

Wood County 138-kV Reinforcement Project

Application to the Ohio Power Siting Board
for a
Certificate of Environmental Compatibility and Public Need

**Prepared for
American Transmission Systems, Incorporated,
a FirstEnergy Company**



OPSB Case Number 18-1335-EL-BTX

December 2018

BEFORE THE OHIO POWER SITING BOARD

Certificate Application for Electric Transmission Facilities

Table of Contents

4906-5-02	Project Summary and Applicant Information	2-1
(A)	Project Summary	2-1
(1)	General Purpose of the Facility	2-1
(2)	General Location, Size, and Operating Characteristics	2-1
(3)	Suitability of Preferred and Alternate Routes	2-2
(4)	Schedule	2-3
(B)	Applicant Description	2-3
(1)	Company History	2-3
(2)	Current Operations and Affiliate Relationships	2-4
4906-5-03	Review of Need and Schedule.....	3-1
(A)	Need for Proposed Facility	3-1
(1)	Purpose of the Proposed Facility	3-2
(2)	System Conditions, Local Requirements, and Other Pertinent Factors	3-3
(3)	Load Flow Studies and Contingency Analyses	3-3
(4)	System Performance Transcription Diagrams	3-8
(B)	Regional Expansion Plans	3-8
(1)	Proposed Facility in Long-Term Forecast	3-8
(C)	System Economy and Reliability	3-8
(D)	Options to Eliminate the Need for the Proposed Project	3-9
(E)	Facility Selection Rationale	3-11
(F)	Project Schedule	3-11
(1)	Gantt Schedule Bar Chart	3-11
(2)	Impact of Critical Delays	3-11
4906-5-04	Route Alternatives Analyses	4-1
(A)	Route Selection Study	4-1
(1)	Study Area Description and Rationale	4-1
(2)	Study Area Map	4-2
(3)	Map of Study Area, Routes, and Sites Evaluated	4-2
(4)	Siting Criteria	4-2
(5)	Siting Process for Preferred and Alternate Routes	4-2
(6)	Route Descriptions and Rationale for Selection	4-3
(B)	Comparison Table of Routes, Route Segments, and Site	4-4
(C)	Public Involvement	4-4
(1)	Official Public Information Open House	4-5

4906-5-05	Project Description	5-1
(A)	Project Area Description	5-1
(1)	Project Area Map	5-1
(2)	Proposed Right-of-Way, Transmission Length, and Properties Crossed	5-1
(B)	Route or Site Alternative Facility Layout and Installation	5-2
(1)	Site Clearing, Construction, and Reclamation	5-2
(2)	Facility Layout	5-4
(C)	Description of Proposed Transmission Lines	5-5
(1)	Electric Power Transmission Lines	5-5
(2)	Diagram of Electric Power Transmission Substations	5-6
4906-5-06	Economic Impact and Public Interaction	6-1
(A)	Ownership of Proposed Facility	6-1
(B)	Capital and Intangible Costs Estimate for Electric Power Transmission Facility Alternatives	6-1
(C)	Capital and Intangible Costs Estimate for Transmission Facility Alternatives	6-2
(D)	Public Interaction and Economic Impact	6-2
(1)	Counties, Townships, Villages, and Cities within 1,000 feet	6-2
(2)	Public Officials Contacted	6-2
(3)	Planned Public Interaction	6-2
(4)	Liability Insurance or Compensation	6-3
(5)	Tax Revenues	6-3
4906-5-07	Health and Safety, Land Use, and Regional Development	7-1
(A)	Health and Safety	7-1
(1)	Compliance with Safety Regulations	7-1
(2)	Electric and Magnetic Fields	7-1
(3)	Estimate of Radio, Television, and Communications Interference	7-5
(4)	Noise from Construction, Operations, and Maintenance	7-6
(B)	Land Use	7-6
(1)	Map of the Site and Route Alternatives	7-6
(2)	Impact on Identified Land Uses	7-7
(3)	Impact on Identified Nearby Structures	7-9
(C)	Agricultural Land Impacts	7-9
(1)	Agricultural Land Map	7-10
(2)	Impacts to Agricultural Lands and Agricultural Districts	7-10
(D)	Land Use Plans and Regional Development	7-12
(1)	Impacts to Regional Development	7-12
(2)	Compatibility of Proposed Facility with Current Regional Land Use Plans	7-12
(E)	Cultural and Archaeological Resources	7-12
(1)	Cultural Resources Map	7-12
(2)	Cultural Resources in Study Corridor	7-13

(3)	Construction, Operation, and Maintenance Impacts on Cultural Resources	7-13
(4)	Mitigation Procedures.....	7-13
(5)	Aesthetic Impact	7-13
4906-5-08	Ecological Information and Compliance with Permitting Requirements ...	8-1
(A)	Ecological Map	8-1
(B)	Field Survey Report for vegetation and surface waters.....	8-1
(1)	Vegetative Communities, Wetlands, and Streams in Study Area	8-2
(2)	Map of Facility, Right-of-Way, and Delineated Resources.....	8-6
(3)	Construction Impacts on Vegetation and Surface Waters	8-7
(4)	Operation and Maintenance Impacts on Vegetation and Surface Water... ..	8-10
(5)	Mitigation Procedures.....	8-10
(C)	Literature Survey of Plant and Animal Life Potentially Affected	8-12
(1)	Project Vicinity Species Descriptions	8-12
(2)	Construction Impacts on Identified Species.....	8-21
(3)	Operation and Maintenance Impacts on Identified Species	8-21
(4)	Mitigation Procedures.....	8-21
(D)	Site Geology	8-22
(1)	Site Geology	8-22
(2)	Slopes and Foundation Soil Suitability	8-22
(E)	Environmental and Aviation Regulation Compliance	8-22
(1)	Licenses, Permits, and Authorizations Required for the Facility	8-22
(2)	Construction Debris	8-23
(3)	Stormwater and Erosion Control	8-23
(4)	Disposition of Contaminated Soil and Hazardous Materials.....	8-25
(5)	Maximum Height of Above Ground Structures.....	8-25
(6)	Dusty or Muddy Conditions Plan.....	8-26
REFERENCES	8-27

TABLES

2-2	PJM 2017 Load Forecast.....	3-4
2-3	2022 Case Evaluation of Power Flows.....	3-5
2-4	2022 Case Evaluation of System Voltages.....	3-5
5-1	Right-of-way Area, Length, and Number of Properties Crossed for the Preferred and Alternate Routes.....	5-1
6-1	Estimates of Applicable Intangible and Capital Costs for Both the Preferred and Alternate Routes.....	6-1
7-1	Transmission Line Loadings	7-2
7-2	EMF Calculations For a Typical Tangent-Tangent Span Configuration Preferred Route (Midway-Brim)	7-2

7-3	EMF Calculations For a Typical Tangent-Tangent Span Configuration Alternate Route (Lemoyne-Brim)	7-3
7-4	EMF Calculations For a Typical Tangent-Deadend Span Configuration Preferred Route (Midway-Brim).....	7-3
7-5	EMF Calculations For a Typical Tangent-Deadend Span Configuration Alternate Route (Lemoyne-Brim)	7-3
7-6	Length and Percent of Land Uses Crossed by Route Alternatives	7-7
7-7	Acreage and Percent of Land Uses within ROW of Route Alternatives	7-8
7-8	Number of Land Use Features Near the Route Alternatives.....	7-8
8-1	NWI Wetlands Within 1,000 feet of the Preferred and Alternate Routes	8-3
8-2	Streams within the Preferred and Alternate Route Environmental Field Survey Area and ROW	8-5
8-3	Delineated Ponds within the Preferred Route and Alternate Route Environmental Field Survey Area	8-6
8-4	Approximate Vegetation Impacts Along the ROW	8-7
8-5	Federally-Listed Species within 1,000 feet of the Project Area	8-14
8-6	State-Listed Species within 1,000 feet of the Project Area	8-15

FIGURES

3-1	Project Schedule
3-2	Aerial Constraint Map
3-3	Topographic Constraint Map
5-1A to 5-1J	Transmission Structure Diagrams
7-1	Land Use Map
7-2	Agricultural Land Use Map
8-1	Overview Map
8-2A to E	Preferred Route Wetland and Waterbodies Delineation Map
8-3A to E	Alternate Route Wetland and Waterbodies Delineation Map

APPENDICES

4-1	Route Selection Study
6-1	List of Public Official Points of Contact
6-2	Public Open Houses Informational Materials
7-1	Typical Cross-Section Profiles of Calculated Electric Fields and Magnetic Fields
8-1	Wetland Delineation Report

Acronyms and Abbreviations

ATSI	American Transmission Systems, Inc.
BES	ATSI's Bulk Electric System
BMP	Best management practice
CEII	Critical Energy Infrastructure Information
CETL	Capacity Emergency Transfer Limit
cm	centimeter
DOE	Determination of Eligibility
DR	Demand Response
DSM	Demand-Side Management
EE	Energy efficiency
ELF	extremely low frequency
EMF	electromagnetic field
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
GIS	geographic information system
HHEI	Headwater Habitat Evaluation Index
ID	identification
kV	kilovolt
MSDS	Material Safety Data Sheet
NA	not applicable
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHL	National Historic Landmarks
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
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
ODNR-DOW	Ohio Department of Natural Resources - Division of Wildlife
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OHI	Ohio Historic Inventory
OHPO	Ohio Historic Preservation Office

OPSB	Ohio Power Siting Board
ORAM	Ohio Rapid Assessment Method
OSHA	Occupational Safety and Health Administration
PADUS	Protected Areas Database of the United States
PEM	palustrine emergent
PHWH	Primary Headwater Habitat
PRD	Price-Response Demand
PUCO	Public Utilities Commission of Ohio
Project	Wood County 138-kV Reinforcement Project
QHEI	Qualitative Habitat Evaluation Index
RAPID	Research and Public Information Dissemination
RFI	Radio frequency interference
ROW	right-of-way
RPM	Reliability Pricing Model
RSS	Route Selection Study
RTEP	Regional Transmission Expansion Plan
SDS	Safety Datasheet
SR	State Route
SWPPP	stormwater pollution prevention plan
T&E	Threatened and endangered
TEAC	Transmission Expansion Advisory Committee
TNW	traditionally navigable waterway
TPL	Transmission Planning Limits
TVI	Television interference
UNT	unnamed tributary
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

4906-5-02 PROJECT SUMMARY AND APPLICANT INFORMATION**(A) PROJECT SUMMARY**

American Transmission Systems, Incorporated (ATSI), a FirstEnergy company, plans to construct a new 138-kilovolt (kV) transmission line in Wood County, Ohio. Route alternatives under consideration traverse Middleton, Center and Plain Townships and a portion of the City of Bowling Green. The new transmission line will connect the Lemoyne-Midway 138 kV Transmission Line to the Brim Substation. The proposed Project will eliminate the existing 3-terminal line configuration and create two new transmission lines: Brim-Lemoyne 138-kV Transmission Line and Brim-Midway 138-kV Transmission Line circuits. As the proposed Project is the installation of a second 138-kV source for the Brim Substation, FirstEnergy is seeking approval for a new 138-kV transmission line route that is physically and functionally separate from the existing 138-kV source to provide greater reliability and operational flexibility for the local transmission and sub-transmission system.

(1) General Purpose of the Facility

The purpose of the proposed Project is to improve reliability of the transmission and sub-transmission systems in the Bowling Green and surrounding area, to strengthen the transmission system under numerous planning contingencies, and to improve overall efficiency and flexibility in the operation of the transmission system in Wood County, Ohio. Currently, electric transmission service in the Project area is provided by one 138 kV transmission line that extends south from the Lemoyne-Midway 138 kV Transmission Line to the Brim Substation. Should a fault occur anywhere along the Lemoyne-Midway 138 kV Transmission Line or the existing 138 kV transmission line tap, it would cause voltage problems for Bowling Green and the surrounding area. The proposed Project is the least impactful option to resolve voltage drops, increased service demand, and provide for future system capacity. The Project will support economic development in the area and will allow ATSI to improve electric transmission service reliability by providing increased redundancy and operating flexibility.

Additional details can be found in the Application's Review of Need and Schedule, in Section 4906-5-03.

(2) General Location, Size, and Operating Characteristics

The proposed Project will be located in north central Wood County. The Project begins at the existing Lemoyne-Midway 138 kV Transmission Line, which trends east/west at the northern extent of the Project Area. The proposed transmission line would extend generally south and terminate at the Brim Substation, located at the northwest corner of the intersection of Bishop Road and Brim Road. The Project, as proposed, is a single-circuit transmission line supported on wood poles requiring a 60-foot-wide permanent right-of-way (ROW). The transmission line will be approximately 6.0 miles in length.

(3) Suitability of Preferred and Alternate Routes

ATSI identified a Preferred and an Alternate Route after conducting a Route Selection Study (RSS), which is included as **Appendix 4-1**. The RSS provides details on the selection process utilized by ATSI to identify the Preferred and Alternate Routes proposed in this Application. A detailed discussion of the RSS and selected routes is found in Section 4906-5-04 of this Application.

In general, the RSS is developed through an iterative and incremental process that starts with the identification of reasonable routes given the Project need and overall Project area considerations. Possible routes for review and consideration were initially selected based on the avoidance or minimization of impacts to known sensitive land uses, ecological features, and cultural resources, where identification was possible from existing resources. Potential routes were then evaluated, compared, and ranked to identify potential routes for further evaluation. Based upon this initial review of potential routes, 16 candidate route alternatives were identified and subject to a numerical scoring system. Based on field data collected and route scores, the 16 candidate routes were then ranked first by individual category (i.e. land use, ecological, technical, and cultural) then overall score.

For purposes of identifying the Preferred and Alternate Routes presented in this Application, the siting team considered all of the factors included in the RSS, with a particular emphasis on route alternatives that minimized residential impacts. Information and land owner considerations were also taken into account, where possible, to further reduce impacts.

Ultimately, ATSI identified the Preferred and Alternate Routes as feasible routes and which represent, in the assessment of the Applicant, the minimal adverse environmental impact taking into account all relevant factors.

(i) Preferred Route

The Preferred Route is identified in the RSS as Route 12 (Nodes: A-B-L-Q-S-T-O-P).

Segment A-B was common amongst all candidate routes since all proposed alignments approached Brim Substation from the south in order to maintain a pathway separate from the existing 138kV Tap to Brim Substation. Segments L-Q-S-T-O-P were selected based on overall rank and limited residential impacts. Other variations of this route were also considered including routes 16, 10, 11, 15, 9, 14, 8, and 13; however, each of these candidate routes share over 50% of the same segments making the routes not viable alternatives under Admin. Code Rule 4906-3-05.

Further, following the public information meeting on September 26, 2018, adjustments were made to segments of the Preferred Route based on landowner comments and information regarding existing land use practices (see Section 4906-5-04).

Overall, the Preferred Route is approximately 6.1 miles in length.

(ii) Alternate Route

The Alternate Route is identified in the RSS as Route 3 (Nodes: A-B-C-I-E-J-K). The Alternate Route shares segment A-B with the preferred route. This segment represents approximately 1.4% of commonality between routes 3 and 12 which is consistent with Admin. Code Rule 4906-3-05.

The Alternate Route ranked 1st overall in the RSS, principally due to it having the lowest (more favorable) ranking land use score due to crossing the least amount of properties and avoiding any institutional land uses properties. However, based on the qualitative evaluation of the Application, it was determined to have a larger direct impact on the land uses of the properties crossed, as compared to the more western corridor of route 12. Based on the qualitative evaluation of the various routes considered in the RSS, however, Applicant determined that this route provided a viable alternative to the Preferred Route.

This route was presented at the public information meeting held on September 26. Based on landowner comments, adjustments were made to segments of the route to accommodate existing land use practices and visual concerns (see Section 4906-5-04).

Overall, the Alternate Route is approximately 6.0 miles in length.

(4) Schedule

Construction of the Project is anticipated to begin in February 2020 with an anticipated in-service date of June 2020. The current Project schedule, including all major activities and milestones, is illustrated in a Gantt schedule bar chart provided in 4906-5-03(F)(1).

(B) APPLICANT DESCRIPTION**(1) Company History**

ATSI is a wholly-owned subsidiary of FirstEnergy Transmission, LLC ("FET"), which is a wholly-owned subsidiary of FirstEnergy Corp. ("FirstEnergy"). ATSI's assets are comprised, in large part, of the transmission assets formerly owned by the operating utilities of FirstEnergy in western Pennsylvania and Ohio (i.e., Pennsylvania Power Company ("Penn Power") in western Pennsylvania, and Ohio Edison Company, The Cleveland Electric Illuminating Company and The Toledo Edison Company in Ohio). ATSI commenced the provision of FERC-jurisdictional interstate transmission service in Ohio on September 1, 2000, following approval from the Public Utilities Commission of Ohio (PUCO) to transfer transmission assets from the FirstEnergy Ohio operating companies to ATSI.

FirstEnergy was formed in 1997 through the merger of Ohio Edison Company and Centerior Energy Corporation. Through this merger, FirstEnergy became the holding company for Ohio Edison and its Pennsylvania Power Company subsidiary, as well as The Cleveland Electric Illuminating Company and The Toledo Edison Company. At that time, FirstEnergy served 2.2 million customers within 13,200 square miles of northern and central Ohio and western Pennsylvania, and had approximately 12,000 megawatts of generating capacity. (FirstEnergy, 2016)

In 2001, FirstEnergy nearly doubled its customers to more than 4.3 million when it merged with the former GPU, Inc., based in Morristown, New Jersey. GPU served 2.1 million customers in a 24,000 square-mile service area in Pennsylvania and New Jersey through its three operating companies: Metropolitan Edison Company, Pennsylvania Electric Company, and Jersey Central Power & Light Company. (FirstEnergy, 2016)

In 2011, FirstEnergy completed a merger with Allegheny Energy, a Greensburg, Pennsylvania based company that served 1.6 million customers in Pennsylvania, West Virginia, Maryland and Virginia. The merger provided opportunities for FirstEnergy to grow and expand into new markets with a stronger, more focused competitive operation. (FirstEnergy, 2016)

Today, FirstEnergy is one of the nation's largest investor-owned electric systems serving 6 million customers within a service territory of 65,000 square miles and six states. (FirstEnergy, 2016)

(2) Current Operations and Affiliate Relationships

ATSI is a transmission-only company (or “transco”) that provides transmission services in the western portion of Pennsylvania and in the state of Ohio. Currently, ATSI owns and maintains over 8,100 circuit-miles of transmission lines, substations and other transmission facilities that are located primarily in the ATSI Zone of PJM Interconnection, LLC (“PJM”), which is the regional transmission organization (“RTO”) for the area. ATSI also owns certain limited transmission facilities outside of its zone that are necessary to tie ATSI’s transmission system into the transmission and generation facilities in neighboring utilities’ territories or otherwise necessary to support transmission service in ATSI’s zone. ATSI’s transmission facilities are under the operational control of PJM.

4906-5-03 REVIEW OF NEED AND SCHEDULE**SECTION SUMMARY**

This Section of the Application provides an explanation of:

- Why it is necessary to construct the proposed new 138 kV transmission line to Brim Substation;
- How the Project fits into the Applicant's long-term forecast and regional plans for the electric system;
- How the Project serves the interest of system economy and reliability; and,
- provides a schedule for the Project.

As explained in this Section of the Application, when compared to other alternatives, the proposed Project is the best option to improve the transmission and sub-transmission systems in Wood County with enhancements to efficiency, reliability and operational flexibility of these systems. Construction of the Project will improve electric service for approximately 16,000 customers served by the transmission system in the Project area and allow for future economic development and growth in the area.

Constructing a new 138 kV transmission line was selected over other alternatives because it is the most efficient option to resolve thermal loading issues, encroaching low voltage limitations, and provide for future system capacity and economic growth in the area. Specifically, construction of the Project will provide safe and reliable electric service, as well as operating flexibility to avoid the potential for local voltage collapse. Further, the Project adds another source for power flow to and through the Project area and affords the Applicant greater flexibility and capacity for future load growth and system maintenance, ensuring that the businesses, homes and communities in the area will have ready access to safe and reliable energy for many years to come. Finally, the Project provides additional operational benefits that accrue by adding another power source in the Project Area.

(A) NEED FOR PROPOSED FACILITY

This Project involves making improvements to the operation of the transmission and sub-transmission systems in the Project Study Area to strengthen the transmission system under numerous planning contingencies and to improve overall efficiency and flexibility in the operation of the transmission system in Wood County, Ohio.

The Project is one component of planned upgrades necessary to achieve the needed system improvements. These two component projects are:

1. The Project, which involves the construction of the new Lemoyne-Midway 138 kV Transmission Line to Brim Substation. The Project is from a new tap location on the existing Lemoyne-Midway 138kV Line to the new Brim 4-Breaker 138kV Ring Bus at the

existing Brim Substation. The new 138kV transmission line is an extension of approximately 6.1 miles from the existing transmission line to the expanded Brim Substation and further networks the Brim Substation into the transmission system.

2. The second component upgrade is the expansion of the Brim Substation. This component project involves the proposed addition of a second 138/69 kV transformer at the Brim Substation, establishing a 4-Breaker 138 kV Ring Bus, and a 4-Breaker 69 kV Ring Bus. This upgrade is not subject to OPSB jurisdiction.

Implementation of these two upgrades are necessary to fully address the required system reinforcements. More specifically, the Project is needed to reinforce the less than 100 kV Transmission System on the FE/ATSI and Bowling Green Municipality system in the Project Study Area to continue to provide safe and reliable electric service and allow for future economic development and growth in the area. As such, the need for the proposed Facility is provided in the context of the reinforcement of the entire Bowling Green area 69 kV system.

The Project Study Area was evaluated in 2016 and has been re-evaluated in 2018 using the PJM 2017 Load Forecasts from the forecast report dated January 2017. In both evaluations, it was determined that the Project Study Area may experience potential circuit thermal overloads and low voltage values that are either approaching or exceeding criteria limitations under various planning scenarios.

(1) Purpose of the Proposed Facility

ATSI's 138 kV and 69 kV transmission system in and near the Project Study Area are part of the regional transmission grid and – through various substations – provide electric supply to customers within the Toledo Edison service territory and around the Bowling Green area. In the Project Area, the existing Project Area Transmission System serves approximately 16,000 customers or 85 MWs of load in Wood County, Ohio. This area of the FirstEnergy service territory is referenced in this Application as the Project Study Area.

Various planning scenarios for the 2017-year case, including the loss of the existing Brim #1 Transformer and the loss of the existing Pemberville-Bowling Green No. 4 69 kV Transmission Line, results in potential thermal overloads on the Midway-Bowling Green No. 2 69 kV Transmission Line at 172%. The system voltage, under these same contingency losses, is observed to have critically low voltages, enough to result in a potential system voltage collapse in the Project Study Area; including Bowling Green No. 2 69 kV substation bus (78%), Bowling Green No. 3 69 kV substation bus (77%), and Tontogany 69 kV substation bus (81%).

The proposed Project will strengthen the Project Study Area and provide additional system capacity to enable future potential economic development inquiries to be quickly evaluated and provided transmission service with limited system reinforcements; depending on the nature of the service request.

The Project installs a new and separate 138 kV transmission line path and source into the Brim Substation. This new 138 kV source will support the Project Study Area under either the loss of the existing Brim #1 Transformer or the loss of the existing Pemberville-Bowling Green No4 69 kV Transmission Line.

When compared to other alternatives, the proposed Project is the best option to resolve potential thermal overloads, encroaching low voltage limitations, and provide for future system capacity and economic growth in the area.

Overall, the Project will provide the following benefits to the Project Area's transmission system and its customers. The Project will:

1. Address potential thermal overloads on the Midway-Bowling Green No. 2 69 kV line, Maclean-Pemberville 69 kV Transmission Line and the Pemberville #1 Transformer.
2. Improve reliability of the Project Area Transmission System under certain planning scenarios by adding voltage support from the 138 kV to the 69 kV system. The area around Bowling Green, Ohio is vulnerable to low voltage conditions under certain scenarios which will be addressed or mitigated by the addition of the new transmission lines providing an additional 138 kV source.
3. Strengthen the Project Area Transmission System to support future growth in load demand in the Project Study Area; an increase in transmission system service capacity of up to 159% in parts of the system planning area.

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

The ATSI transmission system in the Project Area is supported by one ATSI 138-kV line, the Lemoyne-Midway 138 kV Transmission Line Tap to Brim Substation. It has become necessary to build this Project to relieve thermal loading issues, provide additional voltage support, and support future economic growth activities in the area. Greater details can be found in Section (3) -- Load Flow Studies and Contingency Analyses below.

(3) Load Flow Studies and Contingency Analyses

ATSI modeled various planning scenarios and studies of the Project Area's Transmission System for the PJM 2022 and 2017 Forecast summer peak load conditions with, and without, the proposed Project. These studies included evaluation of the effects of multiple element contingencies (N-2 Contingency).

Table 2-2 below lists the applicable system load levels evaluated in the load flow analysis.

Table 2-2: PJM 2017 Load Forecast		
Year	Load Level	Applicable System
2017	12,994 MW	ATSI
2022	13,011 MW	ATSI

Load Flow Study Results

Table 2-3 and Table 2-4 provide a summary of the 2022 case evaluation of the system power flows and system voltages before and after installation of the proposed Project.

1. The Midway-Bowling Green No. 2 69 kV Transmission Line has a summer emergency (SE) rating of 64 MVA and the analysis of the 2022 planning year indicates that the identified circuit will overload to 163% of its summer emergency rating for the loss of the Brim #1 Transformer and the loss of the Pemberville-Bowling Green No4 69 kV Transmission Line. The 2022 case evaluation also shows that with the proposed Project completed, the identified transmission line loading, under contingency analysis, drops to 5% of the summer emergency rating and provides for additional load growth in the planning area.
2. The Pemberville #1 Transformer has a summer emergency rating (SE) of 10 MVA and the analysis of the 2022 planning year indicates that the identified circuit will overload to 104% of its summer emergency (SE) rating for the loss of the Brim #1 Transformer and loss of the Midway-Bowling Green No2 69 kV Transmission Line. The 2021 case evaluation also shows that with the proposed project completed, the identified transmission line loading drops to 15% of its summer emergency (SE) rating and provides for additional load growth in the planning area.
3. The Bowling Green 69 kV substations including Bowling Green No2 through Bowling Green No7 are subjected to potential voltage collapse (below 0.80 per unit) for the loss of the Brim #1 Transformer and the loss of the Pemberville-Bowling Green No4 69 kV Transmission Line before the project is complete. After the completion of the Project the system voltage is sustained at above 1.0 per unit for the Bowling Green No2 through Bowling Green No7 substations.

Table 2-3: 2022 Case Evaluation of Power Flows

Contingency	Rating (MVA)		Monitored Facility	Before Project	After Project	Capacity Margin Gained (%)
	SN	SE		%Overload (SE)	%Overload (SE)	
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	57	64	Midway - Bowling Green No2 69 kV Transmission Line	163.40%	4.80%	158.60%
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	10	10	Pemberville 69/34.5 kV Transformer #1	103.70%	15.10%	88.60%
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	75	90	Maclean - Pemberville 69 kV Transmission Line	99.90%	13.90%	86.00%

Table 2-4: 2022 Case Evaluation of System Voltages

Contingency	KV	Monitored Facility	Before Project Voltage Results PU	After Project Voltage Results PU	Increased Voltage Margin %
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.2	0.79	1.01	22.2
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.3	0.78	1.01	22.5

Contingency	KV	Monitored Facility	Before Project Voltage Results PU	After Project Voltage Results PU	Increased Voltage Margin %
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.4	0.78	1.01	22.78
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.5	0.78	1.01	22.75
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.6	0.78	1.01	22.69
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Bowling Green No.7	0.78	1.01	22.72
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	PGE	0.78	1.01	22.71
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Weston 69 kV	0.86	1.00	13.99
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Tontogany	0.82	1.01	19.13
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	69	Grand Rapids	0.90	1.01	11.08
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	34.5	Malinta	0.81	0.96	14.97

Contingency	KV	Monitored Facility	Before Project Voltage Results PU	After Project Voltage Results PU	Increased Voltage Margin %
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	34.5	McClure	0.81	0.96	14.78
Loss of the Brim Transformer #1 and loss of the Pemberville-Bowling Green No.4 69 kV Transmission Line	34.5	Weston 34.5 kV	0.84	0.99	14.29
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.2	0.92	1.01	9.36
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.3	0.92	1.01	8.77
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.4	0.93	1.01	8.01
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.5	0.92	1.01	9.31
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.6	0.92	1.01	8.55
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	Bowling Green No.7	0.92	1.01	8.78
Loss of the Brim Transformer #1 and loss of the Midway-Bowling Green No.2 69 kV Transmission Line	69	PGE	0.92	1.01	8.98

Load Flow Study

An electronic copy of the Applicant's load flow data, in the form of a load flow case with the proposed facility, can be provided upon request and under seal to the OPSB Staff as it contains confidential trade secret and Critical Energy Infrastructure Information ("CEII").

(4) System Performance Transcription Diagrams

System Performance Transcription Diagrams are confidential trade secret information and critical energy infrastructure information that will be provided upon request under a seal to the OPSB Staff or the Board.

(5) Base Case System Data

Gas Pipeline Information. Not applicable to this Project.

(B) REGIONAL EXPANSION PLANS

The Project was submitted as a supplement to the PJM Regional Transmission Expansion Plan (RTEP) at the Sub-Regional RTEP Committee on August 31, 2018 to improve operational flexibility, improve reliability, and mitigate low voltage or voltage collapse scenarios. See section (1) (c) below.

(1) Proposed Facility in Long-Term Forecast**(a) Reference in Recent Long-Term Forecast**

This Project will be listed in the First Energy Corp 2019 Long Term Forecast Report.

(b) Explanation if Not Referenced

Not applicable, see Section 4906-5-03 (B) (1) (a) directly above.

(c) Reference in Regional Expansion Plans

The Project was also submitted as a supplement to the PJM Regional Transmission Expansion Plan (RTEP) at the Sub-Regional RTEP Committee on August 31, 2018 to improve operational flexibility during maintenance and restoration efforts; improve system protection, coordination, and fault location under the existing three-terminal line configuration; reduce the amount of local load loss under contingency conditions; and mitigate non-planning criteria concerns on the <100kV system under a contingency (P6) condition.

(2) Gas Pipeline Long-Term Forecast Reference

Gas Pipeline Information. Not applicable to this Project.

(C) SYSTEM ECONOMY AND RELIABILITY

Completion of the Project will resolve planning thermal overloads and improve the system voltage on the Project area's transmission system for the future year studied. ATSI has determined that

bringing the Project on-line will not adversely impact any of ATSI's other existing transmission facilities, or the transmission facilities and equipment of neighboring utilities. Overall performance on the Project area's transmission system will be improved significantly as a result of the construction of the Project.

Thermal overloads and low voltages will be corrected, and the Project area's transmission system will have additional margin or capacity to allow ATSI the ability to support future economic growth and greater operational flexibility to continue to provide safe, efficient and reliable electricity to its customers. The Project will add a 138 kV to 69 kV source to the area, strengthening the 69 kV transmission system that provides local service to residential, commercial, and industrial customers. In addition, transmission system maintenance and switching procedures will be easier to facilitate with these new transmission lines put in place. Substation equipment and overhead transmission lines are placed on routine inspection and maintenance schedules, to ensure proper reliability and reduce the chances of system outages.

(D) OPTIONS TO ELIMINATE THE NEED FOR THE PROPOSED PROJECT

Alternatives evaluated for this Project included:

The following operations were evaluated for their potential to eliminate the need for the Proposed Project:

1. Reconductor Midway - Bowling Green No.2 69 kV Transmission Line
2. Replace the existing Pemberville #1 Transformer with a larger unit.

The alternatives listed above do not address potential voltage collapse and adding a capacitor bank is not a viable solution for voltage collapse. Future load growth on the system will continue to push existing transmission system elements (transmission lines and transformers) and conditions beyond their design capabilities for safe operation. The proposed Project addresses existing planning criteria violations and builds a reasonable margin and system capacity, as well as improves operational flexibility, beyond what is immediately needed to address the near-term planning horizon of 2022.

ANALYSIS OF NON-TRANSMISSION ALTERNATIVES

Two different types of non-transmission alternatives were considered: (i) energy efficiency alternatives and (ii) demand-side management alternatives. As explained below, although certain features of each non-transmission alternative were attractive, no single non-transmission alternative resolved all of the capacity, thermal and voltage violations on the ATSI 69 kV Transmission System. Accordingly, the non-transmission alternatives were rejected.

Energy Efficiency

Conservation and energy efficiency programs involve actions taken on the customer side of the meter that reduce the customers' overall energy requirements (collectively referred to as "Energy Efficiency" actions). Energy Efficiency actions focus on using energy more efficiently without sacrificing customer comfort or convenience. These actions usually involve installing more

efficient equipment or changing processes to conserve energy. Energy Efficiency and conservation programs usually provide financial incentives for customers to purchase and install energy efficient equipment and/or educate consumers on the efficient use of energy. Energy Efficiency also requires customer cooperation – a utility cannot force customers to participate in Energy Efficiency programs. The reduction in peak load would be less than what is necessary to relieve the thermal overload problems on the 69-kV system. Further, Energy Efficiency programs will not provide the transmission infrastructure that is needed for future operational flexibility, voltage support, and the capacity for future economic growth. New transmission lines or transmission sources, similar to the proposed Project, would remain needed to solve the system thermal, voltage, and capacity constraints. Accordingly, this option is not sufficient and, as such, was rejected.

Demand Side Management

Demand-Side Management (“DSM”) programs generally involve actions taken on the customer side of the meter that have the intention and effect of reducing the customers’ requirements during peak times. DSM programs typically involve utility incentives that are provided to consumers in exchange for reduction or curtailment of customer load at specific times (usually system peak times, but also can be used to address peak times at specific locations). Load management and demand response incentives are most often provided and renewed on an annual basis. Further, DSM also requires customer cooperation – a utility cannot force customers to participate in DSM programs. DSM will not provide for the future required transmission infrastructure needed for continuous reliable transmission service to the Project Area. This would leave the Project Area without a means of maintaining proper system voltages. New transmission lines, similar to the proposed Project, would remain needed to solve the capacity constraint and system voltage concerns.

It is clear that DSM can make only a small and limited contribution to relieving the capacity problems on the 138 kV and 69 kV System. Accordingly, this option is not sufficient and, as such, was rejected.

Inclusion of Energy Efficiency and Demand Side Management in PJM Forecasting

PJM forecasts include Energy Efficiency and Demand Side Management that clear in PJM’s Reliability Pricing Model and are already included in the modeling and forecasting done by PJM. Consequently, the ability to address the need for the Project through additional Energy Efficiency or Demand Side Management projects is limited by the fact that existing Energy Efficiency and Demand Side Management recourses are already included in the forecasts that were used in the modeling that demonstrated the need for the Project.

New Generation

ATSI does not build or own generation and can only plan for transmission. In 2001, the State of Ohio made a policy decision to deregulate electric utilities. Through this deregulation process, the State of Ohio mandated that transmission and generation must remain in legally separate and

independent companies. As such, ATSI does not build or own generation and can only plan for transmission.

(E) FACILITY SELECTION RATIONALE

The Project which installs an additional 138 kV transmission line circuit into Brim Substation was selected because it is the most efficient long-term solution to resolve the identified thermal overload problems that exist on the ATSI 69 kV transmission system in the Project Study Area, while adding voltage support and additional capacity on the system for future economic load growth and operational flexibility. Construction of the Project will provide operating flexibility to eliminate future violations and adds another source for power flow to and through the Project Study Area, affording greater flexibility and capacity for future load growth and system maintenance and ensuring that the businesses, homes and communities in the area will have ready access to safe and reliable energy for many years to come.

As noted herein, all of the other transmission and non-transmission alternatives either would not resolve all of the capacity and voltage problems or, if such problems would be resolved, the alternatives would: (i) be short term solutions; and (ii) require future additional investments without adding the required overall area improvements.

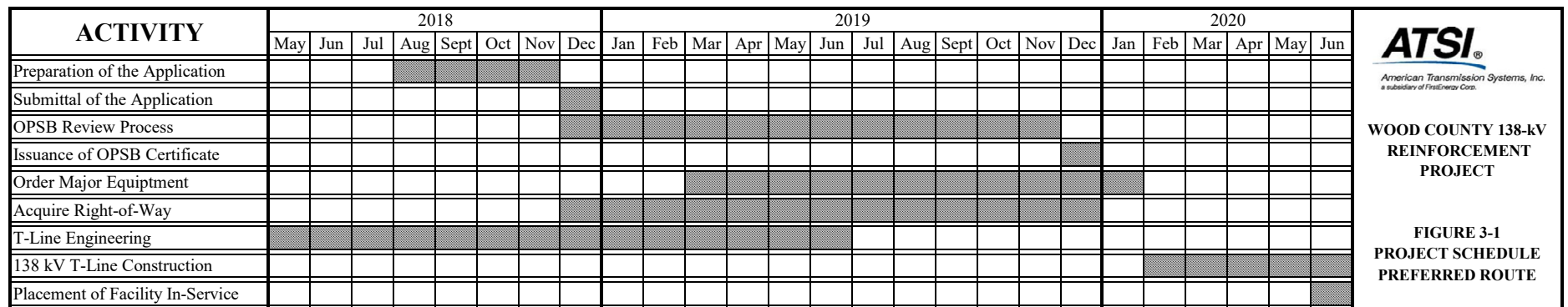
(F) PROJECT SCHEDULE

(1) Overview Schedule

It is anticipated that the overall project will require 24 months to permit, site, design, and build the 138 kV transmission lines from the time of approval. Construction on the Project is expected to begin on approximately February 2020 and is expected to be completed and placed in-service by June 2020. A detailed Project schedule is included as Figure 3-1.

(2) Impact of Critical Delays

Critical delays in construction or other processes necessary to bring the Project on-line may impact the Applicant's electric customers in the Bowling Green and surrounding area by exposing them to ongoing reliability issues until such time as the Project is brought on-line. This may include lower than desired service voltages and emergency forced load shed to prevent thermal loading issues. Project delays will also limit the ability of the community to respond and provide transmission service to economic growth opportunities in an efficient and timely manner.



4906-5-04 ROUTE ALTERNATIVES ANALYSES**(A) ROUTE SELECTION STUDY**

ATSI conducted a Route Selection Study (RSS) for the transmission line proposed in the Project. A copy of the RSS is included as **Appendix 4-1**. The goal of the RSS was to identify reasonable routes, while avoiding or minimizing effects on sensitive land uses, ecological, and cultural features in the Project vicinity with the ultimate objective being the identification of a Preferred and Alternate Route for the Project that met all applicable criteria for issuance of a Certificate by the Ohio Power Siting Board. Potential routes were quantitatively and qualitatively evaluated, compared, and ranked to provide the basis for the selection of a Preferred and an Alternate Route.

Prior to beginning the Study, certain key objectives were identified as the minimum criteria needed to achieve the Project goals. These objectives included identifying:

- Route alternatives that must connect the existing Lemoyne-Midway 138 kV Transmission Line to the existing Brim Substation;
- Route alternatives that must include a 60-foot wide cleared ROW;
- Route alternatives that must be able to support required conductor, insulators, and other hardware required by Transmission Planning and/or Transmission Engineering;
- Route alternatives that must be able to have appropriate rights and permits secured to support an in-service date of June 1, 2020; and,
- Route alternatives that must provide sufficient separation from the existing 138-kV line into Brim Substation to minimize the potential for a single event disrupting both lines, thereby improving reliability.

(1) Project Area Description and Rationale

The Project is located in north-central Wood County, Ohio. The Study Area encompasses Middletown, Plain, and Center Township as well as portions of the Village of Haskins and the City of Bowling Green. The Project area is primarily rural, consisting mainly of agricultural land with small pockets of residential development. The Project area is relatively flat with elevations ranging from approximately 663 to 681 feet above sea level. There are no distinct elevation changes, slopes, or landforms present in the Project Study Area. Woodlots are sparse throughout the Project area. There are no large water features (lakes, rivers, reservoirs) present in the Project area.

ATSI considered geographic features such as existing utility corridors and municipal boundaries, as well as applying professional judgment, to define a focused Project area for the Project. The northwestern corner of the Project area was therefore defined by the existing railroad corridor running northeast/southwest. The western boundary of the Project area was defined by Liberty

Hi Road. The southern boundary was defined by the existing Brim Substation. It is a best practice to limit the Study Area in the opposite direction from the direct path between the start and end point. The southeastern corner of the Project area was defined by the existing railroad corridor running northeast/southwest. The eastern boundary of the Project area was defined by Mercer Road. The northern boundary was defined by the existing transmission corridor. It is a best practice to limit the Study Area in the opposite direction from the direct path between the start and end point.

(2) Project Area Map

Figure 2-1 of the RSS (**Appendix 4-1**) illustrates the approximate boundary of the Study Area.

(3) Map of Project Area, Routes, and Sites Evaluated

Figure 2-1 of the RSS report (**Appendix 4-1**) illustrate the boundary of the Study Area, route segment alternatives, and the route alternatives that were evaluated and scored in order to guide the selection of Preferred and Alternate Routes.

(4) Siting Criteria

The list and description of all quantitative siting criteria as well as the weighting values for each criterion utilized in the RSS are presented in Table 2-3 of the RSS report (**Appendix 4-1**). The quantitative siting criteria consist of constraint and attribute data, including, but not limited to, locations of individual residences, property boundaries, institutional land uses, forested lands, wetlands, streams, existing transmission lines, and other land use features. As the relative importance of various siting criteria vary from project to project, the following criteria were identified as the most relevant for route selection purposes: number of residences near the route, number of properties crossed, and impacts to institutional land use properties (include schools, churches, hospitals, etc.). These criteria were assigned weighting values based on the professional judgment of the siting team which allowed for the calculation of final route scores.

Sensitive areas identified in the RSS included residential parcels, a church, a cemetery, historic structures and places, and ecological resources. As the Study Area is primarily a rural setting, the number of residential structures were primarily located adjacent to existing roadways and sporadically located amongst agricultural land with exception to several dense residential areas in the southern portion of the Study Area. The location of residential structures significantly limited the placement of route alternatives near the southern extent of the Study Area near Brim Substation. Previously identified cultural resource sites were generally concentrated in the southeastern section of the Study Area. Anticipated impacts to cultural resources did not significantly limit the placement of route alternatives. Ecologically sensitive areas include specific locales of streams, minimal wetlands and forest habitat throughout the Study Area.

(5) Siting Process for Preferred and Alternate Routes

After the Study Area and siting criteria were established, preliminary routes were drawn based on the results of the map analysis, review of aerial photography, topographic maps, and the mapped attribute and constraint data. The intent when placing these working centerlines, 16 in

total, was to minimize impacts to residences, and, where practical, to follow existing developed corridors, such as roads and transmission or distribution lines.

Various siting criteria were quantified for each route and then each quantified value was normalized to assign each criteria a suitability value based on a scale of 0 (most suitable) to 100 (least suitable). This makes the data simpler to compare and removes inadvertent weighting of the information. Normalizing the data into a score is vital so that all of the constraints are directly compared according to the same scale. ATSI's siting team identified weighting factors for each siting criteria category (ecological, cultural resources, land use, and technical). The various RSS route alternatives (combinations of selected route segments) were then numerically scored to identify the overall top-ranked route alternatives.

In addition to quantitative scoring, ATSI's siting team, relying on its experience and familiarity with siting major transmission line projects, further refined the routes based on qualitative factors. For this Project, the Applicant took into consideration local public preferences in reaching the final decision regarding the proposed Preferred and Alternate Routes.

A combination of qualitative factors, route scoring, public input, and engineering design/constructability were ultimately all used to determine Preferred and Alternate Routes. The entire siting process, methodology, and results are described in detail in the RSS report in **Appendix 4-1**.

(6) Route Descriptions and Rationale for Selection

The Preferred Route is identified as Route 12 in the RSS. This route is approximately 5.7 miles long and initially ranked second based solely on the quantitative factors. It had the lowest (best) ecological score due to the minimal amount of tree clearing needed (approximately 0.1 acre, compared to a range of approximately 0.1 to 1.0 acre). Route 12 also had the 2nd most favorable ranked land use score, with no residences within 30-ft of the right-of-way (compared to a range of 1 to 9 residences) and 29 property owners crossed by the centerline (compared to a range of 26 to 84 property owners). Route 12 ranked 4th in the technical category with a fewer number of road crossings (8, compared to a range of 7 to 15) and approximately 47% of the centerline paralleling existing roadways (2.7 miles, compared to a range of 0.3 to 5.9 miles), and the total length of the route measuring approximately 5.74 miles (compared to a range of 5.33 to 7.07 miles). The Route 12 land use score was negatively impacted by the portion of the alignment that traverses property owned by the City of Bowling Green.

The Alternate Route is identified as Route 3 in the RSS. Route 3 is approximately 5.6 miles long and initially ranked first overall solely on the quantitative factors. It scored third in the environmental category (approximately 0.16 acre impacted, compared to a range of approximately 0.1 to 1.0). Route 3 also had the lowest (best) land use score with one residence within 30-feet (compared to a range of 1 to 9), and crosses twenty-six parcels (compared to a range of 26 to 84). Route 3 scored third overall in the technical category with eight road crossings (compared to a range of 7 to 15) and approximately 0.32-miles paralleling the existing road/rail

corridor (compared to a range of 0.3 to 5.9 miles). The Route 3 technical use score was negatively impacted by the minimal length that the route that parallels existing road/rail corridors.

Route 3 (A-B-C-I-E-J-K) and route 12 (A-B-L-Q-S-T-O-P) were the most favorable routes overall representing the two corridors approaching the Brim Substation from the west and east. Crossing residential land use is localized near Bishop Road for Route 3 where the route crosses two residential properties where segment B-C parallels Bishop Road (with one residence within 30 feet). The increased level of residential development near the Brim Substation generally was one of the primary reasons for the number of dwellings within 1,000 feet of both of the proposed routes. However, Route 3 has approximately 27% more residences within 1,000 feet due to the northern trend of segment C-I on the eastern side of the residential community. The amount of agricultural land crossed by each route is similar with Route 3 traversing approximately 5.13-miles and Route 12 traversing approximately 5.49 miles.

Although the amount of tree clearing required for either route is minimal, another variable that was considered was the need for adjacent priority tree rights. In addition to the property rights needed to occupy and maintain the proposed 60-foot ROW, adjacent “Priority Tree” rights are needed to allow for the select removal of trees that are dead, diseased, dying, structurally deficient, leaning in, or otherwise growing in such a manner that poses a risk to the facility. Priority Tree rights may extend as much as 150-feet from the centerline. Including the number of parcels needed to secure appropriate priority tree rights along with the number of parcels actually traversed by the proposed routes, Route 3 involves 47 parcels and Route 12 involves 35 parcels.

(B) COMPARISON TABLE OF ROUTES, ROUTE SEGMENTS, AND SITE

Table 3-3 and Figure 3-4 of the RSS Report (**Appendix 4-1**) provide scoring and ranking results for the route alternatives. This table includes the individual category scores (ecological, cultural resources, land use, and technical) for each route alternative and the corresponding relative rank of each.

(C) PUBLIC INVOLVEMENT

ATSI conducted a public information program to raise awareness, communicate Project details, and seek feedback from residents and local elected officials. Part of the public engagement program involved conducting a public informational meeting (open house forum) in the area to seek feedback from the community on the Project and the routes being considered. Prior to the public information meeting, ATSI mailed invitation letters to residents and tenants, and published a newspaper public notice and news release of the public information meeting. A Project website was created with Project mapping and a summary description. At the public information open house, ATSI representatives were available to answer questions, listen, and receive feedback from the public to incorporate in the siting process. A summary of the public informational meeting is provided below.

(1) Official Public Information Open House

ATSI conducted the informational meeting on September 26, 2018 at the Middleton Township Building in Bowling Green, Ohio. The initial route selection studies discussed above and in **Appendix 4-1**, and RSS Routes 3 and 12 were presented for public comment, along with other Project information at the meeting. Route 12 was referred to as Alternative 1 (western route) and Route 3 was referred to as Alternative 2 (eastern route).

Detailed maps of the route alternatives were presented that included property boundaries with unique parcel identification (ID) numbers referenced to a list of property owners. Forty people attended the public information meeting.

ATSI encouraged those attendees with specific objections to suggest alternatives. Fifteen comment cards were received during the meeting. Three comment cards specified a preference for Alternative 1. Two comment cards specified a preference for Alternative 2. Four comment cards provided alternatives to the proposed alignments through agricultural properties. Two comment cards noted concerns regarding current farming practices. One comment card noted a dislike of the visual aspect of the proposed transmission line. One comment card proposed that the alignment for Alternative 2 along Bishop Road be constructed underground. Two comment cards noted concerns regarding radio interference. Finally, one comment card requested further information on when a decision would be made regarding the transmission line.

Following the public information meeting on September 26, 2018 route adjustments were considered and made to both proposed routes based on landowner comments.

Regarding Alternative 1, the Preferred Route, the first adjustment occurred near Hull Prairie Road and Hanna Road where property owners requested the alignment follow parcel lines and the edge of their fields where possible (**Appendix 4-1**, Figure 4-2). To accommodate this adjustment, the alignment was adjusted to trend west from Hull Prairie Road and then north towards Hanna Road following the parcel boundaries. Once the alignment crosses Hanna Road, it trends west along Hanna Road towards the existing proposed alignment.

Minor adjustments were also made between Hanna Road to Cross Creek Road and Middleton Pike to the existing transmission line corridor to accommodate property owner requests to follow existing ditches through the agricultural fields (**Appendix 4-1**, Figures 4-3 and 4-4).

Regarding Alternative 2, the Alternate Route, the first adjustment occurred near Bishop Road and SR-25 (N. Dixie Highway) where property owners requested the alignment be relocated further away from the residential community located at the northeast corner of Brim Road and Bishop Road (**Appendix 4-1**, Figure 4-5). To accommodate this adjustment, the alignment was shifted eastward away from the residential development. Once the alignment crosses SR-25, the alignment was adjusted to follow the parcel boundaries as it extends eastward before trending north.

An additional adjustment was made to Alternative 2 south of Middleton Pike at the request of the property owner to follow the parcel boundaries (**Appendix 4-1**, Figure 4-6).

Following the official public information meeting ATSI reviewed and incorporated the requested adjustments described above. After review of the adjusted routes, ATSI chose to move forward with Alternative 1, designated as the Preferred Route, and Alternative 2, designated as the Alternate Route with the adjustments discussed above.

Route Selection Study, Wood County 138-kV Reinforcement Project

Prepared by



December 2018

Table of Contents

1	Introduction and Project Overview	1-1
1.1	Project Scope and Purpose.....	1-1
1.2	Summary of the Siting Process.....	1-3
1.3	Study Area Characteristics.....	1-4
2	Detailed Siting Study Steps	2-1
2.1	Step 1 – Study Area Delineation.....	2-1
2.2	Step 2 – Evaluation Criteria and Placing Route Centerlines	2-3
2.2.1	Constraint and Attribute Data Collection.....	2-3
2.2.2	Placement of Initial Centerlines.....	2-6
3	Quantitative and Qualitative Analysis	3-1
3.1	Evaluation Process.....	3-1
3.1.1	Discussion of Ecological Criteria	3-1
3.1.2	Discussion of Cultural Criteria.....	3-2
3.1.3	Discussion of Land Use.....	3-2
3.1.4	Discussion of Technical Criteria	3-3
3.2	Ranking and Selection of Routes.....	3-4
3.2.1	Route Evaluation	3-4
3.2.2	Eastern Routes.....	3-5
3.2.3	Western Routes	3-6
4	Public Involvement	4-1
5	Conclusion	5-1

Figures

1-1	Project Vicinity	1-2
2-1	Study Area	2-2
2-4	Proposed Segments.....	2-7
3-4	Route Evaluation – Final Scores.....	3-5
3-6	Segment Comparison for Routes 3, 7, & 6	3-6
3-8	Segment Comparison for Routes 12, 16, & 10.....	3-8
4-1	Public Information Meeting Route Map.....	4-1
4-2	Adjustment 1: Blue Segment.....	4-2
4-3	Adjustment 2: Blue Segment.....	4-3
4-4	Adjustment 3: Blue Segment.....	4-4
4-5	Adjustment 4: Purple Segment	4-5
4-6	Adjustment 5: Purple Segment	4-6
5-1	Preferred and Alternate Routes.....	5-2

Tables

2-2	Study Area Boundary.....	2-3
2-3	Route Selection Study Evaluation Criteria	2-4
2-5	Segment Summary Table.....	2-9
3-3	Route Evaluation – Final Scores.....	3-4
3-5	Segment Comparison for Routes 3, 7, & 6	3-6
3-7	Segment Comparison for Routes 12, 16, & 10.....	3-7
3-9	Comparison of Routes 3 & 12	3-9
3-10	Property Rights & Adjacent Tree Rights.....	3-10

Acronyms and Abbreviations

Application	Certificate of Environmental Compatibility and Public Need
ATSI	American Transmission Systems, Incorporated
GIS	geographic information system
IROL	Interconnection Reliability Operating Limits
kV	kilovolt
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
ODNR	Ohio Department of Natural Resources
OHPO	Ohio Historic Preservation Office
OPSB	Ohio Power Siting Board
PADUS	Protected Areas Database of the United States
Project	Wood County 138-kV Reinforcement Project
PUCO	Public Utilities Commission of Ohio
ROW	right-of-way
SR-25	State Route 25/N. Dixie Highway
SR-285	Middleton Pike
T&E	threatened and endangered
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1 Introduction and Project Overview

1.1 Project Scope and Purpose

American Transmission Systems, Incorporated (ATSI or Applicant), a FirstEnergy company, is proposing to construct a new 138 kilovolt (kV) electric transmission line from the existing Lemoyne-Midway 138 kV Transmission Line to the existing Brim Substation, located in Plain Township, Wood County, Ohio. The Project is referred to as the Wood County 138 kV Reinforcement Project ("Project"; Figure 1-1). Depending on the route selected, the Project length will range from approximately five to seven miles. The proposed work will eliminate the existing 3-terminal line configuration and create the Brim-Lemoyne 138 kV Transmission Line and Brim-Midway 138 kV Transmission Line circuits. The proposed Project will provide a second 138 kV source for the Brim Substation. For reliability purposes, it is necessary to physically separate the two 138 kV sources for the substation to minimize the potential for the same "event" to disrupt both feeds. Therefore, in this Study, sharing 138 kV right-of-way is not considered an acceptable resolution for Project need.

This document presents the Route Selection Study (Study) conducted to identify and compare route alternatives for the Project. The purpose of this Study is to identify viable alternatives that maximize opportunities (i.e. land uses and conditions favorable for electric transmission lines) and avoid or minimize constraints (land uses and conditions unfavorable for electric transmission lines) for the Project, and an assessment of the ecological, cultural, land use, and technical variables present in the Study Area that will help determine the optimal route. The Study identifies major opportunities and constraints and uses an evaluation process to compare alternative transmission line routes for the Project that avoid or minimize constraints and maximize opportunities to the extent practicable.

In Ohio, a project of this scope requires the submittal of a Standard Application for a Certificate of Environmental Compatibility and Public Need (Application) as outlined in 4906-1-01 APPENDIX A of the Ohio Revised Code. The Application is reviewed by the Ohio Power Siting Board (OPSB) which is responsible for issuing Certificates of Environmental Compatibility and Public Need (Certificate) for major utility projects that meet certain statutory criteria established in Ohio law. As part of the Application process, Applicants are required to complete a route selection study and report the results in the Application. Among other requirements, the OPSB's rules require the Applicant to evaluate route alternatives in accordance with a series of criteria established by the OPSB and to present a Preferred and Alternate Route for the proposed transmission line project.

This Study outlines the process used by ATSI to identify and evaluate transmission alternatives for the Project and to decide on the Preferred and Alternate Routes presented in the Application. This Study was prepared in support of the Application for the Project and the final Preferred and Alternate Routes presented in the Study are the same as those presented in the Application.

LEGEND:

- Substation
- Existing 69 kV Line
- Existing 138kV Line
- Existing 345kV Line
- Railroad
- County
- Municipal Boundary

0 1 2
Miles

N

WOOD COUNTY

MICHIGAN AVE

WATERVILLE

SR 562

HASKINS

EXISTING LEMOYNE-MIDWAY 138 kV

EXISTING 138 kV TAP

EXISTING BRIM SUBSTATION

KELLOGG RD

BOWLING GREEN

MAIN ST

WOOSTER ST

SUGAR RIDGE RD

SR 562

REITZ RD

1.2 Summary of the Siting Process

The methodology of the Study is designed to identify transmission line routes that minimize the overall impacts on land use, ecological, and cultural features, to the extent practical, while taking into account economic and technical feasibility. The Study draws upon the latest available land use and ecological data collected from multiple public sources and commercial providers. This is supplemented through field evaluations by FirstEnergy staff and consultants, including representatives from siting, engineering, and construction groups within FirstEnergy. The field evaluation also provides ATSI with the opportunity to qualitatively assess the various routes. The result of this process is a comprehensive assessment of the Study Area and route alternatives that is compiled and summarized in the Study report.

The Study consists of a multi-stage suitability analysis that identifies areas of opportunity and constraint and then directly compares the resulting route alternatives. The Study is comprised of four main steps:

1. **Project Scoping:** Prior to beginning the Study, certain key objectives need to be identified as the minimum needed to achieve the project aims. In this Study, the following objectives must be met:
 - Route alternatives must connect the existing Lemoyne-Midway 138 kV Transmission Line to the existing Brim Substation;
 - Route alternatives must include a 60-foot wide cleared ROW;
 - Route alternatives must be able to support conductor, insulators, and other hardware required by Transmission Planning and/or Transmission Engineering;
 - Route alternatives must be able to have appropriate rights and permits secured to support an in-service date of June 1, 2020; and
 - The route alternatives must provide sufficient separation from the existing 138 kV line into Brim Substation to minimize the potential for the same storm or other event from disrupting both lines.
2. **Definition of a Study Area:** The first step in the Study is to develop a focused Study Area in which to collect detailed constraint and opportunity data. The Study Area was selected based on professional judgment and the geographic characteristics of the region, as well as the physical endpoints of the Project (i.e., substation and existing transmission line location). A Study Area should include the end points of the transmission line and provide a reasonable area in which to identify practical alternatives. In this case, the boundaries of the Study Area were developed based on a review of United States Geological Survey (USGS) maps, state and county road maps, and aerial photographs. Key features of the area that helped identify the limits of the study area included the existing transmission line (northern limit), existing substation (south), I-75 (east), Haskins Road and the town of Haskins (west).
3. **Collection and Mapping of Opportunity and Constraint Data:** Constraint and opportunity data were collected under four broad categories including ecological, cultural, land use, and technical. Multiple individual criteria were collected under these broad categories and selected based on their relevance to the Project, the Study Area, and the availability and quality of the dataset.
4. **Identification of Candidate Routes:** The goal of the Study was to identify viable candidate routes based on reasonable physical placement of the proposed transmission line that avoided or minimized effects on sensitive land uses and ecological, and cultural features in the Study Area. In evaluating the routing criteria, it is generally considered desirable to maximize certain criteria that are most compatible with transmission development, such as, paralleling existing railroad or utility corridors. These more favorable criteria are known as opportunities. Undesirable criteria for routing, such as residences, wetlands, and historic properties, are generally referred to as constraints and the RSS seeks to avoid or minimize their proximity to the Project. When siting transmission lines, three main routing opportunities are generally focused on, where viable:
 - Replacing or upgrading an existing line -- this option typically minimizes natural and social impacts by utilizing an existing ROW.
 - Utilizing an existing corridor through corridor sharing -- corridor sharing pairs the transmission line with an existing linear feature, which can include roads, highways, railroads, railroad

corridors, gas pipelines, or other existing transmission lines. These corridors are considered opportunity areas because locating a new transmission line parallel to them may require less ROW, concentrates linear land uses thus reducing fragmentation of the landscape, and has incremental impacts rather than new impacts regardless of surrounding land use. It is important, however, to realize that it is not always possible, or necessarily the best option to parallel these features. Often, other land uses have encroached overtime to the edge or even into the existing linear easement, making a parallel, easement-sharing route a challenge, or even impractical. Each has to be evaluated.

- While corridor sharing presents an opportunity, it should be noted that private rights from adjacent property owners may still be required to provide adequate clearance to build and operate the transmission facilities. For example, constructing facilities along a public roadway will typically require private rights from adjacent properties for placement of structures and/or removal of incompatible vegetation for both construction and future maintenance. physical occupancy of the facilities, as well as adjacent tree rights which may be required from parcels across the roadway.
- Utilizing brownfield areas such as former industrial corridors or underutilized commercial areas.
- Utilizing greenfield areas such as pasture or fallow fields or agricultural areas to identify routes that cross open lands. Identifying these routes involves assessment of parcel boundaries and land use practices to define routes that minimize potential impacts to private properties and any agricultural or other farming activities (e.g., orchards or center pivot agriculture).

5. Quantitative and Qualitative Analysis of the Alternative Routes to Guide Selection of the Proposed Route:

Initially, the candidate routes are evaluated and compared against each other quantitatively. This refers to collecting data on what each route comes close to, or crosses (such as number of residences, acres of wetlands, miles of existing utility ROW, etc.), totaling it and comparing each route candidate. Those that cross less constraints and more opportunities score more favorably. The quantitative data is normalized, with a maximum score of 100. A lower value represents a more favorable score. This is a method of taking a large number of options and filtering them down to the most likely and favorable options for more detailed analysis. Based on the final quantitative results, a subset of the most favorable routes will be selected for further consideration and qualitative review.

The route selection process utilized by FirstEnergy, however, takes into account the fact that not every factor that is relevant to transmission routing can be reduced to a score. In all cases where quantitative methods are used, FirstEnergy also includes a subsequent qualitative review. Qualitative factors vary from project to project, and include those factors that are not readily quantifiable, or can be counted. These might include areas of local importance, public perception, unmapped or undesignated recreational areas and public vistas.

Therefore, the siting process includes a combination of route scoring, public input, engineering design/constructability, and qualitative factors. The end result is the selection of a Preferred and an Alternate Route.

The route evaluation process is also iterative in that it allows for the re-evaluation of routes, corridors, and additional data at any point in the process. For example, if important information is received from property owners at a public information meeting, route adjustments generally can be introduced into the process and incorporated into the outcome without disruption to the general route selection process.

1.3 Study Area Characteristics

The Project is located in north-central Wood County, Ohio. The Study Area encompasses Middleton, Plain, and Center Township as well as portions of the Village of Haskins and the City of Bowling Green. The Study Area is relatively flat with elevations ranging from approximately 663 to 681 feet above sea level. There are no distinct elevation changes, slopes, or landforms present in the Study Area. The Study Area is primarily rural, consisting mainly of agricultural land with small pockets of residential development. Woodlots are sparse

throughout the Study Area. There are no large water features (lakes, rivers, reservoirs) present in the Study Area; however, there are several residential ponds.

Land use in the Study Area is predominantly agricultural with pockets of residential development located throughout the Study Area. Dense residential development is present in the Village of Haskins in the northwest portion of the Study Area, localized development in the central portion of the Study Area in Middleton Township, and in the south-central portion of the Study Area in Plain Township and Bowling Green. Notably, there is a higher prevalence of residential development to the north and east of the Brim Substation. Light industry, and commercial land is concentrated along State Route 25 (SR-25) which runs north/south through the eastern portion of the Study Area. These land uses consist of a trucking company, Christmas tree farm, animal hospital, metal fabricator, automobile sales and service, Tractor Supply, screen printer, food service distributor, and Dixie Driving Range.

Existing electric infrastructure within the Study Area includes the existing ATSI-owned Dowling-Midway 138 kV, Lemoyne-Midway 345 kV, and Dowling-Fulton 345 kV Transmission Lines that border the Study Area along the northern boundary. There is an existing ATSI owned 138 kV transmission tap line that extends approximately 5.1-miles from the Lemoyne-Midway 138 kV Transmission Line to the Brim Substation. Also present in the Study Area along the south-central border, is an approximately 0.90-miles long Bowling Green Electric-owned 69 kV line. Additionally, distribution lines are prevalent through the Study Area paralleling many of the roadways supplying power to residences and businesses.

2 Detailed Siting Study Steps

2.1 Step 1 – Study Area Delineation

The Study Area can be defined based on a combination of three basic criteria: technical limitations, geographic constraints, and professional judgement. Certain criteria are reviewed when identifying a practical study area such as environmental and cultural impacts balanced with technical and economic viability. Avoiding sensitive natural and man-made features in the landscape minimizes environmental and cultural impacts. These impacts may be further minimized using technological methods that may decrease the proposed transmission line length, which would decrease the total area of impact. Natural and man-made barriers are also influential in defining the study area. It is expensive and may be technically difficult for a new transmission line to cross significant barriers. For example, wide river valleys or other high voltage transmission lines are potentially technically challenging and costly to cross (although paralleling transmission lines can be beneficial in some instances), and thus represent potential study area limits.

With these criteria in mind, the Study Area was identified by reviewing recent aerial imagery, USGS topographic maps, and available state and county-wide environmental data that were overlain and examined in a Geographic Information System (GIS). Initial observations of the general Study Area indicate it is relatively rural and flat in nature with no natural barriers allowing the Study Area to be expanded in all directions. However, since routing options that have a shorter overall length will generally have fewer impacts, the best approach for this Project would be to use the geographical features present within the Study Area and professional judgement to define the Study Area. As a general best siting practice, a route should not extend out perpendicular from the straight line between end points more than half of the total straight-line length. The straight-line distance between the Lemoyne-Midway 138 kV Transmission Line and the Brim Substation Line is approximately 4.6-miles, thus the study area should not (typically) extend to the west or east further than 2.3-miles. It is also a best practice to limit the study area in the opposite direction from the direct path between the start and end point to help limit alternatives to reasonable distances. The Study Area boundaries defined are shown in Figure 2-1 and described below in Table 2-2.

FIGURE 2-1
Study Area

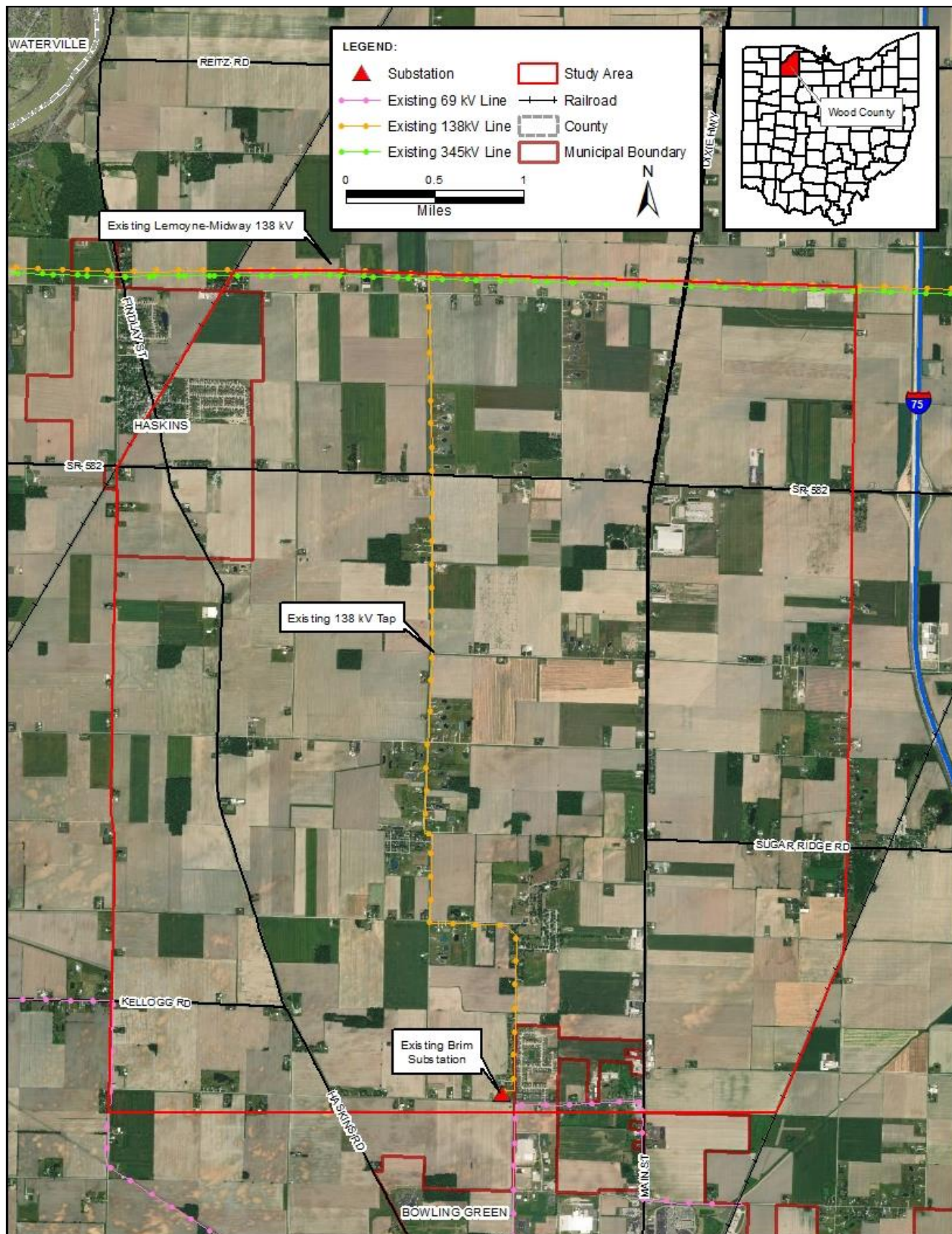


TABLE 2-2
Study Area Boundaries

Northwestern Boundary:	The northwestern corner of the Study Area was defined by the existing railroad corridor running northeast/southwest.
Western Boundary:	The western boundary of the Study Area was defined by Liberty Hi Road.
Southern Boundary:	The southern boundary was defined by the existing Brim Substation. It is a best practice to limit the Study Area to not extend past the beginning and end points.
Southeastern Boundary:	The southeastern corner of the Study Area was defined by the existing railroad corridor running northeast/southwest.
Eastern Boundary:	The eastern boundary of the Study Area was defined by Mercer Road.
Northern Boundary:	The northern boundary was defined by the existing transmission corridor. It is a best practice to limit the Study Area to not extend past the beginning and end points.

2.2 Step 2 – Evaluation Criteria and Placing Route Centerlines

2.2.1 Constraint and Attribute Data Collection

The siting team collected detailed land use, ecological, technical, and cultural data for the Study Area. Using this data, the siting team developed a set of evaluation criteria to compare the routes numerically to one another (Table 2-3). The data collected (evaluation criteria) and used to evaluate and compare the routes that were selected by the Project team based on their relevance to the Project, the Study Area, and the availability and quality of the dataset. A brief rationale for the criteria selected is provided in Table 2-3. The evaluation criteria include both opportunity and constraint data. Opportunity criteria represent features that are favorable for the development of an electric transmission line (i.e. paralleling existing utility infrastructure), whereas constraint data represent areas that are unfavorable to development of an electric transmission line (i.e. residential areas).

TABLE 2-3

Route Selection Study Evaluation Criteria

	Criteria	Source	Rationale
Ecological	Area of woodlots within 60-foot ROW	Digitized from 2017 aerial photograph	Trees that would require clearing. OPSB requires report of woodlots, potential loss of habitat, and cost for clearing.
	Area of National Wetlands Inventory within 60-foot ROW*	U.S. Fish and Wildlife Service	Impacts to wetlands triggers additional construction, maintenance, and permitting cost and schedule issues. Agencies seek to avoid, minimize, and then mitigate for impacts to wetlands. NWI data is dated but is a reasonable analog for overall wetland impact potential at the siting scale.
	Number of NHD stream crossings requiring tree clearing	U.S. Geological Survey (USGS) (The National Map) - National Hydrography Dataset; 2017 aerial photograph	May require additional permitting and consultation with Ohio Department of Natural Resources (ODNR).
	Federal or State Endangered or Threatened Species Areas within 60-ft ROW*	ODNR, Division of Wildlife (Ohio Natural Heritage Program)	T&E species and habitat are reviewed by ODNR and OPSB and may have implications if federal permits are required. It is better to avoid known locations in the siting study.
	Federal or State Endangered or Threatened Species Areas between ROW and 1,000-ft Buffer*		
	Federal or State Protected Species Areas within 60-ft ROW*		
	Federal or State Protected Species Areas between ROW and 1,000-ft Buffer*		
Cultural	National Register of Historic Places (NRHP) within 1,000 feet*	Ohio Historic Preservation Office (OHPO)	Avoid aesthetic impact to historic structures where possible.
	Archaeology sites within 100 feet*		Avoidance of archaeological sites minimizes the need for additional archaeological work.
	Ohio Historical Inventory structures within 1,000 feet*		Avoid aesthetic impact to historic structures where possible.
	Cemeteries within 100 feet*		Potential aesthetic impacts exist.
Land Use	Residences within 30-ft of the ROW edge	Digitized from 2017 aerial photograph	Residences and residential areas are avoided where possible; being further away from residences is preferred. Typically, physical occupancy/encumbrance of residential properties with
	Residences between 30 and 100-ft of ROW edge		
	Residences between 100 and 1,000-ft of ROW edge		

TABLE 2-3

Route Selection Study Evaluation Criteria

	Criteria	Source	Rationale
			right-of-way is less favorable than the visual effect of locating facilities within 1,000-feet of a residence.
	Properties Crossed by Centerline	Wood County Auditor	A lower number of properties crossed is preferred for schedule, cost, and public impact considerations.
	Linear feet of institutional land uses crossed	ArcGIS	Required to report on by OPSB.
	Number of institutional land uses within 1,000 feet*		
	Linear feet of other sensitive land uses crossed*	ArcGIS, Protected Areas Database of the U.S., ODNR, and Federal Aviation Administration	Required to report on by OPSB.
	Number of other sensitive land uses within 1,000 feet*		
Technical	Centerline road crossing	ArcGIS and 2017 aerial photograph	Road crossing permits during construction.
	Centerline railroad crossing*	ArcGIS	Railroad crossing permit during construction. Railroads have specific and often time-consuming procedures for applying for and receiving crossing permits.
	Turn angles	Developed from geographic information system (GIS) data	Requires more expensive dead-end structure and potential for guying.
	Length of segment overbuilding existing transmission line - Inverted*	ATSI and U.S. Energy Information Administration – U.S Energy Mapping System	Uses at least a portion of the existing corridor. Limits forest and property fragmentation and minimizes overall impacts.
	Length of segment paralleling gas pipeline - Inverted*	U.S. Energy Information Administration – U.S Energy Mapping System	Follows existing disturbed corridor and limits fragmentation of property.
	Length of segment paralleling road - Inverted	ESRI	Follows existing disturbed corridor and limits fragmentation of property.
	Length of segment overbuilding existing distribution	Aerial Imagery	May require taller structures to accommodate distribution underbuild.
	Length of route	Developed from GIS Data	The shorter the length the less to potentially impact and less cost.

2.2.2 Placement of Initial Centerlines

Preliminary route candidate centerlines were placed based on review of aerial photography, topographic maps, and the collected opportunity and constraint data. The intent when placing these centerlines was to avoid residences, wetlands, forested areas, and, where practical, to follow existing developed corridors such as roads and existing transmission/distribution lines.

These preliminary route centerlines were assigned lettered nodes at segment intersections for descriptive purposes and were overlaid on aerial photograph-based and U.S. Geological Survey (USGS) topographic based maps populated with the siting constraint data.

The route segments are shown on Figures 2-4A and B and summarized in Tables 2-5A and B.

FIGURE 2-4A
Proposed Segments

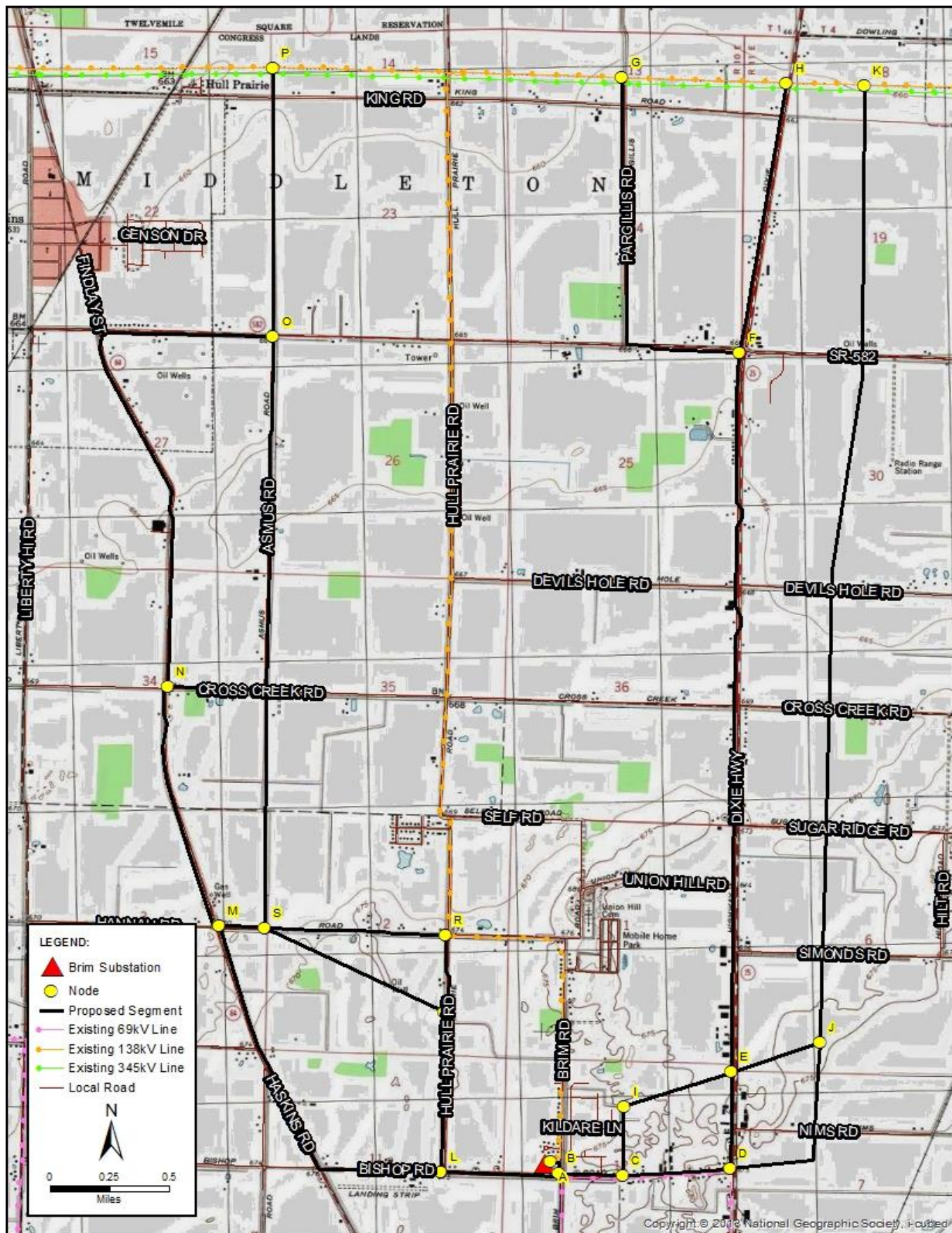


FIGURE 2-4B
Proposed Segments



Two main alternative scenarios were developed based on the location of the existing 138 kV transmission line. These include a set of Western Routes and a set of Eastern Routes. Given the location of the terminal position for the transmission line inside the substation, all proposed routes will share segment A-B, which is approximately 0.08-mile in length and parallels Brim Road just outside the Brim Substation.

The **Eastern Routes** trend east from Brim Substation along Bishop Road and all share segments A-B-C. There are essentially two main north/south corridors: C-I-E-J-K and C-D-E-F-H. The routes utilizing D-E-F-H parallel SR-25 while the routes utilizing I-E-J-K follow a cross-country alignment.

TABLE 2-5A

Main Corridors & Segment Alternatives Summary - East

SEGMENTS	LENGTH	COMMENTS
C-I-E-J-K (Eastern Cross-Country Corridor)	6.0 miles	This cross-country corridor extends north and north east from Bishop Road (node C) through agricultural fields to node I. Segment C-I would be within 1,000-feet of a higher concentration of residential development. The alignment would then trend northeast towards SR-25 (Dixie Highway) near node E. The alignment crosses SR-25 and continues to trend northeast to node J through agricultural fields before turning north to node K again traversing through agricultural fields before reaching the existing Lemoyne-Midway 138 kV Transmission Line at node K.
C-D-E-F-H (Eastern Road Corridor)	5.1 miles	This option parallels roads for most of its length. It parallels Bishop Road on the north side along segment C-D in close proximity to six (6) dwellings and across road frontage owned by the Bowling Green City School District. The corridor then trends generally north along SR-25 to node E and continues north to node F crossing over SR-25 as needed to avoid clearance issues concerning the proximity of buildings and dwellings before reaching node H. The majority of this corridor would need to accommodate the existing distribution lines.
F-G (Segment Alternative)	1.6 miles	This segment provides an alternative to segment F-H and would parallel SR-582 and Pargillis Road. This alignment would have several road crossings associated with it in order to avoid residential properties.

The **Western Routes** trend west from the Brim Substation along Bishop Road and all share segments A-B-L and terminal segment O-P. There are essentially two main north/south corridors: L-M-N-O and L-Q-S-T-O. The corridor utilizing L-M-N-O parallels roadways while the corridor utilizing L-Q-S-T-O is a combination of cross-country segments and segments paralleling existing roadways.

TABLE 2-5B

Main Corridors & Segment Alternatives Summary – West

SEGMENTS	LENGTH	COMMENTS
L-M-N-O (Western Road Corridor)	5.3 miles	This main corridor extends east along Bishop Road, then trends generally north along Haskins Road through nodes M and N before turning east and paralleling SR-582 to node O.

SEGMENTS	LENGTH	COMMENTS
L-Q-S-T-O (Western Mix Road & Cross-Country Corridor)	4.0 miles	This main corridor extends north from Bishop Road paralleling Hull Prairie Road to node Q. From there, the corridor trends northwest through an agricultural field to node S near Hannah Road. Then, the corridor trends north through an agricultural field paralleling a drainage feature, crosses Cross Creek Road near node T, and continues north paralleling Asmus Road to node O.
Q-R-S (Road Corridor Alternative)	1.7 miles	These segments provide an alternative to segment Q-S. Segments Q-R-S would parallel Hull Prairie Road and Hannah Road. This segment would share the intersection of Hannah Road and Hull Prairie Road (node R) with the existing 138 kV transmission line.
S-M (Road Corridor Alternative)	0.19 miles	This segment provides the option to utilize L-M paralleling roadways and then utilize segments S-T-O through agricultural fields and adjacent to roadways.
T-N (Road Corridor Alternative)	0.41 miles	This segment provides the option to utilize L-M-N paralleling roadways and then utilize segments T-O paralleling roadways.

3 Quantitative and Qualitative Analysis

3.1 Evaluation Process

Once the preliminary route options were identified, they were evaluated according to the opportunity and constraint data identified in Table 2-3. The process is outlined as follows:

1. **Raw Data Collection:** Data for each of the evaluation criteria were collected (e.g. acres of forest within the ROW, number of houses within 1,000 feet, length of wetland crossed etc).
2. **Data Tabulation:** The raw data for each criterion was tabulated in a spreadsheet, known as the raw data table. This included the raw data collected by segment and route.
3. **Data Normalization:** Raw data for each route was collected, tabulated, and then normalized. A normalization calculation is used to assign each criteria a suitability value based on a scale of 0 (most suitable) to 100 (least suitable). Each individual evaluation criteria, identified in Table 2-3 was "normalized" in this way, such that all criteria received a suitability score between 0 and 100.
 - The range of data for all criteria across the routes was resolved or normalized to a range of 0-100. This makes it simpler to compare and removes inadvertent weighting of the information. Normalizing the data into a score is vital so that all of the constraints are directly compared according to the same scale. It also allows the data categories to be weighted later as the siting team sees fit. The following formula was used to normalize the raw data:

$$\text{Normalized Score} = (i - \text{Min}(\text{Range})) / (\text{Max}(\text{Range}) - \text{Min}(\text{Range})) * 100$$

Where:

- "i" is the raw criteria value (e.g. acres of wetland crossed by route 1)
- "Min" is the minimum value present for that criteria across all the route candidates (e.g. the minimum observed value for acres of wetland crossed by any/all the route candidates)
- "Max" is the maximum value present in the set. The "set" refers to all the quantitative values for one individual criteria. (e.g. the maximum observed value for acres of wetland crossed by any/all the route candidates)
- "Range" is the difference between the min and max values.

Having the best score does not mean a route is "good" or "bad" according to any external standard, it just means it is "better" or "worse" than the other routes evaluated for the Project based on the criteria selected.

4. **Weighting:** The next step in this process is to apply weighting to the criteria, if desired. Weighting is a widely used method that recognizes under certain circumstances, one evaluation criterion is more relevant to determine an outcome than another. The criteria weighting values are determined by consensus of the siting team and is based on the specific Study Area setting and primary land uses, and professional judgement of the siting team members' experience routing project in a similar setting.

3.1.1 Discussion of Ecological Criteria

Ecological criteria considered within the Study Area included woodlots, stream crossings (National Hydrography Dataset source), threatened or endangered species, and wetlands (National Wetland Inventory "NWI").

Woodlots are sparse throughout, with the majority being located in the southcentral portion of the Study Area, and most were avoided when placing route segments.

NHD streams present in the Study Area primarily run parallel to roadways or agricultural fields. The NHD streams are all unnamed features within the Study Area and have no surrounding woody growth and appear to be channelized drainageways likely developed to support farming. A windshield survey of the Study Area

indicated that when NHD features are found adjacent to roadways and agricultural fields, and there is typically a small buffer zone between the NHD stream and land that is actively farmed.

NWI wetlands are distributed throughout the Study Area and consist of freshwater emergent or freshwater forested/shrub wetlands, freshwater ponds, and riverines. Those features identified as NWI riverines are analogous to the NHD streams identified. A majority of the freshwater ponds are associated with residential properties.

Comments received from the Ohio Department of Natural Resources (ODNR) indicate that a record for Brushy horseweed (*Conyza ramosissima*), state potentially threatened, was identified within the search parameters. Additionally, the project is within the range of the Indiana bat (*Myotis sodalis*), state and federally endangered, and the ODNR recommends cutting occur between October 1 and March 31 if suitable habitat occurs within the Study Area. The Study Area is within the known range of the following aquatic species: pondhorn (*Uniomorus tetralasmus*), state threatened mussel, western banded killifish (*Fundulus diaphanatus menona*) state endangered fish, and the spotted turtle (*Clemmys guttata*), state threatened species. Due to the location and lack of proposed in-stream work, the project is not likely to impact these species. The Study Area is also within the known range of the following birds: northern harrier (*Circus cyaneus*), state endangered, lark sparrow (*Chondestes grammacus*), state endangered, and the upland sandpiper (*Bartramia longicauda*), state endangered. These birds typically inhabit, hunt and nest in large marshes, grasslands, disturbed open areas, and pasture land. Online consultation with the USFWS indicated the Study Area is within the range of the Indiana bat (*Myotis sodalis*) and the Northern Long-eared Bat (*Myotis septentrionalis*). The USFWS comments did not indicate any known critical habitats in the Study Area.

No construction is anticipated within any of the wetlands and streams identified in the Study Area. Best management practices (BMPs), as identified on the Ohio Rainwater and Land Development Manual, will be utilized should access be needed across a wetland or stream. The sensitivity of tree clearing with respect to the Northern long-eared bat and Indiana bat is recognized. Tree clearing to support either of the route alternatives proposed would be minimal, and impacts can be avoided by adhering to the seasonal clearing restrictions.

Ecological constraints are shown on the aerial and topographic constraint maps (Figures 3-2 and 3-3).

3.1.2 Discussion of Cultural Criteria

Ohio Historic Inventory structures, National Register of Historic Places, archaeology sites, and cemeteries were all considered in the route selection study. While these metrics were present within the Study Area, none were tallied for any of the routes considered.

3.1.3 Discussion of Land Use

Land use criteria considered within the Study Area consisted of residences, properties crossed by centerline, institutional land uses, and other sensitive land uses (Figures 3-2 and 3-3).

Although the Study Area is primarily agricultural, there are residential pockets of development throughout the Study Area. In the northwestern portion of the Study Area, there is dense residential development north of Middleton Pike, south of King Road, and east of S. Findlay street. In the central portion of the Study Area, there is dense residential development that radiates outward from the intersection of Cross Creek Road and Hull Prairie Road. Just south of that area, there is a dense cluster of dwellings on Hannah Road extending east from Hull Prairie Road. The Maurer Mobile Home Court and surrounding residential development is clustered near the intersection of Brim Road and Hannah Road. Additional residential development is present north and east of the Brim Substation along Brim Road. Other residences are scattered along roadways primarily surrounded by agricultural land. A majority of the parcels within the Study Area include large tracks, consistent with agricultural land use.

Institutional land uses include schools, churches, and hospitals. No schools or hospitals are mapped in the Study Area. However, there is a property located on Bishop Road, in the southeastern portion of the Study Area, that is owned by the Bowling Green City School District. The parcel houses the Bowling Green City School Bus Garage. One church was identified; the Maumee Valley Unitarian Universalist Congregation located on SR-25. Other sensitive land uses are typically characterized as lands associated with parks, preserves, managed areas, conservation sites, golf courses and airports. One driving range was identified; Dixie Driving Range

located on SR-25. The Nietz Airfield, a private airfield, was identified along the southern boundary of the Study Area on Bishop Road.

Municipal owned land was also identified in the Study Area. The Middleton Township Board of Trustees owns a parcel located on SR-25 in the northeast portion of the Study Area. In addition, the City of Bowling Green owns four parcels in the Study Area. Two are located along Bishop Road southeast of the Brim Substation and appear to be actively farmed. The third is located south of the intersection of Bishop Road and SR-25 and houses a Bowling Green Electric substation. The fourth is located in the northwest portion of the Study Area on King Road and is traversed by the existing transmission corridor that dictates the northern boundary of the Study Area. This parcel appears to be actively farmed.

The Haskins Village Children's Park is composed of eight parcels owned by the Village of Haskins located in the northwest portion of the Study Area. This park is primarily surrounded by residential development within the Village of Haskins limits. In addition, there are four parcels associated with Lusher Park located on Findlay Street which are owned by the City of Haskins. The City of Haskins also owns two additional parcels located in more developed residential areas. There are also seven parcels that comprise the Union Hill Cemetery which is jointly owned by Plain, Center, and Middleton Townships. The Wood County Park District owns three parcels within the Study Area. Two parcels are located on Mercer Road and function as the corporate office. The third parcel is located on Cross Creek Road and is identified as the Fuller Preserve, a Wood County Owned Park. The Wood County Regional Water & Sewer District owns two developed parcels in the Study Area along Middleton Pike/SR-582.

3.1.4 Discussion of Technical Criteria

Technical features considered within the Study Area consist of roads, railroads, turn angles, paralleling existing infrastructure (transmission corridor, gas line, road, railroad, etc.), overbuilding existing distribution, and the overall route length. The majority of the roads within the Study Area form a grid pattern running in a north-south or east-west direction. Major roads in the Study Area include Middleton Pike (SR-582), N. Dixie Highway (SR-25), and Haskins Road (SR-64). Local roads include King Road, Pargillis Road, Asmus Road, Hull Prairie Road, Devils Hole Road, Cross Creek Road, Hannah Road, Brim Road, and Bishop Road. The northwestern and southeastern boundary of the Study Area parallels railways owned by CSX Transportation, Inc. Distribution lines are present throughout the Study Area paralleling roadways. Existing transmission lines in the Study Area include ATSI-owned Dowling-Midway 138 kV, Lemoyne-Midway (Brim) 138 kV, Lemoyne-Midway 345 kV, and Dowling-Fulton 345 kV Transmission Lines. ATSI also owns the final three spans of the Bowling Green No. 5 Bishop-Brim 69 kV Transmission Line into the Brim Substation. In addition, Bowling Green Electric has several 69 kV lines in the southeastern portion of the Study Area.

The presence of the foreign (i.e. non-ATSI owned) 69 kV transmission lines near Brim Substation and the existing Lemoyne-Midway 138 kV Transmission Line Tap to Brim Substation present a technical concern. The transmission lines in this area include the Bowling Green No. 5 Bishop-Brim 69 kV and Bowling Green No. 2 Poe-Bowling Green No. 5 Bishop 69 kV Transmission Line. The Bowling Green No. 5 Bishop-Brim 69 kV Transmission Line extends from the Brim Substation south to Bishop Road, extends east along Bishop Road and across Brim Road, extends south across Bishop Road, and then trends east on the southern side of Bishop Road towards the Bowling Green Electric Substation located on the corner of Bishop Road and SR-25. The Bowling Green No. 2 Poe-Bowling Green No. 5 Bishop 69 kV Transmission Line extends north out of the Bowling Green Electric Substation and trends west on the southern side of Bishop Road on double circuit structures towards Brim Road where the alignment then trends south out of the Study Area.

The existing 138 kV transmission line tap to Brim Substation extends south from the Lemoyne-Midway 138 kV Transmission Line along Hull Prairie Road, trends east for a short distance on Hannah Road, turns south east towards Brim Road, and extends south along Brim Road to the Brim Substation. The need for the proposed undertaking requires a diverse pathway for the new 138 kV transmission line. The existing 138 kV transmission tap presents a physical barrier that must be avoided in order to create a new and separate pathway for the second 138 kV source. In the Study Area there are four major roads that traverse north-south: SR-64/Haskins Road, Asmus Road, Hull Prairie Road, and SR-25/N. Dixie Highway. Portions of Hull Prairie Road and Brim Road are almost exclusively used by the existing 138 kV transmission line tap to Brim Substation; therefore, these road segments cannot be utilized for the new diverse alignment. The inability to utilize Brim Road to approach the Brim Substation from the north creates a bottleneck effect where all potential alignments stemming from the eastern side of the existing Lemoyne-Midway 138 kV Transmission Line Tap location must

utilize Bishop Road to reach the Brim Substation. Furthermore, the southern side of Bishop Road is occupied by the Bowling Green Electric owned 69 kV transmission lines; and existing distribution lines are present on the northern side of the road. Therefore, an alignment along the northern side of Bishop Road would need to accommodate for distribution underbuild.

The technical constraints are shown on the aerial and topographic constraint maps (Figures 3-2 and 3-3).

3.2 Ranking and Selection of Routes

The timeline below identifies the steps used to determine a Preferred and Alternate Route for the Project. These events are described in detail in Sections 3.2.1 through 3.2.5.

- Initial Segments Identified – October 2017
- Initial Route Evaluation – November 2017
- Decision on Route Alternatives for Initial Public Information Meeting – November 2017
- Public Information Meeting – September 2018
- Route Adjustments – September to October 2018
- Decision on Preferred and Alternate Route for OPSB Application – November 2018
- Submission of OPSB Application – December 2018

3.2.1 Route Evaluation

Sixteen route alternatives were identified and compared to one another through numerical scoring (Table 3-3). Based on the data collected and route scores, the routes were ranked first by individual category (i.e. land use, ecological, technical, and cultural) then overall (Figure 3-4). Table 3-3 shows the final scores for the route alternatives ranged from 4.23 to 80.44 out of a possible 100. Routes shaded in purple in Table 3-3 represent varieties of the western route, while routes unshaded represent varieties of the eastern route. Since very few measurable criteria were identified within the Study Area, the numerical quantitative comparison had to be supplemented with more qualitative considerations to ensure the robust consideration of route alternatives. Additionally, the siting team focused on route alternatives that minimized residential impacts. The scoring data is useful for identifying groups of routes that are significantly less or more favorable than others and guide the subsequent qualitative evaluation.

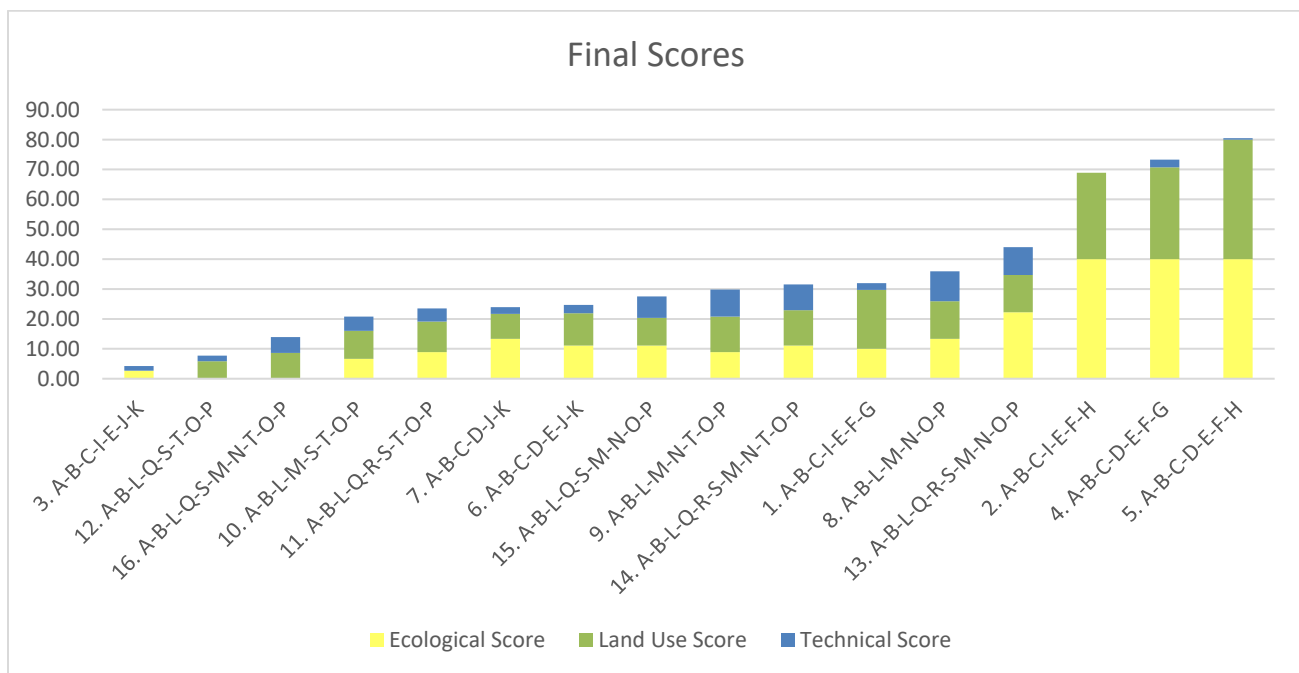
TABLE 3-3
Route Evaluation – Final Scores

Route	Ecological Score	Ecological Rank	Land Use Score	Land Use Rank	Technical Score	Technical Rank	Final Score	Final Rank
3. A-B-C-I-E-J-K	2.67	3	0.00	1	1.56	3	4.23	1
12. A-B-L-Q-S-T-O-P	0.00	1	5.83	2	1.91	4	7.74	2
16. A-B-L-Q-S-M-N-T-O-P	0.00	1	8.64	4	5.27	11	13.91	3
10. A-B-L-M-S-T-O-P	6.67	4	9.34	6	4.76	10	20.77	4
11. A-B-L-Q-R-S-T-O-P	8.89	5	10.21	7	4.41	9	23.51	5
7. A-B-C-D-J-K	13.33	11	8.36	3	2.26	6	23.95	6
6. A-B-C-D-E-J-K	11.11	8	10.81	8	2.80	8	24.72	7
15. A-B-L-Q-S-M-N-O-P	11.11	8	9.24	5	7.20	12	27.55	8
9. A-B-L-M-N-T-O-P	8.89	5	11.88	10	9.04	14	29.81	9
14. A-B-L-Q-R-S-M-N-T-O-P	11.11	8	11.82	9	8.63	13	31.55	10
1. A-B-C-I-E-F-G	10.00	7	19.75	13	2.22	5	31.96	11
8. A-B-L-M-N-O-P	13.33	11	12.60	12	10.00	16	35.93	12
13. A-B-L-Q-R-S-M-N-O-P	22.22	13	12.50	11	9.31	15	44.04	13
2. A-B-C-I-E-F-H	40.00	14	28.90	14	0.00	1	68.90	14

4. A-B-C-D-E-F-G	40.00	14	30.73	15	2.57	7	73.30	15
5. A-B-C-D-E-F-H	40.00	14	40.00	16	0.44	2	80.44	16

FIGURE 3-4

Route Evaluation – Final Scores



The siting team met to discuss the route selection results and to decide on route alternatives to present at the public information meeting. The team observed that the routes fell into several groups based on overall suitability. A discussion of these groups is presented below. Segment A-B is common amongst all the routes and represents the termination of the alignment into Brim Substation.

3.2.2 Eastern Routes

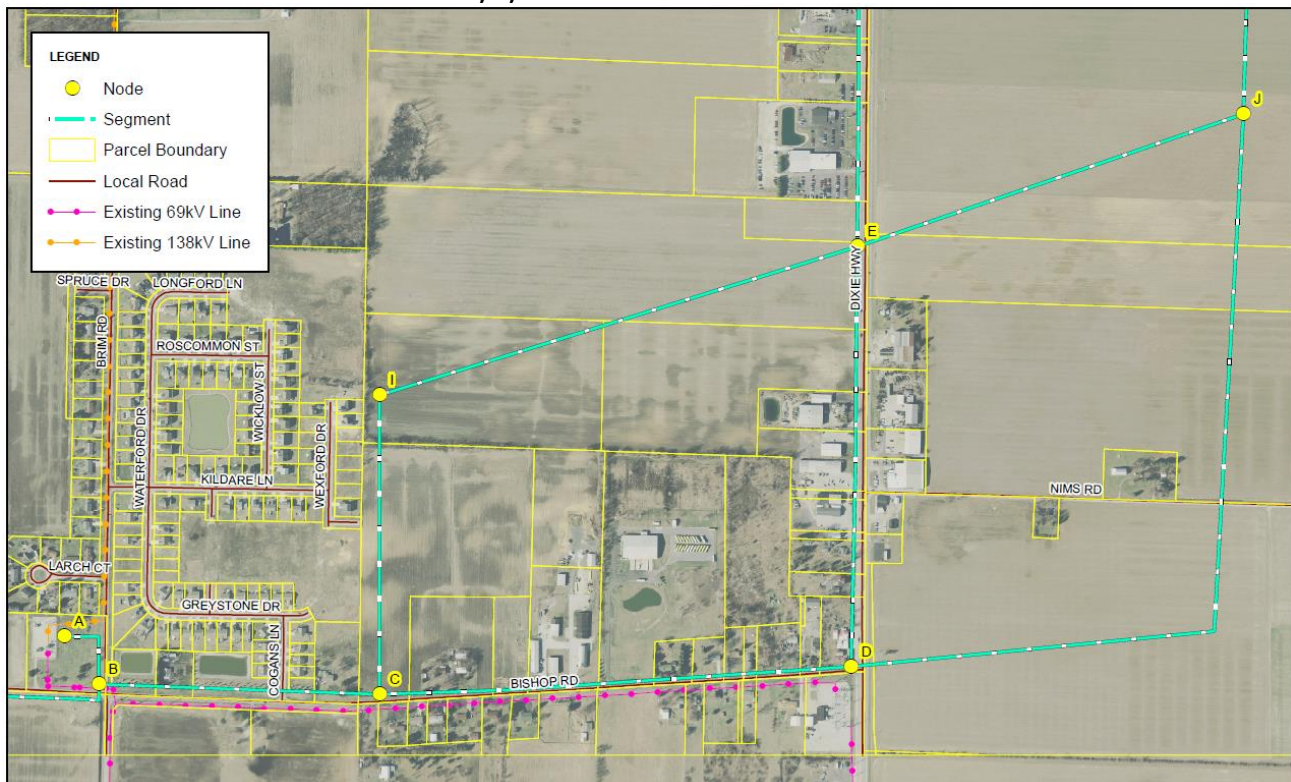
All seven (7) routes heading east from Brim Substation use segments A-B-C, with segment A-B common to all proposed routes. Segment B-C parallels Bishop Road, coming close to two residences on the northern side, and in view of the dense residential community further to the north. At the closest point, the centerline for segment B-C is approximately 33-feet from the nearest dwelling. In addition, segment B-C would involve locating the structures several feet off the parcel boundary and have aerial ROW over the public ROW for approximately 870 feet along Bishop Road.

The Eastern Routes that generally score the best are the options that follow cross-country alignments after Node C. I-E-J-K is a series of segments that overall scores most favorable for the eastern routes. Segment combinations D-E-F-H, parallels SR 25 in close proximity to dwellings which requires several road crossings to achieve necessary clearances. Routes utilizing the D-E-F-H segment combination are adversely affect by these reasons previously stated, and therefore their scores are negatively impacted. Segment F-G is an alternative terminal segment for F-H. Segment F-G would be unfavorable for the same reasons as D-E-F-H. Therefore, based on the combined attribute and constraint data, the most favorable routes are those that avoid the roads and head cross country. Table 3-5 is a selection of the land use data collected for Segments C through J, and Figure 3-6 depicts the subject segments. The table shows those options along Bishop Road have greater immediate residential impacts than the cross-country segments. The four eastern routes using segment E-F-H or F-G therefore were set aside from detailed analysis, leaving Routes 3, 6, and 7.

TABLE 3-5
SEGMENT COMPARISON FOR ROUTES 3, 7, & 6

Route	Segment Combination	Segment Length (in miles)	Segment Approximate distance crossing residential properties (in feet)	Number of residences within 100 feet of ROW per Segment	Number of residences within 1,000 feet of ROW per Segment	Agricultural land crossed (in miles) per Segment
3	C-I-E-J	1.17	0	0	83	1.2
7	C-D-J	1.31	1,050	8	42	0.9
6	C-D-E-J	1.25	1,220	9	41	0.5

FIGURE 3-6
SEGMENT COMPARISON FOR ROUTES 3, 7, & 6



Of these three routes, Route 3 scored more favorably than Routes 7 or 6 in the land use category due to the C-I-E-J segments traversing agricultural land versus segments C-D-J or C-D-E-J which parallel Bishop Road and/or SR-25 which locates the centerline in close proximity to residences. Ecological scores for these three routes were very similar. Tree clearing would be less than an acre for each route. Route 3 would require the shortest length of distribution underbuild (approximately 0.32 miles), while route 7 would require approximately 0.78 miles and route 6 approximately 1.2 miles. The length of distribution underbuild typically increases as more of the centerline is located parallel to existing roadways.

Based on the data above, Route 3 was considered to be the most favorable of the Eastern Routes out of Brim Substation and was retained for consideration as either the preferred or the Alternate Route.

3.2.3 Western Routes

Nine (9) Western Routes were identified and all use Segments A-B-L, with segment A-B common to all proposed routes. These routes would all utilize segment A-B, and then parallel Bishop Road on the southern side as segment B-L trends westward. The alignment along Bishop Road would be located on the edge of an

agricultural field and would accommodate distribution underbuild. At the closest point, the centerline for segment B-L is located approximately 85-feet from the nearest dwelling across Bishop Road.

The Western Routes that generally score the best are the options that primarily follow cross-country alignments after Node L. Q-S-T-O-P is a series of segments that overall scores most favorable for the Western Routes. This group of segments parallels roadways on the edge of agricultural fields and follows cross-county alignments.

Routes containing segment combination Q-R-S (Routes 11, 13 and 14) were eliminated from further review since the alignment near Node R would share the same intersection as the existing Lemoyne-Midway 138 kV Transmission Line Tap to Brim Substation. Sharing this intersection was deemed too close to the existing Lemoyne-Midway 138 kV Transmission Line Tap to Brim Substation and would hinder the overall goal of creating a new and separate pathway.

The remaining six (6) routes (routes 8, 9, 10, 12, 15 and 16) were retained for detailed analysis. Of these six (6) routes, Route 12 and 16 scored more favorably overall. Routes 8, 9, 10, and 15 had relatively higher ecological scores due to tree clearing, higher land use scores due to proximity to residences and the number of properties crossed, and generally higher technical scores due to the number of road crossings, turn angles, length of distribution underbuild needed, and overall route length. For these reasons, Routes 8, 9, 10, and 15 were removed from consideration.

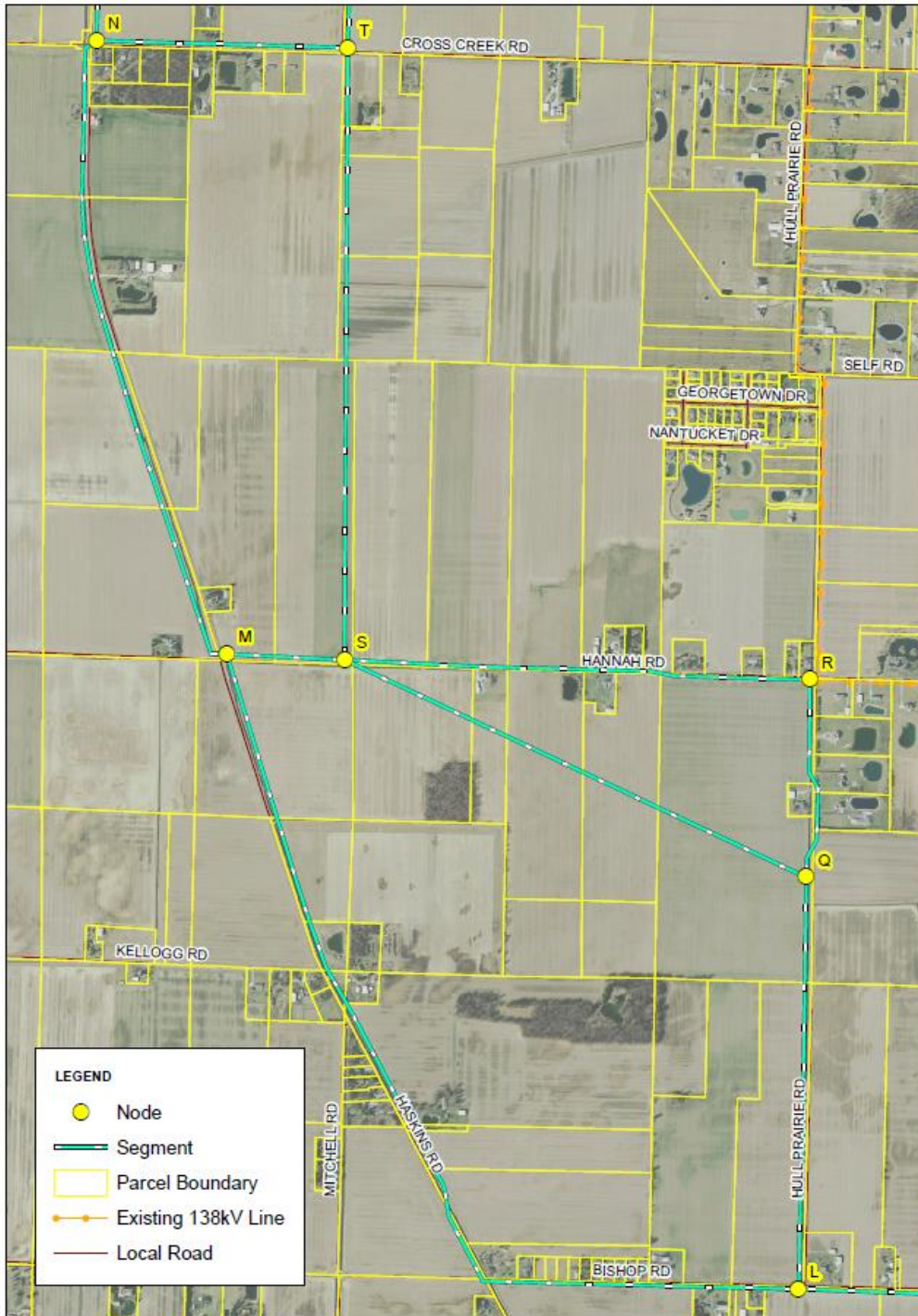
The remaining two (2) routes (routes 12 and 16) scored the most favorable overall for the series of Western Routes. Both routes scored the same in terms of ecological impacts. Route 12 crosses less properties than Route 16, and therefore scored more favorable than Route 16 in the land use category. Route 12 also scored more favorably than Route 16 in four of the five technical categories. Table 3-7 is a selection of the land use data collected for Segments L-Q-S-T and L-Q-S-M-N-T, and Figure 3-8 depicts the subject segments.

TABLE 3-7

SEGMENT COMPARISON FOR ROUTES 12, 16, & 10

Route	Segment Combination	Segment Length (in miles)	Approximate distance crossing residential properties (in feet) per Segment	Number of residences within 100 feet of ROW per Segment	Number of residences within 1,000 feet of ROW per Segment	Agricultural land crossed (in miles) per Segment
12	L-Q-S-T	2.52	0	0	16	2.5
16	L-Q-S-M-N-T	3.20	340	7	27	2.9

FIGURE 3-8
SEGMENT COMPARISON FOR ROUTES 12 & 10



Based on the data above, Route 12 was considered to be the most favorable of the Western Routes out of Brim Substation and was retained for consideration as either the Preferred or the Alternate Route.

Route 3 (A-B-C-I-E-J-K) and route 12 (A-B-L-Q-S-T-O-P) were the most favorable routes overall representing the two corridors approaching the Brim Substation from the west or east. Between Routes 3 and 12, the only shared segment is A-B which extends east from Brim Substation, and angles south towards the intersection of Brim Road and Bishop Road. Segment A-B is approximately 435 feet in length. This represents approximately 1.4% of commonality between Routes 3 and 12 which is consistent with Admin. Code Rule 4906-3-05, which limits alternative routes to less than twenty per cent in common. The percentage in common shall be calculated based on the shorter of the two routes.” Table 3-9 shows an overview comparison between Routes 3 and 12.

TABLE 3-9

COMPARISON OF ROUTES 3 & 12

Route	Segment Combination	Woodlots (acres)	Length (in miles)	Approximate distance crossing residential properties (in feet)	Number of residences within 100 feet of ROW	Number of residences within 1,000 feet of ROW	Length of Distribution Overbuild (in miles)	Agricultural land crossed (in miles)
3	A-B-C-I-E-J-K	0.16	5.58	415	4	122	0.32	5.13
12	A-B-L-Q-S-T-O-P	0.10	5.74	0	6	89	1.10	5.49

The amount of tree clearing required would be minimal for either route. Crossing residential use land is localized near Bishop Road for route 3. Route 12 doesn't cross any residential use land; however, the edge of the 60-foot ROW is within 100-feet of several residences. Route 3 crosses two residential use properties and is within 100-feet of two additional properties where segment B-C parallels Bishop Road near the dense residential development. The dense residential development near the Brim Substation also contributes to the number of dwellings within 1,000 feet of the proposed routes, with Route 3 having approximately 27% more residences within 1,000 feet due to the northern trend of segment C-I on the eastern side of the residential community.

Table 3-9 also notes agricultural land crossed. Agricultural lands crossed is slightly higher for route 12 than route 3; however, considerations can be made to ensure current farming practices are not altered by the addition of the transmission line. Plow patterns and large irrigation systems are agricultural related qualitative factors that can't be measured through numerical scoring and ranking. There were no large irrigation systems noted based on the windshield survey and review of aerial imagery. The proposed routes attempted to follow existing plow patterns where practical. Route 3 follows existing plow patterns based on aerial imagery with exception of segments I-E-J and portions of J-K where adjustments were needed to avoid residences. Route 12 also primarily follows existing plow patterns with the exception of a portion of segment B-L where the alignment runs parallel to Bishop Road; however, the presence of the alignment would not preclude the land from being farmed. In addition, there is already a distribution line that parallels the edge of the field. Segment Q-S traverses diagonally through agricultural land. This segment avoids impacts to residential properties that would be impacted if the alignment were located along Hull Prairie Road and Hannah Road. Segment S-T parallels the boundary between fields that are plowed in different directions and parallels a drainage ditch which acts as physical barriers between neighboring fields. Segment T-O parallels the existing roadway and neighboring agricultural land and has several road crossings to avoid residential properties. Finally, segment O-P primarily parallels a drainage ditch and traverses through a portion of an agricultural field north of Kind Road before terminating at the existing Lemoyne-Midway 138 kV Transmission Line.

Another variable is the need for adjacent priority tree rights. In addition to rights needed to occupy and maintain the proposed 60-foot wide ROW, adjacent "Priority Tree" rights will be needed to allow for the select removal of trees that are dead, diseased, dying, structurally deficient, leaning in, or otherwise growing in such a manner that poses a risk to the facility. Priority Tree rights may be required extending as much as 150-feet from the centerline. The approximate number of parcels and property owners encompassed in each category is noted below in Table 3-10.

TABLE 3-10

PROPERTY RIGHTS & ADJACENT TREE RIGHTS

Route	Number Parcels Crossed for 60-foot ROW	Additional Parcels needed for 150' adjacent tree rights	Total Number Parcels Involved	Number of Properties Owners
3	36	26	62	47
12	44	19	63	35

As shown in table 3-10, route 3 crosses few parcels with respect to the 60-foot ROW; however, its alignment is nearer to adjacent parcels and thus would require adjacent tree rights from more parcels compared to route 12. The total number of parcels involved, including ROW and adjacent tree rights, is similar between the two routes. However, route 12 would affect fewer property owners due to the fact that multiple parcels are owned by single individuals or entities.

Based on the information presented in the Study, FirstEnergy chose to proceed with Route 12 and Route 3 for the initial public information meeting. Route 12 was presented as Alternative 1, the western alternative, and Route 3 was presented as Alternative 2, the eastern alternative.

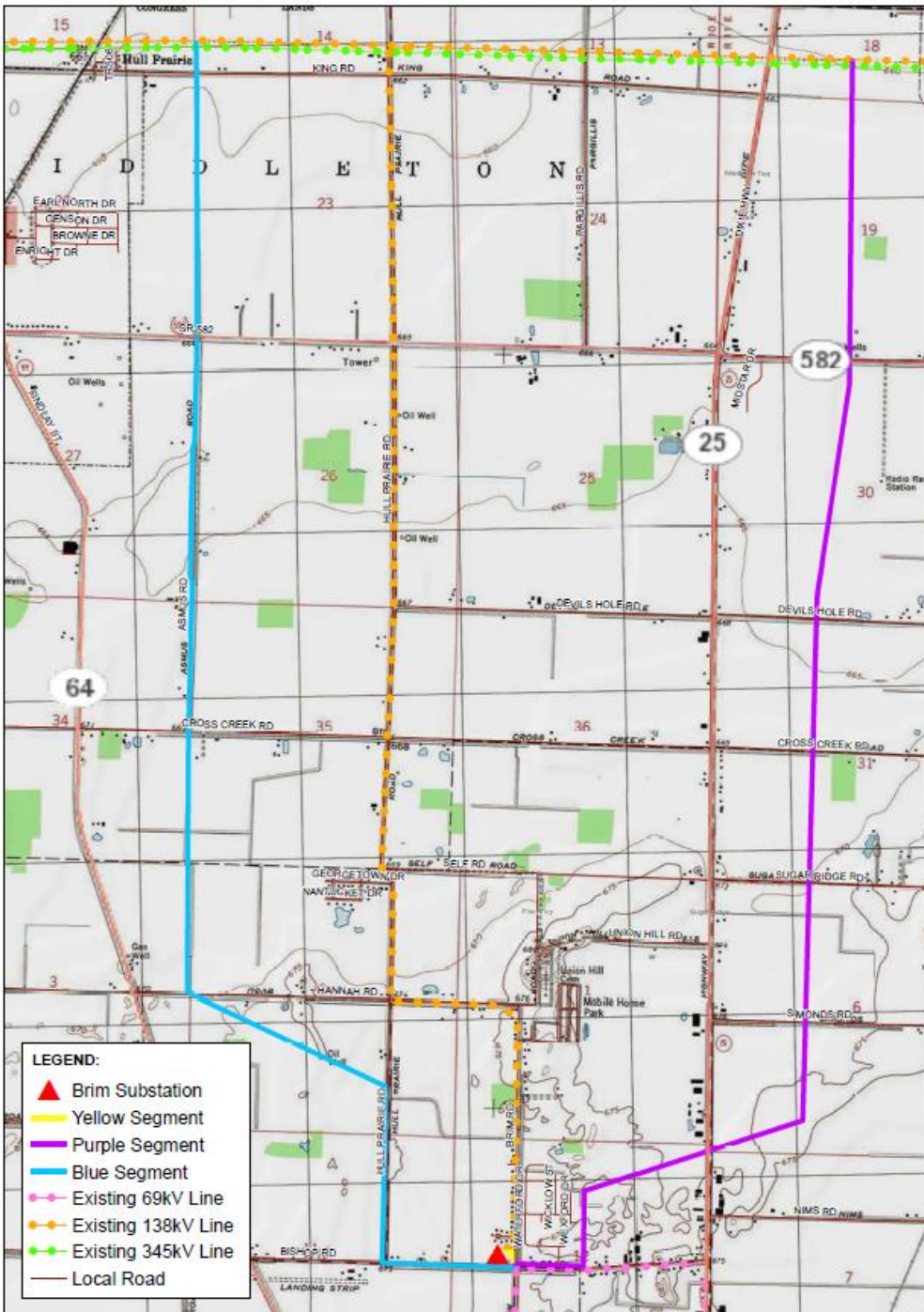
4 Public Involvement

Routes 12 and 3, Alternatives 1 and 2 respectively, were ultimately selected for presentation to the public because they represent two unique and diverse pathways which have the least overall impact to residences. This is reflected in the land use category where these routes scored 1st and 2nd respectively. These routes were distinguished by color for the public meeting. The two routes are shown in Figure 4-1.

- Route 12 – (Alternative 1; Western Route Alternative) – Combination of yellow and blue segments
- Route 3 (Alternative 2; Eastern Route Alternative) – Combination of yellow and purple segments

FIGURE 4-1

Public Information Meeting Routes



4.1.1 Public Information Meeting

The public information meeting was held on September 26, 2018 at the Middleton Township Building in Bowling Green, Ohio. Detailed maps of the proposed route alternatives were present throughout the meeting. Property boundaries were also indicated on the mapping with the unique parcel ID numbers referenced to an ownership spreadsheet. Forty (40) people attended the public information meeting.

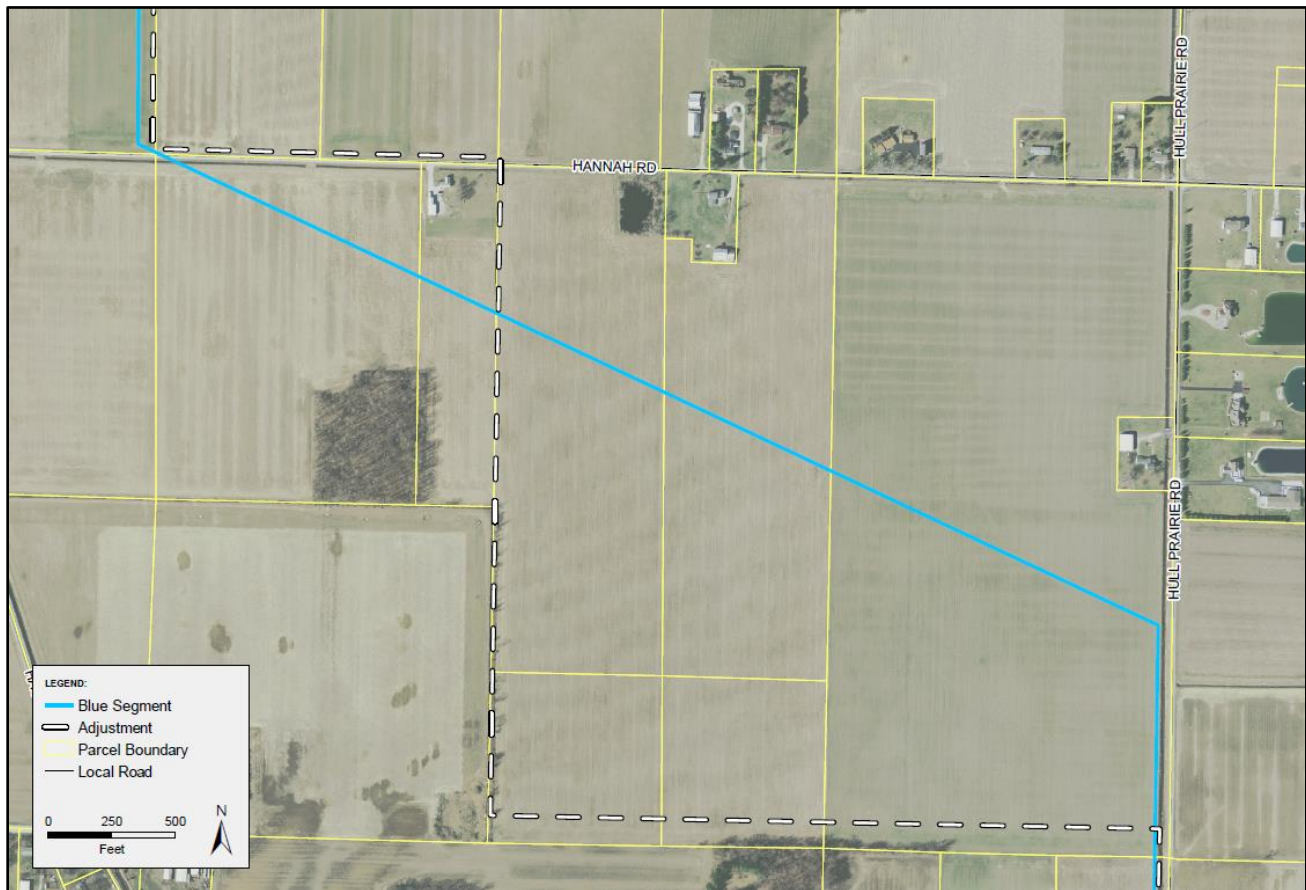
ATSI encouraged those attendees with specific objections to suggest alternatives. Fifteen comment cards were received during the meeting. Three comment cards specified a preference for Alternative 1. Two comment cards specified a preference for Alternative 2. Four comment cards provided alternatives to the proposed alignments through agricultural properties. Two comment cards noted concerns regarding current farming practices. One comment card noted a dislike of the visual aspect of the proposed transmission line. One comment card proposed that the alignment for Alternative 2 along Bishop Road be constructed underground. Two comment cards noted concerns regarding radio interference. Finally, one comment card requested further information on when a decision would be made regarding the transmission line.

4.1.2 Route Adjustments

Following the public information meeting, five route adjustments were made to accommodate landowner comments with three adjustments to Alternative 1, and two adjustments to Alternative 2.

FIGURE 4-2

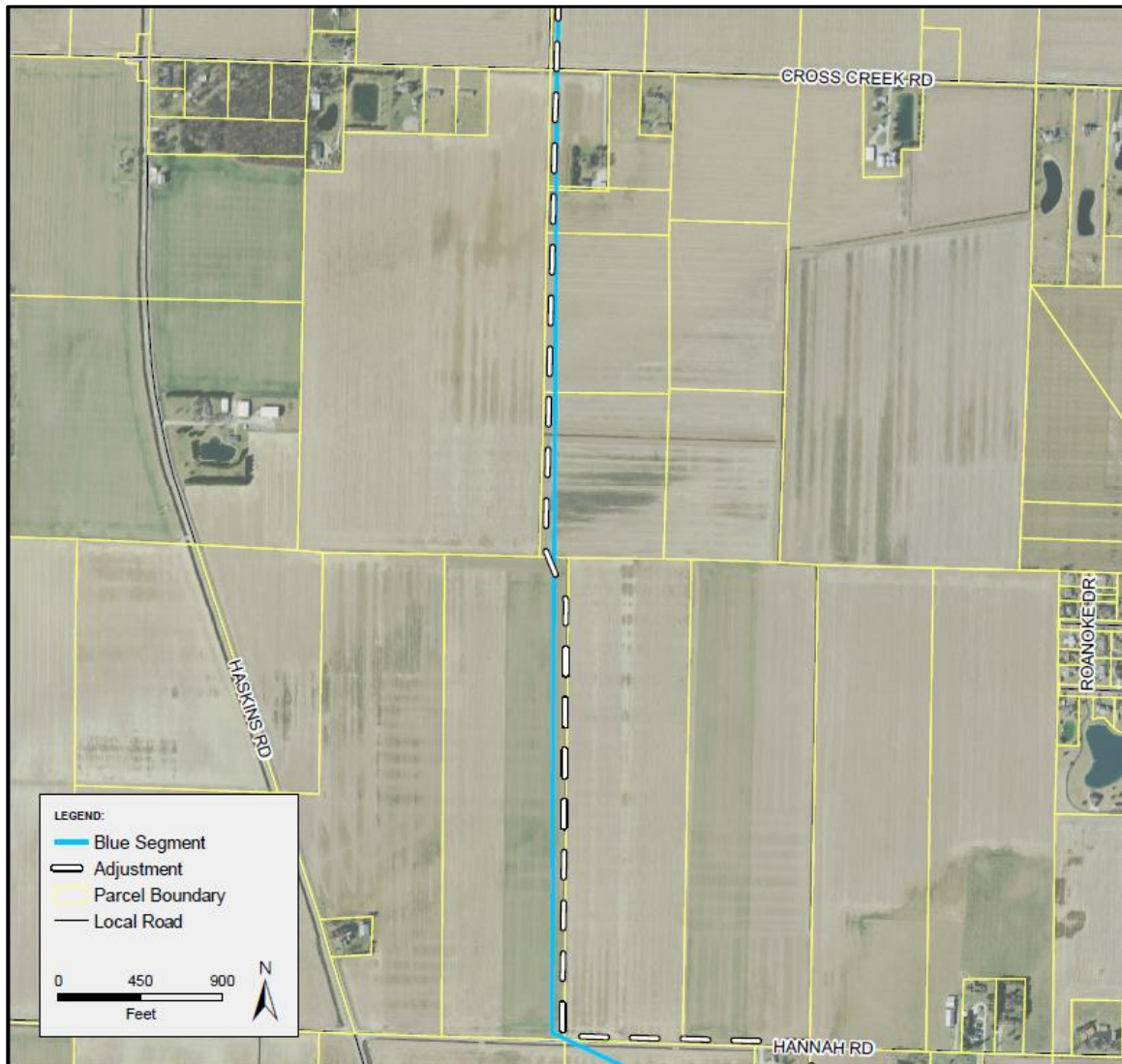
Adjustment 1: Blue Segment



Adjustment 1 was made to the blue segment near Hull Prairie and Hanna Road. Rather than traversing through the agricultural fields, the property owners requested that the centerline follow the parcel boundaries or field edges. The adjustment makes the proposed overall route slightly longer and adds two angle points; however, it accommodates the property owner's requests and reduces any potential effects on current farming practices.

FIGURE 4-3

Adjustment 2: Blue Segment



Adjustment 2 was made to the blue segment where the centerline extends north of Hannah Road towards Cross Creek Road. The centerline was adjusted to parallel field ditches to accommodate farming practices at the request of the property owners. The adjustment resulted in the addition of two angle points. The overall length of the route was not substantially altered.

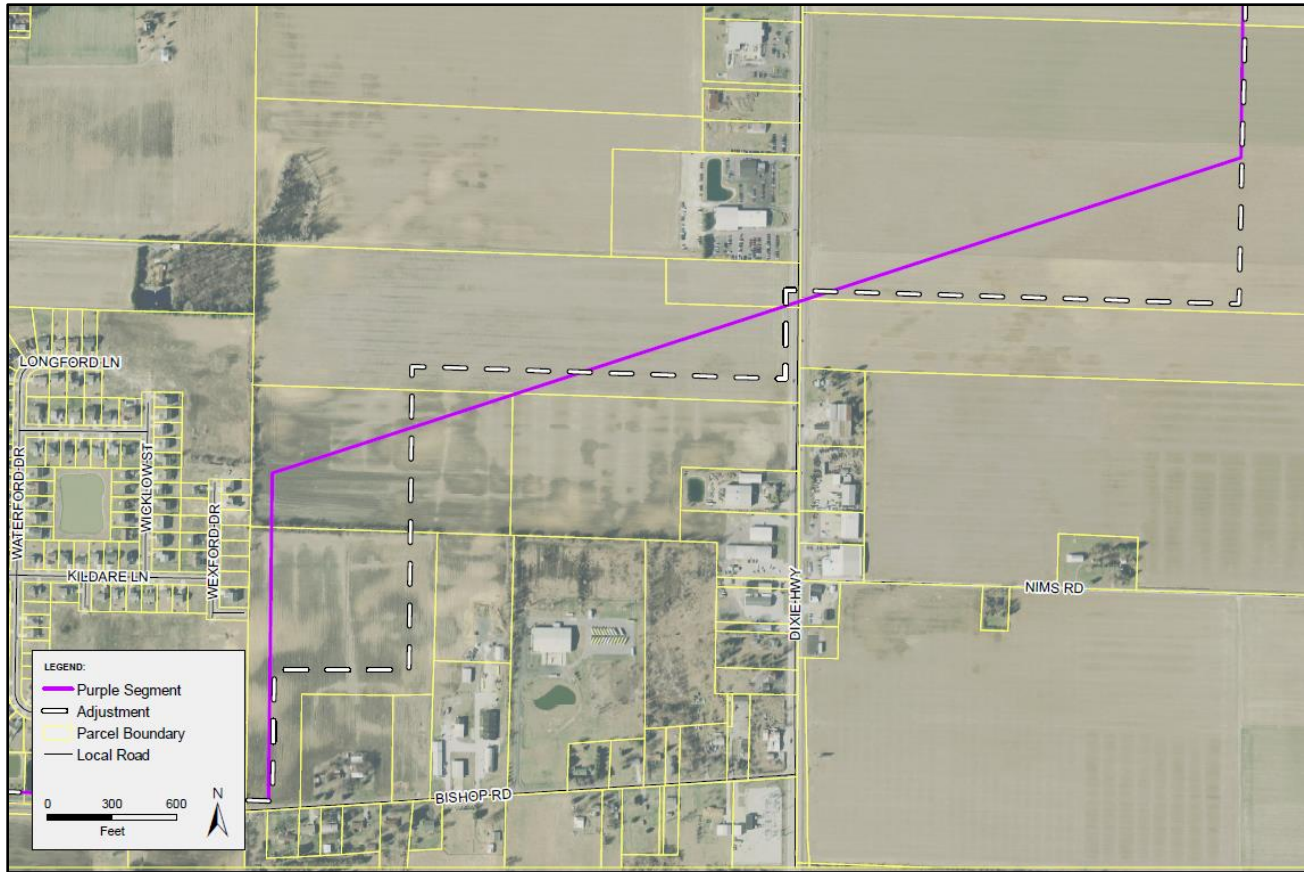
FIGURE 4-4

Adjustment 3: Blue Segment



Adjustment 3 was made to blue segment where the centerline extends north from Middleton Pike (SR-582) towards King Road and to the existing transmission corridor at the northern extent of the Study Area. The centerline was adjusted to parallel field drainage ditches to accommodate farming practices as the request of the property owners. The overall length of the route was not substantially altered.

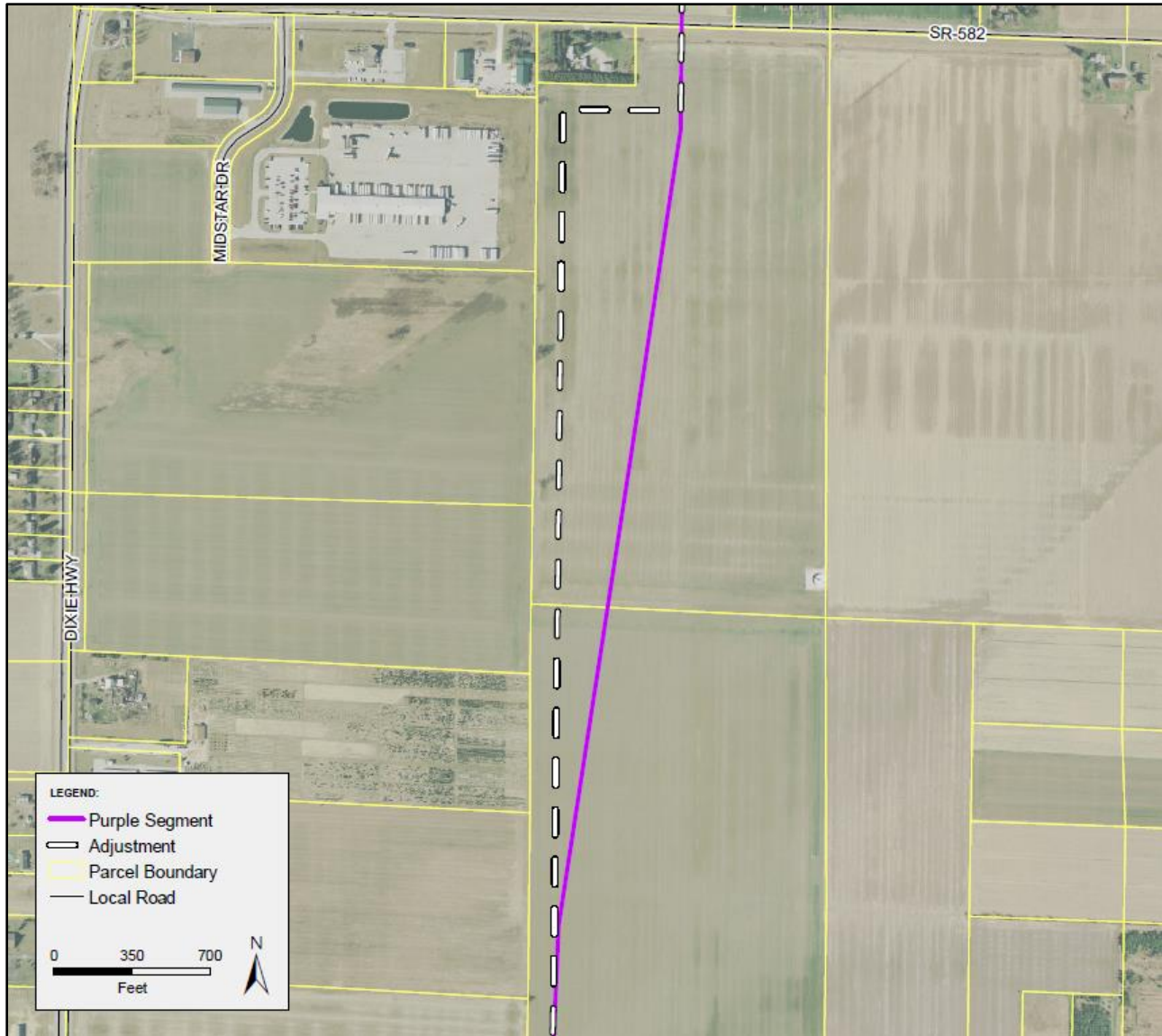
FIGURE 4-5

Adjustment 4: Purple Segment

Adjustment 4 was made to the purple segment between where the centerline extends north from Bishop Road and where it crosses S.R. 25 (N. Dixie Highway) and extends eastward. To accommodate property owner requests, the centerline was shifted further away from the residential development located at the northeast corner of Brim Road and Bishop Road. Shifting the centerline east added two angles as the alignment extends east and then north. An additional angle point was added as the alignment trends east towards S.R. 25 in order to avoid traversing diagonally through the agricultural field. The centerline would then parallel S.R. 25 before crossing over and extending east through the agricultural field and then extending north. The adjustment increases the overall length of the route and adds four additional angle points; however, it accommodates the property owner requests.

FIGURE 4-6

Adjustment 5: Purple Segment



Adjustment 5 was made to the purple segment south of Middleton Pike (SR-582). To accommodate property owner requests, the centerline was shifted to parallel the parcel boundary avoid traversing diagonally through the agricultural field. The adjustment results in replacing two light angle structures with two corner deadend structures and slightly increases the overall length.

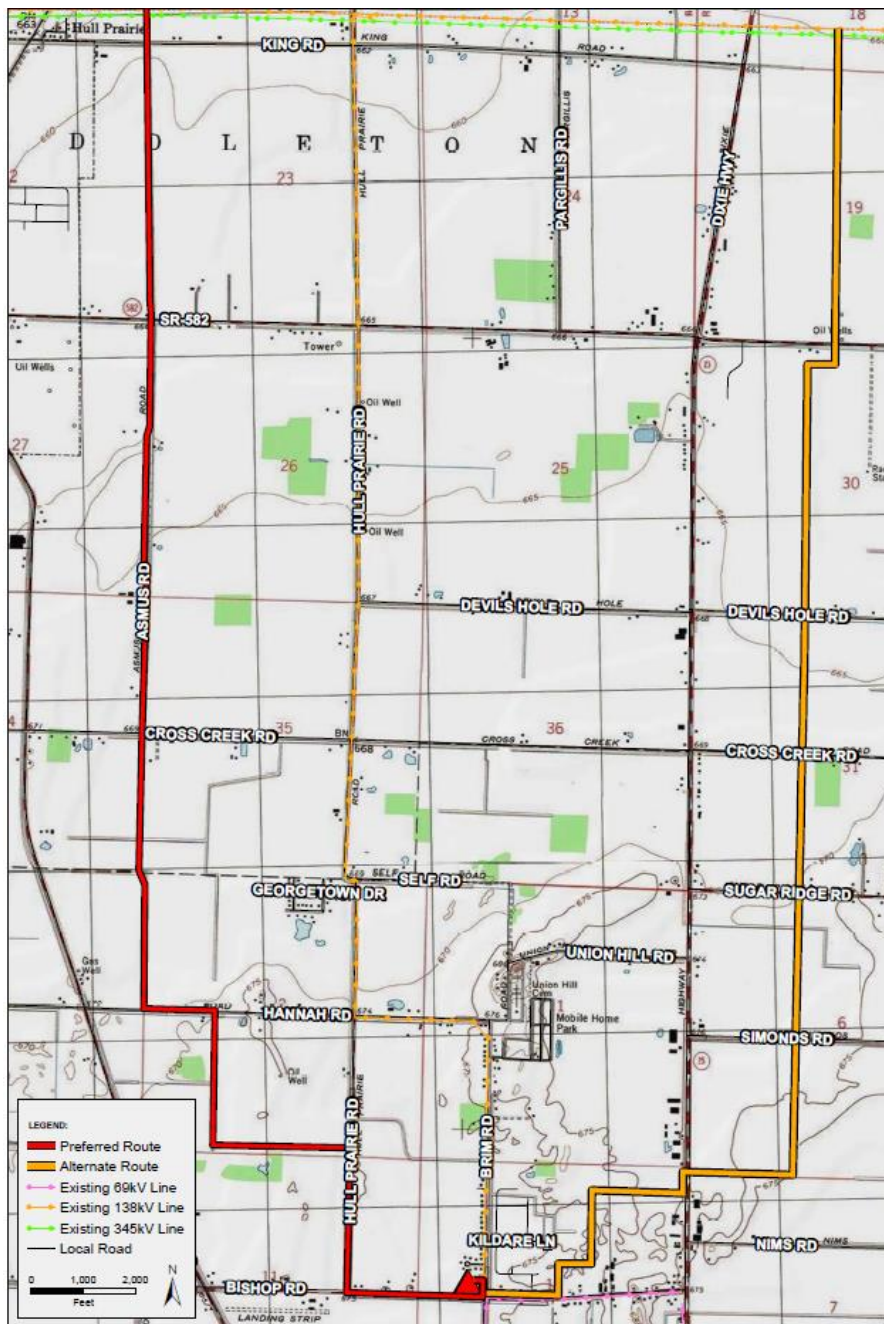
4.1.3 Selection of the Preferred and Alternate Route

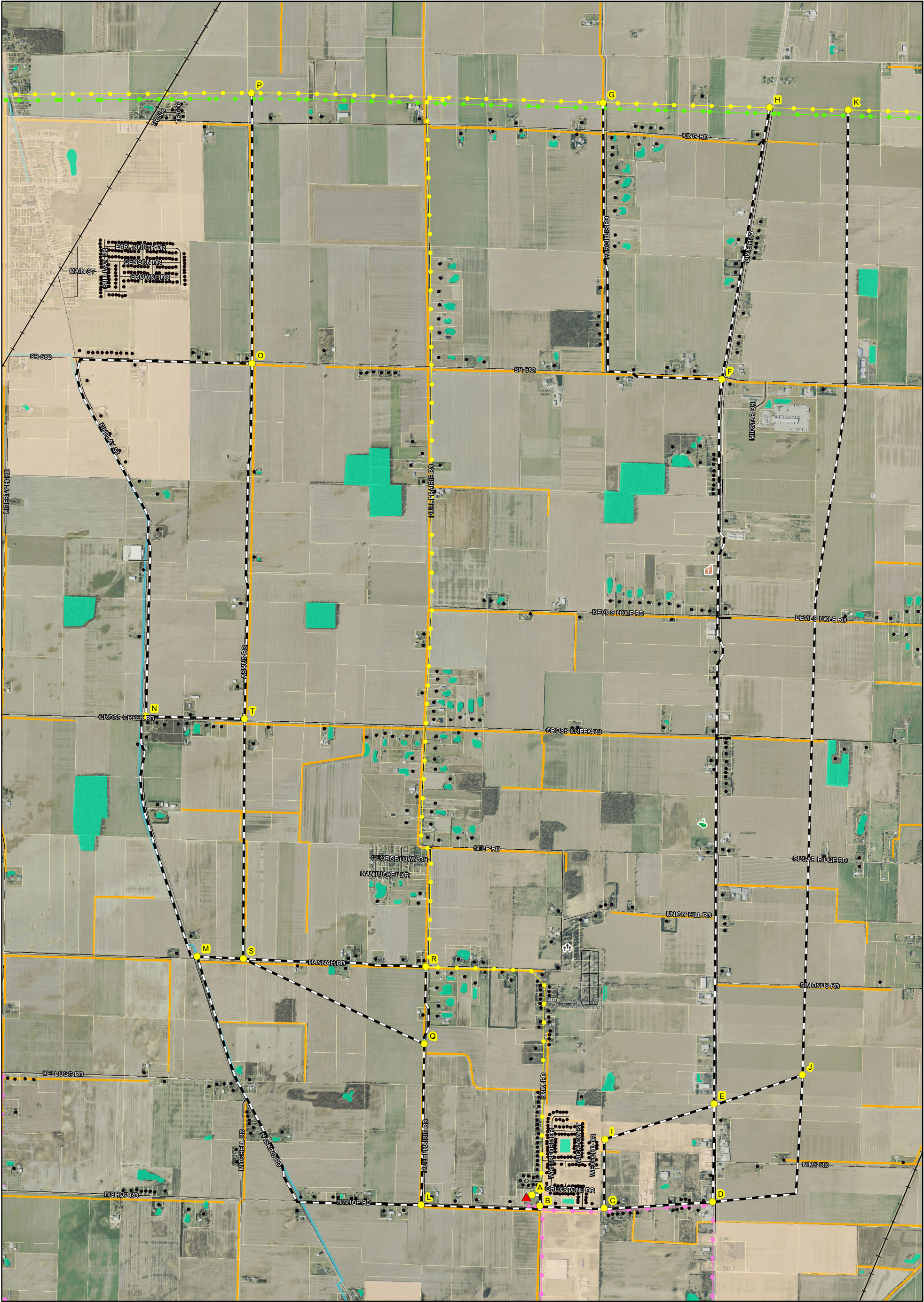
Following the September 2018 public information meeting, the siting team met in October 2018 to discuss adjustments and decide on a Preferred and Alternate Route. Based on landowner comments and discussion with the siting team, ATSI chose to move forward with the yellow and blue segments, designated as the Preferred Route, and the yellow and purple segments, designated as the Alternate Route, taking into account the route revisions discussed above.

5 Conclusion

The siting team conducted a detailed route selection study in an area of Wood County between the Lemoyne-Midway 138 kV Transmission Line and the Brim Substation. Detailed constraint and attribute data were used, along with high-resolution aerial photographs, to place proposed route segments. A total of 16 route alternatives were identified and numerically scored and ranked relative to each other. A detailed quantitative and qualitative analysis was then completed by the siting team, which resulted in the presentation of two segment options for public comment at the initial public information meeting. Following the meeting, the siting team made route adjustments based on landowner comments, and ATSI chose to retain Route 12 as the Preferred Route and Route 3 as the Alternate Route. The final Preferred and Alternate Routes are illustrated in Figure 5-1.

FIGURE 5-1
Preferred and Alternate Routes





LEGEND:

● Node	— Segment	— Perennial Stream (NHD)
▲ Brim Substation	— Railroad	— Canal Ditch (NHD)
⛪ Church	— Existing 69kV Line	— NWI Wetland
🚗 Driving Range	— Existing 138kV Line	— Parcel Boundary
⛪ OGS Cemeteries	— Existing 345kV Line	— Municipality
● Dwelling		

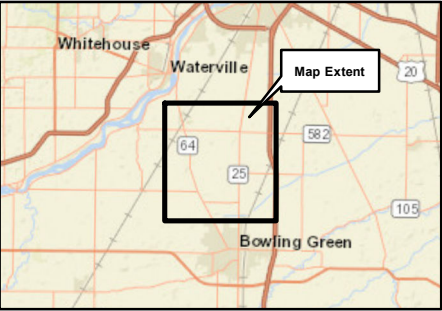
N

Location: Wood County, OH

Source(s): FirstEnergy GIS, Ohio Genealogical Society (OGS), Ohio Department of Transportation - Transportation Information Mapping System (ODOT TIMS), Ohio Geographically Referenced Information Program (OGRIP), National Hydrography Dataset (NHD), National Wetland Inventory (NWI)

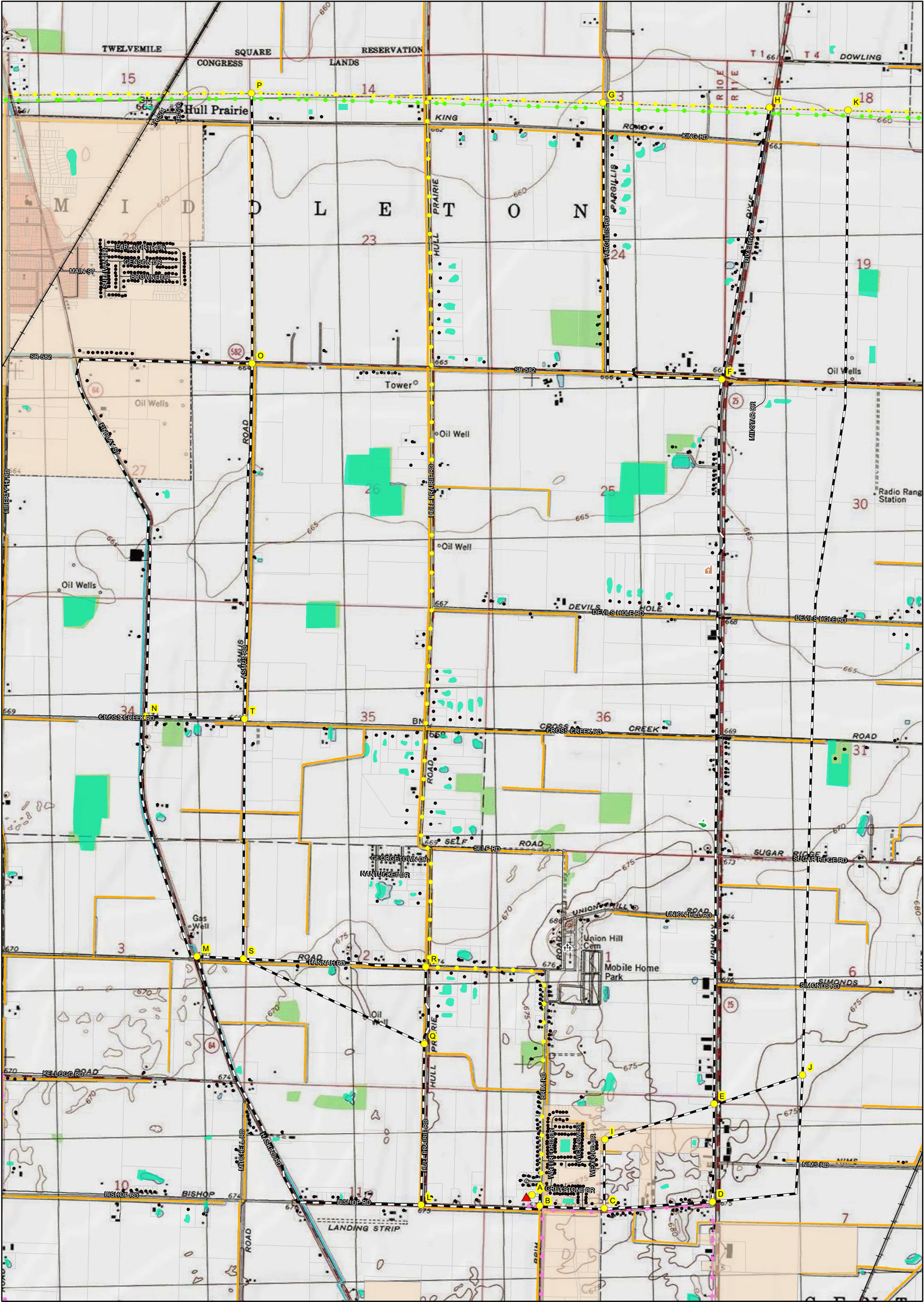
NAD 1983 StatePlane Ohio North
Projection: Lambert Conformal Conic
Linear Unit: U.S. Foot

0 1,000 2,000 4,000
Feet



ATSI
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

FIGURE 3-2
AERIAL CONSTRAINT MAP
WOOD COUNTY 138-kV
REINFORCEMENT PROJECT



LEGEND:

- Node
- Segment
- Perennial Stream (NHD)
- Brim Substation
- Railroad
- Canal Ditch (NHD)
- Church
- Existing 69kV Line
- Existing 138kV Line
- Parcel Boundary
- Driving Range
- Existing 345kV Line
- Municipality
- OGS Cemeteries
- Dwelling

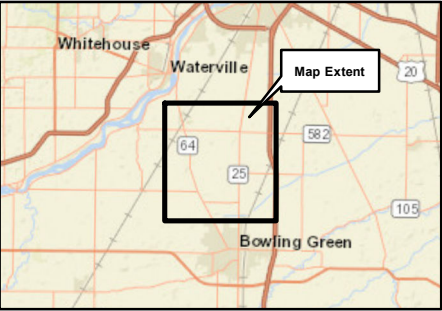
N

Location: Wood County, OH

Source(s): FirstEnergy GIS, Ohio Genealogical Society (OGS), Ohio Department of Transportation - Transportation Information Mapping System (ODOT TIMS), Ohio Geographically Referenced Information Program (OGRIP), National Hydrography Dataset (NHD), National Wetland Inventory (NWI)

NAD 1983 StatePlane Ohio North
Projection: Lambert Conformal Conic
Linear Unit: U.S. Foot

0 1,000 2,000 4,000
Feet



ATSI
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

FIGURE 3-3
TOPOGRAPHIC CONSTRAINT MAP
WOOD COUNTY 138-KV
REINFORCEMENT PROJECT

4906-5-05 PROJECT DESCRIPTION**(A) PROJECT AREA DESCRIPTION**

The map provided in 4906-5-07 (**Figure 7-1**) includes a description of the Project Area's geography, topography, population centers, major industries, and landmarks.

(1) Project Area Map

Figure 7-1 provides a map at 1:24,000-scale, showing the Preferred and Alternate Routes for the Project. This map includes a 1,000-foot corridor on each side of the proposed transmission centerlines (hereafter referred to as the 2,000-foot corridor). This map depicts the proposed transmission line, roads and railroads, 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 map utilizes the Bowling Green North (2016) U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle as a base map.

The information on the map was updated by reviewing digital, georeferenced aerial photography, property parcel data from the Wood County Auditors Office, and field reconnaissance conducted in October 2018. The aerial photographs are georeferenced, ortho-corrected color images derived from ESRI® ArcGIS Online.

(2) Proposed Right-of-Way, Transmission Length, and Properties Crossed

The proposed permanent ROW width is 60 feet wide, with 30 feet on either side of the centerline of the proposed routes. **Table 5-1** provides the Preferred and Alternate Routes ROW acreage, length, and properties crossed based on the proposed centerline."

TABLE 5-1

Right-of-way Area, Length, and Number of Properties Crossed for the Preferred and Alternate Routes

	Route Alternatives	
	Preferred	Alternate
Proposed ROW area (in acres)	44.4	43.6
Length (in miles)	6.1	6.0
Number of properties crossed (by ROW)	43	25

(B) ROUTE OR SITE ALTERNATIVE FACILITY LAYOUT AND INSTALLATION**(1) Site Clearing, Construction, and Reclamation**

The following describes the proposed site clearing, construction methods, and reclamation operations for the Project.

(a) Surveying and Soil Testing

The transmission line will be surveyed to establish the centerline location. The surveying will be completed using conventional and/or aerial methods. The location of significant topographic features and man-made structures along or near the centerline of the transmission line that may affect the design of the transmission line will be identified during the survey. Some minimal clearing of small trees and brush may be required if the surveyor's line of sight is obstructed. Offsets will be used to survey around large trees and other large obstructions. Profile measurements will also be obtained by conventional or aerial methods. Structure locations will be staked prior to construction.

Soil and/or rock tests may be performed along portions of the final approved route if foundations for poles are necessary based on final engineering design. In those few locations where steel structures on concrete foundations may be necessary, geotechnical soil testing using truck-mounted drilling equipment may be utilized. Soil tests will be performed using a drop hammer to drive a sampler tube. Soil bearing capacity is tested by the number of blows required to drive the tube 12 inches into the ground. Soil samples taken with a split-spoon at 5-foot intervals will be used to determine soil type. Typically, the testing will be performed to a depth of between 20 to 40 feet. If rock is encountered, a carbide-tipped bit will be used to drill an exploratory boring 5 to 10 feet into the rock.

(b) Grading and Excavation

No significant grading is anticipated to construct the transmission line on either route. The existing terrain within the Preferred and Alternate routes' ROW generally provides a suitable surface for construction vehicle operation. Some minor local leveling may be necessary for designated laydown and set-up areas for construction equipment; however, any grading would be restricted to the immediate area.

Each wood pole installation requires a machine-drilled hole for placement of the structure. The excavation for these poles will average 3 feet in diameter and 9 to 17 feet deep. A portion of the excavated soil will be used for backfill. The excess material will be placed around the structure or hauled offsite to an approved spoils disposal facility.

The installation of steel poles on concrete foundations may be needed at certain locations. These structures will require a machine-drilled hole for placement of the pole foundation. The excavation for each concrete foundation will be approximately 10 feet in diameter and approximately 35 feet deep. A portion of the excavated soil will be used for backfill around the

foundation, and the excess soil material will be placed around the pole or hauled offsite to an appropriate spoils disposal site.

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

Construction access will be required for the stringing of the conductor cable or wire and installation of the structures. Access roads will require landowner's input and approval. Preliminary access roads for the Preferred and Alternate Route will occur from existing public roads in close proximity to, or crossed by, the transmission line ROW.

Proposed access roads are identified in **Figures 8-2A through E and 8-3A through E**. The location of these access roads cannot be finalized until after a route is approved and Applicant's discussion with affected landowners. Where access across wetlands or streams is necessary, construction matting or equivalent will be used to minimize disturbance. If field conditions necessitate the modification of the finalized access road locations during construction, the concurrence of the property owner will be obtained, necessary environmental field studies will be performed, and necessary permits will be updated.

(d) Stringing of Cable

Conductor installation for the proposed line will be accomplished using the tension stringing method. 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 off the ground. This protects the conductor from surface damage.

Temporary guard or clearance poles will be used as a safety precaution at locations where the conductors could create a hazard to either crew members or the general public. 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 under the observation of crew members at all times. The observers will be in radio and/or visual contact with the operator of the stringing equipment.

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

Generally, the Project will be constructed using direct embed wood poles. In some locations, steel poles may be needed. In these locations a machine-drilled hole for placement of the pole's concrete foundation will be necessary.

(f) Post-Construction Reclamation

After construction is complete, the Project workspace will be restored to conditions as good as those that existed prior to construction. This includes the restoration of drainage ditches, repair or replacement of any pre-existing or damaged fencing or field drainage tiles (or damage thereto), the seeding and mulching of disturbed non-cultivated areas; and the removal of temporary soil erosion and sedimentation control measures after vegetative cover has been established. Disturbed areas adjacent to streams and wetlands will be revegetated using methods to minimize soil erosion and degradation.

Lawn or garden areas, or paved areas damaged during the construction of the transmission line, will be restored to original condition. Landscaping or landscape plantings damaged during construction will also be restored to original condition or replaced to the extent possible and practical as requested by the affected property owner.

Temporary and permanent seeding will be coordinated with construction activities to provide re-vegetation and soil stabilization at the earliest reasonable time. Following construction, all pole locations, material storage sites, and temporary access roads will be restored and seeded with a suitable grass seed mixture that will be specified in the erosion and sediment control plan.

(2) Facility Layout

No new associated facilities such as new substations are proposed for the Project. The existing Brim Substation is being expanded to accommodate the new 138 kV line exit from the substation. The substation expansion is a non-jurisdictional activity and is not included as part of this Project.

(a) Transmission Line Route Map

Figures 8-2A through E and 8-3A through E show maps at 1:6,000-scale of the Preferred and Alternate Routes, respectively. These maps contain the data required by Admin. Code Rule 4906-5-05(A)(1). The additional information required by Admin. Code Rule 4906-5-05 (B)(2)(a) (e.g., pole structure locations) will not be finalized until a final route is approved by the Board and the final engineering design is complete. The data and information required by Admin. Code Rule 4906-5-05 (B)(2)(a) includes temporary access roads and proposed locations of transmission line poles and buildings. This information will be provided to the Board as requested, if the Project is approved and prior to construction activities.

No fenced-in or secured areas are planned for the transmission line Project.

ATSI is currently identifying staging areas and laydown areas for the Project. To date, none have been identified within the Project area. After sites are identified, ATSI will provide final locations that support this Project.

(b) Proposed Layout Rationale

A detailed description of the reasons for the proposed layout (i.e. the Preferred and Alternate Routes) are presented in the RSS (**Appendix 4-1**). There are no unusual features within the Project Study Area.

(c) Plans for Future Modifications

On behalf of ATSI, FirstEnergy's planning engineers generally forecast future transmission projects in a 5-year planning window. Except as otherwise described in this Application, ATSI currently has no plans for future modification of the proposed Project.

(C) DESCRIPTION OF PROPOSED TRANSMISSION LINES**(1) Electric Power Transmission Lines**

The majority of the Project will be installed on wood pole construction. Steel structures may be required at some locations. The exact number and location of structures along the centerline of the proposed routes will be determined during detailed engineering design, if the Board approves the Project.

(a) Design Voltage

The Project will be designed for, and operated at, 138-kV.

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

The proposed new transmission line will be supported on multiple structure types. The general features of these structures are described in the following sections.

1. For tangent configurations on the Preferred and Alternate routes, **Figure 5-1A** conceptually shows a typical single wood pole tangent structure. These typical structures will consist of a single wood pole with three horizontal post insulators to support the transmission conductors on each side of the pole. These tangent structures will have optional distribution underbuild and/or communication facilities.
2. For structures with a light angle configuration on the Preferred and Alternate routes, **Figure 5-1B** conceptually shows a single wood pole structure, with three horizontal post insulators and down guys may be utilized. These structures will have optional distribution underbuild and/or communication facilities. **Figure 5-1C** conceptually shows a single steel structure equivalent that may be used to eliminate the need for guying.
3. **Figure 5-1D** conceptually shows a single wood pole structure, with three suspended insulators and down guys that may be used for structures with a light angle configuration on the Preferred and Alternate routes. These structures will have optional distribution underbuild and/or communication facilities. **Figure 5-1E** conceptually shows a single steel structure with foundation equivalent that may be used to eliminate the need for guying.
4. For deadend structures, **Figure 5-1F** conceptually shows a single wood pole deadend structure with down guys that may be used for structures on the Preferred and Alternate routes. **Figure 5-1G** conceptually shows a single wood pole deadend structure with a stub pole and down guys. **Figure 5-1H** shows a steel pole deadend structure and concrete foundation. These structures will have optional distribution underbuild and/or communication facilities.
5. **Figure 5-1I** conceptually shows the wood pole tap structure that would be utilized for the Preferred and Alternate routes. This structure will have optional distribution underbuild and/or communication facilities.

6. **Figure 5-1J** conceptually shows a double circuit steel pole deadend structure that may be utilized to replace the existing steel lattice tower in the existing Lemoyne-Midway (Brim) 138 kV corridor.

Although it is not anticipated, the design or ROW conditions may dictate that other types of structures need to be utilized. If these unanticipated conditions arise, they will be addressed on a case-by-case basis.

The conductor used for both the Preferred and Alternate routes will be designed and constructed for 138-kV operation and will be 556.5 26/7 ACRS per phase. This conductor has a maximum strength of approximately 22,600 pounds. Optical Ground Wire (OPGW) will be installed on both the Preferred and Alternate routes. The phase conductors and overhead ground wires will be installed in accordance with the latest version of the National Electrical Safety Code (NESC). The conductors will be supported by aluminum clamps attached to the polymer horizontal post insulators. Aluminum clamps will support the overhead ground wire. At deadends, bolted-type deadend clamps will be used on the conductor and on the ground wire.

(c) Base and Foundation Design

A small number of steel structures on concrete foundations may be necessary. The excavation for each concrete foundation will be approximately 10 feet in diameter and 35 feet deep.

(d) Cable Type and Size, where Underground

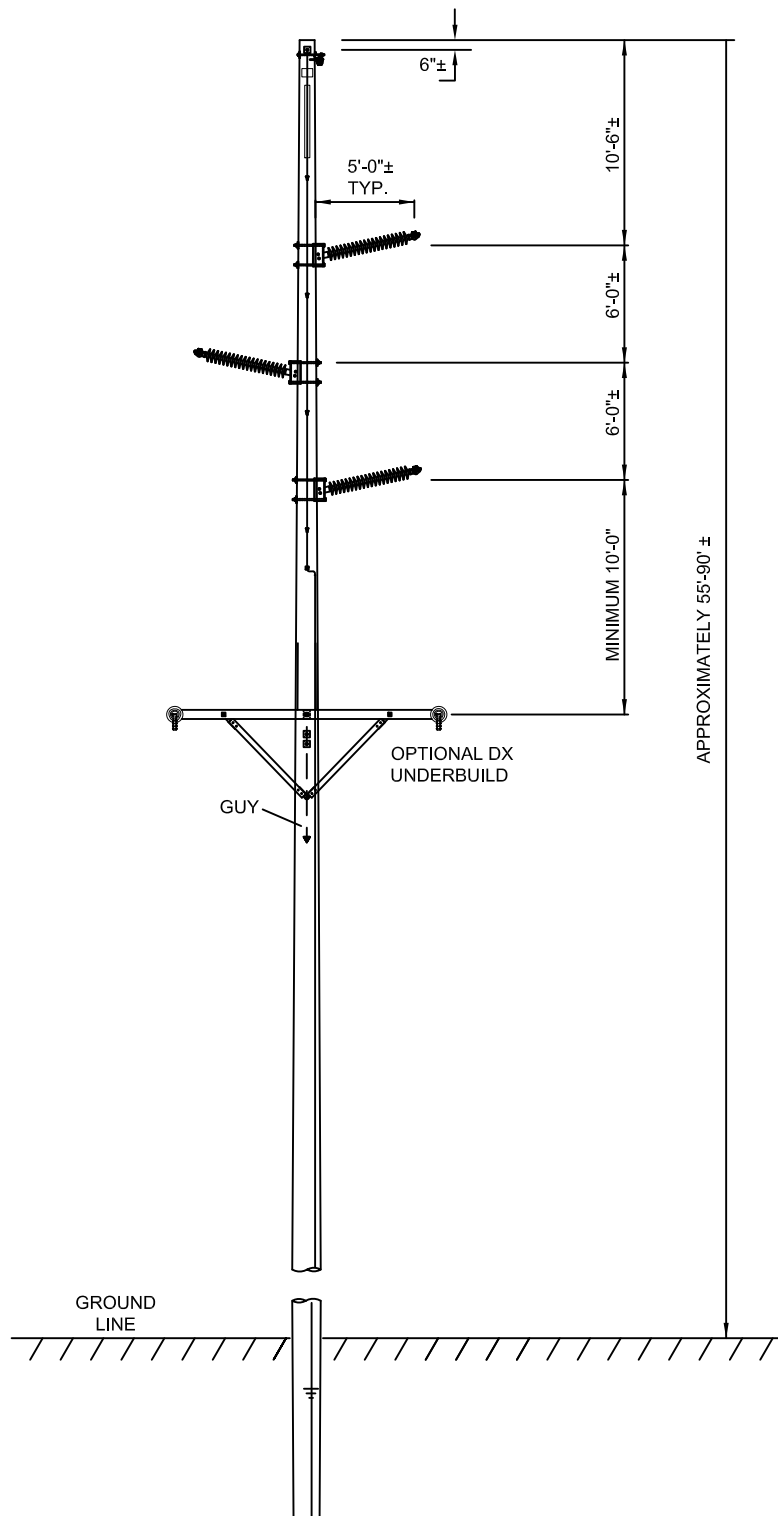
No underground cables are associated with this Project; therefore, this section is not applicable.

(e) Other Major Equipment or Special Structures

No other major equipment or special structures are required for the Project.

(2) Diagram of Electric Power Transmission Substations

No new electric power transmission substations are proposed for this Project.



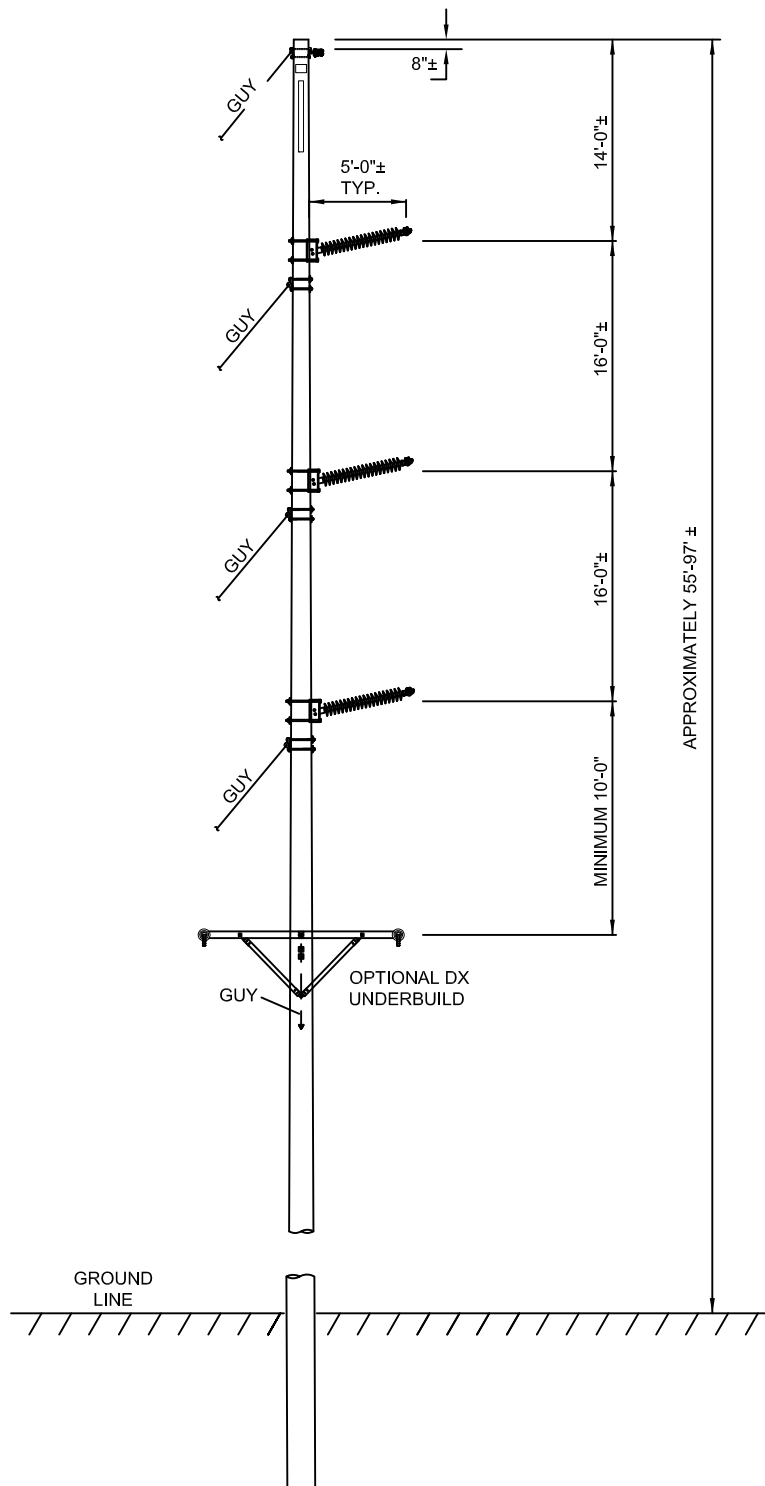
**NOT TO SCALE



WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
HORIZONTAL POST, DELTA, SINGLE POLE

EXHIBIT 5-1A



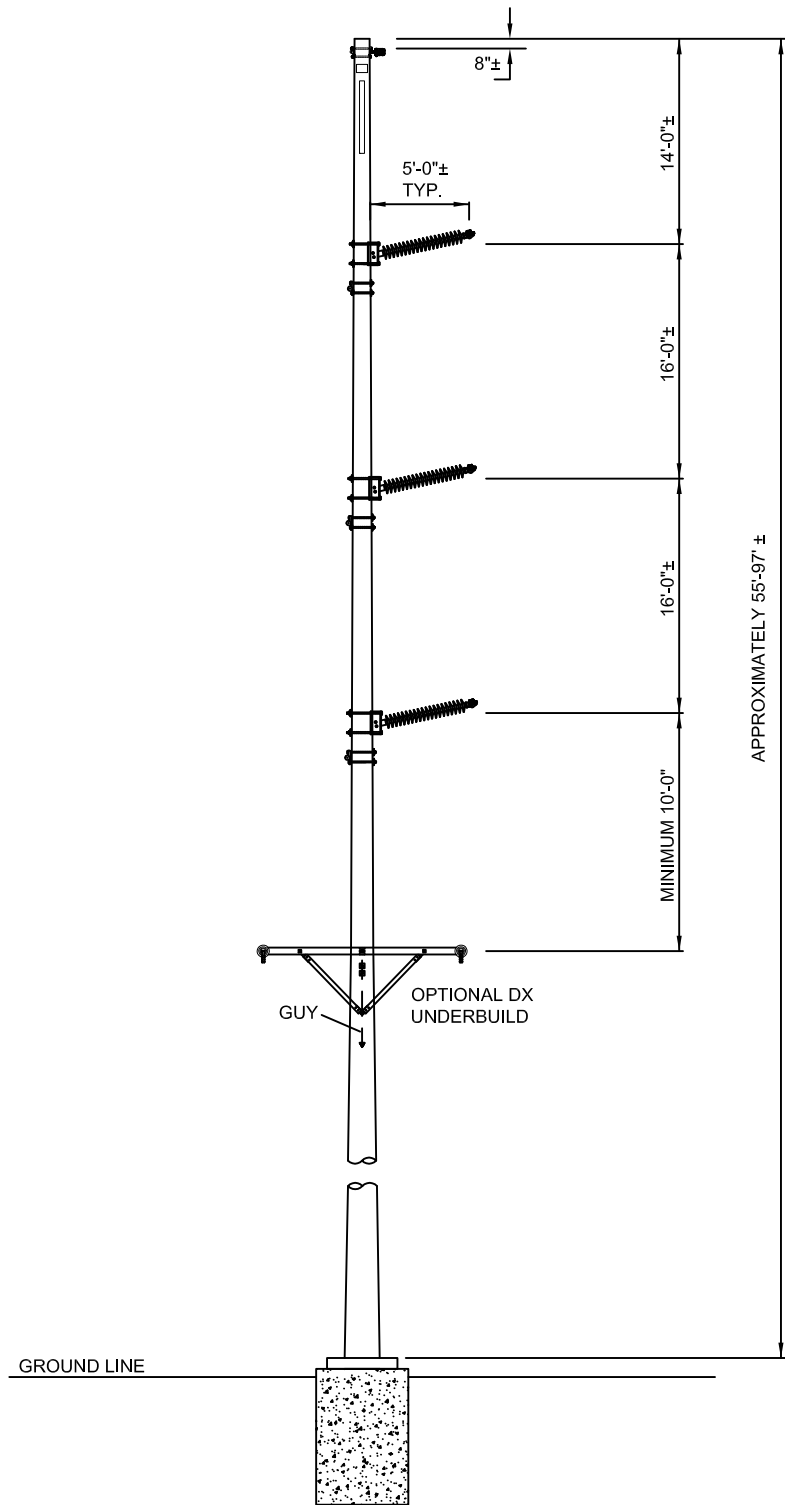
**NOT TO SCALE

ATSI
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
LINE HORIZONTAL POST, VERTICAL SINGLE, POLE

EXHIBIT 5-1B



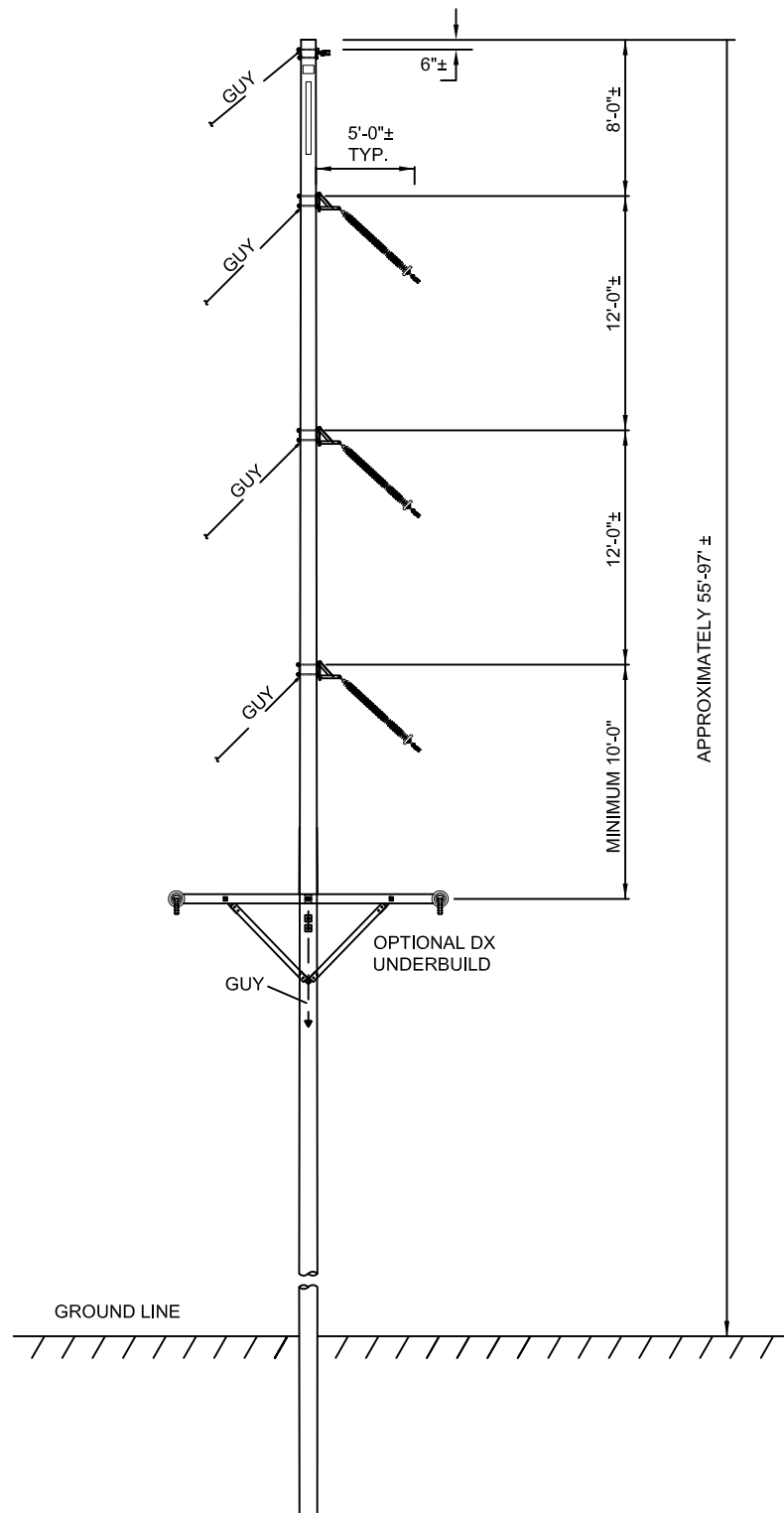
**NOT TO SCALE

ATSI[®]
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT STEEL POLE STRUCTURE
LINE HORIZONTAL POST, VERTICAL, SINGLE POLE

EXHIBIT 5-1C



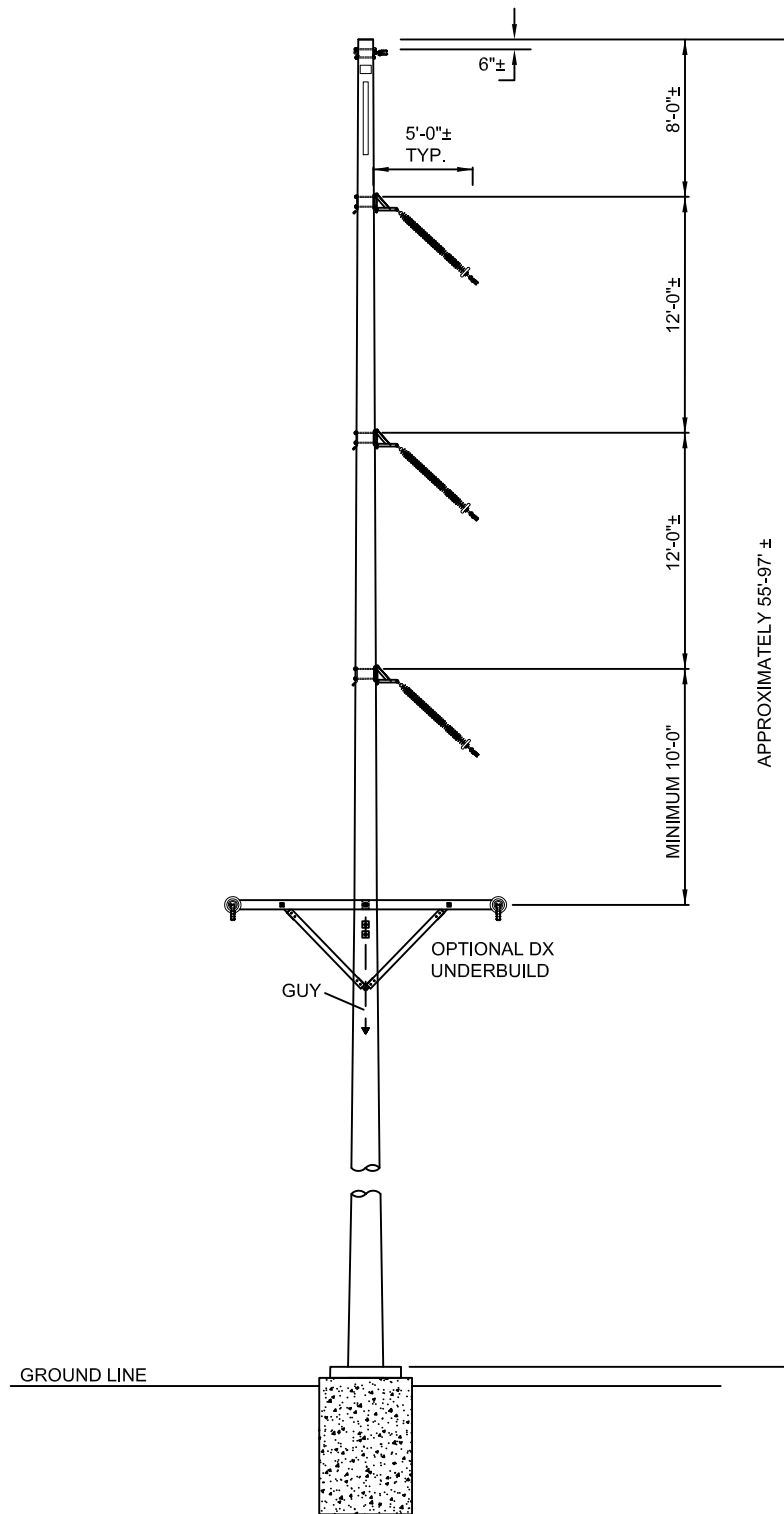
**NOT TO SCALE

ATSI[®]
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
SUSPENSION, VERTICAL, SINGLE POLE

EXHIBIT 5-1D



**NOT TO SCALE

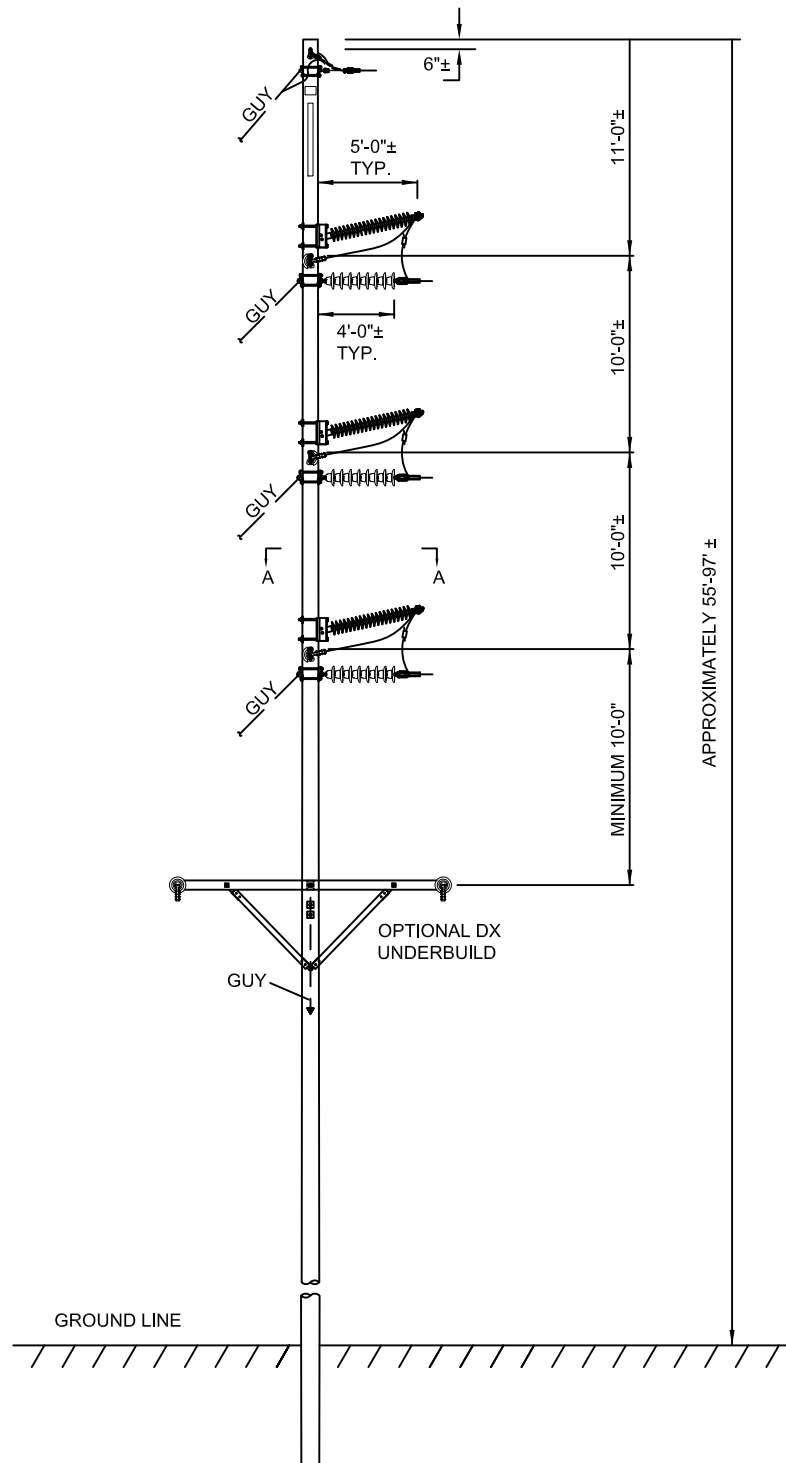
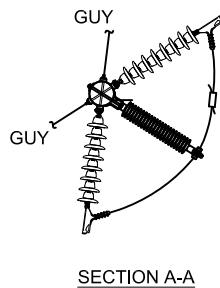
ATSI[®]

American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT STEEL POLE STRUCTURE
SUSPENSION, VERTICAL, SINGLE POLE

EXHIBIT 5-1E



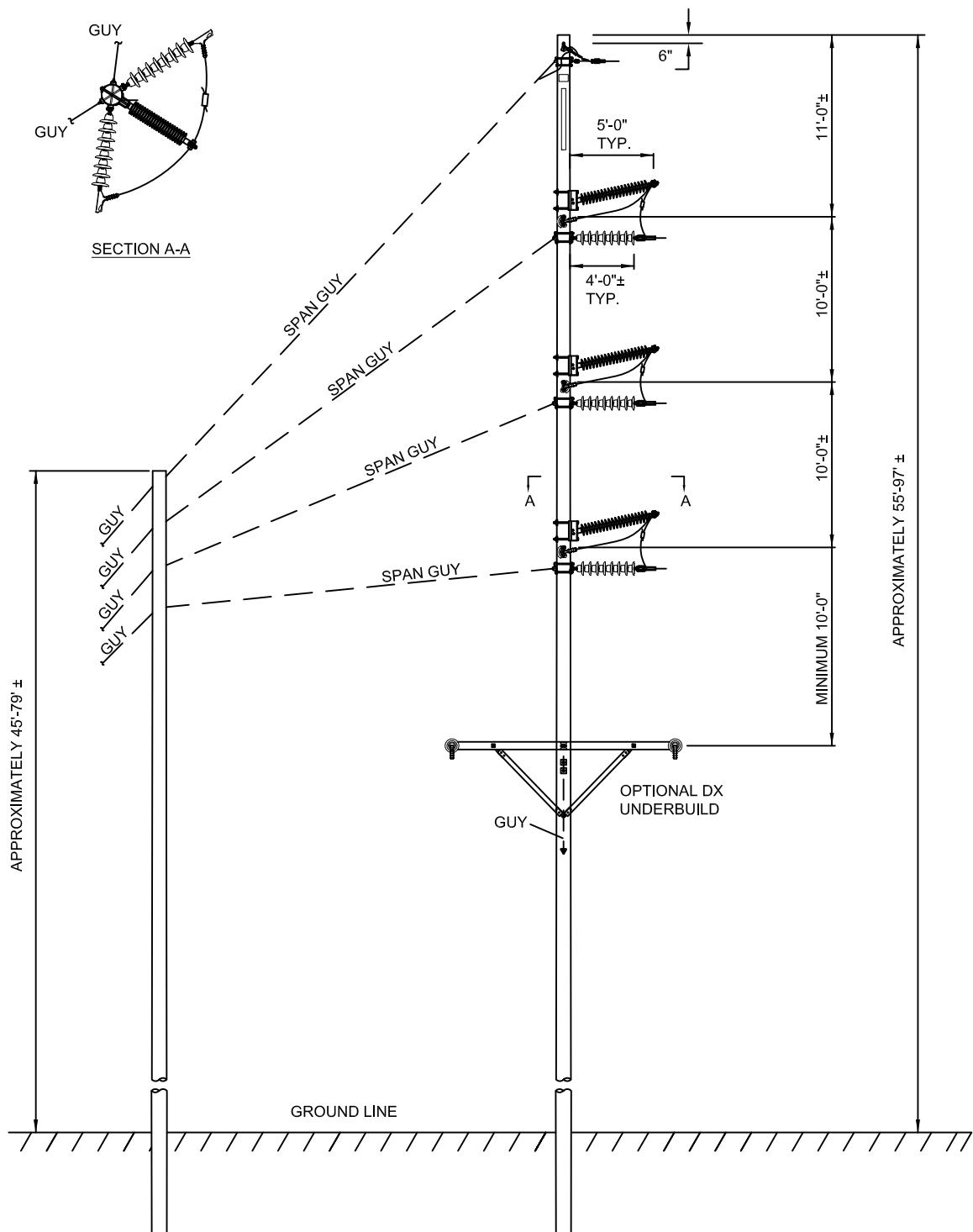
**NOT TO SCALE



WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
DEADEND, VERTICAL, SINGLE POLE

EXHIBIT 5-1F



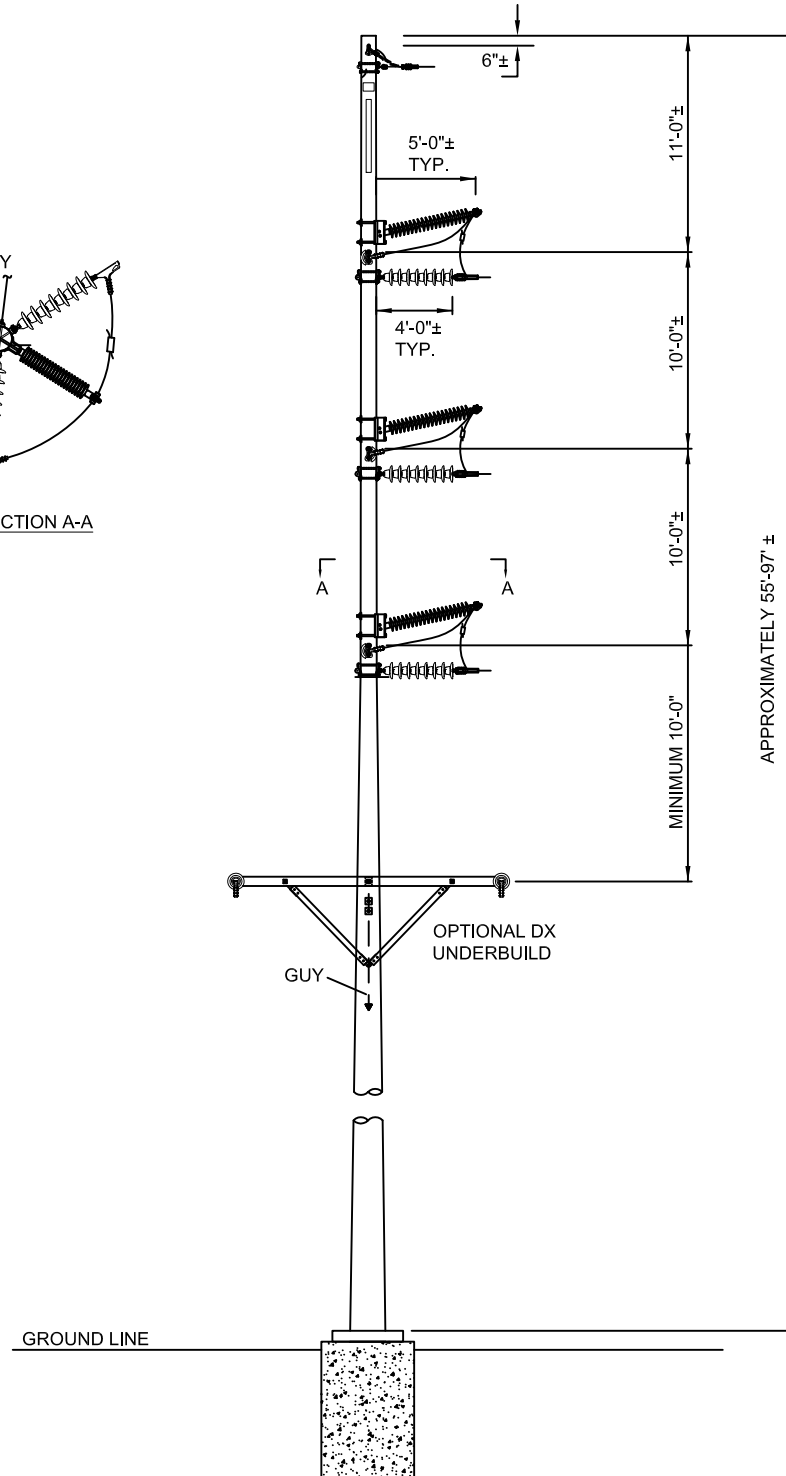
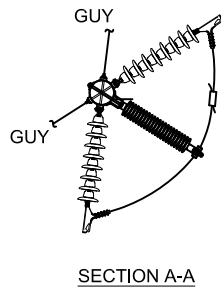
**NOT TO SCALE

ATSI
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
DEADEND, VERTICAL, SINGLE POLE WITH
STUB POLE

EXHIBIT 5-1G



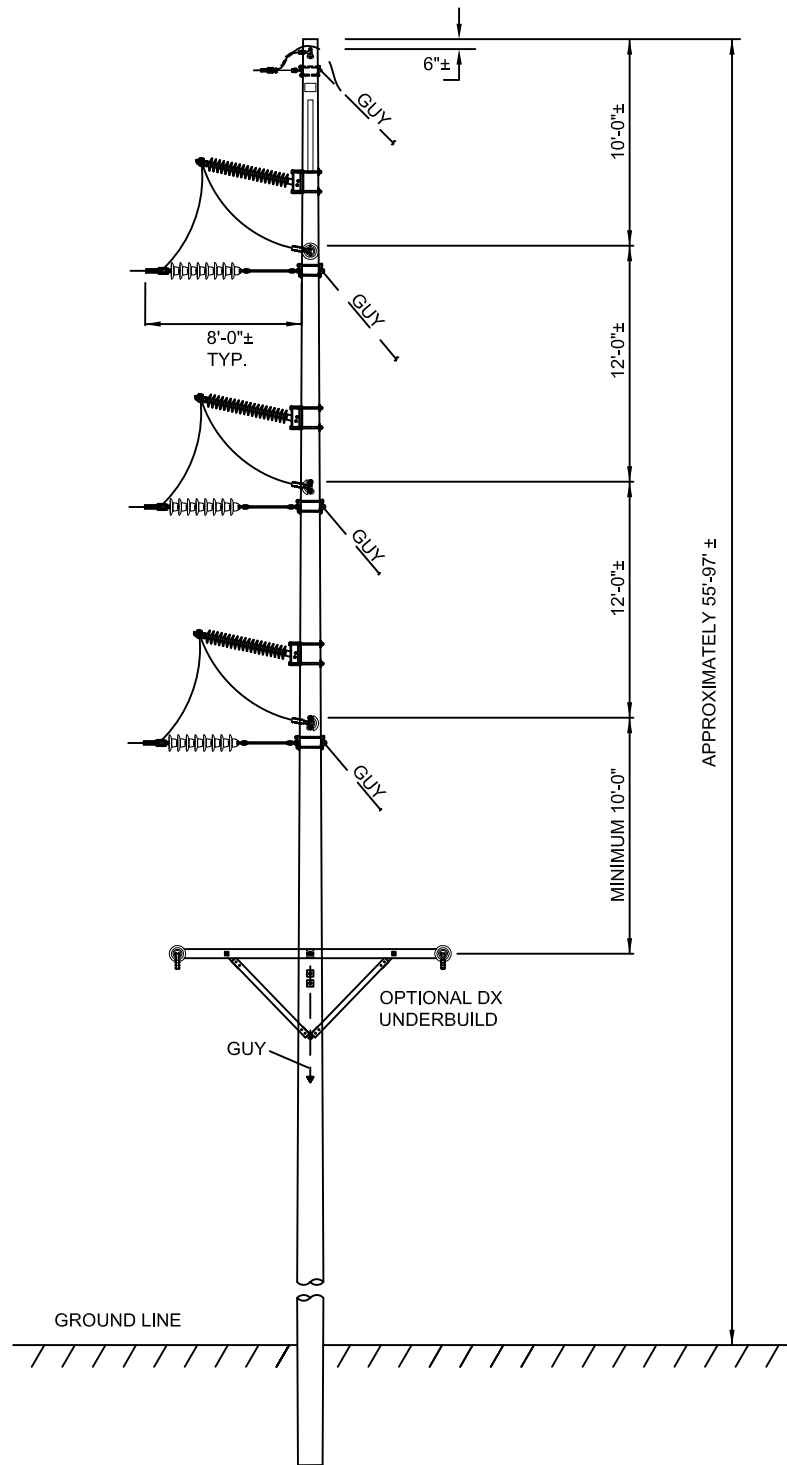
**NOT TO SCALE



WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT STEEL POLE STRUCTURE
DEADEND, VERTICAL, SINGLE POLE

EXHIBIT 5-1H



**NOT TO SCALE

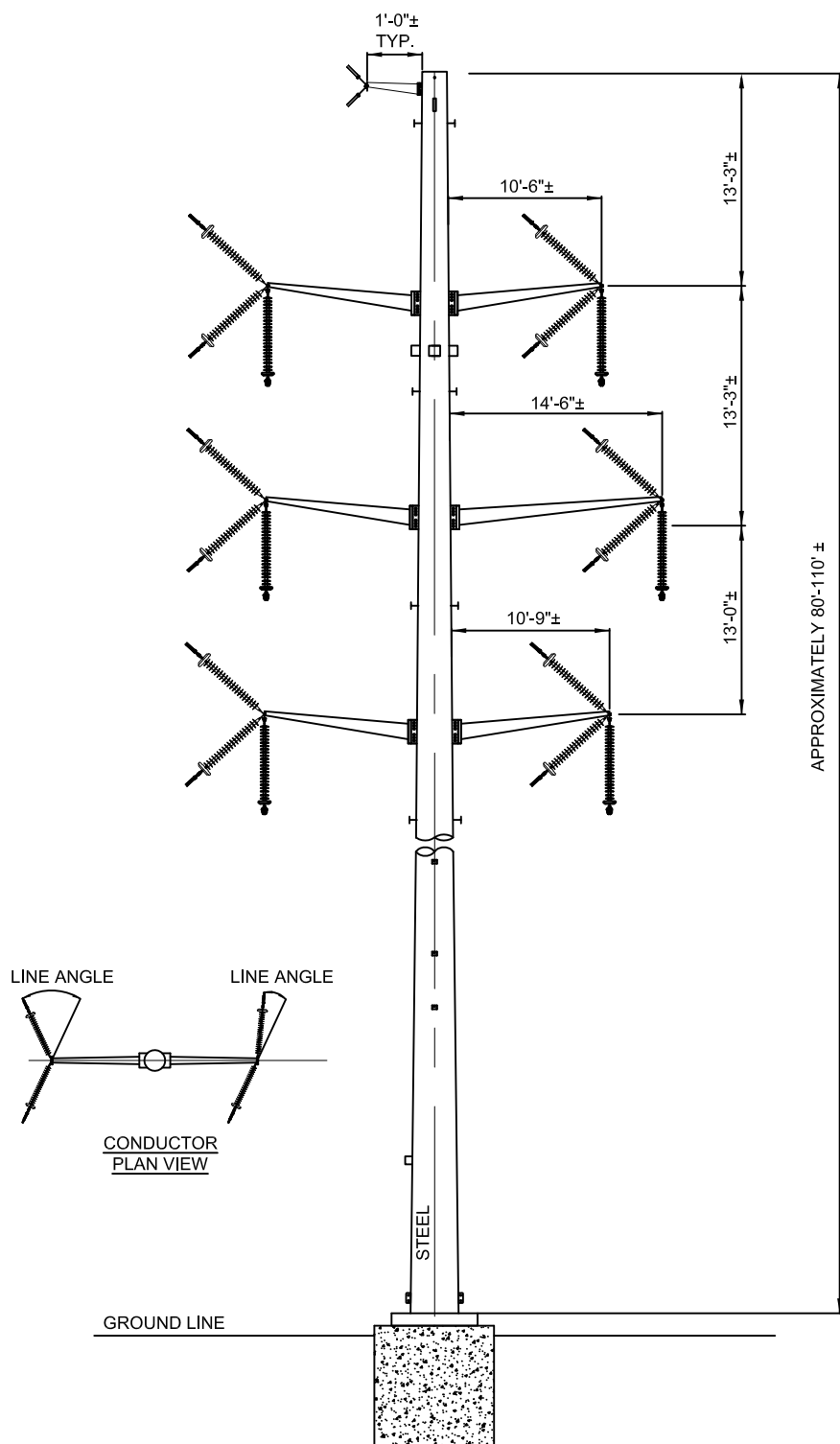
ATSI®

American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV SINGLE CIRCUIT WOOD TAP STRUCTURE
VERTICAL, SINGLE POLE

EXHIBIT 5-11



**NOT TO SCALE



WOOD COUNTY 138-kV
REINFORCEMENT PROJECT

138kV DOUBLE CIRCUIT STEEL POLE STRUCTURE
DEADEND, VERTICAL, SINGLE POLE

EXHIBIT 5-1J

4906-5-06 ECONOMIC IMPACT AND PUBLIC INTERACTION**(A) OWNERSHIP OF PROPOSED FACILITY**

ATSI will construct, own, operate, and maintain the proposed Project.

Both the Preferred and Alternate Routes will consist of new construction located primarily in new ROWs acquired for the Project. In general, Applicant will obtain through negotiation with property owners any easements necessary for the ROW for the Project, although acquiring property rights by fee purchase of land or other types of agreements may occur.

Although Applicant endeavors to reach an amicable agreement with all impacted property owners, it is possible that some property owners may not be willing to provide Applicant with the necessary easements on negotiated terms. Where the necessary ROW for the transmission line along the route approved by the OPSB cannot be obtained through negotiations, appropriation of the necessary ROW will be pursued.

(B) CAPITAL AND INTANGIBLE COSTS ESTIMATE FOR ELECTRIC POWER TRANSMISSION FACILITY ALTERNATIVES

Table 6-1 includes estimates of applicable intangible and capital costs for both the Preferred and Alternate Routes of the Project. Cost estimates are provided only for those items listed in the rule that are applicable to this Project.

TABLE 6-1**Estimates of Applicable Intangible and Capital Costs for Both the Preferred and Alternate Sites**

FERC Account Number	Description	Preferred Route	Alternate Route
350	Land and Land Rights, Engineering Construction, etc.	\$4,404,600	\$4,399,200
352	Structures and Improvements	\$0	\$0
353	Substation Equipment	\$0	\$0
354	Towers and Fixtures	\$0	\$0
355	Poles and Fixtures	\$1,321,400	\$1,306,100
356	Overhead Conductors and Devices	\$0	\$0
357	Underground Conductors and Insulation	\$0	\$0
358	Underground-to-Overhead Conversion Equipment	\$0	\$0
359	Right-of-Way Clearing, Roads, Trails or Other Access	\$2,740,000	\$2,740,000
TOTAL		\$8,466,000	\$8,445,300

FERC = Federal Energy Regulatory Commission

(C) CAPITAL AND INTANGIBLE COSTS ESTIMATE FOR GAS TRANSMISSION FACILITY ALTERNATIVES

This Application is for an electric transmission line therefore this section is not applicable.

(D) PUBLIC INTERACTION AND ECONOMIC IMPACT

This section of the Application provides information regarding public interaction and the economic impact for each of the route alternatives.

(1) Counties, Townships, Villages, and Cities within 1,000 feet

The Preferred Route, including all areas within 1,000 feet of the centerline, is located in Middleton Township and Plain Township. The Alternate Route is located in Middleton Township, Center Township, Plain Township, and the City of Bowling Green. Both the Preferred and Alternate routes tap the existing Lemoyne-Midway 138 kV Transmission Line and head south ultimately terminating at the existing Brim Substation.

(2) Public Officials Contacted

ATSI contacted several local officials to discuss the Project. **Appendix 6-1** provides a list of the local public officials who have been contacted to date or who will be provided a digital or hard copy of the Application, once accepted by the OPSB.

(3) Planned Public Interaction

ATSI's already completed public interaction includes mailing the required notice letters to residents, tenants, and elected officials, public notice of a public information open house, the creation and maintenance of a Project website and conducting a public information open house. ATSI will also complete all necessary notice requirements associated with the filing of this application and the subsequent public and adjudicatory hearings as required by the OPSB's rules.

During the construction of this Project, ATSI will regularly provide Project updates on its website; retain ROW land agents that discuss project timelines, construction and restoration activities with property owners and other concerned members of the public; and convey this information to affected owners and tenants. Copies of informational materials that were available at the public open house are included in **Appendix 6-2**.

During this Project, the public may direct questions or comments to the FirstEnergy transmission projects hotline at 1-800-589-2837, or email transmissionprojects@firstenergycorp.com.

Applicant does request that any communications concerning the Project include the Project name. To access the Project's website, please visit:

https://www.firstenergycorp.com/about/transmission_projects/ohio/wood-county-reinforcement.html.

As required by the Board, if any member of the public wishes to review or request a hard copy of this Application, they can:

- Go to the local Library;
- Go to <http://opsb.ohio.gov/> and search for this project's case number; or
- Access the project's website on https://www.firstenergycorp.com/about/transmission_projects/ohio/wood-county-reinforcement.html and follow the directions to obtain a copy.

Applicant will log comments and information provided through its public interaction program and this information will be shared with the Board, if requested.

At least 7 days prior to any construction activities, an ATSI ROW agent will notify the impacted landowner or the tenant by mail, telephone, or in person, depending on landowner preference.

(4) Liability Insurance or Compensation

FirstEnergy Service Company, as the parent company of ATSI currently self-insures against Commercial general liability and property damage exposure, as well as Commercial liability exposure in connection with its automobile operations. ATSI purchases excess Commercial General Liability insurance covering indemnity to at least \$35,000,000 in excess of \$10,000,000. This insurance is on a per occurrence basis and is arranged under a broad form that includes automobile and contractual liability. Present coverage is arranged with AEGIS and is renewable on a year-to-year basis.

(5) Tax Revenues

The Preferred and Alternate Routes are located within Wood County. ATSI will pay property taxes on utility facilities in this jurisdiction. The approximate annual property taxes associated with the Preferred and Alternate Routes over the first year after the Project is completed are \$567,595 and \$568,446, respectively.

Based on the 2018 tax rates, the following information includes preliminary estimates for these taxing authorities:

Preferred Route:

Wood County	\$116,430
Middleton Township	\$43,804
Plain Township	\$36,791
Bowling Green Local Schools School District	\$111,043
Otsego Local School District	\$259,527
TOTAL	\$567,595

Alternate Route:

Wood County	\$116,145
Middleton Township	\$37,931
Center Township	\$27,880
Plain Township	\$17,292
Bowling Green Local Schools School District	\$225,235
Eastwood Local School District	\$85,774
Perrysburg Exempted Village School District	\$17,245
Otsego Local School District	\$40,943
TOTAL	\$568,445

APPENDIX 6-1
Wood County 138-kV Reinforcement Project
Officials to Be Served a Copy of the Certified Application

Wood County

Board of County Commissioners
Dr. Theodore Bowlus
One Courthouse Square, 5th Floor
Bowling Green, OH 43402

Wood County Engineer's Office
Mr. John Musteric
One Courthouse Square, 5th Floor
Bowling Green, OH 43402

Board of County Commissioners
Ms. Doris Herringshaw
One Courthouse Square, 5th Floor
Bowling Green, OH 43402

Wood County Planning Commission
Mr. Dave Steiner, Director
One Courthouse Square, 5th Floor
Bowling Green, OH 43402

Board of County Commissioners
Mr. Craig LaHote
One Courthouse Square, 5th Floor
Bowling Green, OH 43402

Wood County Soil & Water District
Mr. Jim Carter, District Admin.
1616 E. Wooster St.
Suite 32
Bowling Green, OH 43402

Middleton Township

Middleton Township Officials
Mr. Jim Bostdorff, Trustee Chairman
19210 Haskins Road
Bowling Green, OH 43402

Middleton Township Officials
Mr. Fred Vetter, Trustee
11440 Devils Hole Road
Bowling Green, OH 43402

Middleton Township Officials
Ms. Penny Getz, Trustee
216 E. Greenwood Dr.
Haskins, OH 43525

Middleton Township Officials
Ms. Laurie Limes, Fiscal Officer
15228 Cross Creek Road
Bowling Green, OH 43402

Plain Township

Plain Township Officials
Mr. Donald Bechstein, Trustee
16375 Sand Ridge Road
Bowling Green, OH 43402

Plain Township Officials
Mr. Jim Rossow, Trustee
15821 Green Road
Bowling Green, OH 43402

Plain Township Officials
Mr. Gary Cromley, Trustee
13370 Union Hill Road
Bowling Green, OH 43402

Plain Township Officials
Ms. Elizabeth Bostdorff, Fiscal Officer
18617 Brim Road
Bowling Green, OH 43402

Center Township

Center Township Officials
Mr. Dale Brown, Trustee
17441 Carter Road
Bowling Green, OH 43402

Center Township Officials
Mr. Rick Engle, Trustee
17123 Barr Road
Bowling Green, OH 43402

Center Township Officials
Mr. Doug Wulff, Trustee
11300 E Kramer Road
Bowling Green, OH 43402

Center Township Officials
Ms. Jill Foos, Fiscal Officer
17100 Carter Road
Bowling Green, OH 43402

City of Bowling Green

City of Bowling Green Mayor's Office
Mayor Richard Edwards
304 North Church Street
Bowling Green, OH 43402

Bowling Green City Council
Mr. Bruce Jeffers
304 North Church Street
Bowling Green, OH 43402

Bowling Green City Council - Ward 4
Mr. William Herald
1030 Conneaut Ave
Bowling Green, OH 43402

Bowling Green City Council - Public
Utilities Committee
Mr. Michael Aspacher
25 Parkwood Drive
Bowling Green, OH 43402

Bowling Green Engineering Division
Mr. Jason Sisco, City Engineer
304 North Church Street
Bowling Green, OH 43402

Bowling Green Planning Commission
Attn: Planning Commission
304 North Church Street
Bowling Green, OH 43402

Libraries

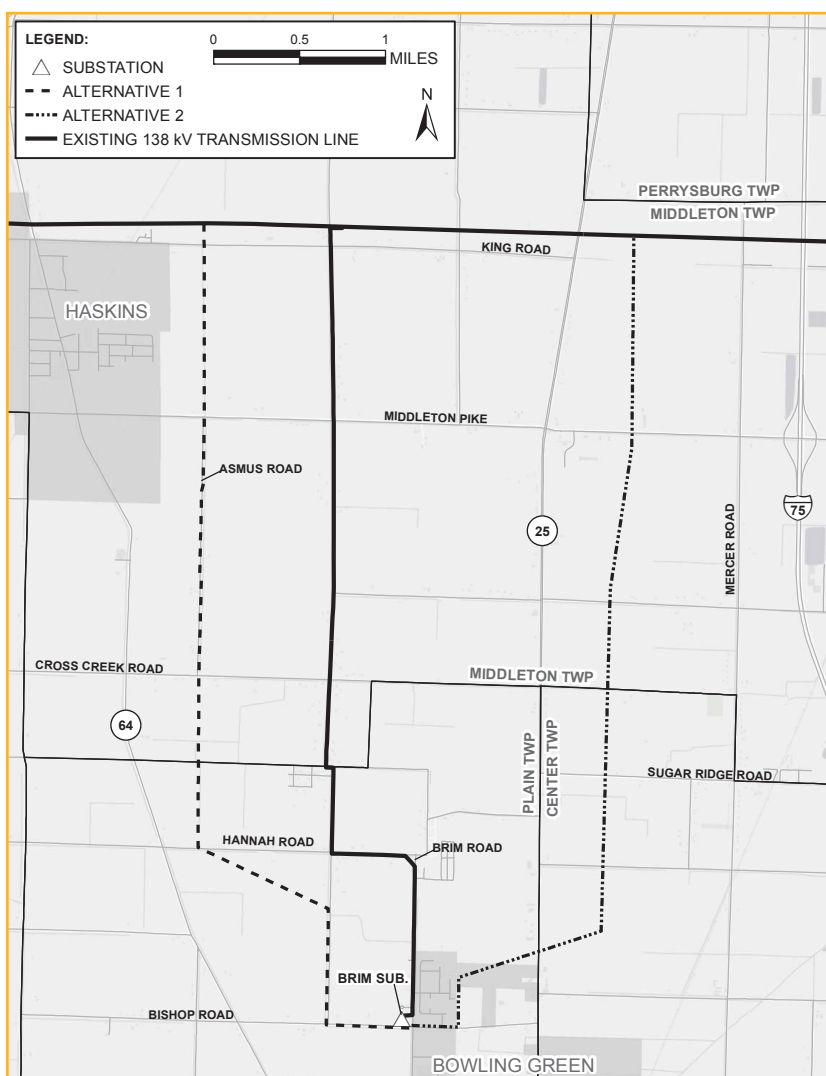
Wood County District Public Library
Mr. Michael Penrod, Director
251 N. Main Street
Bowling Green, OH 43402



WOOD COUNTY 138-kV REINFORCEMENT PROJECT

Proposed 138-Kilovolt (kV) Transmission Line Project to Enhance Service Reliability for Toledo Edison and Bowling Green Area customers in Wood County.

American Transmission Systems, Inc. (ATSI), a FirstEnergy company, is proposing to build the Wood County 138-kV Reinforcement Project to enhance electric service for Toledo Edison and Bowling Green Area customers in Wood County, Ohio. The project will benefit approximately 16,000 customers in the area by improving voltage stability, adding redundancy to the network, and allowing for future load growth when new businesses or homes are built.



PROJECT OVERVIEW

The project consists of three primary components:

- Expanding an existing a 138/69-kV substation in Plain Township to help reinforce the local transmission system
- Constructing an approximately 5.5-mile 138-kV transmission line connecting the expanded substation to the nearby Lemoyne-Midway 138-kV transmission line
- Constructing a short, approximately 0.15-mile 69kV transmission line that will connect the expanded substation to nearby Bowling Green municipal facilities.

FirstEnergy's ATSI affiliate will build and own the new facilities. The estimated project cost is approximately \$20-25 million.

Continued on back

PROJECT SITING

Multiple routes for the transmission line were carefully evaluated to avoid potentially sensitive areas and minimize impacts to land owners and the community. A line route evaluation identified two potential routes for the line, which are illustrated on the accompanying map. The company will seek input on these routes from the community at a public open house meeting to be held in September to identify a Preferred and an Alternate Route. Only one route is required to complete the project.

REGULATORY APPROVAL

ATSI must obtain authorization from the Ohio Power Siting Board (OPSB) for the proposed line and substation expansion before construction can begin. The company expects to make the necessary submittals to the Board for the project by year end 2018. Construction will begin once approval is received.

ABOUT ENERGIZING THE FUTURE

Through *Energizing the Future*, FirstEnergy has upgraded or replaced existing transmission lines, incorporated new, smart technology into the grid, and outfitted dozens of substations with new equipment and enhanced security features. These upgrades are producing reliability improvements across the company's transmission system. FirstEnergy will continue these investments through 2021.

For more information, visit firstenergycorp.com/transmission.





What Are Electric and Magnetic Fields?

Electric and magnetic fields surround anything that generates, transmits, or uses electricity.

Electric fields result from voltage that pushes electric current through an electrical wire.

Magnetic fields are produced when electrical current flows through wires and electrical devices. Together, these electric and magnetic fields from electric power sources are commonly referred to as EMF.

Since electricity plays an important role in modern life and in almost everything we do, EMF can be found almost everywhere. The electricity system that is used to transmit and distribute electricity (e.g., transmission lines, distribution lines, and substations) is a source of EMF. When we use electricity in our homes, offices, schools, workplaces, hospitals, and public areas to power the many appliances, devices, and equipment we use for work, leisure, and transportation, EMF also are present.

Are There Guidelines That Limit Exposure to EMF?

There are no federal exposure limits in the United States and no state agency has adopted exposure limits based on a finding that EMF causes adverse health effects. Scientific organizations, however, have recommended exposure guidelines to protect the general public and workers from very high EMF levels, that have the potential to cause nerve and muscle stimulation, which are short-term and reversible effects. EMF levels found in our environment, including those near high-voltage power lines, however, are far too low to cause these effects.



Where Can I Find More Information?

Health Canada

<http://healthycanadians.gc.ca/healthy-living-vie-saine/environment-environnement/home-maison/emf-cem-eng.php>

National Cancer Institute

<http://www.cancer.gov/cancertopics/factsheet/Risk/magnetic-fields>

World Health Organization

<http://www.who.int/peh-emf/en/>

National Institute of Environmental Health Sciences

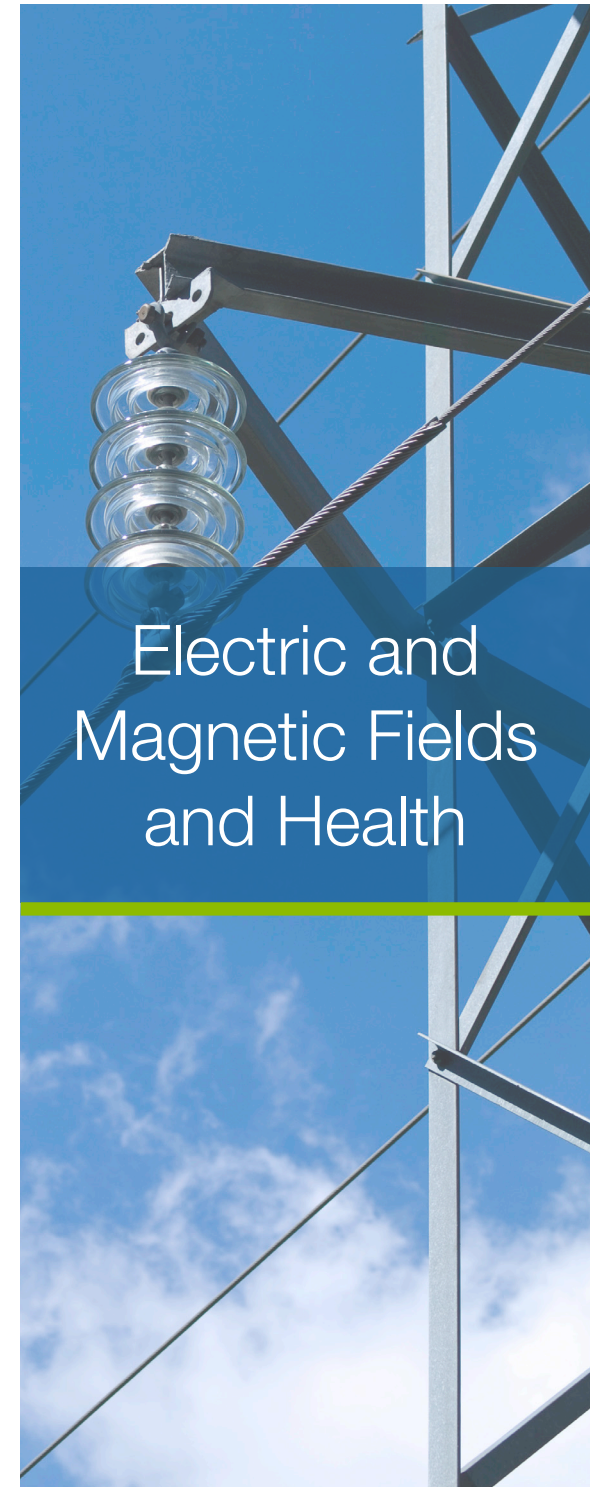
http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

European Commission – SCENIHR

http://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scenihr_consultation_19_en.htm

Exponent

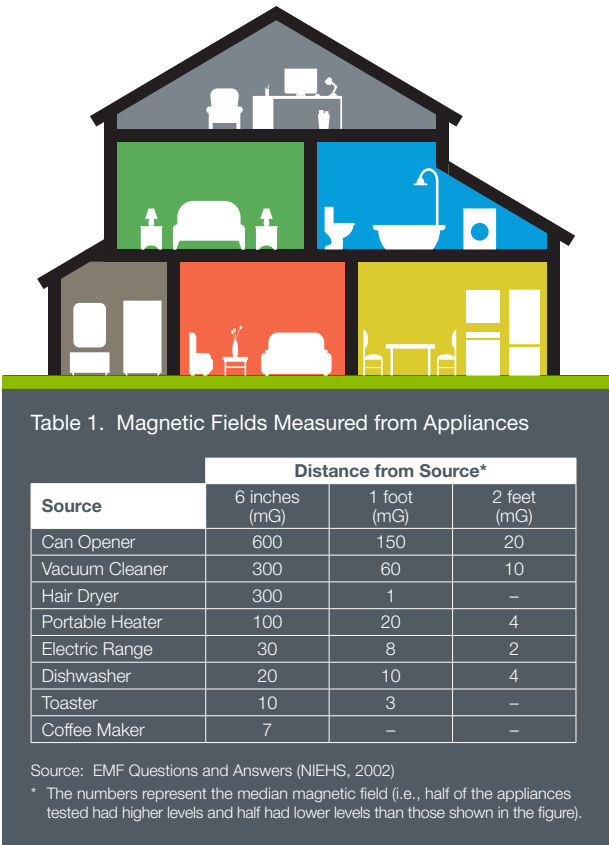
Prepared by Exponent for FirstEnergy | January 2016



How Is EMF Measured and What Are Typical Levels in the Home?

Electric fields are measured in units of volts per meter (V/m) and magnetic fields are measured in milligauss (mG), microtesla (μT) or millitesla (mT) (1 mG = 0.1 μT = 0.0001 mT). The highest levels of EMF are measured directly near the source, and decrease rapidly with distance. Since electric fields are easily blocked or weakened by walls or other objects, more research has been conducted on magnetic fields.

In our homes, magnetic fields are generated from appliances, the wiring that powers those appliances, the distribution lines that deliver electricity to the home, and any currents flowing on water pipes. Magnetic fields from nearby transmission lines also have the potential to contribute to the magnetic-field levels inside a home, but since magnetic fields decrease rapidly as you get farther away from the source, the contribution of transmission lines to a home's magnetic-field level may be less than from other closer sources. The typical average level of magnetic fields in homes in the United States measured away from appliances is approximately 1 mG, while in close proximity to common appliances that are in use, the magnetic-field level can range from tens to hundreds of mG (Table 1).



Equipment within substations also produces magnetic fields, but here too, the fields drop off quickly with distance. At the boundary of substation sites, the magnetic field from substation equipment is typically within the range of levels found inside our homes. The dominant source of magnetic fields near substation boundaries is the power lines serving the substation.



How Are Potential Health Effects Studied?

There are three main approaches that scientists use to study potential effects of exposure to any physical, chemical, or biological agent, including EMF. Over the past 35 years, thousands of studies have been published in research areas related to EMF.

Epidemiologic studies are conducted among people to observe if persons with a disease (such as cancer) experienced higher exposures to EMF than persons without that disease.

Laboratory animal studies (also called *in vivo* studies) are conducted in laboratory animals, most commonly mice and rats, to test whether extended exposures to high levels of EMF cause increased rates of disease or toxic effects.

Laboratory studies of cells and tissues (also called *in vitro* studies) are conducted to see if exposure to EMF can cause any changes in biological processes that could lead to disease.

How Are Scientific Conclusions Drawn from Health Studies?

First and foremost, no single study or a selected small group of studies can form the sole basis of a valid scientific assessment. The method that scientists use to conduct health risk assessments involves the evaluation of all relevant studies in the three main research areas discussed above. The three areas have varying strengths and limitations, thus, they contribute different information to a scientific evaluation and have to be weighed together. Because epidemiologic studies are conducted among people, the main interest of health research, they provide highly relevant scientific evidence. *In vivo* studies can be well controlled by the investigators and can expose animals to high levels of exposure for long time periods up to the entire lifetime of the animals. While animal studies require extrapolation between species, these tests form the primary basis for assessing the safety of all drugs

and medicines. *In vitro* laboratory studies may contribute to better scientific understanding of biological processes and potential exposure effects on a cellular level; however, because cells and tissues may not react the same way in experimental settings as in intact organisms, no direct conclusions can be drawn from *in vitro* studies about disease and adverse health effects. In the overall evaluation, scientists look for overall patterns within and across the three research areas. Epidemiology and *in vivo* studies have primary importance, while *in vitro* studies contribute secondary information in the assessment of scientific evidence. Studies also vary greatly in their quality, thus, each study contributes different weight in the overall evaluation. Higher quality studies contribute more weight, while lower quality studies contribute less weight, and studies with very poor methods may not contribute at all.



What Have Authoritative Scientific Organizations Concluded?

Numerous scientific organizations have assembled groups of independent scientists with expertise in a variety of disciplines to perform comprehensive reviews of EMF research. These organizations include the International Agency for Research on Cancer, the International Commission on Non-Ionizing Radiation, the National Institute of Environmental Health Sciences, the World Health Organization, and most recently in 2015, a Scientific Committee of the European Commission. Overall, the conclusions of these panels are consistent and can be summarized generally, as follows:

- The research does not support the conclusion that EMF causes any long-term, adverse health effects.
- Some epidemiologic studies have reported a statistical association between high, average magnetic-field levels and childhood leukemia. No authoritative agency has concluded, however, that magnetic fields cause childhood leukemia due to the limitations of these studies and the lack of evidence from laboratory studies.
- The *in vivo* studies, overall, do not report an increase in cancer among animals exposed to high levels of EMF even after lifetime exposures.
- The *in vitro* studies provide no explanation as to how magnetic fields could cause disease.

4906-5-07 HEALTH AND SAFETY, LAND USE, AND REGIONAL DEVELOPMENT**(A) HEALTH AND SAFETY****(1) Compliance with Safety Regulations**

The construction, operation, and maintenance of the Project will comply with the requirements of applicable state and federal statutes and regulations related to safety, including requirements specified in the NERC Mandatory Reliability Standards and the National Electrical Safety Code (NESC), as well as those adopted by PUCO. Applicant will also comply with applicable safety standards established by the Occupational Safety and Health Administration (OSHA).

(2) Electric and Magnetic Fields

In accordance with the OPSB requirements specified in OAC 4906-5-07(A)(2), the following subsections provide an analysis of the electromagnetic field (EMF) associated with the Project.

(a) Calculated Electric and Magnetic Field Strength Levels

The following calculations provide an approximation of the magnetic and electric fields strengths of the proposed 138 kV transmission line at particular locations associated with the Project. The calculations provide an approximation of the electric and magnetic field levels based on specific assumptions utilizing the Electric Power Research Institute (EPRI) EMF Workstation 2015 program software.

Factors that affect the level of magnetic and electric fields that are considered in the modeling include variance in the daily and projected long-term transmission line loading, operating voltage, contingency operations, phase configuration, direction of current flows, conductor sag, ground elevation, unbalance conditions, and other nearby magnetic field sources or conductors of neutral current including water mains, metallic fences, and railroad tracks. Electric field computations used for this modeling also assume that shrubs, trees, buildings, and other objects are not in close proximity to the facilities, as they produce significant shielding effects. Finally, other transmission or distribution facilities near the transmission line will also affect the calculated fields. For example, a double-circuit loop configuration, with current flows in opposite directions, results in a partial reduction (cancellation) of the magnetic field levels.

The model and calculations used in this Application also include a number of assumptions including the following:

- Current flows are assumed in the direction expected under normal system operating conditions
- The location of transmission line poles, attached conductors and static wire, and line phasing are based on preliminary engineering layouts

- The calculated field levels assume a reference point approximately 3 feet (1 meter) aboveground.

Using these assumptions, three loading conditions were modeled for the proposed transmission line: 1) the winter normal conductor rating, 2) emergency line loading, and 3) normal maximum loading. The winter normal conductor rating represents the maximum current flow that the conductor can withstand during winter conditions. It is not anticipated that the transmission line would be operated at the winter normal conductor rating level of current flow. The emergency maximum loading represents the maximum current flow in the transmission line under unusual circumstances and only for a short period of times. The normal maximum loading represents the routine maximum loading that the transmission line would be operated. Daily current load levels would fluctuate below this level.

The transmission line loadings used in the calculations are presented in **Table 7-1**. The conductor configurations and right-of-way width are the same over the entire lengths of the Preferred and Alternate Routes. Field strengths were modeled for all configurations under consideration for the portions of both routes that would be within 100 feet of a residential structure, or would occupy more than 10% of the respective proposed route.

TABLE 7-1
Transmission Line Loadings

Line Name	Winter Conductor Rating (Amps)	Emergency Loading (Amps)	Normal Loading (Amps)
Midway-Brim 138-kV Transmission Line	1052	388.8	130.9
Lemoyne-Brim 138-kV Transmission Line	1052	392.3	328.8

One conductor configuration, the typical tangent (Exhibit 5-1A) - tangent (Exhibit 5-1A) configuration, is common to both routes and is present within 100 feet of an occupied residence. The calculated electric and magnetic fields for these configurations are shown in Table 7-2 and Table 7-3.

TABLE 7-2
EMF Calculations for a Typical Tangent (Exhibit 5-1A)-Tangent (Exhibit 5-1A) Span Configuration on the Wood County 138-kV Reinforcement Project Preferred Route (Midway-Brim)

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	0.487	5.49
	At Right-of-Way Edge	0.283 / 0.351	3.77 / 3.98
Emergency Loading	Under Lowest Conductors	0.487	16.31
	At Right-of-Way Edge	0.283 / 0.351	11.21 / 11.85
Winter Rating	Under Lowest Conductors	0.487	44.14
	At Right-of-Way Edge	0.283 / 0.351	30.33 / 31.95

TABLE 7-3

EMF Calculations for a Typical Tangent (Exhibit 5-1A)-Tangent (Exhibit 5-1A) Span Configuration on the Wood County 138-kV Reinforcement Project Alternate Route (Lemoyne-Brim)

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	0.487	13.8
	At Right-of-Way Edge	0.283 / 0.351	9.48 / 9.98
Emergency Loading	Under Lowest Conductors	0.487	16.46
	At Right-of-Way Edge	0.283 / 0.351	11.31 / 11.95
Winter Rating	Under Lowest Conductors	0.487	44.14
	At Right-of-Way Edge	0.283 / 0.351	30.33 / 31.95

The Preferred Route includes one other conductor configuration that is present within 100 feet of an occupied residence, the tangent (Exhibit 5-1A) – deadend (Exhibit 5-1D) configuration. The calculated electric and magnetic fields for these configurations are shown in Table 7-4.

TABLE 7-4

EMF Calculations for a Typical Tangent (Exhibit 5-1A)-Deadend (Exhibit 5-1D) Span Configuration on the Wood County 138-kV Reinforcement Project Preferred Route (Midway-Brim)

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	0.651	5.99
	At Right-of-Way Edge	0.228 / 0.398	4.01 / 4.61
Emergency Loading	Under Lowest Conductors	0.651	17.81
	At Right-of-Way Edge	0.228 / 0.398	11.92 / 13.80
Winter Rating	Under Lowest Conductors	0.651	48.18
	At Right-of-Way Edge	0.228 / 0.398	32.25 / 37.25

The Alternate Route includes the same conductor configuration detailed in Table 7-3 that is present for more than 10% of the overall transmission line length. The calculated electric and magnetic fields for this configuration are shown the Table 7-5.

TABLE 7-5

EMF Calculations For a Typical Tangent (Exhibit 5-1A)-Deadend (Exhibit 5-1D) Span Configuration on the Wood County 138-kV Reinforcement Project Alternate Route (Lemoyne-Brim)

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	0.651	15.06
	At Right-of-Way Edge	0.228 / 0.398	10.08 / 12.25
Emergency Loading	Under Lowest Conductors	0.651	17.97
	At Right-of-Way Edge	0.228 / 0.398	12.03 / 13.85

Winter Rating	Under Lowest Conductors	0.651	48.18
	At Right-of-Way Edge	0.228 / 0.398	32.25 / 37.25

Typical cross section profiles of the normal calculated electric fields and magnetic fields at normal loading, emergency loading and winter conductor rating for all scenarios considered are shown in **Exhibits 7-1 through 7-24 (Appendix 7-1)**.

(b) Current State of EMF Knowledge

Electric and magnetic fields are naturally occurring in the environment and can be found in the Earth's interior and in the human body. They are generated essentially anywhere where there is a flow of electricity, including electrical appliances and power equipment. Electric fields are associated with the voltage of the source; magnetic fields are associated with the flow of current in a wire. The strength of these fields decreases rapidly with distance from the source. EMFs associated with electricity use are not disruptive to cells like x-rays or ultraviolet rays from the sun. EMF fields are thought to be too weak to break molecules or chemical bonds in cells. Scientists have conducted extensive research over the past several decades to determine whether EMFs are associated with adverse health effects, at this time there is no firm basis to conclude that EMFs from transmission lines cause adverse health effects. A number of independent scientific panels have reviewed the research and have stated that there is no basis to conclude that EMFs cause adverse health effects nor has it been shown that levels in everyday life are harmful.

As part of the National Energy Policy Act of 1992, the Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) program was initiated within the 5-year effort under the National EMF Research Program. The culmination of this 5-year effort was a final RAPID Working Group report, which was released for public review in August 1998. The Director of the National Institutes of Environmental Health Sciences (NIEHS) then prepared a final report to Congress after receiving public comments. The NIEHS' Director's final report, released to Congress on May 4, 1999, concluded that extremely low frequency electric and magnetic fields (ELF-EMF) exposure cannot be recognized at this time as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. The Director further stated that the conclusion of this report is insufficient to warrant aggressive regulatory concern.

The following websites sponsored by federal agencies or other organizations provide additional information on EMF:

- Centers for Disease Control/National Institute for Occupational Safety and Health:
<http://www.cdc.gov/niosh/topics/emf/>
- NIEHS: <http://www.niehs.nih.gov/health/topics/agents/emf/>

(c) Line Design Considerations

To minimize the EMFs associated with the construction of the Project, ATSI uses design considerations to reduce the strength of EMFs. For instance, the strength of EMFs can potentially be reduced by installing the transmission line conductors in a compact configuration. Additionally, for multiple circuit transmission lines such as proposed in this Project, selecting certain conductor phasing configurations can reduce the field strengths.

For this Project, ATSI plans to complete final engineering of the facilities according to the requirements of the NESC. The pole heights and configuration were chosen based on NESC specifications, engineering parameters, and cost and should help minimize EMF strength. It is also ATSI's typical practice, as proposed in the new construction portions of this Project, to install 138 kV transmission lines primarily on wood tangent structures supported on horizontal post insulators, which is a form of compact design that reduces EMF field strengths in comparison to other installations.

(d) EMF Public Inquiries Policy

Information on EMF was available at the Public Information Meeting held for the Project on September 26, 2018. This information included a discussion of basic information on electric magnetic field theory, scientific research activities and EMF levels in everyday life. **Appendix 6-2** contains copies of this information. Similar materials will be available upon request to persons along the Project routes.

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

No radio or television interference is expected to occur from the operation of the proposed transmission line along either the Preferred or Alternate Routes. During the operation of transmission lines, gas type discharges (corona) could result in either radio frequency interference (RFI) noise and television interference (TVI) noise under certain conditions. However, large corona levels are typically not encountered at 138 kV, so these types of interference do not generally occur. Consequently, for this Project the potential for radio or television interference is very low.

Further, although radio frequency noise level of the transmission line during heavy rain is greater than the fair weather noise level, the quality of radio reception under typical heavy rain conditions is affected more by atmospheric conditions than by operation of transmission lines. Therefore, the construction of the Project is not expected to increase radio frequency noise levels.

Finally, the gas-type (corona) discharges that can produce RFI and TVI are typically localized effects, resulting primarily from defective hardware (ball and socket hardware in insulators, hardware-to-hardware, line to hardware, etc.) and may be easily and quickly detected. Once detected, the hardware will be repaired or replaced, thus eliminating the interference source.

(4) Noise from Construction, Operations, and Maintenance**(a) Blasting Activities**

Blasting will not be necessary during construction of the Project.

(b) Operation of Earth Moving and Excavating Equipment

Applicant expects that excavation and earth moving will be limited to drilling auger holes for the poles. A vehicle-mounted auger will be used to bore holes and each wood pole will be direct embedded in an approximately 3-foot diameter hole, 9 to 17 feet deep. In the few select locations where steel poles are needed, an excavator will dig a circular area approximately 10 feet in diameter, and approximately 35 feet deep for the concrete foundation. This activity will result in a temporary increase in noise in the vicinity of the Project. Construction activity will generally be limited to daylight hours and will conform to Occupational Safety and Health Administration (OSHA) noise standards. Thus, noise effects are anticipated to be localized, minimal and of short duration.

(c) Driving of Piles, Rock Breaking or Hammering, and Horizontal Directional Drilling

No driving of piles, rock breaking or hammering, or horizontal directional drilling is anticipated during construction of the Project.

(d) Erection of Structures

Pole structures will be installed by vehicle-mounted cranes or equivalent equipment. Self-supporting steel poles will require delivery of concrete for foundation construction, including excavation work for the foundation. The noise associated with these activities will be localized, temporary and generally not louder than the noise generated by earth moving equipment.

(e) Truck Traffic

An increase in truck traffic is anticipated during the construction of the Project for equipment access and equipment delivery. No other additional traffic is anticipated for the Project beyond infrequent, ongoing maintenance.

(f) Installation of Equipment

The equipment will be installed using standard practices and equipment. The noise associated with this activity will be localized, temporary and generally not louder than the noise generated by earth moving equipment.

(B) LAND USE**(1) Map of the Site and Route Alternatives**

A description of each route alternative and the existing and planned land uses along both routes is provided in the following sections.

A map at 1:24,000-scale, including the area 1,000 feet on either side of the centerline, is presented as **Figure 7-1** (refer to Section 4906-5-05) and includes the following information:

- Centerline and ROW for each transmission line route being proposed
- Existing substation locations
- Land use types
- Road names
- Structures
- Incorporated areas and population centers

(2) Impact on Identified Land Uses

Land use in the Project Area (i.e., within 1,000 feet of each transmission line) consists of agriculture, industrial/commercial, residential, existing roadway right-of-way, and institutional (i.e. charitable organization, publicly owned lands, etc.). Comparisons of the various land use types and land use features for both proposed routes are included in **Tables 7-6 through 7-8**. The estimates of each land use type being crossed by the transmission line or land use within the 60-foot wide permanent ROW (linear feet, acreage, and percentages) were determined using geographic information system (GIS) software.

The potential disturbance area during construction activities (vegetation clearing, pole installations, etc.) is limited to the 60-foot wide permanent ROW. The ROW will be restored through soil grading, seeding, and mulching; thus the permanent impact to the ROW will be limited to the removal of existing trees and other vegetation. Property owners may continue to utilize most of the ROW area for general uses that will not affect the safe and reliable operation of the transmission line such as lawn maintenance, crop cultivation, and livestock.

TABLE 7-6
Length and Percent of Land Uses Crossed by Route Alternatives

Land Use	Preferred Route		Alternate Route	
	Linear Feet	Percent	Linear Feet	Percent
Agricultural	30,941.9	96.5	28,077.4	88.3
Industrial/Commercial	474.4	1.5	455.6	1.4
Residential	654.9	2.0	3,209.9	10.1
Road/Railroad Right-of-Way	0.0	0.0	60.0	0.2
Total	32,071.2	100.0	31,802.9	100.0

TABLE 7-7

Acreage and Percent of Land Uses within ROW of Route Alternatives

Land Use	Preferred Route		Alternate Route	
	Acreage	Percent	Acreage	Percent
Agricultural	42.0	95.3	38.6	88.2
Industrial/Commercial	0.7	1.5	0	0
Residential	1.4	3.2	4.0	9.0
Road/Railroad Right-of-Way	0	0	0.6	1.3
Total	44.1	100.0	43.8	100.0

TABLE 7-8

Number of Land Use Features Near the Route Alternatives

	Route Alternatives	
	Preferred	Alternate
Length (in miles)	6.1	6.0
Features within the Potential Disturbance Area of Route Alternatives		
Threatened and Endangered Species (ODNR records) ^c	8	8
Historic Structures (OHI)	0	0
Previously Identified Archaeological Sites	0	1
NWI Wetlands	0	0
Residences	0	0
Commercial/Industrial Properties	0	0
Other Sensitive Land Uses ^b	0	0
Features within 1,000 feet of Route Alternatives (centerline)		
Threatened and Endangered Species (ODNR records) ^c	8	8
Historic Structures (OHI)	0	0
National Register of Historic Places	0	0
Archaeological Sites	1	4
NWI Wetlands	7	12
Residences	83	104
Commercial/Industrial Properties	0	25
Other Sensitive Land Uses ^b	0	0

Notes:

^a Potential disturbance area is defined as the construction workspace (in this case 60-ft wide ROW)^b Other sensitive land uses include airports, parks, state forests, schools, hospitals, churches, golf courses, and

TABLE 7-8

Number of Land Use Features Near the Route Alternatives

	Route Alternatives	
	Preferred	Alternate

cemeteries.

- ^c Current ODNR feedback indicates one species is present within 1-mile of the proposed route and seven species are considered to be within range; however, their presence/absence within 1,000-ft is unknown and is pending further information from ODNR. For purposes of this submission the presence of eight species is assumed within 1,000-ft pending further information from ODNR. Additional discussion regarding these species and information from ODNR is found in 4906-5-08 (C)(1)(a).

(3) Impact on Identified Nearby Structures

(a) Structures within 200 Feet of Proposed Right-of-Way

There are 24 structures (buildings) within 200 feet of the Preferred Route ROW, including 17 residential structures. These range from 55 to 190 feet from the nearest edge of the ROW. There are 27 structures within 200 feet of the Alternate Route ROW, including 19 residential structures. These structures range from 35 to 191 feet from the ROW.

(b) Destroyed, Acquired, or Removed Buildings

The potential removal of structures within the proposed ROW was mitigated during the route selection studies of the Preferred and Alternate Routes through the placement of route centerlines. It is not anticipated that construction of the Preferred or Alternate Routes will require the removal of any structures.

(c) Mitigation Procedures

Mitigation for use restrictions on the ROW, vegetative clearing, and maintenance activities for the transmission line, will be determined as part of ATSI's acquisition of the ROW for this Project, as part of the negotiated settlement between ATSI and the property owner, or as determined in appropriation proceedings. If an existing septic system located in the transmission ROW is impacted by construction, operation, or maintenance of the proposed Project, the septic system will be repaired or replaced by ATSI as necessary to meet the appropriate installation requirements.

(C) AGRICULTURAL LAND IMPACTS

The potential impacts of the Project on agricultural land use include potential damage to crops that may be present, disturbance of underground field drainage systems, compaction of soils, and potential for temporary reduction of crop productivity. Agricultural land used for crop cultivation within the Preferred and Alternate Route ROWs is estimated at 42.0 acres and 39.6 acres, respectively.

Soil compaction resulting from construction activities is typically a temporary issue and is resolved within a few seasons of plowing and tilling the land. ATSI will also work with the

landowners of agricultural land to resolve conflicts with drainage tiles and irrigation systems that are affected by the Project, where necessary.

(1) Agricultural Land Map

Agricultural land use categories and Agricultural District lands are depicted on **Figure 7-2** for both the Preferred and Alternate Routes.

(2) Impacts to Agricultural Lands and Agricultural Districts

The Wood County Auditor's Office was contacted on October 26, 2018 to obtain information on current Agricultural District parcel records. As of October 26, 2018, there were 54 Agricultural District parcels within 1,000 feet of the Preferred and Alternate Routes. The provided data fulfills the requirement of Admin. Code Rule 4906-5-07 (C)(1)(b), which states this data must be collected not more than 60 days prior to submittal.

(a) Acreage Impacted

Table 7-5 provides the acreage impacted that is in current agricultural land use (crop cultivation, Agricultural District lands, and pasture or open land. The agricultural land use determination was based on aerial imagery and field observations.

(b) Evaluation of Construction, Operation, and Maintenance Impacts

The following subsections provide an evaluation of the impact of the construction, operation, and maintenance of the proposed transmission line on the land, agricultural facilities and agricultural practices within the Project area, where present.

(i) Field Operations

Agricultural field operations such as plowing, planting, cultivating, spraying, and harvesting of cultivated crops will only be interrupted for a portion of one growing season or a portion of one dormant season during construction of the Project. Property owners will be compensated for crop damages resulting from ATSI's construction activities. Additionally, no significant impacts to livestock operations or grazing areas are anticipated. Property owners may continue to utilize most of the ROW area for general uses after construction, such as lawn maintenance, crop cultivation, and livestock, contingent upon the use having no adverse impact on the safe and reliable operation of the transmission line.

(ii) Irrigation

There are no known irrigation systems within the proposed ROW for either route. ATSI will identify the presence of any such systems through contact with landowners once the final route is approved. ATSI will coordinate with any landowner if an irrigation system must be relocated to minimize impacts to the irrigation system's operation. ATSI will ensure that the relocation of any irrigation systems will be at no cost to the landowner.

(iii) Field Drainage Systems

Damage to field tile systems is unlikely given the installation of mostly wood pole structures and the relatively short construction duration. ATSI will coordinate with landowners of agricultural land to minimize impact to field tile systems and to restore damaged systems to their pre-construction condition, where necessary.

(iv) Structures Used for Agricultural Operations

There are no structures within 200 feet of the ROW that will be adversely affected by the construction and operation of the transmission line.

(v) Agricultural Land Viability for Agricultural Districts

Both the Preferred and Alternate Routes cross a number of Agricultural District parcels, and portions of these parcels are currently being used for crop cultivation. Agricultural District parcels within the Preferred and Alternate Route ROWs is 35 parcels (38.4 acres) and 20 parcels (42.3 acres), respectively. As property owners will be able to continue to utilize most of the ROW area within an Agricultural District for general uses, such as crop cultivation, no significant impacts on the viability of the Agricultural District land are anticipated.

(c) Mitigation Procedures

Mitigation for damage to existing crops and the compaction of soils is provided as compensation to the property owner in the easement for the ROW. The specific terms of the easement regarding crop damage or soil compaction are determined as part of ATSI's acquisition of the ROW for the Project, as part of the negotiated settlement between ATSI and the property owner, or as determined in appropriation proceedings. Additionally, ATSI and the contractors hired to work on the Project have extensive experience in transmission line construction. Both ATSI and the selected contractors will work to minimize agricultural impacts during construction of the Project.

(i) Avoidance or Minimization of Damage

In order to minimize impacts to agricultural operations, ATSI has considered pole placement where the Preferred and Alternate Routes must cross agricultural fields. Where reasonable, poles have been located at the edges of agricultural fields. Where poles are located within agricultural fields, the single wooden poles will cause minimal disruption to agricultural activities. In instances where there is permanent disruption or damage in the ROW, compensation for this limited impact will be provided to the property owner.

(ii) Field Tile System Damage Repairs

Concerns over interference with field tile drainage systems will be addressed on a case-by-case basis with the individual property owner. In general, ATSI will provide mitigation for damage to underground drainage systems resulting from construction, operation, and maintenance activities by repairing or replacing damaged sections of the drainage systems as necessary.

(iii) Segregation and Restoration of Topsoil

Excavated topsoil will be segregated and stockpiled where necessary to maintain long-term agricultural uses. Topsoil will also be de-compacted and restored to original conditions, unless otherwise agreed to by the landowner.

(D) LAND USE PLANS AND REGIONAL DEVELOPMENT

This section of the Application provides information regarding land use plans and regional development.

(1) Impacts to Regional Development

This Project is expected to support regional development in Wood County through increased reliability and availability of electric power to residential, commercial, institutional, and industrial users throughout the region. No negative impacts on regional development are foreseen for this Project. A more detailed discussion of the need for this Project and how it will affect regional development is included in Section 4906-5-03 of this Application.

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

Mr. David Steiner, Director at the Wood County Planning Commission was contacted on November 26, 2018 regarding compatibility of the proposed transmission lines with regional land use plans. Mr. Steiner indicated that both the Preferred and Alternate Routes are compatible with Wood County's current land use plan. As such, the Project is compatible with the current regional land use plan and will support its implementation by allowing for further economic development in the Project area.

(E) CULTURAL AND ARCHAEOLOGICAL RESOURCES

Research on cultural resources in the Project area were conducted on behalf of ATSI. This research has included a records check and literature review for both the Preferred and Alternate Routes using the Ohio History Connection (OHC) online mapping database. A summary of this effort will be submitted to the OHPO and OPSB under separate cover.

(1) Cultural Resources Map

Based on the cultural resources desktop study, there are five sites recorded in the Project Area with one, 33WO0408, recorded within the Alternate Route ROW. These sites are recorded from local artifact collections and their significance has not been officially established or evaluated. These sites were identified on sandy, former beach deposits that are scattered in this area. There are no sites recorded in the vicinity of the Preferred Route.

There are no recreational areas or trails, scenic rivers, scenic routes or byways, or registered landmarks of historic, religious, archaeological, scenic, natural, or other cultural significance within 1,000 feet of the proposed routes.

(2) Cultural Resources in Study Corridor

The cultural resources review has involved background research utilizing data files from the OHPO online mapping database for both the Preferred and Alternate Routes.

For background research, a 1-mile buffer was used around both the Preferred and Alternate Routes to locate previously identified cultural resources and to provide information on the probability of identifying cultural resources within the Project area. The OHPO online mapping database included a review of the Ohio Archaeological Inventory (OAI), the Ohio Historic Inventory (OHI), Determination of Eligibility (DOE) files, the National Register of Historic Places (NRHP), historic cemeteries, historic bridges, National Historic Landmarks (NHLs), and previous cultural resources surveys.

There is one previously recorded archaeological site 33WO0408 located within the Project area for the Alternate Route. This is a site that was recorded from inspection of an amateur collection and is not likely to be significant.

No known cultural resources or cultural resources investigations were identified within the Project area of the Preferred Route from the desktop review. A summary of resources and studies within 1-mile of the proposed Project was completed and will be submitted to the OHPO and OPSB under separate cover.

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

Based on the results of the cultural resources background research within 1-mile of the proposed Project, impacts to known cultural resources associated with the construction, operation, and maintenance of the proposed Project are not anticipated.

(4) Mitigation Procedures

Based on the results of the cultural resources investigations, no significant impacts to historic properties are anticipated as a result of the Project; therefore, no mitigation is proposed.

(5) Aesthetic Impact**(a) Visibility of the Proposed Facility**

Both the Preferred and Alternate Routes will be visible from residences and other vantage points and landmarks. However, as the area is mostly active farmland with pockets of residential developments dating from the late 19th and early 20th century, many roads in the area are paralleled by wood poles supporting distribution lines, as well as mature trees, and existing 138 kV electric transmission lines occur in parts of the Project area. The addition of the proposed Project is not expected to have a significant negative visual impact.

(b) Facility Effect on Site and Surrounding Area

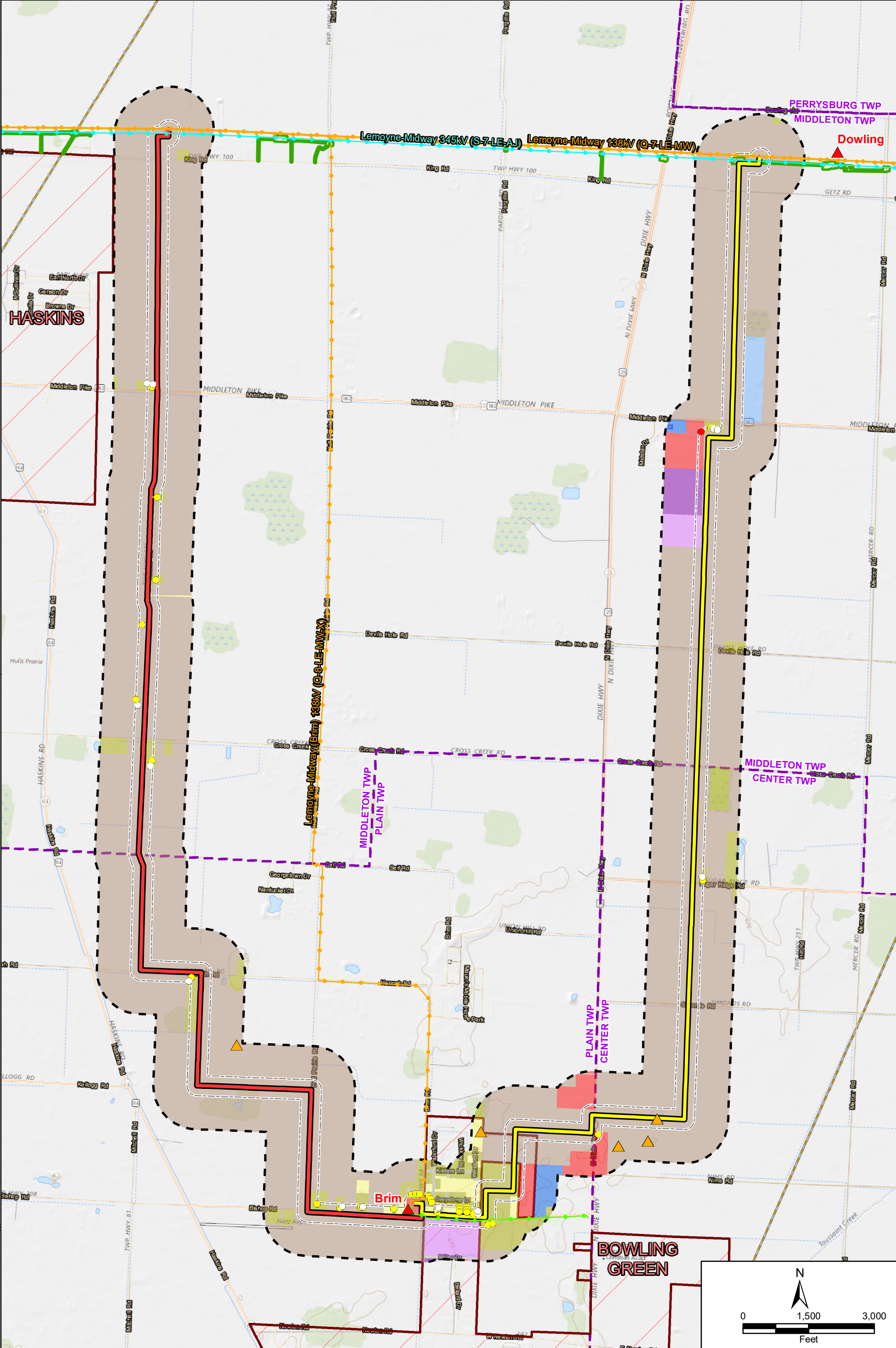
To the extent the construction of the proposed transmission line has any effect on the existing visual aesthetics of the area, the impacts will result primarily from the introduction of a new

man-made element in the landscape. The degree of visual impact of any new man-made element will vary with the viewer and the setting and such impacts can be partially evaluated by comparing the amount of contrast resulting from the construction of the new element and the existing landscape. For example, if the transmission line were screened from view, then the aesthetic impact would be comparatively less than if the transmission line were placed in an existing open area, depending on the viewer. In areas where the transmission line follows similar facilities, the aesthetic impact would be further reduced, because it would create only an incremental change in the existing visual setting.

(c) Visual Impact Minimization

The ability to minimize the visual impacts of the proposed transmission line is constrained by engineering requirements, existing land use, and the Project length. ATSI has limited the potential aesthetic impacts of the transmission line to the extent possible through the route selection process, and where practical, paralleling or overbuilding existing transmission and distribution lines and modern transportation infrastructure.

GPD Group
Path: C:\Users\slaschweizer\Desktop\GIS\Amn\FirstEnergy\FE LemoyneBrim 7.mxd

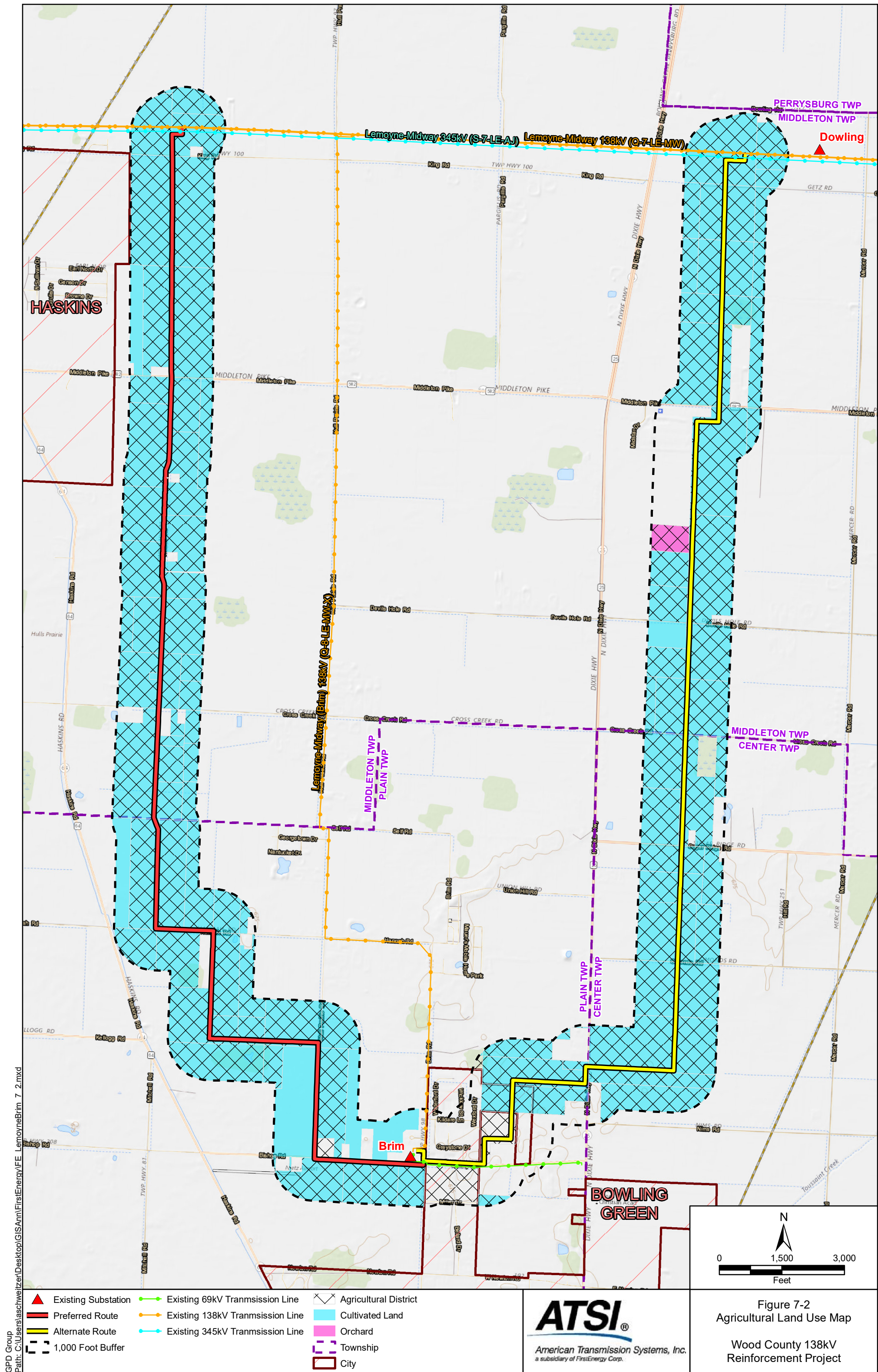


Existing Substation	Existing 69kV Transmission Line	Commercial	Industrial	Township
Preferred Route	Existing 138kV Transmission Line	Other	Commercial	City
Alternate Route	Existing 345kV Transmission Line	Residential	Residential Vacant	
1,000 Foot Buffer	OAI Archaeological Site	Roadway Right-of-Way	Residential	
200 Foot Buffer	Previous Cultural Resources Survey	Agricultural	Publicly Owned	
		Industrial Vacant	Charitable Organization	

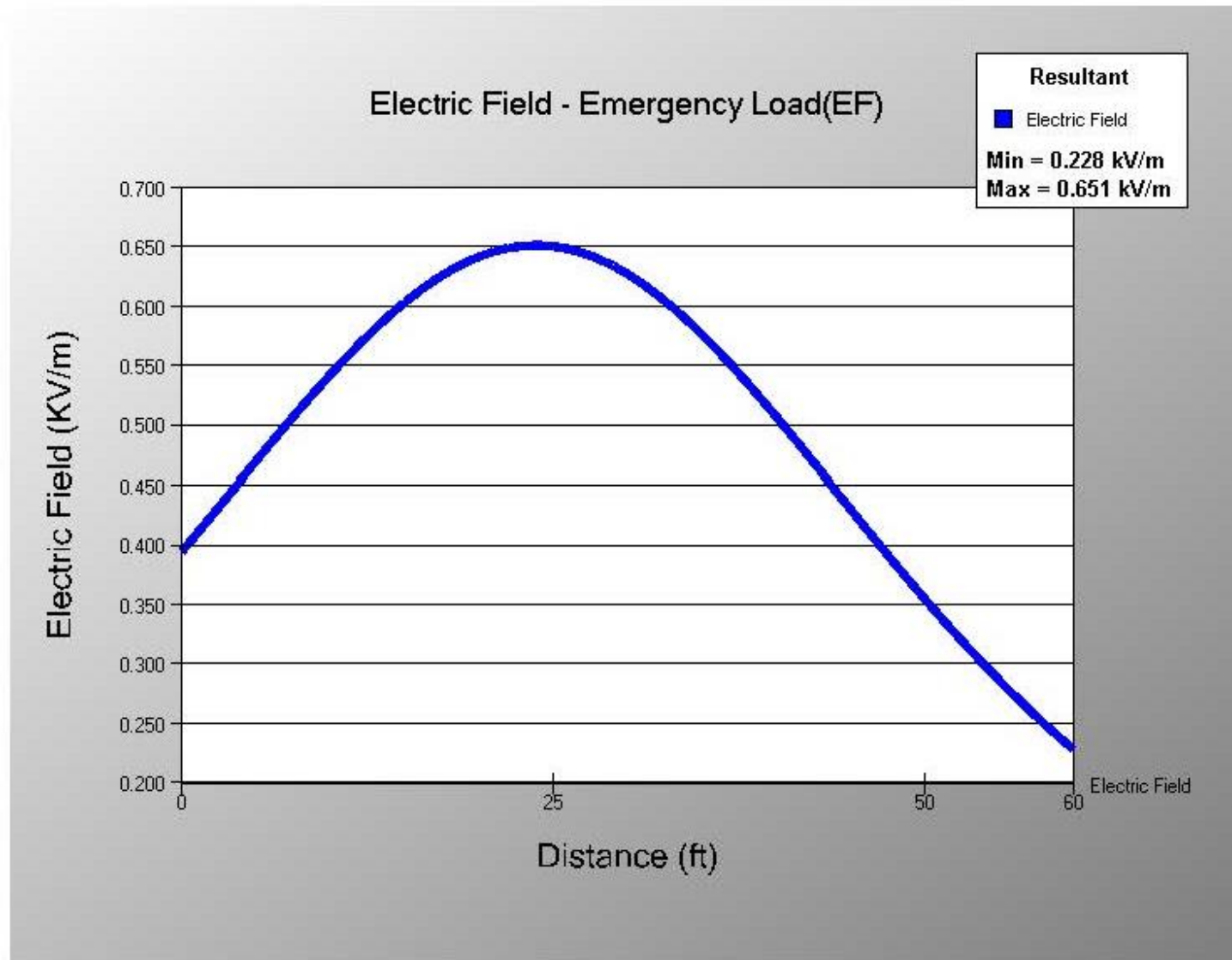


Figure 7-1
Land Use Map

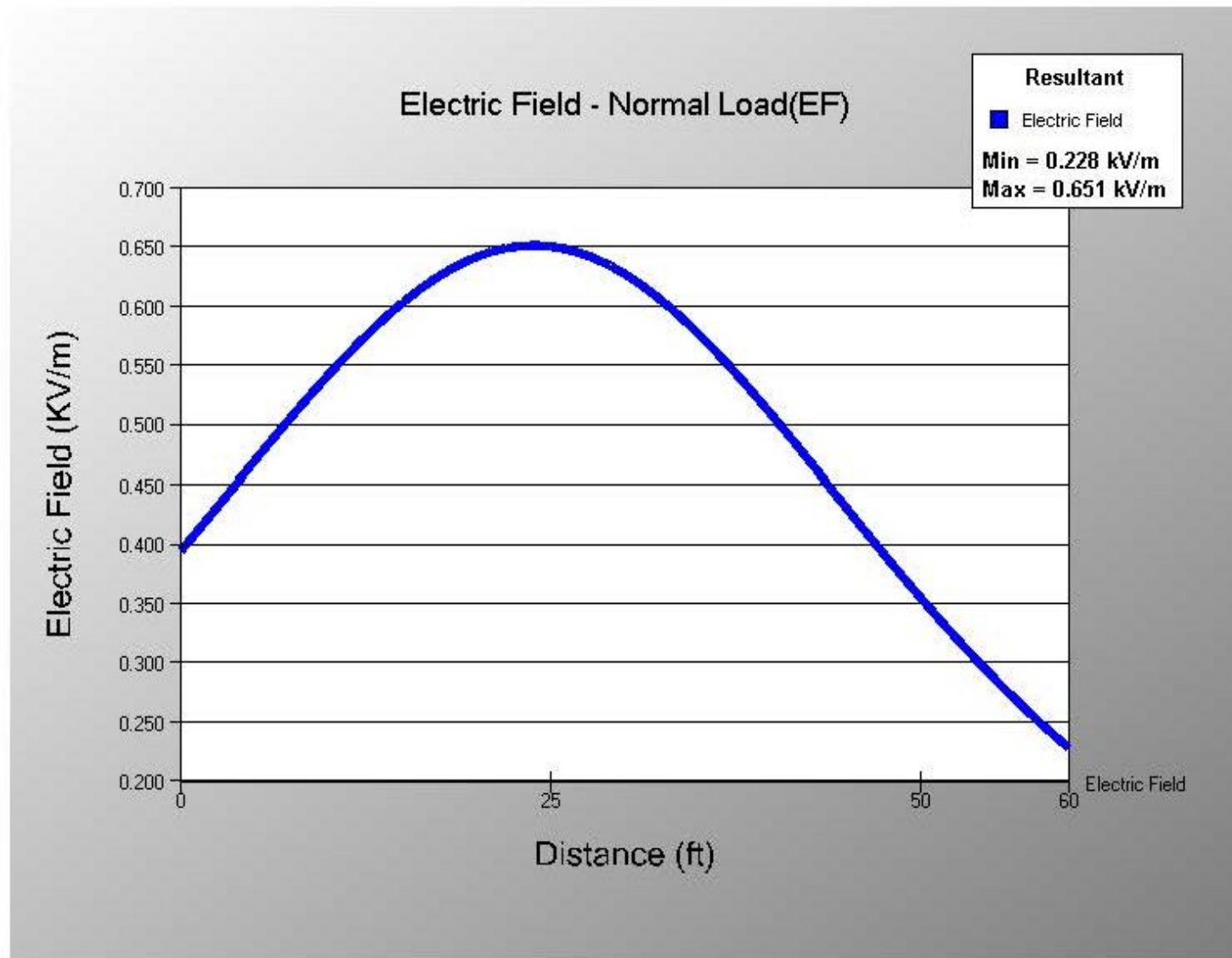
Wood County 138kV
Reinforcement Project



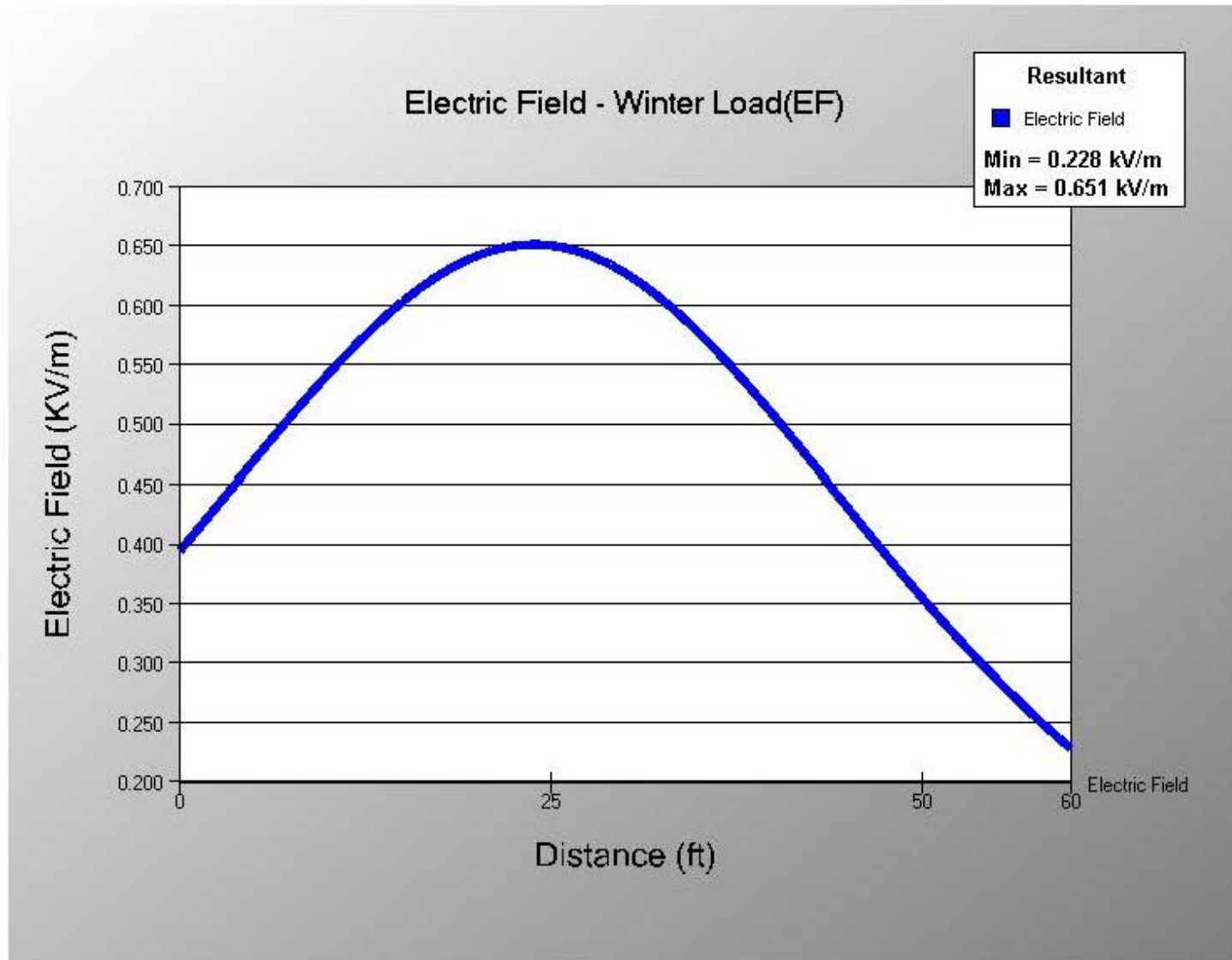
Electric Field, Midway-Brim (Preferred), Deadend



Electric Field, Midway-Brim (Preferred), Deadend



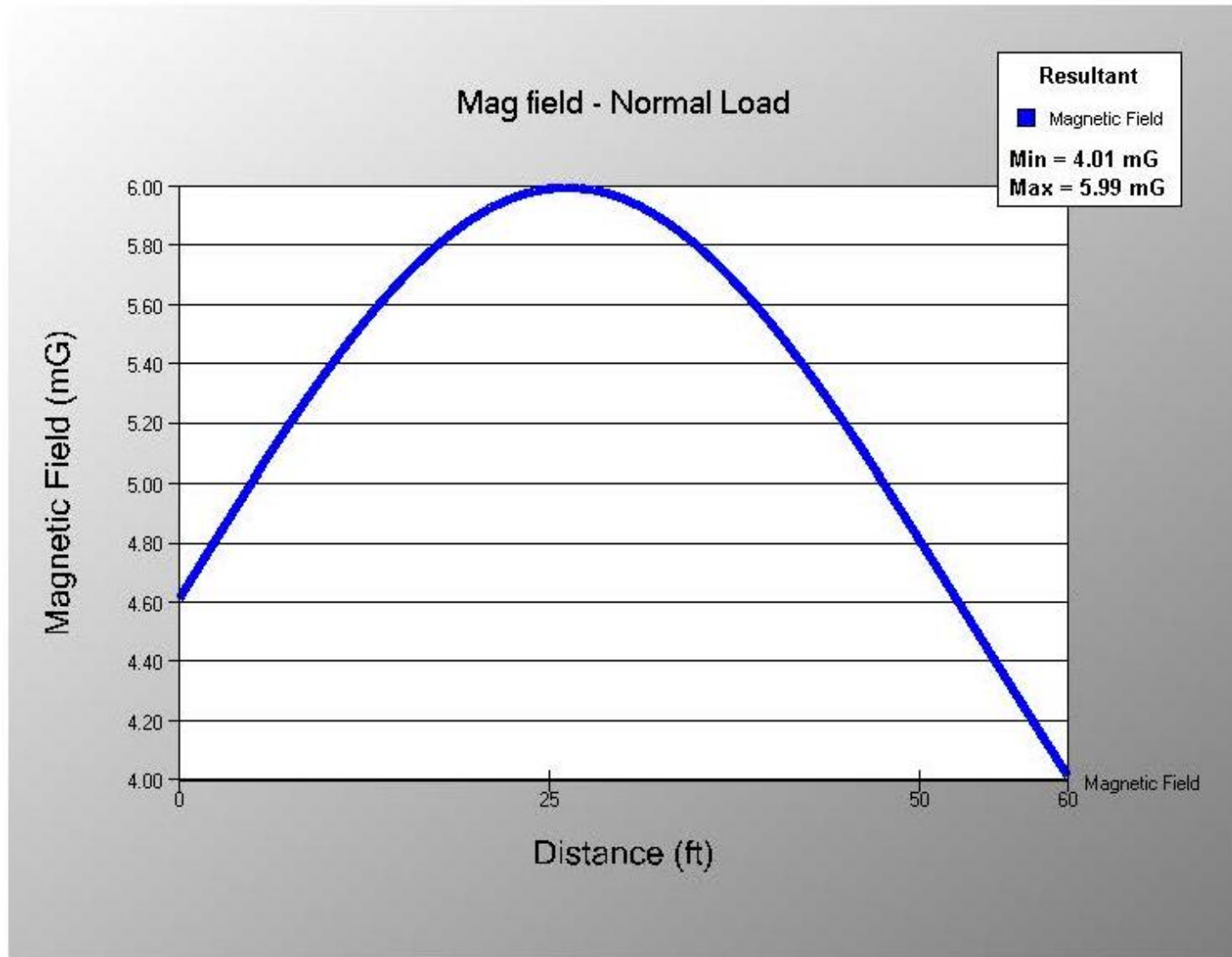
Electric Field, Midway-Brim (Preferred), Deadend



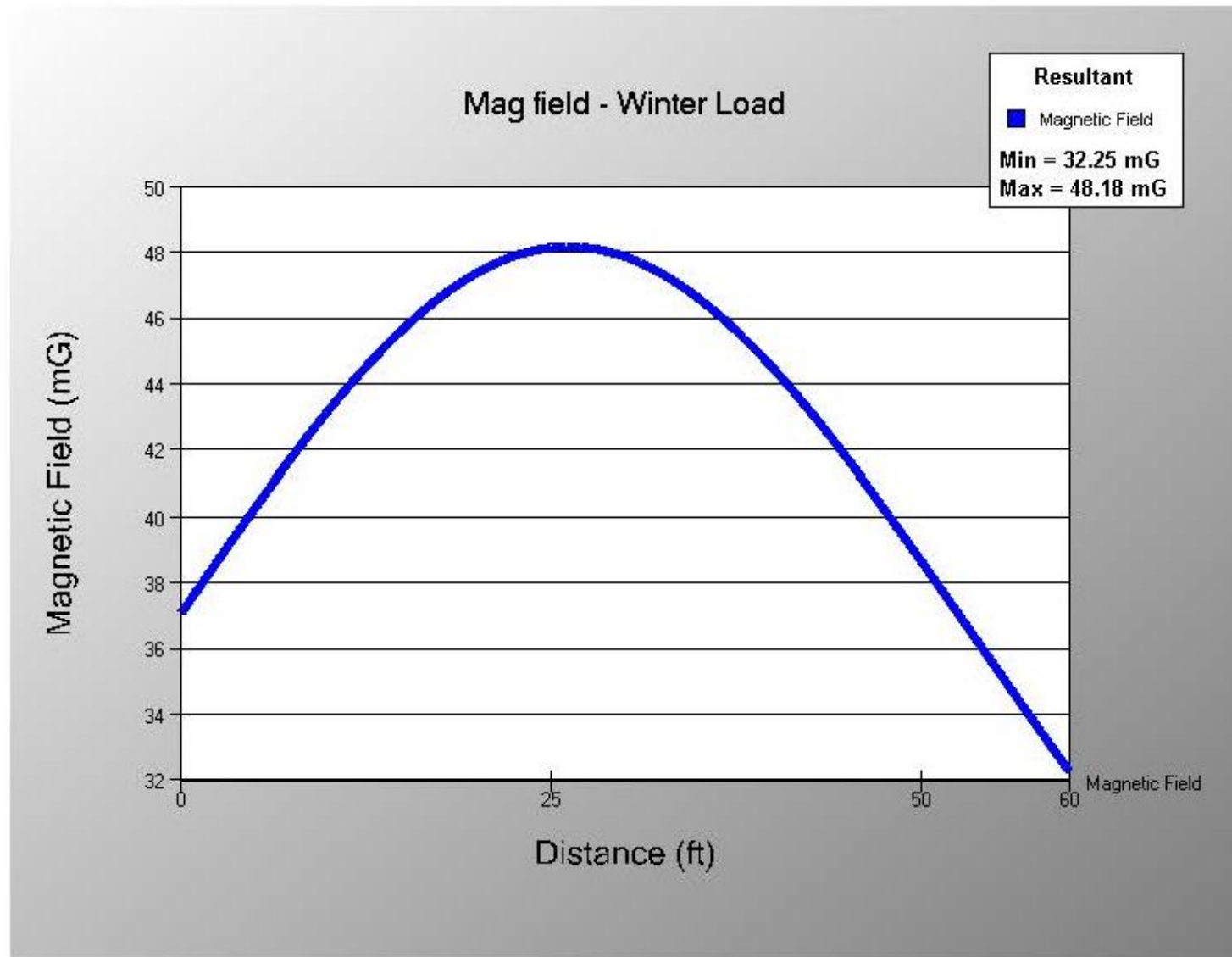
Magnetic Field, Midway-Brim (Preferred), Deadend



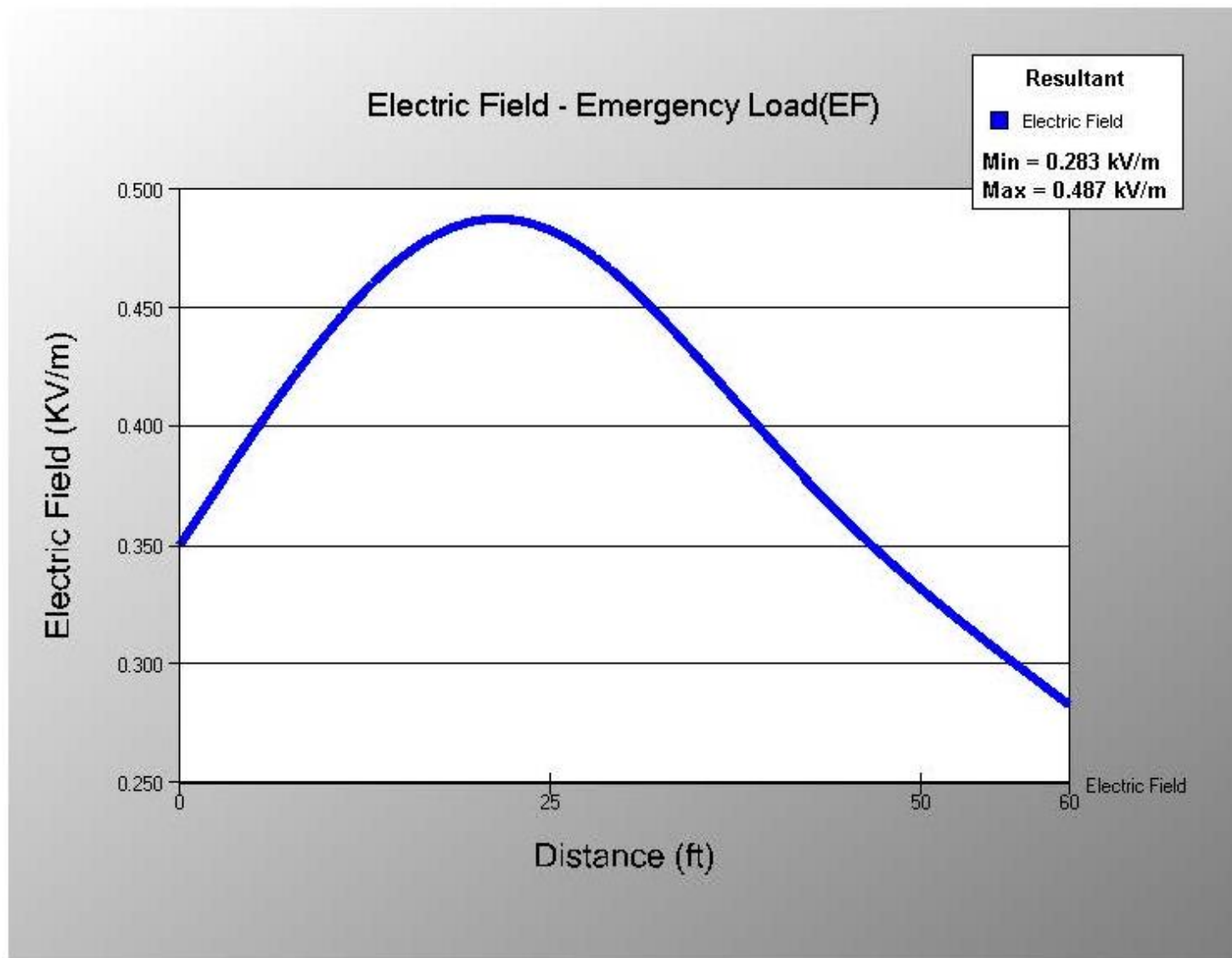
Magnetic Field, Midway-Brim (Preferred), Deadend

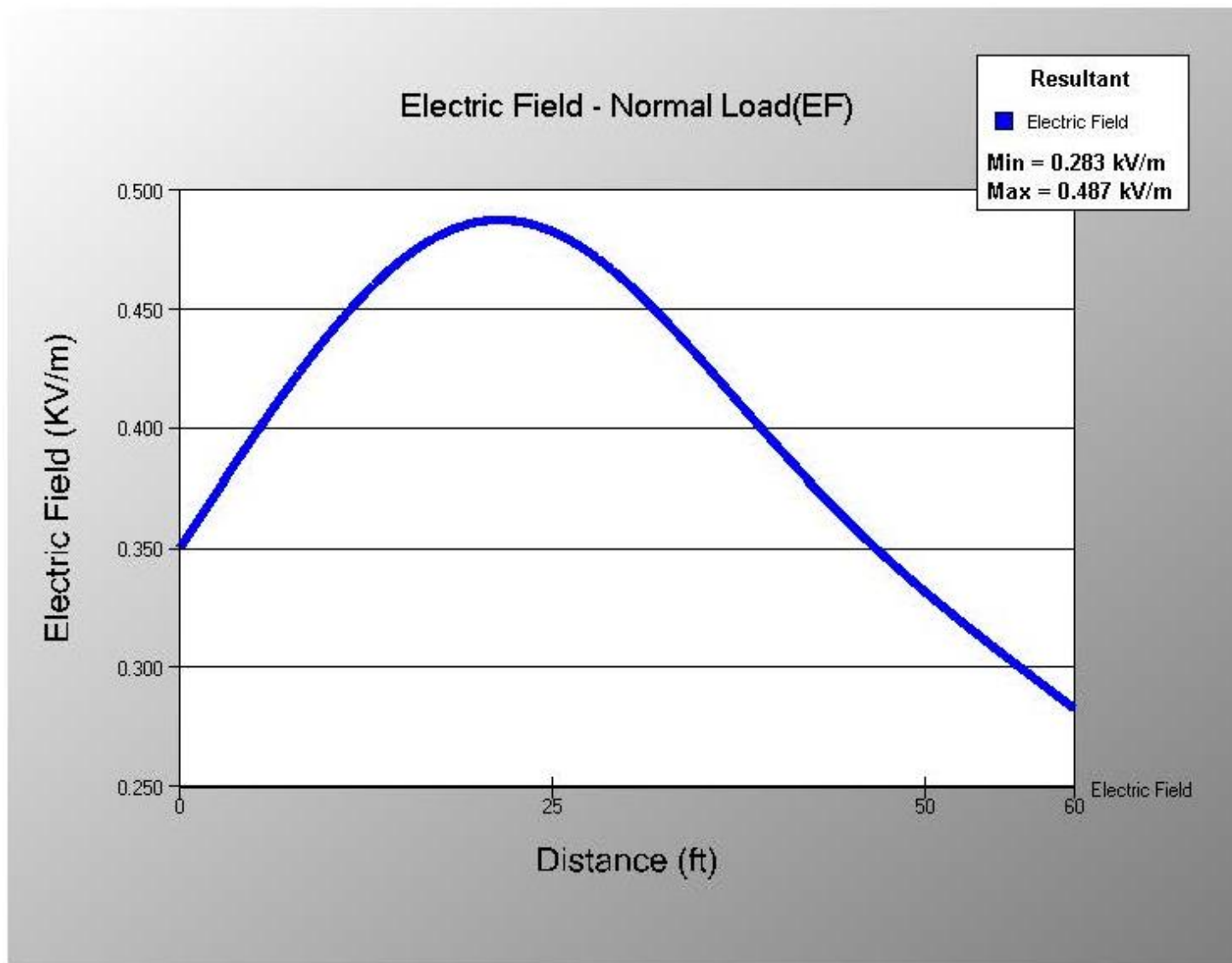


Magnetic Field, Midway-Brim (Preferred), Deadend

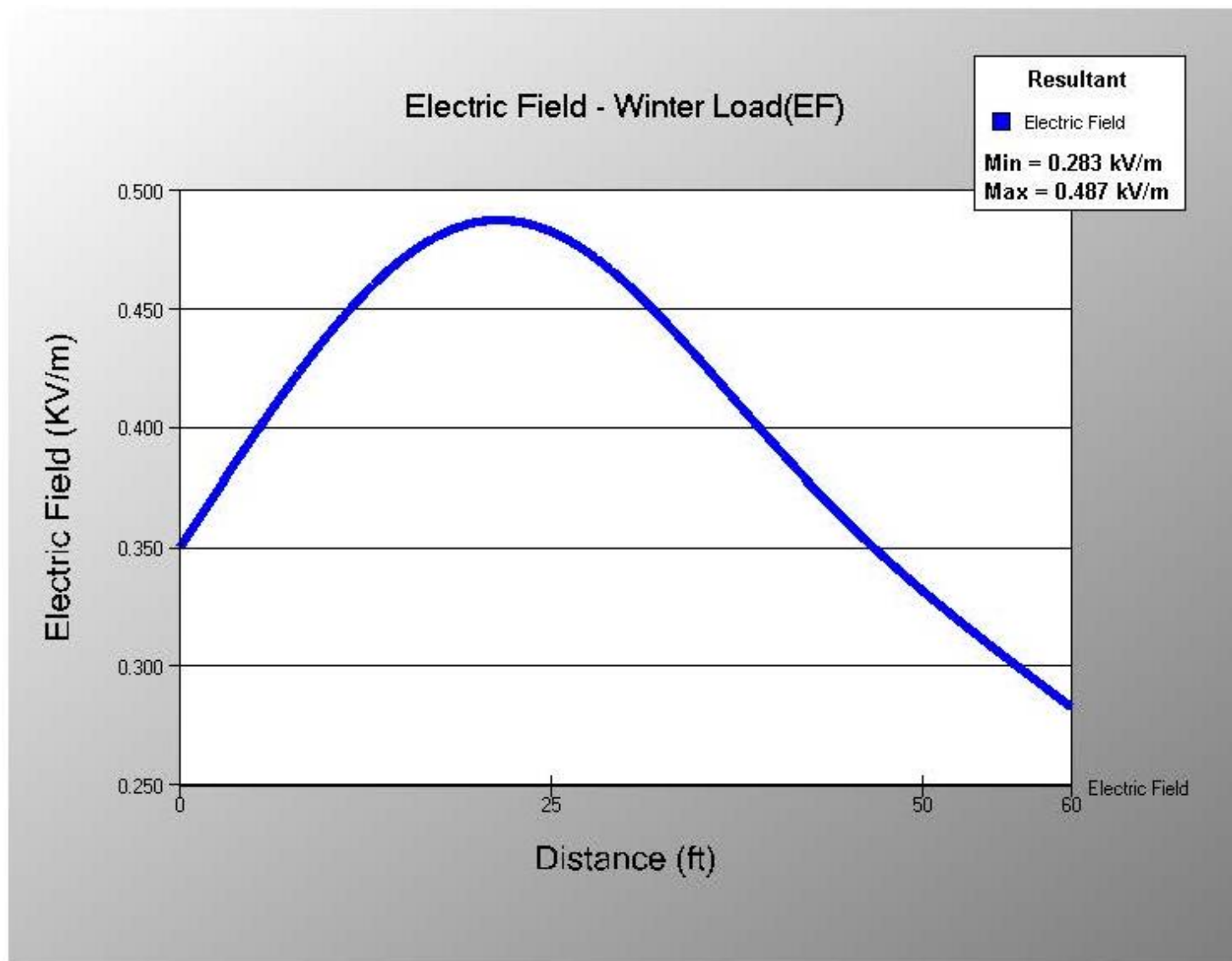


Electric Field, Midway-Brim (Preferred), Tangent

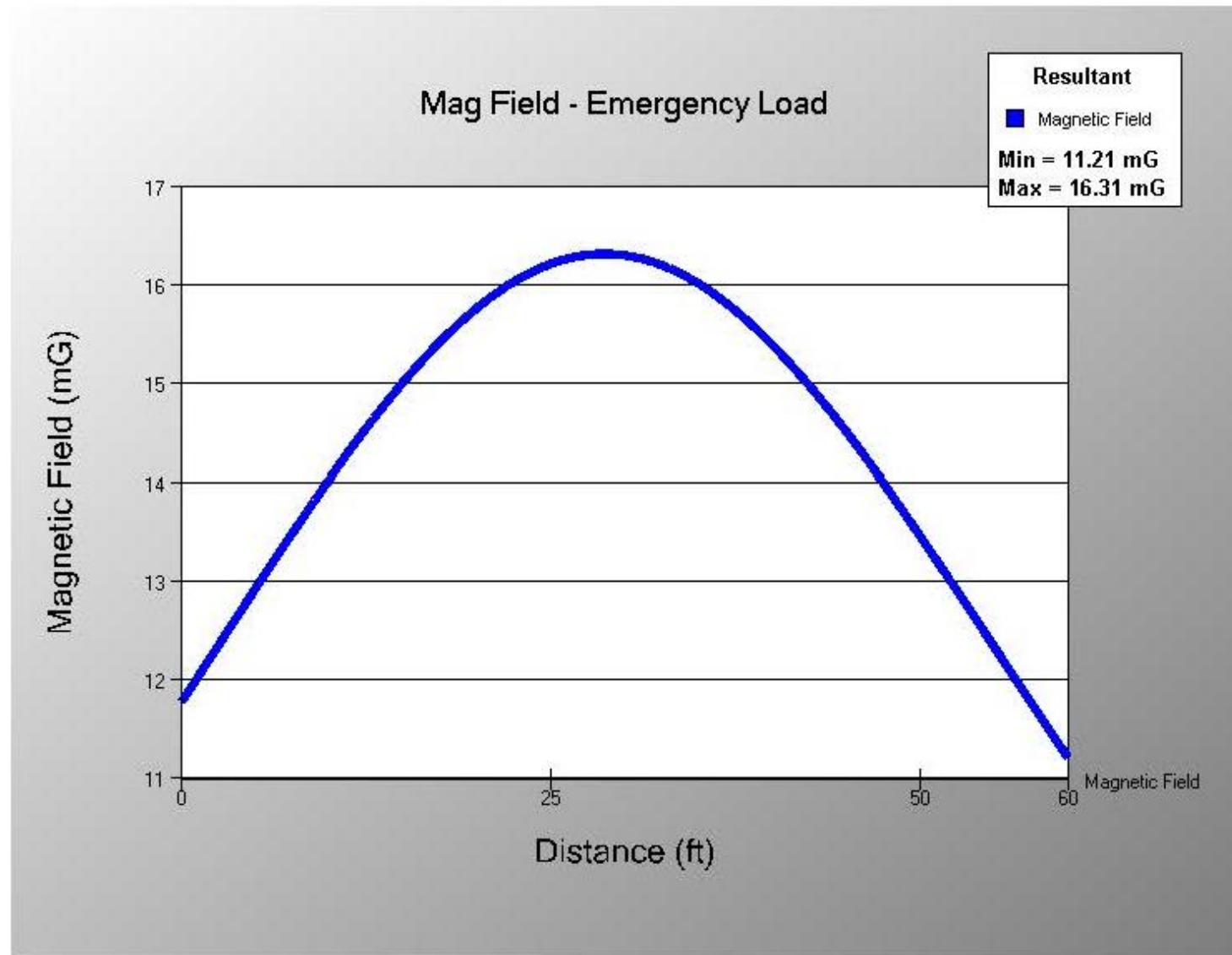




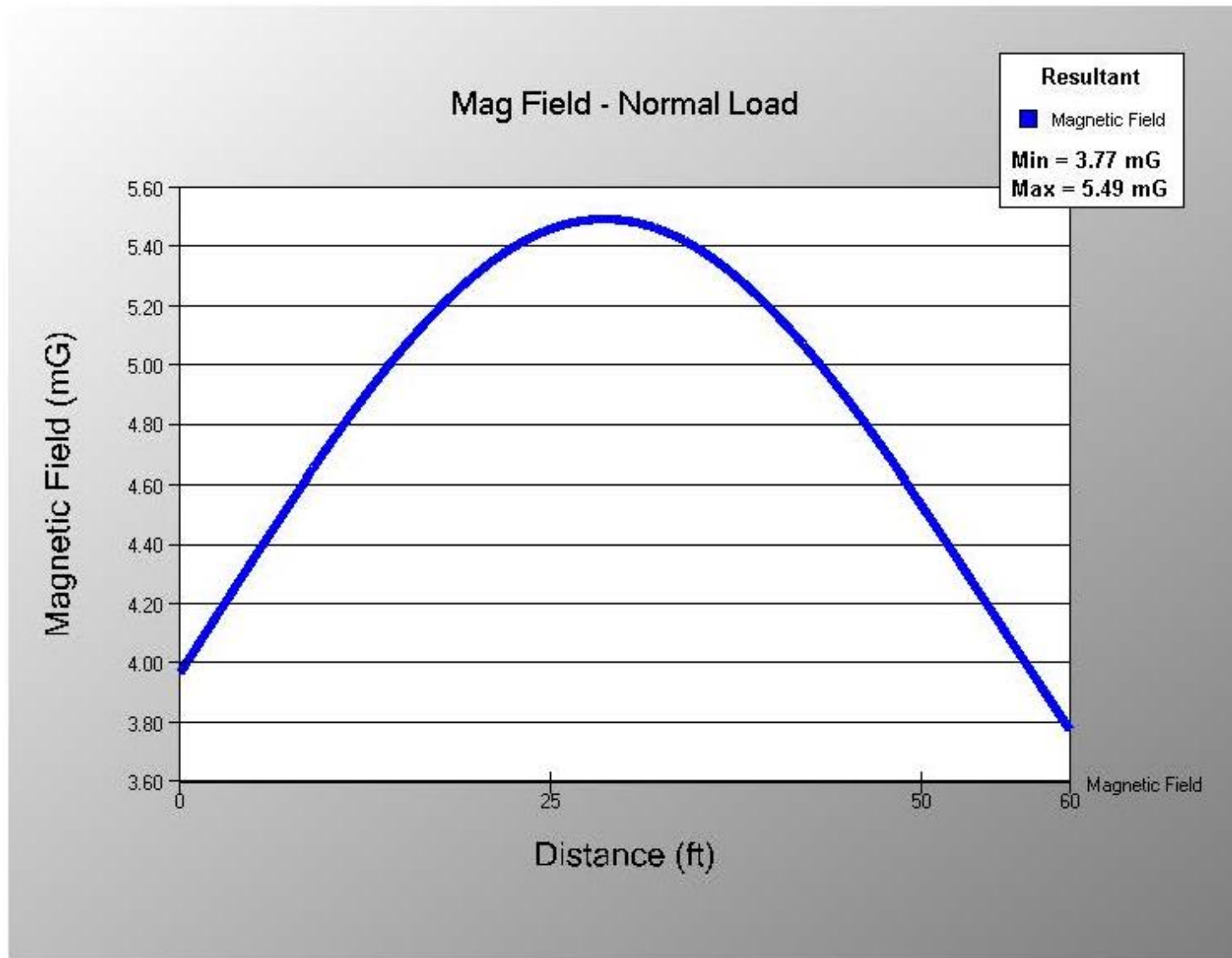
Electric Field, Midway-Brim (Preferred), Tangent



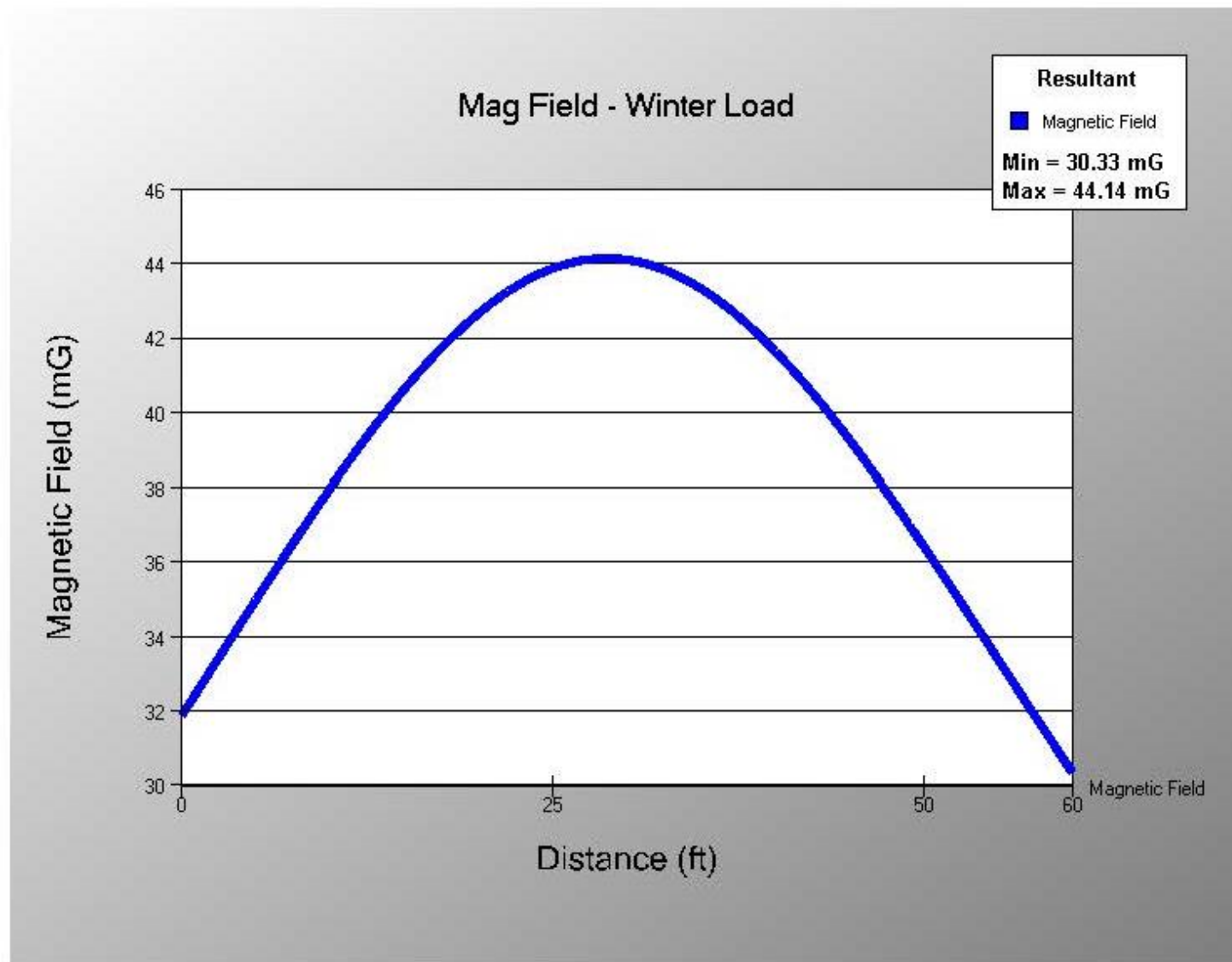
Magnetic Field, Midway-Brim (Preferred), Tangent



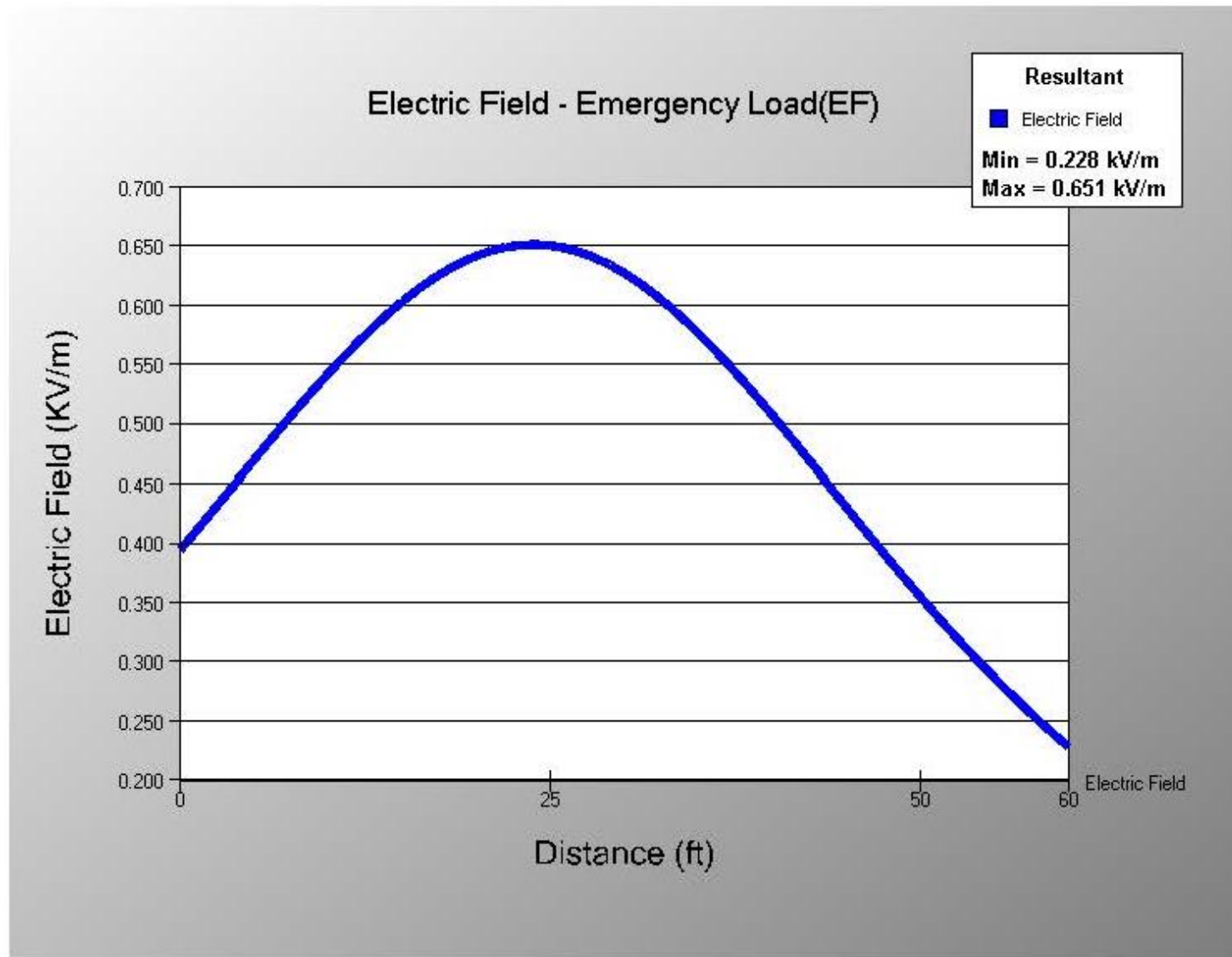
Magnetic Field, Midway-Brim (Preferred), Tangent



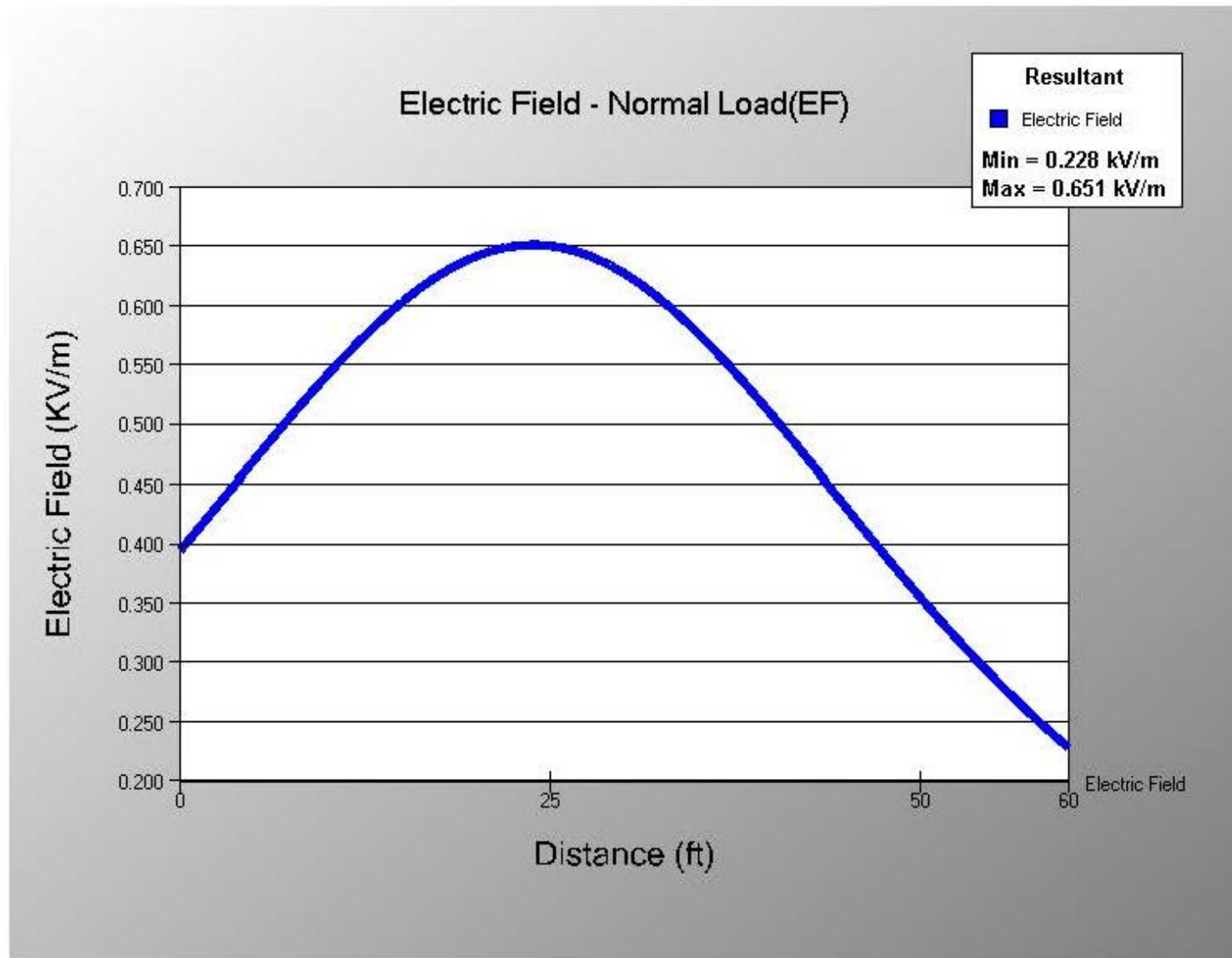
Magnetic Field, Midway-Brim (Preferred), Tangent



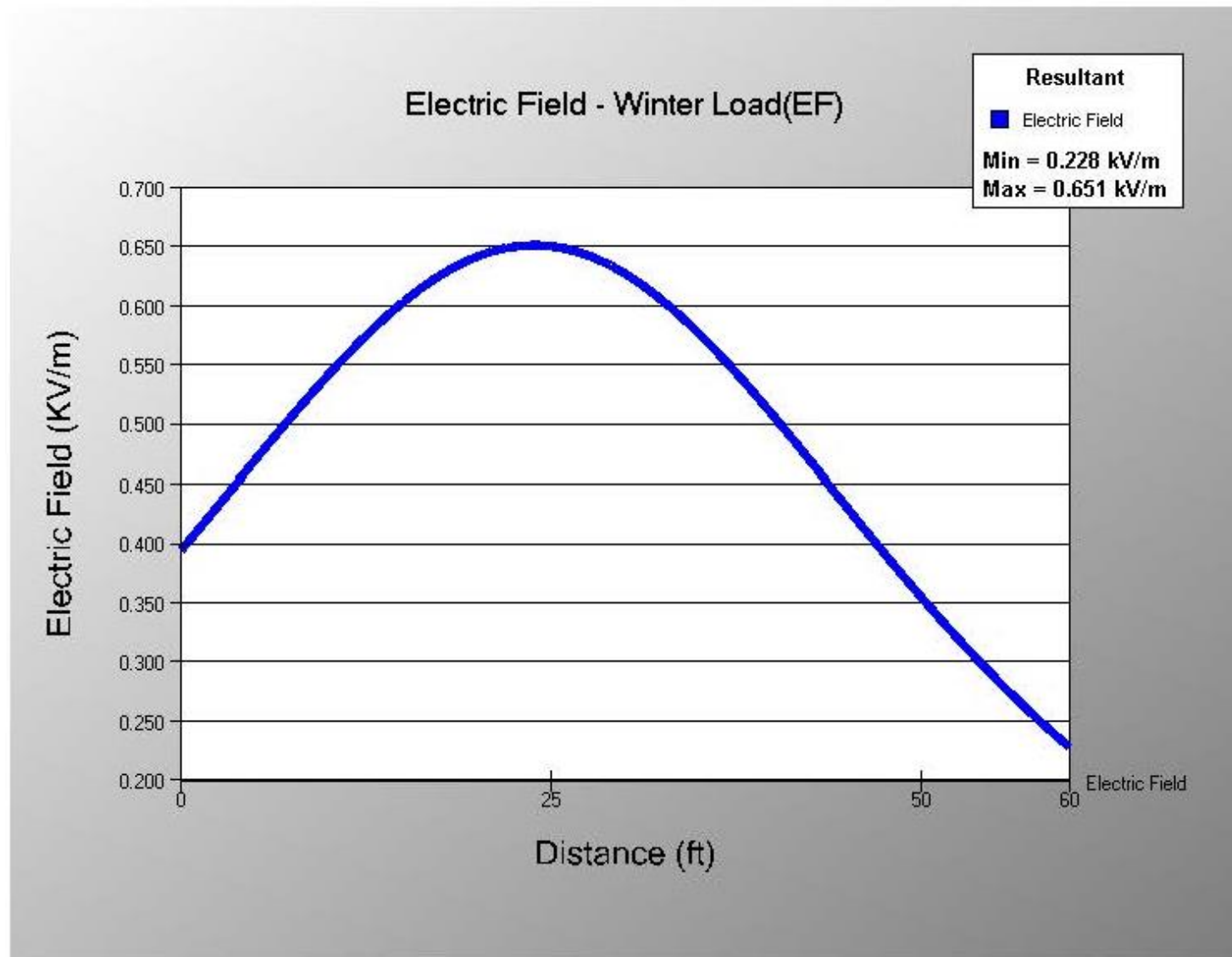
Electric Field, Lemoyne-Brim (Alternate), Deadend

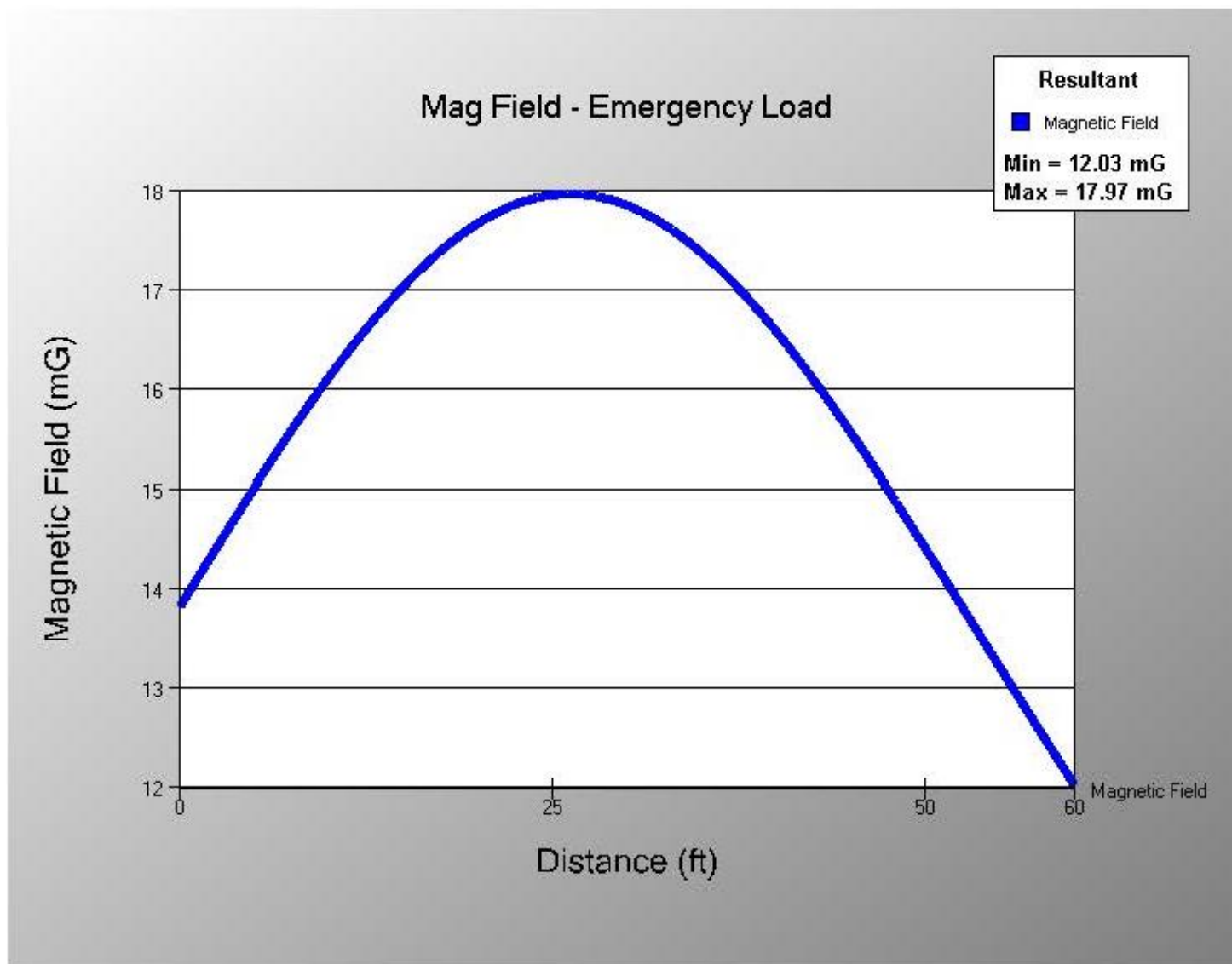


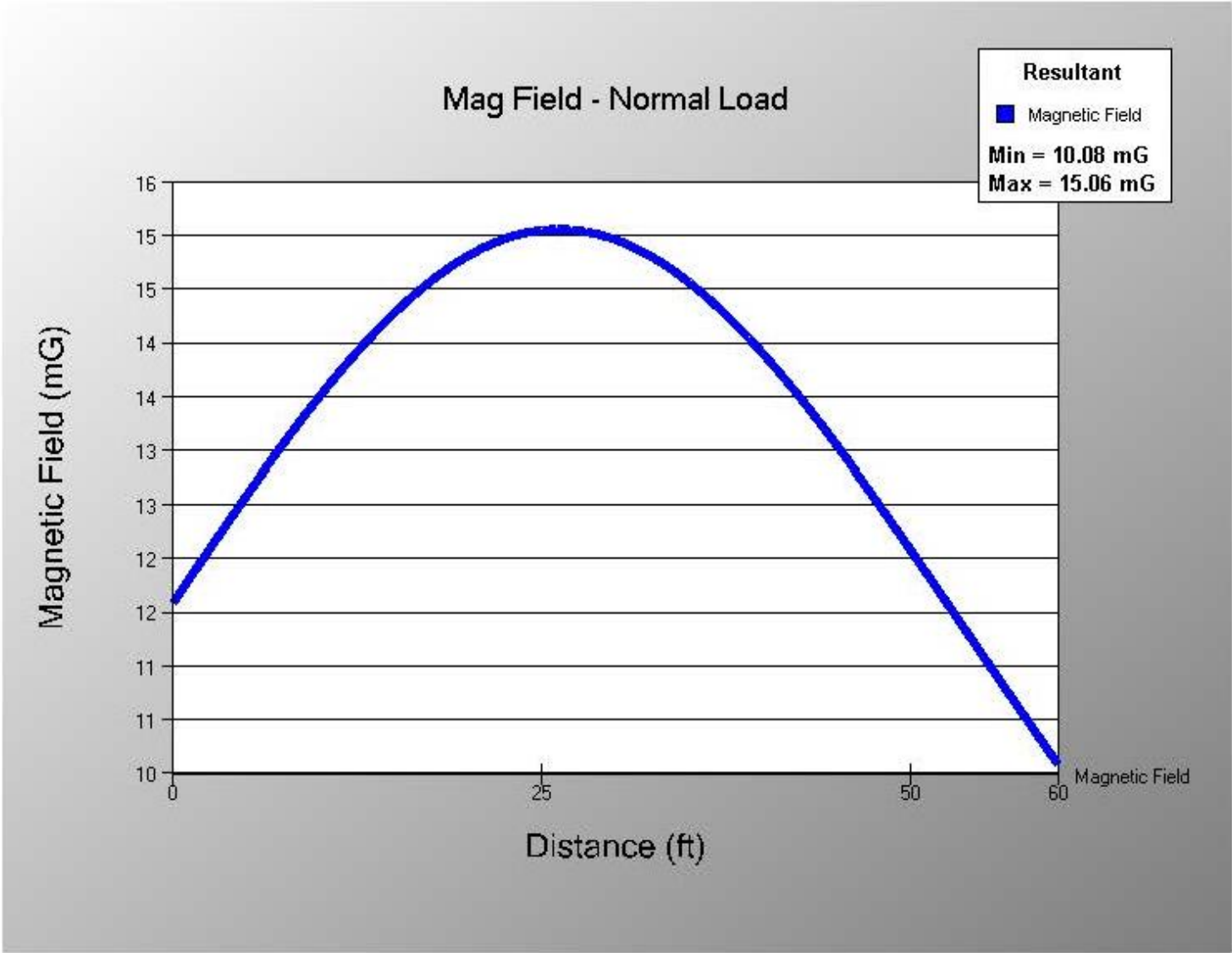
Electric Field, Lemoyne-Brim (Alternate), Deadend

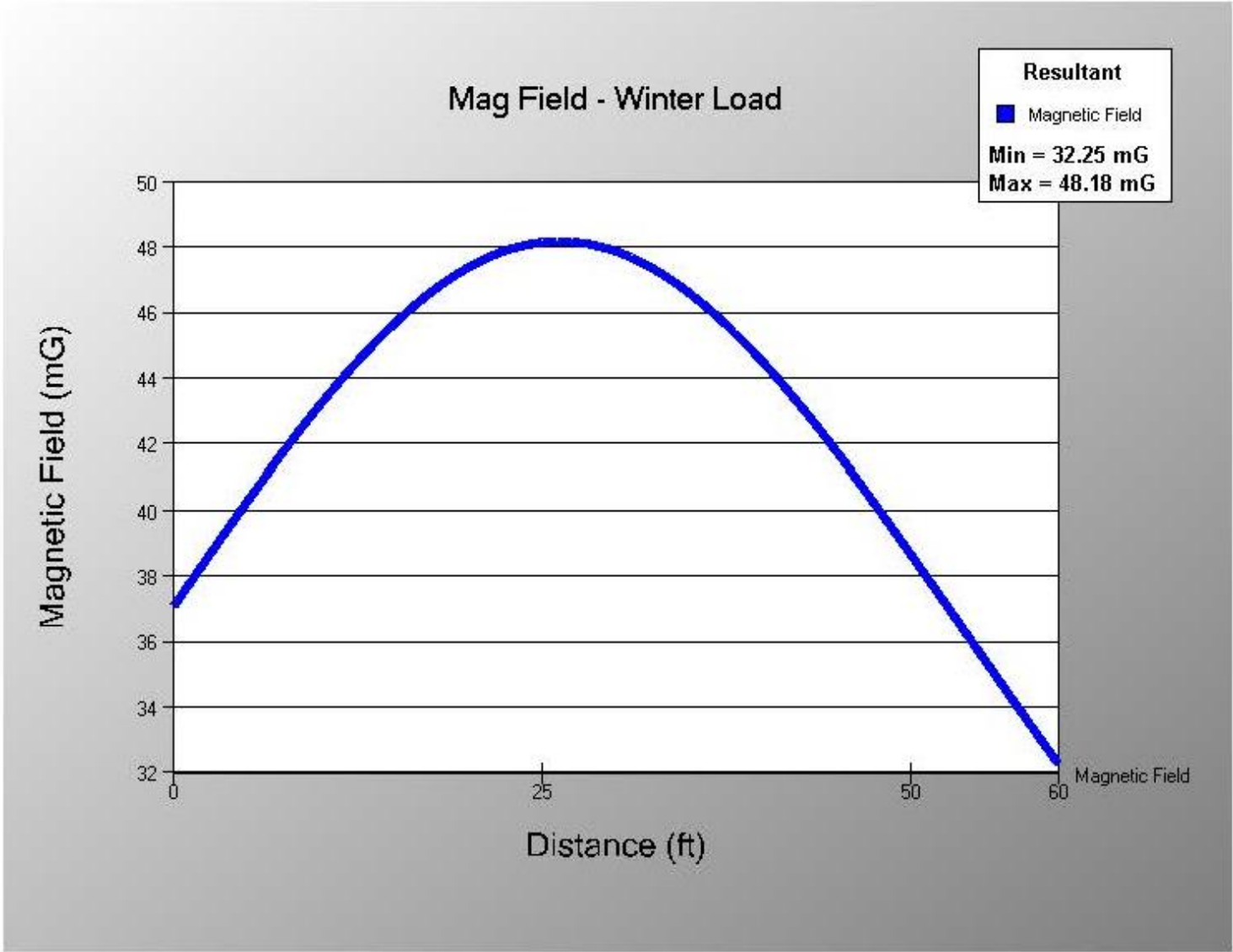


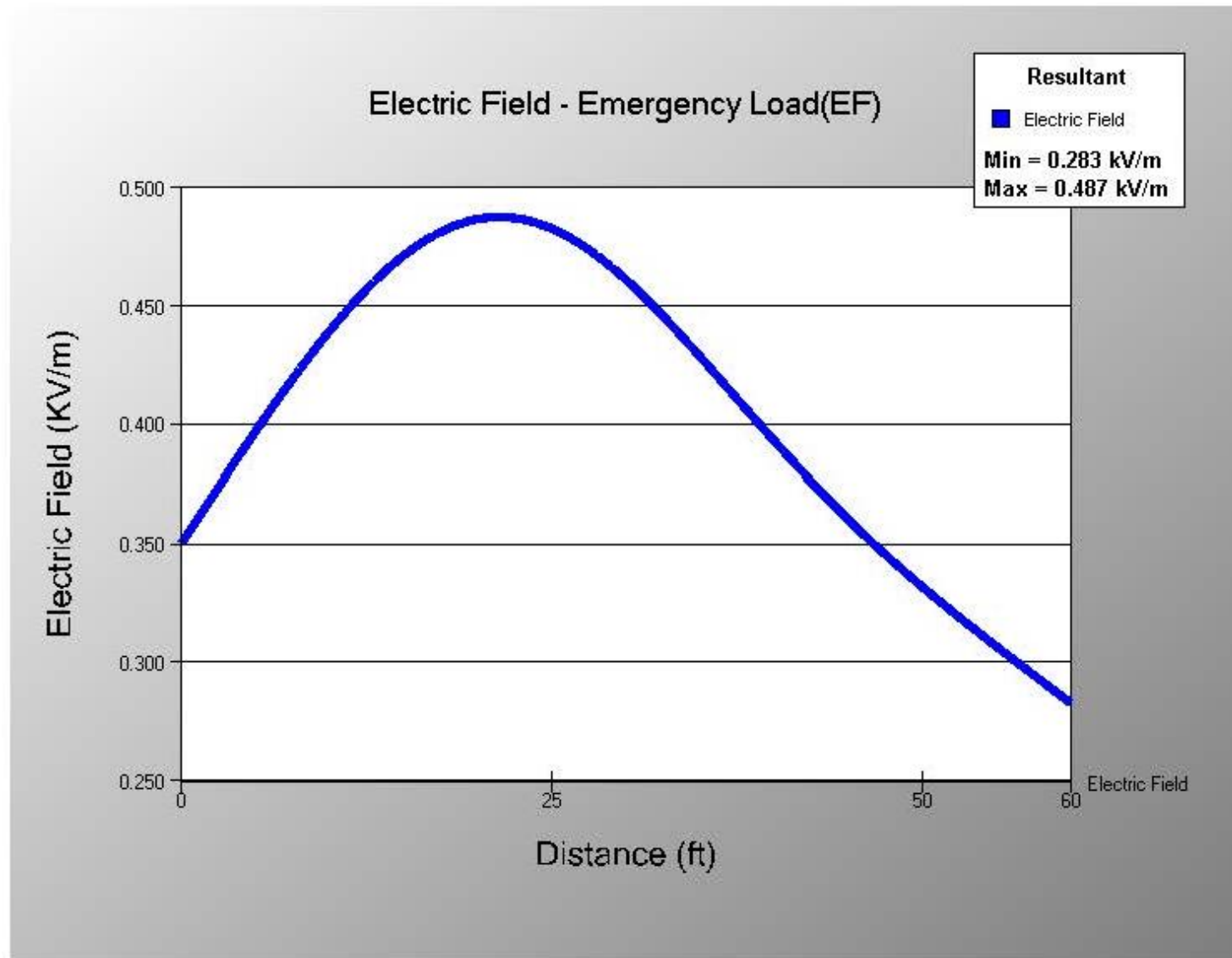
Electric Field, Lemoyne-Brim (Alternate), Deadend

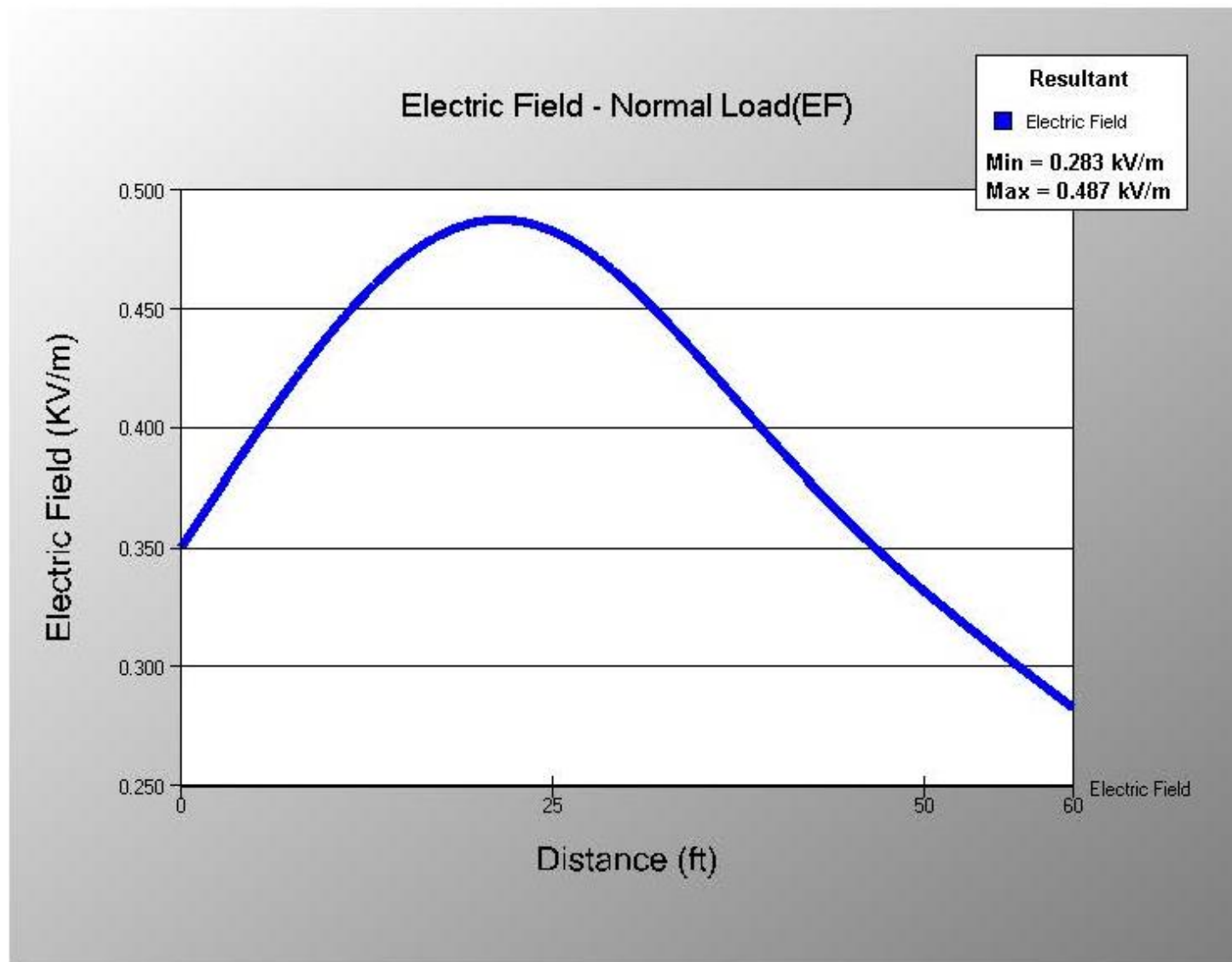


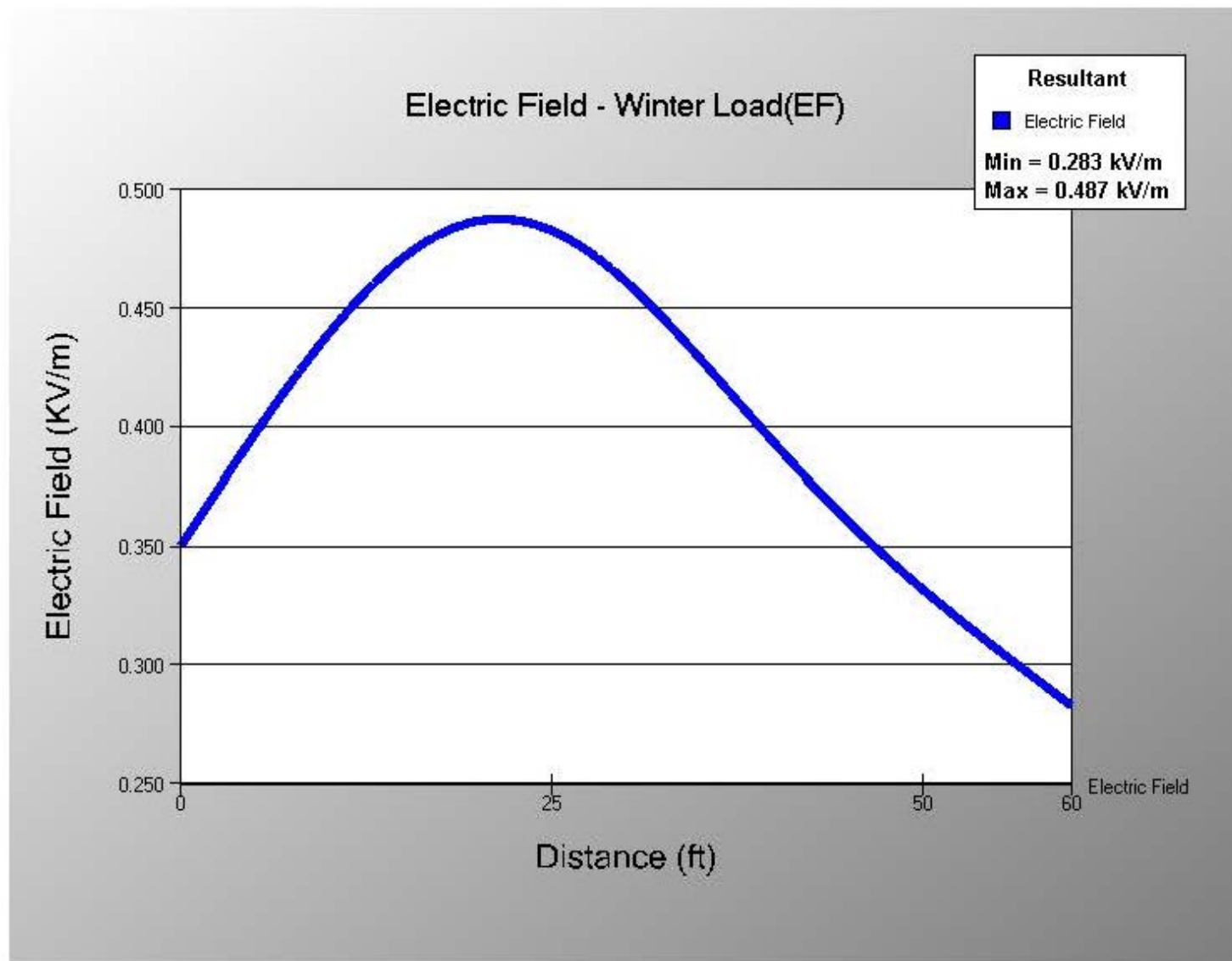


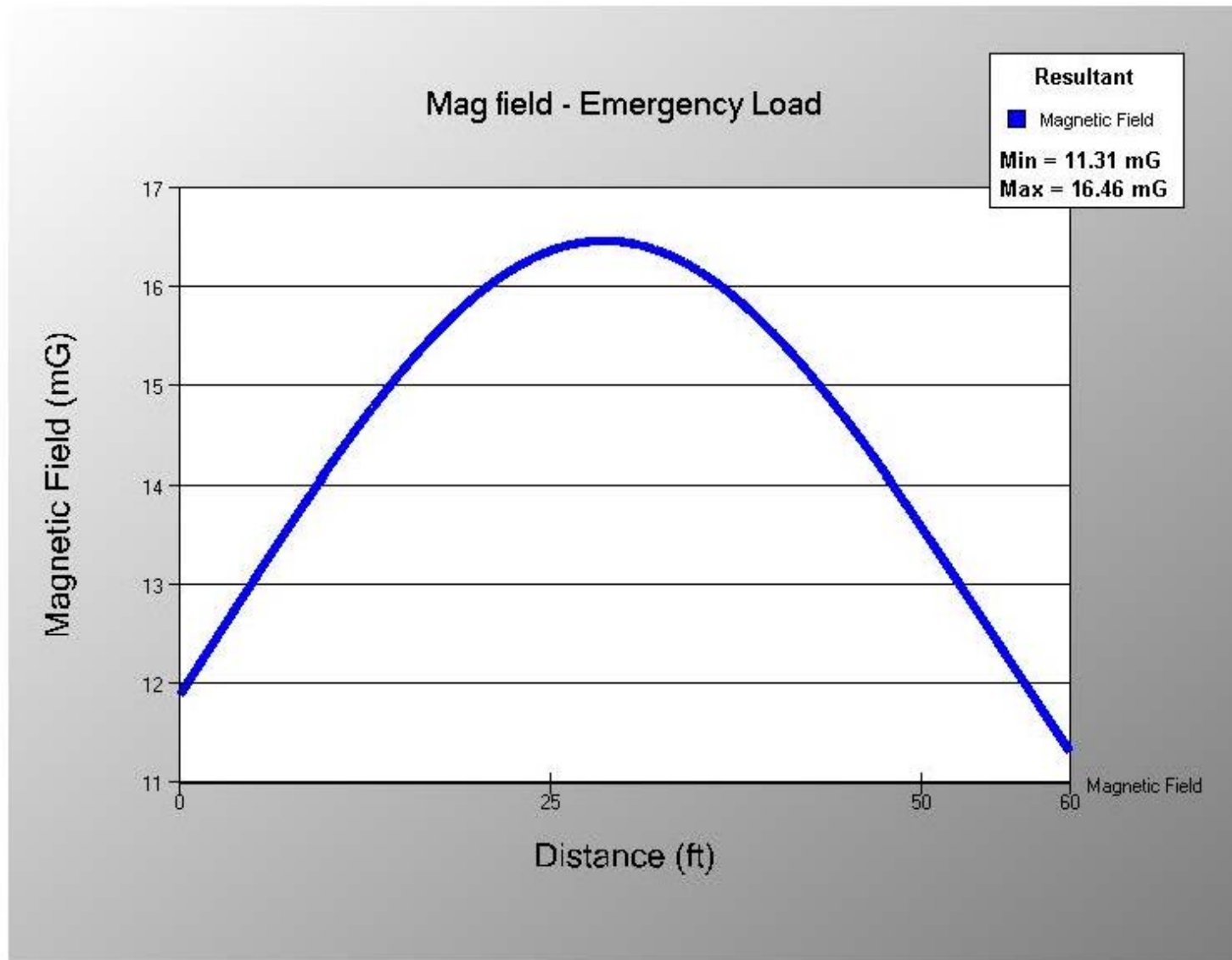




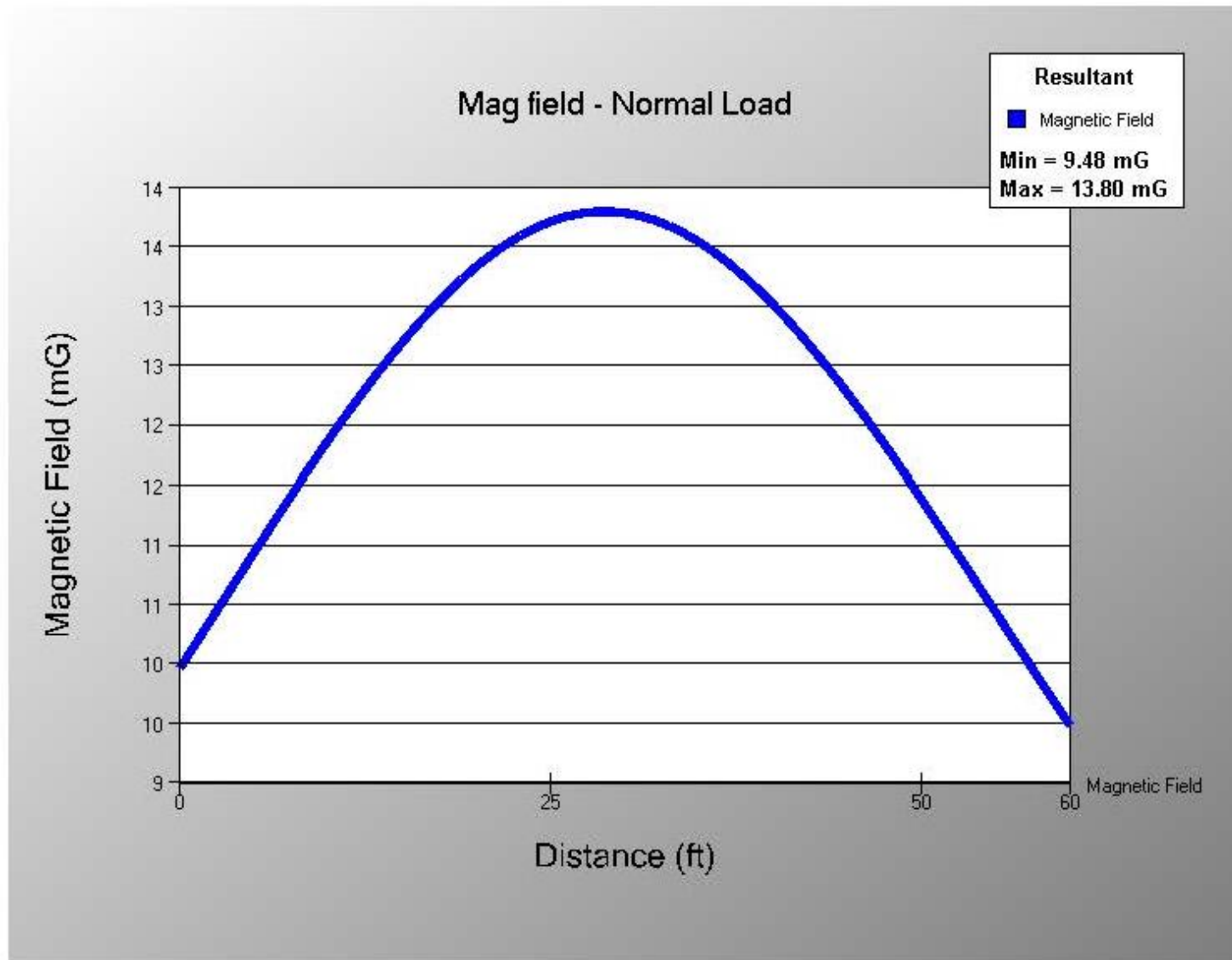




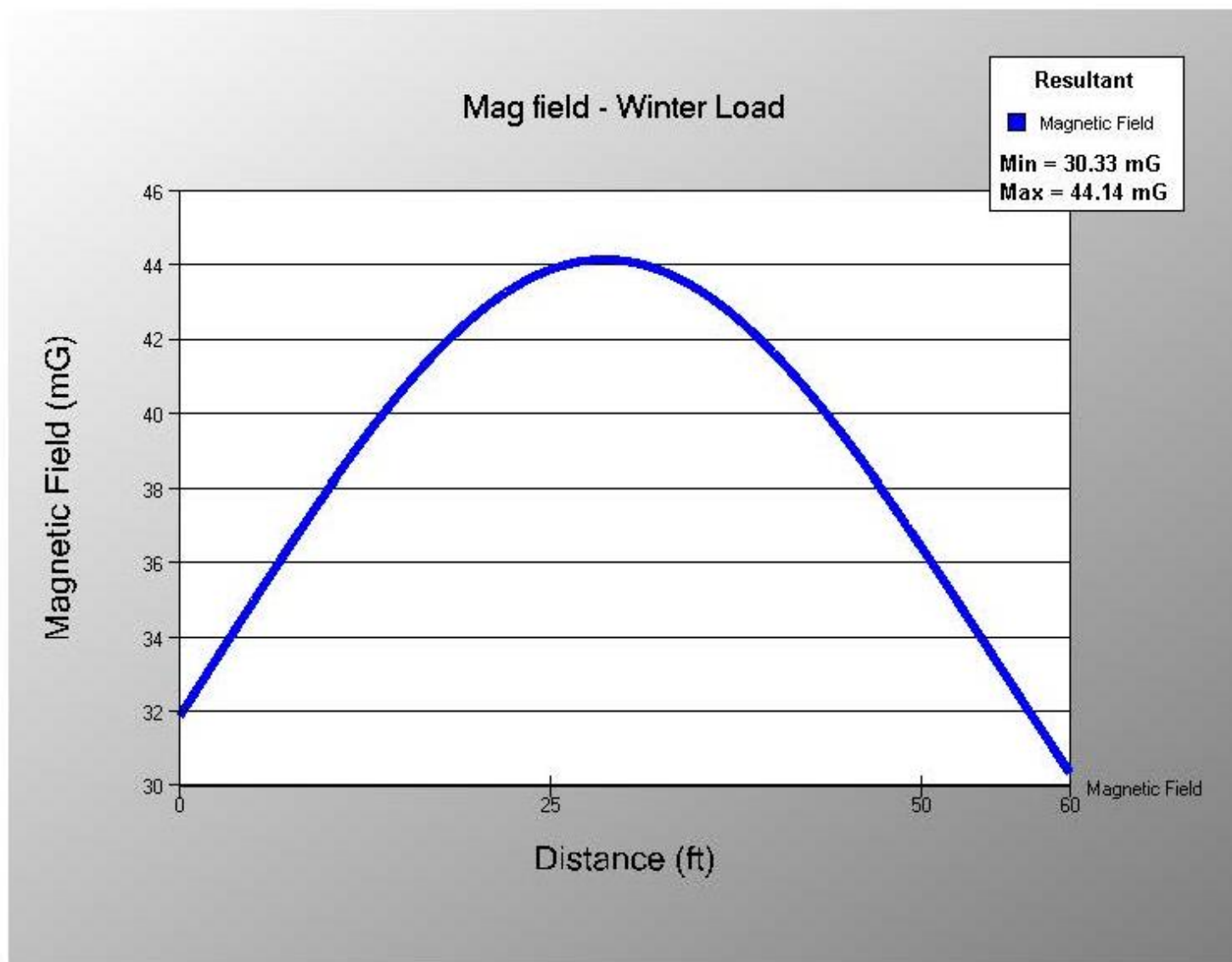




Magnetic Field, Lemoyne-Brim (Alternate), Tangent



Magnetic Field, Lemoyne-Brim (Alternate), Tangent



4906-5-08 ECOLOGICAL INFORMATION AND COMPLIANCE WITH PERMITTING REQUIREMENTS

Following the identification of the primary route options for the Project, and in conjunction with the identification of the Preferred and Alternate Routes as described in the Route Selection Study (**Appendix 4-1**), in the fall of 2018, an iterative study to assess the potential ecological impacts of the Project was conducted. This study included an initial map and literature review of a 1,000-foot corridor on either side of the centerline of what were ultimately determined to be the Preferred and Alternate Routes as well as the assessment of other ecological features within the Project area and other route options being considered at the time. Following the further refinement of route options for the Project, a field survey of ecological habitat and features was performed within 130 feet on either side of the anticipated ROW for both the Preferred and Alternate Route (“field survey area”).

Information in the following sections provide the detailed findings of this ecological study as applied to only the Preferred and Alternate Routes.

(A) ECOLOGICAL MAP

Maps at a scale of 1:24,000 (1 inch = 2,000 feet) including the corridor 1,000 feet either side of the centerline (referred to as the 2,000-foot corridor) of the Preferred and Alternate Routes are presented as **Figure 7-1**. These maps depict the transmission line alignments, substation location, and land use classifications, including vegetative cover. Features within 1,000 feet of the proposed routes were identified from published data and, where accessible, verified by the field ecological survey.

An ecological overview map is provided as **Figure 8-1**. More detailed maps at 1:6,000 scale depicting field-delineated water features, lakes, ponds, reservoirs, highly erodible soils and slopes of 12 percent or greater, wildlife areas, nature preserves, and conservation areas within the 2,000-foot corridor are provided as **Figures 8-2A through 8-2E** (Preferred Route) and **Figures 8-3A through 8-3E** (Alternate Route).

(B) FIELD SURVEY REPORT FOR VEGETATION AND SURFACE WATERS

The ecological survey of both the Preferred and Alternate Routes, consisting of the 260-foot wide field survey area, was conducted in the fall of 2018. The field survey was preceded by review of published mapping, aerial photography, protected federal and state-listed species (e.g., threatened or endangered), and ecological information for at least 1,000 feet on either side of the Preferred and Alternate Routes centerlines. Map sources included USGS 7.5-minute quadrangle topographic maps, U.S. Fish and Wildlife Service (USFWS) NWI maps, and U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) soil survey maps.

Published information regarding existing flora and fauna was requested from the ODNR - Division of Wildlife (ODNR-DOW) Ohio Natural Heritage Program. This request included records of state-listed species within 1 mile of the Project area. The information provided by the ODNR-

DOW indicated one record of federal or state threatened or endangered species, within 1,000 feet of the Preferred and Alternate Routes. More detail on the data provided by the ODNR-DOW is provided in Section 4906-5-08(C)(1).

(1) Vegetative Communities, Wetlands, and Streams in Study Area

(a) Vegetative Communities

Vegetative communities and land use types within the field survey area include agricultural fields, residential land, and existing utility ROW. Habitat descriptions are provided below. Details on the anticipated impacts from construction of the proposed Project are provided in Section 4906-5-08(B)(3)(a) and in Table 8-4.

(i) Agricultural Fields

Portions of both routes pass through fields used for agricultural fields. Open fields planted in soybeans, corn, and wheat were observed along both route options.

(ii) Residential

There are 83 and 103 residences located within 1,000 feet of the Preferred and Alternate Routes, respectively. Vegetation identified on residential property includes areas of grasses and other herbaceous species, such as fescue (*Festuca* spp.), common dandelion (*Taraxacum officinale*), groundivy (*Glechoma hederacea*), English plantain (*Plantago lanceolata*), Fuller's teasel (*Dipsacus fullonum*), great plantain (*Plantago major*), white clover (*Trifolium repens*), and red clover (*Trifolium pratense*).

(iii) Roadway ROW

These areas are mostly located along roadways that are routinely mowed. Dominant herbaceous vegetation in these areas consists of fescue, common dandelion, white clover, English plantain, red clover, and ground ivy, maintained through mowing.

(b) Wetlands

According to the U.S. Army Corps of Engineers (USACE), a wetland is defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation (hydrophytic) typically adapted for life in saturated (hydric) soil conditions.

The onsite methodology described in the 1987 Technical Report Y-87-1, USACE Wetlands Delineation Manual and subsequent guidance documents including the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) was used for this Application. Additionally, each identified wetland was evaluated in accordance with the Ohio Rapid Assessment Method (ORAM) developed by Ohio Environmental Protection Agency (OEPA; Mack, 2001). Wetland categorizations were conducted in accordance with the latest quantitative score calibration procedure (OEPA, 2001). To identify whether potential wetlands exist along the Preferred and Alternate Routes, a desktop study of

available resources was performed prior to the field wetland delineations including a review of USFWS NWI maps and the NRCS soil survey and hydric soil list for Wood County.

(i) Summary of National Wetlands Inventory Data

USFWS NWI data, including freshwater wetlands and riverine areas, were mapped within 1,000 feet of the Preferred and Alternate Routes, and reviewed to guide the field ecological survey as one factor in identifying potential wetland locations (USFWS, 2018). The NWI-mapped areas are shown on **Figures 8-2A through 8-2E** and **Figures 8-3A through 8-3E** for the Preferred and Alternate Route, respectively. **Table 8-1** summarizes the NWI data by wetland classification and habitat type. The actual extent and type of field-delineated wetlands along the routes are discussed in the next section.

TABLE 8-1
NWI Wetlands Within 1,000 feet of the Preferred and Alternate Routes

Wetland Type	NWI Code	NWI Habitat Type*	Total Number of Each Habitat Type Preferred/ Alternate
Freshwater Forested/ Shrub Wetland	PFO1A	Palustrine Forested Broad-leaf Deciduous, Temporary Flooded	0 – Preferred 1 – Alternate
Freshwater Forested/ Shrub Wetland	PFO1C	Palustrine Forested Broad-leaf Deciduous, Seasonally Flooded	0 – Preferred 1 – Alternate
Freshwater Forested/ Shrub Wetland	PSS1C	Palustrine Scrub-Shrub Broad-Leaved Deciduous, Seasonally Flooded	0 – Preferred 1 – Alternate
Freshwater Pond	PUBG	Palustrine Unconsolidated Bottom	2 – Preferred 1 – Alternate
Freshwater Pond	PUBGx	Palustrine Unconsolidated Bottom, Intermittently Exposed Excavated	6 – Preferred 8 – Alternate
Riverine	R5UBFx	Riverine Unknown Perennial Unconsolidated Bottom, Semipermanently Flooded Excavated	8 – Preferred 6 – Alternate
Riverine	R5UBH	Riverine Unknown Perennial Unconsolidated Bottom, Permanently Flooded	1 – Preferred 0 – Alternate
Total Number of Preferred Route NWI Wetlands:			17
Total Number of Alternate Route NWI Wetlands:			18

* USFWS, 2018. Total number of R = 15, PSS = 1, PFO = 2, PUB = 17

(ii) Field-Delineated Wetlands

ATSI's planned ROW is 60 feet wide centered along the transmission line route. The planned construction work activities (workspace) and soil surface disturbance will be limited to this 60-foot wide corridor. During the field survey, no wetlands were identified within the Preferred Route ROW or the Alternate Route ROW.

(c) **Waterbodies**

(i) **Field-Delineated Streams**

Streams and drainage channels were delineated and assessed during the ecological survey.

The OEPA's Headwater Habitat Evaluation Index (HHEI) can be used to evaluate streams with a drainage area less than or equal to one square mile, and maximum pools depths less than or equal to 40 cm (OEPA, 2012). When used, the HHEI is typically used to assess Primary Headwater Habitat (PHWH) streams that fall under the classification of first or second-order streams. The HHEI rates a stream based on its physical habitat and uses that information to estimate the biological potential of the stream. The physical habitats scored for the HHEI are substrate type, pool depth, and bank full width. Within the context of the HHEI, streams can be classified generally as Class I PHWH Streams for scores from 0 to 29.9; Class II PHWH Streams for scores from 30 to 69.9; an Class III PHWH Streams for scores from 70 to 100. A "Modified" qualifier may be added as a prefix to any of these classes if evidence of anthropogenic alterations, such as channelization and bank stabilization, are observed. A higher PHWH class corresponds with a more continuous flow regime. The flow regime determines the physical habitat of the stream and is therefore indicative of the biological communities it can support. Streams with scores between 30 and 69 may be classified as potential rheocrene habitat, depending on substrate type, watershed size, and stream flow. The PHWH class for these potential rheocrene streams is then identified by evaluating the biology (fish, salamanders, and benthic macroinvertebrates).

Four streams were evaluated using the HHEI method (identified in **Table 8-2**). Three of these streams were identified along the Preferred Route field survey area and one along the Alternate Route field survey area.

Streams identified during the ecological survey on the Preferred and Alternate Routes are shown on **Figures 8-2A through 8-2E and Figures 8-3A through 8-3E**, respectively. Detailed information on each delineated stream is included in **Table 8-2**.

The Preferred Route centerline crosses three streams for a total of four crossings. The length of streams located within the Preferred Route field survey area is approximately 19,774 linear feet. The Alternate Route centerline crosses one stream only one time. The total length of streams located within the field survey area of the Alternate Route is approximately 260 linear feet. Details of these features are provided in **Table 8-2** and further discussed in Section 4906-5-08(B)(3)(c).

Approximately 14,038 linear feet of streams are located within the planned Preferred Route ROW, while approximately 60 linear feet are located within the planned Alternate Route ROW.

TABLE 8-2

Streams within the Preferred and Alternate Route Environmental Field Survey Area and ROW

Stream ID Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (inches)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline	Length (linear feet) within Field Survey Area ^a	Length (linear feet) within ROW ^b
Preferred Route												
Stream 1 (1011-11)	Preferred	2A-B	Perennial	20	2	HHEI	27	NA	Modified Class I PHWH	Yes	13,284	7,896
Stream 2 (1011-10)	Preferred	2C	Perennial	20	7	HHEI	51	NA	Modified Class II PHWH	Yes	826	692
Stream 3 (1010-03)	Preferred	2E	Perennial	25	8	HHEI	48	NA	Modified Class II PHWH	Yes	5,664	5,450
Total											19,774	14,038
Alternate Route												
Packer Creek (1024-01)	Alternate	3B	Perennial	15	4	HHEI	39	NA	Modified Class II PHWH	Yes	260	60
Total											260	60

Notes:

- a The width of the field survey area was 260 feet.
- b The width of the construction workspace and the final maintained ROW is planned to be 60 feet.

(ii) Lakes, Ponds, and Reservoirs

No lakes or reservoirs were observed in the field survey area for either the proposed Preferred or Alternate Routes.

One pond with 0.03-acre surface area was identified during the field evaluation within the field survey area along the Preferred Route. Three ponds totaling 0.97-acre surface area were identified within the field survey area along the Alternate Route. Ponds within the field survey area are shown on **Figures 8-2A through 8-2E** and **Figures 8-3A through 8-3E** and are summarized in **Table 8-3**.

Impacts to ponds from construction, operation, or maintenance of the proposed transmission line are not anticipated. Best management practices (BMPs) to control soil erosion and sedimentation, including utilization of silt fencing, filter sock, etc., will be used as appropriate during construction to minimize runoff siltation.

TABLE 8-3**Delineated Ponds within the Preferred Route and Alternate Route Environmental Field Survey Area**

Report Name	Route	Figure	Acreage within Field Survey Area	Acreage within ROW	Linear Feet Crossed by Centerline
Preferred Route Ponds					
Pond 1	Preferred	2E/3E	0.03	0 ^b	not crossed
Total:			0.03	0	0
Alternate Route Ponds					
Pond 1	Alternate	2E/3E	0.25	0 ^b	not crossed
Pond 2	Alternate	2E/3E	0.38	0 ^b	not crossed
Pond 3	Alternate	3B	0.34	0 ^b	not crossed
Total:			0.97	0	0

Notes:

a All measurements listed as <0.01 were assumed to be 0.01 for calculations.

b "0" indicates the pond is not within the ROW.

(2) Map of Facility, Right-of-Way, and Delineated Resources

Detailed maps at 1:6,000 scale depicting the delineated features, field survey area, and proposed ROW are provided as **Figures 8-2A through 8-2E** and **Figures 8-3A through 8-3F** for the Preferred and Alternate Route, respectively.

(3) Construction Impacts on Vegetation and Surface Waters**(a) Construction Impacts on Vegetation**

The construction impacts on woody and herbaceous vegetation along both the Preferred and Alternate Routes will be limited to the initial clearing of vegetation within the 60-foot ROW for the proposed transmission line and access roads. Specific locations for access roads will be identified at the time of ATSI's transmission line easement acquisition process. Trees adjacent to the proposed transmission line ROW, that are dead, dying, diseased, leaning, significantly encroaching, or prone to failure may require clearing to allow for safe operation of the transmission line. Vegetative wastes (such as tree limbs and trunks) generated during the construction phase will be windrowed or chipped and disposed of appropriately depending on individual landowner requests, and applicable permit requirements. The approximate vegetation impacts along the Project ROW are provided in **Table 8-4**.

TABLE 8-4
Approximate Vegetation Impacts Along the ROW

Land Use Type	Length of Route (in feet)	Length of Route (in miles)	Acreage within ROW
Preferred Route			
Agricultural	30,941.9	5.9	42.0
Residential	654.9	0.1	1.4
Alternate Route			
Agricultural	28,077.4	5.3	38.6
Residential	3,209.9	0.6	4.0
Roadway ROW	60.0	<0.1	0.6

(b) Construction Impacts on Wetlands

Impacts to wetlands are not anticipated by the construction, operation, or maintenance of the proposed transmission line. BMPs, including utilization of silt fence or filter sock, will be used as appropriate during construction to minimize runoff siltation.

(c) Construction Impacts on Waterbodies

The Preferred Route centerline crosses three streams a total of four times. The Alternate Route centerline crosses one stream one time. The length of these streams within the ROW are reported in **Table 8-2** and further discussed in Section 4906-5-08(B)(3)(c).

Approximately 14,038 linear feet of streams are located within the Preferred Route ROW, while approximately 260 linear feet are located within the planned Alternate Route ROW.

ATSI will not conduct mechanized clearing within 25 feet of any stream, and will only clear those trees in this area that are tall enough to or have the potential to interfere with safe construction and operation of the transmission line. No streams will be filled or permanently impacted. Some

streams may have to be crossed by construction vehicles. Access paths to proposed pole locations will be evaluated when final engineering design is completed and landowner negotiations completed. If a new stream crossing is necessary, Applicant will use one of the following three proposed methods to cross streams:

- Temporary stream ford
- Temporary culvert stream crossings
- Temporary access bridge

Temporary stream fords are proposed for crossing low quality ephemeral and intermittent streams with a drainage basin less than 1 square mile during periods of low flow. This will involve minimum clearing necessary to gain access to the stream and for passage of construction vehicles.

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Any necessary clearing will leave stumps and roots in-place to aid stabilization and to accelerate re-vegetation.
- Sediment-laden runoff will be prevented from flowing from the access road directly into the stream. Diversions and swales will be used to direct runoff to stormwater management locations. Silt fences will be used as needed according to local topographic conditions.
- Following completion of the work, the areas cleared for the temporary access crossing will be stabilized in accordance with the stormwater pollution prevention plan (SWPPP) approved for the Project.

Culvert stream crossings may be proposed for crossing marginal quality perennial, ephemeral, and intermittent streams with a drainage basin of less than 1 mile. These crossings may be removed or remain in place if needed to provide maintenance access to the transmission line to ensure reliable service. All necessary permits will be secured prior to installation.

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Any necessary clearing will leave stumps and roots in place to aid stabilization and to accelerate re-vegetation.
- Sediment laden runoff will be controlled to minimize flow from the access road directly into the stream. Diversions and swales will be used to direct runoff to stormwater management locations. Silt fence will be used as needed according to local topographic conditions.
- Culvert pipes will be embedded into the existing streambed to avoid a drop or waterfall at the downstream end of the pipe, which would be a barrier to fish migration. Crossings will be placed in shallow areas rather than pools.

- Culverts will be sized to be at least three times the depth of the normal stream flow at the crossing location. The minimum diameter culvert that will be used is 18 inches.
- There will be a sufficient number of culvert pipes to cross the stream completely with no more than a 12-inch space between each one.
- Stone, rock, or aggregate of ODOT number 1 as a minimum size will be placed in the channel, and between culverts. To prevent washouts, larger stone may be used with gabion mattresses. No soil will be placed in the stream channel.
- After completion of construction, culvert crossings will either be removed completely and restored, or left in place for future maintenance access.
- Stream banks will be stabilized as appropriate.

Temporary access bridges or culvert stream crossings will be used for higher quality perennial, ephemeral, and intermittent streams and streams with a drainage basin greater than 1 square mile.

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Any necessary clearing will leave stumps and roots in place to aid stabilization and to accelerate re-vegetation.
- Sediment laden runoff will be controlled to minimize flow from the access road directly into the stream. Diversions and swales will be used to direct runoff to stormwater management locations. Silt fence will be used as needed according to local topographic conditions.
- Bridges will be constructed to span the entire channel. If the channel width exceeds 8 feet, then a floating pier or bridge support may be placed in the channel. No more than one pier, footing, or support will be allowed for every 8 feet of span width. No footings, piers, or supports will be allowed for spans of less than 8 feet.
- No fill other than clean stone, free from soil, will be placed within the stream channel.

These crossings will be addressed in the Project SWPPP. Some of the access routes may be left in place for maintenance activity. Details regarding proposed access road stream crossing methods will be provided to the OPSB separately, if deemed necessary.

Impacts to ponds are not anticipated by the construction, operation, or maintenance of the proposed transmission line. BMPs, including utilization of silt fence or filter sock, will be used as appropriate during construction to minimize runoff siltation.

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

During operation of the transmission line along either of the proposed routes, the impacts on vegetation are anticipated to be minor. Undeveloped non-forested land not significantly disturbed by construction should retain its current vegetation composition. Periodic cutting along the proposed 60-foot-wide transmission line ROW is not expected to result in a significant environmental impact to the vegetation in these types of areas.

The potential impacts on woody and herbaceous vegetation along either of the proposed routes will be limited to maintenance activities along the proposed transmission line ROW and access roads for safe and reliable operation of the transmission line. Trees adjacent to the proposed transmission line ROW, that are dead, dying, diseased, leaning, significantly encroaching, or prone to failure may require clearing to allow for safe operation of the transmission line. Vegetative waste (such as tree limbs and trunks) that is generated during the construction phase will be windrowed or chipped and managed appropriately.

Once the transmission line is in operation, no significant impacts to streams or drainage channels are anticipated. Only periodic selective removal of vegetation that interferes with the operation of the transmission line will be required. No major lakes, ponds, or reservoirs should be affected by the operation or maintenance of the Preferred or Alternate Routes.

ATSI does not anticipate wetland impacts from the operation or maintenance of the Preferred and Alternate Routes. Vegetation that occurs within wetland areas may require periodic cutting. It is not anticipated that such activities would result in erosion or water quality degradation. Maintenance cutting of woody vegetation in wetland areas would be hand-cut by chain saws or other non-mechanized techniques.

(5) Mitigation Procedures

The following mitigation procedures will be used during construction, operation, and maintenance of the proposed Project to minimize the impact on vegetation and surface waters. A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented as required under the applicable surface water permits and will be made available onsite during Project construction. Future maintenance activities will be implemented in accordance with all applicable regulations.

(a) Site Restoration and Soil Stabilization

A SWPPP will be developed specifically for the Project and specified BMPs will be implemented during construction to control erosion and sedimentation. Areas where soil has been disturbed will be seeded and mulched to prevent soil erosion and sedimentation. Experience shows that seeding in non-wetland and non-agricultural areas is advantageous to control erosion on areas disturbed by construction activities. In lightly disturbed wetland areas, existing seed banks are quite often capable of quickly reestablishing vegetation that is compatible with the surrounding wetland. If any unanticipated significant disturbance occurs in wetlands, topsoil will be segregated and replaced so that the existing seed banks will be allowed to revegetate the areas initially.

Additional seeding will only take place if the existing seed bank does not repopulate an area. These measures should preserve the aesthetic qualities along the ROW, prevent erosion, and promote habitat diversity.

Construction access routes and staging areas will be selected to minimize impacts to wetlands and streams to the extent practical. Following construction, pole locations, material storage sites, and temporary access roads will be seeded with a suitable grass seed mixture as specified in the SWPPP for restoring these disturbed areas.

(b) Frac-out Contingency Plan for Horizontal Direction Drill Stream and Wetland Crossings

The Project does not include a stream or wetland crossing by horizontal direction drill. Therefore, a detailed frac-out contingency plan will not be required for the Project.

(c) Demarcation and Protection Methods

Wetlands, streams, and any other environmentally sensitive areas will be clearly staked, flagged, or fenced in accordance with the SWPPP prior to the commencement of any clearing in order to minimize incidental impacts. BMPs such as utilization of silt fences and construction matting will be implemented as required during construction.

(d) Procedures for Inspection and Repair of Erosion Control Measures

Procedures for inspection and repair of erosion control measures, especially after rainfall events, will be outlined in the SWPPP.

(e) Stormwater Runoff Measures

BMPs, including utilization of silt fence or filter socks, will be used as appropriate during construction to minimize runoff and sedimentation of streams and wetlands. Measures to divert stormwater runoff away from fill slopes and other exposed surfaces will be outlined in the SWPPP.

(f) Vegetation Protection Methods

Cutting of woody vegetation in wetlands and near stream banks will be limited to removal of only the cut back required to safely perform construction and continue operation of the transmission line. ATSI will adhere to permit requirements and conditions that will be obtained or authorized for the Project, including specifying that no mechanized clearing of vegetation be performed within a wetland or waterbody as discussed below.

(g) Clearing Methods

ATSI will not conduct mechanized clearing within 25 feet of any stream and will only clear those trees in this area that are tall enough to or have the potential to interfere with safe and reliable construction and operation of the transmission line. Trees adjacent to the proposed transmission line ROW that are dead, dying, diseased, leaning, significantly encroaching, or prone to failure may require clearing to allow for safe and reliable operation of the transmission line. Vegetative waste (such as tree limbs and trunks) that is generated during the construction

phase will be windrowed or chipped and managed in accordance with applicable permit requirements.

(h) Expected Use of Herbicides

Herbicide use on the Project will be in accordance with applicable state and federal regulations and will be applied in accordance with the manufacturer instructions, which include requirements related to the suitability of a particular herbicide for use near surface water. Only appropriate mixtures and selective methods of application including low-volume foliar and cut stump treatment will be used to support the construction of the Project. The application of a stump herbicide treatment consists of applying herbicide to the cambium layer of the stump and associated root flares. A low-volume foliar application method targets specific incompatible vegetation by applying the herbicide directly on the foliage of the target vegetation, while minimizing potential overspray.

The herbicides used during construction of the Project work on enzymes found only within plants, not people or animals. These compounds enter through leaves, stems, and stumps and control plant growth from the inside of the plant. The products used have undergone years of testing and will be used only as approved by appropriate government agencies. The U.S. Environmental Protection Agency (EPA) approves such products for use only after determining that they will not adversely affect human health or the environment when properly applied. The crews that apply herbicides will follow strict usage guidelines in accordance with the labeling and application requirements. Workers who apply herbicides must hold a pesticide applicator license from the state of Ohio or work under the direct supervision of a certified applicator.

(C) LITERATURE SURVEY OF PLANT AND ANIMAL LIFE POTENTIALLY AFFECTED

The Project area is primarily rural with few residences and businesses located on larger lots. The developed areas are dominated by residences and existing utility or road ROW. The rural areas are mostly comprised of fields, pastures, woodlots, residences, and existing road and utility ROW. Both the Preferred and Alternate Routes have potential habitat for wildlife species. Lists of commercial and recreational species were created utilizing professional experience and the ODNR-DOW 2018-2019 Hunting and Trapping Regulations (ODNR-DOW, 2018a).

Lists of protected species are based on information showing their range within Wood County, as reported in correspondence from the ODNR-DOW (ODNR-DOW, 2018b) and the review of USFWS county species distribution lists (USFWS, 2018a). Details on the expected impacts of construction, operation, maintenance, and mitigation procedures can be found following the threatened and endangered, commercial, and recreational species descriptions that follows.

(1) Project Vicinity Species Descriptions

(a) Protected Species

Coordination with ODNR-DOW was initiated in March 2018 to obtain Ohio Natural Heritage Database records within a 1-mile area around the Project area for the preferred and the

alternate routes. A database records search of a larger area allows for potential shifts in the alignments to remain covered by the initial requested area. Although ODNR records of state and federally listed species were provided in March 2018, prior to route selection, the Preferred and Alternate Routes were located entirely within the area covered by the data request. ODNR data indicated that one protected species is known to occur within 1-mile of the Preferred and Alternate Routes and seven species are within the range of the project location. Presence of the species listed within range is assumed wherever suitable habitat occurs unless a presence/absence survey has been performed to document absence. Current information on a species list obtained from USFWS county lists and the ODNR-DOW Ohio Natural Heritage Database is provided in **Tables 8-5 and 8-6**.

A consultation request was submitted to the USFWS on November 12, 2018. A response letter was received dated November 19, 2018. The USFWS confirmed that two federally listed bat species listed in **Table 8-5** may occur in the field survey area, as in Ohio, presence of the Indiana bat and northern long-eared bat is assumed wherever suitable habitat occurs unless a presence/absence survey has been performed to document absence. The USFWS also recommended winter tree clearing to avoid take of these species. ATSI will coordinate any habitat assessments or surveys with the USFWS. The USFWS does not anticipate adverse effects to federally endangered, threatened, proposed, or candidate species due to the project type, size, and location.

Likewise, a consultation request was submitted to the ODNR-DOW on November 12, 2018. To date, a response has not been received. When received, OPSB will be notified of the response.

TABLE 8-5
Federally Listed Species potentially within 1,000 feet of Proposed Routes

Common Name/Species Name ^a	Federal Status ^{b, c}	General Habitat Notes	Recorded Location within Project Vicinity	Potential Habitat in Project Area
Vertebrate Animals				
Indiana bat / <i>Myotis sodalis</i>	Endangered	Hibernacula = Caves and mines Maternity and foraging habitat = small stream corridors with well-developed riparian woods and upland forests. ^d	Wood County, Ohio ^e . No ODNR records in vicinity of the Project area ^b .	No
Northern long-eared bat / <i>Myotis septentrionalis</i>	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. During late spring and summer, roosts and forages in upland forests. ^d	Wood County, Ohio ^e . No ODNR records in vicinity of the Project area ^b .	No

Sources:

a NatureServe Explorer, 2018 b ODNR-DOW, 2018b c USFWS, 2018a d USFWS, 2018b e ODNR, 2018c f ODNR, 2008

TABLE 8-6
State-listed Species within 1,000 feet of Proposed Routes

Common Name/Species Name ^a	State Status ^b	General Habitat Notes	Recorded Location within Project Vicinity ^b	Potential Habitat in Project Area
Vertebrate Animals				
Indiana bat / <i>Myotis sodalis</i>	Endangered	Hibernacula = Caves and mines Maternity and foraging habitat = small stream corridors with well-developed riparian woods and upland forests. ^d	Range is within Wood County, Ohio.	No
Western banded killifish / <i>Fundulus diaphanatus menona</i>	Endangered	Found in areas with an abundance of rooted aquatic vegetation, clear waters, and with substrates of clean sand or organic debris free of silt. ^e	Range is within Wood County, Ohio.	No
Spotted turtle / <i>Clemmys guttata</i>	Threatened	Prefers shallow, sluggish waters of ditches, small streams, marshes, bogs, and pond edges where vegetation is abundant. It occasionally wanders away from water and lives in wet woods and meadows. ^e	Range is within Wood County, Ohio.	Yes
Northern Harrier / <i>Circus cyaneus</i>	Endangered	Hunt low over grasslands. A common migrant and winter species; nesters are much rarer, although they occasionally breed in large marshes and grasslands. ^e	Range is within Wood County, Ohio.	No
Lark sparrow / <i>Chondestes grammacus</i>	Endangered	Nests in grassland habitats with scattered shrub layers, disturbed open areas, as well as patches of bare soil. ^e	Range is within Wood County, Ohio.	Yes
Upland sandpiper / <i>Bartramia longicauda</i>	Endangered	Breed in grasslands, pastures, and unkempt agricultural land with a mosaic of old fields and crop lands, and sometimes the grassy expanses of airports. ^e	Range is within Wood County, Ohio.	Yes
Invertebrate Animals				
Pondhorn / <i>Uniomerus tetralasmus</i>	Threatened	Inhabits slow-moving, shallow waters of sloughs, borrow pits, ponds, ditches, and streams. Tolerant of poor water conditions and can be found in a substrate of fine silt and/or mud. ^a	Range is within Wood County, Ohio.	Yes

TABLE 8-6

State-listed Species within 1,000 feet of Proposed Routes

Common Name/Species Name ^a	State Status ^b	General Habitat Notes	Recorded Location within Project Vicinity ^b	Potential Habitat in Project Area
<i>Plants</i>				
Bushy horseweed / <i>Conyza ramosissima</i>	Potentially Threatened	Dry, open, often disturbed areas: prairie remnants, fields, grazed pastures, along roadsides and railroads and in waste places. ^f	ODNR records within 1-mile of the Preferred and Alternate Routes.	Yes

Sources:

a NatureServe Explorer, 2018 b ODNR-DOW, 2018b c USFWS, 2018a d USFWS, 2018b e ODNR, 2018c f ODNR, 2008

(b) Commercial Species

The commercially important species along the proposed routes consist of those hunted or trapped for fur or other products, include the following species. This information was obtained from the ODNR-DOW 2018-2019 Hunting and Trapping Regulations (ODNR-DOW, 2018a) and the ODNR-DOW Species Guide Index (ODNR-DOW, 2018c).

Beaver (*Castor canadensis*): Beavers occur in forested ponds, lakes, and rivers. In rivers, beavers make burrows with an underwater entrance in the riverbank. However, in streams, lakes and ponds, beavers usually build dams that incorporate a lodge. Based on the habitat present along the routes, this species is unlikely to inhabit locations along the route. This species was not observed during the field investigations.

Coyote (*Canis latrans*): Historically, coyotes prefer open territory, but in Ohio, they have adapted to various habitat types, including forests, clearcuts, and woodlots in rural and urban areas. Coyotes are a very adaptable species that has prospered despite the expanding presence of human impact. This species is likely found near or within the Project, but was not observed during field investigations.

Gray Fox (*Urocyon cinereogentus*): The gray fox prefers wooded areas and partially open brush land with little human presence. Based on habitat present along the routes, this species is likely found near or within the Project, but was not observed during field investigations. However, they are nocturnal animals.

Least Weasel (*Mustela nivalis*): The least weasel inhabits open areas such as meadows, marshes, brushy areas and agricultural fields. Based on habitat present along the routes, this species is likely found near or within the Project, but was not observed during field investigations. However, they are generally nocturnal animals.

Long-tailed Weasel (*Mustela frenata*): The long-tailed weasel is an adaptable animal that can be found in terrestrial habitats near water. Based on habitat present along the routes, this species is likely found near or within the Project, but was not observed during field investigations. However, they are generally nocturnal animals.

Mink (*Mustela vison*): Mink are usually found near water, both running and standing. Minks prefer wooded or brushy areas. This species was not observed during the field investigations.

Muskrat (*Ondatra zibethicus*): The muskrat is a large freshwater rodent. This species was not observed during the field investigations, but it could inhabit select locations along the Routes.

Raccoon (*Procyon lotor*): The raccoon is widespread in Ohio, even in many suburban and urban areas. Raccoons prefer wooded areas with water nearby. This species is likely found near or within the Project, but was not observed during field investigations.

Red Fox (*Vulpes vulpes*): The red fox inhabits a wide range of habitats. This generally nocturnal species was not observed during the field investigations, but it could inhabit select locations along both the Preferred and Alternate Routes.

River Otter (*Lontra canadensis*): River otters live in aquatic habitats such as rivers, lakes, and marshes. They prefer tributaries of large, clean drainages where there is minimal human disturbance. Based on the habitat present along the routes, this species is unlikely to inhabit locations along the route. This species was not observed during the field investigations.

Striped Skunk (*Mephitis mephitis*): The skunk is an adaptable animal that occupies both rural and suburban areas. Their dens may be located under buildings, in open fields, on hillsides, or under logs in the woods, which may have been self-created or formerly used by other animals. This species is likely found near or within the Project, but was not observed during field investigations.

Virginia Opossum (*Didelphis virginiana*): This marsupial's preferred habitat is an area interspersed with woods, wetlands, and farmland; however, they are an adaptable animal that can also be found in urban and suburban areas. This species is likely found near or within the Project, but was not observed during field investigations.

(c) Recreational Species

Recreational species consist of those hunted as game. Recreational species expected to inhabit areas along the proposed ROW include the following. This information was obtained from the ODNR-DOW 2018-2019 Hunting and Trapping Regulations (ODNR-DOW, 2018a) and the ODNR-DOW Species Guide Index (ODNR-DOW, 2018c).

(i) Fowl

American Crow (*Corvus brachyrhynchos*): The American crow is found in all Ohio counties. They prefer habitats with open fields and trees. American crows were observed during the field investigations along both of the routes.

American Woodcock (*Scolopax minor*): Woodcock prefer open, interspersed, early successional habitats, brushy pastures, and woodland borders with moist loam soils. The largest populations occur in northeast, north-central, and central regions of Ohio. This species could inhabit select locations along the routes. No American woodcocks were observed during the field investigations.

American Coot (*Fulica Americana*): Coots inhabit the shallows of freshwater lakes, ponds, or marshes. It is unlikely that this species would exist along the proposed routes because they are found mostly in Lake Erie marshes. This species was not observed during surveys.

Geese: Several geese species can be found in Ohio, although typically during migration: snow geese (*Chen caerulescens*), greater white-fronted geese (*Anser albifrons*), cackling geese (*Branta hutchinsii*), and brant (*Branta bernicla*). The Canada goose (*Branta canadensis*) is commonly found throughout Ohio, both as residents and migrants. Habitat for Canada geese was observed along the routes. No Canada geese were observed during the field investigations.

Mourning Dove (*Zenaida macroura*): Mourning doves are found near rural and suburban residences, nesting in shrubs and trees. They are also frequent in rural farmlands nesting in fencerows and edge habitats. Habitat for this species is present throughout the routes. This species was observed frequently during field surveys.

Mergansers: Several merganser species can be found in Ohio, such as the common merganser (*Mergus merganser*), red-breasted merganser (*Mergus serrator*), and hooded merganser (*Lophodytes cucullatus*). Mergansers are found in deep, open waters of lake and rivers. Habitat for these species is not present along the routes. This species was not observed during field surveys.

Northern Bobwhite Quail (*Colinus virginianus*): The northern bobwhite quail is a forest edge species. This species could exist in select locations along the routes; however, it was not observed during field surveys.

Rail: Several rail species can be found in Ohio, such as Yellow rail (*Coturnicops noveboracensis*), black rail (*Laterallus jamaicensis*), king rail (*Rallus elegans*), and Virginia rail (*Rallus limicola*). Rails are found in densely vegetated wetlands and marshes. Habitat for these species is not present along the routes. This species was not observed during field surveys.

Ring-necked Pheasant (*Phasianus colchicus*): This species can be found primarily along agricultural edges. Pheasants succeed where farming is intensive if there is adequate undisturbed cover for nesting, and sufficient food and cover during winter. This species likely inhabits various locations along the routes; however, no pheasants were observed during field surveys.

Ruffed Grouse (*Bonasa umbellus*): Grouse habitat includes mixed hardwood shrub and forest stands. Habitat for these species is not present along the routes. This species was not observed during field surveys.

Teal: Several teal species could be found in Ohio. The cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas crecca*), and blue-winged teal (*Anas discors*) are waterfowl. They are usually birds of fresh, shallow marshes and rivers instead of large lakes and bays. Habitat for these species is not present along the routes. This species was not observed during field surveys.

Various duck species: Various duck species can be found in Ohio, most of which only during migration. The American black duck (*Anas rubripes*), redhead (*Aythya americana*), greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasback (*Aythya valisineria*), and northern pintail (*Anas acuta*) are usually only found in Ohio during migration and could be found near the proposed routes at that time. The mallard (*Anas platyrhynchos*) and wood duck (*Aix sponsa*) are two duck species that regularly reside and migrate through Ohio.

- Mallard: Most mallards occupy extensive wetlands; however, they are very adaptable. Mallards can be found inhabiting small farm ponds, ditches with flowing water, streams, lakes, and ponds in urban areas. Although this species was not observed during field surveys, habitat for this species does exist throughout the routes.

- Wood Duck: The wood duck prefers mature riparian corridors, quiet backwaters of lakes, ponds bordered by large trees, and secluded wooded swamps. Habitat for this species is not present within the vicinity of select locations along the routes. This species was not observed during field surveys.

Wild Turkey (*Meleagris gallopavo*): Wild turkeys are adaptable animals. Although they prefer mature forests, they can thrive in areas with as little as 15 percent forest cover. Although this species was not observed during the field surveys, it is likely present throughout the routes.

(ii) Mammals

Eastern Cottontail Rabbit (*Sylvilagus floridanus*): This species is found in both rural and urban areas. They prefer open areas bordered by thickets or brush areas. This species prefers habitat found throughout the routes and the species and its habitat was observed during the field surveys.

Feral Swine (*Sus scrofa*): Feral swine (wild boar) are not native to Ohio, but have established breeding populations in several locations, occupying a wide variety of habitats, including forests, cropland, and shrubland. Distribution maps (ODNR, 2016) indicate that feral swine have not been recorded in the vicinity of the Project Area.

Squirrel (Gray, Red, and Fox) (*Sciurus carolinensis*, *Tamiasurius hudsonicus*, and *Sciurus niger*, respectively): The fox squirrel is primarily an inhabitant of isolated woodlots 10 to 20 acres in size with a sparse understory. The eastern gray squirrel prefers more extensive woodland areas. The red squirrel prefers coniferous and mixed forests. Squirrels were observed during the field surveys along the routes.

White-tailed Deer (*Odocoileus virginianus*): White-tailed deer are found in rural and suburban areas. Indirect evidence and several sightings of this species were observed during the field surveys along the routes.

Woodchuck (*Marmota monax*): Woodchucks (groundhogs) live in open grasslands, pastures, and woodlands. This species was observed during field surveys and is likely present throughout the routes.

(iii) Game Fish

Based upon the hydrologic connectivity and the nature of the surface water habitats present within the field survey area, game fish species may inhabit some of the streams that are crossed by the Routes. A list of game fish known to occur in Ohio was obtained from ODNR-DOW's Sport Fish of Ohio Identification Guide (ODNR-DOW, 2012). The list was narrowed to fish most likely to be found in streams located within the field survey area based on professional judgment and experience, and as such, the list of species presented in this section is not an exhaustive list of all species potentially present in the field survey area. The listed species are known to be regionally common and may occur within the surface water features proposed to be impacted.

Bluegill (*Lepomis macrochirus*): Bluegill are found throughout the state, preferring clear ponds and lakes with rooted vegetation. This species is likely to occur in streams along the routes.

Common Carp (*Cyprinus carpio*): Carp can be found in throughout the state, preferring turbid waters rich in organic matter. It is likely that common carp are present in streams along the routes.

Green Sunfish (*Lepomis cyanellus*): Green sunfish are present in most lakes and streams throughout the state and are tolerant of turbid water. They are regularly associated with some type of structure such as brush, vegetation, or rocks. This species is likely to occur in streams along the routes.

Largemouth Bass (*Micropterus salmoides*): Largemouth bass are found in ponds, lakes, and slow sluggish streams throughout the state. This species is likely to occur in streams along the routes.

Longear Sunfish (*Lepomis megalotis*): Longear sunfish are found in streams and lakes throughout the state. They prefer sluggish, clear streams of moderate size with beds of aquatic vegetation. This species may occur in streams along the routes.

Redear Sunfish (*Lepomis microlophus*): Redear sunfish are not native to Ohio. They are found primarily in clear, warm waters with vegetation. This species may occur in streams along the routes.

White Crappie (*Pomoxis annularis*): White crappie can be found in larger ponds, lakes, and rivers. White crappie can tolerate a wide variety of habitats and conditions. This species is regularly found near structures such as fallen trees, stumps, docks, rocks, and aquatic vegetation. This species may occur in streams along the routes.

(2) Construction Impacts on Identified Species

Based on the nature of the proposed Project and habitat characteristics of the surrounding vicinity, the potential for construction impacts to spotted turtles will need to be further evaluated. ATSI will coordinate with USFWS and ODNR to avoid or minimize construction impacts to the associated habitat of the spotted turtle to the extent possible. The construction impact to other identified species (recreational and commercial) is expected to be minor because equivalent habitat to habitat that may be impacted during construction exists immediately adjacent to the construction ROW, and the identified species are mobile.

(3) Operation and Maintenance Impacts on Identified Species

Minimal impacts are anticipated to wildlife during operation and maintenance of the transmission line as agricultural row crops comprise a majority of the area along both routes. ATSI will not conduct mechanized clearing within 25 feet of any stream, and will only clear those trees in this area that are tall enough to have the potential to interfere with safe construction and reliable operation of the line. Operational activities and periodic maintenance of the ROW are not anticipated to impact wildlife significantly because of the minimal permanent ground disturbance and available adjacent habitat available.

(4) Mitigation Procedures

Consultation will be performed with the USFWS and ODNR to determine if the Preferred Route, and Alternate Route, or portions of these routes, contain areas due to the presence of specific

habitat or other factors that would require the use of special mitigation measures for the aforementioned affected wildlife. If such conditions are recognized in the consultation process, the condition will be mitigated appropriately on an site by site basis for the individual species.

(D) SITE GEOLOGY

(1) Site Geology

Both routes fall within the Maumee Lake Plains region of the Central Lowlands physiographic province. The underlying geology of both routes consists primarily of Pleistocene-age silt, clay, and wave-planed clayey till over Silurian and Devonian-age carbonate rocks and shales. Approximately 67.8 percent of the area within 1,000 feet of the Preferred Route occurs within the Lockport Dolomite Formations, 21.7 percent within Tymochtee Dolomite, and lastly 10.5 percent within Greenfield Dolomite. 100 percent of the area within 1,000 feet of the Alternate Route occurs within Lockport Dolomite Formations.

(2) Slopes and Foundation Soil Suitability

No soils with slopes exceeding 12 percent, obtained from the U.S. Department of Agriculture, Natural Resource Conservation Service, were identified within 1,000 feet of the Preferred or Alternate Routes. As a result, no erosional impacts resulting from slopes exceeding 12 percent are expected.

The bedrock geologies consisting primarily of shales and overlaying soils consisting of primarily silt loams and silty clay loams, present along both routes, are generally expected to be suitable for foundation construction. However, bedrock geologies of carbonate rock, such as limestone and dolostone, can be affected by dissolution in the presence of circulating, slightly acidic groundwater. If deemed necessary to obtain further site-specific details on the suitability of the soils for foundation construction, ATSI will conduct soil tests using a drop hammer to drive a sampler tube. Soil bearing capacity is tested by the number of blows required to drive the tube 12 inches into the ground. Soil samples taken with a split-spoon at 5-foot intervals will be used to determine soil type. Typically, the testing will be performed to a depth of between 20 to 40 feet. If rock is encountered, a carbide-tipped bit will be used to drill an exploratory boring 5 to 10 feet into the rock.

(E) ENVIRONMENTAL AND AVIATION REGULATION COMPLIANCE

(1) Licenses, Permits, and Authorizations Required for the Facility

ATSI will submit a Notice of Intent for coverage under the OEPA General National Pollutant Discharge Elimination System (NPDES) Permit for Construction Activities. If the Project requires structural encroachment of jurisdictional waterbodies, coverage under the USACE's Nationwide Permit 12 for wetland and waterbody impacts associated with Utility Line Activities may also be required. It is also anticipated that multiple highway and railroad crossing permits will be necessary.

(2) Construction Debris

As construction proceeds, the ROW will be kept clean of all rubbish and debris. Debris associated with construction of the proposed transmission line is expected to consist of conductor scrap, construction material packaging including cartons, insulator crates, conductor reels and wrapping, and used stormwater erosion control materials. Clearance poles, conductor reels and other materials with salvage value will be removed from the construction area for reuse or salvage. It is estimated that approximately 400 cubic yards of construction debris could be generated from the Project. Construction debris will be disposed of in accordance with state and federal requirements in an OEPA-approved landfill or other appropriately licensed and operated facility.

Where trees must be cleared from the ROW, the resulting brush will be chipped or wind-rowed along the edge of the ROW, and marketable timber will generally be cut into appropriate lengths for sale or disposition by the landowner. Generally, stumps will be left in place.

(3) Stormwater and Erosion Control

A SWPPP will be prepared, BMPs implemented to minimize soil erosion and sedimentation and other pollutant discharges, and will be made available onsite during Project construction. The SWPPP will include the following general provisions, at a minimum:

Erosion and Sediment Controls

Implementation of erosion and sediment control practices will be based on the methods and standards described in the ODNR Rainwater and Land Development Manual (ODNR, 2014); and the OEPA NPDES Permit Program for the discharge of stormwater from construction sites.

Wetlands, streams, and other environmentally sensitive areas will be clearly marked before the start of clearing or construction. No construction or access will be permitted in these areas unless clearly specified in the SWPPP.

No impacts to streams or headwaters are anticipated. No poles are anticipated to be located in streams and no permanent stream crossings are anticipated. Streams, including beds and banks, if disturbed during construction, will be re-stabilized immediately after in-channel work is completed.

Although grubbing activities are not anticipated, sediment basins, traps, and perimeter sediment controls will be implemented within 7 days of any potential grubbing activities. Sediment controls will continue to function until disturbed areas are permanently stabilized.

Silt Fence: Silt fencing or other appropriate BMPs (as used below, “silt fence” includes silt fencing and/or other equivalent BMPs) for erosion control will be installed as needed before ground-disturbing work begins. Silt fence will be installed according to the methods recommended in the Rainwater and Land Development Manual (ODNR, 2014) before upslope land disturbance begins. In general, silt fence will be used where there is the possibility that

sheet flow will carry sediment-laden water into downstream creeks or wetlands. Other methods will be used where flow in ditches, channels or gullies is anticipated. The following installation guidelines will be followed:

- Silt fence will be constructed before upslope land disturbance begins.
- All silt fences will be placed as close to the contour as possible so that water will not concentrate at low points in the fence and so that small swales or depressions that may carry small concentrated flows to the silt fence are dissipated along its length.
- Ends of the silt fences will be brought upslope slightly so that water ponded by the silt fence will be prevented from flowing around the ends.
- Silt fences will be placed on the flattest area available.
- Where possible, vegetation will be preserved for 5 feet (or as much as possible) upslope from the silt fence. If vegetation is removed, it will be reestablished within 7 days from the installation of the silt fence.
- The height of the silt fence will be a minimum of 16 inches above the original ground surface.
- The silt fence will be placed in an excavated or sliced trench cut a minimum of 6 inches deep. The trench will be made with a trencher, cable laying machine, slicing machine, or other suitable device that will ensure an adequately uniform trench depth.
- The silt fence will be placed with the stakes on the downslope side of the geotextile. A minimum of 8 inches of geotextile will be below the ground surface. Excess material will lay on the bottom of the 6-inch deep trench. The trench will be backfilled and compacted on both sides of the fabric.
- Seams between sections of silt fence will be spliced together only at a support post with a minimum 6-inch overlap prior to driving into the ground.

Soil Stabilization: Disturbed areas that remain unworked for more than 21 days will be stabilized with seed and mulch no later than 14 days after the last construction in that area.

Maintenance and Inspection: Erosion and sediment control practices will be inspected at least once every 7 days and within 24 hours after any storm event greater than 0.5 inches of rain per 24-hour period.

ATSI will maintain erosion control measures in good working order. If a repair is necessary, it will be initiated within 24 hours of report. Silt fencing will be inspected for depth of sediment, for tears, for assurance fabric is securely attached to the fence posts, and to ensure that the fence posts are firmly in the ground. Seeded areas will be inspected for evidence of bare spots or washouts. Permanent records of the maintenance and inspection must be maintained throughout the construction period. Records will include, at a minimum, the name of the

inspector, major observations, date of inspection, certification of compliance, and corrective measures taken.

(4) Disposition of Contaminated Soil and Hazardous Materials

All materials stored onsite will be kept in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure. Products will be kept in their original containers with the original manufacturer's label. Manufacturer's recommendations for proper use and disposal will be followed. Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) will be retained and available onsite at all times.

The following general provisions will also be included in the SWPPP to address disposition of contaminated soil and hazardous materials generated or encountered during construction:

Spill Prevention

The following spill prevention methods and procedures are proposed:

- All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers, which are clearly labeled.
- Secondary containment will be provided for all onsite fuel storage tanks required during construction.
- All sanitary waste will be collected in portable units and emptied regularly by a licensed sanitary waste management contractor, as required by local regulations.
- All spills will be cleaned up immediately after discovery. Manufacturer's recommended methods for spill cleanup will be followed. Materials and equipment necessary for spill cleanup will be kept in a designated storage area onsite.
- Spills will be reported to the appropriate government agency as required.
- Suspected hazardous materials encountered during construction will be reported to the regional environmental coordinator by the transmission construction representative. In addition, the project manager will be notified.

(5) Maximum Height of Above Ground Structures

The height of the tallest anticipated aboveground structure and construction equipment is expected to be approximately 150 feet. The nearest airport is located in Wood County (private airport) approximately 3.1 miles west of the western terminus of the proposed transmission lines.

The Federal Aviation Administration (FAA) Form 7460-1, "Notice of Proposed Construction or Alteration," is used for FAA notification. This can be filed electronically or by standard U.S. Mail.

A 7.5-minute quadrangle topographic map showing the proposed construction must be attached to the completed Form 7460-1. The Form 7460-1 must be submitted 45 days prior to the proposed start of construction.

Additionally, a permit from the ODOT, Office of Aviation, must be obtained prior to the start of any construction on or near airports in Ohio that are open to the public. A duplicate of the federal filing fulfills the state permit application requirements as set forth in OAC 5501:1-10-06.

(a) Filing Criteria

The FAA Form 7460-1 must be filed for any construction or alteration of more than 200 feet in height. Additionally, any construction or alteration extending outward and upward in excess of one of the following slopes requires filing:

- 100 to 1 slope for a horizontal distance of 20,000 feet from the nearest public use runway greater than 3,200 feet in length, excluding heliports
- 50 to 1 slope for a horizontal distance of 10,000 feet from the nearest public use runway less than 3,200 feet in length, excluding heliports
- 25 to 1 slope for a horizontal distance of 5,000 feet from the nearest landing and takeoff area of a public use heliport

Upon completion of the final design, ATSI will review the need for any permitting with the FAA and will follow recommendations made by the FAA.

(6) Dusty or Muddy Conditions Plan

Dust Control

The site and surrounding areas will be kept free from dust nuisance resulting from site activities. During excessively dry periods of active construction, dust suppression will be implemented where necessary through irrigation, mulching, or application of tackifier resins.

Excessive Muddy Soil Conditions

Construction entrances will be established and maintained to a condition that will prevent tracking or flowing of sediment onto public ROW. Accumulated sediment spilled, dropped, washed, or tracked onto public ROWs will be removed as soon as practical.

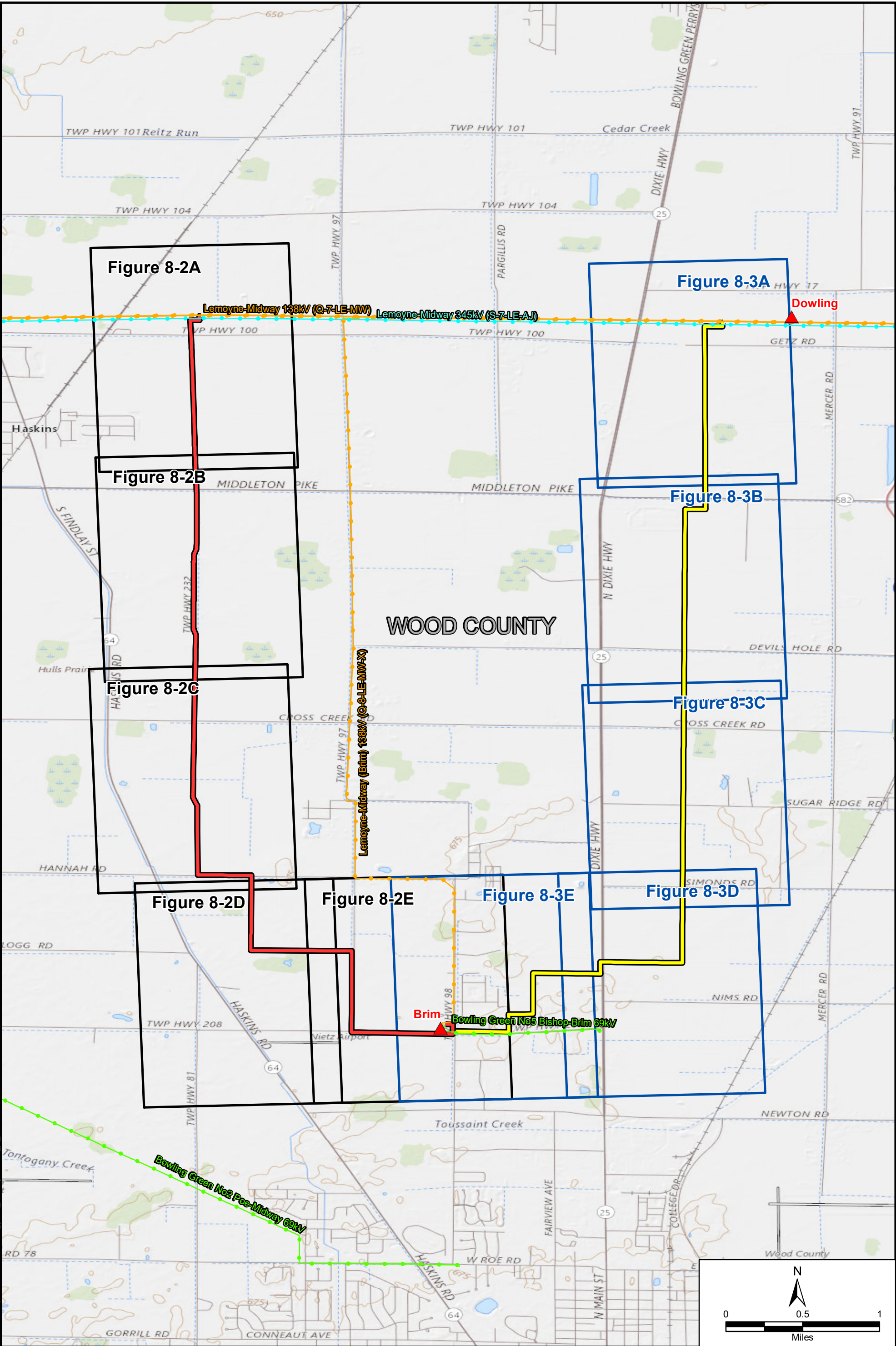
REFERENCES

- Braun, L.E. 1987. The Monocotyledoneae of Ohio. The Ohio State University Press, Columbus, Ohio.
- Brown, Lauren. 1979. Grasses an Identification Guide. Houghton Mifflin Company, New York, New York.
- Cowardin, et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C.
- Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterway Experiment Station, Vicksburg, Mississippi.
- Environmental Laboratory. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). ERDC/EL TR-12-9, U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- Federal Interagency Committee for Wetland Delineation (FICWD). 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington D.C. Cooperative Publication.
- Knobel, Edward. 1980. Field Guide to the Grasses, Sedges and Rushes of the United States. Dover Publications, Inc., Toronto, Ontario.
- Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X
- Mack, John J. 2001. *ORAM v. 5.0 Quantitative Score Calibration*. Ohio Environmental Protection Agency. Columbus, Ohio.
- Natural Resources Conservation Service (NRCS). 2017. *Web Soil Survey*. Soil surveys for Soil surveys for Wood County, Ohio. U.S. Department of Agriculture. Accessed October 2, 2018. <http://websoilsurvey.nrcs.usda.gov>.
- NatureServe Explorer. 2018. An Online Encyclopedia of Life. Accessed November 29, 2018. <http://www.natureserve.org/explorer/>.
- Newcomb, Lawrence. 1977. Newcomb's Wildflower Guide. Little Brown and Company, Boston, Massachusetts.

- Ohio Department of Natural Resources (ODNR). 2014. Rainwater and Land Development. Division of Water Resources. Accessed December 2, 2018.
http://water.ohiodnr.gov/portals/soilwater/pdf/stormwater/Intro_11-6-14.pdf.
- Ohio Department of Natural Resources - Division of Wildlife (ODNR-DOW). 2012. *Sport Fish of Ohio Identification Guide*. Accessed December 2, 2018.
<https://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/id%20guides/pub334.pdf>.
- Ohio Department of Natural Resources - Division of Wildlife (ODNR-DOW). 2018a. Hunting and Trapping Regulations. Accessed December 2, 2018.
<http://www.eregulations.com/ohio/hunting/>.
- Ohio Department of Natural Resources - Division of Wildlife (ODNR-DOW). 2018b. *Ohio Natural Heritage Database Request*. March 5, 2018.
- Ohio Department of Natural Resources - Division of Wildlife (ODNR-DOW). 2016c. Species Guide Index. Accessed December 2, 2018. <http://wildlife.ohiodnr.gov/species-and-habitats/species-guide-index>.
- Ohio Environmental Protection Agency (OEPA). 2001. *Ohio Rapid Assessment Method for Wetlands Version 5.0: User's Manual and Scoring*. February 2001.
- Ohio Environmental Protection Agency (OEPA). 2006. *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)*. OEPA Technical Bulletin EAS/2006-06-1.
- Ohio Environmental Protection Agency (OEPA). 2012. *Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams*. Version 3.0. January 2012.
- Ohio Environmental Protection Agency (OEPA). 2017. State of Ohio Water Quality Standards. Chapter 3745-1 of the Administrative Code. (Standards and Technical Support Section). Division of Surface Water, Columbus, Ohio.
- Rankin, Edward, T. 1989. The Qualitative Habitat Evaluation Index Rationale, Methods, and Application. Ohio EPA, Ecological Assessment Division, Columbus, Ohio.
- Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed October 2, 2018.
<http://websoilsurvey.nrcs.usda.gov/>
- Tiner, R.W. 1988. Field Guide to Nontidal Wetland Identification. Maryland Department of Natural Resources, Annapolis, Maryland and the U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

- U.S. Department of Agriculture – Natural Resources Conservation District. 2009. Soil Survey Geographic (SSURGO) database for Wood County, Ohio. Accessed October 2, 2018.
<https://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/>
- U.S. Department of Agriculture – Soil Conservation Service. Midwestern Wetland Flora, Field Office Guide to Plant Species. Midwest National Technical Center, Lincoln, Nebraska.
- U.S. Geological Service. Bowling Green North, Ohio. 7.5-Minute Topographic Quadrangle Map. U.S. Department of the Interior, Geological Survey.
- U.S. Geological Survey. 2012. The StreamStats program. Accessed October 2, 2018.
<http://streamstats.usgs.gov>
- U.S. Fish and Wildlife Service. November 2018. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.
<http://www.fws.gov/wetlands/>
- U.S. Fish and Wildlife Service (USFWS). 2018a. *Ohio County Distribution of Federally-Listed Threatened, Endangered, Proposed, and Candidate Species*. Revised October 2018.

GPD Group
Path: C:\Users\slaschweizen\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_8_Overview.mxd



Existing Substation	Existing 69kV Transmission Line	Figure Key for 8-2
Preferred Route	Existing 138kV Transmission Line	Figure Key for 8-3
Alternate Route	Existing 345kV Transmission Line	County

ATSI[®]
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

Figure 8-1
Overview Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\lascw@zei\en\Desktop\GIS\Ann\FirstEnergy\FE_LemoyneBrim_Aquatic_Features.mxd

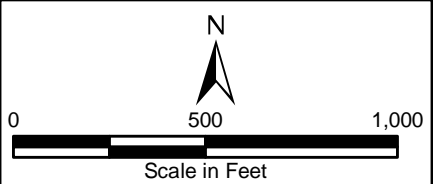
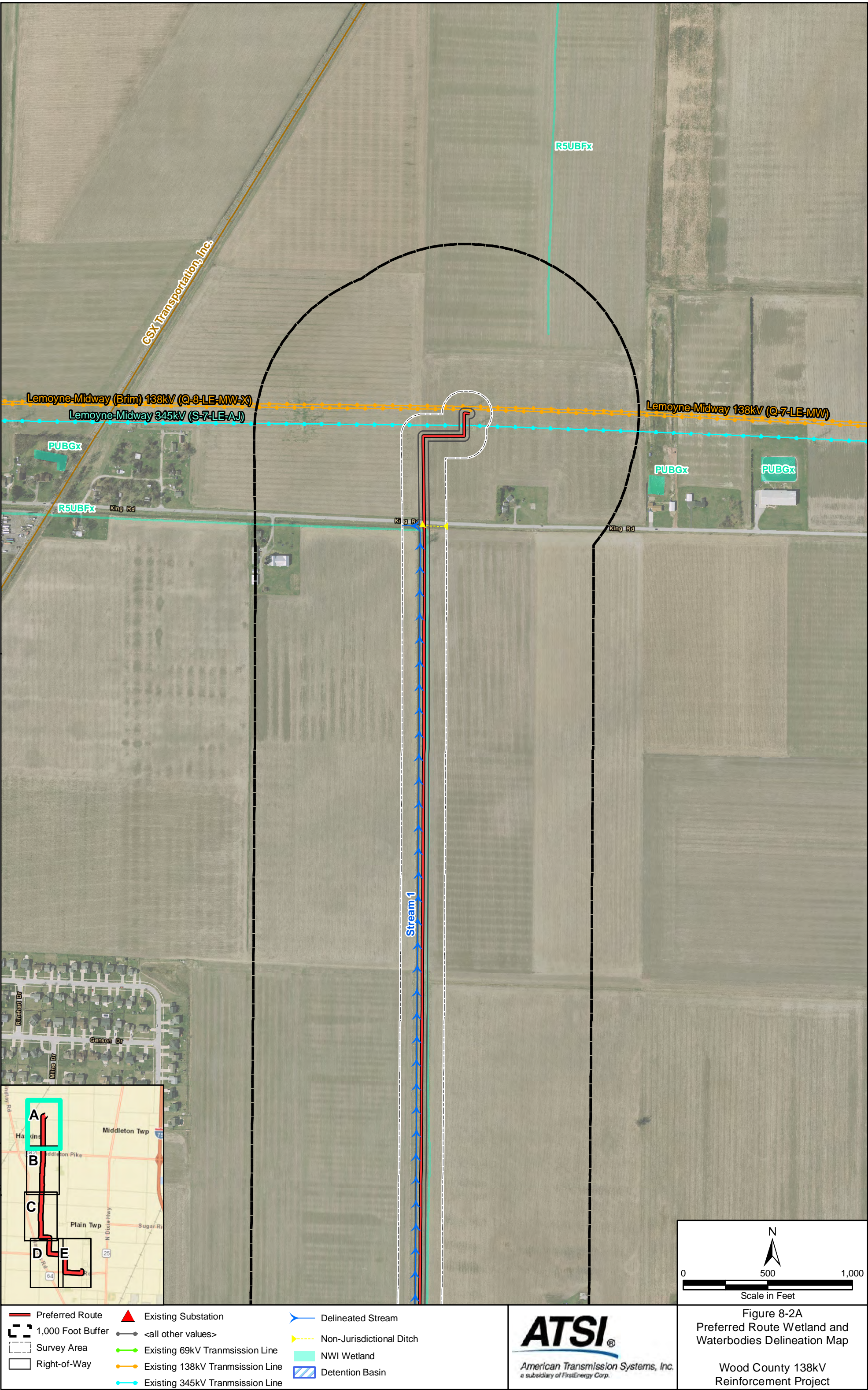
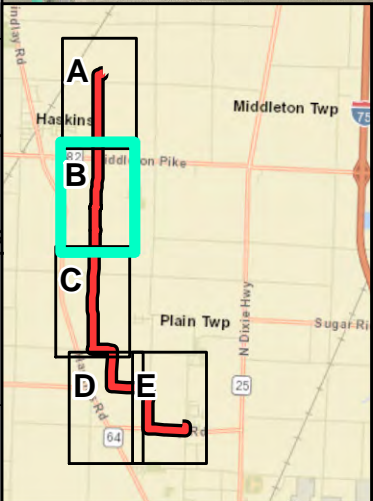
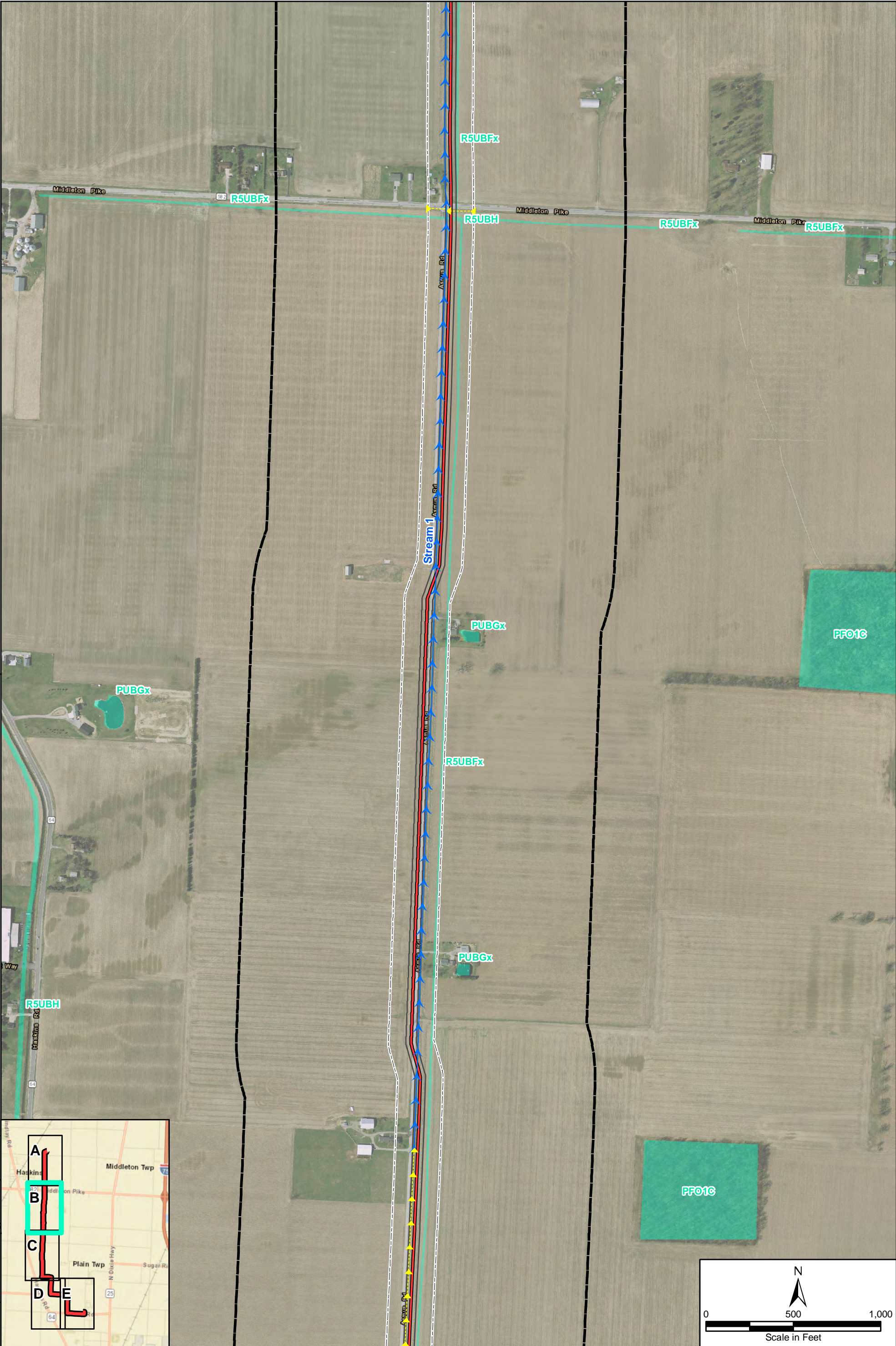


Figure 8-2A
Preferred Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\lasczweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoynBrim_Aquatic_Features.mxd



	Preferred Route		Existing Substation		Delineated Stream
	1,000 Foot Buffer		<all other values>		Non-Jurisdictional Ditch
	Right-of-Way		Existing 69kV Transmission Line		NWI Wetland
			Existing 138kV Transmission Line		Detention Basin
			Existing 345kV Transmission Line		

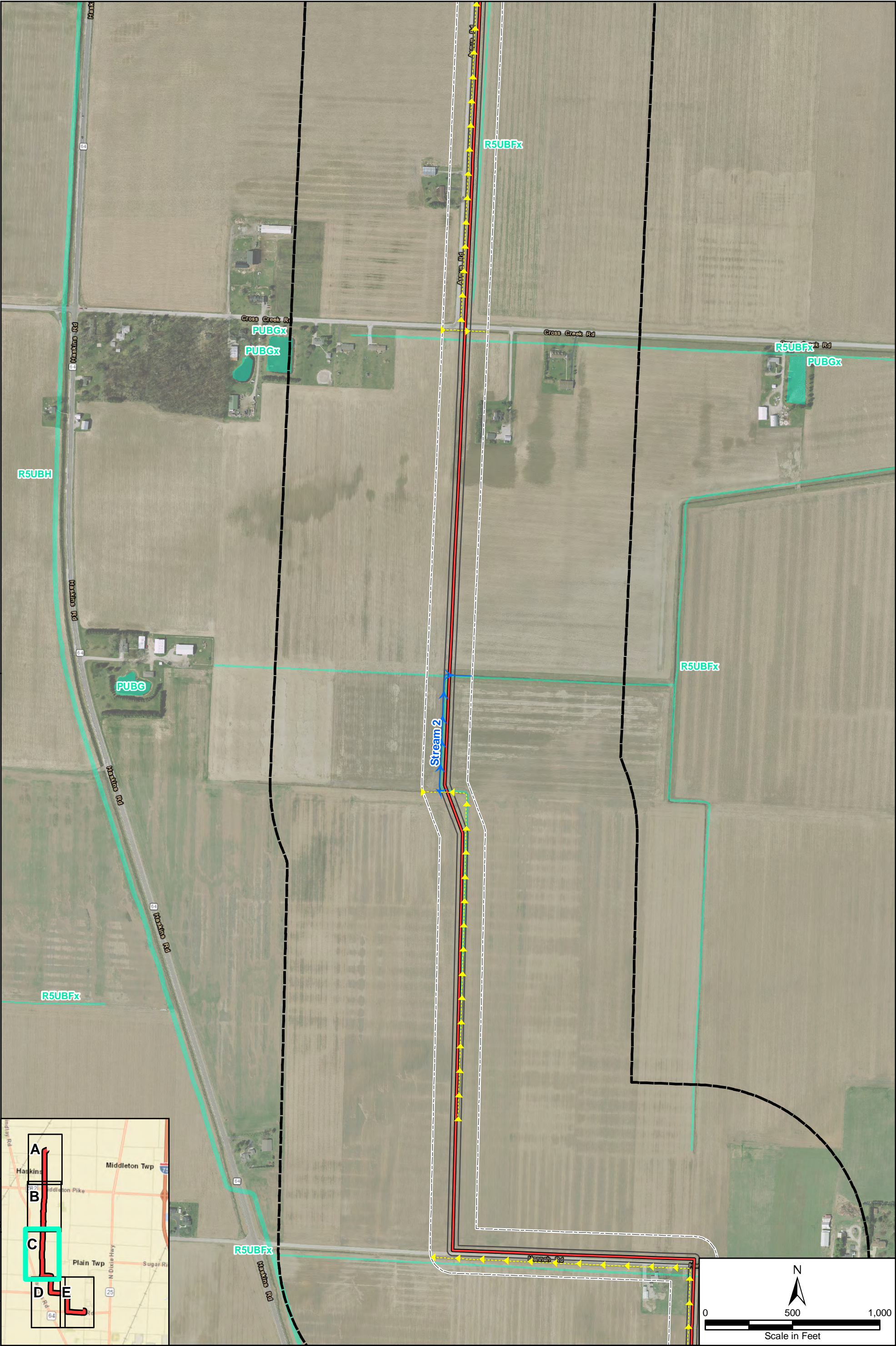


Scale in Feet
0 500 1,000

Figure 8-2B
Preferred Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoineBrim_Aquatic_Features.mxd



- Preferred Route
- 1,000 Foot Buffer
- Survey Area
- Right-of-Way

- Existing Substation
- <all other values>
- Existing 69kV Transmission Line
- Existing 138kV Transmission Line
- Existing 345kV Transmission Line

- Delineated Stream
- Non-Jurisdictional Ditch
- NWI Wetland
- Detention Basin



Figure 8-2C
Preferred Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LemoynBrim_Aquatic_Features.mxd



- | | | |
|-------------------|----------------------------------|--------------------------|
| Preferred Route | Existing Substation | Delineated Stream |
| 1,000 Foot Buffer | <all other values> | Non-Jurisdictional Ditch |
| Survey Area | Existing 69kV Transmission Line | NWI Wetland |
| Right-of-Way | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |



Figure 8-2D
Preferred Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_8_2and3.mxd



- | | | |
|-------------------|----------------------------------|--------------------------|
| Alternate Route | Existing Substation | Delineated Stream |
| 1,000 Foot Buffer | <all other values> | Non-Jurisdictional Ditch |
| Survey Area | Existing 69kV Transmission Line | NWI Wetland |
| Right-of-Way | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

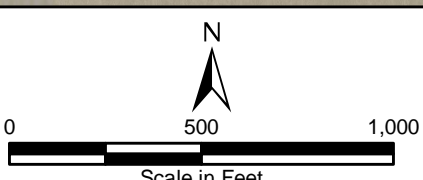
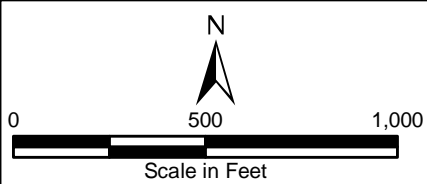


Figure 8-3A
Alternate Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\aschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_8_2and3.mxd



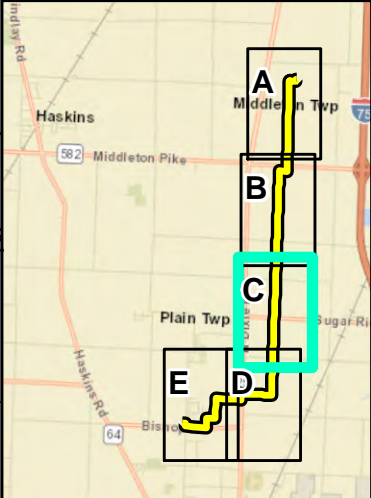
- | | | |
|-------------------|----------------------------------|--------------------------|
| Alternate Route | Existing Substation | Delineated Stream |
| 1,000 Foot Buffer | <all other values> | Non-Jurisdictional Ditch |
| Survey Area | Existing 69kV Transmission Line | NWI Wetland |
| Right-of-Way | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |



Figure 8-3B
Alternate Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_8_2and3.mxd



Alternate Route	Existing Substation	Delineated Stream
1,000 Foot Buffer	<all other values>	Non-Jurisdictional Ditch
Survey Area	Existing 69kV Transmission Line	NWI Wetland
Right-of-Way	Existing 138kV Transmission Line	Detention Basin
	Existing 345kV Transmission Line	

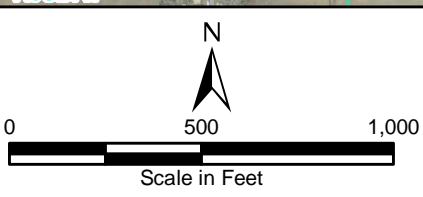
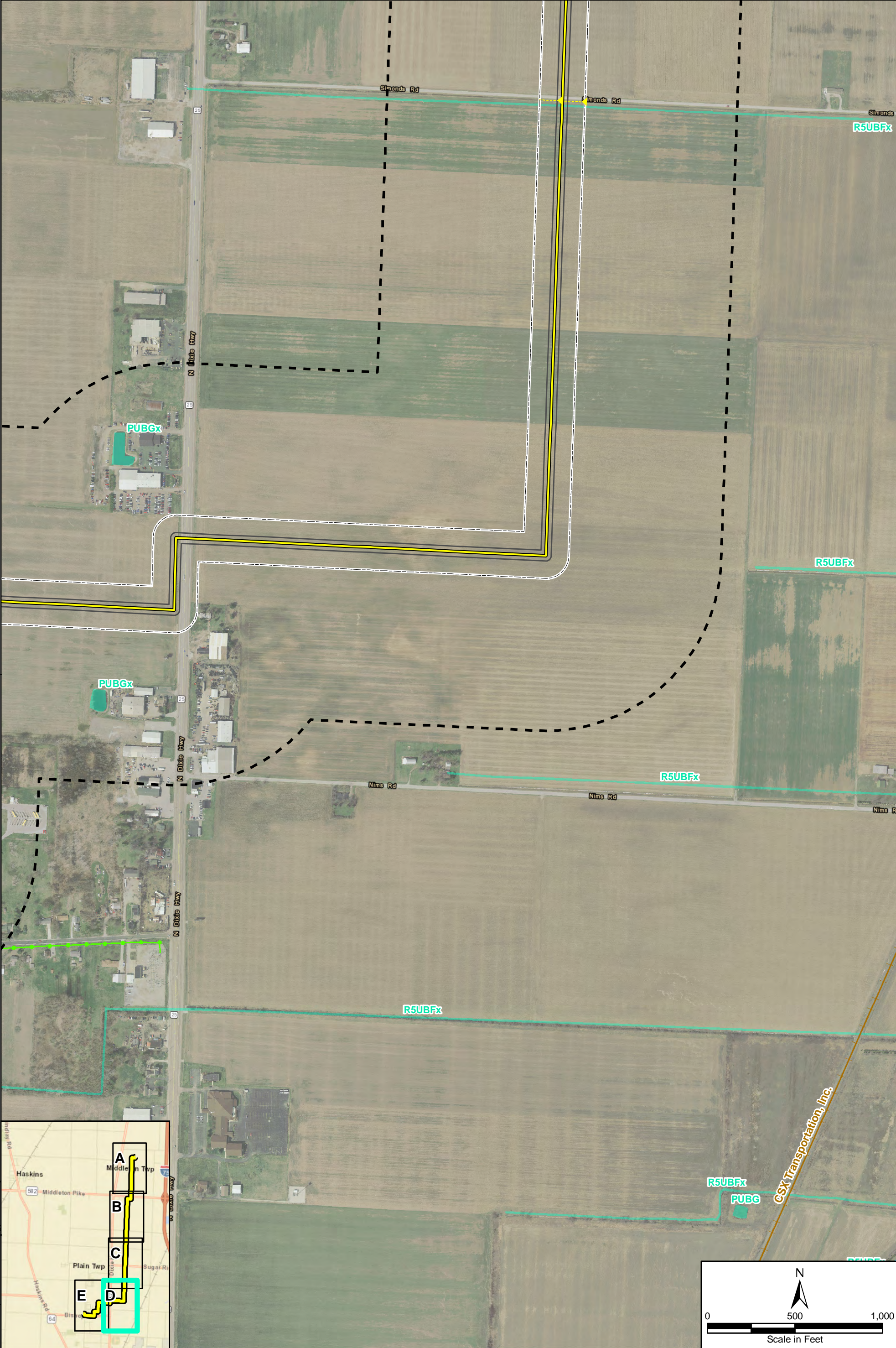


Figure 8-3C
Alternate Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_8_2and3.mxd



- | | | |
|-------------------|----------------------------------|--------------------------|
| Alternate Route | Existing Substation | Delineated Stream |
| 1,000 Foot Buffer | <all other values> | Non-Jurisdictional Ditch |
| Survey Area | Existing 69kV Transmission Line | NWI Wetland |
| Right-of-Way | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

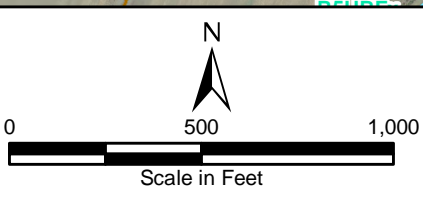
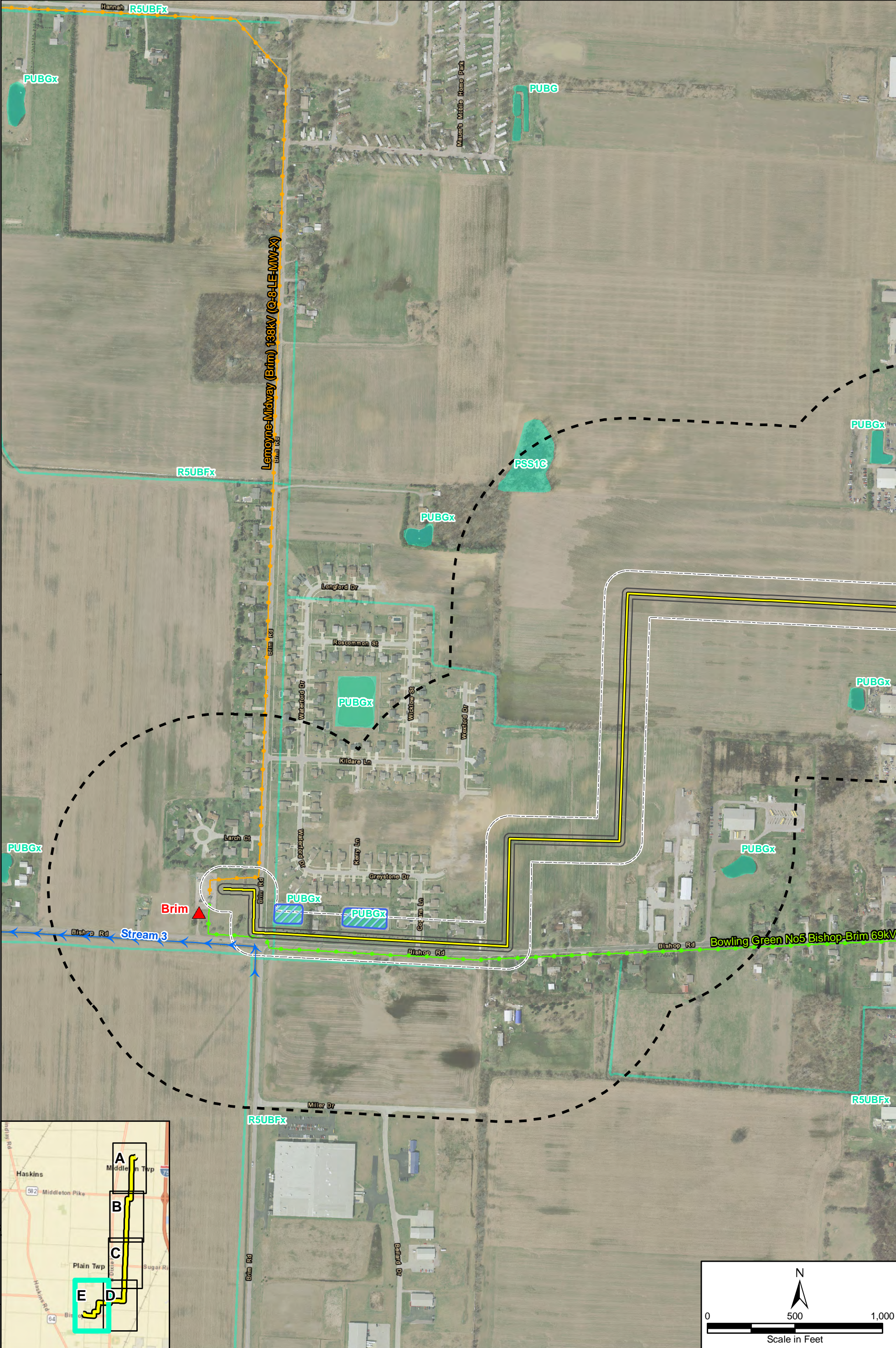


Figure 8-3D
Alternate Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_8_2and3.mxd



- | | | |
|-------------------|----------------------------------|--------------------------|
| Alternate Route | Existing Substation | Delineated Stream |
| 1,000 Foot Buffer | <all other values> | Non-Jurisdictional Ditch |
| Survey Area | Existing 69kV Transmission Line | NWI Wetland |
| Right-of-Way | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

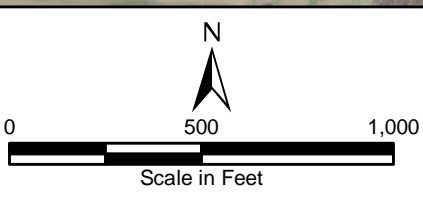


Figure 8-3E
Alternate Route Wetland and
Waterbodies Delineation Map

Wood County 138kV
Reinforcement Project

Wetland Delineation and Surface Water Study

Wood County 138kV Reinforcement Project

Wood County, Ohio

Prepared For:

FirstEnergy West Akron Campus
341 White Pond Drive
Akron, Ohio 44320

November 2018

Prepared By:



GPD GROUP®
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

1801 Watermark Drive, Suite 210
Columbus, Ohio 43215

Tel 614.210.0751
Fax 614.210.0752

Table of Contents

1.0	Executive Summary	1
2.0	Introduction	2
3.0	Wetland Definition	3
4.0	Methods	5
4.1	Wetlands	5
4.1.1	Vegetation	5
4.1.2	Soils	5
4.1.3	Hydrology	6
4.1.4	Wetland Evaluation	6
4.2	Streams	7
4.3	Ponds	7
5.0	Findings	8
5.1	Wetlands	8
5.1.1	Literature Review	8
5.1.2	Field Reconnaissance	8
5.2	Streams	9
5.2.1	Literature Review	9
5.2.2	Field Reconnaissance	9
5.3	Ponds	9
5.3.1	Literature Review	10
5.3.2	Field Reconnaissance	10
6.0	Conclusions	11
7.0	Literature Cited/References	12

Tables

Table 1	Wood County Soil Summary
Table 2	Stream Feature Summary
Table 3	Pond Feature Summary

Figures

Figure 1	USGS Topographic Map
Figure 2	Aquatic Features Location Map
Figure 3	Soils Map
Figure 4	National Wetlands Inventory Map

Appendices

Appendix A	Field Data Forms
Appendix B	Representative Photographs
Appendix C	List of Preparers



1.0 EXECUTIVE SUMMARY

GPD Group completed a routine survey for wetlands and other "Waters of the United States" in October 2018 for American Transmission System, Incorporated (ATSI), a FirstEnergy company, proposed Wood County 138kV Reinforcement Project (Project). The Project is located within the City of Bowling Green and Middleton, Plain, and Center Townships in Wood County, Ohio.

The survey was completed in support of the Project which involves the construction of the Wood County 138kV Reinforcement Project to enhance electrical service in Wood County, Ohio. The Project includes the expansion of the existing 138/69kV substation in Plain Township and the construction of an approximately 5.5-mile 138kV transmission line connecting the expanded substation to the nearby Lemoyne-Midway 138kV Transmission Line. The Project will require a new 60-foot-wide right-of-way (ROW) and will primarily be supported on wood poles.

The environmental survey area investigated and documented in this report consists of a 260-foot-wide corridor (130-foot buffer) along the proposed centerline of the western alternative alignment and the eastern alternative alignment for the proposed Project (environmental survey corridor). The environmental survey corridor is approximately 380 acres in size.

The majority of the environmental survey area is located within the Maumee River Basin and is contained within the Haskins Road Ditch-Maumee River (HUC 12: 04100009-0603) and the Grassy Creek-Maumee River (HUC 12: 04100009-0901) watersheds. The northeast and southeast corners of the environmental survey area are located within the Portage River Basin and are contained within the Cedar Creek-Frontal Lake Erie watershed (HUC 12: 04100010-0703) and the Upper Toussaint Creek (HUC 12: 04100010-0601) watersheds.

The environmental survey area that was investigated is within the jurisdictional boundary of the USACE Buffalo District Office. **Figure 1** depicts the Project location on the Bowling Green North, Ohio United States Geologic Survey (USGS) 7.5-Minute Topographic Quadrangle Map.

The information in this report has been compiled as documentation of existing aquatic features and represents the professional opinion of GPD Group regarding the boundaries, general characteristics, and classifications of waters within the environmental survey area. This document is intended to establish the on-site extent of jurisdictional freshwater features and can be used to facilitate a Jurisdictional Determination. It is GPD Group's recommendation that no earthwork be conducted until such time as all appropriate regulatory agency acknowledgements, reviews, and verifications have been completed.

Based on the field investigations, four (4) stream features and three (3) pond features (in the form of stormwater detention basins) have been identified within the environmental survey area boundary. No wetland features have been identified within the environmental survey area boundary. The identified aquatic features are depicted on the Aquatic Features Location Map (**Figure 2**). The areal extent of the feature was calculated using a Geographic Information System (GIS) and is presented in **Table 2**. Representative photographs were taken of the features within the environmental survey area boundary and are provided in **Appendix B**.



2.0 INTRODUCTION

In October 2018, GPD Group conducted field studies within an approximately 380-acre environmental survey area. These field studies focused on wetlands and other “Waters of the United States” delineations and habitat assessments within a 260-foot-wide corridor (130-foot buffer) along the proposed centerline of the western alternative alignment and the eastern alternative alignment for the Project (environmental survey corridor).

The proposed project involves the construction of the Wood County 138kV Reinforcement Project to enhance electrical service in Wood County, Ohio. The project includes the expansion of the existing 138/69kV substation in Plain Township and the construction of an approximately 5.5-mile 138kV transmission line connecting the expanded substation to the nearby Lemoyne-Midway 138kV transmission line. The project will require a new 60-foot-wide right-of-way (ROW) and will likely be supported on wood poles.

The majority surrounding land use consisted of actively farmed agricultural fields with scattered residential and commercial development.

A Routine Level On-Site Determination, as outlined in the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual, was performed. Additionally, the methods outlined in the April 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) were utilized to further ascertain the presence/absence of the three parameters that define a wetland. The Ohio Rapid Assessment Method for Wetlands (ORAM) Version 5.0 was used to provisionally rate each delineated wetland in accordance with current Ohio Environmental Protection Agency (Ohio EPA) standards, and to determine the appropriate regulatory category in which to place the wetland.

No wetlands were identified; however, in the event of the presence of wetlands, the wetland location would have been flagged in the field, and the identified feature location would have been recorded using a Trimble Geo-XH hand-held Global Positioning System (GPS) unit with sub-meter horizontal accuracy.

Streams were evaluated using either the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams or the Methods for Assessing Habitat in Flowing Water: Using the Qualitative Habitat Evaluation Index (QHEI), published by the Ohio EPA. When appropriate, the Headwater Habitat Evaluation Index (HHEI) data sheets, Headwater Macroinvertebrate Field Evaluation Index (HMFIEI) data sheets, and QHEI data sheets were completed in the field. Stream locations were flagged in the field, and all identified feature locations were recorded using a Trimble Geo-XH hand-held Global Positioning System (GPS) unit with sub-meter horizontal accuracy.

In addition to wetlands and streams, an investigation for ponds located within the environmental survey area boundary was also conducted. Only stormwater detention basins were identified.



3.0 WETLAND DEFINITION

Jurisdictional freshwater wetlands are included as a subset of "Waters of the United States" as defined by 33 CFR Part 328.3. The following definition of a wetland is the regulatory definition used by the USACE for administering Section 404 of the Clean Water Act which limits activities within "Waters of the United States" including wetlands. Wetlands are:

"Those areas 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 conditions. Wetlands generally include swamps, marshes, bogs, and similar areas". (EPA, 40 CFR 230.3)

Wetland determinations are based on a three-parameter approach. An area must exhibit these three characteristics to be classified as a wetland:

1. hydrophytic vegetation
2. hydric soils
3. wetland hydrology

Hydrophytic vegetation is defined as macrophytic plant life growing in water, soil, or on a substrate that is at least periodically deficient in oxygen as a result of the presence of water. In the course of developing the wetland determination methodology, the USACE, in cooperation with the U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), and the Natural Resources Conservation Service (NRCS), compiled a comprehensive list of wetland vegetation. A method to quantify what type of vegetation is typical "wetland vegetation" was also developed and certain species of plants were assigned a plant indicator classification/status. The indicator classification/status of a plant species is expressed in terms of the estimated probability of that species occurring in wetland conditions within a given region. The indicator classification/status within this list includes:

1. Obligate Wetland (OBL) – occur almost always in wetlands (estimated probability 99%), under natural conditions.
2. Facultative Wetland (FACW) – usually occur in wetlands (estimated probability 67% to 99%), but occasionally found in non-wetlands.
3. Facultative (FAC) – equally likely to occur in wetlands and non-wetlands (estimated probability 34% to 66%).
4. Facultative Upland (FACU) – usually occurs in non-wetlands, but occasionally found in wetlands (estimated probability 1% to 33%).
5. Upland (UPL) - occur almost always in uplands (estimated probability 1%), under natural conditions.

Plants that are OBL, FACW, and FAC are considered wetland species.

Hydric soils are those soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions within the major portion of the root zone. The National Technical Committee for Hydric Soils has developed criteria for hydric soil determinations in addition to hydric soil types. The USACE criteria for hydric soils specify that the chroma must be /1 if the soil has no mottles (marked with spots of contrasting color), and /2 or /3 if the soil is mottled. Any soil colors described within this report were determined in the field using the Munsell Soil Color Charts Year 2009 Edition.

Wetland hydrology is the permanent or periodic inundation or saturation of soil (within the root zone) for a significant period during the growing season. Many factors influence the hydrology of an area including



precipitation, topography, soil permeability, and plant cover. The frequency and duration of inundation or soil saturation are important factors in the determination of the existence of wetland hydrology. Primary indicators of wetland hydrology are inundation, soil saturation (within the root zone), water marks, sediment deposits, and drainage patterns. Secondary indicators such as oxidized root channels in the upper 12" of soil, water stained leaves, local soil survey data, and FAC-neutral vegetation test are sometimes also used to determine the presence of wetland hydrology. One primary indicator, or two secondary indicators, is required to establish the presence of wetland hydrology.

Summary

In general, an area must meet all three of the aforementioned criteria to be classified as a wetland. In certain problem areas such as seasonal wetlands that are only wet during certain times of the year or in recently disturbed (atypical) situations, areas may be considered a wetland if only two criteria are met. Additionally, in special situations, an area that meets the definition of a wetland may not be within USACE jurisdiction due to a lack of adjacency to another "Water of the United States". These isolated features fall under the jurisdiction of the Ohio EPA.



4.0 METHODS

4.1 Wetlands

Prior to performing any field studies, the Wood County Soil Survey map, the USGS 7.5-Minute Topographic Quadrangle Map, and the National Wetlands Inventory (NWI) map were analyzed in detail to determine the presence of any previously-identified freshwater wetlands within the environmental survey area boundary.

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any wetlands not annotated on the reviewed sources.

For any suspected wetland areas, the wetland determination is performed based upon the Routine Level On-Site method as outlined in the 1987 USACE Manual. This method consists of collecting a data point within an area that exhibits wetland characteristics. Within this area vegetation is identified, hydrology is assessed, and soils to a depth of at least 18 inches are identified and described. This method is accepted by the USACE and takes into consideration the three wetland parameters (1. Vegetation, 2. Soils, 3. Hydrology) covering both normal and atypical situations. Subsequently, an upland data point within an area adjacent to the delineated wetland, which did not exhibit wetland characteristics, is collected in the same manner, to provide contrasting evidence.

4.1.1 Vegetation

All habitat types within the environmental survey area boundary are identified and the distribution of individual plant species is noted. The existing vegetation is analyzed with respect to percentage of cover for each species. This involves estimation of existing plant species composition by direct observation. Wetlands, as stated previously, are usually characterized by the predominance of hydrophytic plant species. Conversely, upland areas would be dominated by more xerophytic species, or plants better adapted to drier soil conditions. A mesic zone, or the transition between wetland and upland habitat, is often comprised of a mixture of FACW, FAC, and FACU species.

With respect to the vegetation, the USACE Manual places great emphasis on the presence of hydrophytic plant species as an indicator of wetland conditions. It is determined which species are dominant within each plant community. The determination of whether or not an herbaceous species is dominant is based on percentage of cover. Vegetative dominance is calculated as described in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands (50/20 method).

The species indicator classification/status is determined and recorded for each dominant plant species found at the site. This information is used in conjunction with their percentage of cover to determine whether a prevalence of wetland species exists in any of the vegetation communities occurring within the environmental survey area boundary. Species indicator classification/status information is obtained from the USACE's The National Wetland Plant List: 2013 wetland ratings for the State of Ohio (Lichvar, 2013).

4.1.2 Soils

During the field investigation of the environmental survey area, a spade shovel is used to dig soil test pits to accurately document the extent of hydric soil conditions. The test pits are dug to a depth of approximately 18 inches and the soil is examined for color, texture, and moisture content.

Soil color is determined in the field using the 2009 Edition of the Munsell Soil Color Charts. Hydric soils are identified by color/chroma. The Munsell designation indicates the soil color as removed from the test pit. Hydric soil determinations are made in strict accordance with USACE criteria.



Weather conditions during the soil identification procedures for this investigation varied during the field investigation from approximately 80°F and sunny to approximately 50°F and overcast with light rain occurring intermittently.

4.1.3 Hydrology

Hydrology indicators [including inundation, soil saturation (within the root zone), water marks, sediment deposits, etc.] are used in conjunction with vegetation and soil characteristics to establish the presence/absence of freshwater wetlands. The environmental survey area is also evaluated for signs of past human disturbances to determine whether any identified features had been created by man (man-induced wetland) or if the hydrologic regime of the feature had been recently altered. While hydrology is the driving force in wetland creation, it is often the least exact and most difficult to identify in the field. Field indicators are often used to assess the hydrology of an area, especially during times when surface water is not present, or during times of low groundwater, as it might otherwise be difficult to identify.

4.1.4 Wetland Evaluation

ORAM Version 5.0 is used to rate any wetland observed within the environmental survey area boundary in accordance with current Ohio EPA standards, and to determine the appropriate regulatory category in which to place the wetland. This assessment is also used to assess the overall ecological quality and the level of function of a particular wetland. The numeric score obtained from the ORAM field form is not, and should not be considered, an absolute number with intrinsic meaning. The numeric score does, however, allow for relative comparisons between wetlands to be made.

Interim Scoring Break Points for Wetland Regulatory Categories for ORAM

Category	ORAM v5.0 score		
1	0	-	29.9
1 or 2 gray zone	30	-	34.9
Modified 2	35	-	44.9
2	45	-	59.9
2 or 3	60	-	64.9
3	65	-	100

In general, Category 1 wetlands are those wetlands that support minimal wildlife habitat, and minimal hydrological and recreational functions. Category 1 wetlands do not provide critical habitat for threatened or endangered species or contain rare or otherwise sensitive species. Category 2 wetlands support moderate wildlife habitat or hydrological functions. Category 2 wetlands may include the presence of native plant species, but generally do not support threatened or endangered wildlife. Category 3 wetlands support superior wildlife habitat and hydrologic functions. Category 3 wetlands also can have high levels of diversity with a high proportion of native species producing high functional value.

Any wetland observed within the environmental survey area boundary is also identified to their respective Cowardin *et al.* (1979) classification. In brief, this method requires that the delineator classify systems based on the areal extent of vegetative cover. If vegetation covers 30% or more of the substrate, classes are distinguished on the basis of the life form of the plants that constitute the uppermost layer of vegetation and that possess an areal coverage 30% or greater.

The boundary of any wetland identified within the environmental survey area boundary is flagged and recorded in the field with a Trimble Geo-XH hand-held GPS with sub-meter horizontal accuracy. The boundary data that is collected is spatially accurate to <1.0 meter and conforms to the most recent USACE criteria for wetland delineation boundary surveys.



4.2 Streams

Prior to performing any field studies, the Wood County Soil Survey map, the USGS 7.5-Minute Topographic Quadrangle Map, and the NWI map were analyzed in detail to determine the presence of any previously-identified streams within the environmental survey area boundary.

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any streams not annotated on the reviewed sources.

If any streams are identified within the environmental survey area boundary, their drainage area is calculated using the USGS StreamStats for Ohio website (USGS StreamStats Ohio, 2010) to first determine if the stream is considered a Primary Headwater Habitat (PHWH) Stream ($<1.0\text{mi}^2$), or a non PHWH Stream ($>1.0\text{mi}^2$). If the stream is determined to be a PHWH Stream, the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams is used to assign a Headwater Habitat Evaluation Index (HHEI) score for the stream. The HHEI evaluation requires the examination of three habitat variables (channel substrate composition, bankfull width, and maximum pool depth) to sufficiently separate PHWH streams into Class I, Modified Class I, Class II, Modified Class II, and Class III PHWH streams. Once an HHEI score is established for a stream, the decision making flowchart from the Field Evaluation Manual for Ohio's PHWH streams is reviewed to determine the appropriate designation of stream class. Following the flowchart, where it was warranted, further evaluation for potential Rheocrene Biotic Communities may be required. This evaluation includes conducting a Headwater Macroinvertebrate Field Evaluation Index (HMFIEI) and an investigation of the aquatic vertebrates (fish and amphibians) utilizing the stream. The flow regime of the stream is determined in the field based on stream morphology and site conditions at the time of the investigation.

If a stream is identified as a Non-PHWH Stream (drainage area $>1.0\text{mi}^2$), the stream is characterized by completing a Qualitative Habitat Evaluation Index (QHEI) assessment (Rankin, 1989). The QHEI field method requires the examination of six stream habitat characteristics. The evaluation and rating of these six habitat characteristics can yield a qualitative score from 7-100. A low score is indicative of a stream with relatively low ecological/habitat value for fish or macroinvertebrates, etc. A score near the middle of the range is indicative of moderate habitat, and a score near the high end of the range could indicate an exceptional stream community. The six stream habitat characteristics that are evaluated included substrate quality, in-stream cover, channel morphology, riparian zone quality, pool/glide and riffle/run quality, and stream gradient.

Similar to the wetlands, the centerline of streams within the environmental survey area is recorded in the field with a Trimble Geo-XH hand-held GPS with sub-meter horizontal accuracy.

4.3 Ponds

Prior to performing any field studies, the Wood County Soil Survey map, the USGS 7.5-Minute Topographic Quadrangle Map, and the NWI map were analyzed in detail to determine the presence of any previously-identified ponds within the environmental survey area boundary.

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any ponds not annotated on the reviewed sources.

Ponds were identified as those areas with permanent inundation and lacking hydrophytic vegetation indicators.



5.0 FINDINGS

5.1 Wetlands

5.1.1 Literature Review

Prior to performing field studies, the USGS 7.5-Minute Topographic Quadrangle Map (**Figure 1**), Wood County Soil Survey map (**Figure 3**), and NWI map (**Figure 4**) were analyzed in detail to determine the possible distribution of any previously-identified freshwater wetlands within the environmental survey area. The NWI map depicted several riverine unconsolidated bottom (R5UB) features either crossing or flowing alongside of the proposed alignments. No evidence of freshwater wetland features was depicted within the environmental survey area on the topographic map.

The Wood County, Ohio (USDA-NRCS, 2009) Soil Survey Geographic (SSURGO) database indicates that there are thirteen (13) soil units mapped within the environmental survey area boundary. Of these soil units, ten (10) appear on the State Soil Data Access (SDA) Hydric Soil List maintained by the U.S. Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS, 2018). The soil map is included as **Figure 3**. Additional information pertaining to the soil units identified within the environmental survey area are presented in the table below.

Table 1 – Soil Summary

SYMBOL	MAP UNIT NAME	TAXONOMY	DRAINAGE CLASS	HYDRIC
AmA	Aurand fine sandy loam, 0-2% slopes	Fine-loamy, mixed, active, mesic Aquic Argiudolls	Somewhat poorly drained	Yes
AnA	Aurand loam, 0-2% slopes	Fine-loamy, mixed, active, mesic Aquic Argiudolls	Somewhat poorly drained	Yes
HoA	Hoytville clay loam, 0-1% slopes	Fine, illitic, mesic Mollic Epiaqualfs	Very poorly drained	Yes
McA	Mermill fine sandy loam, 0-1% slopes	Fine-loamy, mixed, active, mesic Mollic Epiaqualfs	Very poorly drained	Yes
MfA	Mermill-Aurand complex, 0-1% slopes	Fine-loamy, mixed, active, mesic Mollic Epiaqualfs	Very poorly drained	Yes
NmA	Nappanee sandy loam, 0-2% slopes	Fine, illitic, mesic Aeric Epiaqualfs	Somewhat poorly drained	No
OtB	Ottokee-Spinks loamy fine sands, 2-6% slopes	Mixed, mesic Aquic Udipsamments	Moderately well drained	No
RbA	Randolph loam, 0-2% slopes	Fine, mixed, active, mesic Aeric Endoaqualfs	Somewhat poorly drained	Yes
RfA	Rimer and Tedrow, till substratum, loamy fine sands, 0-2% slopes	Loamy, mixed, active, mesic Aquic Arenic Hapludalfs	Somewhat poorly drained	Yes
SdA	Seward and Ottokee, till substratum, loamy fine sands, 0-2% slopes	Coarse-loamy over clayey, mixed over illitic, active, mesic Oxyaquic Hapludalfs	Moderately well drained	Yes
SdB	Seward and Ottokee, till substratum, loamy fine sands, 2-6% slopes	Coarse-loamy over clayey, mixed over illitic, active, mesic Oxyaquic Hapludalfs	Moderately well drained	Yes
TeA	Tedrow loamy fine sand, 0-2% slopes	Mixed, mesic Aquic Udipsamments	Somewhat poorly drained	Yes
TeB	Tedrow loamy fine sand, 2-6% slopes	Mixed, mesic Aquic Udipsamments	Somewhat poorly drained	No

Notes: State Soil Data Access (SDA) Hydric Soil List (Accessed October 2018)
Soil Designations as seen on **Figure 3**

5.1.2 Field Reconnaissance

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any wetlands



not annotated on the reviewed sources. The riverine unconsolidated bottom (R5UB) features identified on the NWI map were determined to be either streams (See Section 5.2 for information on identified streams) or non-jurisdictional ditches during the field reconnaissance. No evidence of wetland features were identified within the environmental survey area during the field reconnaissance.

5.2 Streams

5.2.1 Literature Review

Prior to performing field studies, the USGS 7.5-Minute Topographic Quadrangle Map (**Figure 1**), Wood County Soil Survey map (**Figure 3**), and NWI map (**Figure 4**) were analyzed in detail to determine the possible distribution of any previously-identified streams within the environmental survey area boundary. Several intermittent streams were shown either crossing or flowing alongside of the proposed alignments.

5.2.2 Field Reconnaissance

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any streams not annotated on the reviewed sources.

Four (4) perennial stream was identified within the environmental survey area boundary during the field reconnaissance activities. These streams are designated Stream 1-3 and Packer Creek. The streams are illustrated on the Aquatic Features Location Map (**Figure 2**). **Appendix A** contains the HHEI field forms completed during the investigation and **Appendix B** contains representative photographs of the streams. A detailed summary of the identified streams is presented in the table below.

TABLE 2. STREAM SUMMARY

TOTAL ON-SITE STREAM LENGTH (FT) 20,034

ID	PHOTO	DRAINAGE AREA (MI ²)	USACE FLOW CHARACTERISTICS/HYDROLOGY ^A	HABITAT ASSESSMENT (SCORE)	401 WQC FOR NWP ELIGIBILITY	OEPA AQUATIC LIFE USE DESIGNATION ^B	ON-SITE LENGTH (FT)
Stream 1	1-3	0.89	RPW - Perennial	HHEI (27)	Ineligible	Modified Class I	13,284
<p>Receiving Waters: Stream 1 originates within the environmental survey area as it becomes a perennial water feature with the environmental survey area. Additionally, the entire length of Stream 1 within in the environmental survey area is confined within an agricultural and roadside ditches. Stream 1 flows north for approximately 2.5-mile before turn west where it flows out of the environmental survey area. Outside of the environmental survey area, Stream 1 continues flowing west and then northwest for a total of 2.1 miles before flowing into the Maumee River.</p> <p>Adjacent Land Use: The surrounding land use consists of actively farmed agricultural fields.</p>							
Stream 2	4-5	0.57	RPW - Perennial	HHEI (51)	Potentially Eligible	Modified Class II	826
<p>Receiving Waters: Stream 2 originates within the environmental survey area, and the entire length of Stream 2 within the survey area is confined within an agricultural ditch. Stream 2 flows north and then east where it exists the environmental survey area. Stream 2 flows east and north before flowing into Stream 3 outside of the environmental survey area.</p> <p>Adjacent Land Use: The surrounding land use consists of actively farmed agricultural fields.</p>							
Stream 3	6-9	0.46	RPW - Perennial	HHEI (48)	Potentially Eligible	Modified Class II	5,664
<p>Receiving Waters: Stream 3 enters the environmental survey area from the south and flows north and west before exiting the environmental survey area. Outside of the environmental survey area, Stream 3 continues flowing north approximately 9.7-mile before flowing into the Maumee River. The entire length of Stream 3 within in the survey area is confined within an agricultural and roadside ditches.</p>							



TABLE 2. STREAM SUMMARY

TOTAL ON-SITE STREAM LENGTH (FT) 20,034

ID	PHOTO	DRAINAGE AREA (MI ²)	USACE FLOW CHARACTERISTICS/ HYDROLOGY ^A	HABITAT ASSESSMENT (SCORE)	401 WQC FOR NWP ELIGIBILITY	OEPA AQUATIC LIFE USE DESIGNATION ^B	ON-SITE LENGTH (FT)
Adjacent Land Use: The surrounding land use consists of actively farmed agricultural fields.							
Packer Creek	10	0.65	RPW - Perennial	HHEI (39)	Potentially Eligible	Modified Class II	260
Receiving Waters: Packer Creek enters the environmental survey area from the west and flows east before exiting the environmental survey area. Outside of the environmental survey area, Packer Creek continues flowing northeast approximately 27-miles before flowing into the Toussaint River which ultimately discharges into Lake Erie.							
Adjacent Land Use: The surrounding land use consists of actively farmed agricultural fields.							

^A Subject to verification by the USACE (TNW=Traditional Navigable Water, RPW=Relatively Permanent Water)

^B Provisional designations based on habitat assessment forms and/or HMFEL.

5.3 Ponds

5.3.1 Literature Review

Prior to performing field studies, the USGS 7.5-Minute Topographic Quadrangle Map (**Figure 1**), Wood County Soil Survey map (**Figure 3**), and NWI map (**Figure 4**) were analyzed in detail to determine the presence of any previously-identified ponds within the environmental survey area boundary. Two (2) palustrine unconsolidated bottom (PUB) features were depicted on the NWI map within the environmental survey area. These features were identified as Pond 1 and Pond 2 during the field reconnaissance. No other evidence of pond features was identified within the environmental survey area boundary on the reviewed sources.

5.3.2 Field Reconnaissance

Following the literature review, further investigation included inspection on foot during the field reconnaissance portion of the project to confirm the information gathered from the literature review, and to identify any ponds not annotated on the reviewed sources. No natural pond features were identified within the environmental survey area during the field reconnaissance activities; however, three (3) constructed ponds (stormwater detention basins) were identified with the environmental survey area.

TABLE 3. POND SUMMARY

TOTAL ON-SITE POND ACREAGE (AC) 0.88

ID	PHOTO	DESIGNED FUNCTION	FUNCTIONING AS DESIGNED?	ESTIMATED TOTAL ACREAGE	ON-SITE ACREAGE
Pond 1	11	Stormwater Retention/ Detention	Yes	0.45	0.26
Pond 2	12	Stormwater Retention/ Detention	Yes	0.61	0.39
Pond 3	13	Stormwater Retention/ Detention	Yes	2.82	0.23
Additional Information: Pond 1, Pond 2, and Pond 3 are stormwater detention basins. Stormwater control features that are constructed to convey, treat, or store stormwaters and that were created in dryland are not considered to be "waters of the United States" in accordance with the Clean Water Act. The USACE will make the final determination of "jurisdiction" in accordance with the Clean Water Act concerning all on-site aquatic features.					



6.0 CONCLUSIONS

Based upon the field reconnaissance activities, four (4) streams and three (3) pond features were identified within the environmental survey area. No freshwater wetland features were identified within the environmental survey area. The streams were designated Stream 1, Stream 2, Stream 3 and Packer Creek and the ponds were designated Pond 1, Pond 2, and Pond 3. Delineated aquatic features are depicted on the Aquatic Features Location Map (**Figure 2**).

Criteria have been evaluated in order to determine whether the aquatic feature located within environmental survey area is "adjacent" or "isolated". Specifically, the definition of "adjacent", as provided in 33 CFR Part 328.4, was used to determine if the aquatic feature was bordering, contiguous, or neighboring ("adjacent") other "Waters of the United States".

Stream 1, Stream 2, and Stream 3 were determined to be contiguous to the Maumee River (OAC 3745-1-11, Table 11-2), and therefore "adjacent". Packer Creek (OAC 3745-1-23, Table 23-2) was determined to be contiguous to Lake Erie, and therefore "adjacent".

Pond 1, Pond 2, and Pond 3 are stormwater detention basins. Stormwater control features constructed to convey, treat, or store stormwaters that are created in dryland are not considered to be "waters of the United States" in accordance with the Clean Water Act.

The USACE will make the final determination of "jurisdiction" in accordance with the Clean Water Act concerning all on-site aquatic features. It is GPD Group's recommendation that no earthwork be conducted until such time as all appropriate regulatory agency acknowledgements, reviews, and verifications have been completed.



7.0 LITERATURE CITED/REFERENCES

- Braun, L.E. 1987. The Monocotyledoneae of Ohio. The Ohio State University Press, Columbus, Ohio.
- Brown, Lauren. 1979. Grasses an Identification Guide. Houghton Mifflin Company, New York, New York.
- Cowardin, et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C.
- Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterway Experiment Station, Vicksburg, Mississippi.
- Environmental Laboratory. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). ERDC/EL TR-12-9, U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- Federal Interagency Committee for Wetland Delineation (FICWD). 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington D.C. Cooperative Publication.
- Knobel, Edward. 1980. Field Guide to the Grasses, Sedges and Rushes of the United States. Dover Publications, Inc., Toronto, Ontario.
- Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X
- Munsell Soil Color Charts. 2009. Munsell Products, Macbeth Color and Photometry Division of Kolmorgen Corporation, Baltimore, Maryland.
- Newcomb, Lawrence. 1977. Newcomb's Wildflower Guide. Little Brown and Company, Boston, Massachusetts.
- Ohio EPA, 2001. Ohio Rapid Assessment Method for Wetlands v. 5.0. Division of Surface Water, Columbus, Ohio.
- Ohio EPA, 2006. Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI). Division of Surface Water, Columbus, Ohio.
- Ohio EPA, 2017. State of Ohio Water Quality Standards. Chapter 3745-1 of the Administrative Code. (Standards and Technical Support Section). Division of Surface Water, Columbus, Ohio.
- Ohio EPA, 2012. Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams – Version 3.0. Division of Surface Water, Columbus, Ohio.
- Rankin, Edward, T. 1989. The Qualitative Habitat Evaluation Index Rationale, Methods, and Application. Ohio EPA, Ecological Assessment Division, Columbus, Ohio.
- Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed October 2, 2018.
- Tiner, R.W. 1988. Field Guide to Nontidal Wetland Identification. Maryland Department of Natural Resources, Annapolis, Maryland and the U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.



United States Department of Agriculture – Natural Resources Conservation Service. October 2018. List of Hydric Soils for Wood County, Ohio.

United States Department of Agriculture – Natural Resources Conservation District. 2009. Soil Survey Geographic (SSURGO) database for Wood County, Ohio.

United States Department of Agriculture – Soil Conservation Service. Midwestern Wetland Flora, Field Office Guide to Plant Species. Midwest National Technical Center, Lincoln, Nebraska.

U. S. Fish and Wildlife Service. October 2018. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>

United States Geological Service. Bowling Green North, Ohio. 7.5-Minute Topographic Quadrangle Map. U.S. Department of the Interior, Geological Survey.

U.S. Geological Survey, 2012, The StreamStats program, online at <http://streamstats.usgs.gov>

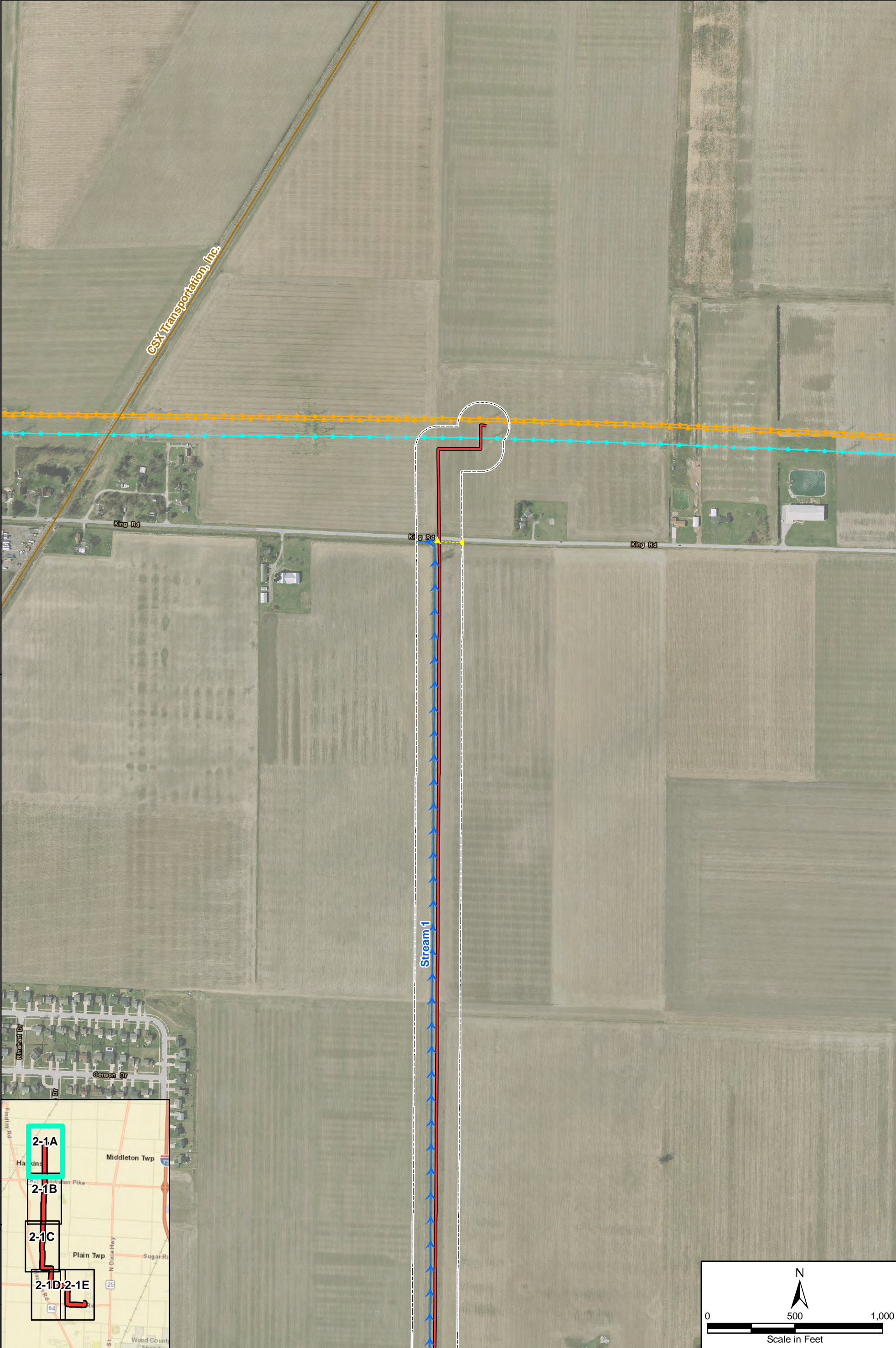


Figures

- Figure 1 USGS Topographic Map
- Figure 2 Aquatic Features Location Map
- Figure 3 Soils Map
- Figure 4 National Wetlands Inventory Map



GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Am\FirstEnergy\FE_LemoynBrim_Welland_2.mxd



- | | | |
|---------------------------|----------------------------------|--------------------------|
| Western Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

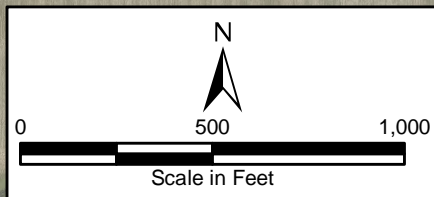
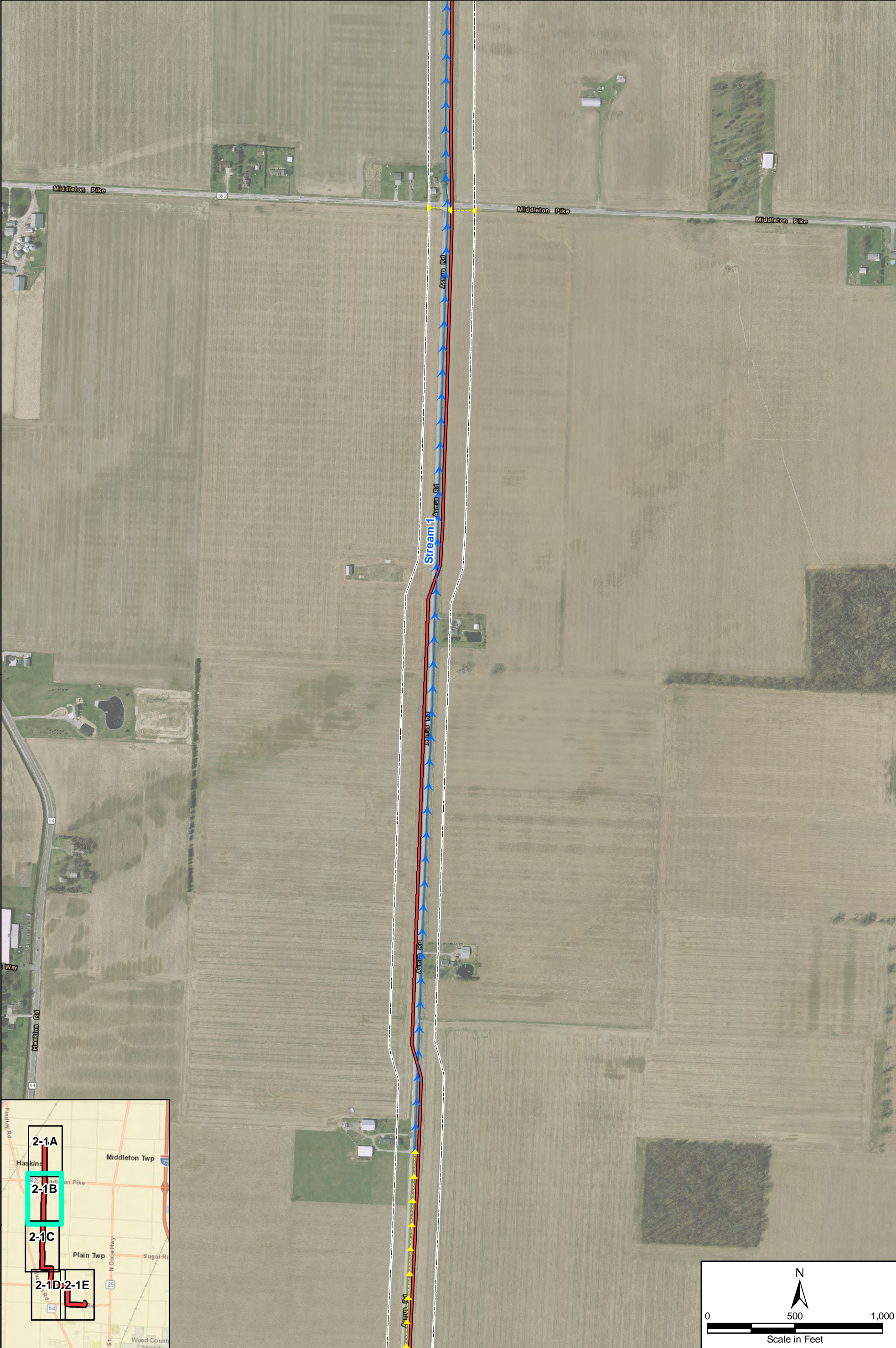


Figure 2-1A
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_2.mxd



- | | | |
|----------------------------------|---------------------------------|--------------------------|
| Western Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| Existing 138kV Transmission Line | Detention Basin | |
| Existing 345kV Transmission Line | | |

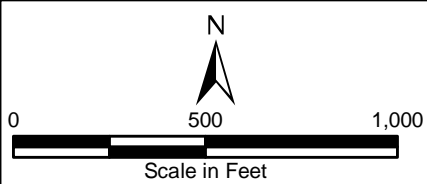
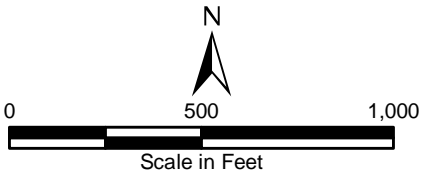
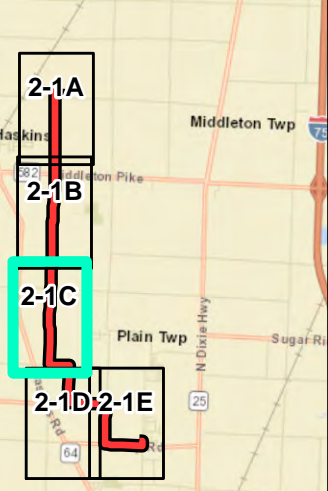


Figure 2-1B
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_Welland_2.mxd



- | | | |
|---------------------------|----------------------------------|--------------------------|
| Western Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |



Figure 2-1C
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoyneBrim_Welland_2.mxd



- | | | |
|---------------------------|----------------------------------|--------------------------|
| Western Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

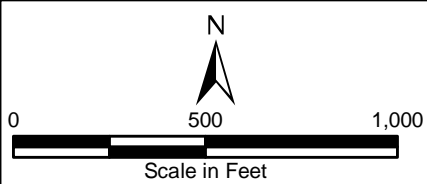


Figure 2-1D
Aquatic Resources Map

Wood County 138kV
Reinforcement Project



Issued: November, 29 2018

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoynBrim_Welland_2.mxd



- | | | |
|----------------------------------|---------------------------------|--------------------------|
| Eastern Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| Existing 138kV Transmission Line | Detention Basin | |
| Existing 345kV Transmission Line | | |

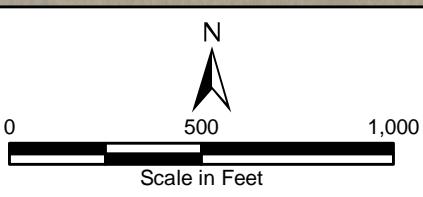
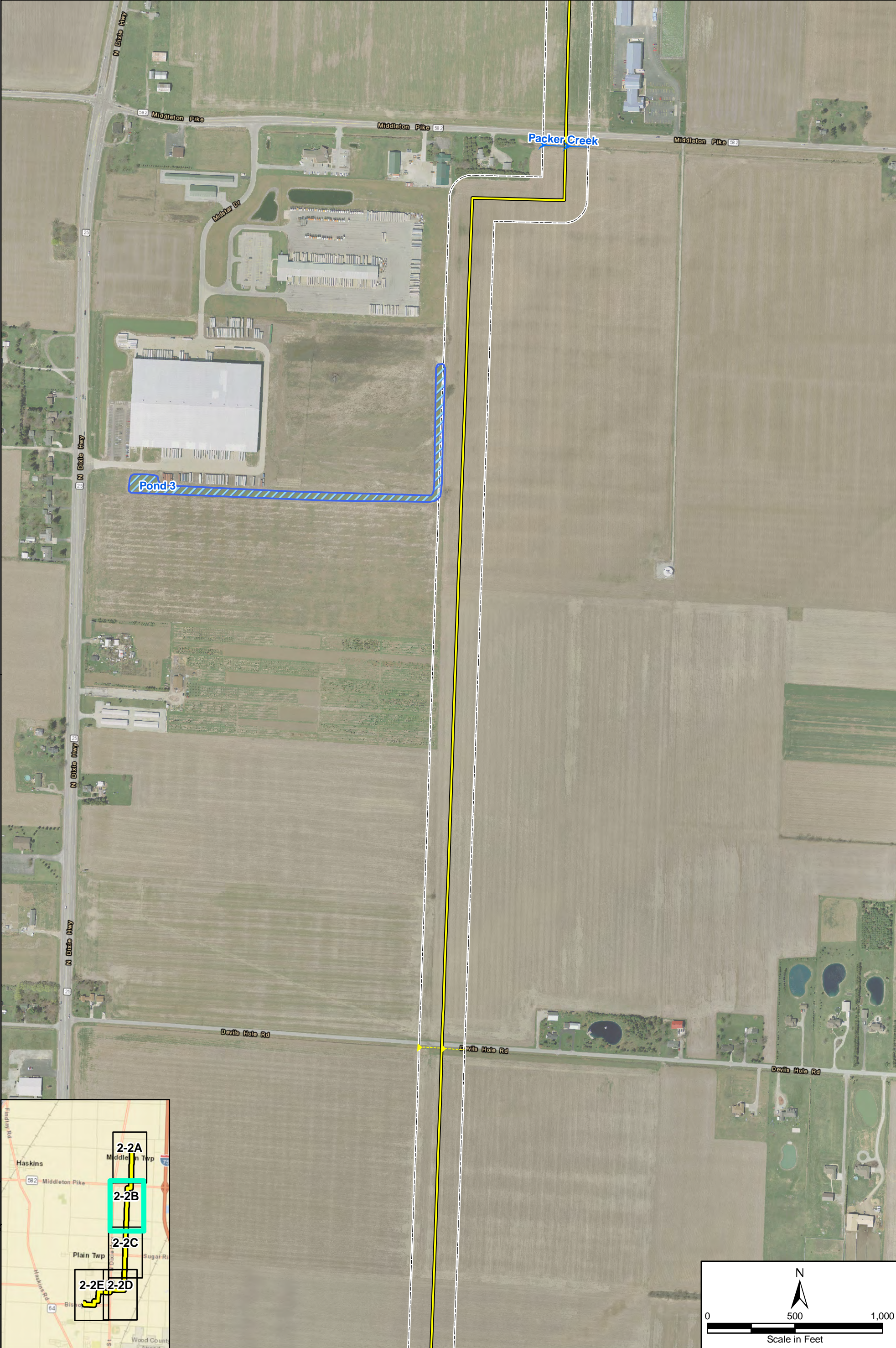


Figure 2-2A
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_Welland_2.mxd



- | | | |
|----------------------------------|---------------------------------|--------------------------|
| Eastern Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| Existing 138kV Transmission Line | Detention Basin | |
| Existing 345kV Transmission Line | | |

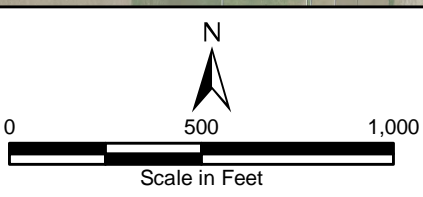


Figure 2-2B
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GISAnn\FirstEnergy\FE_LemoyneBrim_Welland_2.mxd



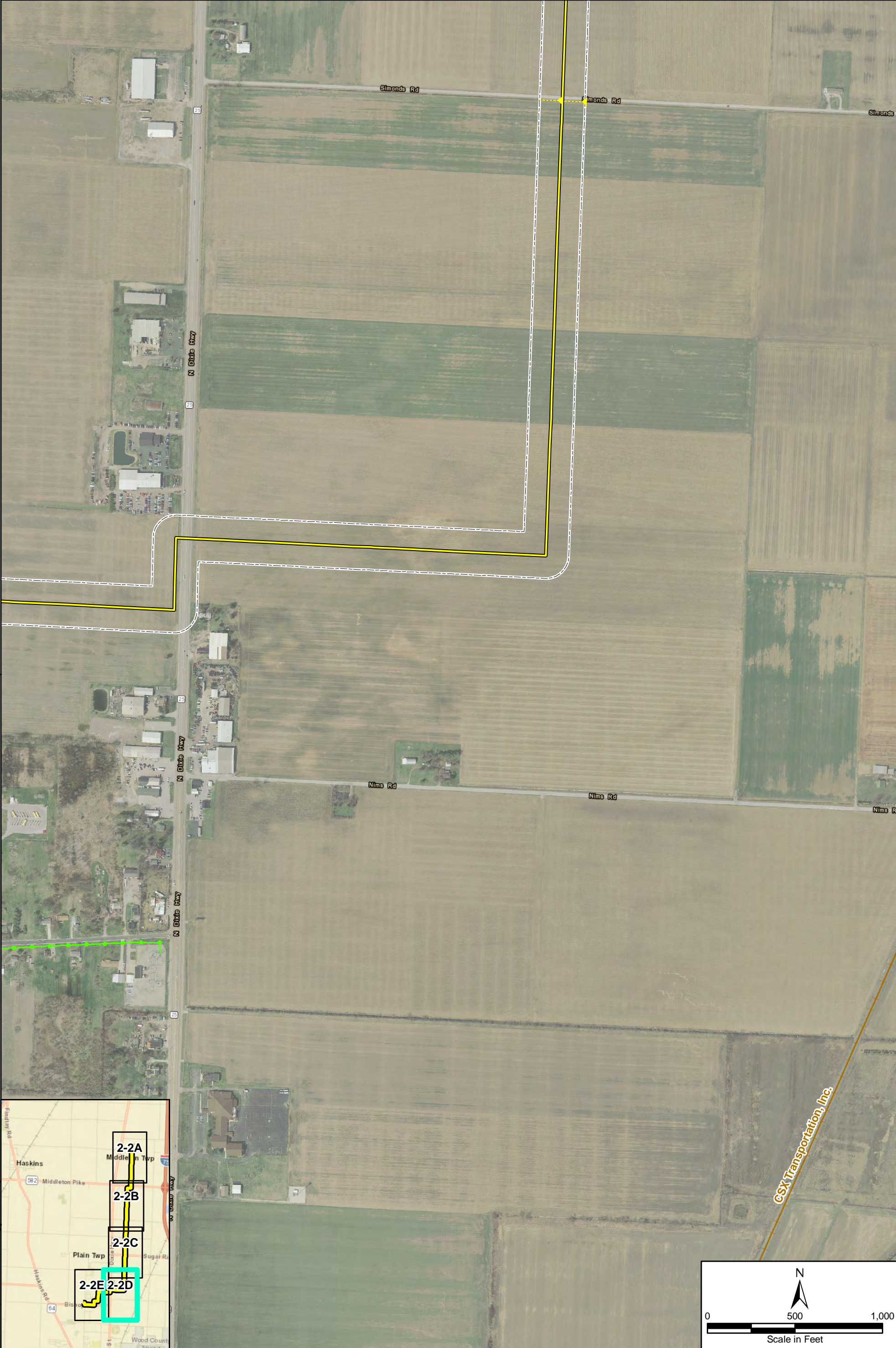
- | | | |
|----------------------------------|---------------------------------|--------------------------|
| Eastern Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| Existing 138kV Transmission Line | Detention Basin | |
| Existing 345kV Transmission Line | | |



Figure 2-2C
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoynBrim_Welland_2.mxd



- | | | |
|---------------------------|----------------------------------|--------------------------|
| Eastern Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

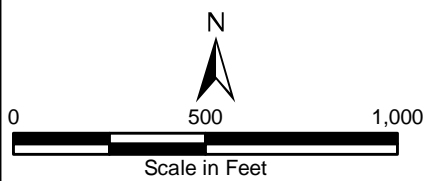
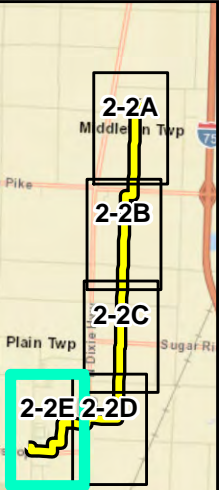
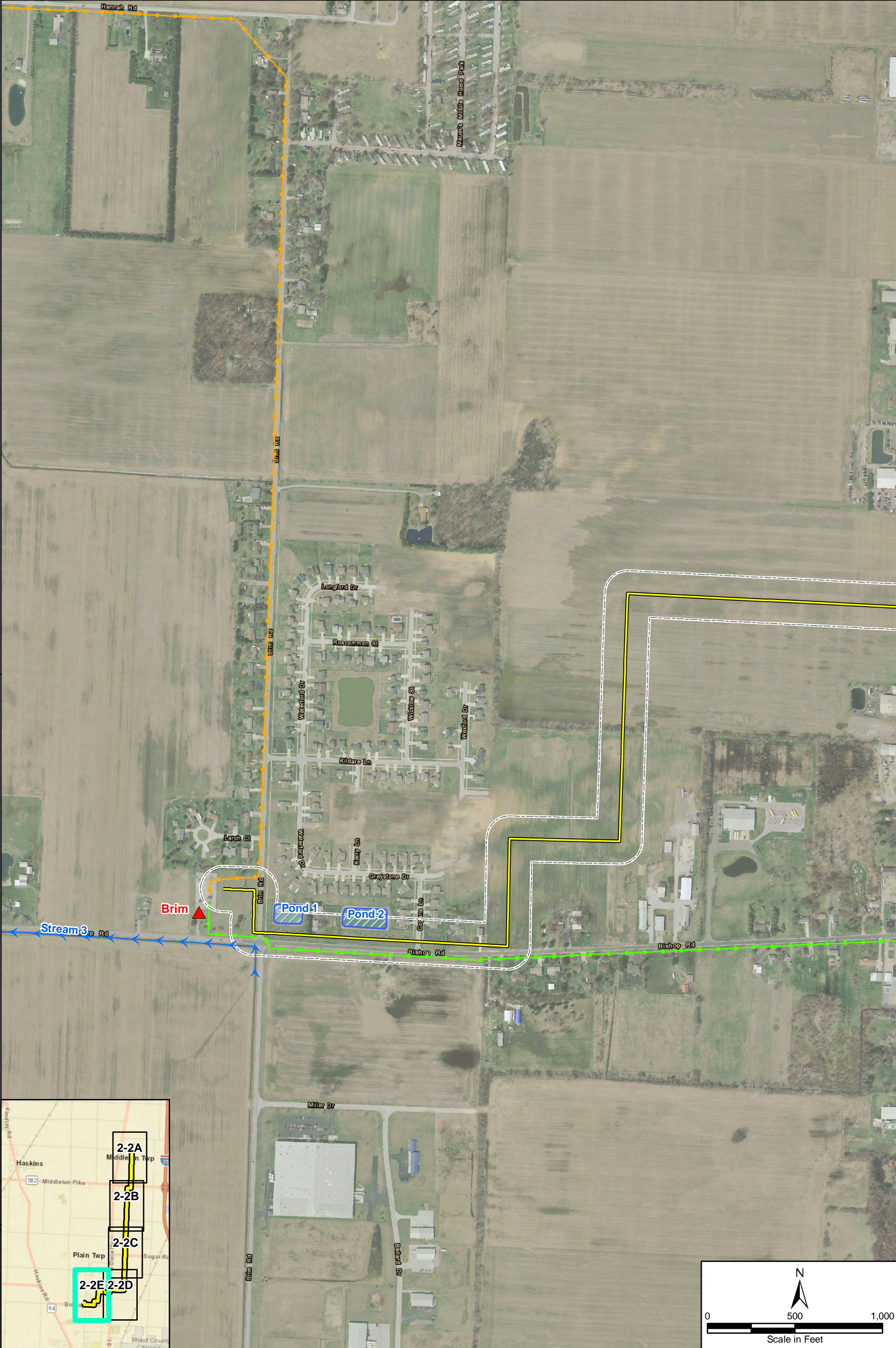


Figure 2-2D
Aquatic Resources Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LenoyneBrim_Welland_2.mxd



- | | | |
|---------------------------|----------------------------------|--------------------------|
| Eastern Alternative Route | Existing Substation | Delineated Stream |
| Survey Area | Existing 69kV Transmission Line | Non-Jurisdictional Ditch |
| | Existing 138kV Transmission Line | Detention Basin |
| | Existing 345kV Transmission Line | |

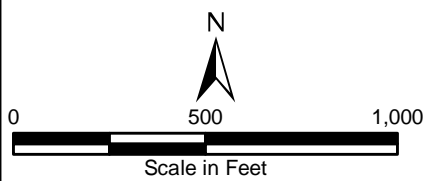
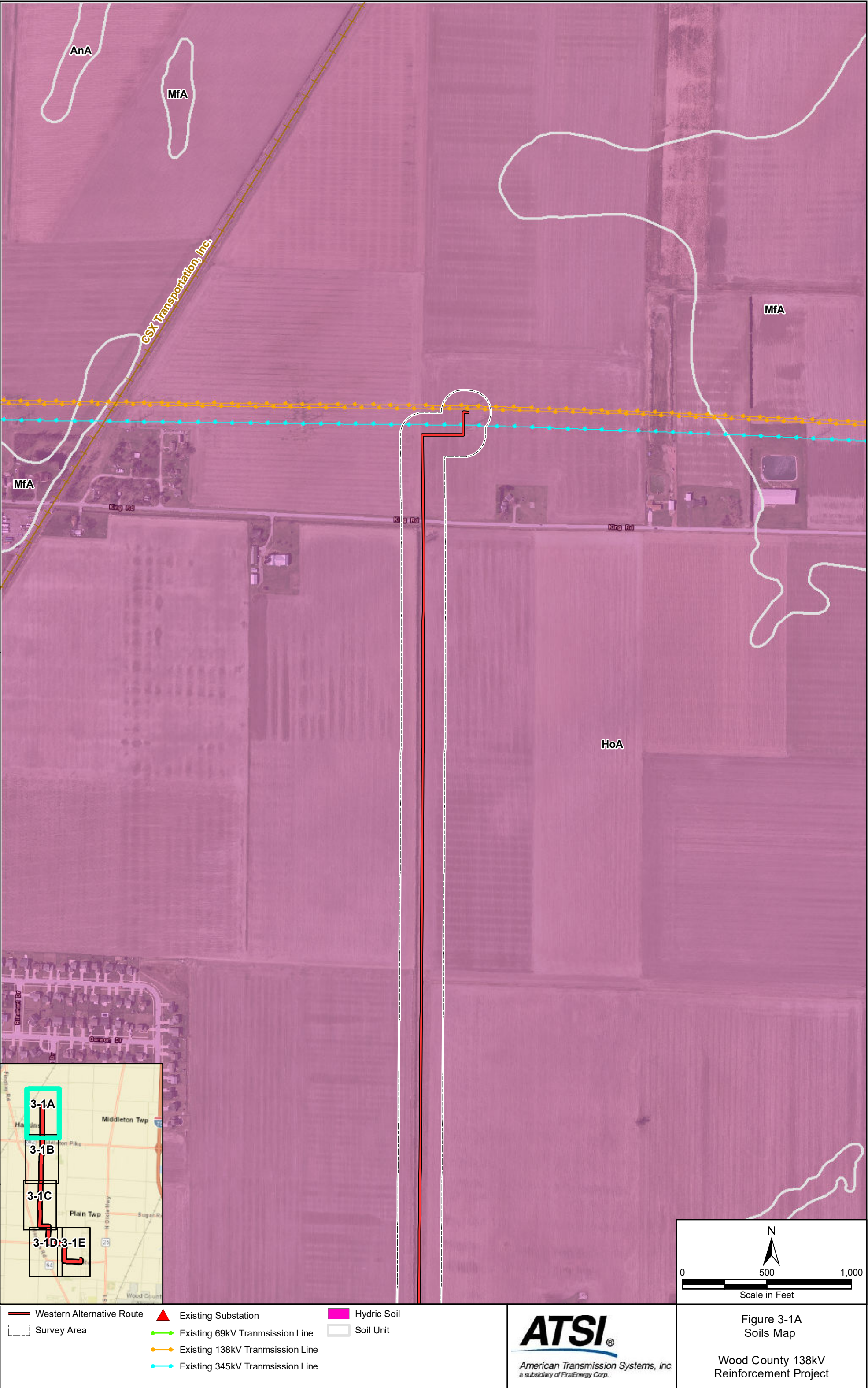
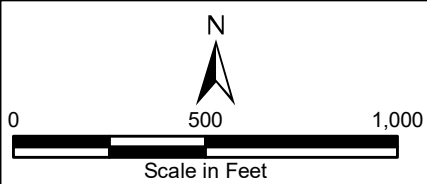
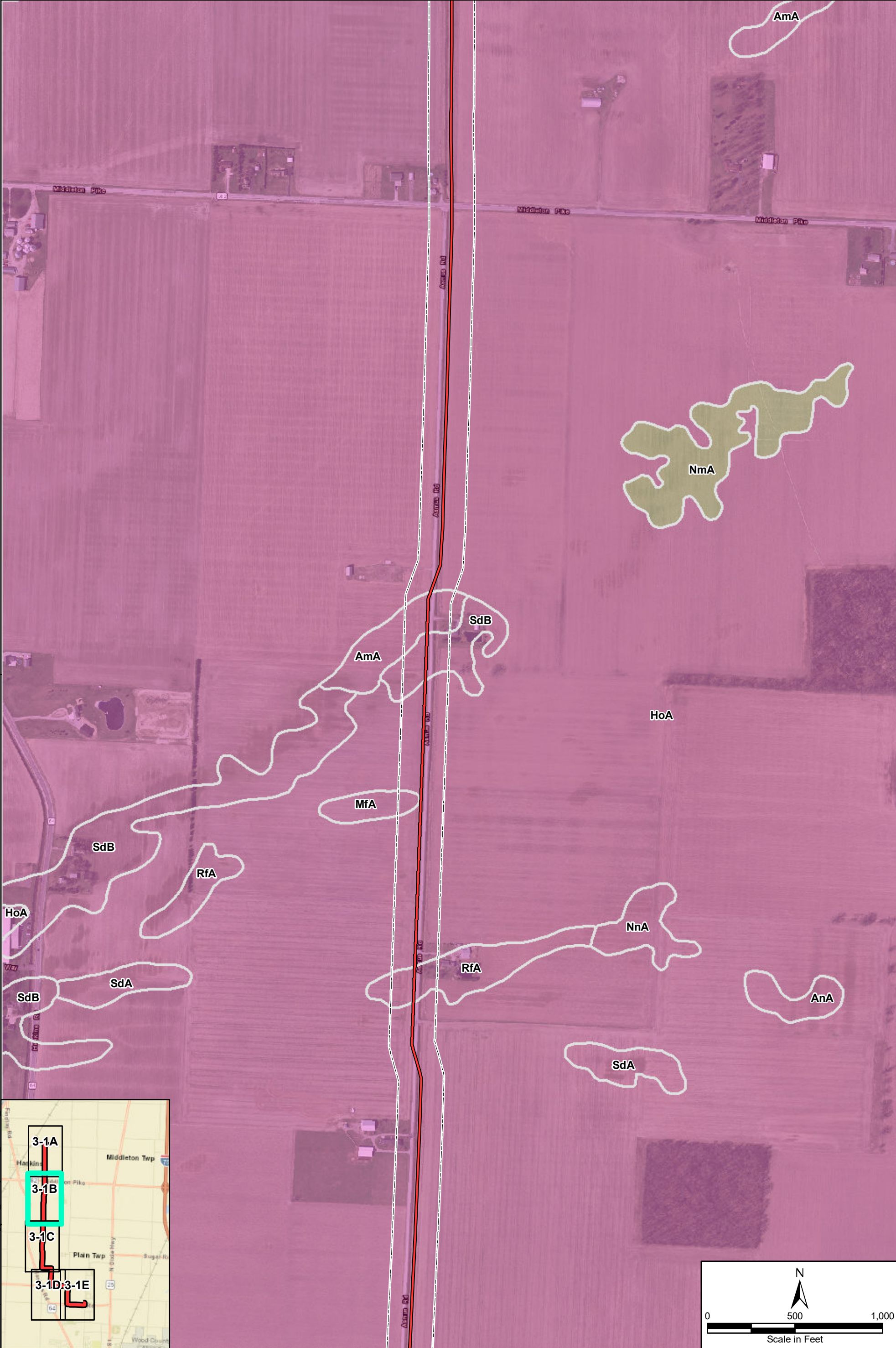


Figure 2-2E
Aquatic Resources Map

Wood County 138kV
Reinforcement Project



GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_3.mxd



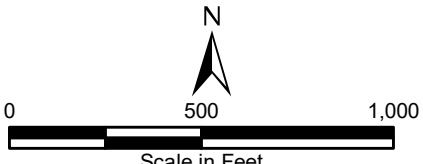
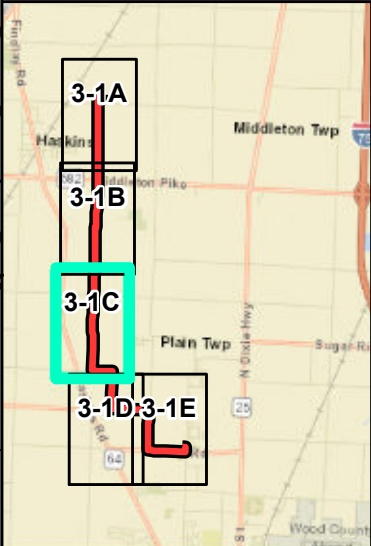
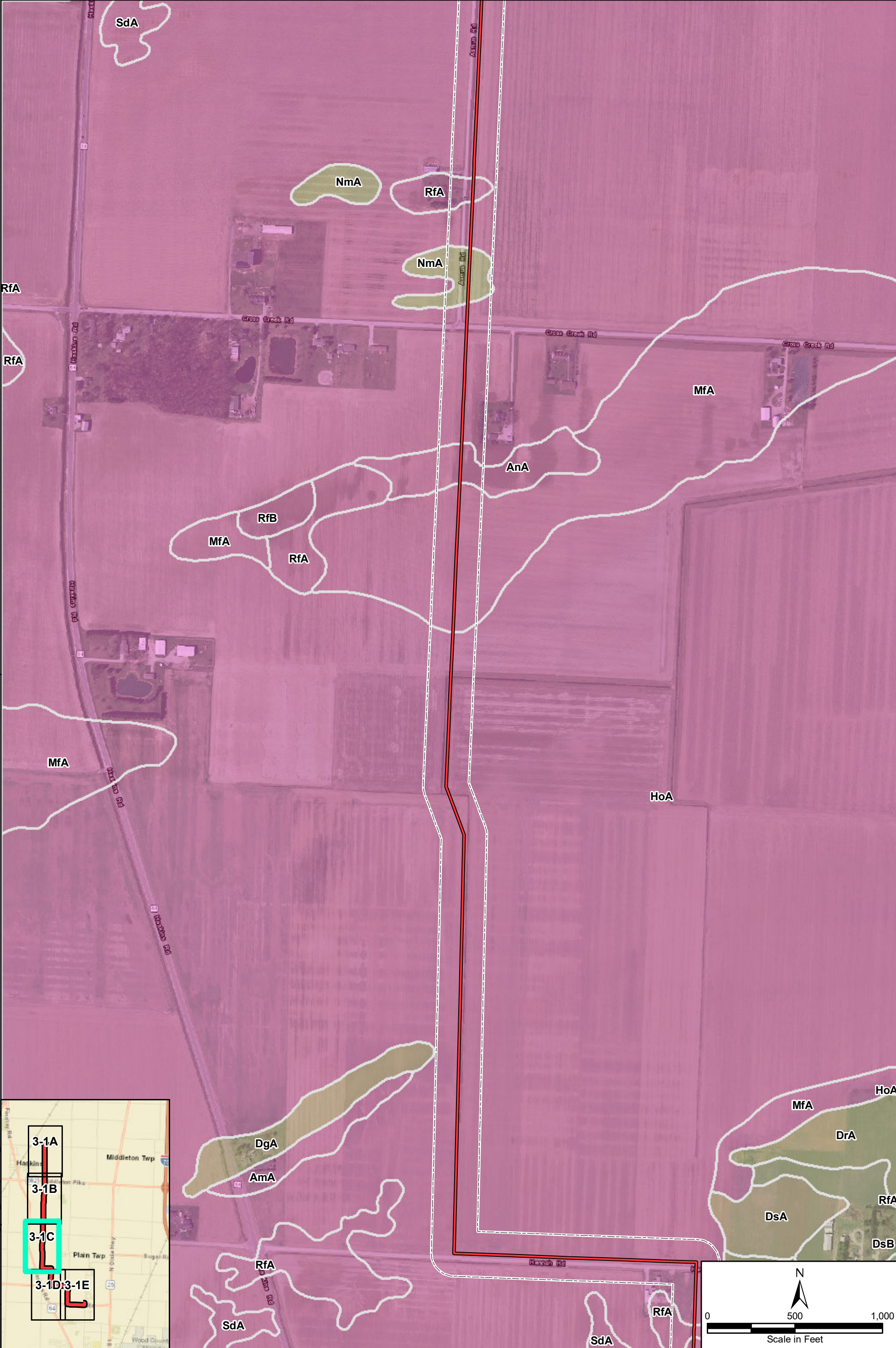
- | | | |
|---------------------------|----------------------------------|-------------|
| Western Alternative Route | Existing Substation | Hydric Soil |
| Survey Area | Existing 69kV Transmission Line | Soil Unit |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |




Figure 3-1B
Soils Map

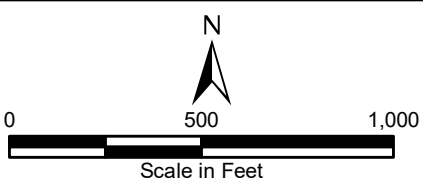
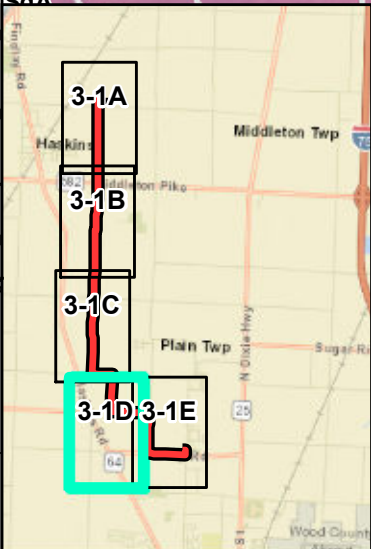
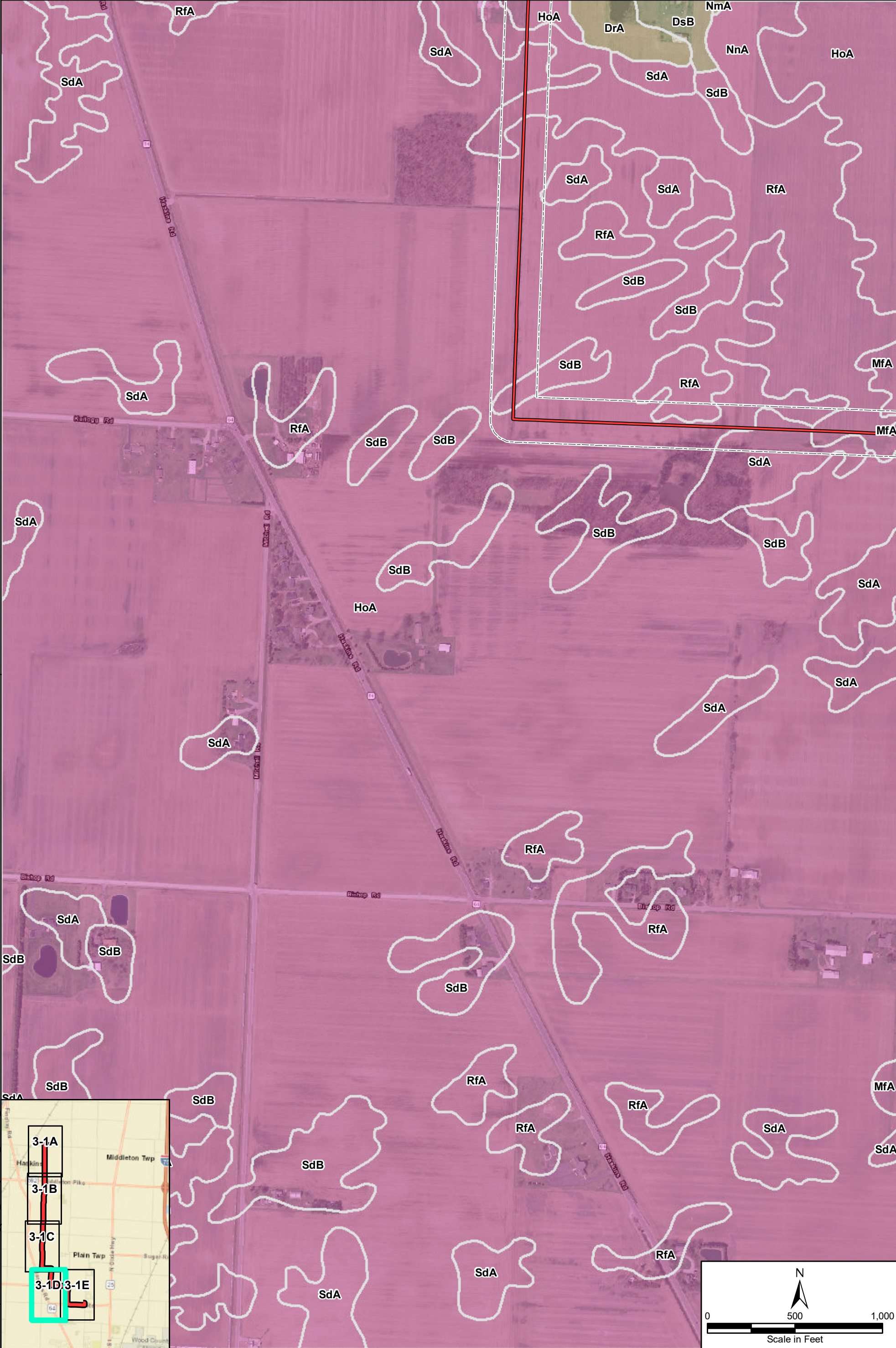
Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_3.mxd



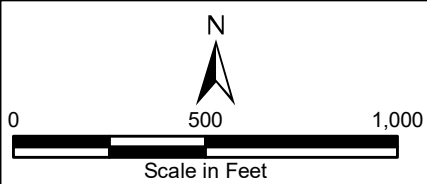
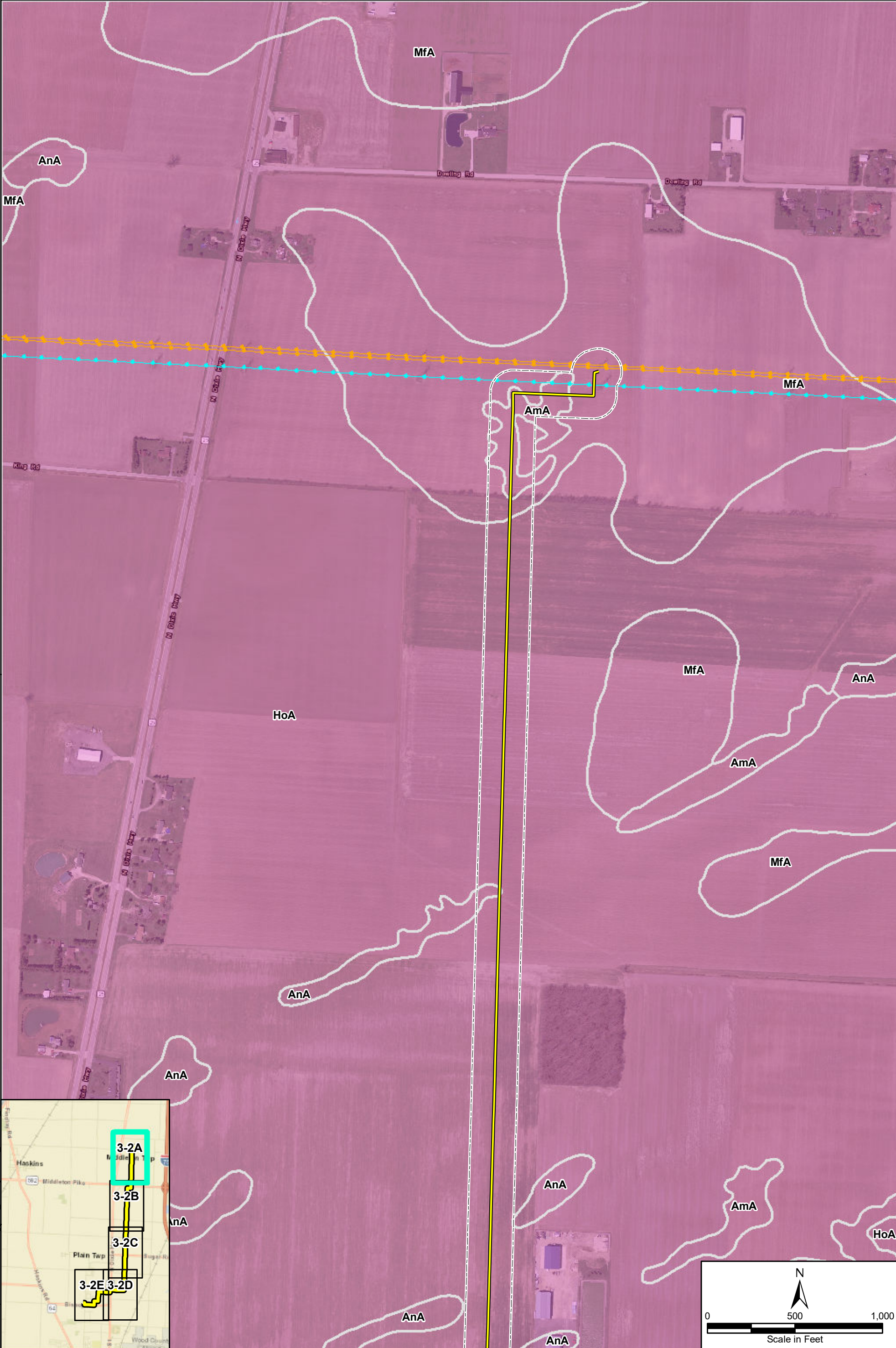
<ul style="list-style-type: none">Western Alternative RouteSurvey Area	<ul style="list-style-type: none">Existing SubstationExisting 69kV Transmission LineExisting 138kV Transmission LineExisting 345kV Transmission Line	<ul style="list-style-type: none">Hydric SoilSoil Unit		<p>Figure 3-1C Soils Map</p> <p>Wood County 138kV Reinforcement Project</p>
---	---	---	---	---

GPD Group
Path: C:\Users\laschweiz\Documents\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_3.mxd



<ul style="list-style-type: none">Western Alternative RouteSurvey Area	<ul style="list-style-type: none">Existing SubstationExisting 69kV Transmission LineExisting 138kV Transmission LineExisting 345kV Transmission Line	<ul style="list-style-type: none">Hydric SoilSoil Unit		<p>Figure 3-1D Soils Map</p> <p>Wood County 138kV Reinforcement Project</p>
---	---	---	--	---

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoynBrim_Welland_3.mxd

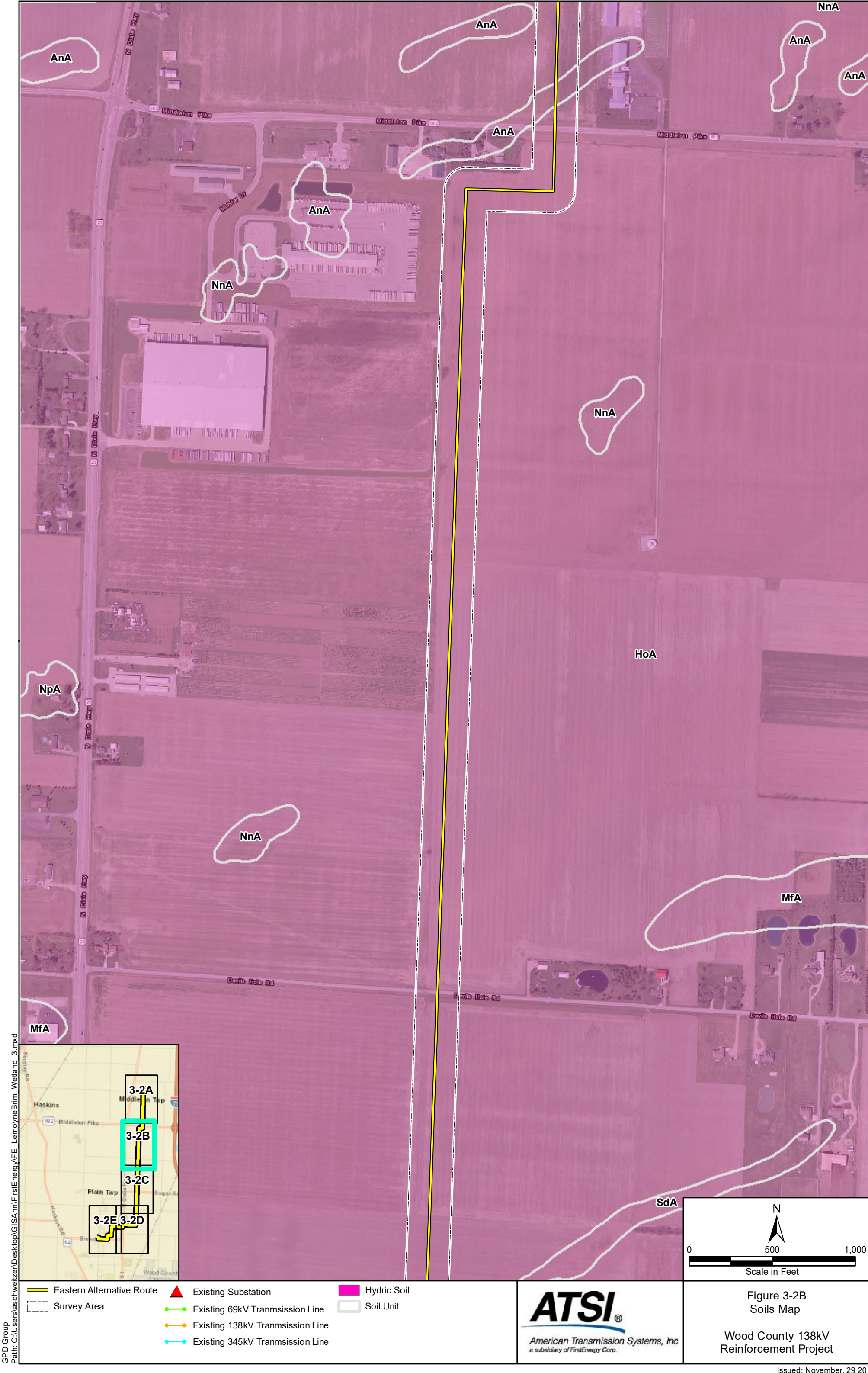


- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | Hydric Soil |
| Survey Area | Existing 69kV Transmission Line | Soil Unit |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

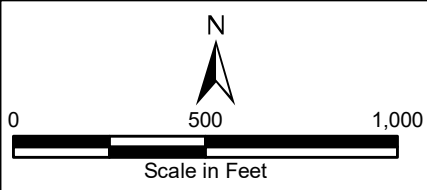
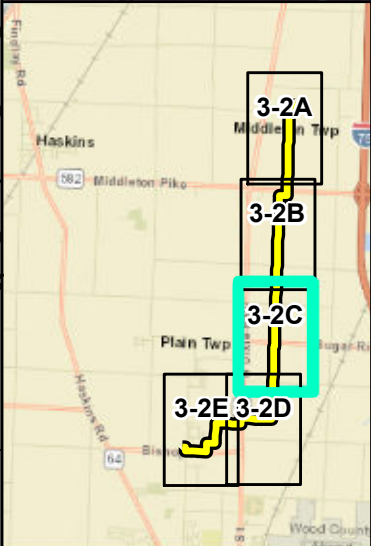
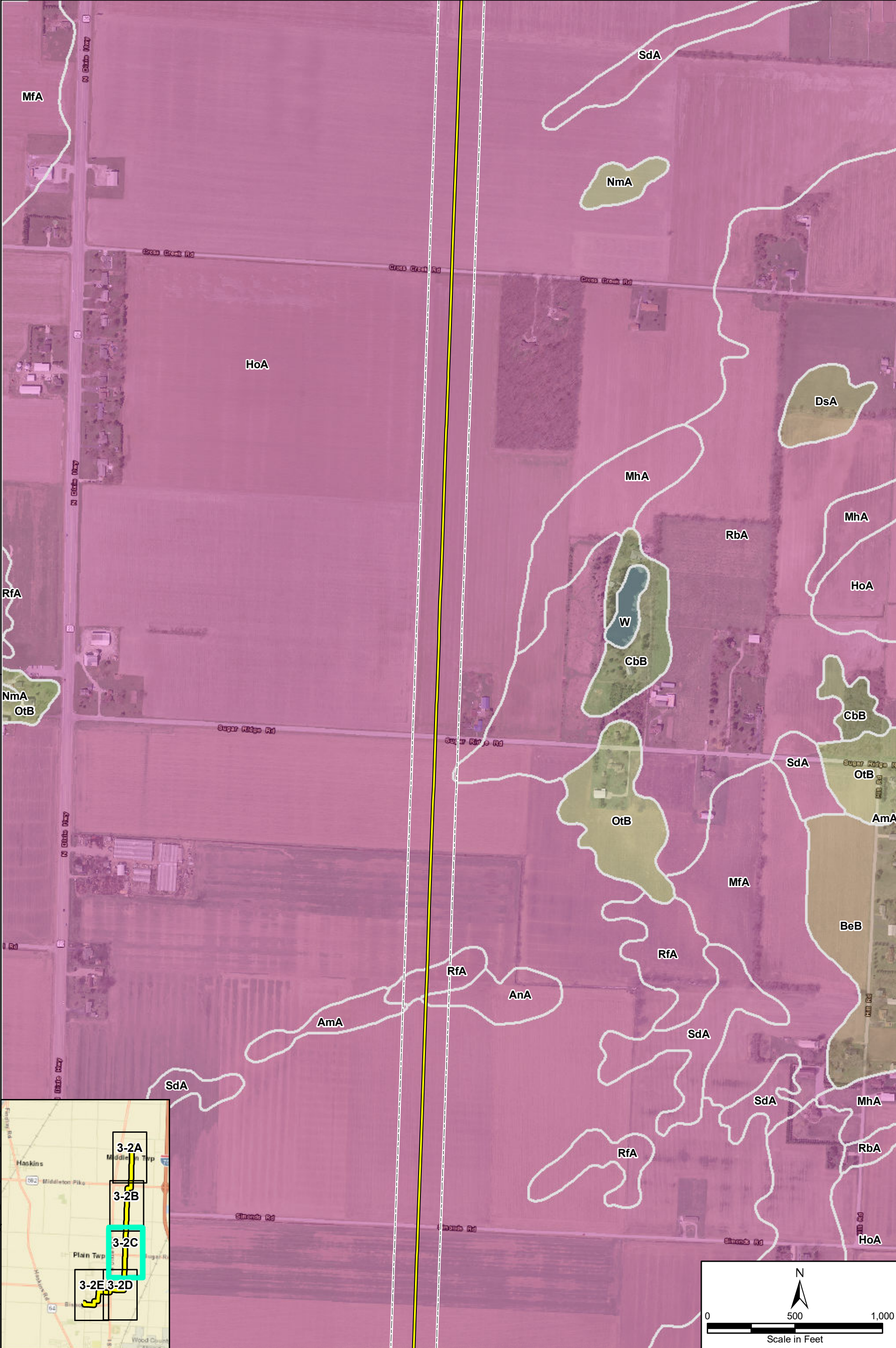


Figure 3-2A
Soils Map

Wood County 138kV
Reinforcement Project



GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_3.mxd



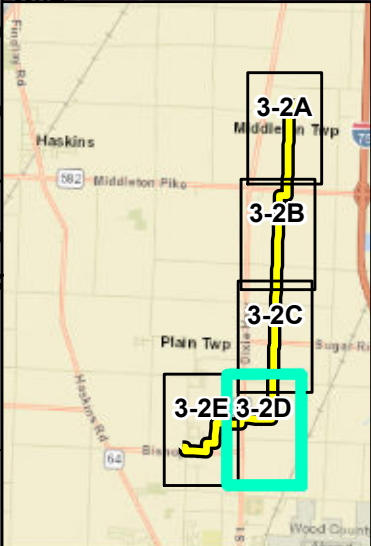
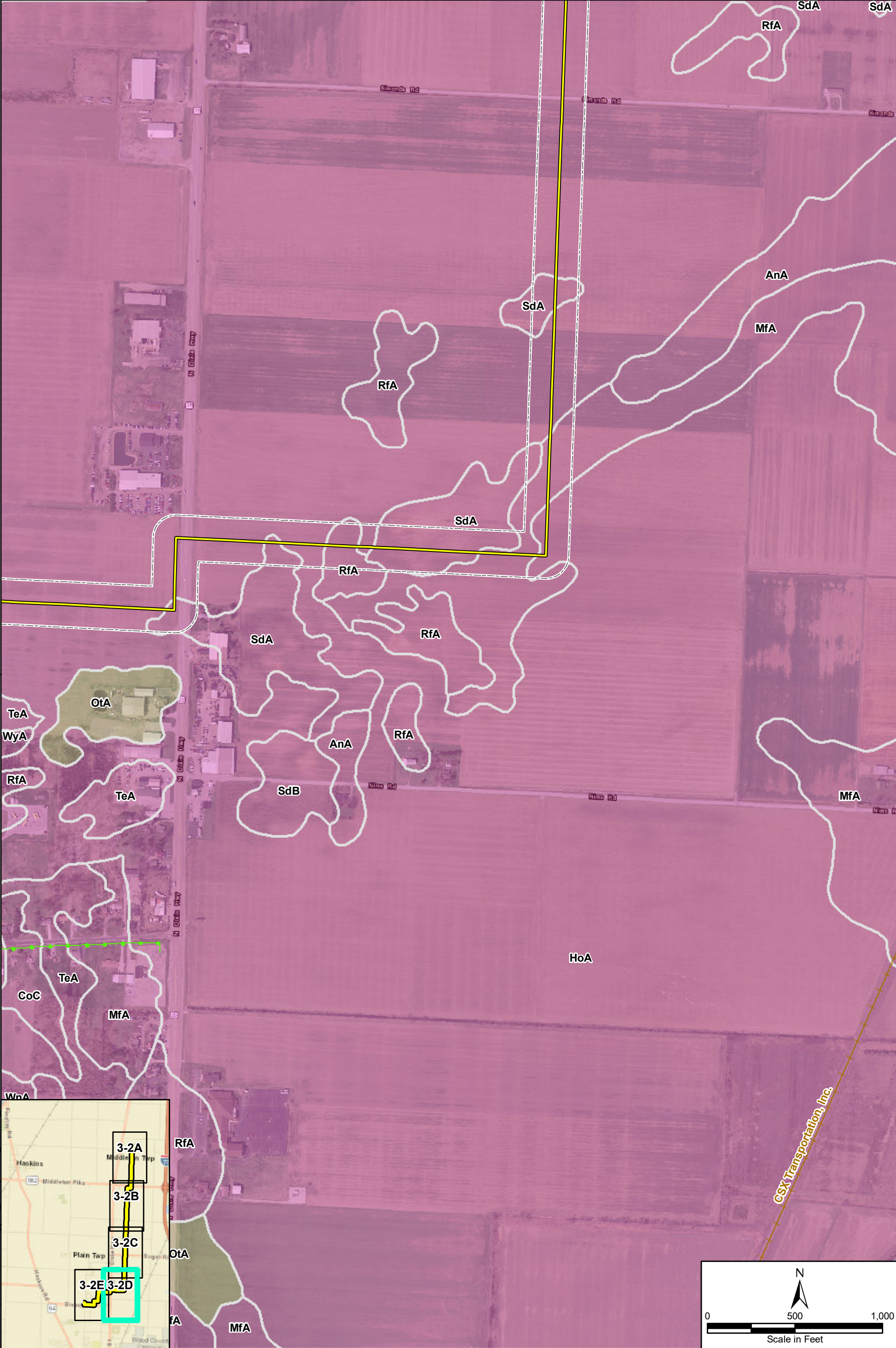
- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | Hydric Soil |
| Survey Area | Existing 69kV Transmission Line | Soil Unit |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |



Figure 3-2C
Soils Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Amn\FirstEnergy\FE_LemoynBrim Welland 3.mxd



Eastern Alternative Route	Existing Substation	Hydric Soil
Survey Area	Existing 69kV Transmission Line	Soil Unit
	Existing 138kV Transmission Line	
	Existing 345kV Transmission Line	

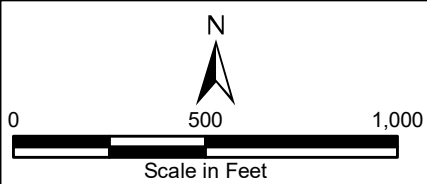
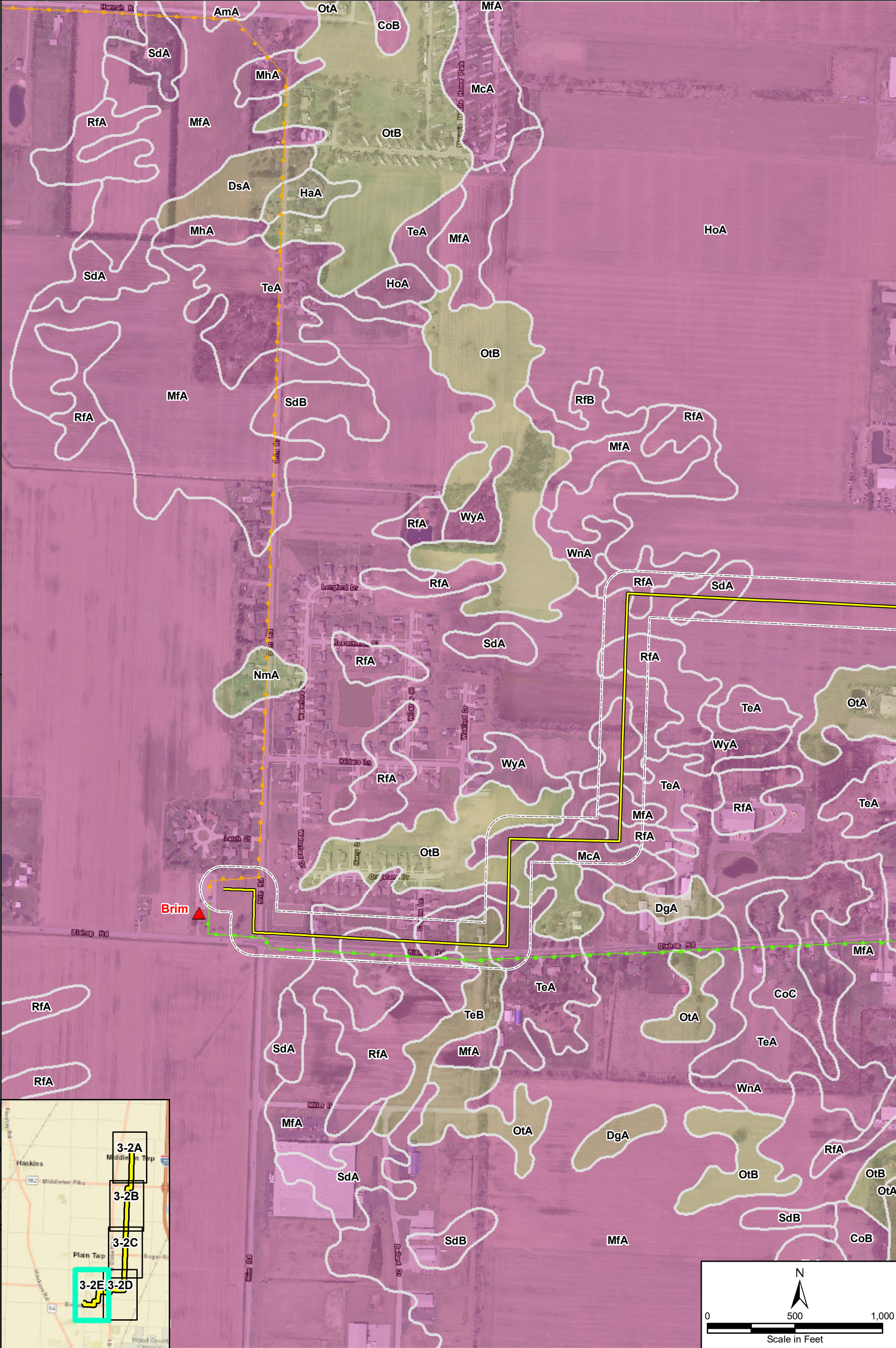
ATSI[®]
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

0 500 1,000
Scale in Feet

Figure 3-2D
Soils Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\Amn\FirstEnergy\FE_LemoyneBrim_Welland_3.mxd



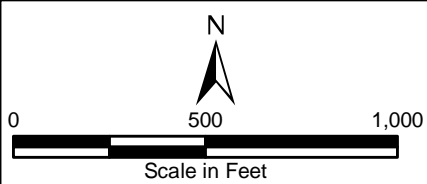
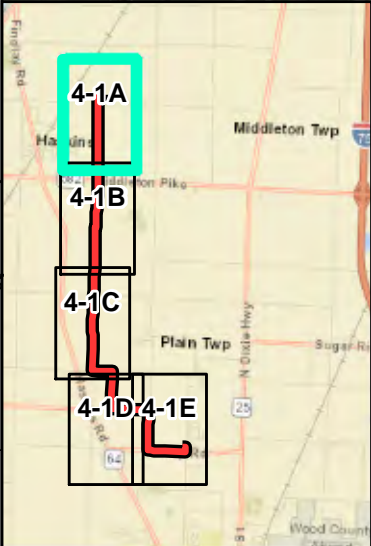
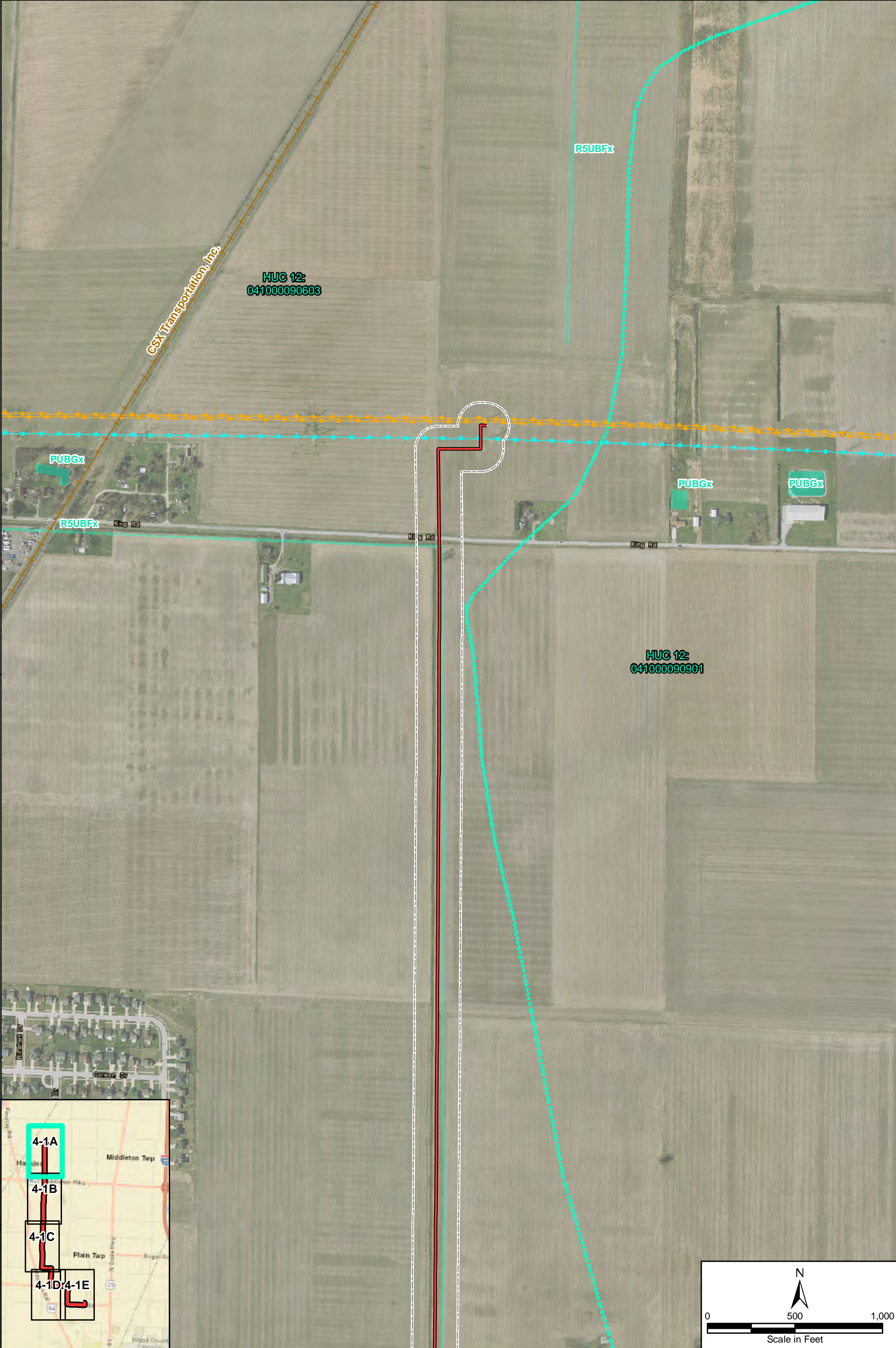
- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | Hydric Soil |
| Survey Area | Existing 69kV Transmission Line | Soil Unit |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |



Figure 3-2E
Soils Map

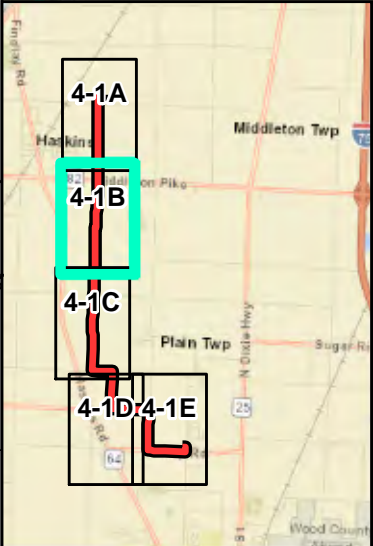
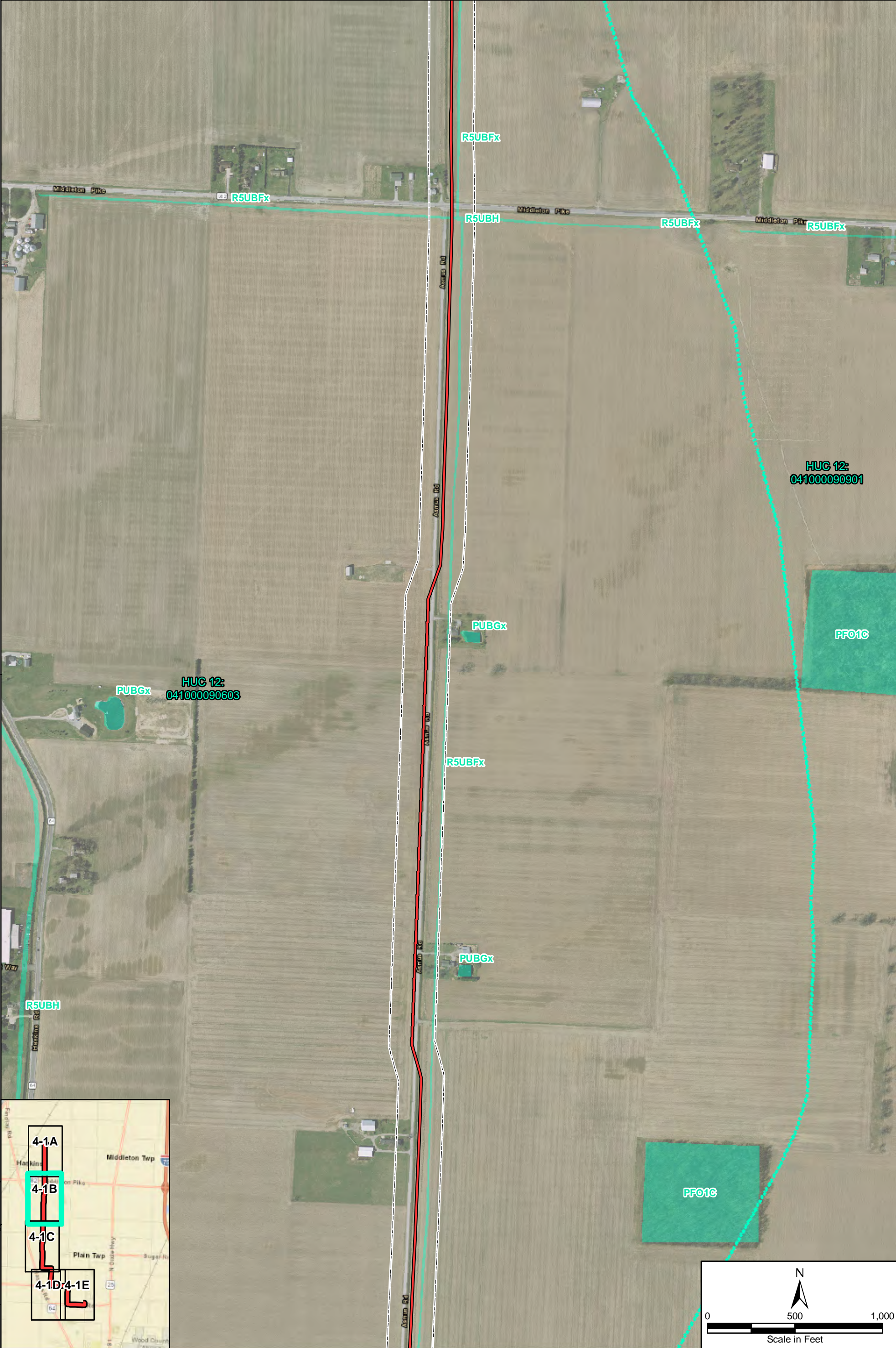
Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GISAnn\FirstEnergy\FE_LemoyneBrim_Wetland_4.mxd



<div><div></div>Western Alternative Route</div> <div><div></div>Survey Area</div>	<div><div></div>Existing Substation</div> <div><div></div>Existing 69kV Transmission Line</div> <div><div></div>Existing 138kV Transmission Line</div> <div><div></div>Existing 345kV Transmission Line</div>	<div><div></div>NWI Wetland</div> <div><div></div>Watershed</div>	<div><div>ATSI[®]</div><div>American Transmission Systems, Inc.</div><div>a subsidiary of FirstEnergy Corp.</div></div>	<div>Figure 4-1A National Wetlands Inventory Map</div> <div>Wood County 138kV Reinforcement Project</div>
---	---	---	---	---

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoynBrim_Wetland_4.mxd



- | | | |
|---------------------------|----------------------------------|-------------|
| Western Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

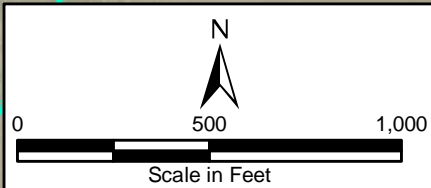
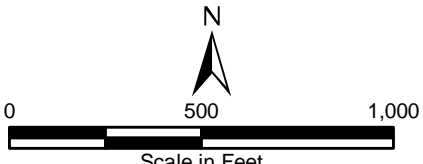
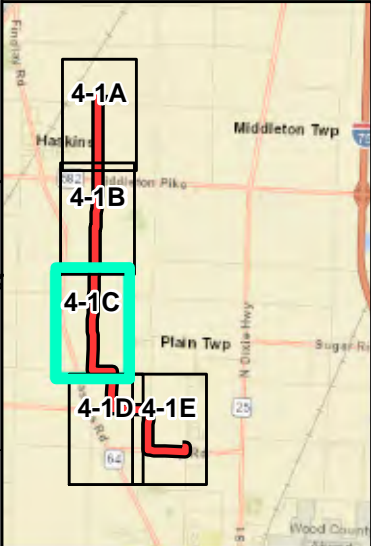
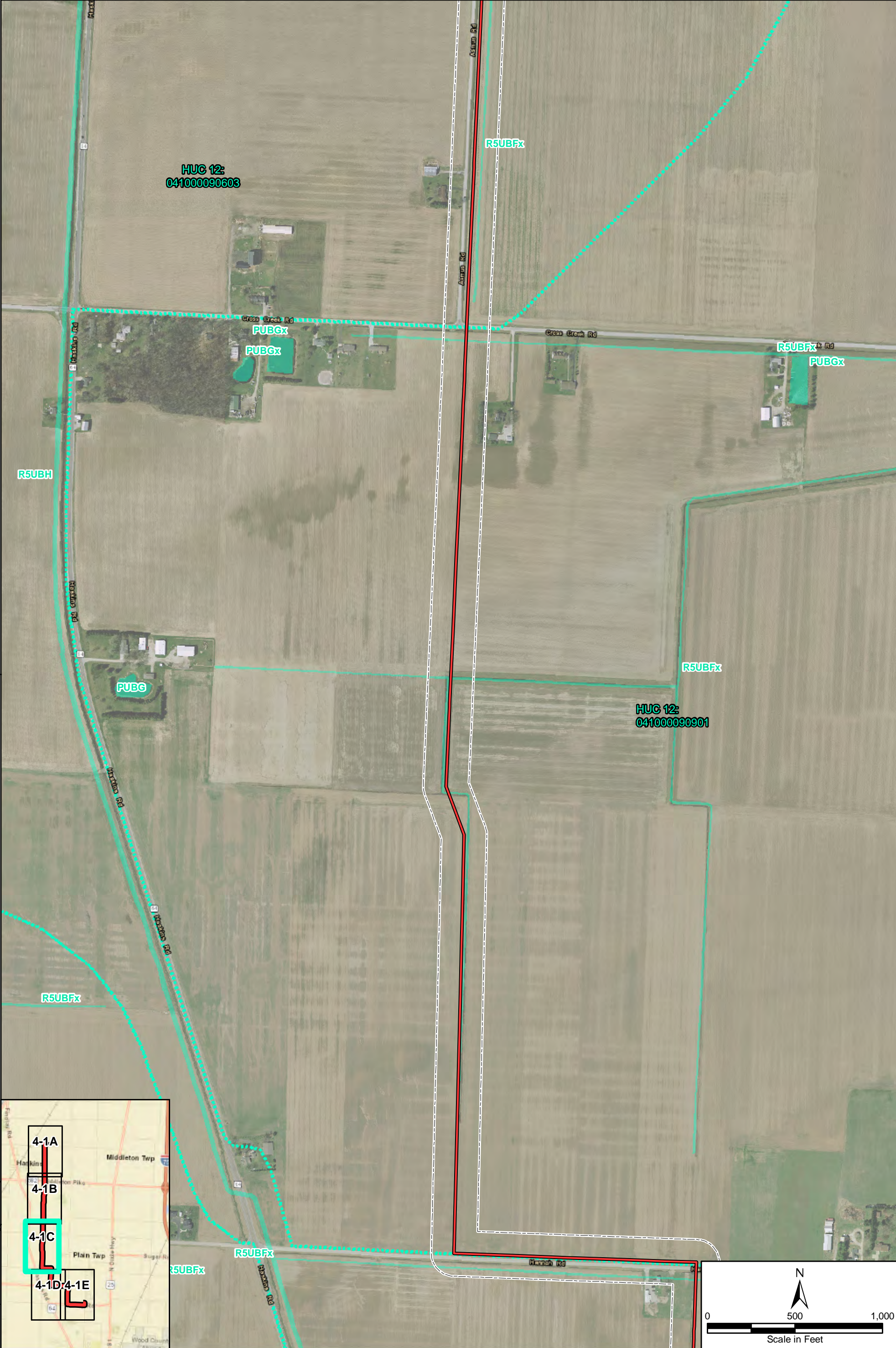


Figure 4-1B
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_Wetland_4.mxd



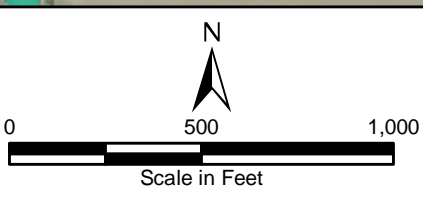
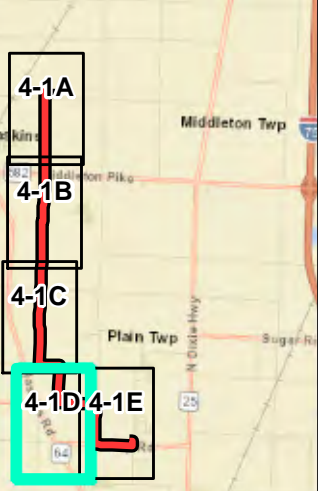
Western Alternative Route	Existing Substation	NWI Wetland
Survey Area	Existing 69kV Transmission Line	Watershed
	Existing 138kV Transmission Line	
	Existing 345kV Transmission Line	



Figure 4-1C
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LemoyneBrim_Wetland_4.mxd



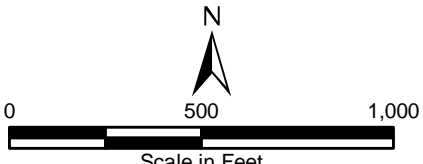
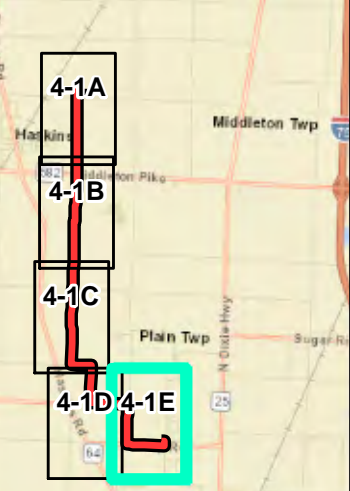
- | | | |
|---------------------------|----------------------------------|-------------|
| Western Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |



Figure 4-1D
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LenoynBrim_Wetland_4.mxd



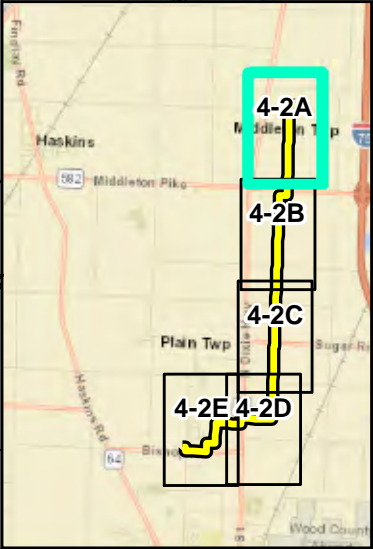
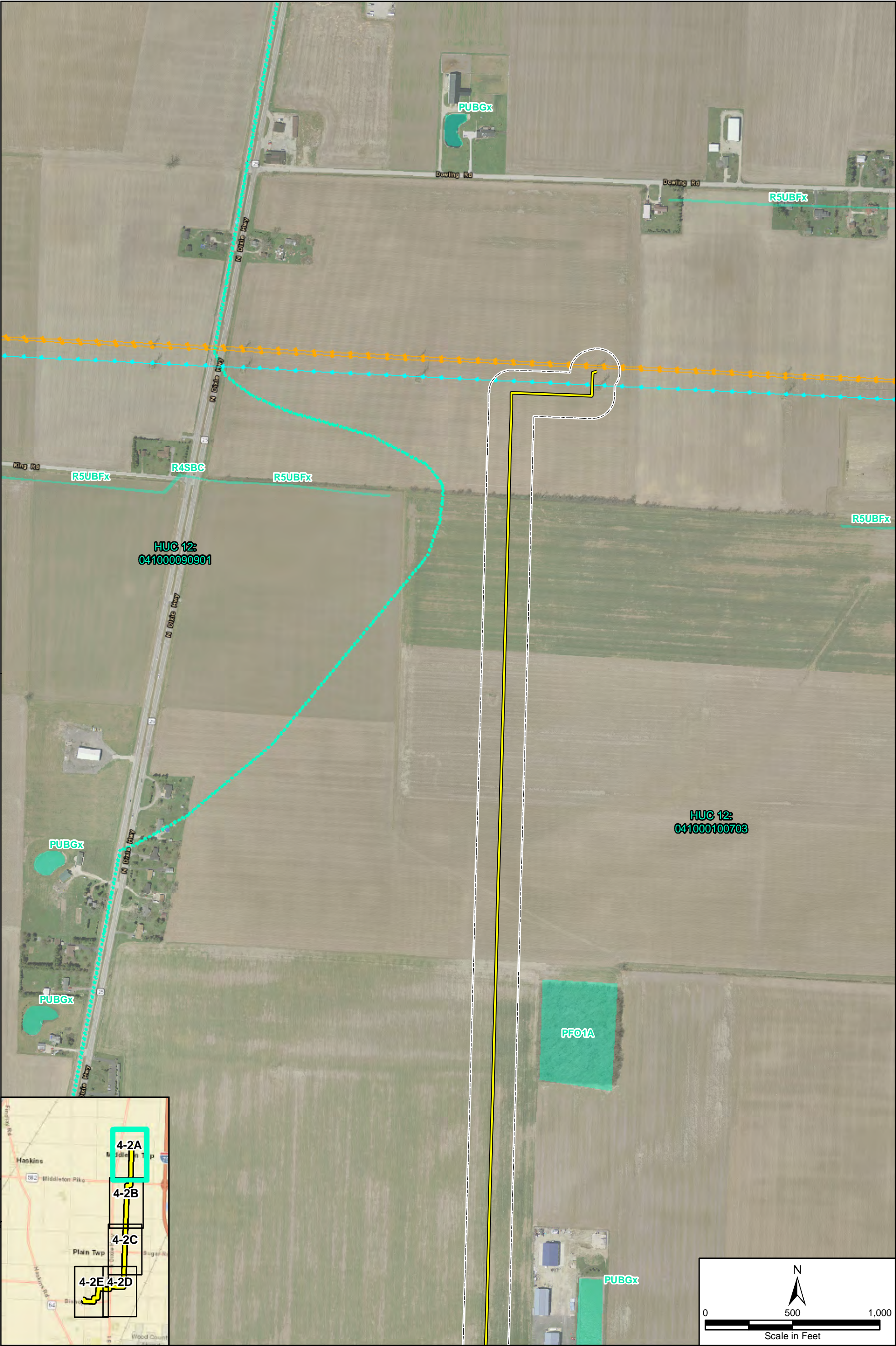
- | | | |
|---------------------------|----------------------------------|-------------|
| Western Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |



Figure 4-1E
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoynBrim_Wetland_4.mxd



- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

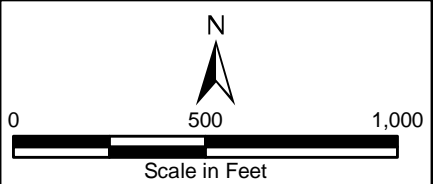


Figure 4-2A
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Am\FirstEnergy\FE_LemoynBrim_Wetland_4.mxd



Eastern Alternative Route	Existing Substation	NWI Wetland
Survey Area	Existing 69kV Transmission Line	Watershed
	Existing 138kV Transmission Line	
	Existing 345kV Transmission Line	

ATSI[®]

American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

N

0 500 1,000
Scale in Feet

Figure 4-2B
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\AmFirstEnergy\FE_LenoyneBrim_Wetland_4.mxd



- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

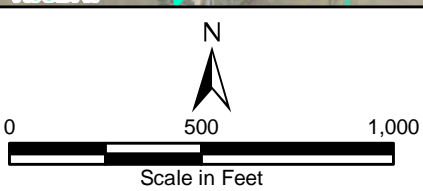
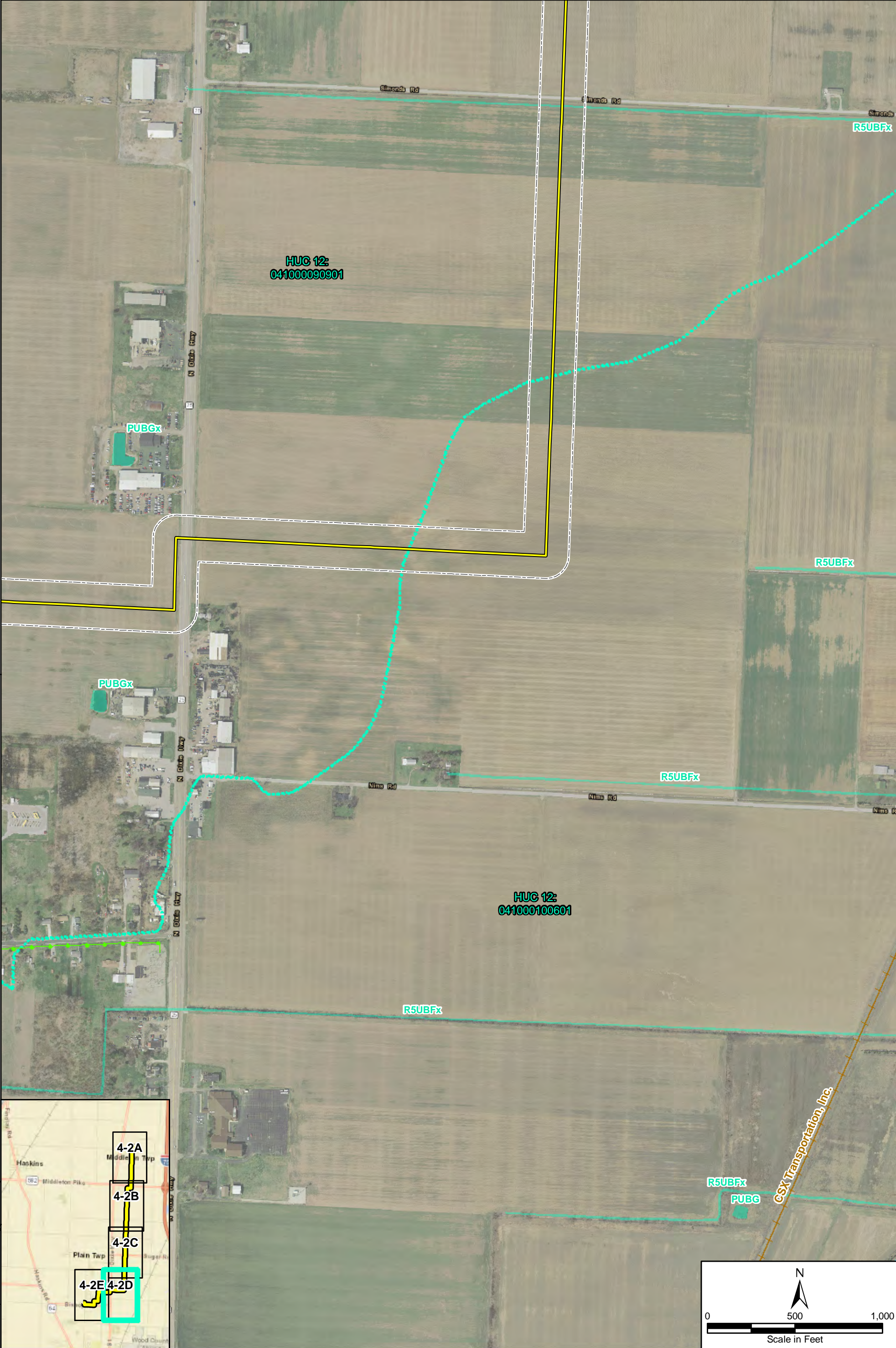


Figure 4-2C
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweitzer\Desktop\GIS\Ann\FirstEnergy\FE_LemoynBrim_Wetland_4.mxd



- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

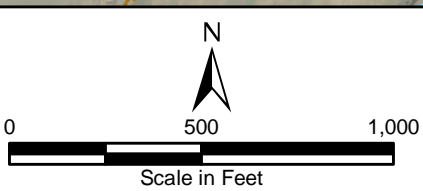
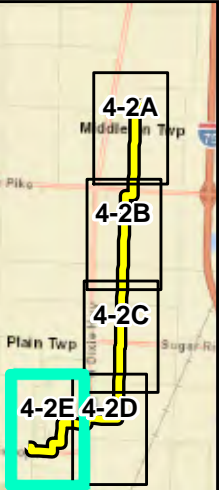


Figure 4-2D
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

GPD Group
Path: C:\Users\laschweizer\Desktop\GIS\AmFirstEnergy\FE_LenoyneBrim_Wetland_4.mxd



- | | | |
|---------------------------|----------------------------------|-------------|
| Eastern Alternative Route | Existing Substation | NWI Wetland |
| Survey Area | Existing 69kV Transmission Line | Watershed |
| | Existing 138kV Transmission Line | |
| | Existing 345kV Transmission Line | |

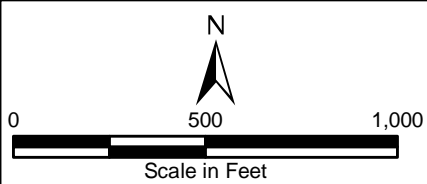


Figure 4-2E
National Wetlands Inventory Map

Wood County 138kV
Reinforcement Project

Appendices

- Appendix A Field Data Forms
- Appendix B Representative Photographs
- Appendix C List of Preparers



Appendix A

Field Data Forms

HHEI Forms





Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

27

SITE NAME/LOCATION Ward County Reinforcement
Stream 1 SITE NUMBER 1011-11 RIVER BASIN Maumee River DRAINAGE AREA (mi²) 0.89
LENGTH OF STREAM REACH (ft) 200 LAT. 41.4455 LONG. 83.6840 RIVER CODE _____ RIVER MILE _____
DATE 10/11/18 SCORER LS/AS/EL COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☒ RECENT OR NO RECOVERY
MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]		<input type="checkbox"/> SILT [3 pt]	<u>5</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]		<input checked="" type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<u>20</u>
<input type="checkbox"/> BEDROCK [16 pt]		<input type="checkbox"/> FINE DETRITUS [3 pts]	
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]		<input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt]	<u>70</u>
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]		<input type="checkbox"/> MUCK [0 pts]	<u>5</u>
<input type="checkbox"/> SAND (<2 mm) [6 pts]		<input type="checkbox"/> ARTIFICIAL [3 pts]	

Total of Percentages of
Blr Slabs, Boulder, Cobble, Bedrock _____

(A) 3

(B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI
Metric
Points**

Substrate
Max = 40

7

A + B

Pool Depth
Max = 30

15

Bankfull
Width
Max=30

5

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____

MAXIMUM POOL DEPTH (centimeters):

6

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input checked="" type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]	

COMMENTS _____

AVERAGE BANKFULL WIDTH (meters)

09

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

(Per Bank)

☐ Wide >10m

☐ Moderate 5-10m

☐ Narrow <5m

☒ None

COMMENTS _____

FLOODPLAIN QUALITY

(Most Predominant per Bank)

☐ Mature Forest, Wetland

☐ Immature Forest, Shrub or Old

☐ Field

☐ Residential, Park, New Field

☐ Fenced Pasture

L R

☐ Conservation Tillage

☐ Urban or Industrial

☒ Open Pasture, Row

☒ Crop

☐ Mining or Construction

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

☒ Stream Flowing

☐ Subsurface flow with isolated pools (Interstitial)

☐ Moist Channel, isolated pools, no flow (Intermittent)

☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

☒ None

☐ 0.5

☐ 1.0

☐ 1.5

☐ 2.0

☐ 2.5

☐ 3.0

☐ >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft)

☐ Flat to Moderate

☐ Moderate (2 ft/100 ft)

☐ Moderate to Severe

☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☒ WWH Name: Maumee River Distance from Evaluated Stream 2.1 mi
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Bowling Green North NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____
County: Wood County Township / City: Middleton Twp

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: 10/11/18 Quantity: 0.3 in.

Photograph Information: 275-278

Elevated Turbidity? (Y/N): N Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) 18 Dissolved Oxygen (mg/l) _____ pH (S.U.) 7.88 Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

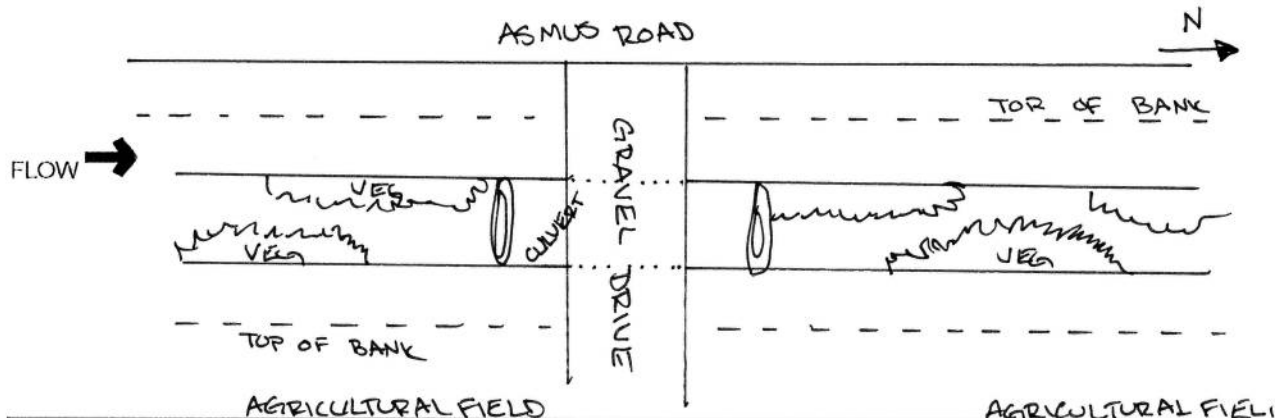
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) Y Voucher? (Y/N) _____ Salamanders Observed? (Y/N) _____ Voucher? (Y/N) _____
Frogs or Tadpoles Observed? (Y/N) _____ Voucher? (Y/N) _____ Aquatic Macroinvertebrates Observed? (Y/N) _____ Voucher? (Y/N) _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location





Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

51

SITE NAME/LOCATION Wood County Reinforcement
Stream 2 SITE NUMBER 1011-10 RIVER BASIN Maumee River DRAINAGE AREA (mi²) 0.57
LENGTH OF STREAM REACH (ft) 200 LAT. 41.3180 LONG. -83.6893 RIVER CODE _____ RIVER MILE _____
DATE 10/11/18 SCORER LS/AS/ES COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☒ RECENT OR NO RECOVERY
MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDG SLABS [16 pts]	_____	<input checked="" type="checkbox"/> SILT [3 pt]	<u>20</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	_____	<input type="checkbox"/> LEAF PACKWOODY DEBRIS [3 pts]	_____
<input type="checkbox"/> BEDROCK [16 pt]	_____	<input type="checkbox"/> FINE DETRITUS [3 pts]	_____
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	_____	<input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt]	<u>70</u>
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	_____	<input type="checkbox"/> MUCK [0 pts]	<u>10</u>
<input type="checkbox"/> SAND (<2 mm) [6 pts]	_____	<input type="checkbox"/> ARTIFICIAL [3 pts]	_____

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock _____

(A) 3

(B) 3

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI
Metric
Points**

Substrate
Max = 40

6

A + B

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters):

18

Pool Depth
Max = 30

25

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]	

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters)

1.7

Bankfull
Width
Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

L	R	(Per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None

COMMENTS _____

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 to 100%) ☐ Flat to Moderate ☐ Moderate (2 to 100%) ☐ Moderate to Severe ☐ Severe (10 to 100%)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☒ WWH Name: Maumee River Distance from Evaluated Stream 87m
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Bowling Green North NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____
County: Wood County Township / City: Middleton Twp

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: 10/11/18 Quantity: 0.3in

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): Y (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) 18.6 Dissolved Oxygen (mg/l) _____ pH (S.U.) 7.48 Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

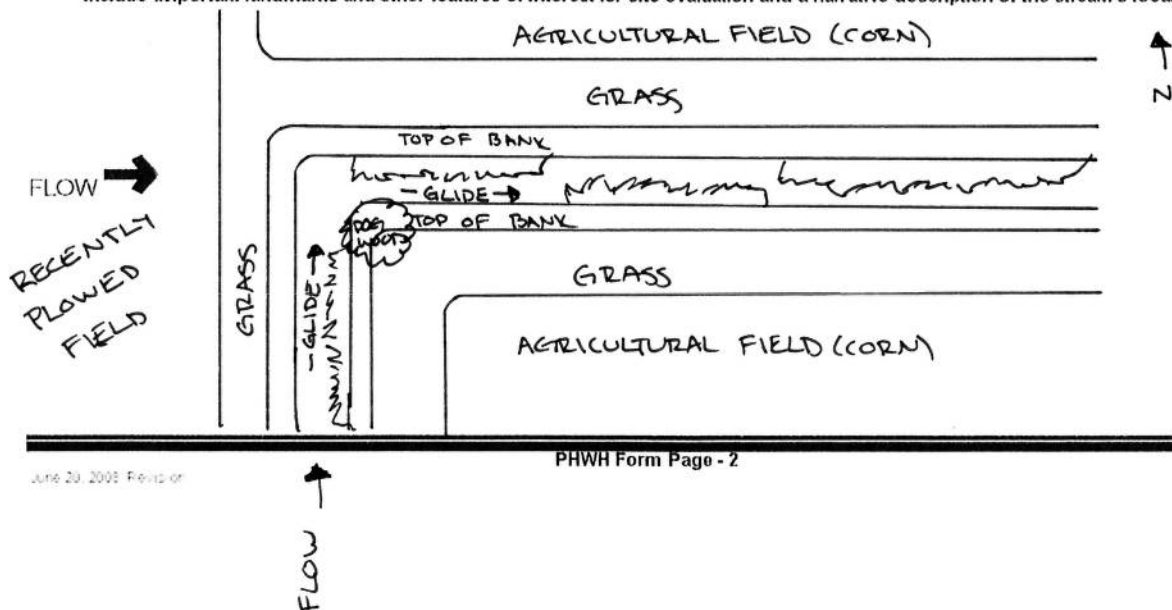
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) ☒ Voucher? (Y/N) _____ Salamanders Observed? (Y/N) _____ Voucher? (Y/N) _____
Frogs or Tadpoles Observed? (Y/N) _____ Voucher? (Y/N) _____ Aqualic Macroinvertebrates Observed? (Y/N) _____ Voucher? (Y/N) _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location





Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

48

SITE NAME/LOCATION Wood County Reinforcement
Stream 3 SITE NUMBER 1010-03 RIVER BASIN Maumee River DRAINAGE AREA (mi²) 0.46
LENGTH OF STREAM REACH (ft) 200 LAT. 41.4078 LONG. -83.6661 RIVER CODE _____ RIVER MILE _____
DATE 10/10/18 SCORER LS/AS/EL COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☒ RECENT OR NO RECOVERY
MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	_____	<input type="checkbox"/> SILT [3 pt]	<u>10</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	_____	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	_____
<input type="checkbox"/> BEDROCK [16 pt]	_____	<input type="checkbox"/> FINE DETRITUS [3 pts]	_____
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	_____	<input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt]	<u>70</u>
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	_____	<input checked="" type="checkbox"/> MUCK [0 pts]	<u>20</u>
<input type="checkbox"/> SAND (<2 mm) [6 pts]	_____	<input type="checkbox"/> ARTIFICIAL [3 pts]	_____

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock

(A) 0

(B) 3

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____

MAXIMUM POOL DEPTH (centimeters):

20

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]	

COMMENTS _____

AVERAGE BANKFULL WIDTH (meters)

1.6

**HHEI
Metric
Points**

Substrate
Max = 40

3

A + B

Pool Depth
Max = 30

25

Bankfull
Width
Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

L	R	(Per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None

COMMENTS _____

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> >3
		<input type="checkbox"/> 2.5

STREAM GRADIENT ESTIMATE

☒ Flat (0 to 100 ft) ☐ Flat to Moderate ☐ Moderate (2 to 100 ft) ☐ Moderate to Severe ☐ Severe (10 to 100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☒ WWH Name: Maumee River Distance from Evaluated Stream 9.7mi
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Bowling Green North NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____
County: Wood County Township / City: Plain Twp

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 10/8/18 Quantity: 0.02 in

Photograph Information: 99-102

Elevated Turbidity? (Y/N): N Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): Y (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) 19.9 Dissolved Oxygen (mg/l) _____ pH (S.U.) 7.45 Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

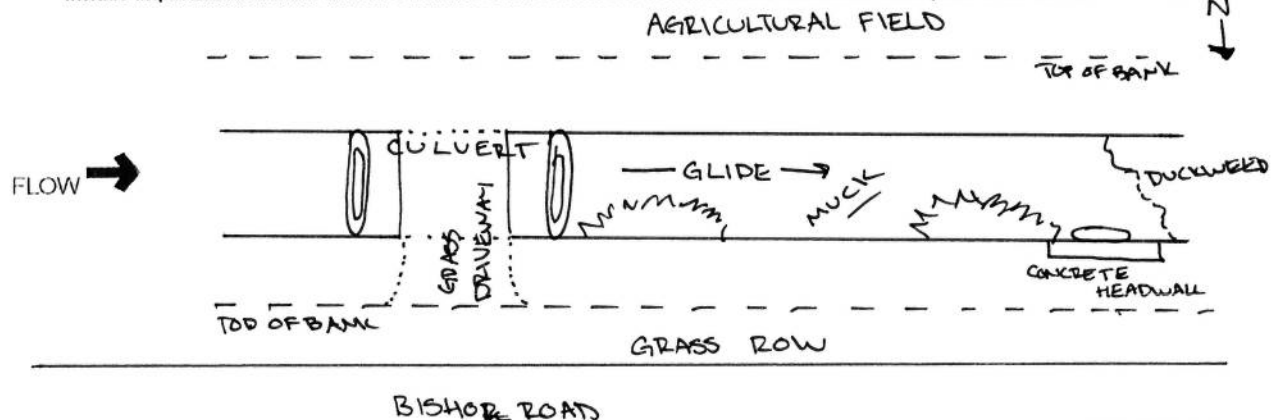
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) Y Voucher? (Y/N) _____ Salamanders Observed? (Y/N) _____ Voucher? (Y/N) _____
Frogs or Tadpoles Observed? (Y/N) Y Voucher? (Y/N) _____ Aquatic Macroinvertebrates Observed? (Y/N) _____ Voucher? (Y/N) _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location





Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

39

SITE NAME/LOCATION Wood County Reinforcement
Packer Creek SITE NUMBER 1024-01 RIVER BASIN Portage River DRAINAGE AREA (mi²) 0.65
LENGTH OF STREAM REACH (ft) 200 LAT. 41.4581 LONG. -83.6114 RIVER CODE _____ RIVER MILE _____
DATE 10/24/18 SCORER LS/AS COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☒ RECENT OR NO RECOVERY
MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDG SLABS [16 pts]	_____	<input type="checkbox"/> SILT [3 pt]	<u>10</u>
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	_____	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<u>5</u>
<input type="checkbox"/> BEDROCK [16 pt]	_____	<input type="checkbox"/> FINE DETRITUS [3 pts]	_____
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	_____	<input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt]	<u>60</u>
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	_____	<input checked="" type="checkbox"/> MUCK [0 pts]	<u>25</u>
<input type="checkbox"/> SAND (<2 mm) [6 pts]	_____	<input type="checkbox"/> ARTIFICIAL [3 pts]	_____

Total of Percentages of
Blr Slabs, Boulder, Cobble, Bedrock _____

(A) 0

(B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI
Metric
Points**

Substrate
Max = 40

4

A + B

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters):

10

Pool Depth
Max = 30

15

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]	

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters)

22

Bankfull
Width
Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

L	R	(Per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None

COMMENTS _____

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

- ☆ **FLOW REGIME** (At Time of Evaluation) (Check ONLY one box):

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS _____

- ☆ **SINUOSITY** (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☒ WWH Name: Packer Creek Distance from Evaluated Stream 1.7mi
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Bowling Green North NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____
County: Wood County Township / City: Middleton Twp

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 10/2/18 Quantity: 0.01 in

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): Y (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) 7.9 Dissolved Oxygen (mg/l) _____ pH (S.U.) 7.49 Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

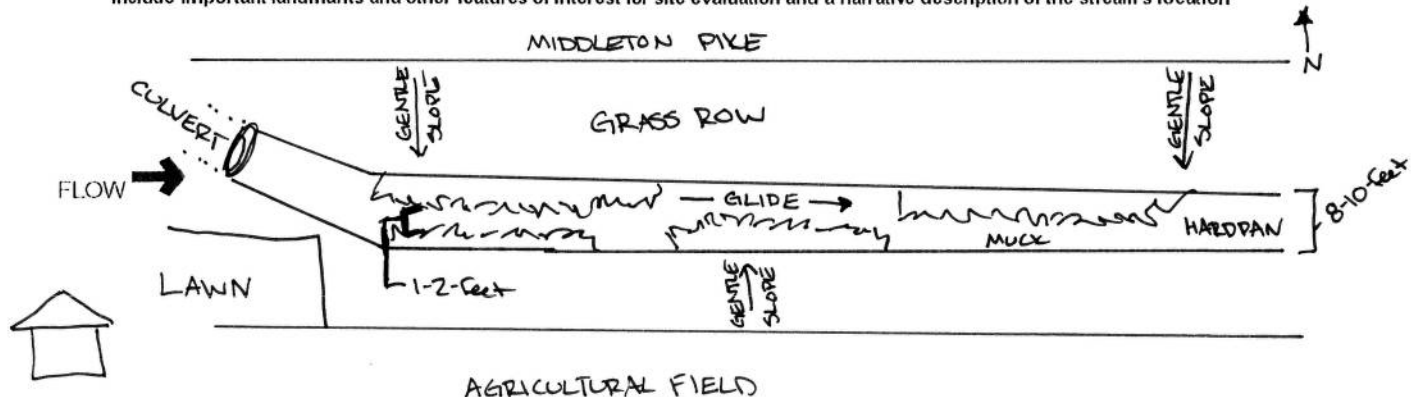
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) _____ Voucher? (Y/N) _____ Salamanders Observed? (Y/N) _____ Voucher? (Y/N) _____
Frogs or Tadpoles Observed? (Y/N) _____ Voucher? (Y/N) _____ Aquatic Macroinvertebrates Observed? (Y/N) _____ Voucher? (Y/N) _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Appendix B

Representative Photographs





Photograph 1: Facing north towards King Road and looking downstream along Stream 1.



Photograph 2: Facing north from Middleton Pike and looking downstream along Stream 1.



Photograph 3: Facing north towards Middleton Pike and looking downstream along Stream 1.



Photograph 4: Facing south, looking upstream along Stream 2.



Photograph 5: Facing north, looking downstream along Stream 2.



Photograph 6: Facing west near the existing Brim Substation, looking downstream along Stream 3.



Photograph 7: Facing east near the Bishop Road/Hull Prairie Road intersection, looking upstream along Stream 3.



Photograph 8: Facing north near the Bishop Road/Hull Prairie Road intersection, looking downstream along Stream 3.



Photograph 9: Facing north near Hull Prairie Road, looking downstream along Stream 3.



Photograph 10: Facing north near Hull Prairie Road, looking downstream along Packer Creek.



Photograph 11: Facing northeast towards Pond 1, a stormwater detention basin.



Photograph 12: Facing northeast towards Pond 2, a stormwater detention basin.



Photograph 13: Facing north towards Pond 3, a stormwater detention basin.

Appendix C

List of Preparers



Ann Schweitzer

Ms. Schweitzer is an Environmental Scientist with GPD Group. She has experience with field data collection, ecological surveys, and Environmental Site Assessment (ESA) projects. Ann assists in coordination efforts with the State Historic Preservations Office (SHPO), Ohio Environmental Protection Agency (OEPA), the U.S. Fish and Wildlife Service (USFWS) and various Divisions of Ohio Department of Natural Resources (ODNR) to complete file reviews and natural heritage database reviews. She also assists in the preparation of technical documents.

Special Training

Course/Program	Date Completed
Ecological Training – Ohio Department of Transportation	November 2012
Waterway Permits Training – Ohio Department of Transportation	November 2012
Wetland Delineation with Emphasis on Soils and Hydrology– Wetland Training Institute	June 2013
Categorical Exclusion (CE) Training– Ohio Department of Transportation	April 2014
Environmental Site Assessment (ESA) Training – Ohio Department of Transportation	May 2014
Habitat Assessment Using the Qualitative Habitat Evaluation Index – Midwest Biodiversity Institute	May 2014
Sedge Identification Workshop – Ohio Wetland Association	June 2014
Wetland Plant Identification – Dr. Robert Mohlenbrock	September 2014
Section 106 Training – Ohio Department of Transportation	September 2014
Section 4(f)/6(f) Training – Ohio Department of Transportation	October 2014
Phase I & II Environmental Site Assessment Processes – ASTM International	November 2014
OSHA 40-Hour Health and Safety Training – Cincinnati State	December 2014
Approved Mussel Surveyor – Ohio Department of Natural Resources	February 2015
QDC Level 2 for the Surface Water Credible Data Program – Ohio EPA	November 2015
Ohio Rapid Assessment Method for Wetland v5.0 Training Course – Ohio EPA	May 2015
Trees of the Eastern Forest – Arc of Appalachia Preserve System: The Forest School	July 2015
Public Involvement Training - Ohio Department of Transportation	February 2016
Freshwater Mussel Identification Workshop – The Ohio State University	April 2016

