Direct Connection Network Upgrades, including but not limited to Costs for tie-in work and Cancellation Costs. Interconnected Transmission Owner oversight costs shall be consistent with Tariff, Attachment P, Appendix 2, section 3.2.3.2(a)(12). Transmission Provider shall bill Interconnection Customer on behalf of the Interconnected Transmission Owner, for the Interconnected Transmission Owner's expected Costs during the subsequent three months. Interconnection Customer shall pay each bill within twenty (20) days after receipt thereof. Upon receipt of each of Interconnection Customer's payments of such bills, Transmission Provider shall reimburse the Interconnected Transmission Owner. Interconnection Customer may request that the Transmission Provider provide a quarterly cost reconciliation. Such a quarterly cost reconciliation will have a one-quarter lag, e.g., reconciliation of Costs for the first calendar quarter of work will be provided at the start of the third calendar quarter of work, provided, however, that Section 11.2.3 of this Appendix 2 shall govern the timing of the final cost reconciliation upon completion of the work.

11.2.3 Final Invoice:

Within 120 days after the Interconnected Transmission Owner completes construction and installation of the Interconnection Facilities for which the Interconnected Transmission Owner is responsible under the Interconnection Service Agreement and the Interconnection Construction Service Agreement, Transmission Provider shall provide Interconnection Customer with an accounting of, and the appropriate Construction Party shall make any payment to the other that is necessary to resolve, any difference between (a) Interconnection Customer's responsibility under the Tariff for the actual Cost of such facilities, and (b) Interconnection Customer's previous aggregate payments to Transmission Provider for the Costs of such facilities. Notwithstanding the foregoing, however, Transmission Provider shall not be obligated to make any payment to either the Interconnection Customer or the Interconnected Transmission Owner that the preceding sentence requires it to make unless and until the Transmission Provider has received the payment that it is required to refund from the Construction Party owing the payment.

11.2.4 Disputes:

In the event of a billing dispute between any of the Construction Parties, Transmission Provider and the Interconnected Transmission Owner shall continue to perform their respective obligations pursuant to this Interconnection Service Agreement and any related Interconnection Construction Service Agreements so long as (a) Interconnection Customer continues to make all payments not in dispute, and (b) the Security held by the Transmission Provider while the dispute is pending exceeds the amount in dispute, or (c) Interconnection Customer pays to Transmission Provider or into an independent escrow account the portion of the invoice in dispute, pending resolution of such dispute. If Interconnection Customer fails to meet any of these requirements, then Transmission Provider shall so inform the other Construction Parties and Transmission Provider or the Interconnected Transmission Owner may provide notice to Interconnection Customer of a Breach pursuant to Section 15 of this Appendix 2.

11.3 No Waiver:

Payment of an invoice shall not relieve Interconnection Customer from any other responsibilities or obligations it has under this Appendix 2, nor shall such payment constitute a waiver of any claims arising hereunder.

11.4 Interest:

Interest on any unpaid amounts shall be calculated in accordance with the methodology specified for interest on refunds in the FERC's regulations at 18 C.F.R. § 35.19a(a)(2)(iii). Interest on delinquent amounts shall be calculated from the due date of the bill to the date of payment.

12.0 Assignment

12.1 Assignment with Prior Consent:

Except as provided in Section 12.2 to this Appendix 2, no Interconnection Party shall assign its rights or delegate its duties, or any part of such rights or duties, under the Interconnection Service Agreement without the written consent of the other Interconnection Parties, which consent shall not be unreasonably withheld, conditioned, or delayed. Any such assignment or delegation made without such written consent shall be null and void. An Interconnection Party may make an assignment in connection with the sale, merger, or transfer of a substantial portion or all of its properties including the Interconnection Facilities which it owns, so long as the assignee in such a sale, merger, or transfer assumes in writing all rights, duties and obligations arising under this Interconnection Service Agreement. In addition, the Interconnected Transmission Owner shall be entitled, subject to Applicable Laws and Regulations, to assign the Interconnection Service Agreement to any Affiliate or successor that owns and operates all or a substantial portion of the Interconnected Transmission Owner’s transmission facilities.

12.2 Assignment Without Prior Consent

12.2.1 Assignment to Owners:

Interconnection Customer may assign the Interconnection Service Agreement without the Interconnected Transmission Owner's or Transmission Provider's prior consent to any Affiliate or person that purchases or otherwise acquires, directly or indirectly, all or substantially all of the Customer Facility and the Customer Interconnection Facilities, provided that prior to the effective date of any such assignment, the assignee shall demonstrate that, as of the effective date of the assignment, the assignee has the technical and operational competence to comply with the requirements of this Interconnection Service Agreement and assumes in a writing provided to the Interconnected Transmission Owner and Transmission Provider all rights, duties, and obligations of Interconnection Customer arising under this Interconnection Service Agreement. However, any assignment described herein shall not relieve or discharge the Interconnection Customer from any of its obligations hereunder absent the written consent of the Transmission Provider, such consent not to be unreasonably withheld, conditioned or delayed.

12.2.2 Assignment to Lenders:

Interconnection Customer may, without the consent of the Transmission Provider or the Interconnected Transmission Owner, assign the Interconnection Service Agreement to any Project Finance Entity(ies), provided that such assignment does not alter or diminish Interconnection Customer's duties and obligations under this Interconnection Service Agreement. If Interconnection Customer provides the Interconnected Transmission Owner with notice of an assignment to any Project Finance Entity(ies) and identifies such Project Finance Entities as contacts for notice purposes pursuant to Section 21 of this Appendix 2, the Transmission Provider or Interconnected Transmission Owner shall provide notice and reasonable opportunity for such entity(ies) to cure any Breach under this Interconnection Service Agreement in accordance with this Interconnection Service Agreement. Transmission Provider or Interconnected Transmission Owner shall, if requested by such lenders, provide such customary and reasonable documents, including consents to assignment, as may be reasonably requested with respect to the assignment and status of the Interconnection Service Agreement, provided that such documents do not alter or diminish the rights of the Transmission Provider or Interconnected Transmission Owner under this Interconnection Service Agreement, except with respect to providing notice of Breach to a Project Finance Entity. Upon presentation of the Transmission Provider and/or the Interconnected Transmission Owner's invoice therefor, Interconnection Customer shall pay the Transmission Provider and/or the Interconnected Transmission Owner's reasonable documented cost of providing such documents and certificates. Any assignment described herein shall not relieve or discharge the Interconnection Customer from any of its obligations hereunder absent the written consent of the Interconnected Transmission Owner and Transmission Provider.

12.3 Successors and Assigns:

This Interconnection Service Agreement and all of its provisions are binding upon, and inure to the benefit of, the Interconnection Parties and their respective successors and permitted assigns.

13 Insurance

13.1 Required Coverages For Generation Resources Of More Than 20 Megawatts or Merchant Transmission Facilities:

Each Interconnected Entity shall maintain insurance as described in paragraphs (a) through (e) below. All insurance shall be procured from insurance companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities are located. Failure to maintain required insurance shall be a Breach of the Interconnection Service Agreement.

(a) Workers Compensation insurance with statutory limits, as required by the state and/or jurisdiction in which the work is to be performed, and employer's liability insurance with limits of not less than one million dollars ($1,000,000).

(b) Commercial General Liability Insurance and/or Excess Liability Insurance covering liability arising out of premises, operations, personal injury, advertising , products and completed operations coverage, independent contractors coverage, liability assumed under an insured contract, coverage for pollution to the extent normally available and punitive damages to the extent allowable under applicable law, with limits of not less than one million dollars ($1,000,000) per occurrence/one million dollars ($1,000,000) general aggregate/one million dollars ($1,000,000) products and completed operations aggregate.

(c) Business/Commercial Automobile Liability Insurance for coverage of owned and non-owned and hired vehicles, trailers or semi-trailers designed for travel on public roads, with a minimum, combined single limit of one million dollars ($1,000,000) each accident for bodily injury, including death, and property damage.

(d) Excess and/or Umbrella Liability Insurance with a limit of liability of not less than twenty million dollars ($20,000,000) per occurrence. These limits apply in excess of the employer's liability, commercial general liability and business/commercial automobile liability coverages described above. This requirement can be met alone or via a combination of primary, excess and/or umbrella insurance.

(e) Professional Liability Insurance providing errors, omissions and/or malpractice coverage in the amount of five million dollars ($5,000,000) per occurrence/aggregate. Coverage shall be provided for the Interconnected Entity's duties, responsibilities and performance outlined in this Appendix 2, the Interconnection Service Agreement, and if applicable, the Interconnection Construction Service Agreement.

An Interconnected Entity may meet the Professional Liability Insurance requirements by requiring third-party contractors, designers, or engineers, or other parties that are responsible for design work associated with the transmission facilities or Interconnection Facilities necessary for the interconnection to procure professional liability insurance in the amounts and upon the terms prescribed by this section 13.1(e), and providing evidence of such insurance to the other Interconnected Entity. Such insurance shall be procured from companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities are located. Nothing in this section relieves the Interconnected Entity from complying with the

insurance requirements. In the event that the policies of the designers, engineers, or other parties used to satisfy the Interconnected Entity's insurance obligations under this section become invalid for any reason, including but not limited to, (i) the policy(ies) lapsing or otherwise terminating or expiring; (ii) the coverage limits of such policy(ies) are decreased; or (iii) the policy(ies) do not comply with the terms and conditions of the Tariff; Interconnected Entity shall be required to procure insurance sufficient to meet the requirements of this section, such that there is no lapse in insurance coverage. Notwithstanding the foregoing, in the event an Interconnected Entity will not design or construct or cause to design or construct any new transmission facilities or Interconnection Facilities, Transmission Provider, in its discretion, may waive the requirement that an Interconnected Entity maintain the Professional Liability Insurance pursuant to this section.

13.1A. Required Coverages For Generation Resources Of 20 Megawatts Or Less:

Each Interconnected Entity shall maintain the types of insurance as described in section 13.1 paragraphs (a) through (e) in an amount sufficient to insure against all reasonably foreseeable direct liabilities given the size and nature of the generating equipment being interconnected, the interconnection itself, and the characteristics of the system to which the interconnection is made. Additional insurance may be required by the Interconnection Customer, as a function of owning and operating a Generating Facility. All insurance shall be procured from insurance companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities are located. Failure to maintain required insurance shall be a Breach of the Interconnection Service Agreement.

13.2 Additional Insureds:

The Commercial General Liability, Business/Commercial Automobile Liability and Excess and/or Umbrella Liability policies procured by each Interconnected Entity (the "Insuring Interconnected Entity") shall include each other Interconnection Party (the "Insured Interconnection Party"), and its respective officers, agents and employees as additional insureds, providing all standard coverages and covering liability of the Insured Interconnection Party arising out of bodily injury and/or property damage (including loss of use) in any way connected with the operations, performance, or lack of performance under this Interconnection Service Agreement.

13.3 Other Required Terms:

The above-mentioned insurance policies (except workers' compensation) shall provide the following:

(a) Each policy shall contain provisions that specify that it is primary and non contributory for any liability arising out of that party's negligence, and shall apply to such extent without consideration for other policies separately carried and shall state that each insured is provided coverage as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount for which the insurer would have been liable had only one insured been covered. Each Insuring Interconnected Entity shall be responsible for its respective deductibles or retentions.

(b) If any coverage is written on a Claims First Made Basis, continuous coverage shall be maintained or an extended discovery period will be exercised for a period of not less than two (2) years after termination of the Interconnection Service Agreement.

(c) Provide for a waiver of all rights of subrogation which the Insuring Interconnected Entity's insurance carrier might exercise against the Insured Interconnection Party.

13.3A No Limitation of Liability:

The requirements contained herein as to the types and limits of all insurance to be maintained by the Interconnected Entities are not intended to and shall not in any manner, limit or qualify the liabilities and obligations assumed by the Interconnection Parties under the Interconnection Service Agreement.

13.4 Self-Insurance:

Notwithstanding the foregoing, each Interconnected Entity may self-insure to meet the minimum insurance requirements of this Section 13 of this Appendix 2 to the extent it maintains a self-insurance program, provided that such Interconnected Entity's senior secured debt is rated at investment grade or better by Standard & Poor's and its self-insurance program meets the minimum insurance requirements of this Section 13. For any period of time that an Interconnected Entity's senior secured debt is unrated by Standard & Poor's or is rated at less than investment grade by Standard & Poor's, such Party shall comply with the insurance requirements applicable to it under this Section 13. In the event that an Interconnected Entity is permitted to self-insure pursuant to this section, it shall notify the other Interconnection Parties that it meets the requirements to self-insure and that its self-insurance program meets the minimum insurance requirements in a manner consistent with that specified in Section 13.5 of this Appendix 2.

13.5 Notices; Certificates of Insurance:

All policies of insurance shall provide for thirty days prior written notice of cancellation or material adverse change. If the policies of insurance do not or cannot be endorsed to provide thirty days prior notice of cancellation or material adverse change, each Interconnected Entity shall provide the other Interconnected Entities with thirty days prior written notice of cancellation or material adverse change to any of the insurance required in this agreement. Each Interconnected Entity shall provide the other with certificates of insurance prior to Initial Operation of the Customer Facility and thereafter at such time intervals as they shall mutually agree upon, provided that such interval shall not be less than one year. All certificates of insurance shall indicate that the certificate holder is included as an additional insured under the Commercial General Liability, Business/Commercial Automobile Liability and Excess and/or Umbrella Liability coverages, and that this insurance is primary with a waiver of subrogation included in favor of the other Interconnected Entities.

13.6 Subcontractor Insurance:

In accord with Good Utility Practice, each Interconnected Entity shall require each of its subcontractors to maintain and provide evidence of insurance coverage of types, and in amounts, commensurate with the risks associated with the services provided by the subcontractor. Bonding of contractors or subcontractors shall be at the hiring Interconnected Entity's discretion, but regardless of bonding, the hiring principal shall be responsible for the performance or non-performance of any contractor or subcontractor it hires.

13.7 Reporting Incidents

The Interconnection Parties shall report to each other in writing as soon as practical all accidents or occurrences resulting in injuries to any person, including death, and any property damage arising out of the Interconnection Service Agreement.

14 Indemnity

14.1 Indemnity:

Each Interconnection Party shall indemnify and hold harmless the other Interconnection Parties, and the other Interconnection Parties' officers, shareholders, stakeholders, members, managers, representatives, directors, agents and employees, and Affiliates, from and against any and all loss, liability, damage, cost or expense to third parties, including damage and liability for bodily injury to or death of persons, or damage to property or persons (including reasonable attorneys' fees and expenses, litigation costs, consultant fees, investigation fees, sums paid in settlements of claims, penalties or fines imposed under Applicable Laws and Regulations, and any such fees and expenses incurred in enforcing this indemnity or collecting any sums due hereunder) (collectively, "Loss") to the extent arising out of, in connection with, or resulting from (i) the indemnifying Interconnection Party's breach of any of the representations or warranties made in, or failure of the indemnifying Interconnection Party or any of its subcontractors to perform any of its obligations under, this Interconnection Service Agreement (including Appendix 2), or (ii) the negligence or willful misconduct of the indemnifying Interconnection Party or its contractors; provided, however, that no Interconnection Party shall have any indemnification obligations under this Section 14.1 in respect of any Loss to the extent the Loss results from the negligence or willful misconduct of the Interconnection Party seeking indemnity.

14.2 Indemnity Procedures:

Promptly after receipt by a Person entitled to indemnity ("Indemnified Person") of any claim or notice of the commencement of any action or administrative or legal proceeding or investigation as to which the indemnity provided for in Section 14.1 may apply, the Indemnified Person shall notify the indemnifying Interconnection Party of such fact. Any failure of or delay in such notification shall not affect an Interconnection Party's indemnification obligation unless such failure or delay is materially prejudicial to the indemnifying Interconnection Party. The Indemnified Person shall cooperate with the indemnifying Interconnection Party with respect to the matter for which indemnification is claimed. The indemnifying Interconnection Party shall have the right to assume the defense thereof with counsel designated by such indemnifying Interconnection Party and reasonably satisfactory to the Indemnified Person. If the defendants in

any such action include one or more Indemnified Persons and the indemnifying Interconnection Party and if the Indemnified Person reasonably concludes that there may be legal defenses available to it and/or other Indemnified Persons which are different from or additional to those available to the indemnifying Interconnection Party, the Indemnified Person shall have the right to select separate counsel to assert such legal defenses and to otherwise participate in the defense of such action on its own behalf. In such instances, the indemnifying Interconnection Party shall only be required to pay the fees and expenses of one additional attorney to represent an Indemnified Person or Indemnified Persons having such differing or additional legal defenses. The Indemnified Person shall be entitled, at its expense, to participate in any action, suit or proceeding, the defense of which has been assumed by the indemnifying Interconnection Party. Notwithstanding the foregoing, the indemnifying Interconnection Party (i) shall not be entitled to assume and control the defense of any such action, suit or proceedings if and to the extent that, in the opinion of the Indemnified Person and its counsel, such action, suit or proceeding involves the potential imposition of criminal liability on the Indemnified Person, or there exists a conflict or adversity of interest between the Indemnified Person and the indemnifying Interconnection Party, in such event the indemnifying Interconnection Party shall pay the reasonable expenses of the Indemnified Person, and (ii) shall not settle or consent to the entry of any judgment in any action, suit or proceeding without the consent of the Indemnified Person, which shall not be unreasonably withheld, conditioned or delayed.

14.3 Indemnified Person:

If an Indemnified Person is entitled to indemnification under this Section 14 as a result of a claim by a third party, and the indemnifying Interconnection Party fails, after notice and reasonable opportunity to proceed under Section 14.2 of this Appendix 2, to assume the defense of such claim, such Indemnified Person may at the expense of the indemnifying Interconnection Party contest, settle or consent to the entry of any judgment with respect to, or pay in full, such claim.

14.4 Amount Owing:

If an indemnifying Interconnection Party is obligated to indemnify and hold any Indemnified Person harmless under this Section 14, the amount owing to the Indemnified Person shall be the amount of such Indemnified Person's actual Loss, net of any insurance or other recovery.

14.5 Limitation on Damages:

Except as otherwise provided in this Section 14, the liability of an Interconnection Party under this Appendix 2 shall be limited to direct actual damages, and all other damages at law are waived. Under no circumstances shall any Interconnection Party or its Affiliates, directors, officers, employees and agents, or any of them, be liable to another Interconnection Party, whether in tort, contract or other basis in law or equity for any special, indirect punitive, exemplary or consequential damages, including lost profits. The limitations on damages specified in this Section 14.5 are without regard to the cause or causes related thereto, including the negligence of any Interconnection Party, whether such negligence be sole, joint or concurrent, or active or passive. This limitation on damages shall not affect any Interconnection Party's rights to obtain equitable

relief as otherwise provided in this Appendix 2. The provisions of this Section 14.5 shall survive the termination or expiration of the Interconnection Service Agreement.

14.6 Limitation of Liability in Event of Breach:

An Interconnection Party ("Breaching Party") shall have no liability hereunder to the other Interconnection Parties, and the other Interconnection Parties hereby release the Breaching Party, for all claims or damages that either of them incurs that are associated with any interruption in the availability of the Customer Facility, Interconnection Facilities, Transmission System or Interconnection Service or damages to an Interconnection Party's facilities, except to the extent such interruption or damage is caused by the Breaching Party's gross negligence or willful misconduct in the performance of its obligations under this Interconnection Service Agreement (including Appendix 2).

14.7 Limited Liability in Emergency Conditions:

Except as otherwise provided in the Tariff or the Operating Agreement, no Interconnection Party shall be liable to any other Interconnection Party for any action that it takes in responding to an Emergency Condition, so long as such action is made in good faith, is consistent with Good Utility Practice and is not contrary to the directives of the Transmission Provider or of the Interconnected Transmission Owner with respect to such Emergency Condition. Notwithstanding the above, Interconnection Customer shall be liable in the event that it fails to comply with any instructions of Transmission Provider or the Interconnected Transmission Owner related to an Emergency Condition.

15 Breach, Cure And Default

15.1 Breach:

A Breach of this Interconnection Service Agreement shall include:

(a) The failure to pay any amount when due;

(b) The failure to comply with any material term or condition of this Appendix 2 or of the other portions of the Interconnection Service Agreement, including but not limited to any material breach of a representation, warranty or covenant (other than in subsections (a) and (c)-(e) of this Section) made in this Appendix 2;

(c) Assignment of the Interconnection Service Agreement in a manner inconsistent with its terms;

(d) Failure of an Interconnection Party to provide access rights, or an Interconnection Party's attempt to revoke or terminate access rights, that are provided under this Appendix 2; or

(e) Failure of an Interconnection Party to provide information or data required to be provided under this Appendix 2 to another Interconnection Party for such other Interconnection Party to satisfy its obligations under this Appendix 2.

15.2 Continued Operation:

In the event of a Breach or Default by either Interconnected Entity, and subject to termination of the Interconnection Service Agreement under Section 16 of this Appendix 2, the Interconnected Entities shall continue to operate and maintain, as applicable, such DC power systems, protection and Metering Equipment, telemetering equipment, SCADA equipment, transformers, Secondary Systems, communications equipment, building facilities, software, documentation, structural components, and other facilities and appurtenances that are reasonably necessary for Transmission Provider and the Interconnected Transmission Owner to operate and maintain the Transmission System and the Transmission Owner Interconnection Facilities and for Interconnection Customer to operate and maintain the Customer Facility and the Customer Interconnection Facilities, in a safe and reliable manner.

15.3 Notice of Breach:

An Interconnection Party not in Breach shall give written notice of an event of Breach to the Breaching Party, to Transmission Provider and to other persons that the Breaching Party identifies in writing to the other Interconnection Party in advance. Such notice shall set forth, in reasonable detail, the nature of the Breach, and where known and applicable, the steps necessary to cure such Breach. In the event of a Breach by Interconnection Customer, Transmission Provider and the Interconnected Transmission Owner agree to provide notice of such Breach, at the same time and in the same manner as its notice to Interconnection Customer, to any Project Finance Entity provided that the Interconnection Customer has provided the notifying Interconnection Party with notice of an assignment to such Project Finance Entity(ies) and identifies such Project Finance Entity(ies) as contacts for notice purposes pursuant to Section 21 of this Appendix 2.

15.4 Cure and Default:

An Interconnection Party that commits a Breach and does not take steps to cure the Breach pursuant to this Section 15.4 is in Default of this Appendix 2 and of the Interconnection Service Agreement.

15.4.1 Cure of Breach:

Except for the event of Breach set forth in Section 15.1(a) above, the Breaching Interconnection Party (a) may cure the Breach within thirty days from the receipt of such notice; or (b) if the Breach cannot be cured within thirty (30) days, may commence in good faith all steps that are reasonable and appropriate to cure the Breach within such thirty day time period and thereafter diligently pursue such action to completion. In an event of Breach set forth in Section 15.1(a), the Breaching Interconnection Party may cure the Breach within five (5) days from the receipt of notice of the Breach.

15.5 Right to Compel Performance:

Notwithstanding the foregoing, upon the occurrence of an event of Default, a non-Defaulting Interconnection Party shall be entitled to (a) commence an action to require the Defaulting Interconnection Party to remedy such Default and specifically perform its duties and obligations hereunder in accordance with the terms and conditions hereof, (b) withhold payments, (c) suspend performance hereunder, and (d) exercise such other rights and remedies as it may have in equity or at law; provided, however, that the Transmission Provider shall not terminate the Interconnection Service Agreement due to the failure of Interconnection Customer to make a payment hereunder unless such failure could reasonably be expected to have a material adverse effect on the Interconnected Transmission Owner.

15.6 Remedies Cumulative:

Subject to Section 20.1, no remedy conferred by any provision of this Appendix 2 is intended to be exclusive of any other remedy and each and every remedy shall be cumulative and shall be in addition to every other remedy given hereunder or now or hereafter existing at law or in equity or by statute or otherwise. The election of any one or more remedies shall not constitute a waiver of the right to pursue other available remedies.

16 Termination

16.1 Termination:

This Interconnection Service Agreement and Interconnection Service under this Interconnection Service Agreement may be terminated by the following means:

16.1.1 By Mutual Consent:

Interconnection Service may be terminated as of the date on which the Interconnection Parties mutually agree to terminate the Interconnection Service Agreement.

16.1.2 By Interconnection Customer:

Interconnection Customer may unilaterally terminate the Interconnection Service Agreement pursuant to Applicable Laws and Regulations upon providing Transmission Provider and the Interconnected Transmission Owner sixty (60) days prior written notice thereof, provided that Interconnection Customer is not then in Default under the Interconnection Service Agreement.

16.1.3 Upon Default of Interconnection Customer:

Transmission Provider may terminate the Interconnection Service Agreement upon the Default of Interconnection Customer of its obligations under the Interconnection Service Agreement by providing Interconnection Customer and the Interconnected Transmission Owner prior written notice of termination; provided, however, that Transmission Provider shall not terminate the Interconnection Service Agreement due to the failure of Interconnection Customer to make a

payment hereunder unless such failure could reasonably be expected to have a material adverse effect on the Interconnected Transmission Owner.

16.2 Disposition of Facilities Upon Termination

16.2.1 Disconnection:

Upon termination of the Interconnection Service Agreement in accordance with this Section 16, Transmission Provider and/or the Interconnected Transmission Owner shall, in coordination with Interconnection Customer, physically disconnect the Customer Facility from the Transmission System, except to the extent otherwise allowed by this Appendix 2.

16.2.2 Network Facilities:

At the time of termination, the Transmission Provider and the Interconnected Entities shall keep in place any portion of the Interconnection Facilities that the Transmission Provider deems necessary for the safety, integrity and/or reliability of the Transmission System. Otherwise, Transmission Provider may, in its discretion, within 30 days following termination of Interconnection Service, require the removal of all or any part of the Interconnection Facilities.

16.2.2.1 In the event that (i) the Interconnection Service Agreement and Interconnection Service under this Appendix 2 are terminated and (ii) Transmission Provider determines that some or all of the Interconnection Facilities that are owned by the Interconnection Customer are necessary for the safety, integrity and/or reliability of the Transmission System, Interconnection Customer, subject to Applicable Laws and Regulations, shall transfer to the Interconnected Transmission Owner title to the Interconnection Facilities that Transmission Provider has determined to be necessary for the safety, integrity and/or reliability of the Transmission System.

16.2.2.2 In the event that removal of some or all of the Interconnection Facilities is necessary to maintain compliance with Applicable Standards, Interconnection Customer shall be responsible for the costs of any such removal. Interconnection Customer shall have the right to take or retain title to equipment and/or facilities that are removed pursuant to this section; alternatively, in the event that the Interconnection Customer does not wish to retain title to removed equipment and/or facilities that it owns, the Interconnected Transmission Owner may elect to pay the Interconnection Customer a mutually agreed amount to acquire and own such equipment and/or facilities.

16.2.3 Request for Disposition Determination:

Interconnection Customer may request a determination from the Transmission Provider whether any Interconnection Facilities will be removed in the event of any termination of Interconnection Service to the Customer Facility within the following year. Transmission Provider shall respond to that request no later than sixty (60) days after receipt.

16.3 FERC Approval:

Notwithstanding any other provision of this Appendix 2, no termination hereunder shall become effective until the Interconnected Entities and/or Transmission Provider have complied with all Applicable Laws and Regulations applicable to such termination, including the filing with the FERC of a notice of termination of the Interconnection Service Agreement, and acceptance of such notice for filing by the FERC.

16.4 Survival of Rights:

Termination of this Interconnection Service Agreement shall not relieve any Interconnection Party of any of its liabilities and obligations arising under this Interconnection Service Agreement (including Appendix 2) prior to the date on which termination becomes effective, and each Interconnection Party may take whatever judicial or administrative actions it deems desirable or necessary to enforce its rights hereunder. Applicable provisions of this Appendix 2 will continue in effect after termination to the extent necessary to provide for final billings, billing adjustments, and the determination and enforcement of liability and indemnification obligations arising from events or acts that occurred while the Interconnection Service Agreement was in effect.

17 Confidentiality:

Information is Confidential Information only if it is clearly designated or marked in writing as confidential on the face of the document, or, if the information is conveyed orally or by inspection, if the Interconnection Party providing the information orally informs the Interconnection Party receiving the information that the information is confidential. If requested by any Interconnection Party, the disclosing Interconnection Party shall provide in writing the basis for asserting that the information referred to in this section warrants confidential treatment, and the requesting Interconnection Party may disclose such writing to an appropriate Governmental Authority. Any Interconnection Party shall be responsible for the costs associated with affording confidential treatment to its information.

17.1 Term:

During the term of the Interconnection Service Agreement, and for a period of three (3) years after the expiration or termination of the Interconnection Service Agreement, except as otherwise provided in this Section 17, each Interconnection Party shall hold in confidence, and shall not disclose to any person, Confidential Information provided to it by any other Interconnection Party.

17.2 Scope:

Confidential Information shall not include information that the receiving Interconnection Party can demonstrate: (i) is generally available to the public other than as a result of a disclosure by the receiving Interconnection Party; (ii) was in the lawful possession of the receiving Interconnection Party on a non-confidential basis before receiving it from the disclosing Interconnection Party; (iii) was supplied to the receiving Interconnection Party without restriction by a third party, who, to the knowledge of the receiving Interconnection Party, after due inquiry, was under no obligation to the disclosing Interconnection Party to keep such information confidential; (iv) was

independently developed by the receiving Interconnection Party without reference to Confidential Information of the disclosing Interconnection Party; (v) is, or becomes, publicly known, through no wrongful act or omission of the receiving Interconnection Party or breach of this Appendix 2; or (vi) is required, in accordance with Section 17.7 of this Appendix 2, to be disclosed to any Governmental Authority or is otherwise required to be disclosed by law or subpoena, or is necessary in any legal proceeding establishing rights and obligations under the Interconnection Service Agreement. Information designated as Confidential Information shall no longer be deemed confidential if the Interconnection Party that designated the information as confidential notifies the other Interconnection Parties that it no longer is confidential.

17.3 Release of Confidential Information:

No Interconnection Party shall disclose Confidential Information to any other person, except to its Affiliates (limited by the Commission's Standards of Conduct requirements), subcontractors, employees, consultants or to parties who may be or considering providing financing to or equity participation in Interconnection Customer or to potential purchasers or assignees of Interconnection Customer, on a need-to-know basis in connection with the Interconnection Service Agreement, unless such person has first been advised of the confidentiality provisions of this Section 17 and has agreed to comply with such provisions. Notwithstanding the foregoing, an Interconnection Party providing Confidential Information to any person shall remain primarily responsible for any release of Confidential Information in contravention of this Section 17.

17.4 Rights:

Each Interconnection Party retains all rights, title, and interest in the Confidential Information that it discloses to any other Interconnection Party. An Interconnection Party's disclosure to another Interconnection Party of Confidential Information shall not be deemed a waiver by any Interconnection Party or any other person or entity of the right to protect the Confidential Information from public disclosure.

17.5 No Warranties:

By providing Confidential Information, no Interconnection Party makes any warranties or representations as to its accuracy or completeness. In addition, by supplying Confidential Information, no Interconnection Party obligates itself to provide any particular information or Confidential Information to any other Interconnection Party nor to enter into any further agreements or proceed with any other relationship or joint venture.

17.6 Standard of Care:

Each Interconnection Party shall use at least the same standard of care to protect Confidential Information it receives as the Interconnection Party uses to protect its own Confidential Information from unauthorized disclosure, publication or dissemination. Each Interconnection Party may use Confidential Information solely to fulfill its obligations to the other Interconnection Parties under the Interconnection Service Agreement or to comply with Applicable Laws and Regulations.

17.7 Order of Disclosure:

If a Governmental Authority with the right, power, and apparent authority to do so requests or requires an Interconnection Party, by subpoena, oral deposition, interrogatories, requests for production of documents, administrative order, or otherwise, to disclose Confidential Information, that Interconnection Party shall provide the Interconnection Party that provided the information with prompt prior notice of such request(s) or requirement(s) so that the providing Interconnection Party may seek an appropriate protective order or waive compliance with the terms of this Appendix 2 or the Interconnection Service Agreement. Notwithstanding the absence of a protective order or agreement, or waiver, the Interconnection Party that is subjected to the request or order may disclose such Confidential Information which, in the opinion of its counsel, the Interconnection Party is legally compelled to disclose. Each Interconnection Party shall use Reasonable Efforts to obtain reliable assurance that confidential treatment will be accorded any Confidential Information so furnished.

17.8 Termination of Interconnection Service Agreement:

Upon termination of the Interconnection Service Agreement for any reason, each Interconnection Party shall, within ten (10) calendar days of receipt of a written request from another party, use Reasonable Efforts to destroy, erase, or delete (with such destruction, erasure and deletion certified in writing to the requesting party) or to return to the other party, without retaining copies thereof, any and all written or electronic Confidential Information received from the requesting party.

17.9 Remedies:

The Interconnection Parties agree that monetary damages would be inadequate to compensate an Interconnection Party for another Interconnection Party's Breach of its obligations under this Section 17. Each Interconnection Party accordingly agrees that the other Interconnection Parties shall be entitled to equitable relief, by way of injunction or otherwise, if the first Interconnection Party breaches or threatens to breach its obligations under this Section 17, which equitable relief shall be granted without bond or proof of damages, and the receiving Interconnection Party shall not plead in defense that there would be an adequate remedy at law. Such remedy shall not be deemed to be an exclusive remedy for the breach of this Section 17, but shall be in addition to all other remedies available at law or in equity. The Interconnection Parties further acknowledge and agree that the covenants contained herein are necessary for the protection of legitimate business interests and are reasonable in scope. No Interconnection Party, however, shall be liable for indirect, incidental or consequential or punitive damages of any nature or kind resulting from or arising in connection with this Section 17.

17.10 Disclosure to FERC or its Staff:

Notwithstanding anything in this Section 17 to the contrary, and pursuant to 18 C.F.R. § 1b.20, if FERC or its staff, during the course of an investigation or otherwise, requests information from one of the Interconnection Parties that is otherwise required to be maintained in confidence pursuant to this Interconnection Service Agreement, the Interconnection Party, shall provide the

requested information to FERC or its staff, within the time provided for in the request for information. In providing the information to FERC or its staff, the Interconnection Party must, consistent with 18 C.F.R. § 388.122, request that the information be treated as confidential and non-public by FERC and its staff and that the information be withheld from public disclosure. Interconnection Parties are prohibited from notifying the other Interconnection Parties prior to the release of the Confidential Information to the Commission or its staff. An Interconnection Party shall notify the other Interconnection Parties to the Interconnection Service Agreement when it is notified by FERC or its staff that a request to release Confidential Information has been received by FERC, at which time any of the Interconnection Parties may respond before such information would be made public, pursuant to 18 C.F.R. § 388.112.

17.11

Subject to the exception in Section 17.10 of this Appendix 2, no Interconnection Party shall disclose Confidential Information of another Interconnection Party to any person not employed or retained by the Interconnection Party, except to the extent disclosure is (i) required by law; (ii) reasonably deemed by the disclosing Interconnection Party to be required in connection with a dispute between or among the Interconnection Parties, or the defense of litigation or dispute; (iii)_ otherwise permitted by consent of the Interconnection Party that provided such Confidential Information, such consent not to be unreasonably withheld; or (iv) necessary to fulfill its obligations under this Interconnection Service Agreement or as a transmission service provider or a Control Area operator including disclosing the Confidential Information to an RTO or ISO or to a regional or national reliability organization. Prior to any disclosures of another Interconnection Party's Confidential Information under this subparagraph, the disclosing Interconnection Party shall promptly notify the other Interconnection Parties in writing and shall assert confidentiality and cooperate with the other Interconnection Parties in seeking to protect the Confidential Information from public disclosure by confidentiality agreement, protective order or other reasonable measures.

17.12

This provision shall not apply to any information that was or is hereafter in the public domain (except as a result of a Breach of this provision).

17.13 Return or Destruction of Confidential Information:

If an Interconnection Party provides any Confidential Information to another Interconnection Party in the course of an audit or inspection, the providing Interconnection Party may request the other party to return or destroy such Confidential Information after the termination of the audit period and the resolution of all matters relating to that audit. Each Interconnection Party shall make Reasonable Efforts to comply with any such requests for return or destruction within ten days of receiving the request and shall certify in writing to the other Interconnection Party that it has complied with such request.

18 Subcontractors

18.1 Use of Subcontractors:

Nothing in this Appendix 2 shall prevent the Interconnection Parties from utilizing the services of subcontractors as they deem appropriate to perform their respective obligations hereunder, provided, however, that each Interconnection Party shall require its subcontractors to comply with all applicable terms and conditions of this Appendix 2 in providing such services.

18.2 Responsibility of Principal:

The creation of any subcontract relationship shall not relieve the hiring Interconnection Party of any of its obligations under this Appendix 2. Each Interconnection Party shall be fully responsible to the other Interconnection Parties for the acts and/or omissions of any subcontractor it hires as if no subcontract had been made.

18.3 Indemnification by Subcontractors:

To the fullest extent permitted by law, an Interconnection Party that uses a subcontractor to carry out any of the Interconnection Party's obligations under this Appendix 2 shall require each of its subcontractors to indemnify, hold harmless and defend each other Interconnection Party, its representatives and assigns from and against any and all claims and/or liability for damage to property, injury to or death of any person, including the employees of any Interconnection Party or of any Affiliate of any Interconnection Party, or any other liability incurred by the other Interconnection Party or any of its Affiliates, including all expenses, legal or otherwise, to the extent caused by any act or omission, negligent or otherwise, by such subcontractor and/or its officers, directors, employees, agents and assigns, that arises out of or is connected with the operation of the facilities of either Interconnected Entity described in this Appendix 2; provided, however, that no Interconnection Party or Affiliate thereof shall be entitled to indemnity under this Section 18.3 in respect of any injury, loss, or damage to the extent that such loss, injury, or damage results from the negligence or willful misconduct of the Interconnection Party or Affiliate seeking indemnity.

18.4 Subcontractors Not Beneficiaries:

No subcontractor is intended to be, or shall be deemed to be, a third-party beneficiary of an Interconnection Service Agreement.

19 Information Access And Audit Rights

19.1 Information Access:

Consistent with Applicable Laws and Regulations, each Interconnection Party shall make available such information and/or documents reasonably requested by another Interconnection Party that are necessary to (i) verify the costs incurred by the other Interconnection Party for which the requesting Interconnection Party is responsible under this Appendix 2 and (ii) carry out obligations and responsibilities under this Appendix 2, provided that the Interconnection Parties shall not use

such information for purposes other than those set forth in this Section 19.1 and to enforce their rights under this Appendix 2.

19.2 Reporting of Non-Force Majeure Events:

Each Interconnection Party shall notify the other Interconnection Parties when it becomes aware of its inability to comply with the provisions of this Appendix 2 for a reason other than an event of force majeure as defined in Section 9.4 of this Appendix 2. The parties agree to cooperate with each other and provide necessary information regarding such inability to comply, including, but not limited to, the date, duration, reason for the inability to comply, and corrective actions taken or planned to be taken with respect to such inability to comply. Notwithstanding the foregoing, notification, cooperation or information provided under this Section shall not entitle the receiving Interconnection Party to allege a cause of action for anticipatory breach of the Interconnection Service Agreement.

19.3 Audit Rights:

Subject to the requirements of confidentiality under Section 17 of this Appendix 2, each Interconnection Party shall have the right, during normal business hours, and upon prior reasonable notice to the pertinent other Interconnection Party, to audit at its own expense the other Interconnection Party's accounts and records pertaining to such Interconnection Party's performance and/or satisfaction of obligations arising under this Appendix 2. Any audit authorized by this Section shall be performed at the offices where such accounts and records are maintained and shall be limited to those portions of such accounts and records that relate to obligations under this Appendix 2. Any request for audit shall be presented to the Interconnection Party to be audited not later than twenty-four months after the event as to which the audit is sought. Each Interconnection Party shall preserve all records held by it for the duration of the audit period.

20 Disputes

20.1 Submission:

Any claim or dispute that any Interconnection Party may have against another arising out of the Interconnection Service Agreement may be submitted for resolution in accordance with the dispute resolution provisions of the Tariff.

20.2 Rights Under The Federal Power Act:

Nothing in this Section shall restrict the rights of any Interconnection Party to file a complaint with FERC under relevant provisions of the Federal Power Act.

20.3 Equitable Remedies:

Nothing in this Section shall prevent any Interconnection Party from pursuing or seeking any equitable remedy available to it under Applicable Laws and Regulations.

21 Notices

21.1 General:

Any notice, demand or request required or permitted to be given by any Interconnection Party to another and any instrument required or permitted to be tendered or delivered by any Interconnection Party in writing to another may be so given, tendered or delivered, by recognized national courier, or by depositing the same with the United States Postal Service with postage prepaid, for delivery by certified or registered mail, addressed to the Interconnection Party, or personally delivered to the Interconnection Party, at the address specified in the Interconnection Service Agreement. Such notices, if agreed to by the Interconnection Parties, may be made via electronic means, with e-mail confirmation of delivery.

21.2 Emergency Notices:

Moreover, notwithstanding the foregoing, any notice hereunder concerning an Emergency Condition or other occurrence requiring prompt attention, or as necessary during day-to-day operations, may be made by telephone or in person, provided that such notice is confirmed in writing promptly thereafter. Notice in an Emergency Condition, or as necessary during day-to-day operations, shall be provided (i) if by the Interconnected Transmission Owner, to the shift supervisor at, as applicable, a Generation Interconnection Customer's Customer Facility or a Transmission Interconnection Customer's control center; and (ii) if by the Interconnection Customer, to the shift supervisor at the Interconnected Transmission Owner's transmission control center.

21.3 Operational Contacts:

Each Interconnection Party shall designate, and provide to each other Interconnection Party contact information concerning, a representative to be responsible for addressing and resolving operational issues as they arise during the term of the Interconnection Service Agreement.

22 Miscellaneous

22.1 Regulatory Filing:

In the event that this Interconnection Service Agreement contains any terms that deviate materially from the form included in Attachment O of the Tariff, Transmission Provider shall file the Interconnection Service Agreement on behalf of itself and the Interconnected Transmission Owner with FERC as a service schedule under the Tariff within thirty days after execution. Interconnection Customer may request that any information so provided be subject to the confidentiality provisions of Section 17 of this Appendix 2. An Interconnection Customer shall have the right, with respect to any Interconnection Service Agreement tendered to it, to request (a) dispute resolution under Section 12 of the Tariff or, if concerning the Regional Transmission Expansion Plan, consistent with Schedule 5 of the Operating Agreement, or (b) that Transmission Provider file the agreement unexecuted with the Commission. With the filing of any unexecuted Interconnection Service Agreement, Transmission Provider may, in its discretion, propose to

FERC a resolution of any or all of the issues in dispute between or among the Interconnection Parties.

22.2 Waiver:

Any waiver at any time by an Interconnection Party of its rights with respect to a Breach or Default under this Interconnection Service Agreement or with respect to any other matters arising in connection with this Appendix 2, shall not be deemed a waiver or continuing waiver with respect to any subsequent Breach or Default or other matter.

22.3 Amendments and Rights Under the Federal Power Act:

This Interconnection Service Agreement may be amended or supplemented only by a written instrument duly executed by all Interconnection Parties. An amendment to the Interconnection Service Agreement shall become effective and a part of this Interconnection Service Agreement upon satisfaction of all Applicable Laws and Regulations. Notwithstanding the foregoing, nothing contained in this Interconnection Service Agreement shall be construed as affecting in any way any of the rights of any Interconnection Party with respect to changes in applicable rates or charges under Section 205 of the Federal Power Act and/or FERC's rules and regulations thereunder, or any of the rights of any Interconnection Party under Section 206 of the Federal Power Act and/or FERC's rules and regulations thereunder. The terms and conditions of this Interconnection Service Agreement and every appendix referred to therein shall be amended, as mutually agreed by the Interconnection Parties, to comply with changes or alterations made necessary by a valid applicable order of any Governmental Authority having jurisdiction hereof.

22.4 Binding Effect:

This Interconnection Service Agreement, including this Appendix 2, and the rights and obligations thereunder shall be binding upon, and shall inure to the benefit of, the successors and assigns of the Interconnection Parties.

22.5 Regulatory Requirements:

Each Interconnection Party's performance of any obligation under this Interconnection Service Agreement for which such party requires approval or authorization of any Governmental Authority shall be subject to its receipt of such required approval or authorization in the form and substance satisfactory to the receiving Interconnection Party, or the Interconnection Party making any required filings with, or providing notice to, such Governmental Authorities, and the expiration of any time period associated therewith. Each Interconnection Party shall in good faith seek, and shall use Reasonable Efforts to obtain, such required authorizations or approvals as soon as reasonably practicable.

23 Representations And Warranties

23.1 General:

Each Interconnected Entity hereby represents, warrants and covenants as follows with these representations, warranties, and covenants effective as to the Interconnected Entity during the time the Interconnection Service Agreement is effective:

23.1.1 Good Standing:

Such Interconnected Entity is duly organized or formed, as applicable, validly existing and in good standing under the laws of its State of organization or formation, and is in good standing under the laws of the respective State(s) in which it is incorporated and operates as stated in the Interconnection Service Agreement.

23.1.2 Authority:

Such Interconnected Entity has the right, power and authority to enter into the Interconnection Service Agreement, to become a party hereto and to perform its obligations hereunder. The Interconnection Service Agreement is a legal, valid and binding obligation of such Interconnected Entity, enforceable against such Interconnected Entity in accordance with its terms, except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforceability is sought in a proceeding in equity or at law).

23.1.3 No Conflict:

The execution, delivery and performance of the Interconnection Service Agreement does not violate or conflict with the organizational or formation documents, or bylaws or operating agreement, of the Interconnected Entity, or with any judgment, license, permit, order, material agreement or instrument applicable to or binding upon the Interconnected Entity or any of its assets.

23.1.4 Consent and Approval:

Such Interconnected Entity has sought or obtained, or, in accordance with the Interconnection Service Agreement will seek or obtain, each consent, approval, authorization, order, or acceptance by any Governmental Authority in connection with the execution, delivery and performance of the Interconnection Service Agreement and it will provide to any Governmental Authority notice of any actions under this Appendix 2 that are required by Applicable Laws and Regulations.

24 Tax Liability

24.1 Safe Harbor Provisions:

This Section 24.1 is applicable only to Generation Interconnection Customers. Provided that Interconnection Customer agrees to conform to all requirements of the Internal Revenue Service ("IRS") (e.g., the "safe harbor" provisions of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016)) that would confer nontaxable status on some or all of the transfer of property, including money, by Interconnection Customer to the Interconnected Transmission Owner for payment of the Costs

of construction of the Transmission Owner Interconnection Facilities, the Interconnected Transmission Owner, based on such agreement and on current law, shall treat such transfer of property to it as nontaxable income and, except as provided in Section 24.4.2 below, shall not include income taxes in the Costs of Transmission Owner Interconnection Facilities that are payable by Interconnection Customer under the Interconnection Service Agreement or the Interconnection Construction Service Agreement. Interconnection Customer shall document its agreement to conform to IRS requirements for such non-taxable status in the Interconnection Service Agreement, the Interconnection Construction Service Agreement, and/or the Interim Interconnection Service Agreement.

24.2 Tax Indemnity:

Interconnection Customer shall indemnify the Interconnected Transmission Owner for any costs that Interconnected Transmission Owner incurs in the event that the IRS and/or a state department of revenue (State) determines that the property, including money, transferred by Interconnection Customer to the Interconnected Transmission Owner with respect to the construction of the Transmission Owner Interconnection Facilities is taxable income to the Interconnected Transmission Owner. Interconnection Customer shall pay to the Interconnected Transmission Owner, on demand, the amount of any income taxes that the IRS or a State assesses to the Interconnected Transmission Owner in connection with such transfer of property and/or money, plus any applicable interest and/or penalty charged to the Interconnected Transmission Owner. In the event that the Interconnected Transmission Owner chooses to contest such assessment, either at the request of Interconnection Customer or on its own behalf, and prevails in reducing or eliminating the tax, interest and/or penalty assessed against it, the Interconnected Transmission Owner shall refund to Interconnection Customer the excess of its demand payment made to the Interconnected Transmission Owner over the amount of the tax, interest and penalty for which the Interconnected Transmission Owner is finally determined to be liable. Interconnection Customer's tax indemnification obligation under this section shall survive any termination of the Interconnection Service Agreement or Interconnection Construction Service Agreement.

24.3 Taxes Other Than Income Taxes:

Upon the timely request by Interconnection Customer, and at Interconnection Customer's sole expense, the Interconnected Transmission Owner shall appeal, protest, seek abatement of, or otherwise contest any tax (other than federal or state income tax) asserted or assessed against the Interconnected Transmission Owner for which Interconnection Customer may be required to reimburse Transmission Provider under the terms of this Appendix 2 or Part VI of the Tariff. Interconnection Customer shall pay to the Interconnected Transmission Owner on a periodic basis, as invoiced by the Interconnected Transmission Owner, the Interconnected Transmission Owner's documented reasonable costs of prosecuting such appeal, protest, abatement, or other contest. Interconnection Customer and the Interconnected Transmission Owner shall cooperate in good faith with respect to any such contest. Unless the payment of such taxes is a prerequisite to an appeal or abatement or cannot be deferred, no amount shall be payable by Interconnection Customer to the Interconnected Transmission Owner for such contested taxes until they are assessed by a final, non-appealable order by any court or agency of competent jurisdiction. In the event that a tax payment is withheld and ultimately due and payable after appeal, Interconnection

Customer will be responsible for all taxes, interest and penalties, other than penalties attributable to any delay caused by the Interconnected Transmission Owner.

24.4 Income Tax Gross-Up

24.4.1 Additional Security:

In the event that Interconnection Customer does not provide the safe harbor documentation required under Section 24.1 prior to execution of the Interconnection Service Agreement, within 15 days after such execution, Transmission Provider shall notify Interconnection Customer in writing of the amount of additional Security that Interconnection Customer must provide. The amount of Security that a Transmission Interconnection Customer must provide initially pursuant to this Interconnection Service Agreement shall include any amounts described as additional Security under this Section 24.4 regarding income tax gross-up.

24.4.2 Amount:

The required additional Security shall be in an amount equal to the amount necessary to gross up fully for currently applicable federal and state income taxes the estimated Costs of Local Upgrades and Network Upgrades for which Interconnection Customer previously provided Security. Accordingly, the additional Security shall equal the amount necessary to increase the total Security provided to the amount that would be sufficient to permit the Interconnected Transmission Owner to receive and retain, after the payment of all applicable income taxes ("Current Taxes") and taking into account the present value of future tax deductions for depreciation that would be available as a result of the anticipated payments or property transfers (the "Present Value Depreciation Amount"), an amount equal to the estimated Costs of Local Upgrades and Network Upgrades for which Interconnection Customer is responsible under the Interconnection Service Agreement. For this purpose, Current Taxes shall be computed based on the composite federal and state income tax rates applicable to the Interconnected Transmission Owner at the time the additional Security is received, determined using the highest marginal rates in effect at that time (the "Current Tax Rate"), and (ii) the Present Value Depreciation Amount shall be computed by discounting the Interconnected Transmission Owner's anticipated tax depreciation deductions associated with such payments or property transfers by its current weighted average cost of capital.

24.4.3 Time for Payment:

Interconnection Customer must provide the additional Security, in a form and with terms as required by Sections 212.4 of the Tariff, within 15 days after its receipt of Transmission Provider's notice under this section. The requirement for additional Security under this section shall be treated as a milestone included in the Interconnection Service Agreement pursuant to Section 217.5 of the Tariff.

24.5 Tax Status:

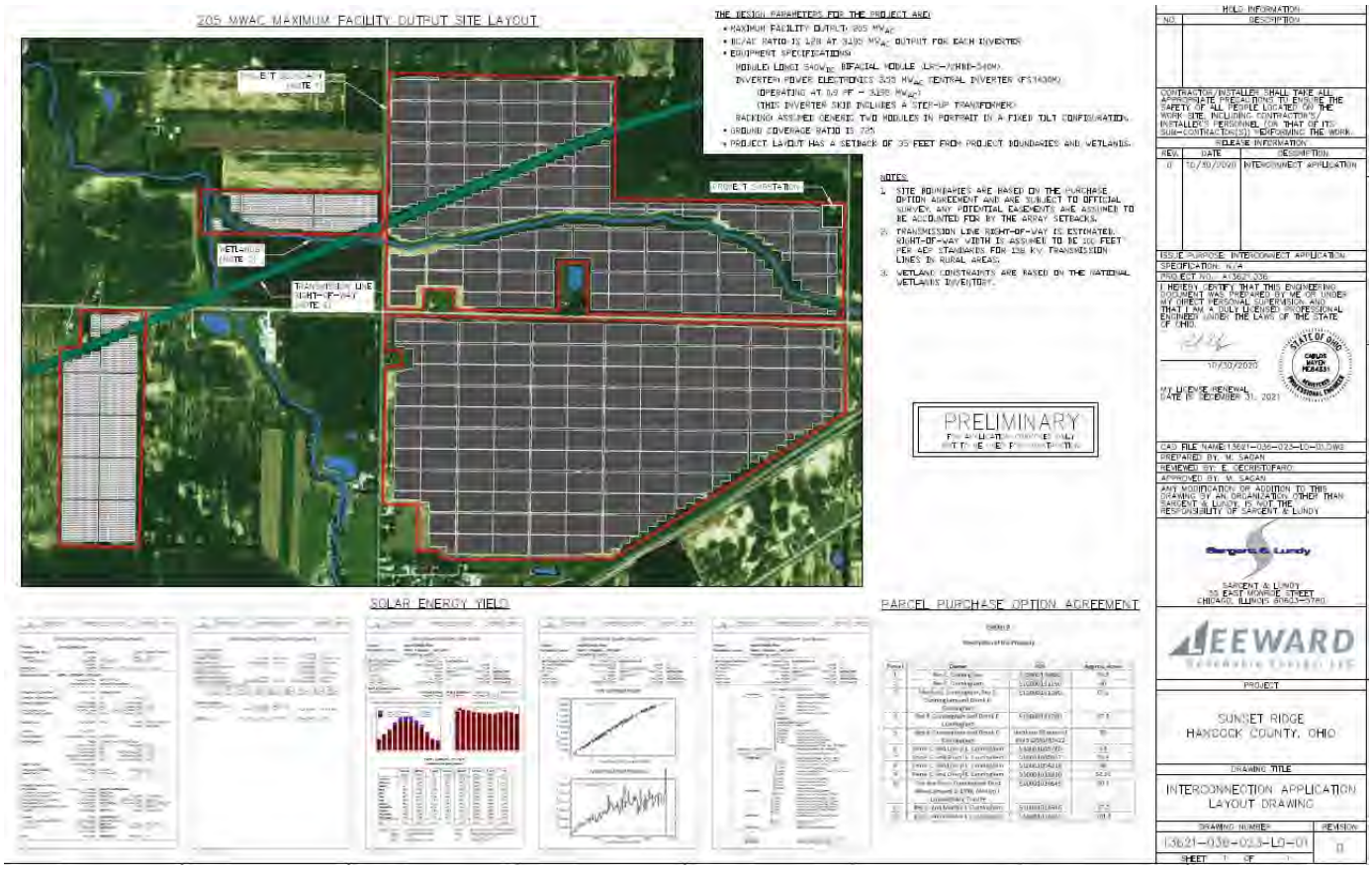
Each Party shall cooperate with the other to maintain the other Party's tax status. Nothing in this Interconnection Service Agreement or Part VI of the Tariff is intended to adversely affect any

Interconnected Transmission Owner's tax exempt status with respect to the issuance of bonds including, but not limited to, local furnishing bonds.

SCHEDULE A

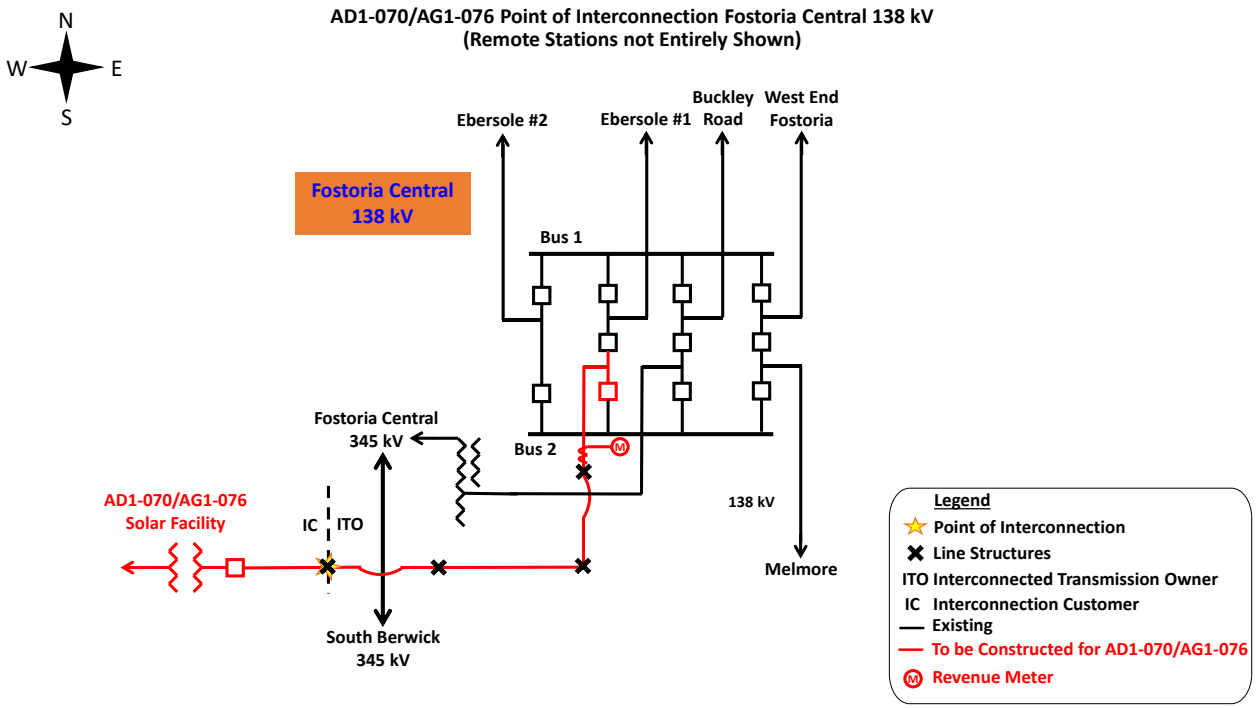
CUSTOMER FACILITY LOCATION/SITE PLAN

Hancock County, Ohio
GPS Coordinates: 41.115671, -83.507212



SCHEDULE B

SINGLE-LINE DIAGRAM



The Point of Interconnection ('POI') is at the fourth structure southwest of the Fostoria Central 138 kV station. Interconnected Transmission Owner (ITO) owns the first four spans from the Fostoria Central 138 kV station to the fourth structure, including the jumpers and fourth structure. The first structure will be located inside the station fence while the remaining three structures will be located on ITO property outside the station fence. The Interconnection Customer owns the 138 kV generator lead line, including remaining structures, from the POI to the AD1-070/AG1-076 generation collector station.

SCHEDULE C

LIST OF METERING EQUIPMENT

AEP will install and own primary and backup revenue metering at the Interconnection Customer's termination in the transmission switching substation as shown in Schedule B. AEP will submit all real and reactive power generation data to PJM as per PJM Manual 14 D.

The Interconnection Customer is responsible for installing equipment assuring that the following real time data is transmitted to PJM as per PJM Manual 14D:

a. Instantaneous net MW for the plant.
b. Instantaneous net MVAR for the plant.

The Interconnection Customer is responsible for installing equipment assuring the following non real-time data is transmitted to PJM as per PJM Manual 14D:

a. Hourly compensated MWh delivered by the plant.
b. Hourly compensated MWh received by the plant.
c. Hourly compensated MVARh delivered by the plant.
d. Hourly compensated MVARh received by the plant.

The Interconnection Customer will be required to install telemetry and communication equipment to provide real-time telemetry data to PJM as well as having the ability to receive and respond to PJM operational command and control signals. The requirements for this equipment are listed in Sections 8.1 through 8.5 of Appendix 2 of this ISA, as well as PJM Manuals 01 and 14D.

SCHEDULE D

APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

Applicable Technical Requirements and Standards are set forth in the following documents that are posted on the PJM website:

- Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System, Revision 3 dated June 30, 2021;
- Standards and Expectations for Siting, Real Estate, Right-of-Way, and Environmental Permitting for Transmission Interconnection Projects, Version 2 dated August 20, 2020; and
- Independent Power Producer (IPP) Option to Build Guidelines, Revision 3 dated October 28, 2021.

To the extent that these Applicable Technical Requirements and Standards conflict with the terms and conditions of the Tariff or any other provision of this ISA, the Tariff and/or this ISA shall control.

SCHEDULE E

SCHEDULE OF CHARGES

None

SCHEDULE F

SCHEDULE OF NON-STANDARD TERMS & CONDITIONS

None

SCHEDULE G

INTERCONNECTION CUSTOMER'S AGREEMENT TO CONFORM WITH IRS SAFE HARBOR PROVISIONS FOR NON-TAXABLE STATUS

As provided in Section 24.1 of Appendix 2 to this ISA and subject to the requirements thereof, Interconnection Customer represents that it meets all qualifications and requirements as set forth in Section 118(a) and 118(b) of the Internal Revenue Code of 1986, as amended and interpreted by Notice 2016-36, 2016-25 I.R.B. (6/20/2016) (the "IRS Notice"). Interconnection Customer agrees to conform with all requirements of the safe harbor provisions specified in the IRS Notice, as they may be amended, as required to confer non-taxable status on some or all of the transfer of property, including money, by Interconnection Customer to Interconnected Transmission Owner with respect to the payment of the Costs of construction and installation of the Transmission Owner Interconnection Facilities specified in this ISA.

Nothing in Interconnection Customer's agreement pursuant to this Schedule G shall change Interconnection Customer's indemnification obligations under Section 24.2 of Appendix 2 to this ISA.

SCHEDULE H

INTERCONNECTION REQUIREMENTS FOR ALL WIND, SOLAR AND NON-SYNCHRONOUS GENERATION FACILITIES

A. Voltage Ride Through Requirements

The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size,
subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

B. Frequency Ride Through Requirements

The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

C. Supervisory Control and Data Acquisition (SCADA) Capability

The wind, solar or non-synchronous generation facility shall provide SCADA capability to transmit data and receive instructions from the Transmission Provider to protect system reliability. The Transmission Provider and the wind, solar or non-synchronous generation facility Interconnection Customer shall determine what SCADA information is essential for the proposed wind, solar or non-synchronous generation facility, taking into account the size of the facility and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area.

D. Meteorological Data Reporting Requirement (Applicable to wind generation facilities only)

The wind generation facility shall, at a minimum, be required to provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Wind speed (meters/second)
- Wind direction (degrees from True North)
- Atmosphere pressure (hectopascals)
- Forced outage data (wind turbine and MW unavailability)

E. Meteorological Data Reporting Requirement (Applicable to solar generation facilities only)

The solar generation facility shall, at a minimum, be required to provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Irradiance
- Forced outage data

The Transmission Provider and Interconnection Customer may mutually agree to any additional meteorological data that are required for the development and deployment of a power production forecast. All requirements for meteorological and forced outage data must be commensurate with the power production forecasting employed by the Transmission Provider. Such additional mutually agreed upon requirements for meteorological and forced outage data are set forth below:
NOT APPLICABLE FOR THIS ISA

SCHEDULE I

INTERCONNECTION SPECIFICATIONS FOR AN ENERGY STORAGE RESOURCE

Not Required

SCHEDULE J

SCHEDULE OF TERMS AND CONDITIONS FOR SURPLUS INTERCONNECTION SERVICE

Not Required

SCHEDULE K

REQUIREMENTS FOR INTERCONNECTION SERVICE BELOW FULL ELECTRICAL GENERATING CAPABILITY

None

IN WITNESS WHEREOF, Transmission Provider, Interconnection Customer and Interconnected Transmission Owner have caused this ISA to be executed by their respective authorized officials.

(PJM Queue Position #AD1-070/AG1-076)

Transmission Provider: **PJM Interconnection, L.L.C.**

By: Jason Shoemaker | Manager, Interconnection Projects | 3/18/2022

Name | Title | Date

Printed name of signer: Jason Shoemaker

Interconnection Customer: **South Branch Solar, LLC**

By: Jason Allen | Chief Executive Officer | 3/8/2022

Name | Title | Date

Printed name of signer: Jason Allen

Interconnected Transmission Owner: **AEP Ohio Transmission Company, Inc.**

By: Robert W. Bradish | Vice President | 3/17/2022

Name | Title | Date

Printed name of signer: Robert W. Bradish

Original Service Agreement No. 6400
Effective Date: March 18, 2022

(PJM Queue #AD1-070/AG1-076)

INTERCONNECTION CONSTRUCTION SERVICE AGREEMENT
Among
PJM INTERCONNECTION, L.L.C.
And
SOUTH BRANCH SOLAR, LLC
And
AEP OHIO TRANSMISSION COMPANY, INC.

Original Service Agreement No. 6400

INTERCONNECTION CONSTRUCTION SERVICE AGREEMENT
By and Among
PJM Interconnection, L.L.C.
And
South Branch Solar, LLC
And
AEP Ohio Transmission Company, Inc.

(PJM Queue Position #AD1-070/AG1-076)

1.0 Parties. This Interconnection Construction Service Agreement ("CSA") including the Schedules and Appendices attached hereto and incorporated herein, is entered into by and between PJM Interconnection, L.L.C. ("Transmission Provider" or "PJM") and the following Interconnection Customer and Interconnected Transmission Owner:

Interconnection Customer:

South Branch Solar, LLC

Interconnected Transmission Owner:

AEP Ohio Transmission Company, Inc. ("Interconnected Transmission Owner" or "AEP").

All capitalized terms herein shall have the meanings set forth in the appended definitions of such terms as stated in Part I of the Tariff.

2.0 Authority. This CSA is entered into pursuant to Part VI of the Tariff. The standard terms and conditions for construction are attached at Appendix 2 to this CSA and are hereby specifically incorporated as provisions of this agreement. Transmission Provider, the Interconnection Customer and the Interconnected Transmission Owner agree to and assume all of their respective rights and obligations as set forth in the standard terms and conditions for construction in Appendix 2 to this CSA. Further, Interconnection Customer and the Interconnected Transmission Owner each agrees to and assumes all of the rights and obligations of a Constructing Entity with respect to the facilities that each of them is responsible for constructing, as set forth in this CSA.

3.0 Customer Facility. This CSA specifically relates to the following Customer Facility at the following location:

a. Name of Customer Facility:

South Branch Solar

b. Location of Customer Facility:

Hancock County, Ohio
GPS Coordinates: 41.115671, -83.507212

4.0 Effective Date and Term.

4.1 Effective Date. This CSA shall become effective on the later of (i) the date the agreement has been executed by all Construction Parties, or (ii) the date of Interconnection Customer's delivery of Security to the Transmission Provider, provided, however, that if the CSA is filed with the FERC unexecuted, the Effective Date shall be the date specified by the FERC. The Interconnected Transmission Owner shall have no obligation to begin construction of the Transmission Owner Interconnection Facilities prior to the Effective Date. Construction shall commence as provided in the Schedule of Work set forth in Schedule J to this CSA.

4.2 Term. This CSA shall continue in full force and effect from the Effective Date until the termination thereof pursuant to Section 14 of Appendix 2 to this CSA.

4.3 Survival. This CSA shall continue in effect after termination to the extent necessary to provide for final billings and payments, including billings and payments pursuant to Section 9 and/or Section 14 of Appendix 2 to this CSA, and to permit the determination and enforcement of liability and indemnification obligations arising from acts or events that occurred while the CSA was in effect.

5.0 Construction Responsibility for

a. Customer Interconnection Facilities. Interconnection Customer is responsible for designing and constructing the Customer Interconnection Facilities described on the attached Schedule G to this CSA.

b. Construction of Transmission Owner Interconnection Facilities.

1. The Transmission Owner Interconnection Facilities regarding which Interconnected Transmission Owner shall be the Constructing Entity are described on the attached Schedule C to this CSA.

2. Election of Construction Option. Specify below whether the Constructing Entities have mutually agreed to construction of the Transmission Owner Interconnection Facilities that will be built by the Interconnected Transmission Owner pursuant to the Standard Option or the Negotiated Contract Option. (See Section 3.2 of the Appendix 2 to this CSA.)

__X__Standard Option.

_____Negotiated Contract Option.

If the parties have mutually agreed to use the Negotiated Contract Option, the permitted, negotiated terms on which they have agreed and which are not already set forth as part of the Scope of Work and/or Schedule of Work attached to this CSA as Schedules I and J, respectively, shall be as set forth in Schedule H attached to this CSA.

3. Exercise of Option to Build. Has Interconnection Customer timely exercised the Option to Build in accordance with Section 3.2.3 of Appendix 2 to this CSA with respect to some or all of the Transmission Owner Interconnection Facilities?

_____ Yes

__X___ No

If Yes is indicated, Interconnection Customer shall build, in accordance with and subject to the conditions and limitations set forth in Section 3.2.3 of Appendix 2 to this CSA, those portions of the Transmission Owner Interconnection Facilities described on Schedule D attached to this CSA.

6.0 [Reserved].

7.0 Scope of Work. The Scope of Work for all construction pursuant to this CSA shall be as set forth in the attached Schedule I, provided, however, that the scope of work is subject to change in accordance with Transmission Provider's scope change process for interconnection projects as set forth in the PJM Manuals.

8.0 Schedule of Work. The Schedule of Work for all construction pursuant to this CSA shall be as set forth in the attached Schedule J, provided, however, that such schedule is subject to change in accordance with Section 3.3 of Appendix 2 to this CSA.

9.0 [Reserved.]

10.0 Notices. Any notice or request made to or by any party regarding this CSA shall be made in accordance with the standard terms and conditions for construction set forth in Appendix 2 to this CSA to the representatives of the other parties, as indicated below:

Transmission Provider:

PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403

Interconnection Customer:

South Branch Solar, LLC
6688 N. Expressway, Suite 500
Dallas, TX 75206
ian.sharpe@leewardengery.com
legal@leewardengery.com

Interconnected Transmission Owner:

Robert Pennybaker, Director – System Interconnections
American Electric Power Service Corporation
212 E 6th St. – 4th Floor
Tulsa, OK 74119
rlpennybaker@aep.com

Cc: John W. Seidensticker, Senior Counsel
American Electric Power Service Corporation
1 Riverside Plaza – 29th Floor
Columbus, OH 43215
jwseidensticker@aep.com

11.0 Waiver. No waiver by any party of one or more defaults by another in performance of any of the provisions of this CSA shall operate or be construed as a waiver of any other or further default or defaults, whether of a like or different character.

12.0 Amendment. This CSA or any part thereof, may not be amended, modified, assigned, or waived other than by a writing signed by all parties.

13.0 Incorporation of Other Documents. All portions of the Tariff and the Operating Agreement pertinent to the subject of this CSA and not otherwise made a part hereof are hereby incorporated herein and made a part hereof.

14.0 Addendum of Interconnection Customer's Agreement to Conform with IRS Safe Harbor Provisions for Non-Taxable Status. To the extent required, in accordance with Section 2.4.1 of Appendix 2 to this CSA, Schedule L to this CSA shall set forth the Interconnection Customer's agreement to conform with the IRS safe harbor provisions for non-taxable status.

15.0 Addendum of Non-Standard Terms and Conditions for Construction Service. Subject to FERC approval, the parties agree that the terms and conditions set forth in the attached Schedule M are hereby incorporated by reference, and made a part of, this CSA. In the event of any conflict between a provision of Schedule M that FERC has accepted and any provision of the standard terms and conditions set forth in Appendix 2 to this CSA that relates to the same subject matter, the pertinent provision of Schedule M shall control.

16.0 Addendum of Interconnection Requirements for all Wind or Non-synchronous Generation Facilities. To the extent required, Schedule N to this CSA sets forth interconnection

requirements for all wind and non-synchronous generation facilities and is hereby incorporated by reference and made a part of this CSA.

17.0 Infrastructure security of electric system equipment and operations and control hardware and software is essential to ensure day-to-day reliability and operational security. All Transmission Providers, Interconnected Transmission Owners, market participants, and Interconnection Customers interconnected with electric systems are to comply with the recommendations offered by the President's Critical Infrastructure Protection Board and best practice recommendations from the electric reliability authority. All public utilities are expected to meet basic standards for electric system infrastructure and operational security, including physical, operational, and cyber-security practices.

IN WITNESS WHEREOF, the parties have caused this Interconnection Construction Service Agreement to be executed by their respective authorized officials.

(PJM Queue Position #AD1-070/AG1-076)

Transmission Provider: **PJM Interconnection, L.L.C.:**

By: /s/ *Jason Shoemaker* Manager, Interconnection Projects 3/18/2022
Name Title Date

Printed name of signer: Jason Shoemaker

Interconnection Customer: **South Branch Solar, LLC**

By: /s/ *Jason Allen* Chief Executive Officer 2/17/2022
Name Title Date

Printed name of signer: Jason Allen

Interconnected Transmission Owner: **AEP Ohio Transmission Company, Inc.**

By: /s/ *Robert W. Bradish* Vice President 3/17/2022
Name Title Date

Printed name of signer: Robert W. Bradish

APPENDICES:

- **APPENDIX 1 - DEFINITIONS**
- **APPENDIX 2 - STANDARD CONSTRUCTION TERMS AND CONDITIONS**

SCHEDULES:

- **SCHEDULE A - SITE PLAN**
- **SCHEDULE B - SINGLE-LINE DIAGRAM OF INTERCONNECTION FACILITIES**
- **SCHEDULE C - TRANSMISSION OWNER INTERCONNECTION FACILITIES TO BE BUILT BY INTERCONNECTED TRANSMISSION OWNER**
- **SCHEDULE D - TRANSMISSION OWNER INTERCONNECTION FACILITIES TO BE BUILT BY INTERCONNECTION CUSTOMER PURSUANT TO OPTION TO BUILD**
- **SCHEDULE E – [Reserved]**
- **SCHEDULE F – [Reserved]**
- **SCHEDULE G - CUSTOMER INTERCONNECTION FACILITIES**
- **SCHEDULE H - NEGOTIATED CONTRACT OPTION TERMS**
- **SCHEDULE I - SCOPE OF WORK**
- **SCHEDULE J - SCHEDULE OF WORK**
- **SCHEDULE K - APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS**
- **SCHEDULE L - INTERCONNECTION CUSTOMER'S AGREEMENT TO CONFORM WITH IRS SAFE HARBOR PROVISIONS FOR NON-TAXABLE STATUS**
- **SCHEDULE M - SCHEDULE OF NON-STANDARD TERMS AND CONDITIONS**
- **SCHEDULE N - INTERCONNECTION REQUIREMENTS FOR A WIND GENERATION FACILITY**

APPENDIX 1

DEFINITIONS

From the PJM Tariff accepted for filing by the Commission as of the effective date of this agreement

Unless the context otherwise specifies or requires, capitalized terms used in this Agreement shall have the respective meanings set forth below. Unless otherwise specified, all references herein to sections, Schedules or Appendices are to sections, Schedules or Appendices of this Agreement.

Abnormal Condition:

"Abnormal Condition" shall mean any condition on the Interconnection Facilities which, determined in accordance with Good Utility Practice, is: (i) outside normal operating parameters such that facilities are operating outside their normal ratings or that reasonable operating limits have been exceeded; and (ii) could reasonably be expected to materially and adversely affect the safe and reliable operation of the Interconnection Facilities; but which, in any case, could reasonably be expected to result in an Emergency Condition. Any condition or situation that results from lack of sufficient generating capacity to meet load requirements or that results solely from economic conditions shall not, standing alone, constitute an Abnormal Condition.

Affected System:

"Affected System" shall mean an electric system other than the Transmission Provider's Transmission System that may be affected by a proposed interconnection or on which a proposed interconnection or addition of facilities or upgrades may require modifications or upgrades to the Transmission System.

Affiliate:

"Affiliate" shall mean any two or more entities, one of which Controls the other or that are under common Control. "Control," as that term is used in this definition, shall mean the possession, directly or indirectly, of the power to direct the management or policies of an entity. Ownership of publicly-traded equity securities of another entity shall not result in Control or affiliation for purposes of the Tariff or Operating Agreement if the securities are held as an investment, the holder owns (in its name or via intermediaries) less than 10 percent (10%) of the outstanding securities of the entity, the holder does not have representation on the entity's board of directors (or equivalent managing entity) or vice versa, and the holder does not in fact exercise influence over day-to-day management decisions. Unless the contrary is demonstrated to the satisfaction of the Members Committee, Control shall be presumed to arise from the ownership of or the power to vote, directly or indirectly, ten percent or more of the voting securities of such entity.

Ancillary Services:

"Ancillary Services" shall mean those services that are necessary to support the transmission of capacity and energy from resources to loads while maintaining reliable operation of the Transmission Provider's Transmission System in accordance with Good Utility Practice.

Applicable Laws and Regulations:

"Applicable Laws and Regulations" shall mean all duly promulgated applicable federal, State

and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority having jurisdiction over the relevant parties, their respective facilities, and/or the respective services they provide.

Applicable Regional Entity:

"Applicable Regional Entity" shall mean the Regional Entity for the region in which a Network Customer, Transmission Customer, New Service Customer, or Transmission Owner operates.

Applicable Standards:

"Applicable Standards" shall mean the requirements and guidelines of NERC, the Applicable Regional Entity, and the Control Area in which the Customer Facility is electrically located; the PJM Manuals; and Applicable Technical Requirements and Standards.

Applicable Technical Requirements and Standards:

"Applicable Technical Requirements and Standards" shall mean those certain technical requirements and standards applicable to interconnections of generation and/or transmission facilities with the facilities of an Interconnected Transmission Owner or, as the case may be and to the extent applicable, of an Electric Distributor, as published by Transmission Provider in a PJM Manual provided, however, that, with respect to any generation facilities with maximum generating capacity of 2 MW or less *(synchronous) or 5 MW or less (inverter-based)* for which the Interconnection Customer executes a Construction Service Agreement or Interconnection Service Agreement on or after March 19, 2005, "Applicable Technical Requirements and Standards" shall refer to the "PJM Small Generator Interconnection Applicable Technical Requirements and Standards." All Applicable Technical Requirements and Standards shall be publicly available through postings on Transmission Provider's internet website.

Attachment Facilities:

"Attachment Facilities" shall mean the facilities necessary to physically connect a Customer Facility to the Transmission System or interconnected distribution facilities.

Behind The Meter Generation:

"Behind The Meter Generation" shall refer to a generation unit that delivers energy to load without using the Transmission System or any distribution facilities (unless the entity that owns or leases the distribution facilities has consented to such use of the distribution facilities and such consent has been demonstrated to the satisfaction of the Office of the Interconnection); provided, however, that Behind The Meter Generation does not include (i) at any time, any portion of such generating unit's capacity that is designated as a Generation Capacity Resource; or (ii) in an hour, any portion of the output of such generating unit that is sold to another entity for consumption at another electrical location or into the PJM Interchange Energy Market.

Breach:

"Breach" shall mean the failure of a party to perform or observe any material term or condition of Tariff, Part IV or Tariff, Part VI, or any agreement entered into thereunder as described in the relevant provisions of such agreement.

Breaching Party:

"Breaching Party" shall mean a party that is in Breach of Tariff, Part IV or Tariff, Part VI and/or an agreement entered into thereunder.

Business Day:

"Business Day" shall mean a day in which the Federal Reserve System is open for business and is not a scheduled PJM holiday.

Cancellation Costs:

"Cancellation Costs" shall mean costs and liabilities incurred in connection with: (a) cancellation of supplier and contractor written orders and agreements entered into to design, construct and install Attachment Facilities, Direct Assignment Facilities and/or Customer-Funded Upgrades, and/or (b) completion of some or all of the required Attachment Facilities, Direct Assignment Facilities and/or Customer-Funded Upgrades, or specific unfinished portions and/or removal of any or all of such facilities which have been installed, to the extent required for the Transmission Provider and/or Transmission Owner(s) to perform their respective obligations under Tariff, Part IV and/or Part VI.

Capacity:

"Capacity" shall mean the installed capacity requirement of the Reliability Assurance Agreement or similar such requirements as may be established.

Capacity Interconnection Rights:

"Capacity Interconnection Rights" shall mean the rights to input generation as a Generation Capacity Resource into the Transmission System at the Point of Interconnection where the generating facilities connect to the Transmission System.

Capacity Resource:

"Capacity Resource" shall have the meaning provided in the Reliability Assurance Agreement.

Commencement Date:

"Commencement Date" shall mean the date on which Interconnection Service commences in accordance with an Interconnection Service Agreement.

Confidential Information:

"Confidential Information" shall mean any confidential, proprietary, or trade secret information of a plan, specification, pattern, procedure, design, device, list, concept, policy, or compilation relating to the present or planned business of a New Service Customer, Transmission Owner, or other Interconnection Party or Construction Party, which is designated as confidential by the party supplying the information, whether conveyed verbally, electronically, in writing, through inspection, or otherwise, and shall include, without limitation, all information relating to the producing party's technology, research and development, business affairs and pricing, and any information supplied by any New Service Customer, Transmission Owner, or other Interconnection Party or Construction Party to another such party prior to the execution of an Interconnection Service Agreement or a Construction Service Agreement.

Consolidated Transmission Owners Agreement, PJM Transmission Owners Agreement or Transmission Owners Agreement:

"Consolidated Transmission Owners Agreement," "PJM Transmission Owners Agreement" or "Transmission Owners Agreement" shall mean the certain Consolidated Transmission Owners Agreement dated as of December 15, 2005, by and among the Transmission Owners and by and between the Transmission Owners and PJM Interconnection, L.L.C. on file with the Commission, as amended from time to time.

Constructing Entity:

"Constructing Entity" shall mean either the Transmission Owner or the New Services Customer, depending on which entity has the construction responsibility pursuant to Tariff, Part VI and the applicable Construction Service Agreement; this term shall also be used to refer to an Interconnection Customer with respect to the construction of the Customer Interconnection Facilities.

Construction Party:

"Construction Party" shall mean a party to a Construction Service Agreement. "Construction Parties" shall mean all of the Parties to a Construction Service Agreement.

Construction Service Agreement:

"Construction Service Agreement" shall mean either an Interconnection Construction Service Agreement or an Upgrade Construction Service Agreement.

Contingent Facilities:

"Contingent Facilities" shall mean those unbuilt Interconnection Facilities and Network Upgrades upon which the Interconnection Request's costs, timing, and study findings are dependent and, if delayed or not built, could cause a need for restudies of the Interconnection

Request or a reassessment of the Interconnection Facilities and/or Network Upgrades and/or costs and timing.

Control Area:

"Control Area" shall mean an electric power system or combination of electric power systems bounded by interconnection metering and telemetry to which a common automatic generation control scheme is applied in order to:

(1) match the power output of the generators within the electric power system(s) and energy purchased from entities outside the electric power system(s), with the load within the electric power system(s);

(2) maintain scheduled interchange with other Control Areas, within the limits of Good Utility Practice;

(3) maintain the frequency of the electric power system(s) within reasonable limits in accordance with Good Utility Practice; and

(4) provide sufficient generating capacity to maintain operating reserves in accordance with Good Utility Practice.

Controllable A.C. Merchant Transmission Facilities:

"Controllable A.C. Merchant Transmission Facilities" shall mean transmission facilities that (1) employ technology which Transmission Provider reviews and verifies will permit control of the amount and/or direction of power flow on such facilities to such extent as to effectively enable the controllable facilities to be operated as if they were direct current transmission facilities, and (2) that are interconnected with the Transmission System pursuant to Tariff, Part IV and Part VI.

Costs:

As used in Tariff, Part IV, Part VI and related attachments, "Costs" shall mean costs and expenses, as estimated or calculated, as applicable, including, but not limited to, capital expenditures, if applicable, and overhead, return, and the costs of financing and taxes and any Incidental Expenses.

Customer Facility:

"Customer Facility" shall mean Generation Facilities or Merchant Transmission Facilities interconnected with or added to the Transmission System pursuant to an Interconnection Request under Subpart A of Tariff, Part IV.

Customer Interconnection Facilities:

"Customer Interconnection Facilities" shall mean all facilities and equipment owned and/or controlled, operated and maintained by Interconnection Customer on Interconnection Customer's side of the Point of Interconnection identified in the appropriate appendices to the Interconnection Service Agreement and to the Interconnection Construction Service Agreement, including any modifications, additions, or upgrades made to such facilities and equipment, that are necessary to physically and electrically interconnect the Customer Facility with the Transmission System.

Default:

As used in the Interconnection Service Agreement and Construction Service Agreement, "Default" shall mean the failure of a Breaching Party to cure its Breach in accordance with the applicable provisions of an Interconnection Service Agreement or Construction Service Agreement.

Emergency Condition:

"Emergency Condition" shall mean a condition or situation (i) that in the judgment of any Interconnection Party is imminently likely to endanger life or property; or (ii) that in the judgment of the Interconnected Transmission Owner or Transmission Provider is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the Transmission System, the Interconnection Facilities, or the transmission systems or distribution systems to which the Transmission System is directly or indirectly connected; or (iii) that in the judgment of Interconnection Customer is imminently likely (as determined in a non-discriminatory manner) to cause damage to the Customer Facility or to the Customer Interconnection Facilities. System restoration and black start shall be considered Emergency Conditions, provided that a Generation Interconnection Customer is not obligated by an Interconnection Service Agreement to possess black start capability. Any condition or situation that results from lack of sufficient generating capacity to meet load requirements or that results solely from economic conditions shall not constitute an Emergency Condition, unless one or more of the enumerated conditions or situations identified in this definition also exists.

Energy Resource:

"Energy Resource" shall mean a Generating Facility that is not a Capacity Resource.

Energy Storage Resource:

"Energy Storage Resource" shall mean a resource capable of receiving electric energy from the grid and storing it for later injection to the grid that participates in the PJM Energy, Capacity and/or Ancillary Services markets as a Market Participant.

Facilities Study:

"Facilities Study" shall be an engineering study conducted by the Transmission Provider (in

coordination with the affected Transmission Owner(s)) to: (1) determine the required modifications to the Transmission Provider's Transmission System necessary to implement the conclusions of the System Impact Study; and (2) complete any additional studies or analyses documented in the System Impact Study or required by PJM Manuals, and determine the required modifications to the Transmission Provider's Transmission System based on the conclusions of such additional studies. The Facilities Study shall include the cost and scheduled completion date for such modifications, that will be required to provide the requested transmission service or to accommodate a New Service Request. As used in the Interconnection Service Agreement or Construction Service Agreement, Facilities Study shall mean that certain Facilities Study conducted by Transmission Provider (or at its direction) to determine the design and specification of the Customer Funded Upgrades necessary to accommodate the New Service Customer's New Service Request in accordance with Tariff, Part VI, section 207.

Federal Power Act:

"Federal Power Act" shall mean the Federal Power Act, as amended, 16 U.S.C. §§ 791a, et seq.

FERC or Commission:

"FERC" or "Commission" shall mean the Federal Energy Regulatory Commission or any successor federal agency, commission or department exercising jurisdiction over the Tariff, Operating Agreement and Reliability Assurance Agreement.

Generating Facilities:

"Generating Facilities" shall mean Interconnection Customer's device for the production and/or storage for later injection of electricity identified in the Interconnection Request, but shall not include the Interconnection Customer's Interconnection Facilities.

Generation Interconnection Customer:

"Generation Interconnection Customer" shall mean an entity that submits an Interconnection Request to interconnect a new generation facility or to increase the capacity of an existing generation facility interconnected with the Transmission System in the PJM Region.

Generation Interconnection Request:

"Generation Interconnection Request" shall mean a request by a Generation Interconnection Customer pursuant to Tariff, Part IV, subpart A, to interconnect a generating unit with the Transmission System or to increase the capacity of a generating unit interconnected with the Transmission System in the PJM Region.

Good Utility Practice:

"Good Utility Practice" shall mean any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period,

or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather is intended to include acceptable practices, methods, or acts generally accepted in the region; including those practices required by Federal Power Act, section 215(a)(4).

Governmental Authority:

"Governmental Authority" shall mean any federal, state, local or other governmental, regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, arbitrating body, or other governmental authority having jurisdiction over any Interconnection Party or Construction Party or regarding any matter relating to an Interconnection Service Agreement or Construction Service Agreement, as applicable.

Hazardous Substances:

"Hazardous Substance" shall mean any chemicals, materials or substances defined as or included in the definition of "hazardous substances," "hazardous wastes," "hazardous materials," "hazardous constituents," "restricted hazardous materials," "extremely hazardous substances," "toxic substances," "radioactive substances," "contaminants," "pollutants," "toxic pollutants" or words of similar meaning and regulatory effect under any applicable Environmental Law, or any other chemical, material or substance, exposure to which is prohibited, limited or regulated by any applicable Environmental Law.

Incremental Auction Revenue Rights:

"Incremental Auction Revenue Rights" shall mean the additional Auction Revenue Rights, not previously feasible, created by the addition of Incremental Rights-Eligible Required Transmission Enhancements, Merchant Transmission Facilities, or of one or more Customer-Funded Upgrades.

Incremental Available Transfer Capability Revenue Rights:

"Incremental Available Transfer Capability Revenue Rights" shall mean the rights to revenues that are derived from incremental Available Transfer Capability created by the addition of Merchant Transmission Facilities or of one of more Customer-Funded Upgrades.

Incremental Capacity Transfer Right:

"Incremental Capacity Transfer Right" shall mean a Capacity Transfer Right allocated to a Generation Interconnection Customer or Transmission Interconnection Customer obligated to fund a transmission facility or upgrade, to the extent such upgrade or facility increases the transmission import capability into a Locational Deliverability Area, or a Capacity Transfer

Right allocated to a Responsible Customer in accordance with Tariff, Schedule 12A.

Incremental Deliverability Rights (IDRs):

"Incremental Deliverability Rights" or "IDRs" shall mean the rights to the incremental ability, resulting from the addition of Merchant Transmission Facilities, to inject energy and capacity at a point on the Transmission System, such that the injection satisfies the deliverability requirements of a Capacity Resource. Incremental Deliverability Rights may be obtained by a generator or a Generation Interconnection Customer, pursuant to an IDR Transfer Agreement, to satisfy, in part, the deliverability requirements necessary to obtain Capacity Interconnection Rights.

Initial Operation:

"Initial Operation" shall mean the commencement of operation of the Customer Facility and Customer Interconnection Facilities after satisfaction of the conditions of Tariff, Attachment O-Appendix 2, section 1.4 (an Interconnection Service Agreement).

Interconnected Entity:

"Interconnected Entity" shall mean either the Interconnection Customer or the Interconnected Transmission Owner; Interconnected Entities shall mean both of them.

Interconnected Transmission Owner:

"Interconnected Transmission Owner" shall mean the Transmission Owner to whose transmission facilities or distribution facilities Customer Interconnection Facilities are, or as the case may be, a Customer Facility is, being directly connected. When used in an Interconnection Construction Service Agreement, the term may refer to a Transmission Owner whose facilities must be upgraded pursuant to the Facilities Study, but whose facilities are not directly interconnected with those of the Interconnection Customer.

Interconnection Construction Service Agreement:

"Interconnection Construction Service Agreement" shall mean the agreement entered into by an Interconnection Customer, Interconnected Transmission Owner and the Transmission Provider pursuant to Tariff, Part VI, Subpart B and in the form set forth in Tariff, Attachment P, relating to construction of Attachment Facilities, Network Upgrades, and/or Local Upgrades and coordination of the construction and interconnection of an associated Customer Facility. A separate Interconnection Construction Service Agreement will be executed with each Transmission Owner that is responsible for construction of any Attachment Facilities, Network Upgrades, or Local Upgrades associated with interconnection of a Customer Facility.

Interconnection Customer:

"Interconnection Customer" shall mean a Generation Interconnection Customer and/or a

Transmission Interconnection Customer.

Interconnection Facilities:

"Interconnection Facilities" shall mean the Transmission Owner Interconnection Facilities and the Customer Interconnection Facilities.

Interconnection Party:

"Interconnection Party" shall mean a Transmission Provider, Interconnection Customer, or the Interconnected Transmission Owner. Interconnection Parties shall mean all of them.

Interconnection Request:

"Interconnection Request" shall mean a Generation Interconnection Request, a Transmission Interconnection Request and/or an IDR Transfer Agreement.

Interconnection Service:

"Interconnection Service" shall mean the physical and electrical interconnection of the Customer Facility with the Transmission System pursuant to the terms of Tariff, Part IV and Tariff, Part VI and the Interconnection Service Agreement entered into pursuant thereto by Interconnection Customer, the Interconnected Transmission Owner and Transmission Provider.

Interconnection Service Agreement:

"Interconnection Service Agreement" shall mean an agreement among the Transmission Provider, an Interconnection Customer and an Interconnected Transmission Owner regarding interconnection under Tariff, Part IV and Tariff, Part VI.

List of Approved Contractors:

"List of Approved Contractors" shall mean a list developed by each Transmission Owner and published in a PJM Manual of (a) contractors that the Transmission Owner considers to be qualified to install or construct new facilities and/or upgrades or modifications to existing facilities on the Transmission Owner's system, provided that such contractors may include, but need not be limited to, contractors that, in addition to providing construction services, also provide design and/or other construction-related services, and (b) manufacturers or vendors of major transmission-related equipment (e.g., high-voltage transformers, transmission line, circuit breakers) whose products the Transmission Owner considers acceptable for installation and use on its system.

Load Serving Entity (LSE):

"Load Serving Entity" or "LSE" shall have the meaning specified in the Reliability Assurance Agreement.

Local Upgrades:

"Local Upgrades" shall mean modifications or additions of facilities to abate any local thermal loading, voltage, short circuit, stability or similar engineering problem caused by the interconnection and delivery of generation to the Transmission System. Local Upgrades shall include:

(i) Direct Connection Local Upgrades which are Local Upgrades that only serve the Customer Interconnection Facility and have no impact or potential impact on the Transmission System until the final tie-in is complete; and

(ii) Non-Direct Connection Local Upgrades which are parallel flow Local Upgrades that are not Direct Connection Local Upgrades.

Material Modification:

"Material Modification" shall mean any modification to an Interconnection Request that has a material adverse effect on the cost or timing of Interconnection Studies related to, or any Network Upgrades or Local Upgrades needed to accommodate, any Interconnection Request with a later Queue Position.

Maximum Facility Output:

"Maximum Facility Output" shall mean the maximum (not nominal) net electrical power output in megawatts, specified in the Interconnection Service Agreement, after supply of any parasitic or host facility loads, that a Generation Interconnection Customer's Customer Facility is expected to produce, provided that the specified Maximum Facility Output shall not exceed the output of the proposed Customer Facility that Transmission Provider utilized in the System Impact Study.

Maximum State of Charge:

"Maximum State of Charge" shall mean the maximum State of Charge that should not be exceeded, measured in units of megawatt-hours.

Merchant A.C. Transmission Facilities:

"Merchant A.C. Transmission Facility" shall mean Merchant Transmission Facilities that are alternating current (A.C.) transmission facilities, other than those that are Controllable A.C. Merchant Transmission Facilities.

Merchant D.C. Transmission Facilities:

"Merchant D.C. Transmission Facilities" shall mean direct current (D.C.) transmission facilities that are interconnected with the Transmission System pursuant to Tariff, Part IV and Tariff, Part

VI.

Merchant Network Upgrades:

"Merchant Network Upgrades" shall mean additions to, or modifications or replacements of, physical facilities of the Interconnected Transmission Owner that, on the date of the pertinent Transmission Interconnection Customer's Upgrade Request, are part of the Transmission System or are included in the Regional Transmission Expansion Plan.

Merchant Transmission Facilities:

"Merchant Transmission Facilities" shall mean A.C. or D.C. transmission facilities that are interconnected with or added to the Transmission System pursuant to Tariff, Part IV and Tariff, Part VI and that are so identified in Tariff, Attachment T, provided, however, that Merchant Transmission Facilities shall not include (i) any Customer Interconnection Facilities, (ii) any physical facilities of the Transmission System that were in existence on or before March 20, 2003 ; (iii) any expansions or enhancements of the Transmission System that are not identified as Merchant Transmission Facilities in the Regional Transmission Expansion Plan and Tariff, Attachment T, or (iv) any transmission facilities that are included in the rate base of a public utility and on which a regulated return is earned.

Merchant Transmission Provider:

"Merchant Transmission Provider" shall mean an Interconnection Customer that (1) owns, controls, or controls the rights to use the transmission capability of, Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities that connect the Transmission System with another control area, (2) has elected to receive Transmission Injection Rights and Transmission Withdrawal Rights associated with such facility pursuant to Tariff, Part IV, section 36, and (3) makes (or will make) the transmission capability of such facilities available for use by third parties under terms and conditions approved by the Commission and stated in the Tariff, consistent with Tariff, Part IV, section 38.

Metering Equipment:

"Metering Equipment" shall mean all metering equipment installed at the metering points designated in the appropriate appendix to an Interconnection Service Agreement.

Minimum State of Charge:

"Minimum State of Charge" shall mean the minimum State of Charge that should be maintained in units of megawatt-hours.

NERC:

"NERC" shall mean the North American Electric Reliability Corporation or any successor thereto.

Network Upgrades:

"Network Upgrades" shall mean modifications or additions to transmission-related facilities that are integrated with and support the Transmission Provider's overall Transmission System for the general benefit of all users of such Transmission System. Network Upgrades shall include:

(i) **Direct Connection Network Upgrades** which are Network Upgrades that are not part of an Affected System; only serve the Customer Interconnection Facility; and have no impact or potential impact on the Transmission System until the final tie-in is complete. Both Transmission Provider and Interconnection Customer must agree as to what constitutes Direct Connection Network Upgrades and identify them in the Interconnection Construction Service Agreement, Schedule D. If the Transmission Provider and Interconnection Customer disagree about whether a particular Network Upgrade is a Direct Connection Network Upgrade, the Transmission Provider must provide the Interconnection Customer a written technical explanation outlining why the Transmission Provider does not consider the Network Upgrade to be a Direcct Connection Network Upgrade within 15 days of its determination.

(ii) **Non-Direct Connection Network Upgrades** which are parallel flow Network Upgrades that are not Direct Connection Network Upgrades.

New Service Request:

"New Service Request" shall mean an Interconnection Request, a Completed Application, or an Upgrade Request.

New Services Queue:

"New Services Queue" shall mean all Interconnection Requests, Completed Applications, and Upgrade Requests that are received within each six-month period ending on March 31 and September 30 of each year shall collectively comprise a New Services Queue.

Nominal Rated Capability:

"Nominal Rated Capability" shall mean the nominal maximum rated capability in megawatts of a Transmission Interconnection Customer's Customer Facility or the nominal increase in transmission capability in megawatts of the Transmission System resulting from the interconnection or addition of a Transmission Interconnection Customer's Customer Facility, as determined in accordance with pertinent Applicable Standards and specified in the Interconnection Service Agreement.

Operating Agreement of the PJM Interconnection, L.L.C., Operating Agreement or PJM Operating Agreement:

"Operating Agreement of the PJM Interconnection, L.L.C.," "Operating Agreement" or "PJM Operating Agreement" shall mean the Amended and Restated Operating Agreement of PJM

Interconnection, L.L.C. dated as of April 1, 1997 and as amended and restated as of June 2, 1997, including all Schedules, Exhibits, Appendices, addenda or supplements hereto, as amended from time to time thereafter, among the Members of the PJM Interconnection, L.L.C., on file with the Commission.

Option to Build:

"Option to Build" shall mean the option of the New Service Customer to build certain Customer-Funded Upgrades, as set forth in, and subject to the terms of, the Construction Service Agreement.

Part I:

"Part I" shall mean the Tariff Definitions and Common Service Provisions contained in Tariff, Part I, sections 1 through 12A.

Part II:

"Part II" shall mean Tariff, Part II, sections 13 through 27A pertaining to Point-To-Point Transmission Service in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part III:

"Part III" shall mean Tariff, Part III, sections 28 through 35 pertaining to Network Integration Transmission Service in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part IV:

"Part IV" shall mean Tariff, Part IV, sections 36 through 112C pertaining to generation or merchant transmission interconnection to the Transmission System in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Part VI:

"Part VI" shall mean Tariff, Part VI, sections 200 through 237 pertaining to the queuing, study, and agreements relating to New Service Requests, and the rights associated with Customer-Funded Upgrades in conjunction with the applicable Common Service Provisions of Tariff, Part I and appropriate Schedules and Attachments.

Parties:

"Parties" shall mean the Transmission Provider, as administrator of the Tariff, and the Transmission Customer receiving service under the Tariff. PJMSettlement shall be the

Counterparty to Transmission Customers.

PJM:

"PJM" shall mean PJM Interconnection, L.L.C., including the Office of the Interconnection as referenced in the PJM Operating Agreement. When such term is being used in the RAA it shall also include the PJM Board.

PJM Manuals:

"PJM Manuals" shall mean the instructions, rules, procedures and guidelines established by the Office of the Interconnection for the operation, planning, and accounting requirements of the PJM Region and the PJM Interchange Energy Market.

PJM Region:

"PJM Region" shall have the meaning specified in the Operating Agreement.

PJM Tariff, Tariff, O.A.T.T., OATT or PJM Open Access Transmission Tariff:

"PJM Tariff," "Tariff," "O.A.T.T.," "OATT," or "PJM Open Access Transmission Tariff" shall mean that certain PJM Open Access Transmission Tariff, including any schedules, appendices or exhibits attached thereto, on file with FERC and as amended from time to time thereafter.

Point of Interconnection:

"Point of Interconnection" shall mean the point or points where the Customer Interconnection Facilities interconnect with the Transmission Owner Interconnection Facilities or the Transmission System.

Project Finance Entity:

"Project Finance Entity" shall mean: (a) a holder, trustee or agent for holders, of any component of Project Financing; or (b) any purchaser of capacity and/or energy produced by the Customer Facility to which Interconnection Customer has granted a mortgage or other lien as security for some or all of Interconnection Customer's obligations under the corresponding power purchase agreement.

Provisional Interconnection Service:

"Provisional Interconnection Service" shall mean interconnection service provided by Transmission Provider associated with interconnecting the Interconnection Customer's Generating Facility to Transmission Provider's Transmission System and enabling that Transmission System to receive electric energy and capacity from the Generating Facility at the Point of Interconnection, pursuant to the terms of the Interconnection Service Agreement and, if applicable, the Tariff.

Queue Position:

"Queue Position" shall mean the priority assigned to an Interconnection Request, a Completed Application, or an Upgrade Request pursuant to applicable provisions of Tariff, Part VI.

Reasonable Efforts:

"Reasonable Efforts" shall mean, with respect to any action required to be made, attempted, or taken by an Interconnection Party or by a Construction Party under Tariff, Part IV or Tariff, Part VI, an Interconnection Service Agreement, or a Construction Service Agreement, such efforts as are timely and consistent with Good Utility Practice and with efforts that such party would undertake for the protection of its own interests.

Regional Entity:

"Regional Entity" shall have the same meaning specified in the Operating Agreement.

Regional Transmission Expansion Plan:

"Regional Transmission Expansion Plan" shall mean the plan prepared by the Office of the Interconnection pursuant to Operating Agreement, Schedule 6 for the enhancement and expansion of the Transmission System in order to meet the demands for firm transmission service in the PJM Region.

Reliability Assurance Agreement or PJM Reliability Assurance Agreement:

"Reliability Assurance Agreement" or "PJM Reliability Assurance Agreement" shall mean that certain Reliability Assurance Agreement Among Load Serving Entities in the PJM Region, on file with FERC as PJM Interconnection L.L.C. Rate Schedule FERC No. 44, and as amended from time to time thereafter.

Schedule of Work:

"Schedule of Work" shall mean that schedule attached to the Interconnection Construction Service Agreement setting forth the timing of work to be performed by the Constructing Entity pursuant to the Interconnection Construction Service Agreement, based upon the Facilities Study and subject to modification, as required, in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

Scope of Work:

"Scope of Work" shall mean that scope of the work attached as a schedule to the Interconnection Construction Service Agreement and to be performed by the Constructing Entity(ies) pursuant to the Interconnection Construction Service Agreement, provided that such Scope of Work may be modified, as required, in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

Secondary Systems:

"Secondary Systems" shall mean control or power circuits that operate below 600 volts, AC or DC, including, but not limited to, any hardware, control or protective devices, cables, conductors, electric raceways, secondary equipment panels, transducers, batteries, chargers, and voltage and current transformers.

Security:

"Security" shall mean the security provided by the New Service Customer pursuant to Tariff, section 212.4 or Tariff, Part VI, section 213.4 to secure the New Service Customer's responsibility for Costs under the Interconnection Service Agreement or Upgrade Construction Service Agreement and Tariff, Part VI, section 217.

Service Agreement:

"Service Agreement" shall mean the initial agreement and any amendments or supplements thereto entered into by the Transmission Customer and the Transmission Provider for service under the Tariff.

Site:

"Site" shall mean all of the real property, including but not limited to any leased real property and easements, on which the Customer Facility is situated and/or on which the Customer Interconnection Facilities are to be located.

State:

"State" shall mean the District of Columbia and any State or Commonwealth of the United States.

State of Charge:

"State of Charge" shall mean the operating parameter that represents the quantity of physical energy stored (measured in units of megawatt-hours) in an Energy Storage Resource Model Participant in proportion to its maximum State of Charge capability. State of Charge is quantified as defined in the PJM Manuals.

Station Power:

"Station Power" shall mean energy used for operating the electric equipment on the site of a generation facility located in the PJM Region or for the heating, lighting, air-conditioning and office equipment needs of buildings on the site of such a generation facility that are used in the operation, maintenance, or repair of the facility. Station Power does not include any energy (i) used to power synchronous condensers; (ii) used for pumping at a pumped storage facility; (iii) used in association with restoration or black start service; or (iv) that is Direct Charging Energy.

Surplus Interconnection Customer:

"Surplus Interconnection Customer" shall mean either an Interconnection Customer whose Generating Facility is already interconnected to the PJM Transmission System or one of its affiliates, or an unaffiliated entity that submits a Surplus Interconnection Request to utilize Surplus Interconnection Service within the Transmission System in the PJM Region. A Surplus Interconnection Customer is not a New Service Customer.

Surplus Interconnection Request:

"Surplus Interconnection Request" shall mean a request submitted by a Surplus Interconnection Customer, pursuant to Tariff, Attachment RR, to utilize Surplus Interconnection Service within the Transmission System in the PJM Region. A Surplus Interconnection Request is not a New Service Request.

Surplus Interconnection Service:

"Surplus Interconnection Service" shall mean any unneeded portion of Interconnection Service established in an Interconnection Service Agreement, such that if Surplus Interconnection Service is utilized, the total amount of Interconnection Service at the Point of Interconnection would remain the same.

Switching and Tagging Rules:

"Switching and Tagging Rules" shall mean the switching and tagging procedures of Interconnected Transmission Owners and Interconnection Customer as they may be amended from time to time.

System Impact Study:

"System Impact Study" shall mean an assessment by the Transmission Provider of (i) the adequacy of the Transmission System to accommodate a Completed Application, an Interconnection Request or an Upgrade Request, (ii) whether any additional costs may be incurred in order to provide such transmission service or to accommodate an Interconnection Request, and (iii) with respect to an Interconnection Request, an estimated date that an Interconnection Customer's Customer Facility can be interconnected with the Transmission System and an estimate of the Interconnection Customer's cost responsibility for the interconnection; and (iv) with respect to an Upgrade Request, the estimated cost of the requested system upgrades or expansion, or of the cost of the system upgrades or expansion, necessary to provide the requested incremental rights.

System Protection Facilities:

"System Protection Facilities" shall refer to the equipment required to protect (i) the Transmission System, other delivery systems and/or other generating systems connected to the Transmission System from faults or other electrical disturbance occurring at or on the Customer Facility, and (ii)

the Customer Facility from faults or other electrical system disturbance occurring on the Transmission System or on other delivery systems and/or other generating systems to which the Transmission System is directly or indirectly connected. System Protection Facilities shall include such protective and regulating devices as are identified in the Applicable Technical Requirements and Standards or that are required by Applicable Laws and Regulations or other Applicable Standards, or as are otherwise necessary to protect personnel and equipment and to minimize deleterious effects to the Transmission System arising from the Customer Facility.

Transmission Facilities:

"Transmission Facilities" shall have the meaning set forth in the Operating Agreement.

Transmission Injection Rights:

"Transmission Injection Rights" shall mean Capacity Transmission Injection Rights and Energy Transmission Injection Rights.

Transmission Interconnection Customer:

"Transmission Interconnection Customer" shall mean an entity that submits an Interconnection Request to interconnect or add Merchant Transmission Facilities to the Transmission System or to increase the capacity of Merchant Transmission Facilities interconnected with the Transmission System in the PJM Region or an entity that submits an Upgrade Request for Merchant Network Upgrades (including accelerating the construction of any transmission enhancement or expansion, other than Merchant Transmission Facilities, that is included in the Regional Transmission Expansion Plan prepared pursuant to Operating Agreement, Schedule 6).

Transmission Owner:

"Transmission Owner" shall mean a Member that owns or leases with rights equivalent to ownership Transmission Facilities and is a signatory to the PJM Transmission Owners Agreement. Taking transmission service shall not be sufficient to qualify a Member as a Transmission Owner.

Transmission Owner Attachment Facilities:

"Transmission Owner Attachment Facilities" shall mean that portion of the Transmission Owner Interconnection Facilities comprised of all Attachment Facilities on the Interconnected Transmission Owner's side of the Point of Interconnection.

Transmission Owner Interconnection Facilities:

"Transmission Owner Interconnection Facilities" shall mean all Interconnection Facilities that are not Customer Interconnection Facilities and that, after the transfer under Tariff, Attachment P, Appendix 2, section 5.5 to the Interconnected Transmission Owner of title to any Transmission Owner Interconnection Facilities that the Interconnection Customer constructed,

are owned, controlled, operated and maintained by the Interconnected Transmission Owner on the Interconnected Transmission Owner's side of the Point of Interconnection identified in appendices to the Interconnection Service Agreement and to the Interconnection Construction Service Agreement, including any modifications, additions or upgrades made to such facilities and equipment, that are necessary to physically and electrically interconnect the Customer Facility with the Transmission System or interconnected distribution facilities.

Transmission Provider:

The "Transmission Provider" shall be the Office of the Interconnection for all purposes, provided that the Transmission Owners will have the responsibility for the following specified activities:

(a) The Office of the Interconnection shall direct the operation and coordinate the maintenance of the Transmission System, except that the Transmission Owners will continue to direct the operation and maintenance of those transmission facilities that are not listed in the PJM Designated Facilities List contained in the PJM Manual on Transmission Operations;

(b) Each Transmission Owner shall physically operate and maintain all of the facilities that it owns; and

(c) When studies conducted by the Office of the Interconnection indicate that enhancements or modifications to the Transmission System are necessary, the Transmission Owners shall have the responsibility, in accordance with the applicable terms of the Tariff, Operating Agreement and/or the Consolidated Transmission Owners Agreement to construct, own, and finance the needed facilities or enhancements or modifications to facilities.

Transmission Service:

"Transmission Service" shall mean Point-To-Point Transmission Service provided under Tariff, Part II on a firm and non-firm basis.

Transmission System:

"Transmission System" shall mean the facilities controlled or operated by the Transmission Provider within the PJM Region that are used to provide transmission service under Tariff, Part II and Part III.

Transmission Withdrawal Rights:

"Transmission Withdrawal Rights" shall mean Firm Transmission Withdrawal Rights and Non-Firm Transmission Withdrawal Rights.

APPENDIX 2

STANDARD CONSTRUCTION TERMS AND CONDITIONS

Preamble

The construction of any Interconnection Facilities required to interconnect a Customer Facility with the Transmission System shall be in accordance with the following Standard Construction Terms and Conditions.

1 Facilitation by Transmission Provider

Transmission Provider shall keep itself apprised of the status of the Constructing Entities' construction-related activities and, upon request of either of them, Transmission Provider shall meet with the Constructing Entities separately or together to assist them in resolving issues between them regarding their respective activities, rights and obligations under this Appendix 2 to this CSA. Each Constructing Entity shall cooperate in good faith with the other Construction Parties in Transmission Provider's efforts to facilitate resolution of disputes.

2 Construction Obligations

2.1 Interconnection Customer Obligations

2.1.1 Generally:

Interconnection Customer shall, at its sole cost and expense, design, procure, construct, own and install the Customer Facility and the Customer Interconnection Facilities in accordance with this Appendix 2 to this CSA, Applicable Standards, Applicable Laws and Regulations, Good Utility Practice, the Scope of Work and the Facilities Study (to the extent that design of the Customer Interconnection Facilities is included therein), provided, however, that, in the event and to the extent that the Customer Facility is comprised of or includes Merchant Network Upgrades, subject to the terms of Section 3.2.3 of this Appendix 2, the Interconnected Transmission Owner, shall design, procure, construct and install such Merchant Network Upgrades.

2.1.2 Interconnection Customer Drawings:

On or before the applicable date specified in the Milestones of the Interconnection Service Agreement, Interconnection Customer shall submit to the Interconnected Transmission Owner and Transmission Provider initial drawings, certified by a professional engineer, of the Customer Interconnection Facilities. Interconnected Transmission Owner and Transmission Provider shall review the drawings to assess the consistency of Interconnection Customer's design of the Customer Interconnection Facilities with the design that was analyzed in the planning model as described in PJM Manuals. After consulting with the Interconnected Transmission Owner, Transmission Provider shall provide comments on the drawings to Interconnection Customer within forty-five (45) days after its receipt thereof, after which time any drawings not subject to comment shall be deemed to be approved. All drawings provided hereunder shall be deemed to be Confidential Information.

2.1.3 Effect of Review:

Interconnected Transmission Owner's and Transmission Provider's reviews of Interconnection Customer's initial drawings of the Customer Interconnection Facilities shall not be construed as confirming, endorsing or providing a warranty as to the fitness, safety, durability or reliability of such facilities or the design thereof. At its sole cost and expense, Interconnection Customer shall make such changes to the design of the Customer Interconnection Facilities as may reasonably be required by Transmission Provider, in consultation with the Interconnected Transmission Owner, to ensure that the Customer Interconnection Facilities meet Applicable Standards and, to the extent that design of the Customer Interconnection Facilities is included in the Facilities Study, to ensure that such facilities conform with the Facilities Study.

2.2 Transmission Owner Interconnection Facilities

2.2.1 Generally:

All Transmission Owner Interconnection Facilities necessary for the interconnection of the Customer Facility shall be designed, procured, installed and constructed in accordance with this Appendix 2, Applicable Standards, Applicable Laws and Regulations, Good Utility Practice, the Facilities Study and the Scope of Work under the Interconnection Construction Service Agreement(s).

2.2.2 Cost Responsibility:

Responsibility for the Costs of the Transmission Owner Interconnection Facilities shall be assigned in accordance with Section 217 of the Tariff, as applicable, and shall be stated in the Interconnection Service Agreement.

2.2.3 Construction Responsibility:

Except as otherwise permitted under, or as otherwise agreed upon by the Interconnection Customer and the Interconnected Transmission Owner pursuant to, Section 3 of this Appendix 2, the Interconnected Transmission Owner shall be responsible for the design, procurement, construction and installation of the Transmission Owner Interconnection Facilities. In the event that there are multiple Interconnected Transmission Owners, the Transmission Provider shall determine how to allocate the construction responsibility among them unless they have reached agreement among themselves on how to proceed.

2.2.4 Ownership of Transmission Owner Interconnection Facilities:

The Interconnected Transmission Owner shall own all Transmission Owner Interconnection Facilities that it builds. In addition, the Interconnection Customer will convey to the Interconnected Transmission Owner, as provided in Section 5.5 of this Appendix 2, title to all Transmission Owner Interconnection Facilities built by the Interconnection Customer pursuant to the terms of Section 3.2 of this Appendix 2. Nothing in this section shall affect the interconnection rights otherwise available to a Transmission Interconnection Customer under Subpart C of Part VI of the Tariff.

2.2A Scope of Applicable Technical Requirements and Standards:

Applicable Technical Requirements and Standards shall apply to the design, procurement, construction and installation of the Interconnection Facilities and Merchant A.C. Transmission Facilities only to the extent that the provisions thereof relate to the design, procurement, construction and/or installation of such facilities. Such provisions relating to the design, procurement, construction and/or installation of facilities shall be appended to the Interconnection Construction Service Agreement. The Interconnection Parties shall mutually agree upon, or in the absence of such agreement, Transmission Provider shall determine, which provisions of the Applicable Technical Requirements and Standards should be identified in the Interconnection Construction Service Agreement. In the event of any conflict between the provisions of the Applicable Technical Requirements and Standards that are appended to this Interconnection Construction Service Agreement and any later-modified provisions that are stated in the pertinent PJM Manual, the provisions appended to this Interconnection Construction Service Agreement shall control.

2.3 Construction By Interconnection Customer

2.3.1 Construction Prior to Execution of Interconnection Construction Service Agreement:

If the Interconnection Customer procures materials for, and/or commences construction of, the Customer Interconnection Facilities, any Transmission Owner Interconnection Facilities that it has elected to construct by exercising the Option to Build under Section 3.2.3 of this Appendix 2, or for any subsequent modification thereto, prior to the execution of the Interconnection Construction Service Agreement or, if the Interconnection Construction Service Agreement has been executed, before the Interconnected Transmission Owner and Transmission Provider have accepted the Interconnection Customer's initial design, or any subsequent modification to the design, of such Interconnection Facilities, such procurement and/or construction shall be at the Interconnection Customer's sole risk, cost and expense.

2.3.2 Monitoring and Inspection:

The Interconnected Transmission Owner may monitor construction and installation of Interconnection Facilities that the Interconnection Customer is constructing. Upon reasonable notice, authorized personnel of the Interconnected Transmission Owner may inspect any or all of such Interconnection Facilities to assess their conformity with Applicable Standards.

2.3.3 Notice of Completion:

The Interconnection Customer shall notify the Transmission Provider and the Interconnected Transmission Owner in writing when it has completed construction of (i) the Customer Facility; (ii) the Customer Interconnection Facilities; and (iii) any Transmission Owner Interconnection Facilities for which it has exercised the Option to Build under Section 3 of this Appendix 2.

2.4 Tax Liability

2.4.1 Safe Harbor Provisions:

This Section 2.4.1 is applicable only to Generation Interconnection Customers. Provided that Interconnection Customer agrees to conform to all requirements of the Internal Revenue Service ("IRS") (e.g., the "safe harbor" provisions of IRS Notices 2001-82 and 88-129) that would confer nontaxable status on some or all of the transfer of property, including money, by Interconnection Customer to the Interconnected Transmission Owner for payment of the Costs of construction of the Transmission Owner Interconnection Facilities, the Interconnected Transmission Owner, based on such agreement and on current law, shall treat such transfer of property to it as nontaxable income and, except as provided in Section 2.4.2 of this Appendix 2, shall not include income taxes in the Costs of Transmission Owner Interconnection Facilities that are payable by Interconnection Customer under this Appendix 2. Interconnection Customer shall document its agreement to conform to IRS requirements for such non-taxable status in the Interconnection Service Agreement, the Interconnection Construction Service Agreement, and/or the Interim Interconnection Service Agreement.

2.4.2 Tax Indemnity:

Interconnection Customer shall indemnify the Interconnected Transmission Owner for any costs that Interconnected Transmission Owner incurs in the event that the IRS and/or a state department of revenue (State) determines that the property, including money, transferred by Interconnection Customer to the Interconnected Transmission Owner with respect to the construction of the Transmission Owner Interconnection Facilities is taxable income to the Interconnected Transmission Owner. Interconnection Customer shall pay to the Interconnected Transmission Owner, on demand, the amount of any income taxes that the IRS or a State assesses to the Interconnected Transmission Owner in connection with such transfer of property and/or money, plus any applicable interest and/or penalty charged to the Interconnected Transmission Owner. In the event that the Interconnected Transmission Owner chooses to contest such assessment, either at the request of Interconnection Customer or on its own behalf, and prevails in reducing or eliminating the tax, interest and/or penalty assessed against it, the Interconnected Transmission Owner shall refund to Interconnection Customer the excess of its demand payment made to the Interconnected Transmission Owner over the amount of the tax, interest and penalty for which the Interconnected Transmission Owner is finally determined to be liable. Interconnection Customer's tax indemnification obligation under this section shall survive any termination of the Interconnection Construction Service Agreement.

2.4.3 Taxes Other Than Income Taxes:

Upon the timely request by Interconnection Customer, and at Interconnection Customer's sole expense, the Interconnected Transmission Owner shall appeal, protest, seek abatement of, or otherwise contest any tax (other than federal or state income tax) asserted or assessed against the Interconnected Transmission Owner for which Interconnection Customer may be required to reimburse Transmission Provider under the terms of this Interconnection Construction Service Agreement, or Part VI of the Tariff. Interconnection Customer shall pay to the Interconnected Transmission Owner on a periodic basis, as invoiced by the Interconnected Transmission Owner, the Interconnected Transmission Owner's documented reasonable costs of prosecuting such

appeal, protest, abatement, or other contest. Interconnection Customer and the Interconnected Transmission Owner shall cooperate in good faith with respect to any such contest. Unless the payment of such taxes is a prerequisite to an appeal or abatement or cannot be deferred, no amount shall be payable by Interconnection Customer to the Interconnected Transmission Owner for such contested taxes until they are assessed by a final, non-appealable order by any court or agency of competent jurisdiction. In the event that a tax payment is withheld and ultimately due and payable after appeal, Interconnection Customer will be responsible for all taxes, interest and penalties, other than penalties attributable to any delay caused by the Interconnected Transmission Owner.

2.4.4 Income Tax Gross-Up

2.4.4.1 Additional Security:

In the event that Interconnection Customer does not provide the safe harbor documentation required under Section 2.4.1 of this Appendix 2 prior to execution of the Interconnection Construction Service Agreement, within 15 days after such execution, Transmission Provider shall notify Interconnection Customer in writing of the amount of additional Security that Interconnection Customer must provide. The amount of Security that a Transmission Interconnection Customer must provide initially shall include any amounts described as additional Security under this Section 2.4.4 regarding income tax gross-up.

2.4.4.2 Amount:

The required additional Security shall be in an amount equal to the amount necessary to gross up fully for currently applicable federal and state income taxes the estimated Costs of Local Upgrades and Network Upgrades for which Interconnection Customer previously provided Security. Accordingly, the additional Security shall equal the amount necessary to increase the total Security provided to the amount that would be sufficient to permit the Interconnected Transmission Owner to receive and retain, after the payment of all applicable income taxes ("Current Taxes") and taking into account the present value of future tax deductions for depreciation that would be available as a result of the anticipated payments or property transfers (the "Present Value Depreciation Amount"), an amount equal to the estimated Costs of Local Upgrades and Network Upgrades for which Interconnection Customer is responsible under the Interconnection Service Agreement. For this purpose, Current Taxes shall be computed based on the composite federal and state income tax rates applicable to the Interconnected Transmission Owner at the time the additional Security is received, determined using the highest marginal rates in effect at that time (the "Current Tax Rate"), and (ii) the Present Value Depreciation Amount shall be computed by discounting the Interconnected Transmission Owner's anticipated tax depreciation deductions associated with such payments or property transfers by its current weighted average cost of capital.

2.4.4.3 Time for Payment:

Interconnection Customer must provide the additional Security, in a form and with terms as required by Section 212.4, within 15 days after its receipt of Transmission Provider's notice under this section. The requirement for additional Security under this section shall be treated as a milestone included in the Interconnection Service Agreement pursuant to Section 212.5.

2.4.5 Tax Status:

Each Party shall cooperate with the other to maintain the other Party's tax status. Nothing in this Interconnection Construction Service Agreement or the Tariff is intended to adversely affect any Interconnected Transmission Owner's tax exempt status with respect to the issuance of bonds including, but not limited to, local furnishing bonds.

2.5 Safety

2.5.1 General:

Each Construction Party shall perform all work hereunder that may reasonably be expected to affect any other Construction Party in accordance with Good Utility Practice, Applicable Standards and Applicable Laws and Regulations pertaining to the safety of persons or property. A Construction Party performing work within an area controlled by another Construction Party must abide by the safety rules applicable to the area.

2.5.2 Environmental Releases:

Each Construction Party shall notify each other Construction Party, first orally and then in writing, of the release of any Hazardous Substances, any asbestos or lead abatement activities, or any type of remediation activities related to the Customer Facility or the Interconnection Facilities, any of which may reasonably be expected to affect another Construction Party. The notifying Construction Party shall (i) provide the notice as soon as possible, (ii) make a good faith effort to provide the notice within twenty-four hours after the Construction Party becomes aware of the occurrence, and (iii) promptly furnish to each other Construction Party copies of any publicly available reports filed with any governmental agencies addressing such events.

2.6 Construction-Related Access Rights:

The Interconnected Transmission Owner and the Interconnection Customer herein grant each other at no charge such rights of access to areas that it owns or otherwise controls as may be necessary for performance of their respective obligations, and exercise of their respective rights, pursuant to this Appendix 2, provided that either of them performing the construction will abide by the safety, security and work rules applicable to the area where construction activity is occurring.

2.7 Coordination Among Construction Parties:

The Transmission Provider, the Interconnection Customer, and all Interconnected Transmission Owners shall communicate and coordinate their activities as necessary to satisfy their obligations under this Interconnection Construction Service Agreement.

3 Schedule Of Work

3.1 Construction by Interconnection Customer:

The Interconnection Customer shall use Reasonable Efforts to design, procure, construct and install the Customer Interconnection Facilities and any Transmission Owner Interconnection Facilities that it elects to build by exercise of the Option to Build (defined in Section 3.2.3.1 below) in accordance with the Schedule of Work.

3.2 Construction by Interconnected Transmission Owner

3.2.1 Standard Option:

The Interconnected Transmission Owner shall use Reasonable Efforts to design, procure, construct and install the Transmission Owner Interconnection Facilities that it is responsible for constructing in accordance with the Schedule of Work.

3.2.1.1 Construction Sequencing:

In general, the sequence of the proposed dates of Initial Operation of Interconnection Customers seeking interconnection to the Transmission System will determine the sequence of construction of Network Upgrades.

3.2.2 Negotiated Contract Option:

As an alternative to the Standard Option set forth in Section 3.2.1 of this Appendix 2, the Interconnected Transmission Owner and the Interconnection Customer may mutually agree to a Negotiated Contract Option for the Interconnected Transmission Owner's design, procurement, construction and installation of the Transmission Owner Interconnection Facilities. Under the Negotiated Contract Option, the Interconnection Customer and the Interconnected Transmission Owner may agree to terms different from those included in the Standard Option of Section 3.2.1 above and the corresponding standard terms set forth in the applicable provisions of Part VI of the Tariff and this Appendix 2. Under the Negotiated Contract Option, negotiated terms may include the work schedule applicable to the Interconnected Transmission Owner's construction activities and changes to same (Section 3.3 of this Appendix 2); payment provisions, including the schedule of payments; incentives, penalties and/or liquidated damages related to timely completion of construction (Section 3.2.1 of this Appendix 2); use of third party contractors; and responsibility for Costs, but only as between the Interconnection Customer and the Interconnected Transmission Owner that are parties to this Interconnection Construction Service Agreement; no other Interconnection Customer's responsibility for Costs may be affected (Section 217 of the Tariff). No other terms of the Tariff or this Appendix 2 shall be subject to modification under the Negotiated Contract Option. The terms and conditions of the Tariff that may be negotiated pursuant to the Negotiated Contract Option shall not be affected by use of the Negotiated Contract Option except as and to the extent that they are modified by the parties' agreement pursuant to such option. All terms agreed upon pursuant to the Negotiated Contract Option shall be stated in full in an appendix to this Interconnection Construction Service Agreement.

3.2.3 Option to Build

3.2.3.1 Option:

Interconnection Customer shall have the option, ("Option to Build") to assume responsibility for the design, procurement, and construction of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades on the dates specified in Schedule J (Schedule of Work) of this Agreement. Transmission Provider and Interconnection Customer must agree as to what constitutes Direct Connection Network Upgrades and identify such Direct Connection Network Upgrades in Schedule D (Option to Build) of this Agreement. If the Transmission Provider and Interconnection Customer disagree about whether a particular Network Upgrade is a Direct Connection Network Upgrade, the Transmission Provider must provide the Interconnection Customer with a written technical explanation outlining why the Transmission Provider does not consider the Network Upgrade to be a Direct Connection Network Upgrade within fifteen (15) days of its determination. Except for Direct Connection Network Upgrades, Interconnection Customer shall have no right to construct Network Upgrades under this option. In order to exercise this Option to Build, Interconnection Customer must provide Transmission Provider and the Interconnected Transmission Owner with written notice of Interconnection Customer's election to exercise the option no later than thirty (30) days from the date the Interconnection Customer receives the results of the Facilities Study (or, if no Facilities Study was required, completion of the System Impact Study). Interconnection Customer may not elect Option to Build after such date.

3.2.3.2 General Conditions Applicable to Option:

In addition to the other terms and conditions applicable to the construction of facilities under this Appendix 2, the Option to Build is subject to the following conditions:

(a) If the Interconnection Customer assumes responsibility for the design, procurement and construction of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades:

(i) Interconnection Customer shall engineer, procure equipment, and construct Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades (or portions thereof) using Good Utility Practice and using standards and specifications provided in advance by Transmission Owner;

(ii) Interconnection Customer's engineering, procurement and construction of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades shall comply with all requirements of law to which Interconnected Transmission Owner shall be subject in the engineering, procurement or construction of Interconnected Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades;

(iii) Interconnected Transmission Owner shall review and approve engineering design, equipment acceptance tests, and the construction of Interconnected Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades;

(iv) Prior to commencement of construction, Interconnection Customer shall provide to Interconnected Transmission Owner a schedule for construction of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades and shall promptly respond to requests for information from Transmission Owner;

(v) At any time during construction, Interconnected Transmission Owner shall have the right to gain unrestricted access to Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades and to conduct inspections of the same;

(vi) At any time during construction, should any phase of the engineering, equipment procurement, or construction of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades not meet the standards and specifications provided by Interconnection Transmission Owner, Interconnection Customer shall be obligated to remedy deficiencies in that portion of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades;

*(*vii*) Interconnection Customer shall indemnify Interconnected Transmission Owner and Transmission Provider for claims arising from Interconnection Customer's construction of Transmission Owner Interconnection Facilities* that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades *under the terms and procedures applicable to Sections 12.1, 12.2, 12.3, and 12.4 of this Appendix 2.*

(viii) Interconnection Customer shall transfer control of Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades to Interconnected Transmission Owner;

(ix) Unless Parties otherwise agree, Interconnection Customer shall transfer ownership of Transmission Owner Attachment Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades to Interconnected Transmission Owner;

(x) Interconnected Transmission Owner shall approve and accept for operation and maintenance Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades to the extent engineered, procured, and constructed in accordance with this ICSA, Appendix 2, section 3.2.3.2;

(xi) Interconnection Customer shall deliver to Transmission Owner "as-built" drawings, information, and any other documents that are reasonably required by Transmission Provider to assure that the Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades are built to the standards and specifications required by Transmission Provider; and

(xii) If Interconnection Customer exercises the Option to Build pursuant to section 3.2.3.1, Interconnection Customer shall pay Interconnected Transmission Owner the agreed upon amount of $0 for Interconnected Transmission Owner to execute the responsibilities enumerated to Interconnected Transmission Owner under section 3.2.3.2. Interconnected Transmission Owner shall invoice Interconnection Customer for this total amount to be divided on a monthly basis pursuant to Interconnection Service Agreement, Tariff, Attachment O, Appendix 2, section 11.2.2.

(b) In addition to the General Conditions applicable to Option to Build set forth in section 3.2.3.2(a) above, the following conditions also apply:

(i) The Interconnection Customer must obtain or arrange to obtain all necessary permits and authorizations for the construction and installation of the Transmission Owner Interconnection Facilities that it is building, provided, however, that when the Interconnected Transmission Owner's assistance is required, the Interconnected Transmission Owner shall assist the Interconnection Customer in obtaining such necessary permits or authorizations with efforts similar in nature and extent to those that the Interconnected Transmission Owner typically undertakes in acquiring permits and authorizations for construction of facilities on its own behalf;

(ii) The Interconnection Customer must obtain all necessary land rights for the construction and installation of the Transmission Owner Interconnection Facilities that it is building, provided, however, that upon Interconnection Customer's reasonable request, the Interconnected Transmission Owner shall assist the Interconnection Customer in acquiring such land rights with efforts similar in nature and extent to those that the Interconnected Transmission Owner typically undertakes in acquiring land rights for construction of facilities on its own behalf;

(iii) Notwithstanding anything stated herein, each Interconnected Transmission Owner shall have the exclusive right and obligation to perform the line attachments (tie-in work), and to calibrate remote terminal units and relay settings, required for the interconnection to such Interconnected Transmission Owner's existing facilities of any Transmission Owner Interconnection Facilities that the Interconnection Customer builds;

(iv) The Transmission Owner Interconnection Facilities built by the Interconnection Customer shall be successfully inspected, tested and energized pursuant to Sections 3.8 and 3.9 of this Appendix 2; and

3.2.3.3 Additional Conditions Regarding Network Facilities:

To the extent that the Interconnection Customer utilizes the Option to Build for design, procurement, construction and/or installation of (a) any Transmission Owner Interconnection Facilities that are Direct Connection Network Upgrades to Transmission System facilities that are in existence or under construction by or on behalf of the Interconnected Transmission Owner on the date that the Interconnection Customer solicits bids under Section 3.2.3.7 below, or (b) Transmission Owner Interconnection Facilities that are Transmission Owner Attachment Facilities and Direct Connection Network Upgrades that are to be located on land or in right-of-way owned

or controlled by the Interconnected Transmission Owner, and in addition to the other terms and conditions applicable to the design, procurement, construction and/or installation of facilities under this Appendix 2, all work shall comply with the following further conditions:

(i) All work performed by or on behalf of the Interconnection Customer shall be conducted by contractors, and using equipment manufacturers or vendors, that are listed on the Interconnected Transmission Owner's List of Approved Contractors;

(ii) The Interconnected Transmission Owner shall have full site control of, and reasonable access to, its property at all times for purposes of tagging or operation, maintenance, repair or construction of modifications to, its existing facilities and/or for performing all tie-ins of Interconnection Facilities built by or for the Interconnection Customer; and for acceptance testing of any equipment that will be owned and/or operated by the Interconnected Transmission Owner;

(iii) The Interconnected Transmission Owner shall have the right to have a reasonable number of appropriate representatives present for all work done on its property/facilities or regarding the Transmission Owner Attachment Facilities and Direct Connection Network Upgrades and the right to stop, or to order corrective measures with respect to, any such work that reasonably could be expected to have an adverse effect on reliability, safety or security of persons or of property of the Interconnected Transmission Owner or any portion of the Transmission System, provided that, unless circumstances do not reasonably permit such consultations, the Interconnected Transmission Owner shall consult with the Interconnection Customer and with Transmission Provider before directing that work be stopped or ordering any corrective measures;

(iv) The Interconnection Customer and its contractors, employees and agents shall comply with the Interconnected Transmission Owner's safety, security and work rules, environmental guidelines and training requirements applicable to the area(s) where construction activity is occurring and shall provide all reasonably required documentation to the Interconnected Transmission Owner, provided that the Interconnected Transmission Owner previously has provided its safety, security and work rules and training requirements applicable to work on its facilities to Transmission Provider and the Interconnection Customer within 20 Business Days after a request therefor made by Interconnection Customer following its receipt of the Facilities Study;

(v) The Interconnection Customer shall be responsible for controlling the performance of its contractors, employees and agents; and

(vi) All activities performed by or on behalf of the Interconnection Customer pursuant to its exercise of the Option to Build shall be subject to compliance with Applicable Laws and Regulations, including those governing union staffing and bargaining unit obligations, and Applicable Standards.

3.2.3.4 Administration of Conditions:

To the extent that the Interconnected Transmission Owner exercises any discretion in the application of any of the conditions stated in Sections 3.2.3.2 and 3.2.3.3 of this Appendix 2, it

shall apply each such condition in a manner that is reasonable and not unduly discriminatory and it shall not unreasonably withhold, condition, or delay any approval or authorization that the Interconnection Customer may require for the purpose of complying with any of those conditions.

3.2.3.5 Approved Contractors:

(a) Each Transmission Owner shall develop and shall provide to Transmission Provider a List of Approved Contractors. Each Transmission Owner shall include on its List of Approved Contractors no fewer than three contractors and no fewer than three manufacturers or vendors of major transmission-related equipment, unless a Transmission Owner demonstrates to Transmission Provider's reasonable satisfaction that it is feasible only to include a lesser number of construction contractors, or manufacturers or vendors, on its List of Approved Contractors. Transmission Provider shall publish each Transmission Owner's List of Approved Contractors in a PJM Manual and shall make such manual available on its internet website.

(b) Upon request of an Interconnection Customer, a Transmission Owner shall add to its List of Approved Contractors (1) any design or construction contractor regarding which the Interconnection Customer provides such information as the Transmission Owner may reasonably require which demonstrates to the Transmission Owner's reasonable satisfaction that the candidate contractor is qualified to design, or to install and/or construct new facilities or upgrades or modifications to existing facilities on the Transmission Owner's system, or (2) any manufacturer or vendor of major transmission-related equipment (e.g., high-voltage transformers, transmission line, circuit breakers) regarding which the Interconnection Customer provides such information as the Transmission Owner may reasonably require which demonstrates to the Transmission Owner's reasonable satisfaction that the candidate entity's major transmission-related equipment is acceptable for installation and use on the Transmission Owner's system. No Transmission Owner shall unreasonably withhold, condition, or delay its acceptance of a contractor, manufacturer, or vendor proposed for addition to its List of Approved Contractors.

3.2.3.6 Construction by Multiple Interconnection Customers:

In the event that there are multiple Interconnection Customers that wish to exercise an Option to Build with respect to Interconnection Facilities of the types described in Section 3.2.3.3 to this Appendix 2, the Transmission Provider shall determine how to allocate the construction responsibility among them unless they reach agreement among themselves on how to proceed.

3.2.3.7 Option Procedures:

(a) Within 10 days after notifying Transmission Provider and the Interconnected Transmission Owner of its election to exercise the Option to Build, Interconnection Customer shall solicit bids from one or more Approved Contractors named on the Interconnected Transmission Owner's List of Approved Contractors to procure equipment for, and/or to design, construct and/or install, the Transmission Owner Interconnection Facilities that the Interconnection Customer seeks to build under the Option to Build on terms (i) that will meet the Interconnection Customer's proposed schedule; (ii) that, if the Interconnection Customer seeks to have an Approved Contractor construct or install Transmission Owner Attachment Facilities and Direct Connection Network

Upgrades, will satisfy all of the conditions on construction specified in Sections 3.2.3.2 and 3.2.3.3 of this Appendix 2; and (iii) that will satisfy the obligations of a Constructing Entity (other than those relating to responsibility for the costs of facilities) under this Appendix 2.

(b) Any additional costs arising from the bidding process or from the final bid of the successful Approved Contractor shall be the sole responsibility of the Interconnection Customer.

(c) Upon receipt of a qualifying bid acceptable to it, the Interconnection Customer shall contract with the Approved Contractor that submitted the qualifying bid. Such contract shall meet the standards stated in paragraph (a) of this section.

(d) In the absence of a qualifying bid acceptable to the Interconnection Customer in response to its solicitation, the Interconnected Transmission Owner(s) shall be responsible for the design, procurement, construction and installation of the Transmission Owner Interconnection Facilities in accordance with the Standard Option described in Section 3.2.1 of this Appendix 2.

3.2.3.8 Interconnection Customer Drawings:

Interconnection Customer shall submit to the Interconnected Transmission Owner and Transmission Provider initial drawings, certified by a professional engineer, of the Transmission Owner Interconnection Facilities that Interconnection Customer arranges to build under this Option to Build. The Interconnected Transmission Owner shall review and approve the initial drawings and engineering design of the Transmission Owner Interconnection Facilities to be constructed under the Option to Build. The Interconnected Transmission Owner shall review the drawings to assess the consistency of Interconnection Customer's design of the pertinent Transmission Owner Interconnection Facilities with Applicable Standards and the Facilities Study. Interconnected Transmission Owner, with facilitation and oversight by Transmission Provider, shall provide comments on such drawings to Interconnection Customer within sixty days after its receipt thereof, after which time any drawings not subject to comment shall be deemed to be approved. All drawings provided hereunder shall be deemed to be Confidential Information.

3.2.3.9 Effect of Review:

Interconnected Transmission Owner's review of Interconnection Customer's initial drawings of the Transmission Owner Interconnection Facilities that the Interconnection Customer is building shall not be construed as confirming, endorsing or providing a warranty as to the fitness, safety, durability or reliability of such facilities or the design thereof. At its sole cost and expense, Interconnection Customer shall make such changes to the design of the pertinent Transmission Owner Interconnection Facilities as may reasonably be required by Transmission Provider, in consultation with the Interconnected Transmission Owner, to ensure that the Transmission Owner Interconnection Facilities that Interconnection Customer is building meet Applicable Standards and conform with the Facilities Study.

3.3 Revisions to Schedule of Work:

The Schedule of Work shall be revised as required in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals, or otherwise by mutual agreement of the Construction Parties, which agreement shall not be unreasonably withheld, conditioned or delayed.

3.4 Suspension:

The following provision applies to Interconnection Requests which have entered the New Services Queue prior to February 1, 2011:

Interconnection Customer shall have the right, upon written notice to Transmission Provider and Interconnected Transmission Owner, to suspend at any time all work by Interconnected Transmission Owner associated with the construction and installation of the Transmission Owner Interconnection Facilities required under an Interconnection Service Agreement or Interconnection Construction Service Agreement, with the condition that, notwithstanding such suspension, the Transmission System shall be left in a safe and reliable condition in accordance with Good Utility Practice and Transmission Provider's safety and reliability criteria. This suspension right permits the Interconnection Customer to request one or more suspensions of work for a cumulative period of up to three years. Interconnection Customer's notice of suspension shall include an estimated duration of the suspension and other information related to the suspension.

The following provision applies to Interconnection Requests which have entered the New Services Queue on or after February 1, 2011:

Interconnection Customer shall have the right, upon written notice to Transmission Provider and Interconnected Transmission Owner, to suspend at any time all work by Interconnected Transmission Owner associated with the construction and installation of the Transmission Owner Interconnection Facilities required under an Interconnection Service Agreement or Interconnection Construction Service Agreement, with the condition that, notwithstanding such suspension, the Transmission System shall be left in a safe and reliable condition in accordance with Good Utility Practice and Transmission Provider's safety and reliability criteria. This suspension right permits the Interconnection Customer to request one or more suspensions of work for a cumulative period of up to (i) three years if the Transmission Provider determines that such suspension would not be deemed a Material Modification, or (ii) one year if the Transmission Provider determines that such suspension would be deemed a Material Modification. Interconnection Customer's notice of suspension shall include an estimated duration of the suspension and other information related to the suspension.

3.4.1 Costs:

In the event of a suspension under this section, Interconnection Customer shall be responsible for all reasonable and necessary Cancellation Costs which Interconnected Transmission Owner or Transmission Provider (i) has incurred pursuant to the Interconnection Service Agreement or Interconnection Construction Service Agreement prior to the suspension and (ii) incurs in suspending such work, including any costs incurred to perform such work as may be necessary to ensure the safety of persons and property and the integrity of the Transmission System during

such suspension and, if applicable, any costs incurred in connection with the cancellation or suspension of material, equipment and/or labor contracts which Interconnected Transmission Owner or Transmission Provider cannot reasonably avoid; provided, however, that prior to cancelling or suspending any such material, equipment or labor contract, Interconnected Transmission Owner or Transmission Provider, as the case may be, shall obtain Interconnection Customer's authorization to do so. Transmission Provider shall invoice Interconnection Customer pursuant to Section 9 of this Appendix 2 for Cancellation Costs for which the customer is liable under this section. Interconnected Transmission Owner and Transmission Provider shall use due diligence to minimize Cancellation Costs in the event of a suspension of work.

3.4.2 Duration of Suspension:

In the event Interconnection Customer suspends work by Interconnected Transmission Owner required under an Interconnection Service Agreement or Interconnection Construction Service Agreement pursuant to this Section 3.4, and has not requested Transmission Provider and the Interconnected Transmission Owner to recommence the work required under the applicable agreement(s) on or before the expiration of the time period allowed under this Section 3.4 following commencement of such suspension, the Interconnection Construction Service Agreement and the Interconnection Service Agreement for the Interconnection Request for which Interconnection Customer suspended work shall be deemed terminated as of the end of such suspension time period. The suspension time shall begin on the date the suspension is requested, or on the date of Interconnection Customer's written notice of suspension to Transmission Provider, if no effective date was specified.

3.5 Right to Complete Transmission Owner Interconnection Facilities:

In the event that, at any time prior to successful Stage Two energization of the Transmission Owner Interconnection Facilities pursuant to Section 3.9 of Appendix 2, the Interconnection Customer terminates its obligations under this Appendix 2 pursuant to Section 14.1.2 below due to a Default by the Interconnected Transmission Owner, the Interconnection Customer may elect to complete the design, procurement, construction and installation of the Transmission Owner Interconnection Facilities. The Interconnection Customer shall notify the Interconnected Transmission Owner and Transmission Provider in writing of its election to complete the Transmission Owner Interconnection Facilities within 10 days after the date of Interconnection Customer's notice of termination pursuant to Section 14.1.2 of this Appendix 2. In the event that the Interconnection Customer elects to complete the Transmission Owner Interconnection Facilities, it shall do so in accordance with the terms and conditions of the Option to Build under Section 3.2.3 of this Appendix 2 and shall be responsible for paying all costs of completing the Transmission Owner Interconnection Facilities incurred after the date of its notice of election to complete the facilities. Interconnection Customer may take possession of, and may use in completing the Transmission Owner Interconnection Facilities, any materials and supplies and equipment (other than equipment and facilities that already have been installed or constructed) acquired by the Interconnected Transmission Owner for construction, and included in the Costs, of the Transmission Owner Interconnection Facilities, provided that Interconnection Customer shall pay Transmission Provider, for the benefit of the Interconnected Transmission Owner and upon presentation by Interconnected Transmission Owner of reasonable and appropriate documentation thereof, any

amounts expended by the Interconnected Transmission Owner for such materials, supplies and equipment that Interconnection Customer has not already paid. Title to all Transmission Owner Interconnection Facilities constructed by Interconnection Customer under this Section 3.5 shall be transferred to the Interconnected Transmission Owner in accordance with Section 5.5 of this Appendix 2.

3.6 Suspension of Work Upon Default:

Upon the occurrence of a Default by Interconnection Customer as defined in Section 13 of this Appendix 2, the Transmission Provider or the Interconnected Transmission Owner may by written notice to Interconnection Customer suspend further work associated with the construction and installation of the Transmission Owner Interconnection Facilities that the Interconnected Transmission Owner is responsible for constructing. Such suspension shall not constitute a waiver of any termination rights under this Interconnection Construction Service Agreement. In the event of a suspension by Transmission Provider or Interconnected Transmission Owner, the Interconnection Customer shall be responsible for the Costs incurred in connection with any suspension hereunder in accordance with Section 14.3 of this Appendix 2.

3.7 Construction Reports:

Each Constructing Entity shall issue reports to each other Construction Party on a monthly basis, and at such other times as reasonably requested, regarding the status of the construction and installation of the Interconnection Facilities. Each Construction Party shall promptly identify, and shall notify each other Construction Party of, any event that the Construction Party reasonably expects may delay completion, or may significantly increase the cost, of the Interconnection Facilities. Should a Construction Party report such an event, Transmission Provider shall, within fifteen days of such notification, convene a technical meeting of the Construction Parties to evaluate schedule alternatives.

3.8 Inspection and Testing of Completed Facilities

3.8.1 Coordination:

Interconnection Customer and the Interconnected Transmission Owner shall coordinate the timing and schedule of all inspection and testing of the Interconnection Facilities.

3.8.2 Inspection and Testing:

Each Constructing Entity shall cause inspection and testing of the Interconnection Facilities that it constructs in accordance with the provisions of this section. The Construction Parties acknowledge and agree that inspection and testing of facilities may be undertaken as facilities are completed and need not await completion of all of the facilities that a Constructing Entity is building.

3.8.2.1 Of Interconnection Customer-Built Facilities:

Upon the completion of the construction and installation, but prior to energization, of any Interconnection Facilities constructed by the Interconnection Customer and related portions of the Customer Facility, the Interconnection Customer shall have the same inspected and/or tested by an authorized electric inspection agency or qualified third party reasonably acceptable to the Interconnected Transmission Owner to assess whether the facilities substantially comply with Applicable Standards. Said inspection and testing shall be held on a mutually agreed-upon date, and the Interconnected Transmission Owner and Transmission Provider shall have the right to attend and observe, and to obtain the written results of, such testing.

3.8.2.2 Of Interconnected Transmission Owner-Built Facilities:

Upon the completion of the construction and installation, but prior to energization, of any Interconnection Facilities constructed by the Interconnected Transmission Owner, the Interconnected Transmission Owner shall have the same inspected and/or tested by qualified personnel or a qualified contractor to assess whether the facilities substantially comply with Applicable Standards. Subject to Applicable Laws and Regulations, said inspection and testing shall be held on a mutually agreed-upon date, and the Interconnection Customer and Transmission Provider shall have the right to attend and observe, and to obtain the written results of, such testing.

3.8.3 Review of Inspection and Testing by Interconnected Transmission Owner:

In the event that the written report, or the observation of either Constructing Entity or Transmission Provider, of the inspection and/or testing pursuant to Section 3.8.2 of this Appendix 2 reasonably leads the Transmission Provider or Interconnected Transmission Owner to believe that the inspection and/or testing of some or all of the Interconnection Facilities built by the Interconnection Customer was inadequate or otherwise deficient, the Interconnected Transmission Owner may, within 20 days after its receipt of the results of inspection or testing and upon reasonable notice to the Interconnection Customer, perform its own inspection and/or testing of such Interconnection Facilities to determine whether the facilities are acceptable for energization, which determination shall not be unreasonably delayed, withheld or conditioned.

3.8.4 Notification and Correction of Defects

3.8.4.1 If the Interconnected Transmission Owner, based on inspection or testing pursuant to Section 3.8.2 or 3.8.3 of this Appendix 2, identifies any defects or failures to comply with Applicable Standards in the Interconnection Facilities constructed by the Interconnection Customer, the Interconnected Transmission Owner shall notify the Interconnection Customer and Transmission Provider of any identified defects or failures within 20 days after the Interconnected Transmission Owner's receipt of the results of such inspection or testing. The Interconnection Customer shall take appropriate actions to correct any such defects or failure at its sole cost and expense, and shall obtain the Interconnected Transmission Owner's acceptance of the corrections, which acceptance shall not be unreasonably delayed, withheld or conditioned. Such acceptance does not modify and shall not limit the Interconnection Customer's indemnification obligations set forth in Appendix 2, section 3.2.3.2(e).

3.8.4.2 In the event that inspection and/or testing of any Transmission Owner Interconnection Facilities built by the Interconnected Transmission Owner identifies any defects or failures to comply with Applicable Standards in such facilities, Interconnected Transmission Owner shall take appropriate action to correct any such defects or failures within 20 days after it learns thereof. In the event that such a defect or failure cannot reasonably be corrected within such 20-day period, Interconnected Transmission Owner shall commence the necessary correction within that time and shall thereafter diligently pursue it to completion.

3.8.5 Notification of Results:

Within 10 days after satisfactory inspection and/or testing of Interconnection Facilities built by the Interconnection Customer (including, if applicable, inspection and/or testing after correction of defects or failures), the Interconnected Transmission Owner shall confirm in writing to the Interconnection Customer and Transmission Provider that the successfully inspected and tested facilities are acceptable for energization.

3.9 Energization of Completed Facilities

(A) Unless otherwise provided in the Schedule of Work, energization of the Interconnection Facilities related to interconnection of a Generation Interconnection Customer and, when applicable as determined by Transmission Provider, of the Interconnection Facilities related to interconnection of a Transmission Interconnection Customer, shall occur in two stages. Stage One energization shall consist of energization of the Customer Interconnection Facilities and of the Transmission Owner Attachment Facilities and will occur prior to initial energization of the Customer Facility. Stage Two energization shall consist of (1) initial synchronization to the Transmission System of any completed generator(s) at the Customer Facility of a Generation Interconnection Customer, or of applicable facilities, as determined by the Transmission Provider, associated with Merchant Transmission Facilities of a Transmission Interconnection Customer, and (2) energization of the remainder of the Transmission Owner Interconnection Facilities. Stage Two energization shall be completed prior to Initial Operation of the Customer Facility.

(B) In the case of Interconnection Facilities related to interconnection of a Transmission Interconnection Customer for which the Transmission Provider determines that two-stage energization is inapplicable, energization shall occur in a single stage, consisting of energization of the Interconnection Facilities and the Customer Facility. Such a single-stage energization shall be regarded as Stage Two energization for the purposes of the remaining provisions of this Section 3.9 and of Section 5.5 of this Appendix 2.

3.9.1

Stage One energization of the Interconnection Facilities may not occur prior to the satisfaction of the following additional conditions:

(a) The Interconnection Customer shall have delivered to the Interconnected Transmission Owner and Transmission Provider a writing transferring to the Interconnected Transmission Owner and Transmission Provider operational control over any Transmission Owner Attachment Facilities that Interconnection Customer has constructed; and

(b) The Interconnection Customer shall have provided a mark-up of construction drawings to the Interconnected Transmission Owner to show the "as-built" condition of all Transmission Owner Attachment Facilities that Interconnection Customer has constructed.

3.9.2 As soon as practicable after the satisfaction of the conditions for Stage One energization specified in Sections 3.8 and 3.9.1 of this Appendix 2, the Interconnected Transmission Owner and the Interconnection Customer shall coordinate and undertake the Stage One energization of facilities.

3.9.3 Stage Two energization of the Interconnection Facilities may not occur prior to the satisfaction of the following additional conditions:

(a) The Interconnection Customer shall have delivered to the Interconnected Transmission Owner and Transmission Provider a writing transferring to the Interconnected Transmission Owner and Transmission Provider operational control over any Transmission Owner Interconnection Facilities that Interconnection Customer has constructed and operational control of which it has not previously transferred pursuant to Section 3.9.1 of this Appendix 2; and

(b) The Interconnection Customer shall have provided a mark-up of construction drawings to the Interconnected Transmission Owner to show the "as-built" condition of all Transmission Owner Interconnection Facilities that Interconnection Customer has constructed and which were not included in the Stage One energization, but are included in the Stage Two energization.

(c) Telemetering systems shall be operational and shall be providing Transmission Provider and the Interconnected Transmission Owner with telemetered data as specified pursuant to Section 8.5.2 of Appendix 2 to the Interconnection Service Agreement.

3.9.4 As soon as practicable after the satisfaction of the conditions for Stage Two energization specified in Sections 3.8 and 3.9.3 of this Appendix 2, the Interconnected Transmission Owner and the Interconnection Customer shall coordinate and undertake the Stage Two energization of facilities.

3.9.5 To the extent defects in any Interconnection Facilities are identified during the energization process, the energization will not be deemed successful. In that event, the Constructing Entity shall take action to correct such defects in any Interconnection Facilities that it built as promptly as practical after the defects are identified. The affected Constructing Entity shall so notify the other Construction Parties when it has corrected any such defects, and the Constructing Entities shall recommence efforts, within 10 days thereafter, to energize the appropriate Interconnection Facilities in accordance with Section 3.9; provided that the Interconnected Transmission Owner may, in the reasonable exercise of its discretion and with the approval of Transmission Provider, require that further inspection and testing be performed in accordance with Section 3.8 of this Appendix 2.

3.10 Interconnected Transmission Owner's Acceptance of Facilities Constructed by Interconnection Customer:

Within five days after determining that Interconnection Facilities have been successfully energized, the Interconnected Transmission Owner shall issue a written notice to the Interconnection Customer accepting the Interconnection Facilities built by the Interconnection Customer that were successfully energized. Such acceptance shall not be construed as confirming, endorsing or providing a warranty by the Interconnected Transmission Owner as to the design, installation, construction, fitness, safety, durability or reliability of any Interconnection Facilities built by the Interconnection Customer, or their compliance with Applicable Standards.

4 Transmission Outages

4.1 Outages; Coordination:

The Construction Parties acknowledge and agree that certain outages of transmission facilities owned by the Interconnected Transmission Owner, as more specifically detailed in the Scope of Work, may be necessary in order to complete the process of constructing and installing all Interconnection Facilities. The Construction Parties further acknowledge and agree that any such outages shall be coordinated by and through the Transmission Provider.

5 Land Rights; Transfer of Title

5.1 Grant of Easements and Other Land Rights:

Interconnection Customer at its sole cost and expense, shall grant such easements and other land rights to the Interconnected Transmission Owner over the Site at such times and in such a manner as the Interconnected Transmission Owner may reasonably require to perform its obligations under this Appendix 2 and/or to perform its operation and maintenance obligations under the Interconnection Service Agreement.

5.2 Construction of Facilities on Interconnection Customer Property:

To the extent that the Interconnected Transmission Owner is required to construct and install any Transmission Owner Interconnection Facilities on land owned by the Interconnection Customer, the Interconnection Customer, at its sole cost and expense, shall legally transfer to the Interconnected Transmission Owner all easements and other land rights required pursuant to Section 5.1 above prior to the commencement of such construction and installation.

5.3 Third Parties:

If any of the easements and other land rights described in Section 5.1 above must be obtained from a third party, the Interconnected Transmission Owner's obligation for completing its construction responsibilities in accordance with the Schedule of Work, to the extent of the facilities that it is responsible for constructing for which such easements and land rights are necessary, shall be subject to Interconnection Customer's acquisition of such easements and other land rights at such

times and in such manner as the Interconnected Transmission Owner may reasonably require to perform its obligations under this Appendix 2, and/or to perform its operation and maintenance obligations under the Interconnection Service Agreement, provided, however, that upon Interconnection Customer's request, the Interconnected Transmission Owner shall assist the Interconnection Customer in acquiring such land rights with efforts similar in nature and extent to those that the Interconnected Transmission Owner typically undertakes in acquiring land rights for construction of facilities on its own behalf. The terms of easements and land rights acquired by Interconnection Customer shall not unreasonably impede the Interconnected Transmission Owner's timely completion of construction of the affected facilities.

5.4 Documentation:

Interconnection Customer shall prepare, execute and file such documentation as the Interconnected Transmission Owner may reasonably require to memorialize any easements and other land rights granted pursuant to this Section 5. Documentation of such easements and other land rights, and any associated filings, shall be in a form acceptable to the Interconnected Transmission Owner.

5.5 Transfer of Title to Certain Facilities Constructed By Interconnection Customer:

Within thirty (30) days after the Interconnection Customer's receipt of notice of acceptance under Section 3.10 of this Appendix 2 following Stage Two energization of the Interconnection Facilities, the Interconnection Customer shall deliver to the Interconnected Transmission Owner, for the Interconnected Transmission Owner's review and approval, all of the documents and filings necessary to transfer to the Interconnected Transmission Owner title to any Transmission Owner Interconnection Facilities constructed by the Interconnection Customer, and to convey to the Interconnected Transmission Owner any easements and other land rights to be granted by Interconnection Customer in accordance with Section 5.1 above that have not then already been conveyed. The Interconnected Transmission Owner shall review and approve such documentation, such approval not to be unreasonably withheld, delayed, or conditioned. Within 30 days after its receipt of the Interconnected Transmission Owner's written notice of approval of the documentation, the Interconnection Customer, in coordination and consultation with the Interconnected Transmission Owner, shall make any necessary filings at the FERC or other governmental agencies for regulatory approval of the transfer of title. Within twenty (20) days after the issuance of the last order granting a necessary regulatory approval becomes final (i.e., is no longer subject to rehearing), the Interconnection Customer shall execute all necessary documentation and shall make all necessary filings to record and perfect the Interconnected Transmission Owner's title in such facilities and in the easements and other land rights to be conveyed to the Interconnected Transmission Owner. Prior to such transfer to the Interconnected Transmission Owner of title to the Transmission Owner Interconnection Facilities built by the Interconnection Customer, the risk of loss or damages to, or in connection with, such facilities shall remain with the Interconnection Customer. Transfer of title to facilities under this section shall not affect the Interconnection Customer's receipt or use of the interconnection rights related to Network Upgrades and/or Local Upgrades for which it otherwise may be eligible as provided in Subpart C of Part VI of the Tariff.

5.6 Liens:

The Interconnection Customer shall take all reasonable steps to ensure that, at the time of transfer of title in the Transmission Owner Interconnection Facilities built by the Interconnection Customer to the Interconnected Transmission Owner, those facilities shall be free and clear of any and all liens and encumbrances, including mechanics' liens. To the extent that the Interconnection Customer cannot reasonably clear a lien or encumbrance prior to the time for transferring title to the Interconnected Transmission Owner, Interconnection Customer shall nevertheless convey title subject to the lien or encumbrance and shall indemnify, defend and hold harmless the Interconnected Transmission Owner against any and all claims, costs, damages, liabilities and expenses (including without limitation reasonable attorneys' fees) which may be brought or imposed against or incurred by Interconnected Transmission Owner by reason of any such lien or encumbrance or its discharge.

6 Warranties

6.1 Interconnection Customer Warranty:

The Interconnection Customer shall warrant that its work (or the work of any subcontractor that it retains) in constructing and installing the Transmission Owner Interconnection Facilities that it builds is free from defects in workmanship and design and shall conform to the requirements of this Interconnection Construction Service Agreement for one (1) year (the "Interconnection Customer Warranty Period") commencing upon the date title is transferred to Interconnected Transmission Owner in accordance with Section 5.5 of this Appendix 2. The Interconnection Customer shall, at its sole expense and promptly after notification by the Interconnected Transmission Owner, correct or replace defective work in accordance with Applicable Technical Requirements and Standards, during the Interconnection Customer Warranty Period. The warranty period for such corrected or replaced work shall be the unused portion of the Interconnection Customer Warranty Period remaining as of the date of notice of the defect. The Interconnection Customer Warranty Period shall resume upon acceptance of such corrected or replaced work. All Costs incurred by Interconnected Transmission Owner as a result of such defective work shall be reimbursed to the Interconnected Transmission Owner by the Interconnection Customer on demand; provided that the Interconnected Transmission Owner submits the demand to the Interconnection Customer within the Interconnection Customer Warranty Period and provides reasonable documentation of the claimed costs. The Interconnected Transmission Owner's acceptance, inspection and testing, or a third party's inspection or testing, of such facilities pursuant to Section 3.8 of this Appendix 2 shall not be construed to limit in any way the warranty obligations of the Interconnection Customer, and this provision does not modify and shall not limit the Interconnection Customer's indemnification obligations set forth in Appendix 2, section 3.2.3.2(e).

6.2 Manufacturer Warranties:

Prior to the transfer to the Interconnected Transmission Owner of title to the Transmission Owner Interconnection Facilities built by the Interconnection Customer, the Interconnection Customer shall produce documentation satisfactory to the Interconnected Transmission Owner evidencing the transfer to the Interconnected Transmission Owner of all manufacturer warranties for

equipment and/or materials purchased by the Interconnection Customer for use and/or installation as part of the Transmission Owner Interconnection Facilities built by the Interconnection Customer.

7 [Reserved.]

8 [Reserved.]

9 Security, Billing And Payments

The following provisions shall apply with respect to charges for the Costs of the Interconnected Transmission Owner for which the Interconnection Customer is responsible.

9.1 Adjustments to Security:

The Security provided by Interconnection Customer at or before execution of the Interconnection Service Agreement (a) shall be reduced as portions of the work are completed, and/or (b) shall be increased or decreased as required to reflect adjustments to Interconnection Customer's cost responsibility, as determined in accordance with Section 217, to correspond with changes in the Scope of Work developed in accordance with Transmission Provider's scope change process for interconnection projects set forth in the PJM Manuals.

9.2 Invoice:

The Interconnected Transmission Owner shall provide Transmission Provider a quarterly statement of the Interconnected Transmission Owner's scheduled expenditures during the next three months for, as applicable, (a) the design, engineering and construction of, and/or for other charges related to, construction of the Interconnection Facilities for which the Interconnected Transmission Owner is responsible under this Interconnection Construction Service Agreement, or (b) in the event that the Interconnection Customer exercises the Option to Build pursuant to Section 3.2.3.1 of this Appendix 2, Interconnected Transmission Owner's oversight costs (i.e. costs incurred by the Interconnected Transmission Owner when engaging in oversight activities to satisfy itself that the Interconnection Customer is complying with the Interconnected Transmission Owner's standards and specifications for the construction of facilities) associated with the Interconnection Customer's building Transmission Owner Attachment Facilities and Direct Connection Network Upgrades, including but not limited to Costs for tie-in work and Cancellation Costs. Interconnected Transmission Owner's oversight costs shall be consistent with Tariff, Attachment P, Appendix 2, section 3.2.3.2(a)(12). Transmission Provider shall bill Interconnection Customer on behalf of the Interconnected Transmission Owner, for the Interconnected Transmission Owner's expected Costs during the subsequent three months. Interconnection Customer shall pay each bill within twenty (20) days after receipt thereof. Upon receipt of each of Interconnection Customer's payments of such bills, Transmission Provider shall reimburse the Interconnected Transmission Owner. Interconnection Customer may request that the Transmission Provider provide a quarterly cost reconciliation. Such a quarterly cost reconciliation will have a one-quarter lag, e.g., reconciliation of costs for the first calendar quarter of work will be provided at the start of the third calendar quarter of work, provided, however, that

Section 9.3 of this Appendix 2 shall govern the timing of the final cost reconciliation upon completion of the work.

9.3 Final Invoice:

Within 120 days after the Interconnected Transmission Owner completes construction and installation of the Interconnection Facilities for which the Interconnected Transmission Owner is responsible under this Interconnection Construction Service Agreement, Transmission Provider shall provide Interconnection Customer with an accounting of, and the appropriate Construction Party shall make any payment to the other that is necessary to resolve, any difference between (a) Interconnection Customer's responsibility under the Tariff for the actual Cost of such facilities, and (b) Interconnection Customer's previous aggregate payments to Transmission Provider for the Costs of such facilities. Notwithstanding the foregoing, however, Transmission Provider shall not be obligated to make any payment to either the Interconnection Customer or the Interconnected Transmission Owner that the preceding sentence requires it to make unless and until the Transmission Provider has received the payment that it is required to refund from the Construction Party owing the payment.

9.4 Disputes:

In the event of a billing dispute between any of the Construction Parties, Transmission Provider and the Interconnected Transmission Owner shall continue to perform their respective obligations pursuant to this Interconnection Construction Service Agreement so long as (a) Interconnection Customer continues to make all payments not in dispute, and (b) the Security held by the Transmission Provider while the dispute is pending exceeds the amount in dispute, or (c) Interconnection Customer pays to Transmission Provider or into an independent escrow account the portion of the invoice in dispute, pending resolution of such dispute. If Interconnection Customer fails to meet any of these requirements, then Transmission Provider shall so inform the other Construction Parties and Transmission Provider or the Interconnected Transmission Owner may provide notice to Interconnection Customer of a Breach pursuant to Section 13 of this Appendix 2.

9.5 Interest:

Interest on any unpaid, delinquent amounts shall be calculated in accordance with the methodology specified for interest on refunds in the FERC's regulations at 18 C.F.R. Section 35.19a(a)(2)(iii) and shall apply from the due date of the bill to the date of payment.

9.6 No Waiver:

Payment of an invoice shall not relieve Interconnection Customer from any other responsibilities or obligations it has under this Interconnection Construction Service Agreement, nor shall such payment constitute a waiver of any claims arising hereunder.

10 Assignment

10.1 Assignment with Prior Consent:

Except as provided in Section 10.2 below, no Construction Party shall assign its rights or delegate its duties, or any part of such rights or duties, under the Interconnection Construction Service Agreement without the written consent of the other Construction Parties, which consent shall not be unreasonably withheld, conditioned or delayed. Any such assignment or delegation made without such written consent shall be null and void. A Construction Party may make an assignment in connection with the sale, merger, or transfer of a substantial portion or all of its properties, including the Interconnection Facilities which it will own upon completion of construction and the transfer of title required by Section 5 of this Appendix 2, so long as the assignee in such a sale, merger, or transfer assumes in writing all rights, duties and obligations arising under this Interconnection Construction Service Agreement. In addition, the Interconnected Transmission Owner shall be entitled, subject to Applicable Laws and Regulations, to assign the Interconnection Construction Service Agreement to any Affiliate or successor that owns and operates all or a substantial portion of the Interconnected Transmission Owner's transmission facilities.

10.2 Assignment Without Prior Consent

10.2.1 Assignment to Owners:

Interconnection Customer may assign the Interconnection Construction Service Agreement without the Interconnected Transmission Owner's or Transmission Provider's prior consent to any Affiliate or person that purchases or otherwise acquires, directly or indirectly, all or substantially all of the Customer Facility and the Customer Interconnection Facilities, provided that prior to the effective date of any such assignment, the assignee shall demonstrate that, as of the effective date of the assignment, the assignee has the technical competence to comply with the requirements of this Appendix 2 and assumes in a writing provided to the Interconnected Transmission Owner and Transmission Provider all rights, duties, and obligations of Interconnection Customer arising under this Appendix 2. However, any assignment described herein shall not relieve or discharge the Interconnection Customer from any of its obligations hereunder absent the written consent of the Interconnected Transmission Owner, such consent not to be unreasonably withheld, conditioned or delayed.

10.2.2 Assignment to Lenders:

Interconnection Customer may, without the consent of the Transmission Provider or the Interconnected Transmission Owner, assign the Interconnection Construction Service Agreement to any Project Finance Entity(ies), provided that such assignment shall not alter or diminish Interconnection Customer's duties and obligations under this Interconnection Construction Service Agreement. If Interconnection Customer provides the Interconnected Transmission Owner with notice of an assignment to any Project Finance Entity(ies) and identifies such Project Finance Entities as contacts for notice purposes pursuant to Section 20 of this Appendix 2, the Transmission Provider or Interconnected Transmission Owner shall provide notice and reasonable opportunity for such entity(ies) to cure any Breach under this Appendix 2 in accordance with this Appendix 2. Transmission Provider or Interconnected Transmission Owner shall, if requested by such lenders, provide such customary and reasonable documents, including consents to assignment, as may be

reasonably requested with respect to the assignment and status of the Interconnection Construction Service Agreement, provided that such documents do not alter or diminish the rights of the Transmission Provider or Interconnected Transmission Owner under this Appendix 2, except with respect to providing notice of Breach to a Project Finance Entity. Upon presentation of the Transmission Provider's and/or the Interconnected Transmission Owner's invoice therefor, Interconnection Customer shall pay the Transmission Provider and/or the Interconnected Transmission Owner's reasonable documented cost of providing such documents and certificates. Any assignment described herein shall not relieve or discharge the Interconnection Customer from any of its obligations hereunder absent the written consent of the Interconnected Transmission Owner and Transmission Provider.

10.3 Successors and Assigns:

This Interconnection Construction Service Agreement and all of its provisions are binding upon, and inure to the benefit of, the Construction Parties and their respective successors and permitted assigns.

11 Insurance

11.1 Required Coverages For Generation Resources Of More Than 20 Megawatts or Merchant Transmission Facilities:

Each Constructing Entity shall maintain, at its own expense, insurance as described in paragraphs (a) through (e) below. All insurance shall be procured from insurance companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities will be located. Failure to maintain required insurance shall be a Breach of the Interconnection Construction Service Agreement.

(a) Workers Compensation Insurance with statutory limits, as required by the state and/or jurisdiction in which the work is to be performed, and employer's liability insurance with limits of not less than one million dollars ($1,000,000).

(b) Commercial General Liability Insurance and/or Excess Liability Insurance covering liability arising out of premises, operations, personal injury, advertising , products and completed operations coverage, independent contractors coverage, liability assumed under an insured contract, coverage for pollution to the extent normally available and punitive damages to the extent allowable under applicable law, with limits of not less than one million dollars ($1,000,000) per occurrence/one million dollars ($1,000,000) general aggregate/one million dollars ($1,000,000) products and completed operations aggregate.

(c) Business/Commercial Automobile Liability Insurance for coverage of owned and non-owned and hired vehicles, trailers or semi-trailers designed for travel on public roads, with a minimum, combined single limit of not less than one million dollars ($1,000,000) each accident for bodily injury, including death, and property damage.

(d) Excess and/or Umbrella Liability Insurance with a limit of liability of twenty million dollars ($20,000,000) per occurrence. These limits apply in excess of the employer's liability, commercial general liability and business/commercial automobile liability coverages described above. This requirement can be met alone or via a combination of primary, excess and/or umbrella insurance.

(e) Professional Liability, including Contractors Legal Liability, providing errors, omissions and/or malpractice coverage. Coverage shall be provided for the Constructing Entity's duties, responsibilities and performance outlined in this Interconnection Construction Service Agreement, with limits of liability as follows:

$10,000,000 each occurrence
$10,000,000 aggregate

An Interconnected Entity may meet the Professional Liability Insurance requirements by requiring third-party contractors, designers, or engineers, or other parties that are responsible for design work associated with the transmission facilities or Interconnection Facilities necessary for the interconnection to procure professional liability insurance in the amounts and upon the terms prescribed by this section 11.1(e), and providing evidence of such insurance to the other Interconnected Entity. Such insurance shall be procured from companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities are located. Nothing in this section relieves the Interconnected Entity from complying with the insurance requirements. In the event that the policies of the designers, engineers, or other parties used to satisfy the Interconnected Entity's insurance obligations under this section become invalid for any reason, including but not limited to, (i) the policy(ies) lapsing or otherwise terminating or expiring; (ii) the coverage limits of such policy(ies) are decreased; or (iii) the policy(ies) do not comply with the terms and conditions of the Tariff; Interconnected Entity shall be required to procure insurance sufficient to meet the requirements of this section, such that there is no lapse in insurance coverage. Notwithstanding the foregoing, in the event an Interconnected Entity will not design or construct or cause to design or construct any new transmission facilities or Interconnection Facilities, Transmission Provider, in its discretion, may waive the requirement that an Interconnected Entity maintain the Professional Liability Insurance pursuant to this section.

11.1A. Required Coverages For Generation Resources Of 20 Megawatts Or Less:

Each Constructing Entity shall maintain the types of insurance as described in section 11.1 paragraphs (a) through (e) above in an amount sufficient to insure against all reasonably foreseeable direct liabilities given the size and nature of the generating equipment being interconnected, the interconnection itself, and the characteristics of the system to which the interconnection is made. Additional insurance may be required by the Interconnection Customer, as a function of owning and operating a Generating Facility. All insurance shall be procured from insurance companies rated "A-," VII or better by AM Best and authorized to do business in a state or states in which the Interconnection Facilities are located. Failure to maintain required insurance shall be a Breach of the Interconnection Construction Service Agreement.

11.2 Additional Insureds:

The Commercial General Liability, Business/Commercial Automobile Liability and Excess and/or Umbrella Liability policies procured by each Constructing Entity (the "Insuring Constructing Entity") shall include each other Construction Party (the "Insured Construction Party"), its officers, agents and employees as additional insureds, providing all standard coverages and covering liability of the Insured Construction Party arising out of bodily injury and/or property damage (including loss of use) in any way connected with the operations, performance, or lack of performance under this Interconnection Construction Service Agreement.

11.3 Other Required Terms:

The above-mentioned insurance policies (except workers' compensation) shall provide the following:

(a) Each policy shall contain provisions that specify that it is primary and non contributory for any liability arising out of that party's negligence and shall apply to such extent without consideration for other policies separately carried and shall state that each insured is provided coverage as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount for which the insurer would have been liable had only one insured been covered. Each Insuring Constructing Entity shall be responsible for its respective deductibles or retentions.

(b) If any coverage is written on a Claims First Made Basis, continuous coverage shall be maintained or an extended discovery period will be exercised for a period of not less than two (2) years after termination of the Interconnection Construction Service Agreement.

(c) Provide for a waiver of all rights of subrogation which the Insuring Constructing Entity's insurance carrier might exercise against the Insured Construction Party.

11.3A No Limitation of Liability:

The requirements contained herein as to the types and limits of all insurance to be maintained by the Constructing Entities are not intended to and shall not in any manner, limit or qualify the liabilities and obligations assumed by the Construction Parties under the Interconnection Construction Service Agreement.

11.4 Self-Insurance:

Notwithstanding the foregoing, each Constructing Entity may self-insure to meet the minimum insurance requirements of this Section 11 to the extent it maintains a self-insurance program; provided that such Constructing Entity's senior secured debt is rated at investment grade or better by Standard & Poor's and its self-insurance program meets the minimum insurance requirements of this Section 11. For any period of time that a Constructing Entity's senior secured debt is unrated by Standard & Poor's or is rated at less than investment grade by Standard & Poor's, it shall comply with the insurance requirements applicable to it under this Section 11. In the event that a Constructing Entity is permitted to self-insure pursuant to this section, it shall notify the

other Construction Parties that it meets the requirements to self-insure and that its self-insurance program meets the minimum insurance requirements in a manner consistent with that specified in Section 11.5.

11.5 Notices; Certificates of Insurance:

Prior to the commencement of work pursuant to this Agreement, the Constructing Entities agree to furnish each other Construction Party with certificates of insurance evidencing the insurance coverage obtained in accordance with this Section 11. All certificates of insurance shall indicate that the certificate holder is included as an additional insured under the Commercial General Liability, Business/Commercial Automobile Liability and Excess and/or Umbrella Liability coverages, and that this insurance is primary with a waiver of subrogation in favor of the other Interconnected Entities. All policies of insurance shall provide for thirty days prior written notice of cancellation or material adverse change. If the policies of insurance do not or cannot be endorsed to provide thirty days prior written notice of cancellation or material adverse change, each Construction Entity shall provide the other Construction Entities with thirty days prior written notice of cancellation or material adverse change to any of the insurance required in this agreement.

11.6 Subcontractor Insurance:

In accord with Good Utility Practice, each Constructing Entity shall require each of its subcontractors to maintain and provide evidence of insurance coverage of types, and in amounts, commensurate with the risks associated with the services provided by the subcontractor. Bonding of contractors or subcontractors shall be at the hiring Constructing Entity's discretion, but regardless of bonding, the hiring principal shall be responsible for the performance or non-performance of any contractor or subcontractor it hires.

11.7 Reporting Incidents:

The Construction Parties shall report to each other in writing as soon as practical all accidents or occurrences resulting in injuries to any person, including death, and any property damage arising out of the Interconnection Construction Service Agreement.

12 Indemnity

12.1 Indemnity:

Each Constructing Entity shall indemnify and hold harmless the other Construction Parties, and the other Construction Parties' officers, shareholders, stakeholders, members, managers, representatives, directors, agents and employees, and Affiliates, from and against any and all loss, liability, damage, cost or expense to third parties, including damage and liability for bodily injury to or death of persons, or damage to property of persons (including reasonable attorneys' fees and expenses, litigation costs, consultant fees, investigation fees, sums paid in settlements of claims, penalties or fines imposed under Applicable Laws and Regulations, and any such fees and expenses incurred in enforcing this indemnity or collecting any sums due hereunder) (collectively, "Loss") to the extent arising out of, in connection with or resulting from (i) the indemnifying

Constructing Entity's breach of any of the representations or warranties made in, or failure of the indemnifying Constructing Entity or any of its subcontractors to perform any of its obligations under, this Appendix 2, or (ii) the negligence or willful misconduct of the indemnifying Constructing Entity or its contractors; provided, however, that neither Constructing Entity shall have any indemnification obligations under this Section 12.1 in respect of any Loss to the extent the Loss results from the negligence or willful misconduct of the Construction Party seeking indemnity.

12.2 Indemnity Procedures:

Promptly after receipt by a Person entitled to indemnity ("Indemnified Person") of any claim or notice of the commencement of any action or administrative or legal proceeding or investigation as to which the indemnity provided for in Section 12.1 above may apply, the Indemnified Person shall notify the indemnifying Constructing Entity of such fact. Any failure of or delay in such notification shall not affect a Constructing Entity's indemnification obligation unless such failure or delay is materially prejudicial to the indemnifying Constructing Entity. The Indemnified Person shall cooperate with the indemnifying Constructing Entity with respect to the matter for which indemnification is claimed. The indemnifying Constructing Entity shall have the right to assume the defense thereof with counsel designated by such indemnifying Constructing Entity and reasonably satisfactory to the Indemnified Person. If the defendants in any such action include one or more Indemnified Persons and the indemnifying Constructing Entity and if the Indemnified Person reasonably concludes that there may be legal defenses available to it and/or other Indemnified Persons which are different from or additional to those available to the indemnifying Constructing Entity, the Indemnified Person shall have the right to select separate counsel to assert such legal defenses and to otherwise participate in the defense of such action on its own behalf. In such instances, the indemnifying Constructing Entity shall only be required to pay the fees and expenses of one additional attorney to represent an Indemnified Person or Indemnified Persons having such differing or additional legal defenses. The Indemnified Person shall be entitled, at its expense, to participate in any action, suit or proceeding, the defense of which has been assumed by the indemnifying Constructing Entity. Notwithstanding the foregoing, the indemnifying Constructing Entity (i) shall not be entitled to assume and control the defense of any such action, suit or proceedings if and to the extent that, in the opinion of the Indemnified Person and its counsel, such action, suit or proceeding involves the potential imposition of criminal liability on the Indemnified Person, or there exists a conflict or adversity of interest between the Indemnified Person and the indemnifying Constructing Entity, in such event the indemnifying Constructing Entity shall pay the reasonable expenses of the Indemnified Person, and (ii) shall not settle or consent to the entry of any judgment in any action, suit or proceeding without the consent of the Indemnified Person, which shall not be unreasonably withheld, conditioned or delayed.

12.3 Indemnified Person:

If an Indemnified Person is entitled to indemnification under this Section 12 as a result of a claim by a third party, and the indemnifying Constructing Entity fails, after notice and reasonable opportunity to proceed under Section 12.2, to assume the defense of such claim, such Indemnified Person may at the expense of the indemnifying Constructing Entity contest, settle or consent to the entry of any judgment with respect to, or pay in full, such claim.

12.4 Amount Owing:

If an indemnifying Constructing Entity is obligated to indemnify and hold any Indemnified Person harmless under this Section 12, the amount owing to the Indemnified Person shall be the amount of such Indemnified Person's actual Loss, net of any insurance or other recovery.

12.5 Limitation on Damages:

Except as otherwise provided in this Section 12, the liability of a Construction Party under this Appendix 2 shall be limited to direct actual damages, and all other damages at law are waived. Under no circumstances shall any Construction Party or its Affiliates, directors, officers, employees and agents, or any of them, be liable to another Construction Party, whether in tort, contract or other basis in law or equity for any special, indirect, punitive, exemplary or consequential damages, including lost profits. The limitations on damages specified in this Section 12.5 are without regard to the cause or causes related thereto, including the negligence of any Construction Party, whether such negligence be sole, joint or concurrent, or active or passive. This limitation on damages shall not affect any Construction Party's rights to obtain equitable relief as otherwise provided in this Appendix 2. The provisions of this Section 12.5 shall survive the termination or expiration of the Interconnection Construction Service Agreement.

12.6 Limitation of Liability in Event of Breach:

A Construction Party ("Breaching Party") shall have no liability hereunder to any other Construction Party, and each other Construction Party hereby releases the Breaching Party, for all claims or damages it incurs that are associated with any interruption in the availability of the Customer Facility, the Interconnection Facilities, Transmission System or Construction Service or damages to a Construction Party's facilities, except to the extent such interruption or damage is caused by the Breaching Party's gross negligence or willful misconduct in the performance of its obligations under this Interconnection Construction Service Agreement.

12.7 Limited Liability in Emergency Conditions:

Except as otherwise provided in the Tariff or the Operating Agreement, no Construction Party shall be liable to any other Construction Party for any action that it takes in responding to an Emergency Condition, so long as such action is made in good faith, is consistent with Good Utility Practice and is not contrary to the directives of the Transmission Provider or the Interconnected Transmission Owner with respect to such Emergency Condition. Notwithstanding the above, Interconnection Customer shall be liable in the event that it fails to comply with any instructions of Transmission Provider or the Interconnected Transmission Owner related to an Emergency Condition.

13 Breach, Cure And Default

13.1 Breach:

A Breach of the Interconnection Construction Service Agreement shall include:

(a) The failure to pay any amount when due;

(b) The failure to comply with any material term or condition of this Interconnection Construction Service Agreement including but not limited to any material breach of a representation, warranty or covenant (other than in Sections 13.1(a) and (c)-(e) hereof) made in this Appendix 2;

(c) Assignment of the Interconnection Construction Service Agreement in a manner inconsistent with the terms of this Appendix 2;

(d) Failure of a Constructing Entity to provide access rights, or a Constructing Entity's attempt to revoke or terminate access rights, that are provided under this Appendix 2; or

(e) Failure of any Construction Party to provide information or data required to be provided to another Construction Party under this Appendix 2 for such other Construction Party to satisfy its obligations under this Interconnection Construction Service Agreement.

13.2 Notice of Breach:

A Construction Party not in Breach of this Interconnection Construction Service Agreement shall give written notice of an event of Breach to the Breaching Construction Party, to the third Construction Party, and to any other persons that the Breaching Construction Party identifies in writing to the other Construction Parties in advance. Such notice shall set forth, in reasonable detail, the nature of the Breach, and where known and applicable, the steps necessary to cure such Breach. In the event of a Breach by Interconnection Customer, Transmission Provider and the Interconnected Transmission Owner agree to provide notice of such Breach, at the same time and in the same manner as its or their notice to Interconnection Customer, to any Project Finance Entity, provided that the Interconnection Customer has provided Transmission Provider and the Interconnected Transmission Owner with notice of an assignment to such Project Finance Entity(ies) and has identified such Project Finance Entities as contacts for notice purposes pursuant to Section 20 of this Appendix 2.

13.3 Cure and Default:

A Construction Party that commits a Breach and does not take steps to cure the Breach pursuant to this Section 13.3 is in Default of this Interconnection Construction Service Agreement.

13.3.1 Cure of Breach:

The Breaching Construction Party (a) may cure the Breach within thirty days from the receipt of such notice; or, (b) if the Breach cannot be cured within thirty days, may commence in good faith all steps that are reasonable and appropriate to cure the Breach within such thirty day time period and thereafter diligently pursue such action to completion.

13.4 Right to Compel Performance:

Upon the occurrence of an event of Default, a non-Defaulting Construction Party shall be entitled to (a) commence an action to require the Defaulting Construction Party to remedy such Default and specifically perform its duties and obligations hereunder in accordance with the terms and conditions hereof, (b) withhold payments, (c) suspend performance hereunder, and (d) exercise such other rights and remedies as it may have in equity or at law.

13.5 Remedies Cumulative:

Subject to Section 19.1 of this Appendix 2, no remedy conferred by any provision of this Appendix 2 is intended to be exclusive of any other remedy and each and every remedy shall be cumulative and shall be in addition to every other remedy given hereunder or now or hereafter existing at law or in equity or by statute or otherwise. The election of any one or more remedies shall not constitute a waiver of the right to pursue other available remedies.

14 Termination

14.1 Termination

14.1.1 Upon Completion of Construction:

14.1.1.1 Conforming Interconnection Construction Service Agreements

If this Interconnection Construction Service Agreement is conforming and, therefore, is only reported to the Commission on PJM's Electric Quarterly Report, it shall terminate upon the date Transmission Provider receives written notice, in a form acceptable to Transmission Provider, from Interconnected Transmission Owner that the following conditions have occurred: (i) completion of construction of all Interconnection Facilities; (ii) if Interconnection Customer exercised the Option to Build, transfer of title under Tariff, Attachment P, Appendix 2, section 5.5; (iii) final payment of all Costs due and owing under this Interconnection Construction Service Agreement; and (iv) if Interconnection Customer exercised the Option to Build, delivery to Interconnected Transmission Owner of final "as-built" drawings of any Interconnection Facilities built by Interconnection Customer in accordance with Tariff, Attachment P, Appendix 2, section 3.2.3.2(a)(xi).

14.1.1.2 Non-Conforming Interconnection Construction Service Agreements

If this Interconnection Construction Service Agreement is non-conforming and, therefore, has been filed with and accepted by the Commission, it shall terminate upon (a) Transmission Provider receiving written notice, in a form acceptable to Transmission Provider, from Interconnected Transmission Owner that the following conditions have occurred: (i) completion of construction of all Interconnection Facilities; (ii) if Interconnection Customer exercised the Option to Build, transfer of title under Tariff, Attachment P, Appendix 2, section 5.5; (iii) final payment of all Costs due and owing under this Interconnection Construction Service Agreement; and (iv) if Interconnection Customer exercised the Option to Build, delivery to Interconnected Transmission

Owner of final "as-built" drawings of any Interconnection Facilities built by Interconnection Customer in accordance with Tariff, Attachment P, Appendix 2, section 3.2.3.2(a)(xi); and (b) the effective date of Transmission Provider's cancellation of the Interconnection Construction Service Agreement in accordance with Commission rules and regulations. Transmission Provider shall serve the Interconnected Transmission Owner and Interconnection Customer with a copy of the notice of cancellation of any Interconnection Construction Service Agreement in accordance with Commission rules and regulations.

14.1.2 Upon Default By Either Constructing Entity:

Either Constructing Entity may terminate its obligations hereunder in the event of a Default by the other Constructing Entity as defined in Tariff, Attachment P, Appendix 2, section 13.3.

14.1.3 By Interconnection Customer:

Subject to its payment of Cancellation Costs as explained in Tariff, Attachment P, Appendix 2, section 14.3, Interconnection Customer may be relieved of its obligations hereunder upon sixty (60) days written notice to Transmission Provider and Interconnected Transmission Owner.

14.2 [Reserved.]

14.3 Cancellation By Interconnection Customer

14.3.1 Applicability:

The following provisions shall survive and shall apply in the event that Interconnection Customer terminates the Interconnection Construction Service Agreement pursuant to this Section 14.1.3.

14.3.1.1 Cancellation Cost Responsibility:

Upon the cancellation of the Interconnection Construction Service Agreement by the Interconnection Customer, the Interconnection Customer shall be liable to pay to the Interconnected Transmission Owner or Transmission Provider all Cancellation Costs in connection with Construction Service for the Interconnection Customer pursuant to this Interconnection Construction Service Agreement, including Section 14.3.1.2 of this Appendix 2. In the event the Interconnected Transmission Owner incurs Cancellation Costs, it shall provide the Transmission Provider, with a copy to the Interconnection Customer, with a written demand for payment and with reasonable documentation of such Cancellation Costs. The Interconnection Customer shall pay the Transmission Provider each bill for Cancellation Costs within thirty (30) days after, as applicable, the Interconnected Transmission Owner's or Transmission Provider's presentation to the Interconnection Customer of written demand therefor, provided that such demand includes reasonable documentation of the Cancellation Costs that the invoicing party seeks to collect. Upon receipt of each of Interconnection Customer's payments of such bills of the Interconnected Transmission Owner, Transmission Provider shall reimburse the Interconnected Transmission Owner for Cancellation Costs incurred by the latter.

14.3.1.2 Disposition of Facilities Upon Cancellation:

Upon cancellation of the Interconnection Construction Service Agreement by an Interconnection Customer, Transmission Provider, after consulting with the Interconnected Transmission Owner, may, at the sole cost and expense of the Interconnection Customer, authorize the Interconnected Transmission Owner to (a) cancel supplier and contractor orders and agreements entered into by the Interconnected Transmission Owner to design, construct, install, operate, maintain and own the Transmission Owner Interconnection Facilities, provided, however, that Interconnection Customer shall have the right to choose to take delivery of any equipment ordered by the Interconnected Transmission Owner for which Transmission Provider otherwise would authorize cancellation of the purchase order; or (b) remove any Transmission Owner Interconnection Facilities built by the Interconnected Transmission Owner or any Transmission Owner Interconnection Facilities (only after title to the subject facilities has been transferred to the Interconnected Transmission Owner) built by the Interconnection Customer; or (c) partially or entirely complete the Transmission Owner Interconnection Facilities as necessary to preserve the integrity or reliability of the Transmission System, provided that Interconnection Customer shall be entitled to receive any rights associated with such facilities and upgrades as determined in accordance with Part VI of the Tariff; or (d) undo any of the changes to the Transmission System that were made pursuant to this Interconnection Construction Service Agreement. To the extent that the Interconnection Customer has fully paid for equipment that is unused upon cancellation or which is removed pursuant to subsection (b) above, the Interconnection Customer shall have the right to take back title to such equipment; alternatively, in the event that the Interconnection Customer does not wish to take back title, the Interconnected Transmission Owner may elect to pay the Interconnection Customer a mutually agreed amount to acquire and own such equipment.

14.3.2 Termination Upon Default:

In the event that Interconnection Customer exercises its right to terminate under Section 14.1.2 of this Appendix 2, and notwithstanding any other provision of this Interconnection Construction Service Agreement, the Interconnection Customer shall be liable for payment of the Interconnected Transmission Owner's Costs incurred up to the date of Interconnection Customer's notice of termination pursuant to Section 14.1.2 and the costs of completion of some or all of the Transmission Owner Interconnection Facilities or specific unfinished portions thereof, and/or removal of any or all of such facilities which have been installed, to the extent that Transmission Provider determines such completion or removal to be required for the Transmission Provider and/or Interconnected Transmission Owner to perform their respective obligations under Part VI of the Tariff or this Interconnection Construction Service Agreement, provided, however, that Interconnection Customer's payment of such costs shall be without prejudice to any remedies that otherwise may be available to it under this Appendix 2 for the Default of the Interconnected Transmission Owner.

14.4 Survival of Rights:

The obligations of the Construction Parties hereunder with respect to payments, Cancellation Costs, warranties, liability and indemnification shall survive termination to the extent necessary to provide for the determination and enforcement of said obligations arising from acts or events that

occurred while the Interconnection Construction Service Agreement was in effect. In addition, applicable provisions of this Interconnection Construction Service Agreement will continue in effect after expiration, cancellation or termination to the extent necessary to provide for final billings, payments, and billing adjustments.

15 Force Majeure

15.1 Notice:

A Construction Party that is unable to carry out an obligation imposed on it by this Appendix 2 due to Force Majeure shall notify each other Construction Party in writing or by telephone within a reasonable time after the occurrence of the cause relied on.

15.2 Duration of Force Majeure:

A Construction Party shall not be responsible for any non-performance or considered in Breach or Default under this Appendix 2, for any non-performance, any interruption or failure of service, deficiency in the quality or quantity of service, or any other failure to perform any obligation hereunder to the extent that such failure or deficiency is due to Force Majeure. A Construction Party shall be excused from whatever performance is affected only for the duration of the Force Majeure and while the Construction Party exercises Reasonable Efforts to alleviate such situation. As soon as the non-performing Construction Party is able to resume performance of its obligations excused because of the occurrence of Force Majeure, such Construction Party shall resume performance and give prompt notice thereof to each other Construction Party.

15.3 Obligation to Make Payments:

Any Construction Party's obligation to make payments for services shall not be suspended by Force Majeure.

15.4 Definition of Force Majeure:

For the purposes of this section, an event of force majeure shall mean any cause beyond the control of the affected Interconnection Party or Construction Party, including but not restricted to, acts of God, flood, drought, earthquake, storm, fire, lightning, epidemic, war, riot, civil disturbance or disobedience, labor dispute, labor or material shortage, sabotage, acts of public enemy, explosions, orders, regulations or restrictions imposed by governmental, military, or lawfully established civilian authorities, which, in any of the foregoing cases, by exercise of due diligence such party could not reasonably have been expected to avoid, and which, by the exercise of due diligence, it has been unable to overcome. Force majeure does not include (i) a failure of performance that is due to an affected party’s own negligence or intentional wrongdoing; (ii) any removable or remediable causes (other than settlement of a strike or labor dispute) which an affected party fails to remove or remedy within a reasonable time; or (iii) economic hardship of an affected party.

16 Subcontractors

16.1 Use of Subcontractors:

Nothing in this Appendix 2 shall prevent the Construction Parties from utilizing the services of subcontractors as they deem appropriate to perform their respective obligations hereunder, provided, however, that each Construction Party shall require its subcontractors to comply with all applicable terms and conditions of this Appendix 2 in providing such services.

16.2 Responsibility of Principal:

The creation of any subcontract relationship shall not relieve the hiring Construction Party of any of its obligations under this Appendix 2. Each Construction Party shall be fully responsible to each other Construction Party for the acts and/or omissions of any subcontractor it hires as if no subcontract had been made.

16.3 Indemnification by Subcontractors:

To the fullest extent permitted by law, a Construction Party that uses a subcontractor to carry out any of the Construction Party's obligations under this Appendix 2 shall require each of its subcontractors to indemnify, hold harmless and defend each other Construction Party, its representatives and assigns from and against any and all claims and/or liability for damage to property, injury to or death of any person, including the employees of any Construction Party or of any Affiliate of any Construction Party, or any other liability incurred by another Construction Party or any of its Affiliates, including all expenses, legal or otherwise, to the extent caused by any act or omission, negligent or otherwise, by such subcontractor and/or its officers, directors, employees, agents and assigns, that arises out of or is connected with the design, procurement, construction or installation of the facilities of either Constructing Entity described in this Appendix 2; provided, however, that no Construction Party or Affiliate thereof shall be entitled to indemnity under this Section 16.3 in respect of any injury, loss, or damage to the extent that such loss, injury, or damage results from the negligence or willful misconduct of the Construction Party or Affiliate seeking indemnity.

16.4 Subcontractors Not Beneficiaries:

No subcontractor is intended to be, or shall be deemed to be, a third-party beneficiary of the Interconnection Construction Service Agreement.

17 Confidentiality:

Information is Confidential Information only if it is clearly designated or marked in writing as confidential on the face of the document, or, if the information is conveyed orally or by inspection, if the Construction Party providing the information orally informs the Construction Party receiving the information that the information is confidential. If requested by any Construction Party, the disclosing Construction Party shall provide in writing the basis for asserting that the information referred to in this section warrants confidential treatment, and the requesting Construction Party may disclose such writing to an appropriate Governmental Authority. Any Construction Party

shall be responsible for the costs associated with affording confidential treatment to its information.

17.1 Term:

During the term of the Interconnection Construction Service Agreement, and for a period of three (3) years after the expiration or termination of the Interconnection Construction Service Agreement, except as otherwise provided in this Section 17, each Construction Party shall hold in confidence, and shall not disclose to any person, Confidential Information provided to it by any other Construction Party.

17.2 Scope:

Confidential Information shall not include information that the receiving Construction Party can demonstrate: (i) is generally available to the public other than as a result of a disclosure by the receiving Construction Party; (ii) was in the lawful possession of the receiving Construction Party on a non-confidential basis before receiving it from the disclosing Construction Party; (iii) was supplied to the receiving Construction Party without restriction by a third party, who, to the knowledge of the receiving Construction Party, after due inquiry, was under no obligation to the disclosing Construction Party to keep such information confidential; (iv) was independently developed by the receiving Construction Party without reference to Confidential Information of the disclosing Construction Party; (v) is, or becomes, publicly known, through no wrongful act or omission of the receiving Construction Party or breach of this Appendix 2; or (vi) is required, in accordance with Section 17.7 of this Appendix 2, to be disclosed to any Governmental Authority or is otherwise required to be disclosed by law or subpoena, or is necessary in any legal proceeding establishing rights and obligations under this Interconnection Construction Service Agreement. Information designated as Confidential Information shall no longer be deemed confidential if the Construction Party that designated the information as confidential notifies the other Construction Parties that it no longer is confidential.

17.3 Release of Confidential Information:

No Construction Party shall disclose Confidential Information of another Construction Party to any other person, except to its Affiliates (limited by the Commission's Standard of Conduct requirements), subcontractors, employees, consultants or to parties who may be or considering providing financing to or equity participation in Interconnection Customer on a need-to-know basis in connection with the Interconnection Construction Service Agreement, unless such person has first been advised of the confidentiality provisions of this Section 17 and has agreed to comply with such provisions. Notwithstanding the foregoing, a Construction Party that provides Confidential Information of another Construction Party to any person shall remain primarily responsible for any release of Confidential Information in contravention of this Section 17.

17.4 Rights:

Each Construction Party retains all rights, title, and interest in the Confidential Information that it discloses to any other Construction Party. A Construction Party's disclosure to another

Construction Party of Confidential Information shall not be deemed a waiver by either Construction Party or any other person or entity of the right to protect the Confidential Information from public disclosure.

17.5 No Warranties:

By providing Confidential Information, no Construction Party makes any warranties or representations as to its accuracy or completeness. In addition, by supplying Confidential Information, no Construction Party obligates itself to provide any particular information or Confidential Information to any other Construction Party nor to enter into any further agreements or proceed with any other relationship or joint venture.

17.6 Standard of Care:

Each Construction Party shall use at least the same standard of care to protect Confidential Information it receives as the Construction Party uses to protect its own Confidential Information from unauthorized disclosure, publication or dissemination. Each Construction Party may use Confidential Information solely to fulfill its obligations to the other Construction Parties under this Interconnection Construction Service Agreement or to comply with Applicable Laws and Regulations.

17.7 Order of Disclosure:

If a Governmental Authority with the right, power, and apparent authority to do so requests or requires a Construction Party, by subpoena, oral deposition, interrogatories, requests for production of documents, administrative order, or otherwise, to disclose Confidential Information, that Construction Party shall provide the Construction Party that provided the information with prompt prior notice of such request(s) or requirement(s) so that the providing Construction Party may seek an appropriate protective order, or waive compliance with the terms of this Interconnection Construction Service Agreement. Notwithstanding the absence of a protective order, or agreement, or waiver, the Construction Party subjected to the request or order may disclose such Confidential Information which, in the opinion of its counsel, the Construction Party is legally compelled to disclose. Each Construction Party shall use Reasonable Efforts to obtain reliable assurance that confidential treatment will be accorded any Confidential Information so furnished.

17.8 Termination of Interconnection Construction Service Agreement:

Upon termination of the Interconnection Construction Service Agreement for any reason, each Construction Party shall, within ten (10) calendar days of receipt of a written request from another party, use Reasonable Efforts to destroy, erase, or delete (with such destruction, erasure and deletion certified in writing to the requesting party) or to return to the requesting party, without retaining copies thereof, any and all written or electronic Confidential Information received from the requesting party.

17.9 Remedies:

The Construction Parties agree that monetary damages would be inadequate to compensate a Construction Party for another Construction Party's Breach of its obligations under this Section 17. Each Construction Party accordingly agrees that each other Construction Party shall be entitled to equitable relief, by way of injunction or otherwise, if the first Construction Party breaches or threatens to breach its obligations under this Section 17, which equitable relief shall be granted without bond or proof of damages, and the receiving Construction Party shall not plead in defense that there would be an adequate remedy at law. Such remedy shall not be deemed to be an exclusive remedy for the breach of this Section 17, but shall be in addition to all other remedies available at law or in equity. The Construction Parties further acknowledge and agree that the covenants contained herein are necessary for the protection of legitimate business interests and are reasonable in scope. No Construction Party, however, shall be liable for indirect, incidental, consequential, or punitive damages of any nature or kind resulting from or arising in connection with a Breach of any obligation under this Section 17.

17.10 Disclosure to FERC or its Staff:

Notwithstanding anything in this Section 17 to the contrary, and pursuant to 18 C.F.R. § 1b.20, if FERC or its staff, during the course of an investigation or otherwise, requests information from one of the Construction Parties that is otherwise required to be maintained in confidence pursuant to this Interconnection Construction Service Agreement, the Construction Party, shall provide the requested information to FERC or its staff, within the time provided for in the request for information. In providing the information to FERC or its staff, the Construction Party must, consistent with 18 C.F.R. § 388.122, request that the information be treated as confidential and non-public by FERC and its staff and that the information be withheld from public disclosure. Construction Parties are prohibited from notifying the other Construction Parties to the Interconnection Construction Service Agreement prior to the release of the Confidential Information to the Commission or its staff. A Construction Party shall notify the other Construction Parties when it is notified by FERC or its staff that a request to release Confidential Information has been received by FERC, at which time any of the Construction Parties may respond before such information would be made public, pursuant to 18 C.F.R. § 388.112.

17.11

Subject to the exception in Section 17.10, no Construction Party shall disclose Confidential Information of another Construction Party to any person not employed or retained by the disclosing Construction Party, except to the extent disclosure is (i) required by law; (ii) reasonably deemed by the disclosing Construction Party to be required in connection with a dispute between or among the Construction Parties, or the defense of litigation or dispute; (iii)_ otherwise permitted by consent of the Construction Party that provided such Confidential Information, such consent not to be unreasonably withheld; or (iv) necessary to fulfill its obligations under this Interconnection Construction Service Agreement or as a transmission service provider or a Control Area operator including disclosing the Confidential Information to an RTO or ISO or to a regional or national reliability organization. Prior to any disclosures of another Construction Party's Confidential Information under this subparagraph, the disclosing Construction Party shall promptly notify the other Construction Parties in writing and shall assert confidentiality and cooperate with the other

Construction Parties in seeking to protect the Confidential Information from public disclosure by confidentiality agreement, protective order or other reasonable measures.

17.12

This provision shall not apply to any information that was or is hereafter in the public domain (except as a result of a Breach of this provision).

17.13 Return or Destruction of Confidential Information:

If any Construction Party provides any Confidential Information to another Construction Party in the course of an audit or inspection, the providing Construction Party may request the other party to return or destroy such Confidential Information after the termination of the audit period and the resolution of all matters relating to that audit. Each Construction Party shall make Reasonable Efforts to comply with any such requests for return or destruction within ten days after receiving the request and shall certify in writing to the requesting Construction Party that it has complied with such request.

18 Information Access And Audit Rights

18.1 Information Access:

Subject to Applicable Laws and Regulations, each Construction Party shall make available to each other Construction Party information necessary (i) to verify the costs incurred by the other Construction Party for which the requesting Construction Party is responsible under this Appendix 2, and (ii) to carry out obligations and responsibilities under this Appendix 2. The Construction Parties shall not use such information for purposes other than those set forth in this Section 18.1 and to enforce their rights under this Appendix 2.

18.2 Reporting of Non-Force Majeure Events:

Each Construction Party shall notify each other Construction Party when it becomes aware of its inability to comply with the provisions of this Appendix 2 for a reason other than an event of force majeure as defined in Section 15.4 of this Appendix 2. The Construction Parties agree to cooperate with each other and provide necessary information regarding such inability to comply, including, but not limited to, the date, duration, reason for the inability to comply, and corrective actions taken or planned to be taken with respect to such inability to comply. Notwithstanding the foregoing, notification, cooperation or information provided under this Section shall not entitle the receiving Construction Party to allege a cause of action for anticipatory breach of this Appendix 2.

18.3 Audit Rights:

Subject to the requirements of confidentiality under Section 17 of this Appendix 2, each Construction Party shall have the right, during normal business hours, and upon prior reasonable notice to the pertinent Construction Party, to audit at its own expense the other Construction Party's

accounts and records pertaining to such Construction Party's performance and/or satisfaction of obligations arising under this Interconnection Construction Service Agreement. Any audit authorized by this Section shall be performed at the offices where such accounts and records are maintained and shall be limited to those portions of such accounts and records that relate to obligations under this Appendix 2. Any request for audit shall be presented to the other Construction Party not later than twenty-four months after the event as to which the audit is sought. Each Construction Party shall preserve all records held by it for the duration of the audit period.

19 Disputes

19.1 Submission:

Any claim or dispute that any Construction Party may have against another Construction Party arising out of this Appendix 2 may be submitted for resolution in accordance with the dispute resolution provisions of Section 12 of the Tariff.

19.2 Rights Under The Federal Power Act:

Nothing in this Section shall restrict the rights of any Construction Party to file a complaint with FERC under relevant provisions of the Federal Power Act.

19.3 Equitable Remedies:

Nothing in this Section shall prevent any Construction Party from pursuing or seeking any equitable remedy available to it under Applicable Laws and Regulations.

20 Notices

20.1 General:

Any notice, demand or request required or permitted to be given by either Construction Party to another and any instrument required or permitted to be tendered or delivered by either Construction Party in writing to another may be so given, tendered or delivered, by recognized national courier, or by depositing the same with the United States Postal Service with postage prepaid, for delivery by certified or registered mail, addressed to the Construction Party, or personally delivered to the Construction Party, at the address specified in the Interconnection Construction Service Agreement. If agreed to in advance by the Construction Parties, notices may be communicated via electronic means, so long as there is e-mail confirmation of delivery.

20.2 Operational Contacts:

Each Construction Party shall designate, and shall provide to each other Construction Party contact information concerning, a representative to be responsible for addressing and resolving operational issues as they arise during the term of the Interconnection Construction Service Agreement.

21 Miscellaneous

21.1 Regulatory Filing:

In the event that this Interconnection Construction Service Agreement contains any terms that deviate materially from the form included in Attachment P or from the standard terms and conditions in this Appendix 2, the Transmission Provider shall file the executed Interconnection Construction Service Agreement on behalf of itself and the Interconnected Transmission Owner with FERC as a service schedule under the Tariff. Interconnection Customer may request that any information so provided be subject to the confidentiality provisions of Section 17 of this Appendix 2. An Interconnection Customer shall have the right, with respect to any Interconnection Construction Service Agreement tendered to it, to request (a) dispute resolution under Section 12 of the Tariff or, if concerning the Regional Transmission Expansion Plan, consistent with Schedule 5 of the Operating Agreement, or (b) that Transmission Provider file the agreement unexecuted with the Commission. With the filing of any unexecuted Interconnection Construction Service Agreement, Transmission Provider may, in its discretion, propose to FERC a resolution of any or all of the issues in dispute between any Construction Parties.

21.2 Waiver:

Any waiver at any time by any Construction Party of its rights with respect to a Breach or Default under this Appendix 2, or with respect to any other matters arising in connection with this Appendix 2, shall not be deemed a waiver or continuing waiver with respect to any other Breach or Default or other matter.

21.3 Amendments and Rights under the Federal Power Act:

Except as set forth in this Section, this Interconnection Construction Service Agreement may be amended, modified, or supplemented only by written agreement of the Construction Parties. Such amendment shall become effective and a part of this Interconnection Construction Service Agreement upon satisfaction of all Applicable Laws and Regulations. Notwithstanding the foregoing, nothing contained in this Interconnection Construction Service Agreement shall be construed as affecting in any way any of the rights of any Construction Party with respect to changes in applicable rates or charges under Section 205 of the Federal Power Act and/or FERC's rules and regulations thereunder, or any of the rights of any Interconnection Party under Section 206 of the Federal Power Act and/or FERC's rules and regulations thereunder. The terms and conditions of this Interconnection Construction Service Agreement and every appendix referred to therein shall be amended, as mutually agreed by the Construction Parties, to comply with changes or alterations made necessary by a valid applicable order of any Governmental Authority having jurisdiction hereof.

21.4 Binding Effect:

This Interconnection Construction Service Agreement, including the rights and obligations incorporated by reference therein from this Interconnection Construction Service Agreement, shall be binding upon, and shall inure to the benefit of, the successors and assigns of the Construction Parties.

21.5 Regulatory Requirements:

Each Construction Party's performance of any obligation under this Interconnection Construction Service Agreement for which such party requires approval or authorization of any Governmental Authority shall be subject to its receipt of such required approval or authorization in the form and substance satisfactory to the receiving Construction Party, or the Construction Party making any required filings with, or providing notice to, such Governmental Authorities, and the expiration of any time period associated therewith. Each Construction Party shall in good faith seek, and shall use Reasonable Efforts to obtain, such required authorizations or approvals as soon as reasonably practicable.

22 Representations and Warranties

22.1 General:

Each Constructing Entity hereby represents, warrants and covenants as follows, with these representations, warranties, and covenants effective as to the Constructing Entity during the full time the Interconnection Construction Service Agreement is effective:

22.1.1 Good Standing:

Such Constructing Entity is duly organized or formed, as applicable, validly existing and in good standing under the laws of its state of organization or formation, and is in good standing under the laws of the respective State(s) in which it is incorporated and operates as stated in the preamble of the Interconnection Construction Service Agreement.

22.1.2 Authority:

Such Constructing Entity has the right, power and authority to enter into the Interconnection Construction Service Agreement, to become a party thereto and to perform its obligations thereunder. The Interconnection Construction Service Agreement is a legal, valid and binding obligation of such Constructing Entity, enforceable against such Constructing Entity in accordance with its terms, except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforceability is sought in a proceeding in equity or at law).

22.1.3 No Conflict:

The execution, delivery and performance of the Interconnection Construction Service Agreement does not violate or conflict with the organizational or formation documents, or bylaws or operating agreement, of such Constructing Entity, or any judgment, license, permit, order, material agreement or instrument applicable to or binding upon such Constructing Entity or any of its assets.

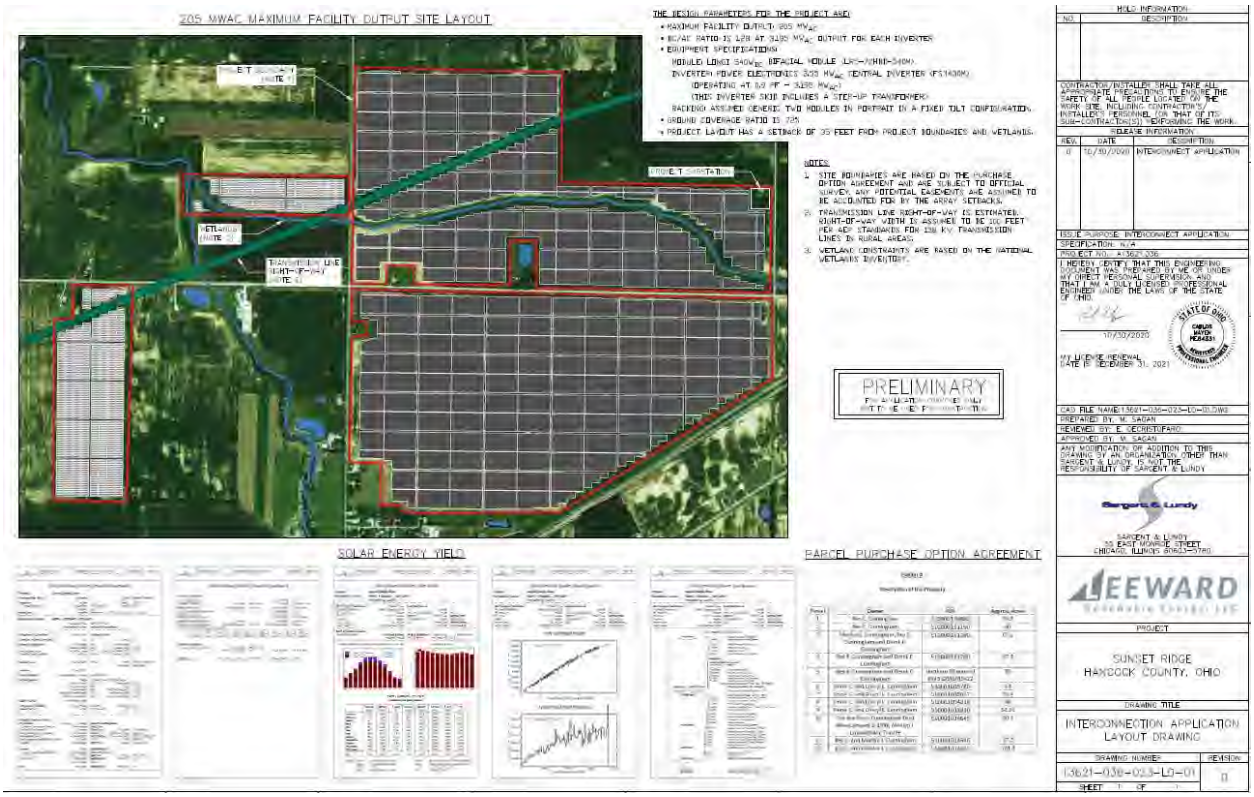
22.1.4 Consent and Approval:

Such Constructing Entity has sought or obtained, or, in accordance with the Interconnection Construction Service Agreement will seek or obtain, each consent, approval, authorization, order, or acceptance by any Governmental Authority in connection with the execution, delivery and performance of such Agreement and it will provide to any Governmental Authority notice of any actions under such Agreement that are required by Applicable Laws and Regulations.

SCHEDULE A

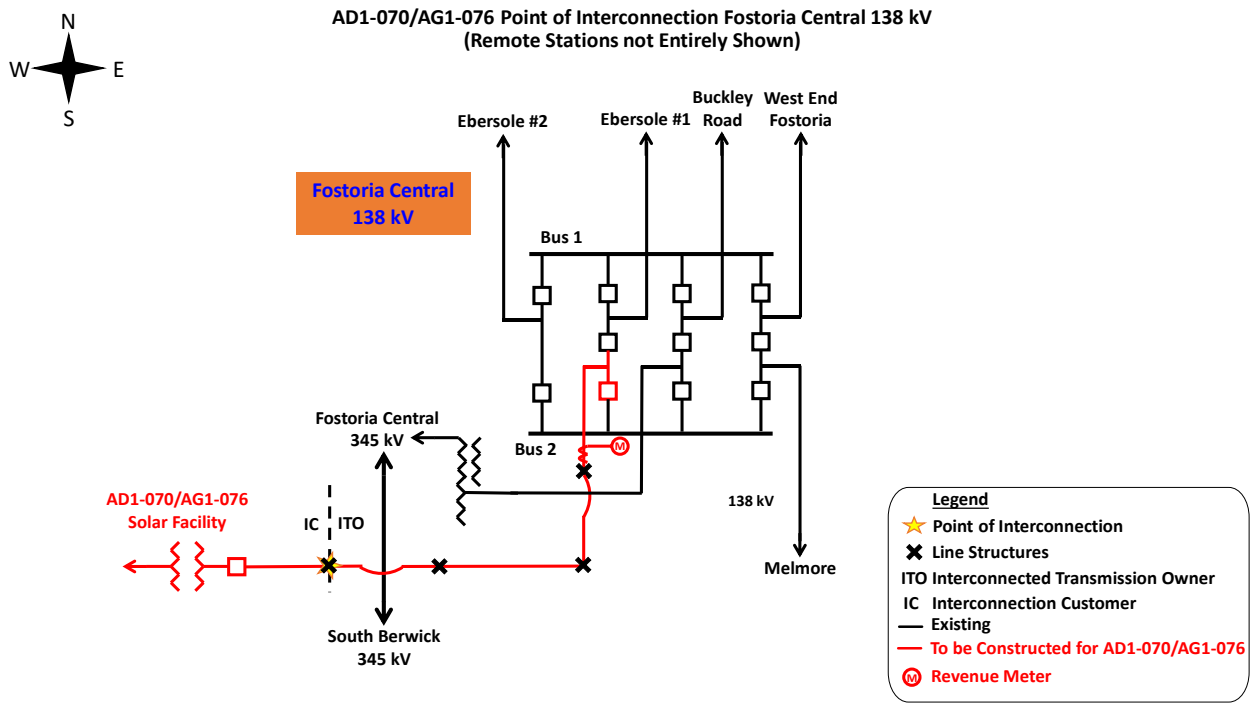
SITE PLAN

Hancock County, Ohio
GPS Coordinates: 41.115671, -83.507212



SCHEDULE B

SINGLE-LINE DIAGRAM OF INTERCONNECTION FACILITIES



The Point of Interconnection ('POI') is at the fourth structure southwest of the Fostoria Central 138 kV station. Interconnected Transmission Owner (ITO) owns the first four spans from the Fostoria Central 138 kV station to the fourth structure, including the jumpers and fourth structure. The first structure will be located inside the station fence while the remaining three structures will be located on ITO property outside the station fence. The Interconnection Customer owns the 138 kV generator lead line, including remaining structures, from the POI to the AD1-070/AG1-076 generation collector station.

SCHEDULE C

TRANSMISSION OWNER INTERCONNECTION FACILITIES TO BE BUILT BY INTERCONNECTED TRANSMISSION OWNER

Attachment Facilities:

- Construct one (1) 138 kV generator lead transmission line from the Fostoria Central 138 kV Station to the Point of Interconnection, including the first four (4) structures outside the Fostoria Central 138 kV Station, install 138 kV revenue meter, and extend dual fiber-optic from the Point of Interconnection to Fostoria Central 138 kV Station control house. **(PJM Network Upgrade n7962)**

Non-Direct Connection Network Upgrades:

- Expand the Fostoria Central 138 kV Station, including the addition of one (1) 138 kV circuit breaker, installation of associated protection and control equipment, 138 kV line risers, and supervisory control and data acquisition (SCADA) equipment. **(PJM Network Upgrade n7963)**

SCHEDULE D

TRANSMISSION OWNER INTERCONNECTION FACILITIES TO BE BUILT BY INTERCONNECTION CUSTOMER PURSUANT TO OPTION TO BUILD

None

SCHEDULE E

[Reserved]

SCHEDULE F

[Reserved]

SCHEDULE G

CUSTOMER INTERCONNECTION FACILITIES

Interconnection Customer shall construct and, unless otherwise indicated, shall own, the following Interconnection Facilities:

- One (1) 138/34.5 kV grounded wye / grounded wye main step-up transformer;
- One (1) 138 kV circuit breaker;
- 138 kV generator lead transmission line from the step-up transformer to the Point of Interconnection;
- Dual fiber-optic cable from the Point of Interconnection to the generator collector station;
- Relay and protective equipment, supervisory control and data acquisition (SCADA) equipment, fiber-optic equipment, and telecommunications equipment; and
- Necessary metering equipment as specified in Schedule C of the AD1-070/AG1-076 ISA.

SCHEDULE H

NEGOTIATED CONTRACT OPTION TERMS

None

SCHEDULE I

SCOPE OF WORK

Interconnected Transmission Owner shall construct and, unless otherwise indicated, shall own, the following:

Attachment Facilities:

- Construct one (1) 138 kV generator lead transmission line from the Fostoria Central 138 kV Station to the Point of Interconnection, including the first four (4) structures outside the Fostoria Central 138 kV Station, install 138 kV revenue meter, and extend dual fiber-optic from the Point of Interconnection to Fostoria Central 138 kV Station control house. **(PJM Network Upgrade n7962)**

Non-Direct Connection Network Upgrades:

- Expand the Fostoria Central 138 kV Station, including the addition of one (1) 138 kV circuit breaker, installation of associated protection and control equipment, 138 kV line risers, and supervisory control and data acquisition (SCADA) equipment. **(PJM Network Upgrade n7963)**

Interconnection Customer shall construct and, unless otherwise indicated, shall own, the following Interconnection Facilities:

- One (1) 138/34.5 kV grounded wye / grounded wye main step-up transformer;
- One (1) 138 kV circuit breaker;
- 138 kV generator lead transmission line from the step-up transformer to the Point of Interconnection;
- Dual fiber-optic cable from the Point of Interconnection to the generator collector station;
- Relay and protective equipment, supervisory control and data acquisition (SCADA) equipment, fiber-optic equipment, and telecommunications equipment; and
- Necessary metering equipment as specified in Schedule C of the AD1-070/AG1-076 ISA.

SCHEDULE J

SCHEDULE OF WORK

The Interconnected Transmission Owner shall commence the scope of work identified in Schedules C and I of this CSA one month after both full execution of this CSA and completion of the construction kickoff call.

The Interconnected Transmission Owner shall complete all Transmission Owner Interconnection Facilities set forth in Schedules C and I of this CSA and provide back feed to the Interconnection Customer's Customer Facilities by **May 15, 2025**.

The Interconnection Customer shall commence the scope of work identified in Schedules G and I of this CSA one month after both full execution of this CSA and completion of the construction kickoff call.

The Interconnection Customer shall complete all Customer Interconnection Facilities set forth in Schedules G and I of this CSA by **May 15, 2025**.

SCHEDULE K

APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

Applicable Technical Requirements and Standards are set forth in the following documents that are posted on the PJM website:

- Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System, Revision 3 dated June 30, 2021;
- Standards and Expectations for Siting, Real Estate, Right-of-Way, and Environmental Permitting for Transmission Interconnection Projects, Version 2 dated August 20, 2020; and
- Independent Power Producer (IPP) Option to Build Guidelines, Revision 3 dated October 28, 2021.

To the extent that these Applicable Technical Requirements and Standards conflict with the terms and conditions of the Tariff or any other provision of this CSA, the Tariff and/or this CSA shall control.

SCHEDULE L

INTERCONNECTION CUSTOMER'S AGREEMENT TO CONFORM WITH

IRS SAFE HARBOR PROVISIONS FOR NON-TAXABLE STATUS

As provided in Section 2.4.1 of Appendix 2 to this CSA and subject to the requirements thereof, Interconnection Customer represents that it meets all qualifications and requirements as set forth in Section 118(a) and 118(b) of the Internal Revenue Code of 1986, as amended and interpreted by Notice 2016-36, 2016-25 I.R.B. (6/20/2016) (the "IRS Notice"). Interconnection Customer agrees to conform with all requirements of the safe harbor provisions specified in the IRS Notice, as they may be amended, as required to confer non-taxable status on some or all of the transfer of property, including money, by Interconnection Customer to Interconnected Transmission Owner with respect to the payment of the Costs of construction and installation of the Transmission Owner Interconnection Facilities specified in this CSA.

Nothing in Interconnection Customer's agreement pursuant to this Schedule L shall change Interconnection Customer's indemnification obligations under Section 2.4.2 of Appendix 2 to the CSA.

SCHEDULE M

SCHEDULE OF NON-STANDARD TERMS AND CONDITIONS

None

SCHEDULE N

INTERCONNECTION REQUIREMENTS FOR ALL WIND, SOLAR AND NON-SYNCHRONOUS GENERATION FACILITIES

A. Voltage Ride Through Requirements

The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

B. Frequency Ride Through Requirements

The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

C. Supervisory Control and Data Acquisition (SCADA) Capability

The wind, solar or non-synchronous generation facility shall provide SCADA capability to transmit data and receive instructions from the Transmission Provider to protect system reliability. The Transmission Provider and the wind, solar or non-synchronous generation facility Interconnection Customer shall determine what SCADA information is essential for the proposed wind, solar or non-synchronous generation facility, taking into account the size of the facility and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area.

D. Meteorological Data Reporting Requirement (Applicable to wind generation facilities only)

The wind generation facility shall, at a minimum, be required to provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Wind speed (meters/second)
- Wind direction (degrees from True North)
- Atmosphere pressure (hectopascals)
- Forced outage data (wind turbine and MW unavailability)

E. Meteorological Data Reporting Requirement (Applicable to solar generation facilities only)

The solar generation facility shall, at a minimum, be required to provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Irradiance
- Forced outage data

The Transmission Provider and Interconnection Customer may mutually agree to any additional meteorological data that are required for the development and deployment of a power production forecast. All requirements for meteorological and forced outage data must be commensurate with the power production forecasting employed by the Transmission Provider. Such additional mutually agreed upon requirements for meteorological and forced outage data are set forth below:
NOT APPLICABLE FOR THIS CSA

IN WITNESS WHEREOF, the parties have caused this Interconnection Construction Service Agreement to be executed by their respective authorized officials.

(PJM Queue Position #AD1-070/AG1-076)

Transmission Provider: **PJM Interconnection, L.L.C.:**

By: Jason Shoemaker _____ Manager, Interconnection Projects _____ 3/18/2022 _____

Name Title Date

Printed name of signer: Jason Shoemaker _____

Interconnection Customer: **South Branch Solar, LLC**

By: Jason Allen _____ Chief Executive Officer _____ 2/17/2022 _____

Name Title Date

Printed name of signer: Jason Allen _____

Interconnected Transmission Owner: **AEP Ohio Transmission Company, Inc.**

By: Robert W. Bradish _____ Vice President _____ 3/17/2022 _____

Name Title Date

Printed name of signer: Robert W. Bradish _____

Generation Interconnection

Facilities Study Report

For

Queue Project AD1-070/AG1-076

Fostoria Central 138 kV

Hancock County, Ohio

February 2022

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer (IC), Hancock Energy, LLC, proposes to install PJM Project AD1-070, a 205 MW (36 MW Capacity) solar generating facility in Hancock and Seneca counties in Ohio (Figure 2). The point of interconnection for the generating facility will be via a direct connection to the Fostoria Central 138 kV station (Figure 1).

The AG1-076 project is an increase to the Interconnection Customer's AD1-070 project, which will share the same point of interconnection. The AG1-076 queue position is a 0 MW uprate (46 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 205 MW with 82 MW of this output being recognized by PJM as Capacity.

1.2 Amendments/Changes to the Impact Study Report

1. The IC requested a technology change from wind to solar, which was approved by PJM. The MFO and CIR are not affected by this change.
2. The original System Impact Study was retooled to reflect withdrawal of earlier queue requests. Based on the results of this re-tool, documented in the revised AD1-070 System Impact Study report dated April 2021, the Ottawa-Lakeview 138 kV and Lakeview-Greenfield 138 kV constraints in ATSI previously attributed to this queue position no longer apply. No power flow criteria violations are now identified for the AD1-070 queue position.

1.3 Interconnection Customer Schedule

PJM and AEP understand that the Interconnection Customer has requested the following schedule dates:

Receive back feed power from AEP: 05/15/2025

Generation Commercial Operation Date: 12/31/2025

Acknowledgement of the Interconnection Customer's requested back feed and commercial operation dates does not imply AEP's commitment to or guarantee of these dates.

1.4 AEP's Scope of Work to Facilitate Interconnection

- AEP's Fostoria Central 138 kV, the station will have to be expanded by adding one (1) 138 kV circuit breaker.

- Associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will be required at the Fostoria Central 138 kV station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

- AEP will build and own the first four (4) transmission line structures exiting the Fostoria Central 138 kV station, to which AEP's transmission line conductor will attach and terminate at the POI to enable extension of 138 kV transmission line for the generation-lead going to the AD1-070/AG1-076 site.

- It is understood that the Interconnection Customer is responsible for all of the connection costs associated with interconnecting the PJM project AD1-070/AG1-076 to the AEP transmission system. The cost of the customer's generating facility and the costs for the line connecting the generating facility to AEP's transmission system (Beyond the POI structure) are not included in this report; these are assumed to be the Customer's responsibility.

- The customer will be responsible for constructing two diverse fiber-optic connections from their telecom equipment to the point of interconnection.

1.5 Description of Transmission Owner Facilities Included in the Facilities Study

1.5.1 Direct Connection Work

- No Direct Connection work will be required for this project.

1.5.2 Non-Direct Connection Work

- AEP will install one (1) additional 138 kV circuit breaker and one line connection for the IPP at the Fostoria Central 138 kV station.
- AEP will review the protection and control setting at the Fostoria Central 138 kV station.
- AEP shall install associated line protection and control equipment, 138 kV line risers, and SCADA at the Fostoria Central 138 kV station.

1.5.3 Attachment Facilities Work

- Two diverse fiber paths are required along the attachment line. AEP will extend the fiber-optic cables from the points of transition (POI structure) into the Fostoria Central 138 kV control house. The customer will be responsible for the fiber work on the IPP side of the points of transition.
- AEP will Install 138 kV revenue metering at the Fostoria Central 138 kV station.
- AEP will build and own the first four (4) transmission line structures exiting the Fostoria Central 138 kV station, to which AEP's transmission line conductor will attach and terminate at the POI to enable extension of 138 kV transmission line for the generation-lead going to the AD1-070/AG1-076 site.

1.5.4 Network Upgrade Work

- None

1.6 Total Cost of Transmission Owner Facilities Included in the Facilities Study:

Attachment Facilities	$1,486,503.00
Direct Connection Facilities	$846,403.00
Non-Direct Connection Facilities	$0.0
Network Upgrade Facilities	$0.0
Total Cost	$2,332,906.00

The estimates do not include the impact that delays in obtaining ROW, permits, or other approvals may have.

1.7 Summary of Schedule Milestones for Completion of Transmission Owner Work Included in Facilities Study:

Standard Process

Typical Schedule for Scope Indicated (Actual schedule to be determined at PJM project kick off meeting)

Activity	Dates(See Notes)
Engineering Start	Day 1*
Material Ordering	Starts Day 60
Construction (Grading & Below Grade)	Starts Day 356
Construction (Above Grade)	Starts Day 416
Outage Requests Made By	Day 144
Outage (Structure Foundations)**	Starts Day 356

Outage (Cut-in & Testing)**	Starts Day 515
Ready For Back Feed (Interconnected Transmission Owner In-Service Date)	Day 545

***Day 1 will be determined at the PJM project kick off meeting.**
****Scheduled Outages are contingent upon outage availability. Longer duration outages are not available during peak load periods.**

<u>Notes Regarding the Schedule</u>

- **All transmission outages are subject to PJM and Interconnected Transmission Owner outage scheduling requirements.**
- **Significant scope of work changes will impact the schedule.**

<u>Assumptions (Standard Process)</u>

- **ISA and ICSA executed by 11/30/2021**
- **Estimates provided are based on a table top process without the benefit of the results of site specific engineering studies (e.g., soil borings, environmental survey, ground grid, etc.), unless otherwise provided by the Interconnection Customer.**
- **System conditions must allow scheduled outages to occur. Additionally clearance outages may be needed for surrounding infrastructure.**
- **All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.**
- **The Interconnection Customer will provide any required additional easements to all facilities and structures**
- **The customer will have their construction and required checkout completed prior to the start of the cut-in and testing outage.**
- **Based on current scoping requirements we have assumed no coordination concerns will arise with an existing AEP project at AEP's Fostoria Central station.**
- **The overall COD is expected to be on or before 12/31/2025. Back feed by May 15, 2025 should be sufficient to support this overall COD.**
- **At the completion of this study the length of the developer's generator lead line was yet to be finalized but indicated by the developer to be between 1.5 and 2.5 miles. AEP assumes the final line length will not pose any major scope changes.**
- **AEP's line exits to the POI will have to cross under an existing AEP 345 kV line and at this time we assume clearance can be met so no 345 kV work will be needed.**
- **Assumed 4 structures is sufficient to exit AEP's station and get to a POI that satisfies both AEP and the developer's needs.**
- **Assumed 5 months for engineering design**
- **Assumed the last 30 days leading to ISD is primarily spent doing fiber, relay, and communications checks.**

- **Settings are approximately 4 months of coordination with the developer's engineer, and AEP has received an up to date Short Circuit model for the project from PJM prior to the start of coordination.**
- **Assumptions were made based on preliminary conversations with the developer on relay coordination and length of fiber path.**
- **Possibility to coordinate OPSB filings to ensure accuracy between parties.**

Transmission Outage Plan

No transmission outage plan has been specified at this time

Note that all 138 kV and above outages are subject to PJM and AEP Operations BES outage-scheduling requirements.

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines – New

- AEP will build and own the first four (4) transmission line structures exiting the Fostoria Central 138 kV station, to which AEP's transmission line conductor will attach and terminate at the POI to enable extension of 138 kV transmission line for the generation-lead going to the AD1-070/AG1-076 site.

2.2 Transmission Line – Upgrades

- No transmission line upgrades will be required for this project.

2.3 Substation Facilities – New

- No new substation facilities will be required for this project.

2.4 Substation Facilities – Upgrades

- AEP will need to expand the existing Fostoria Central 138 kV station to facilitate the connection of the generation lead going to the PJM project AD1-070/AG1-076. To accomplish this, one (1) additional circuit breaker will be installed. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required.

- Due to the new generation source being added, nearby Protective relay-settings for the remainder of the Fostoria Central 138 kV substation will have to be reviewed and updated to account for the addition of the AD1-070/AG1-076 generation source.

2.5 Metering & Communications

Standard 138 kV metering will be installed at the Fostoria Central 138 kV station. A standard station communication scheme will be used. All metering equipment shall meet the requirements as specified by AEP in the "AEP Metering and Telemetering Requirements for AEP Transmission Customers" document (SS-490011). Communication requirements are published in the "AEP SCADA RTU Requirements at Transmission Interconnection Facilities" (SS-500000).

AEP will need to update the telecom equipment at the Fostoria Central 138 kV station for SCADA/EMS functionality. Fiber-optic cable will be extended to the AEP/AD1-070/AG1-076 point of interconnection.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement shall be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand, and proper metering equipment in installed. The metering work above and cost indicated below does not include any potential work or cost to address metering requirements of the local service provider. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

2.6 Environmental, Real Estate, and Permitting issues

The Interconnection customer is expected to obtain, at its' cost, all necessary permits and provisions for the IPP station and generation lead line connecting to the POI outside the Fostoria Central 138 kV station.

2.6.1 System Modeling & Operating Requirements

In addition to the IPP modeling requirements imposed by PJM as part of the Generation Interconnection process, the following system modeling parameters will need to be supplied by the Interconnection Customer to AEP:

- **Modeling parameters are required as outlined in the "Connection Requirements for the AEP Transmission System." These requirements can be accessed at: https://aep.com/requiredpostings/AEPTransmissionStudies**

2.7 Summary of Results of Study

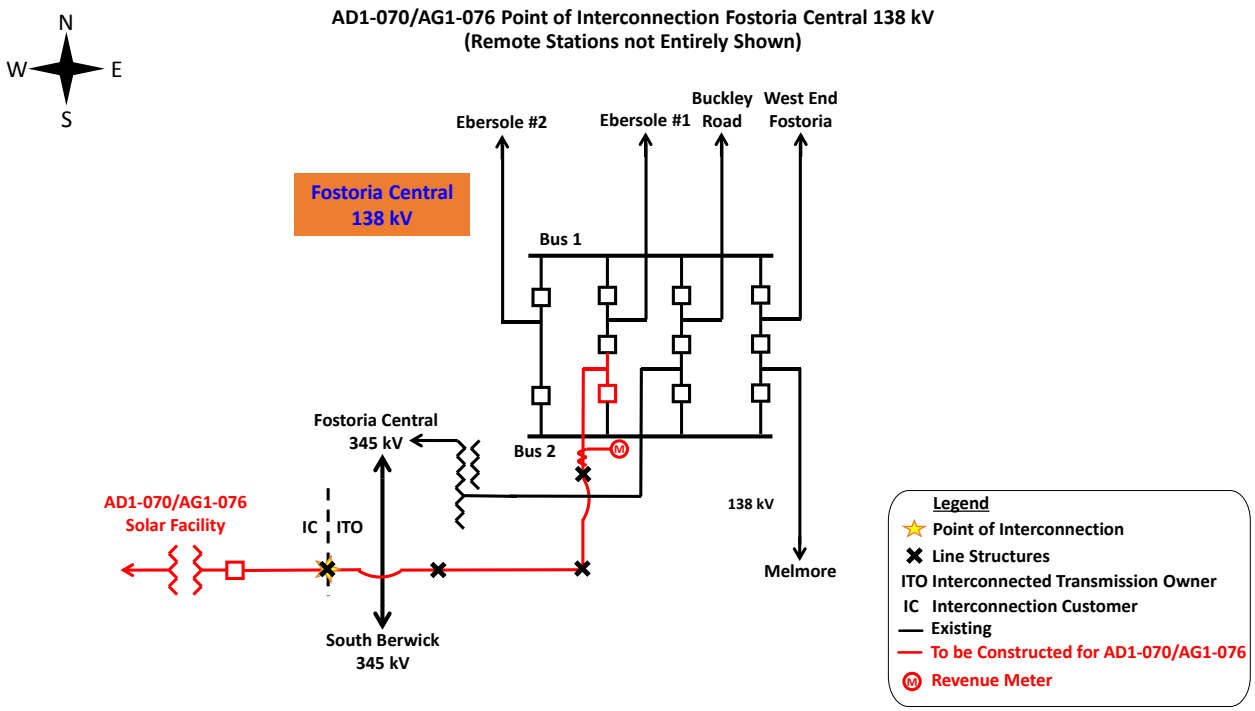
Cost Estimates for AEP

Task	Network Upgrade Number	Engineering	Material	Construction	Other	TOTAL
Install 1 138 kV circuit breaker and install associated P&C equipment	N7963	$137,447.33	$304,931.33	$256,703.33	$147,321.00	$846,403.00
Dual fiber connection	N7962	$22,839.00	$33,120.00	$120,974.00	$38,266.00	$215,199.00
138 kV Revenue Metering	N7962	$48,606.67	$101,757.67	$107,824.67	$52,663.00	$310,852.00
Generator lead first 4 spans exiting the POI station, including the first 4 structures.	N7962	$126,147.00	$251,925.00	$413,271.00	$169,109.00	$960,452.00
TOTAL		$335,040.00	$691,734.00	898,773.00	$407,359.00	$2,332,906.00

2.8 Information Required for Interconnection Service Agreement

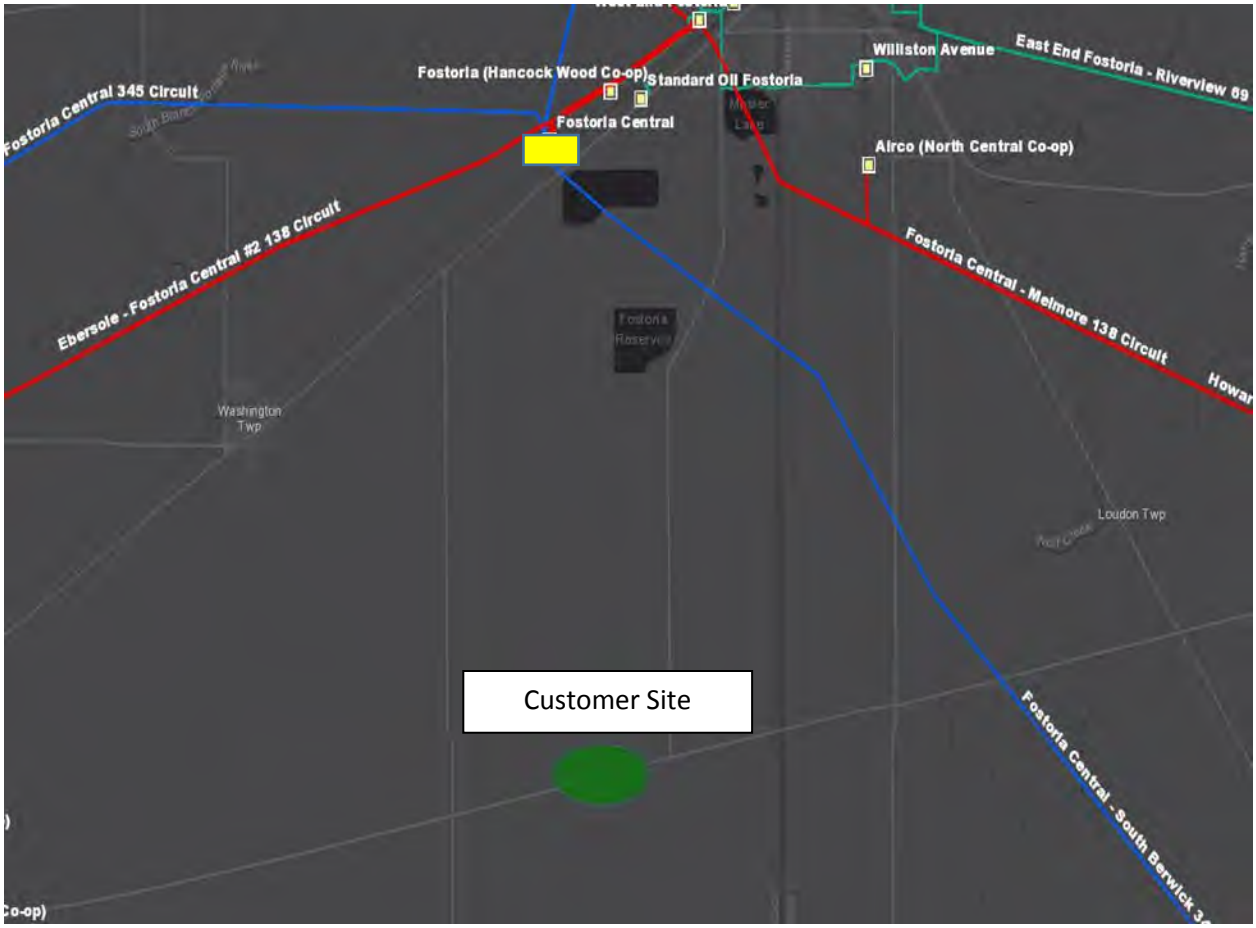
Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0	$304,931.33	$386,802.67	**$691,734.00**
Direct Labor	$0	$394,150.67	$839,662.33	**$1,233,813.00**
Indirect Material	$0	$64,259.68	$81,754.63	**$146,014.32**
Indirect Labor	$0	$83,061.32	$178,283.37	**$261,344.68**
TOTAL	$0	$846,403.00	$1,486,503.00	**$2,332,906.00**

Figure 1: Point of Interconnection One-Line Diagram



The Point of Interconnection ('POI') is at the fourth structure southwest of the Fostoria Central 138 kV station. AEP owns the first four spans from the Fostoria 138 kV station to the fourth structure, including the jumpers and fourth structure. The first structure is inside the station fence, the remaining three will be on AEP-owned property, but outside the fence. The Interconnection Customer (IC), Hancock Energy, LLC, owns the span connecting to the POI, the 138 kV generator lead line, and remaining structures back to the AD1-070/AG1-076 generation collector station.

Figure 2: Point of Interconnection Map



Generation Interconnection
Revised System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position AD1-070

Fostoria Central 138kV

April 2021

Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement.

The System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

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General

Air Energy TCI Inc. (Air Energy) proposes to install PJM Project #AD1-070, a 205.0 MW (36.0 MW Capacity) solar facility in Hancock County, Ohio (see Figure 2). The point of interconnection will be a direct connection to AEP's Fostoria Central138kV substation (see Figure 1).

The requested in backfeed date is July 1, 2020.

The requested in service date is September 30, 2020.

Attachment Facilities

Primary Point of Interconnection (Fostoria Central 138kV Substation)

To accommodate the interconnection at the Fostoria Central 138 kV substation, the installation of a new 138 kV circuit breaker will be required, associated protection and control equipment, SCADA, and 138 kV revenue metering.

Direct Connection to the Fostoria Central 138 kV Substation Work and Cost:

- Install one (1) new 138 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering will also be required.

- **Estimated Station Cost: $1,000,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following table below:

For AEP building Non-Direct Connection cost estimates:

Description	Estimated Cost
138 kV Revenue Metering	$250,000
Upgrade line protection and controls at the Fostoria Central 138 kV substation.	$250,000
Total	**$500,000**

Table 1

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Interconnection Customer Requirements

It is understood that Air Energy is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of Air Energy's generating plant and the costs for the line connecting the generating plant to the Fostoria Central 138 kV substation are not included in this report; these are assumed to be Air Energy's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

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Network Impacts

The Queue Project AD1-070 was evaluated as a 205.0 MW (Capacity 36.0 MW) injection into the Fostoria Central 138 kV substation in the AEP area. Project AD1-070 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-070 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2021

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Affected System Analysis & Mitigation

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LGEE Impacts:

None

MISO Impacts:

No impact in the preliminary study but MISO will be performing a retool. Study results will be addressed in the Facilities Study.

Duke, Progress & TVA Impacts:

None

OVEC Impacts:

None

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.
Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis

Not required

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

No problems identified

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

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Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

None

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

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Conclusion

Based upon the results of this System Impact Study, the construction of the 205.0 MW (36.0 MW Capacity) solar generating facility of Air Energy (PJM Project #AD1-070) will require the following additional interconnection charges. This plan of service will interconnect the proposed solar generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the Air Energy generating facility.

Cost Breakdown for Point of Interconnection (Fostoria Central 138kV Substation)			
Attachment Cost	AEP	Install one (1) 138 kV Circuit Breaker at the Fostoria Central 138 kV Substation	$1,000,000
Non-Direct Connection Cost Estimate	AEP	Install 138 kV Revenue Metering	$250,000
	AEP	Upgrade line protection and controls at the Fostoria Central kV substation	$250,000
		Total Estimated Cost for Project AD1-070	**$1,500,000**

Table 2

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

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Figure 1: Point of Interconnection (Fostoria Central 138kV Substation)

Single-Line Diagram

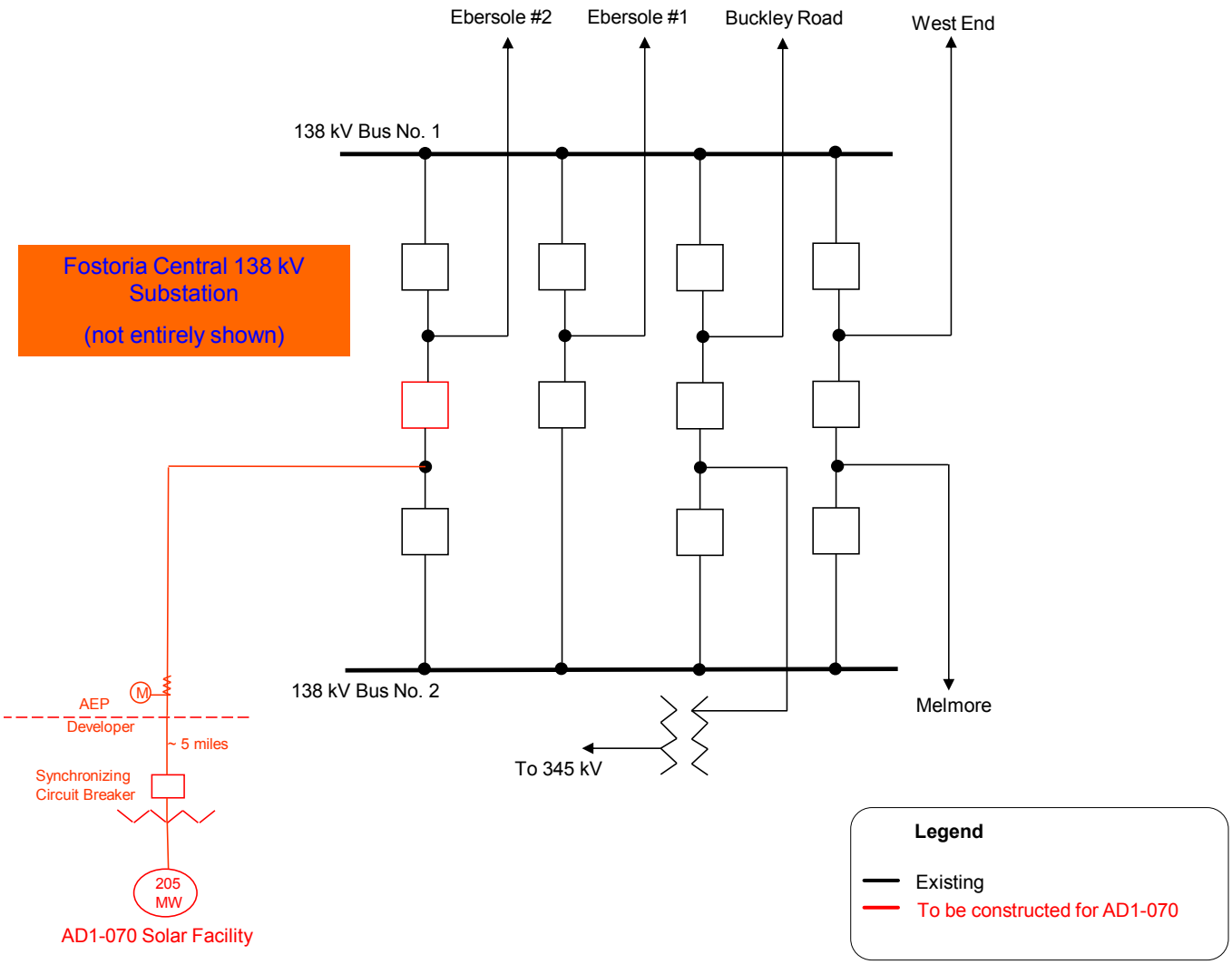
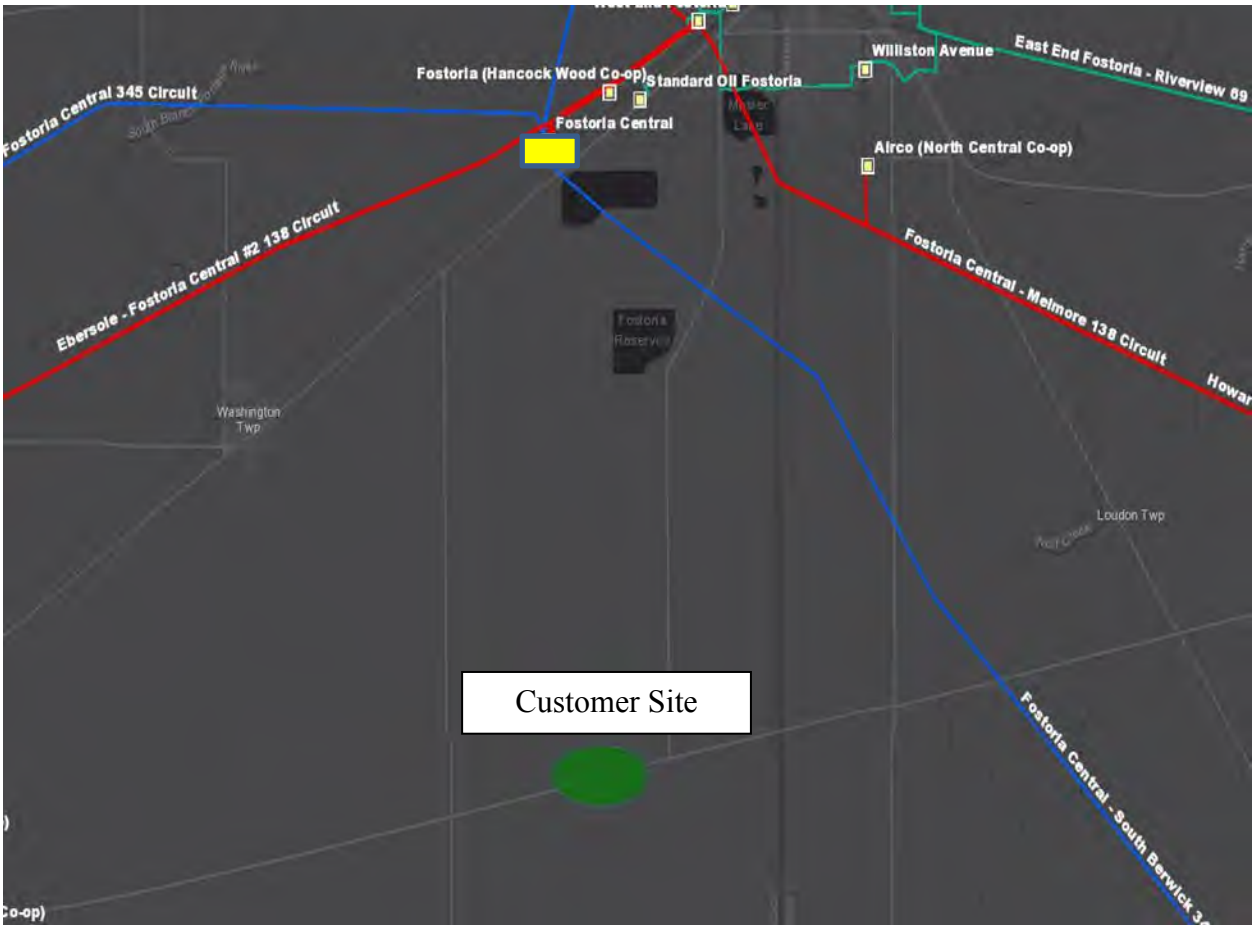


Figure 2: Point of Interconnection (Fostoria Central 138 kV Substation)



Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AD1-070

Fostoria Central 138kV

January 2018

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

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General

The Interconnection Customer (IC) proposes to install PJM Project #AD1-070, a 205.0 MW (36.0 MW Capacity) wind facility in Hancock County, Ohio (see Figure 2). The point of interconnection will be a direct connection AEP's Fostoria Central138kV substation (see Figure 1). The Secondary point of interconnection is to AEP's Fostoria Central – Melmore 138kV circuit (See figure 3).

The requested in backfeed date is July 1, 2020.

The requested in service date is September 30, 2020.

Attachment Facilities

Primary Point of Interconnection (Fostoria Central 138kV Substation)

To accommodate the interconnection at the Fostoria Central 138 kV substation, the installation of a new 138 kV circuit breaker will be required, associated protection and control equipment, SCADA, and 138 kV revenue metering.

Direct Connection to the Fostoria Central 138 kV Substation Work and Cost:

- Install one (1) new 138 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering will also be required.

- **Estimated Station Cost: $1,000,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following table below:

For AEP building Non-Direct Connection cost estimates:

Description	Estimated Cost
138 kV Revenue Metering	$250,000
Upgrade line protection and controls at the Fostoria Central 138 kV substation.	$250,000
Total	**$500,000**

Table 1

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Secondary Point of Interconnection (Fostoria Central – Melmore 138 kV)

To accommodate the interconnection on the Fostoria Central – Melmore 138 kV circuit, a new three (3) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement but operated as a ring-bus will be constructed (see Figure 3). Installation of associated protection and control equipment, 138kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

Interconnection Customer Requirements

It is understood that the IC is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of the IC's generating plant and the costs for the line connecting the generating plant to the Fostoria Central 138 kV substation are not included in this report; these are assumed to be the IC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements

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may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

Option 1

Network Impacts

The Queue Project AD1-070 was evaluated as a 205.0 MW (Capacity 36.0 MW) injection at the Fostoria Central 138 kV substation in the AEP area. Project AD1-070 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-070 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Option 1	
Contingency Name	**Description**
ATSI-P2-3-CEI-345-001	CONTINGENCY 'ATSI-P2-3-CEI-345-001' /* BREAKER FAILURE ON S145 BREAKER AT AVON 345KV DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1 /* 02LAKEAVE 345 02AVON 345 DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2 /* 02LAKEAVE 345 02AVON 345 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END
ATSI-P2-3-OEC-345-031	CONTINGENCY 'ATSI-P2-3-OEC-345-031' /* HAYES 345KV BRK B-3_6_ 12 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1 /* 02HAYES 345 02HAYES 138 END
ATSI-P7-1-CEI-345-001	CONTINGENCY 'ATSI-P7-1-CEI-345-001' /* AVON-BEAVER #1 AND #2 345KV LINE OUTAGES DISCONNECT BRANCH FROM BUS 238551 TO BUS 239725 CKT 1 /* 02AVON 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238551 TO BUS 239725 CKT 2 /* 02AVON 345 02LAKEAVE 345 END

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Option 1	
Contingency Name	**Description**
ATSI-P7-1-OEC-345-001	CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345 END

Table 2

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

AD1-070 Multiple Facility Contingency															
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	238524	238552	1	DC	97.49	98.98	ER	316	10.43	1
2	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	238524	238552	1	DC	97.49	98.98	ER	316	10.43	
3	DCTL	ATSI-P7-1-OEC-345-001	FE - FE	02BEAVER-02CARLIL 345 kV line	238569	238607	1	DC	87.39	88.29	ER	1243	24.49	2
4	LFFB	ATSI-P2-3-OEC-345-023	FE - FE	02BEAVER-02LAKEAVE 345 kV line	238569	239725	2	DC	91.9	92.76	ER	1646	31.13	3
5	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	238915	238524	1	DC	97.52	99.02	ER	316	10.43	4
6	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	238915	238524	1	DC	97.52	99.02	ER	316	10.43	
7	LFFB	ATSI-P2-3-OEC-345-031	FE - FE	X1-027A TAP-02BEAVER 345 kV line	907060	238569	1	DC	82.48	83.17	ER	1742	26.41	5

Table 3

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Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

AD1-070 Contribution to Previously Identified Overloads														
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	239728	239734	1	DC	117.71	118.99	ER	500	14.13	6
2	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	239728	239734	1	DC	117.71	118.99	ER	500	14.13	
3	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	239734	238915	1	DC	111.41	112.69	ER	500	14.13	7
4	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	239734	238915	1	DC	111.41	112.69	ER	500	14.13	

Table 4

Steady-State Voltage Requirements

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Affected System Analysis & Mitigation

LGEE Impacts:

LGEE Impacts to be determined during later study phases (as applicable).

MISO Impacts:

MISO Impacts to be determined during later study phases (as applicable).

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

OVEC Impacts:

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OVEC Impacts to be determined during later study phases (as applicable).

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.
Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

None

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

AD1-070 Multiple Facility Contingency					
#	Contingency Type	Contingency Name	Affected Area	Facility Description	
1	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	There is an existing PJM base line (b2897) project to reconductor the Avon-Admiral Q2 line 795Kcmil ACSR conductor to 795kcmil ACSS 45/7 strand with rating of 435MVA summer normal & 500MVA summer emergency. The base line projects are proposed to alleviate the thermal overload identified for the 2021 PJM Winter generation deliverability study. After the proposed PJM base line project has been completed the Admiral-Avon Q2 138kV line new rating would be 435MVA summer normal and 500MVA summer emergency, the limiting element would be the newly reconductor Admiral-Avon Q2 138kv transmission line, and the new expected Admiral-Avon Q2 138kV line overload would be from 62.56% to 66.93% of its 500MVA summer emergency rating, for the same contingency. See notes. Note 1: The line rating 316MVA summer emergency rating on the model is not correct. The Admiral-Avon Q2 138kV line actual rating is 273MVA summer normal and 332MVA summer emergency rating, higher than the model rating. The limiting element is a transmission line conductor 795Kcmil ACSR 36/1 strand. The line loading based on the actual line rating for the same contingency would be from 94.13% to 100.8% (DC power flow) of its emergency rating (332MVA). Note 2: (PJM b2897). The scheduled in-service date is 06/1/2021.
2	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	
3	DCTL	ATSI-P7-1-OEC-345-001	FE - FE	02BEAVER-02CARLIL 345 kV line	PJM identified a thermal overload on the Beaver-Carlisle 345Kv line for PJM Queue AC2-103 project. The PJM identified thermal overload was confirmed by FE. The limiting elements for the identified thermal overloads are GCY51 ZR3 relay at Beaver and relay thermal (RT) CEYB, impedance relay (ZR) GCY and relay thermal blinder (RT BDD) at Carlisle 345kV substation. ATSI proposed installing a new Dual SEL 345kV relay with UPLC at Beaver and Carlisle substation and adjusting the setting of the Carlisle 345/138kV transformer #1 over current differential relay (BDD). After the proposed projects have been completed, the new Beaver-Carlisle 345kV line rating would be 1228MVA summer normal and 1424MVA summer emergency rating, the new limiting element would be a wave-trap at Carlisle 345kV substation, and the expected line loading would be from 78.08% to 88.54% of its 1424MVA summer emergency rating for the same contingency. The estimated cost to upgrade the Beaver-Carlisle 345kv line relay is $504,700 (without tax).

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AD1-070 Multiple Facility Contingency					
#	Contingency Type	Contingency Name	Affected Area	Facility Description	
4	LFFB	ATSI-P2-3-OEC-345-023	FE - FE	02BEAVER-02LAKEAVE 345 kV line	PJM identified a thermal overload on the Beaver-Lake Ave 345Kv line for PJM Queue AC2-103 project. The identified thermal overload was confirmed by FE. The limiting elements for the identified overloads are the existing (2) 954Kcmil ACSR substation conductor (SCCIR) at Beaver 345kV substation and the Beaver-Lake Ave 345kV ckt 2 (2) 954Kcmil ACSR 45/7 strand conductor line drop. ATSI proposed to reconductor the existing (2) 954Kcmil ACSR substation conductor (SCCIR) at Beaver 345kV substation with (2) 954kcmil ACSS 48/7 strand conductor, 2156MVA summer normal & 2295MVA summer emergency rating and the Beaver-Lake Ave 345kV ckt 2 (2) 954Kcmil ACSR 45/7 strand conductor line drop at Beaver with (2) 954Kcmil 54/7 ACSS conductor, 2184MVA summer normal rating and 2326MVA summer emergency rating. After the proposed conductor work has been completed, the Beaver-Lake Ave 345kV ckt2 new line rating would be 1555MVA summer normal and 1892MVA summer emergency, the limiting element would be a substation conductor (SCCIR) 3500 SAC 127 conductor at Beaver substation and the new expected line overload would be from 81.73% to 92.17% of its 1892MVA summer emergency rating, for the same contingency. See note The estimated cost to reconductor the Beaver 345kV substation and line drop conductor on the Beaver-Lake Ave # 345kV line is $45,000 (without tax).
5	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	There is a proposed PJM base line project (b2897) to upgrade the Admiral-Lorain Q2 138kV line. The limiting elements on the Admiral-Lorain Q2 138kV line are a substation conductor SCCIR (line drop) 795Kcmil ACSR 26/7 strand and a transmission line conductor 795Kcmil ACSR 36/1 strand. The base line projects are proposed to alleviate the thermal overload identified for the 2021 PJM Winter generation deliverability study. The proposed PJM base line projects are to reconductor the existing 795Kcmil ACSR substation conductor (line drop) and 795Kcmil ACSR 26/7 strand transmission line conductor to 795kcmil ACSS with a rating of 435MVA summer normal & 500MVA summer emergency. In-service date Fall of 2020. After all the proposed PJM base line projects have been completed, the Lorain-Admiral Q2 138kV line expected overload would be from 62.58% to 66.95% of its 500MVA summer emergency rating, for the same contingency. Note 1: (PJM b2897). The scheduled in-service date is 06/1/2021.
6	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	
7	LFFB	ATSI-P2-3-OEC-345-031	FE - FE	X1-027A TAP-02BEAVER 345 kV line	PJM identified a thermal overload on the Beaver-Lake Ave 345Kv line for PJM Queue AC2-103 project. The identified thermal overload was confirmed by FE. The limiting elements for the identified overload are the Beaver substation conductor (SCCIR) 954Kcmil ACSR 45/7 strand (the limiting element). ATSI proposed to reconductor the exiting Beaver substation conductor (SCCIR) 954Kcmil ACSR 45/7 strand (limiting element) with bundle 954kcmil ACSS 48/7 strand conductor, 2184MVA summer normal & 2326MVA summer emergency rating. After the proposed reconductoring projects have been completed, the X1-027A-Beaver 345kV new line rating would be 1486MVA summer normal and 1878MVA summer emergency and the new limiting element would be the transmission line 954Kcmil ACSR 45/7 strand conductor, and the expected line loading would be from 78.1% to 92.29% of its 1878MVA summer emergency rating, for the same contingency. See note. The estimated cost to reconductor the Beaver substation conductor on Beaver-X1-027(Davis Bessie) 345kV line is $41,800 (without tax).

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Previous System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, identified for earlier generation or transmission interconnection projects in the PJM Queue)

AD1-070 Contribution to Previously Identified Overloads					
	Contingency				
#	Type	Name	Affected Area	Facility Description	Proposed Mitigation
1	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	There is an existing proposed PJM base line upgrade project (b2896) to alleviate the overload. After the proposed PJM base line upgrade have been completed, the Black River-US Steel 138kV line rating would be 552MVA summer normal and 659MVA summer emergency. After all the proposed PJM base line projects have been completed, the Black River-Charleston (US Steel) 138kV line expected overload would be from 92.88% to 95.56% of its 659MVA summer emergency rating, for the same contingency. See note. The PJM base line projects are listed below: – PJM (b2896)-reconductor the Black River-Charleston 138kV line existing 795Kcmil ACSS conductor with bundle 795Kcmil ACSS conductor with a rating of 897MVA summer normal and 1031MVA summer emergency rating. The scheduled in-service date is 06/1/2021. – PJM (b2896)-upgrade the 2000A wave-traps at Black River and Charleston substation with 3000A wave-trap with rating of 733MVA summer normal and 831MVA summer emergency rating. The scheduled in-service date is 06/1/2021.
2	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	
3	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	There is an existing PJM base line upgrade project (b2896) to reduce the identified overload. After PJM base line b2896 have been completed, PJM identified additional thermal overload on the Charleston (US Steel)-Lorain Q2 138Kv line for PJM Queue AC2-103 project. The identified PJM Queue AC2-103 project thermal overload was confirmed by FE. ATSI proposed additional PJM Queue AC2-103 project mitigation to alleviate the remaining overload. After all proposed base line upgrade projects have been completed, the Charleston-Lorain Q2 138kV rating would be 548MVA summer normal and 688MVA summer emergency and the Charleston-Lorain Q2 138kV line expected overload would be 81.90% to 86.21% of its 688MVA summer emergency rating, for the same contingency. Existing PJM base line project: – PJM b2896 - reconductor the existing Charleston-Lorain Q2 138kV line 795Kcmil ACSS conductor to a bundle 795Kcmil ACSS conductor with a rating of 897MVA summer normal and 1031MVA summer emergency rating. The scheduled in-service date is 06/1/2021. – PJM b2896 - upgrade the 2000A wave-traps at Charleston and Lorain substation to 3000A wave-trap with a rating of 733MVA summer normal and 831MVA summer emergency rating. The scheduled in-service date is 06/1/2021. New Proposed mitigation: – Reconductor the existing Lorain substation (2) 795Kcmil ACSR conductor to (2) 795Kcmil ACSS 30/19 strand conductor with a rating of 796MVA summer normal and 848MVA summer emergency rating. The scheduled in-service date is 06/1/2021. The estimated cost to reconductor the existing Lorain 138kV substation conductor (SCCIR) on the Lorain - US Steel Q2 138kV line with (2) 795Kcmil ACSS 30/19 stand conductor is $86,500 (without tax).
4	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

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Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

Conclusion

Based upon the results of this Feasibility Study, the construction of the 205.0 MW (36.0 MW Capacity) wind generating facility (PJM Project #AD1-070) will require the following additional interconnection charges. This plan of service will interconnect the proposed wind generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the IC's generating facility.

Please note that several of the First Energy upgrades are relying on PJM Baseline projects that are not scheduled to be in service until June 2021 which affects the requested in service date.

Cost Breakdown for Point of Interconnection (Fostoria Central 138kV Substation)			
Type	**Company**	**Description**	**Est. Cost**
Attachment Cost	AEP	Install one (1) 138 kV Circuit Breaker at the Fostoria Central 138 kV Substation	$1,000,000
Non-Direct Connection Cost Estimate	AEP	Install 138 kV Revenue Metering	$250,000
	AEP	Upgrade line protection and controls at the Fostoria Central kV substation	$250,000
	FE	Upgrade the Beaver-Carlisle 345kv line relay	$504,700
	FE	Reconductor the Beaver 345kV substation and line drop conductor on the Beaver-Lake Ave # 345kV line	$45,000
	FE	Reconductor the Beaver substation conductor on Beaver-X1-027(Davis Bessie) 345kV line	$41,800
	FE	The estimated cost to reconductor the existing Lorain 138kV substation conductor (SCCIR) on the Lorain - US Steel Q2 138kV line with (2) 795Kcmil ACSS 30/19 stand conductor	$86,500
		Total Estimated Cost for Project AD1-070	**$2,178,000**

Table 5

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

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Option 2

Network Impacts

The Queue Project AD1-070 was evaluated as a 205.0 MW (Capacity 36.0 MW) injection tapping Fostoria to Melmore 138kV line in the AEP area. Project AD1-070 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-070 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Option 2	
Contingency Name	**Description**
712_B3_05TIFFIN 138-1_WOMOAB	CONTINGENCY '712_B3_05TIFFIN 138-1_WOMOAB' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243015 TO BUS 243130 CKT 1 / 243015 05GREENL 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243130 TO BUS 245637 CKT 1 / 243130 05TIFFIN 138 245637 05TIFFIN C 69.0 1 OPEN BRANCH FROM BUS 247481 TO BUS 245637 CKT 1 / 247481 05HOLME STSS69.0 245637 05TIFFIN C 69.0 1 OPEN BRANCH FROM BUS 245648 TO BUS 245637 CKT 1 / 245648 05MAULE RD 69.0 245637 05TIFFIN C 69.0 1 END
AEP_P7-1_#7731-A	CONTINGENCY 'AEP_P7-1_#7731-A' OPEN BRANCH FROM BUS 243006 TO BUS 934460 CKT 1 / 243006 05FOSTOR 138 934460 AD1-070 TAP 138 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039 05MELMOR 138 243110 05STIFFI 138 1 END
AEP_P7-1_#7732-A	CONTINGENCY 'AEP_P7-1_#7732-A' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8 138 243137 05W.END 138 1 OPEN BRANCH FROM BUS 243006 TO BUS 934460 CKT 1 / 243006 05FOSTOR 138 934460 AD1-070 TAP 138 1

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Option 2	
Contingency Name	**Description**
	END
ATSI-P2-3-CEI-345-001	CONTINGENCY 'ATSI-P2-3-CEI-345-001' /* BREAKER FAILURE ON S145 BREAKER AT AVON 345KV DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1 /* 02LAKEAVE 345 02AVON 345 DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2 /* 02LAKEAVE 345 02AVON 345 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END
ATSI-P7-1-CEI-345-001	CONTINGENCY 'ATSI-P7-1-CEI-345-001' /* AVON-BEAVER #1 AND #2 345KV LINE OUTAGES DISCONNECT BRANCH FROM BUS 238551 TO BUS 239725 CKT 1 /* 02AVON 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238551 TO BUS 239725 CKT 2 /* 02AVON 345 02LAKEAVE 345 END
ATSI-P7-1-OEC-345-001	CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345 END

Table 6

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

AD1-070 Multiple Facility Contingency - Option 2															
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	238524	238552	1	DC	97.45	98.99	ER	316	10.78	1
2	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02AD Q-2-02AVON 138 kV line	238524	238552	1	DC	97.45	98.99	ER	316	10.78	
3	DCTL	ATSI-P7-1-OEC-345-001	FE - FE	02BEAVER-02CARLIL 345 kV line	238569	238607	1	DC	87.35	88.23	ER	1243	23.96	2
4	LFFB	ATSI-P2-3-OEC-345-023	FE - FE	02BEAVER-02LAKEAVE	238569	239725	2	DC	91.86	92.71	ER	1646	30.32	3

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AD1-070 Multiple Facility Contingency - Option 2														
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
				345 kV line										
5	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	238915	238524	1	DC	97.45	98.99	ER	316	10.78	4
6	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02LRN Q2-02AD Q-2 138 kV line	238915	238524	1	DC	97.45	98.99	ER	316	10.78	
7	DCTL	AEP_P7-1_#7731-A	AEP - FE	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	83.8	99.45	ER	245	38.36	5
8	DCTL	AEP_P7-1_#7731-A	AEP - AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	84.17	106.94	ER	167	38.03	6
9	DCTL	AEP_P7-1_#7732-A	AEP - AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	81	102.25	ER	167	35.48	

Table 7

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

AD1-070 Contribution to Previously Identified Overloads - Option 2														
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
10	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	239728	239734	1	DC	117.67	118.99	ER	500	14.6	7
11	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02BLKRVR-02USSTEEL 138 kV line	239728	239734	1	DC	117.67	118.99	ER	500	14.6	
12	LFFB	ATSI-P2-3-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	239734	238915	1	DC	111.37	112.69	ER	500	14.6	8
13	DCTL	ATSI-P7-1-CEI-345-001	FE - FE	02USSTEEL-02LRN Q2 138 kV line	239734	238915	1	DC	111.37	112.69	ER	500	14.6	

Table 8

Steady-State Voltage Requirements

None

Affected System Analysis & Mitigation

LGEE Impacts:

LGEE Impacts to be determined during later study phases (as applicable).

MISO Impacts:

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MISO Impacts to be determined during later study phases (as applicable).

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

OVEC Impacts:

OVEC Impacts to be determined during later study phases (as applicable).

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

AD1-070 Delivery of Energy Portion of Interconnection Request - Option 2														
		Contingency			Bus				Loading		Rating			
#	Type	Name	Affected Area	Facility Description	From	To	Cir.	PF	Initial	Final	Type	MVA	MW Con.	FG App.
1	Non	Non	AEP - FE	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	103.93	108.44	NR	167	16.69	
2	Non	Non	AEP - AEP	AD1-070 TAP-05FOSTOR 138 kV line	934460	243006	1	DC	79.96	149.75	NR	167	116.55	
3	N-1	712_B3_05TIFFIN 138-1_WOMOAB	AEP - AEP	AD1-070 TAP-05FOSTOR 138 kV line	934460	243006	1	DC	83.54	137.37	ER	245	131.88	

Table 9

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Figure 1: Primary Point of Interconnection (Fostoria Central 138kV Substation)

Single-Line Diagram

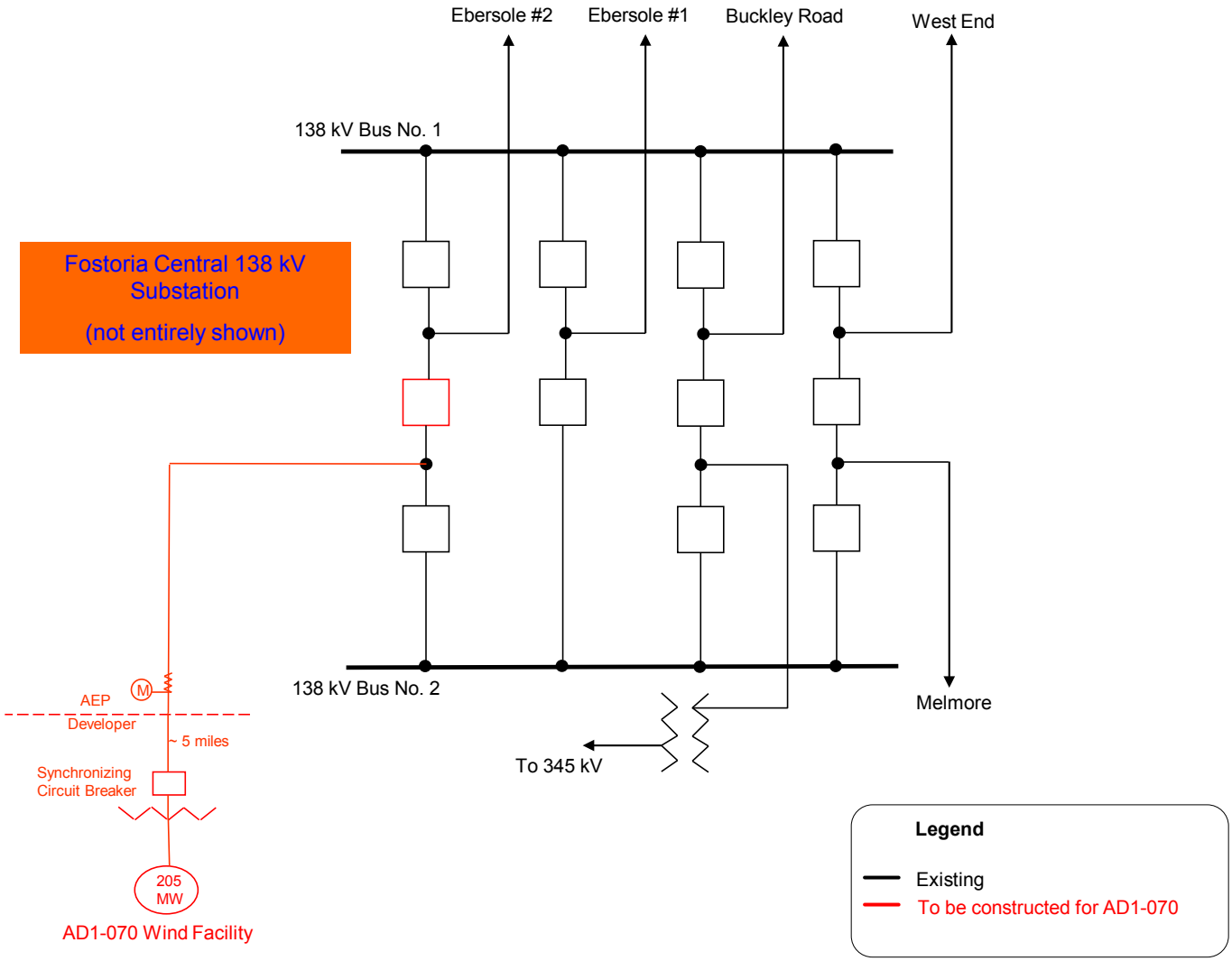

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Figure 2: Primary Point of Interconnection (Fostoria Central 138 kV Substation)

Figure 3: Secondary Point of Interconnection (Fostoria Central - Melmore 138kV)

Single-Line Diagram

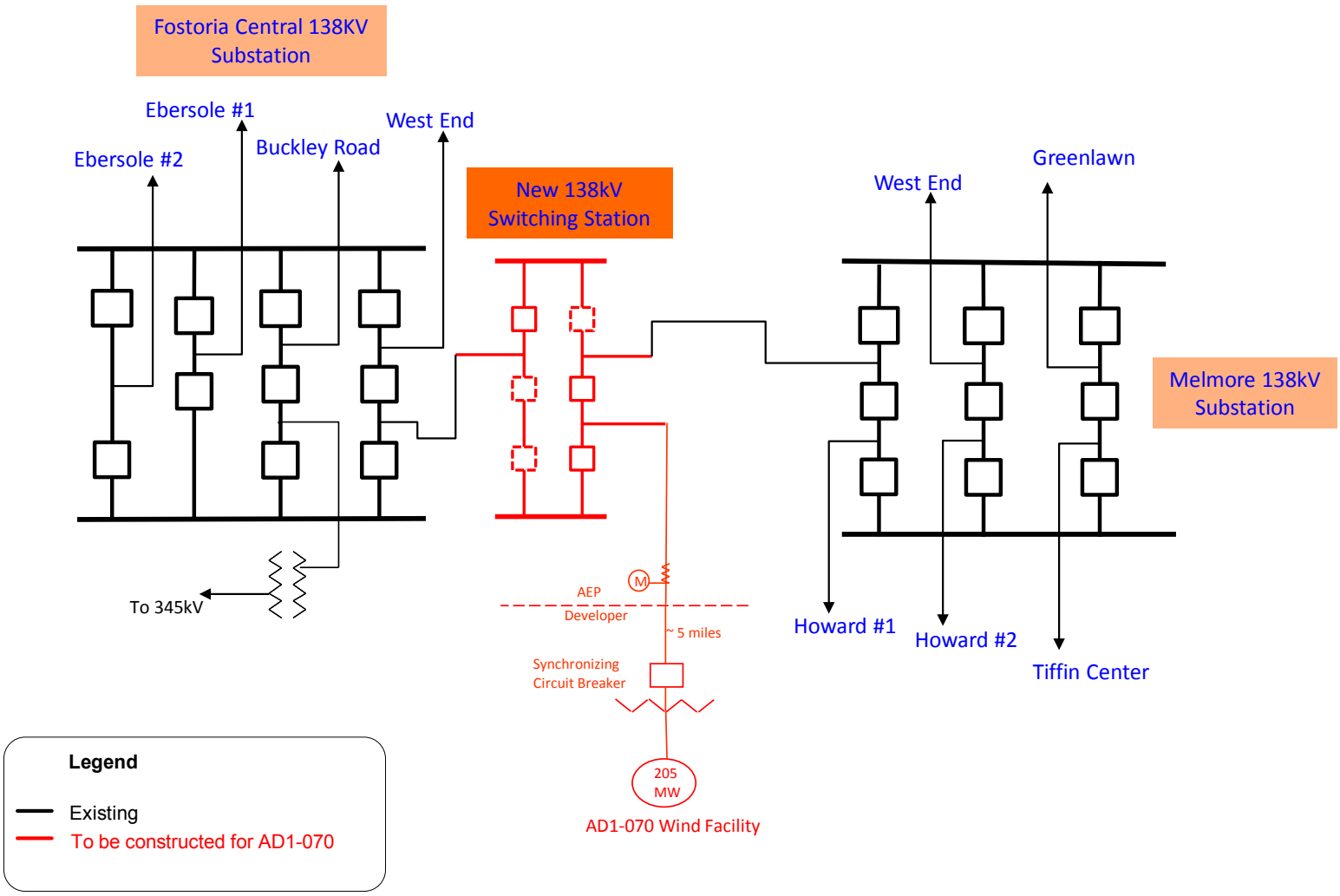

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Figure 4: Secondary Point of Interconnection (Fostoria Central - Melmore 138kV)

Appendices - Option 1

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

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Appendix 1

(FE - FE) The 02AD Q-2-02AVON 138 kV line (from bus 238524 to bus 238552 ckt 1) loads from 97.49% to 98.98% (**DC power flow**) of its emergency rating (316 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 10.43 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*8.97*
238572	*02BEAVGB*	*1.6*
240968	*02BG2 GEN*	*0.45*
240969	*02BG4 G1*	*0.11*
240970	*02BG4 G2&3*	*0.23*
240971	*02BG4 G4&5*	*0.23*
240950	*02BG5*	*1.38*
240973	*02BG6 AMPO*	*2.01*
239276	*02COLLW 11*	*-2.18*
239297	*02CPPW41*	*-2.81*
238979	*02NAPMUN*	*2.12*
240975	*02PGE GEN*	*3.11*
239175	*02WLORG-6*	*2.53*
932791	*AC2-103 C*	*3.73*
932792	*AC2-103 E*	*24.99*
934251	*AD1-052 C1*	*0.99*
934261	*AD1-052 C2*	*0.99*
934252	*AD1-052 E1*	*0.44*
934262	*AD1-052 E2*	*0.44*
934461	*AD1-070 C O1*	*1.83*
934462	*AD1-070 E O1*	*8.6*
934761	*AD1-103 C O1*	*6.28*
934762	*AD1-103 E O1*	*42.02*
934891	*AD1-118*	*4.4*
247551	*U4-028 C*	*0.71*
247940	*U4-028 E*	*4.72*
247552	*U4-029 C*	*0.71*
247941	*U4-029 E*	*4.72*
247548	*V4-010 C*	*1.52*
247947	*V4-010 E*	*10.19*

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901803	*W1-072A*	*2.52*
907062	*X1-027A E1*	*10.5*
907065	*X1-027A E2*	*10.5*
907067	*X1-027A E3*	*10.5*
907069	*X1-027A E4*	*10.5*
931951	*AB1-107 1*	*17.55*
931961	*AB1-107 2*	*38.52*

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Appendix 2

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 87.39% to 88.29% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 24.49 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P7-1-OEC-345-001'                    /* BEAVER-LAKAVE 345
CK 1 & 2
  DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1          /* 02BEAVER
345 02LAKEAVE 345
  DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2          /* 02BEAVER
345 02LAKEAVE 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*22.36*
240968	*02BG2 GEN*	*1.12*
240969	*02BG4 G1*	*0.28*
240970	*02BG4 G2&3*	*0.56*
240971	*02BG4 G4&5*	*0.56*
240950	*02BG5*	*3.41*
240973	*02BG6 AMPO*	*4.97*
238670	*02DVBSG1*	*38.31*
238979	*02NAPMUN*	*5.32*
240975	*02PGE GEN*	*7.7*
239171	*02WLORG-2*	*6.1*
239172	*02WLORG-3*	*6.27*
239173	*02WLORG-4*	*6.26*
239174	*02WLORG-5*	*6.28*
932051	*AC2-015 C*	*4.94*
932052	*AC2-015 E*	*5.77*
932791	*AC2-103 C*	*11.37*
932792	*AC2-103 E*	*76.12*
934251	*AD1-052 C1*	*2.07*
934261	*AD1-052 C2*	*2.07*
934252	*AD1-052 E1*	*0.92*
934262	*AD1-052 E2*	*0.92*
934461	*AD1-070 C O1*	*4.3*
934462	*AD1-070 E O1*	*20.19*
934761	*AD1-103 C O1*	*19.12*
934762	*AD1-103 E O1*	*127.96*
934891	*AD1-118*	*11.43*
940241	*J419*	*8.29*
981121	*J444*	*19.57*
247551	*U4-028 C*	*1.49*

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247940	*U4-028 E*	*9.94*
247552	*U4-029 C*	*1.49*
247941	*U4-029 E*	*9.94*
247567	*V2-006 C*	*1.77*
247961	*V2-006 E*	*11.85*
247548	*V4-010 C*	*3.21*
247947	*V4-010 E*	*21.47*
901803	*W1-072A*	*6.53*
907061	*X1-027A C1*	*0.94*
907064	*X1-027A C2*	*0.94*
907066	*X1-027A C3*	*0.94*
907068	*X1-027A C4*	*0.94*
907062	*X1-027A E1*	*31.98*
907065	*X1-027A E2*	*31.98*
907067	*X1-027A E3*	*31.98*
907069	*X1-027A E4*	*31.98*
931951	*AB1-107 1*	*43.8*
931961	*AB1-107 2*	*101.15*
925751	*AC1-051 C*	*0.7*
925752	*AC1-051 E*	*4.7*
926941	*AC1-181*	*0.58*

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Appendix 3

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 91.9% to 92.76% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 31.13 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-OEC-345-023'                    /* BEAVER 345KV BRK B-
121
 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1        /* 02BEAVER
345 02LAKEAVE 345
 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1        /* 02BEAVER
345 02CARLIL 345
 END
```

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*33.94*
238564	*02BAYSG1*	*28.22*
240968	*02BG2 GEN*	*1.41*
240969	*02BG4 G1*	*0.35*
240970	*02BG4 G2&3*	*0.71*
240971	*02BG4 G4&5*	*0.71*
240950	*02BG5*	*4.31*
240973	*02BG6 AMPO*	*6.29*
239276	*02COLLW 11*	*-4.18*
239297	*02CPPW41*	*-5.13*
238670	*02DVBSG1*	*48.53*
238979	*02NAPMUN*	*6.76*
240975	*02PGE GEN*	*9.73*
239171	*02WLORG-2*	*7.75*
239172	*02WLORG-3*	*7.96*
239173	*02WLORG-4*	*7.94*
239174	*02WLORG-5*	*7.97*
932051	*AC2-015 C*	*6.25*
932052	*AC2-015 E*	*7.3*
932791	*AC2-103 C*	*14.43*
932792	*AC2-103 E*	*96.56*
934251	*AD1-052 C1*	*2.56*
934261	*AD1-052 C2*	*2.56*
934252	*AD1-052 E1*	*1.14*
934262	*AD1-052 E2*	*1.14*
934461	*AD1-070 C O1*	*5.47*
934462	*AD1-070 E O1*	*25.67*
934761	*AD1-103 C O1*	*24.26*
934762	*AD1-103 E O1*	*162.32*
934891	*AD1-118*	*14.5*

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247551	*U4-028 C*	*1.87*
247940	*U4-028 E*	*12.52*
247552	*U4-029 C*	*1.87*
247941	*U4-029 E*	*12.52*
247567	*V2-006 C*	*2.29*
247961	*V2-006 E*	*15.29*
247548	*V4-010 C*	*4.02*
247947	*V4-010 E*	*26.91*
901803	*W1-072A*	*8.29*
907061	*X1-027A C1*	*1.19*
907064	*X1-027A C2*	*1.19*
907066	*X1-027A C3*	*1.19*
907068	*X1-027A C4*	*1.19*
907062	*X1-027A E1*	*40.57*
907065	*X1-027A E2*	*40.57*
907067	*X1-027A E3*	*40.57*
907069	*X1-027A E4*	*40.57*
918401	*AA1-056*	*1.95*
931951	*AB1-107 1*	*55.28*
931961	*AB1-107 2*	*128.22*
925751	*AC1-051 C*	*0.89*
925752	*AC1-051 E*	*5.95*
926941	*AC1-181*	*0.74*

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Appendix 4

(FE - FE) The 02LRN Q2-02AD Q-2 138 kV line (from bus 238915 to bus 238524 ckt 1) loads from 97.52% to 99.02% (**DC power flow**) of its emergency rating (316 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 10.43 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*8.97*
238572	*02BEAVGB*	*1.6*
240968	*02BG2 GEN*	*0.45*
240969	*02BG4 G1*	*0.11*
240970	*02BG4 G2&3*	*0.23*
240971	*02BG4 G4&5*	*0.23*
240950	*02BG5*	*1.38*
240973	*02BG6 AMPO*	*2.01*
239276	*02COLLW 11*	*-2.18*
239297	*02CPPW41*	*-2.81*
238979	*02NAPMUN*	*2.12*
240975	*02PGE GEN*	*3.11*
239175	*02WLORG-6*	*2.53*
932791	*AC2-103 C*	*3.73*
932792	*AC2-103 E*	*24.99*
934251	*AD1-052 C1*	*0.99*
934261	*AD1-052 C2*	*0.99*
934252	*AD1-052 E1*	*0.44*
934262	*AD1-052 E2*	*0.44*
934461	*AD1-070 C O1*	*1.83*
934462	*AD1-070 E O1*	*8.6*
934761	*AD1-103 C O1*	*6.28*
934762	*AD1-103 E O1*	*42.02*
934891	*AD1-118*	*4.4*
247551	*U4-028 C*	*0.71*
247940	*U4-028 E*	*4.72*
247552	*U4-029 C*	*0.71*
247941	*U4-029 E*	*4.72*
247548	*V4-010 C*	*1.52*
247947	*V4-010 E*	*10.19*

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901803	*W1-072A*	*2.52*
907062	*X1-027A E1*	*10.5*
907065	*X1-027A E2*	*10.5*
907067	*X1-027A E3*	*10.5*
907069	*X1-027A E4*	*10.5*
931951	*AB1-107 1*	*17.55*
931961	*AB1-107 2*	*38.52*

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Appendix 5

(FE - FE) The X1-027A TAP-02BEAVER 345 kV line (from bus 907060 to bus 238569 ckt 1) loads from 82.48% to 83.17% (**DC power flow**) of its emergency rating (1742 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-031'. This project contributes approximately 26.41 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-OEC-345-031'                    /* HAYES 345KV BRK B-
3_6_ 12
 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1          /* 02HAYES
345 02DAV-BE 345
 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1          /* 02HAYES
345 02BEAVER 345
 DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1          /* 02HAYES
345 02HAYES 138
 END
```

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*33.44*
238564	*02BAYSG1*	*25.03*
240968	*02BG2 GEN*	*1.25*
240969	*02BG4 G1*	*0.31*
240970	*02BG4 G2&3*	*0.62*
240971	*02BG4 G4&5*	*0.62*
240950	*02BG5*	*3.83*
240973	*02BG6 AMPO*	*5.56*
239276	*02COLLW 11*	*-3.19*
239297	*02CPPW41*	*-3.91*
238670	*02DVBSG1*	*51.66*
238885	*02LEMOG1*	*6.33*
238886	*02LEMOG2*	*6.33*
238887	*02LEMOG3*	*6.33*
238888	*02LEMOG4*	*6.33*
238979	*02NAPMUN*	*6.24*
240975	*02PGE GEN*	*8.62*
932791	*AC2-103 C*	*20.36*
932792	*AC2-103 E*	*136.25*
934461	*AD1-070 C O1*	*4.64*
934462	*AD1-070 E O1*	*21.77*
934761	*AD1-103 C O1*	*34.22*
934762	*AD1-103 E O1*	*229.04*
934891	*AD1-118*	*14.1*
247567	*V2-006 C*	*2.07*
247961	*V2-006 E*	*13.88*
901803	*W1-072A*	*8.06*
907061	*X1-027A C1*	*1.68*

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907064	*X1-027A C2*	*1.68*
907066	*X1-027A C3*	*1.68*
907068	*X1-027A C4*	*1.68*
907062	*X1-027A E1*	*57.24*
907065	*X1-027A E2*	*57.24*
907067	*X1-027A E3*	*57.24*
907069	*X1-027A E4*	*57.24*
918401	*AA1-056*	*1.93*
931951	*AB1-107 1*	*49.16*
931961	*AB1-107 2*	*126.33*
926941	*AC1-181*	*0.68*

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Appendix 6

(FE - FE) The 02BLKRVR-02USSTEEL 138 kV line (from bus 239728 to bus 239734 ckt 1) loads from 117.71% to 118.99% (**DC power flow**) of its emergency rating (500 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 14.13 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*12.16*
238572	*02BEAVGB*	*2.15*
240968	*02BG2 GEN*	*0.61*
240969	*02BG4 G1*	*0.15*
240970	*02BG4 G2&3*	*0.31*
240971	*02BG4 G4&5*	*0.31*
240950	*02BG5*	*1.87*
240973	*02BG6 AMPO*	*2.72*
239276	*02COLLW 11*	*-2.84*
239297	*02CPPW41*	*-3.58*
238979	*02NAPMUN*	*2.87*
240975	*02PGE GEN*	*4.21*
239175	*02WLORG-6*	*3.41*
932051	*AC2-015 C*	*3.48*
932052	*AC2-015 E*	*4.06*
932791	*AC2-103 C*	*5.07*
932792	*AC2-103 E*	*33.91*
934251	*AD1-052 C1*	*1.35*
934261	*AD1-052 C2*	*1.35*
934252	*AD1-052 E1*	*0.6*
934262	*AD1-052 E2*	*0.6*
934461	*AD1-070 C O1*	*2.48*
934462	*AD1-070 E O1*	*11.65*
934761	*AD1-103 C O1*	*8.52*
934762	*AD1-103 E O1*	*57.*
934891	*AD1-118*	*5.97*
247542	*U4-001 C*	*1.52*
247934	*U4-001 E*	*10.14*
247551	*U4-028 C*	*0.96*
247940	*U4-028 E*	*6.4*

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247552	*U4-029 C*	*0.96*
247941	*U4-029 E*	*6.4*
247567	*V2-006 C*	*1.01*
247961	*V2-006 E*	*6.74*
247548	*V4-010 C*	*2.07*
247947	*V4-010 E*	*13.83*
901803	*W1-072A*	*3.41*
907062	*X1-027A E1*	*14.25*
907065	*X1-027A E2*	*14.25*
907067	*X1-027A E3*	*14.25*
907069	*X1-027A E4*	*14.25*
915952	*Y3-092 FTWR*	*31.39*
915953	*Y3-092 NFTWR*	*31.39*
931951	*AB1-107 1*	*23.8*
931961	*AB1-107 2*	*52.22*
923821	*AB2-019*	*1.76*
925751	*AC1-051 C*	*0.5*
925752	*AC1-051 E*	*3.32*
926941	*AC1-181*	*0.32*

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Appendix 7

(FE - FE) The 02USSTEEL-02LRN Q2 138 kV line (from bus 239734 to bus 238915 ckt 1) loads from 111.41% to 112.69% (**DC power flow**) of its emergency rating (500 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 14.13 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*12.16*
238572	*02BEAVGB*	*2.15*
240968	*02BG2 GEN*	*0.61*
240969	*02BG4 G1*	*0.15*
240970	*02BG4 G2&3*	*0.31*
240971	*02BG4 G4&5*	*0.31*
240950	*02BG5*	*1.87*
240973	*02BG6 AMPO*	*2.72*
239276	*02COLLW 11*	*-2.84*
239297	*02CPPW41*	*-3.58*
238979	*02NAPMUN*	*2.87*
240975	*02PGE GEN*	*4.21*
239175	*02WLORG-6*	*3.41*
932051	*AC2-015 C*	*3.48*
932052	*AC2-015 E*	*4.06*
932791	*AC2-103 C*	*5.07*
932792	*AC2-103 E*	*33.91*
934251	*AD1-052 C1*	*1.35*
934261	*AD1-052 C2*	*1.35*
934252	*AD1-052 E1*	*0.6*
934262	*AD1-052 E2*	*0.6*
934461	*AD1-070 C O1*	*2.48*
934462	*AD1-070 E O1*	*11.65*
934761	*AD1-103 C O1*	*8.52*
934762	*AD1-103 E O1*	*57.*
934891	*AD1-118*	*5.97*
247542	*U4-001 C*	*1.52*
247934	*U4-001 E*	*10.14*
247551	*U4-028 C*	*0.96*
247940	*U4-028 E*	*6.4*

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247552	*U4-029 C*	*0.96*
247941	*U4-029 E*	*6.4*
247567	*V2-006 C*	*1.01*
247961	*V2-006 E*	*6.74*
247548	*V4-010 C*	*2.07*
247947	*V4-010 E*	*13.83*
901803	*W1-072A*	*3.41*
907062	*X1-027A E1*	*14.25*
907065	*X1-027A E2*	*14.25*
907067	*X1-027A E3*	*14.25*
907069	*X1-027A E4*	*14.25*
915952	*Y3-092 FTWR*	*31.39*
915953	*Y3-092 NFTWR*	*31.39*
931951	*AB1-107 1*	*23.8*
931961	*AB1-107 2*	*52.22*
923821	*AB2-019*	*1.76*
925751	*AC1-051 C*	*0.5*
925752	*AC1-051 E*	*3.32*
926941	*AC1-181*	*0.32*

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Appendices – Option 2

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

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Appendix 1

(FE - FE) The 02AD Q-2-02AVON 138 kV line (from bus 238524 to bus 238552 ckt 1) loads from 97.45% to 98.99% (**DC power flow**) of its emergency rating (316 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 10.78 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*8.97*
238572	*02BEAVGB*	*1.6*
240968	*02BG2 GEN*	*0.45*
240969	*02BG4 G1*	*0.11*
240970	*02BG4 G2&3*	*0.23*
240971	*02BG4 G4&5*	*0.23*
240950	*02BG5*	*1.38*
240973	*02BG6 AMPO*	*2.01*
239276	*02COLLW 11*	*-2.18*
239297	*02CPPW41*	*-2.81*
238979	*02NAPMUN*	*2.12*
240975	*02PGE GEN*	*3.11*
239175	*02WLORG-6*	*2.53*
932791	*AC2-103 C*	*3.73*
932792	*AC2-103 E*	*24.99*
934251	*AD1-052 C1*	*0.99*
934261	*AD1-052 C2*	*0.99*
934252	*AD1-052 E1*	*0.44*
934262	*AD1-052 E2*	*0.44*
934461	*AD1-070 C O2*	*1.89*
934462	*AD1-070 E O2*	*8.89*
934761	*AD1-103 C O2*	*6.33*
934762	*AD1-103 E O2*	*42.39*
934891	*AD1-118*	*4.4*
LTF	*CARR*	*0.9*
LTF	*CBM-S1*	*3.88*
LTF	*CBM-S2*	*1.64*
LTF	*CBM-W1*	*31.44*
LTF	*CBM-W2*	*27.29*
LTF	*CIN*	*4.37*

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LTF	*CPLE*	*0.29*
LTF	*G-007*	*1.12*
LTF	*IPL*	*2.81*
LTF	*LGEE*	*0.8*
LTF	*MEC*	*8.63*
LTF	*MECS*	*16.34*
LTF	*O-066*	*3.81*
LTF	*RENSSELAER*	*0.7*
LTF	*ROSETON*	*5.06*
247551	*U4-028 C*	*0.71*
247940	*U4-028 E*	*4.72*
247552	*U4-029 C*	*0.71*
247941	*U4-029 E*	*4.72*
247548	*V4-010 C*	*1.52*
247947	*V4-010 E*	*10.19*
901803	*W1-072A*	*2.52*
LTF	*WEC*	*1.39*
907062	*X1-027A E1*	*10.5*
907065	*X1-027A E2*	*10.5*
907067	*X1-027A E3*	*10.5*
907069	*X1-027A E4*	*10.5*
LTF	*Y3-032*	*13.61*
931951	*AB1-107 1*	*17.55*
931961	*AB1-107 2*	*38.52*

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Appendix 2

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 87.35% to 88.23% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 23.96 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P7-1-OEC-345-001'                    /* BEAVER-LAKAVE 345
CK 1 & 2
  DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1          /* 02BEAVER
345 02LAKEAVE 345
  DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2          /* 02BEAVER
345 02LAKEAVE 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*22.36*
240968	*02BG2 GEN*	*1.12*
240969	*02BG4 G1*	*0.28*
240970	*02BG4 G2&3*	*0.56*
240971	*02BG4 G4&5*	*0.56*
240950	*02BG5*	*3.41*
240973	*02BG6 AMPO*	*4.97*
238670	*02DVBSG1*	*38.31*
238979	*02NAPMUN*	*5.32*
240975	*02PGE GEN*	*7.7*
239171	*02WLORG-2*	*6.1*
239172	*02WLORG-3*	*6.27*
239173	*02WLORG-4*	*6.26*
239174	*02WLORG-5*	*6.28*
932051	*AC2-015 C*	*4.94*
932052	*AC2-015 E*	*5.77*
932791	*AC2-103 C*	*11.37*
932792	*AC2-103 E*	*76.11*
934251	*AD1-052 C1*	*2.07*
934261	*AD1-052 C2*	*2.07*
934252	*AD1-052 E1*	*0.92*
934262	*AD1-052 E2*	*0.92*
934461	*AD1-070 C O2*	*4.21*
934462	*AD1-070 E O2*	*19.75*
LTF	*AD1-092*	*4.68*
LTF	*AD1-093*	*8.03*
LTF	*AD1-094*	*1.53*
934761	*AD1-103 C O2*	*18.07*
934762	*AD1-103 E O2*	*120.91*
934891	*AD1-118*	*11.43*

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LTF	CARR	1.36
LTF	CBM-S1	7.56
LTF	CBM-S2	2.4
LTF	CBM-W1	73.96
LTF	CBM-W2	55.9
LTF	CIN	9.16
LTF	CPLE	0.34
LTF	G-007	2.55
LTF	IPL	5.9
940241	J419	8.29
981121	J444	19.57
LTF	LGEE	1.6
LTF	MEC	18.54
LTF	MECS	41.25
LTF	O-066	8.62
LTF	RENSSELAER	1.07
LTF	ROSETON	7.74
247551	U4-028 C	1.49
247940	U4-028 E	9.94
247552	U4-029 C	1.49
247941	U4-029 E	9.94
247567	V2-006 C	1.77
247961	V2-006 E	11.85
247548	V4-010 C	3.21
247947	V4-010 E	21.47
901803	W1-072A	6.53
LTF	WEC	3.05
907061	X1-027A C1	0.94
907064	X1-027A C2	0.94
907066	X1-027A C3	0.94
907068	X1-027A C4	0.94
907062	X1-027A E1	31.98
907065	X1-027A E2	31.98
907067	X1-027A E3	31.98
907069	X1-027A E4	31.98
LTF	Y3-032	34.89
LTF	Z1-043	11.71
931951	AB1-107 1	43.8
931961	AB1-107 2	101.14
LTF	AB2-013	6.69
925751	AC1-051 C	0.7
925752	AC1-051 E	4.7
926941	AC1-181	0.58

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Appendix 3

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 91.86% to 92.71% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 30.32 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-OEC-345-023'                    /* BEAVER 345KV BRK B-
121
 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1        /* 02BEAVER
345 02LAKEAVE 345
 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1        /* 02BEAVER
345 02CARLIL 345
 END
```

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*33.94*
238564	*02BAYSG1*	*28.22*
240968	*02BG2 GEN*	*1.41*
240969	*02BG4 G1*	*0.35*
240970	*02BG4 G2&3*	*0.71*
240971	*02BG4 G4&5*	*0.71*
240950	*02BG5*	*4.31*
240973	*02BG6 AMPO*	*6.29*
239276	*02COLLW 11*	*-4.18*
239297	*02CPPW41*	*-5.13*
238670	*02DVBSG1*	*48.52*
238979	*02NAPMUN*	*6.75*
240975	*02PGE GEN*	*9.73*
239171	*02WLORG-2*	*7.75*
239172	*02WLORG-3*	*7.96*
239173	*02WLORG-4*	*7.94*
239174	*02WLORG-5*	*7.97*
932051	*AC2-015 C*	*6.25*
932052	*AC2-015 E*	*7.3*
932791	*AC2-103 C*	*14.43*
932792	*AC2-103 E*	*96.56*
934251	*AD1-052 C1*	*2.56*
934261	*AD1-052 C2*	*2.56*
934252	*AD1-052 E1*	*1.14*
934262	*AD1-052 E2*	*1.14*
934461	*AD1-070 C O2*	*5.32*
934462	*AD1-070 E O2*	*25.*
LTF	*AD1-092*	*6.31*
LTF	*AD1-093*	*10.84*
LTF	*AD1-094*	*2.07*

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934761	AD1-103 C O2	22.81
934762	AD1-103 E O2	152.63
934891	AD1-118	14.5
LTF	CARR	2.21
LTF	CBM-S1	10.75
LTF	CBM-S2	3.99
LTF	CBM-W1	97.12
LTF	CBM-W2	77.65
LTF	CIN	12.56
LTF	CPLE	0.65
LTF	G-007	3.32
LTF	IPL	8.09
LTF	LGEE	2.24
LTF	MEC	25.21
LTF	MECS	52.8
LTF	O-066	11.27
LTF	RENSSELAER	1.73
LTF	ROSETON	12.51
247551	U4-028 C	1.87
247940	U4-028 E	12.52
247552	U4-029 C	1.87
247941	U4-029 E	12.52
247567	V2-006 C	2.29
247961	V2-006 E	15.29
247548	V4-010 C	4.02
247947	V4-010 E	26.91
901803	W1-072A	8.29
LTF	WEC	4.1
907061	X1-027A C1	1.19
907064	X1-027A C2	1.19
907066	X1-027A C3	1.19
907068	X1-027A C4	1.19
907062	X1-027A E1	40.57
907065	X1-027A E2	40.57
907067	X1-027A E3	40.57
907069	X1-027A E4	40.57
LTF	Y3-032	44.43
LTF	Z1-043	15.79
918401	AA1-056	1.95
931951	AB1-107 1	55.28
931961	AB1-107 2	128.22
LTF	AB2-013	9.03
925751	AC1-051 C	0.89
925752	AC1-051 E	5.95
926941	AC1-181	0.74

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Appendix 4

(FE - FE) The 02LRN Q2-02AD Q-2 138 kV line (from bus 238915 to bus 238524 ckt 1) loads from 97.45% to 98.99% (**DC power flow**) of its emergency rating (316 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 10.78 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*8.97*
238572	*02BEAVGB*	*1.6*
240968	*02BG2 GEN*	*0.45*
240969	*02BG4 G1*	*0.11*
240970	*02BG4 G2&3*	*0.23*
240971	*02BG4 G4&5*	*0.23*
240950	*02BG5*	*1.38*
240973	*02BG6 AMPO*	*2.01*
239276	*02COLLW 11*	*-2.18*
239297	*02CPPW41*	*-2.81*
238979	*02NAPMUN*	*2.12*
240975	*02PGE GEN*	*3.11*
239175	*02WLORG-6*	*2.53*
932791	*AC2-103 C*	*3.73*
932792	*AC2-103 E*	*24.99*
934251	*AD1-052 C1*	*0.99*
934261	*AD1-052 C2*	*0.99*
934252	*AD1-052 E1*	*0.44*
934262	*AD1-052 E2*	*0.44*
934461	*AD1-070 C O2*	*1.89*
934462	*AD1-070 E O2*	*8.89*
934761	*AD1-103 C O2*	*6.33*
934762	*AD1-103 E O2*	*42.39*
934891	*AD1-118*	*4.4*
LTF	*CARR*	*0.9*
LTF	*CBM-S1*	*3.88*
LTF	*CBM-S2*	*1.64*
LTF	*CBM-W1*	*31.44*
LTF	*CBM-W2*	*27.29*
LTF	*CIN*	*4.37*

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LTF	*CPLE*	*0.29*
LTF	*G-007*	*1.12*
LTF	*IPL*	*2.81*
LTF	*LGEE*	*0.8*
LTF	*MEC*	*8.63*
LTF	*MECS*	*16.34*
LTF	*O-066*	*3.81*
LTF	*RENSSELAER*	*0.7*
LTF	*ROSETON*	*5.06*
247551	*U4-028 C*	*0.71*
247940	*U4-028 E*	*4.72*
247552	*U4-029 C*	*0.71*
247941	*U4-029 E*	*4.72*
247548	*V4-010 C*	*1.52*
247947	*V4-010 E*	*10.19*
901803	*W1-072A*	*2.52*
LTF	*WEC*	*1.39*
907062	*X1-027A E1*	*10.5*
907065	*X1-027A E2*	*10.5*
907067	*X1-027A E3*	*10.5*
907069	*X1-027A E4*	*10.5*
LTF	*Y3-032*	*13.61*
931951	*AB1-107 1*	*17.55*
931961	*AB1-107 2*	*38.52*

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Appendix 5

(AEP - FE) The 05HOWARD-02BRKSID 138 kV line (from bus 243024 to bus 238586 ckt 1) loads from 83.8% to 99.45% (**DC power flow**) of its emergency rating (245 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731-A'. This project contributes approximately 38.36 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731-A'
OPEN BRANCH FROM BUS 243006 TO BUS 934460 CKT 1 / 243006 05FOSTOR 138 934460 AD1-070 TAP 138 1
OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039 05MELMOR 138 243110 05STIFFI 138 1
END

Bus Number	*Bus Name*	*Full Contribution*
932051	*AC2-015 C*	*14.23*
932052	*AC2-015 E*	*16.6*
934461	*AD1-070 C O2*	*6.74*
934462	*AD1-070 E O2*	*31.63*
934791	*AD1-106 C O2*	*1.51*
934792	*AD1-106 E O2*	*2.47*
LTF	*CARR*	*0.14*
LTF	*CBM-S1*	*0.97*
LTF	*CBM-S2*	*0.39*
LTF	*CBM-W1*	*6.38*
LTF	*CBM-W2*	*6.61*
LTF	*CIN*	*1.08*
LTF	*CPLE*	*0.07*
LTF	*G-007*	*0.28*
LTF	*IPL*	*0.7*
LTF	*LGEE*	*0.21*
LTF	*MEC*	*2.02*
LTF	*MECS*	*2.85*
LTF	*O-066*	*0.93*
LTF	*RENSSELAER*	*0.11*
LTF	*ROSETON*	*0.82*
247926	*U1-059 E*	*2.36*
247542	*U4-001 C*	*8.26*
247934	*U4-001 E*	*55.28*
247551	*U4-028 C*	*2.43*
247940	*U4-028 E*	*16.28*
247552	*U4-029 C*	*2.43*
247941	*U4-029 E*	*16.28*
247548	*V4-010 C*	*3.93*
247947	*V4-010 E*	*26.28*
247942	*W1-056 E*	*0.87*

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LTF	*WEC*	*0.32*
925751	*AC1-051 C*	*2.*
925752	*AC1-051 E*	*13.38*

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Appendix 6

(AEP - AEP) The AC2-015 TAP-05HOWARD 138 kV line (from bus 932050 to bus 243024 ckt 1) loads from 84.17% to 106.94% (**DC power flow**) of its emergency rating (167 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731-A'. This project contributes approximately 38.03 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731-A'
OPEN BRANCH FROM BUS 243006 TO BUS 934460 CKT 1 / 243006 05FOSTOR 138 934460 AD1-070 TAP 138 1
OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039 05MELMOR 138 243110 05STIFFI 138 1
END

Bus Number	*Bus Name*	*Full Contribution*
932051	*AC2-015 C*	*30.03*
932052	*AC2-015 E*	*35.04*
934461	*AD1-070 C O2*	*6.68*
934462	*AD1-070 E O2*	*31.35*
LTF	*CALDERWOOD*	*0.02*
LTF	*CARR*	*< 0.01*
LTF	*CATAWBA*	*0.02*
LTF	*CBM-W1*	*4.07*
LTF	*CBM-W2*	*0.84*
LTF	*CELEVELAND*	*0.06*
LTF	*CHEOAH*	*0.02*
LTF	*CHILHOWEE*	*< 0.01*
LTF	*CIN*	*0.17*
LTF	*CLIFTY*	*0.46*
LTF	*G-007*	*0.08*
LTF	*HAMLET*	*0.08*
LTF	*IPL*	*0.11*
LTF	*LGEE*	*< 0.01*
LTF	*MEC*	*0.54*
LTF	*MECS*	*3.07*
LTF	*MORGAN*	*< 0.01*
LTF	*O-066*	*0.25*
LTF	*RENSSELAER*	*< 0.01*
LTF	*ROSETON*	*0.03*
LTF	*ROWAN*	*0.05*
LTF	*SANTEETLA*	*< 0.01*
LTF	*TVA*	*< 0.01*
247551	*U4-028 C*	*2.41*
247940	*U4-028 E*	*16.14*
247552	*U4-029 C*	*2.41*
247941	*U4-029 E*	*16.14*

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LTF	*UNIONPOWER*	*0.02*
247548	*V4-010 C*	*3.91*
247947	*V4-010 E*	*26.19*
LTF	*WEC*	*0.11*
925751	*AC1-051 C*	*0.64*
925752	*AC1-051 E*	*4.3*

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Appendix 7

(FE - FE) The 02BLKRVR-02USSTEEL 138 kV line (from bus 239728 to bus 239734 ckt 1) loads from 117.67% to 118.99% (**DC power flow**) of its emergency rating (500 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 14.6 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*12.16*
238572	*02BEAVGB*	*2.15*
240968	*02BG2 GEN*	*0.61*
240969	*02BG4 G1*	*0.15*
240970	*02BG4 G2&3*	*0.31*
240971	*02BG4 G4&5*	*0.31*
240950	*02BG5*	*1.87*
240973	*02BG6 AMPO*	*2.72*
239276	*02COLLW 11*	*-2.84*
239297	*02CPPW41*	*-3.58*
238979	*02NAPMUN*	*2.87*
240975	*02PGE GEN*	*4.21*
239175	*02WLORG-6*	*3.41*
932051	*AC2-015 C*	*3.48*
932052	*AC2-015 E*	*4.06*
932791	*AC2-103 C*	*5.07*
932792	*AC2-103 E*	*33.91*
934251	*AD1-052 C1*	*1.35*
934261	*AD1-052 C2*	*1.35*
934252	*AD1-052 E1*	*0.6*
934262	*AD1-052 E2*	*0.6*
934461	*AD1-070 C O2*	*2.56*
934462	*AD1-070 E O2*	*12.04*
934761	*AD1-103 C O2*	*8.6*
934762	*AD1-103 E O2*	*57.55*
934891	*AD1-118*	*5.97*
LTF	*CARR*	*1.22*
LTF	*CBM-S1*	*5.16*
LTF	*CBM-S2*	*2.13*
LTF	*CBM-W1*	*42.36*

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LTF	*CBM-W2*	*36.42*
LTF	*CIN*	*5.84*
LTF	*CPLE*	*0.37*
LTF	*G-007*	*1.55*
LTF	*IPL*	*3.76*
LTF	*LGEE*	*1.07*
LTF	*MEC*	*11.55*
LTF	*MECS*	*22.11*
LTF	*O-066*	*5.27*
LTF	*RENSSELAER*	*0.95*
LTF	*ROSETON*	*6.88*
247542	*U4-001 C*	*1.52*
247934	*U4-001 E*	*10.14*
247551	*U4-028 C*	*0.96*
247940	*U4-028 E*	*6.4*
247552	*U4-029 C*	*0.96*
247941	*U4-029 E*	*6.4*
247567	*V2-006 C*	*1.01*
247961	*V2-006 E*	*6.74*
247548	*V4-010 C*	*2.07*
247947	*V4-010 E*	*13.83*
901803	*W1-072A*	*3.41*
LTF	*WEC*	*1.86*
907062	*X1-027A E1*	*14.25*
907065	*X1-027A E2*	*14.25*
907067	*X1-027A E3*	*14.25*
907069	*X1-027A E4*	*14.25*
LTF	*Y3-032*	*18.43*
915952	*Y3-092 FTWR*	*31.39*
915953	*Y3-092 NFTWR*	*31.39*
931951	*AB1-107 1*	*23.8*
931961	*AB1-107 2*	*52.22*
923821	*AB2-019*	*1.76*
925751	*AC1-051 C*	*0.5*
925752	*AC1-051 E*	*3.32*
926941	*AC1-181*	*0.32*

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Appendix 8

(FE - FE) The 02USSTEEL-02LRN Q2 138 kV line (from bus 239734 to bus 238915 ckt 1) loads from 111.37% to 112.69% (**DC power flow**) of its emergency rating (500 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-CEI-345-001'. This project contributes approximately 14.6 MW to the thermal violation.

```
CONTINGENCY 'ATSI-P2-3-CEI-345-001'                    /* BREAKER FAILURE ON
S145 BREAKER AT AVON 345KV
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 1          /*
02LAKEAVE 345 02AVON 345
  DISCONNECT BRANCH FROM BUS 239725 TO BUS 238551 CKT 2          /*
02LAKEAVE 345 02AVON 345
  END
```

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*12.16*
238572	*02BEAVGB*	*2.15*
240968	*02BG2 GEN*	*0.61*
240969	*02BG4 G1*	*0.15*
240970	*02BG4 G2&3*	*0.31*
240971	*02BG4 G4&5*	*0.31*
240950	*02BG5*	*1.87*
240973	*02BG6 AMPO*	*2.72*
239276	*02COLLW 11*	*-2.84*
239297	*02CPPW41*	*-3.58*
238979	*02NAPMUN*	*2.87*
240975	*02PGE GEN*	*4.21*
239175	*02WLORG-6*	*3.41*
932051	*AC2-015 C*	*3.48*
932052	*AC2-015 E*	*4.06*
932791	*AC2-103 C*	*5.07*
932792	*AC2-103 E*	*33.91*
934251	*AD1-052 C1*	*1.35*
934261	*AD1-052 C2*	*1.35*
934252	*AD1-052 E1*	*0.6*
934262	*AD1-052 E2*	*0.6*
934461	*AD1-070 C O2*	*2.56*
934462	*AD1-070 E O2*	*12.04*
934761	*AD1-103 C O2*	*8.6*
934762	*AD1-103 E O2*	*57.55*
934891	*AD1-118*	*5.97*
LTF	*CARR*	*1.22*
LTF	*CBM-S1*	*5.16*
LTF	*CBM-S2*	*2.13*
LTF	*CBM-W1*	*42.36*

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LTF	*CBM-W2*	*36.42*
LTF	*CIN*	*5.84*
LTF	*CPLE*	*0.37*
LTF	*G-007*	*1.55*
LTF	*IPL*	*3.76*
LTF	*LGEE*	*1.07*
LTF	*MEC*	*11.55*
LTF	*MECS*	*22.11*
LTF	*O-066*	*5.27*
LTF	*RENSSELAER*	*0.95*
LTF	*ROSETON*	*6.88*
247542	*U4-001 C*	*1.52*
247934	*U4-001 E*	*10.14*
247551	*U4-028 C*	*0.96*
247940	*U4-028 E*	*6.4*
247552	*U4-029 C*	*0.96*
247941	*U4-029 E*	*6.4*
247567	*V2-006 C*	*1.01*
247961	*V2-006 E*	*6.74*
247548	*V4-010 C*	*2.07*
247947	*V4-010 E*	*13.83*
901803	*W1-072A*	*3.41*
LTF	*WEC*	*1.86*
907062	*X1-027A E1*	*14.25*
907065	*X1-027A E2*	*14.25*
907067	*X1-027A E3*	*14.25*
907069	*X1-027A E4*	*14.25*
LTF	*Y3-032*	*18.43*
915952	*Y3-092 FTWR*	*31.39*
915953	*Y3-092 NFTWR*	*31.39*
931951	*AB1-107 1*	*23.8*
931961	*AB1-107 2*	*52.22*
923821	*AB2-019*	*1.76*
925751	*AC1-051 C*	*0.5*
925752	*AC1-051 E*	*3.32*
926941	*AC1-181*	*0.32*

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in

Case No(s). 23-0373-EL-BTX

Summary: Application Appendix A - PJM Studies electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX B

SPECIES CORRESPONDENCE

- Ohio Department of Natural Resources letter to Haley & Aldrich – May 10, 2023
- U.S. Fish and Wildlife Service letter to Haley & Aldrich – April 10, 2023
- Haley & Aldrich letter to Ohio Department of Natural Resources – April 7, 2023
- Haley & Aldrich letter to U.S. Fish and Wildlife Service – April 7, 2023
- U.S. Fish and Wildlife Service Species List – April 6, 2023

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

May 10, 2023

Lynn Gresock
Haley & Aldrich, Inc.
3 Bedford Farms Drive|, Suite 301
Bedford, New Hampshire 03110

Re: 23-0372; South Branch Gen-Tie

Project: The proposed project involves the installation of 138-kilovolt electrical generation tie (Gen-Tie) planned to extend between the previously reviewed South Branch Solar project (No. 21-0249) and the existing Fostoria Central Substation

Location: The proposed project is located in Washington Township, Hancock 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: A review of the Ohio Natural Heritage Database indicates there are no records of state or federally listed plants or animals within one mile of the specified project area. Records searched date from 1980.

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.

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 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 endangered 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 Eileen Wyza at Eileen.Wyza@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 & NORTHERN LONG-EARED 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 Eileen Wyza 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*)
rayed bean (*Villosa fabalis*)

State Endangered
purple lilliput (*Toxolasma lividum*)

State Threatened
pondhorn (*Uniomerus tetralasmus*)
Salamander Mussel (*Simpsonaias ambigua*)

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 western banded killifish (*Fundulus diaphanus menona*), a state endangered fish. 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 this or other aquatic species.

The project is within the range of the Kirtland's snake (*Clonophis kirtlandii*), a state threatened species. This secretive species prefers wet meadows and other wetlands. Due to the location, the type of habitat within the project area, and the type of work proposed, this project is not likely to impact this species.

The project is within the range of the northern harrier (*Circus hudsonius*), 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 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 comment.

Impacts on Public and Private Water Supplies
The proposed project area is in Washington Township in Hancock County. The construction of the facility is not expected to have significant impacts on public or private well yields. The Groundwater Vulnerability Index for this project area is between 140 and 143 (Nelson and Others, 2022), this equates to a high groundwater vulnerability (OEPA, 2014). The construction of the transmission line is not expected to pose a significant groundwater contamination risk.

Groundwater Inventory
Wells developed in the Silurian Limestone Aquifer are likely to yield 25 to 100 gallons per minute. (Schmidt, 1981 and Ohio Department of Natural Resources, Division of Water, Bedrock Aquifer Map, 2000). ODNR has record of 90 wells within one mile of the project area, the majority of which are completed within the limestone (Ohio Department of Natural Resources, Division of Water, Statewide Unconsolidated Aquifer Map, 2000).

Oil, Gas and Mining
ODNR has record of seven oil and gas wells within one mile of the proposed project area. Two of these wells are listed as plugged, two are listed as dry and three have an unknown status (Ohio Department of Natural Resources, Division of Oil and Gas, Ohio Oil and Gas Wells Locator). ODNR has no record of any mining operations within one mile of the project area (Ohio Department of Natural resources, Division of Mineral Resources, Mines of Ohio).

Geohazards
ODNR has record of eight earthquakes within 15-miles of the site. Details regarding these earthquakes 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
July 4, 1992	2.0	10.6	Wood	Henry
July 14, 1992	2.0	10.3	Wood	Henry
June 4, 1990	2.3	2.8	Hancock	Washington
January 31,1936	2.5	14.3	Seneca	Liberty
December 22, 2022	2.8	2.2	Hancock	Washington
February 25, 2010	2.9	3	Seneca	Loudon
September 29, 1974	3.0	5.2	Wood	Perry
February 22, 1961	3.7	9.4	Seneca	Liberty

Soils

Soils in the project area are derived from till. Blount and Pewamo are the most common soil series found within the boundaries of the project area. These soils have silty clay loam, and clay loam textures and together cover the entirety of the project area. There is a moderate risk of shrink-swell potential in these soils. The Pewamo Soil, which makes up approximately 49% of the project area, is a hydric soil and is frequently ponded from January through May (USDA Web Soil Survey). Hydric soils produce an anerobic environment which may speed up the corrosion of certain materials.

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.

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

April 10, 2023

Re: Gen-Tie Project Code: 2023-0065954

Dear Lynn:

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: Due to the project type, size, location, and the proposed implementation of seasonal tree cutting (clearing of trees ≥3 inches diameter at breast height between October 1 and March 31) to avoid impacts to the endangered Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), and the proposed endangered tri-colored bat (*Perimyotis subflavus*) 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.

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.

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, Environmental Services Administrator, at (614) 265-6387 or at mike.pettegrew@dnr.ohio.gov.

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,

Patrice Ashfield
Field Office Supervisor

HALEY & ALDRICH, INC.
3 Bedford Farms Drive
Suite 301
Bedford, NH 03110

7 April 2023
File No. 135392

Ohio Department of Natural Resources
2045 Morse Road
Columbus, Ohio 43229-6693
environmentalreviewrequest@dnr.ohio.gov

Subject: Request for Species Review – South Branch Gen-Tie

To Whom it May Concern:

Haley & Aldrich, Inc. is requesting information from the Ohio Department of Natural Resources regarding the potential presence of threatened or endangered species on or near the location of a proposed 138-kilovolt electrical generation tie (Gen-Tie) planned to extend between the previously reviewed South Branch Solar project (No. 21-0249) and the existing Fostoria Central Substation (the Project). The Project, as it is just greater than 2 miles, will require a full application review by the Ohio Power Siting Board and must consider a preferred as well as an alternate route. Both routes are shown on Figures 1 and 2. A .kmz file showing the routes is attached to the email transmitting this letter.

The preferred and alternate routes for the Project are both located entirely within Hancock County, Ohio. Both routes would extend within property owned and used by the existing Norfolk Southern rail lines, with the preferred route located within the northern edge of that property and the alternate route located within the southern edge of that property. The majority of the Project would be planned to be overhead lines, although some small portions may be installed underground. No wetland or stream impacts are planned, as the limited resources within the property can be spanned. No tree clearing is anticipated, due to the active use of the property; however, if some limited tree clearing is necessary, it will be restricted to occur between October 1 and March 31 in order to avoid impact to summer tree-roosting bats.

We would appreciate if you could provide review for the Gen-Tie's preferred and alternate routes, and indicate the need for additional studies or actions to determine protected species issues and actions.

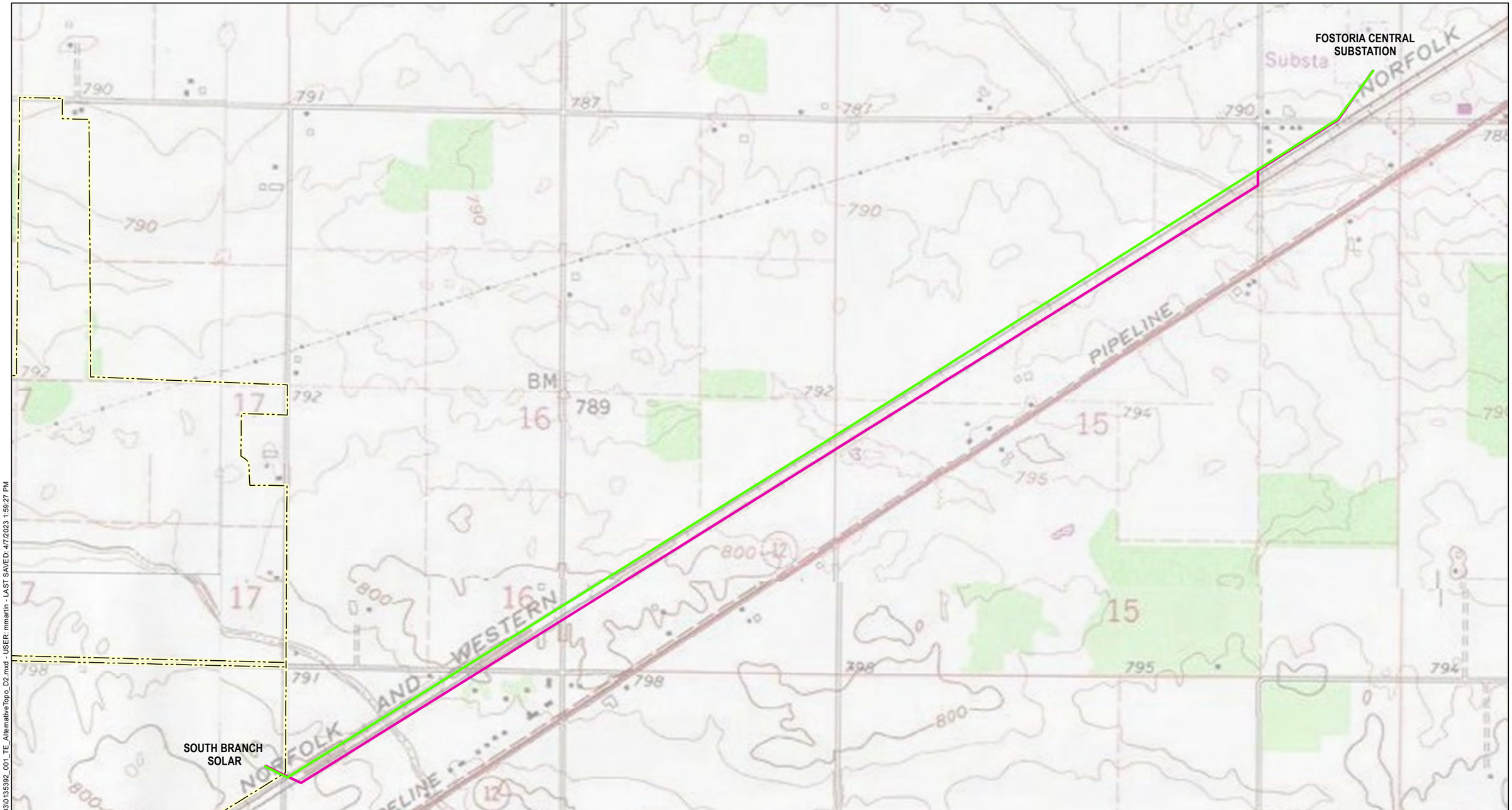
If you have any questions or require additional information, please do not hesitate to contact me (lgresock@haleyaldrich.com; 603-391-3325). Thank you in advance for your assistance.

Sincerely yours,
HALEY & ALDRICH, INC.

Lynn Gresock

Lynn Gresock
Principal Consultant

Attachments: Figures 1 and 2



LEGEND

PREFERRED ROUTE

ALTERNATIVE ROUTE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. TOPOGRAPHIC MAP SOURCE: USGS

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Miles

HALEY ALDRICH

Figure 1
Gen-Tie Route
Locations on Topographic Map

South Branch Solar Gen-Tie
Hancock County, Ohio

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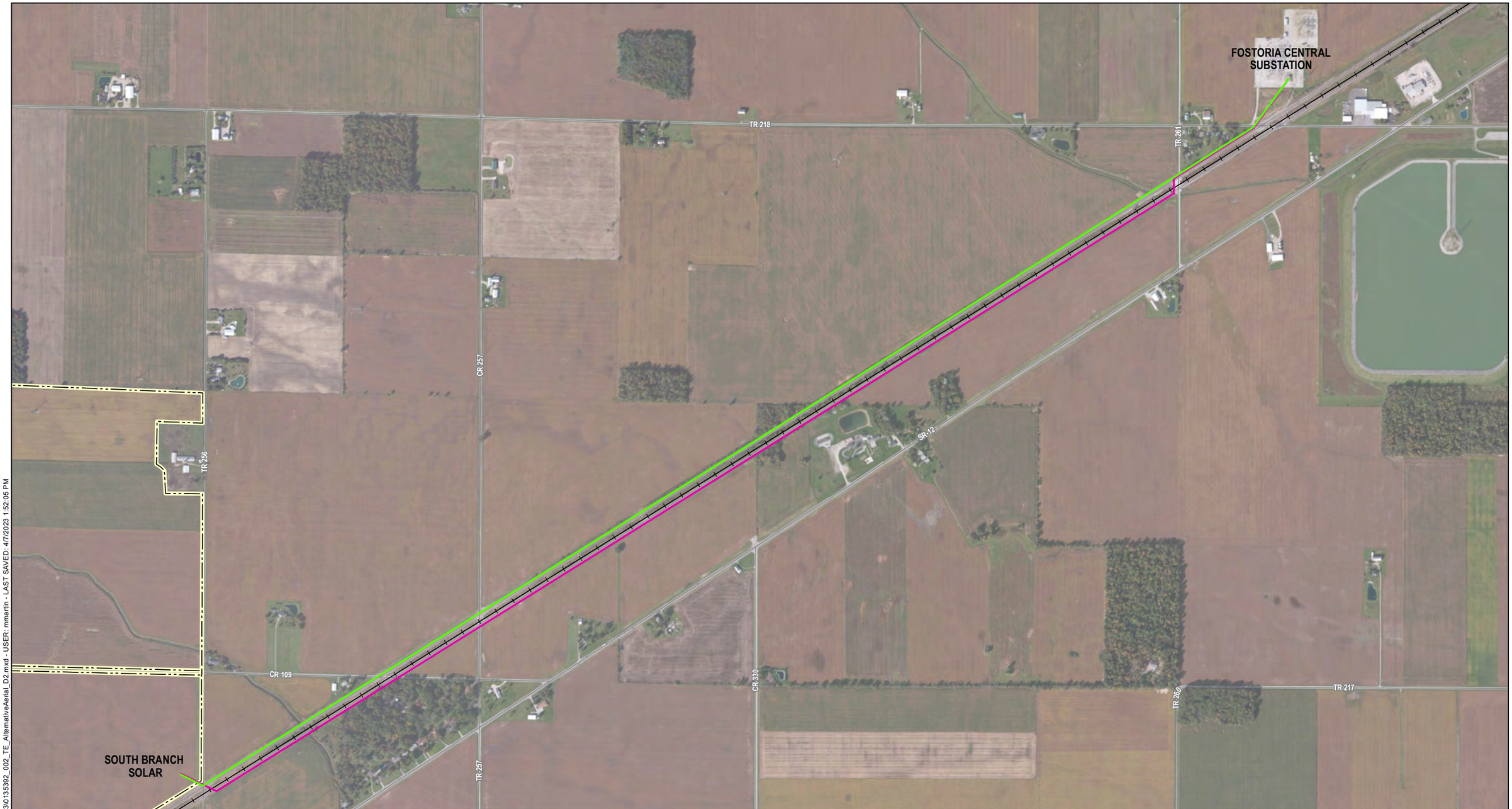

LEGEND

- RAILROAD
- PREFERRED ROUTE
- ALTERNATIVE ROUTE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

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Miles

HALEY ALDRICH

Figure 2
Gen-Tie Alternative Location on Aerial Map

South Branch Solar Gen-Tie
Hancock County, Ohio

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HALEY & ALDRICH, INC.
3 Bedford Farms Drive
Suite 301
Bedford, NH 03110

7 April 2023
File No. 135392

United States Fish and Wildlife Service
Ohio Field Office
4625 Morse Road, Suite 104
Columbus, Ohio 43230-8355

Subject: Request for Species Review – South Branch Gen-Tie
Project Code: 2023-0065954

To Whom it May Concern:

Haley & Aldrich, Inc. is requesting information from the United States Fish and Wildlife Service regarding the potential presence of threatened or endangered species on or near the location of a proposed 138-kilovolt electrical generation tie (Gen-Tie) planned to extend between the previously reviewed South Branch Solar project (TAILS # 03E15000-20210TA-0887) and the existing Fostoria Central Substation (the Project). The Project, as it is just greater than 2 miles, will require a full application review by the Ohio Power Siting Board and must consider a preferred as well as an alternate route. Both routes are shown on Figures 1 and 2.

The preferred and alternate routes for the Project are both located entirely within Hancock County, Ohio. Both routes would extend within property owned and used by the existing Norfolk Southern rail lines, with the preferred route located within the northern edge of that property and the alternate route located within the southern edge of that property. The majority of the Project would be planned to be overhead lines, although some small portions may be installed underground. No wetland or stream impacts are planned, as the limited resources within the property can be spanned.

An Information for Planning and Consultation (IPaC) assessment was completed on 6 April 2023. Table 1 lists the species and critical habitats resulting from the IPaC, along with our commentary regarding the anticipated potential for species presence and/or impact based on our field reconnaissance.

Table 1: ***Federally-Listed Species within or near the Project Area***

Scientific Name	Common Name	Listing Status	Comments
Mammals			
Myotis sodalis	Indiana Bat	Endangered	As the Gen-Tie will be within property actively used by rail traffic, no suitable habitat is expected to be present. Should limited tree clearing be required, it would occur only from October 1 through March 31. Therefore, no impact is anticipated.
Myotis septentrionalis	Northern Long-Eared Bat	Threatened	
Perimyotis subflavus	Tricolored Bat	Proposed Endangered	

Scientific Name	Common Name	Listing Status	Comments
Birds			
Grus americana	Whooping Crane	Experimental population, non-essential	As the Gen-Tie will be within property actively used by rail traffic, no impact is anticipated.
Insects			
Danaus plexippus	Monarch Butterfly	Candidate	Typically found in herbaceous areas dominated by milkweed. As the Gen-Tie will be within property actively used by rail traffic, no impact is anticipated.

We would appreciate if you could provide additional review for the Gen-Tie's preferred and alternate routes, and indicate your concurrence with our findings, or if appropriate, the need for additional studies or actions to determine protected species issues and actions.

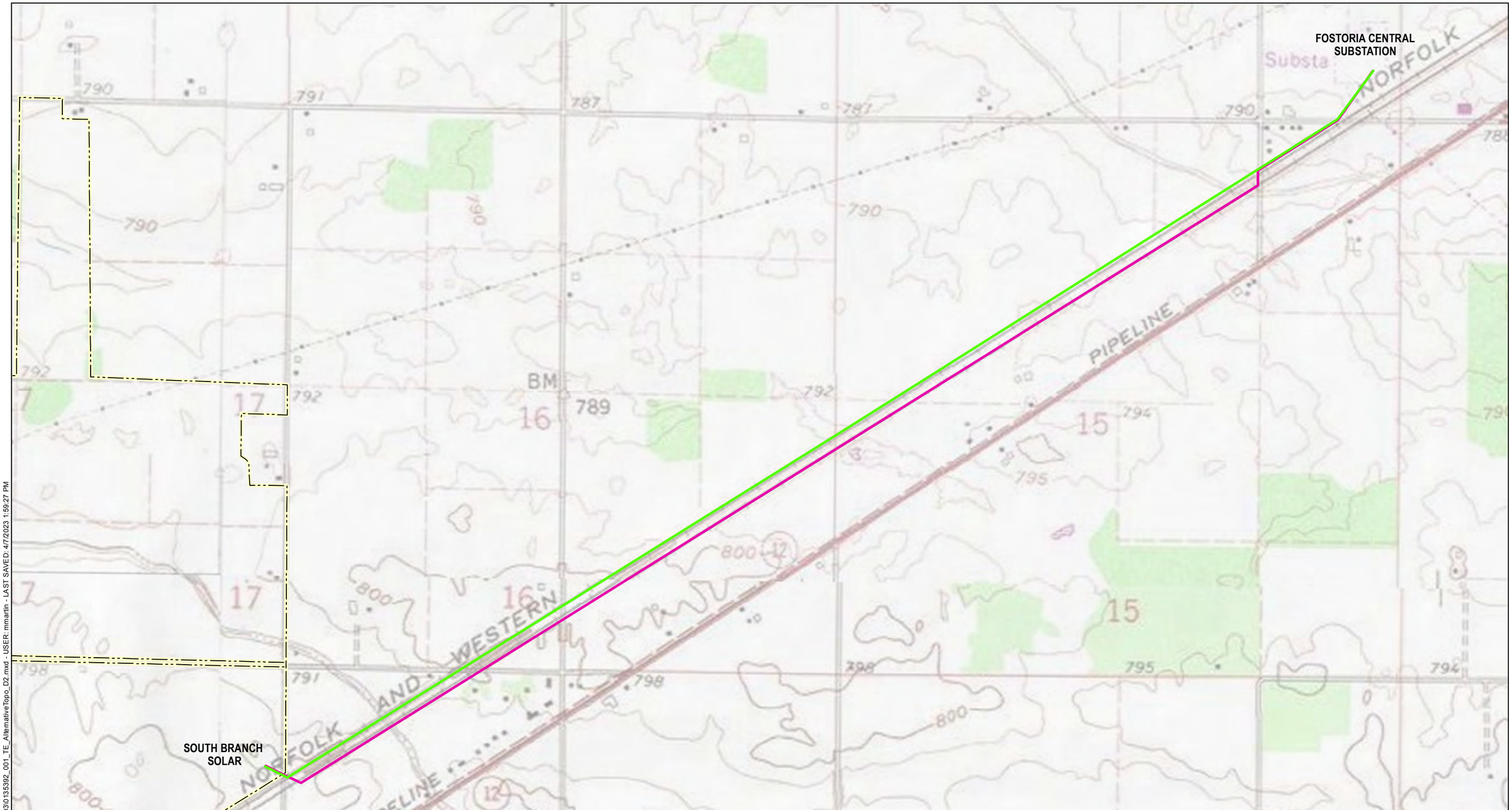
If you have any questions or require additional information, please do not hesitate to contact me (lgresock@haleyaldrich.com; 603-391-3325). Thank you in advance for your assistance.

Sincerely yours,
HALEY & ALDRICH, INC.

Lynn Gresock
Principal Consultant

Attachments: Figures 1 and 2

\\haleyaldrich.com\share\CF\Projects\135392\T&E Species\Transmission Line\USFWS\South Branch Gen-Tie_USFWS Request for Review.docx



LEGEND

PREFERRED ROUTE

ALTERNATIVE ROUTE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. TOPOGRAPHIC MAP SOURCE: USGS

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Miles

HALEY ALDRICH

Figure 1
Gen-Tie Route
Locations on Topographic Map

South Branch Solar Gen-Tie
Hancock County, Ohio

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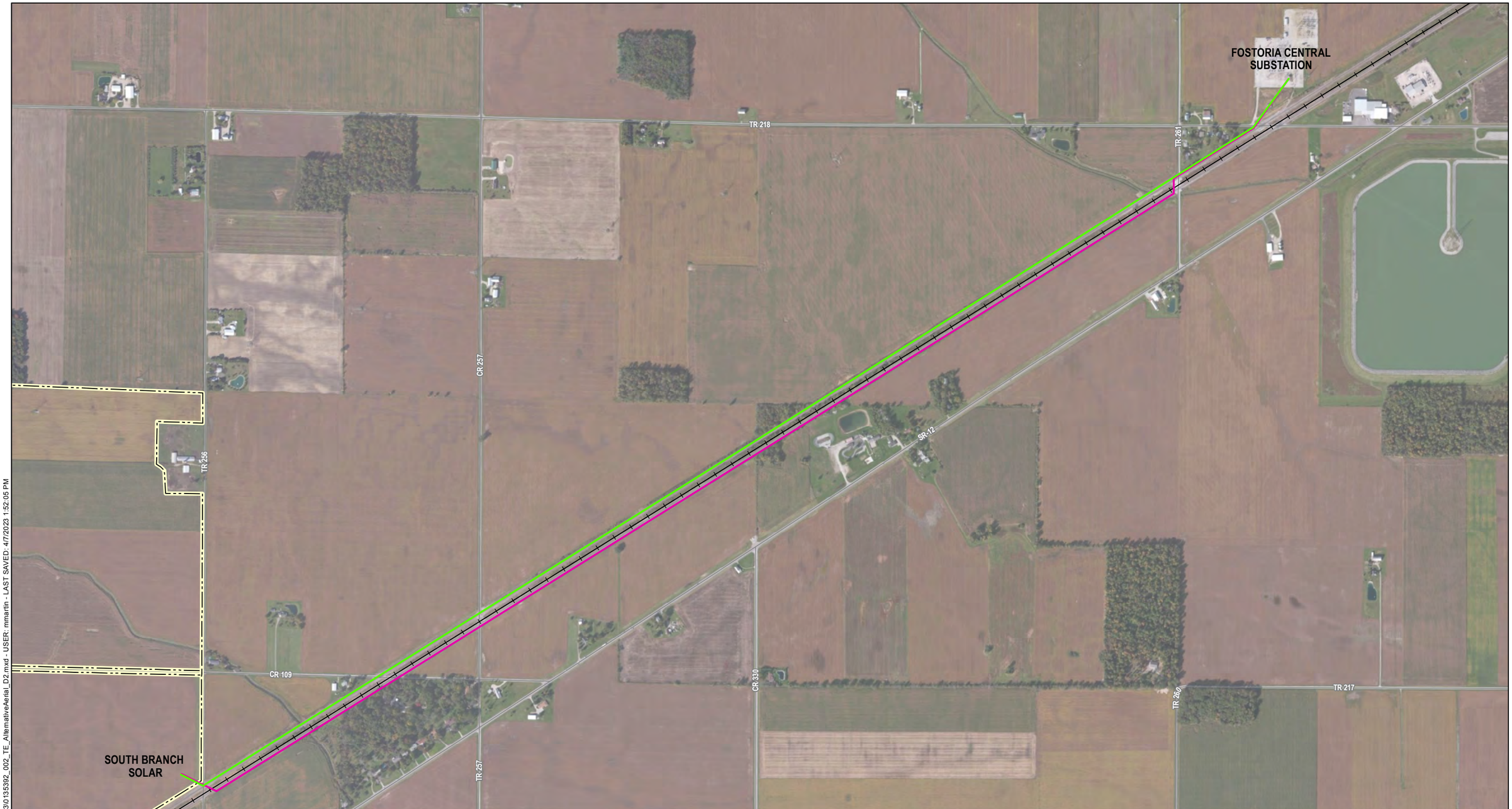

LEGEND

- RAILROAD
- PREFERRED ROUTE
- ALTERNATIVE ROUTE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

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HALEY ALDRICH

Figure 2
Gen-Tie Alternative Location on Aerial Map

South Branch Solar Gen-Tie
Hancock County, Ohio

GIS FILE PATH: Z:\135392\GIS\Maps\2023_03\0135392_002_TE_AlternativeAerial_D2.mxd - USER: mmartin - LAST SAVED: 4/7/2023 1:52:05 PM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, OH 43230-8355
Phone: (614) 416-8993 Fax: (614) 416-8994

In Reply Refer To: April 06, 2023
Project Code: 2023-0065954
Project Name: Southbranch GenTie Line

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, OH 43230-8355
(614) 416-8993

PROJECT SUMMARY

Project Code: 2023-0065954
Project Name: Southbranch GenTie Line
Project Type: Transmission Line - New Constr - Above Ground
Project Description: A proposed gen-tie line from the proposed solar facility to the existing substation.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.13202085,-83.47198797788012,14z

Counties: Hancock County, Ohio

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Whooping Crane *Grus americana* Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non-Essential

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPAC USER CONTACT INFORMATION

Agency: Haley & Aldrich
Name: Audrey West
Address: 8899 Gander Creek Drive
City: Miamisburg
State: OH
Zip: 45342
Email awest@haleyaldrich.com
Phone: 6033913325

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

6/7/2023 3:03:38 PM

in

Case No(s). 23-0373-EL-BTX

Summary: Application Appendix B - Species Consultation electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX C

CULTURAL RESOURCE CORRESPONDENCE

- OHPO Review Letter – June 2, 2023
- Project Summary Form – May 2, 2023
- Phase I Cultural Resource Management Investigations – South Branch Gen-Tie Preferred Route – May 2, 2023
- Phase I Cultural Resource Management Investigations – South Branch Gen-Tie Alternate Route – May 2, 2023

In reply refer to:
2021-HAN-51637

June 2, 2023

Lynn Gresock
Haley & Aldrich, Inc.
3 Bedford Farms Drive, Suite 301
Bedford, New Hampshire 03110
Email: lgresock@haleyaldrich.com

RE: Review-South Branch Solar Gen-Tie (Preferred and Alternate Routes), Washington Township, Hancock County, Ohio

Dear Ms. Gresock:

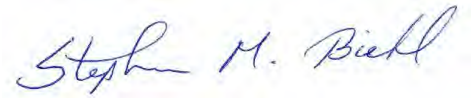
This letter is in response to correspondence received on May 4, 2023 regarding the proposed South Branch Solar Gen-Tie (Preferred and Alternate Routes) Project that is being permitted by the Ohio Power Siting Board (OPSB) in Washington Township, Hancock County, Ohio. We appreciate the opportunity to comment on this project. The comments of the Ohio State Historic Preservation Office (SHPO) are made pursuant to Section 149.53 of the Ohio Revised Code requesting cooperation among state agencies in the preservation of historic properties, Ohio Administrative Code Chapters 4906-4-08 (D). The comments of the Ohio SHPO are also submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The proposed undertaking involves the installation of an approximately 2.4-mile long, 138 kV electric transmission line within a 50-ft wide corridor. The line will extend from the South Branch Solar generating facility to the existing AEP Fostoria Central Substation. The current submission includes two reports by Weller & Associates, Inc. for a Preferred Route and an Alternate Route. The Preferred Route would be located along the northwest side of an existing Norfolk Southern railroad line, which has been previously documented in the Ohio Historic Inventory (OHI #HAN0066705). The Alternate Route would be along the southeast side of the same segment of railroad line.

The archaeological component involved a literature review, including examination of historic-era maps and general history of the area since the direct Area of Potential Effect (APE) is within a previously disturbed transportation corridor. The architectural component examined all above-ground resources 50 years or older within a 1,000-ft radius of the APE. However, this radius was extended to include resources that exhibited potential eligibility for inclusion in the National Register of Historic Places (NRHP).

After careful review of the Preferred Route and Alternate Route reports, the SHPO agrees with Weller that none of the above-ground resources are considered eligible for inclusion in the NRHP, except for the schoolhouse. There was not enough information given about the nine schools that were established in the township to determine if the one in the APE is eligible or not. However, we do not feel that the proposed project would alter its eligibility status. Therefore, the Preferred Route or the Alternate Route will have no effect on historic properties. No further cultural resource investigations are warranted for the project unless the scope of work changes or archaeological remains are discovered during the course of construction. In such a situation, this office should be contacted. If you have any questions concerning this review, please contact either myself via email at sbiehl@ohiohistory.org or Ms. Kristen Koehlinger at kkoehlinger@ohiohistory.org. Thank you for your cooperation.

Sincerely,



Stephen M. Biehl, Project Reviews Coordinator (archaeology)
Resource Protection and Review
State Historic Preservation Office

RPR Serial No. 1098121

OHIO HISTORIC PRESERVATION OFFICE:
RESOURCE PROTECTION AND REVIEW

Section 106 Review - Project Summary Form

For projects requiring a license from the Federal Communications Commission, please use FCC Forms 620 or 621. DO NOT USE THIS FORM.

SECTION 1: GENERAL PROJECT INFORMATION

All contact information provided must include the name, address and phone number of the person listed. Email addresses should also be included, if available. Please refer to the Instructions or contact an OHPO reviewer (mailto:Section106@ohiohistory.org) if you need help completing this Form. Unless otherwise requested, we will contact the person submitting this Form with questions or comments about this project.

Date: 5/2/2023

Name/Affiliation of person submitting form: Lynn Gresock, Haley & Aldrich, Inc.

Mailing Address: 3 Bedford Farms Drive, Suite 301, Amherst, NH 03110

Phone/Fax/Email: 603.391.3325/lgresock@haleyaldrich.com

A. Project Info:

1. This Form provides information about:
   New Project Submittal:
   YES NO

   Additional information relating to previously submitted project:
   YES NO

   OHPO/RPR Serial Number from previous submission:
   Related project (South Branch Solar): 2021-HAN-51637

2. Project Name (if applicable): South Branch Solar Gen-Tie

3. Internal tracking or reference number used by Federal Agency, consultant, and/or applicant to identify this project (if applicable): Not applicable

B. Project Address or vicinity: Parallel to the Norfolk Southern rail line, in Washington Township, Hancock County, Ohio (See Figure 1).

C. City/Township: Washington

D. County: Hancock

E. Federal Agency and Agency Contact. *If you do not know the federal agency involved in your project, please contact the party asking you to apply for Section 106 Review, not OHPO, for this information. HUD Entitlement Communities acting under delegated environmental review authority should list their own contact information.*

No federal actions are contemplated at this time.

F. Type of Federal Assistance. *List all known federal sources of federal funding, approvals, and permits to avoid repeated reviews.*

None.

G. State Agency and Contact Person (if applicable): Ohio Power Siting Board

H. Type of State Assistance: None

I. Is this project being submitted at the direction of a state agency **solely** under Ohio Revised Code 149.53 or at the direction of a State Agency? *Answering yes to this question means that you are sure that no federal funding, permits or approvals will be used for any part of your project, and that you are seeking comments only under ORC 149.53.*

YES NO

J. Public Involvement- Describe how the public has been/will be informed about this project and its potential to affect historic properties. Please summarize how they will have an opportunity to provide comments about any effects to historic properties. (This step is required for all projects under 36 CFR § 800.2):

Public notice regarding the project has been submitted, and a public information meeting will be held on May 3, 2023 at the Elks Lodge in Findlay, Ohio. The public will provide comments at that meeting and will have the opportunity to participate in the Ohio Power Siting Board process.

K. Please list other consulting parties that you have contacted/will contact about this project, such as Indian Tribes, Certified Local Governments, local officials, property owners, or preservation groups. (See 36 CFR § 800.2 for more information about involving other consulting parties). Please summarize how they will have an opportunity to provide comments:

No need for tribal consultation was identified as part of the prior historic and archaeological review process. Local officials and property owners will have the opportunity to attend the public information meeting and participate in the Ohio Power Siting Board process.

SECTION 2: PROJECT DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)

Provide a description of your project, its site, and geographical information. You will also describe your project's Area of Potential Effects (APE). Please refer to the Instructions or contact an OHPO reviewer if you need help with developing the APE or completing this form.

For challenging projects, provide as much information as possible in all sections, and then check the box in Section 5.A. to ask OHPO to offer preliminary comments or make recommendations about how to proceed with your project consultation. This is recommended if your project involves effects to significant historic properties or if there may be challenging procedural issues related to your project. Please note that providing information to complete all Sections will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

A. Does this project involve any Ground-Disturbing activity: YES NO
(If **Yes**, you must complete all of Section 2.A. If **No**, proceed directly to Section 2. B.)

1. General description of width, length and depth of proposed ground disturbing activity:

   The Gen-Tie will be a 138-kilovolt electric transmission line extending between the approved South Branch Solar generating facility and the existing AEP Fostoria Central Substation. The Gen-Tie will be located on Norfolk Southern property, just north of the railroad tracks; an alternate route within the same property located south of the tracks will also be included in the Ohio Power Siting Board review.

   Subsurface activities will consist of installation of mono-pole electric transmission support towers along the majority of the preferred route, and an approximately 0.2 mile segment of underground installation (using HDD or similar techniques) along the easternmost segment to reach the existing Substation.

2. Narrative description of previous land use and past ground disturbances, if known:

   As noted above, the Gen-Tie will be installed within a narrow (approximately 50 foot wide) corridor within land previously disturbed in association with the construction and operation of the Norfolk Southern rail line.

3. Narrative description of current land use and conditions:

   As noted above, work will be within railroad property owned and in use by Norfolk Southern.

4. Does the landowner know of any archaeological resources found on the property?
   YES NO If yes, please describe:

B. Submit the exact project site location on a USGS 7.5-minute topographic quadrangle map for all projects. Map sections, photocopies of map sections, and online versions of USGS maps are acceptable as long as the location is clearly marked. Show the project's Area of Potential Effects (APE). It should be clearly distinguished from other features shown on the map:

See Figure 1.

1. USGS Quad Map Name: Fostoria

2. Township/City/Village Name: Washington

C. Provide a street-level map indicating the location of the project site; road names must be identified and legible. Your map must show the exact location of the boundaries for the project site. Show the project's Area of Potential Effects (APE). It should be clearly distinguished from other features shown on the map:

See Figure 2.

D. Provide a verbal description of the APE, including a discussion of how the APE will include areas with the potential for direct and indirect effects from the project. Explain the steps taken to identify the project's APE, and your justification for the specific boundaries chosen:

The APE is considered to be the Gen-Tie activities within an approximately 50-foot-wide portion of Norfolk Southern property and extending to the existing AEP Fostoria Central Substation. The preferred route is north of the railroad tracks, and an APE for an alternative route south of the tracks will also be evaluated in the Ohio Power Siting Board process.

E. Provide a detailed description of the project. This is a critical part of your submission. Your description should be prepared for a cold reader who may not be an expert in this type of project. The information provided must help support your analysis of effects to historic properties, not other types of project impacts. Do not simply include copies of environmental documents or other types of specialized project reports. If there are multiple project alternatives, you should include information about all alternatives that are still under active consideration:

The Gen-Tie will be a 138-kilovolt electric transmission line extending between the approved South Branch Solar generating facility and the existing AEP Fostoria Central Substation. The Gen-Tie will be located within an approximately 50-foot-wide portion of Norfolk Southern property, just north of the railroad tracks; an alternate route within the same property located south of the tracks will also be included in the Ohio Power Siting Board review. The preferred route will involve installation of approximately 36 foundations to support single structure wooden mono-poles, and an approximately 0.2-mile segment from CR 261 to the existing Fostoria Central Substation that will be installed via HDD or similar methods within an underground conduit.

SECTION 3: IDENTIFICATION OF HISTORIC PROPERTIES

Describe whether there are historic properties located within your project APE. To make that determination, use information generated from your own Background Research and Field Survey. Then choose one of the following options to report your findings. Please refer to the Instructions and/or contact an OHPO reviewer if you are unsure about how to identify historic properties for your project.

If you read the Instructions and you're still confused as to which reporting option best fits your project, or you are not sure if your project needs a survey, you may choose to skip this section, but provide as much supporting documentation as possible in all other Sections, then check the box in Section 5.A. to request preliminary comments from OHPO. After reviewing the information provided, OHPO will then offer comments as to which reporting option is best suited to document historic properties for your project. Please note that providing information to complete this Section will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

Recording the Results of Background Research and Field Survey:

A. **Summary of discussions and/or consultation with OHPO** about this project that demonstrates how the Agency Official and OHPO have agreed that no Field Survey was necessary for this project (typically due to extreme ground disturbance or other special circumstances). Please **attach copies** of emails/correspondence that document this agreement. You must explain how the project's potential to affect both archaeological and historic resources were considered.

B. **A table that includes the minimum information** listed in the OHPO Section 106 Documentation Table (which is generally equivalent to the information found on an inventory form). This information must be printed and mailed with the Project Summary Form. To provide sufficient information to complete this Section, you must also include summary observations from your field survey, background research and eligibility determinations for each property that was evaluated in the project APE.

C. **OHI (Ohio Historic Inventory) or OAI (Ohio Archaeological Inventory) forms**- New or updated inventory forms may be prepared using the OHI pdf form with data population capabilities, the Internet IForm, or typed on archival quality inventory forms. To provide sufficient information to complete this Section, you must include summary observations from your field survey and background research. You must also include eligibility determinations for each property that was evaluated in the project APE

D. **A historic or archaeological survey report** prepared by a qualified consultant that meets professional standards. The survey report should meet the Secretary of the Interior's Standards and Guidelines for Identification and OHPO Archaeological Guidelines. You may also include new inventory forms with your survey, or update previous inventory forms. To complete this section, your survey report must include summary observations from your field survey, background research and eligibility determinations for each property that was evaluated within the APE.

The Project Area associated with the approved South Branch Solar project was evaluated by OHPO (2021-HAN-51637); this is the starting location of the proposed Gen-Tie that is currently the subject of review.

Weller & Associates, Inc. has completed evaluations of the preferred and alternate Gen-Tie routes (attached to this correspondence). These evaluations have concluded that no additional surveys or actions associated with cultural resources are warranted for the project. The reports are being submitted for review by OHPO.

E. **Project Findings**. Based on the conclusions you reached in completing Section 3, please choose one finding for your project. There are (mark one):

Historic Properties Present in the APE:

No Historic Properties Present in the APE: It is anticipated that no historic properties will be located within the APE.

SECTION 4: SUPPORTING DOCUMENTATION

This information must be provided for all projects.

A. Photographs must be keyed to a street-level map, and should be included as attachments to this application. Please label all forms, tables and CDs with the date of your submission and project name, as identified in Section 1. You must present enough documentation to clearly show existing conditions at your project site and convey details about the buildings, structures or sites that are described in your submission. Faxed or photocopied photographs are not acceptable. See Instructions for more info about photo submissions or 36 CFR § 800.11 for federal documentation standards.
   1. Provide photos of the entire project site and take photos to/from historic properties from/towards your project site to support your determination of effect in Section 5.
   2. Provide current photos of all buildings/structures/sites described.

B. Project plan, specifications, site drawings and any other media presentation that conveys detailed information about your project and its potential to affect historic properties.

C. Copies or summaries of any comments provided by consulting parties or the public.

Photographs are included in the attached Weller & Associates, Inc. reports.

SECTION 5: DETERMINATION OF EFFECT

A. **Request Preliminary Comments.** For challenging projects, provide as much information as possible in previous sections and ask OHPO to offer preliminary comments or make recommendations about how to proceed with your project consultation. This is recommended if your project involves effects to significant historic properties, if the public has concerns about your project's potential to affect historic properties, or if there may be challenging procedural issues related to your project. Please be aware that providing information in all Sections will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

   1. We request preliminary comments from OHPO about this project:
      YES NO

   2. Please specify as clearly as possible the particular issues that you would like OHPO to examine for your project (for example- help with developing an APE, addressing the concerns of consulting parties, survey methodology, etc.):

      We are requesting confirmation from the OHPO that no additional archaeological or historic structures studies are warranted for South Branch Solar Gen-Tie project.

B. **Determination of Effect.** If you believe that you have gathered enough information to conclude the Section 106 process, you may be ready to make a determination of effect and ask OHPO for concurrence, while considering public comments. Please select and mark one of the following determinations, then explain the basis for your decision on an attached sheet of paper:

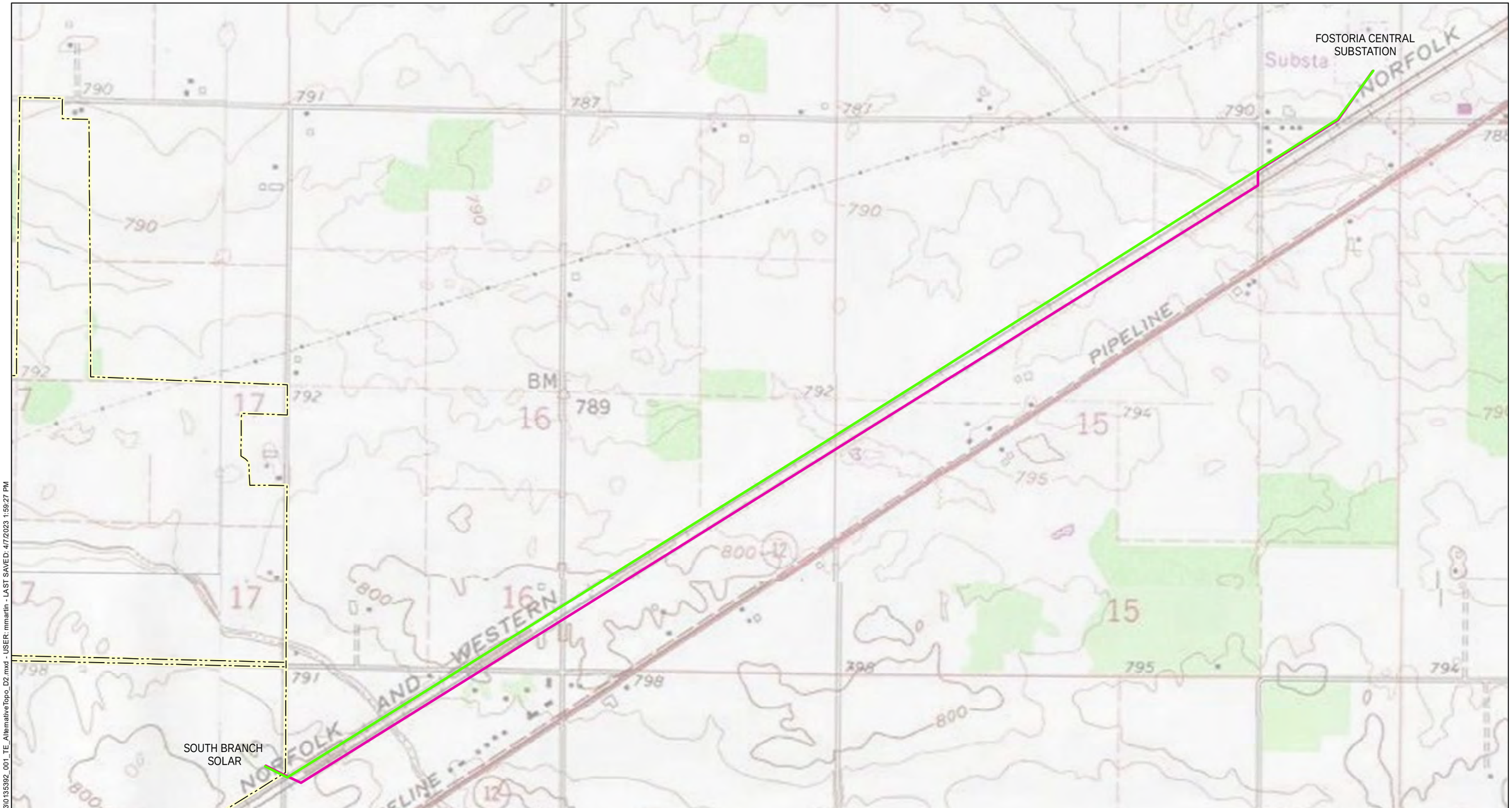
No historic properties will be affected based on 36 CFR § 800.4(d) (1). Please explain how you made this determination:

A detailed review by Weller & Associates, Inc. supports this finding.

No Adverse Effect [36 CFR § 800.5(b)] on historic properties. This finding cannot be used if there are no historic properties present in your project APE. Please explain why the Criteria of Adverse Effect, [36 CFR Part 800.5(a) (1)], were found not to be applicable for your project:

Adverse Effect [36 CFR § 800.5(d) (2)] on historic properties. Please explain why the criteria of adverse effect, [36 CFR Part 800.5(a) (1)], were found to be applicable to your project. You may also include an explanation of how these adverse effects might be avoided, reduced or mitigated:

Please send completed form and supporting documentation to our office through the section106@ohiohistory.org e-mail address. Note that file size is limited to 30 MB. The Ohio SHPO has a federally mandated review time of 30 calendar day. To check your submission was received and logged in for our review, please visit https://www.ohiohistory.org/preserve/state-historic-preservation-office/hpreviews/section-106-project-status.



LEGEND

PREFERRED ROUTE

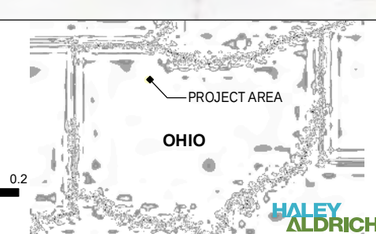
ALTERNATIVE ROUTE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. TOPOGRAPHIC MAP SOURCE: USGS

N

0 0.1 0.2
Miles

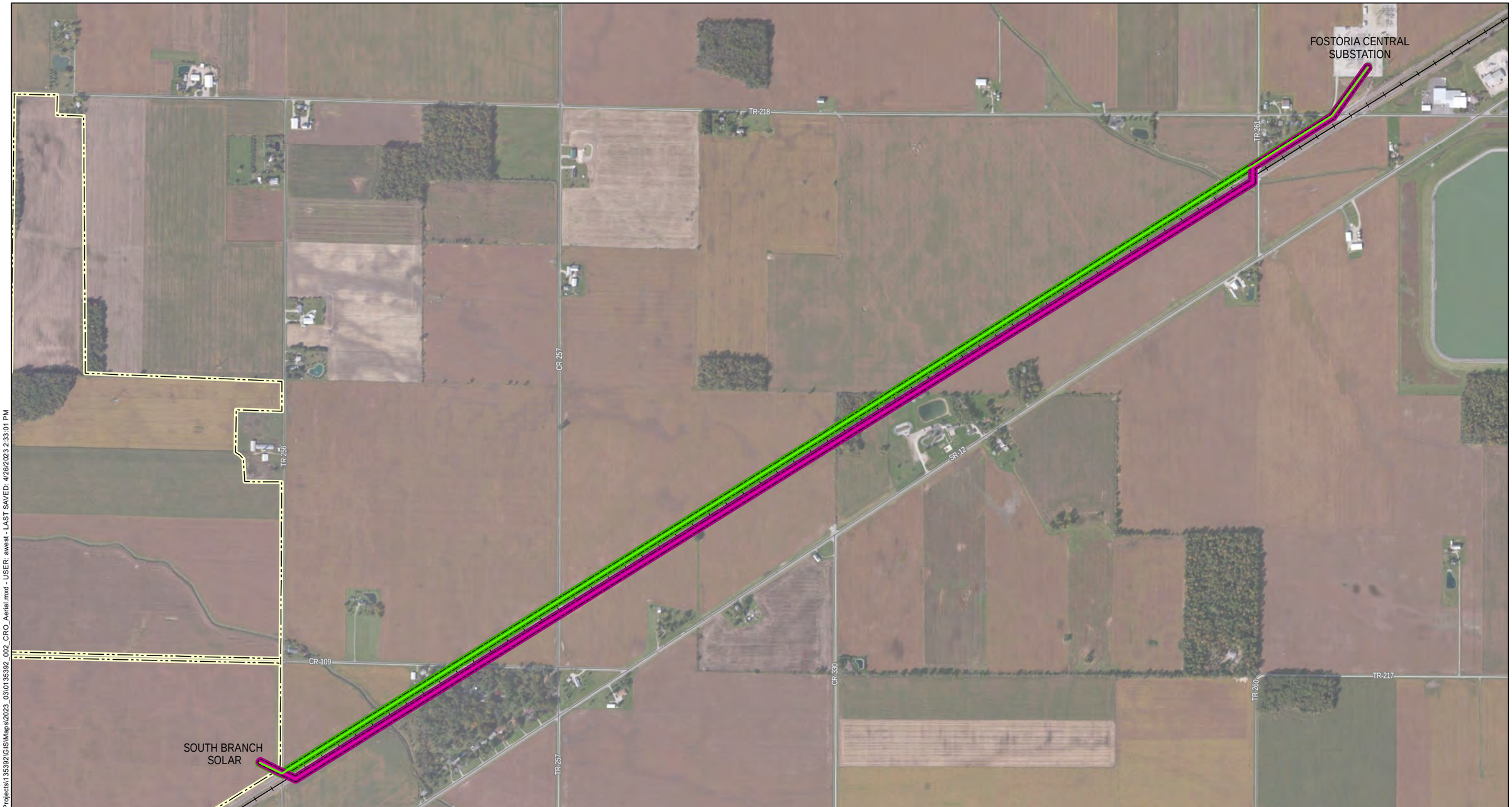


HALEY ALDRICH

Figure 1
Gen-Tie Route
Locations on Topographic Map

South Branch Solar Gen-Tie
Hancock County, Ohio

GIS FILE PATH: Z:\135392\GIS\Maps\2023_03\0135392_001_TE_AlternativeTopo_D2.mxd - USER: mmartin - LAST SAVED: 4/7/2023 1:59:27 PM



LEGEND

- RAILROAD
- PREFERRED ROUTE
- ALTERNATIVE ROUTE
- ALTERNATE ROUTE APE
- PREFERRED ROUTE APE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ROADS DATA SOURCE: OHIO DEPARTMENT OF TRANSPORTATION (ODOT)
3. AERIAL IMAGERY SOURCE: ESRI

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Miles

HALEY ALDRICH

Figure 2
Gen-Tie Alternative Location on Aerial Map

South Branch Solar Gen-Tie
Hancock County, Ohio

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_03\0135392_002_CRO_Aerial.mxd - USER: awest - LAST SAVED: 4/26/2023 2:33:01 PM

Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Preferred Route 138kV Generation Tie in Washington Township, Hancock County, Ohio

Ryan J. Weller
Scott McIntosh

May 2, 2023

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Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Preferred Route 138kV Generation Tie in Washington Township, Hancock County, Ohio

By

Ryan J. Weller
Scott McIntosh

Submitted By:

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Ohio Power Siting Board (OPSB)

Ryan J. Weller, P.I.

May 2, 2023

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W-3457

Abstract

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Preferred Route 138kV Generation Tie in Washington Township, Hancock County, Ohio. The work was conducted for submittal to the Ohio Power Siting Board (OPSB) and ultimately the Ohio History Connection (OHC) for review. These investigations were conducted in a manner that is reflective of a survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994). Thus, the work efforts were designed to evaluate cultural resources for the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological and architectural fieldwork and literature review. There were no archaeological sites identified during these investigations and there were no significant architectural resources identified.

The project corridor is located in a remote and rural setting in northwestern Ohio. The project plans are to install a 138kV Generation Tie line that will connect the South Branch Solar Facility to an existing substation. This report addresses what is regarded as the Preferred Route with is 3.9 km (2.4 mi) long. This corridor is oriented in a northeast-southwest manner with the existing substation being at the northeast terminus. The Preferred Route is located on the northwest side of the railroad tracks. The limits of disturbance and survey corridor are primarily located within the Norfolk Southern Railroad easement and right-of-way. Because the entire project corridor is located in disturbed contexts, the cultural resource management work efforts were focused on the architectural component of the work.

The literature review that was completed for this project did not identify any recorded resources that are directly involved. The corridor is within a railroad property that has been in this location since the latter part of the nineteenth century. There are no significant resources or recorded sites located within or near the project corridor. There are no extant buildings in the project area.

The archaeological fieldwork reviewed aerial images and concluded that the corridor was contained in fully disturbed or previously investigated conditions; there were no archaeological sites identified. The architectural investigations did not result in the identification of any significant resources within the project or what was considered as its area of potential effect. There were no significant cultural resources identified during these investigations. No further cultural resource management work is considered to be necessary and a finding similar to “no effect to any historic properties or landmarks” is considered appropriate.

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Introduction

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Preferred Route 138kV Generation Tie in Washington Township, Hancock County, Ohio (Figures 1-3). The work was conducted under contract Haley & Aldrich, Inc. for submittal to the Ohio Power Siting Board (OPSB) and ultimately the Ohio History Connection (OHC) for review. These investigations were conducted in a manner that is reflective of a survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994). Thus, the work efforts were designed to evaluate cultural resources for the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological and architectural fieldwork and literature review; however, the archaeological component of the work was limited due to disturbances and prior survey overlap.

Ryan Weller served as the Principal Investigator for the archaeological component and Principal Project Manager. John Sidor conducted the literature review prior to the field reconnaissance work; archaeological fieldwork was precluded by clear and obvious disturbances. The architectural component was completed by Scott McIntosh and the associated figures by John Sidor.

Project Description

The project corridor is located in a remote and rural setting in northwestern Ohio. The project plans are to install a 138kV Generation Tie line that will connect the South Branch Solar Facility to an existing substation. This report addresses what is regarded as the Preferred Route with is 3.9 km (2.4 mi) long. This corridor is oriented in a northeast-southwest manner with the existing substation being at the northeast terminus. The Preferred Route is located on the northwest side of the railroad tracks. The limits of disturbance and survey corridor are primarily located within the Norfolk Southern Railroad property. Because the entire project corridor is located in disturbed contexts, the cultural resource management work efforts were focused on the architectural component of the work.

Environmental Setting

Climate

Hancock County, like all of Ohio, has a continental climate with hot and humid summers and cold winters. About 36 inches of precipitation falls annually. The wettest time of year is during growing season from about April to September (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1973).

Physiography, Relief, and Drainage

This part of Hancock is located within the Fostoria Lake Plains Shoals physiographic region of Ohio (Brockman 1998). The terrain in this area is nearly level to very gently undulating setting. This region is characterized by "Portion of the Defiance Moraine lightly eroded by shallow Lake Maumee with low north-south trending hillocks and shallow, closed depressions; many sandy areas; elevation 750'-825', low relief, decreasing west-ward" (Brockman 1998). The project area is drained by unnamed tributaries of the South Branch Portage River; this stream flows northward and is within the Lake Erie watershed.

Geology

Underlying the glacial till is Silurian-aged bedrock (Brockman 1998; USDA, SCS 1973). This includes limestone and dolomitic materials that occasionally produce cherty deposits.

Soils

The project area is a corridor that is aligned, parallel to, and within railroad property. Intact soils are not present or expected in this area as it has been graded and prepared for the installation of the railroad, its access, and drainage. The soils survey for the abutting terrain indicates Blount, Houcktown, Jenera, Glynwood, and Pewamo series soils; these are associated with upland till plain and homogenous conditions (USDA, SCS 2023).

Flora

There is, or at least was, great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, including the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999).

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments such as those in Wyandot and Marion County areas would contain islands of forests but were mostly expansive open terrain dominated by grasses.

The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, dissected areas along drainages and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains

(Black Swamp region) except for the occasional patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests. Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio from about Cincinnati to Bellefontaine east to the Scioto River historically contained a very diverse floral landscape. This is an area where moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forest types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands, are in regions altered by glacial activity, and are widely spaced in relation to each other. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999). Hancock County, including the project area, is generally within what is considered to be a beech forest area (Gordon 1966) (USDA, SCS 1986:68).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e. wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone offered significant species as well. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fishes and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, whereas, the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or open-air scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, and giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

Lepper (1986) has gathered information about this time period in the region. In the central Muskingum River basin there is a dense concentration of sites centered on discrete outcrops of Upper Mercer chert and a few of these sites are exceptionally large suggesting periodic reoccupation. There are indications that the Paleoindians were unusually selective regarding the quality of their raw material, but the evidence for a lithic determined settlement system can be derived from principles of hunter-gatherer settlement systems as outlined by Binford (1978).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Bamforth 1988). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential

resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the creation of greater social and material culture complexity. The environment at this time is warmer and drier. Most elevated landforms in northeastern Ohio have yielded Archaic artifacts (Prufer and Long 1986:7), and the same can be stated for the remainder of Ohio.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

A local proliferation of the Late Archaic is regarded as the Gilbert Phase. The Gilbert Site is located on the east side of the Muskingum River and on the floodplain. This site has yielded features that have been dated from the Late Archaic period. The Gilbert point type, a form similar to Brewerton styles, was defined from deposits from this site (Carskadden 1963) and has been identified with some frequency throughout the county. This is situated to the south of the project and in a similar geological location.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). Pottery makes its first appearance during the Terminal Late Archaic.

Previous studies of Early Woodland "Adena" and Middle Woodland "Hopewell" settlement patterns in the lower Scioto Valley (Shane 1971), Hocking Valley (Black 1979), and southern Ohio in general (Fischer 1974) suggest the following: early Adena sites were located in diverse topographic settings due to seasonal movement from one primary resource zone to another. These settings included not only river bottoms, but also hilltops and small stream

valleys. A shift is seen in late Adena toward greater use of river bottoms and Hopewell sites tended to be located primarily in the bottoms of major rivers. The shift from uplands to bottomlands is thought to be a result of a shift from a generalized subsistence toward an increased dependence on a variety of bottomland resources (Carskadden and Morton 1997a; Ford 1979; Smith 1987; Wymer 1987).

Evidence from Muskingum County, where 209 sq km of hinterland have been surveyed, indicated that during all three periods (early Adena, late Adena, and Hopewell), the bottoms of the Muskingum and Licking Rivers were exploited to a much greater degree than the hinterland (Carskadden and Morton 1997a). The density of river bottom sites is 5.9 times greater than the average hinterland density for early Adena sites, more than 4.8 times for late Adena, and 6.3 times for Hopewell when looking at workshops and short-term sites. Early and late Adena sites have their greatest density along the Muskingum River, whereas the greatest density of Hopewell sites can be found along the Licking River. The dispersed nature of Adena habitation sites (hamlets) has long been recognized. Webb, for example, has observed that "individual house groups perhaps were several hundred feet apart, each group a small unit in itself, yet scores of such house groups might have been within an area of a few square miles" (Webb 1942:363).

The pattern mentioned above by Webb is apparent for the late Adena sites near Dresden and at other locations along the Muskingum River and seems to hold true for early Adena in the area. At Philo, six late Adena hamlets have been located in the river bottoms below a single ridge top burial mound. The local Hopewell settlements take on the same dispersed pattern as seen in earlier Adena. There appears to be a propensity for repeatedly selecting the exact same location, or nearly so, throughout Adena and Hopewell. Of the early Adena river bottom habitation sites, 52 percent were re-occupied in late Adena (or were continuously occupied into late Adena). A total of 34 percent of all late Adena sites in the river bottoms were occupied in Hopewell (about 50 percent long term and 50 percent short term). Twenty percent of the river bottom sites were occupied during all three periods. The site selection continuity seems to represent continuity in subsistence strategies (Carskadden and Morton 1997a).

Adena hamlets in Carskadden and Morton's (1997a) survey are more ephemeral than Hopewell hamlets; there is less in the way of diagnostic artifacts, debitage and pottery. Late Adena hamlets covered areas averaging 0.28 to 0.32 ha with scattered postholes, usually in no identifiable pattern, in the immediate vicinity of a cluster of cooking/thermal features. Although some possible storage pits and a midden were identified at one site, Duncan Falls, there is no real indication that these sites were occupied for great lengths of time (Carskadden and Morton 1997a). What is lacking in the Muskingum River Valley are large (2.0 ha) late Adena sites that are known to occur along the Hocking River by the first century A.D. There also seems to be a lack of late Adena concentrations of mounds and earthworks in the Muskingum River Valley. Radiocarbon dates suggest that very late Adena in the central Muskingum Valley was contemporaneous with very late Adena in the Hocking Valley (post A.D. 1) and yet what was going on in the Hocking Valley was very different from what was going on in the central Muskingum Valley (Carskadden and Morton 1997a).

Although Flint Ridge flint appears to have played a role in the Hopewellian trade network, it became an important source for flint during late Adena, at least locally in the Muskingum River Valley. Over 84 percent of the late Adena (Robbins Phase) projectile points found throughout the Carskadden and Morton (1997a) survey were made from Flint Ridge flint. This contrasts with only 22 percent use of Flint Ridge in early Adena and 74 percent in Hopewell (Carskadden and Morton 1997a).

It seems that most of the ridge top and small stream valley hinterland habitation sites (Adena and Hopewell) in the Muskingum River Valley have characteristics of typical bottomland hamlets, which occur in clusters, just like those in the bottoms. Again, it seems that Hopewell sites seem to occur in the general vicinity, if not exact, on the same site as a late Adena hamlet or hamlet clusters. This continuity continues all the way back into the early Adena, 65 percent of early Adena hinterland habitation sites also date to or have late Adena components, and 25 percent of the hinterland late Adena habitation sites also had either "long term" or "short term" Hopewell components. About 23 percent of all of these hinterland sites were occupied at some point during all three periods (Carskadden and Morton 1997a).

Carskadden and Morton (1997a) argue that the hinterland sites represent continuously occupied Adena-Hopewell occupations. They also suggest that towards the end of the early Adena there was a "settling in" period for local populations. Most of the groups had established themselves in the river bottoms; however, a few groups established themselves in the hinterlands and then remained there into Hopewell. There seems to be no evidence of late Adena populations from the hinterlands moving to the river valleys (Carskadden and Morton 1997a).

Middle Woodland "Hopewell"

Dispersed clusters or isolated river bottom sites of little more than an acre in extent characterize middle Woodland "Hopewell" along the central Muskingum Valley proper. Often associated with these sites are single river terrace burial mounds and in a couple cases, groups of two to four low burial mounds located on terraces or hilltops overlooking the open sites (discussed later).

Review of the *Bibliography of Muskingum County Archaeology 1795-1995* (Carskadden and Morton 1997b) indicates the location of numerous resources in Muskingum County. Many obscure resources are located in this bibliography. The Trinway Earthwork, sometimes called the Dresden Circle (33MU573) is depicted on a late nineteenth century county history (Everhart 1882). In 1805, a diary/journal reference indicated the presence of the earthworks describing it as a "circular brest-works and redoubts, rising one above the other" and located "on a side hill at Wakkatomaka." This reference is reported from a secondhand account and may refer to other earthworks other than the Trinway Earthwork (Carskadden and Morton 1997b).

According to current conventional wisdom, Adena and Hopewell are simply stages in a continuous developmental sequence, and there are sites that span the transitional period between what would be called late Adena and classic Hopewell. These sites produced projectile points

that appear intermediate between the late Adena Robbins type and the later Hopewellian corner notched forms, as well as plain surfaced pottery with characteristics of Adena Plain and McGraw Plain/Murphy Plain. What is suggested is that the corrected date of 77 A.D. from the Cox B site, associated with plain, cordmarked, as well as rocker stamped pottery, probably comes closer to dating the beginning of the Hopewellian component of the Cox site cluster, and the beginning of cordmarked pottery in central Muskingum Valley, meaning the beginning of Hopewell (Carskadden and Morton 1997a).

In spite of Squier and Davis' remark about the lack of rudimentary Hopewellian earthworks, at least three are possible in the Muskingum Valley above Marietta. Two of these (the Dresden Circle and the Lichtenau Circle) are located in the 3.2 km wide bottoms of the Upper Muskingum between Dresden and Coshocton, and the third is located in a narrower portion of the valley at Gilbert, about midway between Dresden and Zanesville. The earthwork just above Dresden, situated near the Hopewellian Cox sites, was a circle about 174 m in diameter; surrounded an area of a little less than 2.4 ha. The Lichtenau earthwork, located about four kilometers below (south) Coshocton, consisted of a circle of about the same size (Carskadden and Morton 1997a). Late Adena as well as Hopewellian habitation sites can be found in the immediate vicinity of both of these circles. Carskadden and Morton (1997a) report that the Dresden and Lichtenau earthworks were constructed by the early Hopewell.

Hopewell settlements are generally characterized as clusters of dispersed sedentary farmsteads or hamlets occurring in the general vicinity of earthwork complexes (Carskadden and Morton 1997a; Pacheco 1988; Smith 1987). Similar, if not identical patterns of Hopewell settlement can be seen along the lower Licking and in the central and upper Muskingum Valley, where a number of clusters of up to six households or hamlets, have been located. Isolated single Hopewell hamlets occur rarely where there is a limited area exposed by plowing according to Carskadden and Morton (1997a). Yet, only at Dresden and possibly Gilbert (and Lichtenau in Coshocton County) are these hamlet clusters associated with an earthwork. However, Cox B and Cox C are the only Hopewell hamlets along the Muskingum that have been tested.

These Hopewell habitation sites (open-air) are further divided into two types, which are designated as long term and/or short-term habitations. The long-term sites are characteristic of farming hamlets as outlined by Pacheco (1988) and consist of hundreds of bladelets, dozens of projectile points, and an abundance of debitage, whereas, the short-term sites are differentiated by two or three bladelets, one or two projectile points, and a very small amount of debitage. Pottery sherds and pit features are normally, but not always, characteristic of long-term sites, whereas single pit features are reminiscent of short-term habitation (Carskadden and Morton 1997a). Pacheco (1992) went on further to designate these sites as small artifact clusters. According to Pacheco (1992) these sites/clusters average .14 ha in size and have artifact densities of less than .2 per sq m, whereas, the hamlets (long term) average .45 ha and have artifact densities greater than .2 per sq m. These small artifact cluster sites as defined by Pacheco (1992) represent short duration specialized camps or activity areas (Carskadden and Morton 1997a; Pacheco 1992).

Over half (56 percent) of the "short term" sites/specialized camps/activity areas found in Carskadden and Morton's (1997a) survey occur in the bottoms of the Muskingum and Licking Rivers, more often than not in the vicinity of the hamlet clusters. The remaining 43 percent of the sites occur in the hinterlands, mostly in the valleys of stream valleys (Carskadden and Morton 1997a).

There is a third type of Hopewellian site identified, and this is the so-called ridge top workshop. These workshops are located in close proximity to flint quarries (could be up to six km away), have an abundance of debitage (particularly bladelet cores, and various blanks in different stages of reduction). These sites for the most part lack pit features. An example of this site type is located near Flint Ridge State Park at the Dodson Village. Numerous amounts of debitage were recovered yet an excavation in 1932 revealed only two cooking features and a small amount of animal bone and potsherds. A reanalysis of this site and artifacts concluded that this site "represents very short-term occupations over a long period of time by comparatively small groups of people intent upon procuring Flint Ridge Flint" (Murphy and Morton 1984:24).

On the other hand, excavation at the Murphy sites has produced just as much if not more lithic debitage as the workshops (Dancey 1991; Pacheco 1992). The Murphy sites suggest that the abundance of such debitage does not preclude a site from being a hamlet. A large amount of debitage may be the result of long duration of occupation. Sites such as those as the Murphy sites are described by Pacheco as "intense occupation by a substantial permanent population." There are ridge top Hopewell sites located in the Muskingum Valley that are distant from flint outcrops that appear to fit the definition of hamlets (Carskadden and Morton 1997a).

The early Late Woodland is assumed by Carskadden and Morton (1997a) to be a continuation of the Middle Woodland culture, but lacking the Hopewellian interaction sphere of goods and elaborate mortuary practices. This stage is represented in the central Muskingum River Valley by a number of open sites along the river including an excavated component at the Philo II site, several rockshelters in the hinterland and possibly a hinterland circular earthen enclosure. Diagnostic artifacts of this time frame include Chesser Notched points and plain rimmed, grit tempered Peters Cordmarked pottery. The angular shoulders, which distinguish Newtown-like pottery, are not found at central Muskingum River Valley sites. Limestone tempering, the characteristic of Watson Cordmarked pottery is present in a minority of sherds. All of the sherds recovered from the early Late Woodland features at Philo II are cordmarked, but nothing that could be interpreted as Peters Plain has been found. Pottery lips appear flattened and un-notched. The only radiocarbon date is from Philo II, A.D. 850 (Morton 1977). The timeframe for the early Late Woodland probably dates between 600-850 A.D. (Morton 1984).

Morton (1984) refers to the middle Late Woodland as "Intrusive Mound-like." This is a difficult cultural manifestation to identify in the central Muskingum River Valley. No burials have been identified in this region as Intrusive Mound-like, however; artifacts associated with this timeframe have been identified in the region. Artifacts associated with the middle Late Woodland are Jack's Reef, Raccoon Notched/Side Notched, and Levanna triangular points. Sites yielding Jack's Reef projectile points are believed to represent the early period of the

middle Late Woodland while the Raccoon Notched points indicate a later period within the middle Late Woodland (Morton 1984). Morton (1984) defines the timeframe for this period is most likely between A.D. 850-1100. The pottery during this timeframe is the Cole Cordmarked (?) and the Peters Cordmarked.

An "Intrusive Mound-like" site near Dresden along the Muskingum River yielded exclusively Jack's Reef Corner Notched points and Peters Cordmarked pottery from a refuse pit. The Peters Cordmarked ceramics are predominant in the early Late Woodland and characterized by a thickened or collared rim with two slight but noticeable raised rim areas with notches along the slip. It seems to Morton (1984) that this vessel is the morphological "missing link" between the plain-rimmed Peters Cordmarked and the later collared and castellated Cole-style ware.

In regard to settlement and subsistence patterns little can be inferred until further investigations within the Muskingum River Valley have been carried out. What can be said is that settlements are represented by low terrace or floodplain "hot spots," sites of generally smaller extent and thinner density than the early Late Woodland sites. Jack's Reef and Raccoon Notched points have been identified in rockshelters, but these are considerably less numerous than Chesser Notched points in such contexts (Morton 1984).

Sites belonging to the late Late Woodland or the "Cole/Baldwin-like" phase include two-rock shelters and two excavated open sites: the Locust Site along the Licking River and a site at Copeland Island along the Muskingum River. Tentative dates suggest 1100-1150 A.D. as the beginning of this phase in the central Muskingum areas, although the earliest radiocarbon dates obtained indicate A.D. 1190 from Copeland Island. These sites have yielded Levanna-like triangular points, yet Raccoon Notched points are found on these sites and believed to fall within the early phase of the late Late Woodland (Morton 1984).

The pottery is similar to that of the Baldwin phase pottery and radiocarbon dated to A. D. 1230. Similarities can also be seen in central Ohio, such as the Cole, Decco, and Ufferman sites. What all the pottery of the Muskingum River Valley has in common is a high proportion of cordmarking, grit tempering, and collared and castellated rims with flange/lugs. What seems to be absent or rare are punctuates, strap handles, incised designs, and shell tempering-in short all of the pottery diagnostic of Fort Ancient. A few sherds in the Muskingum Valley have incising of the parallel oblique kind on the neck of the vessel or in one vessel on the collar (Morton 1984).

Intra-site patterning of the late Late Woodland sites consists of a sparse "linear scatter" or diffuse series of "hot spots" along the floodplain, very much like the patterning of earlier sites. What this seems to suggest is periodic reoccupation over an extended span of time rather than intensive occupation over a relatively short span of time. The Fort Ancient style circular nucleated village layout seen in the later Philo Phase or in the Baum Phase of the Scioto Valley seems to be lacking at these late Late Woodland sites. Present at these sites are deep refuse/storage pits, often containing bone and shell refuse. This suggests some degree of intensity of the occupation at these sites (Morton 1984).

Late Prehistoric

The early Late Prehistoric or the Philo Phase is characterized by nucleated, circular, central plaza-type villages occupied year-round, large scale river bottom maize agriculture, smooth shell tempered Philo Punctate pottery, rich and diversified bone and antler industries, and ossuary-style mass burials (Carskadden and Morton 1977). Projectile points of this time period are the Madison point and the Fort Ancient style points. Radiocarbon dates suggest a beginning of this phase in the Muskingum Valley from A.D. 1230 to A.D. 1320. Radiocarbon dates have suggested something interesting concerning the Cole/Baldwin-like phase. It seems that the Cole/Baldwin-like phase persisted as much as a generation after the appearance of the Philo phases, at least in certain portions of the Muskingum Valley (e.g. Locust Site, Eddy Paul Rockshelter). Several Cole Cordmarked vessels have been recovered from the Philo phase Richards site (A.D. 1260 to A.D. 1290) [Morton 1984].

The late Late Prehistoric or the Riker Phase manifests itself in the form of Wellsburg Simple Stamped and Tuttle Hill Notched pottery. One site, in Muskingum County near Dresden, has a radiocarbon date A.D. 1350 (30 years after the latest Philo phase), and may represent the earliest influx of Riker phase traits into the central Muskingum area, possibly from northeast Ohio. The only other manifestation of this phase in the Muskingum Valley is from a mound to the West of Zanesville, which yielded Tuttle Hill Notched ceramics (Morton 1984).

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and. the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as 'Lower Shawnee 2' existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of

Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River, but settlers were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region. The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio.

These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural

corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Washington Township History

Washington Township, named after President George Washington, organized in 1832. Washington Township is located in the northeast corner of Hancock north of Big Lick Township, east of Cass Township, south of Wood County, and west of Seneca County. The Portage River, the east and middle branch of the Portage River, and several unnamed tributaries flow through the township. Lake Lamberjack, Veterans Memorial Reservoir, Fostoria Reservoir, and Mosier Lake are in the northeast corner of the township. Highways 613, 18, and 12 run through the township. The Norfolk & Western and the Baltimore and Ohio Railroads run through the township. The township is mostly hilly woodland and farmland (Beardsley 1881).

John Gersuch of Wayne County, Ohio made the first land purchase in the township in December 1830 and moved to the township in April 1831. Land purchases in 1831 included James Connelly, John Norris, Richard Cole, and Thomas Kelley. The first schoolhouse in the township was built in about 1833 with Isaac Wiseman as the teacher on James Wiseman's farm. By the 1880s the township had nine schools. The Lake Erie & Western Railroad that ran northeast to southwest and the Continental Road, later the New York, Chicago, & St. Louis Railway that ran east and west in the township crossed at Arcadia. By the 1880s the township had a population of over 2,000. Methodists built the first church in 1832. Other churches in the township included Evangelical Lutheran, Presbyterian, German Reformed, German Baptist, and United Brethren (Beardsley 1881).

John Gorsuch platted Risdon, named for Daniel Risdon, in 1832. The town post office was established in 1837 with Alvin Coles as postmaster. The town merged with Rome in Seneca County to form Fostoria, named for Charles W. Foster, in 1855. Most of Fostoria sits in Seneca

County. The town was the home of College of the United Brethren (Beardsley 1881; Brown 1886).

David Peters and Ambrose Peters platted Arcadia in July 1855 where soon the of the Lake Erie & Western Railroad and the New York, Chicago, & St. Louis Railway would cross. The Lake and Western Railroad came to the town in 1859 and then the New York, Chicago, and St. Louis Railroad crossed the town in 1881. The Toledo, Fostoria, & Findlay Electric Line ran from Findlay to Fostoria paralleling the Lake Erie & Western. David Peters opened the first store. In about 1859, Samuel Blackford built a steam powered grist mill in the town. In 1859, Arcadia incorporated and gained a post office with A.W. Fredrick as postmaster. Industry in the town included handle factories, a broom factory, a pump factory, a saw and planing mill, a concrete factory, and more. By the 1880s the town had a population of about 500. Churches in the town included Methodist, Presbyterian, and Lutheran. Societies in the town included an Odd Fellows, Knights of Pythias, Rathburn Sisters, Maccabes, Lions, and Modern Woodsmen lodges (Beardsley 1881; Brown 1886).

Research Design

The purpose of a Phase I survey is to locate and identify cultural resources that will be affected by the planned generation tie. This includes archaeological deposits as well as architectural properties that are older than 50 years. Once these resources are identified and sampled, they are evaluated for their eligibility or potential eligibility to the NRHP. These investigations are directed to answer or address the following questions:

1) Did the literature review reveal anything that suggests the project area has been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

Archaeological Field Methods

Phase I surveys that are conducted in Ohio typically involve any one or combination of four methods. These included shovel test unit excavation, shovel probes, surface collection, and visual inspection. Disturbance and some other variables can preclude the necessity for any or all of these testing methods. These methods are described in greater detail in the following text.

Shovel test unit excavation. Shovel test units can be excavated in locations where surface visibility was insufficient for surface collection and not severely disturbed. This can include fallow conditions, manicured lawn, corn stubble fields, and possibly soybean stubble fields. If necessary, these units are spaced at about 15 m intervals (50') and generally located on the centerline of the project corridor. Units are manually excavated until they extend 5 cm into the subsoil. Individual shovel test units would be documented regarding their depth, content, and color (Munsell). Wherever sites were encountered, Munsell color readings were taken per shovel test unit. All of the undisturbed soil

matrices from shovel test units were screened through .6 cm hardware mesh. Additional or radial shovel test units will be excavated in areas where cultural remains are identified. These would be placed at 7.5 m intervals and within the project corridor, if intact locations are encountered.

Shovel Probe. This method would be used to delineate areas of disturbance. A shovel test probe measured 30 cm square and was excavated in areas where surface visibility is lacking, but disturbance is not evident on the surface. If natural soils are identified, the probe would be expanded and sampled like a shovel test unit.

Surface Collection. This method would be used in situations where bare ground visibility was sufficient for sampling. This can include any tilled fields, occasional soybean stubble or mature soybean situations, and standing corn. Situations where repeated no-till agriculture is practiced typically precludes the opportunity to conduct surface collection methods. It is typically necessary for conditions to offer a minimum of 50 percent bare ground visibility. Pedestrian transects would be spaced at 5 m intervals. Artifact locations would be plotted using a Trimble GeoXT global positioning system.

Visual inspection. Locations where cultural resources were not expected, such as disturbed areas, steeply sloped areas, and low/wet areas were walked over and visually inspected. This method was used to verify the absence or likelihood of any cultural resources being located in these areas. This method was also utilized to document the general terrain and the surrounding area.

The application of the resulting field survey methods was documented in field notes, field maps, and permit maps.

Curation

There were no cultural remains identified during these investigations. The field notes and maps for this project will be maintained in Weller's files.

Architectural Field Methods

This survey was conducted following the guidelines established in Archeology and Preservation: Secretary of the Interior's Standards and Guidelines (National Park Service 1983) and Guidelines for Local Surveys: A Basis for Preservation Planning. National Register Bulletin No. 24 (National Park Service 1997), and *Guidelines for Conducting History/Architecture Surveys in Ohio* (Ohio SHPO, 2014). When properties are identified, they are subjected to the guidelines outlined in National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation (National Park Service 1996).

There are four criteria for eligibility to be listed in the National Register of Historic Places (NRHP). Only one of these criteria must be met to be considered eligible for listing; however, oftentimes more than one of the criteria is met. The criteria for significance include:

A. Association with historic events or patterns of events;
B. Association with persons important to our past;
C. Exceptional or important architectural characteristics; and/or
D. Data potential.

Architectural properties typically qualify under Criteria A, B, or C. Criterion D is typically reserved for archaeological sites.

In addition to meeting at least one of the established criteria, the appropriate integrity must also be retained by the resource. There must be integrity of location, design, workmanship, setting, materials, feeling, and association.

Prior to commencing fieldwork, a literature review was conducted to determine if any previously recorded architectural properties, NRHP properties, or Ohio Genealogical Society cemeteries were present within the project survey area. Historic maps were also reviewed to aid in guiding the fieldwork and detecting the possible presence of significant within the survey area. Background research was also conducted in order to establish a historic context of the region. The context was compiled by utilizing materials from the SHPO, archival materials at the respective county courthouses, local libraries, and several online resources. The establishment of the historic context helped to guide the interpretation of the field survey results.

The approach to the field survey accounted for the decrease in effects to historic properties as the distance from the project area increased. The survey included a systematic assessment to identify all resources 50 years of age or older within 305 m (1,000 ft) of the project area. In addition to this systematic assessment, the survey extended to resources located beyond 305 m (1,000 ft) that exhibited potential eligibility for inclusion in the NRHP. Some areas within the 305 m (1,000 ft) will be blocked from having a direct line-of-sight to the proposed project by topography and forested areas. Some areas within the 305 m (1,000 ft) may have been recently surveyed and the current survey may not include these areas. The areas that did not have a direct line-of-sight to the project were visually verified in the field and the survey did not include all of these areas. The approach was to identify those properties with NRHP potential, followed by a more intensive documentation and evaluation of those potentially eligible aboveground resources. The comprehensive survey involved recording of each property with potential historic significance to a baseline level of documentation.

Weller focused on the ground plan, the height, and the roof configuration of each structure, noting all visible materials, appendages, extensions, or other alterations. Housing types and structural details within the report and utilized on Ohio Historic Inventory (OHI) forms follow accepted professional terminology and that used by architectural historians McAlester

(2013), and Gordon (1992). Weller then supplemented the field survey data with an examination of available tax records, aerial photographs, and cartographic sources.

Definitions

Within this report, an *architectural resource* is defined as aboveground buildings or structures that are 50 years of age or older. A *historic property* is defined as a building, structure, object, or site that is listed in, or considered eligible for listing in, the NRHP. An *effect* is defined as an activity associated with the project that alters a characteristic of a historic property that qualified it for inclusion in the NRHP.

Literature Review

The literature review study area is defined as a 305 m (1,000 ft) radius from the boundary of the project area. In conducting the literature review, the following resources were consulted at OHPO or the State Library of Ohio:

1) *An Archeological Atlas of Ohio* (Mills 1914);
2) OHPO United States Geological Survey (USGS) 7.5' series topographic maps;
3) Ohio Archaeological Inventory (OAI) files;
4) Ohio Historic Inventory (OHI) files;
5) National Register of Historic Places (NRHP) and Determinations of Eligibility files;
6) OHPO CRM/contract archaeology files; and
7) OHPO consensus determination of eligibility files; and
8) Hancock County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s);
9) Genealogical and cemetery resources.

A review of *An Archeological Atlas of Ohio* (Mills 1914) was conducted. There are no mounds indicated in the study area.

A review of the OHPO topographic maps indicated that there are no sites within or immediately adjacent to the project corridor (Figures 2 and 3).

A review of the Ohio Historic Inventory (OHI) files found the Norfolk Southern Railroad, HAN0066705, in the study area.

A review of the NRHP and DOE files did not find any historic properties listed or eligible for listing in the National Register of Historic Places.

No OGS cemeteries were identified in the study area.

There have been two prior CRM or professional surveys conducted that partially intercept the project area (Figures 2-3). The surveys were completed for a 345kV station fence replacement in Washington Township, Hancock County, Ohio (Weller 2017) and the 404.7 ha (1,000 ac) South Branch Solar Project in Washington Township, Hancock County, Ohio (Weller 2021).

Cartographic/atlas resources were reviewed for the project. The project corridor is located in the same location as the L. E. & L. Railroad tracks in the latter part of the nineteenth century (Hardesty 1875) and through the early twentieth century (Figure 4). This railroad continued in perpetuity into the modern and current era and was increased at some point to being a dual track (Figure 2). Review of aerial images indicates that the project corridor is contained within the railroad's property, an existing substation, and minimal farmland which had already been subject to prior investigations (Figure 3).

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project area has been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

This project area is a corridor that is limited to existing railroad property and previously investigated locations. The literature review does not indicate any significant archaeological resources in association with this project. Given these conditions, archaeological field reconnaissance was not considered to be necessary.

Archaeological Survey Results

The archaeological investigations for this project were limited as it relates to the type of project, its location, and its inherent limitations. The entire project corridor is contained in disturbed contexts or areas that have been recently previously investigated. The limits of disturbance for the generation tie line installation are mostly contained within an existing railroad property. Due to the severely disturbed conditions and limitations of this project area, no additional archaeological work was deemed necessary beyond a literature review and map/cartographic resource inspection.

Architectural Survey Results

Fieldwork confirmed that the project is located along a railroad in farmland setting. Building types and styles are consistent with patterns of settlement in the area and are mostly single-family residences and barns dating from the late-19th century to 1970. Stylistically, the

buildings are vernacular (exhibiting no formal academic style) but a large number of them are of the mid-century Modern Movement.

The field survey identified a total of 35 architectural resources 50 years of age or older within the APE (Figures 5-59; Table 1). One OHI, HAN0066705, was also found in the study area and is the Norfolk Southern Railroad (Figures 6-8, 33, Table 1, Appendix). Fieldwork confirmed that there are no historic properties located within the project area.

None of the resources in the APE were found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The buildings are typical of others in the area and throughout Ohio, are not the works of a master, and do not exhibit distinctive character-defining features; therefore, the resources are not eligible for inclusion in the NRHP under Criterion C.

Table 1. Architectural Field Survey Results

Resource	County	Figure #	Location	Date	Style	Type	NRHP Status
S-1	Hancock	5-6, 24	22116 TR-218, Fostoria	1970	Vernacular	Commercial	Not Eligible
S-2	Hancock	6, 25	21998 SR-12, Fostoria	1955	Modern Movements	Minimal Traditional	Not Eligible
S-3	Hancock	5-7, 26	21770 TR-218, Fostoria	1913	Vernacular	Front-Gable	Not Eligible
S-4	Hancock	6-7, 27	2011 TR-261, Fostoria	c. 1960	Vernacular	Ranch	Not Eligible
S-5	Hancock	6-7, 28	2031 TR-261, Fostoria	1959	Vernacular	Ranch	Not Eligible
S-6	Hancock	6-7, 29	2049 TR-261, Fostoria	1960	Vernacular	Ranch	Not Eligible
S-7	Hancock	6-7, 30	21797 TR-218, Fostoria	1954	Vernacular	Ranch	Not Eligible
S-8	Hancock	6-7, 31	21813 TR-218, Fostoria	1954	Modern Movements	Minimal Traditional	Not Eligible
S-9	Hancock	6-7, 32	21825 TR-218, Fostoria	1956	Modern Movements	Minimal Traditional	Not Eligible
HAN0066705	Hancock	6-8, 33	Norfolk Southern RR, TR-261	c. 1853		Railroad	Not Eligible
S-10	Hancock	8, 34	21727 SR-12, Fostoria	c. 1880	Vernacular	Front-Gable	Not Eligible
S-11	Hancock	8, 35	21727 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-12	Hancock	10, 36	21356 SR-12, Fostoria	c. 1860	Italianate	Hipped	Not Eligible
S-13	Hancock	10, 37	21282 SR-12, Fostoria	1952	Modern Movements	Ranch	Not Eligible
S-14	Hancock	10, 38	21254 SR-12, Fostoria	1954	Modern Movements	Ranch	Not Eligible
S-15	Hancock	10, 39	21283 SR-12, Fostoria	1953	Modern Movements	Minimal Traditional	Not Eligible
S-16	Hancock	10, 40	21283 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-17	Hancock	12, 41	510001015809	1884	Vernacular	Schoolhouse	Not Eligible
S-18	Hancock	12, 42	20819 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-19	Hancock	12, 43	20819 SR-12, Fostoria	1929	Modern Movements	Craftsman, Massed-Plan	Not Eligible
S-20	Hancock	12-13, 44	20702 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-21	Hancock	12-14, 45	20702 SR-12, Fostoria	c. 1880	Vernacular	Gabled-Ell	Not Eligible
S-22	Hancock	14, 46	20521 SR-12, Fostoria	1964	Modern Movements	Minimal Traditional	Not Eligible
S-23	Hancock	14, 47	3054 CR-257, Fostoria	1952	Modern Movements	Minimal Traditional	Not Eligible
S-24	Hancock	14, 48	3020 CR-257, Fostoria	1953	Modern Movements	Ranch	Not Eligible
S-25	Hancock	14, 49	20426 CR-109, Fostoria	1964	Modern Movements	Ranch	Not Eligible

Table 1. Architectural Field Survey Results							
Resource	**County**	**Figure #**	**Location**	**Date**	**Style**	**Type**	**NRHP Status**
S-26	Hancock	14, 50	20346 CR-109, Fostoria	1956	Modern Movements	Minimal Traditional	Not Eligible
S-27	Hancock	14, 51	20392 CR-109, Fostoria	1963	Modern Movements	Ranch	Not Eligible
S-28	Hancock	14-15, 52	20251 CR-109, Fostoria	1951	Vernacular	Side-Gable	Not Eligible
S-29	Hancock	15, 53	20018 CR-109, Fostoria	1969	Modern Movements	Ranch	Not Eligible
S-30	Hancock	14, 16, 54	20270 SR-12, Fostoria	1958	Vernacular	Irregular	Not Eligible
S-31	Hancock	16, 55	20227 SR-12, Fostoria	1956	Modern Movements	Ranch	Not Eligible
S-32	Hancock	16, 56	20209 SR-12, Fostoria	c. 1880	Vernacular	Cross-Gable	Not Eligible
S-33	Hancock	16, 57	20209 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-34	Hancock	16, 58	20126 SR-12, Fostoria	c. 1880	Vernacular	Front-Gable	Not Eligible
S-35	Hancock	16, 59	20126 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible

APE Definition and NRHP Determination

The APE is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. Archaeological investigations are typically limited to the footprint of the construction activity and a very limited area around it if deemed appropriate and depending upon the type of construction. The architectural APE is considerate of the project limits of disturbance as well as its surrounding with parameters that are dependent upon the project type and its setting. Per OPSB regulations, a 305 m (1,000 ft) wide area extending from the project corridor was considered. The project involves the installation of a generation tie line that is 3.9 km (2.4mi) long and it is primarily contained within a railroad property. The archaeological APE for this project pertains to the footprint of the project area, the limits of disturbance.

There were no archaeological sites identified and the area is fully disturbed or previously investigated. The architectural APE for this project is considered to be what is in view of the generation tie line within a 305 m (1,000 ft) survey area but extending to areas containing significant/potentially eligible resources within view of the project area.

Recommendations

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Preferred Route 138kV Generation Tie in Washington Township, Hancock County, Ohio. The archaeological component of this project was very limited to a desktop and soils review; the entire corridor is contained in a disturbed or previously investigated context; no archaeological resources were identified. There are no significant architectural resources involved in this project. It is Weller's opinion that the planned project will have "no effect to any historic properties or landmarks". No further cultural resource management work is deemed necessary for this project.

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Figures

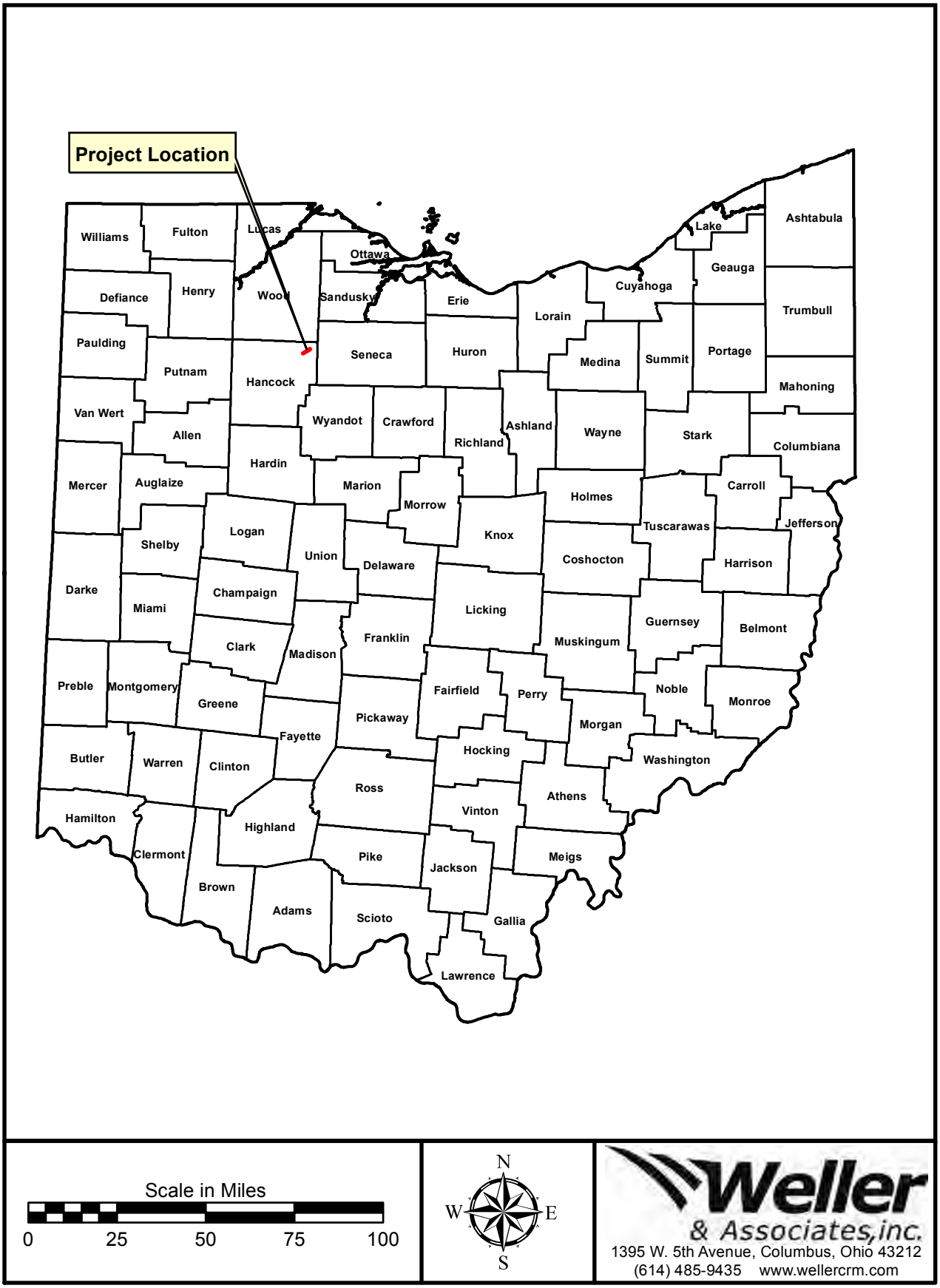

Figure 1. Political map of Ohio showing the approximate location of the project.

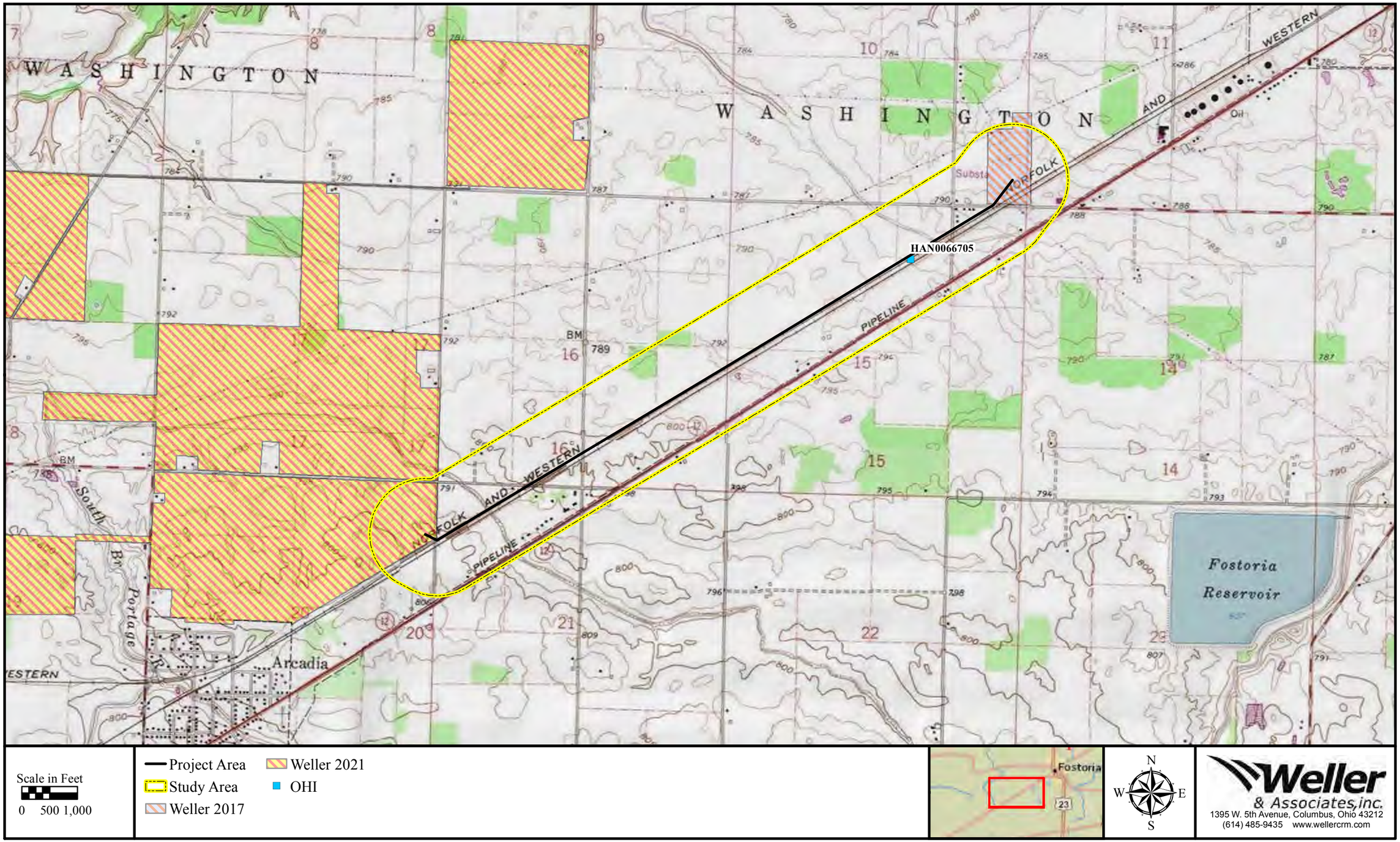

Figure 2. Portions of the USGS *1973 Fostoria, and 1973 Alvada, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and previously recorded resources in the study area.

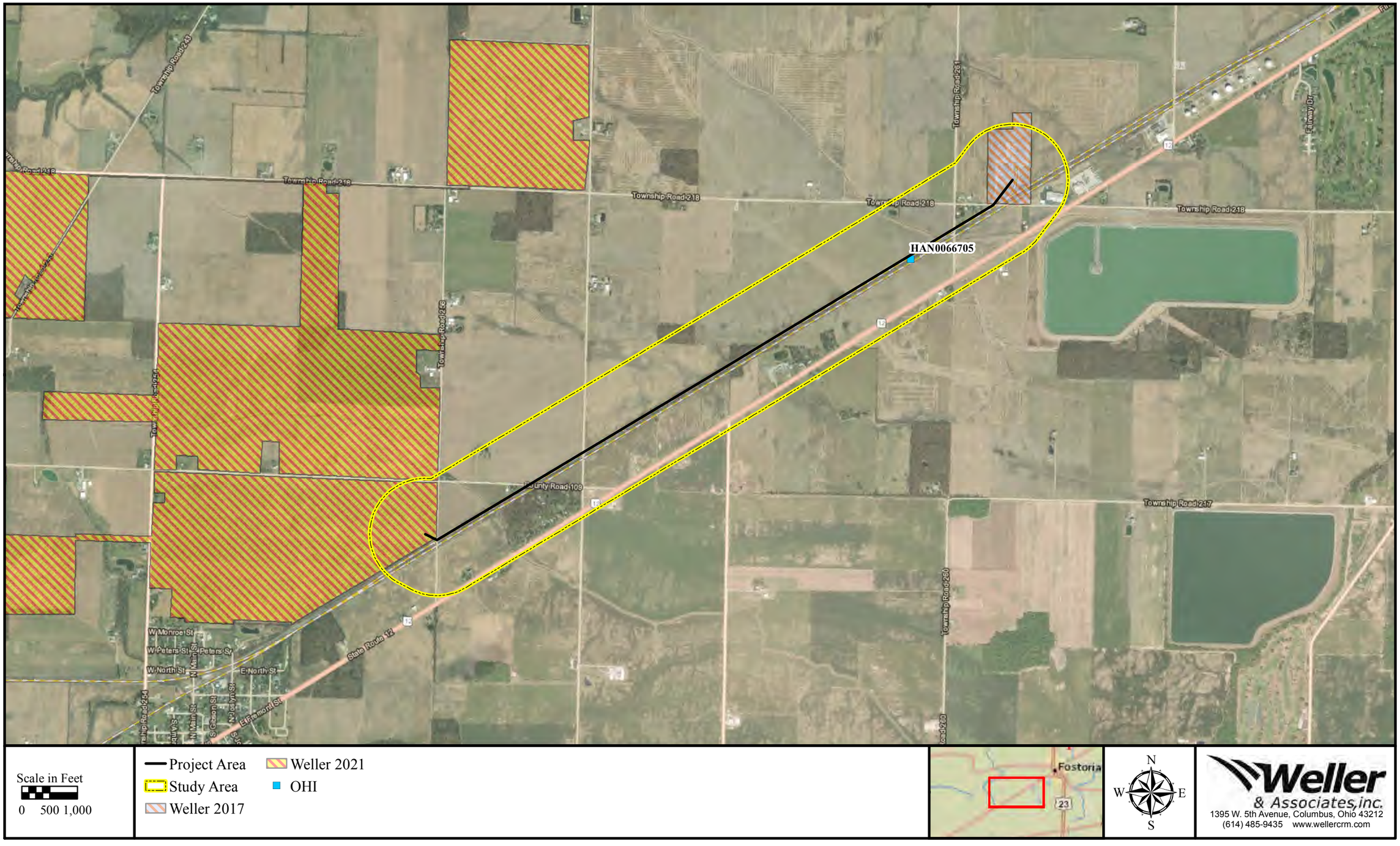

Figure 3. Aerial map indicating the location of the project area and recorded resources within the study area.

Figure 4. Portions of the USGS *1901 Fostoria, and 1903 Findlay, Ohio 15 Minute Series (Topographic)* maps indicating the approximate location of the project.

Figure 5. Architectural fieldwork results and photo orientation map.

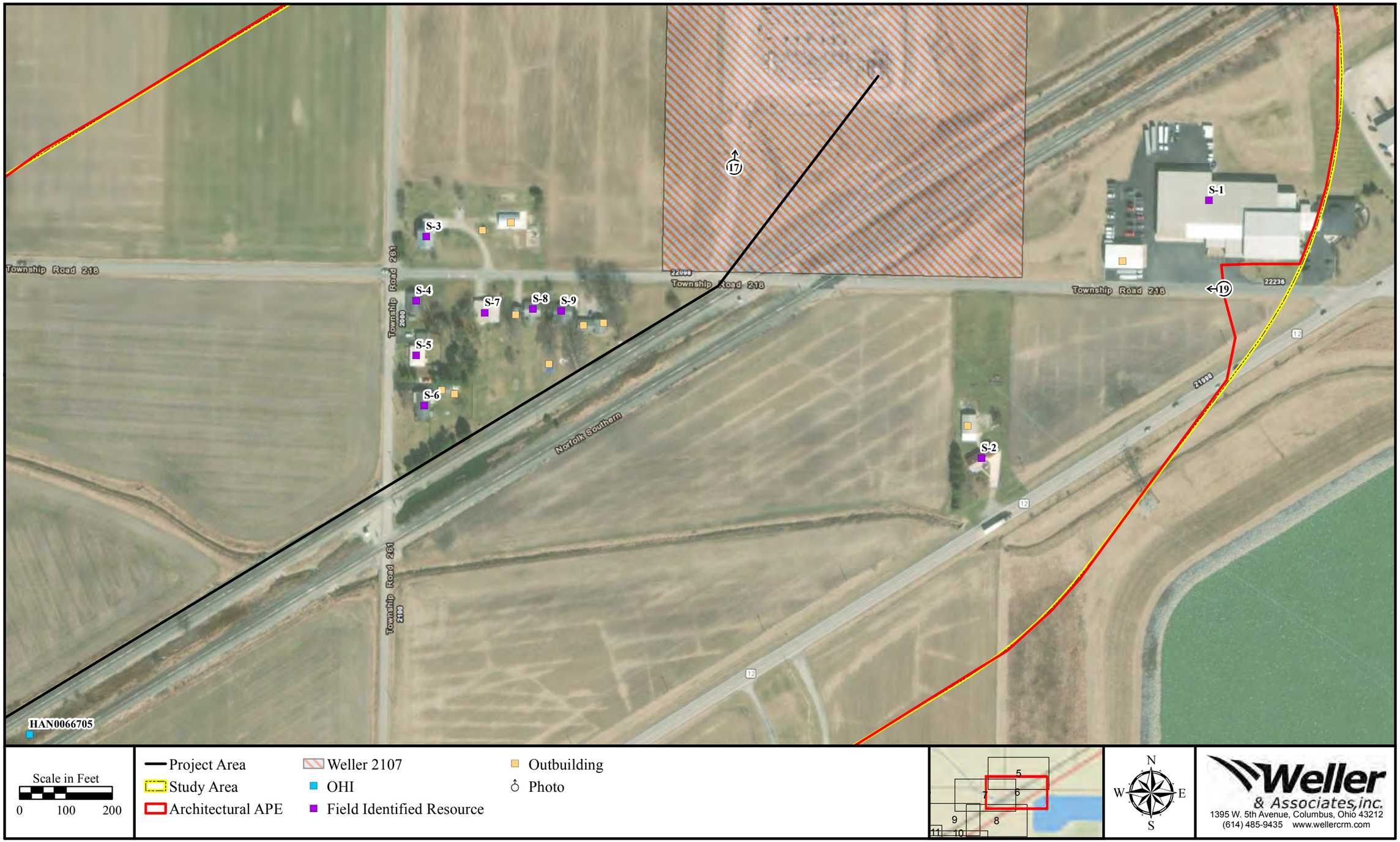

Figure 6. Architectural fieldwork results and photo orientation map.

Figure 7. Architectural fieldwork results and photo orientation map.

Figure 8. Architectural fieldwork results and photo orientation map.

Figure 9. Architectural fieldwork results and photo orientation map.

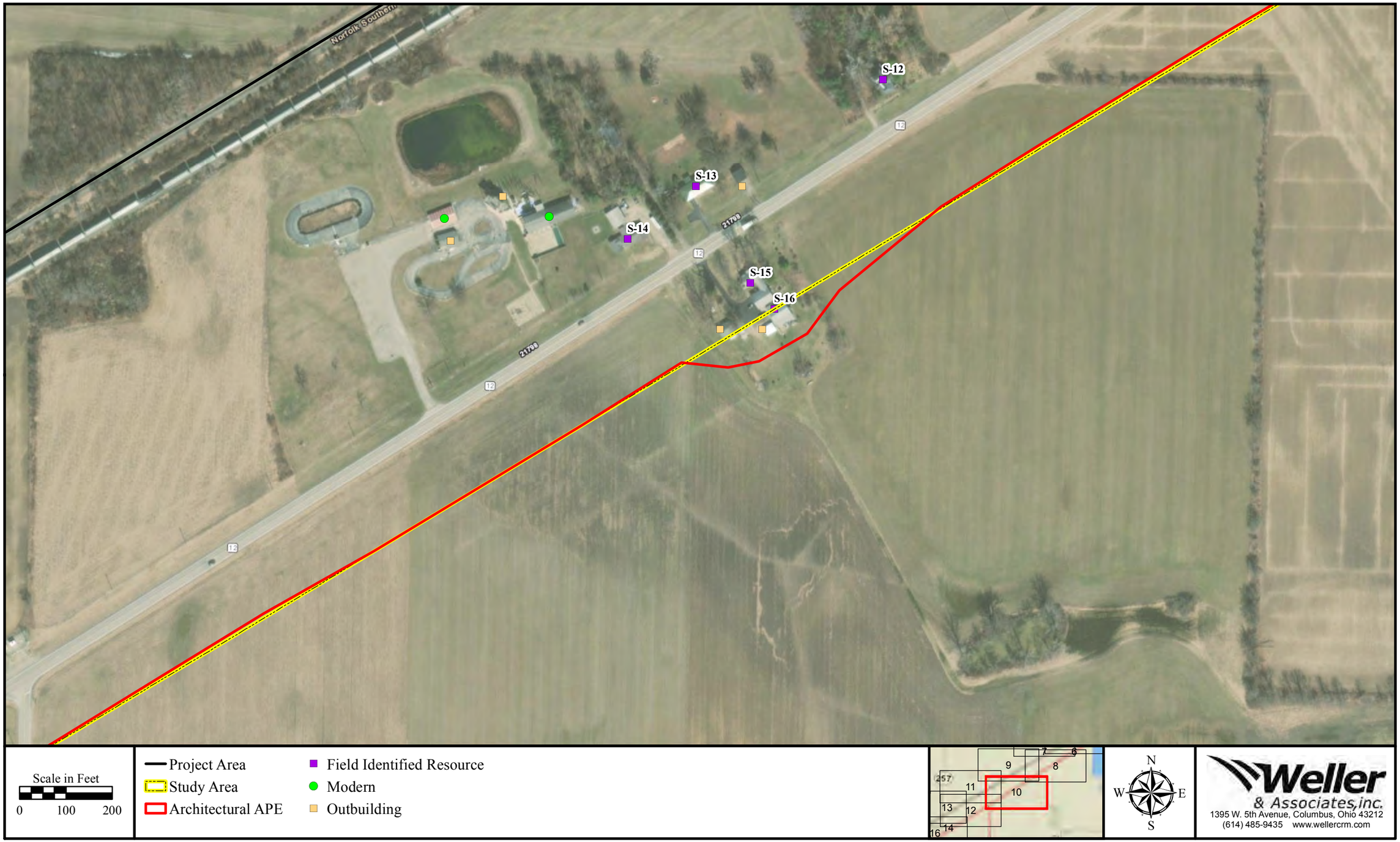

Figure 10. Architectural fieldwork results and photo orientation map.

Figure 11. Architectural fieldwork results and photo orientation map.

Figure 12. Architectural fieldwork results and photo orientation map.

Figure 13. Architectural fieldwork results and photo orientation map.

Figure 14. Architectural fieldwork results and photo orientation map.

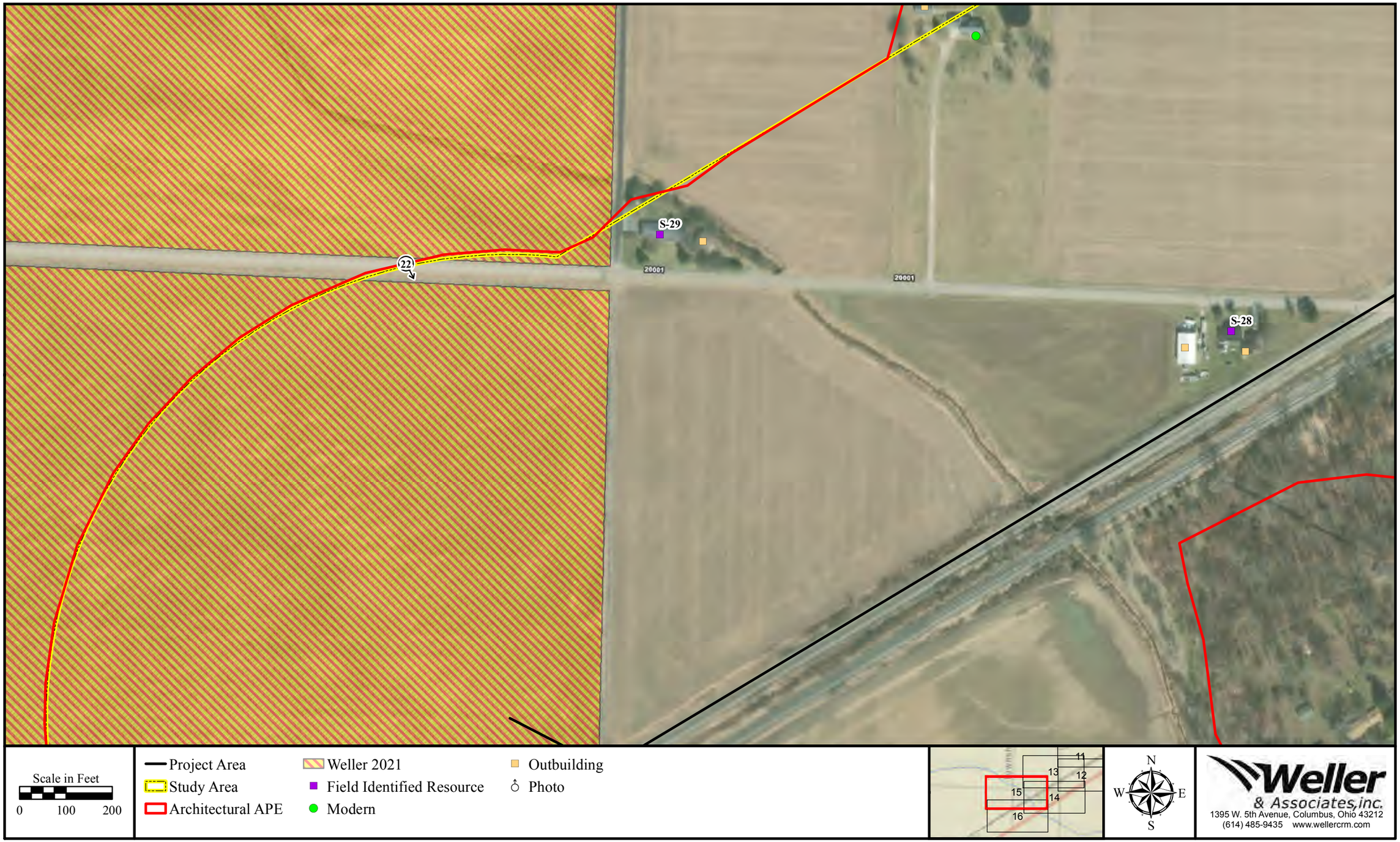

Figure 15. Architectural fieldwork results and photo orientation map.

Figure 16. Architectural fieldwork results and photo orientation map.

Figure 17. North view of the Northern terminus of the Project Area approximately 300ft north of TR-218, Fostoria, Ohio.

Figure 18. Southeast view toward the Project Area from the Architectural APE boundary at TR-261, Fostoria, Ohio.

Figure 19. West view toward the Project Area from the Architectural APE boundary at TR-261, Fostoria, Ohio.

Figure 20. South view toward the Project Area from the Architectural APE boundary at CR-257, Fostoria, Ohio.

Figure 21. West view toward the Project Area from the Architectural APE boundary at CR-109, Fostoria, Ohio.

Figure 22. Southeast view toward the Project Area from the Architectural APE boundary at CR-109, Fostoria, Ohio.

Figure 23. Northwest view of the southern terminus the Project Area approximately 300ft north of OH-12, Fostoria, Ohio.

Figure 24. North view of S-1 from OH-12, Fostoria, Ohio.

Figure 25. Northeast view of S-2 from OH-12, Fostoria, Ohio.

Figure 26. Northeast view of S-3 from TR-218, Fostoria, Ohio.

Figure 27. Southeast view of S-4 from the intersection of TR-218 and TR-261, Fostoria, Ohio.

Figure 28. Southeast view of S-5 from TR-261, Fostoria, Ohio.

Figure 29. Southeast view of S-6 from TR-261, Fostoria, Ohio.

Figure 30. Southwest view of S-7 from TR-218, Fostoria, Ohio.

Figure 31. Southwest view of S-8 from TR-218, Fostoria, Ohio.

Figure 32. Southwest view of S-9 from TR-218, Fostoria, Ohio.

Figure 33. Southwest view of HAN0066705 from TR-261, Fostoria, Ohio.

Figure 34. Southwest view of S-10 from OH-12, Fostoria, Ohio.

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Appendix:

Previously Recorded Resources

Ohio Historic Preservation Office

800 E. 17th Avenue
Columbus, OH 43211
614/298-2000

OHIO HISTORIC INVENTORY

Section 106/RPR Review: **Reviewed** RPR Number: **1056973**

1. No. HAN0066705 **NEW**

4. Present Name(s): **Norfolk Southern RR, TR 261**

2. County: **Hancock**

5. Historic or Other Name(s): **Fremont & Indiana RR**

6. Specific Address or Location:
no address, TR 261

6a. Lot, Section or VMD Number:

7. City or Village:
Fostoria

9. U.T.M. Reference
Quadrangle Name: Fostoria

Zone: 17 Easting: 292905 Northing: 4556386

10. Classification: Structure

11. On National Register? NO

13. Part of Established Hist. Dist? NO

15. Other Designation (NR or Local)

16. Thematic Associations:
New York Central

17. Date(s) or Period:
ca. 1853-present

17b. Alteration Date(s):

18. Style Class and Design:
None No academic style - Vernacular

18a. Style of Addition or Elements(s):

19. Architect or Engineer:

19a. Design Sources: Fremont and Indiana Railroad

20. Contractor or Builder:

21. Building Type or Plan: Other Commercial

22. Original Use, if apparent:
Rail Related

23. Present Use:
Rail Related

24. Ownership: Private

25. Owner's Name & Address, if known:
NORFOLK SOUTHERN
3 Commercial Place
Norfolk, VA 23510

26. Property Acreage: 0.1

27. Other Surveys:

28. No. of Stories: Unknown

29. Basement? No

30. Foundation Material: Unknown

31. Wall Construction:
Unknown
Unknown

32. Roof Type:
Unknown
Roof Material:
Unknown

33. No. of Bays: 0 Side Bays: 0

34. Exterior Wall Material(s):
Unknown

35. Plan Shape: Unknown

36. Changes associated with 17/17b Dates:
17. Original/Most significant construction

17b.

37. Window Type(s):
Unknown

38. Building Dimensions:

39. Endangered? NO
By What?

40. Chimney Placement: Unknown

41. Distance from & Frontage on Road:

51. Condition of Property: Good/Fair

52. Historic Outbuildings & Dependencies
Structure Type(s):

Date(s):

Associated Activity:

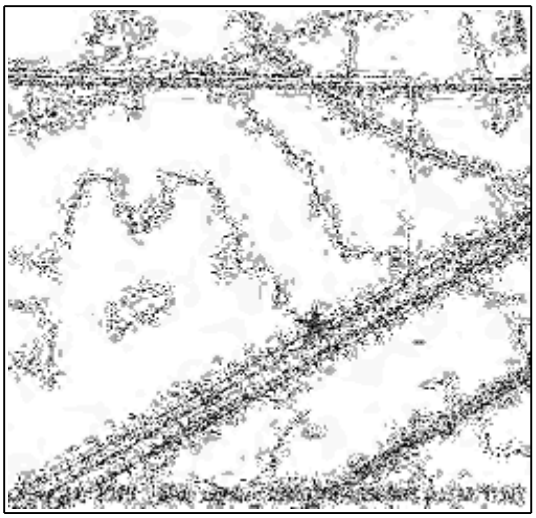
53. Affiliated Inventory Number(s):
Historic (OHI):

Archaeological (OAI):

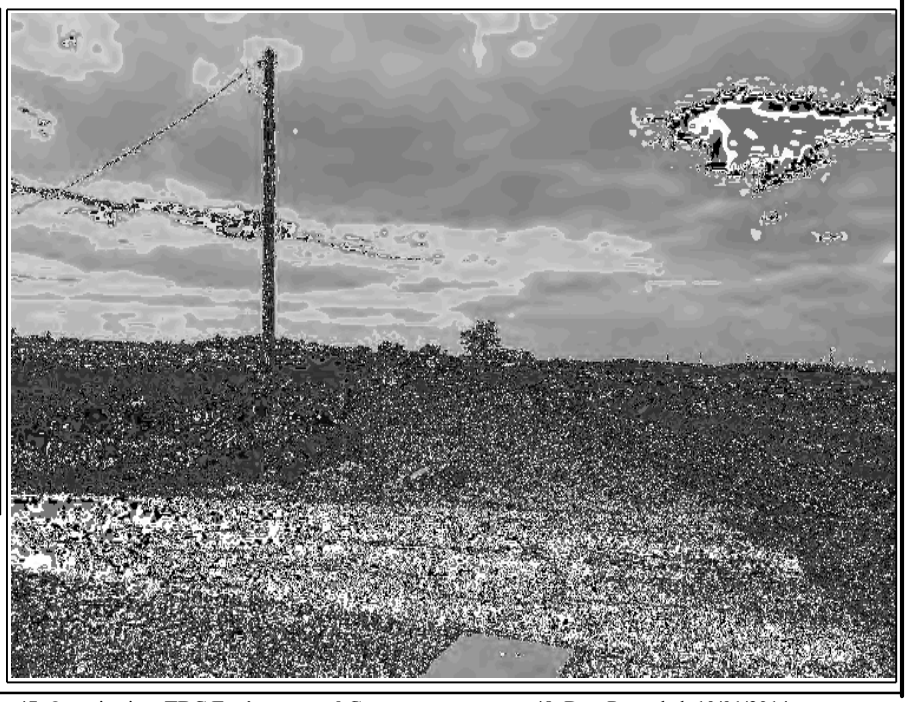
2. County: **Hancock**

4. Present or Historic Name(s): **Norfolk Southern RR, TR 261**

6. Specific Address or Location: **no address, TR 261**



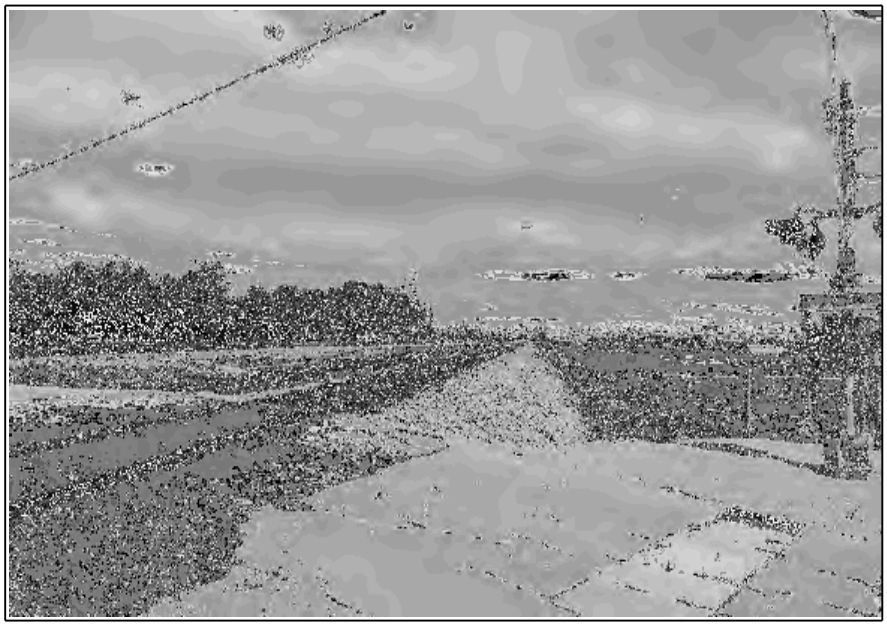
8. Site Plan (location map) with North Arrow



46. Prepared By: **Jessica Burr**
47. Organization: **TRC Environmental Corp**
48. Date Recorded: **10/01/2014**
49. PIR Reviewer: **CS/SCG**
50. PIR Review Date: **12/24/2020**

1. No. HAN0066705 | **4. Present Name(s): Norfolk Southern RR, TR 261**

2. County Hancock | **5. Historic or Other Name(s): Fremont & Indiana RR**



Door Selection: Unknown
Door Position: Unknown
Orientation: Unknown
Symmetry: Unknown

Report Associated With Project:

Primary Author	Secondary Author(s)	Year	Title
Millis, Heather	Burr, Jessica	2014	Historic Architectural Survey for the Proposed Rover Pipeline Project, Noble, Monroe, Belmont, Harrison, Jefferson, Carrol, Tuscarawas, Stark, Wayne, Ashland, Richland, Crawford, Seneca, Hancock, Wood, Henry, Defiance and Fulton Counties, Ohio.

42. Further Description of Important Interior and Exterior Features

Architectural resource HAN0066705 consists of an active railroad owned and operated by Norfolk Southern, that was initially built as part of the Fremont & Indiana Railroad.

43. History and Significance

In 1853, the Fremont & Indiana Railroad incorporated to build a line from Fremont, Ohio to the western Ohio state border (fostoriairontriangle.com, 2015). In 1859, the track reached Fostoria, followed by Findlay in 1862, but went bankrupt that same year. In 1862, the company reorganized as the Fremont, Lima & Union Railroad Company (FLU). In 1865, the FLU Railroad merged with the Lake Erie & Pacific to form the Lake Erie & Louisville Railroad Company (Lewise, 2000). In 1871, the Ohio portions of the railroad were reorganized as the Fremont, Lima & Union Railway Company. In 1872, the company merged back with the Lake Erie & Louisville Railway Company. In 1879, the railroad foreclosed and was sold to the Lake Erie & Western Railway (LEW). In 1900, the LEW Railway came under control of the New York Central Railroad. In 1922, the New York Central Railroad sold the (LEW) to the Nickel Plate Road (Rehor, 1994). In 1964, the Nickel Plate Road and several other carriers merged into the Norfolk & Western Railway. In 1982, the Norfolk & Western merged with the Southern Railway to form Norfolk Southern. To date, architectural resource HAN0066705 is owned and operated by Norfolk Southern (Hancock County Auditors, 2014).

44. Description of Environment and Outbuildings (See #52)

Located approximately 1.6 miles southwest of Fostoria City, resource HAN0066705 crosses through agricultural fields.No outbuildings are associated with the property.

45. Sources of Information

Field Observation, October 2014, Hancock County Auditors Website.Fostoria Rail Preservation Society 2015 *Fostoria, A City Built on Rails*. Fostoria, OH: Fostoria Rail Preservation Society. Located online at: http://www.fostoriairontriangle.com/history.htm. Accessed January 2015. Rehor, John A.1994 *The Nickel Plate story.* Waukesha, WI: Kalmbach Publishing Company.

Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Alternate Route 138kV Generation Tie in Washington Township, Hancock County, Ohio

Ryan J. Weller
Scott McIntosh

May 2, 2023

1395 West Fifth Ave.
Columbus, OH 43212
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www.wellercrm.com

Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Alternate Route 138kV Generation Tie in Washington Township, Hancock County, Ohio

By

Ryan J. Weller
Scott McIntosh

Submitted By:

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Bedford, NH 03110

Lead Agency:

Ohio Power Siting Board (OPSB)

Ryan J. Weller, P.I.

May 2, 2023

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W-3457

Abstract

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Alternate Route 138kV Generation Tie in Washington Township, Hancock County, Ohio. The work was conducted for submittal to the Ohio Power Siting Board (OPSB) and ultimately the Ohio History Connection (OHC) for review. These investigations were conducted in a manner that is reflective of a survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994). Thus, the work efforts were designed to evaluate cultural resources for the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological and architectural fieldwork and literature review. There were no archaeological sites identified during these investigations and there were no significant architectural resources identified.

The project corridor is located in a remote and rural setting in northwestern Ohio. The project plans are to install a 138kV generation tie line that will connect the South Branch Solar Facility to an existing substation. This report addresses what is regarded as the Alternate Route which is 3.9 km (2.4 mi) long. This corridor is oriented in a northeast-southwest manner with the existing substation being at the northeast terminus. The Alternate Route is located on the southeast side of the railroad tracks. The limits of disturbance and survey corridor are primarily located within the Norfolk Southern Railroad property. Because the entire project corridor is located in disturbed contexts, the cultural resource management work efforts were focused on the architectural component of the work.

The literature review that was completed for this project did not identify any recorded resources that are directly involved. The corridor is within a railroad property that has been in this location since the latter part of the nineteenth century. There are no significant resources or recorded sites located within or near the project corridor. There are no extant buildings in the project area.

The archaeological fieldwork reviewed aerial images and concluded that the corridor was contained in fully disturbed or previously investigated conditions; there were no archaeological sites identified. The architectural investigations did not result in the identification of any significant resources within the project or what was considered as its area of potential effect. There were no significant cultural resources identified during these investigations. No further cultural resource management work is considered to be necessary and a finding similar to “no effect to any historic properties or landmarks” is considered appropriate.

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58. Northwest view of S-34 from OH-12, Fostoria, Ohio.
59. North view of S-35 from OH-12, Fostoria, Ohio.

Introduction

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Alternate Route 138kV Generation Tie in Washington Township, Hancock County, Ohio (Figures 1-3). The work was conducted under contract Haley & Aldrich, Inc. for submittal to the Ohio Power Siting Board (OPSB) and ultimately the Ohio History Connection (OHC) for review. These investigations were conducted in a manner that is reflective of a survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994). Thus, the work efforts were designed to evaluate cultural resources for the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological and architectural fieldwork and literature review; however, the archaeological component of the work was limited due to disturbances and prior survey overlap.

Ryan Weller served as the Principal Investigator for the archaeological component and Principal Project Manager. John Sidor conducted the literature review prior to the field reconnaissance work; archaeological fieldwork was precluded by clear and obvious disturbances. The architectural component was completed by Scott McIntosh and the associated figures by John Sidor.

Project Description

The project corridor is located in a remote and rural setting in northwestern Ohio. The project plans are to install a 138kV generation tie line that will connect the South Branch Solar Facility to an existing substation. This report addresses what is regarded as the Alternate Route which is 3.9 km (2.4 mi) long. This corridor is oriented in a northeast-southwest manner with the existing substation being at the northeast terminus. The Alternate Route is located on the southeast side of the railroad tracks. The limits of disturbance and survey corridor are primarily located within the Norfolk Southern Railroad property. Because the entire project corridor is located in disturbed contexts, the cultural resource management work efforts were focused on the architectural component of the work.

Environmental Setting

Climate

Hancock County, like all of Ohio, has a continental climate with hot and humid summers and cold winters. About 36 inches of precipitation falls annually. The wettest time of year is during growing season from about April to September (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1973).

Physiography, Relief, and Drainage

This part of Hancock is located within the Fostoria Lake Plains Shoals physiographic region of Ohio (Brockman 1998). The terrain in this area is nearly level to very gently undulating setting. This region is characterized by "Portion of the Defiance Moraine lightly eroded by shallow Lake Maumee with low north-south trending hillocks and shallow, closed depressions; many sandy areas; elevation 750'-825', low relief, decreasing west-ward" (Brockman 1998). The project area is drained by unnamed tributaries of the South Branch Portage River; this stream flows northward and is within the Lake Erie watershed.

Geology

Underlying the glacial till is Silurian-aged bedrock (Brockman 1998; USDA, SCS 1973). This includes limestone and dolomitic materials that occasionally produce cherty deposits.

Soils

The project area is a corridor that is aligned, parallel to, and within railroad property. Intact soils are not present or expected in this area as it has been graded and prepared for the installation of the railroad, its access, and drainage. The soils survey for the abutting terrain indicates Blount, Houcktown, Jenera, Glynwood, and Pewamo series soils; these are associated with upland till plain and homogenous conditions (USDA, SCS 2023).

Flora

There is, or at least was, great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, including the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999).

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments such as those in Wyandot and Marion County areas would contain islands of forests but were mostly expansive open terrain dominated by grasses.

The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, dissected areas along drainages and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains

(Black Swamp region) except for the occasional patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests. Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio from about Cincinnati to Bellefontaine east to the Scioto River historically contained a very diverse floral landscape. This is an area where moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forest types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands, are in regions altered by glacial activity, and are widely spaced in relation to each other. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999).

Hancock County, including the project area, is generally within what is considered to be a beech forest area (Gordon 1966) (USDA, SCS 1986:68).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e. wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone offered significant species as well. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fishes and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, whereas, the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or open-air scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, and giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

Lepper (1986) has gathered information about this time period in the region. In the central Muskingum River basin there is a dense concentration of sites centered on discrete outcrops of Upper Mercer chert and a few of these sites are exceptionally large suggesting periodic reoccupation. There are indications that the Paleoindians were unusually selective regarding the quality of their raw material, but the evidence for a lithic determined settlement system can be derived from principles of hunter-gatherer settlement systems as outlined by Binford (1978).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Bamforth 1988). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential

resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the creation of greater social and material culture complexity. The environment at this time is warmer and drier. Most elevated landforms in northeastern Ohio have yielded Archaic artifacts (Prufer and Long 1986:7), and the same can be stated for the remainder of Ohio.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

A local proliferation of the Late Archaic is regarded as the Gilbert Phase. The Gilbert Site is located on the east side of the Muskingum River and on the floodplain. This site has yielded features that have been dated from the Late Archaic period. The Gilbert point type, a form similar to Brewerton styles, was defined from deposits from this site (Carskadden 1963) and has been identified with some frequency throughout the county. This is situated to the south of the project and in a similar geological location.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). Pottery makes its first appearance during the Terminal Late Archaic.

Previous studies of Early Woodland "Adena" and Middle Woodland "Hopewell" settlement patterns in the lower Scioto Valley (Shane 1971), Hocking Valley (Black 1979), and southern Ohio in general (Fischer 1974) suggest the following: early Adena sites were located in diverse topographic settings due to seasonal movement from one primary resource zone to another. These settings included not only river bottoms, but also hilltops and small stream

valleys. A shift is seen in late Adena toward greater use of river bottoms and Hopewell sites tended to be located primarily in the bottoms of major rivers. The shift from uplands to bottomlands is thought to be a result of a shift from a generalized subsistence toward an increased dependence on a variety of bottomland resources (Carskadden and Morton 1997a; Ford 1979; Smith 1987; Wymer 1987).

Evidence from Muskingum County, where 209 sq km of hinterland have been surveyed, indicated that during all three periods (early Adena, late Adena, and Hopewell), the bottoms of the Muskingum and Licking Rivers were exploited to a much greater degree than the hinterland (Carskadden and Morton 1997a). The density of river bottom sites is 5.9 times greater than the average hinterland density for early Adena sites, more than 4.8 times for late Adena, and 6.3 times for Hopewell when looking at workshops and short-term sites. Early and late Adena sites have their greatest density along the Muskingum River, whereas the greatest density of Hopewell sites can be found along the Licking River. The dispersed nature of Adena habitation sites (hamlets) has long been recognized. Webb, for example, has observed that "individual house groups perhaps were several hundred feet apart, each group a small unit in itself, yet scores of such house groups might have been within an area of a few square miles" (Webb 1942:363).

The pattern mentioned above by Webb is apparent for the late Adena sites near Dresden and at other locations along the Muskingum River and seems to hold true for early Adena in the area. At Philo, six late Adena hamlets have been located in the river bottoms below a single ridge top burial mound. The local Hopewell settlements take on the same dispersed pattern as seen in earlier Adena. There appears to be a propensity for repeatedly selecting the exact same location, or nearly so, throughout Adena and Hopewell. Of the early Adena river bottom habitation sites, 52 percent were re-occupied in late Adena (or were continuously occupied into late Adena). A total of 34 percent of all late Adena sites in the river bottoms were occupied in Hopewell (about 50 percent long term and 50 percent short term). Twenty percent of the river bottom sites were occupied during all three periods. The site selection continuity seems to represent continuity in subsistence strategies (Carskadden and Morton 1997a).

Adena hamlets in Carskadden and Morton's (1997a) survey are more ephemeral than Hopewell hamlets; there is less in the way of diagnostic artifacts, debitage and pottery. Late Adena hamlets covered areas averaging 0.28 to 0.32 ha with scattered postholes, usually in no identifiable pattern, in the immediate vicinity of a cluster of cooking/thermal features. Although some possible storage pits and a midden were identified at one site, Duncan Falls, there is no real indication that these sites were occupied for great lengths of time (Carskadden and Morton 1997a). What is lacking in the Muskingum River Valley are large (2.0 ha) late Adena sites that are known to occur along the Hocking River by the first century A.D. There also seems to be a lack of late Adena concentrations of mounds and earthworks in the Muskingum River Valley. Radiocarbon dates suggest that very late Adena in the central Muskingum Valley was contemporaneous with very late Adena in the Hocking Valley (post A.D. 1) and yet what was going on in the Hocking Valley was very different from what was going on in the central Muskingum Valley (Carskadden and Morton 1997a).

Although Flint Ridge flint appears to have played a role in the Hopewellian trade network, it became an important source for flint during late Adena, at least locally in the Muskingum River Valley. Over 84 percent of the late Adena (Robbins Phase) projectile points found throughout the Carskadden and Morton (1997a) survey were made from Flint Ridge flint. This contrasts with only 22 percent use of Flint Ridge in early Adena and 74 percent in Hopewell (Carskadden and Morton 1997a).

It seems that most of the ridge top and small stream valley hinterland habitation sites (Adena and Hopewell) in the Muskingum River Valley have characteristics of typical bottomland hamlets, which occur in clusters, just like those in the bottoms. Again, it seems that Hopewell sites seem to occur in the general vicinity, if not exact, on the same site as a late Adena hamlet or hamlet clusters. This continuity continues all the way back into the early Adena, 65 percent of early Adena hinterland habitation sites also date to or have late Adena components, and 25 percent of the hinterland late Adena habitation sites also had either "long term" or "short term" Hopewell components. About 23 percent of all of these hinterland sites were occupied at some point during all three periods (Carskadden and Morton 1997a).

Carskadden and Morton (1997a) argue that the hinterland sites represent continuously occupied Adena-Hopewell occupations. They also suggest that towards the end of the early Adena there was a "settling in" period for local populations. Most of the groups had established themselves in the river bottoms; however, a few groups established themselves in the hinterlands and then remained there into Hopewell. There seems to be no evidence of late Adena populations from the hinterlands moving to the river valleys (Carskadden and Morton 1997a).

Middle Woodland "Hopewell"

Dispersed clusters or isolated river bottom sites of little more than an acre in extent characterize middle Woodland "Hopewell" along the central Muskingum Valley proper. Often associated with these sites are single river terrace burial mounds and in a couple cases, groups of two to four low burial mounds located on terraces or hilltops overlooking the open sites (discussed later).

Review of the *Bibliography of Muskingum County Archaeology 1795-1995* (Carskadden and Morton 1997b) indicates the location of numerous resources in Muskingum County. Many obscure resources are located in this bibliography. The Trinway Earthwork, sometimes called the Dresden Circle (33MU573) is depicted on a late nineteenth century county history (Everhart 1882). In 1805, a diary/journal reference indicated the presence of the earthworks describing it as a "circular brest-works and redoubts, rising one above the other" and located "on a side hill at Wakkatomaka." This reference is reported from a secondhand account and may refer to other earthworks other than the Trinway Earthwork (Carskadden and Morton 1997b).

According to current conventional wisdom, Adena and Hopewell are simply stages in a continuous developmental sequence, and there are sites that span the transitional period between what would be called late Adena and classic Hopewell. These sites produced projectile points

that appear intermediate between the late Adena Robbins type and the later Hopewellian corner notched forms, as well as plain surfaced pottery with characteristics of Adena Plain and McGraw Plain/Murphy Plain. What is suggested is that the corrected date of 77 A.D. from the Cox B site, associated with plain, cordmarked, as well as rocker stamped pottery, probably comes closer to dating the beginning of the Hopewellian component of the Cox site cluster, and the beginning of cordmarked pottery in central Muskingum Valley, meaning the beginning of Hopewell (Carskadden and Morton 1997a).

In spite of Squier and Davis' remark about the lack of rudimentary Hopewellian earthworks, at least three are possible in the Muskingum Valley above Marietta. Two of these (the Dresden Circle and the Lichtenau Circle) are located in the 3.2 km wide bottoms of the Upper Muskingum between Dresden and Coshocton, and the third is located in a narrower portion of the valley at Gilbert, about midway between Dresden and Zanesville. The earthwork just above Dresden, situated near the Hopewellian Cox sites, was a circle about 174 m in diameter; surrounded an area of a little less than 2.4 ha. The Lichtenau earthwork, located about four kilometers below (south) Coshocton, consisted of a circle of about the same size (Carskadden and Morton 1997a). Late Adena as well as Hopewellian habitation sites can be found in the immediate vicinity of both of these circles. Carskadden and Morton (1997a) report that the Dresden and Lichtenau earthworks were constructed by the early Hopewell.

Hopewell settlements are generally characterized as clusters of dispersed sedentary farmsteads or hamlets occurring in the general vicinity of earthwork complexes (Carskadden and Morton 1997a; Pacheco 1988; Smith 1987). Similar, if not identical patterns of Hopewell settlement can be seen along the lower Licking and in the central and upper Muskingum Valley, where a number of clusters of up to six households or hamlets, have been located. Isolated single Hopewell hamlets occur rarely where there is a limited area exposed by plowing according to Carskadden and Morton (1997a). Yet, only at Dresden and possibly Gilbert (and Lichtenau in Coshocton County) are these hamlet clusters associated with an earthwork. However, Cox B and Cox C are the only Hopewell hamlets along the Muskingum that have been tested.

These Hopewell habitation sites (open-air) are further divided into two types, which are designated as long term and/or short-term habitations. The long-term sites are characteristic of farming hamlets as outlined by Pacheco (1988) and consist of hundreds of bladelets, dozens of projectile points, and an abundance of debitage, whereas, the short-term sites are differentiated by two or three bladelets, one or two projectile points, and a very small amount of debitage. Pottery sherds and pit features are normally, but not always, characteristic of long-term sites, whereas single pit features are reminiscent of short-term habitation (Carskadden and Morton 1997a). Pacheco (1992) went on further to designate these sites as small artifact clusters. According to Pacheco (1992) these sites/clusters average .14 ha in size and have artifact densities of less than .2 per sq m, whereas, the hamlets (long term) average .45 ha and have artifact densities greater than .2 per sq m. These small artifact cluster sites as defined by Pacheco (1992) represent short duration specialized camps or activity areas (Carskadden and Morton 1997a; Pacheco 1992).

Over half (56 percent) of the "short term" sites/specialized camps/activity areas found in Carskadden and Morton's (1997a) survey occur in the bottoms of the Muskingum and Licking Rivers, more often than not in the vicinity of the hamlet clusters. The remaining 43 percent of the sites occur in the hinterlands, mostly in the valleys of stream valleys (Carskadden and Morton 1997a).

There is a third type of Hopewellian site identified, and this is the so-called ridge top workshop. These workshops are located in close proximity to flint quarries (could be up to six km away), have an abundance of debitage (particularly bladelet cores, and various blanks in different stages of reduction). These sites for the most part lack pit features. An example of this site type is located near Flint Ridge State Park at the Dodson Village. Numerous amounts of debitage were recovered yet an excavation in 1932 revealed only two cooking features and a small amount of animal bone and potsherds. A reanalysis of this site and artifacts concluded that this site "represents very short-term occupations over a long period of time by comparatively small groups of people intent upon procuring Flint Ridge Flint" (Murphy and Morton 1984:24).

On the other hand, excavation at the Murphy sites has produced just as much if not more lithic debitage as the workshops (Dancey 1991; Pacheco 1992). The Murphy sites suggest that the abundance of such debitage does not preclude a site from being a hamlet. A large amount of debitage may be the result of long duration of occupation. Sites such as those as the Murphy sites are described by Pacheco as "intense occupation by a substantial permanent population." There are ridge top Hopewell sites located in the Muskingum Valley that are distant from flint outcrops that appear to fit the definition of hamlets (Carskadden and Morton 1997a).

The early Late Woodland is assumed by Carskadden and Morton (1997a) to be a continuation of the Middle Woodland culture, but lacking the Hopewellian interaction sphere of goods and elaborate mortuary practices. This stage is represented in the central Muskingum River Valley by a number of open sites along the river including an excavated component at the Philo II site, several rockshelters in the hinterland and possibly a hinterland circular earthen enclosure. Diagnostic artifacts of this time frame include Chesser Notched points and plain rimmed, grit tempered Peters Cordmarked pottery. The angular shoulders, which distinguish Newtown-like pottery, are not found at central Muskingum River Valley sites. Limestone tempering, the characteristic of Watson Cordmarked pottery is present in a minority of sherds. All of the sherds recovered from the early Late Woodland features at Philo II are cordmarked, but nothing that could be interpreted as Peters Plain has been found. Pottery lips appear flattened and un-notched. The only radiocarbon date is from Philo II, A.D. 850 (Morton 1977). The timeframe for the early Late Woodland probably dates between 600-850 A.D. (Morton 1984).

Morton (1984) refers to the middle Late Woodland as "Intrusive Mound-like." This is a difficult cultural manifestation to identify in the central Muskingum River Valley. No burials have been identified in this region as Intrusive Mound-like, however; artifacts associated with this timeframe have been identified in the region. Artifacts associated with the middle Late Woodland are Jack's Reef, Raccoon Notched/Side Notched, and Levanna triangular points. Sites yielding Jack's Reef projectile points are believed to represent the early period of the

middle Late Woodland while the Raccoon Notched points indicate a later period within the middle Late Woodland (Morton 1984). Morton (1984) defines the timeframe for this period is most likely between A.D. 850-1100. The pottery during this timeframe is the Cole Cordmarked (?) and the Peters Cordmarked.

An "Intrusive Mound-like" site near Dresden along the Muskingum River yielded exclusively Jack's Reef Corner Notched points and Peters Cordmarked pottery from a refuse pit. The Peters Cordmarked ceramics are predominant in the early Late Woodland and characterized by a thickened or collared rim with two slight but noticeable raised rim areas with notches along the slip. It seems to Morton (1984) that this vessel is the morphological "missing link" between the plain-rimmed Peters Cordmarked and the later collared and castellated Cole-style ware.

In regard to settlement and subsistence patterns little can be inferred until further investigations within the Muskingum River Valley have been carried out. What can be said is that settlements are represented by low terrace or floodplain "hot spots," sites of generally smaller extent and thinner density than the early Late Woodland sites. Jack's Reef and Raccoon Notched points have been identified in rockshelters, but these are considerably less numerous than Chesser Notched points in such contexts (Morton 1984).

Sites belonging to the late Late Woodland or the "Cole/Baldwin-like" phase include two-rock shelters and two excavated open sites: the Locust Site along the Licking River and a site at Copeland Island along the Muskingum River. Tentative dates suggest 1100-1150 A.D. as the beginning of this phase in the central Muskingum areas, although the earliest radiocarbon dates obtained indicate A.D. 1190 from Copeland Island. These sites have yielded Levanna-like triangular points, yet Raccoon Notched points are found on these sites and believed to fall within the early phase of the late Late Woodland (Morton 1984).

The pottery is similar to that of the Baldwin phase pottery and radiocarbon dated to A. D. 1230. Similarities can also be seen in central Ohio, such as the Cole, Decco, and Ufferman sites. What all the pottery of the Muskingum River Valley has in common is a high proportion of cordmarking, grit tempering, and collared and castellated rims with flange/lugs. What seems to be absent or rare are punctuates, strap handles, incised designs, and shell tempering-in short all of the pottery diagnostic of Fort Ancient. A few sherds in the Muskingum Valley have incising of the parallel oblique kind on the neck of the vessel or in one vessel on the collar (Morton 1984).

Intra-site patterning of the late Late Woodland sites consists of a sparse "linear scatter" or diffuse series of "hot spots" along the floodplain, very much like the patterning of earlier sites. What this seems to suggest is periodic reoccupation over an extended span of time rather than intensive occupation over a relatively short span of time. The Fort Ancient style circular nucleated village layout seen in the later Philo Phase or in the Baum Phase of the Scioto Valley seems to be lacking at these late Late Woodland sites. Present at these sites are deep refuse/storage pits, often containing bone and shell refuse. This suggests some degree of intensity of the occupation at these sites (Morton 1984).

Late Prehistoric

The early Late Prehistoric or the Philo Phase is characterized by nucleated, circular, central plaza-type villages occupied year-round, large scale river bottom maize agriculture, smooth shell tempered Philo Punctate pottery, rich and diversified bone and antler industries, and ossuary-style mass burials (Carskadden and Morton 1977). Projectile points of this time period are the Madison point and the Fort Ancient style points. Radiocarbon dates suggest a beginning of this phase in the Muskingum Valley from A.D. 1230 to A.D. 1320. Radiocarbon dates have suggested something interesting concerning the Cole/Baldwin-like phase. It seems that the Cole/Baldwin-like phase persisted as much as a generation after the appearance of the Philo phases, at least in certain portions of the Muskingum Valley (e.g. Locust Site, Eddy Paul Rockshelter). Several Cole Cordmarked vessels have been recovered from the Philo phase Richards site (A.D. 1260 to A.D. 1290) [Morton 1984].

The late Late Prehistoric or the Riker Phase manifests itself in the form of Wellsburg Simple Stamped and Tuttle Hill Notched pottery. One site, in Muskingum County near Dresden, has a radiocarbon date A.D. 1350 (30 years after the latest Philo phase), and may represent the earliest influx of Riker phase traits into the central Muskingum area, possibly from northeast Ohio. The only other manifestation of this phase in the Muskingum Valley is from a mound to the West of Zanesville, which yielded Tuttle Hill Notched ceramics (Morton 1984).

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and. the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as 'Lower Shawnee 2' existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of

Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River, but settlers were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region. The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio.

These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural

corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Washington Township History

Washington Township, named after President George Washington, organized in 1832. Washington Township is located in the northeast corner of Hancock north of Big Lick Township, east of Cass Township, south of Wood County, and west of Seneca County. The Portage River, the east and middle branch of the Portage River, and several unnamed tributaries flow through the township. Lake Lamberjack, Veterans Memorial Reservoir, Fostoria Reservoir, and Mosier Lake are in the northeast corner of the township. Highways 613, 18, and 12 run through the township. The Norfolk & Western and the Baltimore and Ohio Railroads run through the township. The township is mostly hilly woodland and farmland (Beardsley 1881).

John Gersuch of Wayne County, Ohio made the first land purchase in the township in December 1830 and moved to the township in April 1831. Land purchases in 1831 included James Connelly, John Norris, Richard Cole, and Thomas Kelley. The first schoolhouse in the township was built in about 1833 with Isaac Wiseman as the teacher on James Wiseman's farm. By the 1880s the township had nine schools. The Lake Erie & Western Railroad that ran northeast to southwest and the Continental Road, later the New York, Chicago, & St. Louis Railway that ran east and west in the township crossed at Arcadia. By the 1880s the township had a population of over 2,000. Methodists built the first church in 1832. Other churches in the township included Evangelical Lutheran, Presbyterian, German Reformed, German Baptist, and United Brethren (Beardsley 1881).

John Gorsuch platted Risdon, named for Daniel Risdon, in 1832. The town post office was established in 1837 with Alvin Coles as postmaster. The town merged with Rome in Seneca County to form Fostoria, named for Charles W. Foster, in 1855. Most of Fostoria sits in Seneca

County. The town was the home of College of the United Brethren (Beardsley 1881; Brown 1886).

David Peters and Ambrose Peters platted Arcadia in July 1855 where soon the of the Lake Erie & Western Railroad and the New York, Chicago, & St. Louis Railway would cross. The Lake and Western Railroad came to the town in 1859 and then the New York, Chicago, and St. Louis Railroad crossed the town in 1881. The Toledo, Fostoria, & Findlay Electric Line ran from Findlay to Fostoria paralleling the Lake Erie & Western. David Peters opened the first store. In about 1859, Samuel Blackford built a steam powered grist mill in the town. In 1859, Arcadia incorporated and gained a post office with A.W. Fredrick as postmaster. Industry in the town included handle factories, a broom factory, a pump factory, a saw and planing mill, a concrete factory, and more. By the 1880s the town had a population of about 500. Churches in the town included Methodist, Presbyterian, and Lutheran. Societies in the town included an Odd Fellows, Knights of Pythias, Rathburn Sisters, Maccabes, Lions, and Modern Woodsmen lodges (Beardsley 1881; Brown 1886).

Research Design

The purpose of a Phase I survey is to locate and identify cultural resources that will be affected by the planned generation tie. This includes archaeological deposits as well as architectural properties that are older than 50 years. Once these resources are identified and sampled, they are evaluated for their eligibility or potential eligibility to the NRHP. These investigations are directed to answer or address the following questions:

1) Did the literature review reveal anything that suggests the project area has been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

Archaeological Field Methods

Phase I surveys that are conducted in Ohio typically involve any one or combination of four methods. These included shovel test unit excavation, shovel probes, surface collection, and visual inspection. These methods are described in greater detail in the following text.

Shovel test unit excavation. Shovel test units can be excavated in locations where surface visibility was insufficient for surface collection and not severely disturbed. This can include fallow conditions, manicured lawn, corn stubble fields, and possibly soybean stubble fields. If necessary, these units are spaced at about 15 m intervals (50') and generally located on the centerline of the project corridor. Units are manually excavated until they extend 5 cm into the subsoil. Individual shovel test units would be documented regarding their depth, content, and color (Munsell). Wherever sites were encountered, Munsell color readings were taken per shovel test unit. All of the undisturbed soil matrices from shovel test units were screened through .6 cm hardware mesh. Additional

or radial shovel test units will be excavated in areas where cultural remains are identified. These would be placed at 7.5 m intervals and within the project corridor, if intact locations are encountered.

Shovel Probe. This method would be used to delineate areas of disturbance. A shovel test probe measured 30 cm square and was excavated in areas where surface visibility is lacking, but disturbance is not evident on the surface. If natural soils are identified, the probe would be expanded and sampled like a shovel test unit.

Surface Collection. This method would be used in situations where bare ground visibility was sufficient for sampling. This can include any tilled fields, occasional soybean stubble or mature soybean situations, and standing corn. Situations where repeated no-till agriculture is practiced typically precludes the opportunity to conduct surface collection methods. It is typically necessary for conditions to offer a minimum of 50 percent bare ground visibility. Pedestrian transects would be spaced at 5 m intervals. Artifact locations would be plotted using a Trimble GeoXT global positioning system.

Visual inspection. Locations where cultural resources were not expected, such as disturbed areas, steeply sloped areas, and low/wet areas were walked over and visually inspected. This method was used to verify the absence or likelihood of any cultural resources being located in these areas. This method was also utilized to document the general terrain and the surrounding area.

The application of the resulting field survey methods was documented in field notes, field maps, and permit maps.

Curation

There were no cultural remains identified during these investigations. The field notes and maps for this project will be maintained in Weller's files.

Architectural Field Methods

This survey was conducted following the guidelines established in Archeology and Preservation: Secretary of the Interior's Standards and Guidelines (National Park Service 1983) and Guidelines for Local Surveys: A Basis for Preservation Planning. National Register Bulletin No. 24 (National Park Service 1997), and *Guidelines for Conducting History/Architecture Surveys in Ohio* (Ohio SHPO, 2014). When properties are identified, they are subjected to the guidelines outlined in National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation (National Park Service 1996).

There are four criteria for eligibility to be listed in the National Register of Historic Places (NRHP). Only one of these criteria must be met to be considered eligible for listing; however, oftentimes more than one of the criteria is met. The criteria for significance include:

A. Association with historic events or patterns of events;
B. Association with persons important to our past;
C. Exceptional or important architectural characteristics; and/or
D. Data potential.

Architectural properties typically qualify under Criteria A, B, or C. Criterion D is typically reserved for archaeological sites.

In addition to meeting at least one of the established criteria, the appropriate integrity must also be retained by the resource. There must be integrity of location, design, workmanship, setting, materials, feeling, and association.

Prior to commencing fieldwork, a literature review was conducted to determine if any previously recorded architectural properties, NRHP properties, or Ohio Genealogical Society cemeteries were present within the project survey area. Historic maps were also reviewed to aid in guiding the fieldwork and detecting the possible presence of significant within the survey area. Background research was also conducted in order to establish a historic context of the region. The context was compiled by utilizing materials from the SHPO, archival materials at the respective county courthouses, local libraries, and several online resources. The establishment of the historic context helped to guide the interpretation of the field survey results.

The approach to the field survey accounted for the decrease in effects to historic properties as the distance from the project area increased. The survey included a systematic assessment to identify all resources 50 years of age or older within 305 m (1,000 ft) of the project area. In addition to this systematic assessment, the survey extended to resources located beyond 305 m (1,000 ft) that exhibited potential eligibility for inclusion in the NRHP. Some areas within the 305 m (1,000 ft) will be blocked from having a direct line-of-sight to the proposed project by topography and forested areas. Some areas within the 305 m (1,000 ft) may have been recently surveyed and the current survey may not include these areas. The areas that did not have a direct line-of-sight to the project were visually verified in the field and the survey did not include all of these areas. The approach was to identify those properties with NRHP potential, followed by a more intensive documentation and evaluation of those potentially eligible aboveground resources. The comprehensive survey involved recording of each property with potential historic significance to a baseline level of documentation.

Weller focused on the ground plan, the height, and the roof configuration of each structure, noting all visible materials, appendages, extensions, or other alterations. Housing types and structural details within the report and utilized on Ohio Historic Inventory (OHI) forms follow accepted professional terminology and that used by architectural historians McAlester (2013), and Gordon (1992). Weller then supplemented the field survey data with an examination of available tax records, aerial photographs, and cartographic sources.

Definitions

Within this report, an *architectural resource* is defined as aboveground buildings or structures that are 50 years of age or older. A *historic property* is defined as a building, structure, object, or site that is listed in, or considered eligible for listing in, the NRHP. An *effect* is defined as an activity associated with the project that alters a characteristic of a historic property that qualified it for inclusion in the NRHP.

Literature Review

The literature review study area is defined as a 305 m (1,000 ft) radius from the boundary of the project area. In conducting the literature review, the following resources were consulted at OHPO or the State Library of Ohio:

1) *An Archeological Atlas of Ohio* (Mills 1914);
2) OHPO United States Geological Survey (USGS) 7.5' series topographic maps;
3) Ohio Archaeological Inventory (OAI) files;
4) Ohio Historic Inventory (OHI) files;
5) National Register of Historic Places (NRHP) and Determinations of Eligibility files;
6) OHPO CRM/contract archaeology files; and
7) OHPO consensus determination of eligibility files; and
8) Hancock County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s);
9) Genealogical and cemetery resources.

A review of *An Archeological Atlas of Ohio* (Mills 1914) was conducted. There are no mounds indicated in the study area.

A review of the OHPO topographic maps indicated that there are no sites within or immediately adjacent to the project corridor (Figures 2 and 3).

A review of the Ohio Historic Inventory (OHI) files found the Norfolk Southern Railroad, HAN0066705, in the study area.

A review of the NRHP and DOE files did not find any historic properties listed or eligible for listing in the National Register of Historic Places.

No OGS cemeteries were identified in the study area.

There have been two prior CRM or professional surveys conducted that partially intercept the project area (Figures 2-3). The surveys were completed for a 345kV station fence replacement in Washington Township, Hancock County, Ohio (Weller 2017) and the 404.7 ha

(1,000 ac) South Branch Solar Project in Washington Township, Hancock County, Ohio (Weller 2021).

Cartographic/atlas resources were reviewed for the project. The project corridor is located in the same location as the L. E. & L. Railroad tracks in the latter part of the nineteenth century (Hardesty 1875) and through the early twentieth century (Figure 4). This railroad continued in perpetuity into the modern and current era and was increased at some point to being a dual track (Figure 2). Review of aerial images indicates that the project corridor is contained within the railroad's property, an existing substation, and minimal farmland that is within previously investigated areas (Figure 3).

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project area has been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

This project area is a corridor that is limited to existing railroad property and previously investigated locations. The literature review does not indicate any significant archaeological resources in association with this project. Given these conditions, archaeological field reconnaissance was not considered to be necessary.

Archaeological Survey Results

The archaeological investigations for this project were limited as it relates to the type of project, its location, and its inherent limitations. The entire project corridor is contained in disturbed contexts or areas that have been recently previously investigated. The limits of disturbance for the generation tie line installation are mostly contained within an existing railroad property. Due to the severely disturbed conditions and limitations of this project area, no additional archaeological work was deemed necessary beyond a literature review and map/cartographic resource inspection.

Architectural Survey Results

Fieldwork confirmed that the project is located along a railroad in farmland setting. Building types and styles are consistent with patterns of settlement in the area and are mostly single-family residences and barns dating from the late-19th century to 1970. Stylistically, the buildings are vernacular (exhibiting no formal academic style) but a large number of them are of the mid-century Modern Movement.

The field survey identified a total of 35 architectural resources 50 years of age or older within the APE (Figures 5-59; Table 1). One OHI, HAN0066705, was also found in the study area and is the Norfolk Southern Railroad (Figures 6-8, 33, Table 1, Appendix). Fieldwork confirmed that there are no historic properties located within the project area.

None of the resources in the APE were found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The buildings are typical of others in the area and throughout Ohio, are not the works of a master, and do not exhibit distinctive character-defining features; therefore, the resources are not eligible for inclusion in the NRHP under Criterion C.

Table 1. Architectural Field Survey Results

Resource	County	Figure #	Location	Date	Style	Type	NRHP Status
S-1	Hancock	5-6, 24	22116 TR-218, Fostoria	1970	Vernacular	Commercial	Not Eligible
S-2	Hancock	6, 25	21998 SR-12, Fostoria	1955	Modern Movements	Minimal Traditional	Not Eligible
S-3	Hancock	5-7, 26	21770 TR-218, Fostoria	1913	Vernacular	Front-Gable	Not Eligible
S-4	Hancock	6-7, 27	2011 TR-261, Fostoria	c. 1960	Vernacular	Ranch	Not Eligible
S-5	Hancock	6-7, 28	2031 TR-261, Fostoria	1959	Vernacular	Ranch	Not Eligible
S-6	Hancock	6-7, 29	2049 TR-261, Fostoria	1960	Vernacular	Ranch	Not Eligible
S-7	Hancock	6-7, 30	21797 TR-218, Fostoria	1954	Vernacular	Ranch	Not Eligible
S-8	Hancock	6-7, 31	21813 TR-218, Fostoria	1954	Modern Movements	Minimal Traditional	Not Eligible
S-9	Hancock	6-7, 32	21825 TR-218, Fostoria	1956	Modern Movements	Minimal Traditional	Not Eligible
HAN0066705	Hancock	6-8, 33	Norfolk Southern RR, TR-261	c. 1853		Railroad	Not Eligible
S-10	Hancock	8, 34	21727 SR-12, Fostoria	c. 1880	Vernacular	Front-Gable	Not Eligible
S-11	Hancock	8, 35	21727 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-12	Hancock	10, 36	21356 SR-12, Fostoria	c. 1860	Italianate	Hipped	Not Eligible
S-13	Hancock	10, 37	21282 SR-12, Fostoria	1952	Modern Movements	Ranch	Not Eligible
S-14	Hancock	10, 38	21254 SR-12, Fostoria	1954	Modern Movements	Ranch	Not Eligible
S-15	Hancock	10, 39	21283 SR-12, Fostoria	1953	Modern Movements	Minimal Traditional	Not Eligible
S-16	Hancock	10, 40	21283 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-17	Hancock	12, 41	510001015809	1884	Vernacular	Schoolhouse	Not Eligible
S-18	Hancock	12, 42	20819 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-19	Hancock	12, 43	20819 SR-12, Fostoria	1929	Modern Movements	Craftsman, Massed-Plan	Not Eligible
S-20	Hancock	12-13, 44	20702 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-21	Hancock	12-14, 45	20702 SR-12, Fostoria	c. 1880	Vernacular	Gabled-Ell	Not Eligible
S-22	Hancock	14, 46	20521 SR-12, Fostoria	1964	Modern Movements	Minimal Traditional	Not Eligible
S-23	Hancock	14, 47	3054 CR-257, Fostoria	1952	Modern Movements	Minimal Traditional	Not Eligible
S-24	Hancock	14, 48	3020 CR-257, Fostoria	1953	Modern Movements	Ranch	Not Eligible
S-25	Hancock	14, 49	20426 CR-109, Fostoria	1964	Modern Movements	Ranch	Not Eligible
S-26	Hancock	14, 50	20346 CR-109, Fostoria	1956	Modern Movements	Minimal Traditional	Not Eligible
S-27	Hancock	14, 51	20392 CR-109, Fostoria	1963	Modern Movements	Ranch	Not Eligible

Table 1. Architectural Field Survey Results							
Resource	**County**	**Figure #**	**Location**	**Date**	**Style**	**Type**	**NRHP Status**
S-28	Hancock	14-15, 52	20251 CR-109, Fostoria	1951	Vernacular	Side-Gable	Not Eligible
S-29	Hancock	15, 53	20018 CR-109, Fostoria	1969	Modern Movements	Ranch	Not Eligible
S-30	Hancock	14, 16, 54	20270 SR-12, Fostoria	1958	Vernacular	Irregular	Not Eligible
S-31	Hancock	16, 55	20227 SR-12, Fostoria	1956	Modern Movements	Ranch	Not Eligible
S-32	Hancock	16, 56	20209 SR-12, Fostoria	c. 1880	Vernacular	Cross-Gable	Not Eligible
S-33	Hancock	16, 57	20209 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible
S-34	Hancock	16, 58	20126 SR-12, Fostoria	c. 1880	Vernacular	Front-Gable	Not Eligible
S-35	Hancock	16, 59	20126 SR-12, Fostoria	c. 1900	Vernacular	Barn	Not Eligible

APE Definition and NRHP Determination

The APE is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. Archaeological investigations are typically limited to the footprint of the construction activity and a very limited area around it if deemed appropriate and depending upon the type of construction. The architectural APE is considerate of the project limits of disturbance as well as its surrounding with parameters that are dependent upon the project type and its setting. Per OPSB regulations, a 305 m (1,000 ft) wide area extending from the project corridor was considered. The project involves the installation of a generation tie line that is 3.9 km (2.4mi) long and it is primarily contained within a railroad property. The archaeological APE for this project pertains to the footprint of the project area, the limits of disturbance.

There were no archaeological sites identified, and the area is fully disturbed or previously investigated. The architectural APE for this project is considered to be what is in view of the generation tie line within a 305 m (1,000 ft) survey area but extending to areas containing significant/potentially eligible resources within view of the project area.

Recommendations

In April 2023, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for the 3.9 km (2.4 mi) Alternate Route 138kV Generation Tie in Washington Township, Hancock County, Ohio. The archaeological component of this project was very limited to a desktop and soils review; the entire corridor is contained in a disturbed or previously investigated context; no archaeological resources were identified. There are no significant architectural resources involved in this project. It is Weller's opinion that the planned project will have 'no effect' to any historic properties or landmarks. No further cultural resource management work is deemed necessary for this project.

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Figures

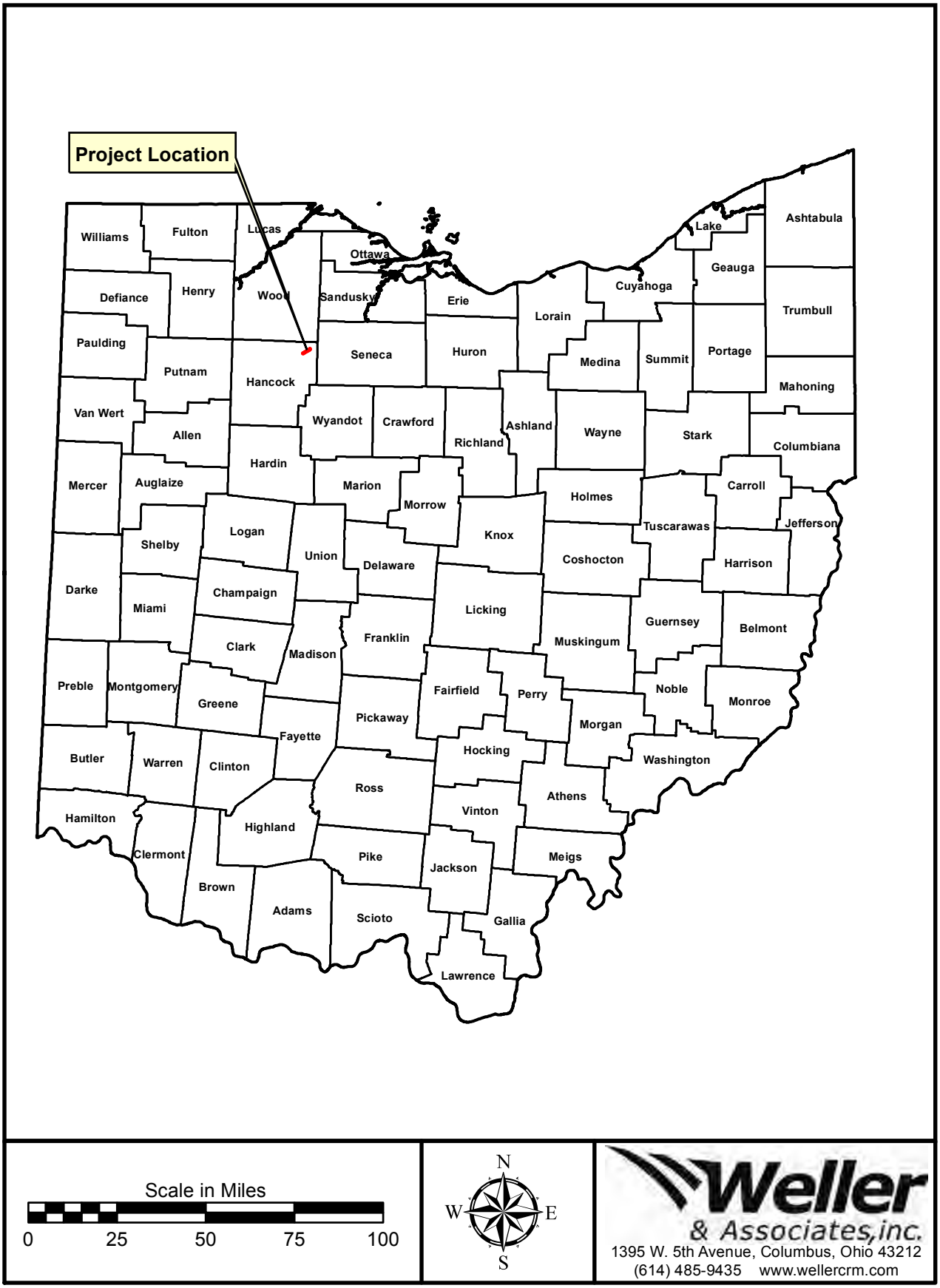


Figure 1. Political map of Ohio showing the approximate location of the project.

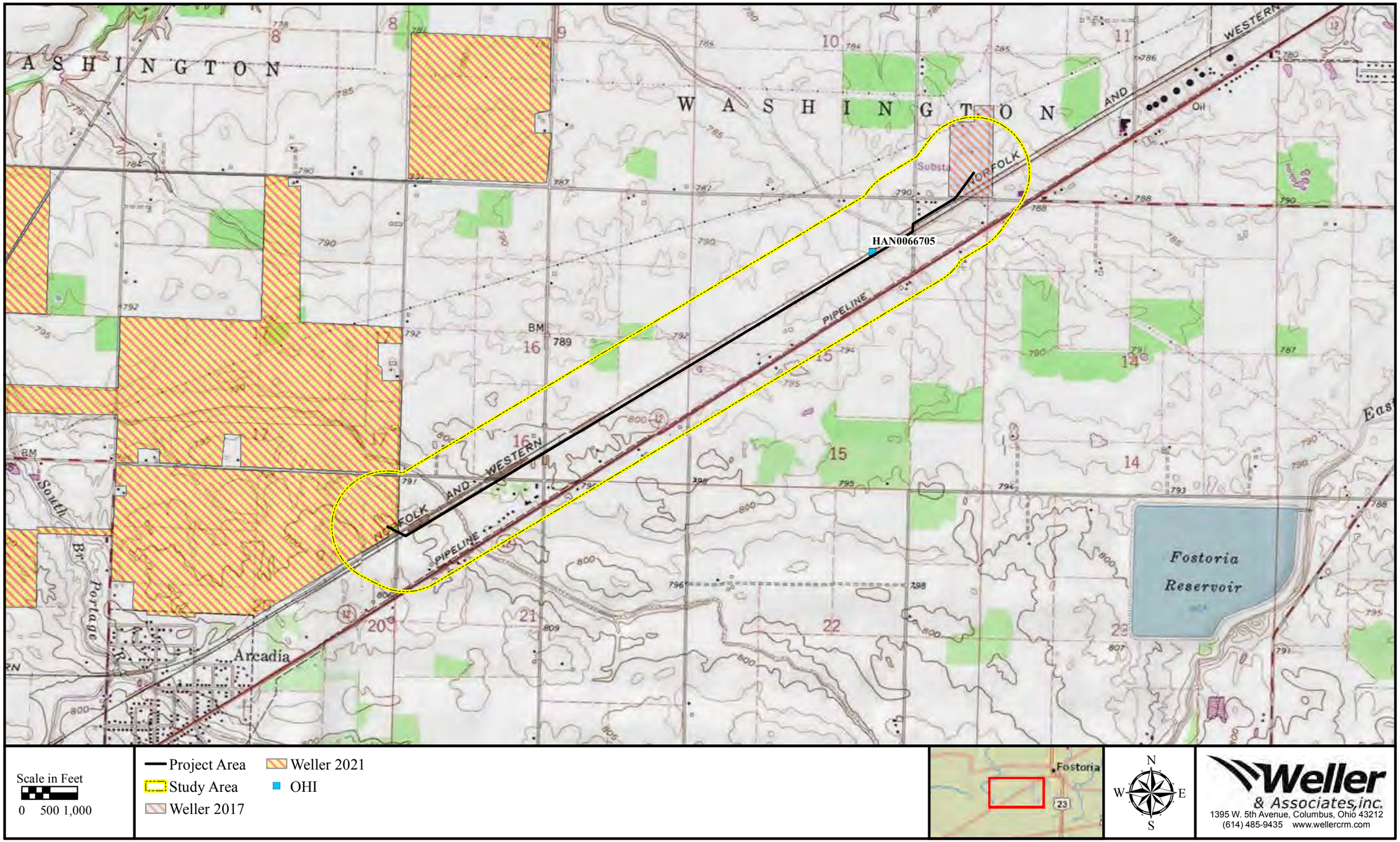


Figure 2. Portions of the USGS *1973 Fostoria, and 1973 Alvada, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and previously recorded resources in the study area.

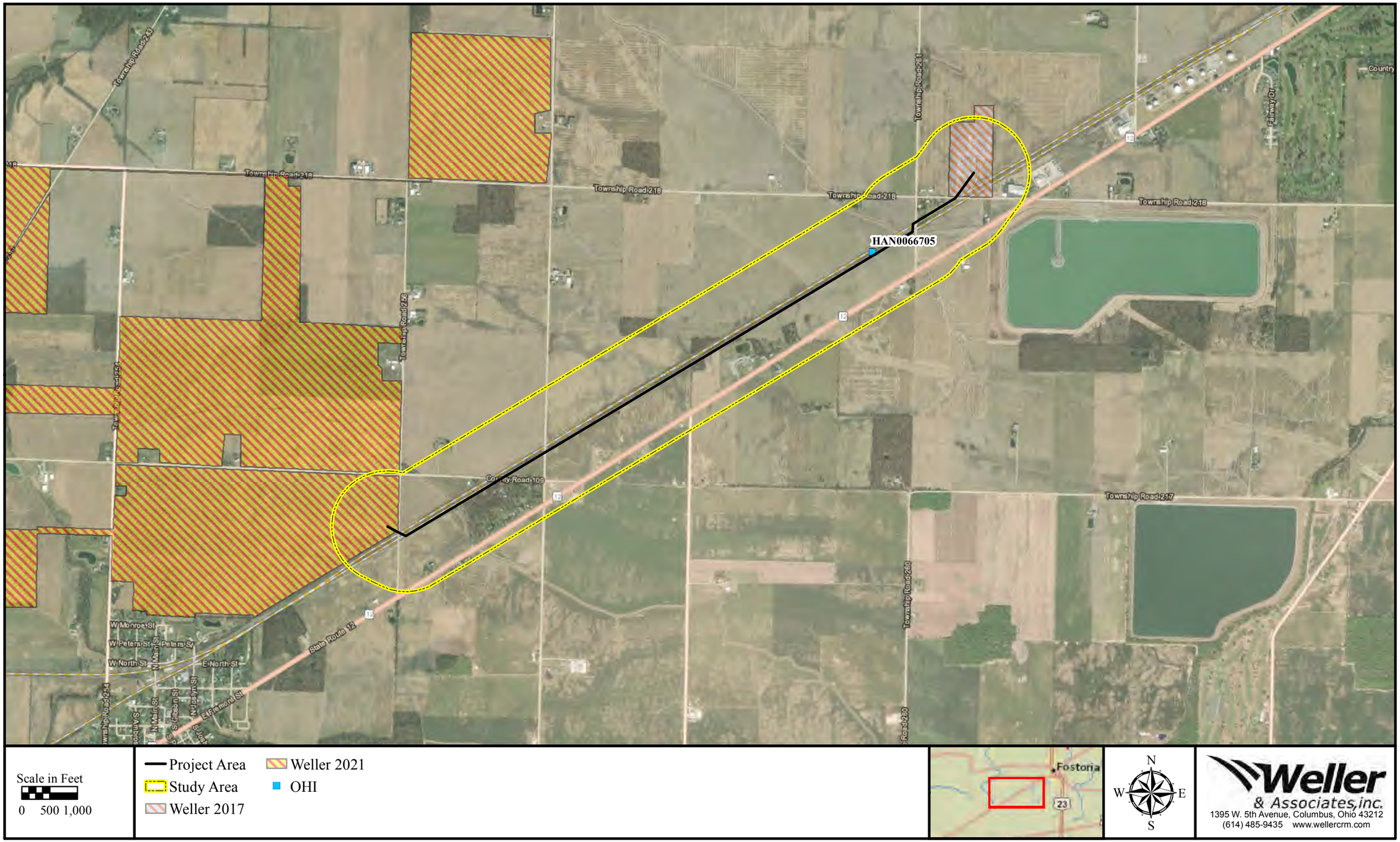


Figure 3. Aerial map indicating the location of the project area and recorded resources within the study area.

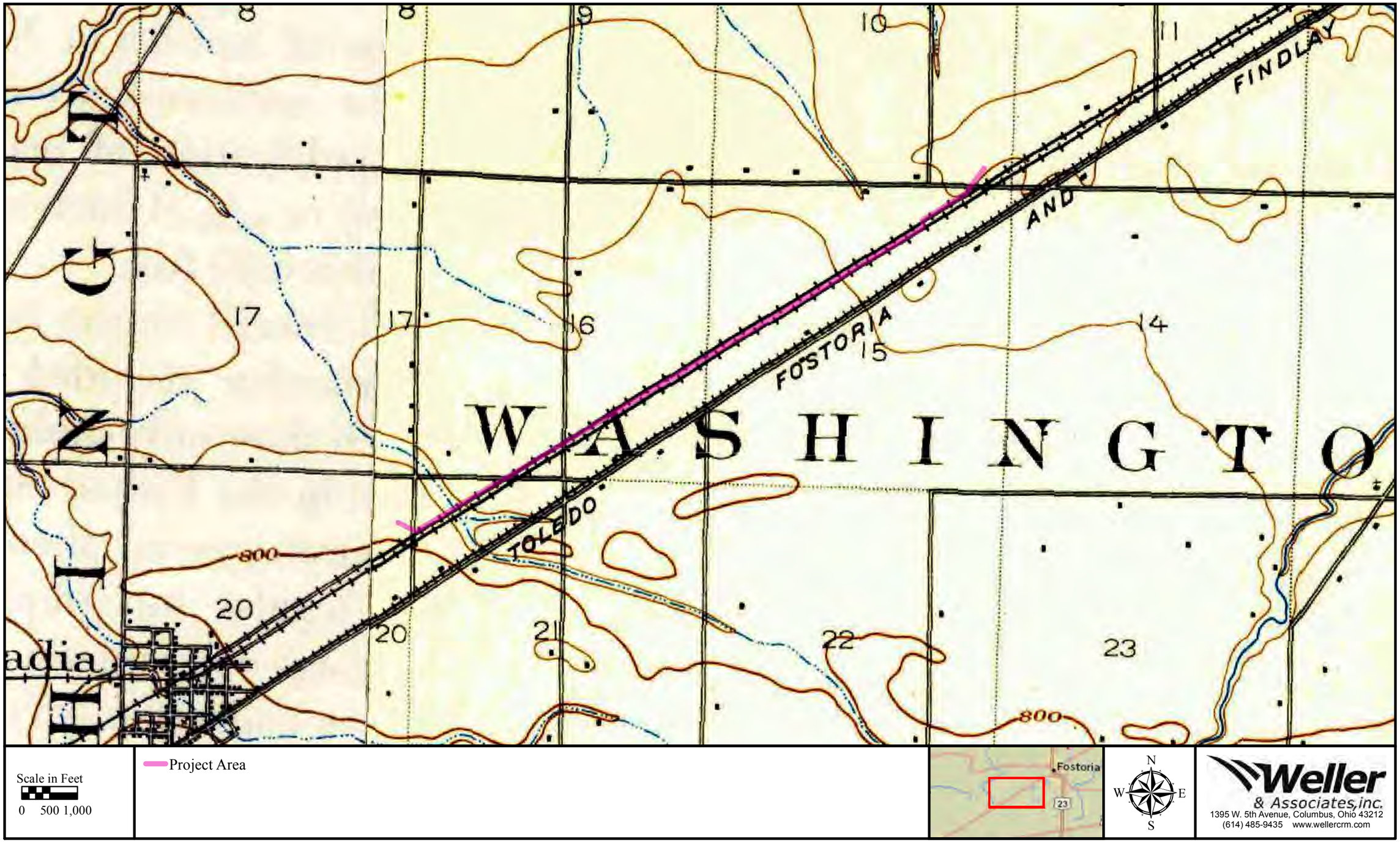


Figure 4. Portions of the USGS *1901 Fostoria, and 1903 Findlay, Ohio 15 Minute Series (Topographic)* maps indicating the approximate location of the project.

Figure 5. Architectural fieldwork results and photo orientation map.

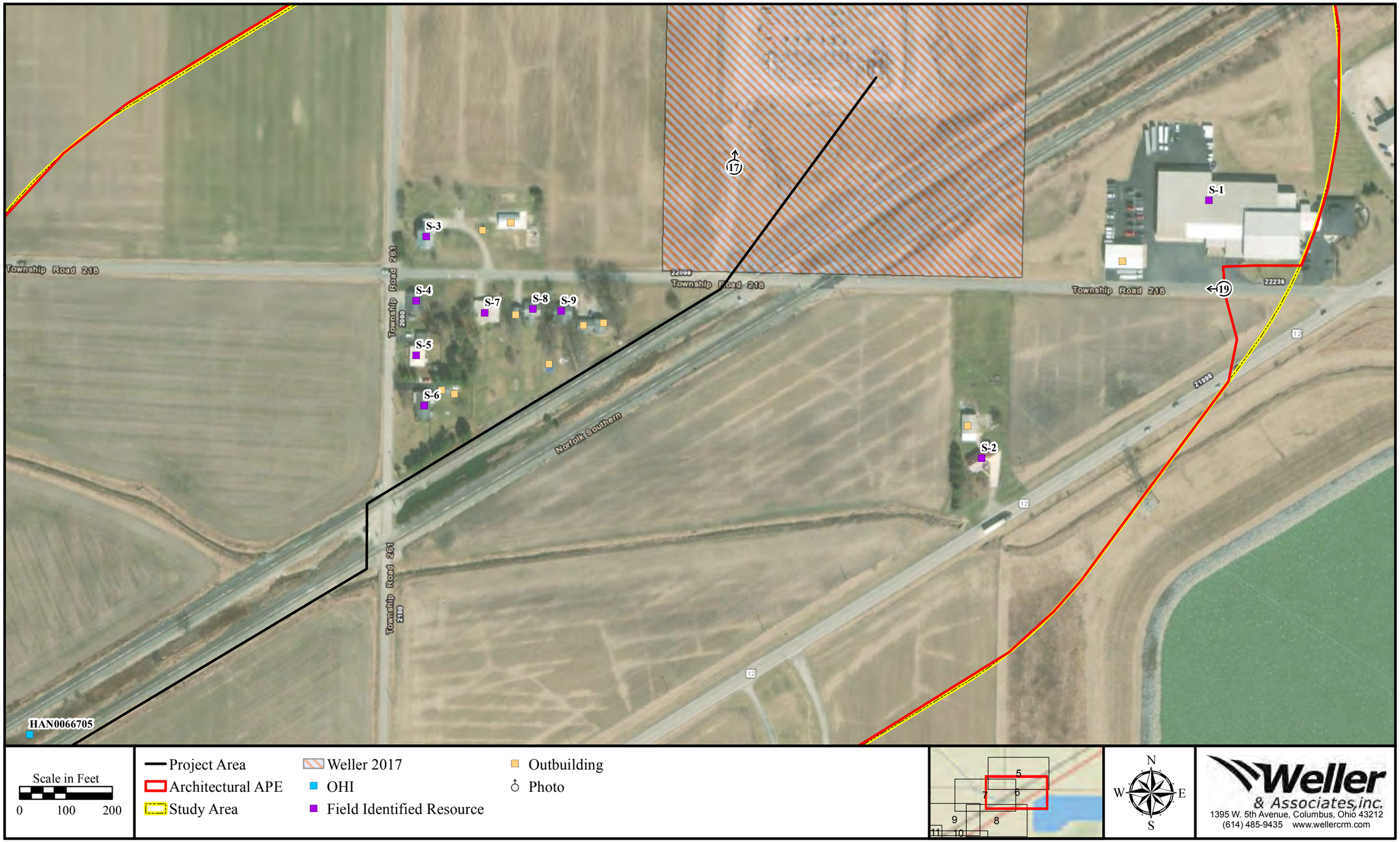


Figure 6. Architectural fieldwork results and photo orientation map.

Figure 7. Architectural fieldwork results and photo orientation map.

Figure 8. Architectural fieldwork results and photo orientation map.

Figure 9. Architectural fieldwork results and photo orientation map.

Figure 10. Architectural fieldwork results and photo orientation map.

Figure 11. Architectural fieldwork results and photo orientation map.

Figure 12. Architectural fieldwork results and photo orientation map.

Figure 13. Architectural fieldwork results and photo orientation map.

Figure 14. Architectural fieldwork results and photo orientation map.

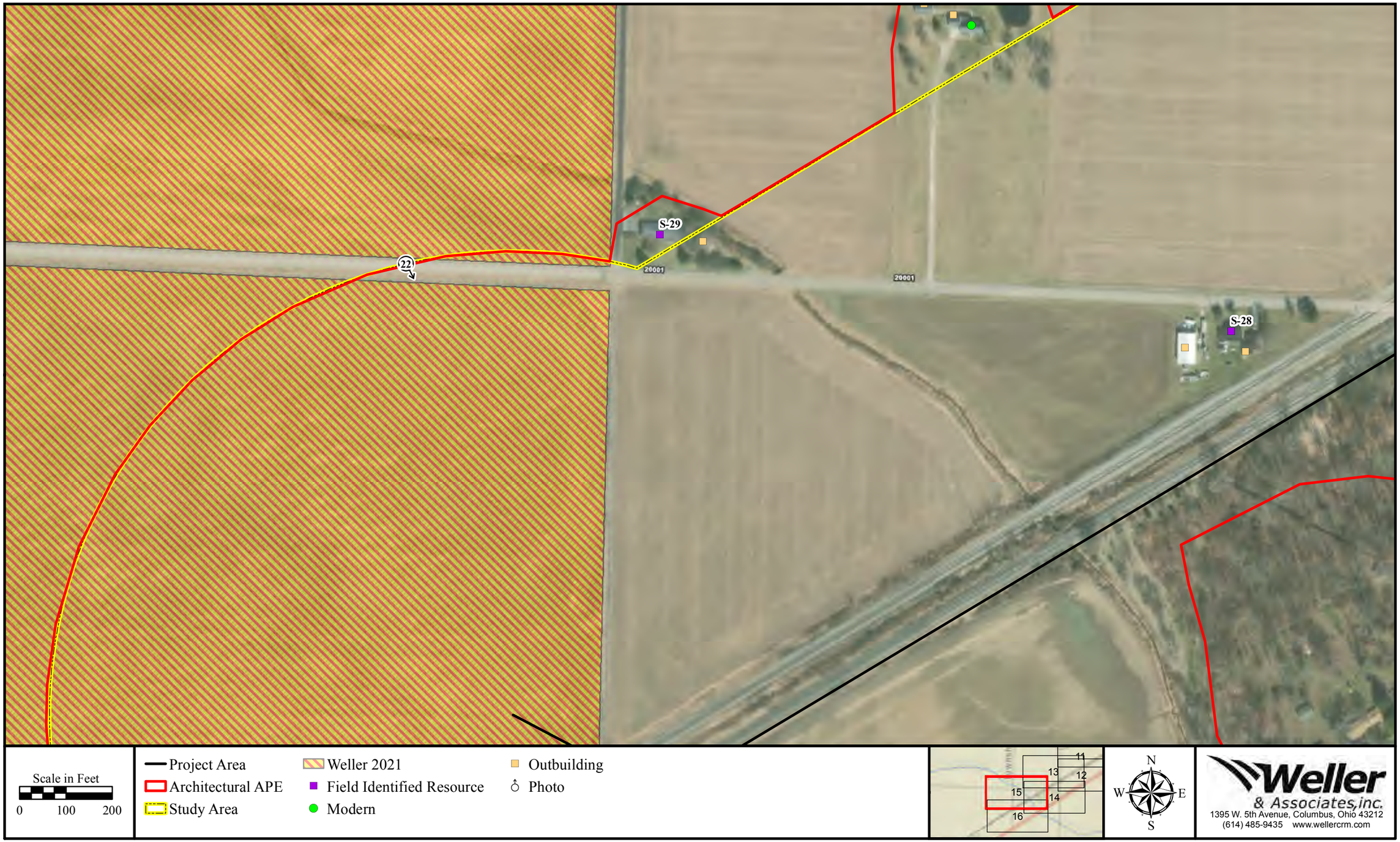


Figure 15. Architectural fieldwork results and photo orientation map.

Figure 16. Architectural fieldwork results and photo orientation map.

Figure 17. North view of the Northern terminus of the Project Area approximately 300ft north of TR-218, Fostoria, Ohio.

Figure 18. Southeast view toward the Project Area from the Architectural APE boundary at TR-261, Fostoria, Ohio.

Figure 19. West view toward the Project Area from the Architectural APE boundary at TR-261, Fostoria, Ohio.

Figure 20. South view toward the Project Area from the Architectural APE boundary at CR-257, Fostoria, Ohio.

Figure 21. West view toward the Project Area from the Architectural APE boundary at CR-109, Fostoria, Ohio.

Figure 22. Southeast view toward the Project Area from the Architectural APE boundary at CR-109, Fostoria, Ohio.

Figure 23. Northwest view of the southern terminus the Project Area approximately 300ft north of OH-12, Fostoria, Ohio.

Figure 24. North view of S-1 from OH-12, Fostoria, Ohio.

Figure 25. Northeast view of S-2 from OH-12, Fostoria, Ohio.

Figure 26. Northeast view of S-3 from TR-218, Fostoria, Ohio.

Figure 27. Southeast view of S-4 from the intersection of TR-218 and TR-261, Fostoria, Ohio.

Figure 28. Southeast view of S-5 from TR-261, Fostoria, Ohio.

Figure 29. Southeast view of S-6 from TR-261, Fostoria, Ohio.

Figure 30. Southwest view of S-7 from TR-218, Fostoria, Ohio.

Figure 31. Southwest view of S-8 from TR-218, Fostoria, Ohio.

Figure 32. Southwest view of S-9 from TR-218, Fostoria, Ohio.

Figure 33. Southwest view of HAN0066705 from TR-261, Fostoria, Ohio.

Figure 34. Southwest view of S-10 from OH-12, Fostoria, Ohio.

Figure 35. Southwest view of S-11 from OH-12, Fostoria, Ohio.

Figure 36. Northeast view of S-12 from OH-12, Fostoria, Ohio.

Figure 37. Northeast view of S-13 from OH-12, Fostoria, Ohio.

Figure 38. Northeast view of S-14 from OH-12, Fostoria, Ohio.

Figure 39. Southwest view of S-15 from OH-12, Fostoria, Ohio.

Figure 40. Southwest view of S-16 from OH-12, Fostoria, Ohio.

Figure 41. Southwest view of S-17 from OH-12, Fostoria, Ohio.

Figure 42. Southwest view of S-18 from OH-12, Fostoria, Ohio.

Figure 43. Southwest view of S-19 from OH-12, Fostoria, Ohio.

Figure 44. Northeast view of S-20 from OH-12, Fostoria, Ohio.

Figure 45. Northeast view of S-21 from OH-12, Fostoria, Ohio.

Figure 46. Southwest view of S-22 from OH-109, Fostoria, Ohio.

Figure 47. Northwest view of S-23 from CR-257, Fostoria, Ohio.

Figure 48. Southwest view of S-24 from CR-109, Fostoria, Ohio.

Figure 49. Southwest view of S-25 from CR-109, Fostoria, Ohio.

Figure 50. Southwest view of S-26 from CR-109, Fostoria, Ohio.

Figure 51. Southwest view of S-27 from CR-109, Fostoria, Ohio.

Figure 52. Southwest view of S-28 from CR-109, Fostoria, Ohio.

Figure 53. Northwest view of S-29 from CR-109, Fostoria, Ohio.

Figure 54. Northeast view of S-30 from OH-12, Fostoria, Ohio.

Figure 55. Southwest view of S-31 from OH-12, Fostoria, Ohio.

Figure 56. Southwest view of S-32 from OH-12, Fostoria, Ohio.

Figure 57. Southwest view of S-33 from OH-12, Fostoria, Ohio.

Figure 58. Northwest view of S-34 from OH-12, Fostoria, Ohio.

Figure 59. North view of S-35 from OH-12, Fostoria, Ohio.

Appendix:

Previously Recorded Resources

Ohio Historic Preservation Office

800 E. 17th Avenue
Columbus, OH 43211
614/298-2000

OHIO HISTORIC INVENTORY

Section 106/RPR Review: **Reviewed** RPR Number: **1056973**

1. No. HAN0066705 **NEW**

4. Present Name(s): **Norfolk Southern RR, TR 261**

2. County: **Hancock**

5. Historic or Other Name(s): **Fremont & Indiana RR**

6. Specific Address or Location:
no address, TR 261

6a. Lot, Section or VMD Number:

7. City or Village:
Fostoria

9. U.T.M. Reference
Quadrangle Name: Fostoria

Zone: 17 Easting: 292905 Northing: 4556386

10. Classification: Structure

11. On National Register? NO

13. Part of Established Hist. Dist? NO

15. Other Designation (NR or Local)

16. Thematic Associations:
New York Central

17. Date(s) or Period:
ca. 1853-present

17b. Alteration Date(s):

18. Style Class and Design:
None No academic style - Vernacular

18a. Style of Addition or Elements(s):

19. Architect or Engineer:

19a. Design Sources: Fremont and Indiana Railroad

20. Contractor or Builder:

21. Building Type or Plan: Other Commercial

22. Original Use, if apparent:
Rail Related

23. Present Use:
Rail Related

24. Ownership: Private

25. Owner's Name & Address, if known:
NORFOLK SOUTHERN
3 Commercial Place
Norfolk, VA 23510

26. Property Acreage: 0.1

27. Other Surveys:

28. No. of Stories: Unknown

29. Basement? No

30. Foundation Material: Unknown

31. Wall Construction:
Unknown
Unknown

32. Roof Type:
Unknown
Roof Material:
Unknown

33. No. of Bays: 0 Side Bays: 0

34. Exterior Wall Material(s):
Unknown

35. Plan Shape: Unknown

36. Changes associated with 17/17b Dates:
17. Original/Most significant construction

17b.

37. Window Type(s):
Unknown

38. Building Dimensions:

39. Endangered? NO
By What?

40. Chimney Placement: Unknown

41. Distance from & Frontage on Road:

51. Condition of Property: Good/Fair

52. Historic Outbuildings & Dependencies
Structure Type(s):

Date(s):

Associated Activity:

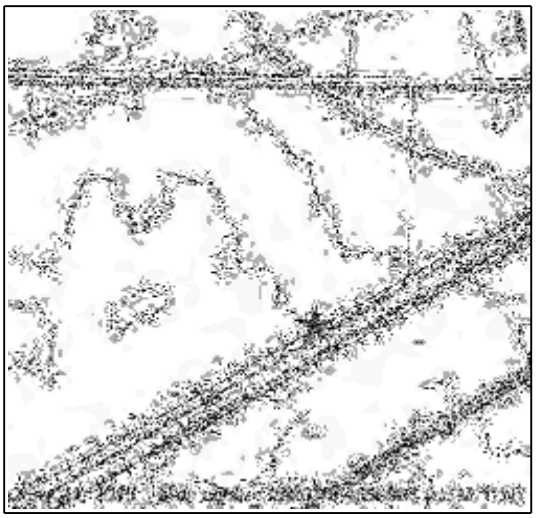
53. Affiliated Inventory Number(s):
Historic (OHI):

Archaeological (OAI):

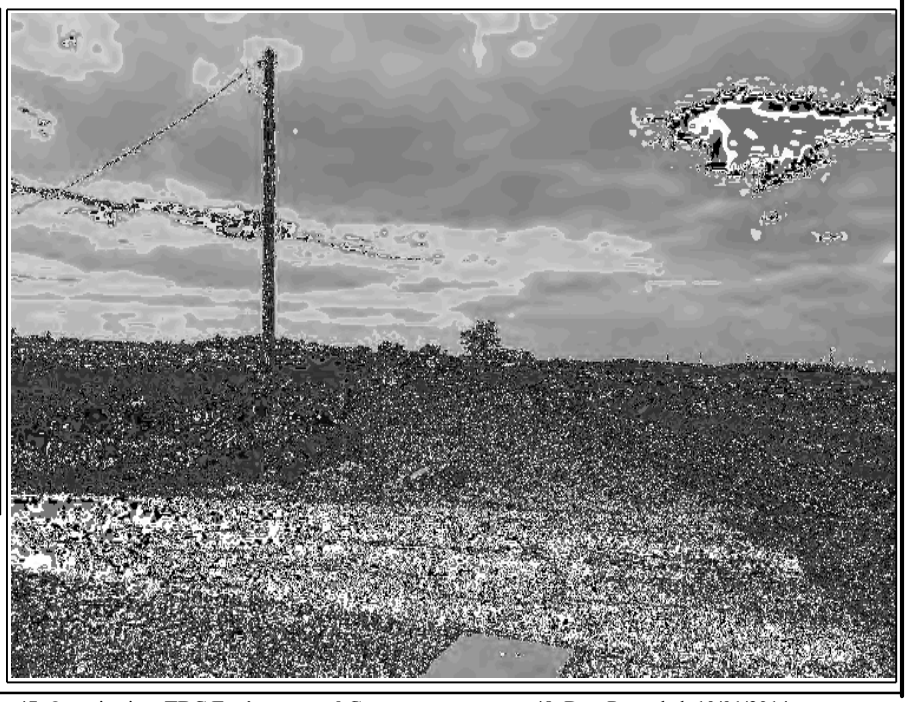
2. County: **Hancock**

4. Present or Historic Name(s): **Norfolk Southern RR, TR 261**

6. Specific Address or Location: **no address, TR 261**



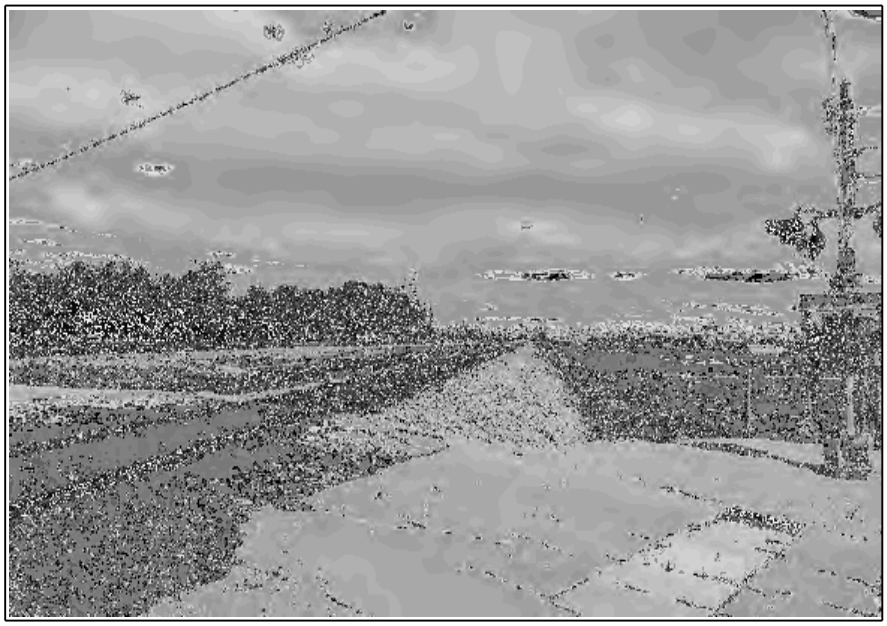
8. Site Plan (location map) with North Arrow



46. Prepared By: **Jessica Burr**
47. Organization: **TRC Environmental Corp**
48. Date Recorded: **10/01/2014**
49. PIR Reviewer: **CS/SCG**
50. PIR Review Date: **12/24/2020**

1. No. HAN0066705 | **4. Present Name(s): Norfolk Southern RR, TR 261**

2. County Hancock | **5. Historic or Other Name(s): Fremont & Indiana RR**



Door Selection: Unknown
Door Position: Unknown
Orientation: Unknown
Symmetry: Unknown

Report Associated With Project:

Primary Author	Secondary Author(s)	Year	Title
Millis, Heather	Burr, Jessica	2014	Historic Architectural Survey for the Proposed Rover Pipeline Project, Noble, Monroe, Belmont, Harrison, Jefferson, Carrol, Tuscarawas, Stark, Wayne, Ashland, Richland, Crawford, Seneca, Hancock, Wood, Henry, Defiance and Fulton Counties, Ohio.

42. Further Description of Important Interior and Exterior Features

Architectural resource HAN0066705 consists of an active railroad owned and operated by Norfolk Southern, that was initially built as part of the Fremont & Indiana Railroad.

43. History and Significance

In 1853, the Fremont & Indiana Railroad incorporated to build a line from Fremont, Ohio to the western Ohio state border (fostoriairontriangle.com, 2015). In 1859, the track reached Fostoria, followed by Findlay in 1862, but went bankrupt that same year. In 1862, the company reorganized as the Fremont, Lima & Union Railroad Company (FLU). In 1865, the FLU Railroad merged with the Lake Erie & Pacific to form the Lake Erie & Louisville Railroad Company (Lewise, 2000). In 1871, the Ohio portions of the railroad were reorganized as the Fremont, Lima & Union Railway Company. In 1872, the company merged back with the Lake Erie & Louisville Railway Company. In 1879, the railroad foreclosed and was sold to the Lake Erie & Western Railway (LEW). In 1900, the LEW Railway came under control of the New York Central Railroad. In 1922, the New York Central Railroad sold the (LEW) to the Nickel Plate Road (Rehor, 1994). In 1964, the Nickel Plate Road and several other carriers merged into the Norfolk & Western Railway. In 1982, the Norfolk & Western merged with the Southern Railway to form Norfolk Southern. To date, architectural resource HAN0066705 is owned and operated by Norfolk Southern (Hancock County Auditors, 2014).

44. Description of Environment and Outbuildings (See #52)

Located approximately 1.6 miles southwest of Fostoria City, resource HAN0066705 crosses through agricultural fields.No outbuildings are associated with the property.

45. Sources of Information

Field Observation, October 2014, Hancock County Auditors Website.Fostoria Rail Preservation Society 2015 *Fostoria, A City Built on Rails*. Fostoria, OH: Fostoria Rail Preservation Society. Located online at: http://www.fostoriairontriangle.com/history.htm. Accessed January 2015. Rehor, John A.1994 *The Nickel Plate story.* Waukesha, WI: Kalmbach Publishing Company.

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Summary: Application Appendix C - Cultural Resource Correspondence electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX D

PUBLIC INFORMATION MEETING MATERIALS

- Poster Materials Presented
- Sign-in Sheet

WELCOME

south branch solar

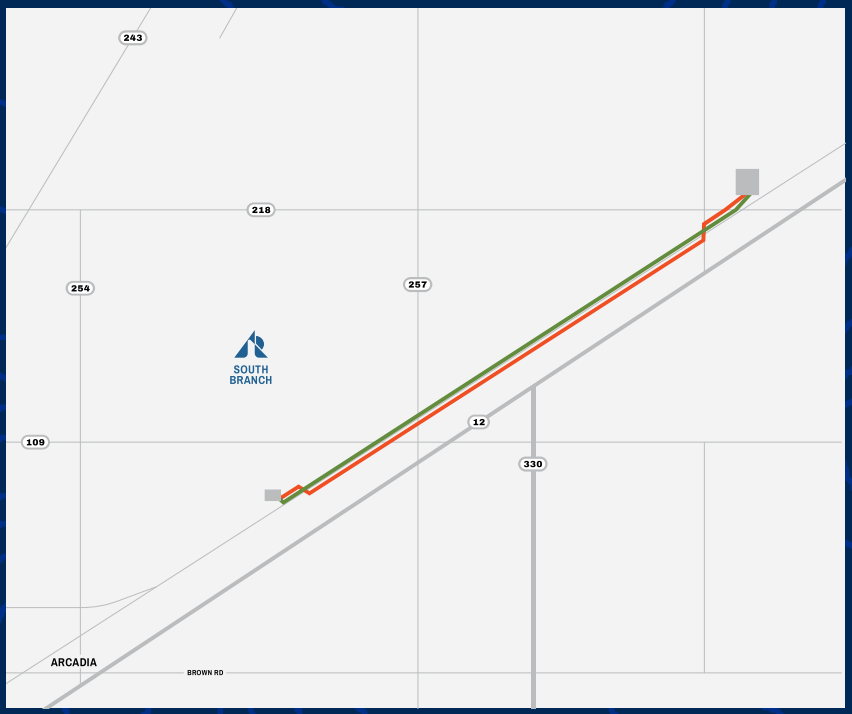
HANCOCK COUNTY, OH

South Branch Generation Tie ("Gen-Tie") Line

COMMUNITY MEETING

Wednesday, May 3, 2023

5-7 PM



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PROJECT FACTS

OVERVIEW:

Approximately 2.4-mile, 138 kilovolt (kV) overhead generation tie (Gen-Tie) electric transmission line that will connect the approved South Branch Solar Project to the existing Fostoria Central Substation in Washington Township.

PERMITTING:

- Gen-Tie application will be submitted to the Ohio Power Siting Board (OPSB) with both a preferred and alternate route.
- As part of the OPSB permit review process, numerous studies and plans are required.

LOCATION:

Located on Norfolk Southern's property, adjacent to the railway, extending from the southeast corner of the approved array footprint, 2.4 miles to the Fostoria Central Substation on County Road 218.

DESIGN:

- Transmission line will utilize monopoles and an underground portion to minimize impact to neighboring homes.
- Located parallel to existing rail infrastructure in order to minimize impacting private residential or agricultural property.
- This Gen-Tie eliminates the need for constructing a utility switchyard.

SCHEDULE

Planning	Permitting	Construction	Operations
2021-2023	2023-2024	2024-2025	2026 →

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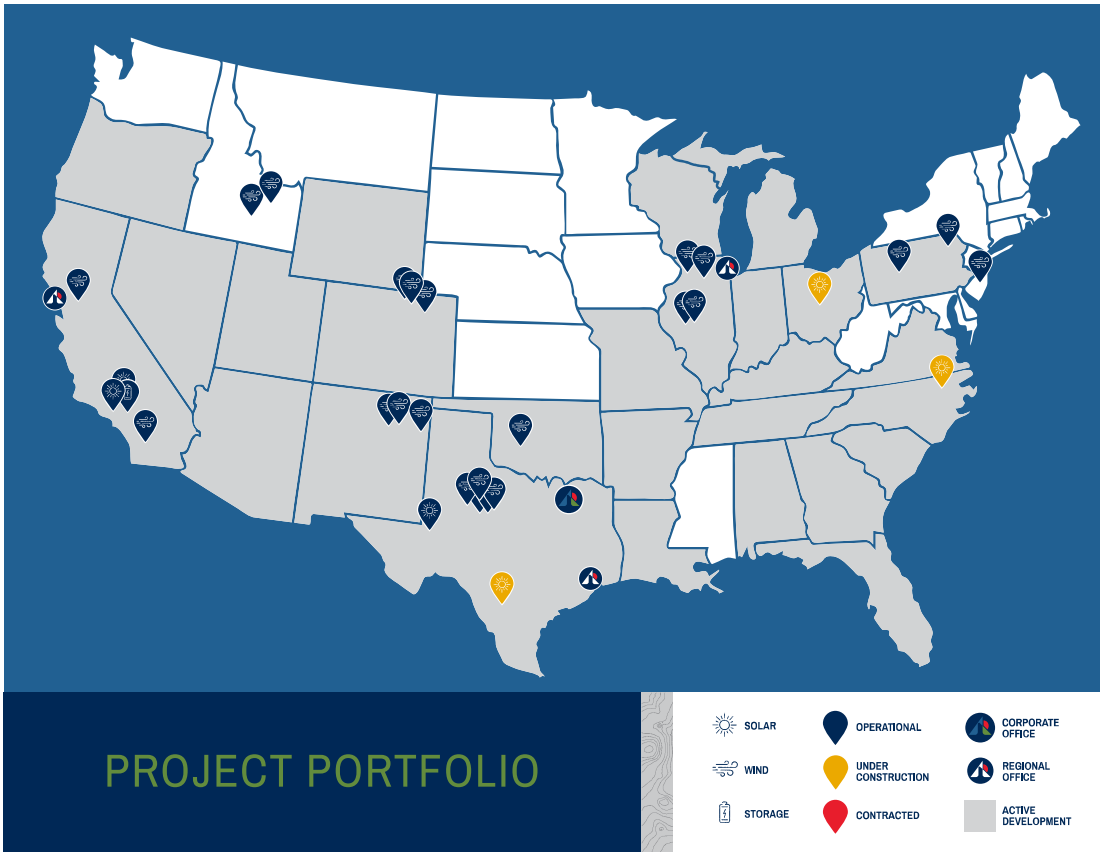
WHO WE ARE
Leeward Renewable Energy



- Leading developer, owner and operator of U.S. renewable generation projects.
- 25 renewable energy facilities across nine states including an approved solar project in Ohio.
- 2,700+ Megawatts (MW) of renewable energy capacity.
- 25 Gigawatts (GW) under development, spanning more than 100 projects.
- Headquartered in Dallas, TX with regional offices in Chicago, IL, Houston, TX, and San Francisco, CA.
- Owner of South Branch Solar, LLC.
- Portfolio company of OMERS Infrastructure, one of Canada's largest pension plans.

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PROJECT SITE SELECTION

PROJECT SITE SELECTION

- The Gen-Tie provides an additional option for the approved South Branch Solar facility to connect to the bulk electric grid. If this option is selected, it would eliminate the need for a utility switchyard within the generating facility site by using AEP's existing Fostoria Central Substation.
- Use of existing infrastructure corridor will minimize environmental, cultural and community impacts.
- Direct route from the solar generating facility to the point of interconnection, which will result in greater efficiencies for operations and maintenance.

LAYOUT FEATURES

- Utilizes a 75-foot-tall monopole design rather than the metal A-frame design often used for other high-voltage infrastructure.
- Minimizes the visual impacts of the project and reduces the overall project footprint.
- Preferred project design currently reflects 37 monopoles spaced approximately 300 feet apart, with an underground segment.
- Compact positioning within rail property.
- Ability to span wetlands and streams located within the rail property.
- Minimal to no need for tree clearing.
- Designed to result in no adverse EMF levels or communications interference.

OPERATIONAL IMPACTS

- Similar, but lower voltage, than other nearby transmission infrastructure.
- Negligible noise, EMF, or communications interference.
- Appropriate drainage features to be incorporated to avoid offsite impacts.

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PRELIMINARY SITE PLAN

PRELIMINARY SITE LAYOUT, SUBJECT TO CHANGE BASED ON DETAILED DESIGN

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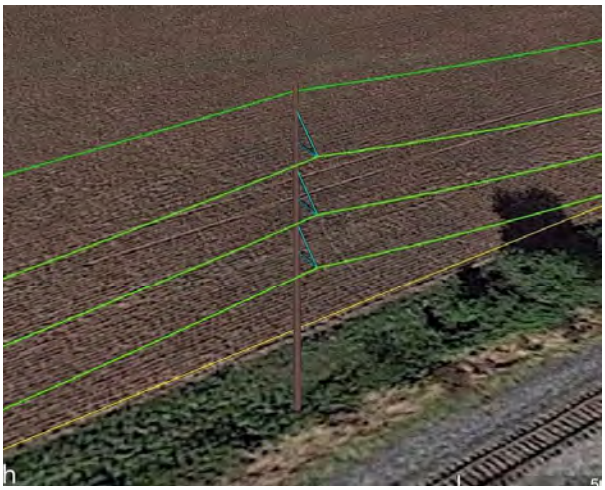
PRELIMINARY SITE PLAN



PRELIMINARY SITE LAYOUT, SUBJECT TO CHANGE BASED ON DETAILED DESIGN

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PERMITTING STUDIES

The Ohio Power Siting Board application for the Gen-Tie will include the following studies and plans:

WETLANDS/STREAM DELINEATIONS
Formal delineations for the preferred route to support water resource avoidance and impact minimization, allowing project to span over wetlands and streams without disruption.

FEDERAL AND STATE THREATENED AND ENDANGERED SPECIES CONSULTATION
Integrating protective measures, as appropriate, to avoid impact to listed species.

GEOTECHNICAL INVESTIGATION
Preliminary analysis of subsurface conditions in the preferred Gen-Tie corridor.

STORMWATER MANAGEMENT STRATEGY
Commitment to pre-construction development and a comprehensive stormwater management plan.

CULTURAL RESOURCES REVIEW
Any Cultural resource impact potential will be presented to the Ohio History Connection for review and concurrence.

AGRICULTURAL IMPACTS
The Gen-Tie's location completely within railroad property avoids potential impacts to agricultural land and activities.

DEMONSTRATION OF LOW EMF LEVELS
Where aboveground Gen-Tie features will extend within 100 feet of a residence, details confirming acceptable and safe levels of EMF will be calculated and presented to meet allowable threshold per OPSB.

COMMUNICATION INTERFERENCE
An analysis will be provided to confirm negligible interference to radio, television, or other communications technology.

NOISE RESTRICTIONS
Activities during construction will be restricted to daytime hours; once operational, noise potential will be limited.

LAND USE CONSIDERATIONS
Demonstrate limited land-use impacts by placing the Gen-Tie's location within an existing infrastructure corridor.

VISUAL IMPACTS
The Gen-Tie will be placed within an existing infrastructure corridor in a location where other above-ground transmission features already exist.

CONSTRUCTION PRACTICES AND BMPS
Assessment of representative views to plan landscaping and other viewshed mitigation strategies.

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HANCOCK COUNTY, OH

THANK YOU

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LEEWARD
renewable energy

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Mila Philipps			
Allison Bauman			
Linda Bishop			
Mary Jo Boes			
Lanny Boes			
GARY Conine			

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Summary: Application Appendix D - Public Information Meeting Materials electronically filed by Teresa Orahood on behalf of Sommer Sheely.

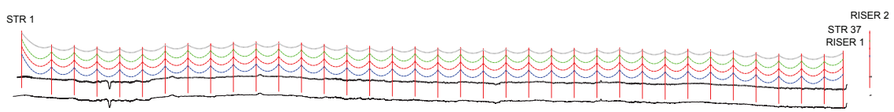
APPENDIX E

GEN-TIE PRELIMINARY ENGINEERING DESIGN

- Gen-Tie Structures and Overview (overhead)
- Plan and Profile Drawings (overhead)
- Pole Direct Embedment and Ground Rod Details (overhead)
- Drilled Pier Schedule (overhead)
- Cover Sheet Notes and Project Data (underground)
- Gen-Tie Layout (underground)
- Single-Line and Schematic (underground)
- Crossings and Cable Tag Details (underground)
- Trench and Duct Bank Details (underground)

SOUTH BRANCH SOLAR 138 kV GENERATION TIE LINE

(OVERHEAD SECTION)



DESIGN PARAMETERS

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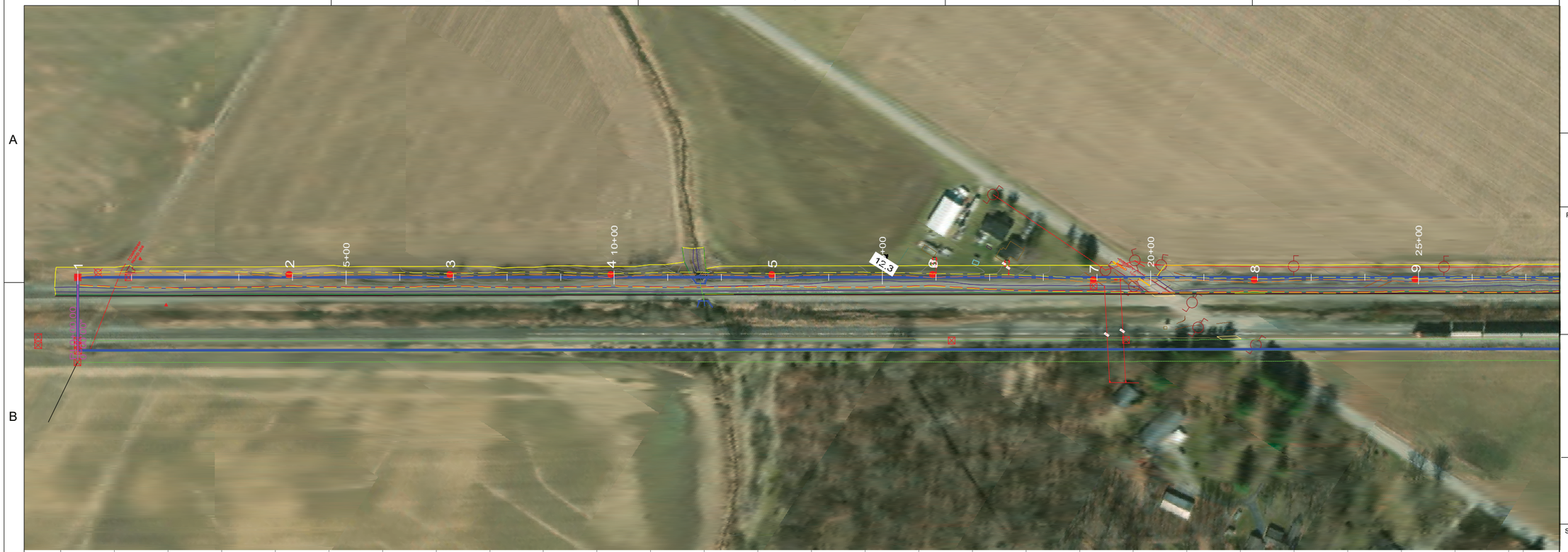

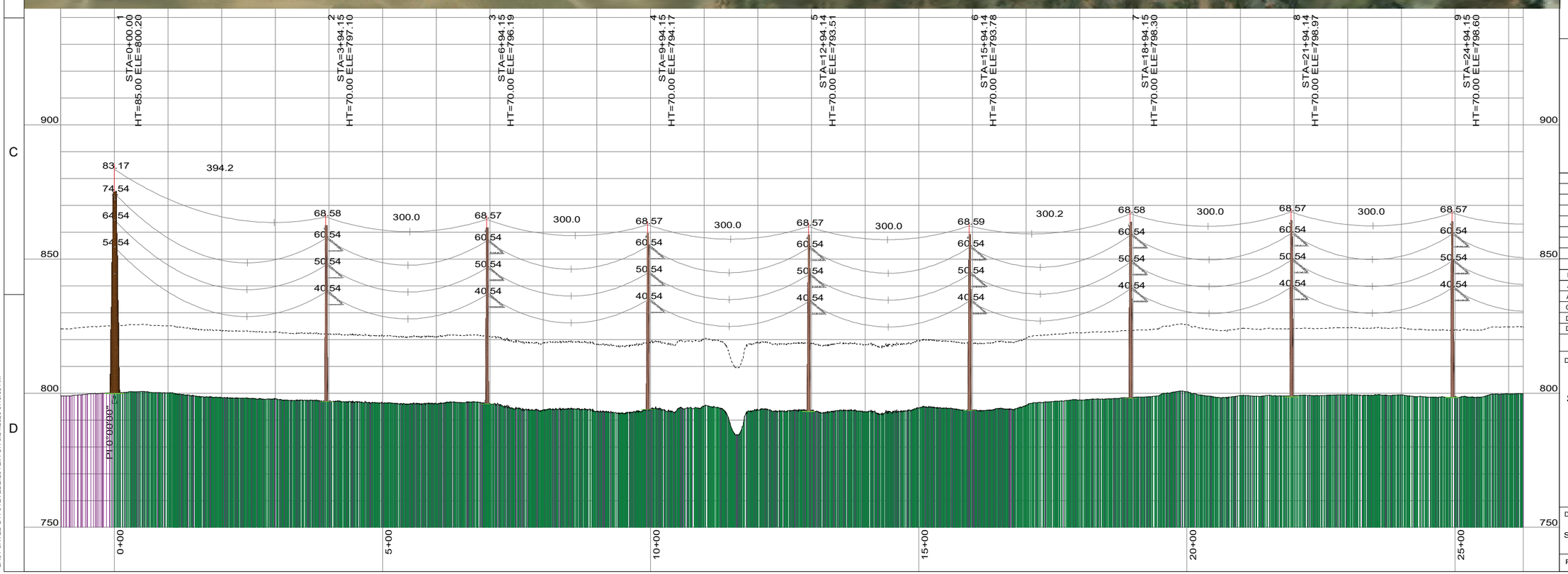

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CHECKED BY: A. AMATO
DESIGNED BY: H. DHORAJIA
DRAWN BY: H. DHORAJIA

PROJECT NUMBER: EE2304015

DRAWING NAME:

SOUTH BRANCH SOLAR 138 KV GEN-TIE LINE

PLAN AND PROFILE WITH ELECTRIC FIELD CONTOURS SOLAR

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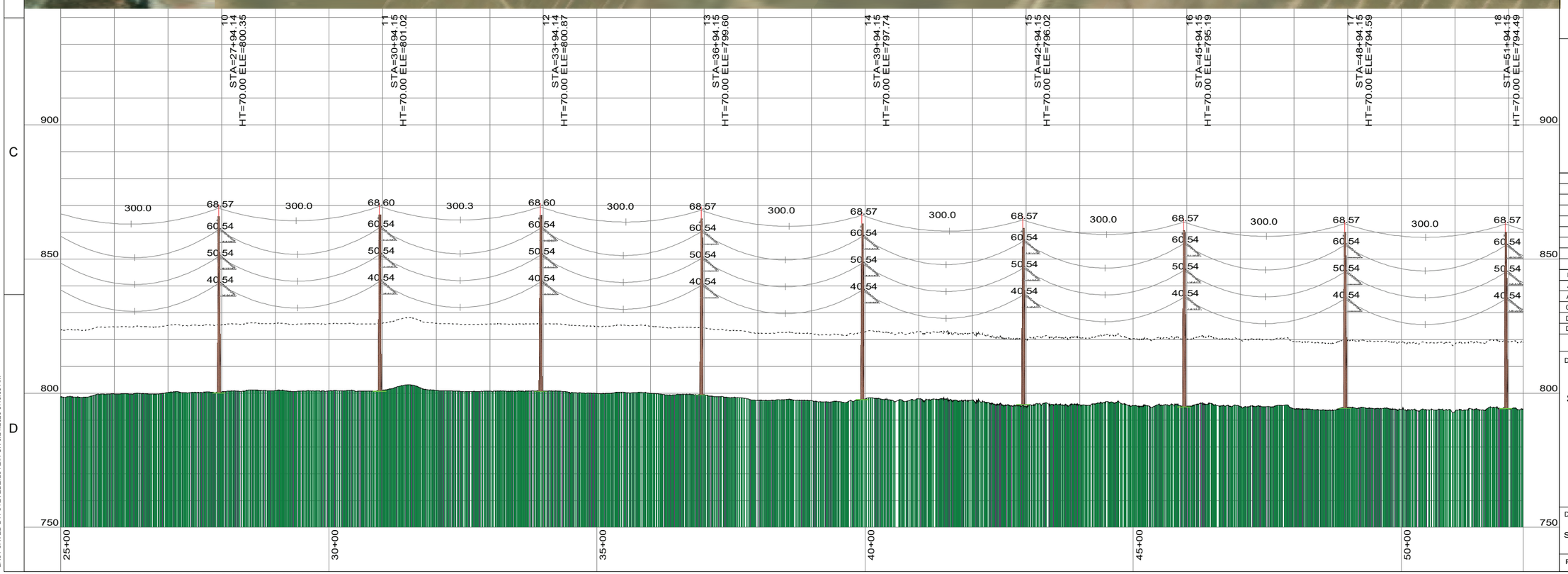

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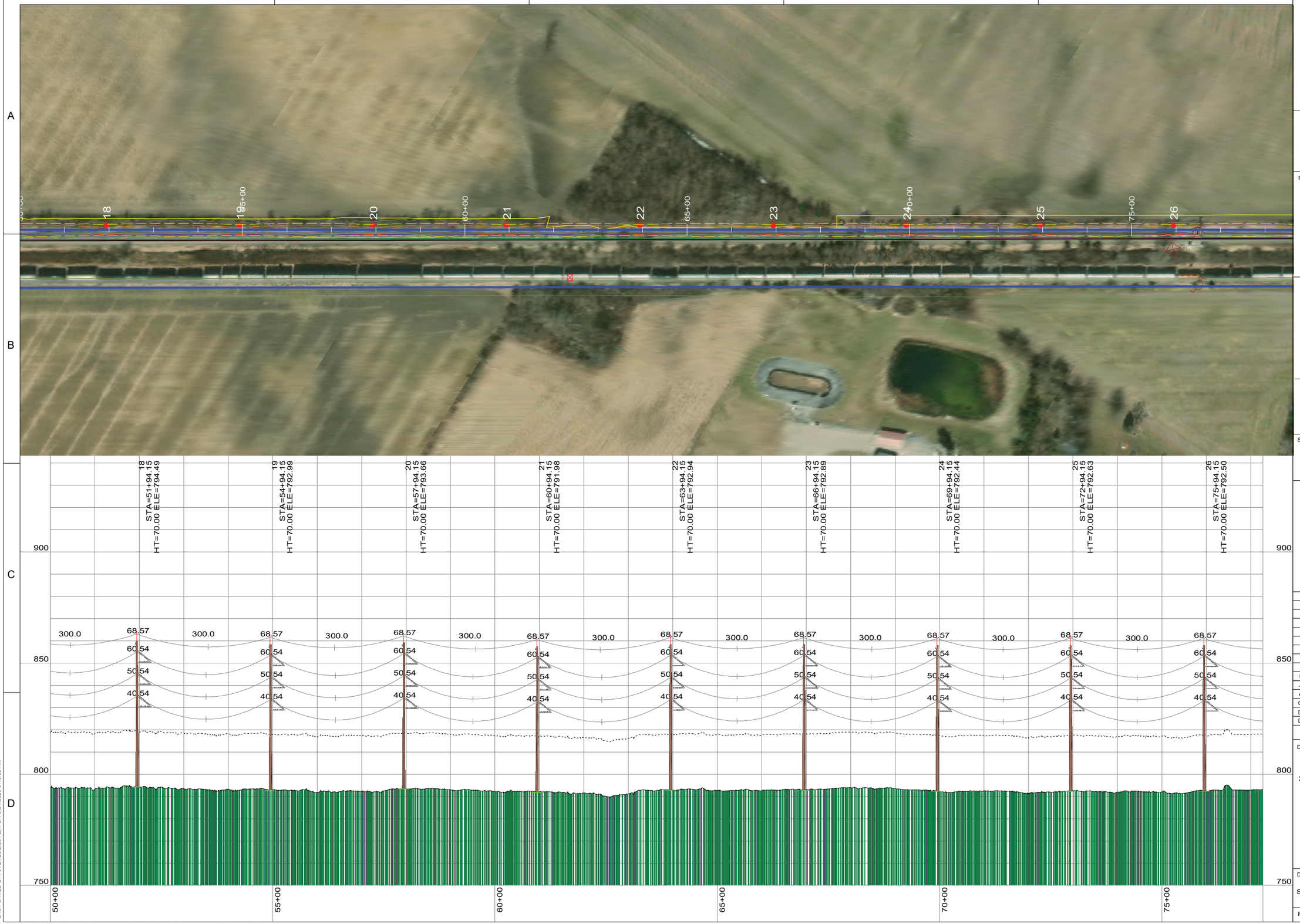

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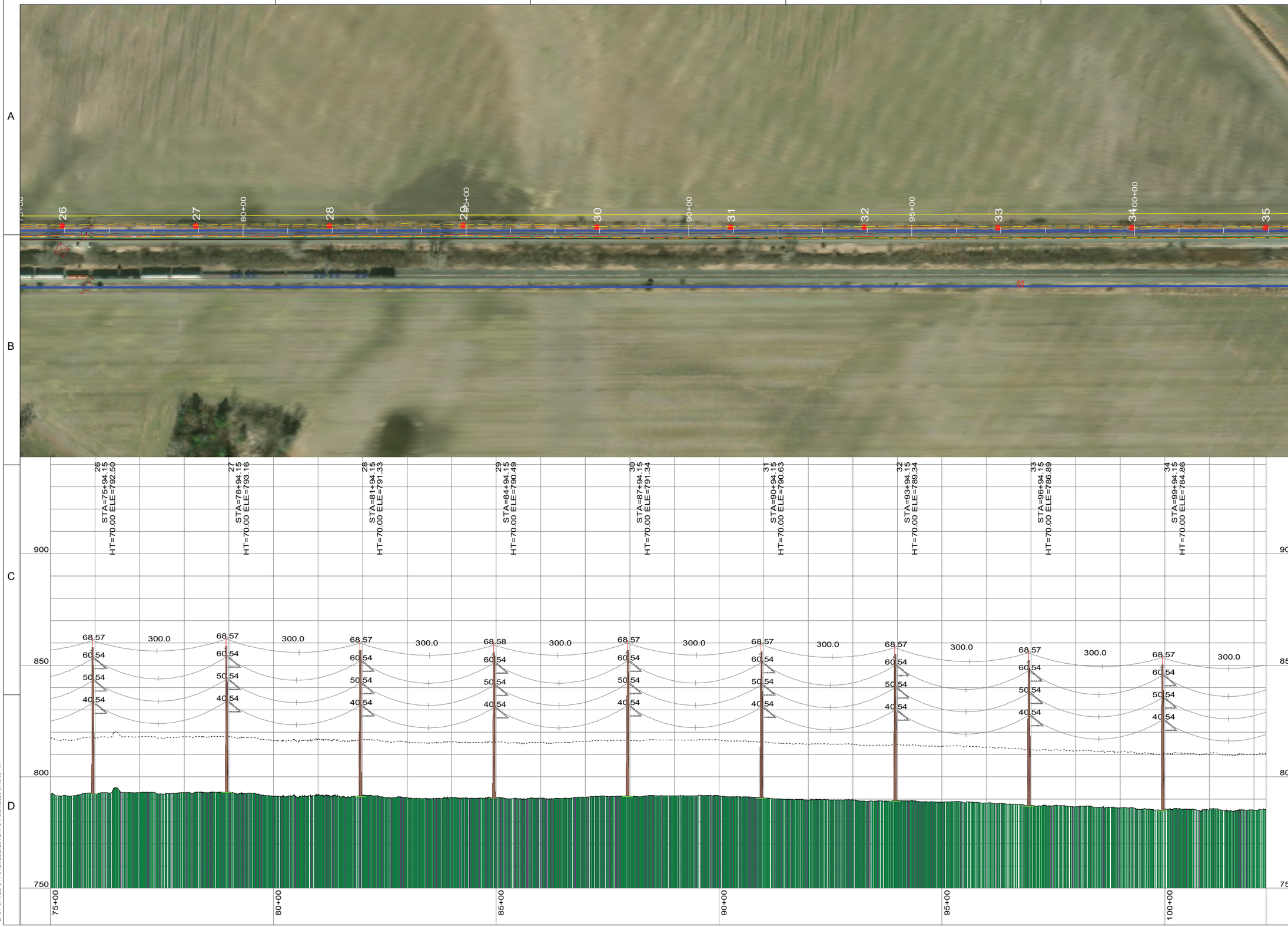

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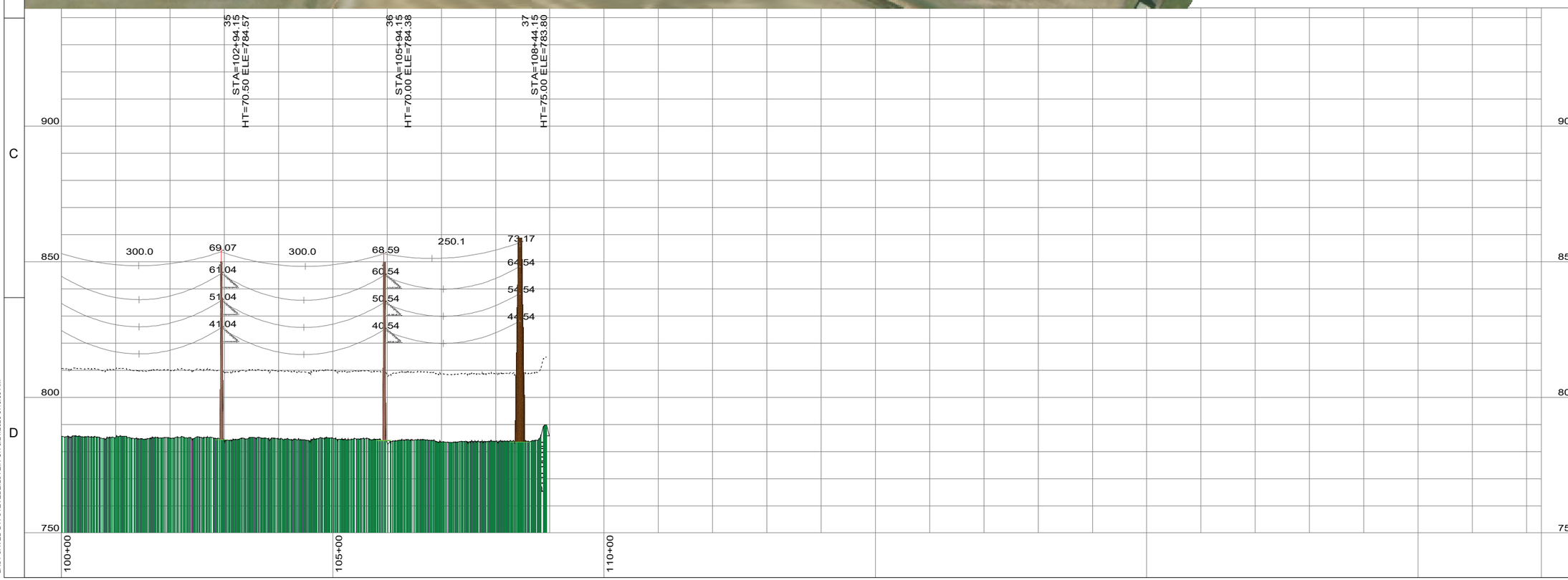

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PLAN AND PROFILE
WITH ELECTRIC FIELD
CONTOURS SOLAR

SHEET - 5

DRAWING NAME:	SHEET:	REVISION
SBSP-T-705	5 OF 5	B

PLS-CADD: SBSP-T-701-5

LAST SAVED BY: STEVEBEILSTEIN ON 3/21/2023 9:45:58 AM

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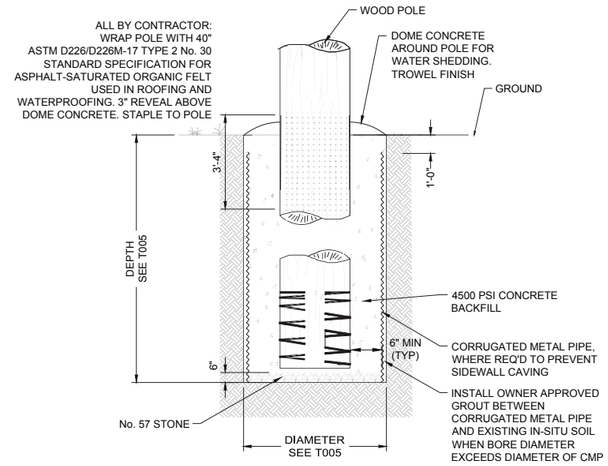
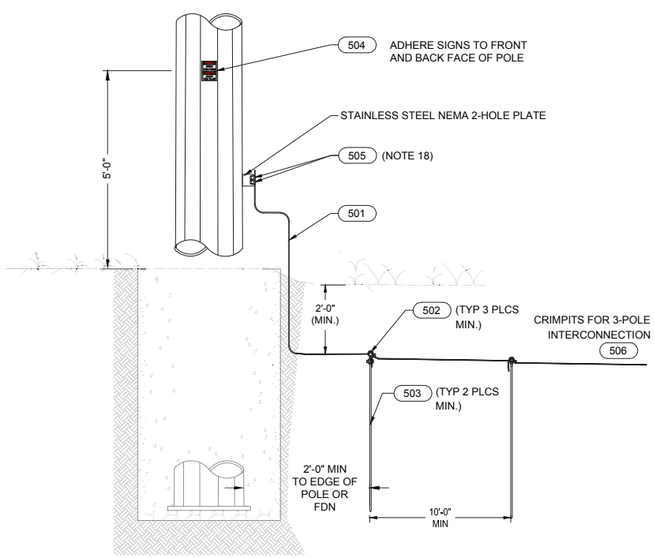


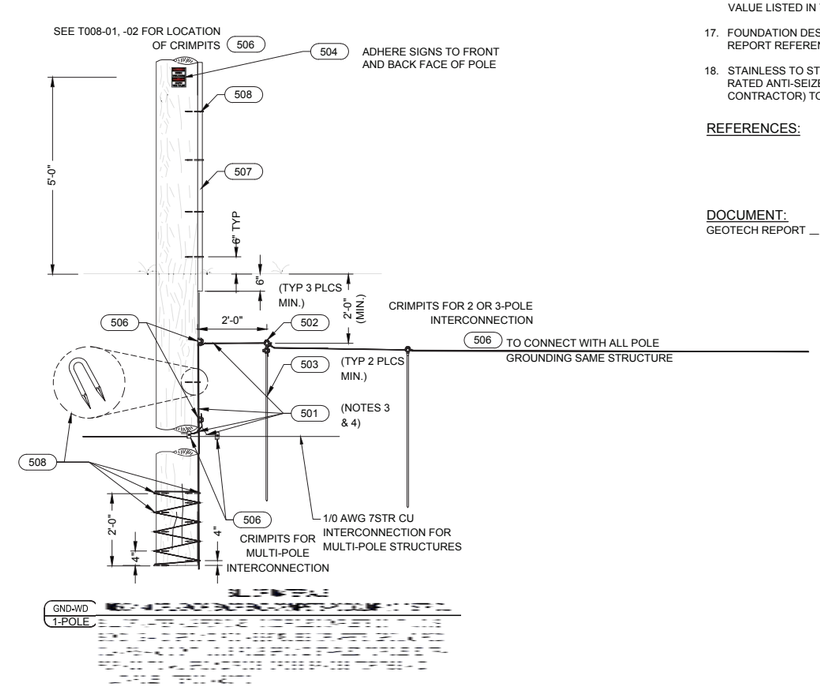
DIREMB WOOD — DIRECT EMBEDMENT DETAIL WOOD POLE
CONCRETE BACKFILL
SCALE: N.T.S.

ITEM No.	QTY	UNIT	DESCRIPTION	MFGR-CATALOG No
501	[illegible]	EA	GROUND WIRE #1/0 AWG 7 STRAND COPPER [illegible] DIAMETER [illegible] LBS/FT	SOUTHWIRE [illegible]
502	8	EA	GROUND ROD CLAMP #8-1/0 RANGE TO [illegible] OD [illegible] DRIVING [illegible] SILICON BRONZE PLATED SCREW [illegible] LBS EST	HS-[illegible]
503	3	EA	GROUND ROD UNTHREADED COPPER CLAD STEEL [illegible] [illegible] LBS EST	HRS-[illegible]
504	2	EA	SIGN – HIGH VOLTAGE BILINGUAL SPANISH [illegible]	[illegible]
505	2	EA	CLAMP GROUND UPPER LOWER CLAMPS CLAMP WB RANGE [illegible] TWO HOLES TIN PLATED CAST BRONZE BODY SS HARDWARE [illegible] WASHER [illegible] BOLT LENGTH FOR [illegible] PLATE LENGTH [illegible] LBS [illegible] THREADED TO SS BOLTED	HRS-[illegible]
506	2 (POLES MULTI-POLE ONLY)	EA	WIRE COPPER CRIMP TAP CONNECTOR FOR [illegible] CONNECTION [illegible] OR [illegible] COPPER CLAD TRENCH GROUND TO [illegible]	BYD-[illegible]

ITEM No.	QTY	UNIT	DESCRIPTION	MFGR-CATALOG No
[illegible]	[illegible]	FEET	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]



M-MISC-GNDR-X-X-1-FAS-1/0 7 STR CU
SINGLE STEEL POLE GROUND ROD ASSEMBLY
SINGLE 1/0 7 STRAND CU GROUND WIRE
NEMA 2 HOLE COMPRESSION CONNECTION TO POLE



NOTES:

1. IF INSTALLATION OF 2 GROUND RODS DOES NOT MEET SOIL RESISTIVITY (25 Ω) REQUIRED, INSTALL ADDITIONAL GROUND RODS OR UTILIZE ERICO GROUND ENHANCEMENT MATERIAL AS REQUIRED.
2. GROUNDING MATERIALS ON BILL OF MATERIAL ARE FOR ONE STEEL POLE STRUCTURE. SOME MATERIALS ARE OVER ESTIMATED (GROUND RODS, ROD CLAMPS AND BONDING BOLTS). THEREFORE, SPARES ARE INCLUDED FOR ALL (SEE NOTE 1).
3. EXCAVATION OF FOUNDATIONS SHALL BE PERFORMED BY ROTARY DRILLING.
4. THE BOTTOM OF EXCAVATIONS SHALL BE FREE OF ALL ORGANICS, FROZEN MATERIAL AND DEBRIS. THE SHAFT SHALL BE FOUNDED ON SOLID, UNDISTURBED SOIL THAT IS EXCAVATED TO A LEVEL PLANE.
5. ALL EXCESS MATERIAL AND WATER IN BOTTOM OF EXCAVATION HOLE SHALL BE REMOVED BEFORE INSTALLATION OF CRUSHED ROCK BACKFILL.
6. ALL EXCAVATED MATERIAL FROM DRILLED HOLES SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.
7. GROUNDWATER SHALL BE FILTERED AND DISPOSED OF PER OWNER'S REQUIREMENTS.
8. EMBEDDED POLE SHALL BE CHECKED FOR PLUMB AND LEVEL PRIOR TO BACKFILL INSTALLATION AND WHEN THE HOLE IS APPROXIMATELY HALF FULL OF BACKFILL. POLE SHOULD BE CENTERED IN THE HOLE WITH A MINIMUM OF 6" CLEAR COVER ON ALL SIDES.
9. CONCRETE BACKFILL SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,500 PSI, A SLUMP OF 6"-8", AND BE IN ACCORDANCE WITH ACI 318, CURRENT REVISION. CONCRETE AIR CONTENT SHALL BE 6% +/- 1.5%.
10. DRILLING FLUID, IF USED, SHALL BE FULLY DISPLACED BY CONCRETE AND SHALL NOT BE DETRIMENTAL TO CONCRETE OR SURROUNDING SOIL. CONTAMINATED CONCRETE SHALL BE REMOVED FROM TOP OF FOUNDATION AND REPLACED WITH FRESH CONCRETE.
11. CONCRETE PLACEMENT SHALL BE SCHEDULED TO ALLOW CONCRETING OF THE ENTIRE FOUNDATION WITHOUT INTERRUPTION DUE TO BREAK PERIODS OR END OF WORKDAY. COLD JOINTS NOT ALLOWED.
12. PLACE CONCRETE CONTINUOUSLY AND IN A SMOOTH FLOW WITHOUT SEGREGATING THE MIXED MATERIAL.
13. THE HOLE SHALL BE CONTINUOUSLY MONITORED DURING CONCRETE PLACEMENT TO DETERMINE IF ANY CAVING OCCURS. ALL CONCRETING SHALL STOP IF ANY CAVING OCCURS, AND ALL LOOSE EARTH, CONTAMINATED CONCRETE AND OTHER MATERIALS SHALL BE REMOVED FROM THE HOLE BEFORE CONCRETING IS TO RESUME.
14. WHERE REQUIRED, PERMANENT CORRUGATED METAL PIPE CASING MAY BE INSTALLED TO PREVENT SIDEWALL CAVING, STARTING 1'-0" BELOW GRADE. CMP TYPE AND INTALLATION METHOD TO BE APPROVED BY ENGINEERING.
15. PERMANENT CASING SHALL BE INSTALLED AGAINST ROCK BACKFILL OR CONCRETE BACKFILL.
16. PERMANENT CASING SHALL BE SIZED TO PROVIDE THE MINIMUM DIAMETER SHOWN. DIAMETER OF PERMANENT CASING CAN BE +6", -0" OF VALUE LISTED IN TABLE UNLESS NOTED OTHERWISE.
17. FOUNDATION DESIGN IS BASED ON THE PROJECT GEOTECHNICAL REPORT REFERENCED BELOW.
18. STAINLESS TO STAINLESS THREADED CONNECTIONS SHALL USE SS RATED ANTI-SEIZE PTFE THREAD SEALANT AND LUBRICANT (BY CONTRACTOR) TO MINIMIZE RISK OF GALLING.

REFERENCES:

TBD

DOCUMENT:
GEOTECH REPORT _ _ _ _ _ _ _ _ _ _

TBD

RRC POWER & ENERGY, LLC
810 HESTERS CROSSING RD,
SUITE 120, ROUND ROCK, TX 78681
PHONE: (512) 992-2087
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PREPARED FOR:

LEEWARD renewable energy

Ohio Utilities Protection Service
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SCALE:

PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	ISSUE DESCRIPTION
A	05/19/2023	IFR 10%

APPROVED BY:	A. PETERMAN
CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	A. AMATO
DRAWN BY:	A. AMATO

PROJECT NUMBER: #########

DRAWING NAME:
##################
138 kV GENERATION TIE LINE

POLE DIRECT EMBEDMENT AND GROUND ROD DETAILS

DRAWING No.	SHEET:	REVISION
SBSP-T-400-01	1 of 1	A

CADFILE: SBSP-T-400-01

5/19/2023 10:27:05 AM

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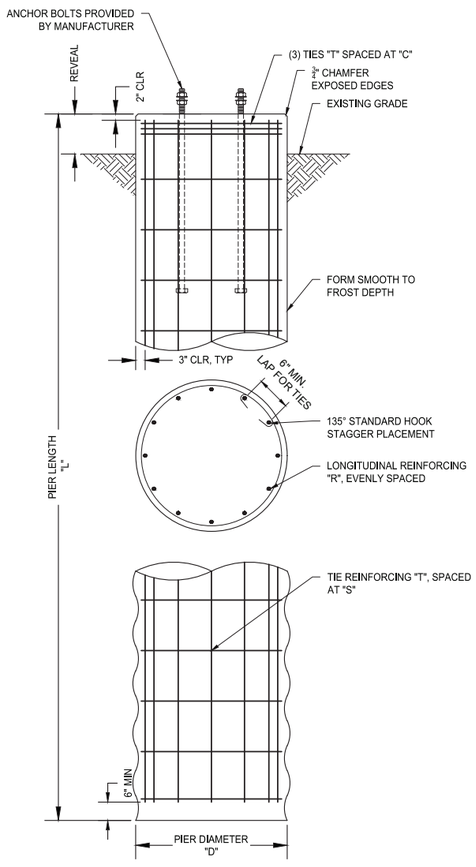
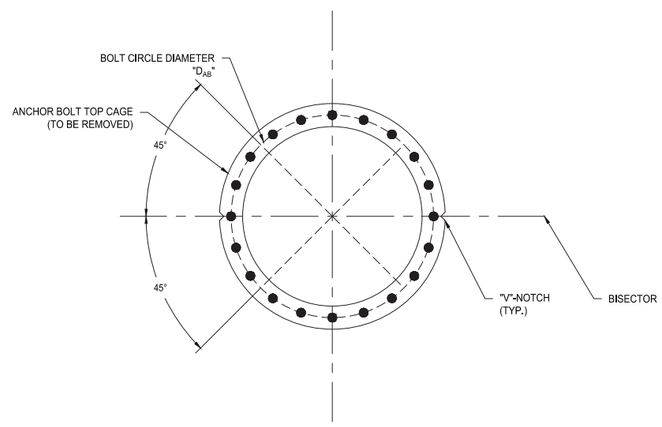
PENDING

			CONCRETE				REINFORCING									ALLOWABLE LOADS		
STRUCTURE	QTY	DETAIL	MAX REVEAL (FT)	DIAMETER "D" (FT)	LENGTH "L" (FT)	VOLUME (YD³)	LONG. BAR SIZE "R"	LENGTH (FT)	QTY PER PIER	TIE SIZE "T"	DIAMETER (FT)	SPACING "S" (IN)	SPACING "C" (IN)	QTY PER PIER	TOTAL WEIGHT PER PIER (LBS)	SHEAR (K)	MOMENT (K-FT)	AXIAL (K)
TBD																		



A ELEVATION VIEW
N.T.S.



B SAMPLE STRUCTURE
N.T.S.

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,500 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C39 AND SHALL BE PLACED IN ACCORDANCE WITH ACI 318-14. TYPE II CEMENT TO BE UTILIZED.
2. CONCRETE REINFORCING BARS SHALL BE GRADE 60 DEFORMED NEW BILLET STEEL IN ACCORDANCE WITH ASTM A-615.
3. MAXIMUM SIZE OF AGGREGATE SHALL BE 0.75 INCHES. AIR CONTENT SHALL BE 6%+/- 1.5%. MAXIMUM W:CM RATIO SHALL BE 0.45.
4. CONCRETE SHALL BE PLACED IN SUCH A MANNER TO AVOID STRIKING THE REBAR OR SEGREGATING. MAXIMUM FREE FALL OF CONCRETE SHALL BE 5'-0".
5. EXCAVATION OF FOUNDATIONS SHALL BE PERFORMED BY ROTARY DRILLING.
6. THE BOTTOM OF EXCAVATIONS SHALL BE FREE OF ALL ORGANICS, FROZEN MATERIAL AND DEBRIS. THE SHAFT SHALL BE FOUNDED ON SOLID, UNDISTURBED SOIL THAT IS EXCAVATED TO A LEVEL PLANE.
7. ALL EXCESS MATERIAL AND WATER IN BOTTOM OF EXCAVATION HOLE SHALL BE REMOVED BEFORE INSTALLATION OF CRUSHED ROCK BACKFILL.
8. ALL EXCAVATED MATERIAL FROM DRILLED HOLES SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.
9. GROUNDWATER SHALL BE FILTERED AND DISPOSED OF PER OWNER'S REQUIREMENTS.
10. DRILLING FLUID, IF USED, SHALL BE FULLY DISPLACED BY CONCRETE AND SHALL NOT BE DETRIMENTAL TO CONCRETE OR SURROUNDING SOIL. CONTAMINATED CONCRETE SHALL BE REMOVED FROM TOP OF FOUNDATION AND REPLACED WITH FRESH CONCRETE.
11. CONCRETE PLACEMENT SHALL BE SCHEDULED TO ALLOW CONCRETING OF THE ENTIRE FOUNDATION WITHOUT INTERRUPTION DUE TO BREAK PERIODS OR END OF WORKDAY. COLD JOINTS NOT ALLOWED.
12. THE HOLE SHALL BE CONTINUOUSLY MONITORED DURING CONCRETE PLACEMENT TO DETERMINE IF ANY CAVING OCCURS. ALL CONCRETING SHALL STOP IF ANY CAVING OCCURS, AND ALL LOOSE EARTH, CONTAMINATED CONCRETE AND OTHER MATERIALS SHALL BE REMOVED FROM THE HOLE BEFORE CONCRETING IS TO RESUME.
13. CONCRETE REINFORCING BARS SHALL BE GRADE 60 DEFORMED NEW BILLET STEEL IN ACCORDANCE WITH ASTM A-615.
14. THREADS OF ANCHOR BOLTS AND NUTS TO BE THOROUGHLY CLEANED OF CONCRETE AND PROTECTED AFTER REPLACEMENT.
15. BEVEL ALL EXPOSED PROJECTING CORNERS OF CONCRETE WORK 3/4" X 3/4" UNLESS INDICATED OTHERWISE. BEVELS SHALL EXTEND BELOW SURROUNDING GRADE.
16. MINIMUM REINFORCING COVER SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:
    CONCRETE CAST AGAINST EARTH = 3"
    ALL OTHER SURFACES = 2"
17. SUBSURFACE CONDITIONS MAY VARY FROM ENGINEERS ASSUMPTIONS. IF UNSUITABLE SUBSURFACE CONDITIONS EXIST, CONTACT ENGINEER IMMEDIATELY.
18. SEE MANUFACTURER'S ANCHOR BOLT CAGE AND STRUCTURE DRAWINGS FOR ADDITIONAL INFORMATION. SET ANCHOR BOLTS TO TEMPLATE. CHECK LOCATIONS AND ELEVATIONS WITH INSTRUMENTS BEFORE CONCRETE IS PLACED. VERIFY ANCHOR BOLT LOCATIONS WITH FINAL STRUCTURE BASEPLATES PRIOR TO PLACING CONCRETE.
19. PROJECTION ABOVE GRADE SHALL BE FORMED WITH A REMOVABLE FORM TO MATCH THE PIER DIAMETER AND PROVIDE A SMOOTH SURFACE ON THE EXPOSED CONCRETE. FORM TO 6" BELOW GRADE.
20. AFTER FORM REMOVAL, FILL ALL VOID AREAS WITH SOIL AND THOROUGHLY COMPACT SOIL AROUND TOP OF PIER USING A POWER OPERATED COMPACTOR. SURROUNDING SOIL SHALL SLOPE DOWNWARD FROM PIER FOR A DISTANCE OF 3 FEET TO PROVIDE POSITIVE DRAINAGE AWAY FROM PIER.
21. V-NOTCH ON BASE PLATE TO BE ALIGNED WITH V-NOTCH ON ANCHOR CAGE.
22. DRILLED PIER FOUNDATION DESIGN DEPENDANT ON MANUFACTURER DESIGNED STEEL POLES AND SHALL BE VERIFIED AGAINST FINAL MANUFACTURER DRAWINGS PRIOR TO CONSTRUCTION OF FOUNDATIONS.
23. TOP OF CONCRETE SHALL BE FINISHED TO PROMOTE DRAINAGE.
24. ALL SECTION CUTS ARE TAKEN FROM THE CENTER OF THE FOUNDATION UNLESS NOTED OTHERWISE.
25. QUANTITIES SHOWN ON THIS DRAWING ARE APPROXIMATE WITH NO ALLOWANCES FOR TYPICAL CONSTRUCTION PRACTICES. CONTRACTOR TO ESTIMATE THEIR OWN QUANTITIES.
26. IF INSTALLATION OF 2 GROUND RODS DOES NOT MEET SOIL RESISTIVITY (25 Ω) REQUIRED, INSTALL ADDITIONAL GROUND RODS OR UTILIZE ERICO GROUND ENHANCEMENT MATERIAL AS REQUIRED.
27. GROUNDING MATERIALS ON BILL OF MATERIAL ARE FOR ONE STEEL POLE STRUCTURE. SOME MATERIALS ARE OVER ESTIMATED (GROUND RODS, ROD CLAMPS AND BONDING BOLTS). THEREFORE, SPARES ARE INCLUDED FOR ALL.

REFERENCES: TBD

DOCUMENT:
GEOTECH REPORT _ _ _ TBD

RRC POWER & ENERGY, LLC
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WWW.RRCcompanies.COM

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PREPARED FOR:

LEEWARD renewable energy

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SCALE:

PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	ISSUE DESCRIPTION
A	05/19/2023	IFR 10%

APPROVED BY:	S. BEILSTEIN
CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	A. AMATO
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

DRILLED PIER SCHEDULE

DRAWING No.	SHEET:	REVISION
SBSP-T-401-01	1 of 1	A

CADFILE: SBSP-T-401-01 OH

5/19/2023 10:26:13 AM

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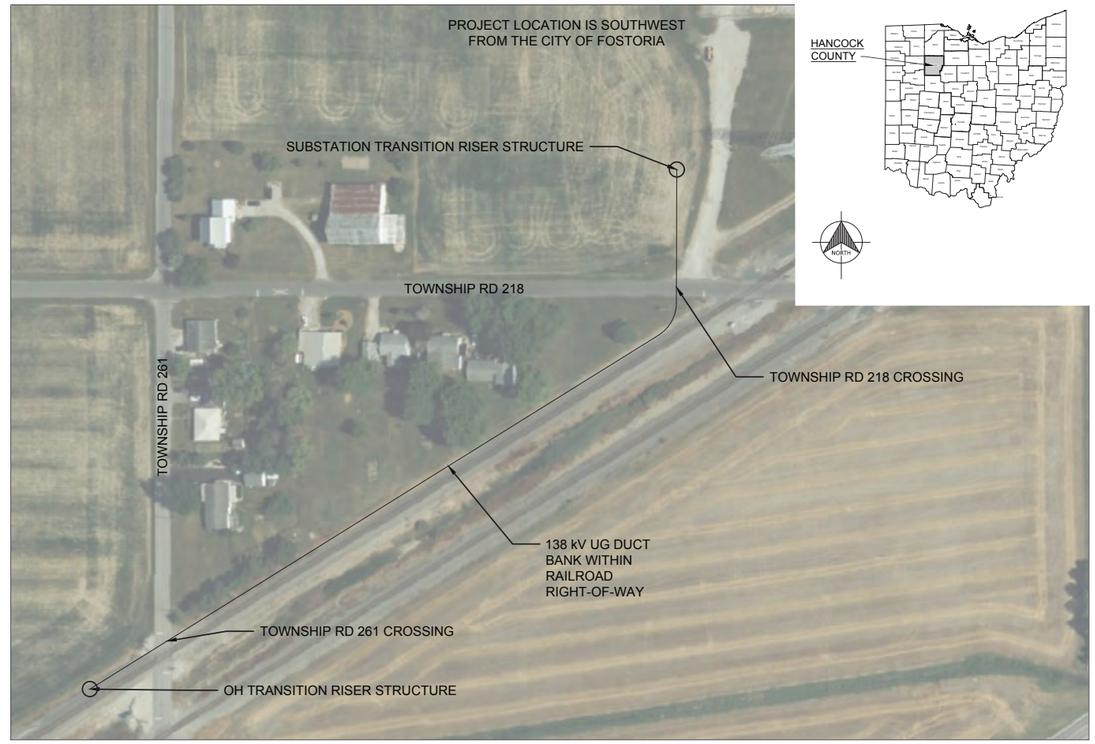
SOUTH BRANCH SOLAR 138 kV GENERATION TIE LINE



NOTES:

1. LINE DESIGN ENGINEER SHALL COORDINATE WITH SUBSTATION, LAND, CIVIL, PERMITTING, CONSTRUCTION, THIRD-PARTY/JOINT USE OWNERS, AND OTHER PERSONNEL REQUIRED TO COORDINATE ALL REQUIREMENTS FOR THE PROJECT. THIS SHALL INCLUDE CONDUCTOR AND COMMUNICATION CONNECTIONS AT SUBSTATIONS.
2. UNIT OF MEASURE FOR DISTANCES AND ELEVATIONS IS FEET.
3. CONTRACTOR MUST COMPLY WITH ALL ENVIRONMENTAL REGULATIONS DURING THE CONSTRUCTION OF THIS PROJECT.
4. CONTACT LOCAL ONE CALL SYSTEM (811) FOR LOCATES BEFORE DIGGING.
5. ADHERE TO ALL AGREEMENT REGULATIONS FOR ALL OVERHEAD AND UNDERGROUND CROSSINGS.
6. FIBER OPTIC CABLE TO BE CONFIRMED BY ENGINEER AT TIME OF ORDER.

REFERENCES:

- NATIONAL ELECTRICAL SAFETY CODE C2-2017 (NESC 2017)
- NATIONAL ELECTRIC CODE (NEC 2017)

ABBREVIATIONS:

PLCS = PLACES
T/L = TRANSMISSION LINE
O.C. = ON CENTER
TYP = TYPICAL
OD = OUTER DIAMETER
KCM = THOUSAND CIRCULAR MILS
30K = 30,000 POUNDS
FT = FEET
IN = INCHES
LBS = POUNDS
STR = STRAND / STRANDS / STRANDING
SUB = SUBSTATION
FTB = FLUIDIZED THERMAL BACKFILL
MAX = MAXIMUM
MIN = MINIMUM
RBS = RATED BREAKING STRENGTH
EHS = EXTRA HIGH STRENGTH
GALV = GALVANIZED
ALUM = ALUMINUM
TBD = TO BE DETERMINED (DATA NOT FINALIZED OR UNAVAILABLE)
DIA = DIAMETER
CLSM = CONTROLLED LOW DENSITY MATERIAL
SVL = SURGE VOLTAGE LIMITER
GCC = GROUND CONTINUITY CONDUCTOR

138 kV DESIGN PARAMETERS	
LINE LENGTH (FT)	1061
LINE RATING (MVA)	205
LINE VOLTAGE (kV)	138
PHASE AMPERAGE (A)	858
CABLE TYPE	SOLID DIELECTRIC (XLPE)
ASSUMED CABLE DESCRIPTION	138 kV 2500 KCMIL COMPACT CU 850 MILS XLPE, 29xAWG 10 Cu AI LAM. HDPE JKT
BIL (kV)	650
CABLE RATING SHORT CIRCUIT CURRENT/DURATION	TBD
CABLE AMPACITY at 90 C (A)	TBD
COND RESISTANCE AC at 25 C (Ω/1000 ft)	0.00436
CABLE SIDEWALL BEARING PRESSURE (LBS/FT)	TBD
CABLE MAXIMUM PULLING TENSION (LBS)	TBD
CABLE MINIMUM BENDING RADIUS (INSTALL/PERM) (IN)	TBD
CABLE MAXIMUM REEL LENGTH (FT)	TBD

DESIGN CONSIDERATION SUMMARY	
COORDINATE SYSTEM	STATE PLANE NAD83 OHIO NORTH, US SURVEY FEET
ELEVATION ASL (FT)	790
LATLON (DMS)	41.137586 , -83.462034
ASSUMED GROUND TEMPERATURE (C)	25
138 kV DEEP SOIL THERMAL RESISTIVITY - NATIVE (C-cm/W)	TBD
138 kV DEEP SOIL THERMAL RESISTIVITY - DRY (C-cm/W)	TBD
138 kV DEEP SOIL DRY DENSITY (LB/FT3)	TBD
CONCRETE THERMAL RESISTIVITY (C-cm/W)	80 @ 2% MOISTURE
CROSSING FACILITES	TBD
PROJECT LIFETIME (YR)	20
DUCT BANK CONFIGURATION	6" 2x2, 1-2" SCH 40/80 PVC, COMM FIBER IN SEPARATE CONDUIT
138 kV GCC CABLE TYPE	350 KCMIL 37 STR Cu XLPE, 600 V
138 kV BONDING CABLE TYPE	250 KCMIL 37 STR Cu XLPE
138 kV CABLE BONDING SCHEME	SINGLE POINT w/ SVL
COMM FIBER CABLE TYPE	TBD
TERRAIN	FLAT GRADED
SOIL	TBD
CONNECTING UTILITY	TBD
138 kV UTILITY FAULT CURRENT REQUIREMENTS	TBD
PROPERTY OWNERSHIP	PRIVATE

CABLE SYSTEM MATERIAL QUANTITIES	QTY
138 kV CABLE CLAMP	60 EA
138 kV SURGE ARRESTOR 115 kV MCOV, 650 BIL	6 EA
138 kV TERMINATIONS	6 EA
138 kV 2500 KCMIL CU TRANSMISSION CABLE	4720 FT
350 KCMIL 37 STR Cu, XLPE, 600 V GCC	1150 FT
FIBER OPTIC CABLE	2300 FT
EARTHING LINK BOX W/ SVL	1 EA
EARTHING LINK BOX W/O SVL	1 EA
6" CONDUIT (PVC & HDPE)	4670 FT
2" CONDUIT (FIBER & GCC)	3510 FT
RISER STRUCTURE AND FOUNDATION	2 EA
250 KCMIL 37 STR Cu, XLPE BONDING LEADS	300 FT
SPACERS	467 EA

DRAWING LIST

DRAWING No.	REV	DESCRIPTION/TITLE	DATE
SBSP-T-000-01	A	COVER SHEET NOTES AND PROJECT DATA	4/28/2023
SBSP-T-000-02		GENERAL NOTES	TBD
SBSP-T-450-01	A	TRENCH AND DUCT BANK DETAILS	4/28/2023
SBSP-T-701-01	A	UG GEN-TIE 138 kV LINE LAYOUT SECTION 1	4/28/2023
SBSP-T-710-01	A	138 kV UG GEN-TIE SINGLE LINE AND SCHEMATIC	4/28/2023
SBSP-T-755-01	A	138 kV CROSSINGS AND CABLE TAG DETAILS	4/28/2023
TBD		RISER STRUCTURE	TBD
TBD		OVERHEAD SPAN DETAILS	TBD

RRC POWER & ENERGY, LLC
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PHONE: (512) 992-2087
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PREPARED FOR:

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SCALE: 0' 100' 200' 400'

PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	ISSUE DESCRIPTION
A	04/28/2023	ISSUED FOR REVIEW 10%

APPROVED BY: S. BEILSTEIN
CHECKED BY: S. BEILSTEIN
DESIGNED BY: D. LANNON
DRAWN BY: A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

COVER SHEET
NOTES
AND PROJECT DATA

DRAWING No.	SHEET:	REVISION
SBSP-D-T000-1	1 of 1	A

CADFILE: SBSP-T-000-01

5/2/2023 10:28:44 AM

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NOTES:

1. COORDINATES ARE OHIO NORTH NAD 83, US SURVEY FOOT.
2. SEWER, GAS, WATER LINE, OTHER FACILITIES CROSSINGS TO BE POTHOLED AND CONFIRMED BY CONTRACTOR. THIS INCLUDES SERVICE DROPS AND LATERALS ALONG THE ROUTE.

REFERENCES:

COVER SHEET NOTES AND PROJECT DATA	SBSP-T-000-01
138 kV TRENCH AND DUCT BANK DETAILS	SBSP-T-450-01
138 kV TIE LINE SCHEMATIC	SBSP-T-710-01
138 KV CROSSING DETAILS	SBSP-T-755-01
SUBSTATION CONDUIT PLAN, CONDUIT SCHEDULE	TBD
SUBSTATION RISER	TBD
RISER STRUCTURE	TBD
OVERHEAD SPAN DETAILS	TBD

LEGEND:

TRENCH LINE

BORE (HORIZ DIRECTIONAL DRILL)

RRC POWER & ENERGY, LLC
810 HESTERS CROSSING RD,
SUITE 120, ROUND ROCK, TX 78681
PHONE: (512) 992-2087
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PREPARED FOR:

LEEWARD renewable energy

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SCALE:

0 40 80 120
SCALE FEET

PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	ISSUE DESCRIPTION
A	04/28/2023	ISSUED FOR REVIEW 10%

APPROVED BY:	S. BEILSTEIN
CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:

SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

UG GEN-TIE
138 kV LINE LAYOUT
SECTION 1

DRAWING No. SBSP-T-701-01
SHEET:
REVISION A

CADFILE: SBSP-T-701-01

5/2/2023 10:20:23 AM

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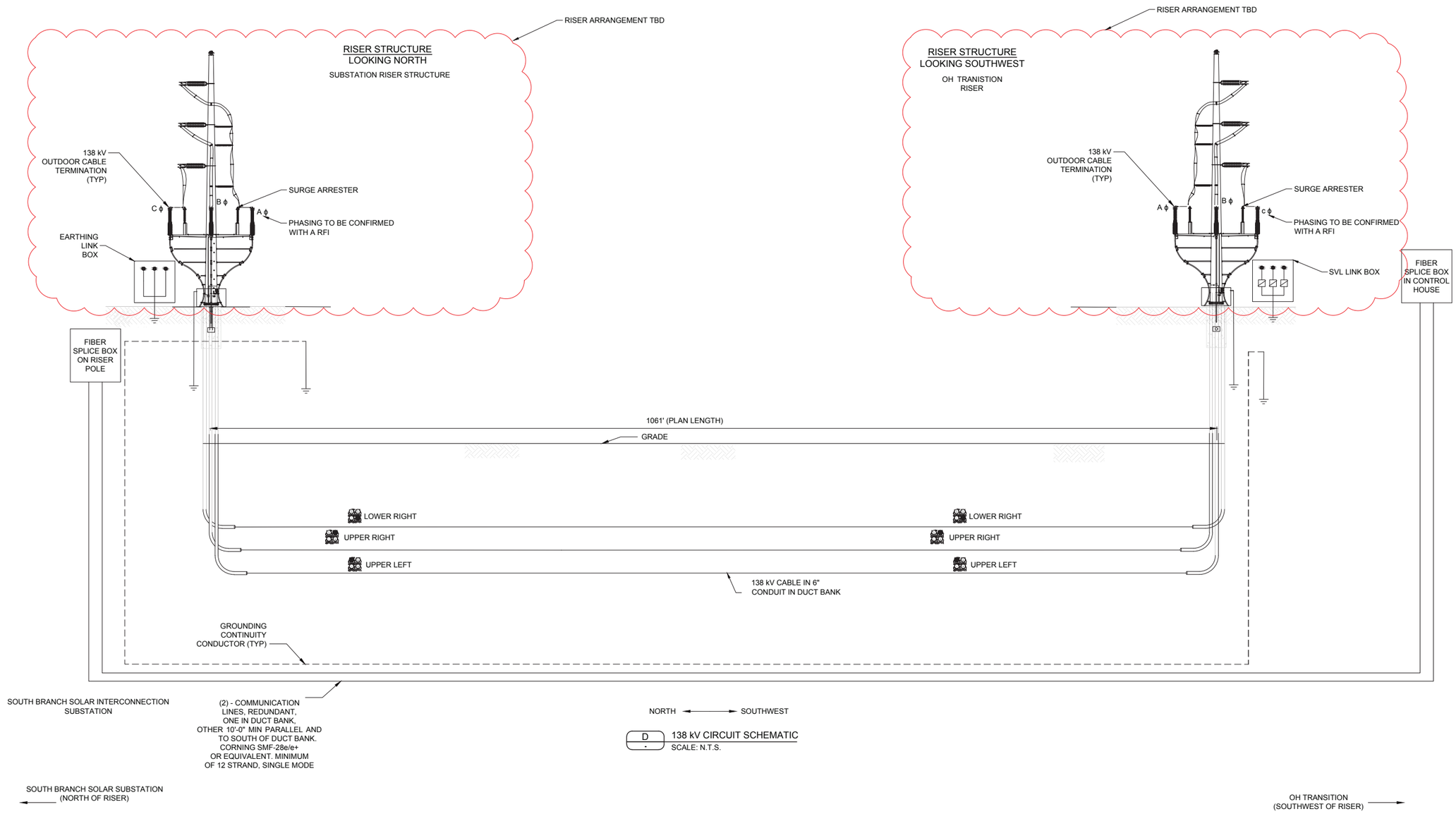
REFERENCES

GENERAL NOTES	SBSP-T-000-01
138 kV TRENCH AND DUCT BANK DETAILS	SBSP-T-450-01
138 kV CROSSING AND CABLE TAG DETAILS	SBSP-T-755-01
138 kV UNDERGROUND TO OVERHEAD TRANSITION	TBD



D 138 kV CIRCUIT SCHEMATIC
SCALE: N.T.S.

RRC POWER & ENERGY, LLC
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CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:

SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

138 kV UG GEN-TIE SINGLE LINE AND SCHEMATIC

DRAWING No.	SHEET:	REVISION
SBSP-T-710-01		A

CADFILE: SBSP-T-710-01

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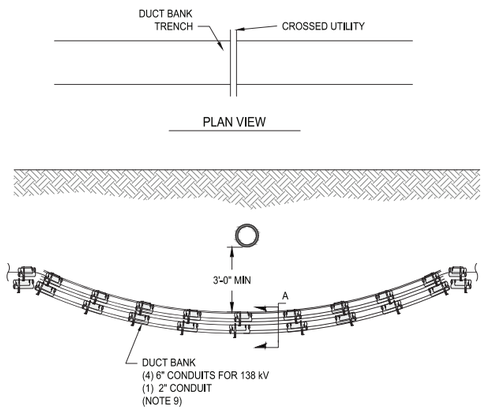
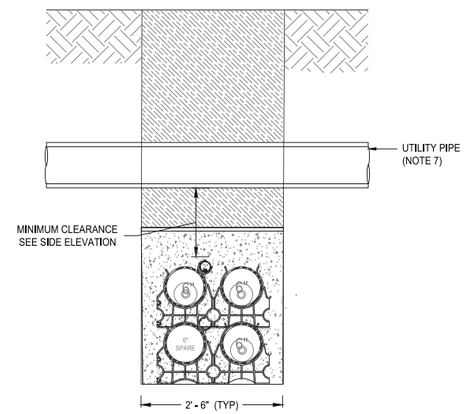


A / - TYPICAL CROSSING TRENCH DETAIL (SIDE ELEVATION)
SCALE: N.T.S.



- / TU02-01 A - A TRENCH SECTION
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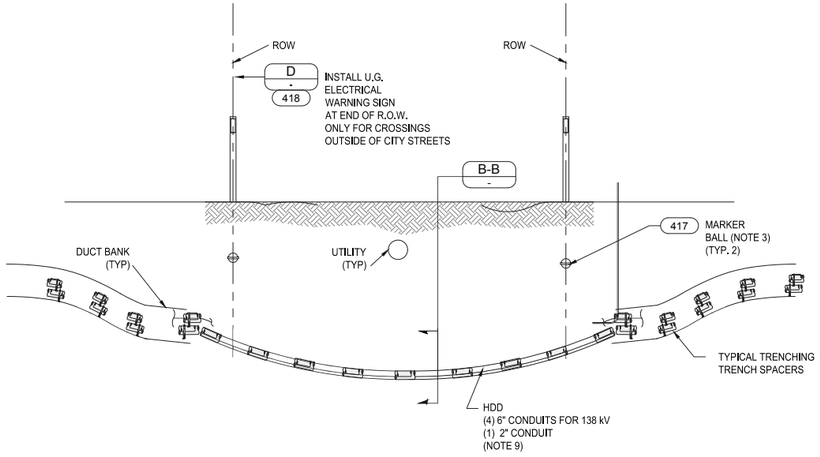
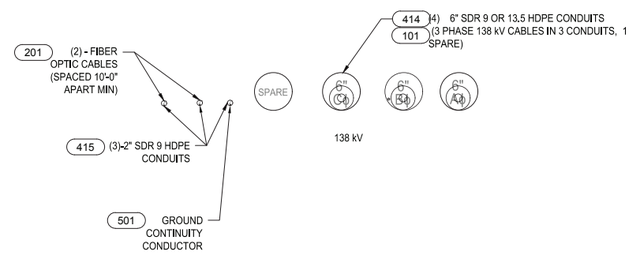
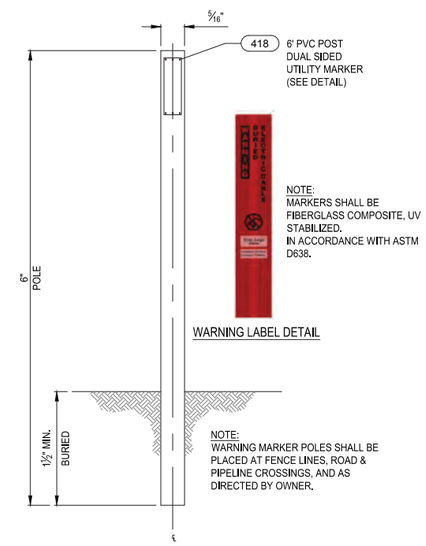


B / - TYPICAL CROSSING HDD DETAIL (SIDE ELEVATION)
SCALE: N.T.S.



B-B / - HDD BORING SECTION
HORIZONTAL DIRECTIONAL DRILL
SCALE: N.T.S



D / - UNDERGROUND ELECTRICAL WARNING SIGN
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HV 138 kV HSSP PHASE	CABLE TAG AND IDENTIFIER HV 138 kV = HIGH VOLTAGE 138 kV OR FO = FIBER OPTIC CABLE SBSP = SOUTH BRANCH SOLAR PROJECT PHASE= Aϕ , Bϕ OR Cϕ

C / - CABLE TAG DETAIL
SCALE: N.T.S.

NOTES

1. PRIOR TO DIGGING, CONTRACTOR SHALL CONTACT THE STATE ONE-CALL SYSTEM AT 811.
2. ALL ELECTRICAL AND DATA CIRCUITS SHALL CROSS AS CLOSE TO NINETY DEGREES (90° +/- 15%) TO PIPELINE AS POSSIBLE.
3. INSTALL MARKER BALLS & SIGNS AT UNDERGROUND UTILITY LINE CROSSING RIGHT-OF-WAY (R.O.W.).
4. THE RATE OF SLOPE OF CONDUIT SHALL NOT EXCEED 4:1.
5. MINIMUM BENDING RADIUS FOR CABLE SHALL BE PER MANUFACTURER'S RECOMMENDATION.
6. SECURE CONDUIT TO SPACERS WITH REQUIRED STRAPPING.
7. UTILITY OWNER SHALL BE CONTACTED TO CONFIRM MAXIMUM OPEN SPANS AND SUPPORT REQUIREMENTS WITHIN THE TRENCH.
8. CONSULT ENGINEER IF BORING DEPTHS EXCEED THE MAXIMUM DEPTH OR IF MINIMUM SPACING REQUIREMENTS CANNOT BE MET.
9. FOR 138 kV 2" SCH 40 PVC FIBER CONDUITS, THEY MUST BE MAINTAINED OUTSIDE OF EHV BORE PIPE, AND MAINTAIN 10'-0" SEPARATION. USE STANDARD HDD BORING TECHNIQUES FOR THESE SINGULAR 2" CONDUITS.

REFERENCES

138 kV TRENCH AND DUCT BANK DETAILS	SBSP-T-450-01
138 kV UG GEN-TIE LAYOUT	SBSP--T-701-01
BILL OF MATERIALS	TBD

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CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

138 kV
CROSSINGS AND CABLE TAG DETAILS

DRAWING No.	SHEET:	REVISION
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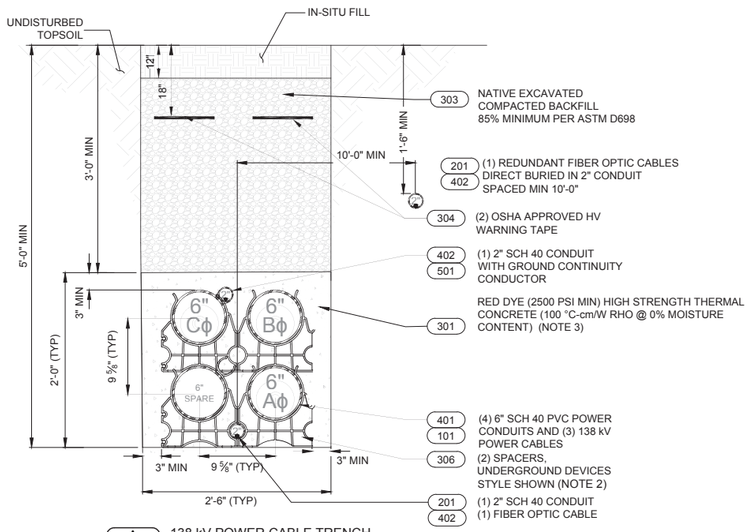


A 138 kV POWER CABLE TRENCH
UNDISTURBED TOPSOIL
SCALE: N.T.S.

NOTES

1. MINIMUM BENDING RADIUS FOR CABLE SHALL BE PER MANUFACTURER'S RECOMMENDATION.
2. SPACERS TO BE DESIGNED BY SELECTED MANUFACTURER OR CONTRACTOR. ANY CALLOUTS AND CATALOG NUMBERS FOR SPACERS PRIOR TO SELECTION OF SPACER MANUFACTURER OR CONTRACTOR ARE FOR BID PURPOSES ONLY.
3. MIX TO BE APPROVED BY ENGINEER.

REFERENCES

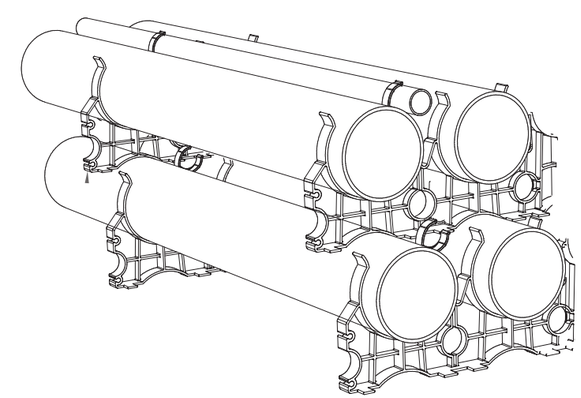
GENERAL NOTES	SBSP-T-000-01
115 kV CROSSING AND CABLE TAG DETAILS	SBSP-T-755-01

DOCUMENTS

SPECIFICATION: HIGH STRENGTH THERMAL CONCRETE	REV A

LEGEND

- DISTURBED TOPSOIL (IN-SITU BACKFILL)
- UNDISTURBED TOPSOIL
- PAVEMENT
- ROAD BASE
- RED DYE (2500 PSI MIN) THERMAL FLUIDIZED BACKFILL
- HIGH STRENGTH THERMAL CONCRETE
- NATIVE COMPACTED EXCAVATED BACKFILL



CONDUIT AND SPACER SYSTEM
ISOMETRIC VIEW (FOR REFERENCE ONLY)
SCALE: N.T.S.

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CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

TRENCH AND DUCT BANK DETAILS

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SBSP-T-450-01	1 of 1	A

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in

Case No(s). 23-0373-EL-BTX

Summary: Application Appendix E - Gen-Tie Preliminary Engineering Design electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX F

PRELIMINARY GEOTECHNICAL REPORT

Geotechnical Report

South Branch Solar Generation Tie Project

Hancock County, Ohio

PREPARED FOR

Leeward Renewable Energy, LLC

Prepared By:

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RRC Project No. GE2209061
June 5, 2023

experience matters

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June 5, 2023

Leeward Renewable Energy, LLC
6688 North Central Expressway, Suite 500
Dallas, Texas 75206

Attn: Mr. Sam H. Monger

Re: Geotechnical Report
South Branch Solar Generation Tie Project
Hancock County, Ohio
RRC Project No. GE2209061

RRC Power & Energy, LLC (RRC) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed the South Branch Solar Generation Tie (gen-tie) Project. The purpose of the geotechnical engineering study was to explore and evaluate the subsurface conditions along the preferred route and develop geotechnical design and construction recommendations for the project. The attached report contains:

- A description of our findings from the field exploration and laboratory-testing program;
- Our engineering interpretation of the results with respect to the project characteristics; and
- Our geotechnical site development and foundation design recommendations for the generation tie.

Should you have any questions concerning this Geotechnical Report, please do not hesitate to contact us. Your business is always appreciated.

Sincerely,

RRC Power & Energy, LLC

Chang Huang, Ph.D., E.I.T.
Geotechnical Engineer

EXECUTIVE SUMMARY

RRC Power & Energy, LLC (RRC) presents a subsurface exploration and geotechnical engineering evaluation for the proposed generation tie as part of the South Branch Solar Project in Hancock County, Ohio.

This geotechnical investigation consisted of geotechnical borings, standard penetration tests (SPT), split-spoon sampling, and laboratory testing.

Topsoil varies from 8 to 11 inches thick. Along the generation tie, soils primarily consisted of medium stiff to hard lean clay with varying amounts of silt, sand and gravel.

The following is a summary of anticipated soil conditions that should be considered in design and construction:

1. Typical drilled shafts and directly embedded poles are feasible for the generation tie foundation. Based on this geotechnical investigation there are no known geohazards or unsuitable soil conditions that would significantly impact the design or construction.

2. Groundwater was encountered at 20 feet or deeper at the time of drilling and immediately after the completion of drilling operations in the borings drilled as part of this study.

3. Based on laboratory test results, surficial soils exhibit “Negligible” sulfate contents. The use of Type I cement can be considered acceptable for the use in foundations concrete.

REVISION HISTORY

Revision	Description	Prepared by	Reviewed by	Issued Date
00	Draft Issue	BR	RP	11/1/2022
01	Updated Draft Issue	BR	RP	1/25/2023
02	Updated Draft Issue	CH	RP	5/26/2023
03	Final	CH	RP	06/05/2023

Checked by

Jieliang Pan, Ph.D., P.E. (OK)
Geotechnical Engineer

STATE OF OHIO
ROHIT PANT
PE. 85701
REGISTERED
PROFESSIONAL ENGINEER

6/5/2023

Prepared by

Chang Huang, Ph.D., E.I.T.
Geotechnical Engineer

Reviewed by

Rohit Pant, Ph.D., P.E.
Geotechnical Group Leader

FIRM REGISTRATION NO. OH COA.04263

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Figure 2: Boring Locations on a Topographic Map
Figure 3: Site Vicinity Surficial Geologic Map
Figure 4: Site Vicinity Bedrock Geologic Map
Figure 5: FEMA Flood Hazard Map
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Log of Boring Key
Logs of Boring

APPENDIX B

Water Soluble Sulfate and Chloride Content – EPA 300/300.1
Soil Resistivity – ASTM G187
pH – ASTM G51
Summary of Laboratory Results

APPENDIX C

Deep Foundation Recommendation

APPENDIX D

Furnished Preliminary Underground Gen-Tie Drawings

GEOTECHNICAL REPORT

1.0 INTRODUCTION

RRC completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed the South Branch Solar Gen-Tie Project. The site is located approximately 3.5 miles southwest of the City of Fostoria in Hancock County, Ohio. The approximate boundaries of the site are shown on Figure 1, Site Location Map.

The purpose of this investigation and report was to:

- Explore subsurface soil, bedrock, and groundwater conditions;
- Conduct field and laboratory tests to characterize the subsurface soil and bedrock properties at selected locations across the site; and
- Provide geotechnical engineering parameters for the design of foundation systems.

2.0 SITE EXPLORATION

A subsurface exploration program was conducted by RRC at selected locations within the project site. RRC's surface exploration consisted of 4 borings along the proposed generation tie alignment. The following section describes our site exploration program in detail.

Figure 2 in Appendix A shows a topographic map for the boreholes along the generation tie. A summary of subsurface exploration is provided within Table A1 within Appendix A.

2.1 Field Exploration and Testing

Field exploration consisted of drilling a total of 4 borings during the period of September 19 through September 20, 2022. We drilled borings to depths of about 30.5 to 50.5 feet below existing grade. The boring locations were staked by land surveyors under the direction of Leeward Renewable Energy, LLC. *Table A1, Summary of Subsurface Exploration and Geographic Coordinates* within Appendix A, outlines geographic latitude and longitude coordinates and depth of each borehole.

The approximate location of the borings on a topographic map is shown on Figure 2 within Appendix A.

We conducted boreholes with a D-50 track mounted rig. Drillers used either hollow stem auger or mud rotary drilling techniques. During the field operations, the drill crew observed for groundwater levels. Following the completion of the drilling operations, the drillers backfilled each bore with bentonite chips in accordance with state regulations.

Standard Penetration Test (SPT) samplers were used to obtain disturbed soil samples. RRC documented each penetration resistance value in accordance with *ASTM D1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. This test consists of driving the sampler into the ground with a 140-pound hammer free-falling 30 inches. The number of blows required to advance the SPT sampler 18 inches is counted and recorded, with

the sum of the blows to drive the last 12 inches referred to as the standard penetration resistance value (N-value). Results of the field tests are shown on the logs of boring under the "Field Data" column and are preceded by the letter "N". Each soil sample from the SPT samplers collected in the field was visually classified, placed in plastic bags to preserve moisture content, and labeled as to location and depth. All SPT samples were arranged in core boxes and transported to our laboratory facility in Round Rock, Texas for further analysis.

RRC classifies soils in general accordance with the Unified Soil Classification System (USCS); *ASTM D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. The soil classification symbols appear on the logs of boring and are briefly described in Appendix A.

RRC's field geologist prepared field logs for each boring. The logs of boring contain classification of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples.

The project engineer/geologist reviewed all the field logs, soil samples, and lab test data to make appropriate modifications to the logs of boring as necessary. Final Logs of Boring and laboratory testing completed are provided in Appendix A. The logs of boring describe the strata encountered, their approximate thickness, SPT results, soil and rock classifications, the various depths at which the samples were obtained, as well as the presence of groundwater.

2.2 Laboratory Tests

The soil samples were returned to the laboratory, examined by the project engineer/geologist, and applicable laboratory testing was assigned on selected soil samples. Laboratory testing was performed in general accordance with ASTM and locally accepted practices. The following laboratory methods of analyses were generally utilized:

- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System): ASTM D2487;
- Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass: ASTM D2216;
- Standard Test Methods for Laboratory Determination of Density and Unit Weight of Soil Specimens: ASTM D7263;
- Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils: ASTM D4318;
- Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve: ASTM D1140;
- Standard Test Method for Measurement of Soil Resistivity using the Two-Electrode Soil Box Method: ASTM G187;
- Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing: ASTM G51; and
- Sulfate and Chlorides Content: EPA 300/300.1.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

The geologic interpretations contained herein are based on available geological maps and literature, and review of the logs of boring as part of this study. The South Branch Solar-Generation Tie project site is located within the Till Plains section and the Eastern Lake section of the Central Lowlands physiographic province in northern Ohio. The Central Lowlands include glacial deposits overlying largely horizontal Silurian sandstones, shales, limestones, conglomerates, and coals. (Reference 1).

The bedrock geologic map of Ohio, Ohio Division of Geological Survey, scale 1:500,000 (Reference 2) indicates thin glacial deposits covering Silurian ages rocks of the following formations (References 2 and 3).

Quaternary Period

- **Clayey Till Ground Moraine** (tca)**:** Dark yellowish brown, reddish brown, or brown to bluish gray to dark gray. Very calcareous clay loam, silty clay, clay, and silty clay loam. Nonsorted to very poorly sorted, locally with faint psuedostratification or streaks of interstratified clay. Pebbles infrequent, very few cobbles and boulders. In northwestern Ohio, includes large areas of clayey till overlain by lake clay, silt, sand, and gravel includes small areas of ice contact and outwash sand and gravel, lake clay, silt, sand, gravel, and alluvium. Thickness generally 1-10 meters.

Silurian Period

- **Tymochtee and Greenfield Dolomites, undivided** (Stg)**:** Dolomite, olive-gray to yellowish-brown, thin to massive bedded, upper two-thirds commonly contains brownish-black to gray shale laminae; locally developed brecciated zones in lower one third.
- **Lockport Dolomite** (Sl)**:** Dolomite, shades of white to medium gray, medium to massive bedded, fine to coarse crystalline; fossiliferous; vuggy.

Figure 3 and Figure 4 within Appendix A show boring locations plotted on a surficial and bedrock geologic map, respectively.

3.2 Geohazard Assessment

3.2.1 Flood Hazard

Based on Federal Emergency Management Agency (FEMA) maps, topographic maps and aerial imagery, it appears that the proposed structure locations within the project can be considered a low risk to flood hazard. FEMA flood hazard maps plotted on Figure 5 in Appendix A indicate sites investigated as part of this study are in an area identified as Zone X. Areas identified as Zone X are considered as 0.2% or less annual chance flood event, or areas of minimal flood hazard. Overall, the risk of flood hazard can be considered low. The design of flood-proofing as

well as the need for scour/erosion protection is the responsibility of the project Civil Engineer or Hydrology Engineer.

3.2.2 Expansive Soils

Based upon review of the logs of boring, laboratory testing results, available geological maps and literature, expansive soils are not expected to be encountered within the majority of project site and can be considered a low risk.

For lightly-loaded structures, which are typically found at generation tie, deep foundation systems could experience excessive post-constructions movements due to volume changes of the underlying expansive clay soils, resulting in a negative impact on the long-term structural performance. The underground gen-tie duct bank system will be embedded to least 5 feet deep according to the drawings provided by the client, as in Appendix D. The system is believe to be insensitive to marginal settlement or uplift although the bank system is not expected to encounter active expansive soil layer. The pole embedment depth for generation tie foundations is anticipated to be approximately 20 feet which should be sufficient in resisting upheaval from possible active layer. It is our opinion that the potential of expansive soils negatively impacting foundations can be considered a low risk.

3.2.3 Soil Corrosion

Surficial soils that exhibit highly corrosive characteristics may damage unprotected concrete and metals. Concrete exposed to high levels of sulfate and chlorides from soil and water may require the use of sulfate resistance concrete, use of chemical admixtures and/or limit water-to-cement ratio to inhibit sulfate and chloride aggression. According to NRCS data, the near surface soils at the project site generally exhibit a low to moderate corrosion potential for concrete and a high corrosion potential for unprotected metals. Figures 6 and 7 within Appendix A provide areas classified as low and moderate potential for corrosion to concrete and high potential for corrosion to unprotected metals, respectively.

3.2.4 Frost Penetration Depth

Based on Reference 4, the average frost penetration depth for Hancock County, Ohio is approximately 3.5 feet.

3.2.5 Karst Potential

The South Branch Solar-Generation Tie Site does contain some known karst hazards consisting of carbonate rocks, fissues, tubes, and caves, which are described below (References 5, 6 and 7).

- **Carbonate Rocks Buried under 50 feet of glacially derived insoluble sediments in a humid climate**: These are areas of carbonate rocks overlain by thin deposits of glacially derived sediments. Units were identified for this classification by overlaying data from the map of Soller and others (2012) on a map of carbonate bedrock units. Cover-collapse sinkholes are common in some of these areas where karst is overlain by loess or other

cohesive unconsolidated deposits.

- **Fissures, tubes, and caves generally less than 1,000 feet long, 50 feet or less vertical extent; in gently dipping to flat lying beds of carbonate rock**: The Silurian Limestones and Dolomites (Niagaran) of Northwestern Ohio and adjacent Indiana are buried beneath glacial drift. Only in Northwestern Ohio, where the glacial deposits are less than 20 ft (6m) thick, are there karst features large enough to cause problems in engineering geology. Caves, each generally with less than 1,000 ft (300m) of passages, are present but not numerous. Fissures less than 100 ft (30m) wide extend for hundreds of feet. Small areas of subsidence have been attributed to alteration of the water table by pumping processes in quarries several miles from the sire of subsidence. Because of the flat terrain, excavation and cuts seldom are deep enough to encounter major karst features.

In general, karst susceptible rocks, if present within 20 feet from existing site grade pose a high risk to foundation systems. Karstic rocks present at the depths between 20 feet to 100 feet are typically considered medium risk and those present at depths greater than 100 feet are considered as low risk. At depths of greater than 100 feet, karst tends to be not well-developed and isolated.

Based on the subsurface investigations completed as part of this study, we did not observe any indications, such as loss of water/air and/or dropping of rock coring tooling, that would indicate a presence of voids or solutions cavities. In addition, based on aerial imagery, it appears that there are not any surficial depressions visible that indicate the development of karstic activities. Based upon review of the logs of boring, available geological maps and literature and our experience within the project area karst potential can be considered low.

3.2.6 Slope Stability

Review of existing site topography and RRC's observations during geotechnical field exploration indicated that the terrain consists mainly flat land within the railway ROW, where most the site exhibits gradual to moderate slopes; however, occasional steeper slopes may be present near drainage features. It appears that the proposed structures will not be located within the general vicinity of drainage features. It is not anticipated that slope stability will be a major concern for this project site, assuming minimum site grading is needed and excavations don't require slopes steeper than standard OSHA safety requirements.

3.2.7 Seismicity

The site modified peak horizontal ground acceleration (PGA_m) was computed to be 0.11g for Site Class D using the US Seismic Design Maps Web-based application program developed by the Applied Technology Council (ATC) (Reference 8) in accordance with ASCE 7-10. In addition, based on the 2015 IBC (Reference 9), the Seismic Design Category is "B" for the project site. Therefore, the risk of seismic hazard is considered low at the project site.

3.3 Subsurface Stratigraphy

Individual Logs of Boring indicate topsoil thickness varies from 8 to 11 inches. Subsequent strata formations generally consist of the following:

- Medium stiff to hard lean clay with varying amounts of silt, sand and gravel;
- Medium stiff to hard silt with varying amounts of sand; and
- Medium dense to dense sand.

The above descriptions are general in nature. Individual Logs of Boring provide more specific stratification. In many Logs of Boring, what is described as thin layers of different soils are actually the same formation with minor variations in sand, clay, and silt content that dictate different formal classifications. Depth ranges are approximate because boundaries between different strata are seldom clear and abrupt in the field. In addition, the lines separating major strata types on the Logs of Boring do not necessarily represent distinct lines of demarcation of the various strata.

Detailed Logs of Boring present the stratum descriptions, types of sampling used, laboratory test data, and additional field data, are presented in Appendix A. The Boring Log Key, defining the terms and descriptive symbols used on each Log of Boring, is also presented in Appendix A.

3.4 Laboratory Test Results

RRC obtained the service of Beyond Engineering & Testing, LLC to conduct laboratory tests. Laboratory test results indicate the native soils possess in-situ moisture contents in the range from about 10% to 22% with an average of 16%.

The native soils tested have Plasticity Index (PI) of 20. Clay soils with a PI less than 15 are generally considered to exhibit a low expansive potential provided their moisture contents are stable. High plasticity clay soils with a PI greater than 25 are generally considered to exhibit a high expansive potential if their moisture contents are allowed to change significantly.

Results of water-soluble sulfate and chloride testing performed on shallow soil samples are summarized in Table 3.4.1.

Table 3.4.1 Summary of Sulfate and Chloride Contents

Sample Location	Depth (feet)	Material Type	Chloride Contents (% by weight)	Sulfate Contents (% by weight)
Boring 1	6	CL	0.0028	0.0487
Boring 2	6	CL	0.0042	0.0125
Boring 3	4	CL	0.0021	0.0066

Notes: CL = Lean Clay.

Results of Minimum Soil Box Resistivity and pH tests performed on shallow soil samples are summarized in Table 3.4.2.

Table 3.4.2 Summary of Minimum Soil Box Resistivity and pH Tests

Sample Location	Depth (feet)	Material Type	Minimum Resistivity (ohm-cm)	pH
Boring 1	3.5	CL	2,008	7.0

Sample Location	Depth (feet)	Material Type	Minimum Resistivity (ohm-cm)	pH
Boring 3	4	CL	3,458	6.6

Notes: CL = Lean Clay.

A summary of laboratory tests is presented in Appendix B.

3.5 Groundwater Conditions

Based upon the information obtained from the borings and historical water data for the region, it is RRC's opinion that static groundwater level should not have an impact on foundation design. Groundwater was encountered at 20 feet or deeper at the time of drilling and immediately after the completion of drilling operations in the borings drilled as part of this study. Groundwater observations for each boring location are also presented on Table A1 in Appendix A.

We reviewed published water well logs for Hancock County, Ohio, available from the Ohio Department of Natural Resource (Reference 10). Historical water well logs within the project site indicate that static groundwater levels were reported to be between 10 and 20 feet below the ground surface. The shallowest groundwater level was recorded in the years of 2007 and 2020 at about 10 feet below the ground surface at Well ID Nos. 2011539 and 2081439. The well locations presented on Table A2 in Appendix A are plotted on Figure 8 in Appendix A.

We note that majority of the water wells were installed to deep aquifers below typical foundation depth and indicate piezometric or static groundwater level within those deep aquifers only. The static water levels from the deep wells do not always provide useful groundwater information for shallow aquifers or perched water tables near foundation depth that should be considered in foundation design.

It is imperative to note that the short-term groundwater level observations presented in this study are not an accurate evaluation of groundwater levels. This Report is not to be interpreted as a comprehensive groundwater study. Groundwater levels are highly dependent on climatic and hydrologic conditions before and after construction, and site development including irrigation demands, drainage and other factors. The presence of water during construction can vary relative to this Report. It is understood that the presence of groundwater may influence certain construction activities and long-term performance of foundations and pavements. If a detailed groundwater study is desired, a groundwater hydrologist should be retained to perform these services.

4.0 FOUNDATION DESIGN AND GEOTECHNICAL RECOMMENDATIONS

4.1 Generation Tie Deep Foundation Systems

Structure elements with heavy axial loads and/or large overturning moments may utilize drilled pier foundations. Pier lengths will likely be dictated by overturning resistance. Allowable end bearing pressures and allowable skin friction values for the generation tie locations are presented in Appendix C.

Allowable end bearing pressures and allowable skin frictions utilize a factor of safety of 3 and 2.5, respectively. Skin friction values should be reduced by 25% when calculating pull-out resistance, where applicable. Settlement associated with drilled piers is anticipated to be on the order of about ½ to 1 inch.

For proper installation of steel rebar and to monitor cleanliness, drilled shafts should have a minimum diameter of 1½ feet. The length of the drilled piers should be determined by the structural engineer to satisfy axial, uplift, and lateral loading.

Lateral load analysis may be performed using the LPILE computer program. LPILE uses a p-y curve finite difference technique for predicting the soil-structure interaction and response. RRC provides detailed LPILE parameters within Appendix C to evaluate drilled piers under lateral loads.

Vertical steel reinforcement to resist tensile loads caused by uplift forces should extend the full length of the pier shaft. Additional reinforcement required by structural demands for axial compressive loads, lateral loads, or minimum reinforcement required by design codes should also be satisfied.

Pole foundation systems may consist of directly embedded pre-stressed concrete pole foundation systems and would likely be designed using EPRI's MFAD computer software. Well-graded and compacted granular backfill material in the annulus can be assumed to exhibit the following parameters outlined in Table 4.1.1. These values assume backfill to be compacted to a relative density of 65% of greater.

Table 4.2.1 Parameters for Compacted Anulus Backfill

Parameter	Compacted Granular Aggregate
Total Unit Weight (pcf)	125
Internal Angle of Friction (degree)	35
Horizontal Modulus of Elasticity (ksi)	1.6

4.2 Lateral Earth Pressures

Lateral design includes restrained elements founded in soils above any free water surface, the following "at rest" equivalent fluid pressures are recommended as shown in Table 4.2.1.

Table 4.2.1 Recommended Eequivalent Fluid Pressures for "At Rest" Condition

Material Type	"At Rest" Coefficient	"At Rest" Lateral Earth Pressure (psf/ft)
Clay Soils	0.63	75.6
Sand Soils	0.47	56.4

Passive and active earth pressure resistance will only mobilize after a minimum of 0.1% and 0.5% lateral movement of the foundation for the passive and active conditions, respectively. The

passive case occurs where a structural element tends to move into the soil mass. The active case occurs when the element tends to move away from the soil mass. Both cases are applicable for unrestrained foundation elements.

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements when using on-site soils as backfill are shown on Table 4.2.2 and Table 4.2.3 for active and passive lateral earth pressures, respectively.

Table 4.2.2 Recommended Eequivalent Fluid Pressures for Active Condition

Material Type	Active Coefficient	Active Lateral Earth Pressure (psf/ft)
Clay Soils	0.45	54.0
Sand Soils	0.31	37.2

Table 4.2.3 Recommended Eequivalent Fluid Pressures for Passive Condition

Material Type	Passive Coefficient	Passive Lateral Earth Pressure (psf/ft)
Clay Soils	2.20	263.8
Sand Soils	3.25	390.0

The equivalent pressures listed above are based on an average total unit weight 120 pcf for on-site clay and sand soils.

The above earth pressure values do not include safety factors. We recommend a minimum safety factor of 2.0 be applied when using passive earth pressure for lateral load resistance. Surcharge loads should also be considered where appropriate. The values apply only to cases where the ground surface is level. Contact RRC to provide suitable values for cases where the ground surface is sloped in excess of 5% or where groundwater is present.

4.3 Seismic Considerations

For structural designs based upon the 2015 International Building Code (IBC) (Reference 9), a Site Class D should be used for the project site. The Mapped Spectral Response Acceleration for the 1 second (S_1) and short periods (S_S) were computed using the Seismic Design Maps Web-based application Program developed by Applied Technology Council (ATC). Table 4.3.1 summarizes recommended seismic parameters to be used in the design:

Table 4.3.1 Recommended Seismic Parameters

Parameter	Recommended Calculated Value
S_S – Mapped Spectral Response Acceleration at Short Period (0.2-Second)	0.136 g
S_1 – Mapped Spectral Response Acceleration at 1-Second Period	0.058 g
F_a (Site Coefficient) – Site Class D	1.6

Parameter	Recommended Calculated Value
F_v (Site Coefficient) – Site Class D	2.4

4.4 Corrosivity of Soils

Water-soluble sulfate results, shown in Section 3.4 of the report, indicated the sulfate content of the surficial soils ranges from 0.0066 to 0.0487 percent by weight. According to ACI durability requirements, these soils are categorized as Exposure Class S0. Foundation concrete should be designed in accordance with Chapter 19 of ACI 318-14: Building Code Requirements for Structural Concrete and Commentary.

The entire project area has a high risk for corrosion to steel, as shown in Figure 7, but chloride test results indicated the surficial soils exhibit “non-aggressive” chloride contents. Chlorides in soils affect metals that are in contact.

Minimum soil box resistivity results range from 2,008 to 3,458 ohm-cm. USDOT (Reference 11), classifies these soils as “Moderately Corrosive” with respect to electrical resistivity. In all, at least moderate corrosion risk should be considered for the steel and proper protection for the steel piles is recommended.

Table 4.4.1 Effect of Soil Box Electrical Resistivity on Corrosion

Aggressiveness	Resistivity in ohm-cm
Very Corrosive	< 700
Corrosive	700 – 2,000
Moderately Corrosive	2,000 – 5,000
Mildly Corrosive	5,000 – 10,000
Non-Corrosive	> 10,000

5.0 FOUNDATION CONSTRUCTION CRITERIA

5.1 Site Preparation

Prior to construction, we recommend adequate positive drainage be provided to maintain a relatively dry condition in the area of proposed construction. This will be very important if any work is attempted during periods of prolonged rainfall or heavy snow fall followed by warmer days. Ponding of water in the areas of construction should be avoided. Winter conditions can also impact the construction process. Newly placed fill should not be placed on frozen subgrade and frozen material should not be used for fill.

5.2 Structural Fill Specifications

Structural fill material beneath foundations, where required, should consist of a non-expansive, well-graded material with sufficient binder for compaction purposes and recommended to meet

the requirements of the Ohio Department of Transportation Construction and Material Specifications, Section 703.11B, Structural Backfill Type 2 or better.

Structural fill should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 95% per ASTM D1557. The structural fill should be moisture conditioned within 2% of optimum moisture content.

5.3 Direct Embed Poles Backfill

One option is to use a cementitious flowable fill or concrete to backfill the annulus. Lateral earth pressure from the native soils provides the lateral resistance; therefore, the goal of the annulus backfill is simply to transmit the loads from the pole to the surround soil. A low-strength cementitious flowable fill can have a strength of 200 psi and be stronger than the surrounding soils.

A second option is crushed aggregate backfill for the annulus. Compacted (Relative Density = 60% or greater) granular backfill material in the annulus can be assumed to exhibit the following parameters outlined in Table 5.3.1 for the design of generation tie poles. Backfill material should meet the specifications of the ASTM C33 #57 or better.

Table 5.3.1 Parameters for Compacted Backfill Materials

Parameter	Compacted Granular Aggregate
Total Unit Weight (pcf)	105
Internal Angle of Friction (degree)	42
Modulus of Elasticity (ksi)	1.6

In order to deter water accumulation within the granular annulus backfill, use native clay soil as a cap for the upper 12-inches of the annulus backfill. The native soil cap should be well-compacted but density verification likely isn't feasible. The surface should also include a slope to drain water away from the pole.

5.4 Drilled Pier Foundation Construction

The following items are important for the successful completion of drilled pier foundations:

- A Geotechnical Engineer or his representative should observe all pier excavations. This pier inspection is to document proper depth, bearing stratum, plumbness, rebar placement, presence of water, cleanliness, or other observations regarding the pier construction.

- The pier excavations should be checked for size and to determine that free water (for dry pier excavation) and loose material have been removed prior to the placement of concrete. Precautions should be taken during the placement of the pier reinforcement and concrete to prevent the loose excavated material from falling into the excavation.

- Prompt placement of concrete in the excavation as it is completed, cleaned, and inspected is strongly recommended. Under no circumstances should a pier/shaft be drilled that cannot be filled with concrete before the end of the workday.

- The reinforcement steel cage placed in the shaft should be designed to be stable and centered during the placement of concrete. Proper installation placement should be verified by the Geotechnical Engineer or his representative at the time of construction.

- The use of a casing or liner may be required in areas where shaft excavations extend in areas of sloughing of sands or entry of water. The drilling contractor should be prepared to provide means and methods to properly construct drilled pier foundations.

- Drilled pier/shaft construction should follow applicable industry standard. Means and methods of construction shall be determined by the design/build contractor.

5.5 Directly Embedded Pole Construction

The following items are important for the successful completion of directly embedded foundations:

- The Geotechnical Engineer or his representative should observe all excavations. Directly embedded pole construction observations are recommended to observe proper depth, bearing stratum, soil conditions and to record other observations regarding the construction.

- Excavations should be checked for size, and to determine all loose material and free water has been removed prior to the placement of the poles and annulus with crushed rock. Precautions should be taken during the placement of the poles and annulus materials to prevent loose excavated material from falling into the excavation.

- Prompt placement of the generation tie pole and annulus material in the excavation as it is completed, cleaned, and inspected is strongly recommended. Under no circumstances should a shaft excavation be drilled that cannot be filled with the generation tie pole and annulus material before the end of the workday.

- The generation tie pole placed in the shaft excavation should be designed to be stable and centered during the placement of the annulus backfill materials.

- The use of a casing or liner will be required in areas where shaft excavations extend below groundwater levels or in areas of caving soils. The drilling contractor should be prepared to provide means and methods to properly construct direct embedded pole foundations.

- Varying subsurface soils conditions, including the depth the bedrock, may be encountered at a distance from the boring location. A Geotechnical Engineer or his representative should also observe subsurface conditions during installation of any ancillary structures such as anchors to verify subsurface conditions match the design criteria.

5.6 Open Excavations

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes.

Surcharge loads, either static or dynamic, should not be applied to an excavation slope. Construction equipment should be prevented from traveling along or near the top of the excavation slope. Monitoring of temporary slopes, trenches, and dewatering during construction should be undertaken by the contractor to detect early warnings of movement within slopes, structures, pavements, etc.

In all cases of excavations, sloped excavations and trench shields are recommended for excavations greater than 4 feet in depth. OSHA and applicable state and local standards should be observed and followed. Site safety is the responsibility of the contractor.

5.7 Horizontal Directional Drilling (HDD)

Lean clay soils are expected at the proposed HDD site as shown in Appendix D. The soil type is not known to be risky for this special drilling technique. Based on the available logs of borings drilled in the vicinity of HDD sites, a summary of preliminary design parameters for soil/bedrock at the HDD sites is presented below. However, the HDD drilling should be performed by a qualified contractor experienced with methods and techniques. Final drilling configuration, drilling parameters and/or means and methods shall be determined by the qualified contractor with experience in this area.

Table 5.7.2 Summary of Preliminary Soil/Bedrock Design Parameters at HDD Sites

Soil/Rock Type	Depth (ft bgs)	Effective Unit Weight (pcf)	Moisture Content (%)	Soil Plasticity		Undrained Shear Strength (psf)	Internal Friction Angle (Degree)	σ'_{vo} at the Bottom of Each Layer (psf)
				LL (%)	PI (%)			
Topsoil	0 to 0.8	110	--	--	--	--	--	88
Lean Clay	0.8 to 3.5	125	16	39	20	900	--	426
Lean Clay	3.5 to 15	130	20	--	--	1900	--	1,920

Notes: bgs = below ground surface. σ'_{vo}: Effective Overburden Pressure

HDD procedure uses drilling fluid such as bentonite slurry to facilitate boring. Seepage of drilling fluid, also known as frac-out, is likely occur near the bore entry and exit point where drill head is shallow. However, frac-out can also occur along any section of the directional bore hole, especially where weak soil/bedrock seams or existing sink holes are present. Based on the preliminary assessment of the geologic and geotechnical data, HDD site has low potential for

existing sinkholes or fault. Therefore, risk for uncontrolled frac-out conditions can be considered low, provided means and methods based on anticipated soil conditions are evaluated and implemented.

It is imperative that HDD contractors experienced in this area review available geologic and geotechnical data and verify means and methods. Additional site investigation or subgrade verification during drilling shall be the responsibility of the HDD contractor. During drilling, pressure shall be closely monitored and not allowed to exceed than required to advance the borehole. A proper contingency plan for inadvertent release of drilling fluid (frac-out mitigation plan) should be prepared prior to commencement of the drilling.

5.8 Drainage and Construction Dewatering

Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structures. Ponding of water near the foundation elements from improper drainage should not be permitted.

6.0 LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is likely soil conditions will vary between or beyond the points explored. If soil conditions are encountered during construction that differ from those described herein, we should be notified immediately in order to provide supplemental recommendations (if needed). If the scope of the proposed construction, including the proposed loads or structural locations, changes from those described in this report, our data should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report assume RRC will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the client and only for the purposes stated, within three years from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client, or the client's design team members for this project, who wishes to use this report shall notify RRC of such intended use. Based on the intended use of the report, RRC may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release RRC from any liability resulting from the use of this report by any unauthorized party.

Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the authors of this report, are only mentioned in the given standard; they are not

incorporated into it or "included by reference," as that latter term is used relative to contracts or other matters of law.

7.0 REFERENCES

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APPENDIX A

Table A1 - Summary of Subsurface Exploration and Geographic Coordinates

Boring No.	Latitude	Longitude	Test/ Drilling Date	Hollow Stem Auger (ft)	Mud Rotary (ft)	Total Depth (ft)	Groundwater During Drilling (ft)	Groundwater Immediately After Drilling (ft)	Remarks
Boring 1	*41.137050*	*-83.462005*	*09/19/22*	*47.0*	*0.0*	*47.0*	*34*	*34*	*Refusal at 47 ft*
Boring 2	*41.135526*	*-83.465201*	*09/19/22*	*30.5*	*0.0*	*30.5*	*20*	*20*	
Boring 3	*41.125492*	*-83.485858*	*09/20/22*	*0.0*	*49.0*	*49.0*	*NA*	*NA*	*Refusal at 49 ft*
Boring 4	*41.119828*	*-83.497669*	*09/20/22*	*0.0*	*50.5*	*50.5*	*NA*	*NA*	

Notes: NA = Not Available.

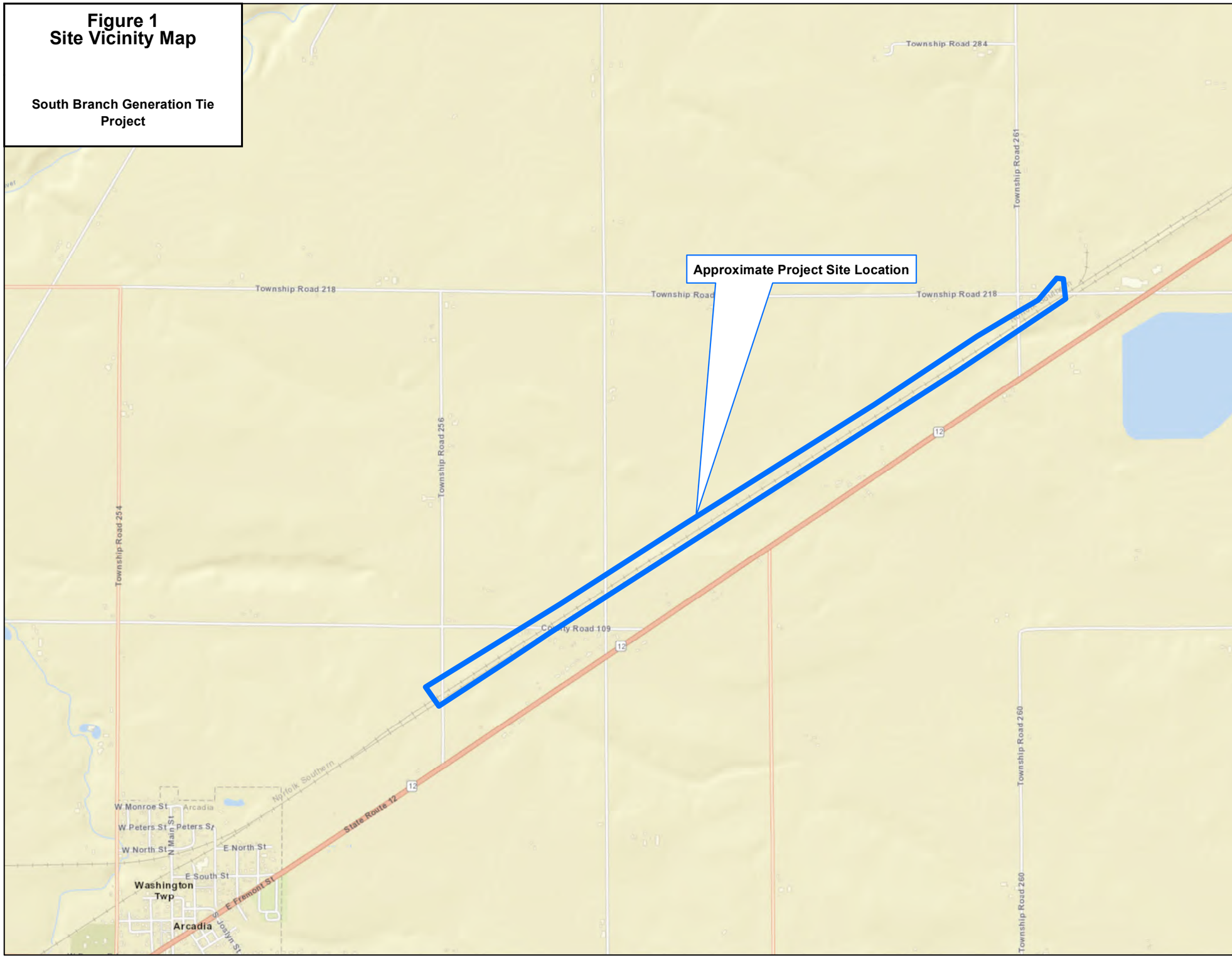
Table A2: Well Log Information Obtained from the Ohio Department of Natural Resource

Well Report No. (ODNR)	**Latitude**	**Longitude**	**Elevation** (feet above sea level)	**Well Depth** (feet below land surface)	**Water Level Record** (feet below land surface)	**Date of Record** (MM/DD/YYYY)
2052876	41.139067	-83.513683	N/D	128	12	7/20/15
2051317	41.125700	-83.457867	N/D	78	15	8/22/14
2028082	41.122778	-83.465556	N/D	110	20	7/27/10
2023966	41.139800	-83.488700	N/D	84	20	9/5/09
2017392	41.136948	-83.482810	N/D	58	15	6/24/08
2081439	41.123400	-83.516517	N/D	73	10	8/5/20
2011539	41.121944	-83.523889	N/D	59	10	7/20/07
981972	41.141830	-83.450500	N/D	110	14	8/3/04
966226	41.120166	-83.525666	N/D	88	11	1/12/04
942390	41.137176	-83.504935	N/D	103	18	4/1/02

N/D = No Data Available.

Figure 1
Site Vicinity Map

South Branch Generation Tie Project



0 0.25 0.5 0.75 Miles

N

Legend

Project Boundary

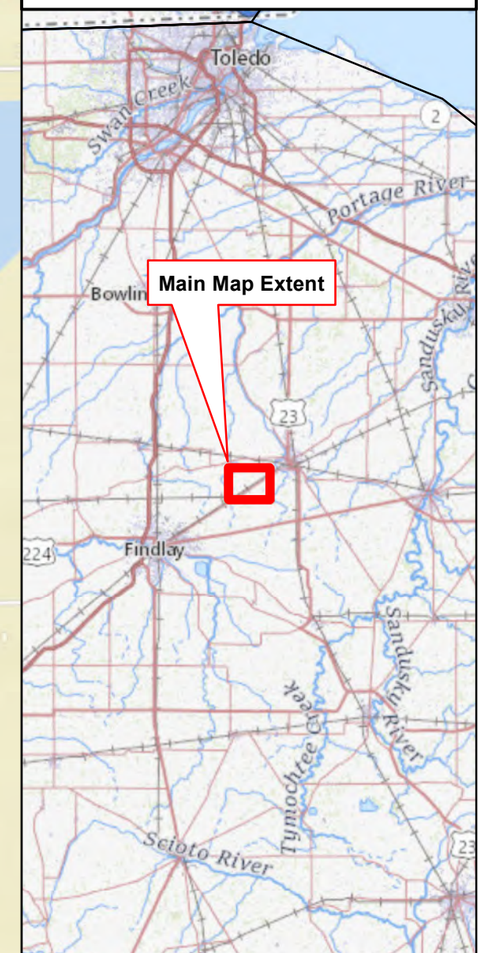


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Figure 2
Boring Locations on a Topographic Map

South Branch Generation Tie Project
Hancock County, OH

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Figure 3
Site Vicinity Surficial Geologic Map

South Branch Generation Tie Project
Hancock County, OH

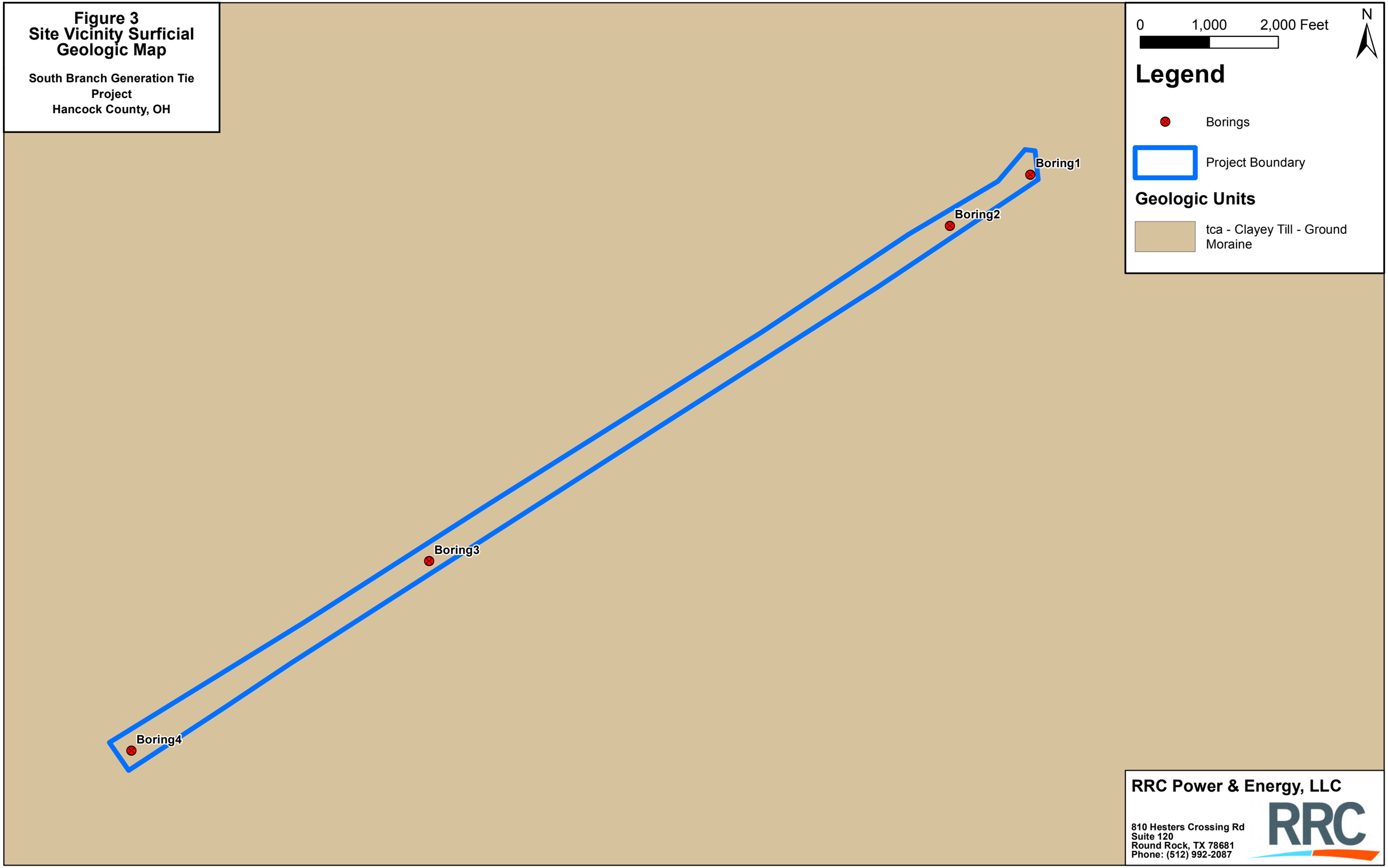

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Figure 4
Site Vicinity Bedrock Geologic Map

South Branch Generation Tie Project
Hancock County, OH

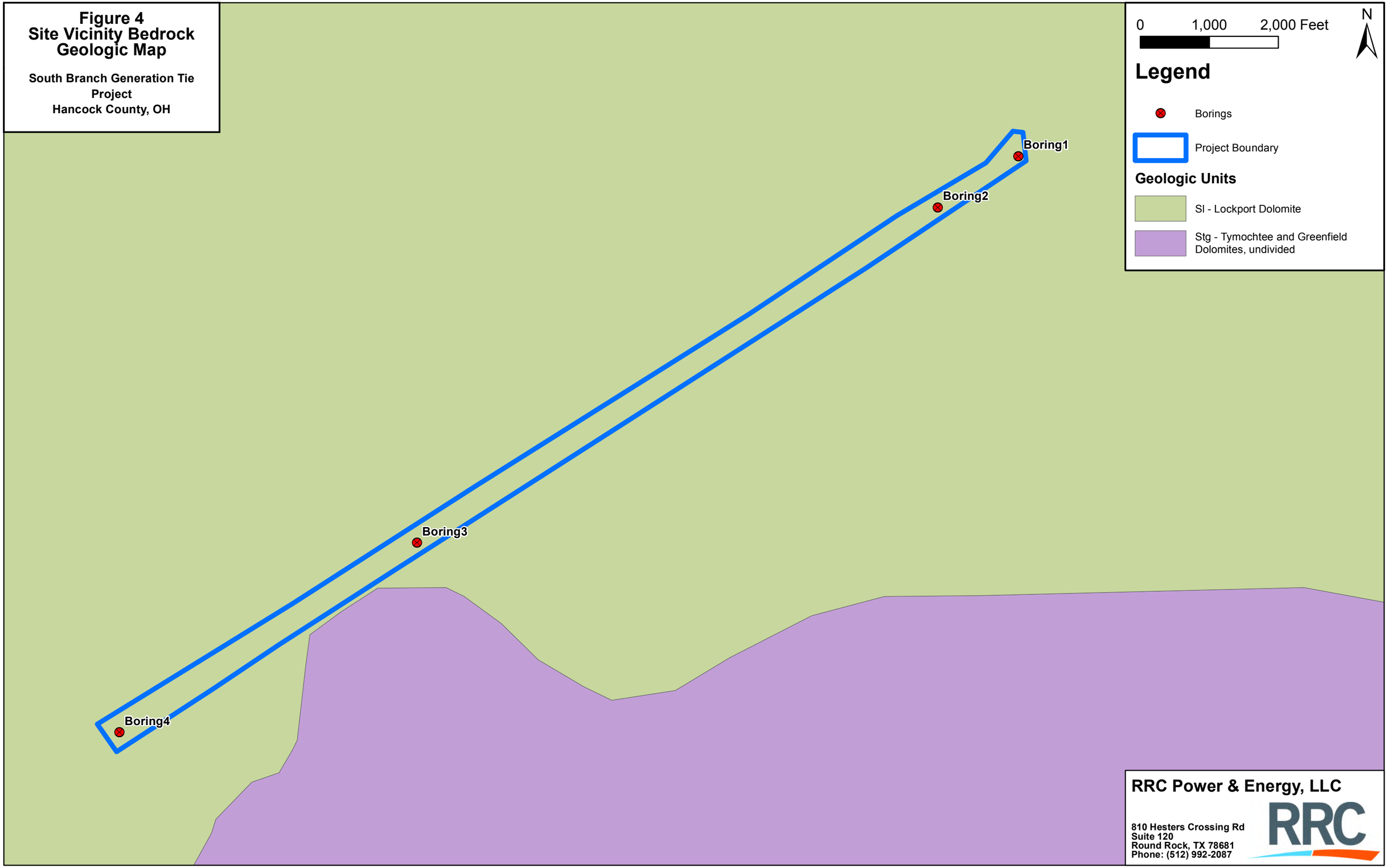

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Figure 5
FEMA Flood Hazard Map

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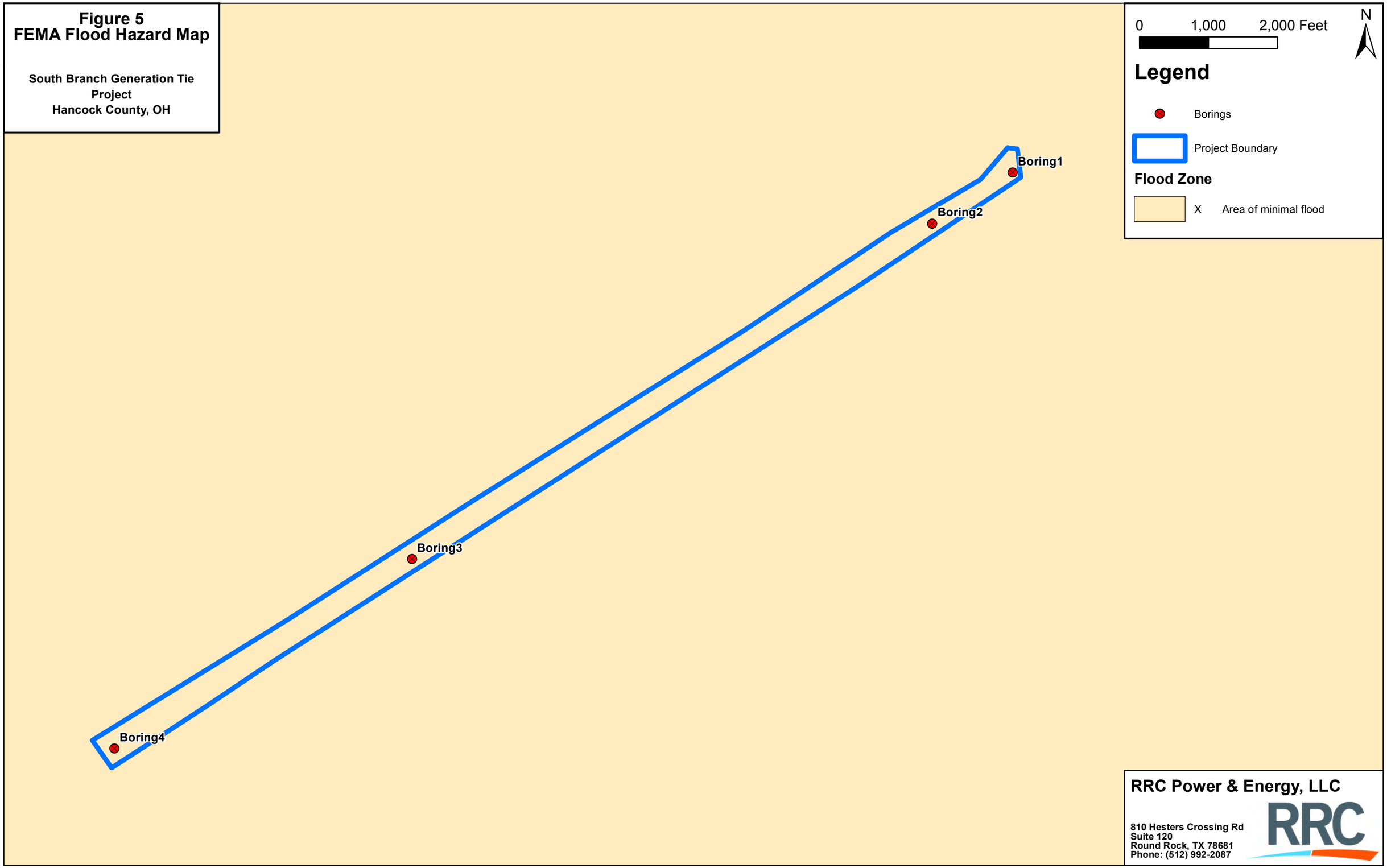
Hancock County, OH



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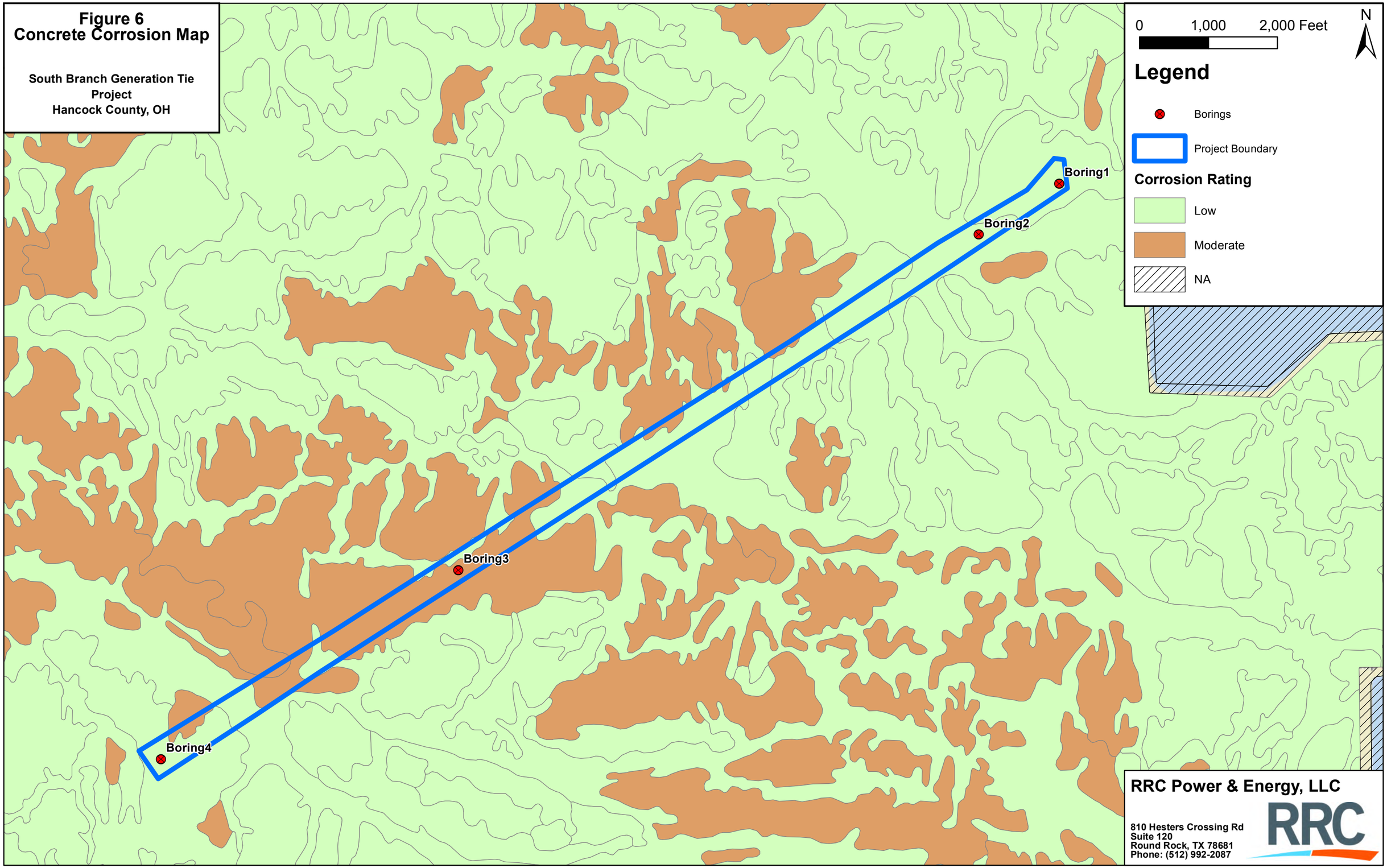
Figure 6
Concrete Corrosion Map
South Branch Generation Tie Project
Hancock County, OH
0
1,000
2,000 Feet
N
Legend
Borings
Project Boundary
Corrosion Rating
Low
Moderate
NA
Boring1
Boring2
Boring3
Boring4
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RRC

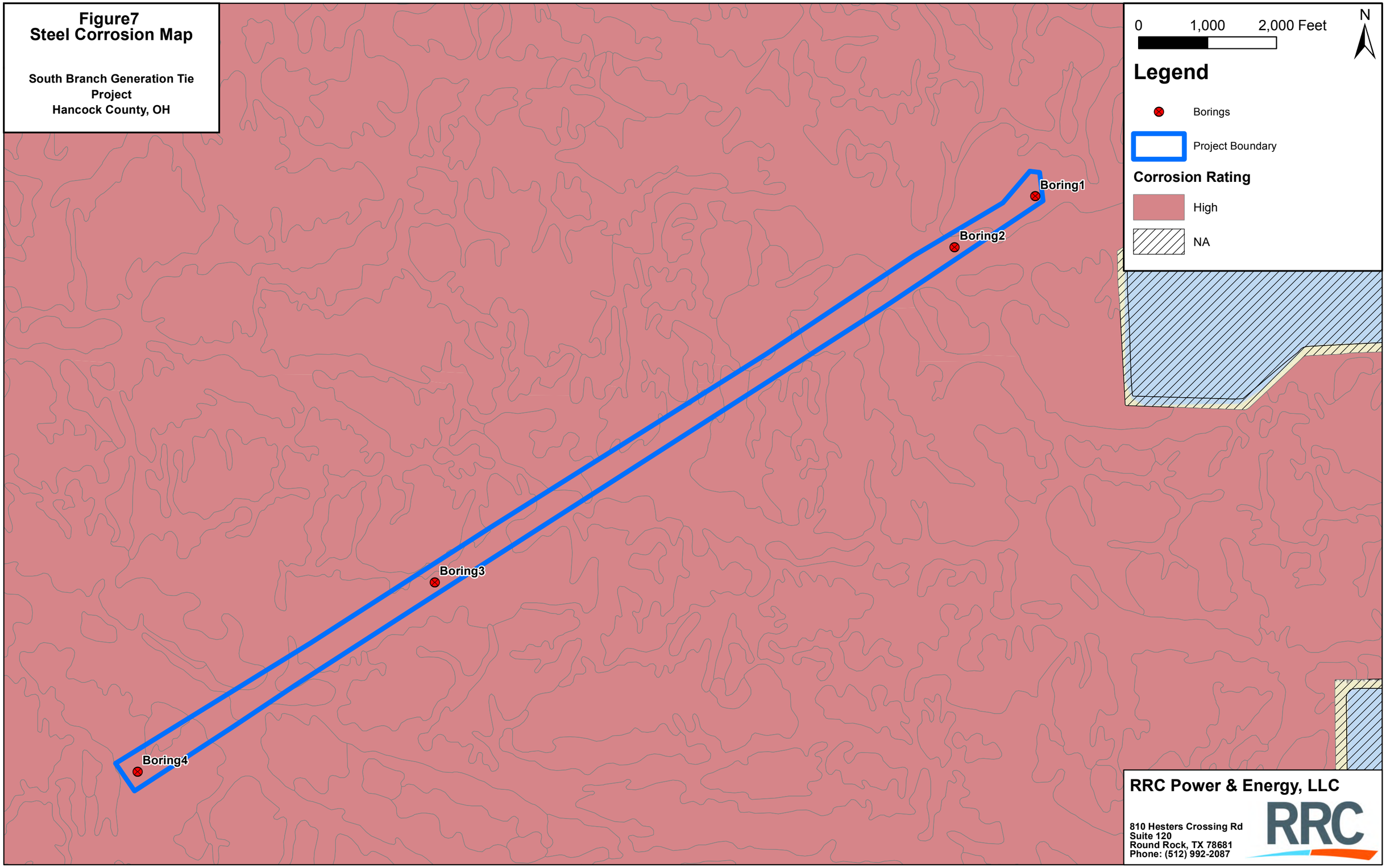


Figure7
Steel Corrosion Map
South Branch Generation Tie Project
Hancock County, OH
0
1,000
2,000 Feet
N
Legend
Borings
Project Boundary
Corrosion Rating
High
NA
Boring1
Boring2
Boring3
Boring4
RRC Power & Energy, LLC
810 Hesters Crossing Rd
Suite 120
Round Rock, TX 78681
Phone: (512) 992-2087
RRC

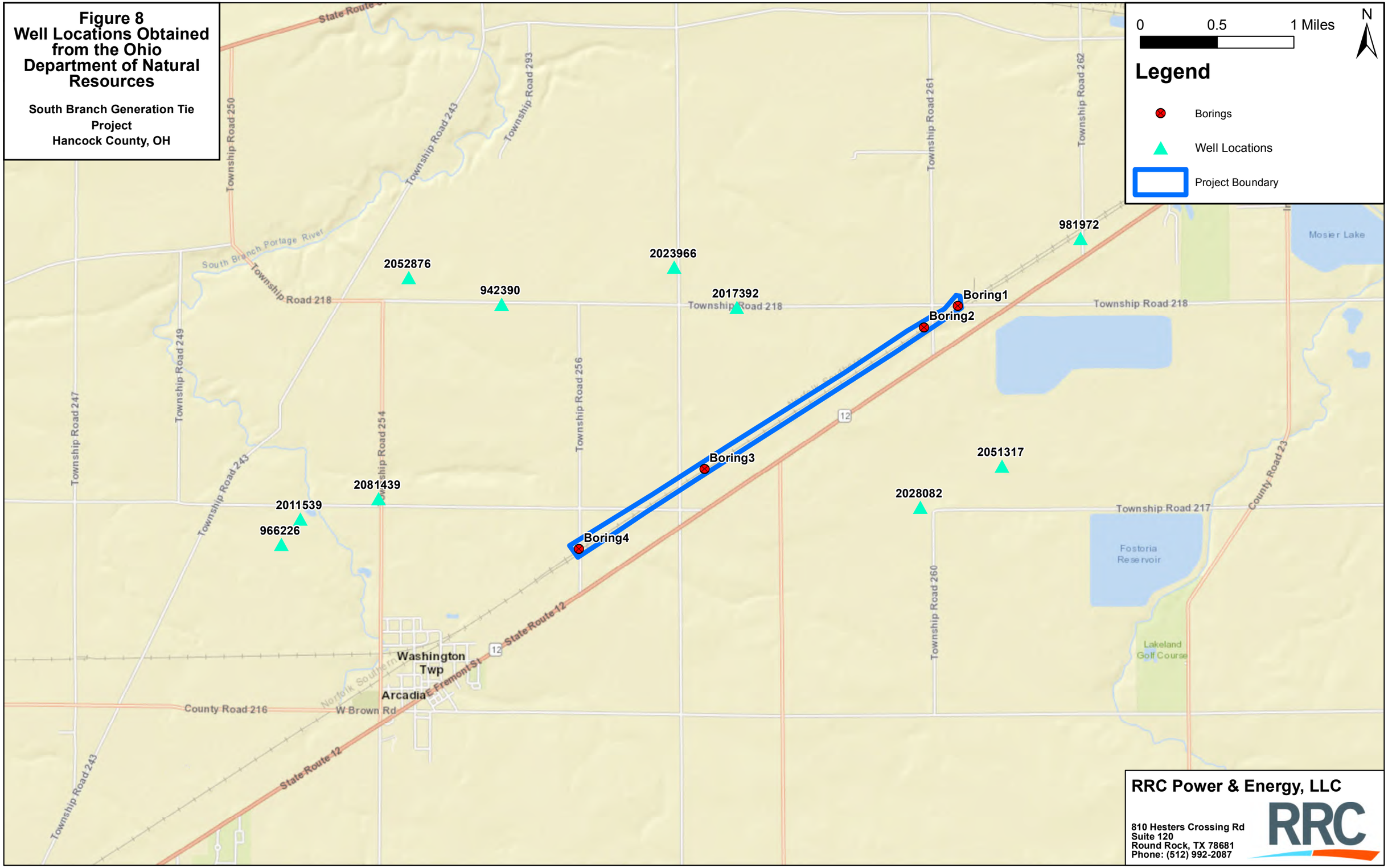


Figure 8
Well Locations Obtained from the Ohio Department of Natural Resources
South Branch Generation Tie Project
Hancock County, OH
0
0.5
1 Miles
N
Legend
Borings
Well Locations
Project Boundary
981972
2052876
2023966
942390
2017392
Boring1
Boring2
Boring3
Boring4
2051317
2081439
2011539
966226
2028082
Township Road 218
Township Road 217
Township Road 250
Township Road 243
Township Road 293
Township Road 261
Township Road 262
Township Road 249
Township Road 247
Township Road 254
Township Road 256
Township Road 260
South Branch Portage River
Mosier Lake
Fostoria Reservoir
Lakeland Golf Course
County Road 23
County Road 216
W Brown Rd
E Fremont St
State Route 12
Washington Twp
Arcadia
Norfolk Southern
RRC Power & Energy, LLC
810 Hesters Crossing Rd
Suite 120
Round Rock, TX 78681
Phone: (512) 992-2087
RRC

BORING LOG KEY

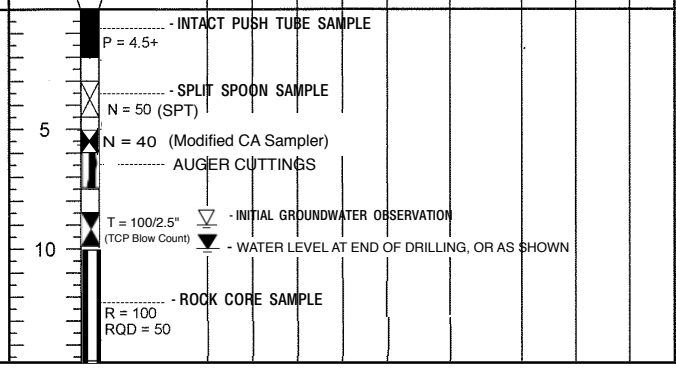
FIELD DATA				LABORATORY DATA								
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)

DRILLING METHOD(S):
Continuous Flight Auger/Hollow-stem Auger/Wet Rotary/NX Core

GROUNDWATER INFORMATION:
Subsurface water was not encountered either during or upon completion of the drilling operations.

SURFACE ELEVATION: ft.

DESCRIPTION OF STRATUM



-- TESTING SYMBOLS DEFINITIOINS --

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

TYPICAL SOIL AND ROCK SYMBOLS (USCS CLASSIFICATION)

- Lean Clay (CL)
- Fat Clay (CH)
- Silt (ML)
- Elastic Silt (MH)
- Silty Sand (SM)
- Clayey Sand (SC)
- Silty, Clayey Sand (SC-SM)
- Poorly-Graded Sand (SP)
- Well-Graded Sand (SW)
- Poorly-Graded Gravel (GP)
- Well-Graded Gravel (GW)
- Clayey Gravel (GC)
- Silty Gravel (GM)
- Silty Clay (CL-ML)
- Claystone
- BASALT
- Limestone
- Sandstone
- Siltstone
- Fill Material
- Shale

DEGREE OF WEATHERING

1) Unweathered: No evidence of any chemical or mechanical alteration.
2) Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered.
3) Moderately weathered: Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10% to 50% of the rock volume altered.
4) Highly weathered: Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
5) Decomposed: rock reduced to a soil with relicit rock texture, generally molded and crumbled by hand.

SOIL STRUCTURE

Calcareous..... Containing calcium carbonate

Slickensided..... The presence of planes of weakness having a slick and glossy appearance

Interbedded..... Alternating layers of varying material

LOG OF BORING Boring 1

RRC Power & Energy, LLC
810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78681
Telephone: (512) 992-2087

CLIENT: Leeward Renewable Energy, LLC
PROJECT: South Branch Solar Project-Gen-Tie
LOCATION: Hancock County, OH
NUMBER: GE2209061
DATE(S) DRILLED: 9/19/2022

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 34 ft. during drilling and measured at 34 ft. immediately after drilling

SURFACE ELEVATION (FT):

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													8 in. Topsoil
			N = 8	16									LEAN CLAY (CL), trace Sand, brown to gray, medium stiff to very stiff, moist
	5		N = 16										
			N = 16										
	10		N = 16										SILTY LEAN CLAY (CL), with Sand, trace Gravel, brown to gray, stiff to very stiff, moist
			N = 11	13								73	
	15		N = 12										
	20		N = 12										
	25		N = 17										LEAN CLAY (CL), with Sand, gray, very stiff, moist
	30		N = 19										SILTY LEAN CLAY (CL), gray, very stiff, moist
	35		N = 31										POORLY-GRADED SAND (SP), black to gray, dense, moist, fine to medium grained
				10									
	40		N = 29										SILTY LEAN CLAY (CL), gray, very stiff to hard, moist
	45		N = 67/9"										
													Refusal at 47 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 41.137050 , Long.-83.462000

RENEWABLE LOG - LOG A GNNL01.GDT - 5/25/23 02:54 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2022\SOUTH BRANCH SOLAR TL-GE2209061\SOUTH BRANCH SOLAR TL-GE2209061.GPJ

LOG OF BORING Boring 2

RRC Power & Energy, LLC
810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78681
Telephone: (512) 992-2087

CLIENT: Leeward Renewable Energy, LLC
PROJECT: South Branch Solar Project-Gen-Tie
LOCATION: Hancock County, OH
NUMBER: GE2209061
DATE(S) DRILLED: 9/19/2022

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater encountered at 20 ft. during drilling and measured at 20 ft. immediately after drilling

SURFACE ELEVATION (FT):

FIELD DATA				LABORATORY DATA									
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													10 in. Topsoil
			N = 6										LEAN CLAY (CL), trace Sand, gray, medium stiff to hard, dry to moist
	5		N = 7	22	39	19	20						
			N = 11	22									
	10		N = 21										
			N = 14										
	15		N = 11										
	20		N = 17										Grading wet
				10									
	25		N = 28										Grading calcareous
	30		N = 60										Grading trace Gravel
													Total Depth = 30.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 41.135517, Long. -83.465314

RENEWABLE LOG - LOG A GNNL01.GDT - 5/25/23 02:54 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2022\SOUTH BRANCH SOLAR TL-GE2209061\SOUTH BRANCH SOLAR TL-GE2209061.GPJ

LOG OF BORING Boring 3

RRC Power & Energy, LLC
810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78681
Telephone: (512) 992-2087

CLIENT: Leeward Renewable Energy, LLC
PROJECT: South Branch Solar Project-Gen-Tie
LOCATION: Hancock County, OH
NUMBER: GE2209061
DATE(S) DRILLED: 9/20/2022

DRILLING METHOD(S):
Mud Rotary

GROUNDWATER INFORMATION:
Groundwater not encountered prior to the introduction of drilling fluid

SURFACE ELEVATION (FT):

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													10 in. Topsoil
			N = 7										LEAN CLAY (CL), with Sand, brown to gray, medium stiff to hard, moist
	5		P = 4.5	15				119					
			N = 29										Grading gray
	10		N = 22										
			N = 17										
	15		N = 17										
	20		N = 11	17								78	
	25		N = 16										
	30		N = 12										
	35		N = 12										
	40		N = 11										SILT (ML), trace Sand, gray, stiff to hard, moist to wet
	45		N = 85/10"	12									
													Refusal at 49 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 41.125420, Long. -83.485977

RENEWABLE LOG - LOG A GNNL01.GDT - 5/25/23 02:54 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2022\SOUTH BRANCH SOLAR TL-GE2209061\SOUTH BRANCH SOLAR TL-GE2209061.GPJ

LOG OF BORING Boring 4

RRC Power & Energy, LLC
810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78681
Telephone: (512) 992-2087

CLIENT: Leeward Renewable Energy, LLC
PROJECT: South Branch Solar Project-Gen-Tie
LOCATION: Hancock County, OH
NUMBER: GE2209061
DATE(S) DRILLED: 9/20/2022

DRILLING METHOD(S):
Mud Rotary

GROUNDWATER INFORMATION:
Groundwater not encountered prior to the introduction of drilling fluid

SURFACE ELEVATION (FT):

FIELD DATA			LABORATORY DATA									
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT LL	ATTERBERG LIMITS: PLASTIC LIMIT PL	ATTERBERG LIMITS: PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													9 in. Topsoil
			N = 10	16									LEAN CLAY (CL), with Silt, gray, stiff to very stiff, moist
	5		N = 17										
			N = 24	17									
	10		N = 26										Grading trace Gravel
			N = 18										
	15		N = 11										
	20		N = 14										
	25		N = 14										
				21									
	30		N = 10										
	35		N = 15										
	40		N = 21										
	45		N = 16										POORLY-GRADED SAND (SP), gray to dark gray, medium dense, moist to wet, fine to coarse grained
	50		N = 17										
													Total Depth = 50.5 ft.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS COORDINATES: Lat. 41.1198278, Long. -83.497669

RENEWABLE LOG - LOG A GNNL01.GDT - 5/25/23 02:54 - R:\OPERATIONS\OP2\02 DESIGN\GEOTECHNICAL\G DRIVE\GINT\PROJECTS\2022\SOUTH BRANCH SOLAR TL-GE2209061\SOUTH BRANCH SOLAR TL-GE2209061.GPJ

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810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78661
512.992.2087

APPENDIX B

Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

Client: RRC Power & Energy, LLC
Project: South Branch Generation Tie Project

RRC Project No.: GE2209061
Testing Method: EPA 300/300.1
Test Date: 10/16/2022

No.	Sample ID & Depth	Sulfate Content (mg SO_4/kg)	Chloride Content (mg/kg)
1	Boring 1 at 6.0 ft	487	28.3
2	Boring 2 at 6.0 ft	125	41.5
3	Boring 3 at 4.0 ft	65.5	21.4
4			
5			
6			
7			
8			
9			
10			

Note 1: Method Detection Limit (MDL) is 5 mg/L
Note 2: ND = No Detection, Below Method Detection Limit
The chloride and sulfate MDLs are volumetric. Results are mass per mass of dry soil.

HuaMiao Cao, P.E., 10/17/2022
Quality Review/Date
Tested by: XENCO

The results shown on this report are for the exclusive use of the client for whom they were obtained and apply only to the sample tested and / or inspected. They are not intended to be indicative of qualities of apparently identical products. The use of our name must recieve prior written approval. Reports must be reproduced in their entirety. Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.

Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

Minimum Soil Resistivity

Client: RRC Power & Energy, LLC
Project: South Branch Generation Tie
Project No.: GE2209061
Sample ID: Boring 1 at 3.5 ft

Test Method: ASTM G187
Test Date: 10/20/22
Resistivity Meter: Humboldt, H-4385
Calibrated Date: 11/5/2021
Multiplication Factor: 0.67 cm

Temp: 20.4 °C

Distilled Water Added (mL)	Measured Resistance (ohms)
20	3680
30	2690
40	2670
50	2860

Minimum Resistivity: 2008 ohm-cm at 15.5˚C (60˚F)

pH of Soil for Use in Corrosion Testing

As-received conditions: 6.98
Temp: 22.6 °C

Test Method: ASTM G51
pH Meter: Hanna Instruments No. 99121

Nancy Bai, 10/21/2022
Quality Review/Date
Tested by: S.G. & J.Z.

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Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

Minimum Soil Resistivity

Client: RRC Power & Energy, LLC
Project: South Branch Generation Tie
Project No.: GE2209061
Sample ID: Boring 3 at 4.0 ft

Test Method: ASTM G187
Test Date: 10/20/22
Resistivity Meter: Humboldt, H-4385
Calibrated Date: 11/5/2021
Multiplication Factor: 0.67 cm

Temp: 19.8 °C

Distilled Water Added (mL)	Measured Resistance (ohms)
30	4680
40	4660
50	5090
60	5230

Minimum Resistivity: 3458 ohm-cm at 15.5˚C (60˚F)

pH of Soil for Use in Corrosion Testing

As-received conditions: 6.62
Temp: 23.5 °C

Test Method: ASTM G51
pH Meter: Hanna Instruments No. 99121

Nancy Bai, 10/21/2022
Quality Review/Date
Tested by: S.G. & J.Z.

The results shown on this report are for the exclusive use of the client for whom they were obtained and apply only to the sample tested and / or inspected. They are not intended to be indicative of qualities of apparently identical products. The use of our name must recieve prior written approval. Reports must be reproduced in their entirety. Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.

SUMMARY OF LABORATORY RESULTS

RRC Power & Energy, LLC
810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78681
Telephone: (512) 992-2087

CLIENT: Leeward Renewable Energy, LLC
PROJECT: South Branch Solar Generation Tie
LOCATION: Hancock County, OH
NUMBER: GE2209061

Borehole	Depth (ft)	USCS	Water Content (%)	Dry Unit Weight (pcf)	< No. 200 (%)	LL	PL	PI	Compressive Strength (tsf)	Strain at Failure (%)	Confining Pressure (psi)	Chlorides (%/weight)	Sulfates (%/weight)	pH	Minimum Resistivity (ohm-cm)
Boring 1	1.0		16												
Boring 1	3.5													7.0	2,008
Boring 1	6.0											0.0028	0.0487		
Boring 1	11.0		13		73										
Boring 1	38.5		10												
Boring 2	3.5		22			39	19	20							
Boring 2	6.0		22									0.0042	0.0125		
Boring 2	23.5		10												
Boring 3	4.0		15	119								0.0021	0.0066	6.6	3,458
Boring 3	18.5		17		78										
Boring 3	43.5		12												
Boring 4	1.0		16												
Boring 4	8.5		17												
Boring 4	28.5		21												

ND Not Detected; **D** Diluted;
*Denotes Total Unit Weight

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Round Rock, TX 78661
512.992.2087

APPENDIX C

Table C1.1 – LPILE Computer Program Parameters for Lateral Load Analysis for Boring 1

Soil Layer	Depth (feet)	LPILE Soil Type	K (pci)		γ'	C	ϕ	ε_{50}	E_{rm}	UCS	RQD	K_{rm}
			Static	Cyclic	(pcf)	(psf)	(degree)		(psi)	(psi)	(%)	
1*	0 to 3	Stiff Clay w/o Free Water	--	--	110	--	--	--	--	--	--	--
2	3 to 4	Stiff Clay w/o Free Water	--	--	120	1,050	--	0.007	--	--	--	--
3	4 to 12	Stiff Clay w/o Free Water	--	--	120	2,120	--	0.007	--	--	--	--
4	12 to 24	Stiff Clay w/o Free Water	--	--	120	1,590	--	0.007	--	--	--	--
5	24 to 34	Stiff Clay w/o Free Water	--	--	120	2,250	--	0.005	--	--	--	--
6	34 to 44	Stiff Clay w/o Free Water	--	--	58	3,850	--	0.005	--	--	--	--
7	44 to 47	Stiff Clay w/o Free Water	--	--	58	5,980	--	0.004	--	--	--	--

Notes: *Upper 3 feet of soil should be neglected due to seasonal moisture change.

Table C1.2 – Direct Embedment/Drilled Pier Foundation Design Parameters for Boring 1

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	γ' (pcf)	ϕ (degree)	C (psf)	C'_{Rock} (psf)	K_p	SPT N-Value (blows/ft)	Deformation Modulus (ksi)	Allowable Unit Skin Friction (FS=2.5)[1] (psf)	Allowable Bearing Pressure (FS=3) (psf)
1*	0 to 3	CL	110	--	--	--	--	--	--	--	--
2	3 to 4	CL	120	--	1,050	--	3.04	8	1.1	230	2,800
3	4 to 12	CL	120	--	2,120	--	3.04	16	1.6	460	4,200
4	12 to 24	CL	120	--	1,590	--	3.04	12	1.4	350	4,200
5	24 to 34	CL	120	--	2,250	--	3.04	17	1.7	490	6,700
6	34 to 44	CL	58	--	3,850	--	3.04	29	2.4	790	11,500
7	44 to 47	CL	58	--	5,980	--	3.04	100	5.2	1,070	17,900

Table C1.3 – Grout Anchor Design Parameters for Boring 1

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	Ultimate Grout Bond Strength[2] (psi)
1*	0 to 3	CL	--
2	3 to 4	CL	4
3	4 to 12	CL	7
4	12 to 24	CL	6
5	24 to 34	CL	8
6	34 to 44	CL	13
7	44 to 47	CL	21

Notes: Design depth to groundwater is 34 feet.

*Upper 3 feet of soils should be neglected due to seasonal moisture change; Kp: Rankine Passive Earth Pressure Coefficient; γ': Effective Unit Weight ($\gamma'=\gamma_{Total}$-62.4 pcf); ϕ: Angle of Internal Friction.

[1] For uplift resistance, the allowable skin friction provided in table above should be reduced by 25 percent.

[2] A minimum bond length of 10 feet in bedrock and 15 feet in soils is recommended. Estimated bond strength are for gravity grout anchors. RRC recommends grout anchor capacities be verified by pull-out test.

Table C2.1 – LPILE Computer Program Parameters for Lateral Load Analysis for Boring 2

Soil Layer	Depth (feet)	LPILE Soil Type	K (pci)		γ'	C	ϕ	ε_{50}	E_{rm}	UCS	RQD	K_{rm}
			Static	Cyclic	(pcf)	(psf)	(degree)		(psi)	(psi)	(%)	
1*	0 to 3	Stiff Clay w/o Free Water	--	--	110	--	--	--	--	--	--	--
2	3 to 6	Stiff Clay w/o Free Water	--	--	120	920	--	0.010	--	--	--	--
3	6 to 9	Stiff Clay w/o Free Water	--	--	120	1,450	--	0.007	--	--	--	--
4	9 to 20	Stiff Clay w/o Free Water	--	--	120	1,850	--	0.007	--	--	--	--
5	20 to 24	Stiff Clay w/o Free Water	--	--	58	2,250	--	0.005	--	--	--	--
6	24 to 29	Stiff Clay w/o Free Water	--	--	58	3,720	--	0.005	--	--	--	--
7	29 to 31	Stiff Clay w/o Free Water	--	--	58	5,980	--	0.004	--	--	--	--

Notes: *Upper 3 feet of soil should be neglected due to seasonal moisture change.

Table C2.2 – Direct Embedment/Drilled Pier Foundation Design Parameters for Boring 2

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	γ' (pcf)	ϕ (degree)	C (psf)	C'_{Rock} (psf)	K_p	SPT N-Value (blows/ft)	Deformation Modulus (ksi)	Allowable Unit Skin Friction (FS=2.5)[1] (psf)	Allowable Bearing Pressure (FS=3) (psf)
1*	0 to 3	CL	110	--	--	--	--	--	--	--	--
2	3 to 6	CL	120	--	920	--	3.15	7	1.0	200	2,000
3	6 to 9	CL	120	--	1,450	--	3.15	11	1.3	320	3,800
4	9 to 20	CL	120	--	1,850	--	3.15	14	1.5	400	4,900
5	20 to 24	CL	58	--	2,250	--	3.15	17	1.7	490	6,700
6	24 to 29	CL	58	--	3,720	--	3.15	28	2.3	780	11,100
7	29 to 31	CL	58	--	5,980	--	3.15	60	3.7	1,070	17,900

Table C2.3 – Grout Anchor Design Parameters for Boring 2

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	Ultimate Grout Bond Strength[2] (psi)
1*	0 to 3	CL	--
2	3 to 6	CL	3
3	6 to 9	CL	5
4	9 to 20	CL	6
5	20 to 24	CL	8
6	24 to 29	CL	13
7	29 to 31	CL	21

Notes: Design depth to groundwater is 20 feet.

*Upper 3 feet of soils should be neglected due to seasonal moisture change; Kp: Rankine Passive Earth Pressure Coefficient; γ': Effective Unit Weight ($\gamma'=\gamma_{Total}$-62.4 pcf); ϕ: Angle of Internal Friction.

[1] For uplift resistance, the allowable skin friction provided in table above should be reduced by 25 percent.

[2] A minimum bond length of 10 feet in bedrock and 15 feet in soils is recommended. Estimated bond strength are for gravity grout anchors. RRC recommends grout anchor capacities be verified by pull-out test.

Table C3.1 – LPILE Computer Program Parameters for Lateral Load Analysis for Boring 3

Soil Layer	Depth (feet)	LPILE Soil Type	K (pci)		γ'	C	ϕ	ε_{50}	E_{rm}	UCS	RQD	K_{rm}
			Static	Cyclic	(pcf)	(psf)	(degree)		(psi)	(psi)	(%)	
1*	0 to 3	Stiff Clay w/o Free Water	--	--	110	--	--	--	--	--	--	--
2	3 to 7	Stiff Clay w/o Free Water	--	--	120	2,120	--	0.007	--	--	--	--
3	7 to 12	Stiff Clay w/o Free Water	--	--	120	2,920	--	0.005	--	--	--	--
4	12 to 18.5	Stiff Clay w/o Free Water	--	--	120	2,250	--	0.005	--	--	--	--
5	18.5 to 39	Stiff Clay w/o Free Water	--	--	120	1,590	--	0.007	--	--	--	--
6	39 to 44	Stiff Clay w/o Free Water	--	--	120	1,450	--	0.007	--	--	--	--
7	44 to 49	Stiff Clay w/o Free Water	--	--	120	5,980	--	0.004	--	--	--	--

Notes: *Upper 3 feet of soil should be neglected due to seasonal moisture change.

Table C3.2 – Direct Embedment/Drilled Pier Foundation Design Parameters for Boring 3

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	γ' (pcf)	ϕ (degree)	C (psf)	C'_{Rock} (psf)	K_p	SPT N-Value (blows/ft)	Deformation Modulus (ksi)	Allowable Unit Skin Friction (FS=2.5)[1] (psf)	Allowable Bearing Pressure (FS=3) (psf)
1*	0 to 3	CL	110	--	--	--	--	--	--	--	--
2	3 to 7	CL	120	--	2,120	--	3.04	16	1.6	460	3,800
3	7 to 12	CL	120	--	2,920	--	3.04	22	2.0	640	3,800
4	12 to 18.5	CL	120	--	2,250	--	3.04	17	1.7	490	3,800
5	18.5 to 39	CL	120	--	1,590	--	3.04	12	1.4	350	3,800
6	39 to 44	ML	120	--	1,450	--	3.04	11	1.3	320	3,800
7	44 to 49	ML	120	--	5,980	--	3.04	100	5.2	1,070	17,900

Table C3.3 – Grout Anchor Design Parameters for Boring 3

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	Ultimate Grout Bond Strength[2] (psi)
1*	0 to 3	CL	--
2	3 to 7	CL	7
3	7 to 12	CL	10
4	12 to 18.5	CL	8
5	18.5 to 39	CL	6
6	39 to 44	ML	5
7	44 to 49	ML	21

Notes: Design depth to groundwater is 49 feet.

*Upper 3 feet of soils should be neglected due to seasonal moisture change; Kp: Rankine Passive Earth Pressure Coefficient; γ': Effective Unit Weight ($\gamma'=\gamma_{Total}$-62.4 pcf); ϕ: Angle of Internal Friction.

[1] For uplift resistance, the allowable skin friction provided in table above should be reduced by 25 percent.

[2] A minimum bond length of 10 feet in bedrock and 15 feet in soils is recommended. Estimated bond strength are for gravity grout anchors. RRC recommends grout anchor capacities be verified by pull-out test.

Table C4.1 – LPILE Computer Program Parameters for Lateral Load Analysis for Boring 4

Soil Layer	Depth (feet)	LPILE Soil Type	K (pci)		γ'	C	ϕ	ε_{50}	E_{rm}	UCS	RQD	K_{rm}
			Static	Cyclic	(pcf)	(psf)	(degree)		(psi)	(psi)	(%)	
1*	0 to 3	Stiff Clay w/o Free Water	--	--	105	--	--	--	--	--	--	--
2	3 to 4	Stiff Clay w/o Free Water	--	--	120	1,320	--	0.007	--	--	--	--
3	4 to 14	Stiff Clay w/o Free Water	--	--	120	2,250	--	0.005	--	--	--	--
4	14 to 34	Stiff Clay w/o Free Water	--	--	120	1,450	--	0.007	--	--	--	--
5	34 to 44	Stiff Clay w/o Free Water	--	--	120	1,990	--	0.007	--	--	--	--
6	44 to 50.5	Sand (Reese)	90	--	120	--	31.68344	--	--	--	--	--

Notes: *Upper 3 feet of soil should be neglected due to seasonal moisture change.

Table C4.2 – Direct Embedment/Drilled Pier Foundation Design Parameters for Boring 4

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	γ' (pcf)	ϕ (degree)	C (psf)	C'_{Rock} (psf)	K_p	SPT N-Value (blows/ft)	Deformation Modulus (ksi)	Allowable Unit Skin Friction (FS=2.5)[1] (psf)	Allowable Bearing Pressure (FS=3) (psf)
1*	0 to 3	CL	105	--	--	--	--	--	--	--	--
2	3 to 4	CL	120	--	1,320	--	3.04	10	1.2	290	3,500
3	4 to 14	CL	120	--	2,250	--	3.04	17	1.7	490	3,800
4	14 to 34	CL	120	--	1,450	--	3.04	11	1.3	320	3,800
5	34 to 44	CL	120	--	1,990	--	3.04	15	1.6	430	5,300
6	44 to 50.5	SP	120	32	--	--	3.21	16	1.5	850	6,400

Table C4.3 – Grout Anchor Design Parameters for Boring 4

Soil Layer	Depth (feet)	USCS Soil & Rock Classification	Ultimate Grout Bond Strength[2] (psi)
1*	0 to 3	CL	--
2	3 to 4	CL	5
3	4 to 14	CL	8
4	14 to 34	CL	5
5	34 to 44	CL	7
6	44 to 50.5	SP	12

Notes: Design depth to groundwater is 50.5 feet.

*Upper 3 feet of soils should be neglected due to seasonal moisture change; Kp: Rankine Passive Earth Pressure Coefficient; γ': Effective Unit Weight ($\gamma'=\gamma_{Total}$-62.4 pcf); ϕ: Angle of Internal Friction.

[1] For uplift resistance, the allowable skin friction provided in table above should be reduced by 25 percent.

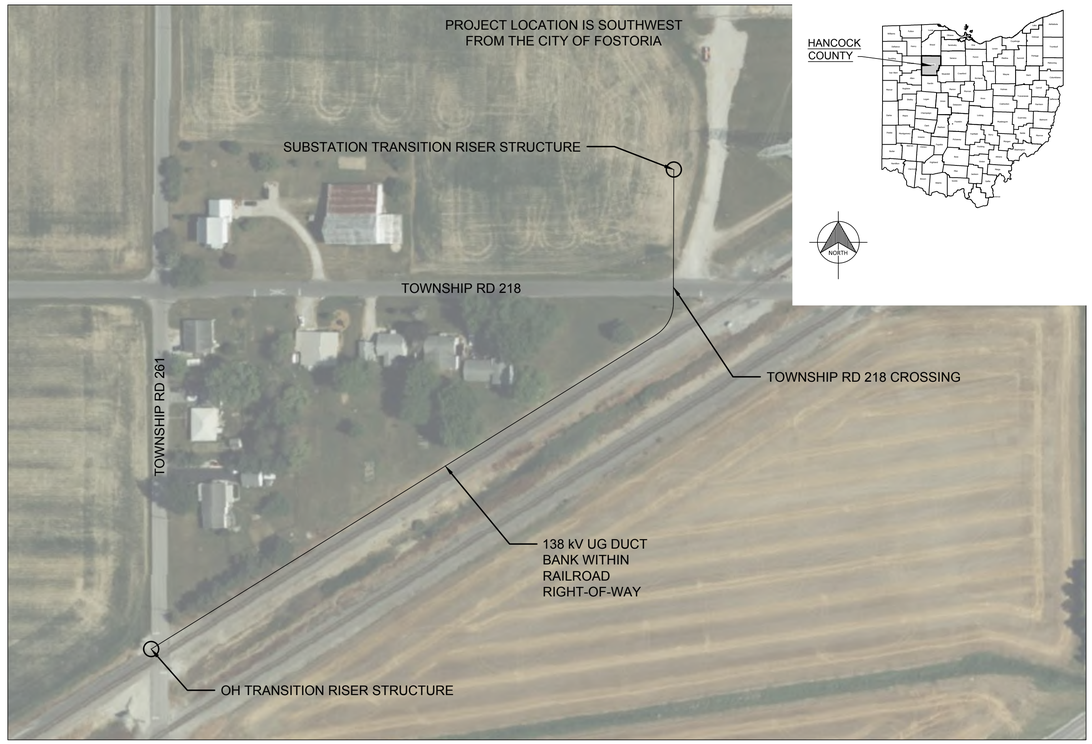
[2] A minimum bond length of 10 feet in bedrock and 15 feet in soils is recommended. Estimated bond strength are for gravity grout anchors. RRC recommends grout anchor capacities be verified by pull-out test.

www.RRCcompanies.com

810 Hesters Crossing Rd, Suite 120
Round Rock, TX 78661
512.992.2087

APPENDIX D

SOUTH BRANCH SOLAR 138 kV GENERATION TIE LINE



NOTES:

1. LINE DESIGN ENGINEER SHALL COORDINATE WITH SUBSTATION, LAND, CIVIL, PERMITTING, CONSTRUCTION, THIRD-PARTY/JOINT USE OWNERS, AND OTHER PERSONNEL REQUIRED TO COORDINATE ALL REQUIREMENTS FOR THE PROJECT. THIS SHALL INCLUDE CONDUCTOR AND COMMUNICATION CONNECTIONS AT SUBSTATIONS.
2. UNIT OF MEASURE FOR DISTANCES AND ELEVATIONS IS FEET.
3. CONTRACTOR MUST COMPLY WITH ALL ENVIRONMENTAL REGULATIONS DURING THE CONSTRUCTION OF THIS PROJECT.
4. CONTACT LOCAL ONE CALL SYSTEM (811) FOR LOCATES BEFORE DIGGING.
5. ADHERE TO ALL AGREEMENT REGULATIONS FOR ALL OVERHEAD AND UNDERGROUND CROSSINGS.
6. FIBER OPTIC CABLE TO BE CONFIRMED BY ENGINEER AT TIME OF ORDER.

REFERENCES:

- NATIONAL ELECTRICAL SAFETY CODE C2-2017 (NESC 2017)
- NATIONAL ELECTRIC CODE (NEC 2017)

138 kV DESIGN PARAMETERS	
LINE LENGTH (FT)	1011
LINE RATING (MVA)	205
LINE VOLTAGE (kV)	138
PHASE AMPERAGE (A)	858
CABLE TYPE	SOLID DIELECTRIC (XLPE)
ASSUMED CABLE DESCRIPTION	138 kV 2500 KCMIL COMPACT CU, 850 MILS XLPE, 29xAWG 10 Cu, AI LAM, HDPE JKT
BIL (kV)	650
CABLE RATING SHORT CIRCUIT CURRENT/DURATION	TBD
CABLE AMPACITY at 90 °C (A)	TBD
COND RESISTANCE AC at 25 °C (Ω/1000 ft)	0.00436
CABLE SIDEWALL BEARING PRESSURE (LBS/FT)	TBD
CABLE MAXIMUM PULLING TENSION (LBS)	TBD
CABLE MINIMUM BENDING RADIUS (INSTALL/PERM) (IN)	TBD
CABLE MAXIMUM REEL LENGTH (FT)	TBD

DESIGN CONSIDERATION SUMMARY	
COORDINATE SYSTEM	STATE PLANE NAD83 OHIO NORTH, US SURVEY FEET
ELEVATION ASL (FT)	790
LAT-LON (DMS)	41.137586°, -83.462034°
ASSUMED GROUND TEMPERATURE (°C)	25
138 kV DEEP SOIL THERMAL RESISTIVITY - NATIVE (°C-cm/W)	TBD
138 kV DEEP SOIL THERMAL RESISTIVITY - DRY (°C-cm/W)	TBD
138 kV DEEP SOIL DRY DENSITY (LB/FT3)	TBD
CONCRETE THERMAL RESISTIVITY (°C-cm/W)	80 @ 2% MOISTURE
CROSSING FACILITIES	TBD
PROJECT LIFETIME (YR)	20
DUCT BANK CONFIGURATION	6" 2x2, 1-2" SCH 40/80 PVC, COMM FIBER IN SEPARATE CONDUIT
138 kV GCC CABLE TYPE	350 KCMIL 37 STR Cu, XLPE, 600 V
138 kV BONDING CABLE TYPE	250 KCMIL 37 STR Cu, XLPE
138 kV CABLE BONDING SCHEME	SINGLE POINT w/ SVL
COMM FIBER CABLE TYPE	TBD
TERRAIN	FLAT, GRADED
SOIL	TBD
CONNECTING UTILITY	TBD
138 kV UTILITY FAULT CURRENT REQUIREMENTS	TBD
PROPERTY OWNERSHIP	PRIVATE

CABLE SYSTEM MATERIAL QUANTITIES	QTY
138 kV CABLE CLAMP	60 EA
138 kV SURGE ARRESTOR 115 kV MCOV, 650 BIL	6 EA
138 kV TERMINATIONS	6 EA
138 kV 2500 KCMIL CU TRANSMISSION CABLE	4500 FT
350 KCMIL 37 STR Cu, XLPE, 600 V GCC	1100 FT
FIBER OPTIC CABLE	2200 FT
EARTHING LINK BOX W/ SVL	1 EA
EARTHING LINK BOX W/O SVL	1 EA
6" CONDUIT (PVC & HDPE)	4450 FT
2" CONDUIT (FIBER & GCC)	3340 FT
RISER STRUCTURE AND FOUNDATION	2 EA
250 KCMIL 37 STR Cu, XLPE BONDING LEADS	300 FT
SPACERS	445 EA

DRAWING LIST			
DRAWING No.	REV	DESCRIPTION/TITLE	DATE
SBSP-T-000-01	A	COVER SHEET NOTES AND PROJECT DATA	4/28/2023
SBSP-T-000-02		GENERAL NOTES	TBD
SBSP-T-450-01	A	TRENCH AND DUCT BANK DETAILS	4/28/2023
SBSP-T-701-01	A	UG GEN-TIE 138 kV LINE LAYOUT SECTION 1	4/28/2023
SBSP-T-710-01	A	138 kV UG GEN-TIE SINGLE LINE AND SCHEMATIC	4/28/2023
SBSP-T-755-01	A	138 kV CROSSINGS AND CABLE TAG DETAILS	4/28/2023
TBD		RISER STRUCTURE	TBD
TBD		OVERHEAD SPAN DETAILS	TBD

ABBREVIATIONS:

PLCS = PLACES
T/L = TRANSMISSION LINE
O.C. = ON CENTER
TYP = TYPICAL
OD = OUTER DIAMETER
KCM = THOUSAND CIRCULAR MILS
30K = 30,000 POUNDS
FT = FEET
IN = INCHES
LBS = POUNDS
STR = STRAND / STRANDS / STRANDING
SUB = SUBSTATION
FTB = FLUIDIZED THERMAL BACKFILL
MAX = MAXIMUM
MIN = MINIMUM
RBS = RATED BREAKING STRENGTH
EHS = EXTRA HIGH STRENGTH
GALV = GALVANIZED
ALUM = ALUMINUM
TBD = TO BE DETERMINED (DATA NOT FINALIZED OR UNAVAILABLE)
DIA = DIAMETER
CLSM = CONTROLLED LOW DENSITY MATERIAL
SVL = SURGE VOLTAGE LIMITER
GCC = GROUND CONTINUITY CONDUCTOR

RRC POWER & ENERGY, LLC
810 HESTERS CROSSING RD,
SUITE 120, ROUND ROCK, TX 78681
PHONE: (512) 992-2087
WWW.RRCcompanies.COM

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LEEWARD renewable energy

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SCALE: 0' 100' 200' 400'

PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	ISSUE DESCRIPTION
A	04/28/2023	ISSUED FOR REVIEW 10%

APPROVED BY: S. BEILSTEIN
CHECKED BY: S. BEILSTEIN
DESIGNED BY: D. LANNON
DRAWN BY: A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

COVER SHEET
NOTES
AND PROJECT DATA

DRAWING No. SBSP-D-T000-1 | SHEET: 1 of 1 | REVISION A

CADFILE: SBSP-T-000-01

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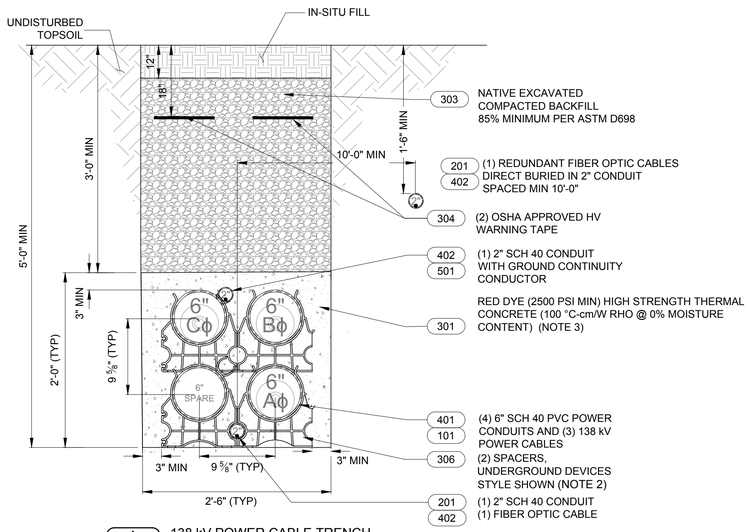


A
-
138 kV POWER CABLE TRENCH
UNDISTURBED TOPSOIL
SCALE: N.T.S.

NOTES

1. MINIMUM BENDING RADIUS FOR CABLE SHALL BE PER MANUFACTURER'S RECOMMENDATION.
2. SPACERS TO BE DESIGNED BY SELECTED MANUFACTURER OR CONTRACTOR. ANY CALLOUTS AND CATALOG NUMBERS FOR SPACERS PRIOR TO SELECTION OF SPACER MANUFACTURER OR CONTRACTOR ARE FOR BID PURPOSES ONLY.
3. MIX TO BE APPROVED BY ENGINEER.

REFERENCES

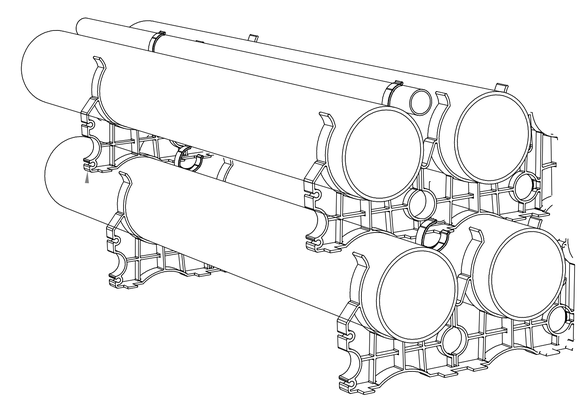
GENERAL NOTES	SBSP-T-000-01
115 kV CROSSING AND CABLE TAG DETAILS	SBSP-T-755-01

DOCUMENTS

SPECIFICATION: HIGH STRENGTH THERMAL CONCRETE	REV A

LEGEND

- DISTURBED TOPSOIL (IN-SITU BACKFILL)
- UNDISTURBED TOPSOIL
- PAVEMENT
- ROAD BASE
- RED DYE (2500 PSI MIN) THERMAL FLUIDIZED BACKFILL
- HIGH STRENGTH THERMAL CONCRETE
- NATIVE COMPACTED EXCAVATED BACKFILL



CONDUIT AND SPACER SYSTEM
ISOMETRIC VIEW (FOR REFERENCE ONLY)
SCALE: N.T.S.

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APPROVED BY:	S. BEILSTEIN
CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:
SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

TRENCH AND
DUCT BANK DETAILS

DRAWING No.	SHEET:	REVISION
SBSP-T-450-01	1 of 1	A

CADFILE: SBSP-T-450-01

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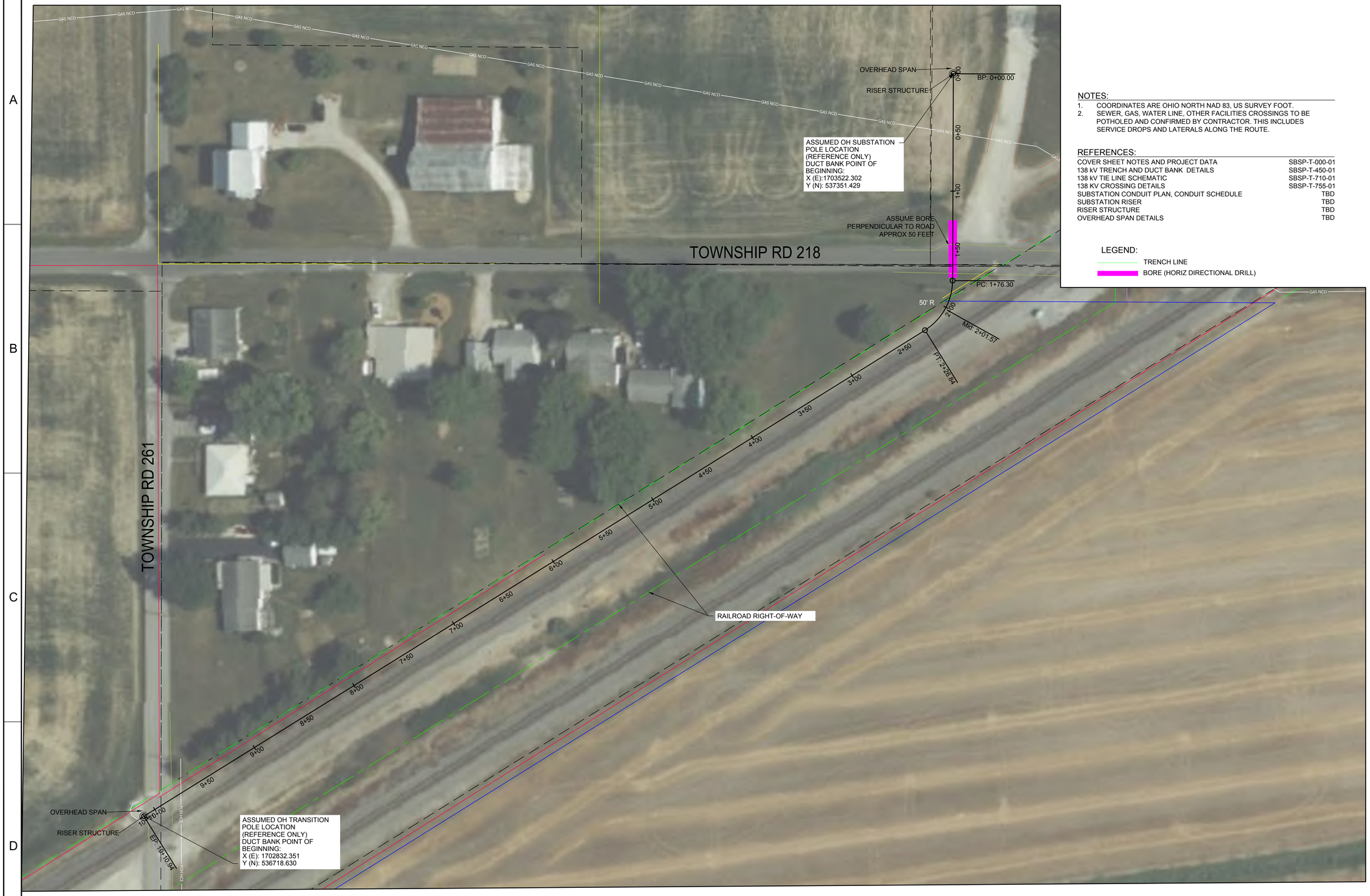

NOTES:

1. COORDINATES ARE OHIO NORTH NAD 83, US SURVEY FOOT.
2. SEWER, GAS, WATER LINE, OTHER FACILITIES CROSSINGS TO BE POTHOLED AND CONFIRMED BY CONTRACTOR. THIS INCLUDES SERVICE DROPS AND LATERALS ALONG THE ROUTE.

REFERENCES:

COVER SHEET NOTES AND PROJECT DATA	SBSP-T-000-01
138 kV TRENCH AND DUCT BANK DETAILS	SBSP-T-450-01
138 kV TIE LINE SCHEMATIC	SBSP-T-710-01
138 KV CROSSING DETAILS	SBSP-T-755-01
SUBSTATION CONDUIT PLAN, CONDUIT SCHEDULE	TBD
SUBSTATION RISER	TBD
RISER STRUCTURE	TBD
OVERHEAD SPAN DETAILS	TBD

LEGEND:

TRENCH LINE

BORE (HORIZ DIRECTIONAL DRILL)

RRC POWER & ENERGY, LLC
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APPROVED BY:	S. BEILSTEIN
CHECKED BY:	S. BEILSTEIN
DESIGNED BY:	D. LANNON
DRAWN BY:	A. AMATO

PROJECT NUMBER: EE2304015

DRAWING NAME:

SOUTH BRANCH SOLAR
138 kV GENERATION TIE LINE

UG GEN-TIE
138 kV LINE LAYOUT
SECTION 1

DRAWING No. SBSP-T-701-01 SHEET: REVISION A

CADFILE: SBSP-T-701-01

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This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

6/7/2023 3:15:20 PM

in

Case No(s). 23-0373-EL-BTX

Summary: Application Appendix F - Preliminary Geotechnical Report electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX G

HDD CONTINGENCY PLAN

south branch solar

Horizontal Directional Drilling Contingency Plan

South Branch Gen-Tie
Hancock County, Ohio

May 2023

Table of Contents

Introduction 1
Procedures and Responsibilities 1
Equipment 2
Inadvertent Release Containment & Control 2
Reporting 3

Introduction

South Branch Solar, LLC (South Branch) is proposing to construct a 138-kilovolt (kV) electric transmission line (the Gen-Tie) to allow electricity generated at South Branch Solar to tie directly into the existing Fostoria Center Substation within Washington Township, Hancock County, Ohio. The Gen-Tie will extend to the north of an active rail line, within railroad property.

Where the Gen-Tie will consist of overhead structures, natural resources will be avoided by the structures and by spanning overhead wires. A portion of the Gen-Tie is proposed to be installed underground to minimize visual impacts. Underground installation may use a trenchless excavation method known as horizontal directional drilling (HDD).

HDD is a steerable utility installation system commonly used to install cables and pipelines beneath roads, rivers, wetlands, and other obstacles. HDD is a safe, efficient, cost-effective method and utilizes a watery mud-slurry, drilling fluid mixture throughout the operation in order to reduce friction and stabilize the drilled hole. The drilling fluid mixture typically consists primarily of water, with limited amounts of bentonite clay, a natural, non-toxic substance.

During the HDD process there is potential for drilling fluids to be inadvertently released to the surface (sometimes referred to as “frac-out” or “release”). Frac-out is most likely to occur near the bore entry and exit points, however, the entire bore hole will be monitored for instances of seepage or inadvertent release during construction.

The following operational procedures and outlined responsibilities will be established for the prevention, containment, and remediation of any frac-outs that may occur in connection with the potential use of HDD as part of the Gen-Tie construction. It is expected that, while in-field roles will be associated with members of the construction contractor’s team, South Branch will provide oversight for the implementation of these measures.

Procedures and Responsibilities

Any potential HDD operations will be carefully monitored and carried out by South Branch personnel, and the directional drilling contractor. A Site Supervisor will be designated to oversee any potential HDD activities, and to lead the implementation of this frac-out management plan.

In an effort to identify inadvertent returns quickly and reduce adverse impacts, South Branch will have an environmental specialist on-site during construction activities that may affect sensitive areas (e.g. wetlands, streams, etc.), including during the implementation of HDD activities. The specialist will be familiar with water quality protection issues and potential threatened or endangered species of plants and animals that may be encountered. The environmental specialist will have authority to direct the Site Supervisor to implement measures in the event necessary for environmental protection. It is not currently anticipated that such work will occur within wetlands or streams.

Monitoring of HDD activity will include inspection of the entry and exit points as well as along the drill path, continuous examination of drilling pressures and return flows, and necessary documentation of drilling status and conditions.

The Site Supervisor will be responsible for ensuring that all relevant employees are trained properly for conducting standard HDD activity and responding to potential inadvertent release. The Site Supervisor will be responsible for confirming availability and managing the necessary equipment on-site during which time HDD frac-out may occur and utilizing such equipment safely and

effectively. In the event of any inadvertent frac-out from HDD activities, the Site Supervisor will be responsible for reporting such occurrences to the required and appropriate agencies.

South Branch will be responsible for notifying owners of abutting property where HDD or similar activities will occur at least 7 days prior to initiation of the HDD activities. South Branch will ensure that abutting landowners are aware of Gen-Tie contact personnel, such that any potential issue observed resultant from the HDD activities can be promptly reported in accordance with the Gen-Tie's Complaint Resolution Plan.

Equipment

If HDD is utilized in Project construction, certain equipment will be made available in order to carry out such work safely and in preparation of any inadvertent release occurrences. Such equipment may include spill response kits and spill containment materials, hay bales, silt fences, sandbags, portable pumps, plastic sheeting, and a vacuum truck.

Inadvertent Release Containment & Control

In an effort to identify inadvertent returns quickly, and reduce adverse impacts to sensitive resources (e.g., wetlands, streams, grassland habitat, etc.), the bore path will be constantly monitored by South Branch personnel and the directional drilling contractor, in addition to oversight by the Gen-Tie's environmental specialist, where sensitive resources are present.

If inadvertent release of drilling fluid is detected as a result of HDD activities taking place on-site, all drilling activities will cease until containment is established, and the contractor will take immediate action to identify the release and ensure appropriate response is taken, in consultation with the environmental specialist. The release will be promptly assessed by the contractor, in coordination with the environmental specialist and South Branch, to determine whether the release may potentially reach adjacent waterbodies, wetlands or other nearby sensitive areas. Drilling will not be permitted to resume until containment measures (e.g., straw wattles, straw bales, sandbags, filter sock, etc.) and soil stabilization measures are applied for inadvertent returns that occurred near streams. The installation and functionality of the mitigation will be evaluated by the environmental specialist.

If inadvertent release occurs in upland areas, immediate actions will be taken to contain the release, utilizing hay bales, silt fences, and sandbags. Once contained, any released fluid will be collected and either recycled or disposed of at an approved location.

If an inadvertent release occurs in a wetland or other waterbody, whether inside or outside of the Gen-Tie corridor, immediate actions will be taken to contain the release and prevent migration. Inadvertent returns that occur within waterways will be controlled using a sandbag containment structure to ensure sediment releases remain at the point of discharge. All inadvertent return containments will be continually monitored to ensure releases remain within the affected areas. If public health and safety are threatened by an inadvertent release, all drilling operations will halt immediately until the threat is eliminated.

Preemptive measures, such as installing a sediment barrier along the bore path parallel with the stream, will be employed ahead of commencing drilling activities to prevent an upland inadvertent return from

entering into the stream. If necessary, a relief pit may be excavated within the Project limits in an upland area adjacent to the drill path. Relief pits will not be permitted for installation in sensitive resources. The contractor installing the relief pit is required to coordinate with the environmental specialist prior to installation to ensure impacts to sensitive resources are avoided.

All disturbed areas associated with the Project will be stabilized and restored per the specifications outlined in the Stormwater Pollution Prevention Plan.

Reporting

If an inadvertent release occurs within a wetland, waterbody, or other sensitive resource area, the contractor and/or Site Supervisor will immediately notify South Branch, and relevant agencies will be contacted per the table below and in accordance with regulatory reporting requirements.

Agency	Point(s) of Contact	Preferred Contact Method	Protocol for Notification
Ohio Power Siting Board (OPSB)	OPSB Hotline	866-270-6772	Call OPSB Hotline as soon as possible, describing the type of frac-out; follow up with email and then a call to OPSB Project Lead
	Email	contactOPSB@puco.ohio.gov	
	Compliance Investigator (Eric Morrison)	614-981-3916	
Ohio Environmental Protection Agency (Ohio EPA)	Spill Hotline (24/7)	800-282-9378	Notify within 30 minutes, describing the type of frac-out
Ohio Department of Natural Resources (ODNR)	Division of Wildlife (Mike Pettegrew)	614-265-6387	Notify as soon as possible if within an area where listed species are known to occur

Regulatory agencies will be notified as required by applicable laws and regulations and such notifications will include:

- Date and time of inadvertent release;
- Location of the release;
- Type and approximate quantity of the release;
- How the release occurred, and HDD activity being performed at the time;
- Description of potentially sensitive areas in relation to release location; and
- Description of methods to contain and remediate the release location, as applicable.

For minor releases not requiring regulatory reporting, HDD may continue if full containment is achieved as described above. For releases requiring external reporting and communication, HDD activities shall not restart without prior approval from the Site Supervisor and the environmental specialist.

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Case No(s). 23-0373-EL-BTX

Summary: Application Appendix G - HDD Contingency Plan electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX H

COMPLAINT RESOLUTION PLAN

south branch solar

Complaint Resolution Plan

South Branch Gen-Tie
Hancock County, Ohio

May 2023

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1. Introduction

South Branch Solar, LLC (South Branch) is proposing to construct a 138-kilovolt (kV) electric transmission line (Gen-Tie) to allow electricity generated at South Branch Solar to tie directly into the existing Fostoria Center Substation within Washington Township, Hancock County, Ohio. The Gen-Tie will extend to the north of an active rail line, within railroad property.

South Branch plans to develop, own, and operate the Gen-Tie for its useable life. As such, South Branch intends to be a good neighbor in the local community. South Branch will keep the community informed of Gen-Tie updates and will address comments, concerns, or questions from the public during all phases of the Gen-Tie construction and operation. This Complaint Resolution Plan establishes a process for community engagement and receiving, investigating, and addressing complaints.

2. Community Engagement

Throughout the development process of the generating facility and Gen-Tie, South Branch has interacted with multiple landowners, including those within and neighboring the Gen-Tie, as well as local officials and community organizations.

South Branch held a public information meeting on May 3, 2023, to provide information about the Gen-Tie and answer questions from the community. As part of the Ohio Power Siting Board (OPSB) permitting process, a public hearing will be held to obtain on-the-record comments regarding the Gen-Tie.

To keep the public informed about the Gen-Tie, South Branch has included information on the website developed for the generating facility (www.southbranchsolar.com). The website provides specific information about the Gen-Tie, including contact information, frequently asked questions, and an outline of the OPSB permitting process, including opportunities for public involvement. The website will be continuously updated and will act as an up-to-date public source of information for all interested parties. A copy of this Complaint Resolution Plan will be posted to the website.

In addition, South Branch will name a construction manager and/or community liaison for the Gen-Tie who will serve as a central point of contact for issue management during construction. That person will work with the construction team and construction contractor to promptly address and keep a log of all community-related issues. Visible signage listing the specific phone number and email address for this contact person will also be posted at the construction entrance to the Gen-Tie construction area.

3. Complaint Resolution

The complaint resolution process, outlined below, can be used to address public questions, concerns, or complaints during all phases of the Gen-Tie construction and operation.

3.1 COMPLAINT FILING PROCESS

There are several ways in which an individual can file a complaint, including:

- By phone, using the specific phone number identified for use during the construction and operations and maintenance (O&M) phases. Once established, this phone number will be provided to local officials, posted on signage at the Project entrance, and reflected on the generating facility website.
- In person, by visiting the temporary construction office onsite at the generating facility during the construction phase, or the permanent O&M facility at the generating facility during normal business hours. Complaints can be filed with the construction manager or O&M staff.
- In writing, by filing a written complaint to the local construction office or O&M facility.
- Electronically, using a dedicated project email account provided on the generating facility website, correspondence, and on signage.

In order to accurately and thoroughly address a complaint, the following information should be provided with the complaint:

- Name of complainant;
- Date the complaint was filed;
- Contact information of the complainant; and
- Detailed information about the complaint including, if possible, the location, date, and time the issue occurred, and any other details that may help identify and evaluate the issue.

3.2 COMPLAINT REVIEW PROCESS

In coordination with the complainant, South Branch will work to address complaints effectively and efficiently such that both parties are satisfied. Upon receipt of a complaint, South Branch staff will evaluate whether the complaint relates to a particularly urgent issue, such as a claim that drain tiles are affected. All complaints received will be logged and, depending upon the nature of the complaint, one of two procedures will be followed, as outlined below. The complaint logbook will include any available pertinent information on the complaint, including the complainant's name, the date the complaint was received, the nature of the complaint, actions/resolutions taken to address the complaint, and the date that the matter was resolved. South Branch will provide a copy of the logbook entries to OPSB Staff on a quarterly basis throughout Gen-Tie construction and the first 5 years of operation.

3.2.1 Drain Tile Complaints

While drain tiles are not anticipated to be substantial issue given the installation of the Gen-Tie within active railroad property, some are known to be present and will be carefully addressed. Drain tile complaints will be logged and the specific location (to the extent able to be identified) will be noted on mapping. As each related issue is investigated, locations will be refined and maintained on mapping, along with other related information, in order to track concerns, identify potential properties along the path of flow in order in order to monitor, and anticipate future issues, as appropriate. Drain tile complaints will be directed to the designated local expert who will be responsible for such issues at the generating facility, and action will be taken

promptly to assess root causes and remedy them. Action may include field investigation and/or other actions to determine the extent to which the Gen-Tie may have contributed to a particular issue and to identify appropriate actions to address related issues. This rapid response approach acknowledges that addressing drainage concerns quickly can identify whether actions are necessary in order to avoid the potential for broader impacts or issues.

Following the initial response, a plan that includes an appropriate timeline will be developed to address the complaint, as appropriate.

3.2.2 Other Complaints

Other complaints will also be logged. The need for incorporation into Gen-Tie mapping will depend upon the nature of the complaint. South Branch will follow up on all other received complaints within two business days, excluding holidays. If a complaint is received during the construction phase, the construction manager or community liaison will be responsible for initiating review. If a complaint is filed during the operations phase, O&M staff or community liaison will be responsible for initiating review. The first step to addressing a complaint is determining whether there was violation of federal, state, local laws or permit conditions. South Branch also will determine whether outside resources are necessary for proper response.

South Branch is committed to resolving complaints within 30 days of receipt, unless extenuating circumstances require a longer time, or it is determined that the complaint is unresolvable. If complaint resolution lasts longer than 30 days, South Branch will communicate with the complainant, providing an explanation for the extended time and a timeline for addressing the complaint.

4. Notifications

At least seven days prior to the start of the Gen-Tie construction, and at least seven days prior to the start of Gen-Tie operation, South Branch will provide a notice of the upcoming activities to property owners and tenants within and adjacent to the Gen-Tie, government officials, and emergency responders. The notices will be sent via mail and will provide information about the Gen-Tie, including contact information, and a copy of the final Complaint Resolution Plan. The pre-construction notice will include a timeframe for Gen-Tie construction and a planned schedule for post-construction restoration activities. The pre-operation notice will contain a timeframe for the start of Gen-Tie operation.

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Summary: Application Appendix H - Complaint Resolution Plan electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX I

EMF, CORONA EFFECTS, AND COMMUNICATIONS INTERFERENCE REPORT

138 kV Generation Tie Line Electric and Magnetic Field, Audible Noise, and Radio and TV Interference Calculations

South Branch Solar Generation Tie Line
Hancock Co., OH

South Branch Solar, LLC

Prepared By:

20308 Frankie Lane
Pflugerville, Texas 78660
432.438.7381

RRC Project No. MD2304015
June 1, 2023

REVISION HISTORY

Revision	Description	Performed by	Reviewed by	Issued Date
0	Issue for Permit	SSB	HD	5/25/2023

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1.0 PURPOSE

The purpose of this document is to provide the calculations and analysis of potential electrical and communications interference effects from the electric field, magnetic fields and corona effects due to the South Branch Solar Project's 138kV generation tie line ("Gen-Tie"). The generation tie line will be used to transmit the energy generated from the solar facilities to the electrical grid.

The software used for calculating the electric and magnetic field magnitudes was Bonneville Power's Corona and Field Effects (CAFE) Program.

The results were verified using PLS-CADD version 18.00x64. The calculations are based on the Electric Power Research Institute (EPRI) Red Book methods (3rd Edition, 2005 – 7.4 Calculations of Magnetic Fields and Appendices 7.1 Calculations of Field Ellipse Parameters and 7.6 Electric Field Calculations for 3D Geometry.

The audible noise, and radio and TV interference results were developed using Bonneville Power's Corona and Field Effects (CAFE) Program.

2.0 SUMMARY OF RESULTS

The calculated magnetic field is calculated to be approximately 43 mG (milligauss), and the calculated electric field is 0.4 kV/m (kilovolt per meter) at 25 ft from the project centerline at 1 meter above grade, see Appendix A for EMF report from BPA CAFE.

For power-frequency EMF, IEEE Standard C95.6-2002 recommends the following limits as shown in Table 1 (IEEE, 2002). The results are well below these recommended limits.

Table 1. Recommended Power Frequency EMF Limits

	General Public	Controlled Environment
Electric Field Limit (kV/m)	5.0	20.0*
Magnetic Field Limit (mG)	9,040	27,100
*10.0 kV/m within power line ROW		

The audible noise was analyzed per industry standard L50 heavy rain conditions. For the CAFE analysis, the conductor position was assumed to be 25 ft from ground level, which is the design ground clearance requirement.

The audible noise is calculated to be approximately 22 dB at 25 ft from the centerline and can be compared to a ticking watch at 20 dB or a whisper at 30 dB.

It is difficult to quantify the potential effects of radio and TV interference as the signal strength and other noise sources can vary depending on signal transmission conditions and equipment used (.e.g. atmospheric conditions, solar weather, other sources of interference, terrain, vegetation, TV model, etc.).

The radio and TV interference depends on the frequency, but the peak is under 50 dB, and 15 dB respectively for the typical frequencies used in the area. Typical television signals range from 54 MHz for Channel 2, to 210 MHz for Channel 13. Lower frequencies are affected more by the low frequency noise from transmission lines.

Impacts on radio and TV reception are typically based on a signal to noise ratio (SNR). Most TV receivers require a signal of at least 65 dBm (decibels above or below 1 milliwatt). For example, if the over the air signal is less than 80 dBm, and assuming there is 15 dB of noise at that frequency, there may be noticeable interference.

It should be noted that interference drops quickly as distance from the conductor increases. The interference for TV signals drop to zero at around 100 ft from the centerline.

In addition, the modern transition from analog to digital signals has reduced the potential impact of interference further.

Possible mitigation for poor signal reception is a higher and larger antenna, and signal amplifiers.

3.0 ACRONYMS

- EPRI – Electric Power Research Institute
- kcmil – thousand circular mils
- USGS – United States Geological Survey
- ROW – Right-of-Way/Easement
- SBSP – South Branch Solar Project
- NYCRR – New York Codes, Rules, and Regulations
- IEEE – Institute of Electrical and Electronics Engineers
- ACSR – Aluminum Conductor Steel Reinforced
- EMF – Electric and Magnetic Fields
- CAFE – BPA Corona and Field Effects Program

4.0 REFERENCES

- EPRI Transmission Line Reference Book – 200 kV and Above, Third Edition “Red Book” 3rd Edition, 2005
- The National Map http://apps.nationalmap.gov
- IEEE 738-2012 Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors
- IEEE Standard C95.6-2002 - IEEE Standard for Safety Levels With Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz

5.0 ASSUMPTIONS AND CLARIFICATIONS

Operating voltages are assumed to be 5% over nominal voltages (138 kV * 1.05 = 144.9 kV).

The field strengths are calculated at one (1) meter above ground level with five (5) foot measurement intervals depicting the width of the entire Right-of-Way (ROW) or easement and out to five hundred (500) feet from the centerline on both sides. 500 ft is what is used as the limits in the BPA CAFE Analysis Program.

The magnetic field strengths are modeled based on a maximum operating phase current of 603 A per phase for the solar gen-tie circuit, for the full generation capacity (130 MW) of the South Branch Solar Project (SBSP). This current value assumes an undervoltage of 5% (138 kV * 0.95 = 131.1 kV) and a power factor (pf) of 0.95.

This electrical current value is assumed to provide the necessary operating currents for the typical utility operation cases of summer normal, summer short term emergency, winter normal, and winter short term emergency, as the generation facility can only generate as much energy as it is rated for.

The South Branch Solar Project 138 kV generation tie line has been designed and modeled to meet industry and project design requirements, including conductor tensions and sags, and electrical clearances to ground and other facilities.

The lowest conductor position for the calculations is assumed to be at 25 ft from ground. The distance to ground will exceed this requirement, and vary throughout the line.

See Appendices C for the design model information, including the following requirements.

1) Structural details and dimensions, and identifying phase spacing
2) Circuit phasing
3) Other characteristics affecting electric and magnetic field magnitudes.
4) Right-of-Way/easement boundaries
5) Structure locations
6) Aerial photos/drawings showing;
   a) Identified ROW segment
   b) Cross-section, and
   c) Nearest residence or occupied non-residential building in each identified ROW segment with a stated measurement of the distance between the edge of ROW and the nearest edge of the residence or building.

Only the effects of wires are being analyzed.

It is assumed that ground return currents for magnetic field calculations are insignificant, as the tie line will typically be operated at a balanced 3-phase condition.

6.0 RESULTS

The maximum magnetic and electric fields are accounted for within the width of easement route that was analyzed, and their peaks are calculated near the centerline of the gen-tie line easement area.

The calculated magnetic field is calculated to be approximately 43 mG, and the calculated electric field is 0.4 kV/m at 25 ft from the project centerline at 1 meter above grade, see Appendix A for EMF report from BPA CAFE.

The audible noise was analyzed per industry standard L50 heavy rain conditions. For the CAFE analysis, the conductor position was assumed to be at 25 ft from ground level, which is the design clearance requirement.

The audible noise is calculated to be approximately 22 dB at 25 ft from the centerline, and can be compared to a ticking watch at 20 dB or a whisper at 30 dB.

The radio and TV interference depends on the frequency, but the peak is under 50 dB, and 20 dB respectively for the typical frequencies used in the area, which could potentially result in minor, sporadic AM interference, in certain wet conditions, with nominal TV interference.

The line will produce negligible interference at the Digital TV frequencies (channels) that can be received in the area based on the FCC Digital TV Reception Maps website (https://www.fcc.gov/media/engineering/dtvmaps).

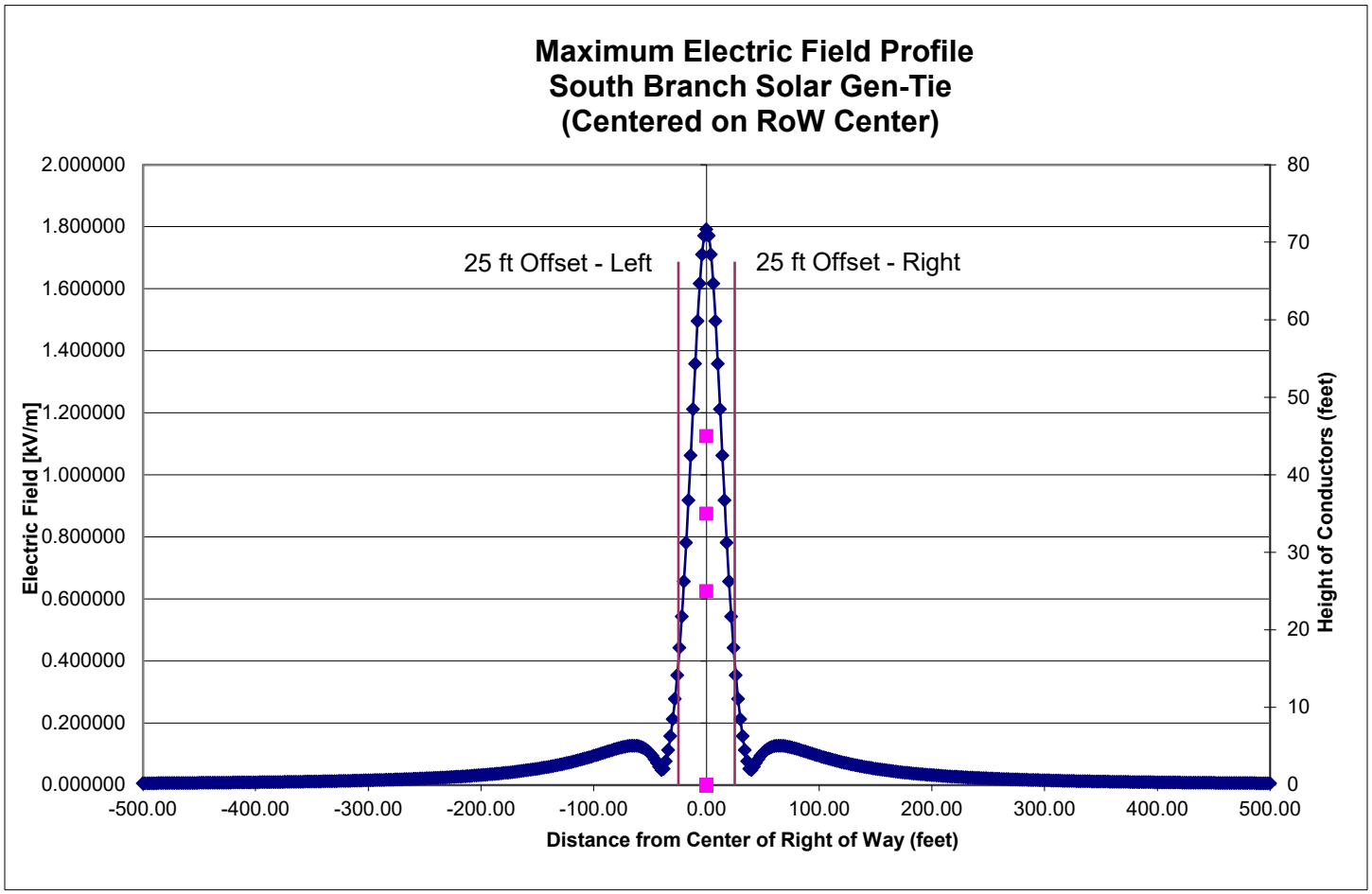
It should be noted that interference drops quickly as distance from the conductor increases. The interference for TV signals drop to zero at around 100 ft from the centerline.

See Appendix A for the calculation results in graphical format.

APPENDIX

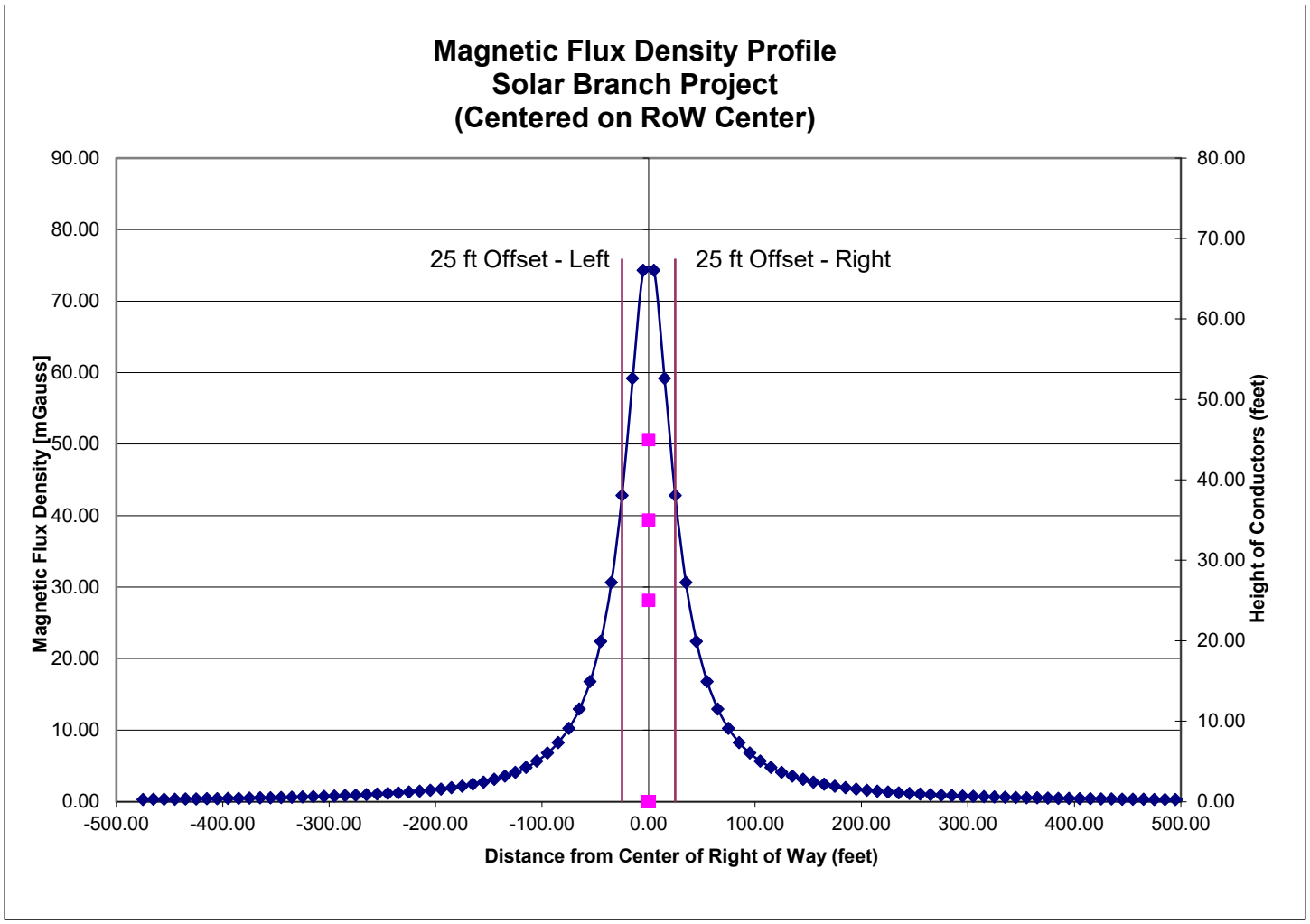
8.1 Appendix A – Full Calculation Results

Electric Field Chart



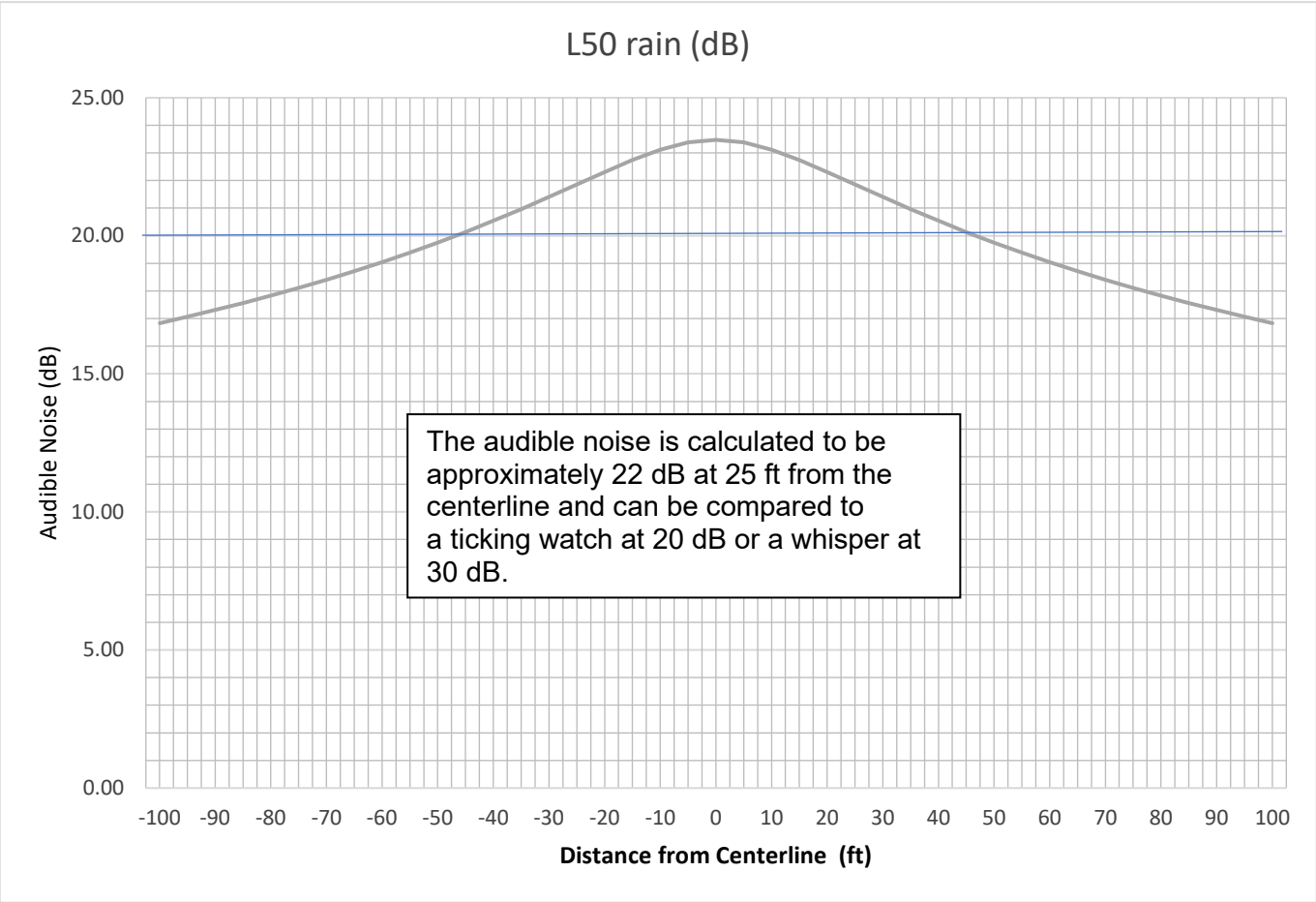
**IEEE C95.6-2002 recommended limit of 5 kV/m is 2x more than the peak near the center of the line.*

Magnetic Field Chart

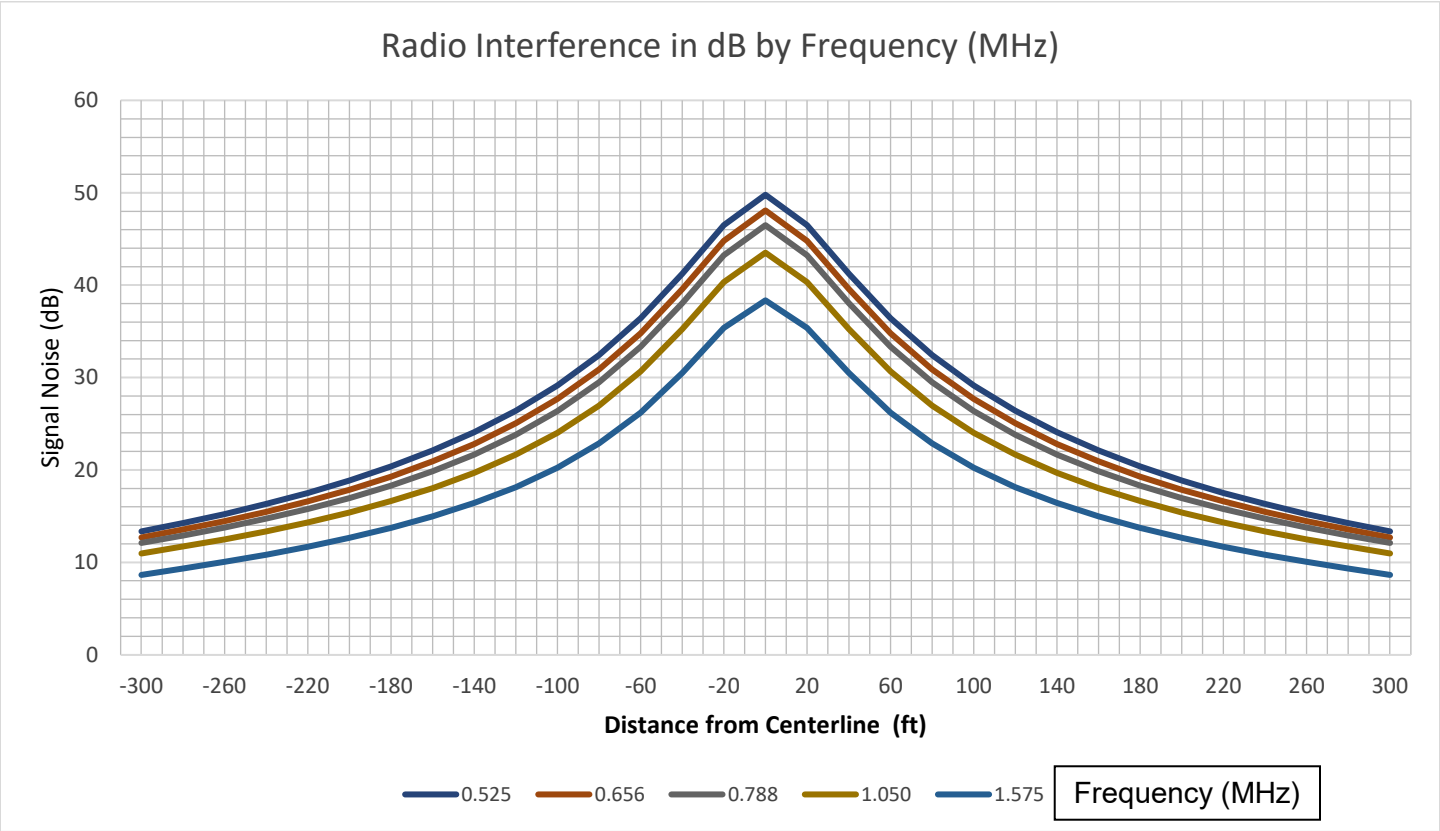


**IEEE C95.6-2002 recommended limit of 9,040 mG is 100x more than the peak near the center of the line.*

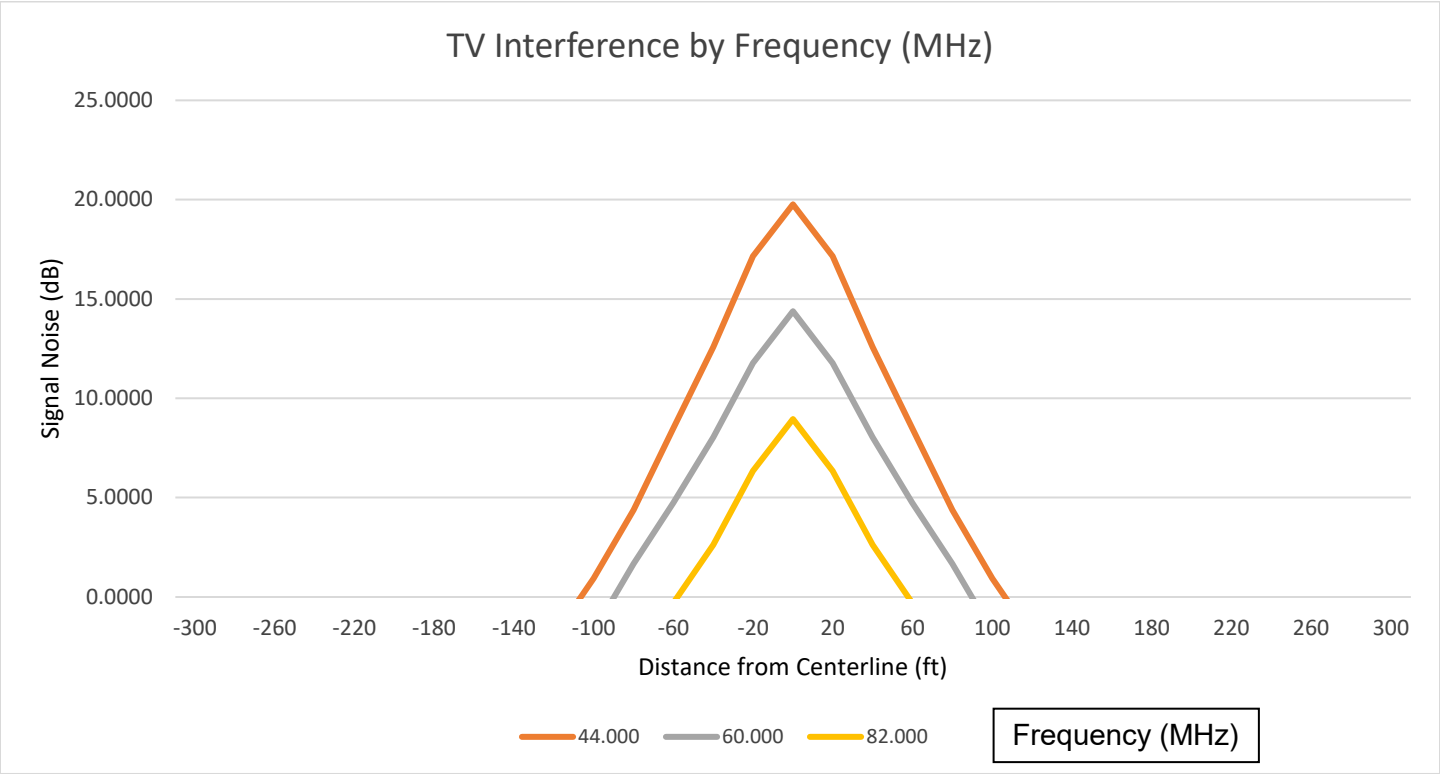
Audible Noise Chart



Radio Interference Chart



TV Interference Chart



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Summary: Application Appendix I - EMF, Corona Effects, and Communications Interference Report electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX J

PROJECT SUBSTATION NOISE EVALUATION

ACENTECH
ACOUSTICS TECHNOLOGY VIBRATION

Memorandum

TO	Lynn Gresock (Haley & Aldrich)
FROM	Alex Odom
DATE	May 25, 2023
PROJECT	**South Branch Solar**
SUBJECT	Transformer Relocation Assessment
PROJECT NO	J634331
CC	Michael Bahtiarian (Acentech)

SUMMARY

We were informed by South Branch Solar, LLC. that the Project Substation location for the generating facility has been adjusted[1] for an alternate point of interconnection (POI) design proposal. Additionally, to our knowledge, the Project Substation model has not changed.

Based on a preliminary analysis of the new substation location, we do not anticipate the conclusions of our previous evaluation[2] to have changed. While the project sound levels resulting from the substation will shift to a different portion of the surrounding community, the estimated increases in sound levels over daytime ambient are 1 dB or less, and we predict no estimated increases in sound levels over nighttime ambient, as described in our previous evaluation.

*** End of Memorandum ***

[1] Haley and Aldrich supplied a .kmz file, received May 19, 2023.
[2] "South Branch Solar Project Noise Evaluation", Acentech, dated December 16, 2021.

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Case No(s). 23-0373-EL-BTX

Summary: Application Appendix J - Project Substation Noise Evaluation electronically filed by Teresa Orahood on behalf of Sommer Sheely.

APPENDIX K

WETLAND AND WATER RESOURCES REPORTS

- Wetland and Stream Delineation Report, South Branch Gen-Tie (Preferred ROW)
- Wetland and Stream Investigation, South Branch Gen-Tie (Alternate ROW)

www.haleyaldrich.com

WETLAND AND STREAM DELINEATION REPORT

SOUTH BRANCH GEN-TIE
HANCOCK COUNTY, OHIO

Prepared for:
South Branch Solar, LLC

Prepared by:
Haley & Aldrich, Inc.

File No. 0135392-002
May 2023

HALEY & ALDRICH, INC.
200 TOWN CENTRE DRIVE. SUITE 2
ROCHESTER, NY 14623
585.359.9000

SIGNATURE PAGE FOR

WETLAND AND STREAM DELINEATION REPORT

SOUTH BRANCH GEN-TIE
HANCOCK COUNTY, OHIO

PREPARED FOR
SOUTH BRANCH SOLAR, LLC

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Michael S. Martin
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REVIEWED AND APPROVED BY:

James B. Pippin
Senior Wetland Biologist
Haley & Aldrich, Inc.

Lynn Gresock
Principal Consultant
Haley & Aldrich, Inc.

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2	Topography and Soils
3	Federal and State Mapped Aquatic Resources
4	Delineated Wetlands and Streams

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B	Wetland Determination Data and Stream Inventory Data Forms

1. Introduction

This Wetland and Stream Delineation Report summarizes the results of field work performed by Haley & Aldrich, Inc. (Haley & Aldrich) to locate and identify wetlands and streams in support of a proposed electric generation transmission interconnection line (Gen-Tie) for the South Branch Solar Project (the Project). The Gen-Tie is located entirely within Hancock County, Ohio (Figure 1), and is proposed to be constructed within Norfolk Southern railroad property just north of the tracks, extending approximately 2.3 miles northeasterly to connect energy generated by South Branch Solar to the existing Fostoria Central Substation.

In accordance with requirements of the Ohio Power Siting Board (OPSB), a field survey is required for the area within 100 feet of the potential Gen-Tie disturbance area (Study Area). The Study Area (Figure 1) encompasses approximately 58 acres of land, while the Field Survey Area encompasses approximately 68 acres of land. The field delineation effort described in this report focused on the Study Area. The Study Area is located approximately 1.2 miles northeast of the Village of Arcadia, approximately 1.6 miles southwest of the City of Fostoria, and 6.2 miles northeast of the City of Findlay. Most of the Study Area consists of land disturbed in association with the active railroad as well as areas of active farming (e.g., soybean and corn). Two relatively small areas of residential land and a small woodlot are also present. There are several roadways, as well as existing electric transmission and distribution lines that extend through the Study Area.

2. Regulatory Authorities

2.1 WATERS OF THE UNITED STATES

The Study Area is located within area under the jurisdiction of the U.S. Army Corps of Engineers (USACE) Buffalo District. As defined by the USACE, Waters of the United States include lakes, ponds, streams (intermittent and perennial), and wetlands, which are regulated under Sections 401 and 404 of the Clean Water Act. Federal jurisdictional wetlands are defined as "those that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbor Act (33 United States Code [U.S.C.] 401 et seq.), which requires a permit from the USACE to construct any structure in or over any navigable water of the United States, as well as any proposed action that would alter or disturb (such as excavation/dredging or deposition of materials) these waters. If the proposed structure or activity affects the course, location, condition, or capacity of the navigable water, even if the proposed activity is outside the boundaries of the water body, a permit from the USACE is required.

2.2 OHIO WETLANDS AND STREAMS

The Ohio Environmental Protection Agency (Ohio EPA) Division of Surface Water regulates wetlands pursuant to Section 401 of the federal Clean Water Act. Section 401 of the Clean Water Act requires that state agencies evaluate projects that will result in the discharge of dredged or fill material into Waters of the United States to determine whether the discharge will violate the state's water quality standards. Section 401 Water Quality Certifications are issued for the discharge of dredge and fill materials to Waters of the State.

"Waters of the State" are those waters within the jurisdiction of the Ohio EPA. They are generally defined as surface and underground water bodies, which extend through or exist wholly within the state; these include, but are not limited to, streams and both isolated and non-isolated wetlands. Private ponds, or any pond, reservoir or facility built for reduction of pollutants prior to discharge are not included in this definition.

In addition to Waters of the United States, the Ohio EPA also regulates, and issues permits for isolated wetland and ephemeral stream impacts under Sections 6111.21 and 6111.03(J)(1) of the Ohio Revised Code (ORC). The state relies on the USACE jurisdictional authority regarding wetland and stream determinations and delineations including whether a wetland is isolated or non-isolated and whether a stream is ephemeral.

3. Methodology

Prior to initiating field investigations, Haley & Aldrich conducted a desktop review of publicly available data to evaluate the presence of mapped wetlands and streams within the Study Area. Data consulted included:

- United States Geological Survey (USGS) topographic quadrangle maps;
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps;
- Natural Resources Conservation Service (NRCS) Web Soil Survey;
- Federal Emergency Management Agency (FEMA) Flood Insurance maps;
- National Hydrography Dataset (NHD);
- Ohio Wetlands Inventory (OWI); and
- Recent aerial photography.

The wetland and stream delineation field survey was performed in accordance with criteria set forth in the *Corps of Engineers Wetland Delineation Manual* ([Environmental Laboratory, 1987] [Manual]) and the *2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* ([Version 2.0] [USACE, 2010] [Supplement]). Data was collected from one or more sample plots in each delineated wetland (depending on the size of the delineated area) and were recorded on USACE Wetland Determination Data forms. The boundaries of wetlands were located with a Trimble TDC150 Global Positioning System (GPS) unit with reported sub-meter accuracy.

Hydrology was evaluated based on indicators that are divided into two categories: primary and secondary. The 1987 Manual and 2010 Supplement define hydrology as present when at least one primary indicator or two secondary indicators are identified. One primary indicator is sufficient to evaluate whether hydrology is present; however, if primary indicators are absent, two or more secondary indicators are required to evaluate hydrology. If other potential hydrology evidence was found (e.g., moss trim lines or microtopographic relief), it was subsequently documented on the Wetland Determination Data Form.

Hydrophytic vegetation was assessed by identifying plant species and their assigned wetland indicator rating of obligate, facultative wet, facultative, facultative upland, or upland, according to the *2020 National Wetland Plant List* (USACE, 2020). In both upland and wetland communities, vegetation was characterized using the areal dominance method, with a 30-foot radius around the soil sample location for trees, a 15-foot radius for saplings/shrubs, and a 5-foot radius for herbaceous plants.

Hydric soil indicators were evaluated using soil characteristics, as defined in *Field Indicators of Hydric Soils in the United States (Version 8.0)* (NRCS, 2016). Evidence of hydric soil indicators were recorded based on the presence of color matrix, hue, and redoximorphic features, such as saturation, gleyed matrix, mottling, hydrogen sulfide odor, and/or organic/peat layers. Soil test pits were dug using a shovel to a depth of approximately 18 inches, or refusal due the presence of hard pan layer, rock or hard fill material. Soil color was described using the Munsell Color book, and soil texture was determined using United States Department of Agriculture (USDA) hand-texture methods.

Wetlands were classified based on the Cowardin classification system (Cowardin, *et al.*, 1979). This system includes classifications for Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO) wetlands. Within PEM wetlands, emergent plants make up at least 30 percent aerial coverage and are the tallest life form. Within PSS wetlands, woody plants less than 20 feet tall are the dominant vegetation. PFO wetlands are dominated by woody plants at least 20 feet tall.

Wetlands were also evaluated using the *Ohio Rapid Assessment Method (ORAM) for Wetlands v. 5.0* (Mack, 2001). The ORAM process focuses on an assessment of delineated wetlands, as opposed to the boundary of wetlands. The ORAM assessment utilizes scoring forms to determine the ecological and functional value of a particular wetland. The ORAM was developed to provide a relatively fast and easy method for determining the appropriate category of a wetland under the Wetland Anti-Degradation Rule, Ohio Administrative Code (OAC) Rule 3745-1-54. These regulations specify three wetland categories: Category 1, Category 2, and Category 3, which correspond to low-, medium-, and high-quality wetlands, respectively.

Additional surface waters, including stream channels and drainage ways, found during field work were investigated, and ordinary high-water marks were located with GPS. Delineated streams were characterized on the Stream Inventory Data Form, as well as the Primary Headwater Habitat Evaluation Form (Ohio EPA, 2020) and Qualitative Habitat Evaluation Index and Use Assessment Field Sheet, as necessary. Recorded stream data included average water width, average ordinary high-water mark width, bankfull width, stream depth, bank height and slope, meander, gradient, channel substrate types, and adjacent vegetative community characteristics. To the extent practicable, these surface waters were investigated to evaluate drainage patterns and potential connections to other Waters of the United States.

Streams were classified as either perennial, intermittent or ephemeral. A perennial stream has flowing water year-round during a typical year. They are generally identified as solid blue lines on USGS topographic maps. An intermittent stream has flowing water during certain times of the year when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Intermittent streams are generally identified as dashed blue lines on USGS topographic maps. An ephemeral stream has flowing water only during and for a short duration after precipitation events in a typical year. Ephemeral streams are not identified on USGS topographic maps. These desktop classifications were refined based on conditions observed during the field survey (e.g., flowing water unrelated to recent precipitation in an unmapped stream would be classified as intermittent).

4. Site Setting

4.1 PHYSIOGRAPHY AND SOILS

The Study Area is located in the Till Plains section of the larger Central Lowlands physiographic province. Topography with the Study Area is generally flat with small areas of greater relief associated with stream channels. Elevation within the Study Area ranges from approximately 780 feet above mean sea level (amsl) at a stream crossing in the northeastern portion of the Study Area to approximately 800 feet amsl at the crossing of County Road 257 (USGS, 2021). A topographic map of the Study Area and surrounding region is provided as Figure 2.

Soil map units, drainage class, and hydric classification are listed in Table 1, in order of prevalence within the Study Area, and provided as Figure 2 (NRCS, 2022).

Table 1. Study Area Soils

Soil Map Unit Symbol	Soil Map Unit Name	Percentage of Study Area	Drainage Class	Hydric Classification[1]
PmA	Pewamo silty clay loam, 0 to 1 percent slopes	28.9	Very Poorly Drained	Hydric
Blg1A1	Blount silt loam, ground moraine, 0 to 2 percent slopes	19.7	Somewhat Poorly Drained	Hydric
BpA	Blount-Houcktown complex, 0 to 3 percent slopes	17.9	Somewhat Poorly Drained – Moderately Well Drained	Not Hydric
BrA	Blount-Jenera complex, 0 to 3 percent slopes	0.7	Somewhat Poorly Drained – Moderately Well Drained	Not Hydric
GsB	Glynwood-Blount-Houcktown complex, 1 to 4 percent slopes	0.6	Moderately Well Drained – Somewhat Poorly Drained	Not Hydric

Note:

[1] Soils mapping source: USDA, NRCS Web Soil Survey (accessed 12 October 2022).

Descriptions of each soil series comprising at least five percent of the Study Area, in order of prevalence, are provided below. See Figure 2 for mapping of all soil map units located within the Study Area.

- **Pewamo Series:** Pewamo series soils consist of deep, dark-colored soils that are poorly drained. They are nearly level and located on the till plain. Pewamo series soils have a seasonal high-water table. The available moisture capacity is high, and permeability is moderately slow.
- **Blount Series**: Blount series soils consist of very deep, somewhat poorly drained soils on wave-worked till plains, till plains, and near-shore zones (relict). Depth to the top of a perched seasonal high-water table ranges from 0.5 to 2 feet in normal years. Permeability is slow to very slow. These soils are well suited to agricultural use.

- **Glynwood Series**: Glynwood series soils consist of very deep, moderately well drained soils on ground moraines and end moraines. The depth to the top of an intermittent perched high water table ranges from 1 to 2 feet between January and April in normal years. Permeability is slow to very slow. These soils are well suited to agricultural use.

4.2 HYDROLOGY

The Study Area is located in the Cedar-Portage Watershed (USGS HUC 04100010). The major streams located in this watershed include the Portage River, Sugar Creek, Lacarpe Creek, Bayou Ditch, Berger Ditch, and Wolf Ditch. The Portage River flows northeast to Lake Erie.

The majority of surface hydrology within the Study Area is generated by precipitation. The Study Area has an average annual precipitation of 33.80 inches, as measured in nearby Findlay, Ohio (NCDC, 2022).

There are two NWI wetlands mapped within the Study Area, which are classified as riverine wetlands (NWI codes R4SBC). These mapped areas coincide with unnamed intermittent streams indicated on USGS topographic mapping. The OWI indicates the potential presence of one, relatively small, shrub scrub wetland within the Study Area. State and federally mapped aquatic resources within the Study Area are summarized in Table 2 and depicted on Figure 3.

Table 2. State and Federally Mapped Wetlands and Streams within Study Area

Code	Wetland Type	Status
R4SBC	Riverine	No official state or federal status
R4SBC	Riverine	No official state or federal status
37	Shrub Scrub	No official state or federal status

5. Results

Field investigations to delineate wetlands and streams within the Study Area were completed by two Haley & Aldrich wetland scientists on 27 September 2022. A total of six wetlands and two stream segments were identified. Delineated wetlands and streams are depicted on Figure 4 and are summarized below and in Tables 3 and 4, respectively.

5.1 DELINEATED WETLANDS

Wetland RMA is a 1.5-acre PEM wetland located between the Norfolk Southern railbeds. This wetland is hydrologically connected to an unnamed tributary, which flows through a series of box culverts beneath the railroad. The observed indicators of wetland hydrology in this wetland were High Water Table (A2), Saturation (A3), Geomorphic Position (D2), and FAC-Neutral Test (D2). The dominant vegetation included narrow-leaf cattail (*Typha angustifolia*) and field horsetail (*Equisetum arvense*). The observed hydric soil indicator was Sandy Redox (S5).

Wetland RMB is a 5.3-acre wetland that includes areas of PEM (2.6 acres) and PSS (2.7 acres). The wetland is located between the Norfolk Southern railbeds and is hydrologically connected to an unnamed tributary, which flows through a series of culverts beneath the railroad. The observed indicators of wetland hydrology included High-Water Table (A2), Saturation (A3), Geomorphic Position (D2), and FAC-Neutral Test (D2) in both the PEM and PSS portions of the wetland. The dominant vegetation included narrow-leaf cattail and field horsetail in the PEM portion and willows (*Salix spp.*), shoreline sedge (*Carex hyalinolepis*), and narrow-leaf cattail in the PSS portion. The observed hydric soil indicator was Depleted Matrix (F3) in both the PEM and PSS portions of the wetland.

Wetland RMC is a 0.2-acre PEM wetland located in a closed depression within an active agricultural field. The observed indicators of wetland hydrology in this wetland were High Water Table (A2), Saturation (A3), Sparsely Vegetated Concave Surface (B8), Surface Soil Cracks (B6), and Geomorphic Position (D2). The dominant vegetation included rough cocklebur (*Xanthium strumarium)* and American yellowrocket (*Barbarea orthoceras*). The observed hydric soil indicators were Depleted Below Dark Surface (A11) and Depleted Matrix (F3). Wetland RMC appears to be an isolated wetland.

Wetland RMD is a 0.1-acre PEM wetland located in a closed depression within an active agricultural field. The observed indicators of wetland hydrology in this wetland were Surface Water (A1), High Water Table (A2), Saturation (A3), Sparsely Vegetated Concave Surface (B8), Stunted or Stressed Plants (D1), and FAC-Neutral Test (D5). The dominant was yellowseed false pimpernel (*Lindernia dubia*). The observed hydric soil indicators were Depleted Below Dark Surface (A11) and Depleted Matrix (F3). Wetland RMD appears to be an isolated wetland.

Wetland RME is a 0.1-acre PEM wetland located in a closed depression within an active agricultural field. The observed indicators of wetland hydrology in this wetland were Surface Water (A1), High Water Table (A2), Saturation (A3), Sparsely Vegetated Concave Surface (B8), Surface Soil Cracks (B6), and Geomorphic Position (D2). The dominant vegetation was rough cocklebur (*Xanthium strumarium)*. The observed hydric soil indicator was Depleted Matrix (F3). Wetland RME appears to be an isolated wetland.

Wetland RMF is a 0.2-acre PEM wetland located in a closed depression within an active agricultural field. The observed indicators of wetland hydrology in this wetland were Surface Soil Cracks (B6) and Stunted or Stressed Plants (D1). The dominant vegetation included rough cocklebur (*Xanthium strumarium)* and American yellowrocket (*Barbarea orthoceras*). The observed hydric soil indicator was Depleted Matrix (F3). Wetland RMF appears to be an isolated wetland.

Table 3 contains the complete inventory of wetlands delineated in the Study Area. Representative photos of each wetland are included in Appendix A and completed Wetland Determination Data Forms are provided in Appendix B. Wetland community type was classified according to the Cowardin classification (Cowardin, *et al*., 1979).

Table 3. Delineated Wetlands

Wetland ID	Wetland Community[1]	Delineated Area[2] (acres)	ORAM Category	Presumed Jurisdiction[3]
Wetland RMA	PEM	1.5	1	USACE
Wetland RMB	PEM	2.6	1	USACE
	PSS	2.7		USACE
Wetland RMC	PEM	0.2	1	Ohio EPA
Wetland RMD	PEM	0.1	1	Ohio EPA
Wetland RME	PEM	0.1	1	Ohio EPA
Wetland RMF	PEM	0.2	1	Ohio EPA

Notes:

[1] Wetland classifications are based on the Cowardin classification system.

[2] Area of delineated wetlands presented on Figure 4 represent the entire wetland area identified during field investigations within the Study Area and may include small areas outside of the actual Study Area limits.

[3] If necessary, final federal and state jurisdiction can only be confirmed through consultation with USACE and Ohio EPA staff.

5.2 DELINEATED STREAMS

Stream RM1 is an unnamed intermittent stream that flows northwest through a series of box culverts underneath the Norfolk Southern railroad, ultimately to the South Branch Portage River. North of the railroad the stream has been channelized and receives drainage from the adjacent agricultural fields. The average ordinary high-water mark width was approximately 12 feet and the stream had a silt, sand, and cobble substrate. The water was turbid and approximately 8 inches deep at the time of observation.

Stream RM2 is an unnamed intermittent stream that flows northwest through a series of culverts underneath the Norfolk Southern railroad, ultimately to the South Branch Portage River. North of the railroad the stream has been channelized and receives drainage from the adjacent agricultural fields. The average ordinary high-water mark width was approximately 8 feet and the stream had a silt and leaf pack substrate. The water was turbid and approximately 8 inches deep at the time of observation.

Table 4 below contains a summary of streams delineated within the Study Area. Representative photos of each stream are included in Appendix A, and completed Stream Data Inventory Forms are provided in Appendix B.

Table 4. Delineated Streams

Stream ID	Stream Type[1]	Delineated Length (feet)[2]	Delineated Width (feet)[3]	Delineated Depth (inches)[3]	HHEI Score	HHEI Classification	Presumed Jurisdiction[4]
Stream RM1	Intermittent	167	12	8	72	Modified Class III	USACE
Stream RM2	Intermittent	204	8	8	63	Modified Class II	USACE

Notes:

[1] A perennial stream has flowing water year-round during a typical year. Perennial streams are generally identified as solid blue lines on USGS topographic maps. An intermittent stream has flowing water during certain times of the year when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Intermittent streams are generally identified as dashed blue lines on USGS topographic maps. An ephemeral drain has flowing water only during and for a short duration after precipitation events in a typical year. Ephemeral drains are not identified on USGS Topographic maps.

[2] Length of delineated wetlands presented on Figure 4 represent the entire stream length identified during field investigations and may include small areas outside of the actual Study Area limits.

[3] Stream characteristics are an average of conditions observed during the field survey.

[4] If necessary, jurisdiction will be confirmed through agency consultation.

HHEI = Headwater Habitat Evaluation Index

6. Conclusions

A total of six wetlands and two stream segments were delineated during the field investigation conducted by Haley & Aldrich in September 2022. Haley & Aldrich's analysis suggests Wetlands RMC, RMD, RME and RMF appear to be isolated, and as such, are likely not to be considered jurisdictional by the USACE; Ohio EPA jurisdiction could apply to such resources. Wetlands RMA and RMB were observed to have hydrological connections to other Waters of the United States (unnamed tributaries of the South Branch Portage River) and would likely be considered jurisdictional by the USACE. Streams RM1 and RM2 are also likely to be considered jurisdictional by the USACE due to their connection to Waters of the United States. A formal determination of jurisdictional status would be made through consultation with the USACE.

References

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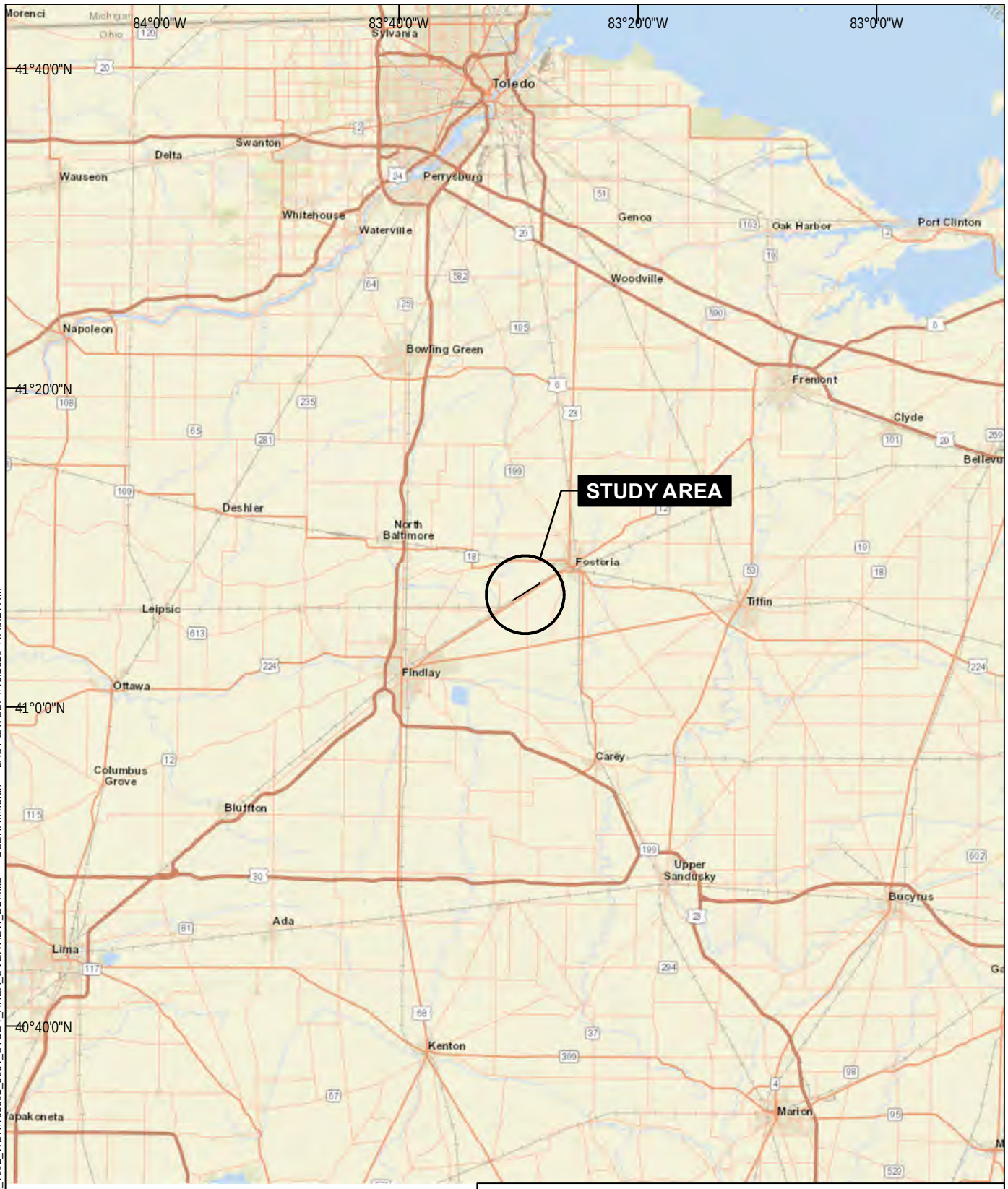
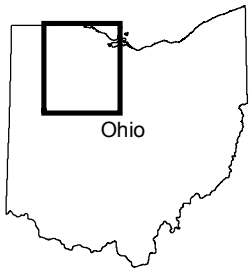
\\haleyaldrich.com\share\CF\Projects\135392\Wetlands\Transmission Line\Report\2023_0516_HAI_South_Branch_Solar_Wetland Report_D.docx

FIGURES





N

0 5 10

SCALE IN MILES

MAP SOURCE: ESRI

SITE COORDINATES: 41°07'43"N, 83°28'40"W

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

STUDY AREA OVERVIEW

APPROXIMATE SCALE: 1 IN = 10 MI
MAY 2023

FIGURE 1

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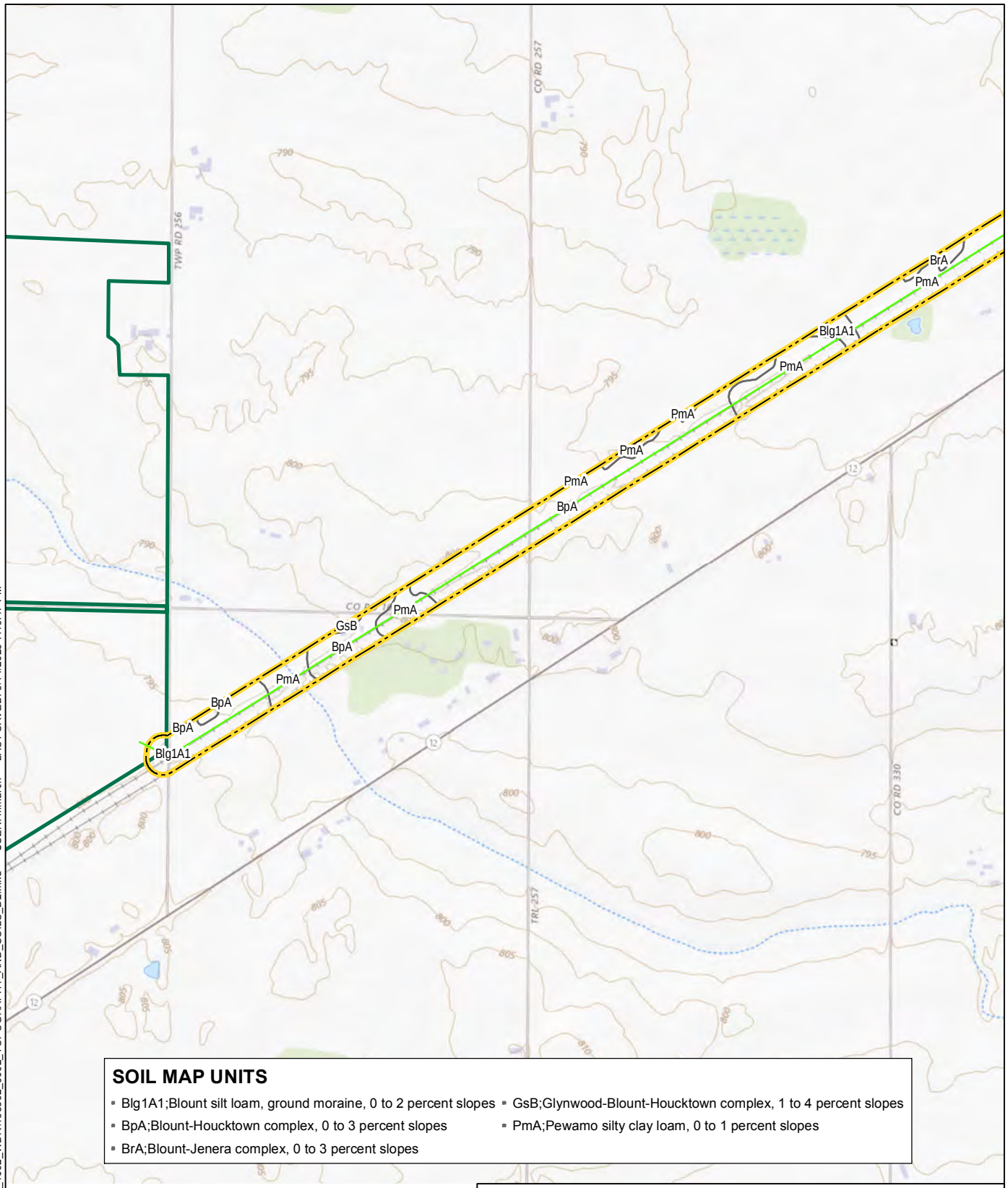

SOIL MAP UNITS

- Blg1A1;Blount silt loam, ground moraine, 0 to 2 percent slopes
- BpA;Blount-Houcktown complex, 0 to 3 percent slopes
- BrA;Blount-Jenera complex, 0 to 3 percent slopes
- GsB;Glynwood-Blount-Houcktown complex, 1 to 4 percent slopes
- PmA;Pewamo silty clay loam, 0 to 1 percent slopes

LEGEND

- PROPOSED GEN-TIE LINE
- STUDY AREA
- SUBSTATION BOUNDARY
- SOUTH BRANCH SOLAR PROJECT AREA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

N

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Feet

HALEY ALDRICH

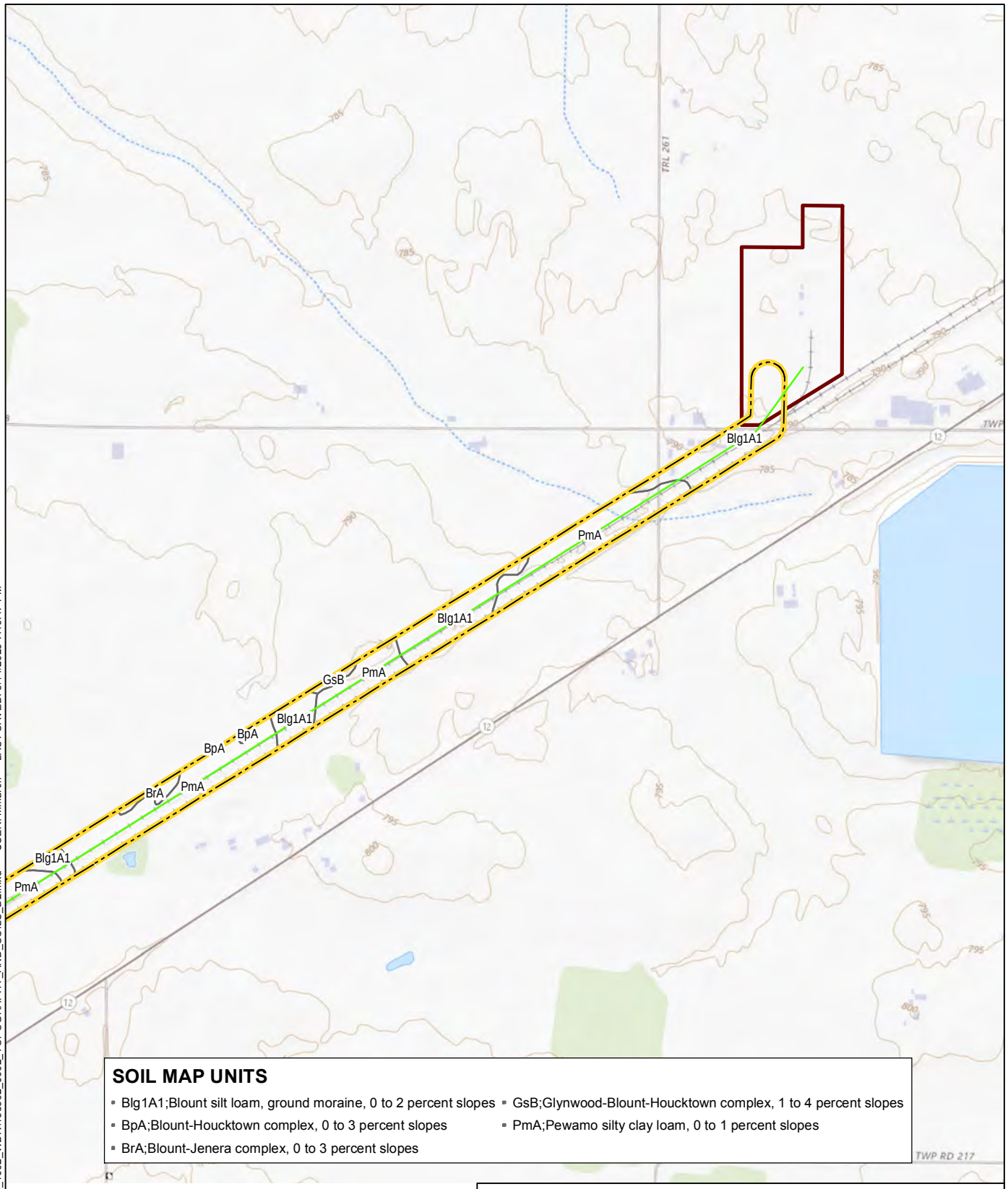
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

FIGURE 2
SHEET 1 OF 2

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0002_TOPOGRAPHY_AND_SOILS_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 7:16:17 PM



SOIL MAP UNITS

- Blg1A1;Blount silt loam, ground moraine, 0 to 2 percent slopes
- BpA;Blount-Houcktown complex, 0 to 3 percent slopes
- BrA;Blount-Jenera complex, 0 to 3 percent slopes
- GsB;Glynwood-Blount-Houcktown complex, 1 to 4 percent slopes
- PmA;Pewamo silty clay loam, 0 to 1 percent slopes

LEGEND

- PROPOSED GEN-TIE LINE
- STUDY AREA
- SUBSTATION BOUNDARY
- SOUTH BRANCH SOLAR PROJECT AREA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

N

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Feet

HALEY ALDRICH

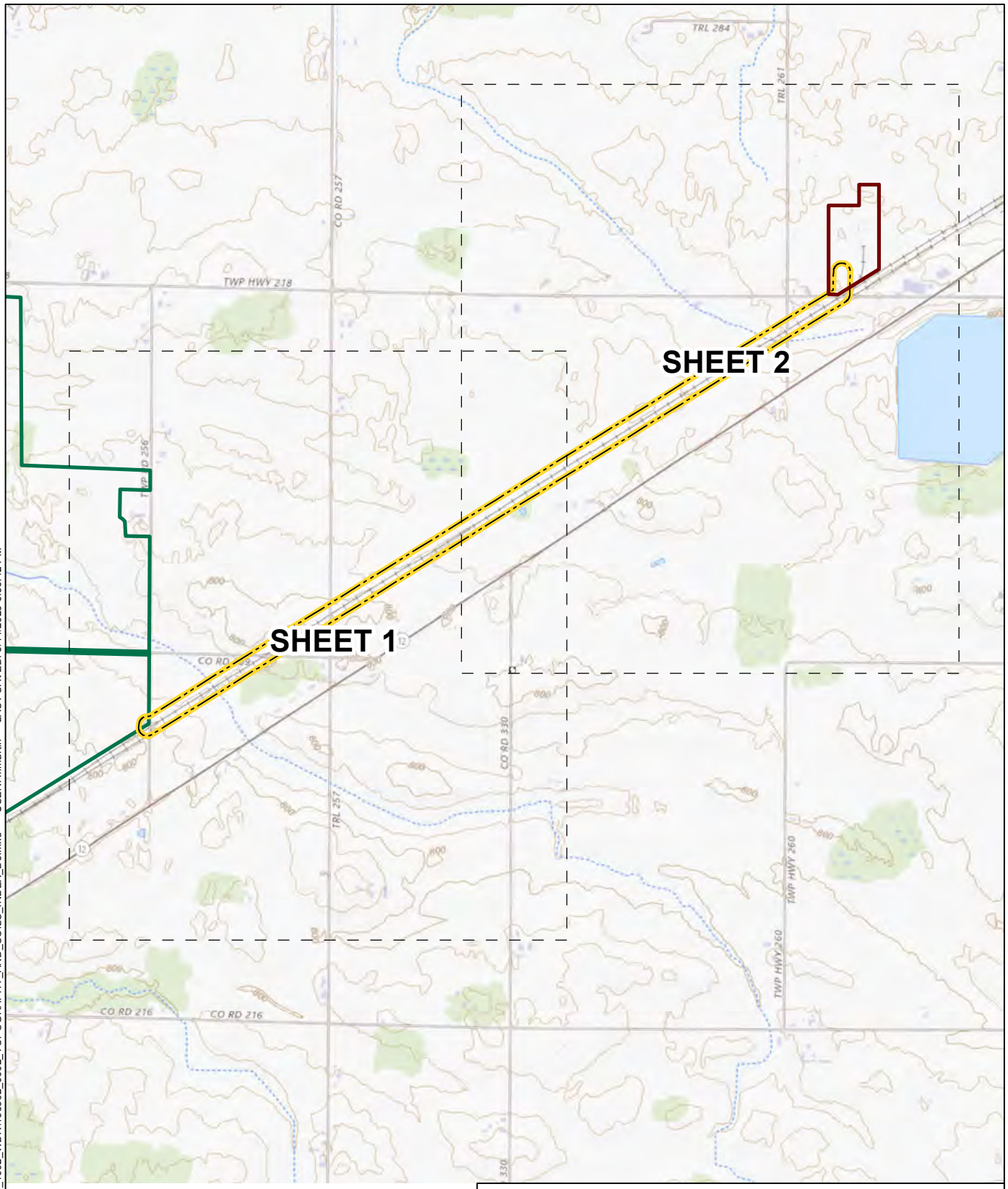
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

FIGURE 2
SHEET 2 OF 2

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0002_TOPOGRAPHY_AND_SOILS_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 7:16:17 PM



LEGEND

- SUBSTATION BOUNDARY
- INDEX SHEET
- STUDY AREA
- SOUTH BRANCH SOLAR PROJECT AREA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

N

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Feet

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

INDEX SHEET
FIGURE 2

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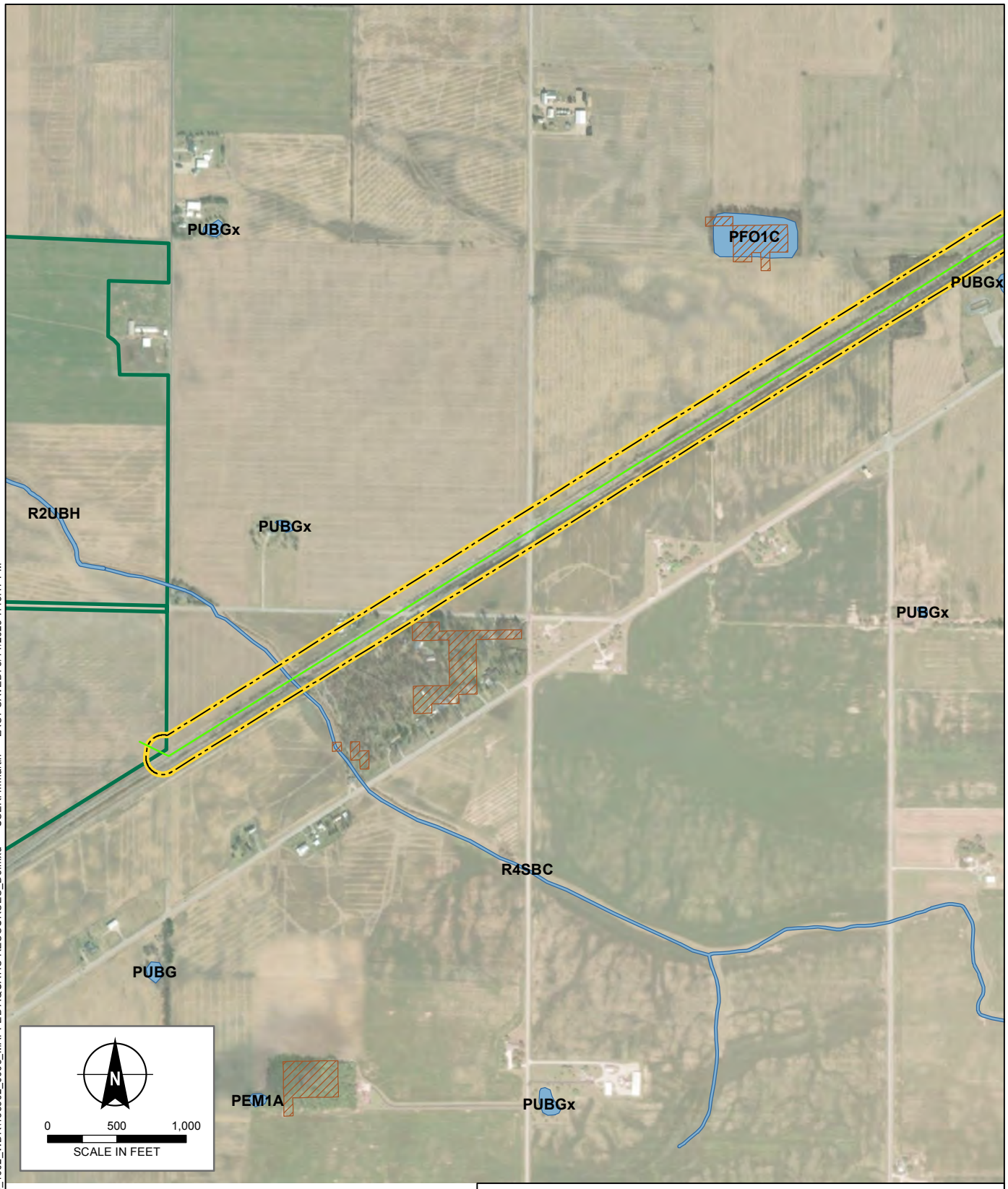


PROPOSED GEN-TIE LINE

NWI WETLAND

STUDY AREA

SOUTH BRANCH SOLAR PROJECT AREA

OHIO WETLAND INVENTORY

WOODS ON HYDRIC SOIL

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

HALEY ALDRICH

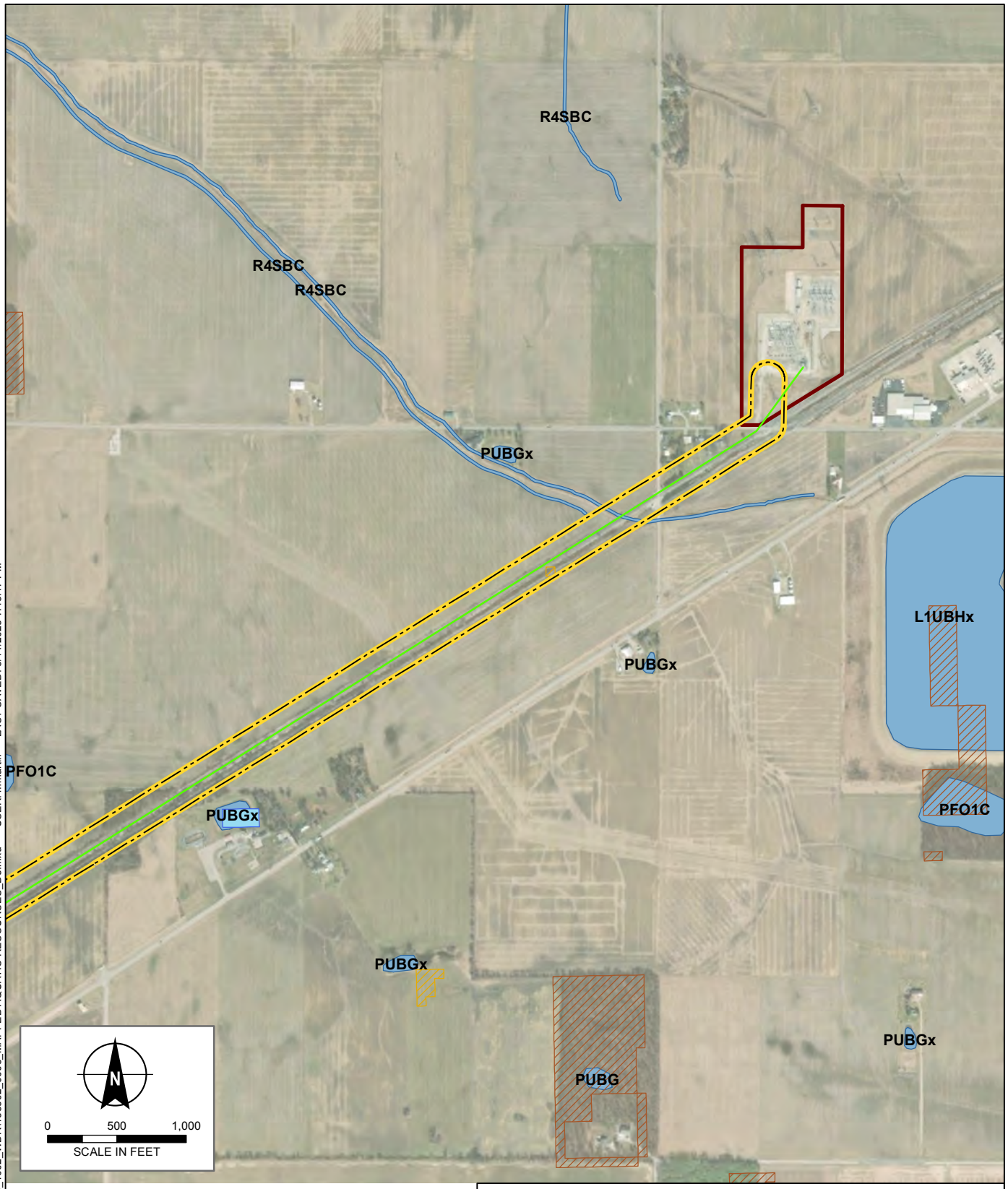
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

SHEET 1 OF 2
FIGURE 3

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0003_MAPPED AQUATIC RESOURCES_D3.mxd — USER: mmartin — LAST SAVED: 5/14/2023 7:13:17 PM



PROPOSED GEN-TIE LINE
NWI WETLAND
SUBSTATION BOUNDARY
STUDY AREA

OHIO WETLAND INVENTORY
OPEN WATER
WOODS ON HYDRIC SOIL
SHRUB/SCRUB WETLAND

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

HALEY ALDRICH

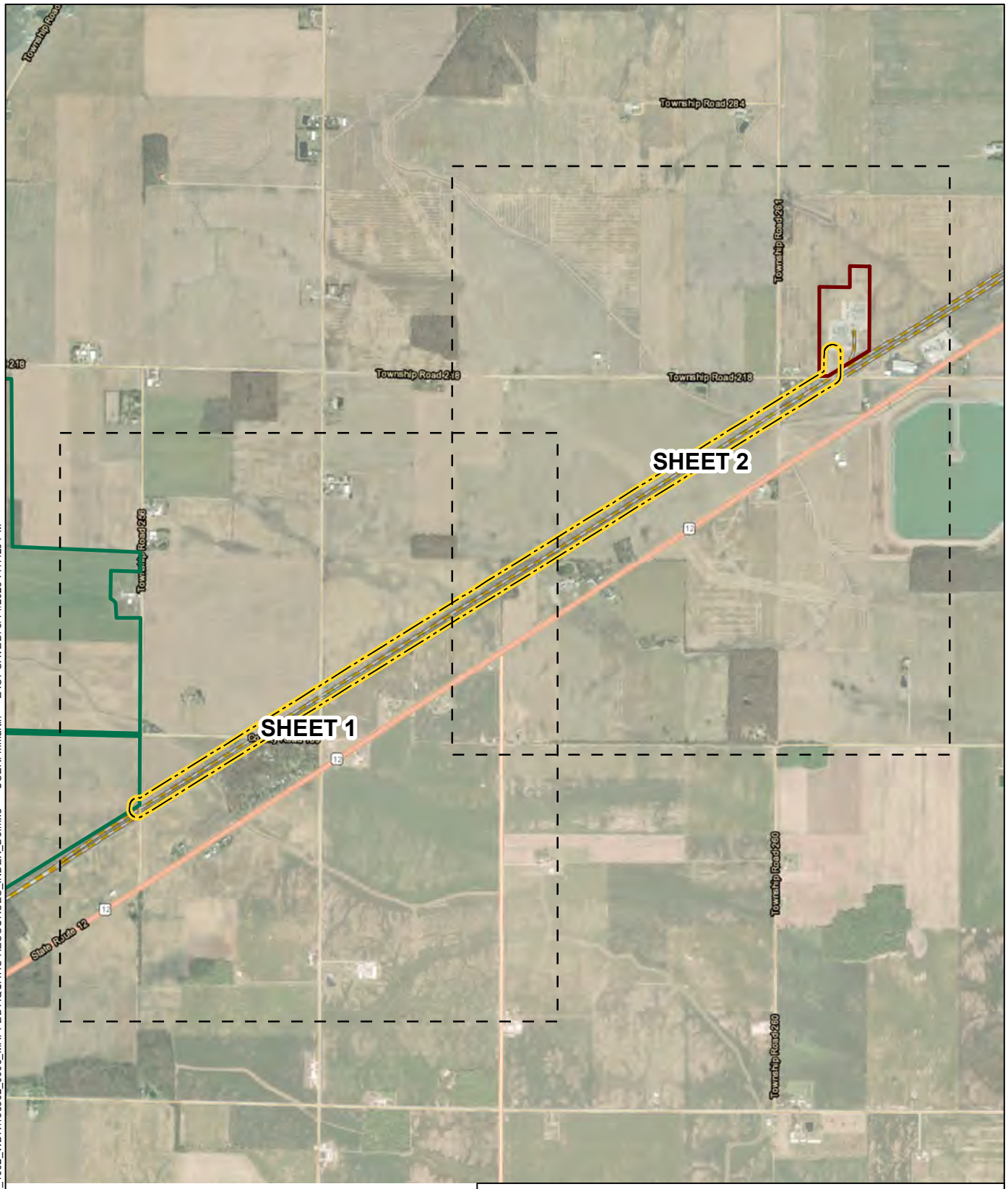
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

SHEET 2 OF 2
FIGURE 3

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0003_MAPPED AQUATIC RESOURCES_D3.mxd — USER: mmartin — LAST SAVED: 5/14/2023 7:13:17 PM



LEGEND

- STUDY AREA
- INDEX SHEET
- SUBSTATION BOUNDARY
- SOUTH BRANCH SOLAR PROJECT AREA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

N

0 1,000 2,000
Feet

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

INDEX SHEET
FIGURE 3

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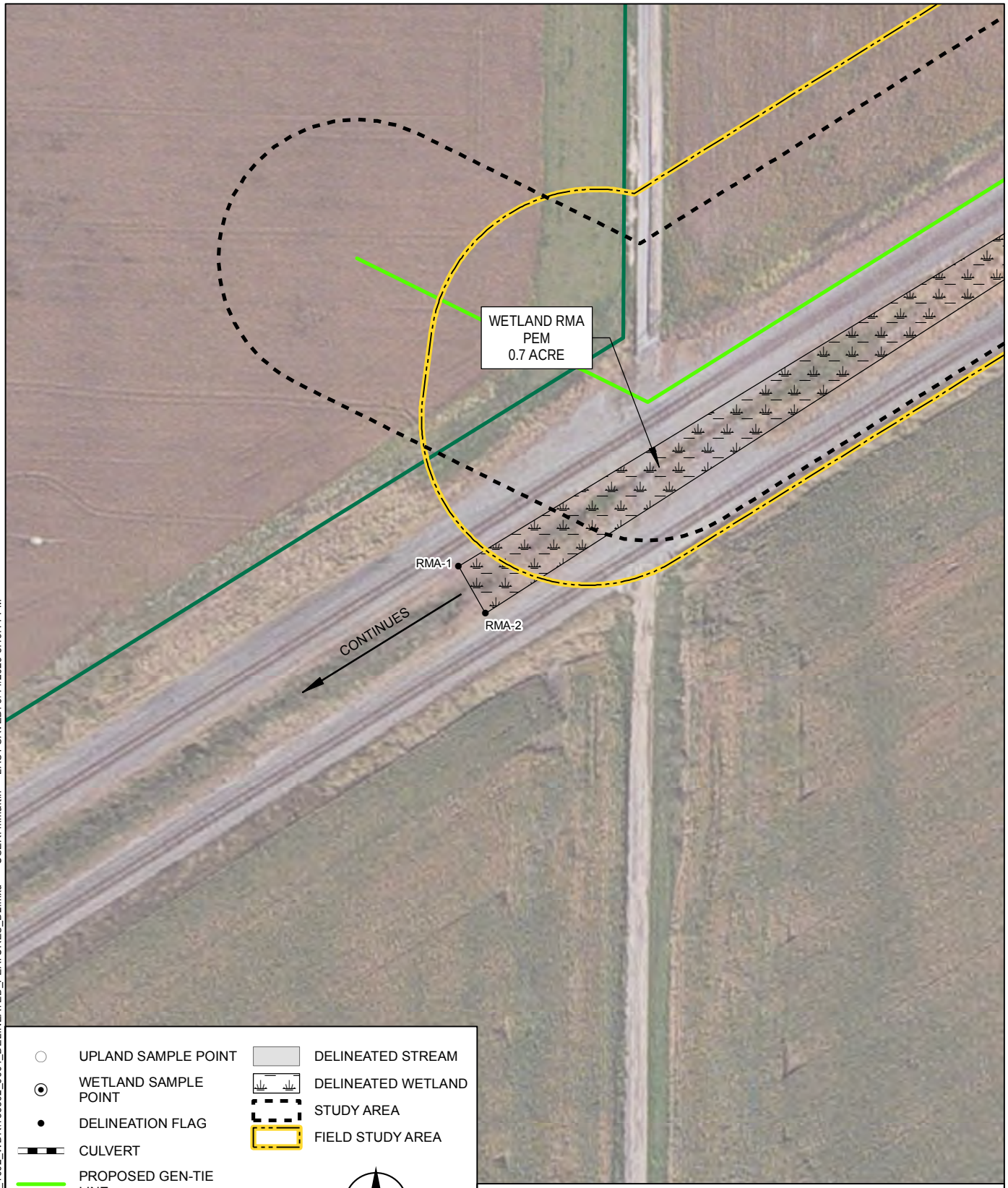

UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DELINEATED WETLAND TYPES ARE BASED ON COWARDIN CLASSIFICATION.
3. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 1 OF 15

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UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DELINEATED WETLAND TYPES ARE BASED ON COWARDIN CLASSIFICATION.
3. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

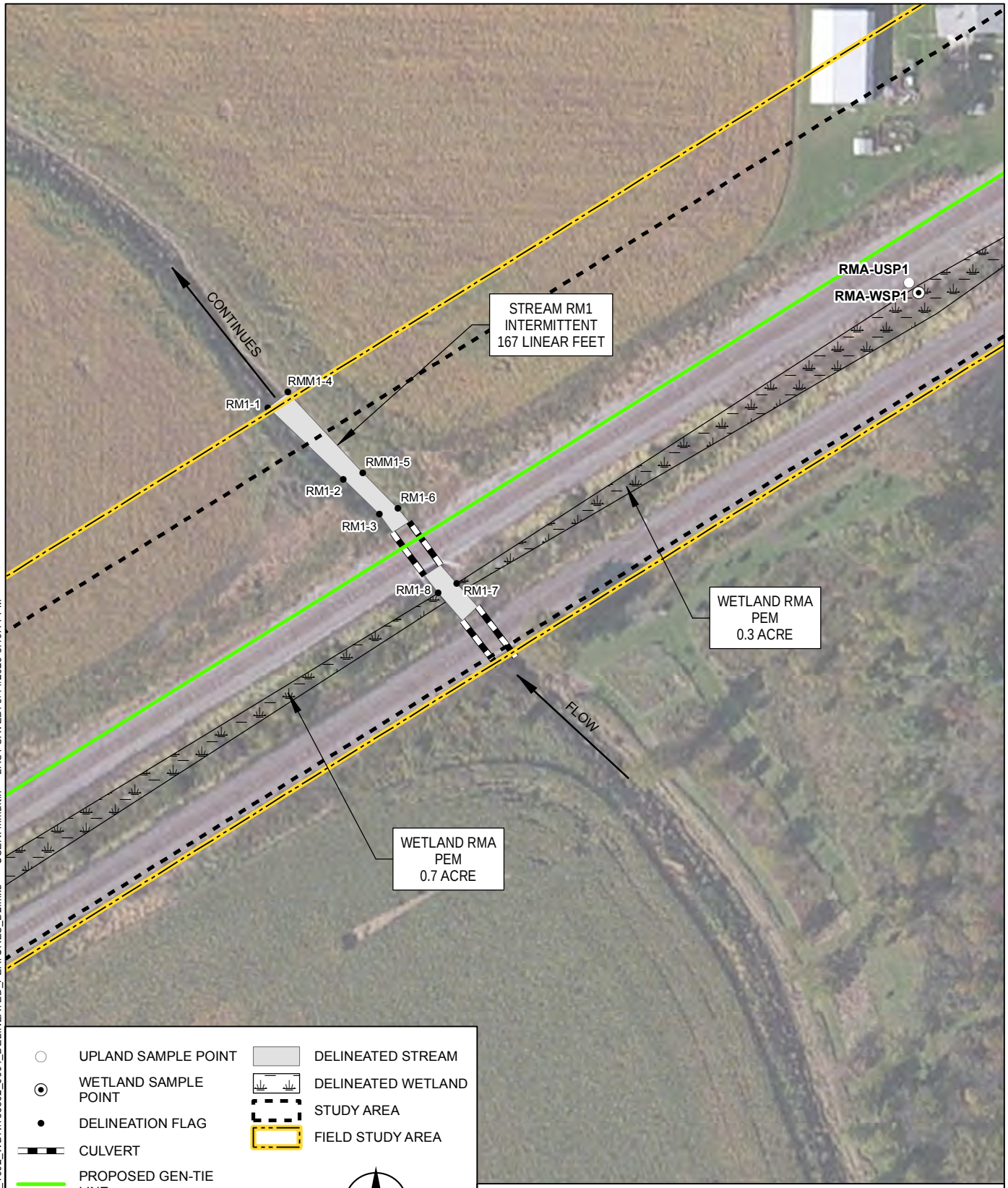
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 2 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
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HALEY ALDRICH

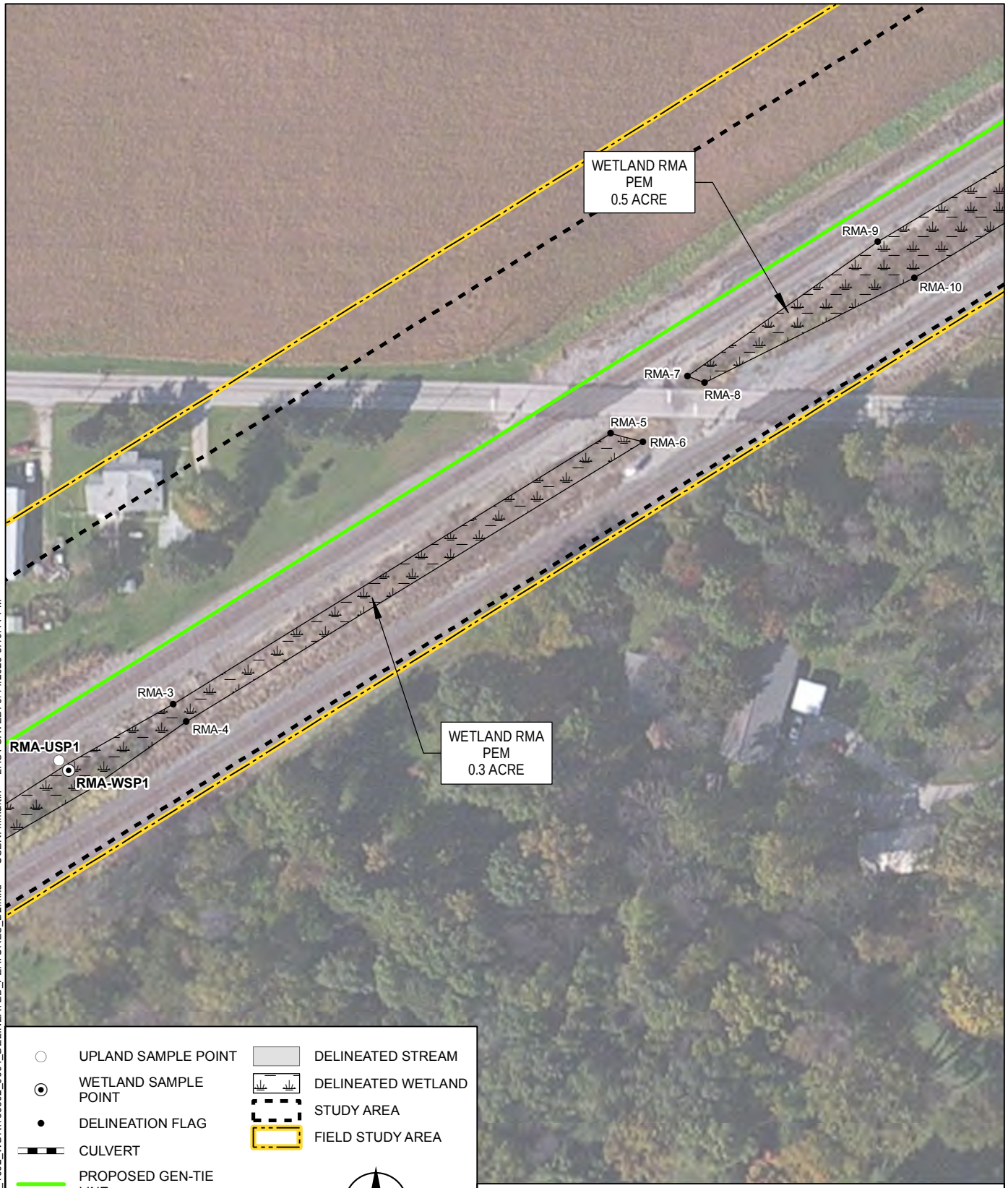
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 3 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



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WETLAND SAMPLE POINT
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CULVERT
PROPOSED GEN-TIE LINE
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HALEY ALDRICH

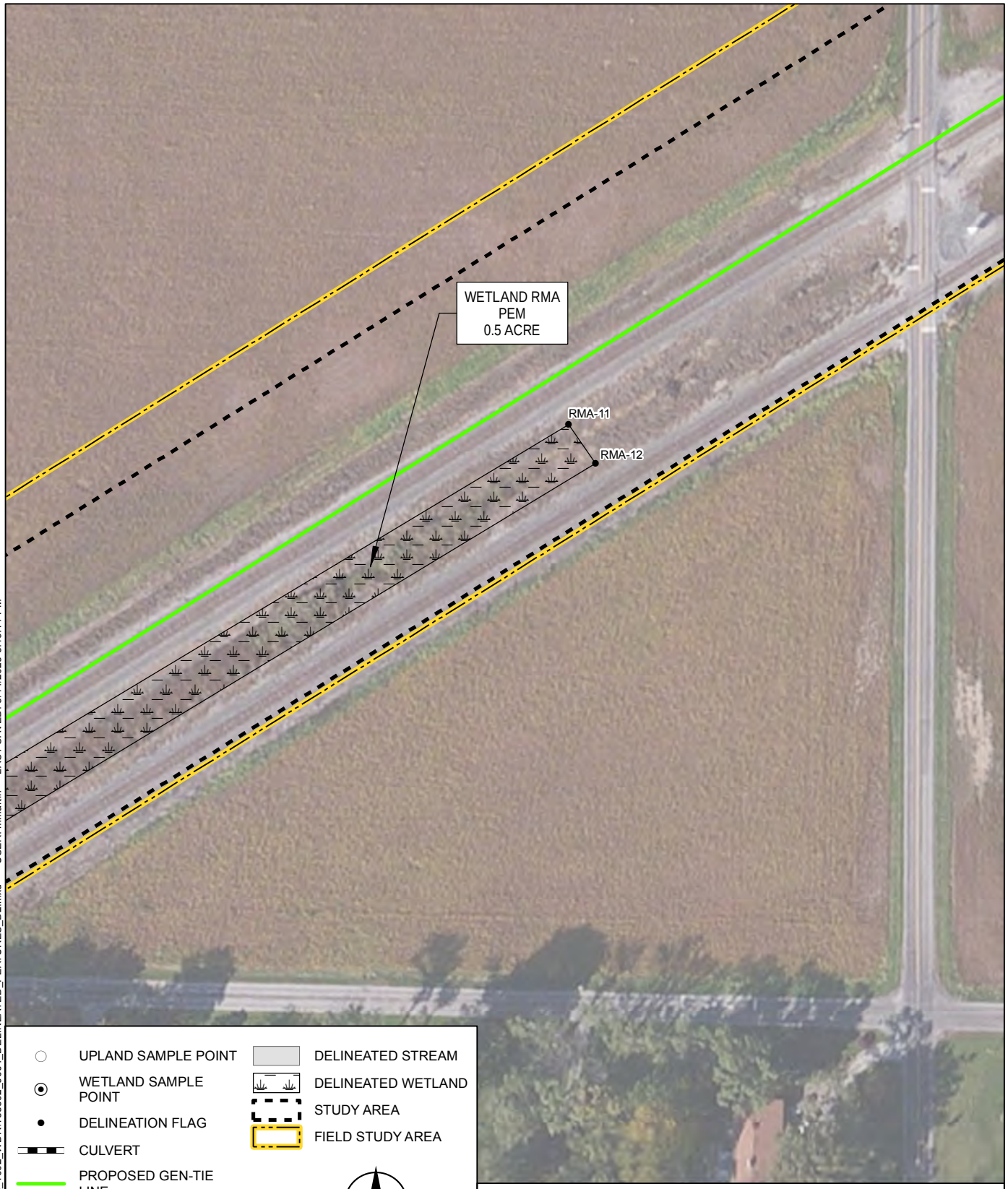
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 4 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



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DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
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DELINEATED WETLAND
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FIELD STUDY AREA

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0 50 100
Feet

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HALEY ALDRICH

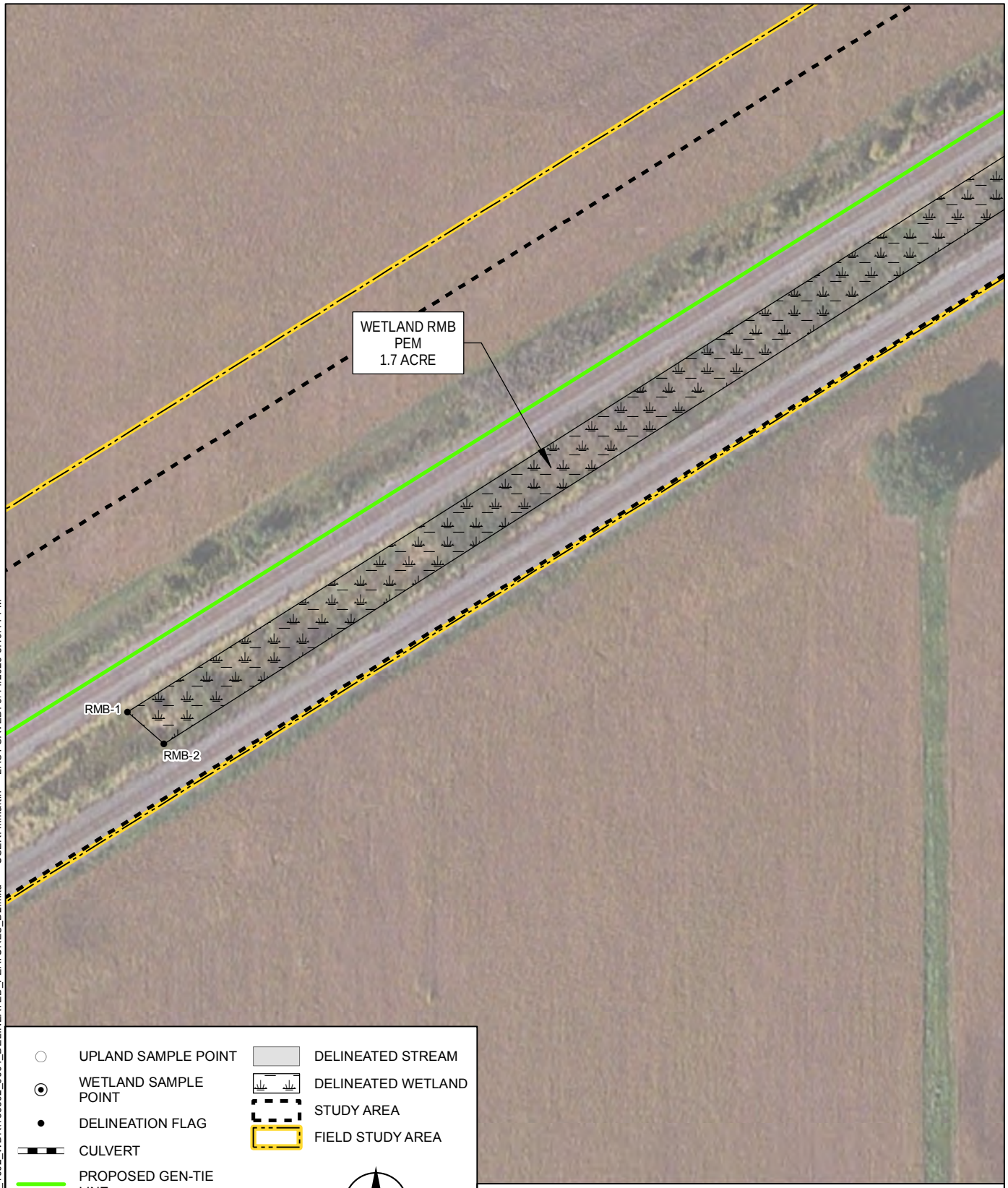
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 5 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
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N

0 50 100
Feet

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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 6 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM

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DELINEATION FLAG
CULVERT
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HALEY ALDRICH

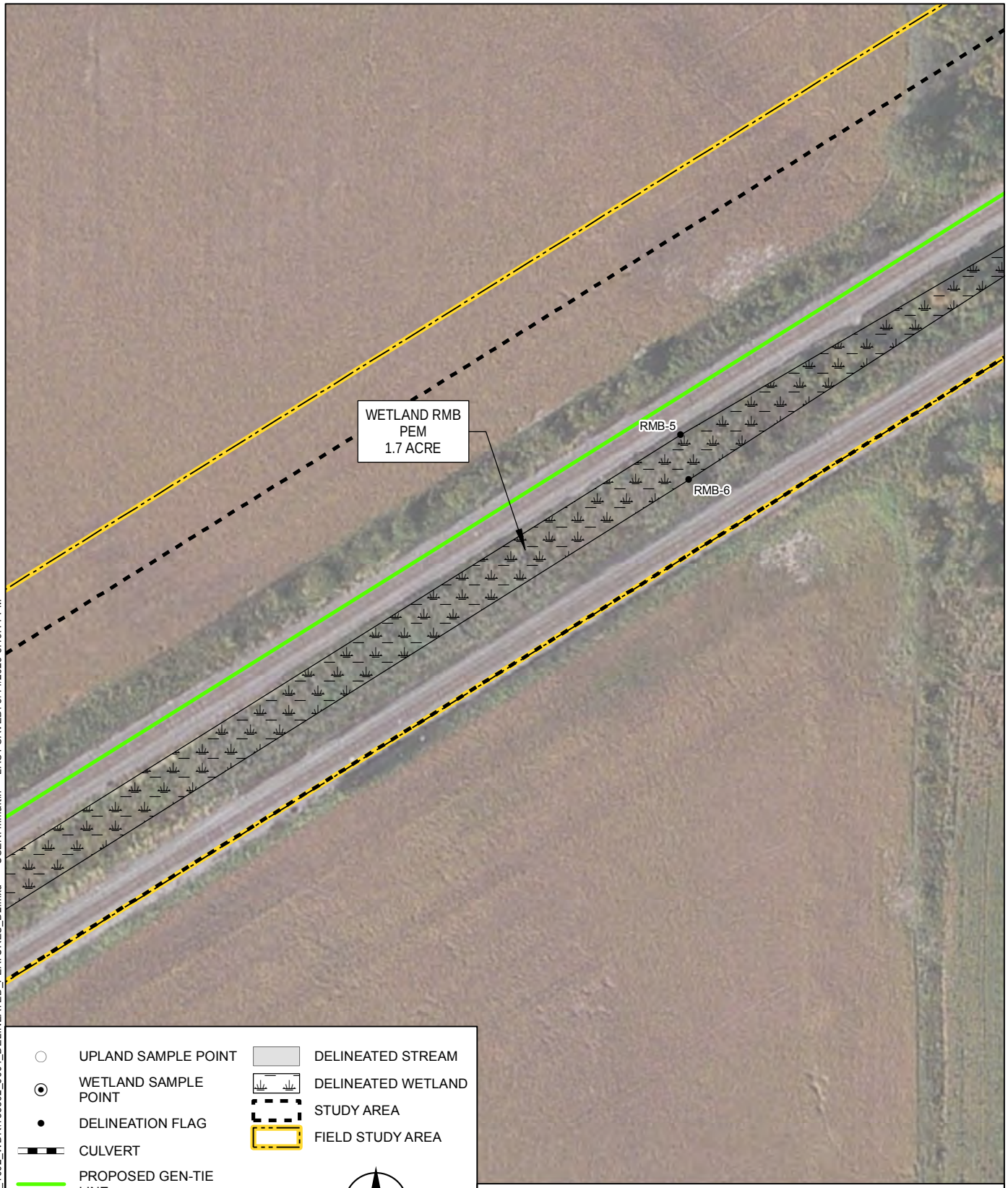
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 7 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
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DELINEATED WETLAND
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FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

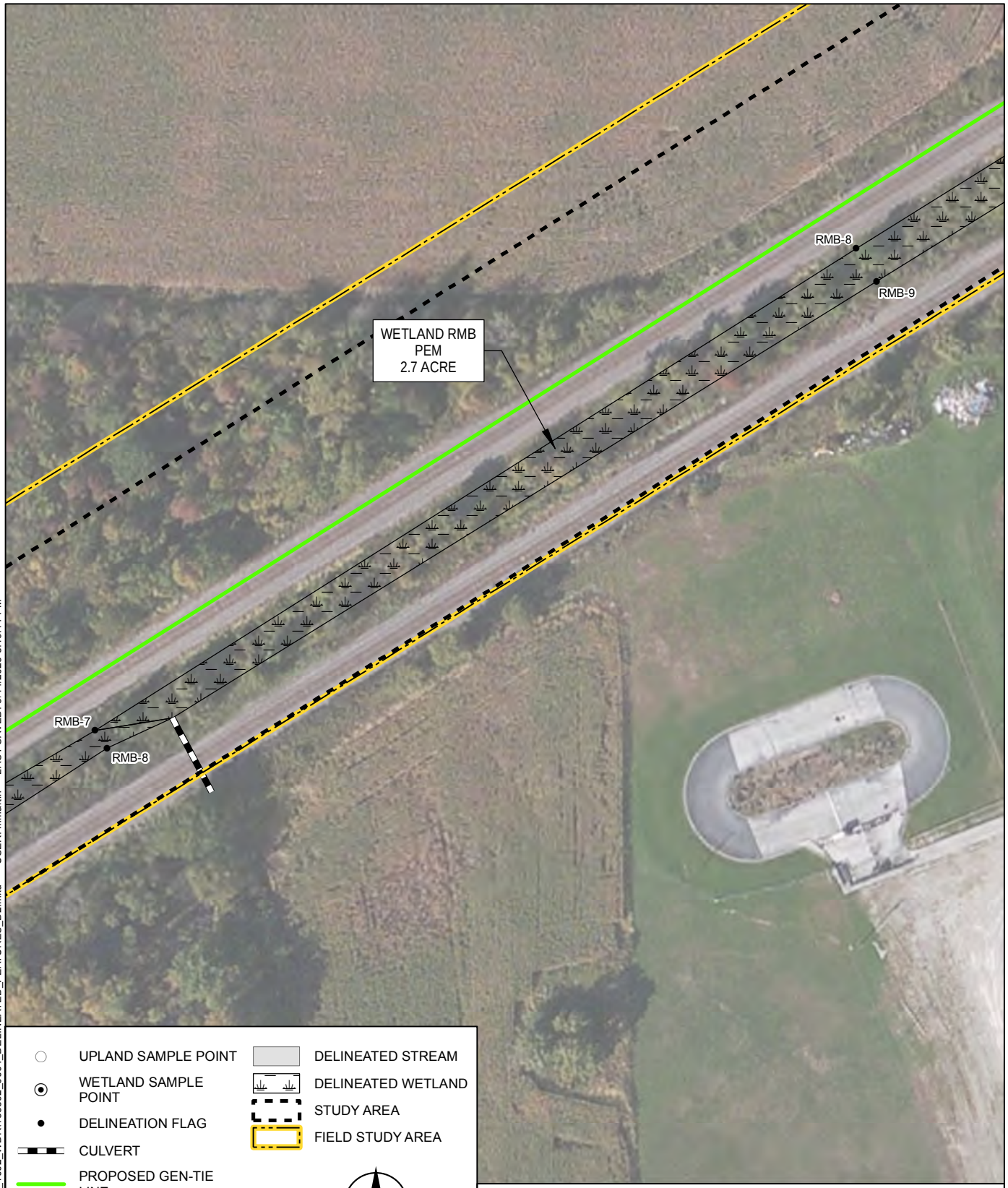
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 8 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
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DELINEATED WETLAND
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FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

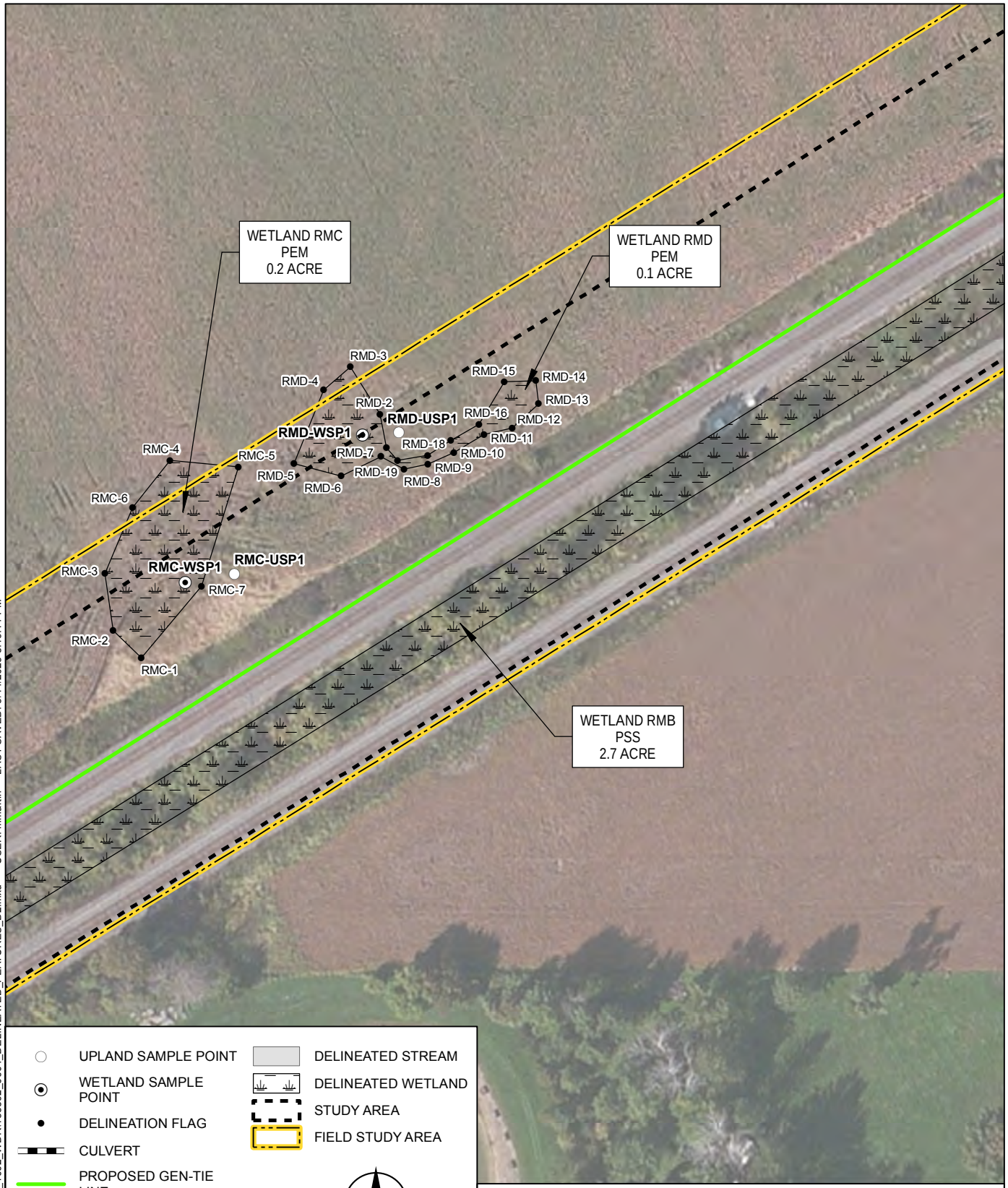
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 9 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

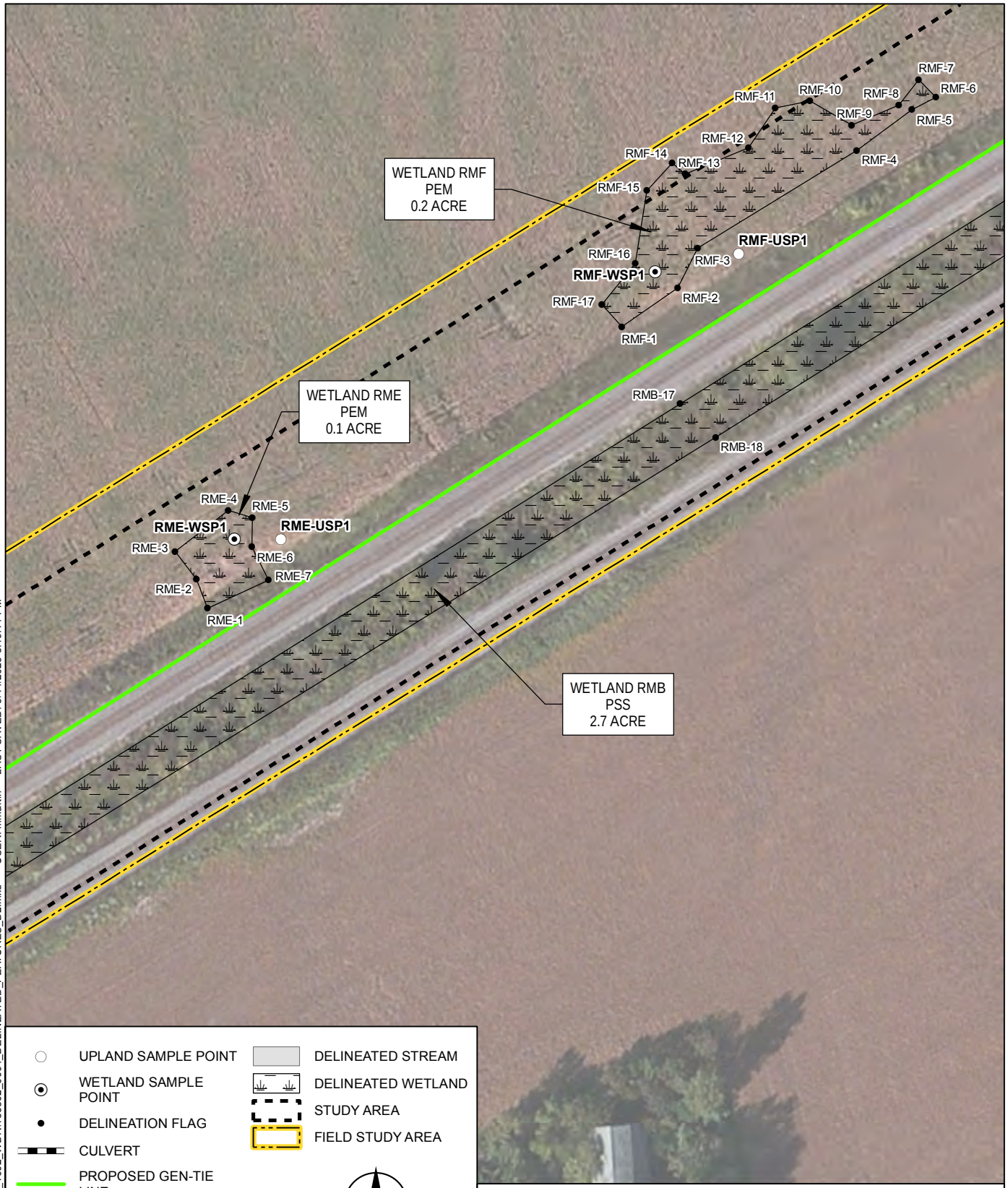
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 10 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 11 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM

UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

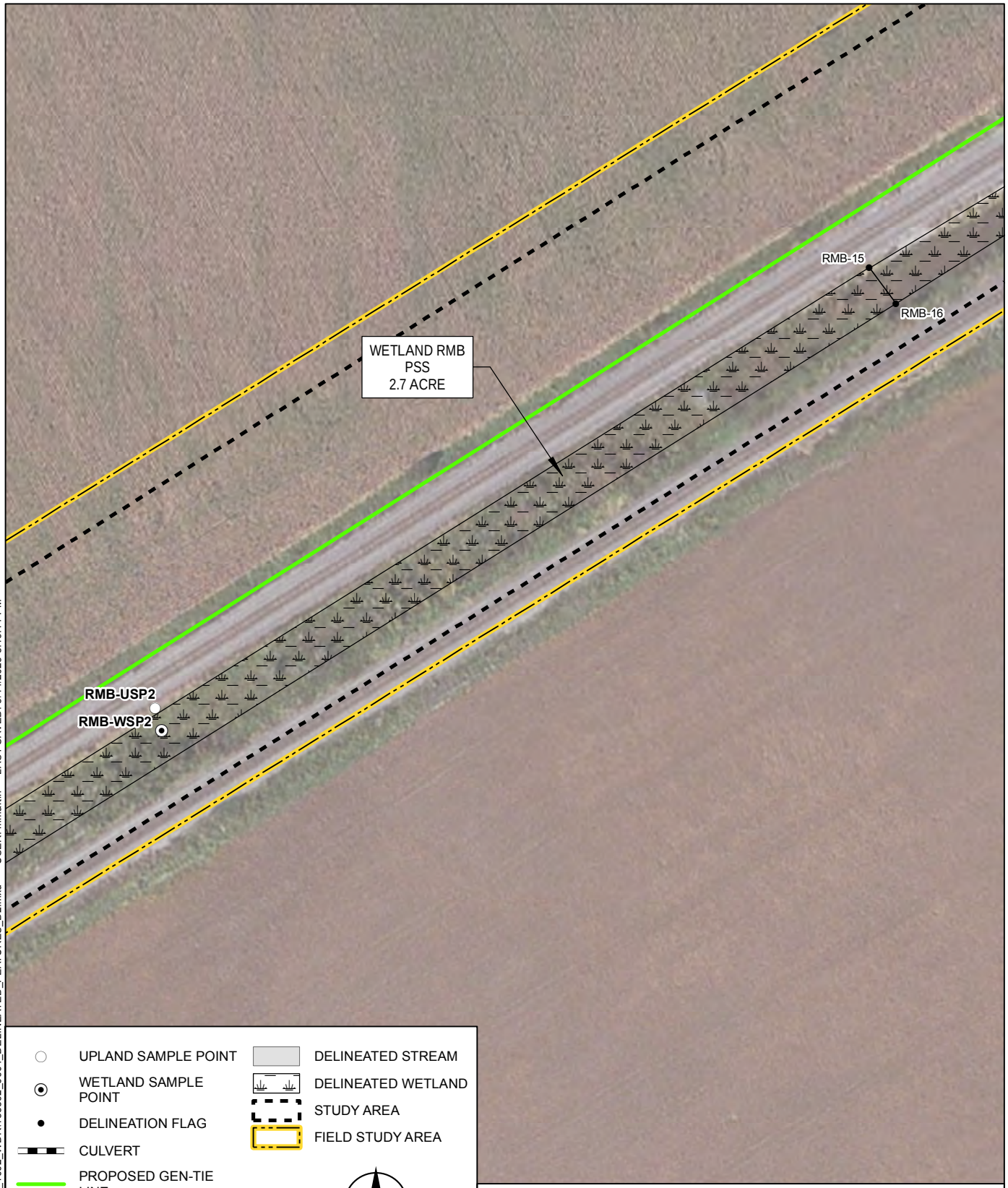
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 12 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
DELINEATED STREAM
DELINEATED WETLAND
STUDY AREA
FIELD STUDY AREA

N

0 50 100
Feet

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HALEY ALDRICH

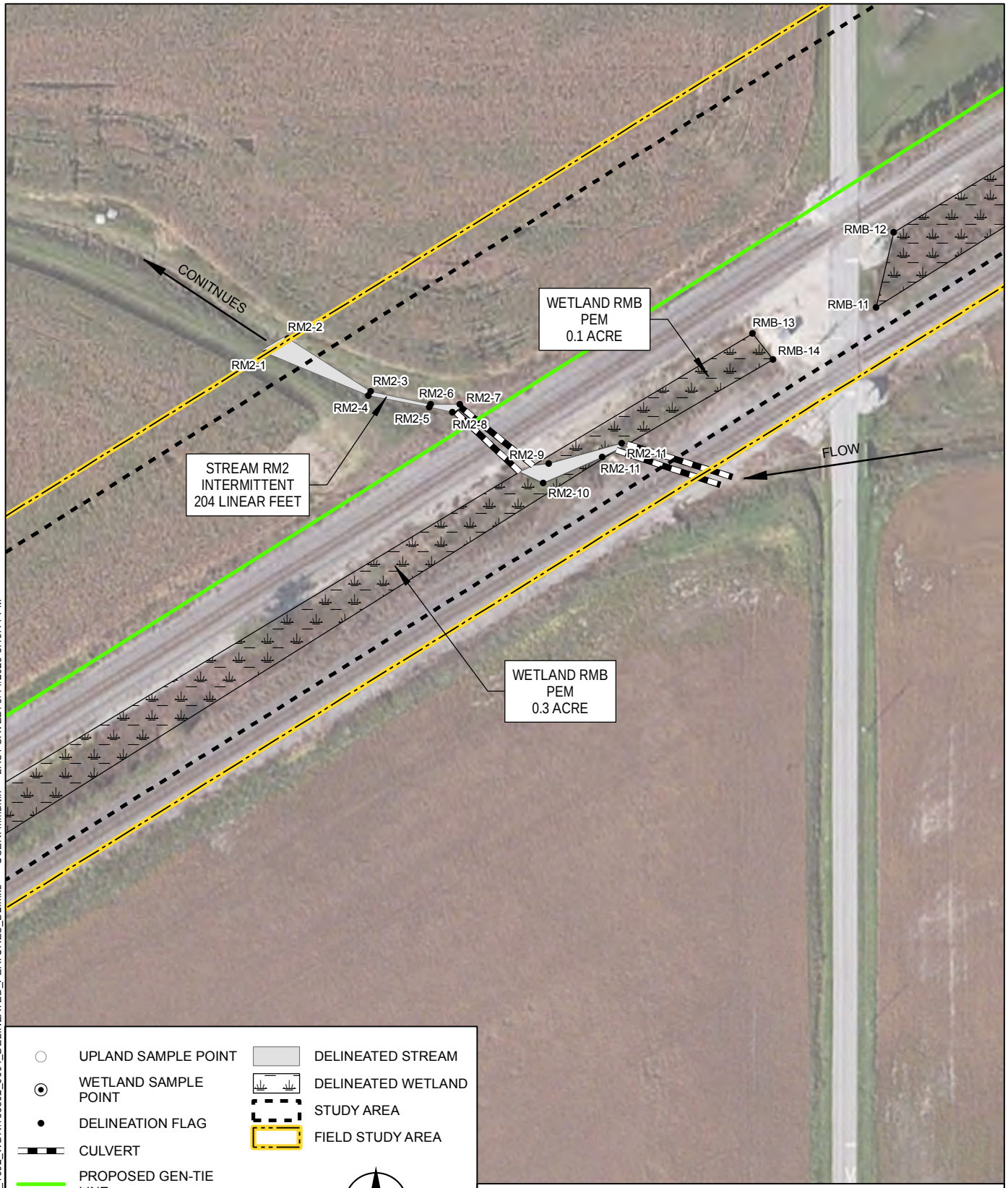
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 13 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



UPLAND SAMPLE POINT
WETLAND SAMPLE POINT
DELINEATION FLAG
CULVERT
PROPOSED GEN-TIE LINE
FEATURE CONTINUES
SUBSTATION BOUNDARY
SOUTH BRANCH SOLAR PROJECT AREA
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DELINEATED WETLAND
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N

0 50 100
Feet

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HALEY ALDRICH

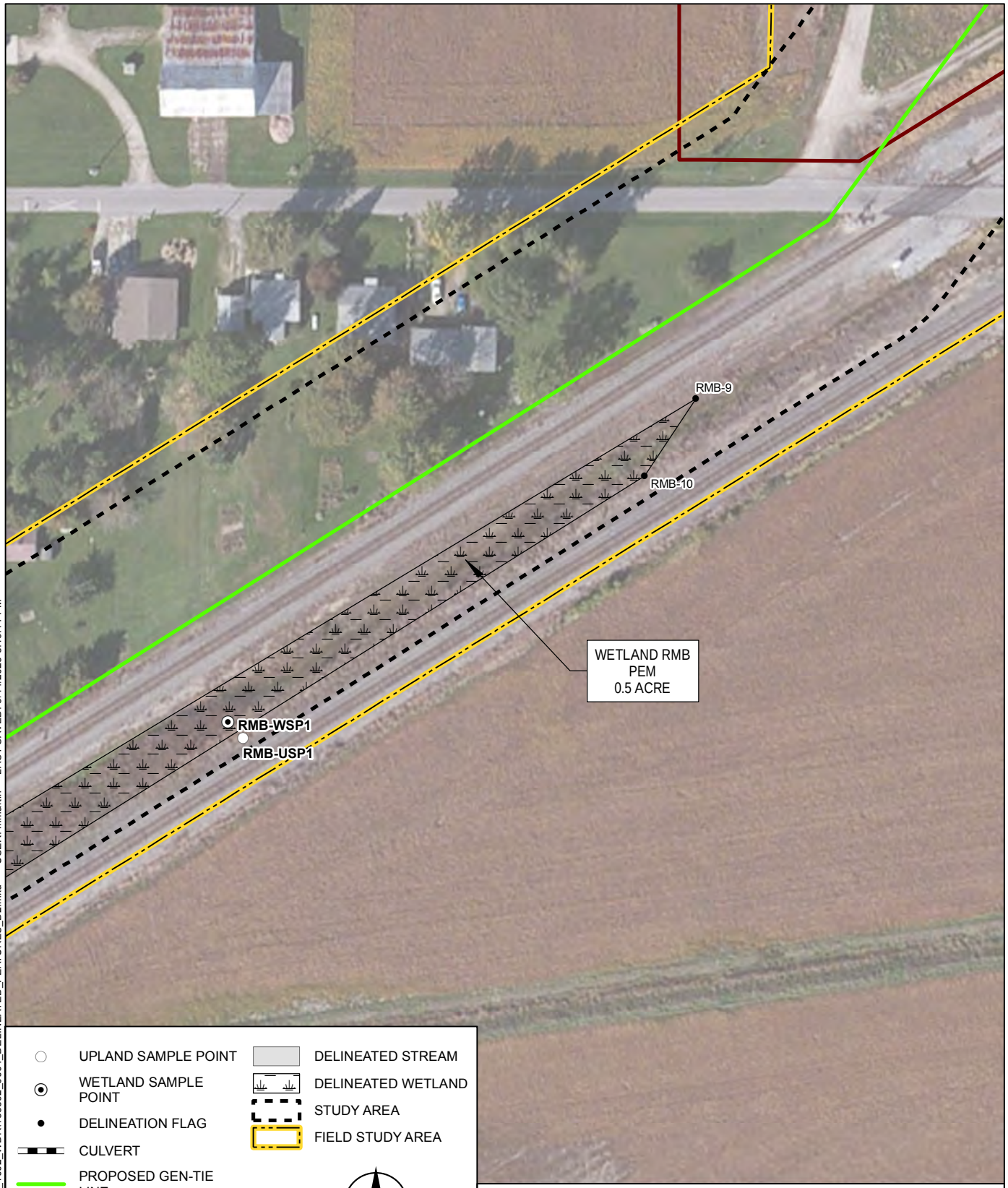
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 14 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



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DELINEATION FLAG
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N

0 50 100
Feet

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HALEY ALDRICH

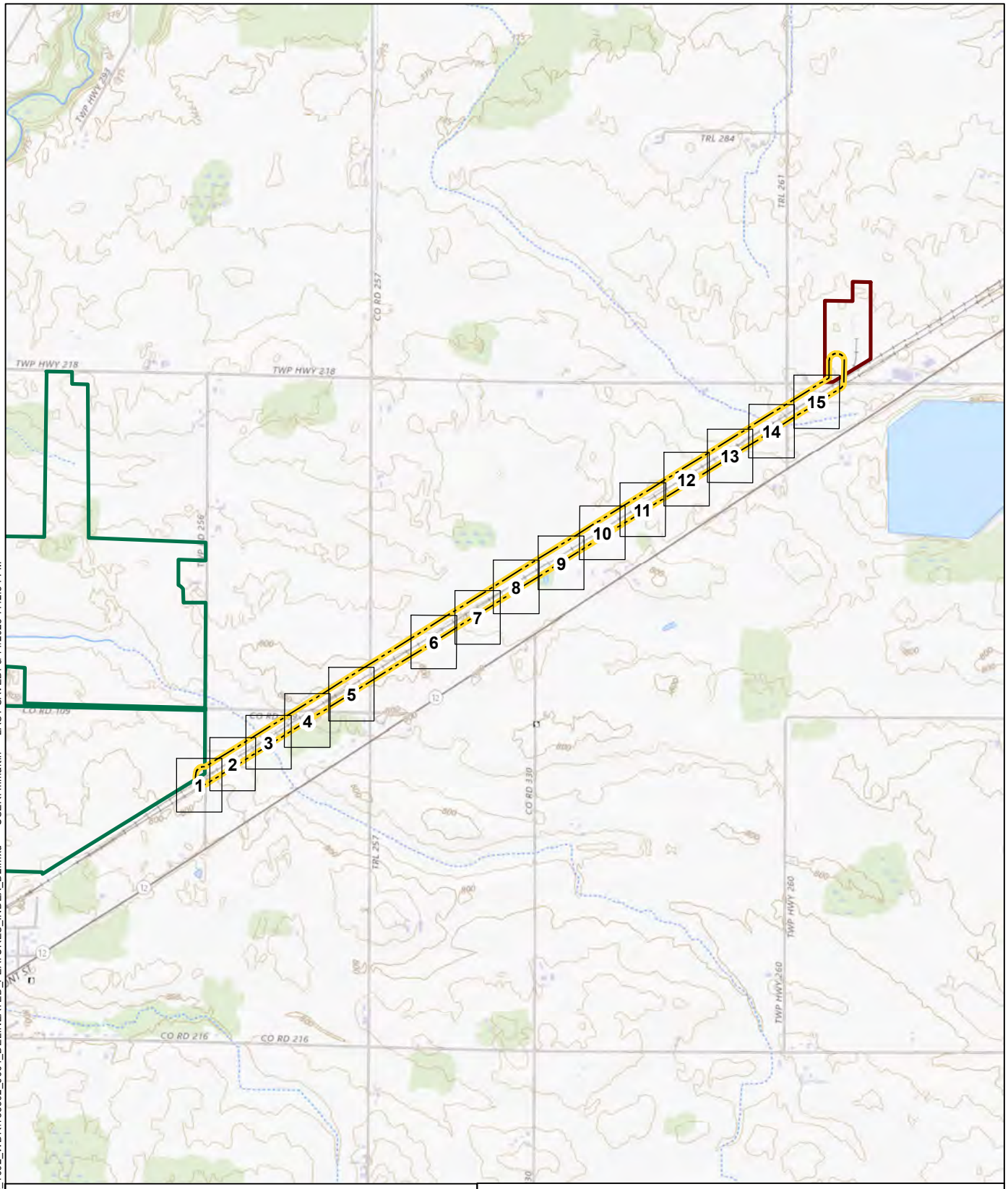
SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

DELINEATED WETLANDS AND STREAMS

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 15 OF 15

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 8:19:14 PM



LEGEND

- INDEX SHEET
- STUDY AREA
- SOUTHBRANCH SOLAR PROJECT AREA
- SUBSTATION BOUNDARY

N

0 0.25 0.5
Miles

NOTES

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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
INDEX SHEET

GIS FILE PATH: Z:\135392\GIS\Maps\2022_1002_WDR\135392_0004_DELINEATED_FEATURES_INDEX_D2.mxd — USER: mmartin — LAST SAVED: 5/14/2023 7:42:54 PM

APPENDIX A
Photo Log

Photo 1: View looking northwest at Stream RM1 (intermittent, vegetated channel) near flag RM1-3.

Photo 2: View looking northwest at Stream RM2 (intermittent, vegetated channel) from Norfolk Southern railroad.

Photo 3: View looking northeast at Wetland MMA (PEM) near flag RMA-9.

Photo 4: View looking northeast at Wetland MMB (PEM) near flag RMB-12.

Photo 5: View looking southwest at Wetland RMB (PSS) near sample point RMB-WSP2.

Photo 6: View looking north at Wetland RMC (PEM) near flag RMC-1.

Photo 7: View looking north at Wetland RMD (PEM) near flag RMD-6.

Photo 8: View looking northwest at Wetland RME (PEM) near flag RME-7.

Photo 9: View looking north at Wetland RMF (PEM) near flag RMF-3.

APPENDIX B
Wetland Determination Data and Stream Inventory Data Forms

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMA-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S21 T2N R12E

Landform (hillslope, terrace, etc.): Railroad Bed Local relief (concave, convex, none): Concave

Slope (%): 5 Lat: 41.1219262 Long: -83.4929351 Datum: WGS 84

Soil Map Unit Name: BpA - Blount-Houcktown complex, 0 to 3 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil ✔, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Sample point is within active railroad ROW.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Setaria faberi	80	✔	FACU
2. Equisetum arvense	20	✔	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	80	x 4 = 320
UPL species	0	x 5 = 0
Column Totals:	80 (A)	320 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMA-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: fill

Depth (inches): 12

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMA-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S21 T2N R12E

Landform (hillslope, terrace, etc.): Railroad Bed Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 41.1219311 Long: -83.4929441 Datum: WGS 84

Soil Map Unit Name: BpA - Blount-Houcktown complex, 0 to 3 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point located in depression between two railroad tracks.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	60	✔	OBL
2. Equisetum arvense	20	✔	FAC
3. Schoenoplectus tabernaemontani	10		OBL
4. Cyperus strigosus	5		FACW
5. Phragmites australis	5		FACW
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 15 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	70	x 1 = 70
FACW species	10	x 2 = 20
FAC species	20	x 3 = 60
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	100 (A)	150 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMA-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 18	10YR 2/2	95	10YR 4/6	5	C	M	Sandy Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ✔ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✔ Depth (inches): _____

Water Table Present? Yes ✔ No ___ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 4

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMB-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Railroad Bed Local relief (concave, convex, none): Concave

Slope (%): 5 Lat: 41.1360866 Long: -83.4634793 Datum: WGS 84

Soil Map Unit Name: Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Sample point located within railroad ROW.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Equisetum arvense	95	✔	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 15 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	95	x 3 = 285
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	95 (A)	285 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMB-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/3	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: fill

Depth (inches): 10

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMB-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Railroad Bed Local relief (concave, convex, none): Concave

Slope (%): 5 Lat: 41.136095 Long: -83.4635093 Datum: WGS 84

Soil Map Unit Name: Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point is within active railroad ROW.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	80	✔	OBL
2. Equisetum arvense	20	✔	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	80	x 1 = 80
FACW species	0	x 2 = 0
FAC species	20	x 3 = 60
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	100 (A)	140 (B)

Prevalence Index = B/A = 1.40

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMB-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/2	90	10YR 4/6	10	C	M	Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: fill

Depth (inches): 12

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ✔ No ___ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMB-WSP2

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Railroad Bed Local relief (concave, convex, none): Concave

Slope (%): 3 Lat: 41.1337062 Long: -83.4685894 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point located within active railroad ROW.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1. Salix nigra	70	✔	OBL
2.			
3.			
4.			
5.			
	70% = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Carex hyalinolepis	30	✔	OBL
2. Solidago canadensis	10	✔	FACU
3. Typha angustifolia	10	✔	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	50% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	110 (A)		140 (B)

Prevalence Index = B/A = 1.27

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMB-WSP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 4/2	100					Silt Loam	
4 - 18	10YR 5/2	85	10YR 5/6	15	C	M	Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ✔ No ___ Depth (inches): 2

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMC-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): None

Slope (%): 0 Lat: 41.130584 Long: -83.475711 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Sample point is located in an active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Glycine max	80	✔	
2. Abutilon theophrasti	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	10	x 4 = 40
UPL species	0	x 5 = 0
Column Totals:	10 (A)	40 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMC-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 14	7.5YR 3/1	100					Silt Loam	
14 - 18	2.5Y 5/2	95	10YR 4/6	5	C	M	Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMC-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Closed Depression Local relief (concave, convex, none): Concave

Slope (%): _____ Lat: 41.1305572 Long: -83.4758251 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point is located in an active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Xanthium strumarium	30	✔	FAC
2. Barbarea orthoceras	10	✔	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	10	x 1 = 10
FACW species	0	x 2 = 0
FAC species	30	x 3 = 90
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	40 (A)	100 (B)

Prevalence Index = B/A = 2.50

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMC-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 3/1	100					Silt Loam	
10 - 18	2.5Y 5/1	90	2.5Y 5/6	10	C	M	Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ✔ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✔ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ✔ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 10

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMD-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 41.1308769 Long: -83.475199 Datum: WGS 84

Soil Map Unit Name: BpA - Blount-Houcktown complex, 0 to 3 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Sample point is located in an active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Glycine max	100	✔	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = NaN

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks: (Include photo numbers here or on a separate sheet.)

Area is planted with soybean.

SOIL

Sampling Point: RMD-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 18	10YR 3/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMD-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Closed Depression Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 41.1308323 Long: -83.4753421 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point located in active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Lindernia dubia	25	✔	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	25	x 1 = 25
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	25 (A)	25 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

✔ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

✔ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMD-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 3/1	100					Silt Loam	
10 - 18	10YR 4/2	80	10YR 4/6	20	C	M	Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ✔ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✔ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✔ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✔ No ___ Depth (inches): 1

Water Table Present? Yes ✔ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RME-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): None

Slope (%): 0 Lat: 41.1316739 Long: -83.4731861 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Sample point located in active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Glycine max	95	✔	
2. Plantago major	5		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	5	x 3 = 15
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	5 (A)	15 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RME-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 18	10YR 4/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RME-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Closed Depression Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 41.13169 Long: -83.4733628 Datum: WGS 84

Soil Map Unit Name: Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point is located in an active agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Xanthium strumarium	70	✔	FAC
2. Hibiscus trionum	15		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	70	x 3 = 210
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	70 (A)	210 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RME-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 18	10YR 3/2	95	10YR 4/6	5	C	M	Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✔ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✔ No ___ Depth (inches): 2

Water Table Present? Yes ✔ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMF-USP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 41.1322288 Long: -83.4720853 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		

Herb Stratum (Plot size: 5 ft r)			
1. Glycine max	90	✔	
2. Abutilon theophrasti	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		

Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	10	x 4 = 40
UPL species	0	x 5 = 0
Column Totals:	10 (A)	40 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks: (Include photo numbers here or on a separate sheet.)

Field is planted in soybean.

SOIL

Sampling Point: RMF-USP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 18	10YR 4/1	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: South Branch Solar Transmission Line Project City/County: Hancock County Sampling Date: 2022-09-27

Applicant/Owner: Leeward Renewable Energy Development State: Ohio Sampling Point: RMF-WSP1

Investigator(s): M. Martin, R. Moyles Section, Township, Range: S15 T2N R12E

Landform (hillslope, terrace, etc.): Closed Depression Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 41.1322536 Long: -83.4722695 Datum: WGS 84

Soil Map Unit Name: PmA - Pewamo silty clay loam, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Sample point is located in an agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Xanthium strumarium	45	✔	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	45% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	45	x 3 = 135
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	45 (A)	135 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ✔ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: RMF-WSP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 4/2	100					Silt Loam	
8 - 18	10YR 4/2	95	10YR 4/6	5	C	M	Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✔ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

HALEY & ALDRICH, INC.
200 Town Centre Drive, Suite 2
Rochester, NY 14623
585.359.9000

MEMORANDUM

16 May 2023
File No. 0135392-002

TO: South Branch Solar, LLC

FROM: Haley & Aldrich, Inc.
Michael Martin, Senior Scientist
Audrey West, Assistant Project Manager

SUBJECT: Wetland and Stream Investigation
South Branch Gen-Tie Line – Alternate Route
Hancock County, Ohio

On behalf of South Branch Solar, LLC (South Branch), Haley & Aldrich, Inc. (Haley & Aldrich) conducted a field visit along a proposed alternative route for a proposed electric generation transmission interconnection line (Gen-Tie). In accordance with requirements of the Ohio Power Siting Board (OPSB), an alternative Gen-Tie route must be considered, including a field survey within 100 feet of the potential Gen-Tie disturbance area (Study Area). The Study Area (Figure 1) encompasses approximately 58 acres of land. The field investigation effort described in this report focused on the Study Area. The Alternate Route is entirely located in Hancock County, Ohio and follows the southern side of Norfolk Southern railroad property approximately 2.4 miles east to connect energy generated by South Branch Solar to the existing Fostoria Central Substation.

Methodology

Prior to field investigations, a desktop review of publicly available data sources was conducted. Data consulted included: United States Geological Survey (USGS) topographic quadrangle maps, United States Fish & Wildlife Service (USFWS) National Wetland Inventory (NWI) maps, Natural Resources Conservation Service (NRCS) County Soil survey, Federal Emergency Management Agency (FEMA) Flood Insurance maps, National Hydrography Dataset, Ohio Wetlands Inventory (OWI), and recent aerial imagery.

Because land access was restricted to the railroad right-of-way, formal wetland and stream delineations of the entire Study Area were not feasible. As a result, this reconnaissance-level survey was restricted to observations of wetlands and streams from the public roadways and the railroad right-of-way. The approximate size and location of potential wetlands and streams were recorded on Study Area mapping and the general characteristics of any observed features were noted. The observations of this site visit should not be considered sufficient to support permitting should future impacts be proposed in or around the Study Area.

Project Setting

The Study Area was approximately 70 acres, including areas of existing road and utility line rights-of-way, active agricultural crop land, residential land, scattered woodlots, and the existing Fostoria Central Substation. Topography within the Study Area is generally flat and elevation ranges from approximately 780 feet above mean sea level (amsl) to approximately 800 feet amsl. A topographic map of the Study Area and surrounding region is provided as Figure 2.

Soil map units, drainage class, and hydric classification are listed in Table 1, in order of prevalence within the Study Area, and provided as Figure 2. Soils within the Study Area primarily consist of somewhat poorly drained to very poorly drained silt loams and silty clay loams. The majority of soils mapped within the Study Area are classified as hydric.

Table 1. Study Area Soils

Soil Map Unit Symbol	Soil Map Unit Name	Percentage of Study Area	Drainage Class	Hydric Classification[1]
PmA	Pewamo silty clay loam, 0 to 1 percent slopes	46.3	Very Poorly Drained	Hydric
Blg1A1	Blount silt loam, ground moraine, 0 to 2 percent slopes	29.7	Somewhat Poorly Drained	Hydric
BpA	Blount-Houcktown complex, 0 to 3 percent slopes	23.9	Somewhat Poorly Drained – Moderately Well Drained	Not Hydric
Blg1B1	Blount silt loam, ground moraine, 2 to 4 percent slopes	0.1	Somewhat Poorly Drained	Not Hydric

Note:
[1] *Soils mapping source: USDA, NRCS Web Soil Survey (accessed 12 October 2022).*

The Study Area is located in the Cedar-Portage Watershed (USGS HUC 04100010). The major streams located in this watershed include the Portage River, Sugar Creek, Lacarpe Creek, Bayou Ditch, Berger Ditch, and Wolf Ditch. The Portage River flows northeast to Lake Erie. The majority of surface hydrology within the Study Area is generated by precipitation. The Study Area has an average annual precipitation of 33.80 inches, as measured in nearby Findlay, Ohio.

There are two National Wetlands Inventory (NWI) wetlands mapped within the Study Area. These include one area classified as an excavated pond (NWI code PUBGx) and one area classified as a riverine system associated with an intermittent channel (NWI codes R4SBC). The two mapped riverine areas coincide with unnamed intermittent streams indicated on USGS topographic mapping. The OWI indicates the potential presence of two potential wetland areas within the Study Area. These include one area classified as Woods on Hydric Soil and one Shrub/Scrub Wetland. State and federally mapped aquatic resources within the Study Area are depicted on Figure 3.

Results

Field investigations to determine the potential presence of wetlands and streams within and adjacent to the Study Area were completed by Haley & Aldrich wetland scientists on 26 and 27 September 2022. A map of the observed aquatic features is provided as Figure 4 and descriptions of these features are provided below.

WETLANDS

Wetland areas were observed throughout the Study Area in the depressed area between the railroad beds of the Norfolk Southern railroad. This includes areas of both emergent and scrub shrub vegetation. In general, these areas are considered low quality and were heavily disturbed by construction and operation of the railroad. These areas were observed to be hydrologically connected to intermittent streams that flow northwest through a series of culverts under the railroad. As a result, it is possible these areas could be considered jurisdictional by the United States Army Corps of Engineers (USACE).

One woodlot was observed in areas classified by the OWI as Woods on Hydric Soil. Based on the OWI mapping and the otherwise extensive farming near the Study Area, it appears likely that at least portions of this area include wetlands. Two additional forested areas are located within the Study Area. Based on aerial photography, it appears likely that at least portions of these two areas include wetlands.

One excavated pond was observed just outside of the Study Area and was associated with residential development. No inlets or outlets were observed at this pond. Because the pond appears to have been privately constructed, to not impound any natural stream channel, or to be hydrologically connected to any Waters of the United States, it is unlikely to be considered jurisdictional by the USACE or Ohio Environmental Protection Agency.

STREAMS

Two intermittent streams were observed in the Study Area. One stream, located in the northern portion of the Study Area, flows west from a reservoir located east of the Study Area before flowing into a series of culverts beneath the Norfolk Southern railroad. The stream then continues northwest into a culvert under Township Road 218 to the northwest towards the South Branch Portage River. The other stream, located in the southern portion of the Study Area, flows northwest through a series of culverts beneath the Norfolk Southern railroad. The stream continues northwest towards the South Branch Portage River. Both streams have been channelized within agricultural areas and receive runoff from drain tiles in the adjacent fields. The stream channels are heavily vegetated and obscured in most areas.

Conclusion

Haley & Aldrich performed a reconnaissance level investigation from public roadways and the railroad right-of-way to determine the potential presence of wetlands and streams within the Study Area on 26 and 27 September 2022, where access was not authorized. Two intermittent streams and two

emergent/scrub shrub wetlands were observed within the Study Area. Additionally, three relatively small, forested areas were observed within the Study Area that may include additional wetlands. Because of the distance to these sites from the public roadway and railroad right-of-way, it was not possible to make a definitive determination regarding the presence of wetlands in these areas. Land access and further evaluation of the specific hydrological, vegetation, and soil characteristics of these sites would be necessary to make such a determination.

Enclosures:

- Figure 1 – Study Area Overview
- Figure 2 –Topography and Soils
- Figure 3 – Federal and State Mapped Aquatic Resources
- Figure 4 – Observed Aquatic Resources
- Attachment A – Photo Log

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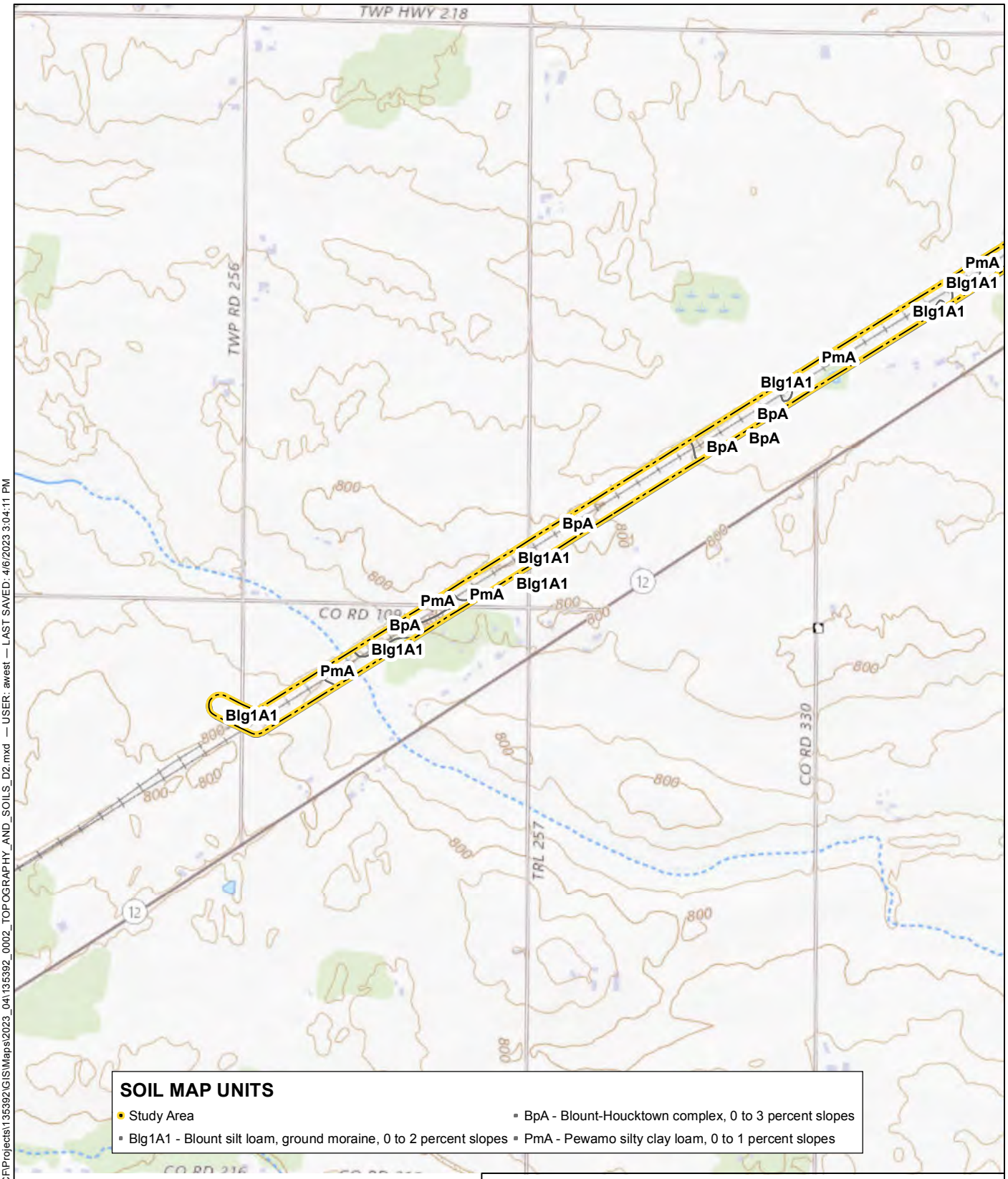
FIGURES



SOIL MAP UNITS

- Study Area
- Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes
- BpA - Blount-Houcktown complex, 0 to 3 percent slopes
- PmA - Pewamo silty clay loam, 0 to 1 percent slopes

LEGEND

Study Area

N

0 500 1,000
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

FIGURE 2
SHEET 1 OF 2

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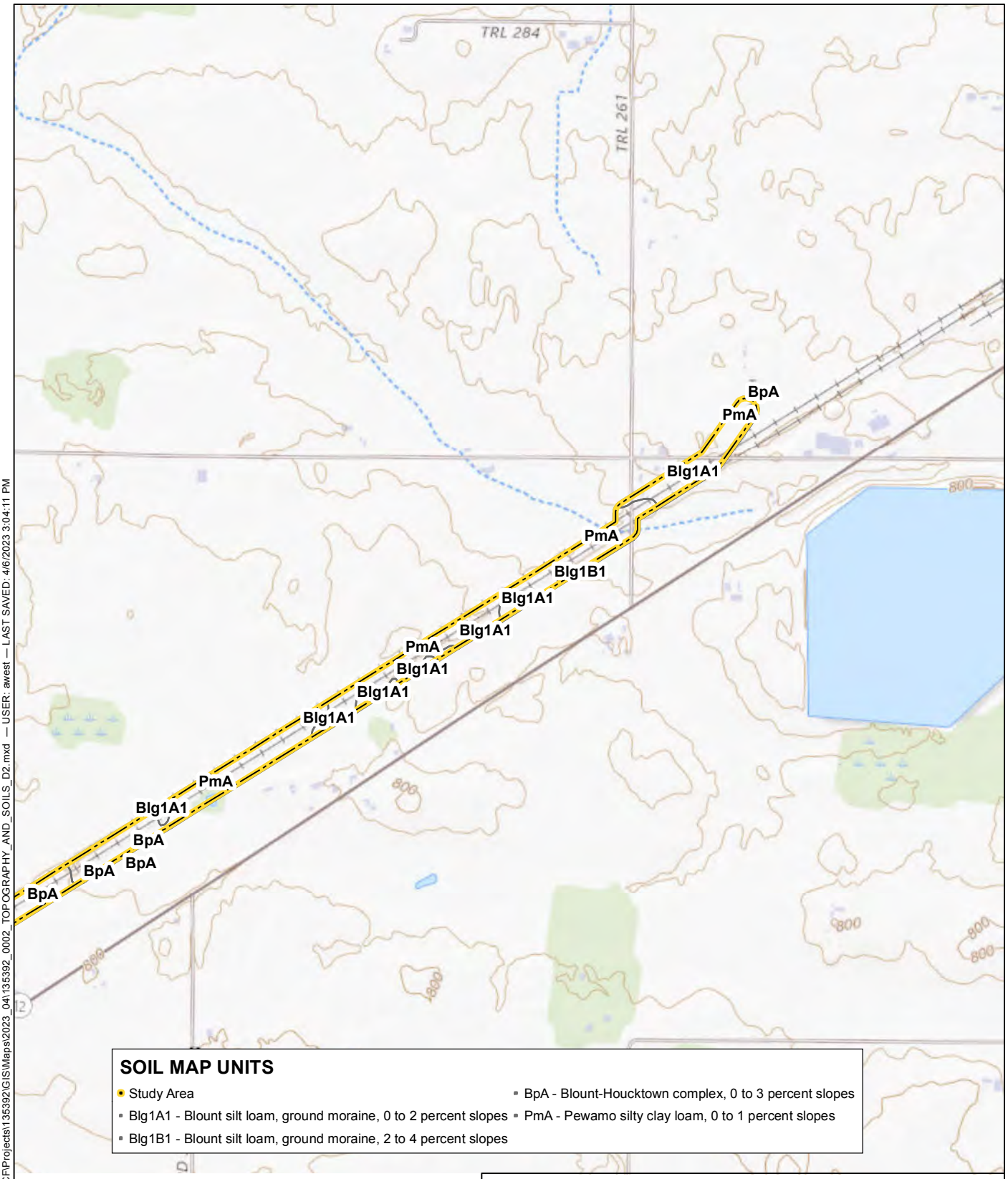

SOIL MAP UNITS

- Study Area
- Blg1A1 - Blount silt loam, ground moraine, 0 to 2 percent slopes
- Blg1B1 - Blount silt loam, ground moraine, 2 to 4 percent slopes
- BpA - Blount-Houcktown complex, 0 to 3 percent slopes
- PmA - Pewamo silty clay loam, 0 to 1 percent slopes

LEGEND

Study Area

N

0 500 1,000
Feet

NOTES
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2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

HALEY ALDRICH

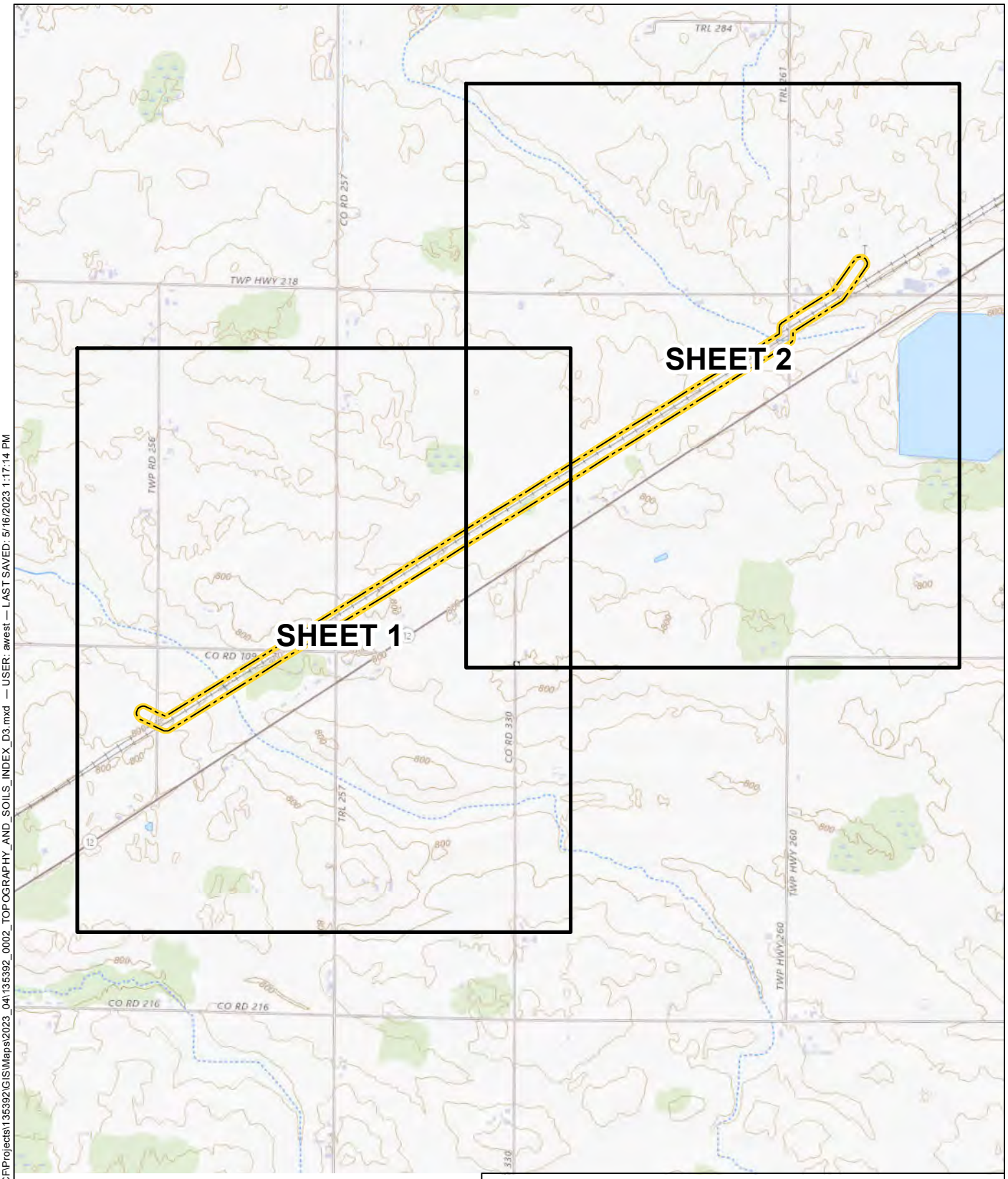
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

FIGURE 2
SHEET 2 OF 2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0002_TOPOGRAPHY_AND_SOILS_D2.mxd — USER: awest — LAST SAVED: 4/6/2023 3:04:11 PM



LEGEND

Index Sheet

Study Area

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

N

0 1,000 2,000
Feet

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

TOPOGRAPHY AND SOILS

SCALE: AS SHOWN
MAY 2023

INDEX SHEET
FIGURE 2

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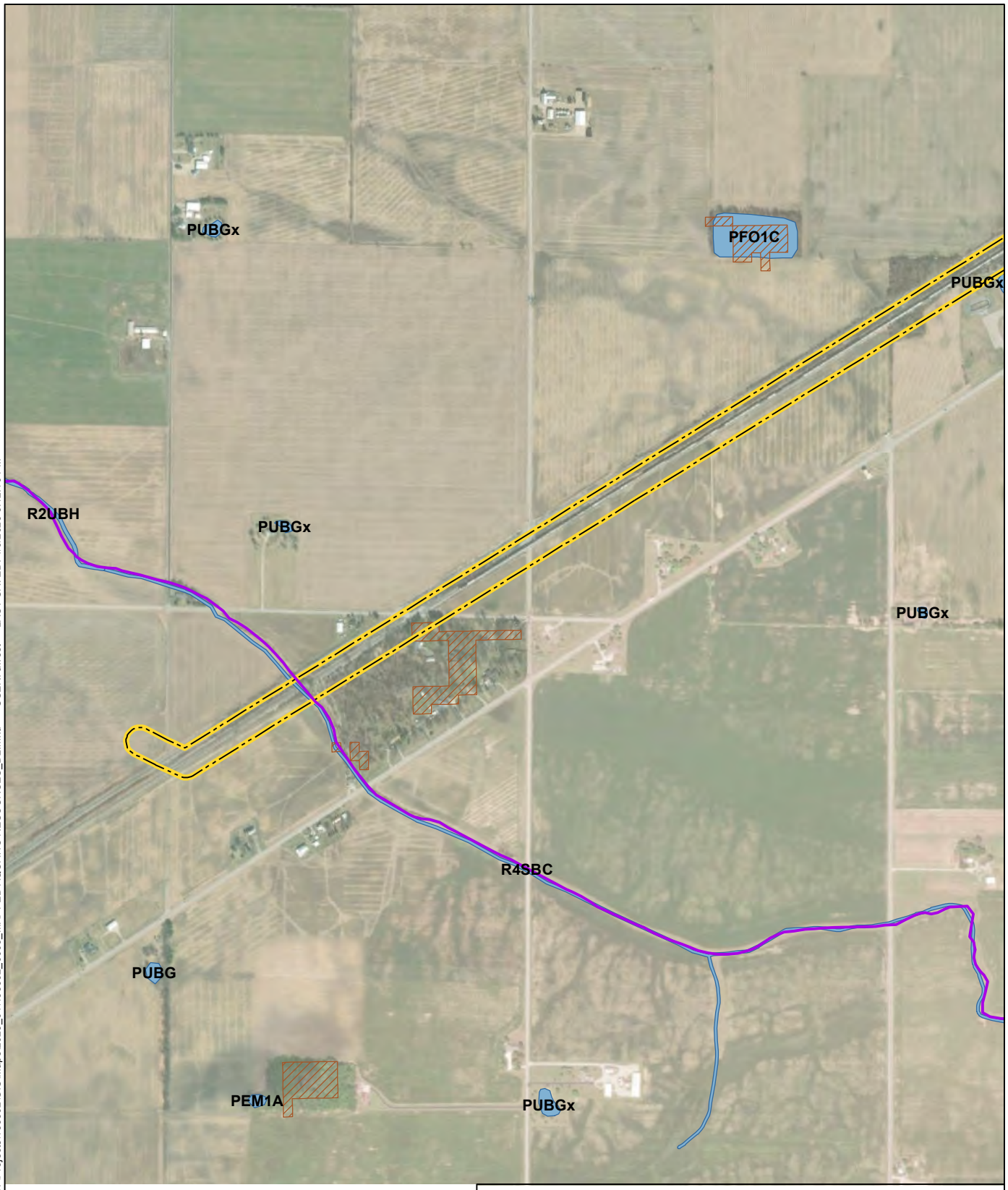

Ohio Weland Inventory

- Woods on Hydric Soils
- Study Area
- NWI Wetland
- NHD Stream

N

0 500 1,000

SCALE IN FEET

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

SHEET 1 OF 2
FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0003_MAPPED AQUATIC RESOURCES_D2.mxd — USER: awest — LAST SAVED: 4/6/2023 3:12:16 PM

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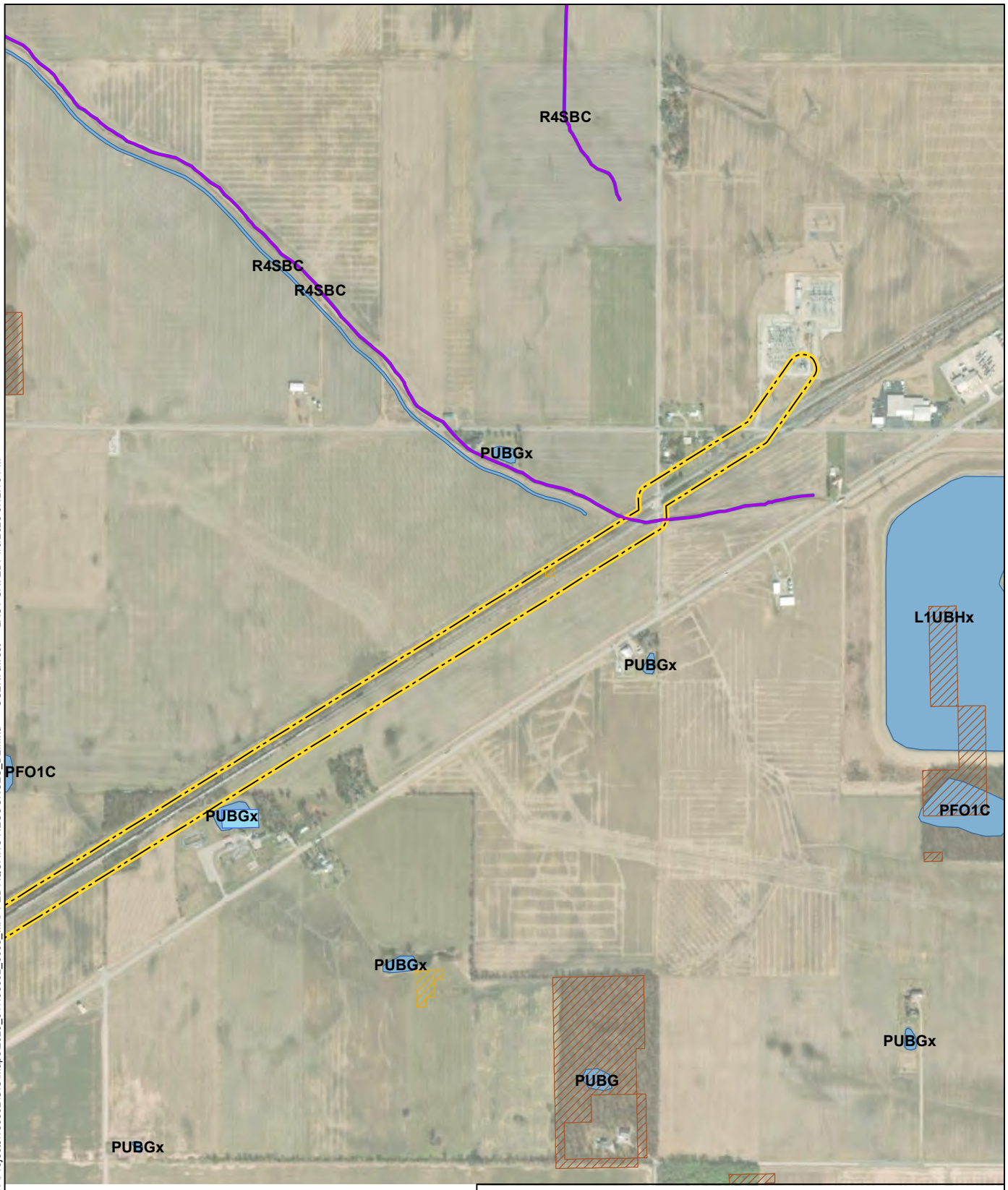

Ohio Weland Inventory

- Open Water
- Woods on Hydric Soils
- Shrub/Scrub Wetland
- Study Area
- NWI Wetland
- NHD Stream

N

0 500 1,000

SCALE IN FEET

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

SHEET 2 OF 2
FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0003_MAPPED AQUATIC RESOURCES_D2.mxd — USER: awest — LAST SAVED: 4/6/2023 3:12:16 PM

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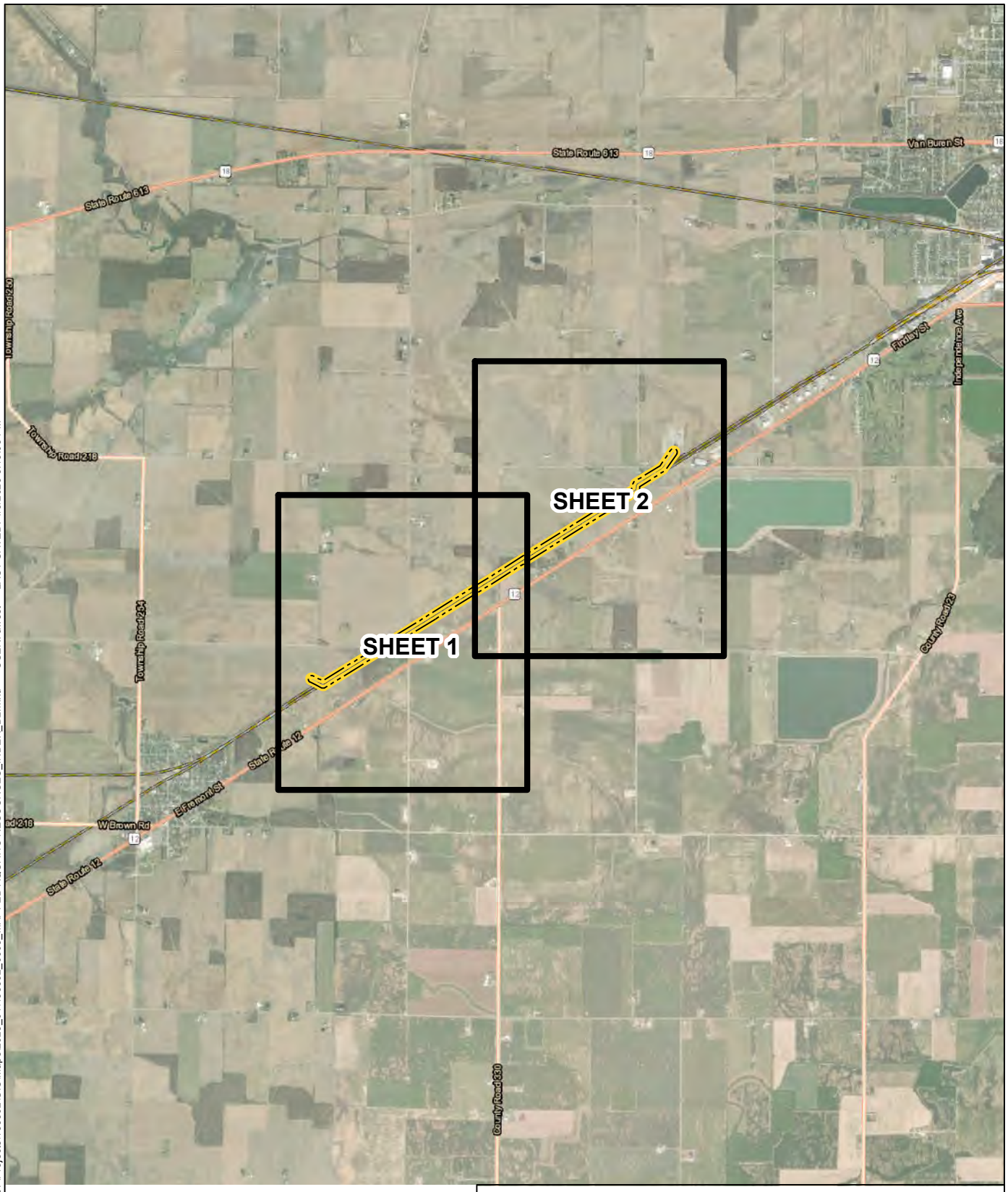


LEGEND

Index Sheet

Study Area

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: ESRI

N

0 0.5 1
Miles

HALEY ALDRICH

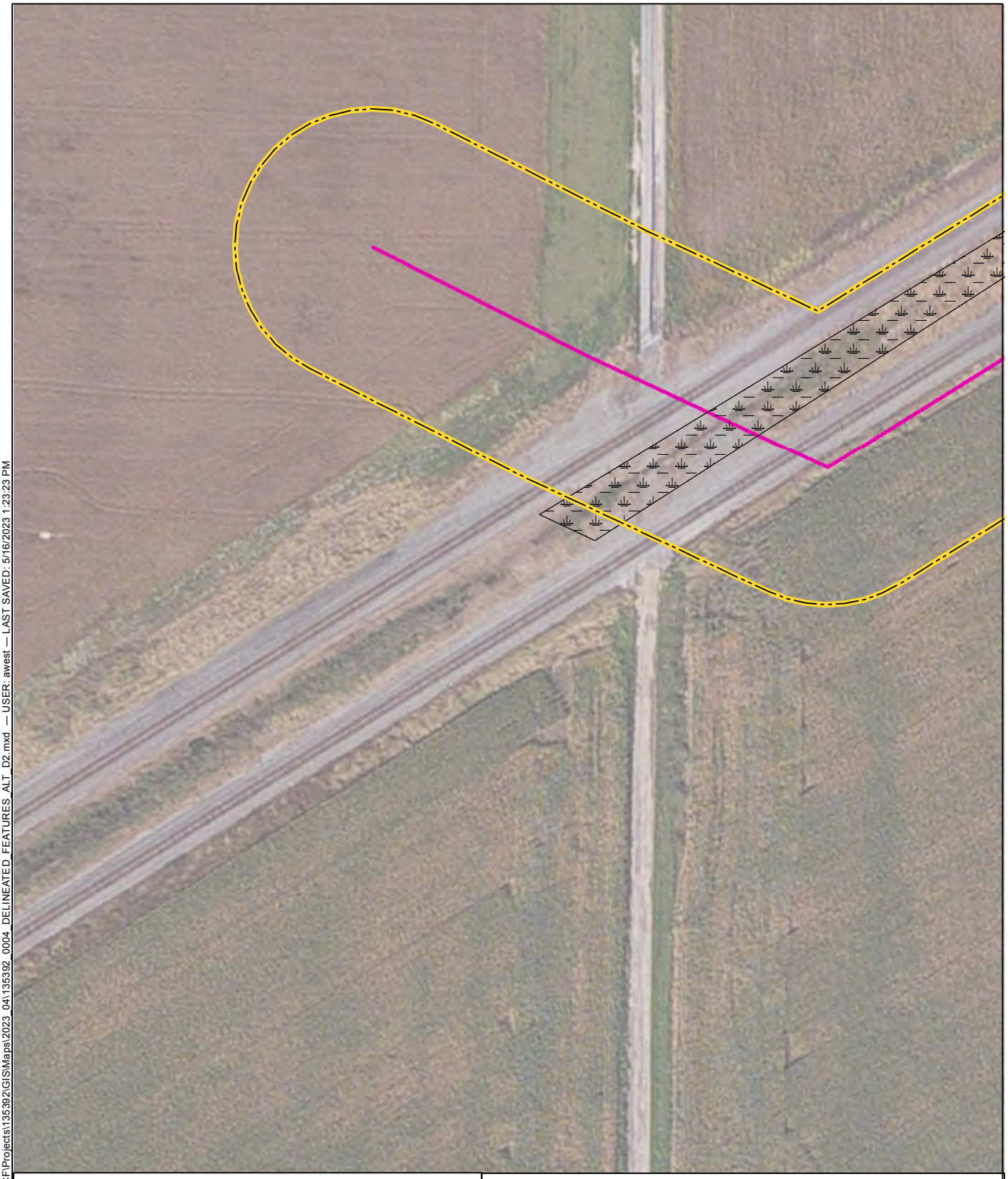
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

FEDERAL AND STATE
MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
MAY 2023

INDEX SHEET
FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0003_MAPPED AQUATIC RESOURCES_INDEX_D2.mxd — USER: awest — LAST SAVED: 4/6/2023 3:15:05 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 1 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
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HALEY ALDRICH

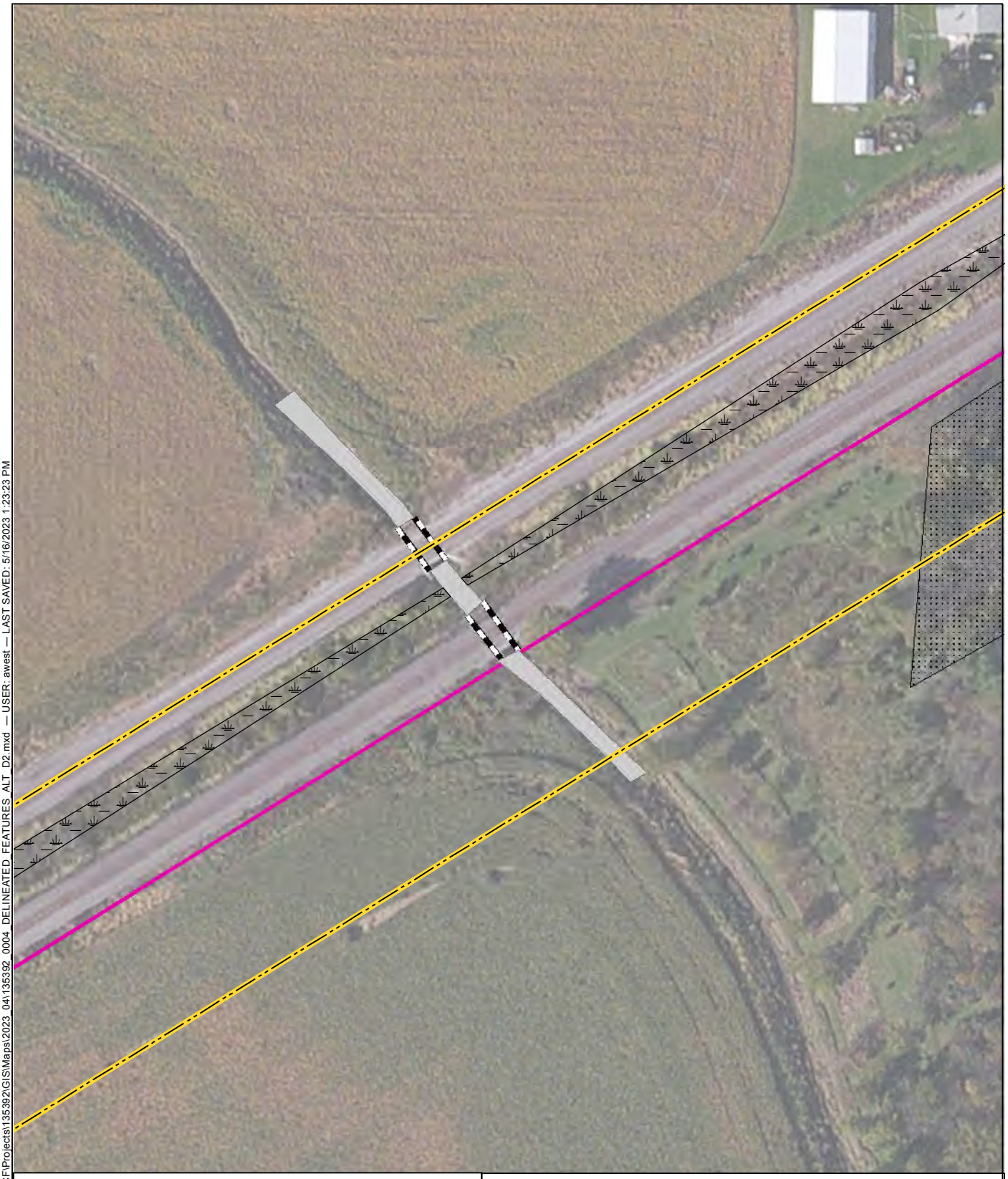
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 2 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 3 OF 15

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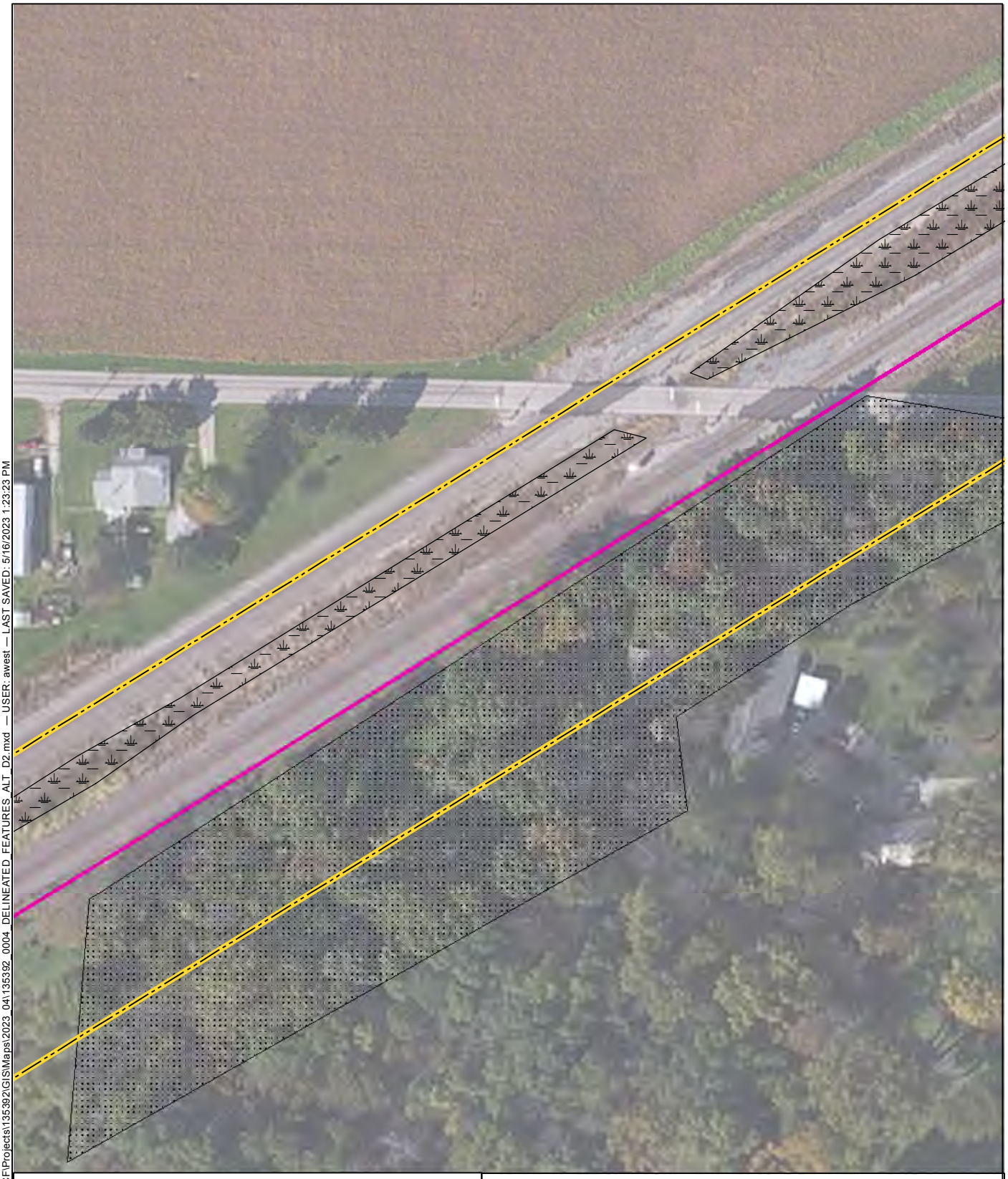

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 4 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
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2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 5 OF 15

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Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
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2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 6 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
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2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 7 OF 15

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Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

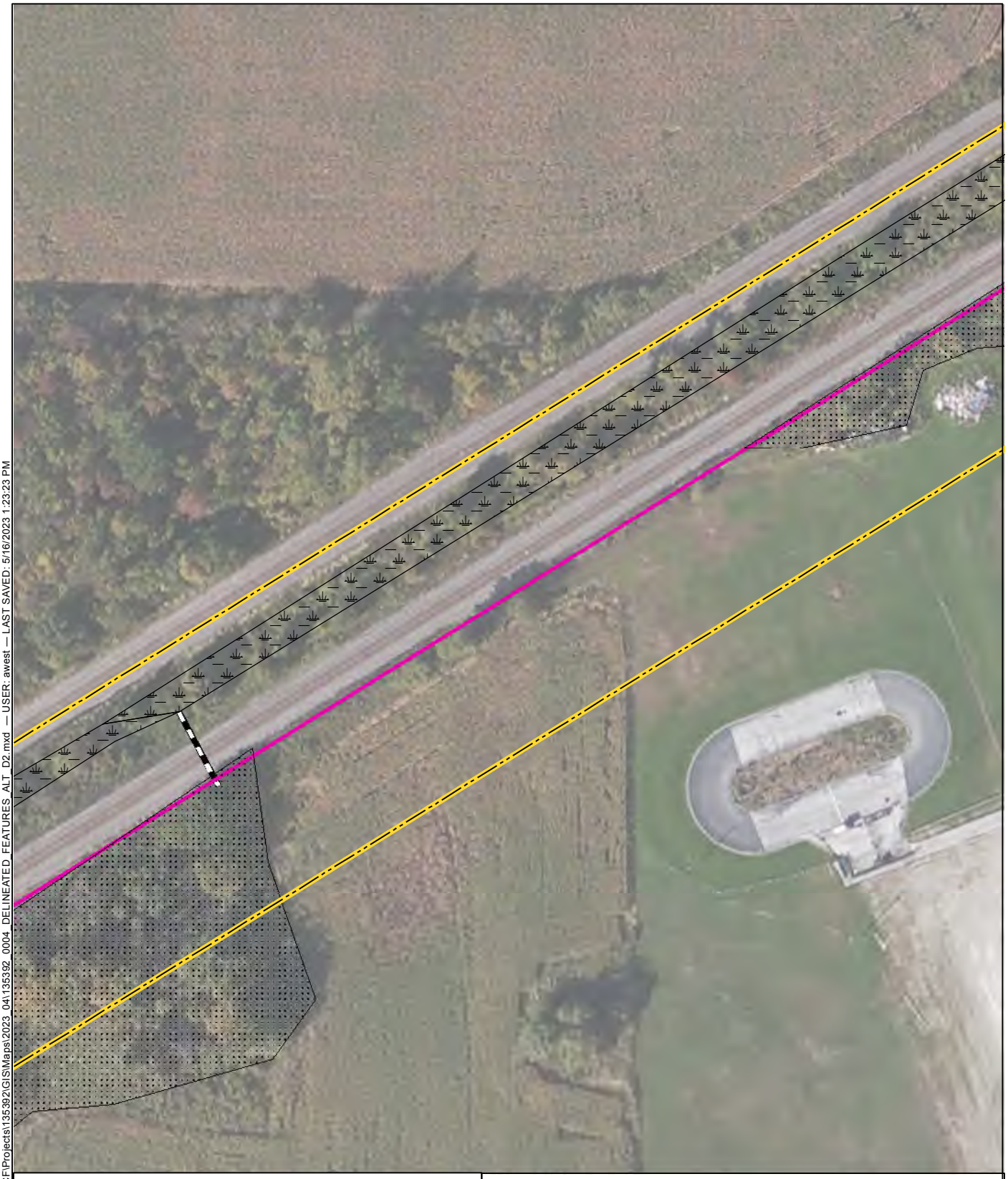
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 8 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
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HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 9 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 10 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

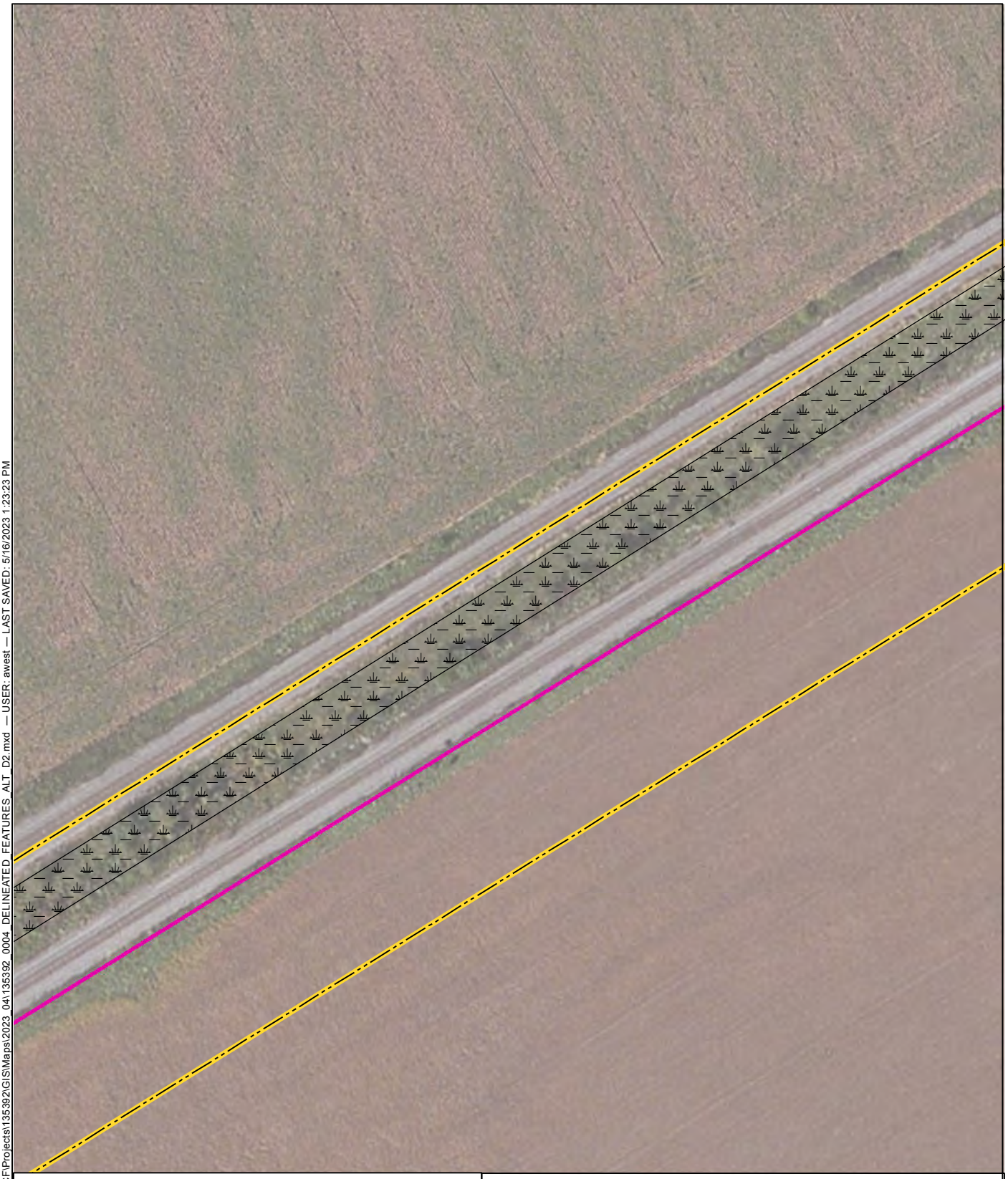
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 11 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 12 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM

Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

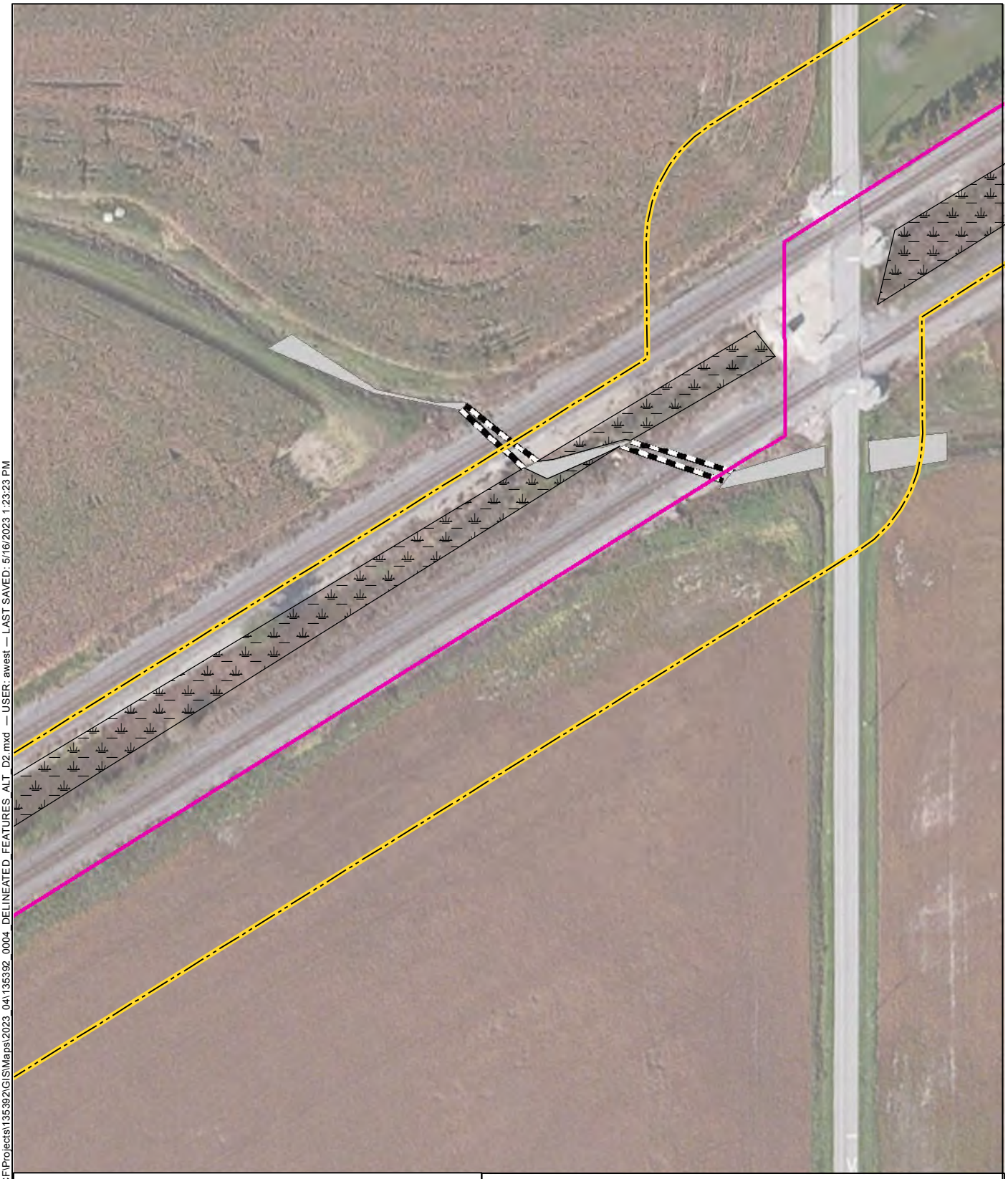
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 13 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

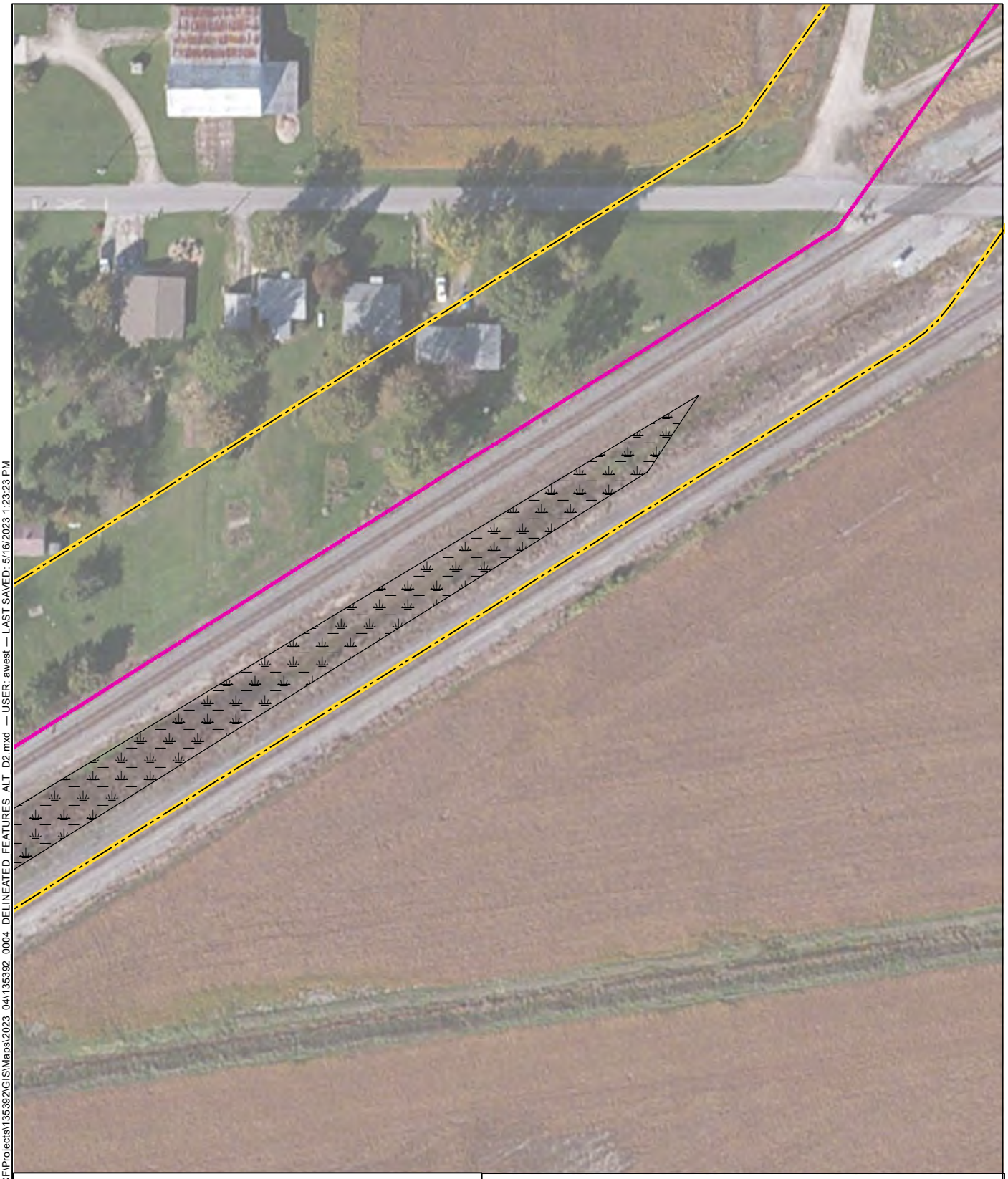
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 14 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



Study Area
Wetland
Potential Wetland
Stream
Alternative Route
Culvert

N

0 50 100
Feet

NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: CLARITY WORLD IMAGERY.

HALEY ALDRICH

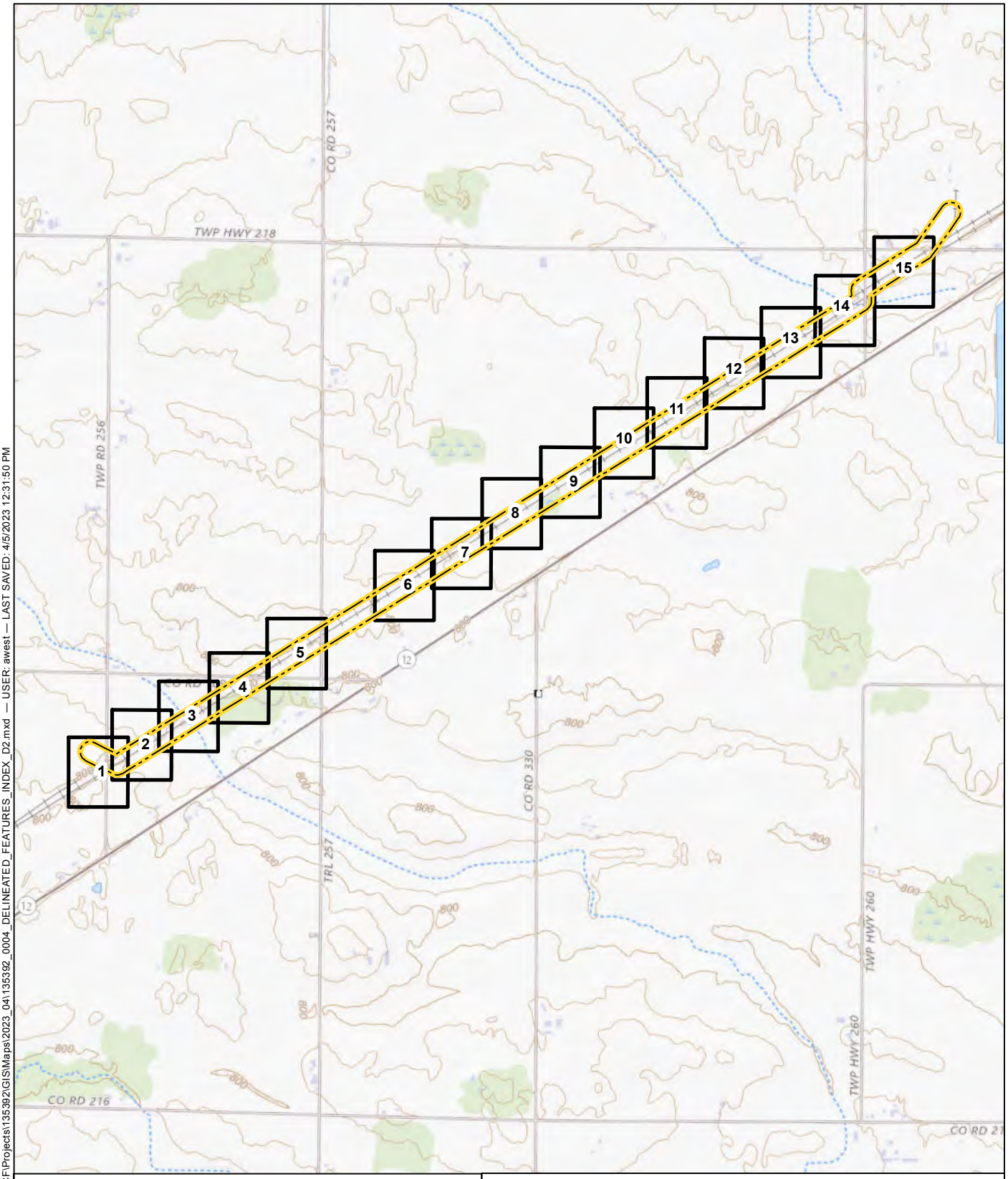
SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATIVE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
SHEET 15 OF 15

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\135392\GIS\Maps\2023_04\135392_0004_DELINEATED_FEATURES_ALT_D2.mxd — USER: awest — LAST SAVED: 5/16/2023 1:23:23 PM



LEGEND

Study Area

Index Sheet

N

0 0.2 0.4
Miles

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DELINEATED WETLAND TYPES ARE BASED ON COWARDIN CLASSIFICATION.
3. BASE MAP SOURCE: USGS - THE NATIONAL MAP.

HALEY ALDRICH

SOUTH BRANCH SOLAR GEN-TIE LINE
ALTERNATE ROUTE
HANCOCK COUNTY, OHIO

OBSERVED AQUATIC FEATURES

SCALE: AS SHOWN
MAY 2023

FIGURE 4
INDEX SHEET

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ATTACHMENT A
Photo Log

Photo 1: View looking northwest at Intermittent Stream.

Photo 2: View looking northwest at Intermittent Stream from Norfolk Southern railroad.

Photo 3: View looking northeast at PEM Wetland within depression between railroad beds.

Photo 4: View looking northeast at PEM Wetland within depression between railroad beds.

Photo 5: View looking east at forested area outside of the railroad Right of Way (ROW).

Photo 6: View looking east at forested area outside of the railroad ROW.

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in

Case No(s). 23-0373-EL-BTX

Summary: Application Appendix K - Wetland and Other Waters Delineation Reports electronically filed by Teresa Orahood on behalf of Sommer Sheely.