Lincoln Park-Riverbend 138 kV Transmission Line 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 19-1871-EL-BTX

April 2021

BEFORE THE OHIO POWER SITING BOARD

Certificate Application for Electric Transmission Facilities

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Acronyms and Abbreviations

ATSI	American Transmission Systems, Incorporated
BMP	Best Management Practice
CEII	Critical Energy Infrastructure Information
cm	centimeter
DOE	Determination of Eligibility
DSM	Demand-Side Management
ELF	extremely low frequency
EMF	electric and magnetic 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 Electrical 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
PEM	Palustrine Emergent
PFO	Palustrine Forested
PHWH	Primary Headwater Habitat

PSS	Palustrine Scrub-Shrub
PUCO	Public Utilities Commission of Ohio
Project	Lincoln Park-Riverbend 138 kV Transmission Line Project
QHEI	Qualitative Habitat Evaluation Index
RAPID	Research and Public Information Dissemination
RFI	Radio frequency interference
ROW	Right-of-Way
RSS	Route Selection Study
RTEP	Regional Transmission Expansion Plan
SDS	Safety Datasheet
SWPPP	Stormwater Pollution Prevention Plan
TVI	Television Interference
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, is seeking the approval of the Ohio Power Siting Board ("OPSB") to construct a new, approximately 5 to 6 mile long, 138 kV transmission line through the cities of Campbell and Youngstown in Mahoning County, Ohio ("Project"). The proposed transmission line will connect the Lincoln Park Substation to the Riverbend Substation. In addition to the transmission line, there is work at both the Riverbend and Lincoln Park substations. At Riverbend, the substation fence will be expanded to accommodate the conversion of the 138 kV straight bus to a four-breaker ring bus. The expansion at Riverbend Substation meets the requirements of the OPSB and is included as part of this Application. At Lincoln Park Substation, the bus will be expanded to accept the new 138 kV transmission line terminal. All work at Lincoln Park Substation will occur inside the substation fence and is not part of this Application. Route alternatives considered as part of the route selection process traverse the City of Youngstown and a portion of the City of Campbell as displayed in **Appendix 4-1**. **Figure 2-1** provides a general overview of the entire Project Area and **Figure 2-2** provides an overview of the expansion of the Riverbend Substation.

(1) General Purpose of the Facility

The purpose of the proposed Project is to improve the reliability of the transmission and sub-transmission systems in the Youngstown and surrounding areas by strengthening the transmission system under various planning contingencies and to improve overall efficiency and flexibility in the operation of the transmission system in the Project area.

As the transmission system in the Project area is currently configured, the loss of both the Riverbend-Salt Springs 138 kV Transmission Line and the Riverbend-Wickliffe 138 kV Transmission Line results in the loss of all 138 kV sources into the Riverbend Substation. Because there are no additional sources at the Riverbend Substation, under the combination of these contingencies, all of the customers served from the radial 23 kV system originating from the Riverbend Substation will suffer an outage.

Similarly, the loss of both the Lincoln Park-Masury 138 kV Transmission Line and the Lincoln Park-Lowellville 138 kV Transmission Line will result in potential local voltage collapse of the Lincoln Park area 23 kV system, which would result in significant customer outages.

By providing a third 138 kV source to both substations, the Project will remove these outage and voltage collapse conditions under the contingencies discussed above. As proposed in this Application, the proposed Project is the least impactful option to resolve the outages and voltage drops, as well as to 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

(a) Preferred and Alternative Route

The proposed Project is located in northeast Mahoning County. The Project begins at the existing Lincoln Park Substation, trends southwest for approximately 2 miles, then west for approximately 3 miles, to the Riverbend Substation. The Project, as proposed, is a single-circuit transmission line primarily supported on wood or steel poles requiring a 65-foot-wide permanent right-of-way (ROW). The transmission line will be approximately 5.21 or 6.23 miles in length depending on whether the Preferred or Alternate Route is selected, respectively.

(b) Riverbend Substation Expansion

The existing Riverbend Substation is located within the City of Youngstown and approximately 0.18 miles southeast of the intersection of Barn Street and N. West Avenue. The existing Riverbend Substation pad is approximately 1.52 acres with a fenced area of approximately 1.48-acres (the graded pad area extends beyond the fence for grounding purposes). The scope of this Project requires the expansion of the existing substation pad and fenced area by approximately 0.10 and 0.08 acres, respectively. Therefore, an approximately 8 percent expansion of the fenced area of the existing Riverbend Substation is anticipated to occur within the company-owned parcel. An overview figure displaying the general location of the existing Riverbend Substation and proposed expansion area is displayed on Figure 2-2. Additionally, detailed drawings displaying the substation expansion are provided as Appendix 5-1.

(3) Suitability of Preferred and Alternate Routes

ATSI has conducted an in-depth Route Selection Study (RSS) through which it identified a Preferred and Alternate Route for the proposed transmission line. The complete RSS is included as Appendix 4-1. The RSS provides details about the selection process utilized by ATSI to identify the Preferred and Alternate Routes as proposed in this Application. A further discussion of the RSS and selected routes is found in Section 4906-5-04 of this Application.

In general, the RSS process is 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 are selected by the siting team based on the avoidance or minimization of impacts to known sensitive land uses, ecological features, and cultural resources that have been identified from existing information sources. Possible routes are then evaluated, compared, and ranked for further evaluation. Based upon such initial review of possible routes for this Project, forty-nine (49) candidates were identified as route alternatives for further review and analysis.

Following the identification of the candidate route alternatives, additional data was collected through field investigation of the Project area. This additional field data, along with other information and observations, was compiled using a numerical scoring system designed to provide a reasonable basis for quantitative comparison of the 49 candidate routes. The numerical scoring system allowed ATSI to rank the 49 candidate routes: first by individual routing category (i.e. land use, ecological effects, and cultural impacts) and then overall score.

After the 49 candidate routes were identified and scored, the siting team further reviewed all available information, both quantitative and qualitative, as well as the comments and information received at the public information meeting held on November 12, 2019, to select the Preferred and Alternate Routes presented in the Application. This final review and analysis involved consideration of all of the factors included in the RSS, with a particular emphasis on route alternatives that minimized residential impacts, in addition to other quantitative and qualitative criteria that most-mitigated impacts from the Project.

Ultimately, the process discussed in detail in the RSS identified the Preferred and Alternate Routes, both of which are feasible and represent, in the assessment of the Applicant, the minimal adverse impact, taking into account all relevant factors.

ATSI notes that during the process of identifying the Preferred and Alternate Routes presented in this Application, it identified certain route segments that because of their location and ownership were considered superior to all other routing options in the area of the respective segments. In order to allow ATSI to incorporate these route segments into both the Preferred and Alternate Routes, on December 20, 2019, ATSI requested a waiver of the 20% rule found in Admin. Code Rule 4906-3-05. The request was granted on January 10, 2020. Therefore, as discussed below, Segments 2, 8 and 47, as identified in the RSS, are included in both the Preferred and Alternate Routes presented below.

In general, Segments 2, 8, and 47 were superior to all other routing options because of their location and property ownership. Segments 2 and 8 were selected as the proposed transmission line approaches Lincoln Park Substation from the south in order to utilize property owned by Ohio Edison and the City of Youngstown and to avoid (to the maximum extent possible) impacting private property and residences. Segment 47 was thus identified as a component of both the Preferred and Alternate Routes because the Segment partially utilizes an existing railroad corridor and the existing Gibson-Riverbend 23 kV Line right-of-way. When possible, ATSI prefers to utilize existing right-of-way for new transmission line projects as the use of existing rights-of-way tends to have fewer overall impacts when compared to routes that do not utilize existing right-of-way. Segment 47 is also preferred over Segment 46, the closest alternative, because it avoids the Pepsi Cola property; crossing the Pepsi Cola property would require the transmission line to span approximately 700 feet over existing buildings, creating encroachments within the proposed right-of-way.

(i) Preferred Route

The Preferred Route is identified in the RSS as Route 44 (Segments 2-8-11-19-25-30-35-38-41-47). The Preferred Route is approximately 5.21 miles in length. Segments 2-8-11-19-25-30-35-38-41-47 were selected based on highest overall rank when factoring in limited residential impacts.

(ii) Alternate Route

The Alternate Route is identified in the RSS as Route 22 (2-8-10-16-21-24-27-28-36-39A-39B-42-47). The Alternate Route is approximately 6.23 miles in length. The Alternate Route shares segments 2, 8, and 47 with the Preferred Route. Combined, these three segments result in the

Alternate Route having approximately 21.6% in common with the Preferred Route and were the subject of the above-reference waiver granted on January 10, 2020.

(4) Schedule

Construction of the Project is anticipated to begin in November 2022, with an anticipated in-service date of December 2023. The current Project schedule, including all major activities and milestones, is included in a Gantt schedule bar chart in Figure 3-5, and described in more detail in Section 4906-5-03(F)(1) of this Application.

(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 electric 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, 2020).

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, 2020).

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, 2020).

In 2016, FirstEnergy announced its plan to move away from commodity-exposed generation and transform into a fully-regulated transmission and distribution utility (FirstEnergy, 2020). The final step of this strategy was completed on February 27, 2020 with the emergence of their former affiliate FirstEnergy Solutions Corp.'s (now Energy Harbor) emergence from bankruptcy. (FirstEnergy 2020 Annual Report)

Today, FirstEnergy's 10 regulated distribution companies form one of the nation's largest investor-owned electric systems, based on serving 6 million customers in the Midwest and Mid-Atlantic regions (FirstEnergy, 2020)

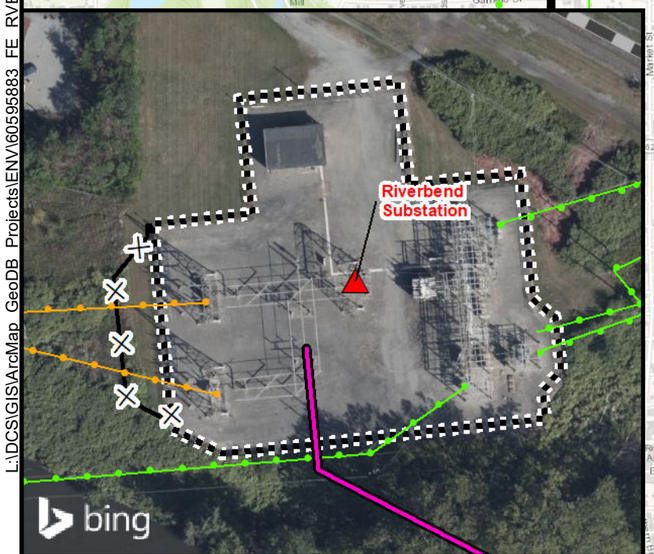
(2) Current Operations and Affiliate Relationships

ATSI is a transmission-only company that provides transmission services in the western portion of Pennsylvania and in 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 this 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.

L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\Figure 2-1_Transmission Line Overview Map.mxd

Riverbend Substation

Lincoln Park Substation



N

0 1,000 2,000 4,000 Feet

LEGEND:

- Existing Substation
- Common Route
- Alternate Route
- Preferred Route

Riverbend Substation Expansion

- Existing Substation
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Proposed Expansion
- Existing Fenceline

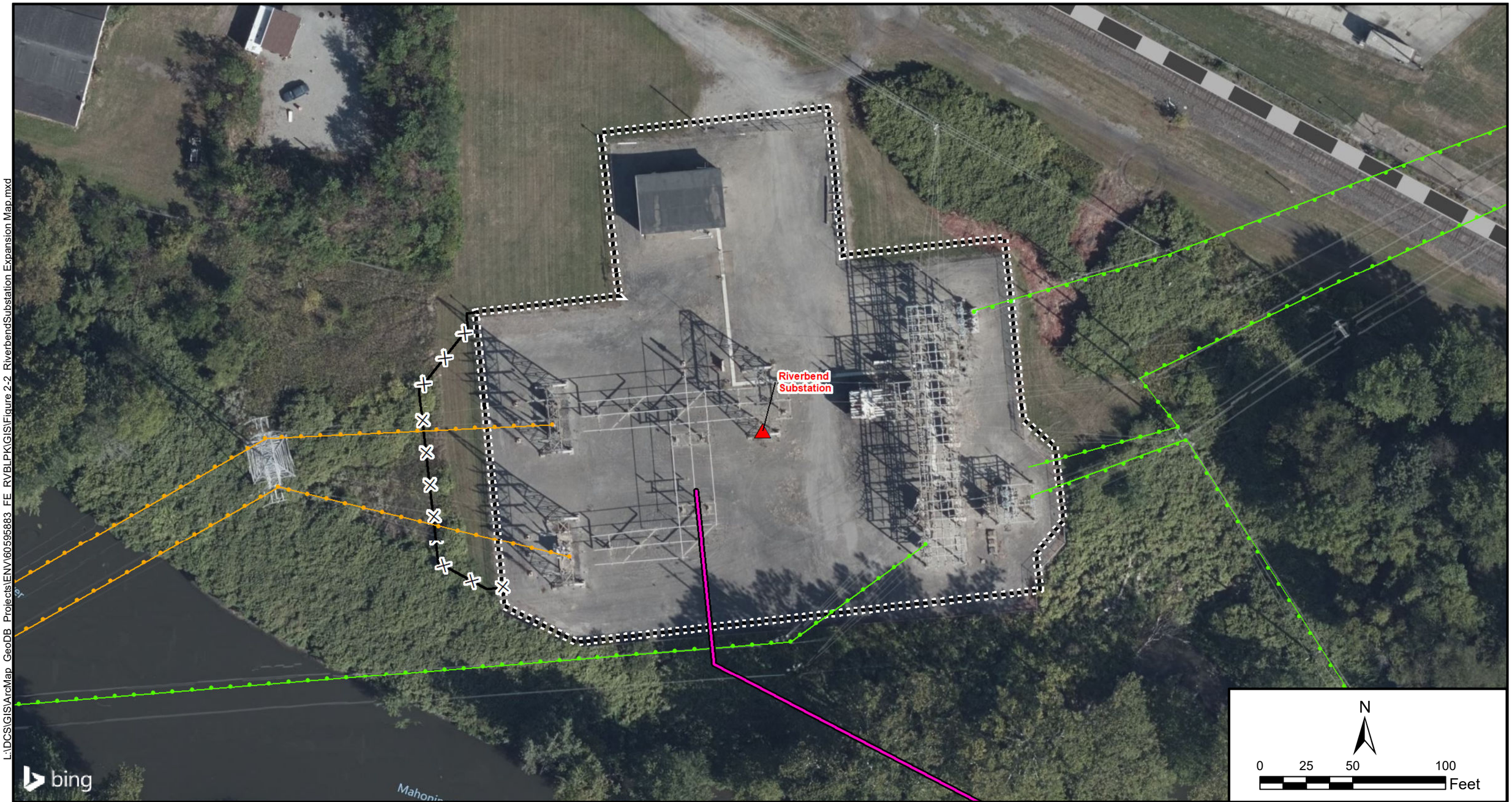
ATSI

FIGURE 2-1
TRANSMISSION LINE OVERVIEW MAP

LINCOLN PARK-RIVERBEND 138 KV
TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

L:\DCS\GIS\ArcMap GeoDB Projects\ENV\60595883 FE RVBLPK\GIS\Figure 2-2 RiverbendSubstation Expansion Map.mxd



Riverbend Substation Expansion

- Existing Substation
- Common Route
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Proposed Expansion
- Existing Fenceline

ATSI

FIGURE 2-2
SUBSTATION EXPANSION OVERVIEW -
RIVERBEND SUBSTATION

LINCOLN PARK-RIVERBEND 138 KV
TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

4906-5-03 REVIEW OF NEED AND SCHEDULE

This Section of the Application sets forth:

- Need for the Project;
- The Project's impact on the long-term forecast and regional plans for the electric system;
- Augmentation of system economy and reliability from the Project; and,
- Schedule for the Project.

(A) NEED FOR PROPOSED FACILITY

This Project is needed to provide both the Lincoln Park and Riverbend Substations with an additional 138 kV source in order to mitigate impact otherwise caused by damages or other problems affecting shared structures. Additionally, this Project enables maintenance to be performed without necessitating concomitant outages. This Project makes improvements to the reliability and operational flexibility of the transmission system in the Project Study Area, strengthens the transmission system under certain planning contingencies, and increases the resiliency and efficiency of the operation of the transmission system in the Youngstown, Ohio area.

The Project consists of three primary components necessary to achieve the system improvements. These upgrades are:

1. Converting the Riverbend Substation from a 138 kV straight bus configuration to a four-breaker ring bus configuration by installing two 138 kV breakers.

2. Expanding the Lincoln Park Substation ring bus to accommodate a new 138 kV terminal by installing one 138 kV breaker.

3. Constructing a new 138 kV transmission line to connect the Riverbend Substation to the Lincoln Park Substation.

Implementation of these three upgrades is necessary to achieve the system improvements. More specifically, the Project is needed to reinforce the 138 kV Transmission System on the FE/ATSI system in the Project Study Area to continue to provide safe and reliable electric service and to provide capacity for economic development and load growth in the area.

The Project Study Area was originally evaluated in 2018 using a current model of the transmission system and has since been re-evaluated in 2020 using the PJM 2019 RTEP power flow case, which incorporates the most recent system configuration changes and an updated load forecast for the year 2024. In both evaluations it was identified the Project Study Area will continue to be subject to the potential of load loss under certain contingency situations (see **Table 3-2** for specific contingency definitions). As such, this Project is needed.

(1) Purpose of the Proposed Facility

ATSI's 138 kV transmission system in and near the Project Study Area is an integral part of the regional transmission grid; through the Lincoln Park, Wickliffe, and Riverbend Substations, ATSI provides electric service to customers within the Youngstown and surrounding area.

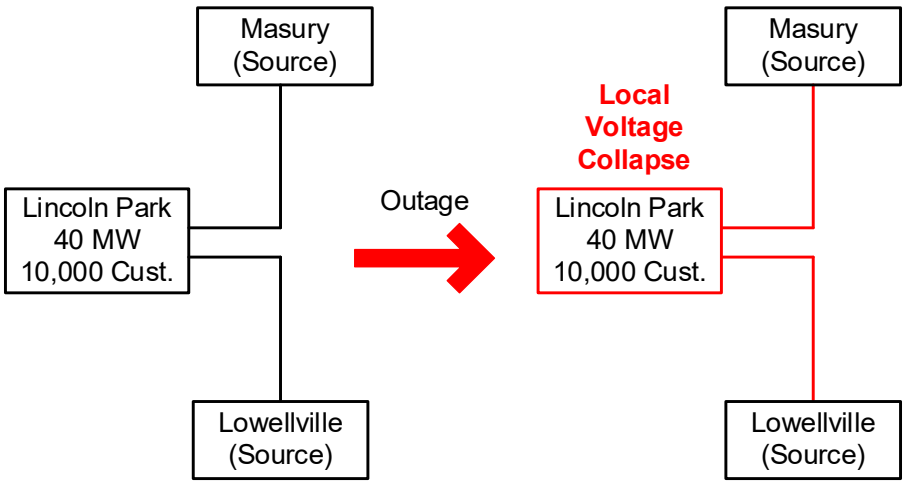
This Project was selected as part of the Federal Energy Regulatory Commission's regional transmission planning process; it is the best solution for similar issues affecting both the Lincoln Park Substation and the Riverbend Substation.

As explained in this Section of the Application, when compared to other alternatives, the proposed Project is the best option to enhance the reliability, resiliency, efficiency, and operational flexibility of the transmission and sub-transmission systems in the Youngstown area. Construction of the Project will directly improve electric service for approximately 25,000 customers served by the transmission system in the Project area and provide additional capacity for economic development and load growth in the area.

Construction of a new 138 kV transmission line was selected over other alternatives because it is the most effective solution to address the load and customer risk for certain contingency situations while also providing additional capacity.

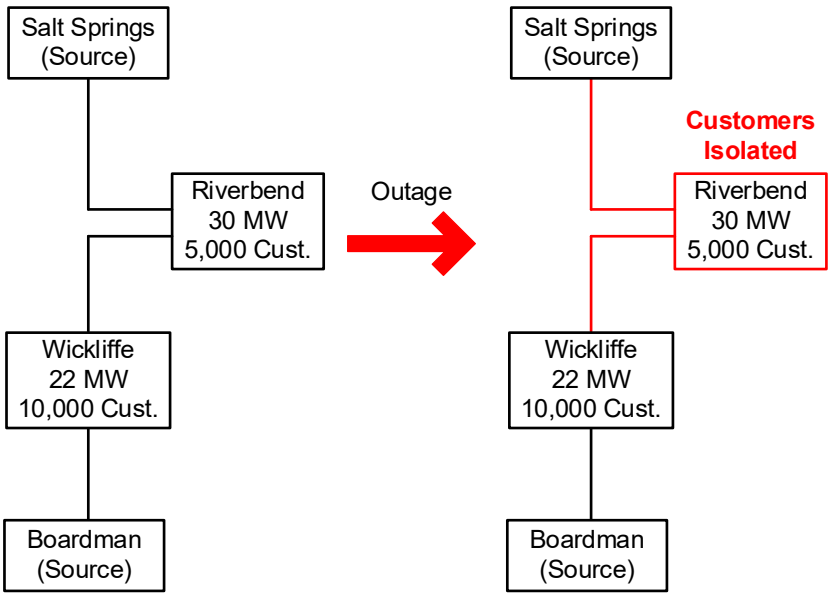
Approximately 10,000 customers and 40 MW of load are vulnerable to complete outages due to the existing configuration of the two 138 kV transmission lines (Lincoln Park-Masury and Lincoln Park-Lowellville) that presently serve the Lincoln Park 138 kV Substation. As constructed, the Lincoln Park-Masury and Lincoln Park-Lowellville transmission lines are a double circuit and share twenty-one (21) common structures (equating to roughly three miles in distance); there is no other transmission line connected to the Lincoln Park Substation (see **Figure 3-1**). Consequently, the failure of any such shared structures would result in a cessation of power to the Lincoln Park substation and a lengthy outage for the customers served by Lincoln Park Substation.

Figure 3-1: General Representation of Lincoln Park Outage Addressed by Project



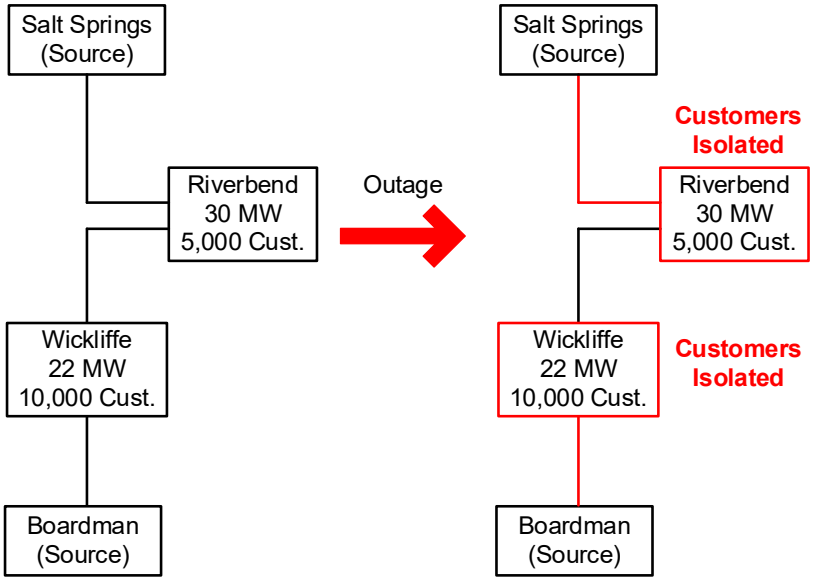
Similarly, the Riverbend 138 kV Substation serves approximately 5,000 customers (30 MW of load) is served from two 138 kV sources: the Riverbend-Salt Springs 138 kV Transmission Line and the Riverbend-Wickliffe 138 kV Transmission Line (see **Figure 3-2**). These two 138 kV lines are constructed as a double circuit and share common structures for roughly 3.4 miles (47 structures). Failure of any one of these structures would result in a lengthy outage of both 138 kV sources. An outage of both 138 kV sources serving the Riverbend Substation results in approximately 5,000 customers and 30 MW of load being interrupted.

Figure 3-2: **General Representation of Riverbend Outage Addressed by Project**



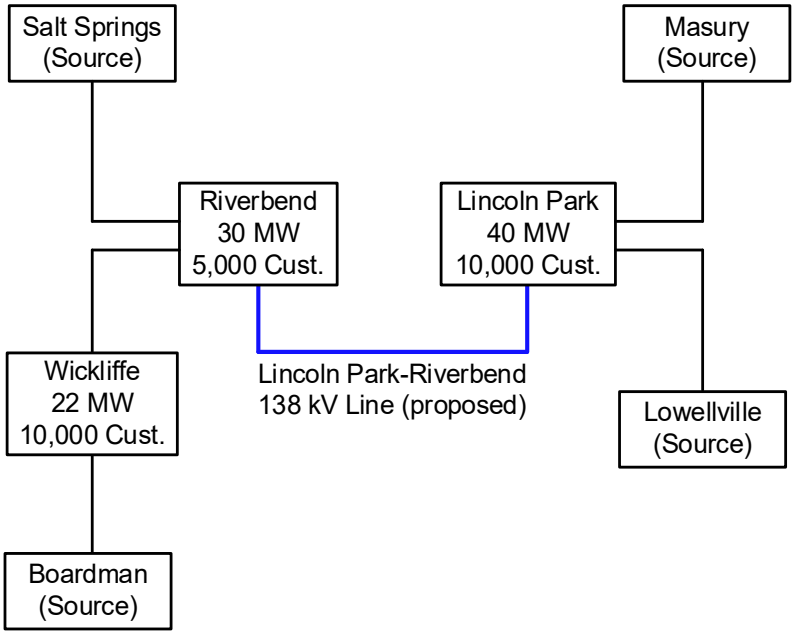
Additionally, the Riverbend and Wickliffe 138 kV Substations are also served from two 138 kV sources, the Riverbend-Salt Springs and Boardman-Wickliffe 138 kV Transmission Lines. As presented in **Figure 3-3**, the Broadman-Wickliffe 138 kV Transmission Line serves the Riverbend Substation through the Wickliffe Substation. As a result of this configuration, outage of both 138 kV sources serving the Riverbend/Wickliffe area results in approximately 15,000 customers and 52 MW of load being interrupted.

Figure 3-3: **General Representation of Riverbend/Wickliffe Outage Addressed by Project**



By constructing the new 138 kV transmission line proposed in this Project, a third 138 kV source will be provided to both the Lincoln Park area and Riverbend/Wickliffe area, which significantly increases reliability, resiliency, and operational flexibility in the entire Project Area (see **Figure 3-4**).

Figure 3-4: **General Representation of the Project Area Following Construction of Lincoln Park-Riverbend 138 kV Transmission Line**



Additionally, the proposed Project will strengthen the Project Study Area by providing additional system capacity to enable economic development opportunities and provide operational flexibility for maintenance and storm restoration activities.

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

1. Address potential customer outages caused by the loss of any of the transmission structures shared by both 138 kV sources into the Lincoln Park Substation (approximately 10,000 customers affected).
2. Address potential customer outages caused by the loss of any of the transmission structures shared by both 138 kV sources into the Riverbend Substation (approximately 5,000 customers affected).
3. Address potential customer outages caused by the loss of both 138 kV sources into the Riverbend/Wickliffe area (approximately 15,000 customers affected).
4. Strengthen the Project Area Transmission System to support future growth in load demand in the Project Study Area.

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

The ATSI transmission system in the Project Area is supported by two 138-23 kV substations (Lincoln Park and Riverbend) as well as one 138-22.86 kV distribution substation (Wickliffe). The 138-23 kV Lincoln Park Substation is only fed by two 138 kV transmission lines (which share numerous structures). The entire area served by the combination of the Riverbend and Wickliffe Substations is also served by only two 138 kV transmission lines (which likewise share numerous structures). The Project is needed to mitigate the possibility of a significant number of customers being interrupted who are served from either of these substations by creating a connection between them.

Additionally, this Project provides support for future economic growth activities in the area. Greater details can be found in Section (3) -- Power Flow Studies and Contingency Analyses below.

(3) Power Flow Studies and Contingency Analyses

ATSI modeled various planning scenarios and studies of the Project Area's Transmission System using the PJM 2019 RTEP summer power flow peak conditions for model year 2024 with and without the proposed Project. These studies included evaluation of the effects of the specific contingencies the proposed Project addresses.

Table 3-1 below lists the applicable system load level evaluated in the power flow analysis.

Table 3-1
Model Load Levels[1]

Year	Load Level	Applicable System
2024	12,484 MW	ATSI

Power Flow Study Results

Table 3-2 provides a summary of the 2024 case evaluation of the load MW interrupted before and after installation of the proposed Project.

1. For the loss of the Lincoln Park-Lowellville 138-kV Transmission Line followed by the loss of the Lincoln Park-Masury 138 kV Transmission Line (or vice-versa), the Lincoln Park 23-kV area experiences potential local voltage collapse resulting in the interruption of 40 MW of load and approximately 10,000 customers.
2. For the loss of the Salt Springs-Riverbend 138 kV Transmission Line followed by the loss of the Riverbend-Wickliffe 138 kV Transmission Line (or vice-versa), the Riverbend 23-kV area becomes isolated from the transmission system resulting in the interruption of 30 MW of load and approximately 5,000 customers.
3. For the loss of the Salt Springs-Riverbend 138 kV Transmission Line followed by the loss of the Boardman-Wickliffe 138 kV Transmission Line (or vice-versa), the entire Riverbend/Wickliffe area become isolated from the transmission system resulting in the interruption of 52 MW of load and approximately 15,000 customers.

Table 3-2
2024 Case Evaluation

Contingency	Monitored Facility	Before Project Voltage Results PU	After Project Voltage Results PU	Before Project MW Interrupted (MW)	After Project MW Interrupted
Loss of the Lincoln Park-Lowellville 138 kV Transmission Line and loss of the Lincoln Park-Masury 138 kV Transmission Line	Lincoln Park 23 kV	Potential Voltage Collapse	0.98	40	0
Loss of the Salt Springs-Riverbend 138 kV Transmission Line and loss of the Riverbend-Wickliffe 138 kV Transmission Line	Riverbend 23 kV	NA (isolated buses/loss of load)	0.94	30	0
Loss of the Salt Springs-Riverbend 138 kV Transmission Line and loss of the Boardman-Wickliffe 138 kV Transmission Line	Wickliffe 138 kV/Riverbend 23 kV	NA (isolated buses/loss of load)	0.90	52	0

In addition to these case evaluations, ATSI reviewed the impact of these contingency scenarios on the transmission system's reliability metrics. If these three contingency scenarios were to take place with the

existing transmission system configuration, there are significant negative impacts to the reliability metrics: System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), and Customer Average Interruption Duration (CAIDI), which are defined as follows:.

$$\text{SAIDI} = \frac{\sum \text{Customer Minutes Interrupted}}{\sum \text{Customers Served}}$$

$$\text{SAIFI} = \frac{\sum \text{Customer Interrupted}}{\sum \text{Customers Served}}$$

$$\text{CAIDI} = \frac{\sum \text{Customer Minutes Interrupted}}{\sum \text{Customers Interrupted}}$$

The negative impacts are summarized in **Table 3-3** below. This table assumes a three-hour outage duration, which was determined based on historic off-hours outage restoration times necessary to assemble a crew, dispatch the crew to the scene, allow the crew time to determine the issue, and then perform switching to restore customers. The impact values provided are for the Ohio Edison region of the FirstEnergy footprint.

Table 3-3
Impact to reliability metrics

Contingency	SAIDI Impact	SAIFI Impact	CAIDI Impact	System CAIDI Increase
(1) Loss of the Lincoln Park-Lowellville 138 kV Transmission Line and loss of the Lincoln Park-Masury 138 kV Transmission Line	1.727	0.010	180	0.6
(2) Loss of the Salt Springs-Riverbend 138 kV Transmission Line and loss of the Riverbend-Wickliffe 138 kV Transmission Line	0.864	0.005	180	0.3
(3) Loss of the Salt Springs-Riverbend 138 kV Transmission Line and loss of the Boardman-Wickliffe 138 kV Transmission Line	2.591	0.014	180	0.8

The transmission SAIDI, SAIFI and system CAIDI increases illustrate the negative impact to Ohio Edison's regional reliability indices for the average customer served by Ohio Edison during a year. These increases are a direct result of the outage scenarios described in the table and corresponding customers interrupted for a 3-hour outage duration. The SAIDI impact reflects the increase in total duration of interruptions (minutes) for the average Ohio Edison customer. The SAIFI impact reflects the increase to the average number of interruptions (outage frequency) that an average Ohio Edison customer experiences and the system CAIDI impact reflects the increase to the average restoration time (minutes) that it would take to restore an outage in Ohio Edison territory. The Project will mitigate the potential for the transmission outages and subsequent reliability metric impacts for

Ohio Edison under the contingency scenarios described above and improve overall reliability and operational flexibility in the Project area.

Load Flow Study

All models and associated files should be requested through PJM. This is due to the fact that the data in the power flow model and associated files is owned by PJM. ATSI only provides some of the data that goes into the model. All the other Transmission Owners (TOs) and stakeholders also provide input to the model and associated files. PJM assembles the data and creates the model and associated files. The model and the associated file are not owned or controlled by ATSI.

(4) System Performance Transcription Diagrams

FirstEnergy does not create System Performance Transcription Diagrams. Therefore, no diagrams for this Project are available.

(B) REGIONAL EXPANSION PLANS

The Project need was submitted as a supplement to the PJM Regional Transmission Expansion Plan (RTEP) at the Sub-Regional RTEP Committee on January 14, 2019, and the solution was presented March 25, 2019. See section (1) (c) below.

(1) Proposed Facility in Long-Term Forecast

(a) Reference in Recent Long-Term Forecast

The Project is included in the 2021 LTFR (21-054-EL-FOR) on page 97.

(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 need was submitted as a Supplemental Project to the PJM Regional Transmission Expansion Plan (RTEP) at the Sub-Regional RTEP Committee on January 14, 2019, and the solution was presented March 25, 2019. As proposed, the Project solution would improve operational flexibility, reliability, and infrastructure resilience; reduce the amount of local load loss under contingency conditions; and mitigate non-planning criteria concerns on the <100 kV system under a contingency (P6) condition. PJM evaluated the proposed Project and did not identify any FirstEnergy or PJM Planning Criteria violations caused by the Project. As such, there is no additional need for other network system upgrades as a result of the Project. PJM assigned the Project supplemental upgrade identification number s1947.

PJM, in its capacity as the regional Transmission Planning Coordinator, Transmission Planner and Transmission Operator, identifies the need and timing for mandatory transmission system upgrades as part of the reliability planning, economic planning, and interconnection planning process to preserve the reliability of the electricity grid that is under its operational control as the Regional Transmission Organization. The PJM planning process is an 18-month cycle starting in September of every calendar year. The process ultimately produces a PJM Board approved Regional Transmission Expansion Plan ("RTEP") 18 months later (February). The RTEP identifies transmission system upgrades and enhancements to provide for the operational, economic, and reliability requirements of PJM. The RTEP

consists of system upgrades produced from one or more of four planning processes: reliability planning; economic planning; interconnection planning; and local planning.

Baseline upgrades are identified as part of the reliability planning and economic planning analysis. The analysis consists of a comprehensive series of detailed studies that are designed to satisfy PJM's reliability planning criteria and those of the applicable transmission owners, including FirstEnergy's Transmission Planning Criteria, as well as North American Electric Reliability Corporation ("NERC") and ReliabilityFirst Corporation ("RF") reliability standards. The transmission planning process and the baseline RTEP projects selected for construction under that process are required by the applicable reliability and planning criteria and, once approved by PJM, are mandatory. Transmission Owners are obligated to build these projects under Section 1.7 of Schedule 6 of the PJM Operating Agreement. These projects are identified with an upgrade ID starting with the letter "b" followed by a four-digit number.

Supplemental upgrades are projects initiated by a Transmission Owner ("TO") and are part of the local planning process. In accordance with Attachment M-3 of the PJM Open Access Transmission Tariff ("OATT'), FirstEnergy provides information regarding the criteria used to plan and identify Supplemental Projects at an Assumptions Meeting. The process for developing Supplemental upgrades includes identification and review of system needs at a separate Needs meeting and provides an opportunity for stakeholders to comment. Next, there is a Solutions meeting where potential solutions and any considered alternatives are discussed. Stakeholders may then provide comments on the potential solutions.

FirstEnergy supplemental upgrades are typically: (i) a request for electric service from new or existing customers; and/or, (ii) a project identified pursuant to FirstEnergy's Energizing the Future methodology. This methodology and any identified projects are presented to PJM and the PJM stakeholders in accordance with the PJM OATT, Attachment M-3, as described above. ATSI Reliability Enhancement projects, like the proposed Project, are presented at the PJM Subregional RTEP Western committee meetings, which occur monthly. Supplemental upgrades that have been reviewed through the Attachment M-3 process are identified with an "s" followed by a four-digit number. Although supplemental upgrades are not mandated or directed by PJM, they are necessary in order to address planning functions not transferred to PJM (e.g., asset management, customer interconnections). These projects reflect the PJM TOs' obligation to provide reliable service in its local service territories and are grounded in Good Utility Practice.

In general, FirstEnergy's reliability enhancement methodology is intended to: (i) proactively upgrade or replace transmission lines and substation components that present an increasing risk to reliability; (ii) modernize the Operating Companies' transmission infrastructure by implementing technological advances to enhance reliability and promote increased efficiencies; (iii) increase or restore load serving capability; (iv) improve the resiliency of the existing transmission system to better withstand and recover from storms and unusual weather events such as extreme heat and cold; (v) address heightened concerns with cyber and physical security; (vi) improve customer reliability by installing new equipment with real-time monitoring capabilities to optimize maintenance intervals and reduce the likelihood of equipment failure; and (vii) better address our customers' needs by reducing the duration and frequency of unscheduled outages. Reliability Enhancement projects, like the proposed Project, are largely driven to meet customers' increasing reliability demands.

This Project was reviewed in accordance with the PJM OATT Attachment M-3 process, as described above, and presented at the PJM Sub-Regional RTEP Committee on January 14, 2019, and March 25, 2019. PJM assigned the Project supplemental upgrade identification number s1947.

(2) Gas Pipeline Long-Term Forecast Reference

This code provision relates to gas pipeline projects and is therefore not applicable to this Project.

(C) SYSTEM ECONOMY AND RELIABILITY

Completion of the Project will resolve planning concerns for customers at risk in 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, nor 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.

The potential for interrupting significant numbers of customers will be mitigated, 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 an additional 138 kV source to both the Lincoln Park and Riverbend 138 kV substations, strengthening the 138 kV transmission system that provides local service to residential, commercial, and industrial customers in the area. In addition, transmission system maintenance and switching procedures will be less complex with this new transmission line, thus reducing customers' overall exposure to long duration outages. Substation equipment and overhead transmission lines are inspected on a routine basis and have regular 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 alternatives were evaluated for their potential to eliminate the need for the Proposed Project:

1. Construction of a Lincoln Park-Shenango 138 kV Transmission Line
2. Construction of a second Salt Springs-Riverbend 138 kV Transmission Line

The alternatives listed above must both be completed in order to provide the same benefit to the affected customers that will be realized with the proposed Project. As stated above, the main issue this Project addresses is that both Lincoln Park and Riverbend Substations each only have two 138 kV sources. In order to mitigate the potential interruption of customers, a third source must be added to both substations. The proposed Project builds one 138 kV transmission line between the two existing substations, providing a third source for each. The alternatives above require building two separate 138 kV transmission lines to provide a new 138 kV source for each substation. **Table 3-4** below provides a breakdown of approximate costs, customer impacts and load impacts of the alternative's evaluation.

Table 3-4
2023 Alternative Project Cost Evaluation

Proposed Solution	Estimated Line Mileage (miles)	Expected Costs ($million)	Customers Impacted (rounded to nearest thousand)	MW Impacted (taken from table 3-1)
Lincoln Park-Riverbend 138 kV Transmission Line	5.2	$23.0	25,000	92
TOTAL	**5.2**	**$23.0**	**25,000**	**92**
Alternatives				
Lincoln Park-Shenango 138 kV Transmission Line	10	$25.4	10,000	40
Salt Springs-Riverbend #2 138 kV Transmission Line	5	$14.5	15,000	52
TOTAL	**15**	**$39.9**	**25,000**	**92**

As shown in Table 3-4, the proposed Project has a significantly lower transmission line footprint and considerably lower costs. The proposed Project would require roughly 5.7 miles of 138 kV transmission line construction and cost almost $6 million less than the aggregated construction cost for both the Lincoln Park-Shenango 138 kV Transmission Line and the Salt Springs-Riverbend #2 138 kV Transmission Line. Consequently, the proposed Project is the shortest, least impactful and cheapest solution to the Project need.

ANALYSIS OF NON-TRANSMISSION ALTERNATIVES

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

Inclusion of Energy Efficiency and Demand Side Management in PJM Forecasting

PJM's Reliability Pricing Model incorporates Energy Efficiency and Demand Side Management resources. Consequently, the determination of need for this Project already accounts for Energy Efficiency or Demand Side Management resources, which are built into the forecasts derived from PJM's Reliability Pricing Model.

(E) FACILITY SELECTION RATIONALE

The Project, which installs a 138 kV transmission line from the Lincoln Park 138 kV Substation to the Riverbend 138 kV Substation, was selected because it is the most efficient long-term solution to resolve identified concerns that exist on the transmission system in the Project Study Area while adding additional capacity on the system for economic development, load growth, and operational

flexibility. Construction of the Project will provide operating flexibility and provides another source for power flow to and through the Project Study Area, affording greater flexibility and capacity for load growth and system maintenance and ensures the businesses, homes and communities in the area will have ready access to safe and reliable energy for many years to come.

As noted in the Application, all of the other transmission alternatives either would not resolve all of the concerns at a similar cost or, if such problems would be resolved, the alternatives would: (i) be short term solutions; and (ii) require additional future investment to address the required overall necessary area improvements.

(F) PROJECT SCHEDULE

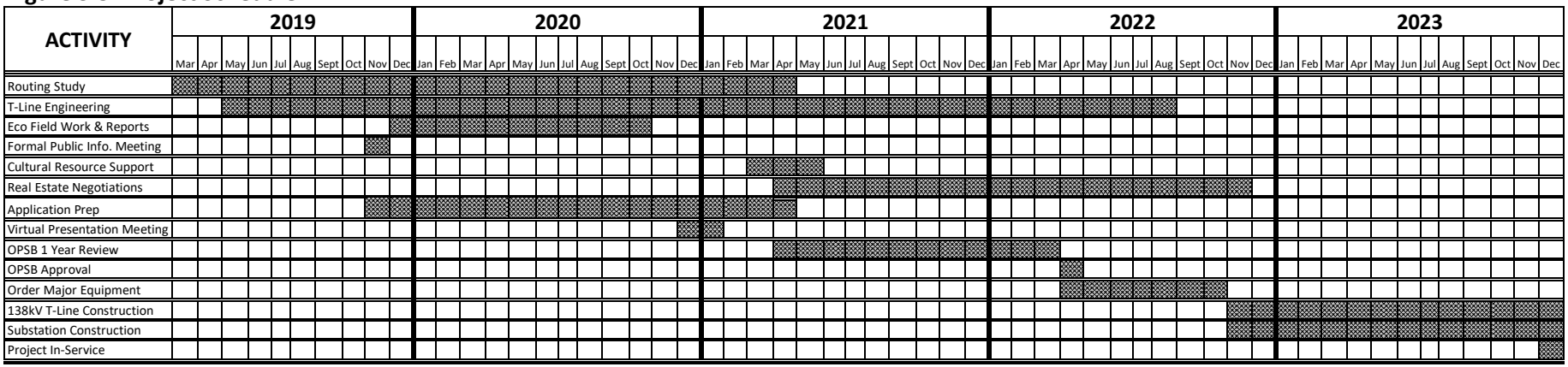
(1) Overview Schedule

It is anticipated that the overall Project will require 24 months to permit, site, design, and build the 138 kV transmission line. Construction of the Project is expected to begin in approximately November 2022 and is expected to be completed and placed in-service by December 2023. A detailed Project schedule is included as **Figure 3-5** on next page.

(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 City of Youngstown and surrounding area by exposing them to ongoing reliability issues until such time as the Project is completed. This may include lower than desired service voltages and interruption to service. Project delays will also limit the ability to respond to and provide transmission service to economic development opportunities in an efficient and timely manner.

Figure 3-5. Project Schedule



4906-5-04 ROUTE ALTERNATIVES ANALYSES

(A) ROUTE SELECTION STUDY

ATSI and its siting team conducted an independent 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 Area 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 must connect the existing Lincoln Park Substation and Riverbend Substation;
- Route alternatives must support a 65-foot wide cleared right of way (ROW);
- Route alternatives must be able to support conductor, insulators, and other hardware required by ATSI;
- Route alternatives must be able to have appropriate rights and permits secured to support an in-service date in December 2023;
- Route alternatives should attempt to eliminate significant backtracking through the Project area; and
- Route alternatives should attempt to minimize the number of major corridor crossings, including major highways, railroads, and the Mahoning River.

(1) Project Area Description and Rationale

The Project is predominantly located within the City of Youngstown with a portion crossing the City of Campbell in northeastern Mahoning County, Ohio. The Project Area is primarily urban with high-density residential, commercial, and industrial development. The urban nature presents significant routing constraints due to potential building encroachments. The Mahoning River is a prominent waterbody in the 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. The delineation of the study area was driven by the identification of start and end points for the new electric transmission line. The new 138 kV transmission line is anticipated to originate from the existing Lincoln Park Substation and the endpoint is fixed at the existing Riverbend 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 to prevent backtracking.

(2) Project Area Map

Figure 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 of the RSS report (**Appendix 4-1**) illustrates 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 1** 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. 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. The Study Area is primarily a residential and industrial setting, with some rural parcels near the eastern portion of the area. Anticipated impacts to cultural resources did not significantly limit the placement of route alternatives. Ecologically sensitive areas include the Mahoning River, specific locales of streams, 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, 49 in total, was to minimize impacts.

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. 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**. The information provided throughout this application is based on the final alignments of both the

Preferred and Alternate Routes, after the constructability review was completed.

(6) Route Descriptions and Rationale for Selection

The Preferred Route is identified as Route 44 (2-8-11-19-25-30-35-38-41-44-47) in the RSS. This route is approximately 5.21 miles long, which is the shortest route, and initially ranked sixth out of 49 total routes scored based solely on the quantitative factors. It had the first lowest (best) land use score due to the fact that there are no building encroachments and low number of residences within 100 and 1,000 feet and parcels crossed. Route 44 crosses approximately 0.6 mile of Lincoln Park. In the quantitative analysis, the park was considered a negative constraint. However, discussions with local officials indicated that the portion of the park proposed to be crossed represents an opportunity to reduce impacts to private landowners. Route 44 had the first lowest (best) engineering score, primarily due to its shortest length. It ranked 12th in the ecological categories and 44th in the cultural categories, but no fatal flaws were identified. Route 44 is predominantly north of the Mahoning River.

The Alternate Route is identified as Route 22 (2-8-10-16-21-24-27-28-36-39A-39B-42-47) in the RSS. Route 22 is approximately 6.23 miles long and initially ranked second overall solely on the quantitative factors. It was selected over the lowest (best) scoring route in the RSS because of a more favorable entrance into Riverbend Substation following engineering review, which was the only difference between the two routes. Route 22 received the second ranked ecological score, eighth ranked land use score, 11th ranked engineering score, and 17th ranked cultural score. Route 22 was initially considered for selection as the Preferred Route due to its favorable quantitative score. However, two commercial/industrial buildings were identified within a 65-foot ROW. It is approximately 1.02 miles longer than Route 44, which is likely to increase construction and maintenance costs. Route 22 utilizes approximately 0.7 miles less of publicly-owned parcels (City of Youngstown, metro parks, Mahoning County) which will increase impacts to private landowners. Ultimately, Route 22 was selected as the Alternative Route because it was considered by the Applicant to be a viable candidate and the most favorable true alternative to the selected Preferred Route because it was closest to the 20% commonality threshold and south of the Mahoning River.

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

Tables 2A through 2E 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 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 a first informational meeting on November 12, 2019, at the Taylor Mahoning Valley History Center in Youngstown, Ohio. Detailed maps of the group of study segments identified by the RSS provided in **Appendix 4-1** were presented throughout the meeting. Property boundaries were also indicated on the mapping with the unique parcel identification numbers referenced to an ownership spreadsheet. Approximately 40 people attended the public information meeting. The majority of these attendees were affiliated with a church along Segment 25. While the church group generally preferred routes avoiding the church property, benefits of maintaining areas of the adjacent park were noted. Subsequent to the meeting, Project details, including maps, were provided to the church and no additional comments were made. Following the public meeting, the Applicant continued its evaluations and selected the Preferred and Alternate Routes.

(2) Alternative Public Engagement Plan

Due to the ongoing COVID-19 pandemic and the restrictions on public meetings, ATSI was granted a waiver to undertake an alternative public engagement plan in accordance with the proposal set forth in its motion for waiver of the public information meeting requirement, which allowed ATSI to proceed with public engagement that ensured the safety of everyone involved while providing the community with the chance to gather information and provide feedback on the Project.

ATSI's 30-day alternative public engagement plan was formally completed on January 20, 2021. A detailed explanation of its three components, as well as of ATSI's February 2021 virtual meeting with the City of Youngstown Parks Committee, has been provided to the Board in ATSI's compliance filing, docketed March 31, 2021.

PROPOSED LINCOLN PARK-RIVERBEND 138 KV TRANSMISSION LINE PROJECT

ROUTE SELECTION STUDY

Prepared for:

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Project #: 60595883

April 2021

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FIGURES (FOLLOW TABLES)

1.0 Introduction

This document presents the Route Selection Study ("Study") for a proposed 138 kV electric transmission line located in Mahoning County, Ohio. The Study is a preliminary route selection evaluation, conducted by AECOM Technical Services, Incorporated. ("AECOM"), in consultation with American Transmission Systems, Incorporated ("ATSI"), a FirstEnergy company.

ATSI is proposing to construct a new 138 kV electric transmission line called the Lincoln Park-Riverbend 138 kV Transmission Line ("Project"). The Project will extend from the existing Lincoln Park Substation, which is located east of the City of Youngstown to the existing Riverbend Substation, which is located west of the City of Youngstown, (See Figure 1).

As a 138 kV electric transmission line project greater than two miles in length, the Project is subject to review and certification by the Ohio Power Siting Board (OPSB) under Ohio Revised Code (ORC) Chapter 4906: Power Siting. ORC 4906-3-05 Alternatives in Standard certificate applications states:

> *All standard certificate applications for electric power transmission facilities and gas pipelines shall include fully developed information on two sites/routes... Each proposed site/route shall be designated as a preferred or an alternate site/route. Each proposed site/route shall be a viable alternative on which the applicant could construct the proposed facility. Two routes shall be considered as alternatives if not more than twenty per cent of the routes are in common. The percentage in common shall be calculated based on the shorter of the two routes. Any segment of a route that makes use of existing transmission structures or is entirely within existing transmission rights-of-way may be excluded from the calculation of the percentage in common.*

Therefore, based on the ORC governing the Project, Preferred and Alternate Routes must be selected.

2.0 Purpose and Objectives

Prior to the beginning of the Study, certain key objectives were 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 Lincoln Park and Riverbend substations;
- Route alternatives must support a 65-foot wide cleared right of way (ROW);
- Route alternatives must be able to support conductor, insulators, and other hardware required by ATSI.;
- Route alternatives must be able to have appropriate rights and permits secured to support an in-service date of December 31, 2023;
- Route alternatives should attempt to eliminate significant backtracking through the Project area; and
- Route alternatives should attempt to minimize the number of major corridor crossings including major highways, railroads, and the Mahoning River.

Based on these objectives, 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 adverse effects to the extent practical. ATSI retained AECOM to assist with the evaluations and scoring of environmental, land-use and value, cultural, and engineering/construction issues within the study area. The purpose of this Study is to assist ATSI with identifying the routes best suited for the transmission line that will have the fewest overall impacts.

3.0 Methodology

The iterative methodology of the Study is consistent with standard industry practice and designed to identify transmission line routes that minimize the overall impacts on ecology, sensitive land uses, socioeconomic, and cultural features to the greatest extent possible, taking into account economic and technical feasibility. This process relies on detailed land use and ecological data collected from multiple public sources and commercial providers, which is confirmed and supplemented through field evaluations by trained specialists from AECOM and ATSI. The field evaluation also provides ATSI with a quantitative and qualitative assessment of route alternatives. The result of this process is compiled and summarized into a detailed and comprehensive assessment of the study area and route alternatives. In addition, the Study is designed to meet regulatory standards and to identify routes that minimizes adverse environmental and social impacts from the Project, taking into account the described relevant and measurable factors. The data and analysis in the Study are presented in a format that allows consideration and comparison

of additional route concepts and alternatives in response to public input or inquiries from government agencies, if any.

The Study consists of a multi-stage suitability analysis that identifies areas of opportunity and constraint and then directly compares the resultant feasible route candidates to assess possible routes. The Study is comprised of three main steps:

- Definition of a study area;
- Assignment of route candidate centerlines based on detailed ecological, cultural, engineering, and land use criteria; and
- Scoring and ranking of route candidates, based on a 65-foot wide right-of-way, to guide selection of the route to be constructed.

4.0 Defining the Study Area

An initial task in the Study was the definition of the study area. The study area was selected based on professional judgment and the geographic characteristics of the region, as well as the physical start and endpoint of the Project. In general, and in accordance with industry practice, a study area for a transmission siting project should be within reasonable distance of the end points of the transmission line and it should provide the opportunity to identify multiple potentially feasible transmission line routes for further evaluation. 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, as shown on Figure 1. Constraints such as major water bodies, urban/developed areas, transportation routes, existing utility corridors, and the locations of the end points played key roles in determining the boundaries of the study area and route candidate selections.

In this case, the identification of the study area was driven by the identification of start and end points for the new electric transmission line. The Project will extend from the existing Lincoln Park Substation, which is located east of the City of Youngstown to the existing Riverbend Substation, which is located west of the City of Youngstown.

5.0 Siting Criteria for Detailed Candidate Evaluations

The goal of the Study was to identify viable routes based on reasonable physical placement of the new transmission line that avoid or limit impacts to sensitive land uses, ecological, socioeconomic, and cultural features in the study area. In evaluating the siting criteria, it is standard industry practice to maximize certain criteria along a given route, for instance, paralleling existing corridors to minimize new impacts. These more favorable criteria are known as opportunities. Undesirable criteria for siting, such as residences, wetlands, and historic properties, are generally referred to as constraints. Therefore, the goal of a routing Study is to maximize opportunities while minimizing constraints. The criteria used in this Study, which are consistent with the criteria used in similar routing studies, are listed below in Table 1.

TABLE 1: QUANTITATIVE SITING CRITERIA

Criteria*	**Data Source**
Ecological	
Area of Woodlots within 65-foot Right-of-way (acres)	Woodlots as digitized from aerial photography
Area of National Wetland Inventory (NWI) Wetlands within 65-foot Right-of-way (acres)	NWI wetland areas as identified by United States Fish and Wildlife Service (USFWS)
Number of Stream Crossings	USGS Topographic Maps
T&E Composite	
Threatened and Endangered Species Listings within 65-foot Right-of-way (60% of composite score)	Ohio Department of Natural Resources (ODNR) Natural Heritage Database
Threatened and Endangered Species Listings between 65-foot Right-of-way and 1,000 feet (25% of composite score)	Ohio Department of Natural Resources (ODNR) Natural Heritage Database
Protected Species Listings between 65-foot Right-of-way and 1,000 feet (15% of composite score)	Ohio Department of Natural Resources (ODNR) Natural Heritage Database

TABLE 1: QUANTITATIVE SITING CRITERIA	
Criteria*	**Data Source**
Cultural	
National Register of Historic Places and Districts within 1,000 feet of center line	Ohio Historic Preservation Office (OHPO) online database
Known Archaeology Sites within 100 feet of center line	OHPO online database
Ohio Historic Inventory Structure within 1,000 feet of center line	OHPO online database
Cemeteries within 100 feet of center line	OHPO online database and field observation
Land Use	
Residences Composite	
Residences within 32.5 feet (50% of composite score) of center line (65-ft Right-of-way)	Aerial photography, Mahoning County auditor data, and field observation
Residences between 32.5 and 100 feet (30% of composite score) of center line	Aerial photography, Mahoning County auditor data, and field observation
Residences between 100 and 1,000 feet (20% of composite score) of center line	Aerial photography, Mahoning County auditor data, and field observation
Non-residential buildings within 65-foot ROW	Aerial photography, Mahoning County auditor data, and field observation
Properties Crossed by Centerline	Mahoning County Auditor
Institutions Composite	
Linear feet of Institutional Land Uses Crossed (67% of composite score)	Schools and places of worship - USGS maps, Mahoning County Buildings and Parcel Data backchecked with ESRI GIS data layer, and field observation
Institutional Land Uses within 1,000 feet (33% of composite score)	Schools and places of worship - USGS maps, Mahoning County Buildings and Parcel Data backchecked with ESRI GIS data layer, and field observation
Other Sensitive Land Uses Composite	
Other Sensitive Land Uses Crossed (67% of composite score)	Includes airports, air strips, parks, preserves, park district property, designated managed areas, conservation and observatory sites, libraries, and golf courses; sources: US Forest Service, ODNR, Mahoning County auditor data, ESRI GIS data, and field observation

TABLE 1: QUANTITATIVE SITING CRITERIA	
Criteria*	**Data Source**
Other Sensitive Land Uses within 1,000 feet (33% of composite score)	Includes airports, air strips, parks, preserves, park district property, designated managed areas, conservation and observatory sites, libraries, and golf courses; sources: US Forest Service, ODNR, Mahoning County auditor data, ESRI GIS data, and field observation
Engineering	
Number of Public Road Crossings	Mahoning County auditor data, aerial photography, USGS topographic maps
Number of Railroad Crossings	Mahoning County auditor data, aerial photography, USGS topographic maps
Turn Angles Greater than 0 and Less than 20 Degrees	Calculated by GIS software
Turn Angles Greater than 20 Degrees	Calculated by GIS software
Number of Highway Overpass Crossings	Mahoning County auditor data, aerial photography, field observation
Percent of Route Closely Paralleling Electric Right-of-way	Aerial photography
Percent of Route Closely Paralleling Public Roads	Aerial photography
Length of Route (miles)	Calculated by GIS software

*65-ft ROW indicates 32.5 feet on each side of the centerline with a total buffer area of 65 feet wide
Within 100 feet of centerline indicates 100 feet on each side of the centerline with a total buffer area of 200 feet wide
Within 1,000 feet of centerline indicates 1,000 feet on each side of the centerline with a total buffer area of 2,000 feet wide

In addition to the ecological, land use, cultural, and engineering opportunities and constraints, several qualitative factors were considered. These issues include construction and maintenance access, schedule, and likely right-of-way availability along the routes.

6.0 Identification of Initial Route Candidates

Based on the identified needs and technical requirements of the Project, the study area was evaluated to identify candidate routes. A constraint map of the study area was developed using ArcMap GIS software. Georeferenced data layers for the identified constraints, obtained from published State and Federal materials and local planning documents, were superimposed on available aerial photography. A windshield survey of the study area was conducted to verify the nature of the study area and identify possibly important constraints that were not included in the GIS layers. Based on the resulting constraint map, initial candidate route segments were identified.

A vicinity map, showing all 50 evaluated candidate route segments, is shown as Figure 2. Finer resolution aerial photography base maps, showing the candidate route segments that were not eliminated, are provided as Figure 3 (pages 1 through 8). A discussion of all 50 evaluated candidate route segments is provided below.

1: Segment 1 exits the Lincoln Park Substation to the east and runs for approximately 3.0 miles in total length to the intersection of McCartney Road and Struthers Liberty Road where Segments 5 and 6 connect. This segment is the longest of the 50 segments. Segment 1 runs east approximately 1.5 miles cross-country, parallel to the existing Lincoln Park-Lowellville 138 kV Transmission Line, crossing Jacobs Road, McKelvey Lake and Coitsville Hubbard Road, before turning to the south where it runs on the west side and parallel to Coitsville Hubbard Road for approximately 0.70 mile. Segment 1 crosses Coitsville Hubbard Road and continues south on the east side of the road and within the existing 23kV Line right-of-way for approximately 0.20mile before crossing back over to the west side of Coitsville Hubbard Road. Segment 1 continues south along the west side and parallel to Coistville Hubbard Road for approximately 0.10mile before crossing Oak Street and then turning west and paralleling McCartney Road for approximately 0.5 mile. The last 0.7 mile of this segment runs parallel to the existing Campbell-Masury 23 kV Line. Segment 1 crosses Dry Run creek, Coitsville Ditch, and several unnamed tributaries. Jackson Cemetery is mapped to the west of this segment, on the opposite side of Coitsville Hubbard Road, and Coitsville Methodist Cemetery is mapped on the southwest corner of the intersection of McCartney Road and Struthers Liberty Road to the southwest of the endpoint of Segment 1.

2: Segment 2 exits the Lincoln Park Substation to the south and runs for approximately 0.4 mile in total length cross-country, paralleling the existing Emerson-Wood and Center-Lincoln Park 23 kV lines. Segment 2 terminates at Oak Street where Segments 5 and 8 connect.

3: Segment 3 exits the Lincoln Park Substation to the south and runs west for approximately 0.8 mile in total length cross-country to Early Road where Segments 7 and 18 connect. Segment 3 crosses two parcels owned by the City of Youngstown, the existing Emerson-Wood and Center-Lincoln Park 23 kV lines, and Dry Run creek.

4: Segment 4 exits the Lincoln Park Substation to the northwest and runs for approximately 0.7 mile in total length cross-country to Early Road where Segments 7 and 9 connect. This segment runs north approximately 0.3 mile paralleling the existing Emerson-Wood and Center-Lincoln Park 23 kV lines, before turning to the west and running for approximately 0.4 mile through woodlots behind residential development. This segment crosses Dry Run creek, one parcel owned by the City of Youngstown, and has several crossings of the existing 23 kV lines.

5: Segment 5 runs for approximately 1.5 miles in total length from the intersection of McCartney Road and Struthers Liberty Road, where Segments 1 and 6 connect, to where Segments 2 and 8 connect along Oak Street. This segment runs north approximately 0.5 mile cross-country before turning to the west and paralleling Oak Street for approximately 1.0 mile. Oak Street Park is mapped adjacent to the north of this segment. Coitsville Methodist Cemetery is mapped on the southwest corner of the intersection of McCartney Road and Struthers Liberty Road to the southwest of the endpoint of Segment 5.

6: Segment 6 runs for approximately 2.3 miles in total length, primarily through residential neighborhoods, and is the third longest segment. This segment runs from the intersection of McCartney Road and Struthers Liberty Road where Segments 1 and 5 connect to where Segments 13 and 14 intersect on Wilson Avenue. This segment runs south approximately 0.8 mile along Struthers Liberty Road, crossing through two parcels owned by the City of Campbell, before turning to the west and paralleling Whipple Avenue for approximately 1.3 mile. This segment then turns south-southwest and parallels Third Street for approximately 0.2 mile, crossing through a parcel owned by the City of Campbell. Roosevelt Park is mapped to the

west of this segment, on the opposite side of Struthers Liberty Road. Two cemeteries, Coitsville Methodist Cemetery, and Temple Emanuel Cemetery are mapped along Struthers Liberty Road, on the opposite side of the street from Segment 6. Additionally, near the intersection of Hyatt and Suthers Liberty Road, Segment 6 crosses between the two portions of the Archangel Michael Greek Orthodox Cemetery.

7: Segment 7 runs for approximately 0.5 mile in total length, parallel to Early Road, from where Segments 4 and 9 connect to where Segments 3 and 18 connect at the intersection of Early Road and East High Avenue. This segment crosses the existing Emerson-Wood 23 kV Line which runs parallel to Early Road.

8: Segment 8 runs for approximately 0.4 mile in total length, parallel to Oak Street, from where Segments 2 and 5 intersect to where Segments 10 and 11 connect at the intersection of Lamar Avenue and Oak Street. This segment crosses through one parcel owned by the City of Youngstown. Segment 8 crosses the existing Emerson-Wood and Center-Lincoln Park 23 kV lines in two different locations. Segment 8 will require an underbuild of existing electric and communications lines.

9: Segment 9 runs for approximately 1.9 miles in total length, through residential neighborhoods, from where Segments 4 and 7 connect along Early Road to where Segments 31 and 33 connect in the western portion of a parcel owned by the City of Youngstown. This segment runs west-northwest approximately 0.3 mile, through woodlots and crosses East Branch Crab Creek, before turning to the west and paralleling Stewart Avenue for approximately 0.5 mile. Segment 9 crosses the existing Lincoln Park-Wirt 23 kV Line which runs parallel along Stewart Avenue. This segment then turns south and parallels Lansdowne Boulevard before generally going west. The remaining approximately 1.1 miles crosses primarily woodlots along an unnamed tributary, Victory Field Park, and several side streets. The last 1.1 mile stretch of this segment has eight 90-degree turns to avoid the dense urban development. This segment crosses through three parcels owned by the City of Youngstown.

10: Segment 10 runs for approximately 0.5 mile in total length, parallel to Lamar Avenue, from where Segments 8 and 11 intersect on Oak Street to where Segments 12 and 16 connect at the intersection of McCartney Road and Woodland Avenue. The existing Center-Lincoln Park 23 kV Line runs parallel to this segment and would likely be underbuilt. Lamar Avenue is a narrow corridor with a limited number of homes in close proximity on the west side of the street, which is the same side of the street as the 23 kV Line. While encroachments can be avoided, the opportunity to shift to the east side of Lamar Avenue seems to be available and may provide a better opportunity for the Project.

11: Segment 11 runs for approximately 0.3 mile in total length, parallel to Oak Street, where Segments 8 and 10 intersect to where Segments 17 and 19 connect along Oak Street. This segment crosses the existing Emerson-Wood 23 kV Line that runs parallel to Oak Street and an unnamed tributary. Segment 11 will require an underbuild of existing electric and communications lines.

12: Segment 12 runs for approximately 1.0 mile in total length, primarily through residential neighborhoods, from where Segments 10 and 16 connect along McCartney Road to where Segments 13 and 20 connect along Wilson Avenue. This segment runs south approximately 0.5 mile, paralleling the existing Center-Lincoln Park 23 kV Line and Woodland Avenue before turning to the southwest and paralleling the same line and Coitsville Road for approximately 0.2 mile. The remaining approximately 0.3 mile of this segment runs south to southwest crossing woodlots. Segment 12 crosses the existing 23 kV Line three times that runs parallel along Woodland Avenue. This segment crosses through one parcel owned by the City of Campbell. Segment 12 will require an underbuild of existing electric and and communications lines.

13: Segment 13 runs for approximately 0.3 mile in total length, parallel to Wilson Avenue, from where Segments 6 and 14 connect to where Segments 12 and 20 connect. This segment parallels the existing Center-Lincoln Park 23 kV Line for approximately 0.1 mile before crossing the 23 kV line and Wilson Avenue near the

intersection of 1st Street. Segment 13 crosses an unnamed tributary on the north side of Wilson Avenue.

14: Segment 14 runs for approximately 0.1 mile in total length from where Segments 6 and 13 intersect along Wilson Avenue to where Segments 15 and 23 connect. This segment crosses undeveloped land and a railroad track. Segment 14 is the second shortest segment.

15: Segment 15 runs for approximately 1.0 mile in total length, through a rail yard, from where Segments 14 and 23 intersect to the south of a railroad track to where Segments 27, 28, and 29 connect along South Center Street. This segment crosses the Mahoning River, Pine Hollow Creek, a railroad track, and the existing Center-Lincoln Park 23 kV Line.

16: Segment 16 runs for approximately 0.4 mile in total length from where Segments 10 and 12 intersect along McCartney Road (US-422) to where Segments 21 and 22 connect to the northeast of the intersection of McCartney Road and Keystone Street. Commercial development is mapped to the north of the eastern half of this segment. Segment 16 crosses Camden Avenue. Some communications line underbuilds are likely.

17: Segment 17 runs for approximately 1.5 miles in total length parallel to the existing Emerson-Wood 23 kV Line, primarily through residential neighborhoods. This segment runs from where Segments 11 and 19 connect along Oak Street Extension to where Segments 32 and 34 connect along Himrod Avenue at the entrance ramp to US-62. This segment runs south approximately 0.4-mile, paralleling Oak Street Extension before turning to the northwest and crossing Oak Street. The remaining approximately 1.0 mile of this segment runs west along Himrod Avenue. Segment 17 crosses the 23 kV line four times, Dry Run creek, and US-62 and two access ramps to US-62 at the western end of the segment.

18: Segment 18 runs for approximately 1.2 miles in total length parallel to the existing Emerson-Wood 23 kV Line, primarily through residential neighborhoods. This

segment runs from where Segments 3 and 7 connect at the intersection of Early Road and East High Avenue to where Segments 31 and 32 connect along Albert Street. Segment 18 crosses several local roads, including Lansdowne Boulevard, Karlston Avenue, Euclid Avenue, North Truesdale Avenue, North Garland Avenue, North Pearly Avenue, and Albert Street. This segment also parallels the northern parcel boundary of the City of Youngstown City Dump for approximately 0.1 mile. East High School is also in close proximity.

19: Segment 19 runs for approximately 0.6 mile in total length, primarily through undeveloped land, from the intersection of Segments 11 and 17 along Oak Street Extension to where Segments 22 and 25 connect along McCartney Road. Approximately 0.1 mile of this segment crosses a land bank parcel owned by the City of Youngstown Land Reutilization Program and approximately 0.3 mile of this segment crosses two parcels in the Mill Creek Metro Park system, specifically Lincoln Park. This segment also crosses the existing Emerson-Wood 23 kV Line, an unnamed tributary, and Oak Street/U.S. 422. Some challenging terrain is also present.

20: Segment 20 runs for approximately 0.3 mile in total length near Wilson Avenue from where Segments 12 and 13 connect to where Segments 21 and 24 connect. This segment crosses Wilson Avenue, the existing Center-Lincoln Park 23 kV Line, and an industrial property.

21: Segment 21 runs for approximately 0.8 mile in total length, primarily through woodlots and residential neighborhoods, from where Segments 16 and 22 connect along McCartney Road to where Segments 20 and 24 connect at Wilson Avenue. Segment 21 cuts through the corner of two parcels owned by the City of Campbell and crosses McCartney Road, Gladstone Street, and Wilson Avenue. Segment 21 also crosses the existing Center-Lincoln Park 23 kV Line. An underbuild of existing electric line will be necessary. Challenging terrain is also present along the southern portion of the segment.

22: Segment 22 runs for approximately 0.4 mile in total length from where Segments 16 and 21 connect along McCartney Road (US-422) to where Segments 19 and 25 connect in a woodlot mapped in Lincoln Park. Approximately 0.1 mile of this segment crosses two parcels in the Mill Creek Metro Park system, specifically Lincoln Park. This segment crosses McCartney Road (US-422) and McCartney Road (non-U.S. highway portion).

23: Segment 23 runs for approximately 0.9 mile in total length, through a rail yard, from where Segments 14 and 15 intersect to the south of a railroad track to where Segments 24, 26, and 27 connect along South Center Street. This segment crosses a railroad track and the existing Center-Lincoln Park 23 kV Line.

24: Segment 24 runs for approximately 0.4 mile in total length from where Segments 20 and 21 connect south of Wilson Avenue to where Segments 23, 26, and 27 connect along South Center Street. This segment crosses an industrial property and the existing Center-Lincoln Park 23 kV Line.

25: Segment 25 runs for approximately 0.7 mile in total length from where Segments 19 and 22 connect in a woodlot, mapped in Lincoln Park, to where Segments 26 and 30 connect at the dead-end of South Jackson Street, adjacent to the north of a rail yard. Approximately 0.4 mile of this segment crosses three parcels in the Mill Creek Metro Park system, specifically Lincoln Park. Segment 25 crosses Dry Run creek. This segment parallels Park Drive and Gladstone Street before crossing over Wilson Avenue and South Jackson Street. An underbuild of an existing electric line is likely necessary.

26: Segment 26 runs for approximately 0.4 mile in total length from where Segments 23, 24, and 27 connect west of South Center Street to where Segments 25 and 30 connect along South Jackson Street. This segment crosses Dry Run creek and an industrial property that is mapped adjacent to the north of railroad tracks.

27: Segment 27 runs for approximately 0.2 mile in total length, parallel to South Center Street, from where Segments 23, 24, and 26 connect west of South Center Street to

where Segments 15, 28, and 29 connect along South Center Street. This segment crosses the Mahoning River and a rail yard, including crossing a railroad track. Segment 27 runs parallel to the existing Center-Lincoln Park 23 kV Line for approximately 0.1 mile.

28: Segment 28 runs for approximately 1.6 miles in total length from where Segments 15, 27, and 29 connect along of South Center Street to where Segments 29 and 36 connect along Gibson Street. Almost the entirety of this segment crosses through a rail yard, running parallel to railroad tracks, before turning southwest and crossing Performance Place. The segment then turns northwest and runs parallel to Performance Place, crossing through a land bank parcel owned by the City of Youngstown Land Reutilization Program, before turning west and at Poland Avenue and crossing the street and a railroad track. At its western end, Segment 28 crosses two City of Youngstown parcels. The Mahoning River is mapped to the north-northeast of this segment.

29: Segment 29 runs for approximately 2.1 miles in total length from where Segments 15, 27, and 28 connect along South Center Street to where Segments 28 and 36 connect along Gibson Street. The first 0.5 mile of this segment crosses through a rail yard, parallel to South Center Street and a railroad track. Railroad tracks are crossed in three different locations. The segment then turns southwest and runs for approximately 0.2 mile through a residential neighborhood, crossing over Poland Avenue and running parallel to Caledonia Street. Segment 29 then turns due west at Mabel Street and crosses United States Interstate 680 (I-680), running for approximately 0.6 mile parallel to Mabel Street. The remainder of this segment runs for approximately 0.8 mile north and runs parallel to Gibson Street through residential neighborhoods, crossing I-680, a railroad track, 15 parcels owned by the City of Youngstown (including a wastewater treatment plant), and four land bank parcels owned by the City of Youngstown Land Reutilization Program. Segment 29 parallels the existing Center-Lincoln Park 23 kV Line for approximately 0.1 mile, the existing Center-Gibson 23 kV Line for approximately 0.7 mile, and the

existing Gibson-Riverbend 23 kV Line for approximately 0.6 mile. Underbuild of existing electric lines will be necessary.

30: Segment 30 runs for approximately 1.1 miles in total length from where Segments 25 and 26 connect at the dead-end of South Jackson Street, adjacent to the north of a rail yard, to where Segments 34 and 35 connect adjacent to a railroad track, southwest of Wilson Avenue. Almost the entirety of this segment runs adjacent to the north of a rail yard through the edge of several industrial properties and woodlots. The Mahoning River is mapped to the south of the segment. Segment 30 crosses US-62 at the northwestern end.

31: Segment 31 runs for approximately 0.4 mile in total length, primarily through a residential neighborhood, parallel to Albert Street and Valley Drive from where Segments 18 and 32 connect southwest of the intersection of High Avenue and Albert Street to where Segments 9 and 33 connect in a woodlot on a parcel owned by the City of Youngstown. Approximately 0.1 mile of Segment 31 parallels the existing Emerson-Wood 23 kV Line. This segment crosses the existing transmission line, a land bank parcel owned by the City of Youngstown Land Reutilization Program, East Branch Crab Creek, and US-62.

32: Segment 32 runs for approximately 0.6 mile in total length from where Segments 17 and 34 connect along Himrod Avenue to where Segments 18 and 31 connect southwest of the intersection of High Avenue and Albert Street. The first 0.3 mile of the segment crosses Himrod Avenue and then runs parallel to the existing Emerson-Wood 23 kV Line and North Hine Street. An area of land bank parcels owned by the City of Youngstown Land Reutilization Program is mapped along the west side of North Hine Street. The segment then turns east and runs for approximately 0.2 mile parallel to Oak Street. This portion of Segment 32 crosses North Hine Street, US-62, and North Lane Avenue. The remaining 0.1 mile of Segment 32 then turns northeast and crosses Oak Street at North Fruit Street. Segment 32 crosses seven parcels owned by the City of Youngstown.

33: Segment 33 runs for approximately 2.8 miles in total length from where Segments 9 and 31 connect between U.S. 62, McHenry Street, and Willow Street to Riverbend Substation. This segment is the second longest segment and traverses a high density area of development. Segment 33 has over 20 turns to avoid the surrounding commercial and residential structures. This segment runs west for approximately 0.1 mile through woodlots that are mapped on a parcel owned by the City of Youngstown. The segment then turns north along Willow Street, crossing McHenry Street, and runs approximately 0.3 mile before turning west and running approximately 0.2 mile south of McGuffey Road, crossing a railroad track, Crab Creek, and Andrew Avenue. Segment 33 then turns north, crosses McGuffey Avenue and runs approximately 0.2 mile parallel to Randall Avenue before turning west and traversing through residential neighborhoods along Sycamore Street, Indiana Avenue, Park Avenue, Madison Avenue, and associated cross streets for approximately 0.8 mile. This portion of Segment 33 runs adjacent to the southern boundary of Wick Park for approximately 0.3 mile. The remaining approximately 0.7 mile generally traverses southward through the residential, commercial, and industrial properties along Griffith Street, Gardner Street, and North West Avenue between Madison Avenue to the Riverbend Substation. Segment 33 parallels several existing 23 kV Lines, including Emerson-Wood 23 kV Line for approximately 0.6 mile, Belmont-Emerson 23 kV Line for approximately 0.2 mile, and Belmont-Salt Springs 23 kV Line for approximately 0.3 mile. Seven parcels owned by the City of Youngstown and 19 parcels land bank parcels owned by the City of Youngstown Land Reutilization Program (15) and the Mahoning County Land Reutilization Corporation (4) are crossed by Segment 33.

34: Segment 34 runs for approximately 0.1 mile in total length from where Segments 17 and 32 connect between the two entrance ramps to US-62 along Himrod Avenue to where Segments 30 and 35 connect in an undeveloped area to the east of a railroad track. This segment crosses woodlots and one of the entrance ramps to US-62 and Wilson Avenue.

35: Segment 35 runs for approximately 0.4 mile in total length from where Segments 30 and 34 connect in an undeveloped area to the west of Wilson Avenue and south of Federal Plaza East to where Segments 37 and 38 connect on the southeastern corner of a parcel owned by the City of Youngstown, west of South Avenue. The majority of this segment runs through woodlots, adjacent to and the north of a railroad track followed by the Mahoning River to the south. This segment crosses two railroad tracks, Crab Creek, two parcels owned by the City of Youngstown, and South Avenue.

36: Segment 36 runs for approximately 0.2 mile in total length from where Segments 28 and 29 connect on a parcel owned by the City of Youngstown, to the west of Gibson Avenue, to where Segments 37 and 39 connect in an undeveloped area to the south of a railroad track, along East Woodland Avenue, on a parcel owned by the City of Youngstown. This segment crosses four parcels owned by the City of Youngstown, the existing Gibson-Riverbend 23 kV Line, and several transportation corridors including, US-62, Poland Avenue, and South Avenue. An underbuild of subtransmission and distribution lines, requiring outages or working with energized wire, appears necessary. Underbuild of existing electric lines will be required.

37: Segment 37 runs for approximately 0.1 mile in total length from where Segments 36 and 39 connect on a parcel owned by the City of Youngstown, to the north of East Woodland Avenue, to where Segments 35 and 38 connect in an undeveloped area on a parcel owned by the City of Youngstown, to the west of South Avenue. This segment crosses two parcels owned by the City of Youngstown, two railroad tracks, and the Mahoning River. Segment 37 is the shortest segment.

38: Segment 38 runs for approximately 0.3 mile in total length from where Segments 35 and 37 connect in an undeveloped area on a parcel owned by the City of Youngstown, to the west of South Avenue, to where Segments 40 and 41 connect on the southwestern corner of a parcel owned by the City of Youngstown, east of Market Street. The majority of this segment runs adjacent to and north of a railroad track and the Mahoning River through the southern portion of a parcel owned by

the City of Youngstown. New commercial construction is ongoing along this segment.

39A: Segment 39A runs for approximately 0.3 mile in total length from where Segments 36 and 37 connect in an undeveloped area on a parcel owned by the City of Youngstown, along East Woodland Avenue, to where Segment 40 connects. The segment switches from the north to the south of East Woodland Avenue to avoid encroachments.

39B: Segment 39B runs for approximately 0.3 mile in total length beginning where Segments 39A and 40 connect just east of the intersection of East Woodland Avenue and Erie Street. The segment crosses from the south of East Woodland Avenue to the north at the Market Street Intersection and then turns north following a 23 kV Line.

40: Segment 40 runs for approximately 0.1 mile in total length beginning where Segments 38 and 41 connect on the southwestern portion of a parcel owned by the City of Youngstown, to the east of Market Street. It extends south across the Mahoning River to the intersection of Segments 39A and 39B just east of the intersection of East Woodland Avenue and Erie Street. The Market Street bridge, two railroad corridors, steep terrain along the Mahoning River, and buildings along East Woodland Avenue restricted the placement of this segment.

41: Segment 41 runs for approximately 0.3 mile in total length from where Segments 38 and 40 connect on the southwestern portion of a parcel owned by the City of Youngstown (amphitheater), to the east of Market Street, to where Segments 44 and 48 connect to the east of a railroad track, south of the intersection of Marshall Street and West Front Street. The majority of this segment runs adjacent to and north of a railroad track and the Mahoning River, through the southern and western portions of four parcels owned by the City of Youngstown. Segment 41 crosses Market Street and the existing Gibson-Riverbend 23 kV Line.

42: Segment 42 runs for approximately 0.4 mile in total length from where Segments 39B and 43 connect north of Ridge Avenue, to where Segments 44 and 47 connect to the east of a railroad track on a parcel owned by the City of Youngstown, south of Marshall Street. The majority of this segment runs adjacent to and north of a railroad track and south of the Mahoning River. Approximately 0.3 mile of Segment 42 parallels the existing Gibson-Riverbend 23 kV Line. This segment crosses the existing railroad track before it ties into the intersection of Segment 39B and Segment 43. Underbuild of existing electric lines may be required.

43: Segment 43 runs for approximately 0.3 mile in total length from where Segments 39B and 42 connect north of Ridge Avenue to where Segments 45 and 46 connect to the east of a railroad track on a parcel owned by the City of Youngstown, and east of the intersection of Pike Street and Oak Hill Avenue. The majority of this segment runs through a rail yard area near and parallel to railroad tracks. The Mahoning River is mapped to the northeast and east of this segment.

44: Segment 44 runs for approximately 0.1 mile in total length from where Segments 41 and 48 connect to the south of the intersection of Marshall Street and West Front Street to where Segments 42 and 47 connect on a parcel owned by the City of Youngstown, to the east of a railroad track and south of Marshall Street. This segment crosses one parcel owned by the City of Youngstown and the Mahoning River. It appears that two water wells are mapped within 5-10 feet of this segment.

45: Segment 45 runs for approximately 0.7 mile in total length from where Segments 43 and 46 connect on a parcel owned by the City of Youngstown, to the north of Pike Street and a railroad track, to where Segments 46 and 49 connect to on a parcel owned by the City of Youngstown, north of a railroad track and south of the Mahoning River. This segment runs west for approximately 0.1 mile, crossing through the intersection of Oak Hill Avenue and Pike Street and crossing I-680. Segment 45 then turns west-northwest at High Street and parallels High Street for approximately 0.2 mile before turning north. The remaining 0.4 mile of this segment crosses I-680 and two ramps to I-680, Marshall Street, Mahoning Avenue,

and a railroad track; 0.2 of the 0.4 mile parallels South West Avenue and North West Avenue. Oak Hill Cemetery is mapped to the south of Segment 45 on the south side of High Street. This segment also crosses four land bank parcels owned by the City of Youngstown Land Reutilization Program, two parcels owned by the City of Youngstown, and the existing Riverbend-Salt Springs 138 kV Transmission Line. Some underbuild of existing lines is likely.

46: Segment 46 runs for approximately 0.4 mile in total length from where Segments 43 and 45 connect on a parcel owned by the City of Youngstown, to the north of Pike Street and a railroad track, to where Segments 45 and 49 connect at the intersection of the existing Riverbend-Salt Springs 138 kV Transmission Line on a parcel owned by the City of Youngstown, north of a railroad track and south of the Mahoning River. This segment transects a commercial and industrial area of development and crosses Oak Hill Avenue, Marshall Street, Mahoning Avenue, and four parcels owned by the City of Youngstown.

47: Segment 47 runs for approximately 0.3 mile in total length from where Segments 42 and 44 connect to the east of a railroad track on a parcel owned by the City of Youngstown, south of Marshall Street, to the Riverbend Substation. This segment transects a commercial and industrial area of development and crosses Marshall Street, a railroad track, the Mahoning River, and two parcels owned by the City of Youngstown. Steel structures may be necessary in commercial parking lots and at street corners. A distribution underbuild will be necessary and require outages.

48: Segment 48 runs for approximately 0.5 mile in total length from where Segments 41 and 44 connect to the south of the intersection of Marshall Street and West Front Street, east of a railroad, to the Riverbend Substation. This segment transects a commercial and industrial area of development and crosses West Front Street, 5th Avenue, the existing Belmont-Riverbend 23 kV Line, and a railroad track.

49: Segment 49 runs for approximately 0.1 mile in total length from where Segments 45 and 46 connect on a parcel owned by the City of Youngstown, north of a railroad

track and south of the Mahoning River, to the Riverbend Substation. This segment crosses the existing Oak Hill-Riverbend 23 kV Line and Riverbend-Salt Springs 138 kV Transmission Line and two parcels owned by the City of Youngstown.

As the siting effort evolved, 11 candidate route segments were eliminated (see Figure 2). These eliminations were based on the likelihood of impacts on residential, commercial and industrial areas, planned future developments, and natural areas. Segment 1 was eliminated because of engineering and construction constraints caused by close proximity to an existing 138 kV transmission line which would potentially require power outages to surrounding areas in order to build the new transmission line. Approximately 0.2 mile of Segment 1 also crosses McKelvey Lake. Finally, Segment 1 was eliminated due to ecological impacts. Segments 3 and 5 were eliminated due to potential significant ecological impacts related to the wooded and undeveloped nature of several larger areas of land along these segments and stream corridors and associated wetland areas mapped along these segments..

Segments 6, 7, 17, 18, 29, 33, and 45 were eliminated due to the high density of urban development in these areas of the Project. Segment 6 is primarily residential development along Whipple Road. Segment 6 is also in close proximity to three mapped cemeteries and Roosevelt Park. Sixty-four building encroachments were identified within the 65-foot ROW. Segment 7 was eliminated due to Segments 3 and 18 being eliminated. This segment served as a potential connector segment through the front yards of several residences on Early Road.

Segment 17 is primarily residential development along Himrod Avenue with 34 building encroachments identified within the 65-foot ROW. Segment 18 is primarily residential development along East High Avenue with 23 identified building encroachments within the 65-foot ROW and East High School located on an adjacent parcel to the north. Segment 29 crosses through several residential neighborhoods between the industrial development to the south of the Mahoning River and I-680. This segment also requires crossing I-680 in two different locations. A large area of land bank parcels and parcels owned by the City of Youngstown are mapped along Gibson Street. Segment 33 also crosses through several residential neighborhoods with eight identified building encroachments within the 65-foot ROW. Wick Park is also mapped adjacent to Segment 33. Segment 33 is the second longest segment and is engineered with many 90-degree

turns to avoid surrounding development. Segment 45 is in close proximity to Oak Hill Cemetery and requires crossing I-680. Segment 48 was eliminated because of the pinch point between the Mahoning River to the west and south and downtown Youngstown development to the east and north, including eleven building encroachments within the 65-foot ROW.

As a result, a total of 11 candidate route segments (Segments 1, 3, 5, 6, 7, 17, 18, 29, 33, 45, and 48) were eliminated due to existing ecological and urban development impacts. Therefore, the remaining 39 candidate route segments were utilized to generate 49 candidate routes that would provide connectivity between Lincoln Park and Riverbend substations. These candidate route alternatives were compared by developing a ranking system as discussed in Section 7.0.

7.0 Route Scoring Rationale

Although there are numerous methods available for route selection studies, ranging from purely quantitative to purely qualitative, industry practice in Ohio typically relies on both quantitative and qualitative factors to achieve a greater balance between opportunities and constraints across unique siting circumstances. In this Study, a system of numeric data collection, grouping (to simplify), and scoring was chosen to aid comparison and ranking. A subsequent qualitative evaluation was applied to the quantitative ranking to compare the candidate routes to determine the final ranking.

The route alternatives were compared by developing a ranking system based on the impacts of each route on the standard siting criteria (constraints and opportunities) used routinely by ATSI and the industry generally. Each criterion for every route was measured, normalized, and scored as described in the following sections. After the attribute table was completed, the route candidate scores were totaled, routes ranked by total score, and finally the appropriate qualitative factors were considered to identify the candidate route with the fewest overall impacts.

Numerical scoring of the routes was conducted according to the following steps.

Assembly of "Raw" Route Data: Scoring was completed for each of the 49 identified potential routes. Where appropriate, attributes crossed by the new Project centerline were measured. Residences, National Register of Historic Places, as well as institutional and other sensitive land

uses were considered out to 1,000 feet to reflect aesthetic impacts. The various other ecological, land use, cultural, and engineering constraints were measured either as linear feet crossed by the centerline or as an attribute count within an appropriate corridor.

Data Normalization: In order to assign scores, the data was normalized so that each constraint could be directly compared according to the same, non-dimensional scale. The formula used to normalize each constraint in the Study was:

$$\textbf{Normalized Score} = ((X_{I\,J}\text{-Min Value }_{J})/\text{Range})*100$$

*where I= x^{th} value in constraint and J= constraint

Using the data range for each attribute to normalize the score has two advantages. First, all the constraints were scored out of 100 and were therefore directly comparable. Second, the relative distribution of the data within each constraint was maintained, i.e., there was no unnecessary grouping of the data.

Totaling Attributes to Find Route Score: The weighting factors are selected for each project based on the characteristics of the study area, as well as both ATSI's and AECOM's previous experience in siting linear utility facilities in similar settings. Given the high importance of both ecological and land use considerations, these two categories were given the highest weighting. For this Project, ATSI and AECOM applied a weighting factor of: (a) land use matters – 40%; (b) ecological matters – 40%; (c) cultural matters – 10%; and (d) engineering matters – 10%.

8.0 Quantitative Route Ranking

The results of the route scoring for the 49 candidates are provided in Table 2E. Route scores, with the lowest scores considered better, ranged from 20.94 to a high of 49.19 (minimum possible score is 0; maximum possible score is 100).

The most favorable scoring candidate route was Route 23 (2-8-10-16-21-24-27-28-36-39A-39B-43-46-49), which received a score of 20.94 out of 100 and is approximately 6.23 miles long. This route received the most favorable ecological score, fifth most favorable cultural score, fifteenth most favorable land use score, and sixteenth most favorable engineering score. Route 22 (2-8-10-

16-21-24-27-28-36-39A-39B-42-47), 6.11 miles long, is identical except for Segments 42 and 47. It received the second most favorable score of 23.00 out of 100, ranking second in the ecological category, seventeenth in the cultural category, eighth in the land use category, and eleventh in the engineering category. The difference of 2.06 between the score of Route 23 and Route 22 is the fourth highest between two consecutively ranked routes. However, the greatest quantitative difference between consecutively ranked routes is 4.61 and occurs between the second and third ranked routes, Route 22 and Route 30 (2-8-10-16-22-25-30-35-38-41-44-47), respectively. This difference in scoring suggests Routes 22 and 23 may be significantly more favorable than other candidates based on the quantitative results.

Desktop review identified no fatal flaws with Routes 22 or 23, although there is potential for building encroachments along each of the routes. Apparent commercial buildings are likely to be within the 65-foot wide ROW associated with both Routes located along Segments 16 and 28 as aligned for this evaluation. The northern portion of Routes 22 (Segments 42 and 47) and Route 23 (Segments 43, 46, and 49) are the only differences in these two routes. As a result, one additional commercial/industrial building was identified within the 65-foot wide ROW along Segment 46 associated with Route 23. The quantitative scoring suggests Route 23 is more favorable, but the additional encroachment along Segment 46 could prove difficult. Given the similarity of these two routes, both were retained for further evaluation.

With the similarity of Routes 22 and 23, the commonality between the routes exceeds the OPSB's maximum 20% commonality requirement and additional routes were further evaluated to identify viable route options. Due to the surrounding land use associated with urban developments, viable route options were limited due to encroachments of existing residential, commercial, and/or other sensitive resources. As a result, the next four favorable candidate routes were further assessed for commonality and rankings with Route 22 and 23. The result of this analysis are provided below.

- Route 30 (2-8-10-16-22-25-30-35-38-41-44-47) ranked third with a score of 27.60, one encroachment, and ranked third in both ecological and engineering score. This route has approximately 38% overlap with Route 22 and 31% with Route 23. The commonality between Route 30 with either Route 22 or Route 23 would be at least 11% greater than the maximum

OPSB commonality threshold of 20%. Therefore, the Route 30 was not considered favorable candidate route due to high commonality between Route 22 and Route 23.

- Route 21 (2-8-10-16-21-24-26-30-35-38-41-44-47) ranked fourth with a score of 28.42, one encroachment, and ranked fourth in ecological and second in engineering scores. This route has approximately 55% overlap with Route 22 and 49% with Route 23. The commonality between Route 31 with either Route 22 or Route 23 would be at least 29% greater than the maximum OPSB commonality threshold of 20%. Therefore, Route 21 was not considered a favorable candidate route due to high commonality between Route 22 and Route 23.

- Route 25 (2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49) ranked fifth with a score of 28.74, three encroachments, and ranked nineth, seventh, and tenth in ecological, cultural, and engineering scores, respectively. This route has approximately 63% overlap with Route 22 and 76% with Route 23. The commonality between Route 25 with either Route 22 or Route 23 would be at least 43% greater than the maximum OPSB commonality threshold of 20%. Therefore, Route 25 was not considered a favorable candidate route.

- Route 44 (2-8-11-19-25-30-35-38-41-44-47) is the shortest route at 4.95 miles and ranked sixth with a score of 29.08, no encroachments, and rank first in both land use and engineering scores. This route has approximately 22% overlap with Route 22 and 15% with Route 23. Route 44 is under the commonality threshold for Route 23 and exceeds the maximum OPSB commonality threshold of 20% by approximately 2% for Route 22. Therefore, Route 44 was carried forward as a favorable candidate route for further evaluation.

Due to the varying opportunities and constraints associated with this group of routes, it was recommended that all of their segments be carried forward for additional evaluation. Segment 26 was also recommended to be carried forward because it appeared in several of the best scoring routes, zero encroachments, and provided another alternative parallel to the north of the Mahoning River. Routes and corresponding segments recommended for further evaluation are provided in Figure 4.

9.0 Selection of the Preferred and Alternate Routes

The routes selected for further evaluation were presented at a public meeting held on November 12, 2019 at the Taylor Mahoning Valley History Center in Youngstown, 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 identification numbers referenced to an ownership spreadsheet. Approximately 40 people attended the public information meeting. The majority of these attendees were affiliated with a church along Segment 25. While the church group generally preferred routes avoiding the church property, benefits of maintaining areas of the adjacent park were noted. Subsequent to the meeting, Project details, including maps, were provided to the church and no additional comments have been received.

ATSI also held general discussion with public officials in the project area, including representatives from the City of Youngstown. No major objections to the route concepts under consideration were noted. City officials acknowledged the economic benefits of the project and suggested that a ROW along the Mahoning River within Youngstown could provide a beneficial corridor for future recreational use and maintenance of the area.

Following the public meeting and discussions with public officials, the siting team continued its detailed evaluation of the study segments still under consideration. The substation engineering team strongly preferred an entrance into Riverbend Substation from the east. Detailed engineering and ROW review along Segment 46 noted the need for an approximately 700-foot span across a Pepsi Cola property. This relatively long span and the potential for encroachments within this section suggested difficult ROW acquisition, construction, and maintenance. Based on the station entrance preference and Pepsi Cola property difficulties, Segment 47 was selected over the combination of Segments 46 and 49. Segment 43 was eliminated based on the need for Segments 46 and 49 to reach Riverbend Substation, which eliminated Route 23.

With the substation entrance/exits common across the remaining alternatives under consideration, the siting team decided to minimize the remaining overlap for the Preferred and Alternate Routes. Route 22 (2-8-10-16-21-24-27-28-36-39A-39B-42-47) and Route 44 (2-8-11-19-25-30-35-38-41-47) were selected. These routes essentially provided alternatives primarily north and south of the

Mahoning River. With 21.6% overlap, a waiver of the 20% commonality rule seemed reasonable. In order to allow ATSI to these routes as the Preferred and Alternate Routes, on December 20, 2019, ATSI requested a waiver of the 20% rule found in Admin. Code Rule 4906-3-05. The request was granted on January 10, 2020.

On August 27th, 2020 a field walk of the Preferred Route was completed by ATSI. On this walk, constructability constraints were identified along Segment 19 and 30. Segment 19 was found to have very steep sloping terrain that would require a significant amount of tree clearing within and outside the proposed 65-foot wide ROW. For Segment 19, there is concern that clearing of trees and vegetation on such a steep terrain could lead to unstable and/or future sliding/shifting of the area. Additionally, this segment parallels tributaries of Dry Run, which would require clearing of the naturally vegetated areas that can lead to bank erosion. To avoid such potential impacts and preserve the naturally vegetated land along the tributary, Segment 19 has been adjusted. Segment 19 now runs for approximately 0.8 mile in total length, primarily through undeveloped land, from Segment 11 along Oak Street Extension to where Segments 22 and 25 connect along McCartney Road. Segment 19 will run parallel with Oak Street Extension for approximately 0.4 mile where it will share the same route as the existing 23 kV Lline and crosses Dry Run at a 90 degree angle on the north side of the public road. The segment will continue south along the eastern side of Oak Street/U.S. 422 through Lincoln Park where it again crosses Dry Run at a 90 degree angle, then continues south then southwest, crossing Oak Street/U.S. 422 and ending at Segments 22 and 25. Segment 30 was found to have a newly installed gas pipeline below the preferred segment location and steep sloping terrain to the southwest. While paralleling an existing utility is seen as an opportunity, the actual construction of a new 138kV transmission line can be challenging when in close proximity to an existing gas pipeline. To address theseconstructability concerns, approximately 1.1 miles of Segment 30 was shifted to the northeast outside of the gas pipeline ROW. The changes described above, impacted the total length of the Preferred Route, adding an additional 0.14 mile. Furthermore, an engineering and ecological field review of the proposed tie-ins to the Lincoln Park and Riverbend substations, Segments 2 and 47 respectively, resulted in an adjustment to the overall length of both the Preferred and Alternate routes, adding an additional 0.12 mile. Therefore, the total length of the Preferred Route is now 5.21 miles (previously 4.95 miles) and the total length of the Alternate Route is now 6.23 miles (previously 6.11 miles). Based

on the field evaluations and proposed shifts in alignment, the Preferred Route (Route 44) and the Alternate Route (Route 22) still remain the most favorable candidate routes.

Due to the ongoing COVID-19 pandemic and the restrictions on public meetings, ATSI was granted a waiver by the OPSB on October 30, 2020 to undertake an alternative public engagement plan in accordance with the proposal set forth in its motion for waiver of the public information meeting requirement, which allowed ATSI to proceed with public engagement that ensured the safety of everyone involved while providing the community with the chance to gather information and provide feedback on the Project. ATSI prepared and posted to the Project website a presentation that explored many elements of the Project and allowed the public several avenues to communicate with ATSI. This comment period was from December 20, 2020 to January 20, 2021 . No public comments were received as part of this second public information program.

10.0 Summary and Recommendations

. Based on a qualitative and quantitative review of information obtained from GIS data, field reconnaissance, agency consultation and public outreach, as well as engineering and cost estimates for the two alternatives, the Siting Team recommends Route 44 as the Preferred Route and Route 22 as the Alternative Route.

Route 44 was identified as the Preferred Route over Route 22 due to the following factors:

- Two commercial/industrial encroachments were identified within the right-of-way of Route 22 and no encroachments were identified within the right-of-way of Route 44.
- Route 22 is approximately 1.02 miles longer than Route 44, which is likely to increase construction and maintenance costs.
- Route 22 utilizes approximately 0.7 mile less of publicly owned parcels (City of Youngstown, metro parks, Mahoning County) which will increase impacts to private landowners.
- Ultimately, Route 22 was selected as the Alternative Route because it was considered by ATSI to be a viable candidate and the most favorable true alternative to the selected

Preferred Route because it was closest to the 20% commonality threshold and provided an option south of the Mahoning River.

TABLE 2A
QUANTITATIVE ECOLOGICAL ROUTING COMPARISON

		ECOLOGICAL											
Route	Length (mi)	Area of Woodlots within 65-ft ROW (acres) (a)	Normalized Score for Area of Woodlots within 65-ft ROW (acres) (a)	Area of NWI Wetlands within 65-ft ROW (acres) (b)	Normalized Score for Area of NWI Wetlands within 65-ft ROW (acres) (b)	Stream Crossings (c)	Normalized Score for Stream Crossings (c)	Federal or State Endangered or Threatened Species Areas within 65 ft ROW (d)	Normalized Score for Federal or State Endangered or Threatened Species Areas within 65 ft ROW (weighted 60%) (d)	Federal or State Endangered or Threatened Species Areas between ROW and 1,000 ft (d)	Normalized Score for Federal or State Endangered or Threatened Species Areas between ROW and 1,000 ft (weighted 25%) (d)	Federal or State Protected Species between ROW and 1,000 ft (d)	Normalized Score for Federal or State Protected Species between ROW and 1,000 ft (weighted 15%) (d)
1. 2-8-10-12-13-14-15-28-36-39A-39B-42-47	6.72	19.47	30	1.94	88	6	67	0	0	0	0	0	0
2. 2-8-10-12-13-14-15-28-36-39A-39B-43-46-49	6.84	18.15	17	1.63	70	6	67	0	0	0	0	0	0
3. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-42-47	6.67	22.63	59	2.03	93	7	100	0	0	0	0	0	0
4. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-43-46-49	6.80	21.32	47	1.72	75	7	100	0	0	0	0	0	0
5. 2-8-10-12-13-14-23-26-30-35-38-40-39B-42-47	6.74	21.42	48	2.15	100	7	100	0	0	0	0	0	0
6. 2-8-10-12-13-14-23-26-30-35-38-40-39B-43-46-49	6.86	20.11	36	1.84	82	7	100	0	0	0	0	0	0
7. 2-8-10-12-13-14-23-26-30-35-38-41-44-47	6.37	18.81	23	1.75	77	7	100	0	0	0	0	0	0
8. 2-8-10-12-13-14-23-27-28-36-39A-39B-42-47	6.81	18.85	24	1.94	88	6	67	0	0	0	0	0	0
9. 2-8-10-12-13-14-23-27-28-36-39A-39B-43-46-49	6.94	17.54	11	1.64	70	6	67	0	0	0	0	0	0
10. 2-8-10-12-20-24-26-30-35-37-39A-39B-42-47	6.08	22.65	60	2.02	93	5	33	0	0	0	0	0	0
11. 2-8-10-12-20-24-26-30-35-37-39A-39B-43-46-49	6.20	21.34	47	1.72	75	5	33	0	0	0	0	0	0
12. 2-8-10-12-20-24-26-30-35-38-40-39B-42-47	6.14	21.44	48	2.14	100	5	33	0	0	0	0	0	0
13. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	6.26	20.12	36	1.84	82	5	33	0	0	0	0	0	0
14. 2-8-10-12-20-24-26-30-35-38-41-44-47	5.78	18.82	23	1.75	77	5	33	0	0	0	0	0	0
15. 2-8-10-12-20-24-27-28-36-39A-39B-42-47	6.22	18.86	24	1.94	88	4	0	0	0	0	0	0	0
16. 2-8-10-12-20-24-27-28-36-39A-39B-43-46-49	6.34	17.55	11	1.63	70	4	0	0	0	0	0	0	0
17. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	5.97	23.26	65	0.84	23	5	33	0	0	0	0	0	0
18. 2-8-10-16-21-24-26-30-35-37-39A-39B-43-46-49	6.09	21.95	53	0.53	5	5	33	0	0	0	0	0	0
19. 2-8-10-16-21-24-26-30-35-38-40-39B-42-47	6.03	22.05	54	0.96	30	5	33	0	0	0	0	0	0
20. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	6.15	20.73	41	0.65	12	5	33	0	0	0	0	0	0
21. 2-8-10-16-21-24-26-30-35-38-41-44-47	5.67	19.44	29	0.56	7	5	33	0	0	0	0	0	0
22. 2-8-10-16-21-24-27-28-36-39A-39B-42-47	6.11	19.47	30	0.76	18	4	0	0	0	0	0	0	0
23. 2-8-10-16-21-24-27-28-36-39A-39B-43-46-49	6.23	18.16	17	0.45	0	4	0	0	0	0	0	0	0
24. 2-8-10-16-22-25-26-27-28-36-39A-39B-42-47	6.37	19.55	30	0.85	23	6	67	0	0	0	0	0	0
25. 2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49	6.49	18.24	18	0.54	5	6	67	0	0	0	0	0	0
26. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	5.61	23.17	64	0.84	23	5	33	0	0	0	0	0	0
27. 2-8-10-16-22-25-30-35-37-39A-39B-43-46-49	5.74	21.86	52	0.53	5	5	33	0	0	0	0	0	0
28. 2-8-10-16-22-25-30-35-38-40-39B-42-47	5.68	21.96	53	0.95	30	5	33	0	0	0	0	0	0
29. 2-8-10-16-22-25-30-35-38-40-39B-43-46-49	5.80	20.64	41	0.65	12	5	33	0	0	0	0	0	0
30. 2-8-10-16-22-25-30-35-38-41-44-47	5.31	19.35	28	0.56	7	5	33	0	0	0	0	0	0
31. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-42-47	6.38	26.94	100	0.89	26	6	67	0	0	0	0	0	0
32. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-43-46-49	6.50	25.63	88	0.58	8	6	67	0	0	0	0	0	0
33. 2-8-11-19-22-21-24-26-30-35-38-40-39B-42-47	6.44	25.73	89	1.00	33	6	67	0	0	0	0	0	0
34. 2-8-11-19-22-21-24-26-30-35-38-40-39B-43-46-49	6.56	24.42	76	0.70	15	6	67	0	0	0	0	0	0
35. 2-8-11-19-22-21-24-26-30-35-38-41-44-47	6.08	23.12	64	0.61	10	6	67	0	0	0	0	0	0
36. 2-8-11-19-22-21-24-27-28-36-39A-39B-42-47	6.52	23.16	64	0.80	21	5	33	0	0	0	0	0	0
37. 2-8-11-19-22-21-24-27-28-36-39A-39B-43-46-49	6.64	21.84	52	0.50	3	5	33	0	0	0	0	0	0
38. 2-8-11-19-25-26-27-28-36-39A-39B-42-47	6.00	19.94	34	0.90	26	7	100	0	0	0	0	0	0
39. 2-8-11-19-25-26-27-28-36-39A-39B-43-46-49	6.13	18.63	22	0.59	8	7	100	0	0	0	0	0	0
40. 2-8-11-19-25-30-35-37-39A-39B-42-47	5.25	23.57	68	0.89	26	6	67	0	0	0	0	0	0
41. 2-8-11-19-25-30-35-37-39A-39B-43-46-49	5.37	22.25	56	0.58	8	6	67	0	0	0	0	0	0
42. 2-8-11-19-25-30-35-38-40-39B-42-47	5.31	22.35	57	1.00	33	6	67	0	0	0	0	0	0
43. 2-8-11-19-25-30-35-38-40-39B-43-46-49	5.43	21.04	44	0.70	15	6	67	0	0	0	0	0	0
44. 2-8-11-19-25-30-35-38-41-44-47	4.95	19.74	32	0.61	9	6	67	0	0	0	0	0	0
45. 4-9-31-32-34-35-37-39A-39B-42-47	5.64	20.16	36	1.14	41	7	100	0	0	0	0	0	0
46. 4-9-31-32-34-35-37-39A-39B-43-46-49	5.76	18.85	24	0.84	23	7	100	0	0	0	0	0	0
47. 4-9-31-32-34-35-38-40-39B-42-47	5.70	18.94	25	1.26	48	7	100	0	0	0	0	0	0
48. 4-9-31-32-34-35-38-40-39B-43-46-49	5.82	17.63	12	0.95	30	7	100	0	0	0	0	0	0
49. 4-9-31-32-34-35-38-41-44-47	5.34	16.33	0	0.87	25	7	100	0	0	0	0	0	0
MIN	4.95	16.33	0	0.45	0	4	0	0	0	0	0	0	0
MAX	6.94	26.94	100	2.15	100	7	100	0	0	0	0	0	0
RANGE	1.99	10.61		1.70		3		0		0		0	

(a) sources: USGS topographic quadrangles, aerial photography, and field observation

(b) source: National Wetland Inventory data

(c) source: USGS topographic quadrangle maps

(d) source: ODNR Biodiversity Database and Pennsylvania Natural Diversity Inventory

TABLE 2B
QUANTITATIVE CULTURAL ROUTING COMPARISON

		CULTURAL							
Route	Length (mi)	National Register of Historic Places within 1,000 ft (e)	Normalized Score for National Register of Historic Places within 1,000 ft (e)	Known Archaeology Sites within 100 ft (f)	Normalized Score for Known Archaeology Sites within 100 ft (f)	Ohio Historical Inventory Historic Structures within 1,000 ft (f)	Normalized Score for Ohio Historical Inventory Historic Structures within 1,000 ft (f)	Cemeteries within 100 ft (g)	Normalized Score for Cemeteries within 100 ft (g)
1. 2-8-10-12-13-14-15-28-36-39A-39B-42-47	6.72	3	14	0	0	62	2	0	0
2. 2-8-10-12-13-14-15-28-36-39A-39B-43-46-49	6.84	2	0	0	0	61	0	0	0
3. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-42-47	6.67	3	14	0	0	76	34	0	0
4. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-43-46-49	6.80	2	0	0	0	75	32	0	0
5. 2-8-10-12-13-14-23-26-30-35-38-40-39B-42-47	6.74	3	14	0	0	77	36	0	0
6. 2-8-10-12-13-14-23-26-30-35-38-40-39B-43-46-49	6.86	2	0	0	0	78	39	0	0
7. 2-8-10-12-13-14-23-26-30-35-38-41-44-47	6.37	9	100	0	0	98	84	0	0
8. 2-8-10-12-13-14-23-27-28-36-39A-39B-42-47	6.81	3	14	0	0	69	18	0	0
9. 2-8-10-12-13-14-23-27-28-36-39A-39B-43-46-49	6.94	2	0	0	0	68	16	0	0
10. 2-8-10-12-20-24-26-30-35-37-39A-39B-42-47	6.08	3	14	0	0	80	43	0	0
11. 2-8-10-12-20-24-26-30-35-37-39A-39B-43-46-49	6.20	2	0	0	0	79	41	0	0
12. 2-8-10-12-20-24-26-30-35-38-40-39B-42-47	6.14	3	14	0	0	81	45	0	0
13. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	6.26	2	0	0	0	82	48	0	0
14. 2-8-10-12-20-24-26-30-35-38-41-44-47	5.78	9	100	0	0	102	93	0	0
15. 2-8-10-12-20-24-27-28-36-39A-39B-42-47	6.22	3	14	0	0	73	27	0	0
16. 2-8-10-12-20-24-27-28-36-39A-39B-43-46-49	6.34	2	0	0	0	72	25	0	0
17. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	5.97	3	14	0	0	78	39	0	0
18. 2-8-10-16-21-24-26-30-35-37-39A-39B-43-46-49	6.09	2	0	0	0	77	36	0	0
19. 2-8-10-16-21-24-26-30-35-38-40-39B-42-47	6.03	3	14	0	0	79	41	0	0
20. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	6.15	2	0	0	0	80	43	0	0
21. 2-8-10-16-21-24-26-30-35-38-41-44-47	5.67	9	100	0	0	100	89	0	0
22. 2-8-10-16-21-24-27-28-36-39A-39B-42-47	6.11	3	14	0	0	70	20	0	0
23. 2-8-10-16-21-24-27-28-36-39A-39B-43-46-49	6.23	2	0	0	0	69	18	0	0
24. 2-8-10-16-22-25-26-27-28-36-39A-39B-42-47	6.37	3	14	0	0	71	23	0	0
25. 2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49	6.49	2	0	0	0	70	20	0	0
26. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	5.61	3	14	0	0	69	18	0	0
27. 2-8-10-16-22-25-30-35-37-39A-39B-43-46-49	5.74	2	0	0	0	68	16	0	0
28. 2-8-10-16-22-25-30-35-38-40-39B-42-47	5.68	3	14	0	0	70	20	0	0
29. 2-8-10-16-22-25-30-35-38-40-39B-43-46-49	5.80	2	0	0	0	71	23	0	0
30. 2-8-10-16-22-25-30-35-38-41-44-47	5.31	9	100	0	0	91	68	0	0
31. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-42-47	6.38	3	14	0	0	83	50	0	0
32. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-43-46-49	6.50	2	0	0	0	82	48	0	0
33. 2-8-11-19-22-21-24-26-30-35-38-40-39B-42-47	6.44	3	14	0	0	84	52	0	0
34. 2-8-11-19-22-21-24-26-30-35-38-40-39B-43-46-49	6.56	2	0	0	0	85	55	0	0
35. 2-8-11-19-22-21-24-26-30-35-38-41-44-47	6.08	9	100	0	0	105	100	0	0
36. 2-8-11-19-22-21-24-27-28-36-39A-39B-42-47	6.52	3	14	0	0	75	32	0	0
37. 2-8-11-19-22-21-24-27-28-36-39A-39B-43-46-49	6.64	2	0	0	0	74	30	0	0
38. 2-8-11-19-25-26-27-28-36-39A-39B-42-47	6.00	3	14	0	0	72	25	0	0
39. 2-8-11-19-25-26-27-28-36-39A-39B-43-46-49	6.13	2	0	0	0	71	23	0	0
40. 2-8-11-19-25-30-35-37-39A-39B-42-47	5.25	3	14	0	0	70	20	0	0
41. 2-8-11-19-25-30-35-37-39A-39B-43-46-49	5.37	2	0	0	0	69	18	0	0
42. 2-8-11-19-25-30-35-38-40-39B-42-47	5.31	3	14	0	0	71	23	0	0
43. 2-8-11-19-25-30-35-38-40-39B-43-46-49	5.43	2	0	0	0	72	25	0	0
44. 2-8-11-19-25-30-35-38-41-44-47	4.95	9	100	0	0	92	70	0	0
45. 4-9-31-32-34-35-37-39A-39B-42-47	5.64	3	14	0	0	77	36	0	0
46. 4-9-31-32-34-35-37-39A-39B-43-46-49	5.76	2	0	0	0	76	34	0	0
47. 4-9-31-32-34-35-38-40-39B-42-47	5.70	3	14	0	0	78	39	0	0
48. 4-9-31-32-34-35-38-40-39B-43-46-49	5.82	2	0	0	0	79	41	0	0
49. 4-9-31-32-34-35-38-41-44-47	5.34	9	100	0	0	99	86	0	0
MIN	4.95	2	0	0	0	61	0	0	0
MAX	6.94	9	0	0	0	105	100	0	0
RANGE	1.99	7		0		44		0	

(e) source: OHPO and PHMC databases

(e) source: OHPO and PHMC databases

(g) sources: USGS topographic quadrangles and field observation

TABLE 2C
QUANTITATIVE LAND USE ROUTING COMPARISON

		LAND USE																	
Route	Length (mi)	Residences within 32.5 ft (h)	Normalized Score for Residences within 32.5 ft (weighted 50%) (h)	Residences between 32.5 and 100 ft (h)	Normalized Score for Residences between 32.5 and 100 ft (weighted 30%) (h)	Residences between 100 and 1,000 ft (h)	Normalized Score for Residences between 100 and 1,000 ft (weighted 20%) (h)	Non-residential Buildings within 32.5 ft (h)	Normalized Score for Non-residential Buildings within 32.5 ft (weighted 20%) (h)	Properties Crossed by Centerline (i)	Normalized Score for Properties Crossed by Centerline (i)	Linear Feet of Institutional Land Uses Crossed (j)	Normalized Score for Linear Feet of Institutional Land Uses Crossed (weighted 67%) (j)	Institutional Land Uses within 1,000 ft (j)	Normalized Score for Institutional Land Uses within 1,000 ft (weighted 33%) (j)	Linear Feet of Other Sensitive Land Uses Crossed (j)	Normalized Score for Linear Feet of Other Sensitive Land Uses Crossed (weighted 67%) (k)	Other Sensitive Land Uses within 1,000 ft (k)	Normalized Score for Other Sensitive Land Uses within 1,000 ft (weighted 33%) (k)
1. 2-8-10-12-13-14-15-28-36-39A-39B-42-47	6.72	6	50	44	29	530	13	1	5	116	75	337	8	16	0	0	0	0	0
2. 2-8-10-12-13-14-15-28-36-39A-39B-43-46-49	6.84	6	50	45	30	539	13	2	10	115	73	337	8	22	11	0	0	0	0
3. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-42-47	6.67	6	50	44	29	560	14	0	0	126	87	337	8	27	20	0	0	0	0
4. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-43-46-49	6.80	6	50	45	30	569	15	1	5	125	86	337	8	33	31	0	0	0	0
5. 2-8-10-12-13-14-23-26-30-35-38-40-39B-42-47	6.74	6	50	43	28	560	14	0	0	125	86	337	8	27	20	0	0	0	0
6. 2-8-10-12-13-14-23-26-30-35-38-40-39B-43-46-49	6.86	6	50	44	29	569	15	1	5	124	85	337	8	33	31	0	0	0	0
7. 2-8-10-12-13-14-23-26-30-35-38-41-44-47	6.37	6	50	43	28	545	13	0	0	110	67	337	8	26	18	0	0	0	0
8. 2-8-10-12-13-14-23-27-28-36-39A-39B-42-47	6.81	6	50	44	29	535	13	1	5	118	77	337	8	18	4	0	0	0	0
9. 2-8-10-12-13-14-23-27-28-36-39A-39B-43-46-49	6.94	6	50	45	30	544	13	2	10	117	76	337	8	24	15	0	0	0	0
10. 2-8-10-12-20-24-26-30-35-37-39A-39B-42-47	6.08	6	50	43	28	598	16	2	10	128	90	196	0	28	22	0	0	0	0
11. 2-8-10-12-20-24-26-30-35-37-39A-39B-43-46-49	6.20	6	50	44	29	607	17	3	15	127	89	196	0	34	33	0	0	0	0
12. 2-8-10-12-20-24-26-30-35-38-40-39B-42-47	6.14	6	50	42	28	598	16	2	10	127	89	196	0	28	22	0	0	0	0
13. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	6.26	6	50	43	28	607	17	3	15	126	87	196	0	34	33	0	0	0	0
14. 2-8-10-12-20-24-26-30-35-38-41-44-47	5.78	6	50	42	28	583	15	2	10	112	70	196	0	27	20	0	0	0	0
15. 2-8-10-12-20-24-27-28-36-39A-39B-42-47	6.22	6	50	43	28	573	15	3	15	120	80	196	0	19	6	0	0	0	0
16. 2-8-10-12-20-24-27-28-36-39A-39B-43-46-49	6.34	6	50	44	29	582	15	4	20	119	78	196	0	25	17	0	0	0	0
17. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	5.97	0	0	11	4	548	13	1	5	136	100	784	33	28	22	0	0	1	11
18. 2-8-10-16-21-24-26-30-35-37-39A-39B-43-46-49	6.09	0	0	12	5	557	14	2	10	135	99	784	33	34	33	0	0	1	11
19. 2-8-10-16-21-24-26-30-35-38-40-39B-42-47	6.03	0	0	10	3	548	13	1	5	135	99	784	33	28	22	0	0	1	11
20. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	6.15	0	0	11	4	557	14	2	10	134	97	784	33	34	33	0	0	1	11
21. 2-8-10-16-21-24-26-30-35-38-41-44-47	5.67	0	0	10	3	533	13	1	5	120	80	784	33	27	20	0	0	1	11
22. 2-8-10-16-21-24-27-28-36-39A-39B-42-47	6.11	0	0	11	4	523	12	2	10	128	90	784	33	19	6	0	0	1	11
23. 2-8-10-16-21-24-27-28-36-39A-39B-43-46-49	6.23	0	0	12	5	532	13	3	15	127	89	784	33	25	17	0	0	1	11
24. 2-8-10-16-22-25-26-27-28-36-39A-39B-42-47	6.37	0	0	7	1	419	7	2	10	111	68	493	17	18	4	2222	45	2	22
25. 2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49	6.49	0	0	8	2	428	7	3	15	110	67	493	17	24	15	2222	45	2	22
26. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	5.61	0	0	7	1	441	8	1	5	111	68	493	17	26	18	2222	45	2	22
27. 2-8-10-16-22-25-30-35-37-39A-39B-43-46-49	5.74	0	0	8	2	450	8	2	10	110	67	493	17	32	29	2222	45	2	22
28. 2-8-10-16-22-25-30-35-38-40-39B-42-47	5.68	0	0	6	0	441	8	1	5	110	67	493	17	26	18	2222	45	2	22
29. 2-8-10-16-22-25-30-35-38-40-39B-43-46-49	5.80	0	0	7	1	450	8	2	10	109	66	493	17	32	29	2222	45	2	22
30. 2-8-10-16-22-25-30-35-38-41-44-47	5.31	0	0	6	0	426	7	1	5	95	48	493	17	25	17	2222	45	2	22
31. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-42-47	6.38	0	0	11	4	483	10	0	0	102	57	784	33	28	22	1833	37	3	33
32. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-43-46-49	6.50	0	0	12	5	492	11	1	5	101	56	784	33	34	33	1833	37	3	33
33. 2-8-11-19-22-21-24-26-30-35-38-40-39B-42-47	6.44	0	0	10	3	483	10	0	0	101	56	784	33	28	22	1833	37	3	33
34. 2-8-11-19-22-21-24-26-30-35-38-40-39B-43-46-49	6.56	0	0	11	4	492	11	1	5	100	54	784	33	34	33	1833	37	3	33
35. 2-8-11-19-22-21-24-26-30-35-38-41-44-47	6.08	0	0	10	3	468	9	0	0	86	37	784	33	27	20	1833	37	3	33
36. 2-8-11-19-22-21-24-27-28-36-39A-39B-42-47	6.52	0	0	11	4	458	9	1	5	94	47	784	33	19	6	1833	37	3	33
37. 2-8-11-19-22-21-24-27-28-36-39A-39B-43-46-49	6.64	0	0	12	5	467	9	2	10	93	46	784	33	25	17	1833	37	3	33
38. 2-8-11-19-25-26-27-28-36-39A-39B-42-47	6.00	0	0	7	1	293	0	1	5	73	20	493	17	17	2	3295	67	3	33
39. 2-8-11-19-25-26-27-28-36-39A-39B-43-46-49	6.13	0	0	8	2	302	0	2	10	72	19	493	17	23	13	3295	67	3	33
40. 2-8-11-19-25-30-35-37-39A-39B-42-47	5.25	0	0	7	1	315	1	0	0	73	20	493	17	25	17	3295	67	3	33
41. 2-8-11-19-25-30-35-37-39A-39B-43-46-49	5.37	0	0	8	2	324	2	1	5	72	19	493	17	31	28	3295	67	3	33
42. 2-8-11-19-25-30-35-38-40-39B-42-47	5.31	0	0	6	0	315	1	0	0	72	19	493	17	25	17	3295	67	3	33
43. 2-8-11-19-25-30-35-38-40-39B-43-46-49	5.43	0	0	7	1	324	2	1	5	71	18	493	17	31	28	3295	67	3	33
44. 2-8-11-19-25-30-35-38-41-44-47	4.95	0	0	6	0	300	0	0	0	57	0	493	17	24	15	3295	67	3	33
45. 4-9-31-32-34-35-37-39A-39B-42-47	5.64	3	25	26	15	662	20	1	5	128	90	1387	67	27	20	651	13	1	11
46. 4-9-31-32-34-35-37-39A-39B-43-46-49	5.76	3	25	27	16	671	20	2	10	127	89	1387	67	33	31	651	13	1	11
47. 4-9-31-32-34-35-38-40-39B-42-47	5.70	3	25	25	15	662	20	1	5	127	89	1387	67	27	20	651	13	1	11
48. 4-9-31-32-34-35-38-40-39B-43-46-49	5.82	3	25	26	15	671	20	2	10	126	87	1387	67	33	31	651	13	1	11
49. 4-9-31-32-34-35-38-41-44-47	5.34	3	25	25	15	647	19	1	5	112	70	1387	67	26	18	651	13	1	11
MIN	4.95	0	0	6	0	293	0	0	0	57	0	196	0	16	0	0	0	0	0
MAX	6.94	6	50	45	30	671	20	4	20	136	100	1387	67	34	33	3295	67	3	33
RANGE	1.99	6		39		378		4		79		1191		18		3295		3	

(h) sources: plat maps, aerial photography, and field observation

(i) source: GIS parcel boundaries provided by the Portage County Auditor

(j) includes schools, churches, and hospitals, librarys

(k) includes airports, parks, preserves, park district property, designated managed areas, conservation sites, museums, and golf courses; sources: USGS, ESRI GIS data, and field observation

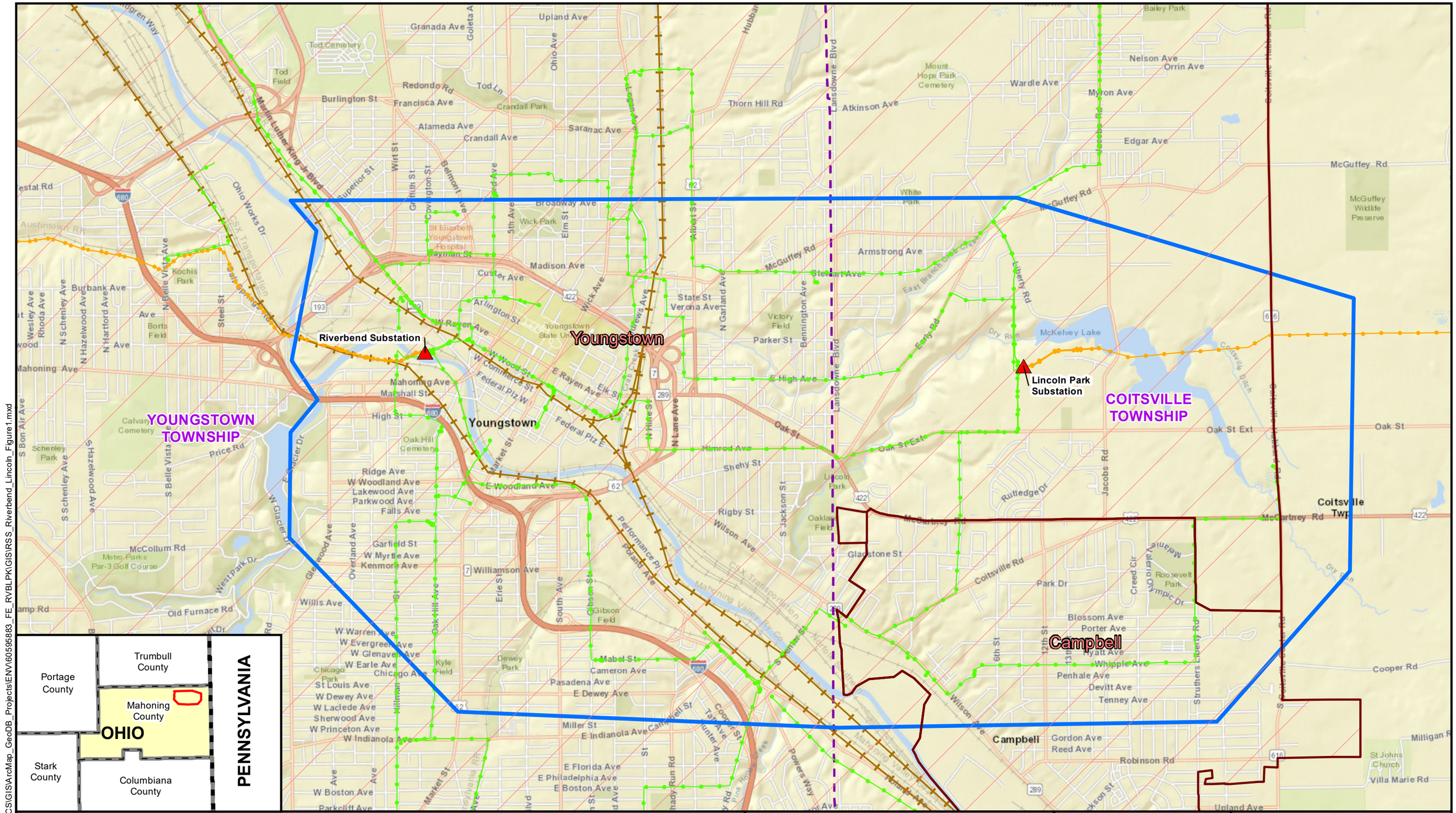
TABLE 2D
QUANTITATIVE ENGINEERING ROUTING COMPARISON

		ENGINEERING															
Route	Length (mi)	Centerline Road Crossings (l)	Normalized Score for Centerline Road Crossings (l)	Centerline Railroad Crossings (l)	Normalized Score for Centerline Railroad Crossings (l)	Turn Angles Greater than 0 and Less than 20 Degrees	Normalized Score for Turn Angles Greater than 0 and Less than 20 Degrees (30%)	Turn Angles Greater than 20 Degrees	Normalized Score for Turn Angles Greater than 20 Degrees (70%)	Highway Overpass Crossings	Normalized Score for Highway Overpass Crossings	Percent of Length Paralleling Existing Electric ROW	Normalized Score for Length Paralleling Existing Electric ROW	Percent of Length Parallel to Road	Normalized Score for Percent of Length Parallel to Road	Length of Route	Normalized Score for Length of Route
1. 2-8-10-12-13-14-15-28-36-39A-39B-42-47	6.72	25	76	12	57	21	13	44	63	3	0	45%	19	50%	14	6.72	89
2. 2-8-10-12-13-14-15-28-36-39A-39B-43-46-49	6.84	26	81	10	29	24	18	42	56	3	0	38%	43	50%	14	6.84	95
3. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-42-47	6.67	20	52	15	100	21	13	39	46	3	0	43%	28	43%	36	6.67	87
4. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-43-46-49	6.80	21	57	13	71	24	18	36	35	3	0	35%	52	44%	35	6.80	93
5. 2-8-10-12-13-14-23-26-30-35-38-40-39B-42-47	6.74	20	52	15	100	23	17	38	42	3	0	38%	44	39%	50	6.74	90
6. 2-8-10-12-13-14-23-26-30-35-38-40-39B-43-46-49	6.86	21	57	13	71	25	20	35	32	3	0	31%	67	39%	50	6.86	96
7. 2-8-10-12-13-14-23-26-30-35-38-41-44-47	6.37	15	29	12	57	19	10	46	70	3	0	32%	62	39%	49	6.37	72
8. 2-8-10-12-13-14-23-27-28-36-39A-39B-42-47	6.81	25	76	15	100	22	15	42	56	3	0	48%	12	53%	7	6.81	94
9. 2-8-10-12-13-14-23-27-28-36-39A-39B-43-46-49	6.94	26	81	13	71	20	12	37	39	3	0	39%	40	52%	7	6.94	100
10. 2-8-10-12-20-24-26-30-35-37-39A-39B-42-47	6.08	21	57	11	43	26	22	30	14	3	0	46%	18	45%	31	6.08	57
11. 2-8-10-12-20-24-26-30-35-37-39A-39B-43-46-49	6.20	22	62	9	14	28	25	33	25	3	0	38%	44	45%	31	6.20	63
12. 2-8-10-12-20-24-26-30-35-38-40-39B-42-47	6.14	21	57	11	43	29	27	32	21	3	0	40%	35	40%	48	6.14	60
13. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	6.26	22	62	9	14	30	28	29	11	3	0	33%	60	40%	47	6.26	66
14. 2-8-10-12-20-24-26-30-35-38-41-44-47	5.78	16	33	8	0	28	25	37	39	3	0	34%	55	40%	46	5.78	42
15. 2-8-10-12-20-24-27-28-36-39A-39B-42-47	6.22	26	81	11	43	31	30	28	7	3	0	51%	0	55%	0	6.22	64
16. 2-8-10-12-20-24-27-28-36-39A-39B-43-46-49	6.34	27	86	9	14	30	28	33	25	3	0	43%	26	55%	0	6.34	70
17. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	5.97	15	29	11	43	20	12	30	14	3	0	26%	82	30%	79	5.97	51
18. 2-8-10-16-21-24-26-30-35-37-39A-39B-43-46-49	6.09	16	33	9	14	22	15	26	0	3	0	30%	68	34%	66	6.09	57
19. 2-8-10-16-21-24-26-30-35-38-40-39B-42-47	6.03	15	29	11	43	17	7	30	14	3	0	33%	60	28%	83	6.03	54
20. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	6.15	16	33	9	14	16	5	38	42	3	0	25%	85	29%	82	6.15	60
21. 2-8-10-16-21-24-26-30-35-38-41-44-47	5.67	10	5	8	0	19	10	26	0	3	0	26%	81	28%	84	5.67	36
22. 2-8-10-16-21-24-27-28-36-39A-39B-42-47	6.11	20	52	11	43	18	8	34	28	3	0	44%	24	44%	34	6.11	58
23. 2-8-10-16-21-24-27-28-36-39A-39B-43-46-49	6.23	21	57	9	14	26	22	30	14	3	0	36%	49	44%	34	6.23	64
24. 2-8-10-16-22-25-26-27-28-36-39A-39B-42-47	6.37	21	57	11	43	23	17	39	46	3	0	41%	32	52%	9	6.37	72
25. 2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49	6.49	22	62	9	14	28	25	26	0	3	0	34%	56	52%	9	6.49	78
26. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	5.61	16	33	11	43	26	22	34	28	3	0	36%	48	44%	33	5.61	34
27. 2-8-10-16-22-25-30-35-37-39A-39B-43-46-49	5.74	17	38	9	14	23	17	37	39	3	0	31%	64	47%	25	5.74	40
28. 2-8-10-16-22-25-30-35-38-40-39B-42-47	5.68	16	33	11	43	25	20	35	32	3	0	34%	55	41%	43	5.68	37
29. 2-8-10-16-22-25-30-35-38-40-39B-43-46-49	5.80	17	38	9	14	25	20	33	25	3	0	26%	82	41%	43	5.80	43
30. 2-8-10-16-22-25-30-35-38-41-44-47	5.31	11	10	8	0	23	17	43	60	3	0	27%	78	42%	41	5.31	18
31. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-42-47	6.38	17	38	11	43	27	23	31	18	6	70	33%	60	28%	84	6.38	72
32. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-43-46-49	6.50	18	43	9	14	25	20	39	46	6	70	25%	84	29%	82	6.50	78
33. 2-8-11-19-22-21-24-26-30-35-38-40-39B-42-47	6.44	17	38	11	43	20	12	37	39	6	70	28%	77	23%	99	6.44	75
34. 2-8-11-19-22-21-24-26-30-35-38-40-39B-43-46-49	6.56	18	43	9	14	22	15	33	25	6	70	20%	100	24%	97	6.56	81
35. 2-8-11-19-22-21-24-26-30-35-38-41-44-47	6.08	12	14	8	0	13	0	36	35	6	70	21%	98	23%	100	6.08	57
36. 2-8-11-19-22-21-24-27-28-36-39A-39B-42-47	6.52	22	62	11	43	15	3	39	46	6	70	38%	43	38%	53	6.52	79
37. 2-8-11-19-22-21-24-27-28-36-39A-39B-43-46-49	6.64	23	67	9	14	17	7	35	32	6	70	31%	66	38%	52	6.64	85
38. 2-8-11-19-25-26-27-28-36-39A-39B-42-47	6.00	19	48	11	43	21	13	36	35	4	23	41%	34	38%	52	6.00	53
39. 2-8-11-19-25-26-27-28-36-39A-39B-43-46-49	6.13	20	52	9	14	23	17	39	46	4	23	33%	60	39%	51	6.13	59
40. 2-8-11-19-25-30-35-37-39A-39B-42-47	5.25	14	24	11	43	25	20	35	32	4	23	39%	40	31%	75	5.25	15
41. 2-8-11-19-25-30-35-37-39A-39B-43-46-49	5.37	15	29	9	14	23	17	28	7	4	23	30%	69	31%	74	5.37	21
42. 2-8-11-19-25-30-35-38-40-39B-42-47	5.31	14	24	11	43	25	20	31	18	4	23	33%	60	25%	94	5.31	18
43. 2-8-11-19-25-30-35-38-40-39B-43-46-49	5.43	15	29	9	14	27	23	27	4	4	23	24%	89	26%	92	5.43	24
44. 2-8-11-19-25-30-35-38-41-44-47	4.95	9	0	8	0	19	10	31	18	4	23	25%	85	25%	95	4.95	0
45. 4-9-31-32-34-35-37-39A-39B-42-47	5.64	29	95	11	43	21	13	27	4	5	47	40%	35	37%	55	5.64	35
46. 4-9-31-32-34-35-37-39A-39B-43-46-49	5.76	30	100	9	14	16	5	31	18	5	47	32%	63	38%	54	5.76	41
47. 4-9-31-32-34-35-38-40-39B-42-47	5.70	29	95	11	43	18	8	27	4	5	47	35%	54	32%	72	5.70	38
48. 4-9-31-32-34-35-38-40-39B-43-46-49	5.82	30	100	9	14	17	7	28	7	5	47	26%	81	32%	71	5.82	44
49. 4-9-31-32-34-35-38-41-44-47	5.34	24	71	8	0	14	2	28	7	5	47	28%	77	32%	72	5.34	20
MIN	4.95	9	0	8	0	13	0	26	0	3	0	20%	100	23%	100	4.95	0
MAX	6.94	30	100	15	0	31	30	46	70	6	100	51%	0	55%	0	6.94	100
RANGE	1.99	21		7		18		20		3		31%		32%		1.99	

(l) sources: USGS topographic quadrangles, USGS digital orthophoto quadrangles and field observation

TABLE 2E
QUANTITATIVE ROUTE SCORES AND RANKING

Route	Normalized Ecological Score	Ecological Rank	Normalized Cultural Score	Cultural Rank	Normalized Land Use Score	Land Use Rank	Normalized Engineering Score	Engineering Rank	Total Score	Rank
23. 2-8-10-16-21-24-27-28-36-39A-39B-43-46-49	4.31	1	4.55	5	36.29	15	42.45	16	20.94	1
22. 2-8-10-16-21-24-27-28-36-39A-39B-42-47	11.91	2	8.69	17	33.09	8	41.26	11	23.00	2
30. 2-8-10-16-22-25-30-35-38-41-44-47	17.09	3	42.05	43	32.11	5	37.22	3	27.60	3
21. 2-8-10-16-21-24-26-30-35-38-41-44-47	17.32	4	47.16	47	32.95	7	36.00	2	28.42	4
25. 2-8-10-16-22-25-26-27-28-36-39A-39B-43-46-49	22.51	9	5.11	7	37.87	23	40.76	10	28.74	5
44. 2-8-11-19-25-30-35-38-41-44-47	27.07	12	42.61	44	26.35	1	34.54	1	29.08	6
27. 2-8-10-16-22-25-30-35-37-39A-39B-43-46-49	22.57	10	3.98	2	40.03	30	39.47	6	29.38	7
29. 2-8-10-16-22-25-30-35-38-40-39B-43-46-49	21.44	6	5.68	8	39.62	29	44.08	19	29.40	8
16. 2-8-10-12-20-24-27-28-36-39A-39B-43-46-49	20.34	5	6.25	10	41.90	36	41.48	14	29.67	9
37. 2-8-11-19-22-21-24-27-28-36-39A-39B-43-46-49	22.04	8	7.39	12	37.85	22	53.76	34	30.07	10
18. 2-8-10-16-21-24-26-30-35-37-39A-39B-43-46-49	22.80	11	9.09	20	40.88	33	42.33	15	30.61	11
41. 2-8-11-19-25-30-35-37-39A-39B-43-46-49	32.55	23	4.55	5	34.27	10	38.52	5	31.04	12
20. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	21.67	7	10.80	28	40.47	32	53.65	33	31.30	13
43. 2-8-11-19-25-30-35-38-40-39B-43-46-49	31.42	21	6.25	10	33.87	9	45.74	20	31.31	14
39. 2-8-11-19-25-26-27-28-36-39A-39B-43-46-49	32.49	22	5.68	8	32.11	6	49.91	29	31.40	15
24. 2-8-10-16-22-25-26-27-28-36-39A-39B-42-47	30.11	17	9.25	21	34.67	13	45.78	21	31.42	16
28. 2-8-10-16-22-25-30-35-38-40-39B-42-47	29.04	14	8.69	17	36.43	16	43.78	17	31.43	17
15. 2-8-10-12-20-24-27-28-36-39A-39B-42-47	27.95	13	10.39	27	38.70	25	37.44	4	31.44	18
26. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	30.17	18	8.12	14	36.84	17	40.06	8	31.62	19
36. 2-8-11-19-22-21-24-27-28-36-39A-39B-42-47	29.64	16	11.53	29	34.65	12	54.62	36	32.33	20
19. 2-8-10-16-21-24-26-30-35-38-40-39B-42-47	29.27	15	13.80	38	37.28	20	48.19	26	32.82	21
38. 2-8-11-19-25-26-27-28-36-39A-39B-42-47	40.09	34	9.82	24	28.91	2	46.33	23	33.22	22
42. 2-8-11-19-25-30-35-38-40-39B-42-47	39.02	32	9.25	21	30.67	3	45.95	22	33.40	23
40. 2-8-11-19-25-30-35-37-39A-39B-42-47	40.15	35	8.69	17	31.08	4	41.40	13	33.50	24
17. 2-8-10-16-21-24-26-30-35-38-40-39B-43-46-49	30.40	19	13.23	35	37.68	21	51.65	31	33.72	25
2. 2-8-10-12-13-14-15-28-36-39A-39B-43-46-49	38.40	30	0.00	1	39.07	27	55.94	38	36.58	26
9. 2-8-10-12-13-14-23-27-28-36-39A-39B-43-46-49	37.03	28	3.98	2	40.37	31	58.22	41	37.18	27
14. 2-8-10-12-20-24-26-30-35-38-41-44-47	33.35	24	48.30	48	38.56	24	39.90	7	37.59	28
35. 2-8-11-19-22-21-24-26-30-35-38-41-44-47	35.04	25	50.00	49	34.51	11	50.68	30	37.89	29
1. 2-8-10-12-13-14-15-28-36-39A-39B-42-47	46.00	41	4.14	4	35.88	14	55.29	37	38.69	30
13. 2-8-10-12-20-24-26-30-35-38-40-39B-43-46-49	37.70	29	11.93	30	46.08	43	48.09	25	39.52	31
8. 2-8-10-12-13-14-23-27-28-36-39A-39B-42-47	44.63	39	8.12	14	37.17	19	59.94	42	39.53	32
11. 2-8-10-12-20-24-26-30-35-37-39A-39B-43-46-49	38.83	31	10.23	25	46.49	44	43.89	18	39.54	33
34. 2-8-11-19-22-21-24-26-30-35-38-40-39B-43-46-49	39.39	33	13.64	37	42.03	37	62.49	46	40.18	34
32. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-43-46-49	40.52	36	11.93	30	42.44	38	61.24	45	40.50	35
49. 4-9-31-32-34-35-38-41-44-47	31.15	20	46.59	46	48.51	45	41.37	12	40.66	36
10. 2-8-10-12-20-24-26-30-35-37-39A-39B-42-47	46.43	42	14.37	39	43.29	40	40.24	9	41.35	37
12. 2-8-10-12-20-24-26-30-35-38-40-39B-42-47	45.30	40	14.94	40	42.89	39	48.37	27	41.61	38
31. 2-8-11-19-22-21-24-26-30-35-37-39A-39B-42-47	48.12	44	16.07	41	39.24	28	56.28	39	42.18	39
33. 2-8-11-19-22-21-24-26-30-35-38-40-39B-42-47	46.99	43	16.64	42	38.84	26	63.55	47	42.35	40
46. 4-9-31-32-34-35-37-39A-39B-43-46-49	36.63	27	8.52	16	56.43	49	49.09	28	42.99	41
48. 4-9-31-32-34-35-38-40-39B-43-46-49	35.50	26	10.23	25	56.03	48	53.94	35	43.03	42
45. 4-9-31-32-34-35-37-39A-39B-42-47	44.24	38	12.66	33	53.24	47	46.62	24	44.92	43
47. 4-9-31-32-34-35-38-40-39B-42-47	43.11	37	13.23	35	52.83	46	52.28	32	44.93	44
7. 2-8-10-12-13-14-23-26-30-35-38-41-44-47	50.04	45	46.02	45	37.03	18	58.12	40	45.24	45
4. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-43-46-49	55.52	47	7.95	13	44.96	42	60.28	44	47.01	46
6. 2-8-10-12-13-14-23-26-30-35-38-40-39B-43-46-49	54.39	46	9.66	23	44.55	41	65.46	48	47.09	47
3. 2-8-10-12-13-14-23-26-30-35-37-39A-39B-42-47	63.12	49	12.09	32	41.76	35	60.27	43	49.19	48
5. 2-8-10-12-13-14-23-26-30-35-38-40-39B-42-47	61.99	48	12.66	33	41.35	34	65.85	49	49.19	49
MIN	4.31		0.00		26.35		34.54		20.94	1
MAX	63.12		50.00		56.43		65.85		49.19	49



Legend

- Substation
- Railroad
- City or Town
- Township Boundary
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- General Project Study Area

0 0.25 0.5 1 Miles

N

ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 1
Project Overview

Source: BMCD, ESRI, ARCGIS Online World Street Map

Issued: December 29, 2019

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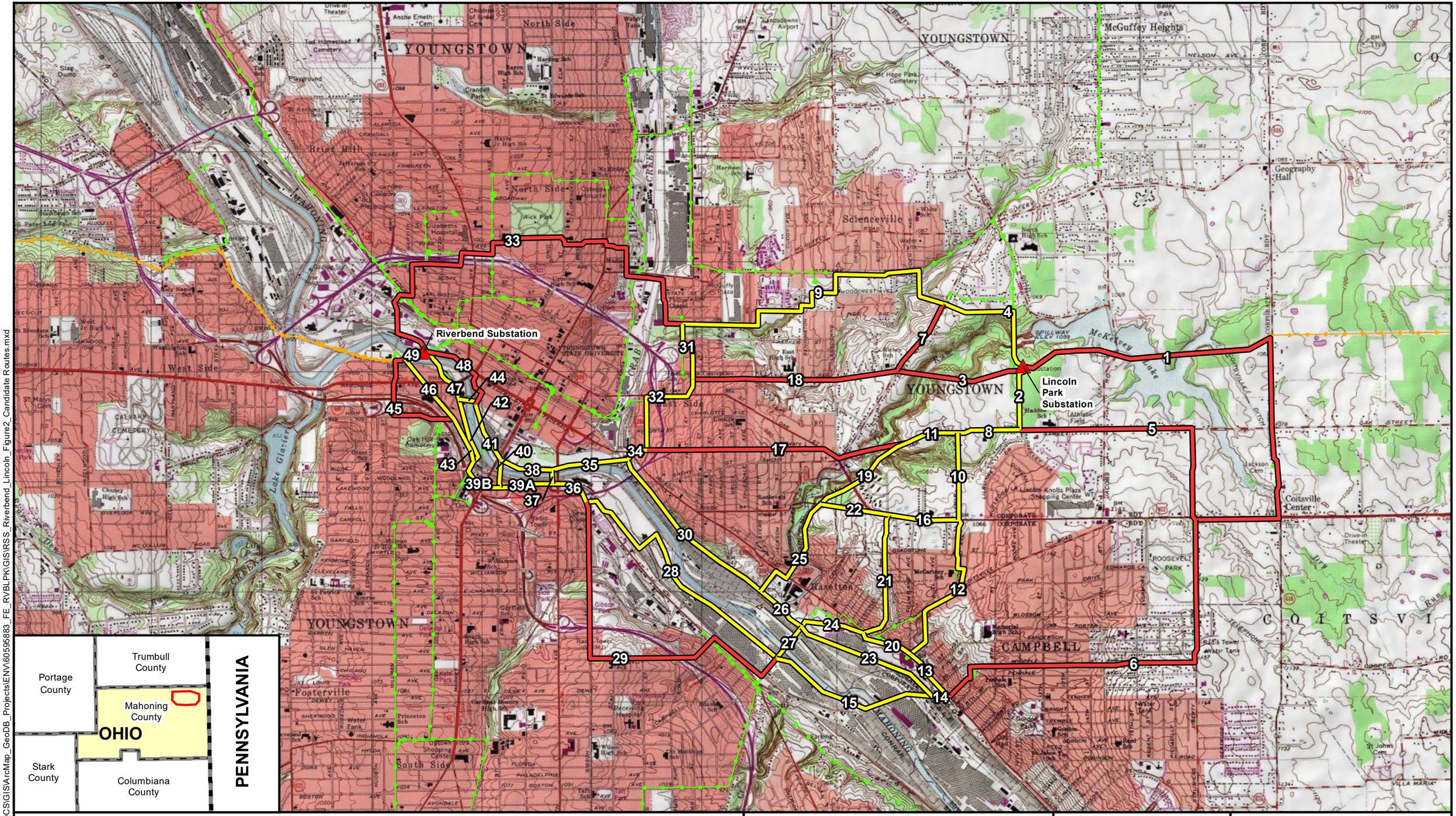
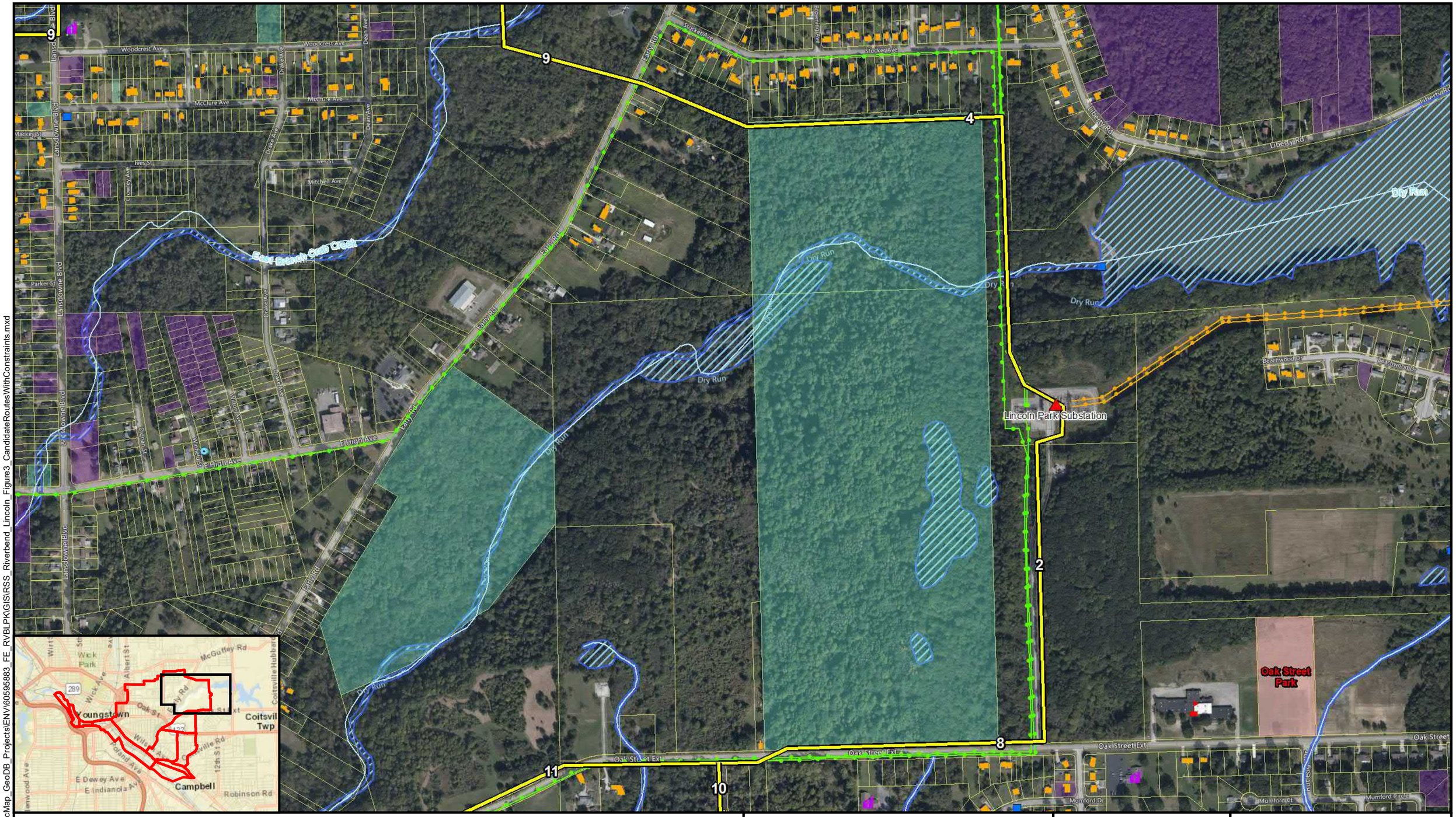

Riverbend Substation
Lincoln Park Substation
YOUNGSTOWN
North Side
West Side
South Side
Scienceville
McGuffey Heights
Hazelton
CAMPBELL
Fosterville
Trumbull County
Portage County
Mahoning County
Stark County
Columbiana County
OHIO
PENNSYLVANIA
Legend
Substation
Existing 23 kV Subtransmission Line
Existing 138 kV Transmission Line
Candidate Route Segment
Candidate Route Segment (Eliminated)
0 0.25 0.5 1 Miles
N
ATSI
Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 2
Candidate Routes by Segment
URS Path: G:\Cincinnati\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\RS_Riverbend_Lincoln_Figure2_Candidate Routes.mxd
Source: BMCD, ESRI, ARCGIS Online World Street Map
Issued: December 29, 2019

URS Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure3_CandidateRoutesWithConstraints.mxd



Legend

- Substation
- Candidate Route Segment
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Historic Structure (OHPO)
- National Register Listing (OHPO)
- National Register Determinations of Eligibility (OHPO)
- Cemetery (OHPO)

Mahoning County Data

- Museum
- Monument
- Well
- Railroads
- Residence
- Church
- School
- Stream (National Hydrography Dataset)
- National Wetland Inventory
- Sensitive Land Use/Parks

0 250 500 1,000 Feet

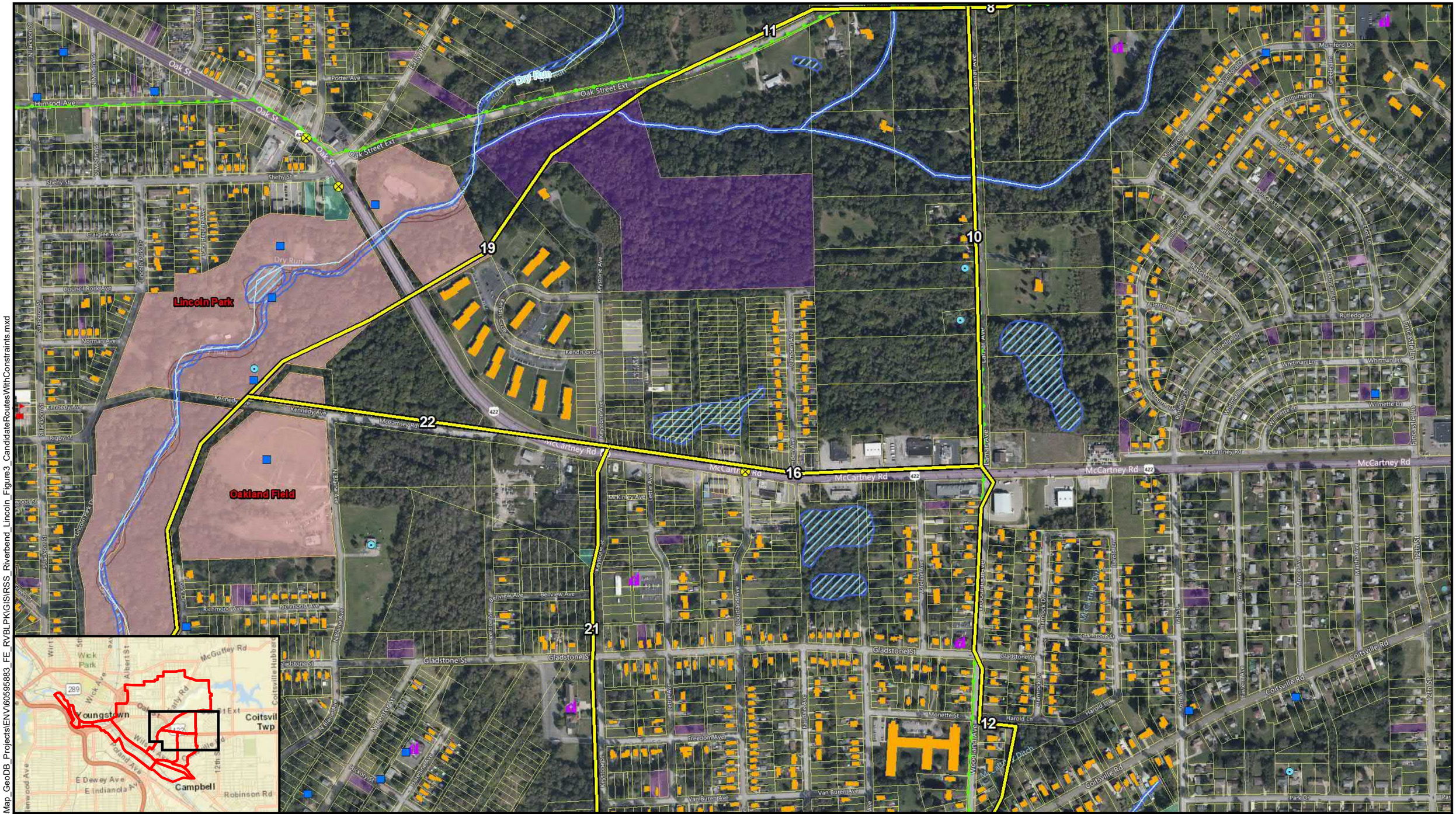
N

ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 1 of 8

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021



Legend

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N

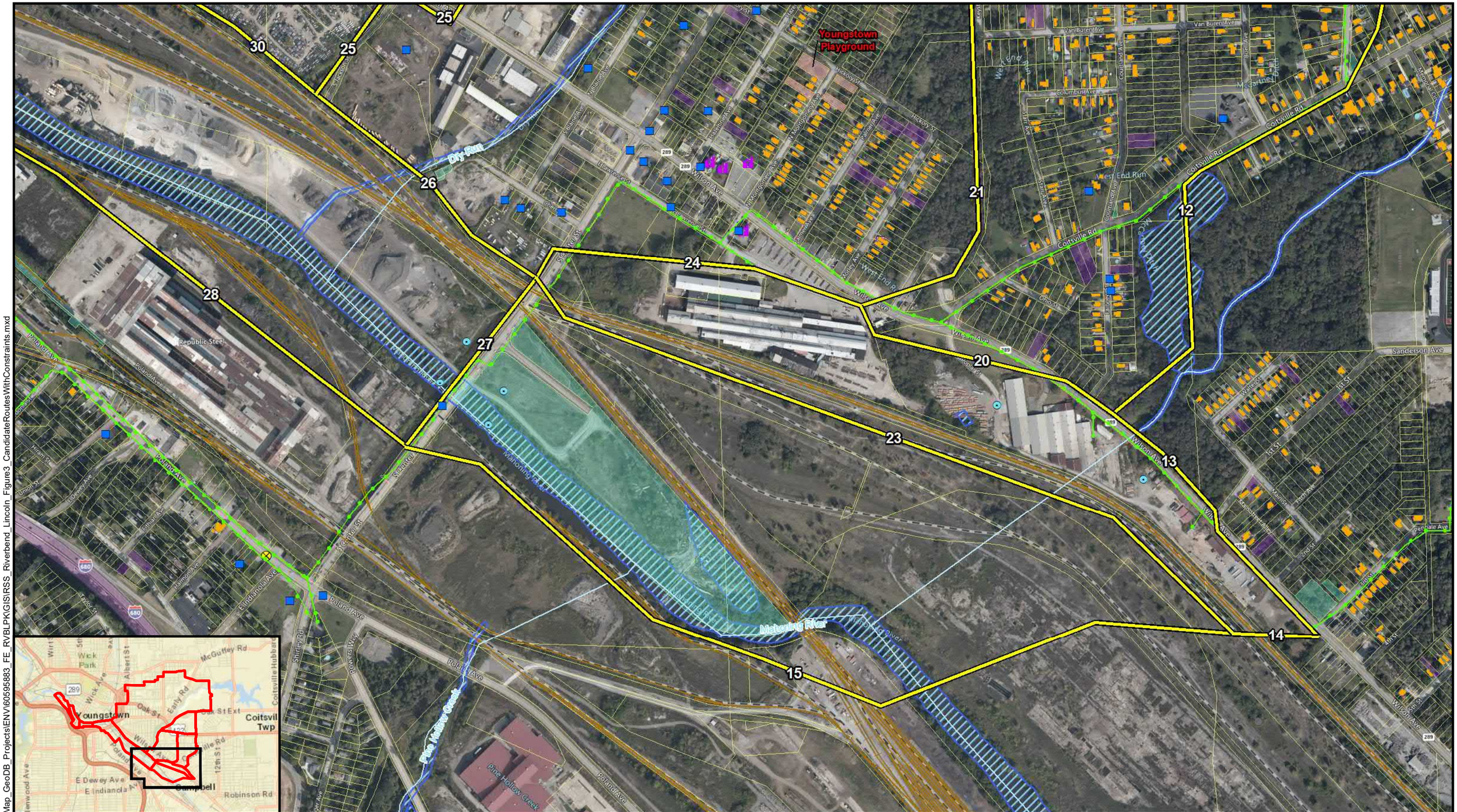
ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 2 of 8

URS Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure3_CandidateRoutesWithConstraints.mxd

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021



Legend

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ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 3 of 8

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021

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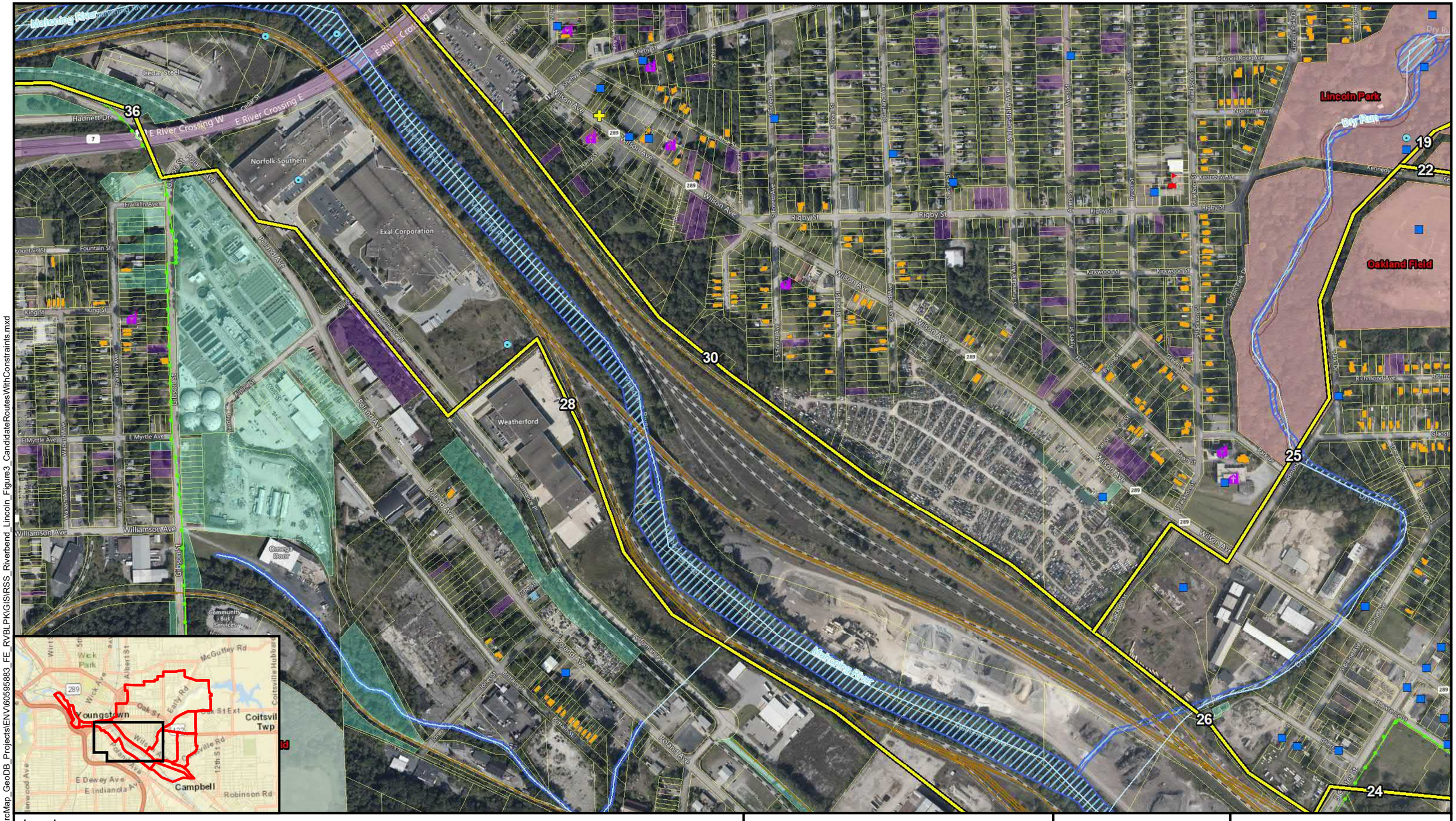

Legend

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0 250 500 1,000 Feet

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ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 4 of 8

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021

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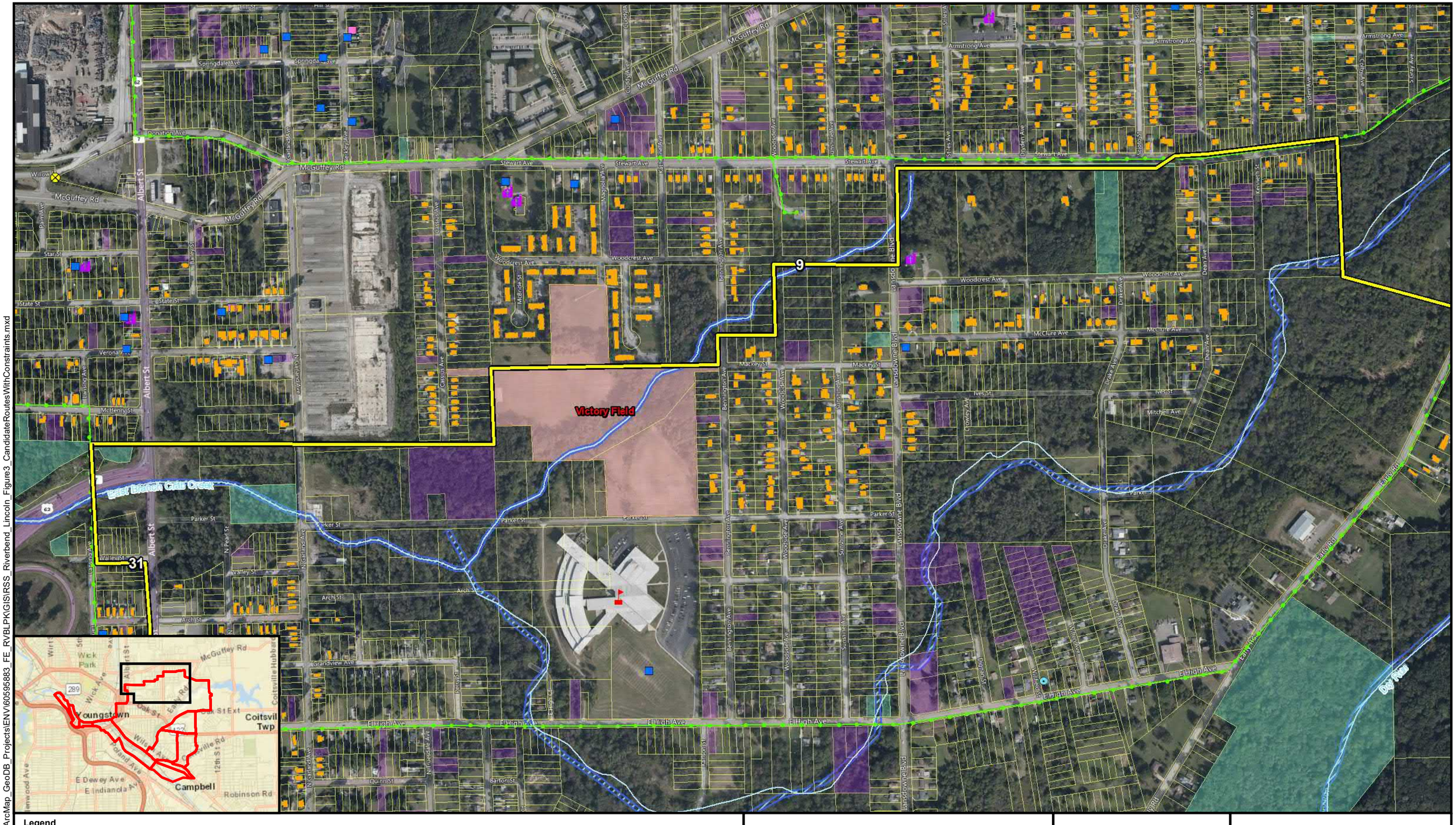

Legend

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0 250 500 1,000 Feet

N

ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 5 of 8

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021

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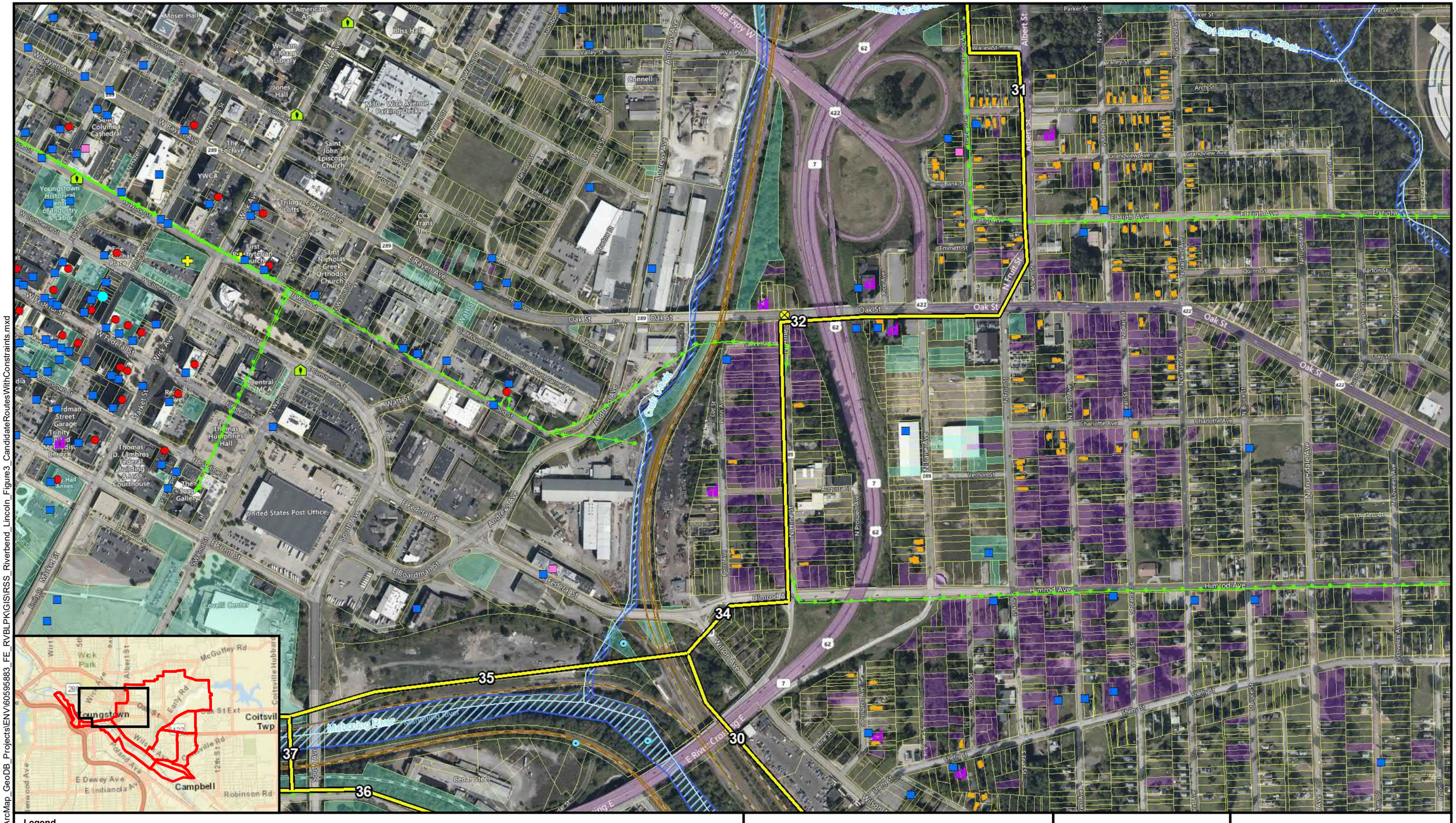

Legend

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- Existing 138 kV Transmission Line
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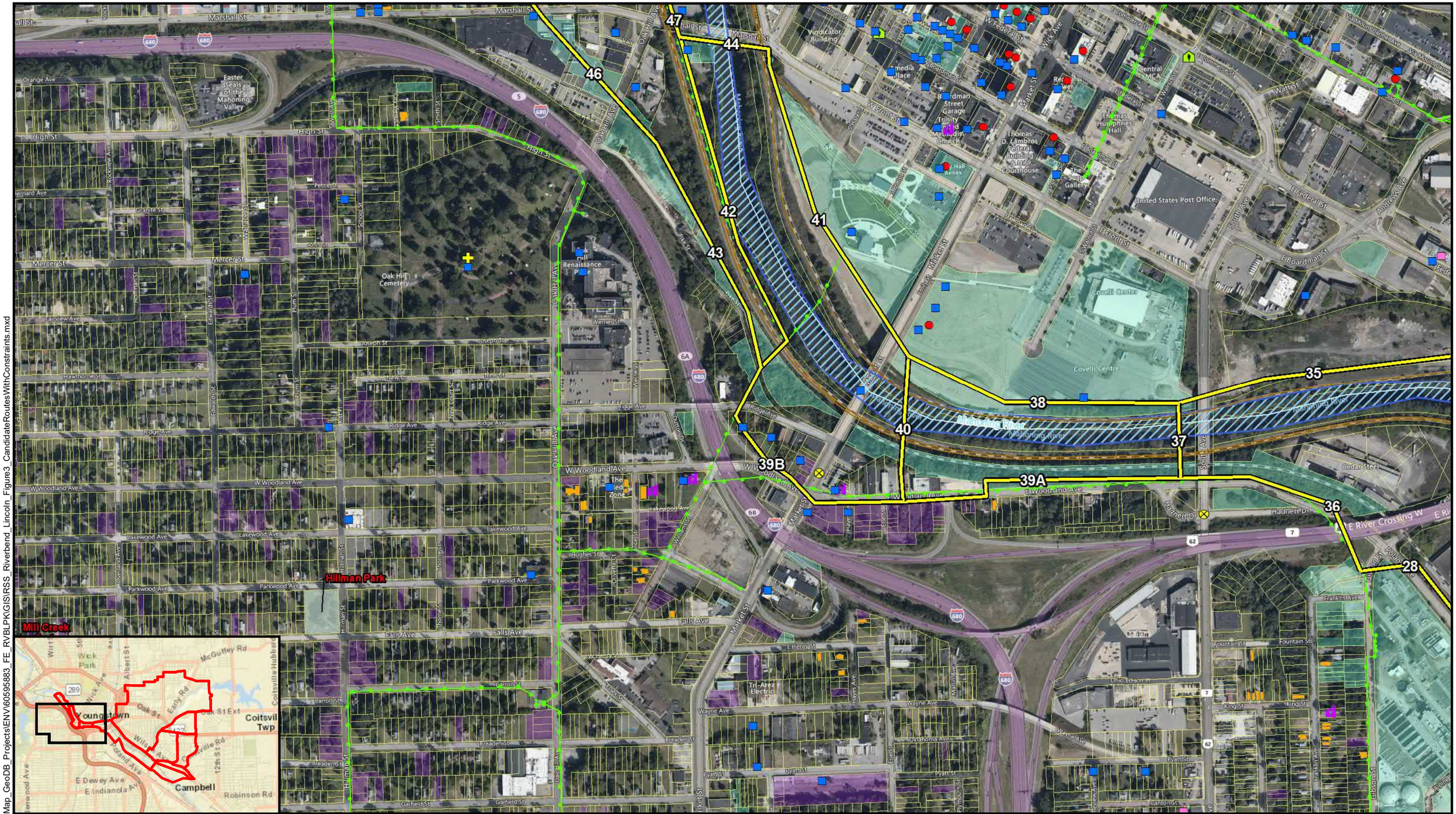
ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 6 of 8

Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Issued: January 21, 2021



Legend

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ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 7 of 8

URS Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure3_CandidateRoutesWithConstraints.mxd

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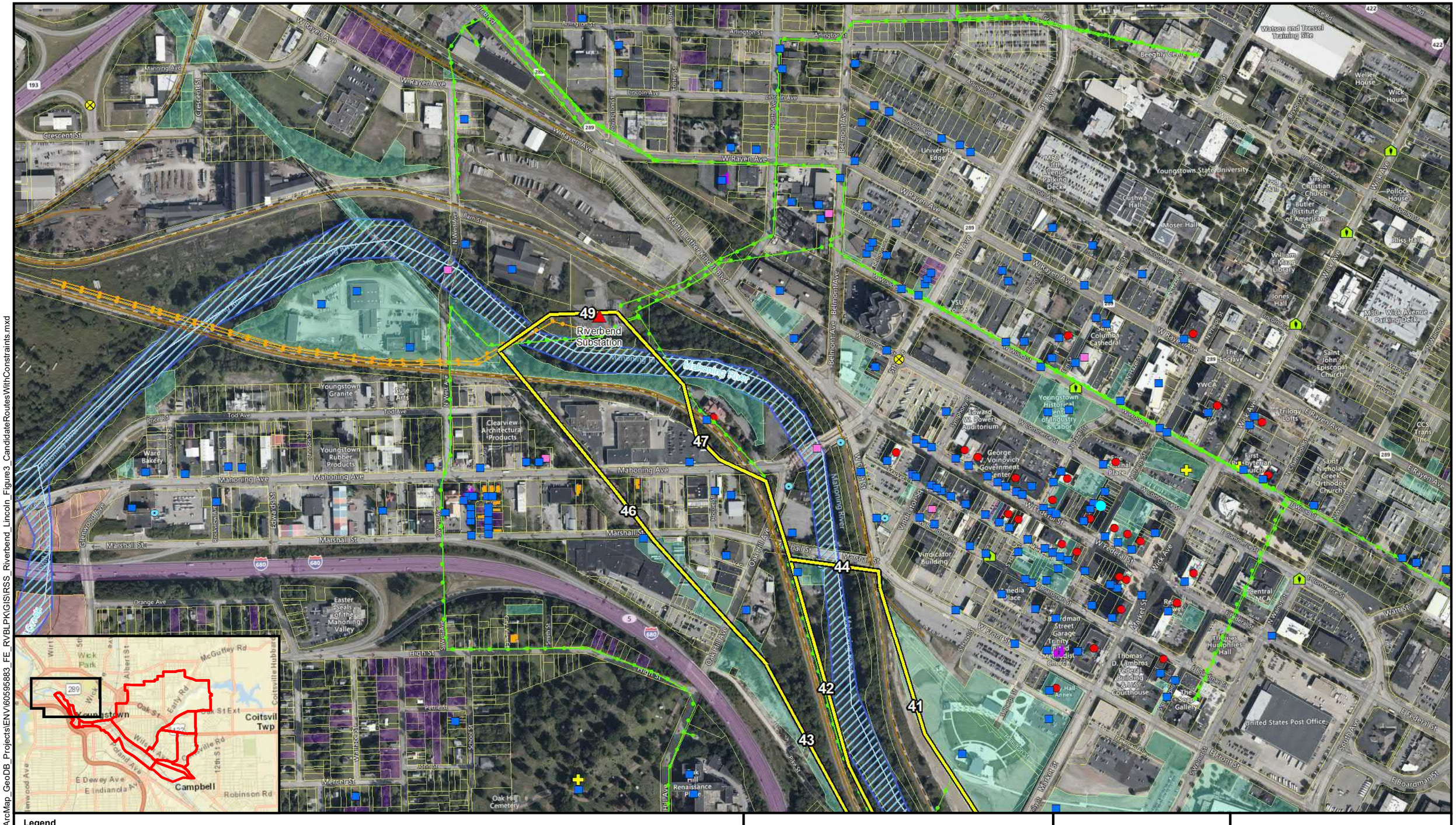
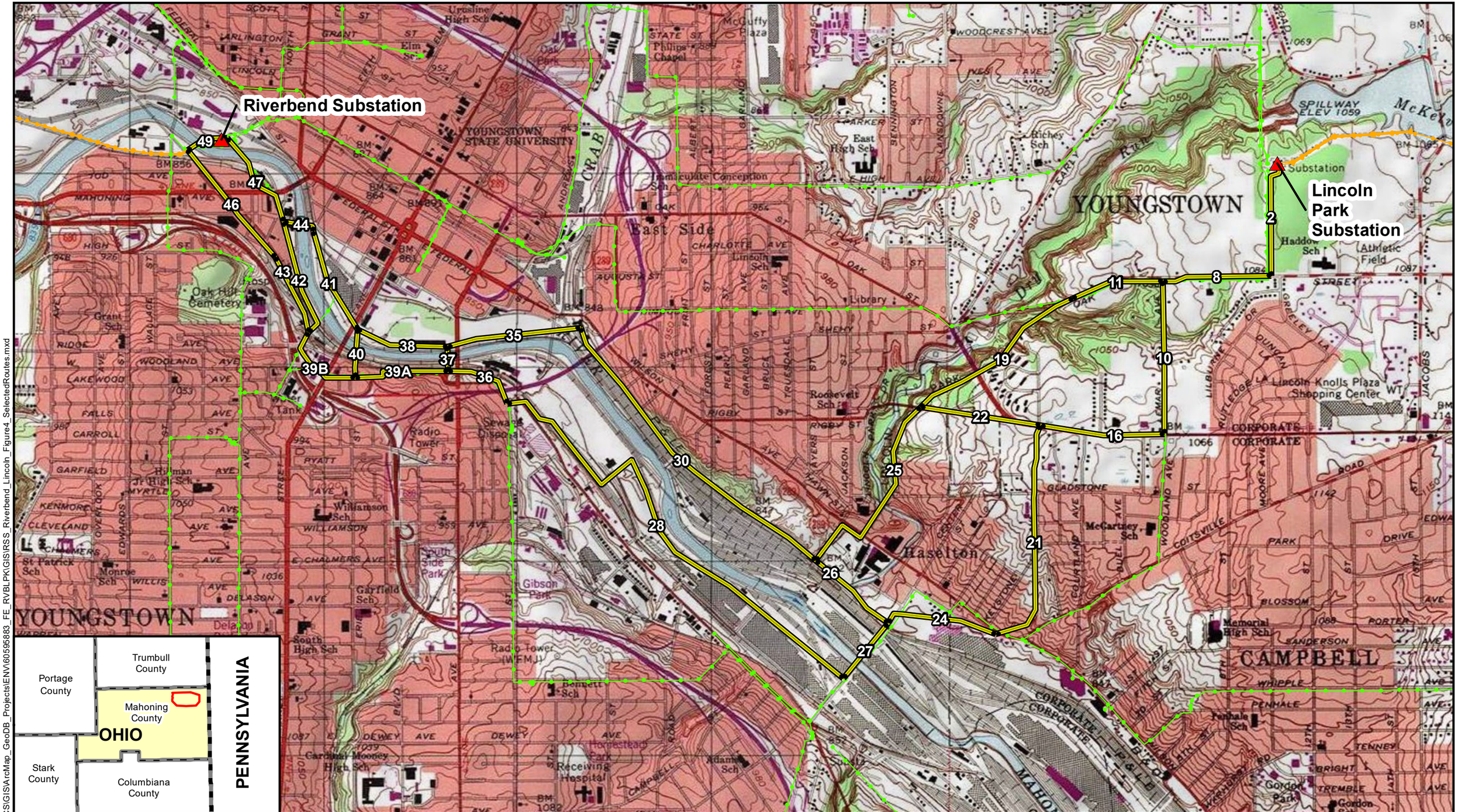


Source: BMCD, ESRI, Mahoning County Auditor, USGS, OHPO, ArcGIS Online Bing Map Hybrid

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 3
Candidate Routes with
Identified Constraints
Page 8 of 8

Issued: January 21, 2021

URS Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60596883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure3_CandidateRoutesWithConstraints.mxd



Legend

- Substation
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Route Selected for Further Evaluation

0 750 1,500 3,000 Feet

N

ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 4
Routes Selected for Further Evaluation

Source: BMCD, ESRI, ARCGIS Online World Street Map

Issued: December 29, 2019

URS Path: G:\Cincinnati\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60596883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure4_SelectedRoutes.mxd

Riverbend Substation

Lincoln Park Substation

ARLINGTON

YSU
Youngstown State University

MAHONING COMMONS

DOWNTOWN YOUNGSTOWN

EAST HIGH

LINCOLN KNOLLS

OAK HILL

LOWER GIBSON

ERIE

ENGLESIDE GARDENS

Portage County

Trumbull County

Mahoning County

OHIO

Stark County

Columbiana County

PENNSYLVANIA

Legend

- Alternate Route
- Common Route
- Preferred Route
- Existing 138 kV Transmission Line
- Substation

0 750 1,500 3,000 Feet

N

ATSI

Lincoln Park-Riverbend 138 kV
Route Selection Study
Figure 5
Preferred and Alternate Routes

URS Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\RSS_Riverbend_Lincoln_Figure5_Pref&AltRoutes_Aerial.mxd

Source: BMCD, ESRI, ARCGIS Online World Street Map

Issued: January 21, 2021

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). The 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 Campbell (1980) and Youngstown (1985) U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles as a base map.

The information on the map was updated by reviewing digital, georeferenced aerial photography, property parcel data from the Mahoning County Auditor's Office, and field reconnaissance conducted in January 2020. 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 65 feet, with 32.5 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)	41.08	49.12
Length (in miles)	5.21	6.23
Number of properties crossed (by ROW)	73	151

(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. These locations will be identified during the detailed engineering design phase of the project which will occur contemporaneously with the OPSB's review of the Application. A professional geotechnical contractor will be retained to coordinate and conduct the geotechnical investigation with ATSI oversight. If suitable access is available, truck-mounted drilling equipment will 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. Once the geotechnical investigation is complete, recovered soil samples will be evaluated in a laboratory to determine soil characteristics which are then used for foundation analysis and design using an industry standard software program, Foundation Analysis and Design (FAD) Tools, released by the Electric Power Research Institute (EPRI).

(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 Routes will occur from existing public roads in close proximity to, or crossed by, the transmission line ROW.

Proposed access roads are identified in **Figure 7-1 and Figure 3** of **Appendix 8-1**. 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 embedded 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 Riverbend Substation is being expanded to accommodate the new 138 kV line exit from the substation.

(a) Transmission Line Route Map and Substation Expansion Map

Figure 7-1 shows a map at 1:24,000-scale of the Preferred and Alternate Routes, respectively. More detailed maps at 1:2,400-scale are provided in **Figure 3** of **Appendix 8-1**. 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, temporary access roads, etc.) are provided on **Figure 7-2**. However, off-right-of-way work areas including pull sites, laydown yards, and other facilities have not been fully identified and associated structures are preliminary in design. Therefore, finalized information will be provided to the Board, if the Project is approved and prior to construction activities.

The Project proposes to expand the existing Riverbend Substation by an additional 0.10 acre to facilitate the installation of new equipment in the substation. This represents approximately 8 percent expansion of the substation. To accommodate the addition of this new expansion area, approximately 188 linear feet of additional fence will be installed. Drawings of the substation expansion are provided in **Appendix 5-1**.

ATSI is currently identifying staging areas and laydown areas for the Project. To date, none have been identified within the Project area.

(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 utilizing wood pole construction. Steel structures may be required at some locations. The exact number and location of structures along the centerline of the ROW 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 Project, Figure 5-1A conceptionally shows a typical single wood pole tangent structure. These typical structures will consist of a single wood pole with three horizontal braced-post insulators to support the transmission conductors in a delta configuration. These tangent structures will have distribution underbuild and/or communication facilities where necessary.

2. For line angle configurations on the Project, Figures 5-1B and 5-1C conceptually show single wood pole structures with three polymer suspension insulators and down guys to support the transmission conductors in a vertical configuration. Figure 5-1B may be used on line angles between 20° and 30° and would have distribution underbuild and/or communication facilities where necessary. Figure 5-1C may be used on heavier line angles between 30° and 50°.

3. Figure 5-1D conceptually shows a single wood pole deadend structure, where the conductor is terminated and supported in a vertical configuration on porcelain/glass insulators. The structure will be supported by down guys.

4. Figures 5-1E, 5-1F, 5-1G conceptually show steel pole structures atop drilled shaft concrete foundations that may be installed to eliminate down guys on the Project. Figure 5-1E shows a steel pole structure with conductors supported in a vertical configuration on steel arms and polymer suspension insulators. This structure may be used on line angles between 0° and 30°. Figure 5-1F shows a steel pole structure with conductors supported in a vertical configuration on polymer suspension insulators. This structure may be used on line angles from 30° to 50°. Figure 5-1G shows a deadend steel pole structure with conductors terminated and supported in a vertical configuration on porcelain/glass insulators.

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 the Project will be designed and constructed for 138 kV operation and will be 795 26/7 ACSR per phase. This conductor has a maximum strength of approximately 31,500 pounds. Optical Ground Wire (OPGW) will be installed on the Project. 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 polymer insulators (insulator type will vary with structure type). Aluminum clamps will support the overhead ground wire. At dead ends, bolted-type dead-ends clamps will be used on the conductor and on the ground wire.

(c) Base and Foundation Design

Several steel structures on concrete foundations may be necessary. The excavation for each concrete foundation will be approximately 10 feet in diameter and approximately 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.

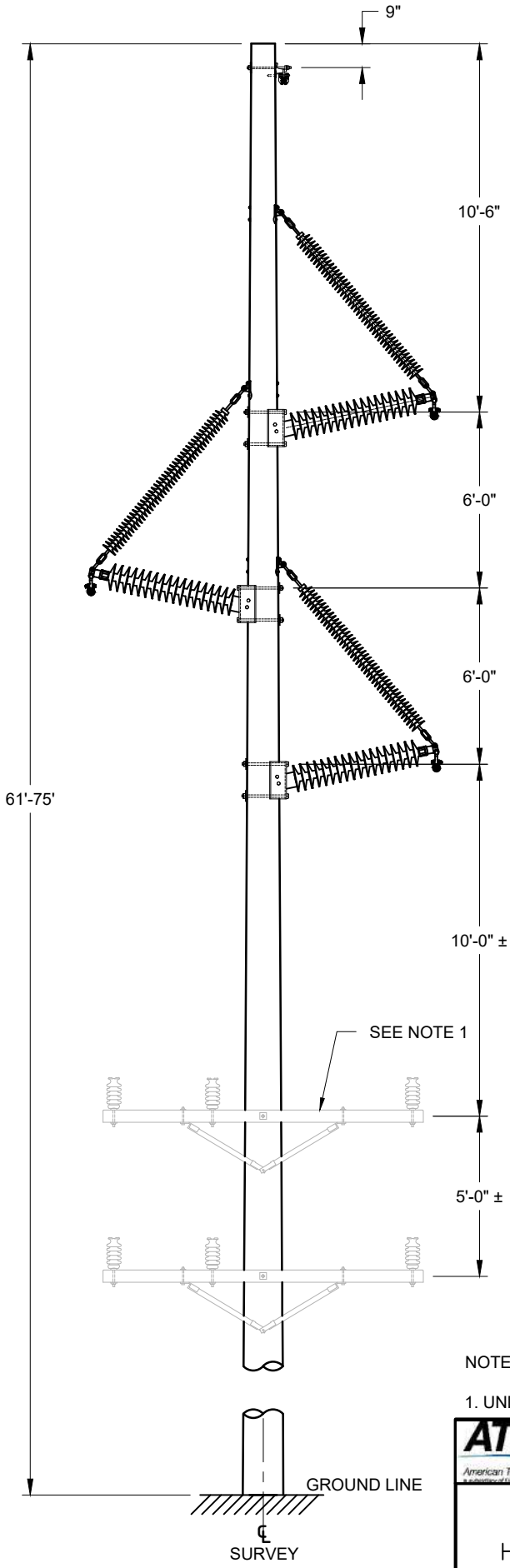
(2) Diagram of Electric Power Transmission Substations

No new electric power transmission substations are proposed for this Project. The existing Riverbend Substation will be expanded as part of this Project. Drawings of the substation expansion are provided in Appendix 5-1.

The Riverbend Substation will be expanded by an additional 0.10 acre to facilitate the installation of new equipment in the substation. This represents an 8 percent expansion of the substation within its existing company-owned parcel. To accommodate the additional of this new expansion area, approximately 188 linear feet of additional fence will be installed.

The following equipment will be installed as part of this expansion:

- 138kV Circuit Breakers – (3)
- 138kV Breaker Disconnect Switches – (8) Sets of 3
- 138kV Station Service Voltage Transformer “SSVT” – (1)
- 138kV Capacitive Voltage Transformer “CCVT” – (4) Sets of 3
- 138kV Line Exit MOAB – (3) sets of 3



NOTE:

1. UNDER BUILD CROSSARM(S) TO BE USED WHERE NECESSARY.

ATSI® American Transmission Systems, Inc.

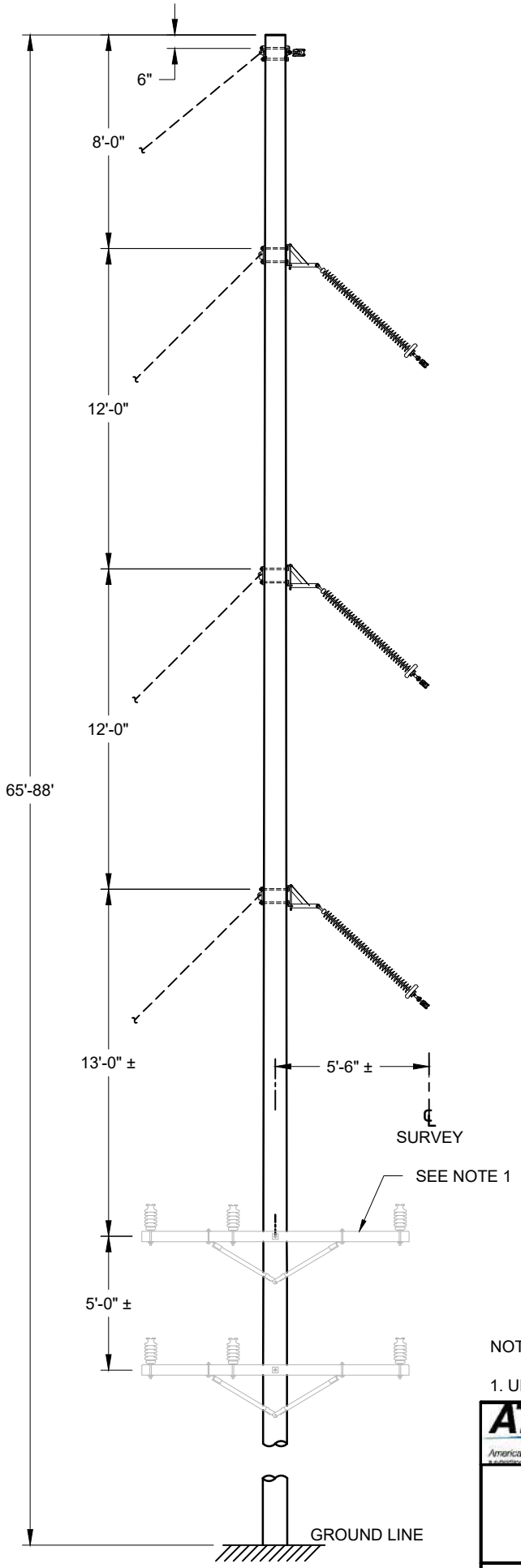
LINCOLN PARK – RIVERBEND 138kV TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
HORIZONTALL POST DELTA SINGLE POLE 0° TO 2°

EXHIBIT 5–1A

PAPER SIZE: 8.5X11

SCALE: NTS



NOTE:

1. UNDER BUILD CROSSARM(S) TO BE USED WHERE NECESSARY.

ATSI® American Transmission Systems, Inc.

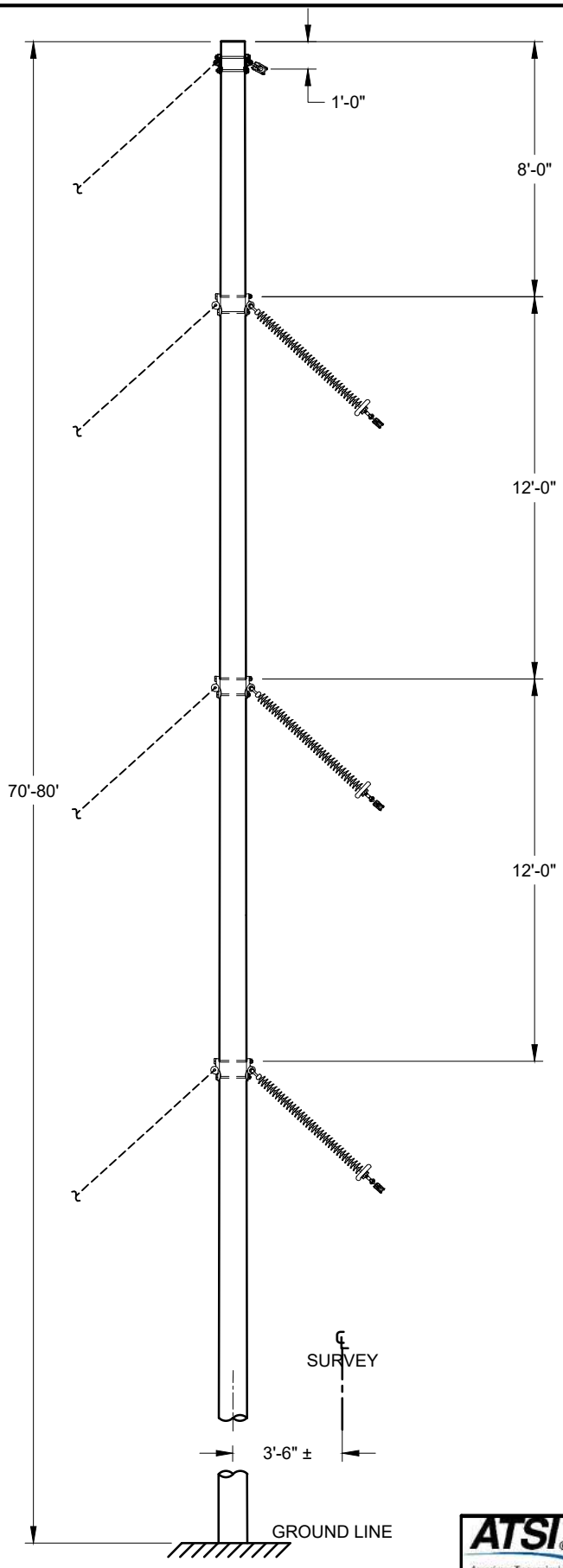
LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
SUSPENSION VERTICAL SINGLE POLE 20° TO 30°

EXHIBIT 5–1B

PAPER SIZE: 8.5X11

SCALE: NTS



PAPER SIZE: 8.5X11

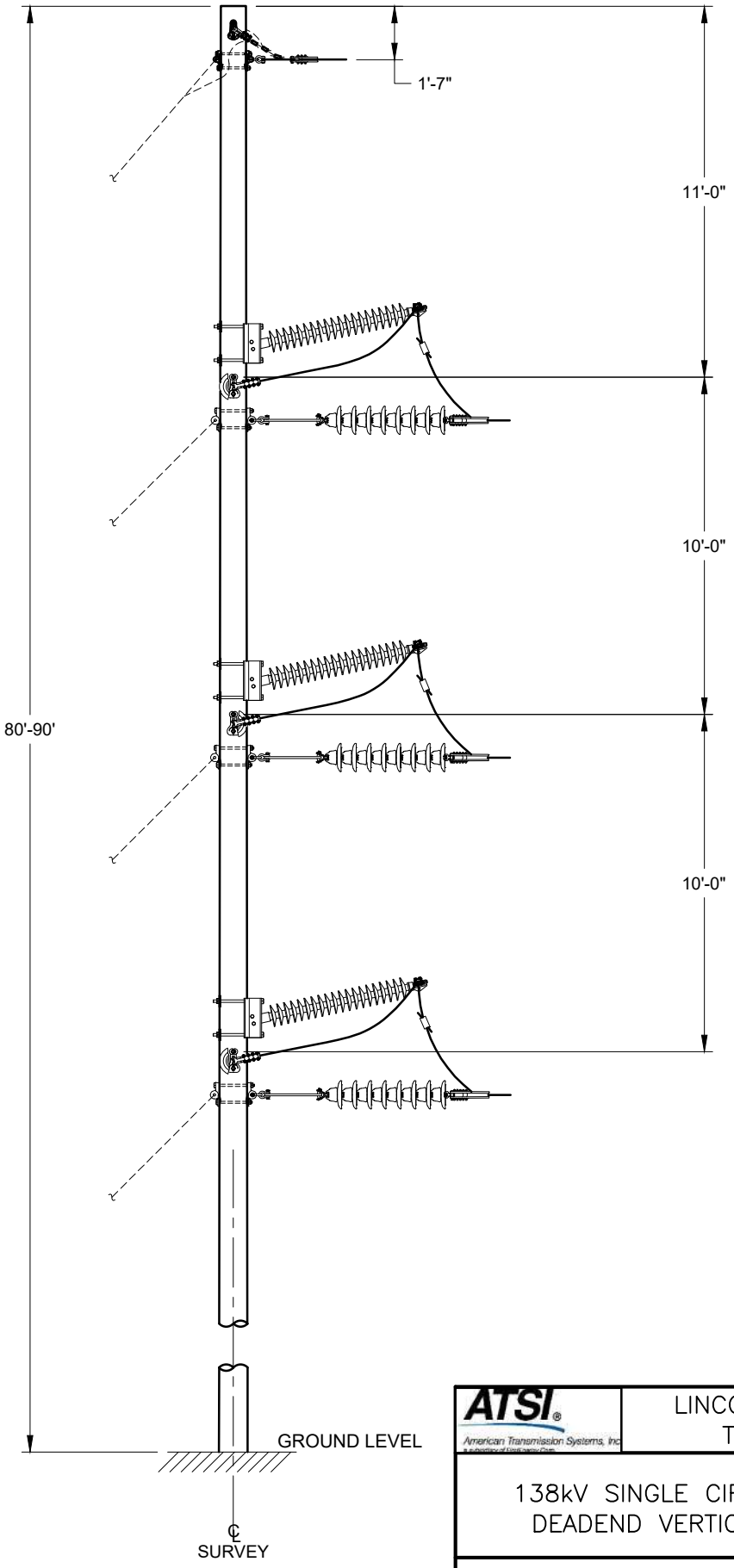
SCALE: NTS

ATSI
American Transmission Systems, Inc.

LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT POLE STRUCTURE SUSPENSION
VERTICAL SINGLE POLE 30° TO 50°

EXHIBIT 5–1C



PAPER SIZE: 8.5X11

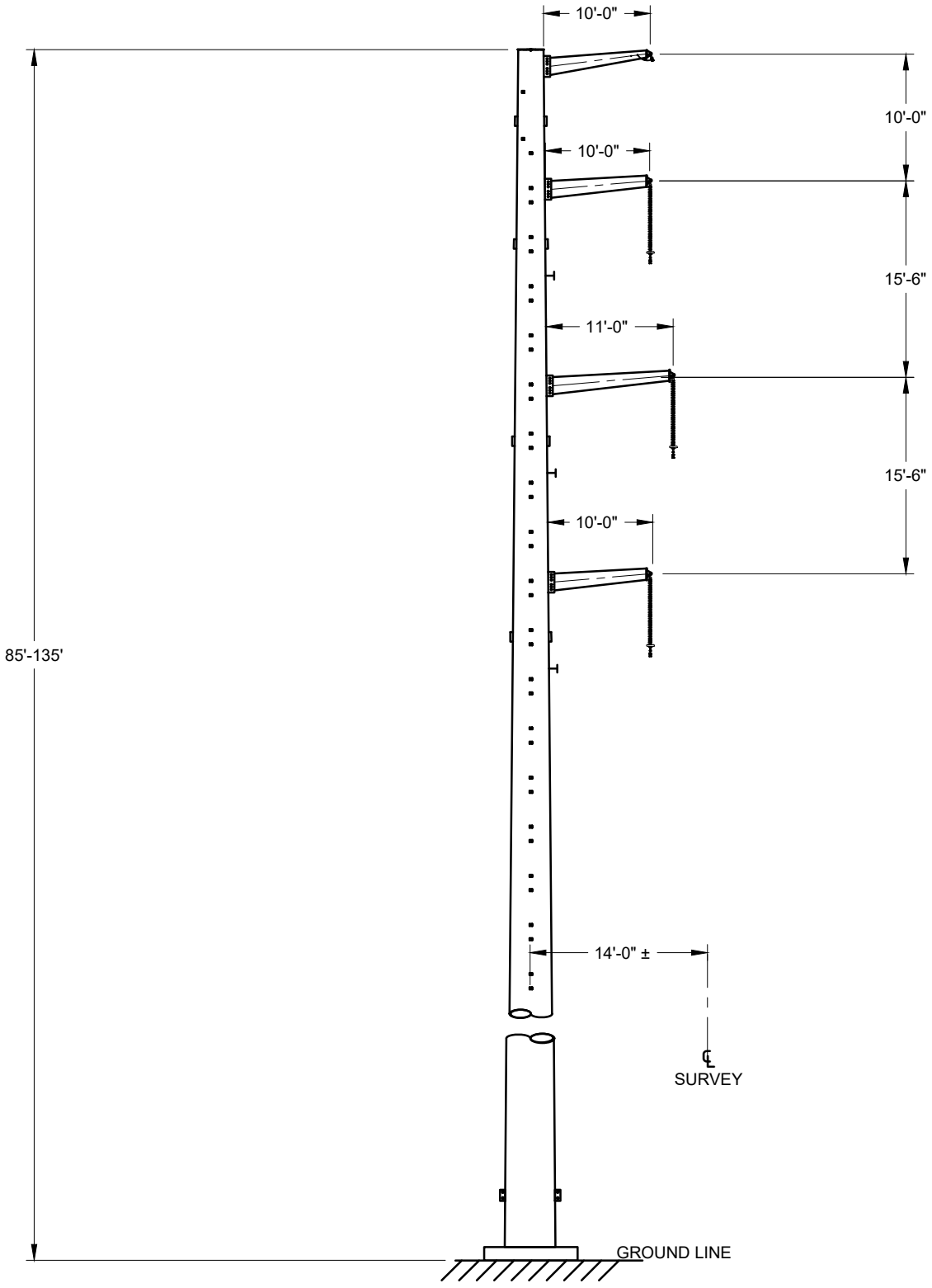
SCALE: NTS

ATSI
American Transmission Systems, Inc.

LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT WOOD POLE STRUCTURE
DEADEND VERTICAL SINGLE POLE 45° TO 60°

EXHIBIT 5–1D



ATSI
American Transmission Systems, Inc.

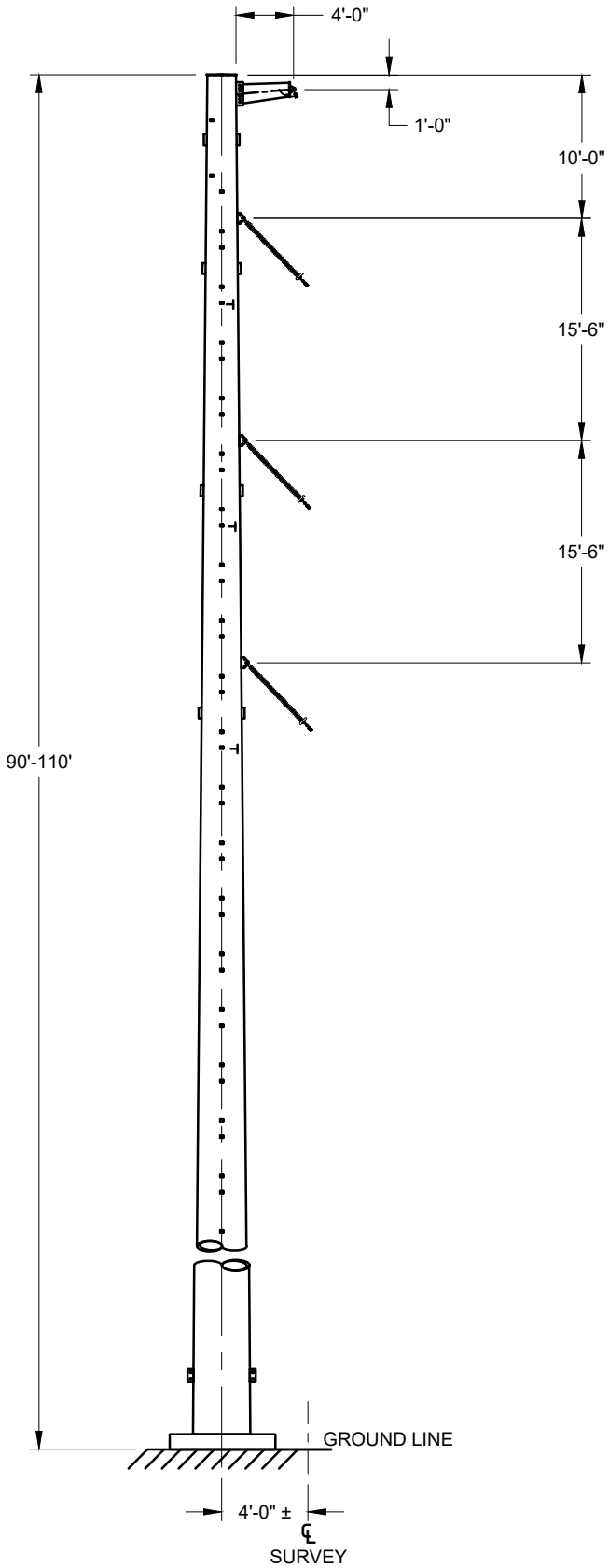
LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT TUBULAR STEEL STRUCTURE
SUSPENSION SINGLE POLE 0° TO 30°

EXHIBIT 5-1E

PAPER SIZE: 8.5X11

SCALE: NTS



ATSI
American Transmission Systems, Inc.

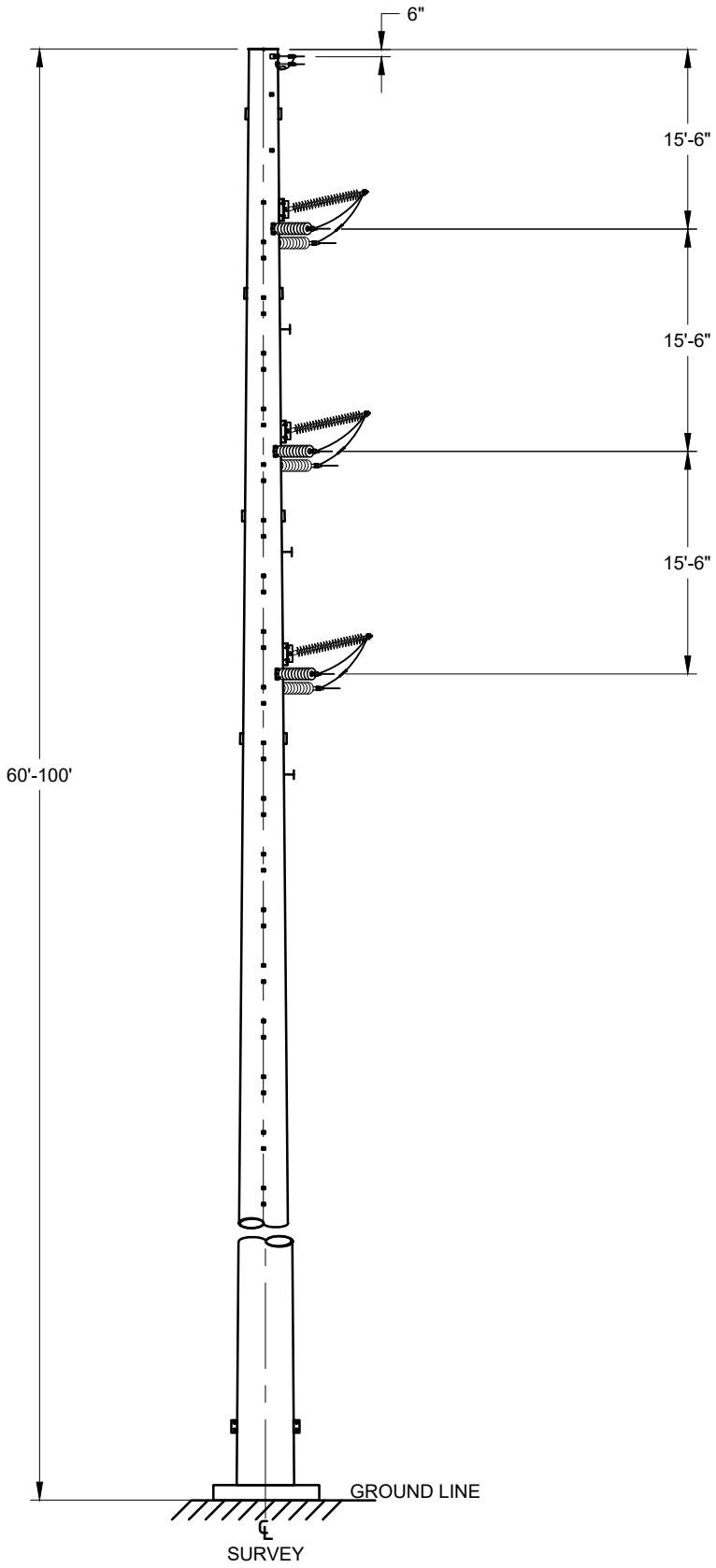
LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT TUBULAR STEEL STRUCTURE
SUSPENSION SINGLE POLE 30° TO 50°

EXHIBIT 5–1F

PAPER SIZE: 8.5X11

SCALE: NTS



ATSI
American Transmission Systems, Inc.

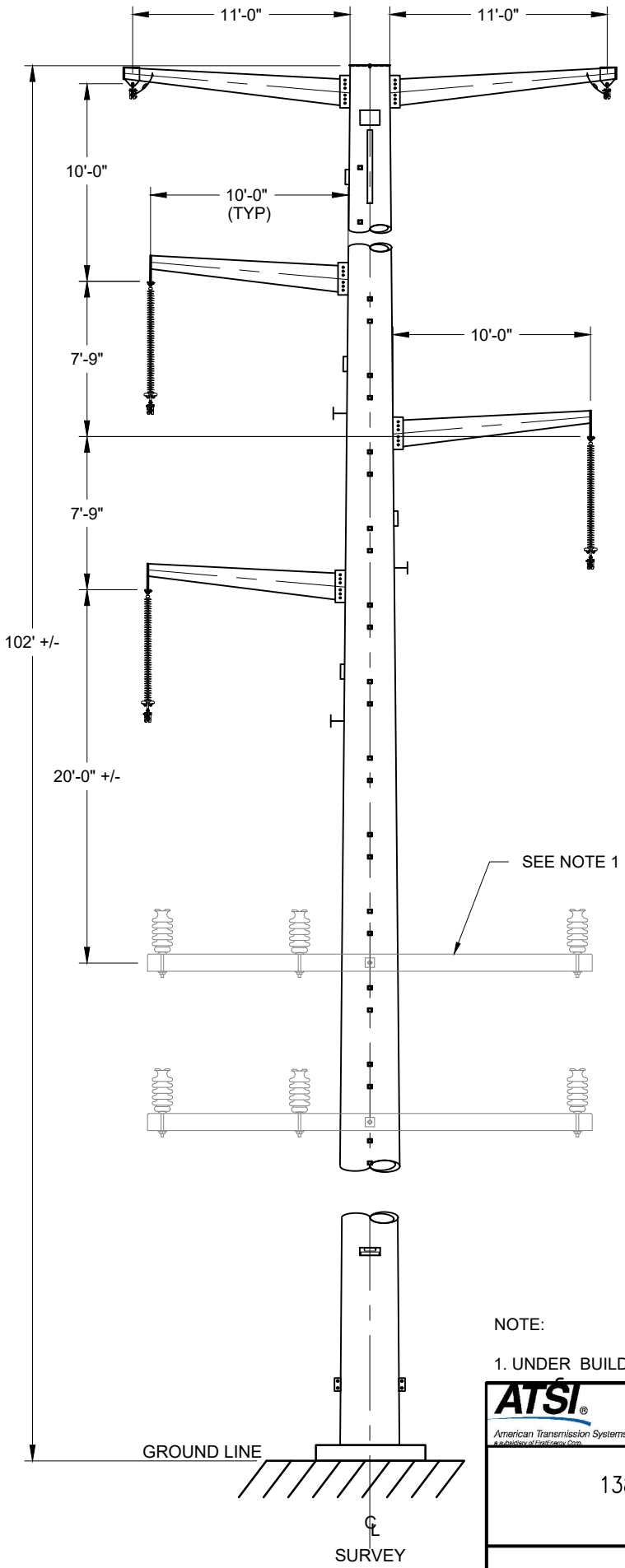
LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT TUBULAR STEEL STRUCTURE
DEADEND SINGLE POLE 0° TO 60°

EXHIBIT 5-1G

PAPER SIZE: 8.5X11

SCALE: NTS



NOTE:

1. UNDER BUILD CROSSARM(S) TO BE USED WHERE NECESSARY.

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

LINCOLN PARK – RIVERBEND 138kV
TRANSMISSION LINE PROJECT

138kV SINGLE CIRCUIT STEEL POLE STRUCTURE
DELTA SUSPENSION SINGLE POLE

EXHIBIT 5–1H

PAPER SIZE: 8.5X11

SCALE: NTS

BLUE CLAY FIRM AND MOIST SOME STONES 14"TO 1' BECOMING PLASTIC

BROWN CLAY WITH BLUE CLAY MIX VERY FIRM AND PLASTIC VERY SOME SAND

EL 821.60 WATER ENTERING HOLE

BROWN SAND WET FAIRLY FIRM WATER ABOVE CAUSING PROBLEMS CAN NOT PENETRATE ROCK

ROCK

BURIED FIBER OPTIC CABLE IN 4" PVC

RIVERBEND - SALT SPRINGS 138 KV LINE

HANDHOLE HA-510

G.W.

138 KV LINE

S 54° 38' 46" E. 551.31'

N. 72° 26' 35" W. 477.70'

I.P.

E.W. BASE LINE

N.S. BASE LINE

SPOIL AREA

FLOOR 845.00

CONTROL HOUSE

HYDRANT

GATE

SLAG

TEST HOLE #1

TEST HOLE #2

TEST HOLE #3

TEST HOLE #4

31' OF 1" COPPER

4" BRICK SEWER

EL. Top Of Pipe 834.50

EL. Top Of Pipe 834.32

EL. Top Of Pipe 833.73

EL. Top Of Pipe 834.90

BURIED

ERIE R

15729055

FIRSTENERGY

RIVERBEND - WICKLIFFE 138KV LINE

SALT SPRINGS - RIVERBEND 138KV LINE

LINCOLN PARK - RIVERBEND 138KV LINE

BELMONT - RIVERBEND #2 23 KV LINE

STATIC WIRE

LINCOLN PARK - RIVERBEND 23KV LINE

CENTER - RIVERBEND 23KV LINE

BELMONT - RIVERBEND #1 23 KV LINE

OAKHILL - RIVERBEND 23KV LINE

DRIVE

12' CROSSOVER

3' TO 1' SLOPE

N

PROJECT DEVELOPMENT

DATE: 04/17/20

BY: RKB	FirstEnergy	DIST. CODE:	REGION: DH-EA / AREA: Youngstown
APP: BLT	Energy Delivery Technical Services	SCALE: 1/8"=1'-0"	FACILITY: RIVERBEND
DATE: 04/17/20		SIZE: 42x30	
CHKD: Proj Dev			

DRAWING TO BE USED FOR PROJECT DEVELOPMENT ONLY.

OPERATING COMPANY: Ohio Edison (OE)

Title
Appendix S-1
Riverbend Substation Expansion Drawing

SAP NETWORK NO.: 15729055

DOC. ID: O-YN-119-G4,SH.1

REV: -

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.	$2,198,000	$2,559,000
352	Structures and Improvements	$1,871,270	$1,871,270
353	Substation Equipment	$3,639,930	$3,639,930
354	Towers and Fixtures	$0	$0
355	Poles and Fixtures	$11,394,595	$9,496,500
356	Overhead Conductors and Devices	$3,999,805	$6,382,300
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	$0	$0
	TOTAL	$23,103,600	$23,949,000

FERC = Federal Energy Regulatory Commission

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

Because this Application is for an electric transmission line 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 and Alternate Routes, including all areas within 1,000 feet of the centerline, are located in Mahoning County, including portions of the City of Youngstown, the City of Campbell, and Coitsville Township. The Riverbend Substation is located within the City of Youngstown in Mahoning County.

(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 included: mailing the required notice letters to residents, tenants, and elected officials; providing public notice of a public information open house and the alternative public engagement plan; creating and maintaining the Project website; conducting a virtual open house; and hosting other alternative public engagement (e.g., virtual meeting with City of Youngstown Parks Committee). 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. A copy 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 1-888-311-4737, 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/lincoln-park-riverbend.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/linoln-park-riverbend.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 upon request.

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 Mahoning County. ATSI will pay personal 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 $1,862,985 and $1,917,124, respectively.

Based on the 2019 tax rates, the following information includes preliminary estimates for these taxing authorities:

Preferred Route:

Mahoning County	$270,495
Youngstown City -Youngstown City School District	$1,592,490
	TOTAL $1,862,984

Alternate Route:

Mahoning County	$280,392
Youngstown City - Youngstown City School District	$1,467,167
Campbell City - Campbell City School District	$167,453
Coitsville Township	$2,112
	TOTAL $1,917,124

APPENDIX 6-1
Lincoln Park-Riverbend 138 kV Transmission Line Project
Officials to Be Served a Copy of the Certified Application

Mahoning County

Board of County Commissioners
Mr. David C. Ditzler
21 W Boardman Street, 2nd Floor
Youngstown, OH 44503
330-740-2006

Board of County Commissioners
Ms. Carol Rimedio-Righetti
21 W Boardman Street, 2nd Floor
Youngstown, OH 44503
330-740-2006

Board of County Commissioners
Mr. Anthony Traficanti
21 W Boardman Street, 2nd Floor
Youngstown, OH 44503
330-740-2006

Mahoning County Engineer's Office
Mr. Patric T. Ginnetti, P.E., P.S.
940 Bears Den Road
Youngstown, OH 44511
330-799-1581

Mahoning County Planning Commission
Mr. Micheal P. O'Shaughnessy,
Executive Director
50 Westchester Drive, Suite 203
Youngstown, OH 44515
330-270-2890

Mahoning County Soil & Water District
Ms. Kathleen Vrable-Bryan, District Admin.
850 Industrial Road
Youngstown, OH 44509
330-740-7995

Coitsville Township

Coitsville Township Officials
Ms. Phyllis Johnson
Vice - Chairman
6767 McGuffey Road
Lowellville, OH 44436
330-534-0508

Coitsville Township Officials
Mr. Gerald Backo,
Chairman
6262 McGuffey Road, Ext.
Lowellville, OH 44436
330-534-1502

Coitsville Township Officials
Mr. Robert Lisko, Trustee
6126 McCartney Road
Lowellville, OH 44436
330-503-1454

Coitsville Township Officials
Ms. Christeen Partika,
Fiscal Officer
6050 Villa Marie Road
Lowellville, OH 44436
330-501-9744

City of Youngstown

City of Youngstown Mayor's Office
Mayor Jamael Tito Brown
26 S Phelps St., 1st Floor
Youngstown, OH 44503
330-742-8701

Youngstown City Council
Mr. DeMaine Kitchen, President
26 S Phelps St., 6th Floor
Youngstown, OH 44503
330-742-8709

Youngstown City Council
Mr. Julius T. Oliver
1st Ward
91 E. Warren Avenue
Youngstown, OH 44507
330-259-6158

Youngstown City Council
Mr. Jimmy Hughes
2nd Ward
3239 Oak Street Ext.
Youngstown, OH 44505
330-272-5108

Youngstown City Council
Ms. Samantha Turner,
3rd Ward
465 Fairgreen Avenue
Youngstown, OH 44504
330-398-9514

Youngstown City Council
Mr. Mike Ray
4th Ward
377 Division Street
Youngstown, OH 44509
330-792-5956

Youngstown City Council
Ms. Lauren McNally
5th Ward
1255 E. Cherokee Drive
Youngstown, OH 44511
330-423-2112

Youngstown City Council
Ms. Anita Davis
6th Ward
469 Mistletoe Avenue
Youngstown, OH 44511
330-207-0302

Youngstown City Council
Ms. Basia Adamczak
7th Ward
1215 Aberdeen Avenue
Youngstown, OH 44502
330-7518-6942

Youngstown City Planning and Zoning Division
Ms. Nikki Posterli, Director
26 S Phelps Street, 4th Floor
Youngstown, OH 44503
330-742-8704

City of Campbell

City of Campbell Mayor's Office
Mayor Nick Phillips
351 Tenney Avenue
Campbell, OH 44405
330-755-1451

City of Campbell Mayor's Office
Mr. Steve Cappittee
Zoning Inspector
351 Tenney Avenue
Campbell, OH 44405
330-755-1451

Campbell City Council Office
Mr. George Levendis
Council President
351 Tenney Avenue
Campbell, OH 44405
330-755-1663

Campbell City Council Office
Mr. Timothy O'Bryan
1st Ward
351 Tenney Avenue
Campbell, OH 44405

Campbell City Council Office
Mr. Bryan Tedesco
2nd Ward
351 Tenney Avenue
Campbell, OH 44405
330-755-1663

Campbell City Council Office
Mr. Joseph Mazzocca Jr.
3rd Ward
351 Tenney Avenue
Campbell, OH 44405
330-755-1663

Campbell City Council Office
Mr. Robert Stanko
4th Ward
351 Tenney Avenue
Campbell, OH 44405
330-755-1663

Libraries

Youngstown and Mahoning County
District Public Library
Ms. Aimee Fifarek, Executive Director
305 Wick Avenue
Youngstown, OH 44503
330-744-8636

Energizing the FUTURE

Lincoln Park-Riverbend 138-kV Transmission Line Project

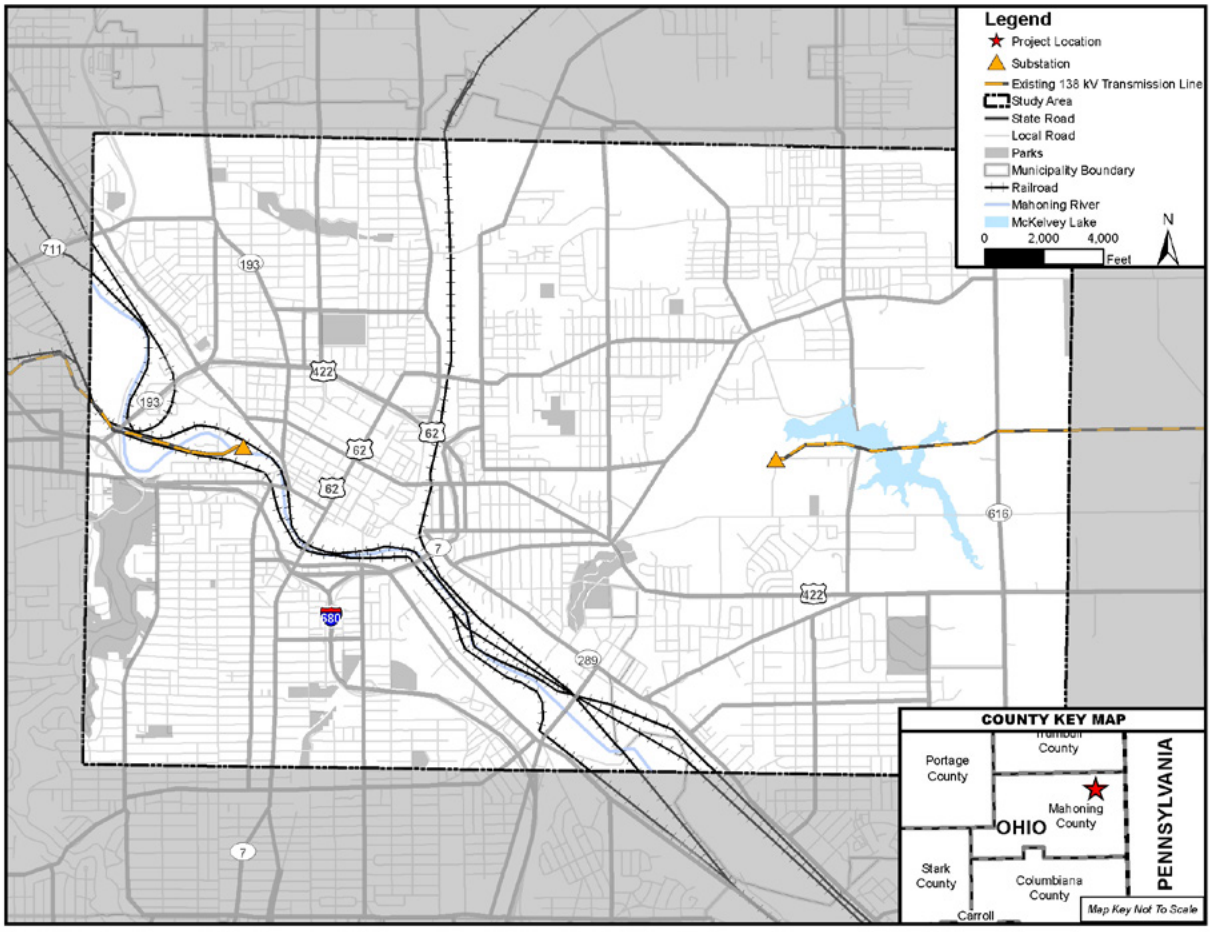
Enhancing Service Reliability and Performance for approximately 15,000 Ohio Edison Customers in the City of Youngstown and Surrounding Area

At FirstEnergy, it's our responsibility to deliver the power our customers depend on in their daily lives. American Transmission Systems, Incorporated (ATSI), a transmission subsidiary of FirstEnergy, is proposing to construct a new 138-Kilovolt (kV) Transmission Line and upgrade two existing substations in the Youngstown, Ohio, area. The project is expected to enhance service reliability and performance for approximately 15,000 customers and support residential and business expansion plans in the area.

Project Overview

ATSI will build a new approximately 5-mile, 138-kV transmission line between the existing Lincoln Park and Riverbend Substations, both located in Youngstown. In addition, the Riverbend Substation will be upgraded to an advanced design that will help reduce the frequency and duration of power outages, and the Lincoln Park Substation will be upgraded to accommodate the new transmission line.

Continued



COMM9163-11-20-CV
Produced by FirstEnergy's Communications and Branding Department

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

Along with increased transmission system reliability, the project will support the existing 23-kV distribution network that provides electric service to thousands of residential customers as well as St. Elizabeth Hospital, Youngstown State University and many commercial and industrial facilities in the area. The project will also alleviate voltage concerns in the Lincoln Park service area, which provides electric service to portions of Ward 1 and Ward 2.

Line Siting and Approvals

ATSI will file an application and seek authorization from the Ohio Power Siting Board ("OPSB") for this project. In addition, all required permits and authorizations from federal, state and local agencies will be secured to complete the project.

Multiple routes for the transmission line will be carefully evaluated to avoid potentially sensitive areas and minimize impacts to land owners and the community. The project's two end points are illustrated on the accompanying map.

Easements

Single wood poles will support the majority of the new transmission line, with steel poles used where necessary. ATSI will negotiate with property owners to obtain the necessary agreements for right-of-way and vegetation management rights. Company representatives will work closely with local officials and affected landowners to keep them updated on the project.

Permitting

Detailed wetland, stream and other environmental and historical evaluations will be performed along the transmission line route. ATSI will obtain all permits required by state and federal agencies prior to construction.

Construction

Transmission line construction is projected to begin in November 2022, with an in-service date of December 1, 2023.

Preliminary Project Timeline

Jan. 2021..... Filing with the Ohio Power Siting Board

Jan. 2021 – Nov. 2022 ..... Real Estate Negotiations

Nov. 2022 .....Construction Start

Dec. 2023 ..... Project In-Service Date

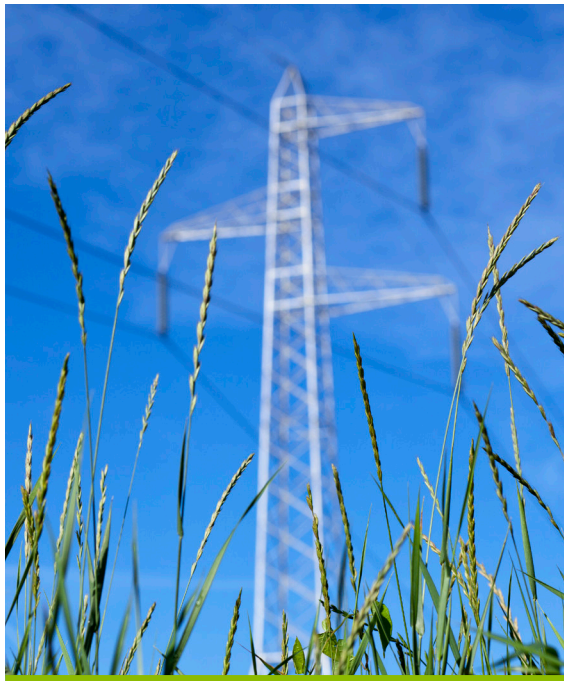
About *Energizing the Future*

Through *Energizing the Future*, FirstEnergy Corp.'s ("FirstEnergy") transmission-owning operating companies have 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.

For more information and project updates, visit firstenergycorp.com/about/transmission_projects/ohio

Energizing the FUTURE

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



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

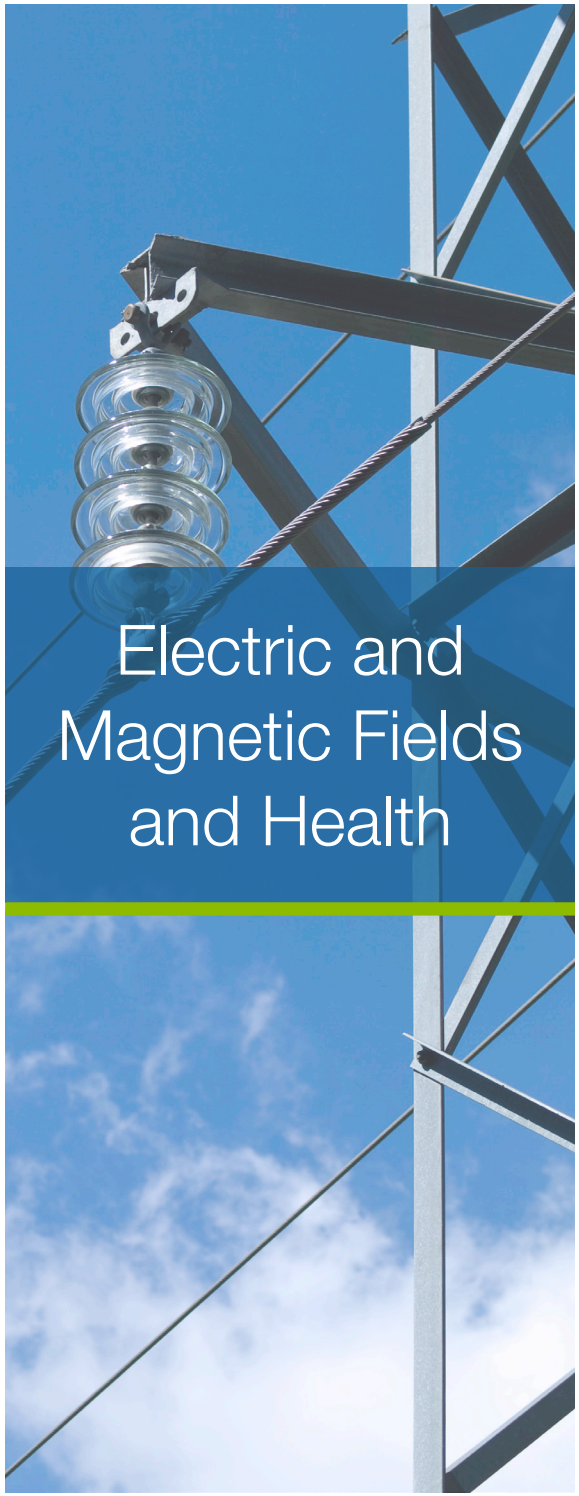
http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

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



Electric and Magnetic Fields and Health

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).

Table 1. Magnetic Fields Measured from Appliances

Source	Distance from Source*		
	6 inches (mG)	1 foot (mG)	2 feet (mG)
Can Opener	600	150	20
Vacuum Cleaner	300	60	10
Hair Dryer	300	1	–
Portable Heater	100	20	4
Electric Range	30	8	2
Dishwasher	20	10	4
Toaster	10	3	–
Coffee Maker	7	–	–

Source: EMF Questions and Answers (NIEHS, 2002)

* The numbers represent the median magnetic field (i.e., half of the appliances tested had higher levels and half had lower levels than those shown in the figure).

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.

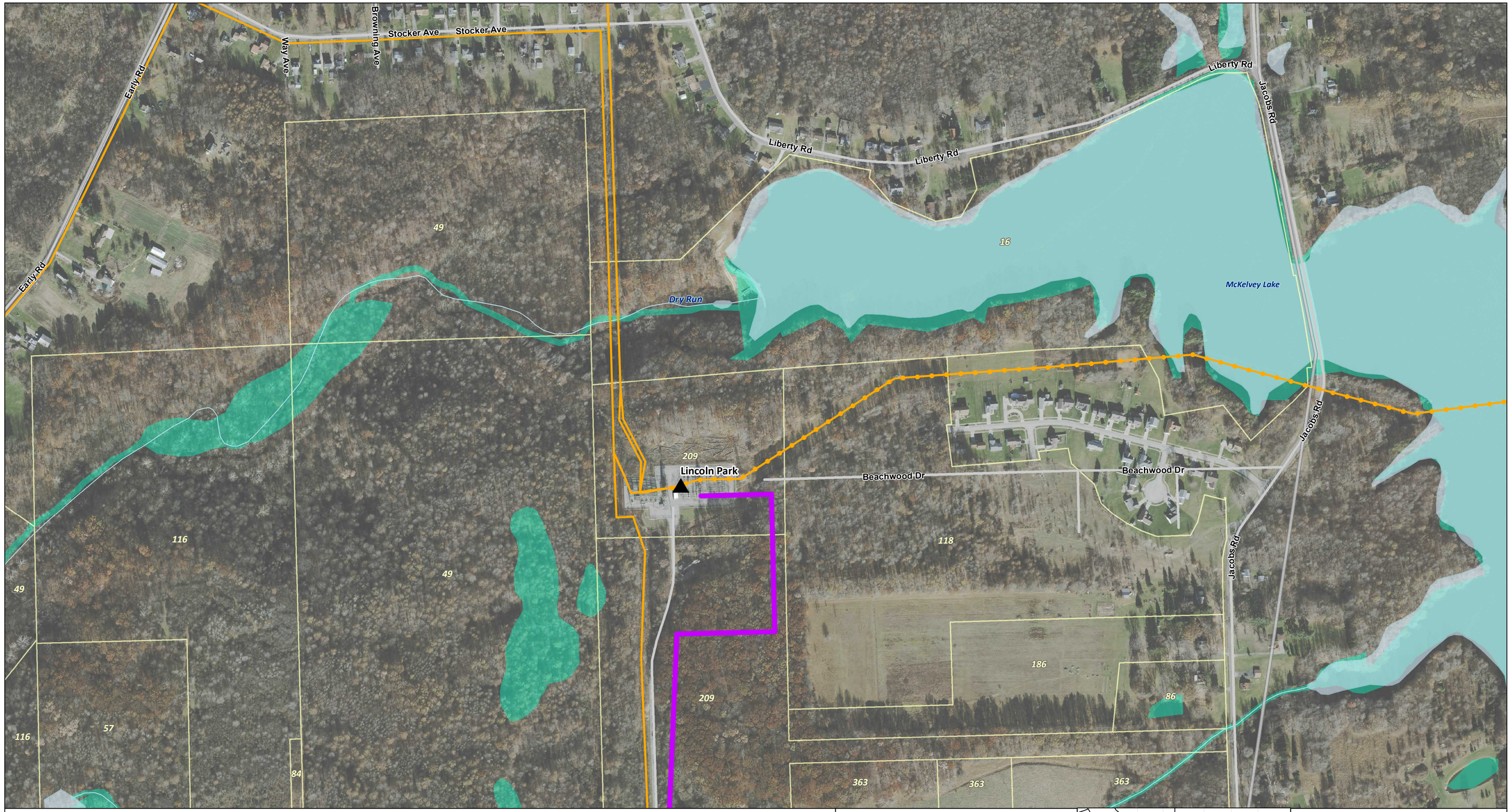
How Are Scientific Conclusions Drawn from Health Studies?

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.



- Existing Substation
- Common Route
- Existing Transmission Line (69 kV or lower)
- Existing Transmission Line (138 kV)
- Stream
- Waterbody
- NWI Wetland
- Parcel Boundary

ATSI

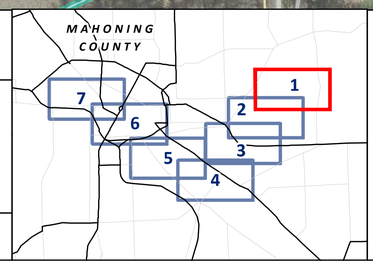
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

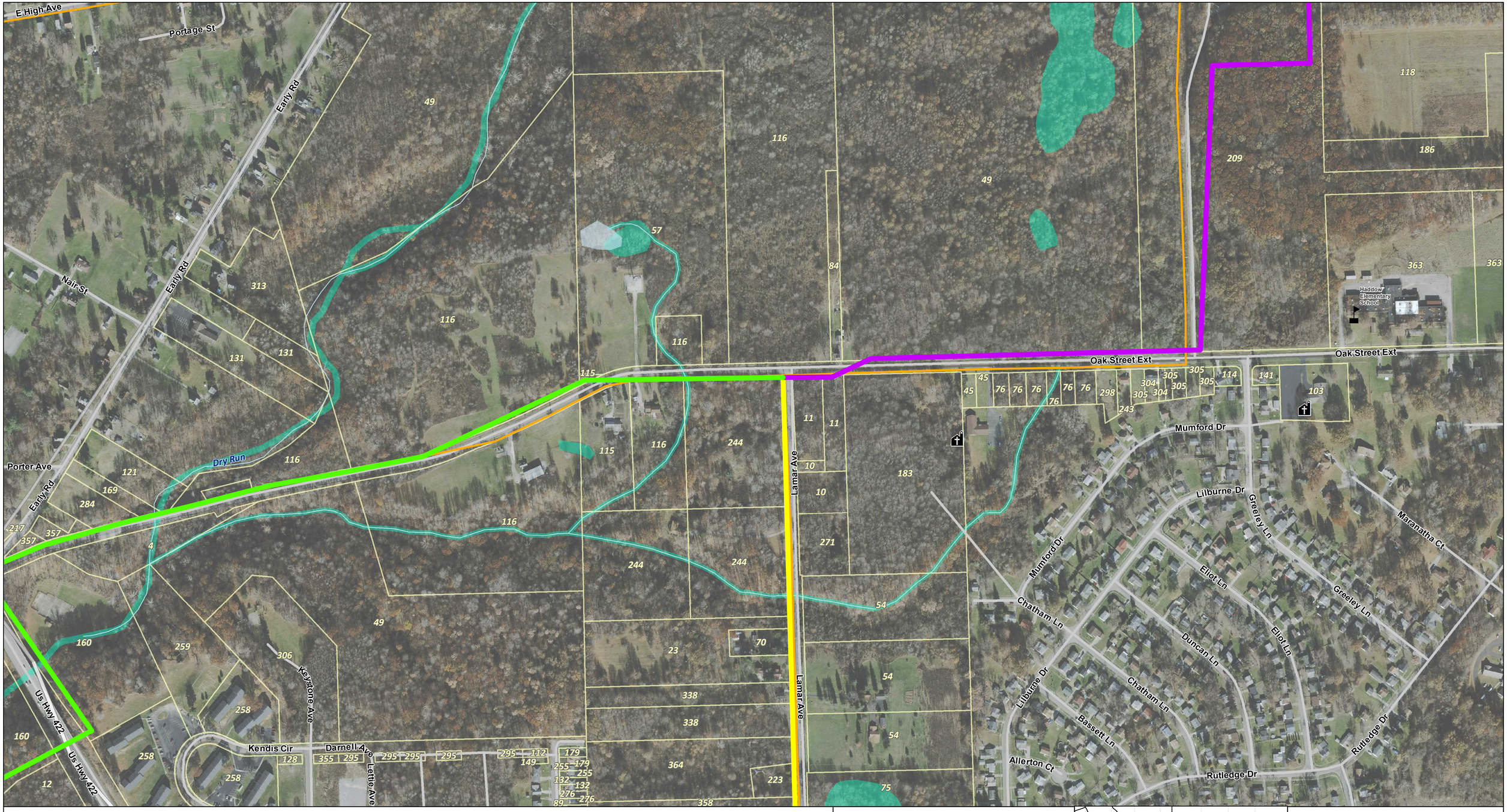
Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 1 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project



- Alternate Route
- Common Route
- Preferred Route
- Existing Transmission Line (69 kV or lower)
- Stream
- Waterbody
- NWI Wetland
- Parcel Boundary
- Church
- School

ATSI

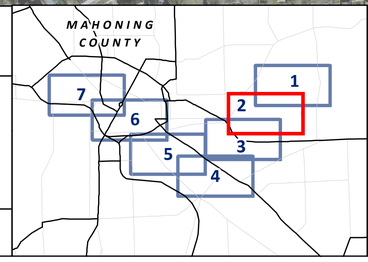
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

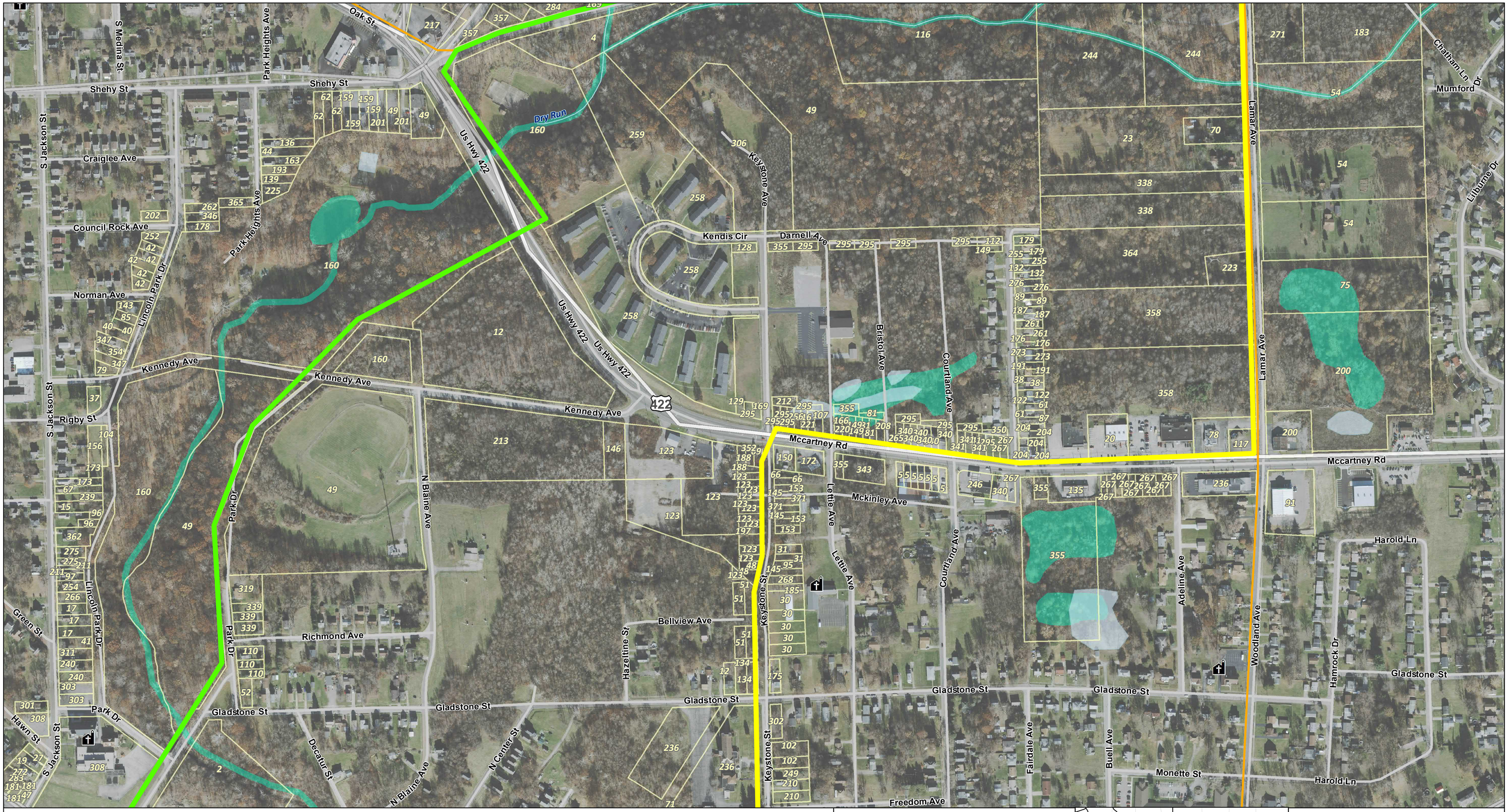
Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 2 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project



- Alternate Route
- Preferred Route
- Existing Transmission Line (69 kV or lower)
- Stream
- Waterbody
- NWI Wetland
- Parcel Boundary
- Church

ATSI

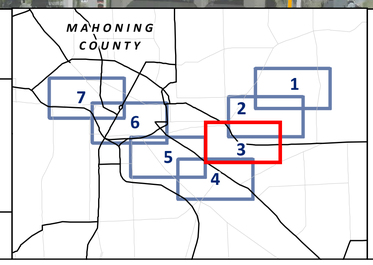
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

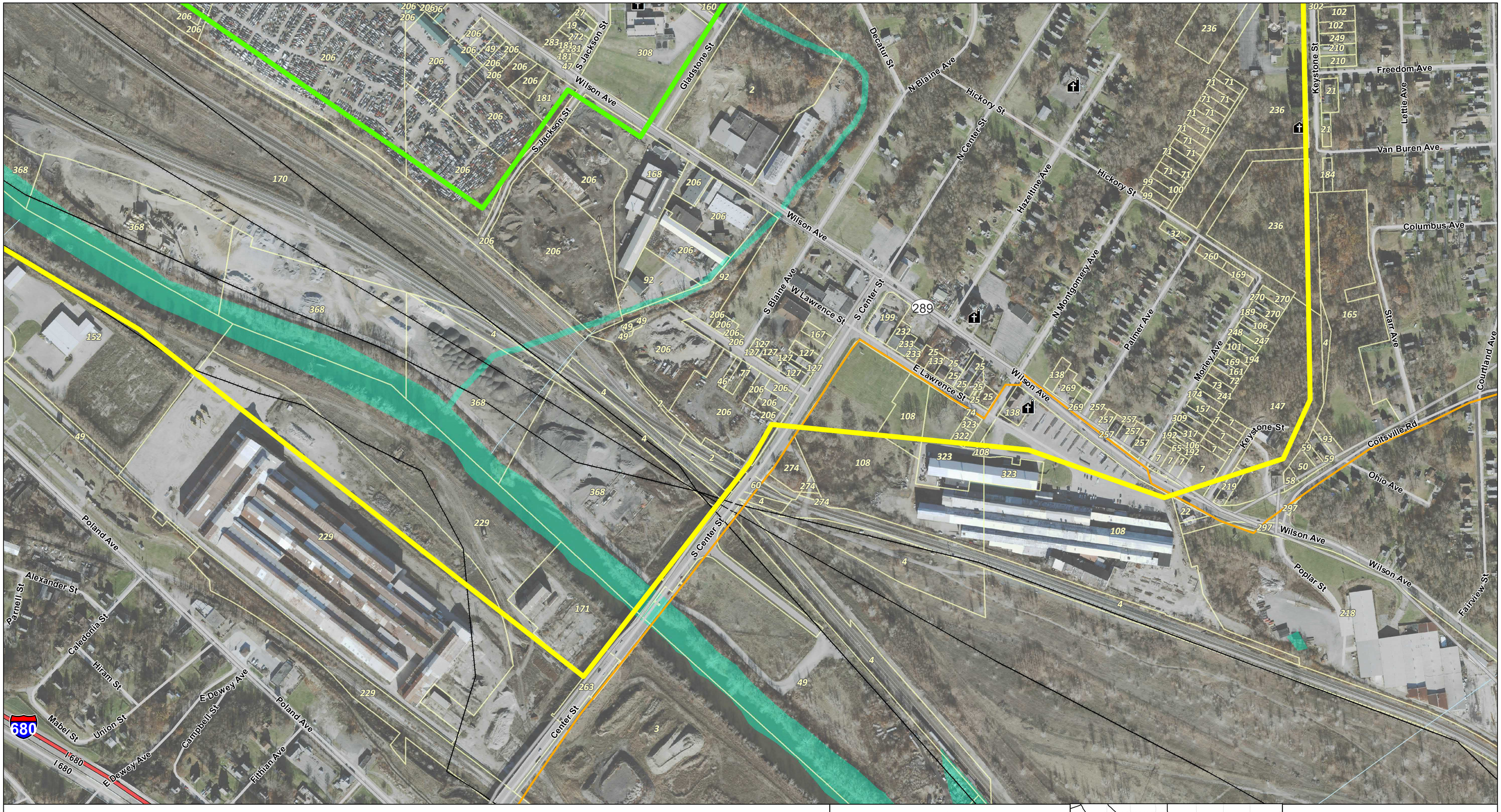
Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 3 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project



- Alternate Route
- Preferred Route
- Existing Transmission Line (69 kV or lower)
- Stream
- NWI Wetland
- Parcel Boundary
- Church
- Railroads (Local)

ATSI

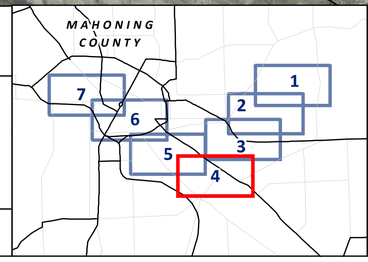
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

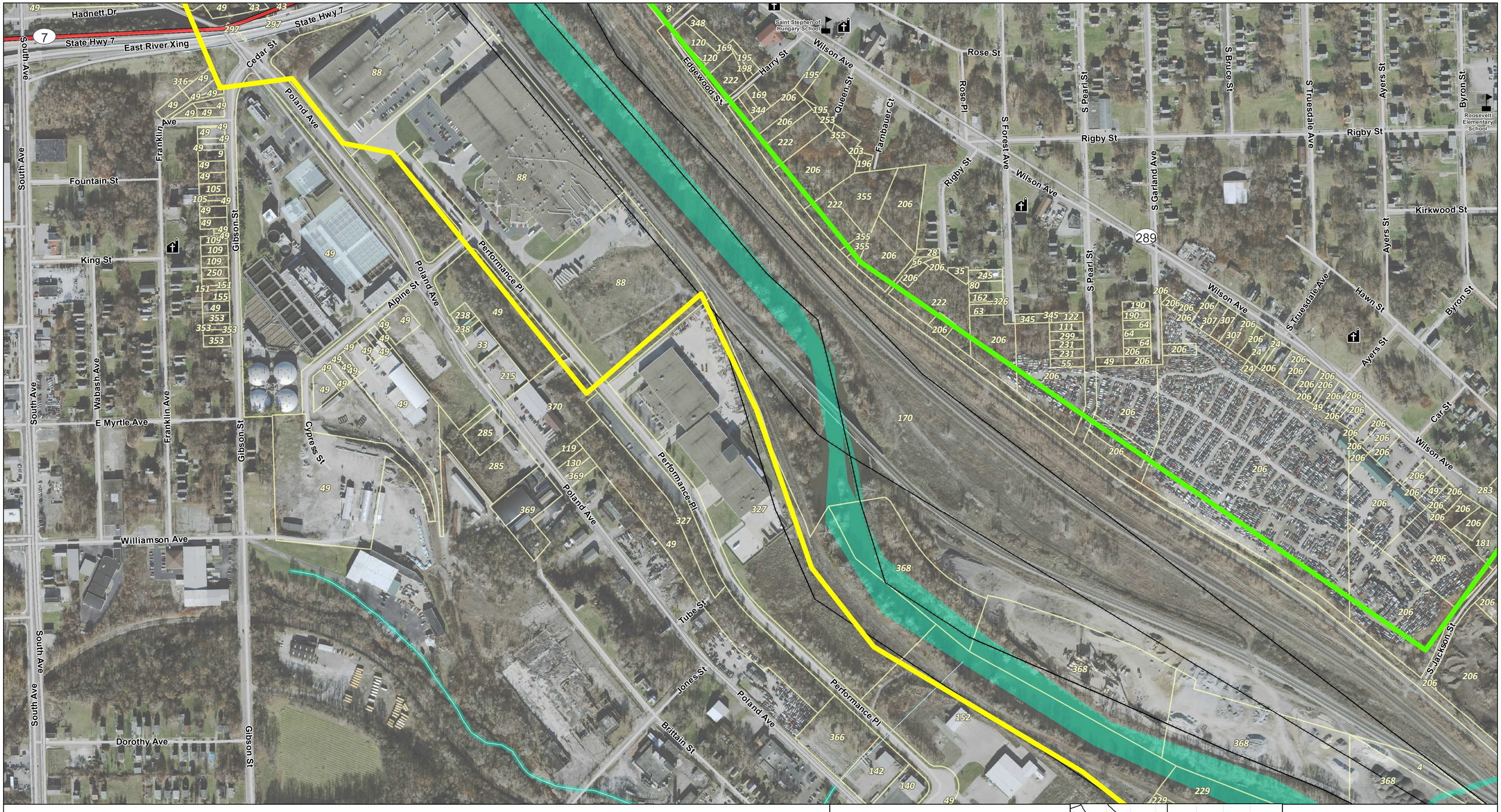
Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 4 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project



- Alternate Route
- Preferred Route
- Stream
- Waterbody
- NWI Wetland
- Parcel Boundary
- Church
- School
- Railroads (Local)

ATSI

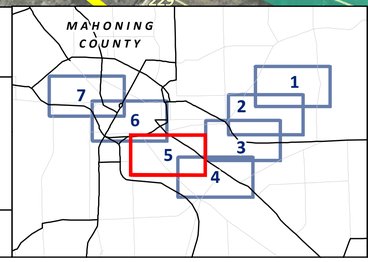
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

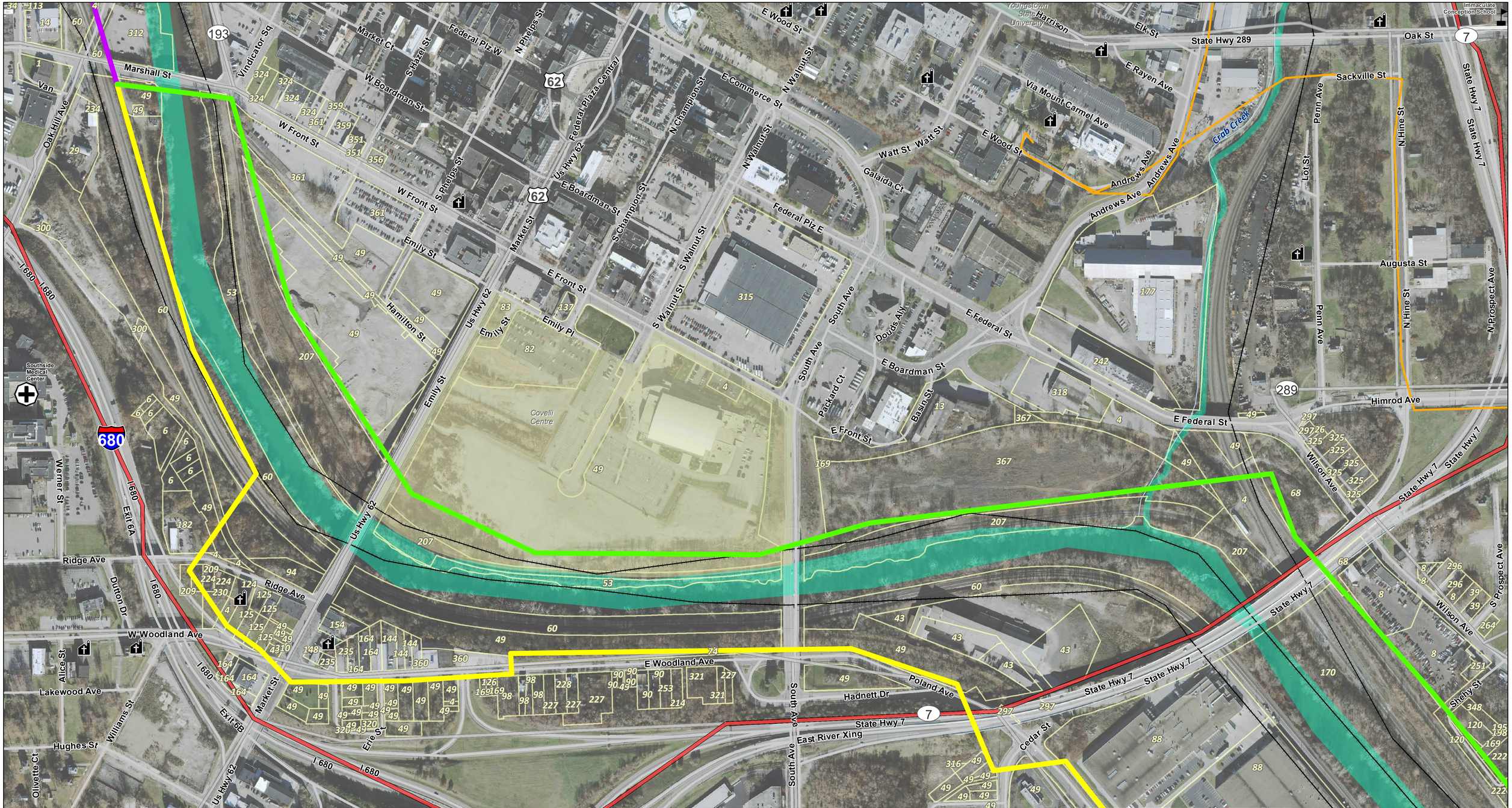
Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 5 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project



- Alternate Route
- Common Route
- Preferred Route
- Existing Transmission Line (69 kV or lower)
- Stream
- NWI Wetland
- Parcel Boundary
- Church
- School
- Hospital
- Railroads (Local)
- Stadium
- University or College

ATSI

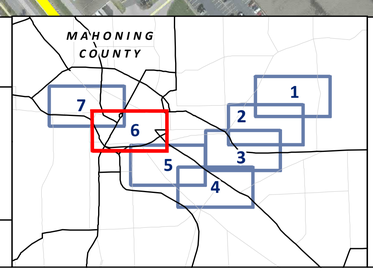
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 6 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project

Existing Substation
Alternate Route
Common Route
Preferred Route
Existing Transmission Line (69 kV or lower)
Existing Transmission Line (138 kV)

Waterbody
NWI Wetland
Parcel Boundary
Church
Railroads (Local)
Stadium

University or College
Parks (Local)

ATSI

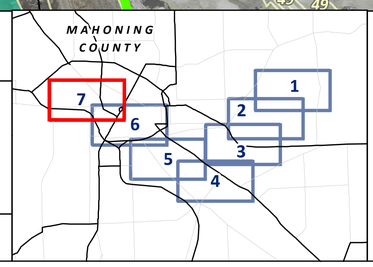
Transmission line routes are preliminary and subject to change

1 inch = 200 feet
when printed at 22x34

0 200 400 600
Feet

Imagery Source: NAIP, 2016

November 13, 2020



Aerial Map 7 of 7

ATSI
Lincoln Park - Riverbend
138kV Transmission Line Project

FirstEnergy

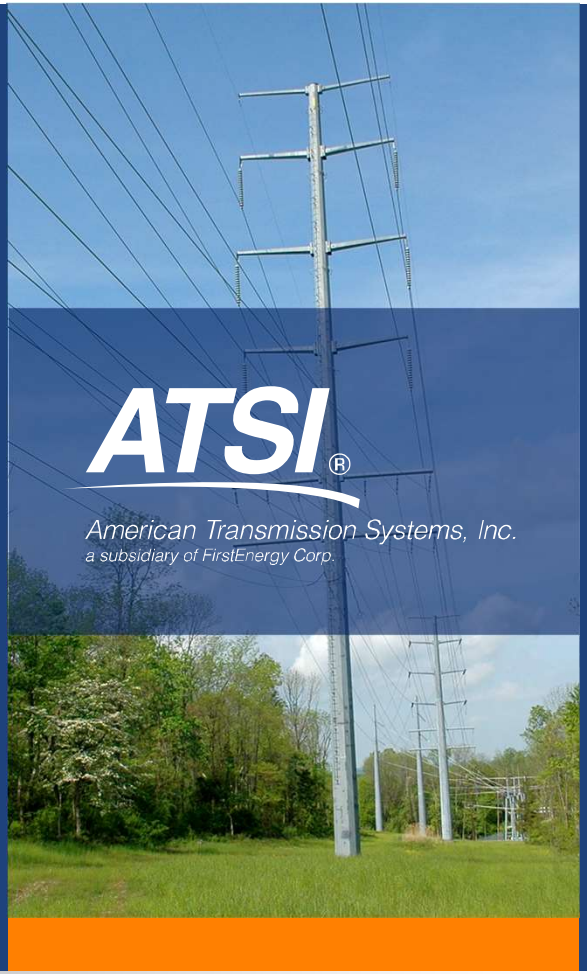
Transmission

Lincoln Park-Riverbend 138-kV Transmission Line Project

American Transmission Systems, Incorporated

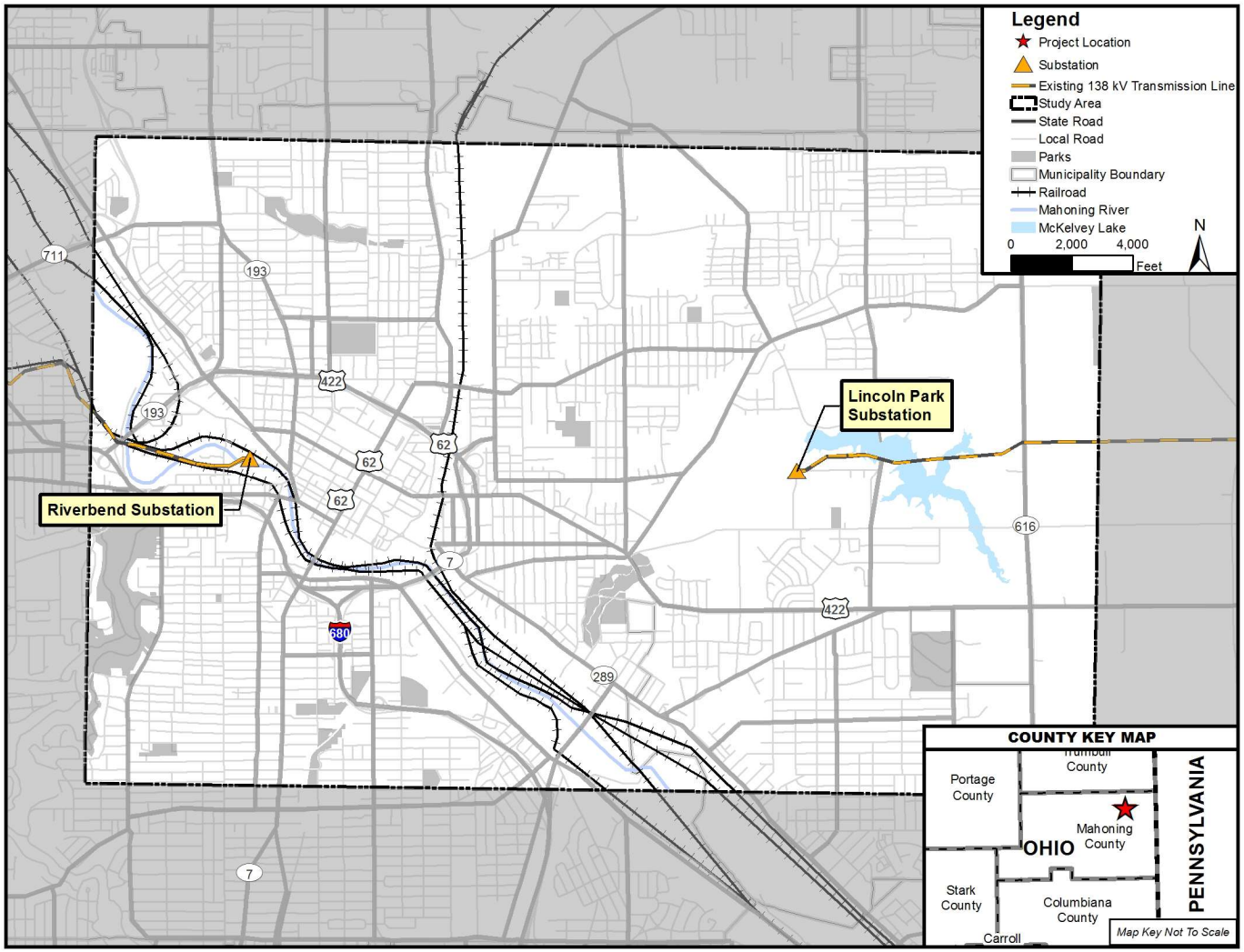
("ATSI"), a FirstEnergy Company

December 2020



Energizing the FUTURE

Lincoln Park-Riverbend Overview



- **An approximate 5-mile 138-kV transmission line connecting the Lincoln Park and Riverbend substations in Youngstown, Ohio**
- **Upgrades at both the Lincoln Park and Riverbend substations**

Need & Benefits

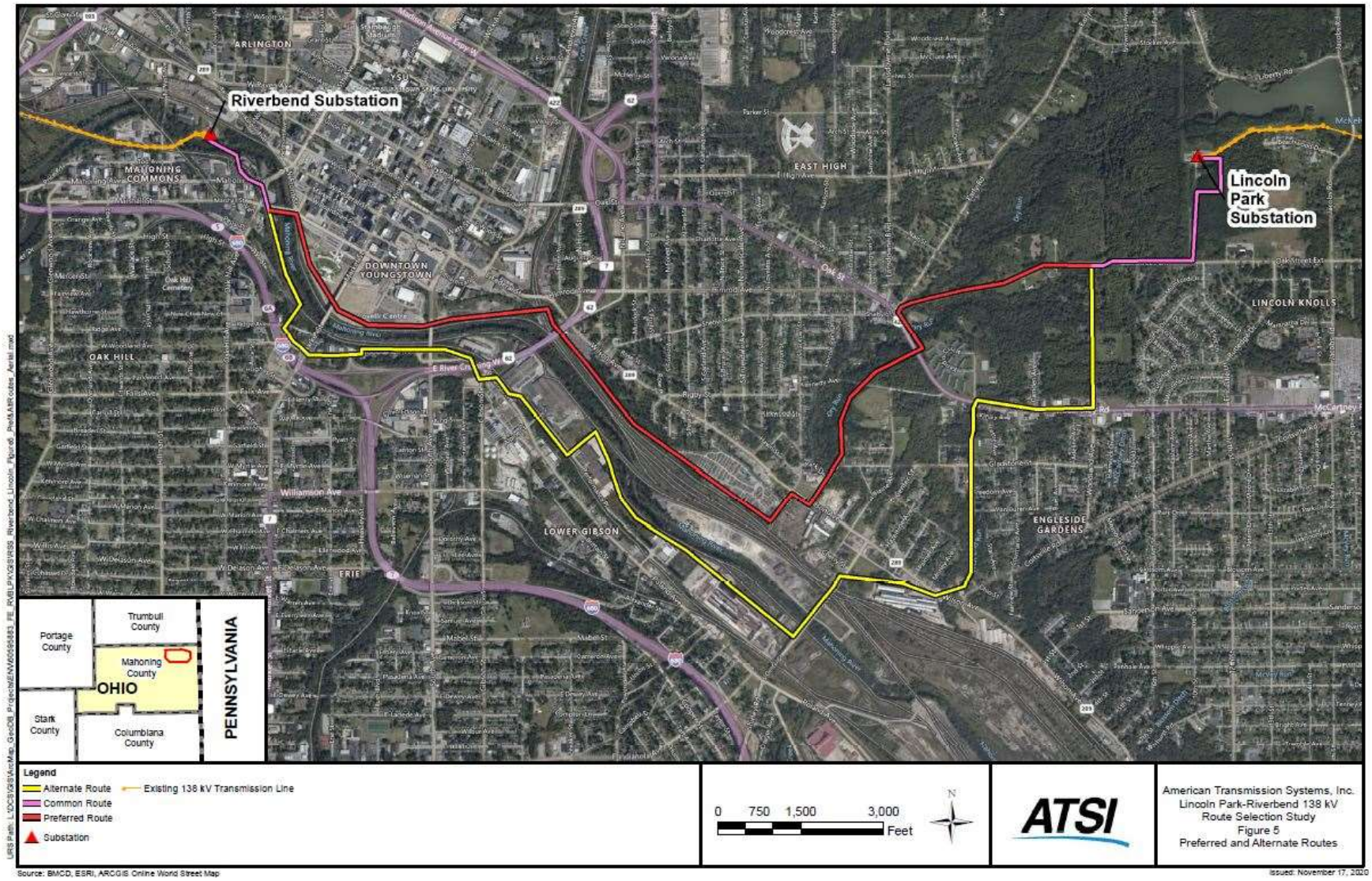
The Project's Objectives:

- **Provide a second 138-kV source to the existing Lincoln Park and Riverbend substations that will improve transmission system reliability**
- **Provide additional support for the existing 23-kV distribution network that provides electric service to thousands of residential customers, as well as St. Elizabeth Hospital, Youngstown State University and many commercial and industrial facilities in the area**

These improvements will:

- **Reduce outages for transmission and distribution customers and provide additional capacity for future load growth and economic development in the area**
- **Alleviate voltage concerns in the Lincoln Park service area, which provides electric service to portions of Ward 1 and Ward 2**

Lincoln Park-Riverbend Route Alternatives



Lincoln Park-Riverbend 138-kV Transmission Line Project:

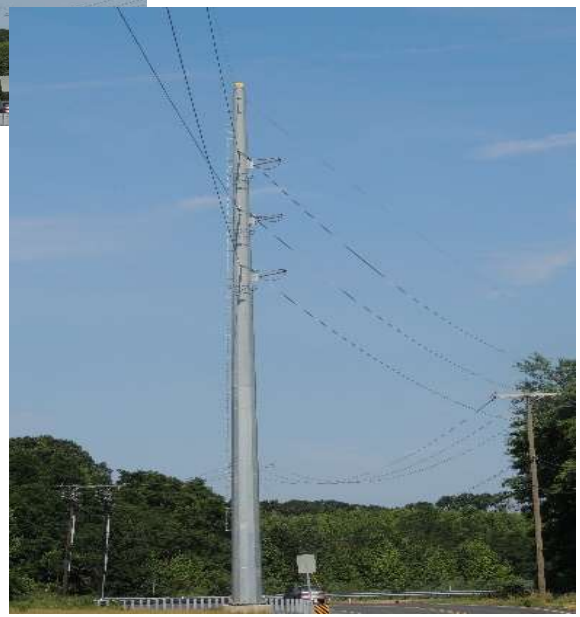
Engineering Design **Structure Types**

Wood Structures

Height: 60’-90’

Steel Monopoles

Height: 60’-135’



Lincoln Park-Riverbend 138-kV Transmission Line Project:

Real Estate Negotiations

- **Right-of-Way width (ROW) Required for the Transmission Line is 65’**
  - ATSI will negotiate with property owners to obtain any necessary easements or vegetation management rights to support the new transmission line.

- **Examples of land rights acquisition:**
  - Easement agreements
  - Priority Tree Rights
  - Access Roads
- **ATSI’s goal is to work with the property owners to obtain all necessary rights to construct the Lincoln Park-Riverbend 138-kV Transmission Line. However, should that not occur, ATSI may seek these rights through eminent domain as a last resort.**

Lincoln Park-Riverbend 138-kV Transmission Line Project:

Vegetation Management

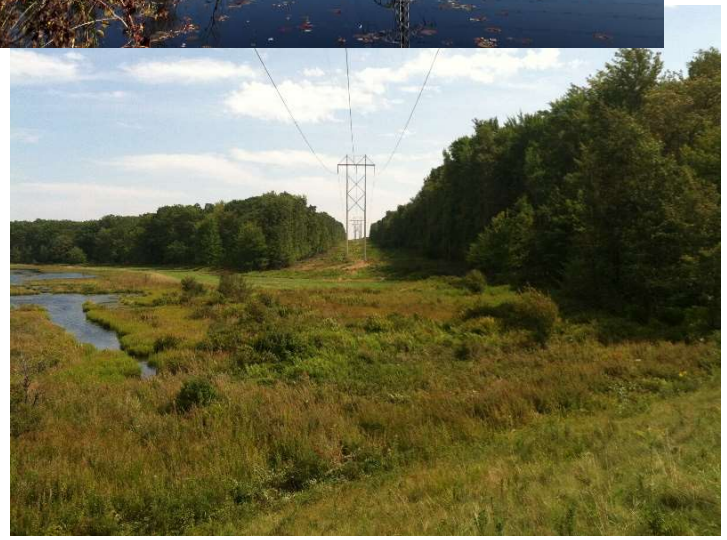
- **Proper vegetation management is an important part of ensuring electric system reliability.**
- **FirstEnergy focuses on responsible vegetation management to create a sustainable, compatible low-growing habitat that supports reliable electric service.**

Lincoln Park-Riverbend 138-kV Transmission Line Project:

Environmental Permitting

Principle Regulatory Agencies

- **U.S. Army Corps of Engineers**
- **U.S. Fish & Wildlife Service**
- **Federal Land Managers (NPS,NFS)**
- **Ohio Environmental Protection Agency**
- **Ohio Department of Natural Resources**
- **State Cultural Resource Agencies**
- **County and Municipal Agencies**



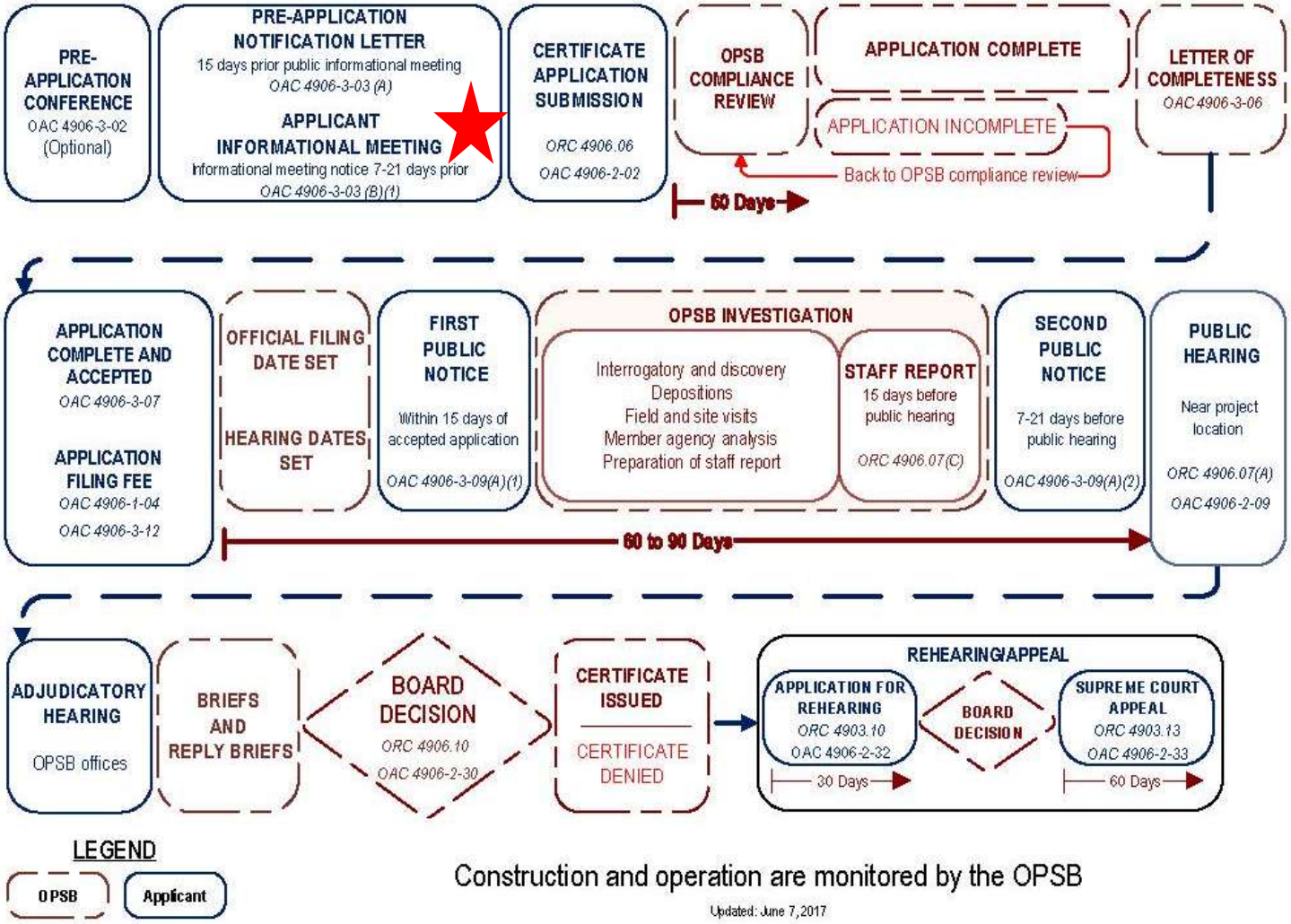
Lincoln Park-Riverbend 138-kV Transmission Line Project:

Ohio Power Siting Board (OPSB) Approval Process

- **ATSI must submit an application to the OPSB to secure approval for this project.**
- **The OPSB is legally obligated to review the application and, if certain legal criteria are met, it may approve the project.**
- **OPSB approval is obtained through the assurance of a Certificate of Environmental Compatibility and Public Need.**

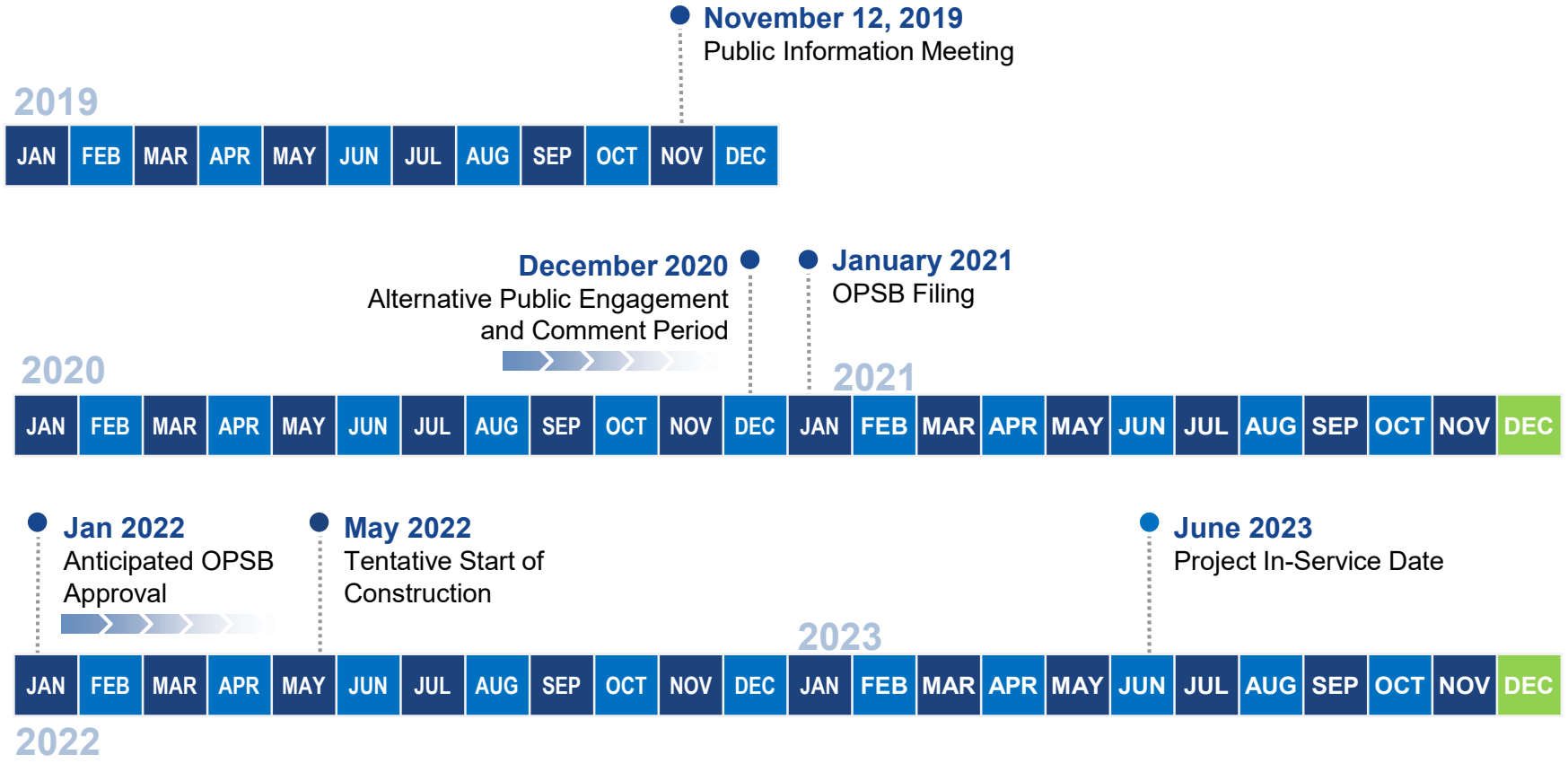
Lincoln Park-Riverbend 138-kV Transmission Line Project:

OPSB Standard Application Process Flowchart



Lincoln Park-Riverbend 138-kV Transmission Line Project:

Proposed Construction Schedule



Lincoln Park-Riverbend 138-kV Transmission Line Project:

Ohio Power Siting Board (OPSB) Contact Information

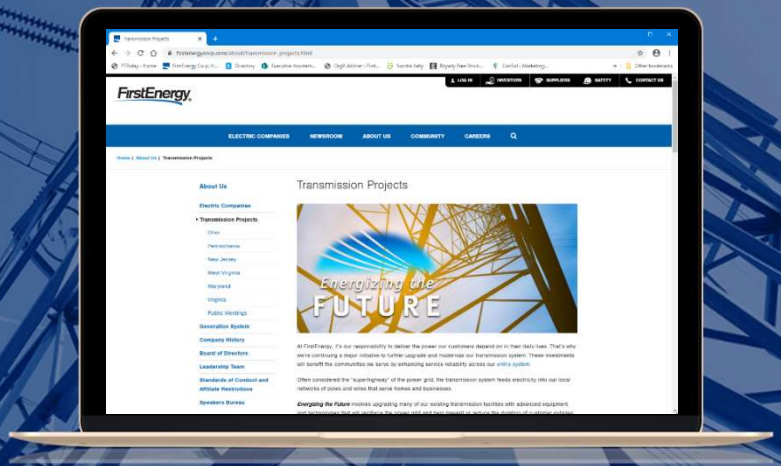
- **More information on the OPSB, its composition, and the process it will follow in reviewing the project application is available at:**
  - Website: **www.opsb.ohio.gov**
  - E-mail: **contactopsb@puco.ohio.gov**
  - Phone: 866-270-6772
  - Mail: 180 East Broad Street 11th Floor, Columbus, Ohio 43215
- **When contacting with OPSB about the project, use the following references:**
  - Project Name: Lincoln Park-Riverbend 138-kV Transmission Line
  - OPSB Case Number: 19-1871-EL-BTX

Ohio Power Siting Board

Ohio Public Utilities Commission

ATSI®

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



FirstEnergy/ATSI Contact Information

- **Visit the project website for additional information**
- **Contact us if you'd like to schedule an individual meeting for further discussion**

Email: https://www.firstenergycorp.com/about/transmission_projects.html

Phone: 1-888-311-4737

Website: www.firstenergycorp.com/about/transmission_projects/ohio/lincoln-park-riverbend.html

Thank You

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 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 electric and magnetic fields (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 various 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 the following assumptions:

- 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) above ground.

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 route.

TABLE 7-1
Transmission Line Loadings

Line Name	Winter Conductor Rating (Amps)	Emergency Loading (Amps)	Normal Loading (Amps)
Lincoln Park-Riverbend 138 kV Transmission Line (Preferred)	1318	303	28
Lincoln Park-Riverbend 138 kV Transmission Line (Alternate)	1318	303	28

One conductor configuration, the typical tangent to tangent (Figure 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 to Tangent) Span Configuration on the Lincoln Park-Riverbend 138 kV Transmission Line Project Preferred Route

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	4.702	12.82
	At Right-of-Way Edge	0.61 / 0.75	2.04 / 2.35
Emergency Loading	Under Lowest Conductors	4.702	138.7
	At Right-of-Way Edge	0.61 / 0.75	22.1 / 29.95
Winter Rating	Under Lowest Conductors	4.702	603.32
	At Right-of-Way Edge	0.61 / 0.75	96.11 / 108

TABLE 7-3

EMF Calculations for a Typical Tangent to Tangent Span Configuration on the Lincoln Park-Riverbend 138 kV Transmission Line Project Alternate Route

Line EMF Calculations		Electric Field (kV/meter)	Magnetic Field (mGauss)
Normal Loading	Under Lowest Conductors	2.605	7.02
	At Right-of-Way Edge	0.58 / 0.65	1.79 / 2.11
Emergency Loading	Under Lowest Conductors	2.605	75.96
	At Right-of-Way Edge	0.58 / 0.65	19.36 / 23.5
Winter Rating	Under Lowest Conductors	2.605	330.43
	At Right-of-Way Edge	0.58 / 0.65	84.23 / 100.5

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 **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.

For this Project, ATSI plans to complete final engineering of the facilities according to the requirements of the NESC. The pole heights and compact conductor configuration were chosen based on NESC specifications, engineering parameters, and cost which should help minimize EMF strength.

(d) EMF Public Inquiries Policy

Information on EMF was available at the Public Information Meeting held for the Project on November 12, 2019, and during the Alternative Public Engagement (virtual meeting) held from December 20, 2020 through January 20, 2021. 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 (OHSA) 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 7-4 through 7-6**. The estimates of each land use type being crossed by the transmission line or land use within the 65-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 65-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 7-4
Length and Percent of Land Uses Crossed by Route Alternatives

Land Use[1,2]	Preferred Route			Alternate Route		
	Linear Feet		Percent	Linear Feet		Percent
Agricultural	458	1,673	6.1%	0	0	0.0%
Agricultural and Forested	1,215			0		
Industrial/Commercial	8,782	15,580	56.6%	12,839	21,828	66.3%
Industrial/Commercial and Forested	6,798			8,989		
Institutional	493	493	1.8%	495	784	2.4%
Institutional and Forested	0			289		
Municipal	277	1,516	5.5%	413	1,707	5.2%
Municipal and Forested	1,239			1,294		
Recreational	171	3,730	13.6%	0	0	0.0%
Recreational and Forested	3,559			0		

TABLE 7-4 (Continued)
Length and Percent of Land Uses Crossed by Route Alternatives

Land Use[1,2]	Preferred Route			Alternate Route		
	Linear Feet		Percent	Linear Feet		Percent
Residential	56	1,869	6.8%	1,008	4,550	13.8%
Residential and Forested	1,813			3,542		
Road/Railroad Right-of-Way	2,187	2,187	7.9%	3,592	3,592	10.9%
Water	476	476	1.7%	460	460	1.4%
Total	**27,524**		**100.0%**	**32,921**		**100.0%**

Notes: 1) Land use was determined by using the Land Use Code attribute in the Mahoning County Properties GIS data from September 2020 and use was confirmed through aerial imagery review (Bing Hybrid and Google Earth-June 2019)
2) Water is associated with open-water visible on aerial imagery, including the Mahoning River. Water does not include delineated features and the extent of delineated features are included in Table 8-2.

TABLE 7-5
Acreage and Percent of Land Uses within ROW of Route Alternatives

Land Use[1,2]	Preferred Route			Alternate Route		
	Acreage		Percent	Acreage		Percent
Agricultural	0.55	1.80	4.4%	0.00	0.00	0.0%
Agricultural and Forested	1.25			0.00		
Industrial/Commercial	12.55	22.77	55.4%	18.09	30.35	61.8%
Industrial/Commercial and Forested	10.22			12.27		
Institutional	0.44	0.44	1.1%	0.63	0.95	1.9%
Institutional and Forested	0.00			0.32		
Municipal	0.30	1.66	4.0%	0.49	1.91	3.9%
Municipal and Forested	1.36			1.41		
Recreational	0.27	5.16	12.5%	0.00	0.00	0.0%
Recreational and Forested	4.89			0.00		
Residential	0.10	2.06	5.0%	0.96	5.39	11.0%
Residential and Forested	1.96			4.43		
Road/Railroad Right-of-Way	6.48	6.48	15.8%	9.63	9.63	19.6%
Water	0.72	0.72	1.7%	0.89	0.89	1.8%
Total	**41.08**		**100.0%**	**49.12**		**100.0%**

Notes: 1) Land use was determined by using the Land Use Code attribute in the Mahoning County Properties GIS data from September 2020 and use was confirmed through aerial imagery review (Bing Hybrid and Google Earth-June 2019)
2) Water is associated with open-water visible on aerial imagery, including the Mahoning River. Water does not include delineated features and the extent of delineated features are included in Table 8-2.

TABLE 7-6
Number of Land Use Features Near the Route Alternatives

	Route Alternatives	
	Preferred	**Alternate**
Length (in miles)	5.21	6.23
Features within the Potential Disturbance Area of Route Alternatives[a]		
Historic Structures (OHI)	2	3
National Register of Historic Places	0	0
Previously Identified Archaeological Sites	0	0
NWI Wetlands	4	2
Residences	0	0
Commercial/Industrial Structures	0	2
Other Sensitive Land Uses[b]	1 (park)	0
Features within 1,000 feet of Route Alternatives (centerline)		
Historic Structures (OHI)	90	70
National Register of Historic Places	9	3
Archaeological Sites	1	1
Historic Cemetery (OGS)	1	0
NWI Wetlands	18	22
Residences	406	531
Commercial/Industrial Structures	179	249
Other Sensitive Land Uses[b]	24 (4 monuments, 3 parks, 1 cemetery, 2 schools, and 14 churches)	21 (4 monuments, 1 park, 1 cemetery, 1 school, and 8 churches)

Notes:
a Potential disturbance area is defined as the construction workspace (in this case 65-ft wide ROW)
b Other sensitive land uses include airports, parks, state forests, schools, hospitals, churches, golf courses, and cemeteries.

(3) Impact on Identified Nearby Structures

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

There are 56 structures (buildings) within 200 feet of the Preferred Route ROW, including 16 residential structures and one church. These range from 19 to 200 feet from the nearest edge of the ROW. There are 129 structures within 200 feet of the Alternate Route ROW, including 22 residential structures and three churches. These structures range from 0 to 199 feet from the ROW.

(b) Destroyed, Acquired, or Removed Buildings

The potential removal of structures within the proposed ROW was generally mitigated during the route selection studies of the through the placement of route centerlines. It is not anticipated

that construction of the Preferred Route will require the removal of any structures. Two commercial buildings and one outbuilding are within the ROW of the Alternate Route. If the Alternate Route is selected, ATSI will attempt to enter into an encroachment agreement with the property owner, and if this approach is not successful, ATSI will negotiate with the property owner to remove these 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 Alternate Route ROW is not present. However, one agricultural land use is located within the Preferred Route ROW for approximately 1.80acres. Approximately 0.55acre is associated with open hay field and 1.25acres is forested area not utilized for agricultural purposes. As soil compaction resulting from construction activities is temporary in nature and would be resolved within a few seasons of plowing and tilling, ATSI does not anticipate adverse effects to agricultural lands. Additionally, 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 are depicted on **Figure 7-3** for both the Preferred and Alternate Routes. The Mahoning County Auditor's Office was contacted on January 6, 2020 to obtain information on current Agricultural District parcel records. As of January 6, 2020, there were no Agricultural District parcels within 1,000 feet of the Preferred and Alternate Routes. Due to the lapse of time, the Mahoning County Auditor's Office was contacted on November 23, 2020, to confirm if there are changes to the previously-provided Agricultural District parcels. As of April 12, 2021, there were no Agricultural parcels within the taxing districts 44, 46, and 53 (i.e. Campbell and Youngstown City). In taxing districts 42 and 45 (i.e. Coitsville), there are 27 Agricultural parcels. Of these 27 Agricultural parcels, none are located 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.

(2) Impacts to Agricultural Lands and Agricultural Districts

(a) Acreage Impacted

The agricultural land use determination was based on aerial imagery and field observations. Three agricultural parcels were identified within 1,000 feet of the Preferred and Alternate Routes. Only one of these parcels is crossed by the Preferred Route in an area used as an apparent hay field.

(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 agricultural 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

No Agricultural District parcels were identified within the ROW of the Preferred and Alternate Routes. Therefore, no 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 Route 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 the City of Youngstown and Mahoning 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

The Applicant reviewed the Youngstown 2010 Citywide Plan. No conflicts with future proposed land uses outlined in the plan were identified. 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

Cultural resources studies of the Project area were conducted on behalf of ATSI. These studies include a background records check and literature review using data files from the Ohio Historic

Preservation Office (OHPO) for both the Preferred and Alternative Routes. Additionally, a Phase 1 archeological reconnaissance and aboveground (architectural) resource survey for the Preferred Route and proposed expansion of the Riverbend Substation were completed for the Project. The results of the Phase 1 archaeological reconnaissance and aboveground (architectural) resource survey of the entirety of the Preferred Route, including the expansion of the Riverbend Substation, as well as the cultural resource desktop analysis of the alternative route will be filed with the OPSB.

(1) Cultural Resources Map

Archival research considered a one-mile buffer around both the Preferred and Alternate Routes, to locate previously-identified cultural resources and to provide information on the probability of identifying cultural resources as part of this Project. This review included examination 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 on-file with the OHPO. This archival research indicated the following for the preferred and alternative route.

- **Preferred Route**: a total of 41 NRHP properties/districts, seven OAI sites, 466 OHI resources, seven cemeteries, three bridges and eight prior cultural investigations have been documented within one mile of the Preferred Route alignment. The lone archaeological site within 1,000 feet of the Preferred Route, a remnant levee of the Mahoning River inventoried as 33MH0071, does not extend within the proposed limits. Additionally, a total of nine NRHP, 90 OHI resources, and one historic cemetery was identified within 1,000 feet. Of this total inventory, 16 inventoried historic resources remain extant within 500 feet of the Preferred Route, including the NRHP-listed Baltimore & Ohio Railroad Terminal (NRHP ID 86001565) and four resources previously determined either eligible or potentially eligible for the NRHP. Two OHI resources (Lincoln Park: MAH0108104 and a commercial warehouse: MAH0129004) are located within Preferred Route's right-of-way.
- **Alternate Route**: a total of 41 NRHP properties/districts, seven OAI sites, 473 OHI resources, 10 cemeteries, three bridges and eight prior cultural investigations have been documented within one mile of the Preferred Route alignment. The lone archaeological site within 1,000 feet of the Alternative Route, a remnant levee of the Mahoning River inventoried as 33MH0071, does not extend within the proposed limits. Additionally, three NRHP, 71 OHI resources, and one cemetery was identified within 1,000 feet. Of this inventory, 17 OHI-listed aboveground resources, three bridges, one OAI archaeological site and one NRHP property occur within 500 feet of the Alternate Route; four of the aboveground resources have been recommended as eligible or potentially eligible for the NRHP. Three OHI resources (William Herbert & Sons Garage: MAH0107404; Johnson Block: MAH0097704; and Center Street Bridge: MAH0029004) were located within the Alternative Route's right-of-way.

Cultural resources already in the public domain (e.g., OHI Listed resources) within one mile of the Preferred and Alternative routes are identified on **Figure 7-1**.

(2) Cultural Resources in Study Corridor

Cultural resource studies to date have involved background research utilizing data files from the OHPO online mapping system (see section above) as well as a Phase 1 archeological reconnaissance and aboveground (architectural) survey of the Preferred Route and expansion of the existing Riverbend Substation. Separate reports summarizing these efforts will be filed with the OPSB.

Between March 18 and 25, 2021, the Phase 1 archeological reconnaissance and aboveground (architectural) surveys were completed for the Preferred Route and proposed expansion to the Riverbend Substation. The Phase 1 archeological reconnaissance survey included the examination of all potential areas of proposed ground disturbance including the preferred route transmission line corridor, temporary access roads, and expansion of the existing Riverbend Substation. The Phase 1 aboveground (architectural) investigations considered a potential viewshed buffer of approximately 500-foot around all proposed aboveground infrastructure.

The Phase I archaeological survey involved examination of approximately 58 acres of potential land requirements, across which the OHPO-recommended 50-foot testing interval was applied. In this manner, a total of 1,426 individual sample loci (SL) were examined. Of this total, 113 SL were hand-excavated as shovel tests, with the remainder visually surveyed due to ground disturbances from existing infrastructure or other developments, water inundation, or steep slopes. As a result of these investigations, no evidence for any archaeological deposits or features were encountered within the proposed limits of the Preferred Route, associated access roads or expansion of the existing Riverbend Substation.

While the Phase I archaeological survey did not identify any resources, the Phase I aboveground investigations identified 59 undocumented historic structures. In addition, the survey confirmed the presence of 16 previously inventoried aboveground resources (three previously inventoried aboveground resources are no longer extant). Of the 16 inventoried resources, one is listed in the NRHP (the Baltimore & Ohio Railroad Terminal), four were previously determined as eligible or potentially eligible, seven have been determined not eligible and four have not been formally assessed for NRHP eligibility. All 59 newly documented aboveground resources are recommended as not eligible for the NRHP. Based on the location of the Preferred Route and expansion of the existing Riverbend Substation, and due to intervening (screening) elements of the modern landscape and/or presence of existing infrastructure similar in size/scale to the proposed overhead transmission line and new poles, the Project will not pose an adverse effect to any of the previously documented or newly identified historic resources identified within the Project.

The combined results from the March 2021 Phase I cultural resources investigations conducted for the Preferred Route and Riverbend Substation expansion indicate that the Project will not adversely affect any historic resources. The results of the Phase I archaeological survey and Phase I aboveground investigations on the Preferred Route and Riverbend Substation expansion will be provided in separate report volumes to the OPSB and OHPO in April 2021, concurrent with the desktop archival research report for the Alternate Route. The Phase I archaeological report contains an Unanticipated Discovery Plan, designed for implementation in the event that cultural resources are inadvertently encountered during construction activities for the Project. All 59

newly-identified aboveground resources have been assigned permanent OHI IDs, and the necessary documentation (forms) associated with each have been filed with the OHPO.

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

Based on the results of the cultural resources investigations conducted for the Preferred Route and Riverbend Substation expansion, impacts to known historic resources associated with the construction, operation, and maintenance of the proposed Project are not anticipated. An Unanticipated Discovery Plan has been developed, detailing the necessary protocols to be implemented in the event cultural resources are encountered during construction of the Preferred Route and Riverbend Substation expansion.

(4) Mitigation Procedures

As noted above, based on the surveys conducted to date, no adverse impacts to known and recorded historic properties are anticipated because of the Project; therefore, no mitigation is proposed at this time. Should any future changes to the Project occur, additional cultural resources studies will be conducted to identify potential impacts to NRHP-eligible or listed resources, and any necessary mitigation procedures will be developed in consultation with the OHPO and OPSB.

(5) Aesthetic Impact

(a) Visibility of the Proposed Facility

The viewshed along the Preferred and Alternative Routes from residences and potentially sensitive vantage points may be altered by the presence of the transmission line. The Project area is characterized by a variable terrain, woodlots, wetlands, floodplains, industrial lots, and suburban and urban residential properties. Many major overhead transmission lines, distribution lines, large industrial and commercial buildings, and railroads extend through or adjacent to the proposed boundaries of the Preferred Route. Due to both intervening wood lots in the eastern portion of these routes and existing infrastructure of the remaining portions, the routes were identified as not having a significant impact on the overall visual landscape. At select locations where tree clearing may be required, visual impacts may be greater. Lastly, the expansion of the Riverbend Substation is situated within an already-cleared area abutting the existing substation situated within an existing transmission right-of-way and adjacent to an old railroad yard.

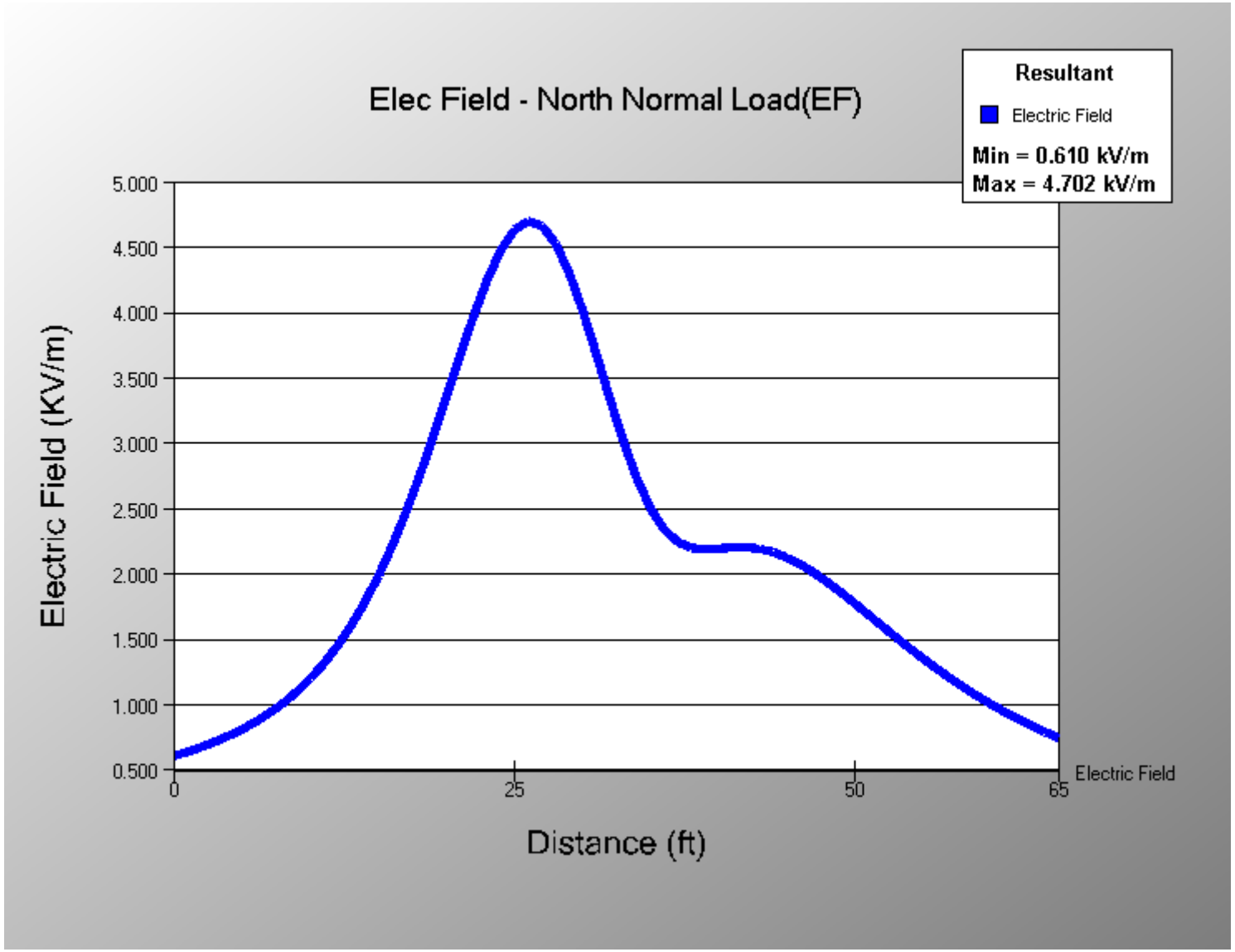
(b) Facility Effect on Site and Surrounding Area

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, though such impacts can be partially evaluated by comparing the amount of contrast resulting from the construction of the new element with 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.

Electric Field, Lincoln Park-Riverbend (Preferred)



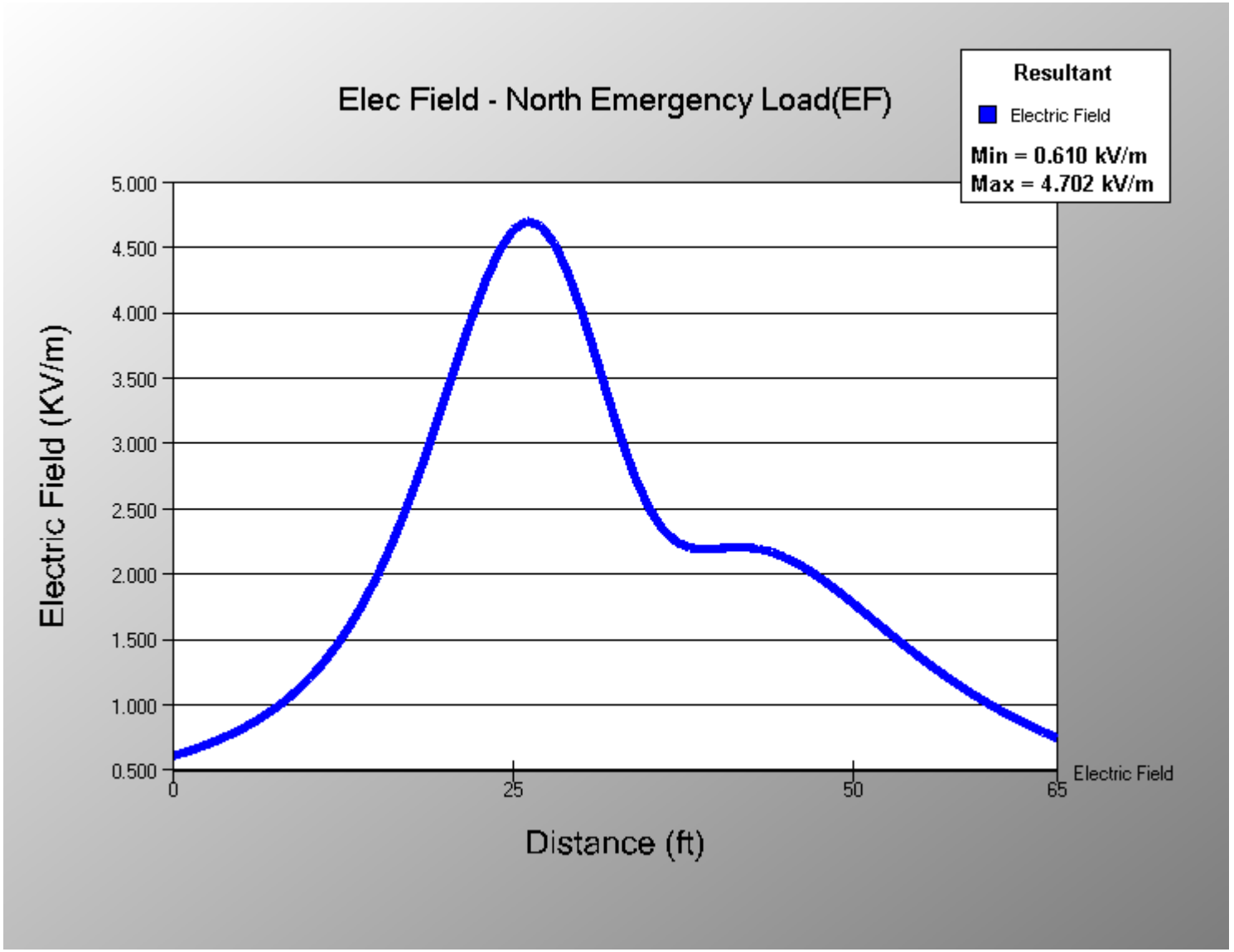
ATSI® American Transmission Systems, Inc. a subsidiary of FirstEnergy Corp.

LINCOLN PARK-RIVERBEND 138-kV
TRANSMISSION LINE PROJECT

ELECTRIC FIELD NORMAL LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Preferred)



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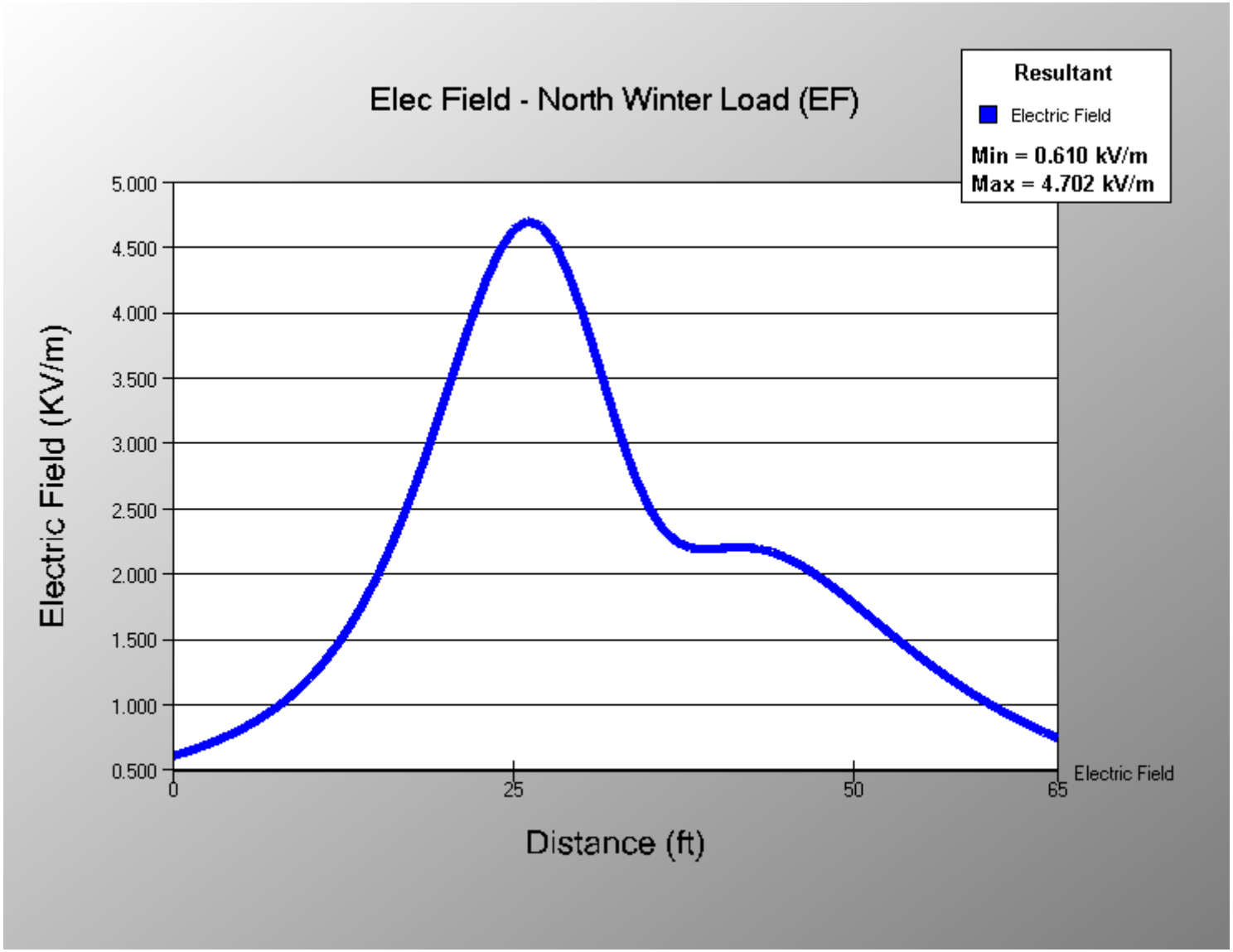
LINCOLN PARK-RIVERBEND 138-kV TRANSMISSION LINE PROJECT

ELECTRIC FIELD EMERGENCY LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Preferred)



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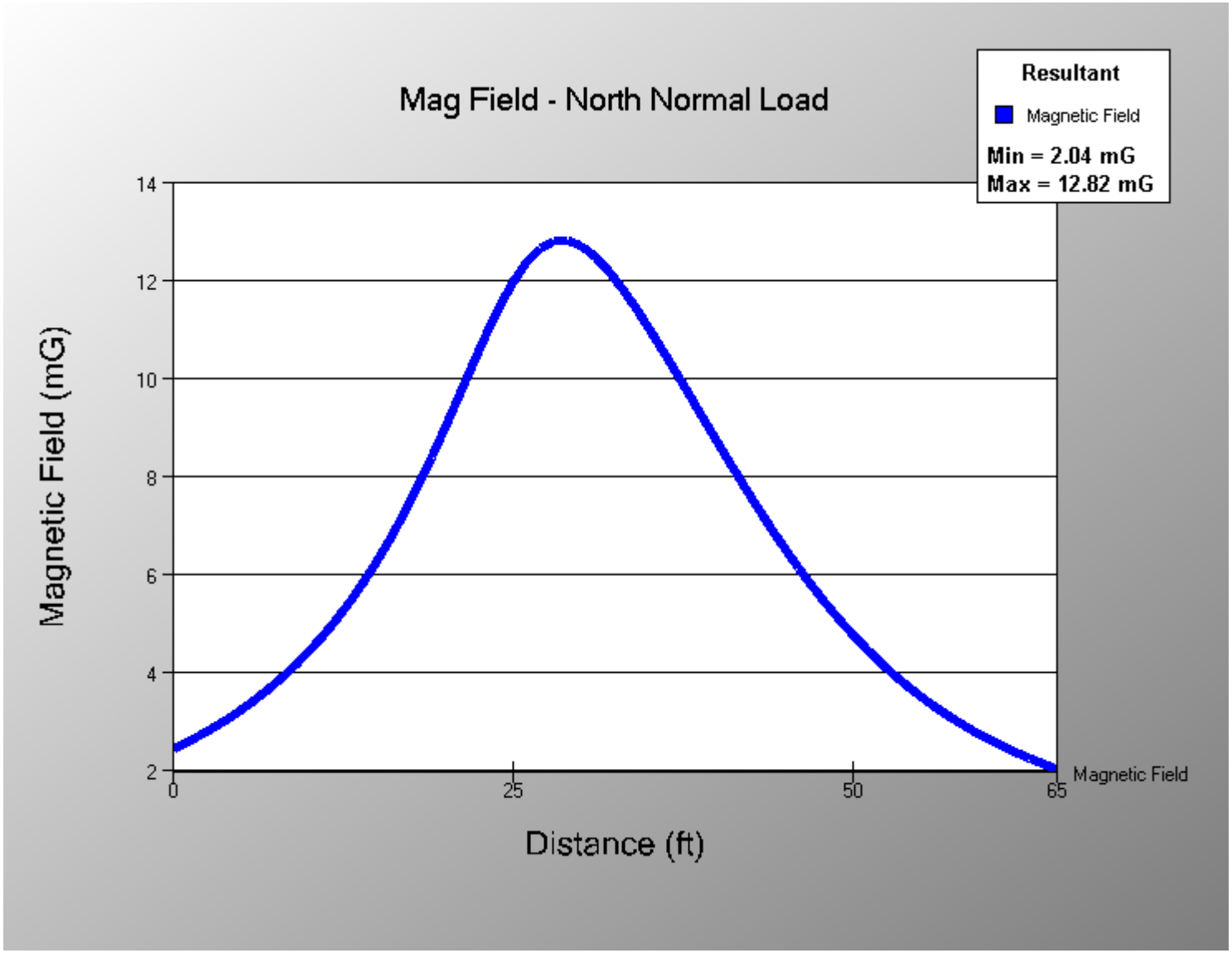
ELECTRIC FIELD WINTER LOAD	
EXHIBIT 7-1	

Electric Field, Lincoln Park-Riverbend (Preferred)



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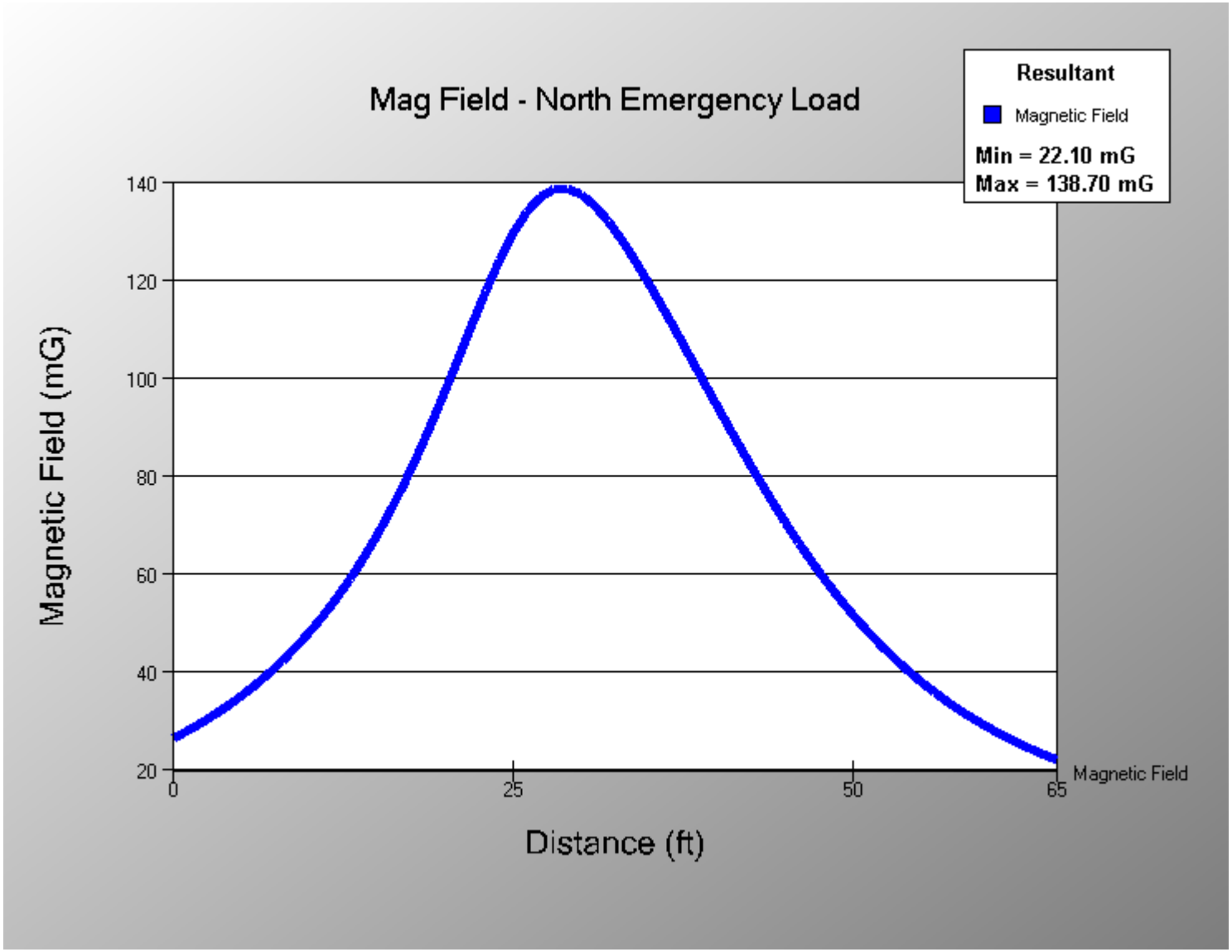
MAG FIELD NORMAL LOAD	
EXHIBIT 7-1	

Electric Field, Lincoln Park-Riverbend (Preferred)



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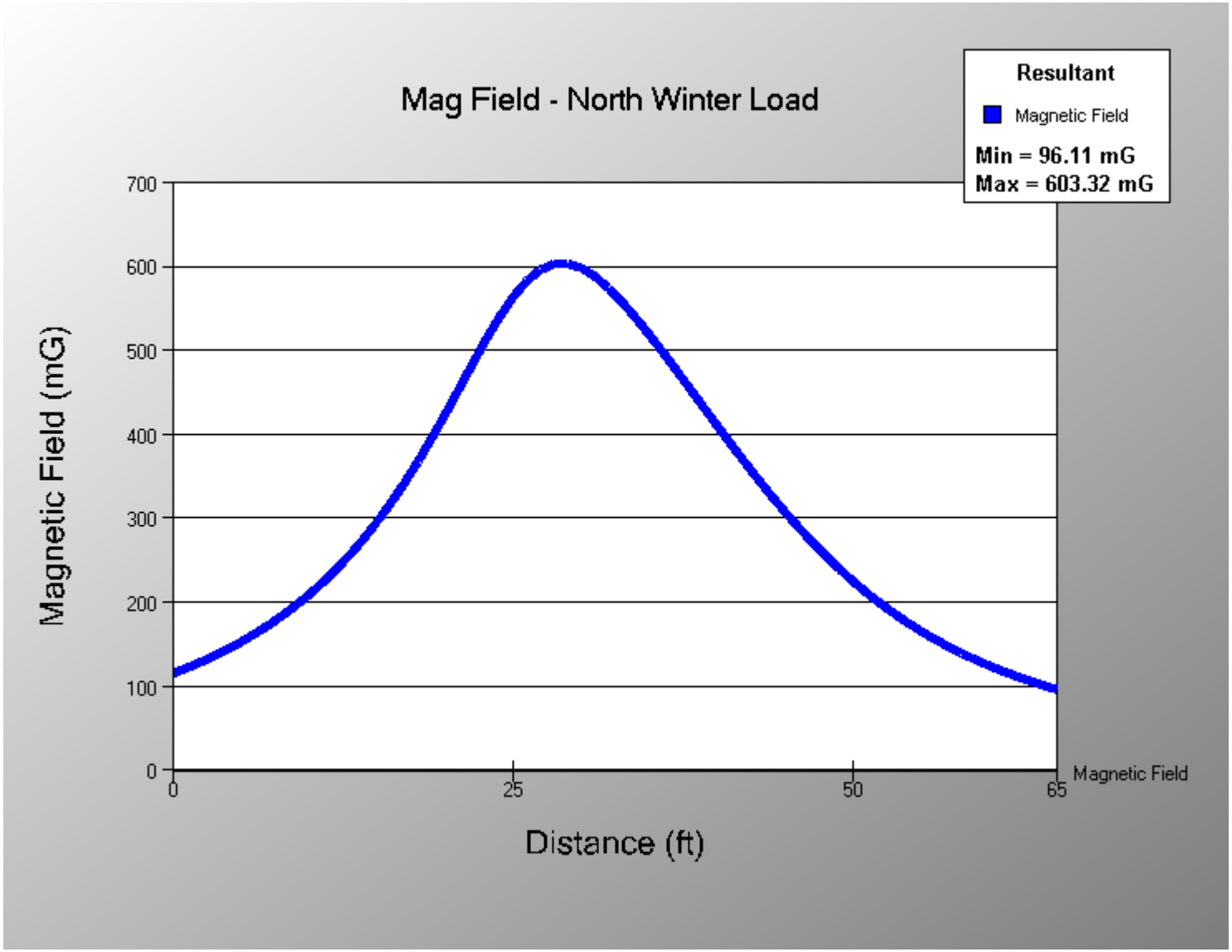
LINCOLN PARK-RIVERBEND 138-kV TRANSMISSION LINE PROJECT

MAG FIELD EMERGENCY LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Preferred)



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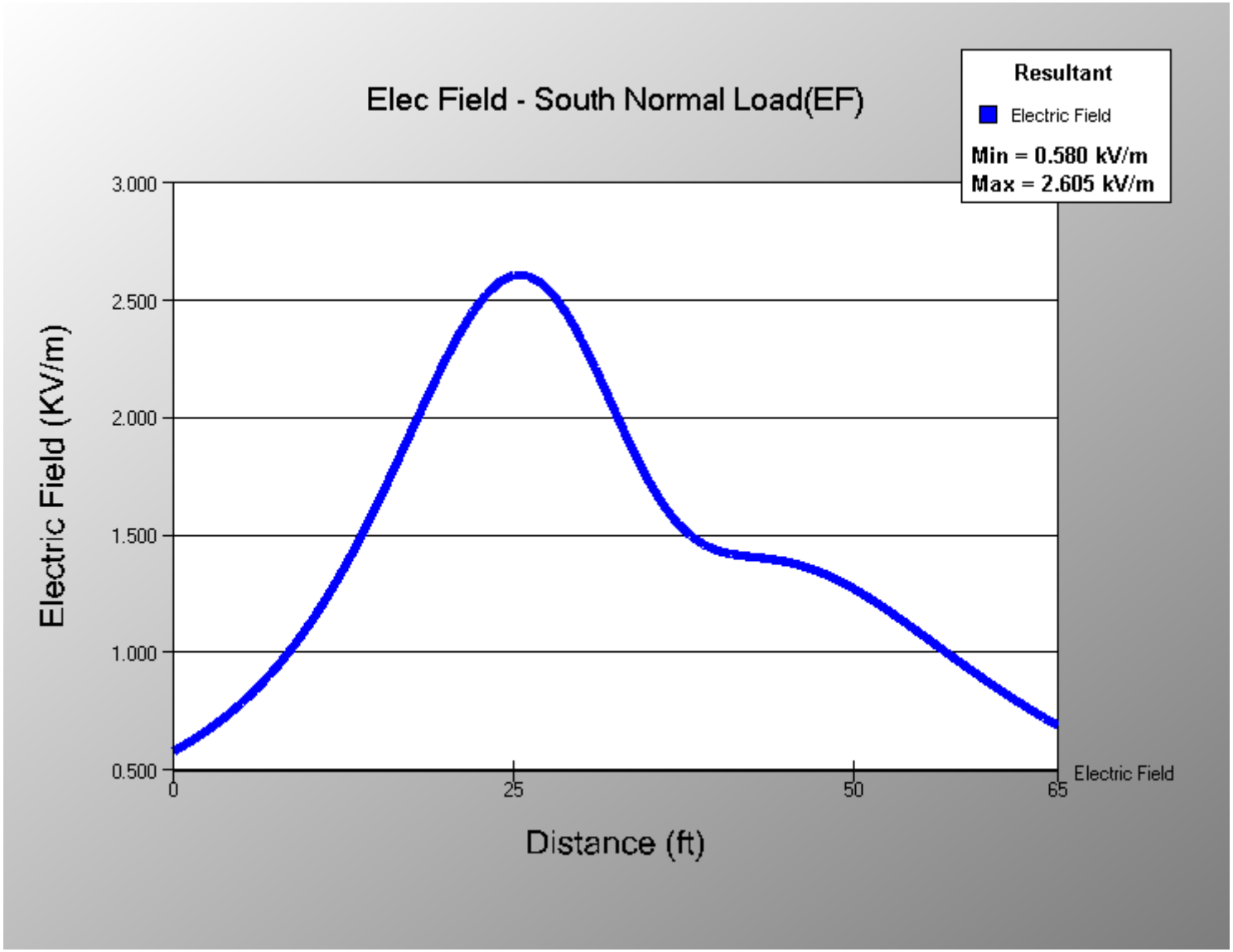
TRANSMISSION LINE PROJECT

MAG FIELD WINTER LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Alternate)



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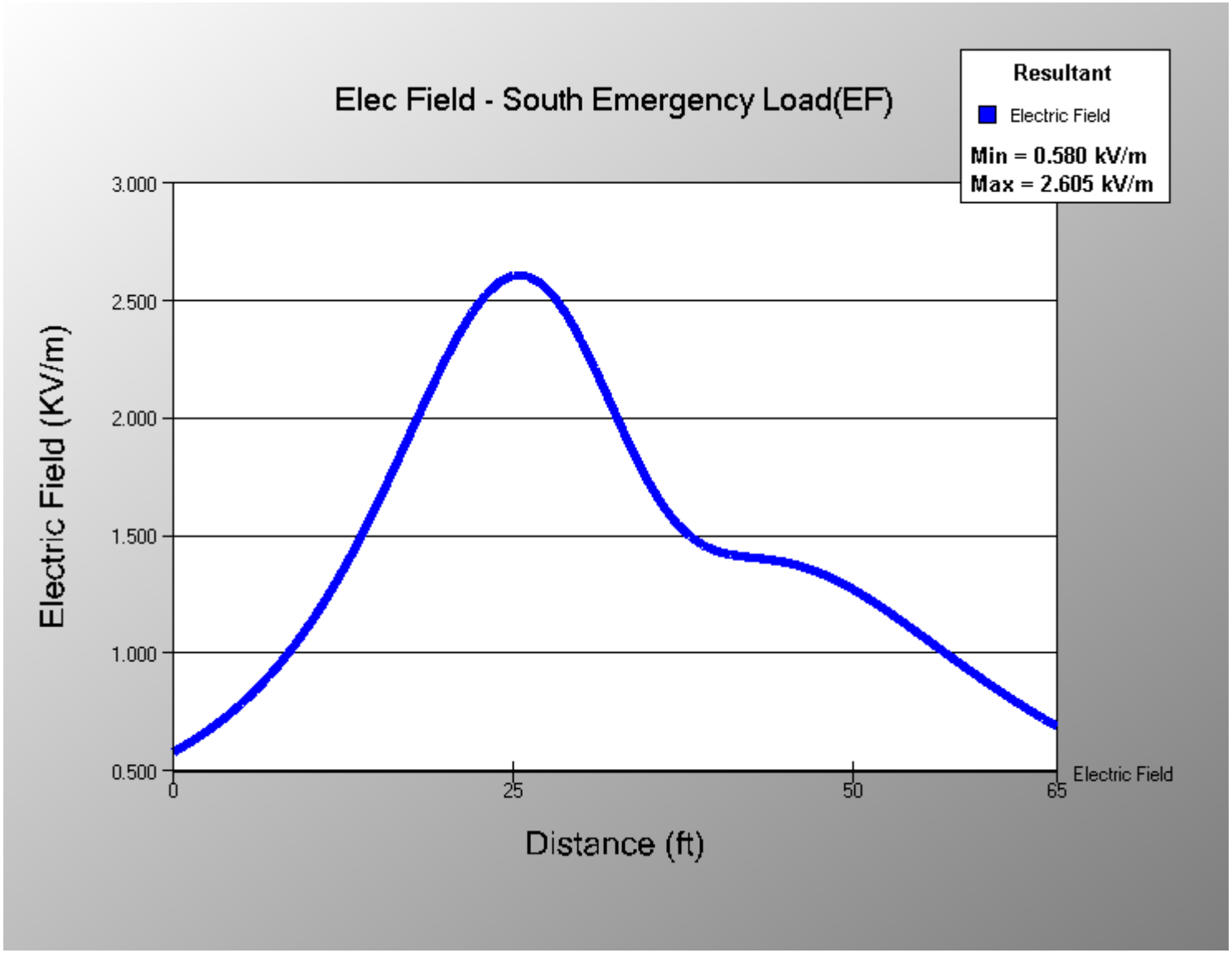
LINCOLN PARK-RIVERBEND 138-kV
TRANSMISSION LINE PROJECT

ELECTRIC FIELD NORMAL LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Alternate)



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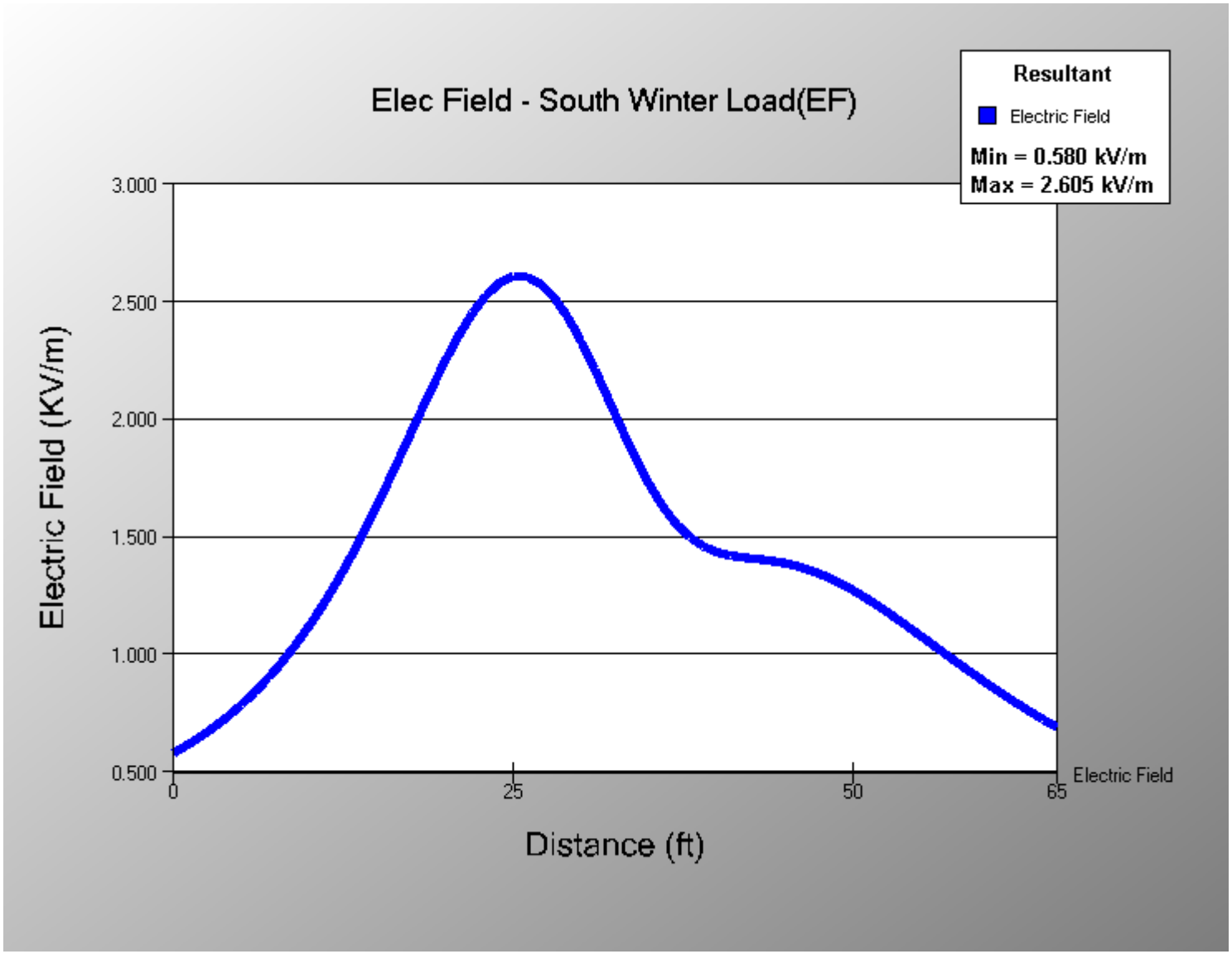
ELECTRIC FIELD EMERGENCY LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Alternate)



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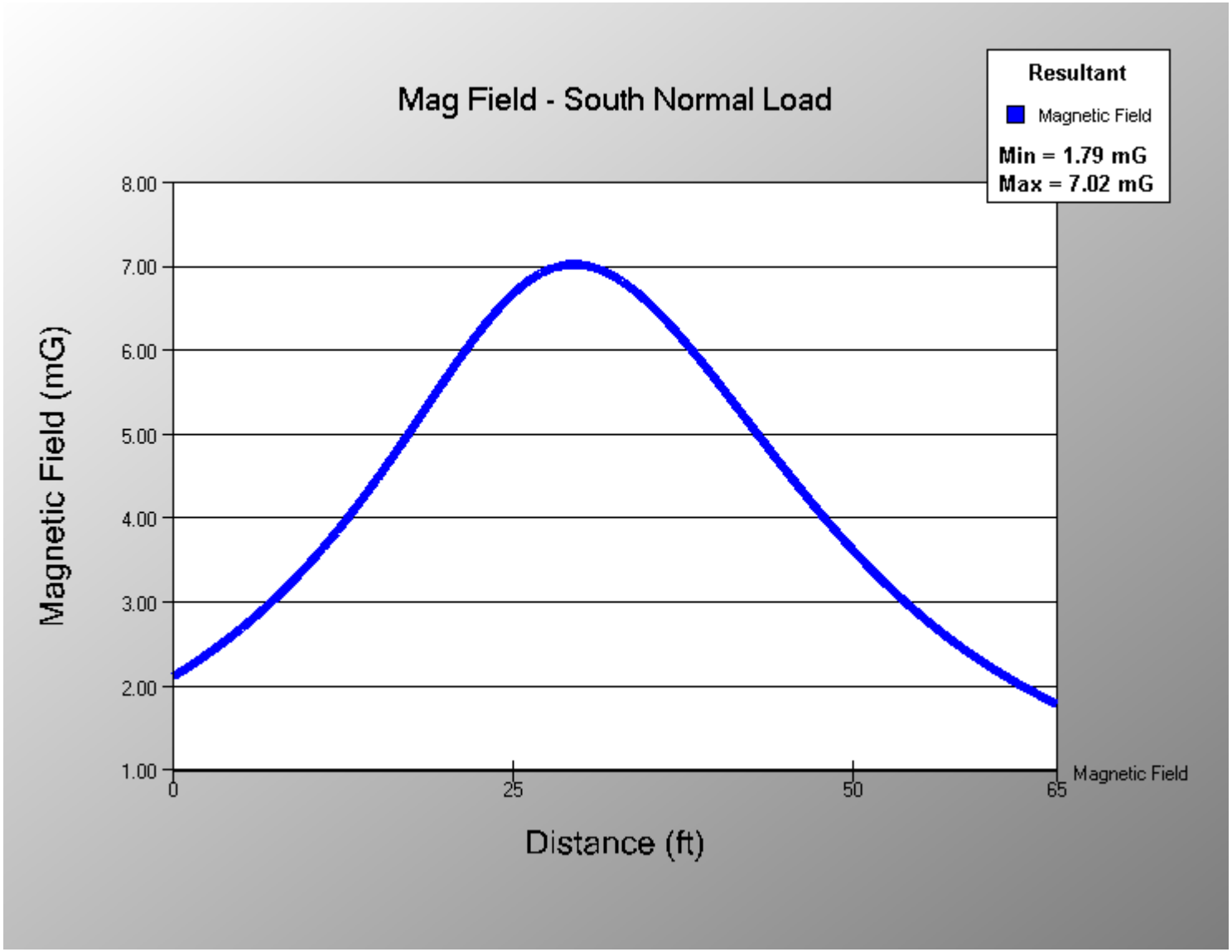
LINCOLN PARK-RIVERBEND 138-kV
TRANSMISSION LINE PROJECT

ELECTRIC FIELD WINTER LOAD

EXHIBIT 7-1

Electric Field, Lincoln Park-Riverbend (Alternate)



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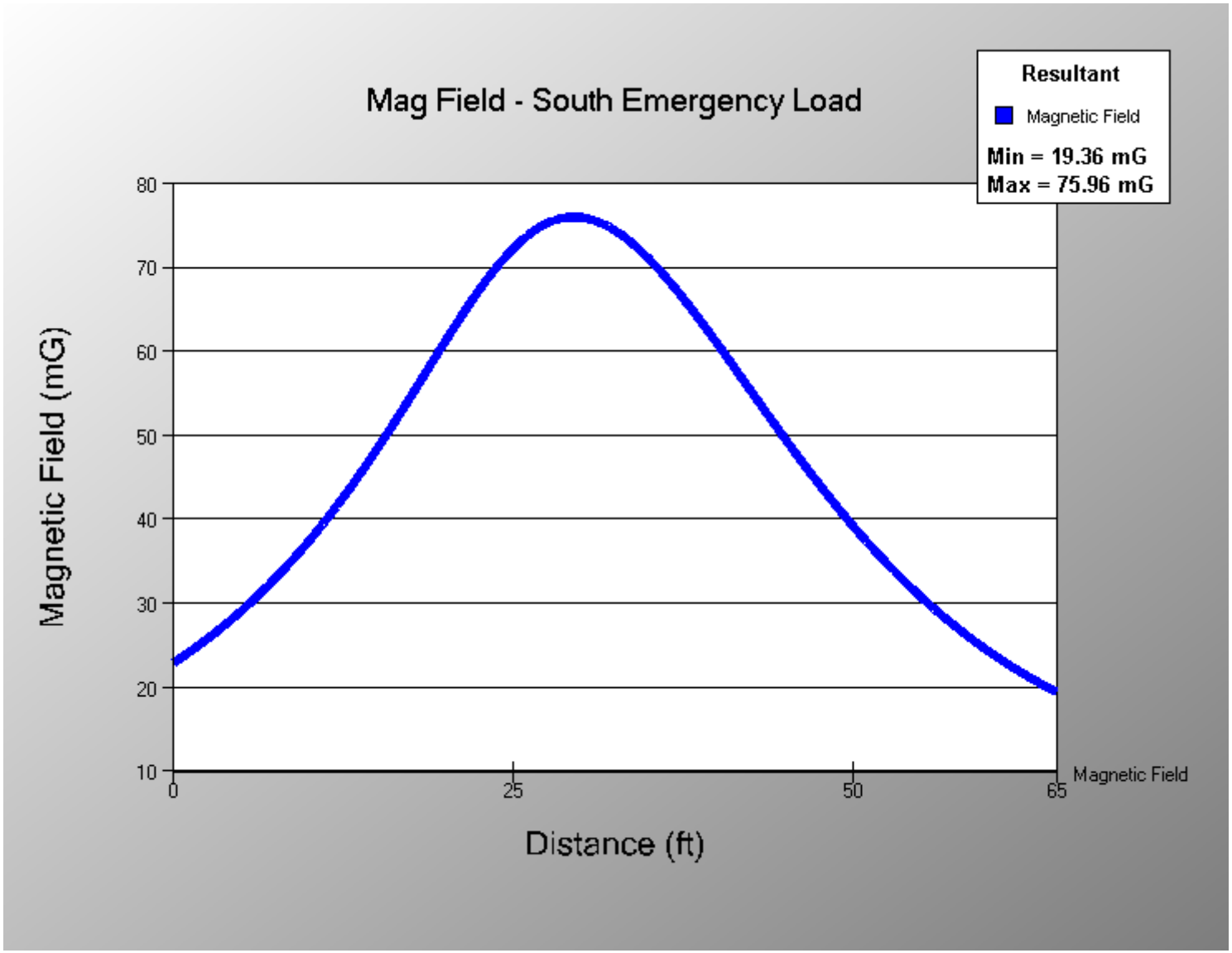
MAG FIELD NORMAL LOAD	
EXHIBIT 7-1	

Electric Field, Lincoln Park-Riverbend (Alternate)



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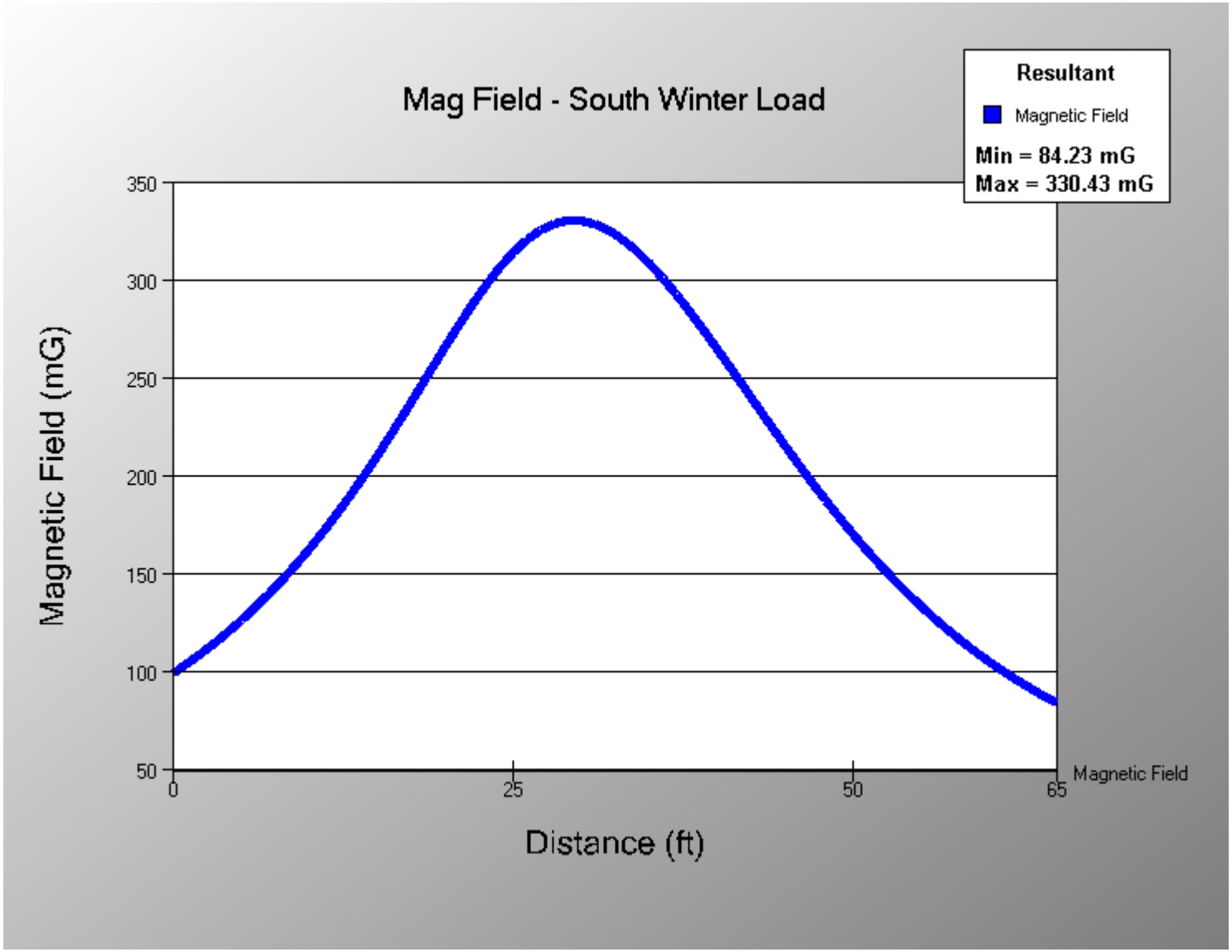
MAG FIELD EMERGENCY LOAD	
EXHIBIT 7-1	

Electric Field, Lincoln Park-Riverbend (Alternate)



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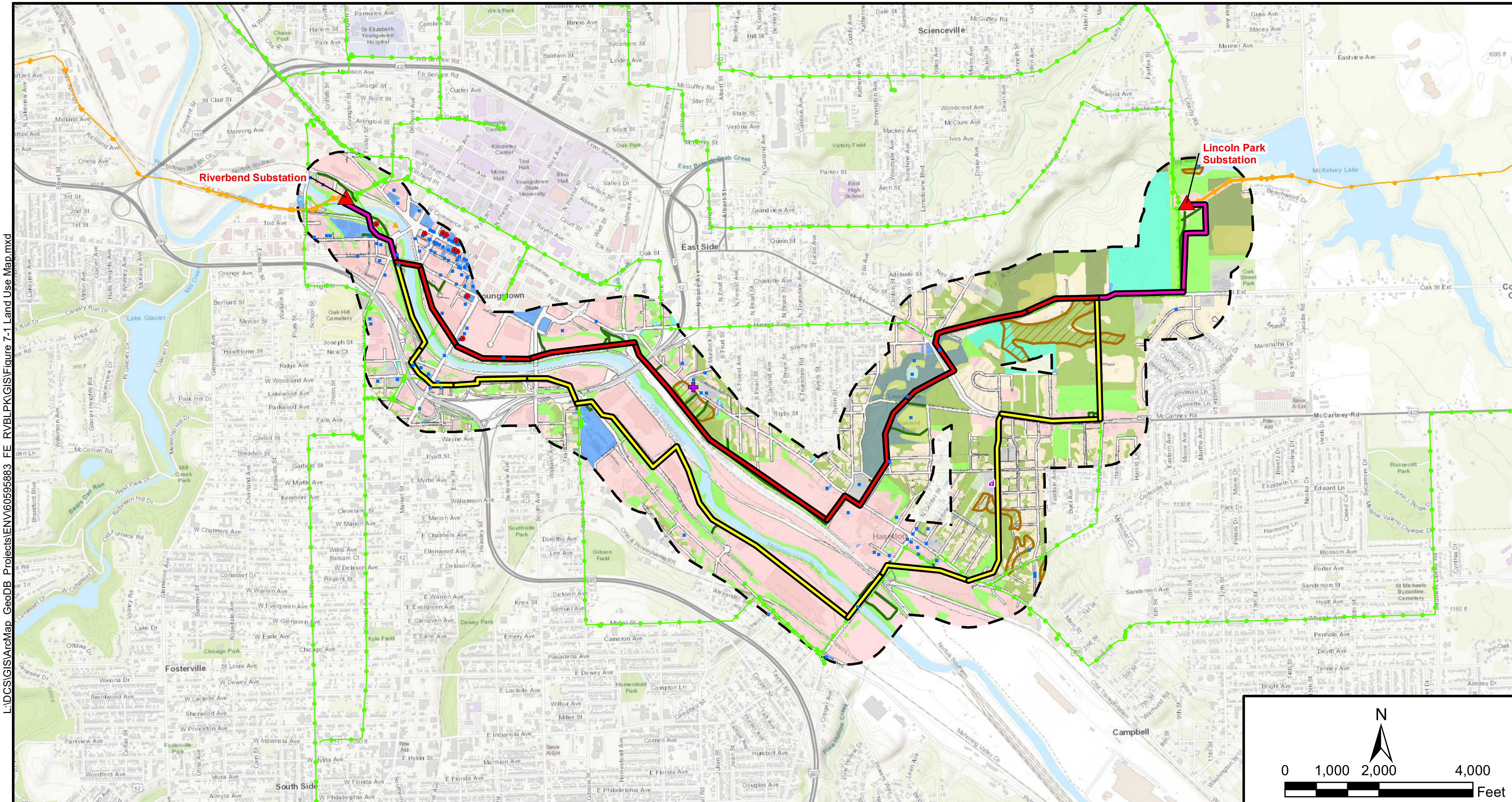
MAG FIELD WINTER LOAD	
EXHIBIT 7-1	

L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\60595883_FE_RVBLPK\GIS\Figure 7-1 Land Use Map.mxd



LEGEND:

- Existing Substation
- Common Route
- Alternate Route
- Preferred Route
- 2,000-foot Route Corridor
- Preliminary Access Road
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Soil That Exceeds 12% Slope
- Agricultural
- Agricultural and Forest
- Industrial/Commercial
- Industrial/Commercial and Forest
- Institutional
- Institutional and Forest
- Municipal
- Municipal and Forest
- Recreational
- Recreational and Forest
- Residential
- Residential and Forest
- Road/Railroad Right-of-Way
- Water
- Church
- School
- Cemetery
- OAI
- National Register of Historic Places Site
- Ohio Historic Inventory Structure

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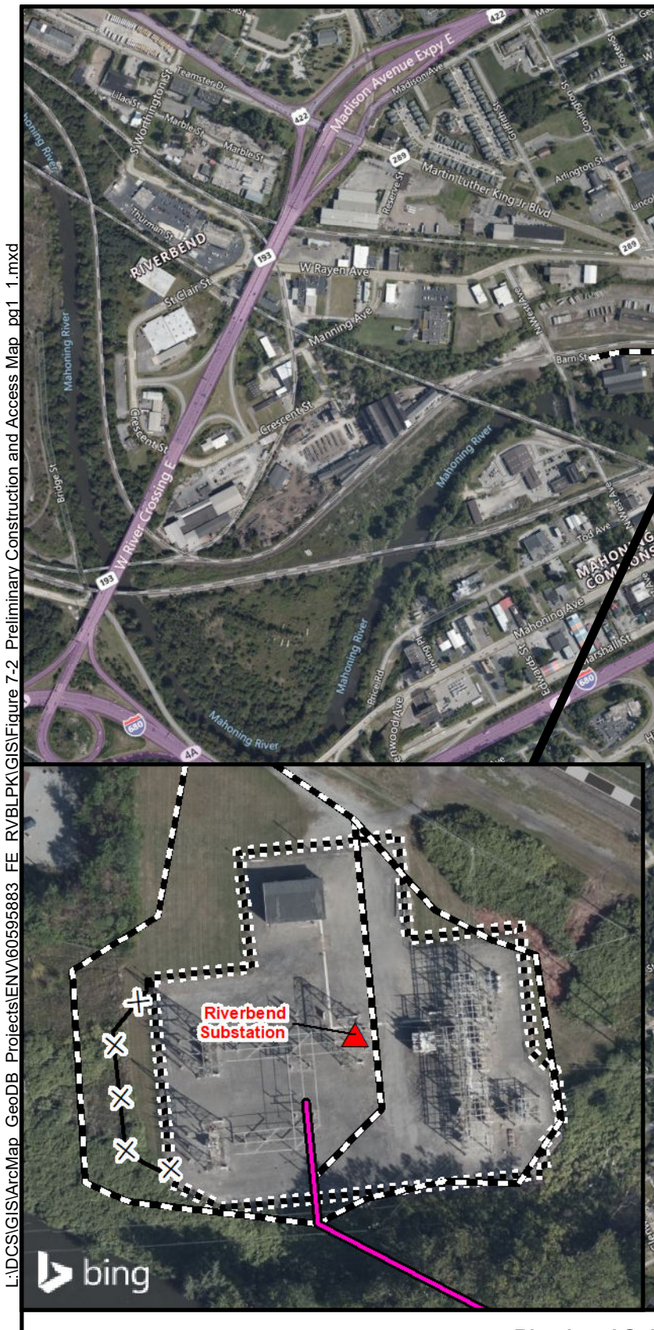
FIGURE 7-1
LAND USE MAP

LINCOLN PARK-RIVERBEND 138 KV
TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

L:\DCS\GIS\ArcMap GeoDB Projects\ENV\60595883 FE RVBLPK\GIS\Figure 7-2 Preliminary Construction and Access Map pg1 1.mxd



Riverbend Substation

LEGEND:

- Existing Substation
- Preliminary Proposed Structure Location
- Common Route
- Alternate Route
- Preferred Route

Riverbend Substation Expansion

- Existing Substation
- Proposed Expansion
- Existing Fenceline
- Preliminary Proposed Access Roads

0 500 1,000 2,000 Feet

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FIGURE 7-2
PRELIMINARY CONSTRUCTION AND ACCESS MAP
SHEET 1 OF 2

LINCOLN PARK-RIVERBEND 138 KV TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

L:\DCS\GIS\ArcMap GeoDB Projects\ENV\60595883 FE RVBLPK\GIS\Figure 7-3 Agricultural Land Use.mxd

Riverbend Substation

Lincoln Park Substation

East Side

Youngstown

South Side

Haselton

Coitsville Center

Coitsville Twp

0 1,000 2,000 4,000 Feet

0 400 800 1,600 Feet

bing

LEGEND:

- Existing Substation
- Common Route
- Alternate Route
- Preferred Route
- 2000-Foot Route Corridor
- Existing 23 kV Subtransmission Line
- Existing 138 kV Transmission Line
- Cultivated Crops
- Hay Field

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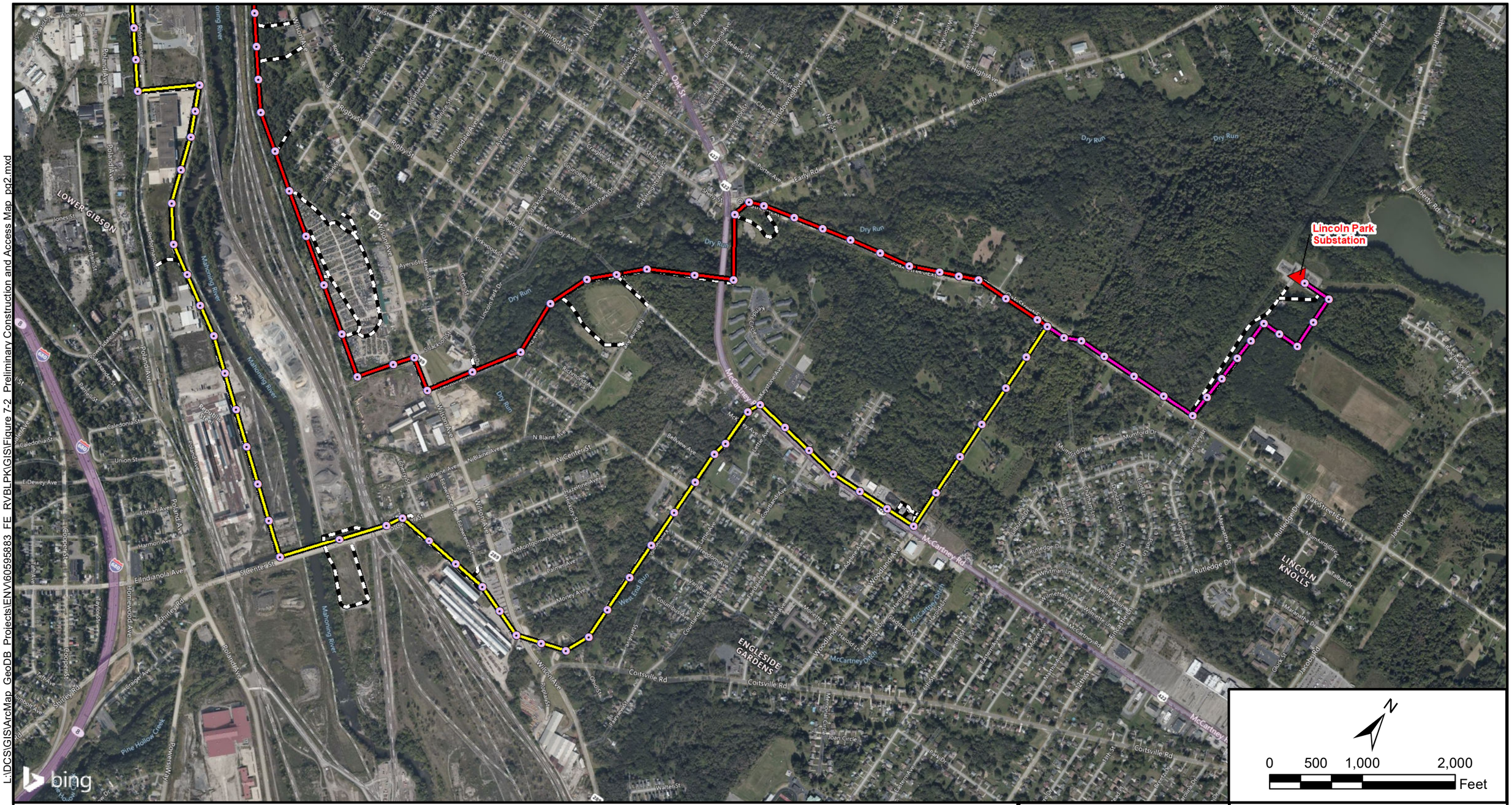
FIGURE 7-3
AGRICULTURAL LAND USE MAP

LINCOLN PARK-RIVERBEND 138 KV
TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

L:\DCS\GIS\ArcMap GeoDB Projects\ENV\60595883 FE RVBLPK\GIS\Figure 7-2 Preliminary Construction and Access Map pg2.mxd



LEGEND:

- Existing Substation
- Preliminary Proposed Structure Location
- Common Route
- Alternate Route
- Preferred Route
- Preliminary Proposed Access Roads

0 500 1,000 2,000 Feet

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FIGURE 7-2
PRELIMINARY CONSTRUCTION AND ACCESS MAP
SHEET 2 OF 2

LINCOLN PARK-RIVERBEND 138 KV TRANSMISSION LINE PROJECT

Source: BMCD, ESRI, ARCGIS Online World Street Map

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**), an iterative study to assess the potential ecological impacts of the Project was conducted in 2020. 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 for the proposed 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

A map 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 is presented as **Figure 7-1**. This map depicts 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 1** of **Appendix 8-1**. More detailed maps at 1:2,400 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 are provided as **Figures 2 through 4** of **Appendix 8-1**.

(B) FIELD SURVEY REPORT FOR VEGETATION AND SURFACE WATERS

The ecological survey includes 388 acres encompassing the 65-foot wide ROW associated with both the Preferred and Alternate Routes, access roads, and anticipated work areas. It was completed on January 06 to 08, August 20, October 06, November 03, 2020 and March 11, 2021. 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 no records of federal or state threatened or endangered species, within 1,000 feet of the Preferred and Alternate Routes (ODNR-DOW, 2019). 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 within the field survey area include forested, landscaped/maintained, old field/scrub-shrub, stream/wetland, and urban areas. 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 8-2**.

(i) Forested

Oak-Hickory and successional mixed hardwood woodlands are present along the Project survey corridor. Woody species dominating these areas included white oak (Quercus alba), swamp white oak (Quercus bicolor), pin oak (Quercus palustris), box elder (Acer negundo), American elm (Ulmus americana), shagbark hickory (Carya ovata), black walnut (Juglans nigra), red maple (Acer rubrum), and silver maple (Acer saccharinum). The dominant shrub-layer species included honeysuckle (Lonicera maackii), and blackberry (Rubus occidentalis).

(ii) Landscaped/Maintained

Residential and commercial lawns as well as other landscaped areas, typically adjacent to roads, are crossed by the routes. Vegetation identified 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) Old Field/Scrub-shrub

Herbaceous cover exists alongside roads, field borders, and abandoned fields within the survey corridor of the Project in the form of successional old-field communities. These communities are the earliest stages of recolonization by plants following disturbance. This community type is typically short-lived, giving way progressively to shrub and forest communities unless periodically re-disturbed, in which case they remain as old fields. The old-field areas within the study corridors and adjacent areas are infrequently mowed areas of grasses, forbs, and occasional shrubs.

(iv) Streams/Wetlands

Streams and wetlands were observed within and beyond the proposed ROW of the Preferred and Alternate Routes, as discussed in detail in other portions of this section.

(v) Urban

Urban areas are areas developed with residential and commercial land uses, including roads, railroads, buildings and parking lots. These areas are generally devoid of significant woody and herbaceous vegetation.

(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 [Environmental Laboratory, 1987; and 2012]. Additionally, each identified wetland was evaluated in accordance with the Ohio Rapid Assessment Method (ORAM) developed by Ohio Environmental Protection Agency (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 Mahoning County (NRCS, 2020).

(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, 2020). The NWI-mapped areas are shown on **Figure 2** of **Appendix 8-1** 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[a]	NWI Habitat Type[b]	Total Number of Each Habitat Type Preferred/ Alternate
Lake	L1UBHh	Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded	1 – Preferred 1 – Alternate
Freshwater Emergent Wetland	PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded	1 – Preferred 2 – Alternate
Freshwater Forested/Shrub Wetland	PFO1/EM1C	Palustrine, Forested Broad-Leaved Deciduous, Emergent, Persistent, Seasonally Flooded	0 – Preferred 1 – Alternate
	PFO1C	Palustrine, Forested Broad-Leaved Deciduous, Seasonally Flooded	0 – Preferred 1 – Alternate
	PSS1C	Palustrine, Scrub-Shrub Broad-Leaved Deciduous, Seasonally Flooded	3 – Preferred 5 – Alternate
Freshwater Pond	PUBG	Palustrine, Unconsolidated Bottom	1 – Preferred 1 – Alternate
	PUBGx	Palustrine, Unconsolidated Bottom, Intermittently Exposed Excavated	1 – Preferred 1 – Alternate
Riverine	R2UBFx	Riverine, Lower Perennial, Unconsolidated Bottom, Semipermanently Flooded, Excavated	1 – Preferred 0 – Alternate

Wetland Type	NWI Code[a]	NWI Habitat Type[b]	Total Number of Each Habitat Type Preferred/ Alternate
	R2UBG	Riverine, Lower Perennial, Unconsolidated Bottom, Intermittently Exposed	1 – Preferred 1 – Alternate
	R3UBH	Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded	1 – Preferred 1 – Alternate
	R4SBC	Riverine, Intermittent, Streambed, Seasonally Flooded	2 – Preferred 3 – Alternate
	R5UBH	Riverine, Unknown Perennial, Unconsolidated Bottom, Permanently Flooded	6 – Preferred 5 – Alternate
Total Number of Preferred Route NWI Wetlands:			**18**
Total Number of Alternate Route NWI Wetlands:			**22**

a Cowardin et al., 1979

b USFWS, 2020.

(ii) Field-Delineated Wetlands

ATSI's planned ROW is 65 feet wide centered along the transmission line route. The planned construction work activities (workspace) and soil surface disturbance will be limited to this 65-foot wide corridor. Thirty-two wetland complexes were delineated using the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual as well as the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) [Environmental Laboratory, 1987; and 2012]. Delineated wetlands were also evaluated using the Ohio EPA Ohio Rapid Assessment Method (identified in **Table 8-1**). A total of 21 wetlands were identified along the Alternate Route and 22 wetlands along the Preferred Route, including 11 wetlands within the corridor common with both routes.. No wetlands were identified within the expansion of the Riverbend Substation or associated work areas or access to the expansion area. Wetlands identified during the ecological survey on the Preferred Route and Alternate Route are shown on **Figure 3** of **Appendix 8-1**. Detailed information on each delineated wetland is included in **Table 2** and **Table 3** of **Appendix 8-1**.

Twenty-two wetlands were delineated within the survey corridor of the Preferred Route totaling 12.57 acres. Eight of these wetlands are within the 65-foot ROW of the Preferred Route totaling 0.52 acres. Twenty-one wetlands were delineated within the survey corridor of the Alternate Route totaling 13.03 acres. Thirteen of these wetlands are within the 65-foot ROW of the Alternate Route totaling 1.23 acres. Details of these features are provided in **Table 2** of **Appendix 8-1**. and further discussed in Section 4906-5-08(B)(3)(c).

(c) Waterbodies

(i) Field-Delineated Streams

Streams and drainage channels were delineated and assessed during the ecological survey. Streams with drainage areas greater than 1 square mile or maximum pool death greater than 40 centimeters were assessed using the OEPA Qualitative Habitat Evaluation Index (QHEI) [Rankin

1989 and OEPA, 2006]. The QHEI is one measure that is used by OEPA, in association with biotic sampling, to determine a stream's aquatic life use designation in accordance with the Ohio water quality standards (OEPA, 2017). The QHEI method classifies streams based on their drainage area. Streams that drain greater than or equal to 20 square miles are classified as "large streams", while those that drain less than 20 square miles are classified as "headwaters".

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, 2020). 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).

Thirty-five streams were evaluated using the QHEI and HHEI methods within the field survey area associated the Preferred and Alternate, Routes (identified in **Table 3** of **Appendix 8-1**). A total of 14 streams were identified along the Alternate Route and 23 along the Preferred Route, including 2 streams within the corridor common to both routes. No streams were identified within the expansion of the Riverbend Substation or associated work areas or access to the expansion areas. However, the Mahoning River is located outside of the survey area of the substation expansion and will not be affected by the Project.

Streams identified during the ecological survey on the Preferred and Alternative Route are shown on **Figure 3** of **Appendix 8-1**. Detailed information on each delineated stream is included in **Table 3** of **Appendix 8-1**.

The Preferred Route centerline crosses 8 unique streams for a total of 11 crossings with a cumulative length of approximately 15,131 and 727 linear feet within the field survey area and 65-foot ROW, respectively. Additionally, the Alternate Route crosses 9 unique streams for a total of 12 crossings with a cumulative length of 7,102 and 1,437 linear feet within the field survey area and 65-foot ROW, respectively. As both these routes overlap along the common corridor a total of two of these streams and/or crossings are located within both the Preferred and Alternative Route for approximately 987 and 210 linear feet within the field survey area and 65-foot ROW, respectively. Details of these features are provided in **Table 4** of **Appendix 8-1** and further discussed in Section 4906-5- 08(B)(3)(c).

(ii) Lakes, Ponds, and Reservoirs

No lakes, ponds, or reservoirs were observed in the field survey area for the Preferred Route, Alternate Route and/or the expansion area of the Riverbend Substation.

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

Detailed maps at 1:2,400 scale depicting the delineated features, field survey area, and proposed ROW are provided as **Figure 3 of Appendix 8-1** for the Preferred Route, Alternative Route, and the expansion of the Riverbend Substation.

(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 65-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 8-2**.

TABLE 8-2
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/Cultivated	457	0.09	0.57
Barren	2,323	0.44	3.45
Forested	14,160	2.68	19.03
Landscaped/Maintained	813	0.15	0.97
Old Field/Scrub-Shrub	1,543	0.29	2.15
Stream/Wetland	996	0.19	1.56
Urban - Road/RR ROW, Pavement, Buildings	7,228	1.37	13.35
Alternate Route			
Agricultural/Cultivated	0	0.00	0.00
Barren	0	0.00	0.00
Forested	15,279	2.89	19.90
Landscaped/Maintained	2,874	0.54	3.71
Old Field/Scrub-Shrub	6,048	1.15	8.59
Stream/Wetland	1,365	0.26	2.27
Urban - Road/RR ROW, Pavement, Buildings	7,357	1.39	14.65

(b) Construction Impacts on Wetlands

Permanent impacts to wetlands are not anticipated by the construction, operation, or maintenance of the proposed transmission line because no poles are proposed within wetland boundaries. BMPs, including timber matting and utilization of silt fence or filter sock, will be used as appropriate during construction to minimize runoff siltation.

During wetland and waterbody delineations, 22, and 21 wetlands were identified along Preferred Route's and Alternative Route's ROWs, respectively. The cumulative acreage of the delineated wetlands within the Preferred Route's ROW is 0.52acre and Alternative Route ROW is 1.23acres. No wetlands are located within the extent of the proposed expansion of the Riverbend Substation. Detailed information regarding these features are provided in **Appendix 8-1**. Where temporary construction access through a wetland cannot be avoided, the crossing would occur during dry conditions or protective construction matting would be used to minimize impacts from the construction vehicles. Anticipated disturbances based on wetland ORAM categories for the Preferred and Alternative Routes ROWs are provided in **Appendix 8-1**.

(c) Construction Impacts on Waterbodies

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 after final engineering design and landowner negotiations are complete. If a new stream crossing is necessary, the Applicant will use temporary culverts or temporary access bridge methods.

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 65-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 directional drilling. 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 urban with relatively high density residential, industrial, commercial, and institutional land uses. Road, railroad, and utility ROWs are present through the area. Limited recreational and agricultural land uses are also present. 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 2020-2021 Hunting and Trapping Regulations (ODNR-DOW, 2020a).

Lists of protected species are based on information showing their range within Mahoning County, as reported in correspondence from the ODNR-DOW (ODNR-DOW, 2019b) and USFWS (USFWS, 2019a), in addition to the review of USFWS county species distribution lists (USFWS, 2017). 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

A consultation request was submitted to the ODNR-DOW on April 25, 2019, to obtain Ohio Natural Heritage Database records within a 25 square mile study area centered on 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 April 2019, prior to route selection, the Preferred and Alternate Routes were located entirely within the area covered by the data request. ODNR data indicated that the provided 25 square mile area is within the range of three listed species. 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 8-3 and 8-4**.

A consultation request was submitted to the USFWS on April 25, 2019. A response letter was received dated May 3, 2019. The USFWS confirmed that two federally listed bat species listed in **Table 8-3** may occur in the 25 square mile 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 (USFWS, 2019).

The initial review request submitted to the ODNR and USFWS included a review area that contained all route alternatives identified in the RSS in **Appendix 4-1**. As a result, the agencies responses may reflect a larger Project area than the Preferred and/or Alternative Route. However, the expansion of the Riverbend Substation is also therefore included within this original request to the ODNR and USFWS.

TABLE 8-3
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				
Eastern massasauga *Sistrurus catenatus*	Threatened	Uses a range of habitats including wet prairies, fens, and other wetlands, as well as drier upland habitat[b] Due to flooding in the vicinity of the Mahoning River and urban nature of the study area, habitat for this species is not likely in the project area.	Mahoning County, Ohio[c] ; No ODNR records in vicinity of the Project area [b]	No
Indiana bat *Myotis sodalis*	Endangered	Hibernacula = Caves and mines Maternity and foraging habitat = small stream corridors with well-developed riparian woods and upland forests[b]	Mahoning County, Ohio[c] ; Presence assumed wherever suitable habitat occurs.[d]	Yes
Northern long-eared bat *Myotis septentrionalis*	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]	Mahoning County, Ohio[c] ; Presence assumed wherever suitable habitat occurs.[d]	Yes

Sources:

a: NatureServe, 2020; b: ODNR-DOW, 2019; c:USFWS, 2017; d: USFWS, 2019, and e: ODNR-DOW, 2020a

TABLE 8-4
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				
Eastern massasauga *Sistrurus catenatus*	Threatened	Uses a range of habitats including wet prairies, fens, and other wetlands, as well as drier upland habitat[b] Due to flooding in the vicinity of the Mahoning River and urban nature of the study area, habitat for this species is not likely in the project area.	Range is within Mahoning County, Ohio. ODNR concluded that due to location and type of habitat within the project area, this project is not likely to impact this species.[b]	No
Indiana bat *Myotis sodalis*	Endangered	Hibernacula = Caves and mines Maternity and foraging habitat = small stream corridors with well-developed riparian woods and upland forests[d]	Range is within Mahoning County, Ohio[b]. Presence assumed wherever suitable habitat occurs.[d]	Yes
Northern Harrier *Circus cyaneus*	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] No nesting habitat was identified during the field surveys for the project.	Range is within Mahoning County, Ohio[b]. Presence assumed wherever suitable habitat occurs.[d]	No

Sources:

a: NatureServe, 2020; b: ODNR-DOW, 2019; c:USFWS, 2017; d: USFWS, 2019, and e: ODNR-DOW, 2020a

(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 2020-2021 Hunting and Trapping Regulations (ODNR-DOW, 2020a) and the ODNR-DOW Species Guide Index (ODNR-DOW, 2020b).

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 not 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 likely occurs near or within the Project, in proximity to the Mahoning River and Dry Run, 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 likely occurs near or within the Project, in proximity to the Mahoning River and Dry Run. 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, such as the Mahoning River and Dry Run.

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 surrounding urban land cover present throughout the area, this species is unlikely to occur along the routes. 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 2020-2021 Hunting and Trapping Regulations (ODNR-DOW, 2020a) and the ODNR-DOW Species Guide Index (ODNR-DOW, 2020b).

(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 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. 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 may be present along the routes in proximity to the Mahoning River. This species was not observed during field surveys.

Northern Bobwhite Quail (*Colinus virginianus*): The northern bobwhite quail is a forest edge species. This species may exist in select locations along northeastern-most portions of 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 may be 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 does not inhabit areas along the routes. 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 may be present along the routes, in proximity to the Mahoning River and Dry Run. 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. This species was observed occasionally during field surveys and sufficient habitat for this species exists 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 present within the vicinity of select locations along the routes, specifically the northeastern-most portions of 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. This species was not observed during the field surveys and it is not 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 of this species was observed during the field surveys along the routes.

Woodchuck (*Marmota monax*): Woodchucks (groundhogs) live in open grasslands, pastures, and woodlands. This species was not observed during field surveys; however, indirect evidence of this species was observed during the field surveys along 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 the Indiana bat and the Northern long eared 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 listed species 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. ATSI will not conduct mechanized clearing within 25 feet of any streamand 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 a site by site basis for the individual species.

(D) SITE GEOLOGY

(1) Site Geology

Both routes fall within portions of the Allegheny and Pottsville Groups (undifferentiated) and the Logan and Cuyahoga Formations (undivided) of the Appalachian Plateau physiographic province. The underlying geology of both routes consists of either Mississippian-age (Upper and Lower) shale, siltstone, sandstone, conglomerate and limestone or Pennsylvanian-age (Middle and Lower) shale, siltstone, sandstone, conglomerate, limestone, underclay, coal, and flint. Approximately 48 percent of the area within 1,000 feet of the Preferred Route occurs within the Maxville Limestone; Rushville, Logan and Cuyahoga Formations, and 52 percent within the Allegheny and Pottsville, Undivided Formation. Approximately 54 percent of the area within 1,000 feet of the Alternate Route occurs within the Maxville Limestone; Rushville, Logan and Cuyahoga Formations, and 46 percent within the Allegheny and Pottsville Groups (USGS, 2005).

(2) Slopes and Foundation Soil Suitability

Seven 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. These soils account for one percent within the Alternate ROW and less than 0.33 percent within the Preferred ROW. Few, if any, pole locations are expected to be within the areas with slopes exceeding 12 percent. Erosion and sediment controls will be placed in accordance with best management practices on slopes exceeding 12 percent where construction will occur (NRCS, 2020).

The bedrock geologies consisting primarily of siltstone, mudstone, and sandstone and overlaying soils consisting of primarily silt loams and disturbed urban soils, present along both routes, are generally expected to be suitable for foundation construction. 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 (NRCS, 2020).

(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 143 feet. The nearest airport is located in Mahoning County (a private airport), approximately 2.2 miles north of the proposed transmission line. Two helipads associated with hospitals are located within one mile north of the project near downtown Youngstown.

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.

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

Based on preliminary engineering, ATSI submitted the proposed structure locations and heights to the FAA for Obstruction Evaluation/Airport Airspace Analysis. FAA made a Determination of No Hazard to Air Navigation at each location. 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.

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