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August 8, 2025

VIA ELECTRONIC FILING

Matthew Homsher, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
P.O. Box 3265
Harrisburg, PA 17105-3265

Re: Application of Mid-Atlantic Interstate Transmission, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Carroll-Huntertown 230 Kilovolt Transmission Line Located in Straban, Mount Pleasant, Mount Joy, and Germany Townships, Adams County, Pennsylvania
Docket No. A-2025-_____

Dear Secretary Homsher:

Enclosed for filing on behalf of Mid-Atlantic Interstate Transmission, LLC ("MAIT") is the Application for Approval of the Caroll-Hunterstown 230 Kilovolt Transmission Line Located in Straban, Mount Pleasant, Mount Joy, and Germany Townships, Adams County, Pennsylvania, which includes the following:

1. The Application and the Exhibits in support;

2. The Direct Testimony in support of the Application; and

3. The Notice of Filing.

The associated $350.00 filing fee has been paid by Post & Schell, P.C. as of the time of the filing.

MAIT notes that on July 3, 2025, the Company attempted to file the instant Application along with a related Letter of Notification with the Commission. The Commission rejected the filing and required that the Application and Letter of Notification be filed separately. To comply with the Commission's directive, MAIT is hereby re-submitting this Application for Approval of the

Carroll-Hunterstown 230 Kilovolt Transmission Line. The Letter of Notification will be separately filed.

Due to file size restrictions, the Application, the accompanying Exhibits, and Direct Testimony are being uploaded separately to the Commission's ShareFile for large filings. Additionally, under separate cover, MAIT is providing the Commission a CD containing PDF copies of the Application, the accompanying Exhibits, Direct Testimony, and Notice of Filing.

Copies of the Application, the accompanying Exhibits, and Direct Testimony are being served by certified mail, return receipt requested, upon the parties indicated on the Certificate of Service associated with the Application.

Copies of the Notice of Filing are being served by certified mail, return receipt requested, upon the parties indicated in the Certificate of Service associated with the Notice of Filing.

Subject to the Pennsylvania Public Utility Commission's approval, the Project has a scheduled construction date on or about April 1, 2027, for the proposed high-voltage transmission line to meet an in- service date of June 1, 2028. To support this construction timeline, MAIT respectfully requests that the Commission issue its final ruling on or before January 2027 to allow for preparation in advance of construction.

Respectfully submitted,

GPL/dmc
Enclosures

cc: Deb Backer - Bureau of Technical Utility Services (*via email; w/attachments*)
Jordan Van Order - Bureau of Technical Utility Services (*via email; w/attachments*)

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Application has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 57.74(b).

VIA CERTIFIED MAIL: RETURN RECEIPT REQUESTED

PA Department of Environmental Protection
ATTN: Office of Chief Counsel
400 Market St., 9th Floor
Harrisburg, PA 17105
CC: Secretary to PADEP Chief Counsel

PA Department of Environmental Protection
ATTN: Bureau of Waterways Engineering and Wetlands
400 Market Street
Harrisburg, PA 17101

Office of Consumer Advocate
555 Walnut Street
5th Floor Forum Place
Harrisburg, PA 17101-1923
Attn: Darryl Lawrence, Consumer Advocate

Pennsylvania Public Utility Commission
Bureau of Investigation and Enforcement
P.O. Box 3265
Harrisburg, PA 17105-3265
Attn: Allison Kaster

Office of Small Business Advocate
555 Walnut Street, 1st Floor Forum Place
Harrisburg, Pennsylvania 17101
Attn: NazAarah Sabree,
Small Business Advocate

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Gettysburg, PA 17325

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Commissioner, Adams County
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Marty Karsteter Qually
Commissioner, Adams County
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Office of Planning and Development Director
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Gettysburg, PA 17325

Adam McClain
Conservation District Manager
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Wes McDaniel
Germany Township Board of Supervisors
Vice Chairperson
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Jack Ketterman
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Bryan Gonnella
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Patrick Manley
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Germany Township Engineer
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Germany Township Engineer
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Mount Pleasant Township

Mount Pleasant Township

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David Sentz
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Building Code/Zoning/Code Enforcement
Officer
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Gettysburg, PA 17325

C.S. Davidson, Inc.
Mount Pleasant Township Engineer
38 N Duke Street
York, PA 17401

Date: August 8, 2025

Garrett P. Lent

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL–HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	**Docket No. A-2025-_____**

APPLICATION
OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

Mid-Atlantic Interstate Transmission, LLC ("MAIT"), a FirstEnergy Company, pursuant to the Pennsylvania Public Utility Commission's ("Commission") regulations at 52 Pa. Code § 57.72 *et seq*. and its Interim Guidelines for the Filing of Electric Transmission Line Siting Applications at 52 Pa. Code § 69.3101 *et seq*. ("Interim Guidelines"), requests the Commission's approval to construct approximately 12.9 miles of 230 kilovolt ("kV") transmission line by rebuilding the existing 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Hunterstown Substation to double-circuit 230/115 kV and 230/138 kV lines, respectively (together, the "Carroll–Hunterstown 230 kV Transmission Line" or "Project").[1] The

[1] Related to the proposed Carroll-Hunterstown 230 kV Transmission Line, MAIT intends to file a separate Letter of Notification pursuant to Sections 57.72(d)(1)(i) and (vi) of the Public Utility Commission's regulations, 52 Pa. Code §§ 57.72(d)(1)(i) and (vi), to rebuild approximately 2.0 miles of the existing Lincoln–Orrtanna 115 kV Transmission Line to accommodate a higher capacity conductor (the "Lincoln–Orrtanna Rebuild Project"). The Lincoln–Orrtanna Rebuild Project is designed to address the same transmission system needs as the proposed Carroll–Hunterstown 230 kV Transmission Line. Collectively, the Carroll–Hunterstown 230 kV Transmission and the Lincoln–Orrtanna Rebuild Project are referred to herein as the "Carroll–Hunterstown Improvements Project."

proposed Carroll–Hunterstown 230 kV Transmission Line will cross 12.9 miles in Straban, Mount Pleasant, Mount Joy, and Germany townships in Adams County, Pennsylvania. In addition to the portions of the Carroll–Hunterstown 230 kV Transmission Line located in Pennsylvania, approximately 11.3 miles of the proposed Carroll–Hunterstown 230 kV Transmission Line will be located in Carroll County, Maryland,[2] terminating at Carroll Substation. The Carroll–Hunterstown 230 kV Transmission Line is needed to increase the current-carrying capacity of the existing Carroll–Hunterstown corridor that connects Hunterstown Substation in Adams County, Pennsylvania, to Carroll Substation in Carroll County, Maryland to meet current and expected transmission system needs in Adams and Carroll counties and the surrounding areas.

MAIT is making this filing available to the public on its website. MAIT has included a link to this website[3] in this Application and in the Notice of Filing. MAIT also intends to provide the URL address to this filing in the newspaper notice it publishes in newspaper(s) of general circulation in the area of the Carroll–Hunterstown Improvements Project, which includes the Carroll-Hunterstown 230 kV Transmission Line.

Subject to the Commission's approval, construction on the Carroll–Hunterstown Improvements Project is scheduled to begin on or about April 1, 2027, to meet an in-service date of June 1, 2028. To support this construction timeline, MAIT respectfully requests that the Commission issue its final ruling by January 2027.

In support of this Application, MAIT states as follows:

[2] The portion of the proposed Carroll–Hunterstown 230 kV Transmission Line located in Carroll County, Maryland will be the subject of a separate filing with the Maryland Public Service Commission ("MDPSC") and not a subject of this filing.

[3] https://www.firstenergycorp.com/about/transmission_projects/pennsylvania/carroll-hunterstown-project.html.

I. INTRODUCTION

1. The name of the Applicant and the address of its principal business office are:

Mid-Atlantic Interstate Transmission, LLC
341 White Pond Drive
Akron, OH 44320

2. MAIT's attorneys in this matter authorized to receive notices and communications on its behalf are:

Tori L. Giesler (ID #207742)
FirstEnergy Service Company
341 White Pond Dr.
Akron, OH 44320
(610) 921-6658
tgiesler@firstenergycorp.com

David B. MacGregor (ID #28804)
Garrett P. Lent (ID #321566)
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12th Floor
Harrisburg, PA 17101-1601
(717) 731-1970
dmacgregor@postschell.com
glent@postschell.com
mrulli@postschell.com

3. MAIT also requests that a copy of all notices and communications regarding this matter be sent to:

Mary E. Anderson
Supervisor, Transmission Siting East
FirstEnergy Service Company
341 White Pond Drive
Akron, OH 44320
mcargill@firstenergycorp.com

4. MAIT is a public utility that provides interstate electric transmission services in the Commonwealth subject to the jurisdiction of the Federal Energy Regulatory Commission

("FERC"). Accordingly, this Commission asserts jurisdiction over the siting and construction of transmission lines by MAIT in Pennsylvania pursuant to the Commission's regulations at 52 Pa. Code § 57.71 et seq.

5. In support of this Application, MAIT includes the written direct testimony of seven witnesses, identified as MAIT Statement Nos. 1 through 7, and their supporting exhibits. MAIT also includes with this submission a cross-reference document that lists provisions of the Commission's regulations and notes where they are referenced in this submission. *See* **Attachment 1**. Additionally, MAIT's witnesses sponsor the following exhibits, which are included with the filing and provide additional detailed information regarding the proposed Carroll–Hunterstown 230 kV Transmission Line:

- Mary E. Anderson (MAIT Statement No. 1) provides an introduction of MAIT's seven witnesses, summarizes the Project's regulatory requirements, describes MAIT's outreach to the public, and sponsors MAIT Exhibits 1 and 2:
  - **MAIT Exhibit 1:** Project Fact Sheet; and
  - **MAIT Exhibit 2:** Proof of Publication for Public Meeting.
- Jacquelyn Lojek (MAIT Statement No. 2) identifies the electrical need for the Project, describes the alternatives to the Project that were considered, describes the Electric and Magnetic field ("EMF") calculations for the Project, and sponsors MAIT Exhibits 3 through 10:
  - **MAIT Exhibit 3:** Relevant portions of PJM Interconnection, L.L.C.'s ("PJM") October 31, 2023 Transmission Expansion Advisory Committee ("TEAC") presentation;

- **MAIT Exhibit 4:** Relevant portions of PJM's December 5, 2023 TEAC presentation;
- **MAIT Exhibit 5:** MAIT's response to PJM accepting construction responsibility for the Project;
- **MAIT Exhibit 6:** Maps of the existing and proposed MAIT transmission system in the Project area, including the entirety of the proposed Carroll–Hunterstown corridor;
- **MAIT Exhibit 7:** Graph noting EMF calculations under normal loading for existing 115 kV conditions;
- **MAIT Exhibit 8:** Graph noting EMF calculations under normal loading for existing 138 kV conditions;
- **MAIT Exhibit 9:** Graph noting EMF calculations under normal loading for proposed 230/115 kV conditions; and
- **MAIT Exhibit 10:** Graph noting EMF calculations under normal loading for proposed 230/138 kV conditions.

- Barry A. Baker (MAIT Statement No. 3) describes the principal elements of the siting analysis completed for the Carroll–Hunterstown 230 kV Transmission Line, including an explanation of how the environmental assessment was conducted and the reasons why the proposed route was selected, and sponsors MAIT Exhibits 11 through 16:
  - **MAIT Exhibit 11:** Route Selection Study;
  - **MAIT Exhibit 12:** Topographic Overview Map;
  - **MAIT Exhibit 13:** Aerial General Layout Map;

- **MAIT Exhibit 14:** List of Agency & Permit Requirements;
- **MAIT Exhibit 15:** Wetland Delineation Report;
- **MAIT Exhibit 16:** Carroll–Hunterstown PA Natural Diversity Inventory ("PNDI") Review and Correspondence; and

- Lisa Marinelli (MAIT Statement No. 4) explains the process by which easements and other land rights were acquired for the ROW for the Project, and sponsors MAIT Exhibits 17 and 18:
  - **MAIT Exhibit 17:** List of property owners crossed by the ROW; and
  - **MAIT Exhibit 18:** 15-Day Landowner Notice Packet.
- Korey R. Swierczek (MAIT Statement No. 5) describes the design and engineering for the Project; how the Project will be constructed; MAIT's plans for operating and maintaining the proposed transmission line after it is constructed, including removing and controlling vegetation; and sponsors MAIT Exhibits 19 through 43:
  - **MAIT Exhibit 19:** Depiction of the proposed 230 kV transmission line within an existing 115 kV ROW between Germantown Substation and Lincoln Substation;
  - **MAIT Exhibit 20:** Depiction of a typical ROW section for the existing 115 kV transmission line between Germantown Substation and Lincoln Substation;
  - **MAIT Exhibit 21:** Depiction of the proposed 230 kV transmission line within an existing 115 kV ROW between Lincoln Substation and Hunterstown Substation;
  - **MAIT Exhibit 22:** Depiction of a typical ROW section for the existing 115 kV transmission line between Lincoln Substation and Hunterstown Substation;

- **MAIT Exhibit 23:** Depiction of the proposed 230 kV transmission line within an existing 138 kV ROW between the Pennsylvania-Maryland State Line and Germantown Substation;
- **MAIT Exhibit 24:** Depiction of a typical ROW section for the existing 138 kV transmission line between the Pennsylvania-Maryland State Line and Germantown Substation;
- **MAIT Exhibit 25** depicts the new ROW needed at the Hunterstown Substation parcel to accommodate the Hunterstown–Riley 115 kV Transmission Line relocation and the new Carroll–Hunterstown 230 kV Transmission Line;
- **MAIT Exhibit 26:** Depiction of a 115 kV single-circuit steel pole, with strain insulators on arms in a delta configuration;
- **MAIT Exhibit 27:** Depiction of an atypical double-circuit steel two-pole structure, with suspension insulators on arms;
- **MAIT Exhibit 28:** Depiction of a typical 230 kV single-circuit steel three-pole structure, with strain insulators for light line angles;
- **MAIT Exhibit 29:** Depiction of a typical 230 kV single-circuit steel three-pole structure, with strain insulators for heavy line angles;
- **MAIT Exhibit 30:** Depiction of an atypical double-circuit steel pole structure, with 230 kV strain insulators attaching to the pole and 115 kV insulators attaching to arms below the 230 kV;
- **MAIT Exhibit 31:** Depiction of an atypical double-circuit steel pole structure, with strain insulators in a vertical configuration with the 230 kV above the 115/138 kV;

- **MAIT Exhibit 32:** Depiction of an atypical double-circuit steel pole structure, with suspension insulators on arms attaching to the pole in a vertical configuration with the 230 kV above the 115/138 kV;
- **MAIT Exhibit 33:** Depiction of a typical double-circuit steel pole structure, with suspension insulators on arms in a vertical configuration for light line angles;
- **MAIT Exhibit 34:** Depiction of a typical double-circuit steel pole structure, with strain insulators on arms in a vertical configuration for light to heavy line angles;
- **MAIT Exhibit 35:** Depiction of an atypical double-circuit steel two-pole structure, with strain insulators on arms in a delta configuration;
- **MAIT Exhibit 36**: Depiction of a typical 230 kV single-circuit steel pole structure, with strain insulators in a vertical configuration for heavy line angles;
- **MAIT Exhibit 37:** Depiction of a typical 115 kV single-circuit steel pole structure, with strain insulators in a vertical configuration for light line angles;
- **MAIT Exhibit 38:** Depiction of an atypical 115 kV single-circuit steel pole structure, with suspension insulators on arms in a delta configuration for light line angles;
- **MAIT Exhibit 39:** Depiction of a typical 115 kV single-circuit steel pole structure with horizontal post insulators in a delta configuration;
- **MAIT Exhibit 40:** Depiction of a typical wood H-Frame tangent structure, which represents the majority of the structures that support the existing conductors within the Carroll–Hunterstown Transmission corridors;

- **MAIT Exhibit 41:** Maintaining a Safe and Reliable Transmission System Vegetation Management for New Transmission Construction Projects Brochure;
- **MAIT Exhibit 42** Maintaining a Safe and Reliable Transmission System Tree Trimming Comprehensive Vegetation Management Brochure; and
- **MAIT Exhibit 43:** Vegetation Management Program Brochure.

- Andrew Gledhill (MAIT Statement No. 6) describes PJM's Load Forecasting Process, explains the specific long-term load forecasts on which PJM relied for the 2022 Window 3 Competitive Solicitation Process, and sponsors MAIT Exhibits 44 through 50:
  - **MAIT Exhibit 44**: PJM Manual 19: Load Forecasting and Analysis;
  - **MAIT Exhibit 45**: PJM 2024 Load Forecast Supplement;
  - **MAIT Exhibit 46**: Itron Inc.'s 2022 PJM Model Review Report;
  - **MAIT Exhibit 47**: PJM 2022 Load Forecast Report;
  - **MAIT Exhibit 48**: PJM 2023 Load Forecast Report;
  - **MAIT Exhibit 48**: PJM 2024 Load Forecast Report; and
  - **MAIT Exhibit 50**: PJM 2025 Load Forecast Report.
- Sami Abdulsalam (MAIT Statement No. 7) describes the PJM Regional Transmission Expansion Plan ("RTEP") process, explains PJM's 2022 Window 3 Process, details 2022 Window 3 violations as it pertains to the reliability need for this Project, and sponsors MAIT Exhibits 51 through 55:
  - **MAIT Exhibit 51**: Operating Agreement, Schedule 6, PJM's Regional Transmission Expansion Planning Protocol;

- **MAIT Exhibit 52**: PJM Manual 14B - PJM Region Transmission Planning Process (Revision 56);
- **MAIT Exhibit 53**: PJM RTEP – 2022 RTEP Proposal Window 3, Problem Statement and Requirements;
- **MAIT Exhibit 54**: Special TEAC Materials, 2023 RTEP 2028 Preliminary Summer & Winter Generation Deliverability 500 kV and Above Violation Summary (April 27, 2023); and
- **MAIT Exhibit 55**: Reliability Analysis Report, 2022 Window 3 (December 8, 2023).

6. The Application regarding the Carroll–Hunterstown 230 kV Transmission Line, inclusive of the accompanying exhibits and statements, which are incorporated herein by reference, contains all the information required by 52 Pa. Code §§ 57.72(c), 69.1101, 69.3101-.3107.

II. APPLICATION FOR SITING APPROVAL OF THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

A. General Description of the Project

7. MAIT proposes to rebuild approximately 12.9 miles of the existing 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Hunterstown Substation as a double-circuit transmission line to accommodate the proposed new 230 kV circuit on one side and the 115 kV or 138 kV circuit on the other. This includes approximately 2.8 miles of the Carroll–Germantown 138 kV Transmission Line, approximately 7.5 miles of the Germantown–Lincoln 115 kV Transmission Line, approximately 1.4 miles of the Lincoln–Riley 115 kV Transmission Line, and approximately 1.2 miles of the Hunterstown–Riley 115 kV Transmission Line. The 138 kV circuit extends from Carroll Substation in Maryland to Germantown Substation

in Pennsylvania. The 115 kV circuits currently terminate at Germantown Substation, Straban Substation, Lincoln Substation, Riley Substation, and Hunterstown Substation. The existing 138 kV and 115 kV transmission lines will continue to provide service to those substations after the rebuild. The proposed Carroll–Hunterstown 230 kV Transmission Line will bypass the intermediate substations and electrically connect Hunterstown Substation in Pennsylvania to Carroll Substation in Maryland. The new 230 kV circuit may be constructed on single circuit structures as it bypasses the intermediate substations while the existing 115 kV and 138 kV circuits maintain their existing connections.

8. The proposed improvements from Carroll Substation to Hunterstown Substation will primarily consist of two single-circuit transmission lines, each consisting of three electrical phases, elevated above the ground by self-supporting, double-circuit steel monopole structures. Approximately 105 structures ranging from approximately 56 to 198 feet in height above ground will be installed, with an average height of approximately 120 feet and span lengths of approximately 800 feet.

9. The Carroll–Hunterstown 230 kV Transmission Line is needed to mitigate violations of FirstEnergy's and PJM Interconnection, LLC's ("PJM") planning criteria that were identified as part of PJM's 2022 RTEP analysis for Open Window 3. Specifically, the Carroll–Hunterstown 230 kV Transmission Line will address thermal violations identified under North American Electric Reliability Corporation ("NERC") Category P1, P2, P4, and P7 conditions and to provide adequate transmission capacity to meet current and expected transmission system needs in Adams County, Pennsylvania; Carroll County, Maryland; and the surrounding areas.

10. MAIT is including with this Application several maps that either depict or aid in understanding the location and description of the Carroll–Hunterstown 230 kV Transmission Line.

Jacquelyn Lojek (MAIT Statement No. 2) sponsors **MAIT Exhibit 6,** which is a map showing the existing transmission system in the Carroll–Hunterstown 230 kV Transmission Line area. This exhibit also reflects the proposed transmission system in the Carroll–Hunterstown 230 kV Transmission Line area after completion of the rebuild. In addition, Barry A. Baker (MAIT Statement No. 3) sponsors **MAIT Exhibits 12 and 13**, which are, respectively, a topographic general overview and an aerial general layout mapping of the area encompassing the Carroll–Hunterstown 230 kV Transmission Line showing the proposed line route in relation to major physical features. Mr. Baker also provides a narrative description of the proposed route in his direct testimony.

11. The Carroll–Hunterstown 230 kV Transmission Line will be located in Straban, Mount Pleasant, Mount Joy, and Germany townships in Adams County, Pennsylvania. A description of the Proposed Route is provided as required by 52 Pa. Code § 57.72(c)(3) in **Appendix A**, attached hereto. The Carroll–Hunterstown 230 kV Transmission Line is proposed to be constructed within an existing transmission corridor, which is currently occupied by the Carroll–Germantown 138 kV, Germantown–Lincoln 115 kV, Lincoln–Riley 115 kV, and Riley–Hunterstown 115 kV transmission lines.

12. The proposed route for the Carroll–Hunterstown 230 kV Transmission Line occupies existing ROW on 85 property tracts, including land upon which the existing Germantown, Lincoln, Straban, and Hunterstown substations are situated. New ROW is required for one parcel that currently accommodates the existing Hunterstown Substation in Adams County, Pennsylvania, as depicted in **MAIT Exhibit 25**. MAIT will amend a license agreement through negotiation with the affected property owner in order to terminate the proposed new 230 kV line at the substation and relocate approximately 600 feet of the Hunterstown–Riley 115 kV

Transmission Line near the Hunterstown Substation. The existing and newly acquired ROW agreements with the underlying landowners will allow MAIT to install the proposed structures to support the proposed Carroll–Hunterstown 230 kV Transmission Line. MAIT does not anticipate any directly impacted landowners will object to the Carroll–Hunterstown 230 kV Transmission Line.

13. Korey R. Swierczek (MAIT Statement No. 5) describes the existing transmission line corridor used by the Carroll–Hunterstown 230 kV Transmission Line, and he sponsors several exhibits depicting the corridor and the typical structures that will support the proposed transmission line.

14. In full, the proposed transmission line will extend from Carroll Substation in Carroll County, Maryland, to Hunterstown Substation in Adams County, Pennsylvania. For the portion of the Carroll–Hunterstown 230 kV Transmission Line located in Pennsylvania, the transmission line will be approximately 12.9 miles in length and will occupy primarily existing transmission line ROW with one amended license agreement being required. In total, the proposed Carroll–Hunterstown 230 kV Transmission Line is approximately 24.2 miles in length, with 12.9 miles in Pennsylvania and 11.3 miles in Maryland.

15. The proposed transmission line begins by exiting the Carroll Substation and follows the existing 138 kV transmission line ROW to the northeast for 2.34 miles to the Middleburg Road crossing. Continuing to the northeast, the Proposed Route extends for 3.84 miles to the SR 140 (Taneytown Pike) crossing located east of Taneytown, Maryland. After crossing SR 140, the proposed route extends north for 5.14 miles to the Maryland/Pennsylvania border. Turning to the northeast, the route extends for 2.80 miles to the SR 97 (Baltimore Pike) crossing located adjacent to Germantown Substation, which is where the 138 kV line changes over to 115 kV. At this point,

the transmission line crosses SR 97 and turns to the northwest for 7.48 miles to Lincoln Substation located near Gettysburg. From Lincoln Substation, the route turns to the northeast and extends for 2.61 miles to Hunterstown Substation.

16. **MAIT Exhibit 13** provides a general layout for the proposed Carroll–Hunterstown 230 kV Transmission Line. Pursuant to 52 Pa. Code § 57.72(c)(3), a general description of the Proposed Route of the Carroll–Hunterstown 230 kV Transmission Line is attached to this Application as **Appendix A**.

B. Engineering Description

17. The proposed Carroll–Hunterstown 230 kV Transmission Line would rebuild approximately 12.9 miles of the existing 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Hunterstown Substation as a double-circuit transmission line to accommodate the proposed new 230 kV circuit on one side and the 115 kV or 138 kV circuit on the other. The proposed transmission line will be supported by multiple structure types as shown in **MAIT Exhibits 26 through 39** and as described more fully in Mr. Swierczek's direct testimony (MAIT Statement No. 5). Based on preliminary engineering, the proposed transmission line will require approximately 105 structures ranging in height from approximately 56 feet to approximately 198 feet above ground, with an average height of approximately 120 feet. The average span length between structures will be approximately 800 feet. The structures are designed as steel monopole structures.

18. The overhead 230 kV double-circuit transmission line will utilize conductors that are 1590 thousand circular mils ("KCM") 54/19 aluminum conductor, steel reinforced ("ACSR"). In addition to the transmission conductors, the line will carry two shield wires. One of the shield wires will be 7 No. 8 Alumoweld, which consists of seven strands of No. 8 aluminum-clad steel

wire. The main purpose of the shield (or ground) wire is for lightning protection. The other shield wire will be an optical ground wire ("OPGW").[4] This wire is composed of aluminum and aluminum-clad steel strands surrounding an aluminum tube containing fiber-optic strands. The optical fibers within the cable can be used for high-speed transmission of data for the purpose of protection and control of the transmission line, as well as for voice and other data communication. The proposed Project will be designed and operated at 230 kV. The transmission maximum design operating temperature is 212 degrees Fahrenheit. The transmission line will meet or exceed all requirements of the current National Electrical Safety Code ("NESC") under all operating conditions.

C. Right-of-Way Assessment

19. The proposed new Carroll–Hunterstown 230 kV Transmission Line will utilize the existing ROW on the Carroll–Germantown 138 kV, Germantown–Lincoln 115 kV, Lincoln–Riley 115 kV, and Hunterstown–Riley115 kV transmission line corridors. Typical ROW width for the corridor between Lincoln Substation and the Pennsylvania-Maryland border is 110 feet, while the typical ROW width for the corridor between Lincoln Substation and Hunterstown Substation is 200 feet. The existing 115 and 138 kV transmission line structures in the centerline of the ROW are depicted in **MAIT Exhibits 20 and 24**. The existing 115 transmission line structures offset in the ROW are depicted in **MAIT Exhibit 22**.

20. The proposed double circuit 230/138 kV and 230/115 kV transmission lines will be constructed along the center of the existing 138 and 115 kV ROW. The 230 kV line will bypass

[4] Implementation of advanced technologies was considered as part of this Project. OPGW will be installed from Hunterstown Substation (PA) to Carroll Substation (MD), which will complete the fiber pathway between the Substations. OPGW enables remote power system monitoring, relay protection, and network communications through high-speed data transmission. It provides real-time data exchange for system protection schemes and Supervisory Control and Data Acquisition ("SCADA"), improving system reliability and operational flexibility. OPGW offers a reliable communication path with minimal maintenance. It enables critical power functions like remote monitoring, fault detection, and real-time data communication.

the Germantown, Straban, and Riley substations remaining on the center of the ROW. The proposed transmission line structures that will support the existing 115 and 138 kV lines and proposed new 230 kV transmission line conductors are depicted within centerline of existing ROW in **MAIT Exhibits 19 and 23**. The proposed transmission line structures that will support the existing 115 lines and proposed new 230 kV transmission line conductors are depicted in offset existing ROW in **MAIT Exhibit 21**. ROW widths and configurations are more fully described in Mr. Swierczek's direct testimony (MAIT Statement No. 5).

D. Property Owners

21. The names and addresses of known persons, corporations and other entities of record who own property within the proposed transmission line route for the Carroll–Hunterstown 230 kV Transmission Line are provided in **MAIT Exhibit 17**. Of the 85 parcels crossed by the Project, new ROW is required for one parcel that currently accommodates the existing Hunterstown Substation in Adams County, Pennsylvania. MAIT will amend a license agreement through negotiation with the affected property owner in order to relocate a portion of the existing Hunterstown–Riley 115 kV Transmission Line and allow for the proposed new 230 kV line to terminate at the Hunterstown Substation.

E. Statement of Need

22. Ms. Lojek (MAIT Statement No. 2) explains that the Carroll–Hunterstown 230 kV Transmission Line is needed to mitigate violations of FirstEnergy and PJM planning criteria that were identified as part of PJM's 2022 RTEP analysis for Open Window 3. Specifically, the Carroll–Hunterstown 230 kV Transmission Line will address thermal violations identified under NERC Category P1, P2, P4, and P7 conditions and provide adequate transmission capacity to meet

current and expected transmission system needs in Adams County, Pennsylvania; Carroll County, Maryland; and the surrounding areas.

23. The proposed Carroll–Hunterstown 230 kV Transmission Line will resolve thermal loading planning criteria violations identified as part of the 2022 RTEP analysis. The 2022 RTEP analysis, which studied the transmission system model anticipated for the year 2027, identified thermal loading planning criteria violations including: (1) violations on the Lincoln–Orrtanna 115 kV, Hunterstown–Riley 115 kV, Lincoln-Riley 115 kV, Germantown-Lincoln 115 kV 998, and Germantown–Taneytown 138 kV transmission lines under NERC Category P1, P2, P4, and P7 conditions; (2) a violation following a faulted 500 kV circuit breaker at Conastone Substation, which would outage the Conastone–Brighton 500 kV Transmission Line and increase the loading on the Hunterstown–Riley 115 kV, Lincoln–Riley 115 kV, Germantown–Lincoln 115 kV, and Germantown–Taneytown 138 kV transmission lines to approximately 142 percent, 147 percent, 135 percent, 129 percent, and 143 percent of their summer emergency ratings, respectively; and (3) an outage of the Hunterstown–Lincoln 115 kV Transmission Line that would increase loading on the Lincoln–Orrtanna 115 kV Transmission Line to approximately 140 percent of the summer emergency rating. These violations are further described in the testimony of Jacquelyn Lojek (MAIT Statement No. 2).

24. As discussed in Mr. Gledhill's direct testimony (MAIT Statement No. 6), the 2022 Load Forecast Report showed that electricity demand in the PJM Region is expected to steadily increase over the next 15 years. In the 2022 Load Forecast Report, PJM identified several zones—including the APS, Dominion Virginia Power ("DOM"), American Transmission Systems, Inc. ("ATSI"), and Commonwealth Edison ("COMED") zones—that had to be adjusted to account for large, unanticipated load changes. This contrasted with the relatively flat demand trends

throughout much of PJM for the preceding decade. PJM created a 2022 Modified Load Forecast for 2027 for the Maryland (APS) and DOM (Virginia) zones that considered approximately 1,200 MW and 2,700 MW of additional load, respectively. PJM developed a 2027 study year base case and a 2028 study year sensitivity analysis.

25. As discussed in Dr. Abdulsalam's direct testimony (MAIT Statement No. 7), the 2027/28 baseline reliability criteria violations included numerous overloaded 500 kV transmission lines, which provide the backbone of the transmission system serving the District of Columbia, Maryland, and Virginia region, and the APS and DOM zones. The majority of those overloaded 500 kV facilities occurred during both summer and winter peak. In addition to the regional violations, the Carroll–Hunterstown transmission corridor was severely overloaded. Overloaded transmission lines, which are the result of transmitting more power than the system is designed for, can lead to cascading outages and system collapse if not addressed. Numerous voltage collapse and extreme low-voltage magnitude and voltage drop violations in various areas, including Maryland, APS and DOM zones, were observed, indicating the inability of the power system to deliver the generated power to load centers.

26. Based on this extensive review, PJM determined that not addressing these voltage violations will make the power system inoperable under the identified outage/condition leading to loss of load and generation and cascading transmission outages.

F. Safety Considerations

27. The proposed Carroll–Hunterstown 230 kV Transmission Line will not create any unreasonable risk of danger to the public health or safety. The design, construction, and operation of the Carroll–Hunterstown 230 kV Transmission Line will meet or exceed the requirements specified in the latest edition of the NESC and all applicable safety standards established by the

Occupational Safety and Health Administration ("OSHA"). All work will be performed in accordance with NESC; OSHA; and any applicable local, state or federal requirements.

28. The Carroll–Hunterstown 230 kV Transmission Line is being completed within existing transmission line corridors, with the exception of the amended license agreement needed at the Hunterstown Substation property. FirstEnergy's vegetation management practices are described in **MAIT Exhibits 41 through 43** and discussed in Mr. Swierczek's direct testimony (MAIT Statement No. 5).

29. An EMF study for the proposed transmission line was performed. Results of that study are provided in Table 1 and Table 2 of Ms. Lojek's direct testimony (MAIT Statement No. 2) in response to Section 69.3107(b) of the Commission's Interim Guidelines.

30. No communication towers, pipelines, or other utilities will be affected by the Project.

31. The Project will involve numerous road crossings, including federal, state, and local roads and highways. MAIT will obtain the necessary Pennsylvania Department of Transportation ("PennDOT") Highway Occupancy Permits, or equivalent type permits prior to construction.

32. MAIT will coordinate with the Federal Aviation Association ("FAA") and PA Bureau of Aviation, as needed, to assess potential interference with any air navigation facility before construction. Aviation coordination has been initiated through the FAA. MAIT will ensure that the pole locations and heights are properly recorded by the FAA. MAIT will comply with any additional lighting and other visual aids that may be required by these agencies to ensure aviation safety in the region.

G. Route Analysis

33. MAIT retained AECOM Technical Services Corporation ("AECOM"), an Engineering and Environmental consulting firm, to prepare a comprehensive study of alternative routes and the potential impacts from the Carroll–Hunterstown 230 kV Transmission Line. The results of this study are set forth in AECOM's Transmission Line Route Selection Study ("Route Selection Study"), which is provided as **MAIT Exhibit 11**. MAIT evaluated four alternative routes ("Alternative Routes"), and of these routes, the Rebuild Route was selected as the Proposed Route. After analyzing and comparing the four Alternative Routes against potential impacts on the built environment, AECOM concluded that the Rebuild Route is preferred over other alternatives. The entire length of the Rebuild Route can be constructed within an existing 110- to 200-foot-wide ROW in Pennsylvania that currently contains a single-circuit 115 kV or 138 kV system. This route is also one of the shortest, most direct routes of all the Alternative Routes. Other options would require significantly more, new ROW. The Rebuild Route is expected to result in minimal incremental impacts to the built environment, including residential areas, land use, conserved lands, and cultural resources. The basis for the final route selection is set forth in Section 6 of the Route Selection Study and is also explained in Mr. Baker's direct testimony (MAIT Statement No. 3). The Route Selection Study and Mr. Baker's testimony provide additional information regarding the Alternative Routes considered by MAIT.

H. Environmental Assessment

34. AECOM conducted a comprehensive review of the environmental constraints located within the Carroll–Hunterstown 230 kV Transmission Line study area ("Study Area") that identified the environmental setting of the Study Area including wetlands, soils, geology, public lands, designated natural areas or preserves, recreation areas, and historic resources. The

environmental assessment is set forth in Section 4.1 of the Route Selection Study (**MAIT Exhibit 11**). No substantial impacts to these resources are anticipated as a result of constructing the Carroll–Hunterstown 230 kV Transmission Line.

35. As further explained in Mr. Baker's direct testimony, after analyzing and comparing the four routes against potential impacts to the natural environment, AECOM concluded that the Rebuild Route is preferred over the other Alternative Routes from an environmental perspective. This alignment would result in significantly less forest clearing and potential impacts to forested wetlands compared to other options. The Rebuild Route would also minimize the amount of 100-year floodplain crossed.

36. MAIT will implement appropriate measures during construction and throughout the subsequent operation of the Carroll–Hunterstown 230 kV Transmission Line to avoid or minimize impacts to environmental resources. MAIT will obtain all the relevant state and federal permits needed to construct the Carroll–Hunterstown 230 kV Transmission Line and will adhere to the conditions set forth in those permits. As part of the permitting process, MAIT has conducted detailed ecological surveys of the Rebuild Route Corridor. These surveys included wetland delineations, stream identifications, and threatened and endangered species surveys. MAIT will continue to coordinate with state and federal agencies to minimize the potential ecological impacts.

I. Social Assessment

37. The Route Selection Study also considered social resources in or near the Study Area. The entire Study Area was evaluated based on existing residential and commercial development, land uses, archaeological and historical areas, recreational and scenic resources, conserved lands, and terrain and landscape. MAIT also provided notice of the Carroll–Hunterstown 230 kV Transmission Line to representatives of Adams County and the

commissioners of the townships through which the Proposed Route will pass. In addition, a Public Open House was held to gather additional comments and opinions from affected landowners and the local community, and a virtual public open house forum was also made available on the internet for the public to review the proposed Carroll–Hunterstown 230 kV Transmission Line virtually. Comments received from landowners were considered in the selection of the Proposed Route. The built environment assessments are set forth in Section 4.2 of the Route Selection Study. A summary of the Public Open House is provided in Section 6.1 of the Route Selection Study.

38. After analyzing and comparing the four Alternative Routes against potential impacts on the built environment, the Routing Team concluded the Rebuild Route is preferred over other alternatives. The entire length of the Rebuild Route can be constructed within an existing 110- to 200-foot-wide ROW in Pennsylvania that currently contains a single-circuit 115 kV or 138 kV system. This route is also one of the shortest, most direct routes of all the alternatives. Other options would require significantly more, new ROW. Although the Rebuild Route cumulatively crosses more parcels and is in close proximity to more residences, the existing line has been in place for decades and over this time, land subdivision has increased the number of parcels crossed, and the expanding residential development has placed more homes up against the line. Therefore, the Rebuild Route is expected to result in minimal incremental impacts to the built environment including residential areas, land use, conserved lands, and cultural resources.

J. Airports and Aircraft Facilities

39. The closest airport to Hunterstown Substation is the Gettysburg Regional Airport, which is located approximately 5.80 miles west of the substation and approximately 4.00 miles from the West Route. No private airports are located in the Pennsylvania portion of the Study Area, and no other smaller airports or heliports were identified within 2 miles of the Study Area.

No potential aeronautical effects are anticipated as a result of the Project; however, MAIT will continue its coordination with the FAA and PA Bureau of Aviation, as needed, to assess potential interference with any air navigation facility before construction commences.

K. Governmental Agency Requirements

40. A list of local, state, and federal governmental agencies that have permitting or licensing requirements in connection with the construction or maintenance of the Carroll–Hunterstown 230 kV Transmission Line and a list of documents that have been, or are required to be, filed with those agencies in connection with siting and construction are set forth in **MAIT Exhibit 14**.

41. To date, no comments have been received from Adams County officials, nor has the Company received comments from officials in Straban, Mount Pleasant, Mount Joy, or Germany townships in response to the proposed Carroll–Hunterstown 230 kV Transmission Line.

L. Ownership, Cost and Construction Schedule

42. MAIT will own and construct the Project. Construction is scheduled to begin on or about April 2027, pending Commission approval. The proposed in-service date for the Project is June 1, 2028.

43. The estimated total cost of the Project, including proposed upgrades in Maryland and associated substation costs, is approximately $148,450,000.[5] Of this total Project cost, approximately $85,850,000[6] will include upgrades in Pennsylvania, of which approximately $82,090,000 is attributed to the transmission line upgrades. Of the transmission line upgrades,

[5] Of the approximate $148,450,000 total Project cost, the total approximate cost for upgrades in Maryland is $62,600,000.

[6] Of the approximate $85,850,000 Pennsylvania Project costs, approximately $3,760,000 is attributed to associated substation upgrades at Hunterstown, Straban, Lincoln, and Germantown substations.

approximately $71,110,000 is attributed to the proposed Carroll-Hunterstown 230 kV Transmission Line.

Estimated Transmission Line Costs:

Carroll–Hunterstown 230 kV Transmission Line	$71,110,000
Lincoln–Orrtanna 115 kV Transmission Line	$10,980,000[7]
Total Estimated Transmission Line Cost	$82,090,000

M. Litigation

44. There is no litigation concluded or in progress concerning the siting and construction of the Project.

N. Additional Information Required By Commission Guidelines

45. The Interim Guidelines, 51 Pa. Code §§ 69.3101-.3107, contain guidelines for public notice of transmission line siting applications. A copy of MAIT's Project fact sheet is included as **MAIT Exhibit 1,** along with a copy of the proof of newspaper publication for the public information meeting included as **MAIT Exhibit 2**. A copy of the 15-day landowner notice package is included as **MAIT Exhibit 18.**

46. Section 69.3103 of the Interim Guidelines provides that applications for eminent domain authority should be filed separately but may be filed simultaneously with the associated transmission siting application, or as soon as reasonably known. MAIT is coordinating with one landowner for an amended license agreement. MAIT does not anticipate the need to exercise eminent domain in connection with the Carroll–Hunterstown 230 kV Transmission Line.

47. Section 69.3104 of the Interim Guidelines lists information required for exemption from municipal zoning standards. A list of municipal permits required for the Carroll–Hunterstown 230 kV Transmission Line, and their status, is contained in **MAIT Exhibit 14**.

[7] The associated Lincoln-Orrtanna 115 kV Transmission Line Project will be subject to a separate Letter of Notification.

48. Section 69.3105(1) of the Interim Guidelines provides that applications for siting electric transmission lines should utilize a combination of transmission route evaluation procedures, including high-level GIS data, traditional mapping (including U.S. Geological Survey data and compilation), aerial maps, and analysis of physical site-specific constraints raised by affected landowners. This information is included in the Route Selection Study (**MAIT Exhibit 11**).

49. Section 69.3105(2) of the Interim Guidelines provides that transmission applicants should summarize the status of property acquisitions and provide the current status of property acquisition litigation or settlements. MAIT has existing rights to support the Carroll–Hunterstown 230 kV Transmission Line. A list of property owners from whom land rights have been obtained is included in **MAIT Exhibit 17**. As previously mentioned, regarding the sole parcel where new ROW is required, MAIT will amend the existing license agreement through negotiation with the affected property owner in order to relocate a portion of the Hunterstown–Riley 115 kV Transmission Line to allow for termination of the proposed new 230 kV at the substation.

50. Section 69.3105(3) of the Interim Guidelines states transmission applications should provide information regarding the reasonable alternative routes the utility actively considered in its final phase of the route selection process, and the relative merits of each, including:

i. The environmental, historical, cultural and aesthetic considerations of each route;

ii. The proximity of these alternative routes to residential and non-residential structures;

iii. The applicant's consideration of relevant existing ROWs; and

iv. The comparative construction costs associated with each route.

51. Items (i) through (iii) of Section 69.3105(3) are included as part of **MAIT Exhibit 11**. The comparative estimated construction costs (item iv) for the four alternative transmission line routes evaluated are shown below in Table 1. Approximate costs include the scope of work in both Pennsylvania and Maryland for the new 230 kV transmission line.

Table 1: Alternative Route Cost Comparison

Route Alternative	Approximate Distance (miles)	Approximate Cost ($)
Proposed Route (Rebuild Route)	24.2	$125,130,000
East Route	31.7	$140,382,000
Central Route	24.0	$153,984,000
West Route	24.8	$150,814,000

52. Section 69.3106 of the Interim Guidelines provides that siting applications should include a matrix or list showing all expected federal, state and local government regulatory permitting or licensing approvals that may be required for the project at the time the application is filed, the issuing agency, the approximate timeframe for approval and current status. **MAIT Exhibit 14** contains a list of all local, state and federal agencies with requirements for permitting or licensing approvals. MAIT will inform the Commission in a timely manner of all changes in the status of all permits and licenses required for the Carroll–Hunterstown 230 kV Transmission Line.

53. Section 69.3107(a) of the Interim Guidelines provides that siting applications should contain a vegetation management plan. **MAIT Exhibit 41** is a copy of the FirstEnergy Maintaining a Safe and Reliable Transmission System Vegetation Management for New Transmission Construction Projects Brochure, **MAIT Exhibit 42** is a copy of the FirstEnergy Maintaining a Safe and Reliable Transmission System Tree Trimming Comprehensive Vegetation Management Brochure, and **MAIT Exhibit 43** is a copy of the FirstEnergy Vegetation

Management Program Brochure. These exhibits describe MAIT's vegetation plan, vegetation practices, and landowner notification procedures.

54. Section 69.3107(b) of the Interim Guidelines provides that siting applications should contain a description of electric and magnetic field mitigation procedures that the utility proposes to utilize along the transmission line. MAIT's typical transmission line route selection process, which was employed for the Carroll–Hunterstown 230 kV Transmission Line, evaluates a number of factors to identify the appropriate location for the proposed transmission line. Among other things, this evaluation process identifies and considers residences and locations where large groups of people typically gather, such as schools and places of worship. Although locating the transmission line in close proximity to these types of land uses is not precluded by state or federal rules or guidelines, providing the largest practical distance from residences, schools, places of worship and similar facilities is generally more acceptable to the local community and is an effective way to mitigate potential EMF concerns.

55. As part of MAIT's approach to efficiently construct a transmission line project, the design of all or portions of a transmission line project will typically utilize a compact conductor arrangement. This approach has the added benefit of reducing EMF strengths. Here, MAIT proposes to construct a double-circuit steel tangent structure because it is a compact design that reduces EMF field strengths in comparison to other installations.

56. As a point of reference, the Company is providing estimates of the EMF strengths for the Carroll–Hunterstown 230 kV Transmission Line. These estimates have been prepared utilizing the Electric Power Research Institute's EMF Workstation 2015 software program ("Program"). The Program relies on the law of Biot-Savart, an equation describing the magnetic field generated by a constant electric current. The law relates the magnetic field to the magnitude,

direction, length, and proximity of the electric current. The EMF strengths directly beneath the centerline at mid-span and at the edges of the ROW for the proposed 230/138 kV and 230/115 kV transmission lines have been calculated. These calculations are provided in the Direct Testimony of Ms. Lojek (MAIT Statement No. 2) and **MAIT Exhibits 7 through 10**.

O. Service of Application

57. Copies of this Application and accompanying exhibits, or the Notice of Filing, have been served upon all interested parties by certified mail, return receipt requested, as required by the Commission's regulation at 52 Pa. Code § 57.74.

III. CONCLUSION

WHEREFORE, based on the forgoing, Mid-Atlantic Interstate Transmission, LLC respectfully requests that the Pennsylvania Public Utility Commission review and approve this application for the location and construction of the Carroll–Hunterstown 230 kV Transmission Line.

Respectfully Submitted,

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Date: August 8, 2025

APPENDIX A

APPENDIX A

The following description of the Proposed Route for the Carroll–Hunterstown 230 kV Transmission Line is provided as required by 52 Pa. Code § 57.72(c)(3).

The Carroll–Hunterstown 230 kV Transmission Line, as shown on **MAIT Exhibit 12** will start at the existing Carroll Substation in Carroll County, Maryland, and will extend approximately 24.2 miles to the existing Hunterstown Substation. In Pennsylvania, the proposed Carroll–Hunterstown 230 kV Transmission Line involves rebuilding approximately 12.9 miles of the existing 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Hunterstown Substation as a double-circuit transmission line to accommodate the proposed new 230 kV circuit on one side and the 115 kV or 138 kV circuit on the other. The proposed new Carroll–Hunterstown 230 kV line will utilize the existing ROW on the Carroll–Germantown 138 kV, Germantown–Lincoln 115 kV, Lincoln–Riley 115 kV, and Riley–Hunterstown 115 kV transmission line corridors. The typical ROW width for the corridor between Lincoln Substation and the Pennsylvania-Maryland border is 110 feet, while the typical ROW width for the corridor between Lincoln Substation and Hunterstown Substation is 200 feet. The Carroll–Hunterstown 230 kV Transmission Line will occupy existing transmission line right-of-way. In Pennsylvania, the Carroll–Hunterstown 230 kV Transmission Line will cross 12.9 miles of Adams County, including 2.91 miles of Germany Township, 3.17 miles of Mount Joy Township, 1.49 miles of Mount Pleasant Township, and 6.30 miles of Straban Township.

Beginning in Carroll County, Maryland, from Carroll Substation, the proposed route follows the existing 138 kV transmission line ROW to the northeast for 2.34 miles to the Middleburg Road crossing. Continuing to the northeast, the route extends for 3.84 miles to the SR 140 (Taneytown Pike) crossing located east of Taneytown, Maryland. After crossing SR 140,

the proposed route extends north for 5.14 miles to the Maryland/Pennsylvania border. Turning to the northeast, the route extends for 2.80 miles to the SR 97 (Baltimore Pike) crossing located adjacent to Germantown Substation, which is where the 138 kV line changes over to 115 kV. At this point, the proposed route crosses SR 97 and turns to the northwest for 7.48 miles to Lincoln Substation located near Gettysburg. From Lincoln Substation, the route turns to the east and extends for 2.61 miles to Hunterstown Substation.

ATTACHMENT 1

ATTACHMENT 1
CARROLL-HUNTERSTOWN IMPROVEMENTS PROJECT
PA PUC REGULATION CROSS-REFERENCE MATRIX

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 (c)	Application shall contain		
57.72 (c)(1)	The name of the applicant and the address of its principal business office.	• Application, Section I	
57.72 (c)(2)	The name, title and business address of the attorney of the applicant and the person authorized to receive notice and communications with respect to the application if other than the attorney of the applicant.	• Application, Section I	
57.72 (c)(3)	A general description – not a legal or metes and bounds description – of the proposed route of the HV line, to include the number of route miles, the rights-of-way width and the location of the proposed HV line within each city, borough, town, and township traversed.	• Application, Appendix A	
57.72 (c)(4)	A names and addresses of known persons, corporations, and other entities of record owning property within the proposed rights-of-way, together with an indication of HV line rights-of-way acquired by the applicant.	• Exhibit 18	
57.72 (c)(5)	A general statement of the need of the proposed HV line in meeting identified present & future demands for service, how the proposed line will meet that need, and engineering justifications	• Application, Section II.E	
57.72 (c)(6)	A statement of the safety considerations which will be incorporated into the design, construction, and maintenance of the proposed HV line.	• Application, Section II.F	
57.72 (c)(7)	A description of the studies which had been made as to the projected environmental impact of the HV line as proposed and of the efforts which have been and will be made to minimize the impact of the HV line upon the environment and upon scenic and historic areas.	• Exhibit 11 (Route Selection Study)	• Section 5.0

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 (c)(8)	A description of the efforts of the applicant to locate and identify archeologic, geologic, historic, scenic, or wilderness areas within 2 miles of the proposed right-of-way and the location and identity of the areas	• Exhibit 11 (Route Selection Study)	
57.72 (c)(9)	The location and identity of airports within 2 miles of the nearest limit of the right-of-way of the proposed HV line.	• Exhibit 11 (Route Selection Study)	• Section 4.2.1
57.72 (c)(10)	A general description of reasonable alternative routes to the proposed HV line, including a description of the corridor planning methodology, a comparison of the merits and detriments of each route, and a statement of the reasons for selecting the proposed HV line route.	• Exhibit 11 (Route Selection Study)	
57.72 (c)(11)	A list of the local, state, and federal governmental agencies which have requirements that shall be met in connection with the construction or maintenance of the proposed HV line and a list of documents which have been or are required to be filed with those agencies.	• Exhibit 14	
57.72 c(12)	The estimated cost of construction of the proposed HV line and the projected date for completion.	• Application, Section II.L, MAIT Statement No. 5	
57.72 c(13)(i)	A depiction of the proposed route on aerial photographs and topographic maps of suitable detail.	• Exhibit 12 and Exhibit 13	
57.72 c(13)(ii)	A description of the proposed HV line, including the length of the line, the design voltage, the size, number, and materials of conductors, the design of the supporting structures and their height, configuration and materials of construction, the average distance between supporting structures, the number of supporting structures, the line to structure clearances and the minimum conductor to ground clearance at mid-span under normal load and average weather conditions and under predicted extreme load and weather conditions.	• Application, Section II.B • MAIT Statement No. 5	

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 c(13)(iii)	A simple drawing of a cross section of the proposed rights-of-way of the HV line and any adjoining rights-of-way showing the placement of the supporting structures at typical locations, with the height and width of the structures, the width of the right-of-way and the lateral distance between the conductors and the edge of the right-of-way indicated.	• Exhibits 19, 21, and 23	
57.72 c(13)(iv)	A system map which shows in suitable detail the location and voltage of existing transmission lines and substations of the applicant and the location and voltage of the proposed HV line and associated substations	• Exhibit 12 and Exhibit 13	
57.72 (c)(14)	A statement identifying litigation concluded or in progress which concerns property or matter relating to the proposed HV line, right-of-way route, or environmental matters.	• Application, Section II.M	
Chapter 69	Interim guidelines require		
69.3102 (a)(1)	A Code of Conduct/Internal Practices governing the manner in which public utility employees or their agents interact with landowners along proposed rights of way.	• Exhibit 18	
69.3102 (a)(2)	Copies of information provided to landowners by the public utility of any publicly disseminated notices advising landowners to contact the Commission or OCA in the event of improper land agent practices.	• Exhibit 18	
69.3102 (a)(3)	Copies of all notices sent pursuant to §57.91 (relating to disclosure of eminent domain power of electric utilities).	• Exhibit 18	
69.3102 (b)	Applicants for transmission siting authority should serve a copy of the Code of Conduct on all landowners along the proposed route whose property is to be purchased, subject to easement rights or borders the transmission corridor. The Code of Conduct should also be available on the applicant's website.	• Exhibit 18	

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
69.3102 (c)	Applicants for transmission siting authority should provide prior notice to the Commission's Office of Communications of informational presentations to community groups by the public utility scheduled after the filing of the transmission siting application so that the Commission, OCA and other interested parties can attend meetings or obtain copies of information being disseminated at the presentations.	At this time, no informal presentations are scheduled for after the Application is filed.	
69.3103	**Eminent domain filing requirements**	Not applicable.	
69.3104	**Exemption from municipal zoning standards**	Not applicable.	
69.3105 (1)	Transmission applicants should utilize a combination of transmission route evaluation procedures including high-level GIS data, traditional mapping (including US Geological Survey data and compilation), aerial maps and analysis of physical site-specific constraints raised by affected landowners.	• Exhibit 11 (Route Selection Study)	
69.3105 (2)	Transmission applicants should summarize the status of property acquisitions (including fee simple acquisitions and rights of way/easements) as part of the application. The applicant should provide the current status and continuing updates on property acquisition litigation or settlements during the course of the siting proceeding.	• Statement No. 4	
69.3105 (3)(i)	In providing information regarding the reasonable alternative routes the utility actively considered in its final phase of the route selection process, and the relative merits of each, in accordance with §57.72(c)(10), the applicant should include the following information: The environmental, historical, cultural and aesthetic considerations of each route.	• Application, Section II.G • Exhibit 11 (Route Selection Study)	• Exhibit 11, Section 5.0
69.3105 (3)(ii)	The proximity of these alternative routes to residential and non-residential structures.	• Exhibit 11 (Route Selection Study)	• Section 5.2.2.1

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
69.3105 (3)(iii)	The applicant's consideration of relevant existing rights of way.	• Exhibit 11 (Route Selection Study)	
69.3105 (3)(iv)	The comparative construction costs associated with each route.	• Exhibit 11 (Route Selection Study)	• Section 5.0
69.3105 (4)	With reference to the proposed route, applicants should provide a summary of efforts made to contact and solicit assistance from local governments and non-governmental organizations regarding areas encompassed within the requirement of §57.72(c)(8).	• Exhibit 11 (Route Selection Study)	
69.3106 (1)	A matrix or list showing all expected federal, state and local government regulatory permitting or licensing approvals that may be required for the project at the time the application is filed, the issuing agency, approximate timeline for approval and current status. The applicant should provide an update on the status of the regulatory permitting/licensing approvals as the case progresses.	• Exhibit 14	
69.3107(a)(1)	Applicants for transmission line siting authority should provide a detailed vegetation management plan that includes the following components: A general description of the utility's vegetation management plan.	• Exhibit 43	
69.3107(a)(2)	Factors that dictate when each method, including aerial spraying, is utilized.	• Exhibit 43	
69.3107(a)(3)	Vegetation management practices near aquatic and other sensitive locations.	• Exhibit 43	
69.3107(a)(4)	Notice procedures to affected landowners regarding vegetation management practices.	• Exhibit 18	
69.3107(a)(5)	Provision of a copy of a landowner maintenance agreement that describes the duties and responsibilities of landowners and the utility for vegetation management to the extent utilized.	Not Applicable.	

Pennsylvania Code Section*	PA PUC Regulation Requirement	Location in Application	Associated Tables/Figures
69.3107(b)(1)	Transmission siting applications should include the following: A description of the EMF mitigation procedures that the utility proposes to utilize along the transmission line route. This description should include a statement of policy approach for evaluating design and siting alternatives and a description of the proposed measures for mitigating EMF impacts.	• Application, Section II.N	

*Pennsylvania Code 57.71 – 57.75 relates to "Commission Review of Siting and Construction of Electric Transmission Lines". Pennsylvania Code 69.3101 – 69.3107 relates to "General Orders, Policy Statements, and Guidelines on Fixed Utilities". Sections described within Attachment 1 pertain specifically to those items required to be included for a transmission line application filing.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL–HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

VERIFICATION

I, Mary E. Anderson, state that I am a Supervisor of Transmission Siting at FirstEnergy Service Company; that I am authorized to make this Verification on behalf of MAIT and that the facts set forth are true and correct to the best of my knowledge, information and belief. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities).

August 8, 2025

Mary E. Anderson

Mary E. Anderson

NOTICE OF FILING

Post & Schell P.C.
ATTORNEYS AT LAW

17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
717-731-1970 Main
717-731-1985 Main Fax
www.postschell.com

Garrett P. Lent

glent@postschell.com
717-612-6032 Direct
717-731-1985 Direct Fax
File #: 212097

August 8, 2025

VIA CERTIFIED MAIL

Re: Application of Mid-Atlantic Interstate Transmission, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the Carroll-Huntertown 230 Kilovolt Transmission Line Located in Straban, Mount Pleasant, Mount Joy, and Germany Townships, Adams County, Pennsylvania
Docket No. A-2025-_____

Enclosed is a Notice of Filing advising that Mid-Atlantic Interstate Transmission, LLC ("MAIT") is filing the above-referenced Application, seeking the Pennsylvania Public Utility Commission's ("Commission") approval of the siting and construction of the Carroll–Hunterstown 230 kV Transmission Line located in Adams County, Pennsylvania. This Notice of Filing is being served on you in accordance with Section 57.74(c) of the Commission's regulations.

Please note that MAIT originally served this Notice of Filing on July 3, 2025. At that time, the Company attempted to file the above-referenced Application along with a related Letter of Notification with the Commission. The Commission rejected the filing and required that the Application and Letter of Notification be filed separately. To comply with the Commission's directive, MAIT is re-submitting its Application for Approval of the Carroll-Hunterstown 230 Kilovolt Transmission Line and is serving this copy of the updated Notice of Filing pursuant to 52 Pa. Code § 57.74(c).

Respectfully submitted,

Garrett P. Lent

GPL/dmc
Enclosures

cc: Certificate of Service

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Notice of Filing has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 57.74(c).

VIA CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Office of Chief Counsel Real Property Division
Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 9th Floor
Harrisburg, PA 17120

Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
PO Box 8552
Harrisburg, PA 17105-8767
Attn: Rebecca Bowen

U.S. Fish and Wildlife Service
Pennsylvania Field Office
110 Radnor Rd, Suite 101
State College, PA 16801-4850
Attn: Robert Anderson

U.S. Army Corps of Engineers
Baltimore Regulatory District
Attn: Wade Chandler
2 Hopkins Plaza
Baltimore, MD 21201

Ms. Andrea Lowery, Executive Director
Pennsylvania Historical & Museum Commission
300 North Street
Harrisburg, PA 17120-0024

Adams Commerce Center
1300 Proline Place
Gettysburg, PA 17325

Adams Solar, LLC
1360 Post Oak Blvd Suite 400
Houston, TX 77056

Alan R. Weaner
145 Weaner Road
Gettysburg, PA 17325

Amos Conley Farms
570 Prospect Road
Mount Joy, PA 17552

Amos G. Miller
440 Hickory Road
Littlestown, PA 17340

Andrew Reed
204 Ashley Court
Gahanna, OH 43230-6250

Antonio L. Vitale
101 Honeysuckle Lane
Littlestown, PA 17340

John F. Goleski and Jeanne Goleski
384 Heritage Drive
Gettysburg, PA 17325

Bradley Jacob Weikert
712 Lee Drive
Gettysburg, PA 17325

Bryan R. Solesha
713 Lee Drive
Gettysburg, PA 17325

Chad W. Hanford
711 Lee Drive
Gettysburg, PA 17325

Circle Oak Farm
240 Bender Road
Hanover, PA 17331

Clayton Wood
2382 Strong Road
Delevan, NY 14042

Cody Ray Huffman
160 Bulk Plant Road
Littlestown, PA 17340

Cynthia E. Keller
2405 Low Dutch Road
Gettysburg, PA 17325

Dale L. Maccall
325 Gettysburg Road
Littlestown, PA 17340

Daniel Lee Hurkett
707 Lee Drive
Gettysburg, PA 17325-8945

David B. Craine
1065 Hoffman Road
Gettysburg, PA 17325

David J. Eckert
3607 Beaufort Street
Harrisburg, PA 17111

David R. Updyke
165 Updyke Road
Littlestown, PA 17340

Deaner Family Limited Partnership
129 Willow Road
Gettysburg, PA 17325

Dennis J. Flickinger
401 Flickinger Road
Gettysburg, PA 17325

Deonna L. Kramer
702 Heritage Drive
Gettysburg, PA 17325

Donald F. Masemer
1596 Hanover Road
Gettysburg, PA 17325

Dusan Bratic
101 US Route 15 South
Dillsburg, PA 17019

Edward M. Kane
CMR 415 Box 4614
Apo, AE 09114-4614

Eric D. Neely
825 Hoffman Road
Gettysburg, PA 17325

Evans Holding Company
3528 Concord Road
York, PA 17402

Francis L. Hartlaub, Jr.
4110 Baltimore Pike
Littlestown, PA 17340

Fred E. Bitzel
385 Hickory Road
Littlestown, PA 17340

Gary F. Buchman
1529 Fish and Game Road
Littlestown, PA 17340

George F. Matthews
PO Box 353
Littlestown, PA 17340

Glenn M. Bentzel
1521 Hunterstown Road
Gettysburg, PA 17325

Glenn W. Hansford
710 Lee Drive
Gettysburg, PA 17325

Gloria Burr
104 Bowers Road
Littlestown, PA 17340

GPU Energy
300 Madison Avenue
Morristown, NJ 07962

James E. Werner
631 Heritage Drive
Gettysburg, PA 17325

James G. Tavenner
716 Lee Drive
Gettysburg, PA 17325

Jamie D. Flynn
1503 Knoxlyn Road
Gettysburg, PA 17325

Jerome W. Foehrkolb
512 Grigsby Court
Joppa, MD 21085

John W. Toms
139 Wheaton Drive
Littlestown, PA 17340

John W. Welty
113 Hummingbird Lane
Littlestown, PA 17340

Joshua A. Fazenbaker
709 Lee Drive
Gettysburg, PA 17325

Joshua D. Little
11 Lori Lane
Littlestown, PA 17340

Julia Paulette Ottey
310 Updyke Road
Littlestown, PA 17340

KAC 1275 Investment, LLC
PO Box 850
Aurora, OH 44202

Kati Heefner Shearer
701 Lee Drive
Gettysburg, PA 17325

Kenneth A. Hilbert
4004 Baltimore Pike
Littlestown, PA 17340

Kestrel Acquisition, LLC
8403 Colesville Road Suite 915
Silver Spring, MD 20910

Kinsella Living Trust
365 Bowers Road
Littlestown, PA 17340

Kyle M. Arentz
295 Hickory Road
Littlestown, PA 17340

Lester O. Uhler
156 Plunkert Road
Littlestown, PA 17340

Lisa Q. Heininger
969 Teeter Road
Littlestown, PA 17340

Mark H. Miller
348 Straley’s Road
Littlestown, PA 17340

Mark L. Brown
705 Lee Drive
Gettysburg, PA 17325

Metropolitan Edison Company
300 Madison Avenue
Morristown, NJ 07962

Millard E. Basehoar
355A Basehoar Road
Littlestown, PA 17340

N. Thomas Miller
52 Straley's Road
Littlestown, PA 17340

Nathaniel M. Dewar
575 Gettysburg Road
Littlestown, PA 17340

Neil James Crouse
202 Plunkert Road
Littlestown, PA 17340

Patricia A. Straley
239 Straley's Road
Littlestown, PA 17340

Regina M. Schultz
301 Smith Road
Gettysburg, PA 17325

Richard L. Fox
708 Lee Drive
Gettysburg, PA 17325

Richard Zambito
1675 Hanover Road
Gettysburg, PA 17325

Robert F. Sentz
1501 Fish And Game Road
Littlestown, PA 17340

Robert W. Diehl and Ruth E. Diehl
70 Miller Road
Littlestown, PA 17340

Robles Estrada
1560 Hanover Road
Gettysburg, PA 17325

Samuel T. Hartlaub
931 Beck Road
Gettysburg, PA 17325

Scott A Hawk
70 Honeysuckle Ln
Littlestown, PA 17340

Shawn Davis
1550 Hanover Road
Gettysburg, PA 17325

SNM Enterprises, Inc.
1280 York Road
Gettysburg, PA 17325

Stephen Thomas Hamer
59 Hummingbird Lane
Littlestown, PA 17340

Tanner M. Scmall
515 Blacksmith Shop Road
Gettysburg, PA 17325

Terrell Lafary
110 Honeysuckle Lane
Littlestown, PA 17340

Terry N. Bodenberg
360 Willow Road
Gettysburg, PA 17325

The Grantie Farm, Inc.
1390 Hanover Road
Gettysburg, PA 17325

Tina L. Schutt
714 Lee Drive
Gettysburg, PA 17325

Trigen, LLC
200 Proline Place
Gettysburg, PA 17325

Wade A. Hartlaub
172 Plunkert Road
Littlestown, PA 17340

Date: August 8, 2025

Garrett P. Lent

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL–HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

NOTICE OF FILING PURSUANT TO

52 PA. CODE § 57.74(c)

Mid-Atlantic Interstate Transmission, LLC ("MAIT") hereby submits Notice that the above-captioned Application has been filed with the Pennsylvania Public Utility Commission ("Commission"). The purpose of the Application is to seek Commission approval of the siting and construction of the Carroll–Hunterstown 230 kV Transmission Line located in Adams County, Pennsylvania.[1] Pursuant to 52 Pa. Code § 57.74(c), you are receiving this Notice because you are the record owner of property within the right-of-way ("ROW"), or represent a federal, state or local entity identified under 52 Pa. Code §

[1] Related to the proposed Carroll-Hunterstown 230 kV Transmission Line, MAIT intends to file a separate Letter of Notification pursuant to Sections 57.72(d)(1)(i) and (vi) of the Public Utility Commission's regulations, 52 Pa. Code §§ 57.72(d)(1)(i) and (vi), to rebuild approximately 2.0 miles of the existing Lincoln–Orrtanna 115 kV Transmission Line to accommodate a higher capacity conductor (the "Lincoln–Orrtanna Rebuild Project"). The Lincoln–Orrtanna Rebuild Project is designed to address the same transmission system needs as the proposed Carroll–Hunterstown 230 kV Transmission Line. Collectively, the Carroll–Hunterstown 230 kV Transmission and the Lincoln–Orrtanna Rebuild Project are referred to as the "Carroll–Hunterstown Improvements Project."

57.74(c). You are not required to appear or participate in this matter, but you may request Commission permission to intervene.

OVERVIEW OF THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

FirstEnergy subsidiaries MAIT and Potomac Edison ("PE") have been awarded a project by regional transmission organization PJM Interconnection, L.L.C. ("PJM") to upgrade a 24.2-mile transmission line between the Hunterstown Substation in Adams County, Pennsylvania, and the Carroll Substation in Carroll County, Maryland. The proposed Carroll–Hunterstown 230 kV Transmission Line will enhance transmission system reliability, accommodate growing demand for electricity by residential and commercial customers, and facilitate the connection of renewable energy sources. It is one of multiple projects that was awarded by PJM, the grid operator for 13 states including Maryland and Pennsylvania, after PJM solicited proposals to address the growing demand for electricity in its territory.

The proposed Carroll–Hunterstown 230 kV Transmission Line involves rebuilding the existing 115-kilovolt (kV) and 138-kV wires, known as circuits, and a new set of 230-kilovolt (kV) wires to the existing corridor. New steel structures that can accommodate the circuits will be installed. The line spans 12.9 miles in the Met-Ed service area in Adams County and 11.3 miles in Potomac Edison's service area in Carroll County. Potomac Edison will construct a new 230 kV ring bus at the existing Carroll Substation for upgrades related to the rebuilt line.

The proposed Carroll–Hunterstown 230 kV Transmission Line will provide MAIT and PE with a new transmission source which will allow for increased capacity to ensure reliable long-term services to customers in the surrounding territory, accommodate

growing demand for electricity by residential and commercial customers, and facilitate the connection of renewable energy sources. Subject to Commission approval, construction of the Carroll–Hunterstown 230 kV Transmission Line in Pennsylvania is scheduled to begin on or about June 1, 2027, to meet an in-service date on or about June 1, 2028.

ROUTE FOR THE PROPOSED CARROLL-HUNTERSTOWN 230 KV TRANSMISSION LINE

MAIT and PE undertook a detailed siting analysis of feasible alternatives for the Carroll–Hunterstown 230 kV Transmission Line. The goal of the siting analysis was to determine the most suitable route for a new 230 kV transmission line to connect the existing Hunterstown Substation, located in Adams County, PA, to the existing Carroll Substation, located in Carroll County, MD.

The feasible Alternative Routes were compared, and a Proposed Route was selected based upon a detailed analysis and balance of human/built concerns, environmental impacts, and engineering and constructability considerations. Based on this detailed evaluation process, MAIT and PE selected "Alternative Route 3" as the Proposed Route for the Carroll–Hunterstown 230 kV Transmission Line because it was the overall best alternative to minimize potential impacts of the transmission line.

The Proposed Route extends approximately 24.21 miles in length. A general description of the Proposed Route is provided below:

- From the Carroll Substation, the Rebuild Route follows the existing 138 kV transmission line ROW to the northeast for 2.34 miles to the Middleburg Road crossing. Land use is predominantly agriculture, but some residential development is located near Union Bridge, which is the site of the Carroll Substation. This

section spans Little Pipe Creek and Cherry Branch (Class IV-P), the adjacent FEMA floodplains, and an active freight railroad (Maryland Midland).

- Continuing to the northeast, the route extends for 3.84 miles to the SR 140 (Taneytown Pike) crossing located east of Taneytown. Land use is agricultural in the southern half of this section but becomes increasingly residential and commercial in the northern section near Taneytown. Along this section, Big Pipe Creek (Class IV-P) and several of its tributaries are also spanned, as well as SR 832 (Old Taneytown Road), which is located near SR 140.
- After crossing SR 140, the Rebuild Route extends north for 5.14 miles to the Maryland/Pennsylvania border. This section crosses predominantly agricultural. The route spans Piney Creek (Class IV-P) and several tributaries as well as SR 194 (Francis Scott Key Highway) and a few local roads. An abandoned railroad corridor is crossed just south of SR 194.
- Turning to the northeast, the route extends for 2.80 miles to the SR 97 (Baltimore Pike) crossing located adjacent to the Germantown Substation, which is where the 138 kV line changes over to 115 kV. This section spans across a mix of residential and agricultural lands, with one of the agricultural parcels being protected by a land trust easement with the Land Conservancy of Adams County. Alloway Creek (WWF) and a few of its tributaries are spanned in this section.
- At this point, the Rebuild Route crossed SR 97 and turns to the northwest for 7.48 miles to the Lincoln Substation located near Gettysburg. Land use is agricultural in the southern half that becomes more residentially and commercially developed in the northern half near Gettysburg. This section crosses one farm protected by a

Land Conservancy of Adams County easement. Littles Run, and Whites Run (WWF streams), a few of their tributaries, and several tributaries of Rock Creek (WWF) are spanned. Lake Heritage, which is part of Plum Run (WWF), and the densely developed Lake Heritage development are also crossed. The route also spans SR 116 (Hanover Road), U.S. Route 15, and U.S. Route 30. A portion of the Gettysburg Battlefield Historic District may be crossed in this section.

- From the Lincoln Substation, the route turns to the east and extends for 2.61 miles to the Hunterstown Substation. This section crosses over agricultural and rural residential land uses. The route spans U.S Route 15 again, an active freight railroad (Western Maryland), a Columbia gas pipeline, and two existing transmission lines including the Hunterstown–Conemaugh 500 kV line. Tributaries to Rock Creek are also spanned in this section.

The right-of-way for the Carroll–Hunterstown 230 kV Transmission Line is generally 110 to 200 feet in width. There are a total of 85 deeded properties in Pennsylvania crossed by the route selected for the proposed Carroll–Hunterstown 230 kV Transmission Line. Of the 85 parcels crossed by the Carroll–Hunterstown 230 kV Transmission Line, new ROW is required for one parcel that currently accommodates the existing Hunterstown Substation in Adams County, Pennsylvania. MAIT will amend a license agreement through negotiation with the affected property owner in order to relocate a portion of the existing Hunterstown–Riley 115 kV Transmission Line and allow for the proposed new 230 kV line to terminate at the Hunterstown Substation.

MAP

A map showing the route selected for the Carroll–Hunterstown 230 kV Transmission Line is enclosed.

EXAMINATION

A complete copy of the Application for the Carroll–Hunterstown 230 kV Transmission Line is available for examination at the following link:

https://www.firstenergycorp.com/about/transmission_projects/pennsylvania/carroll-hunterstown-project.html.

PARTICIPATION

You are not required to appear or participate in this matter, but you may request Commission permission to intervene. To intervene as a formal party to this proceeding, you should file a petition to intervene with the Secretary of Pennsylvania Public Utility Commission at P.O. Box 3265 Harrisburg, Pennsylvania 17105-3265. The petition to intervene should state your alleged right or interest to participate in the formal proceeding. A copy of the petition to intervene should be served on the undersigned counsel for MAIT.

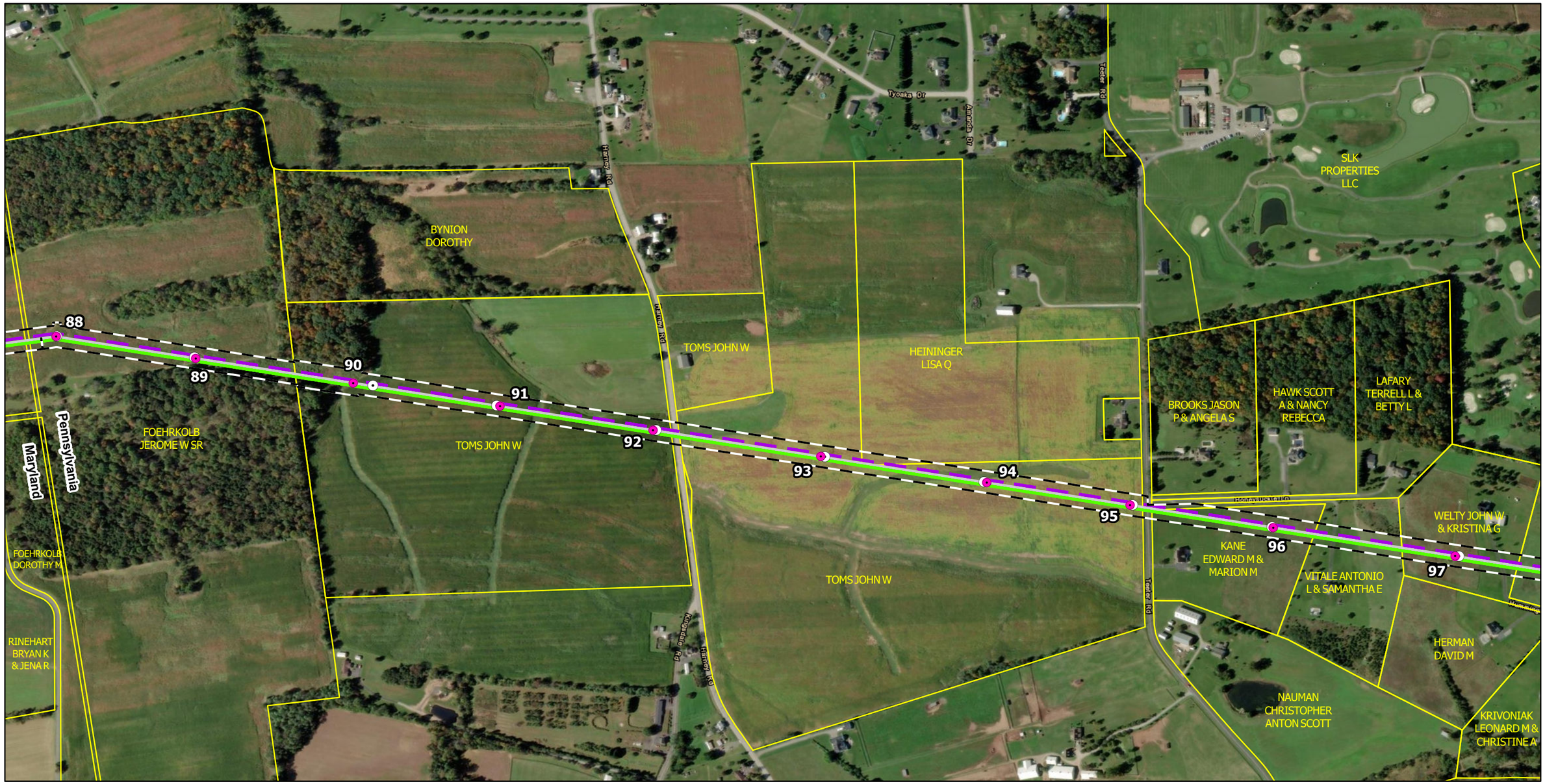
QUESTIONS

If you have any questions concerning the Carroll–Hunterstown 230 kV Transmission Line, you may reach out to transmissionprojects@firstenergycorp.com or contact a company representative at 888-311-4737. Please reference the Carroll–Hunterstown 230 kV Transmission Line in all communications.

Respectfully submitted,

Dated: August 8, 2025

By: Mary E. Anderson
Mary E. Anderson
Transmission Siting Supervisor
FirstEnergy Service Company



Legend

- Existing Structure Locations
- Proposed Structure Locations
- ROW Corridor
- 115kV Transmission Line
- 230kV Transmission Line
- 138kV Transmission Line
- Existing Transmission Line
- Property Boundary

Notes

1. Existing structure locations provided by FirstEnergy 7/16/2024.
2. Proposed structure locations provided by FirstEnergy 9/25/2024.
3. ROW corridors are approximate based on field survey and record plans.
4. Proposed circuit alignment provided by FirstEnergy 5/21/2025.

Pennsylvania State Plane South
Datum: North American 1983
Projection: Lambert Conformal Conic
Linear Unit: US Foot

References:
Google Imagery Basemap

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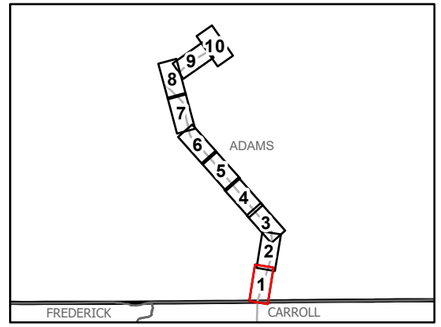

AECOM

Exhibit 13
Aerial General Layout Map
Carroll-Hunterstown Improvements Project

Page 1 of 10

Adams County, Pennsylvania
FirstEnergy Corporation: Akron, Ohio

Prepared By: MC	Checked By: DY
Job: 60735729	Date: 7/24/2025

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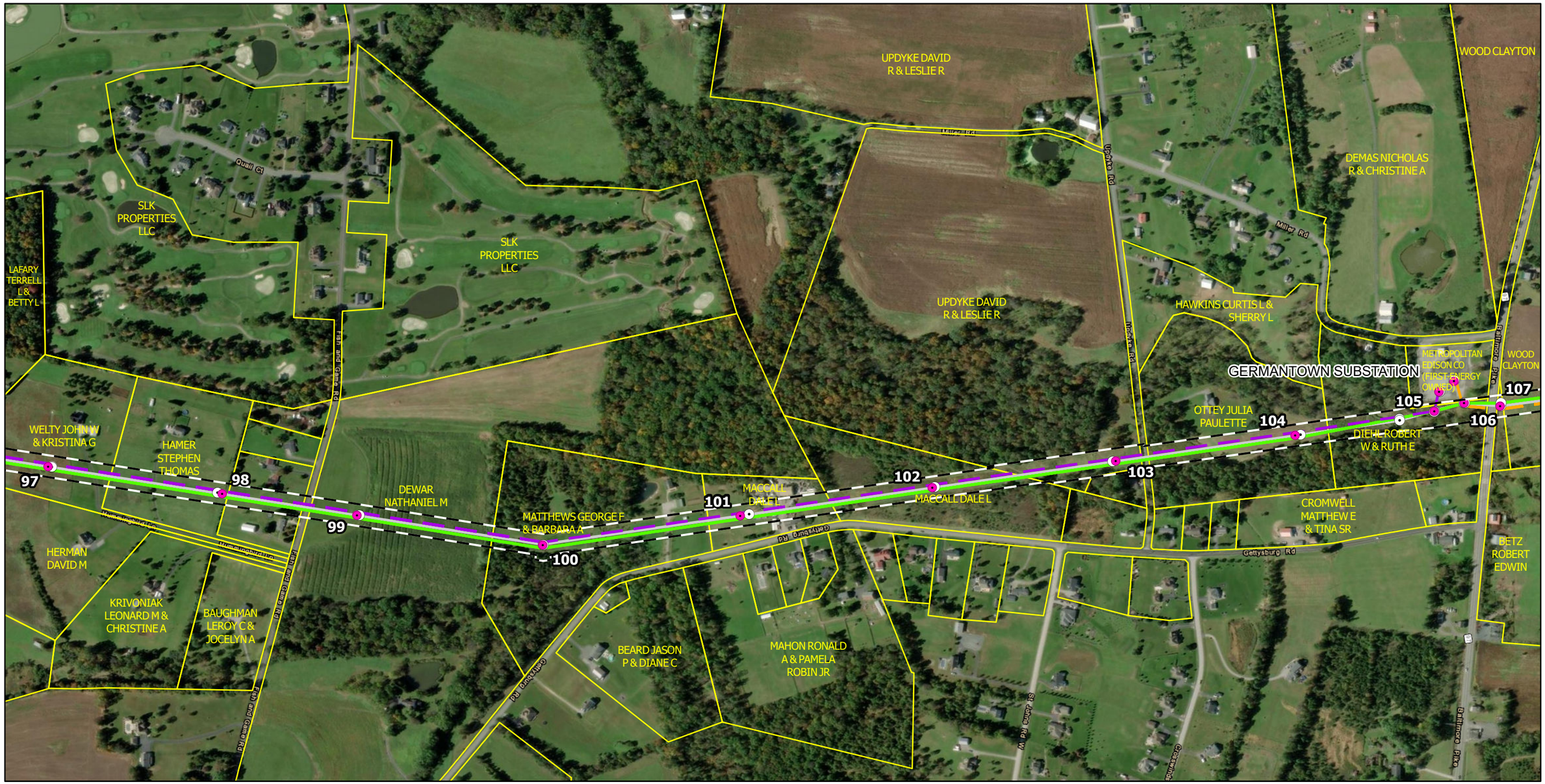

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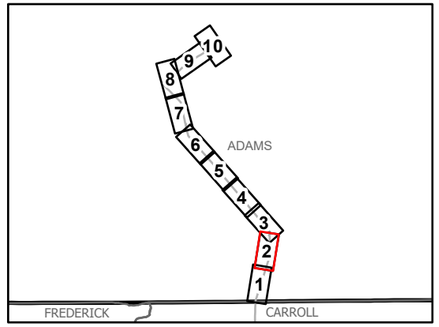

AECOM

Exhibit 13
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Page 2 of 10

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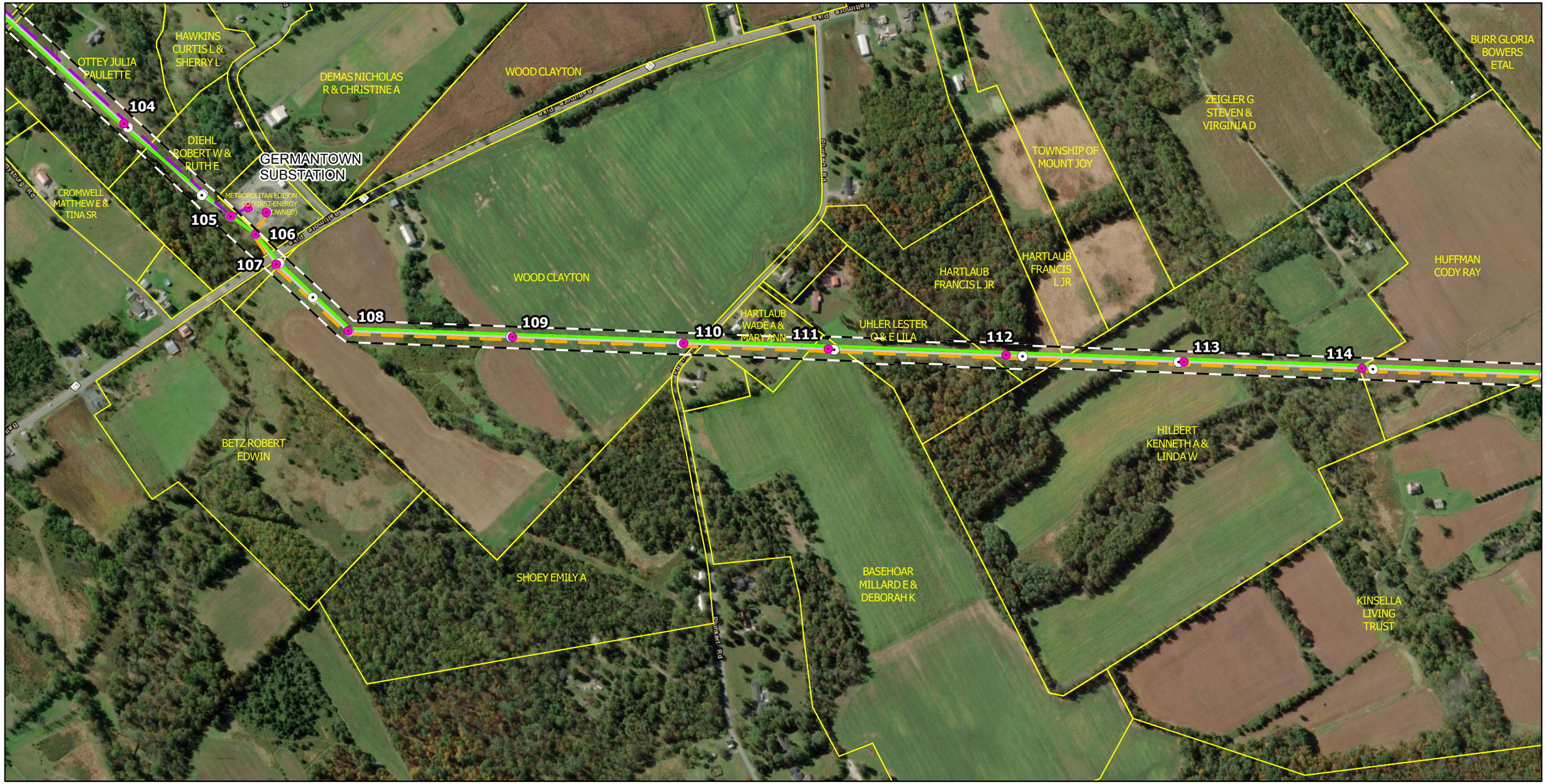

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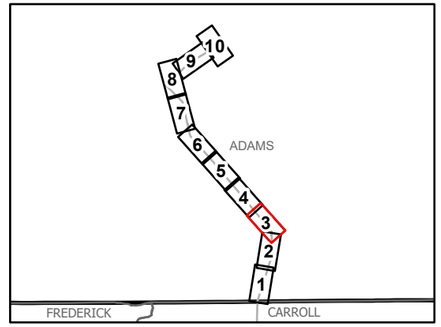

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FirstEnergy Corporation: Akron, Ohio

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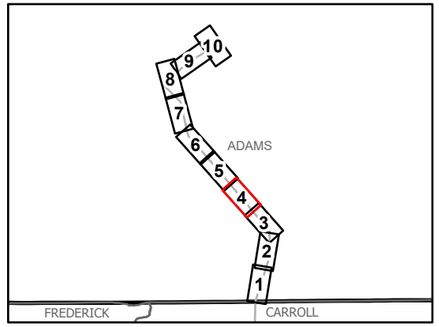

AECOM

Exhibit 13
Aerial General Layout Map
Carroll-Hunterstown Improvements Project

Page 4 of 10

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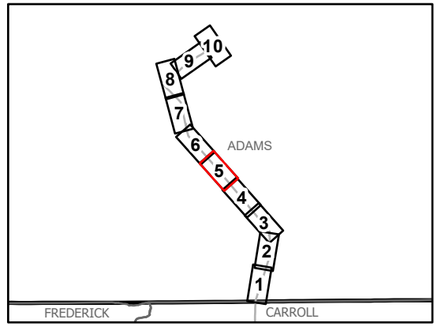

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Exhibit 13
Aerial General Layout Map
Carroll-Hunterstown Improvements Project

Page 5 of 10

Adams County, Pennsylvania
FirstEnergy Corporation: Akron, Ohio

Prepared By: MC	Checked By: DY
Job: 60735729	Date: 7/24/2025

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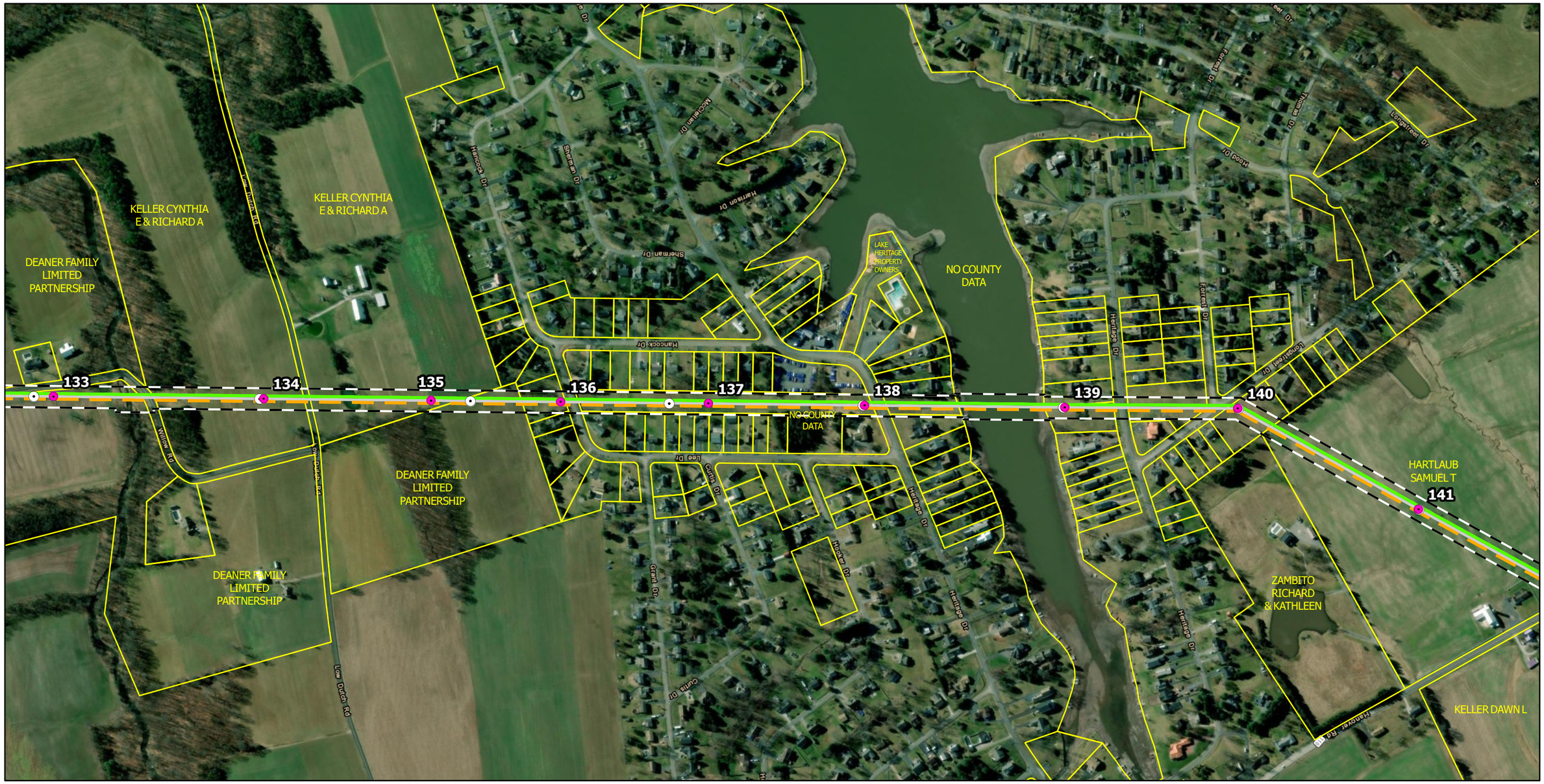

Legend

- Existing Structure Locations
- Proposed Structure Locations
- ROW Corridor
- 115kV Transmission Line
- 230kV Transmission Line
- 138kV Transmission Line
- Existing Transmission Line
- Property Boundary

Notes

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2. Proposed structure locations provided by FirstEnergy 9/25/2024.
3. ROW corridors are approximate based on field survey and record plans.
4. Proposed circuit alignment provided by FirstEnergy 5/21/2025.

Pennsylvania State Plane South
Datum: North American 1983
Projection: Lambert Conformal Conic
Linear Unit: US Foot

References:
Google Imagery Basemap

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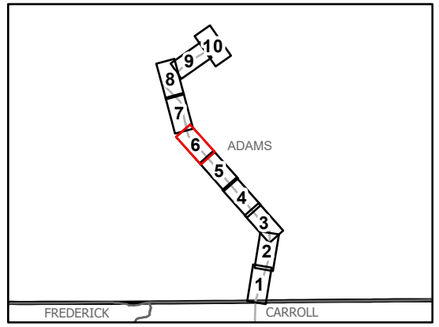

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Page 6 of 10

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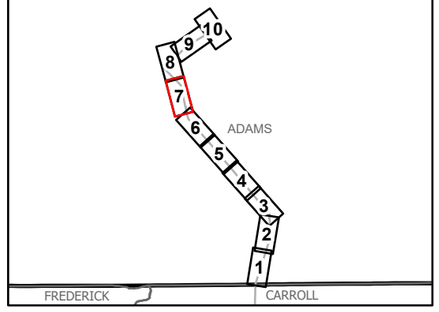

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Carroll-Hunterstown Improvements Project

Page 7 of 10

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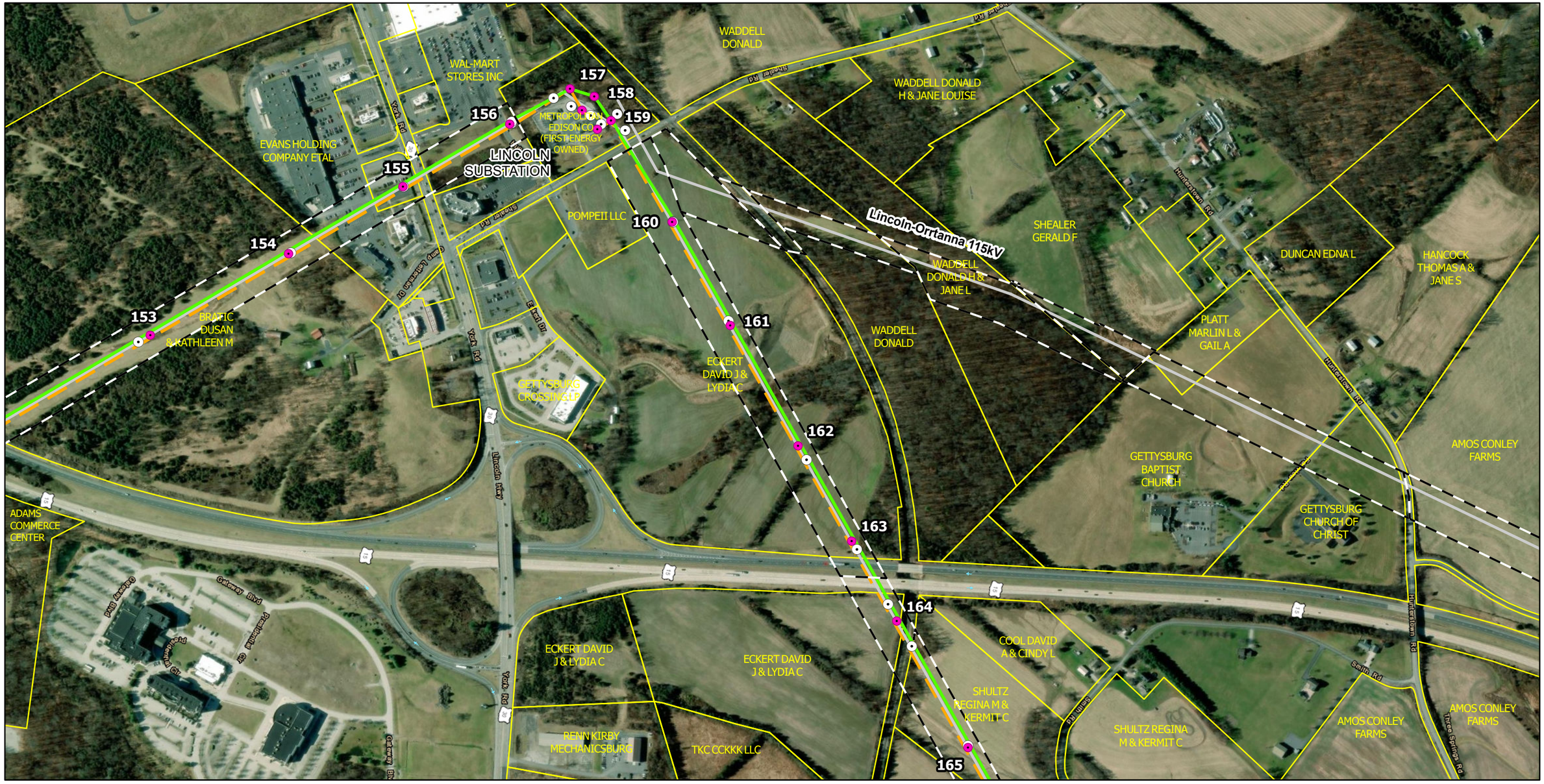

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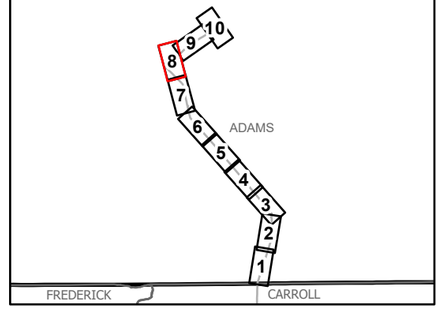

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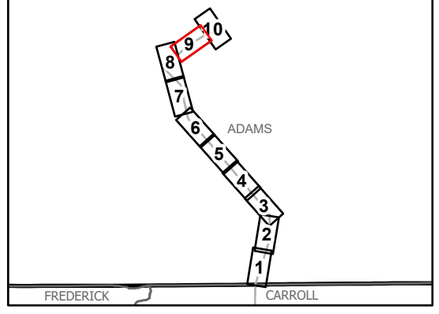

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Carroll-Hunterstown Improvements Project

Page 9 of 10

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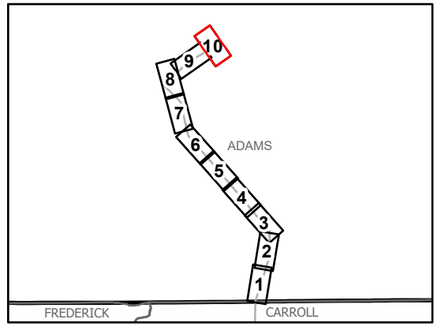

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TESTIMONY

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL– HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	**:**	**Docket No. A-2025-_____**

Direct Testimony
of
Mary E. Anderson

List of Topics Addressed

Introduction of Witnesses; Overview of Regulatory Requirements; Outreach to Public; and Public Comments

Dated: August 8, 2025

I. RESPONSIBILITIES, EXPERIENCE AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Mary E. Anderson, and my business address is 76 South Main Street, Akron, Ohio 44308.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by FirstEnergy Service Company ("FESC") as Supervisor, Transmission Siting East. In that capacity, my primary responsibility is oversight of the siting of transmission facilities for the utility subsidiaries of FirstEnergy Corp. ("FirstEnergy") that provide service in Pennsylvania, Maryland, New Jersey, Virginia, and West Virginia; and obtaining the necessary siting and other related approvals from the utility regulatory authorities in those states for transmission facilities.

Q. WHAT ARE YOUR CURRENT RESPONSIBILITIES?

A. My responsibilities generally consist of supervising a team of individuals responsible for siting new or modified, existing transmission facilities; overseeing transmission line route selection studies performed by consultants; and developing associated regulatory filings.

Q. PLEASE PROVIDE YOUR EDUCATIONAL BACKGROUND.

A. I graduated from Ashland University in 2012 with a Bachelor of Science Degree in Biology and Environmental Science.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. I have been employed by FESC since September 2019. I was a Transmission Specialist III in Transmission Siting from September 2019 through July 2022. From July 2022 to present, I've been employed as the Supervisor for Transmission Siting East. Prior to working for FESC, I was employed by GPD Group as an Environmental Scientist from September 2012 through September 2019, where I supported FirstEnergy transmission line siting efforts as a contractor.

Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION") OR OTHER REGULATORY AGENCIES?

A. Yes. I provided written testimony to the Commission in the following docketed cases:

1. Mid-Atlantic Interstate Transmission, LLC's ("MAIT") Hunterstown–Orrtanna 115 Kilovolt ("kV") Transmission Line Project (Docket No. A-2021-3025450);
2. Joint Letter of Notification of MAIT and PPL Electric Utilities Corporation for the Martins Creek–Siegfried #2 230 kV Transmission Line Loop to Klecknersville 230 kV Substation Project and the associated Joint Petition of MAIT and Metropolitan Edison Company regarding the shelter control structures at the proposed Klecknersville substations (Consolidated Docket Nos. A-2022-3036551 and P-2022-3036554); and
3. MAIT's East Germantown–Germantown 115 kV Transmission Line Project (Docket No. A-2024-3049995).

II. PURPOSE OF TESTIMONY

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am testifying in support of MAIT's Application for approval to locate and construct the proposed construction of the new Carroll–Hunterstown 230/115 and 230/138 kV Transmission Line ("Carroll-Hunterstown 230 kV Transmission Line"). The proposed Carroll-Hunterstown 230 kV Transmission Line is part of the larger Carroll-Hunterstown Improvements Project, which also includes the proposed rebuild of approximately 2.0 miles of the existing Lincoln–Orrtanna 115 kV Transmission Line ("Lincoln-Orrtanna Rebuild Project"). The Lincoln-Orrtanna Rebuild Project will be the subject of a separately-filed Letter of Notification and is designed to address the same transmission system needs as the proposed Carroll–Hunterstown 230 kV Transmission Line.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide an overview of the Carroll-Hunterstown 230 kV Transmission Line as part of the Carroll–Hunterstown Improvements Project, describe my role in the siting process, provide an overview of the findings that the Commission is required to make to approve the siting of a high-voltage ("HV") transmission line and to describe the public information outreach that MAIT conducted prior to selecting its proposed route for the Carroll–Hunterstown 230 kV Transmission Line.

III. INTRODUCTION OF OTHER WITNESSES

Q. PLEASE IDENTIFY THE OTHER WITNESSES WHO WILL BE PROVIDING DIRECT TESTIMONY ON BEHALF OF MAIT IN THIS PROCEEDING AND THE TOPICS THEY ADDRESS.

A. In addition to me, six other witnesses are submitting direct testimony on MAIT's behalf in support of its Application:

- **Jacquelyn Lojek (MAIT Statement No. 2)** is the Manager, Transmission Planning, for FESC. Ms. Lojek will describe the electrical need for the Carroll-Hunterstown 230 kV Transmission Line, the alternatives to the Carroll-Hunterstown 230 kV Transmission Line that were considered; the FE Transmission Load Connection Process; the PJM Interconnection, L.L.C. ("PJM") regional transmission expansion planning process; and the Electromagnetic field ("EMF") calculations.

- **Barry A. Baker (MAIT Statement No. 3)** is the Vice President and Eastern United States Regional Practice Lead for the Environmental Planning & Permitting Practice of AECOM. Mr. Baker will describe the principal elements of MAIT's siting analysis, explain how the environmental assessment was conducted, and discuss the reasons why the proposed route was selected.

- **Lisa Marinelli (MAIT Statement No. 4)** is a Senior Real Estate Representative in Right of Way Services for FESC. Ms. Marinelli will review the existing rights on behalf of MAIT, explain the process by which easements and other land rights were acquired for the Carroll-Hunterstown 230 kV Transmission Line, and discuss previous and ongoing communication with landowners.

- **Kory R. Swierczek (MAIT Statement No. 5)** is the Director – Transmission Engineering for ExecuPOWER, LLC. Mr. Swierczek will describe the design and engineering for the Carroll-Hunterstown 230 kV Transmission Line and how the Carroll-Hunterstown 230 kV Transmission Line will be

constructed. Mr. Swierczek will also describe MAIT's plans for operating and maintaining the proposed transmission line after it is constructed, including vegetation maintenance activities and practices.

- **Andres Gledhill (MAIT Statement No. 6)** is the Manager of the Resource Adequacy Planning Department for PJM. Mr. Gledhill will describe PJM's Load Forecasting Process and the specific long-term load forecasts on which PJM relied for the 2022 Window 3 Competitive Solicitation Process.

- **Sami Abdulsalam (MAIT Statement 7)** is the Director of Transmission Planning for PJM. Dr. Abdulsalam will describe the PJM Regional Transmission Expansion Plan ("RTEP") process, PJM's 2022 Window 3 Process, and the 2022 Window 3 violations as they pertain to the reliability need for the Carroll-Hunterstown 230 kV Transmission Line.

Each of these witnesses is also sponsoring various exhibits that accompany the Application, as identified in their respective written direct testimonies.

IV. APPLICATION

Q. PLEASE DESCRIBE MAIT.

A. MAIT is a Pennsylvania public utility that was issued a Certificate of Public Convenience pursuant to the Commission's final order entered on August 24, 2016, at Docket Nos. A-2015-2488903 *et al*. Accordingly, the Commission has already found and determined that MAIT has the technical, financial, and legal fitness to own and operate transmission facilities and to provide transmission service in Pennsylvania.

Q. WHAT IS YOUR ROLE WITH REGARD TO THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. I am responsible for coordinating MAIT's efforts to obtain the Commission's approval to locate and construct the Carroll–Hunterstown 230 kV Transmission Line. In this role, I provided input and overall coordination regarding the Transmission Line Route Selection Study and MAIT's Application. I will also act as MAIT's lead technical representative throughout the regulatory process for obtaining siting approval.

Q. ARE YOU SPONSORING ANY EXHIBITS ASSOCIATED WITH YOUR DIRECT TESTIMONY?

A. Yes. I am sponsoring **MAIT Exhibits 1 and 2**, which are attached to my testimony.

Q. DO YOU HAVE FINAL DECISION-MAKING AUTHORITY FOR THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. No. Final decision-making authority for the Carroll–Hunterstown Improvements Project lies with MAIT's management. My role involves assessing issues and formulating recommendations for executive review and approval and implementing management's decisions and guidance. As such, I am responsible for identifying issues that require management's prior approval, presenting those issues to management, answering questions from management, and executing management's decisions and directions. Here, I was the project lead in charge of preparing the Application and presenting it for management's authorization. Once MAIT's management approved the filing of the Application, I became

responsible for serving as MAIT's lead representative to the Commission throughout the regulatory process.

Q. WHAT ARE THE FUNDAMENTAL REQUIREMENTS AN APPLICANT MUST SATISFY TO OBTAIN SITING APPROVAL FOR AN HV TRANSMISSION LINE?

A. The Commission's regulations at 52 Pa. Code § 57.71 require prior Commission approval to locate and construct an HV (greater than 100 kV) transmission line. To obtain such approval, an applicant must file an application that contains the information specified in 52 Pa. Code § 57.72 and must serve the application or provide the requisite notice of its filing as specified in 52 Pa. Code § 57.74. In order to grant approval to locate and construct an HV transmission line, the Commission must make four findings, as set forth in 52 Pa. Code § 57.76:

(1) That there is a need for the line;

(2) That it will not create an unreasonable risk of danger to the health and safety of the public;

(3) That it is in compliance with applicable statutes and regulations providing for the protection of the natural resources of this Commonwealth; and

(4) That it will have minimum adverse environmental impact, considering the electric power needs of the public, the state of available technology and the available alternatives.

Q. DO MAIT'S APPLICATION AND ITS ACCOMPANYING EXHIBITS AND DIRECT TESTIMONY INCLUDE THE INFORMATION REQUIRED BY THE COMMISSION'S REGULATIONS AND NEEDED BY THE COMMISSION TO

MAKE THE FINDINGS AND DETERMINATIONS REQUIRED BY ITS REGULATIONS?

A. Yes, they do. MAIT's Application and its accompanying direct testimony and supporting exhibits provide the information specified in the Commission's regulations and provide evidence that will support all of the findings required by 52 Pa. Code § 57.76 for the construction and siting of the Carroll–Hunterstown 230 kV Transmission Line. As explained in the Application, MAIT has also satisfied all service and notice requirements imposed by the Commission's regulations.

Q. DO MAIT'S APPLICATION AND THE ACCOMPANYING EXHIBITS AND DIRECT TESTIMONY DEMONSTRATE THAT THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE IS IN THE PUBLIC INTEREST AND SHOULD BE APPROVED?

A. Yes.

Q. PLEASE EXPLAIN THE CONNECTION BETWEEN THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE AND THE LINCOLN–ORRTANNA REBUILD PROJECT.

A. Both line upgrade projects were identified as part of PJM's 2022 RTEP analysis for Open Window 3, which is further addressed by the testimony of Jacquelyn Lojek in MAIT Statement No. 2. While the Carroll-Hunterstown 230 kV Transmission Line is the subject

of this Application, as noted earlier, the Lincoln-Orrtanna 115 kV Rebuild Project will be the subject of a separate Letter of Notification filing.

V. PUBLIC INFORMATION

Q. DID MAIT HOLD A PUBLIC INFORMATION MEETING FOR THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. Yes. MAIT held a public engagement meeting on November 21, 2024, at the Littlestown High School, located at 200 E. Myrtle Street, Littlestown, PA 17340. Landowners, public officials, and the general public were invited to attend and learn about the Carroll–Hunterstown Improvements Project. Landowners and the public were also given the opportunity to comment at the public engagement meeting. In addition, MAIT developed a virtual online engagement platform that was also available for public viewing. This platform gives the public the opportunity to review information and provide comments on the Carroll–Hunterstown Improvements Project.

Q. HOW WERE LANDOWNERS INFORMED OF THE PUBLIC INFORMATION MEETING?

A. On November 1, 2024, MAIT mailed letters to those landowners crossed by and within 500 feet of the Carroll–Hunterstown Improvements Project, notifying them of the Project. These letters informed the landowners of the Carroll–Hunterstown Improvements Project and the upcoming public engagement meeting, provided instructions on how to access the virtual online engagement platform, and provided both a phone number and email for questions and/or comments related to the Carroll–Hunterstown Improvements Project. In

addition, the letters were accompanied by a fact sheet setting forth relevant facts about the Carroll–Hunterstown Improvements Project. I have enclosed a copy of the fact sheet as **MAIT Exhibit 1**.

Q. HOW WERE PUBLIC OFFICIALS NOTIFIED OF THE PUBLIC INFORMATION MEETING?

A. FirstEnergy's External Affairs Manager for Adams County provided notice by electronic mail to public officials in the county and townships that are within the Carroll–Hunterstown Improvements Project area. These public officials were notified of the date for the public engagement meeting. In addition, the External Affairs Manager provided the public officials with a copy of the fact sheet for the Carroll–Hunterstown Improvements Project.

Q. HOW WAS THE GENERAL PUBLIC INFORMED OF THE PUBLIC INFORMATION MEETING?

A. A Notice of Proposed Utility Facility was published in the Gettysburg Times on November 6, 2024, notifying the public of the Carroll–Hunterstown Improvements Project. I have provided a copy of the proof of publication and signed affidavit for the public information meeting as **MAIT Exhibit 2**.

Q. DID MAIT CONSIDER THE COMMENTS RECEIVED FROM LANDOWNERS, PUBLIC OFFICIALS AND THE GENERAL PUBLIC AS PART OF THE SITING PROCESS?

A. Yes, it did. The comments MAIT received were evaluated and addressed as part of the siting process.

Q. HAS THERE BEEN ANY FURTHER COMMUNICATION WITH LANDOWNERS SINCE THE PUBLIC INFORMATION MEETING?

A. Ongoing communication with landowners will be discussed in the testimony of Lisa Marinelli in MAIT Statement No. 4.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does. However, I reserve the right to file such additional testimony or exhibits as may be necessary or appropriate.

MAIT Statement No. 2

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL– HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

Direct Testimony
of
Jacquelyn L. Lojek

List of Topics Addressed

Project Need, PJM Interconnection Process, Transmission Alternatives Considered, and Electric and Magnetic Field ("EMF") Information

Dated: August 8, 2025

I. RESPONSIBILITIES, EXPERIENCE, AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jacquelyn L. Lojek. My business address is 800 Cabin Hill Drive, Greensburg, Pennsylvania 15601.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by FirstEnergy Service Company ("FESC"), a subsidiary of FirstEnergy Corp. ("FirstEnergy") and affiliate of Mid-Atlantic Interstate Transmission Company ("MAIT"), as the Manager, Transmission Planning in the Transmission Planning and Protection Department. In this proceeding, I am testifying on behalf of MAIT.

I am responsible for overseeing the planning functions across the FirstEnergy affiliate companies to ensure safe and reliable operation of the transmission and sub-transmission lines and substations in accordance with FirstEnergy, PJM Interconnection, L.L.C. ("PJM"), and the North American Electric Reliability Corporation ("NERC") reliability criteria. Transmission Planning develops capital reinforcement projects to address any identified reliability criteria violations on the transmission and sub-transmission system.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE AND EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Science Degree in Electrical Engineering from Pennsylvania State University in 2011. I received a Master of Science Degree in

Industrial Engineering from the University of Pittsburgh in 2014. I am a Registered Professional Engineer with the Commonwealth of Pennsylvania (No. PE087848), as well as with the Commonwealth of Virginia and the states of West Virginia and Maryland. My professional experience, prior to joining FESC, includes nuclear power plant automation design, manufacturing, testing and commissioning. My FirstEnergy professional experience includes transmission planning, project management, and continuous improvement. I started my professional career with Westinghouse Electric Company in 2011 as a Hardware Engineer designing relay control equipment for nuclear power plants. I joined FESC in September 2017 in the Transmission Planning department as an Engineer, where I was responsible for planning the electric transmission system for the West Penn Power Company ("West Penn") and the Pennsylvania Electric Company ("Penelec"). In 2021, I was named Supervisor, Transmission Project Management for Monongahela Power ("Mon Power"), The Potomac Edison Company, West Penn Power, and Penelec. I was promoted to Manager, Process Control & Continuous Improvement in December 2022. In 2023, I was promoted to my current role of Manager of Transmission Planning with responsibility to oversee FirstEnergy's network planning activities. My education, experience and qualifications are fully set forth in **Appendix A** to my testimony.

Q. WAS YOUR TESTIMONY PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION AND CONTROL?

A. Yes. I consulted Travis Turner, Engineer IV at FESC, for the Electric and Magnetic Field Study.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION") OR OTHER REGULATORY AGENCIES?

A. No. I have not previously provided testimony before the Commission. I have testified before the Federal Energy Regulatory Commission ("FERC"), as listed in **Appendix A**.

II. PURPOSE OF TESTIMONY

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.

A. The purpose of my direct testimony is to support of MAIT's Application for approval to locate and construct the Carroll-Hunterstown Improvements Project ("Project"), which includes the proposed construction of the new Carroll–Hunterstown 230/115 and 230/138 kV Transmission Line ("Carroll-Hunterstown 230 kV Transmission Line") that is the subject of this full siting Application. Specifically, I will:

- Describe the Carroll-Hunterstown Improvements Project from an electrical perspective;
- Describe the need for the Carroll-Hunterstown Improvements Project;

- Describe benefits to customers that will be gained from the proposed Carroll-Hunterstown Improvements Project;
- Describe the consequences of deferring construction of the Carroll-Hunterstown Improvements Project;
- Explain the alternatives considered;
- Explain the advanced technologies used for the Carroll–Hunterstown 230 kV Transmission Line; and
- Describe the Company's electric and magnetic field ("EMF") mitigation procedures that will be utilized along the proposed Carroll-Hunterstown Improvements Project.

Q. PLEASE IDENTIFY AND DESCRIBE THE EXHIBITS TO YOUR TESTIMONY AND SUMMARIZE THE CONTENTS OF THOSE EXHIBITS.

A. I am sponsoring eight exhibits with my direct testimony:

- **MAIT Exhibit 3** – Relevant portions of PJM's October 31, 2023 Transmission Expansion Advisory Committee ("TEAC") presentation;
- **MAIT Exhibit 4** – Relevant portions of PJM's December 5, 2023 TEAC presentation;
- **MAIT Exhibit 5** – FirstEnergy's response to PJM accepting construction responsibility for the Project;

- **MAIT Exhibit 6** – Maps of the existing and proposed MAIT transmission system in the Project area, including the entirety of the proposed Carroll–Hunterstown corridor;
- **MAIT Exhibit 7** – Graph noting EMF calculations under normal loading for existing 115 kV Conditions;
- **MAIT Exhibit 8** – Graph noting EMF calculations under normal loading for existing 138 kV Conditions;
- **MAIT Exhibit 9** – Graph noting EMF calculations under normal loading for proposed 115/230 kV Conditions; and
- **MAIT Exhibit 10** – Graph noting EMF calculations under normal loading for proposed 138/230 kV Conditions.

III. ELECTRICAL DESCRIPTION OF THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT

Q. DESCRIBE THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE FROM AN ELECTRICAL PERSPECTIVE.

A. MAIT is proposing to increase the current-carrying capability (i.e., "loadability") of the existing Carroll–Hunterstown corridor that connects Hunterstown Substation in Adams County, Pennsylvania, to Carroll Substation in Carroll County, Maryland. This corridor currently consists of the Carroll–Germantown 138 kV Transmission Line, Germantown–Lincoln 115 kV Transmission Line, Lincoln–Riley 115 kV Transmission Line, and Riley–Hunterstown 115 kV Transmission Line. The increase in loadability will be achieved through replacing the existing

795 Aluminum Conductor Steel Reinforced ("ACSR") and 556.5 ACSR transmission cables with 1590 ACSR transmission cables over an approximate cumulative total distance of 24.2 miles, with 12.9 miles located in Pennsylvania.[1]

The Carroll–Hunterstown 230 kV Transmission Line will also build a new 230 kV line with 1590 ACSR cable from Hunterstown Substation to Carroll Substation within the existing corridor, for an approximate, cumulative total distance of 24.2 miles, 12.9 miles of which will be located in Pennsylvania. This new 230 kV line will be constructed on double-circuit steel structures that will accommodate the existing circuits: Carroll–Germantown 138 kV Transmission Line, Germantown–Lincoln 115 kV Transmission Line, Lincoln–Riley 115 kV Transmission Line, and Riley–Hunterstown 115 kV Transmission Line. The proposed Carroll–Hunterstown 230 kV Transmission Line will require the installation of a 230 kV circuit breaker at Hunterstown Substation, along with the construction of a 230 kV ring bus at Carroll Substation (Maryland).

Carroll Substation will need to be expanded as a result of the construction of a 230 kV ring bus. In a ring bus configuration, the bus and breakers are connected in a loop, and each transmission line or transformer is connected to its own bus section protected by two breakers. This arrangement provides redundant paths for supplying power to the connected facilities and provides for more reliable fault isolation when breakers do not operate correctly. This configuration minimizes the impact under a "stuck" breaker condition so that only two facilities

[1] The remaining portion of the Project will be located in Maryland.

will be impacted. The ring bus configuration enhances the reliability and resiliency of the transmission system by ensuring appropriate fault isolation and provides enhanced operational flexibility.

The new transmission lines will employ conductors with a larger size compared to the existing 138 kV and 115 kV conductors. The larger size of the proposed conductor built to 230 kV standard will result in a current-carrying capacity increase when operated at 138 kV and 115 kV. Sizing the conductor for 230 kV voltage level will allow for future upgrades without needing to replace the conductor. This increase in current-carrying capacity leads to a higher thermal rating than the conductors used on the existing facilities. The higher thermal rating will increase the capacity of the transmission facilities within the Carroll–Hunterstown corridor and will allow for greater power transfer, which can accommodate future load growth.

IV. ELECTRICAL NEED FOR THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT

Q. DESCRIBE THE ELECTRICAL NEED FOR THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT.

A. The Carroll–Hunterstown Improvements Project is needed to mitigate violations of FirstEnergy and PJM Planning Criteria that were identified as part of PJM's 2022 Regional Transmission Expansion Plan ("RTEP") analysis for Open Window 3. Specifically, the Carroll–Hunterstown Improvements Project will address thermal violations identified under NERC Category P1, P2, P4, and P7 conditions as well

as provide adequate transmission capacity to meet current and expected transmission system needs in Adams County, Pennsylvania, Carroll County, Maryland, and the surrounding areas.

Q. DESCRIBE MAIT'S PARTICIPATION IN THE PJM PROCESS THAT RESULTED IN THE RECOMMENDATION FOR THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT.

A. As a transmission owner in the PJM region, MAIT participates fully in PJM's transmission planning process. MAIT is obligated under the PJM Operating Agreement to construct, operate, and own transmission facilities as designated by PJM in its annual RTEP process.

PJM, in its capacity as the regional 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 processes to preserve the reliability of the electricity grid that is under its operational control as the Regional Transmission Organization ("RTO"). The PJM planning process is an 18-month cycle starting in September of every calendar year. The process ultimately produces a PJM Board-approved RTEP 18 months later (February). The RTEP identifies transmission system upgrades and enhancements to provide for the operational, economic, and reliability requirements of the transmission system to meet the mandatory NERC and PJM reliability standards and to ensure that power continues to flow reliably to customers. 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 not only PJM's reliability planning criteria, but also those of the applicable transmission owners, including FirstEnergy Transmission Planning Criteria, as well as the NERC and ReliabilityFirst Corporation ("RF") reliability standards. The baseline RTEP projects selected for construction under this transmission planning process are identified with an upgrade identification number starting with the letter "b" followed by a four-digit number.

Q. IS MAIT REQUIRED TO PLAN THE TRANSMISSION SYSTEM TO MEET MANDATORY RELIABILITY STANDARDS?

A. Yes, pursuant to Section 215 of the Federal Power Act, FERC has certified NERC as the electric reliability organization to develop and enforce mandatory reliability standards, subject to FERC review and approval. The FERC-approved NERC reliability standards are mandatory.

PJM, a FERC-approved RTO, is responsible for ensuring the reliability of the electric transmission system under its functional control and coordinating the movement of wholesale electricity in all or parts of 13 states, including Pennsylvania, and the District of Columbia. PJM is responsible for assuring compliance with NERC standards for the bulk electric system within its control

area. NERC reliability standards require that the bulk electric system be designed to operate within applicable thermal and voltage criteria limits, defined in FirstEnergy and PJM Planning Criteria, under various system loading conditions and in consideration of credible outages of elements on the bulk electric system.

MAIT is a member of PJM as defined in Schedule 12 of the Operating Agreement[2] and is required to satisfy the requirements of the Operating Agreement and the Consolidated Transmission Owners Agreement[3] ("CTOA"), including participation in the RTEP process. MAIT adheres to NERC reliability standards, PJM planning criteria, and FirstEnergy planning criteria.

Q. DESCRIBE THE PLANNING CRITERIA USED BY MAIT IN ASSESSING ITS TRANSMISSION FACILITIES.

A. FirstEnergy's Transmission Planning Criteria, using NERC standards and PJM manuals as guides, state that the following conditions and associated criteria, as defined by NERC, must be met on the bulk electric system:

- **NERC Category P0** pertains to system performance under normal (no contingency) conditions. NERC Category P0 provides that the planning authority and the transmission planner (in this instance, PJM is both) shall each demonstrate, through a valid assessment, that their respective portions of the interconnected transmission system are planned, with all transmission facilities in service and under normal

[2] Available at https://www.pjm.com/pjmfiles/directory/merged-tariffs/oa.pdf.
[3] Available at https://www.pjm.com/pjmfiles/directory/merged-tariffs/toa42.pdf.

operating conditions, to supply projected customer demands and provide projected firm transmission services at all demand levels over the range of forecasted system demands. This represents the normal day-to-day condition and configuration of the bulk electric system.

- **NERC Category P1** states that the loss of any single generating unit, transmission circuit, transformer, shunt device, or single pole of a bipolar DC line on the transmission system will not cause the loading on any bulk electric system facility to exceed the seasonal emergency rating of any such facility, violate the maximum voltage deviation criteria, or violate the emergency minimum or maximum voltage criteria. This is also known as N-1, where N is the total number of transmission components in the network under study.
- **NERC Category P2 through Category P7 contingencies** are events resulting in the loss of multiple transmission elements. These contingencies include: loss of a single generating unit followed by a Category P1 contingency; loss of two adjacent transmission circuits on a common structure; loss of a bi-polar DC line; a faulted circuit breaker (NERC P2); a fault in combination with a stuck circuit breaker; failure of primary relay protection; or a combination of the loss of a single transmission circuit, transformer, shunt device, or single pole of a DC line followed by the loss of an additional single transmission circuit, transformer, shunt device, or single pole of a DC line (i.e., N-1-1). For these contingencies, thermal loading shall not

exceed the seasonal emergency rating of any transmission facility, violate the maximum voltage deviation criteria, or violate the emergency minimum or maximum voltage criteria.

Q. WERE PLANNING CRITERIA VIOLATIONS IDENTIFIED WHEN PERFORMING PLANNING ASSESSMENTS?

A. Yes, as part of the 2022 RTEP analysis, which studied the transmission system model anticipated for the year 2027, thermal loading Planning Criteria violations were identified on the Lincoln–Orrtanna 115 kV Transmission Line, the Hunterstown–Riley 115 kV Transmission Line, the Lincoln–Riley 115 kV Transmission Line, the Germantown–Lincoln 115 kV Transmission Line, and the Germantown–Taneytown 138 kV Transmission Line under NERC Category P1, P2, P4, and P7 conditions. The worst violation was identified following a faulted 500 kV circuit breaker at Conastone Substation, which would outage the Conastone–Brighton 500 kV Transmission Line. The results of the analysis show that, upon outage of the Conastone–Brighton 500 kV Transmission Line and under the conditions modeled, the loading on the Hunterstown–Riley 115 kV Transmission Line, the Lincoln–Riley 115 kV Transmission Line, the Germantown–Lincoln 115 kV Transmission Line, and the Germantown–Taneytown 138 kV Transmission Line would increase to approximately 142 percent, 147 percent, 135 percent, and 143 percent of their summer emergency ratings, respectively.

Q. WHO PERFORMED THE PLANNING ASSESSMENT?

A. PJM performed the initial planning assessment, but the violation was reviewed and verified by the FirstEnergy Transmission Planning Department.

Q. DESCRIBE THE GENERAL ISSUES OBSERVED IN THE 2022 PJM RTEP OPEN WINDOW 3 STUDY.

A. The reliability of the transmission system is determined based on how the transmission system functions under various system conditions. Transmission system reliability is measured on its ability to function within the thermal loading, voltage and stability limits, and the ability of the system to correctly interrupt and isolate short circuits under different loading conditions—such as summer peak, winter peak, and light load conditions—for the tested contingencies. Reliability criteria violations, such as exceeding thermal loading limits, voltage magnitude or deviation limits, or non-convergent contingencies (i.e., contingencies in which the power flow analysis failed to reach a numerical solution indicating instability in the transmission system) in the 2027/2028 summer, winter, and light load scenarios were identified in the PJM 2022 RTEP Open Window 3 study. The violations are associated with significant load growth in the Dominion and Allegheny Power Systems ("APS") transmission zones and generation deactivations.

As discussed in Mr. Gledhill's direct testimony (MAIT Statement No. 6), the 2022 Load Forecast Report showed that electricity demand in the PJM Region is expected to steadily increase over the next 15 years. In the 2022 Load Forecast Report, PJM identified several zones, including the APS, Dominion Virginia Power

("DOM"), American Transmission Systems, Inc. ("ATSI"), and Commonwealth Edison ("COMED") zones, that had to be adjusted to account for large, unanticipated load changes. This contrasted with the relatively flat demand trends throughout much of PJM for the preceding decade. PJM created a 2022 Modified Load Forecast for 2027 for the Maryland (APS) and DOM (Virginia) zones that considered approximately 1,200 MW and 2,700 MW of additional load, respectively. PJM developed a 2027 study year base case (which was based on the Modified 2022 Load Forecast as well as additional assumptions as described in Dr. Abdulsalam's Direct Testimony) and a 2028 study year sensitivity analysis (which incorporated updated load forecast information from the 2023 Load Forecast as well as additional assumptions as described in Dr. Abdulsalam's direct testimony).

As discussed in Dr. Abdulsalam's direct testimony (MAIT Statement No. 7), the 2027/28 baseline reliability criteria violations included numerous overloaded 500 kV transmission lines, which are the backbone of the transmission system serving the District of Columbia, Maryland, Virginia region and the APS and DOM zones. The majority of those overloaded 500 kV facilities occurred during both summer and winter peak. In addition to the regional violations, the Carroll–Hunterstown transmission corridor was severely overloaded. Overloaded transmission lines, which are the result of transmitting more power than the system is designed for, can lead to cascading outages and system collapse if not addressed. Numerous voltage collapse and extreme low-voltage magnitude and voltage drop violations in various areas, including the Maryland, APS and DOM zones, were observed, indicating the inability of the power system to deliver the generated

power to load centers. Not addressing these voltage violations will make the power system inoperable under the identified outage/condition leading to loss of load and generation and cascading transmission outages.

Q. HAS PJM INCLUDED THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT IN ITS RTEP?

A. Yes. PJM presented the Carroll–Hunterstown Improvements Project, a first read, at the TEAC meeting held on October 31, 2023. **MAIT Exhibit 3** contains an excerpt from this presentation that discusses the Carroll–Hunterstown Improvements Project. PJM presented the Carroll–Hunterstown Improvements Project, a second read, at the TEAC meeting held on December 5, 2023. **MAIT Exhibit 4** contains an excerpt from this presentation that discusses the Carroll–Hunterstown Improvements Project. PJM assigned baseline upgrade numbers "b3800.10", "b3800.11", "b3800.12", "b3800.14", "b3800.18", "b3800.19", "b3800.22", "b3800.23" and "b3800.24" to the transmission facilities of the Project. On October 7, 2024, FirstEnergy entered into a Designated Entity Agreement with PJM to accept construction responsibility for the Project. A copy of the agreement is provided as **MAIT Exhibit 5**.

V. BENEFITS OF THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT

Q. WILL THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT PROVIDE ANY ADDITIONAL BENEFITS TO THE TRANSMISSION SYSTEM?

A. Yes. As shown in **MAIT Exhibit 6**, the Carroll–Hunterstown corridor links the transmission system in Pennsylvania to the transmission system in Maryland and crosses the Pennsylvania-Maryland state line. MAIT owns the transmission lines running from Hunterstown Substation to Germantown Substation and 2.8 miles of the Germantown–Taneytown 138 kV Transmission Line located in Adams County, Pennsylvania. MAIT's service area in Pennsylvania is primarily served from 500 kV corridors from the north and south. These corridors are the main transmission lines bringing power from remote generation sources to MAIT's load centers. The local transmission facilities serving Pennsylvania load are connected to the 500 kV system through transformers at the Hunterstown, Bedington, and Doubs substations. The Carroll–Hunterstown corridor transmission lines provide electrical power to serve customers in Adams County, Pennsylvania, and support the broader 115 kV and 138 kV transmission systems. The Carroll–Hunterstown Improvements Project will provide greater operational flexibility to the RTO and the transmission operators ("TOs") when operating the system for adverse system conditions and for planned and unplanned outages. It also plays a vital role in the regional distribution of electricity and supporting local loads.

Q. WHAT BENEFITS WILL THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT PROVIDE TO PENNSYLVANIA?

A. The Carroll–Hunterstown Improvements Project will help assure the future reliability of MAIT's transmission system, and the Project will provide additional transmission capacity in Pennsylvania. As previously stated, MAIT's service area in Pennsylvania is primarily served from 500 kV corridors from the north and south. These corridors are the main transmission lines from remote generation sources to MAIT's load centers. The 138 kV and 230 kV transmission lines connect the extra high-voltage ("EHV") transmission substations to the local distribution substations and are vital for supplying power to industrial, commercial, and residential areas that are spread over medium distances. They also enhance the resilience of the grid to withstand and recover from disruptions. The Carroll–Hunterstown corridor provides the link to Maryland's transmission system when any of the other northern corridors are constrained or out of service. It plays a crucial role in transferring electrical energy to Pennsylvania loads and delivering power to customers in Adams County, Pennsylvania and the surrounding areas through the transmission lines and facilities of the corridor.

VI. CONSEQUENCES OF DEFERRING THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT

Q. WHAT ARE SOME OF THE CONSEQUENCES OF NOT PROCEEDING WITH THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. If the Carroll–Hunterstown Improvements Project does not proceed as planned, the reliability of the transmission system, especially the reliability of the 138 kV

network in the area, will be at risk, including the reliability of transmission service for Pennsylvania. Delaying the Carroll–Hunterstown Improvements Project will increase the risk of infrastructure failures that would compromise availability and reliability of transmission service for Pennsylvania. The failures can lead to cascading loss of system elements due to transmission lines exceeding their thermal or capacity limits, voltage collapse due to insufficient reactive power support, and electric service interruption. Delaying or not proceeding with the Carroll–Hunterstown Improvements Project can constrain the capability of transmission systems to transfer power across regions. Addressing reliability needs promptly is crucial to avoid damaging critical infrastructure and to maintaining reliable service to customers and ensuring a secure, resilient, and efficient power system.

VII. ELECTRICAL ALTERNATIVES TO THE CARROLL-HUNTERSTOWN IMPROVEMENTS PROJECT

Q. WERE ELECTRICAL ALTERNATIVES TO THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT CONSIDERED?

A. Yes. MAIT considered constructing new, greenfield transmission lines between the Hunterstown and Carroll substations. However, this solution was rejected in favor of rebuilding the existing corridor and adding the new 230 kV circuit within the existing corridor. Rebuilding the existing 115 kV and 138 kV lines allows for the reuse of the existing transmission corridor without the need for a new transmission corridor between the Hunterstown and Carroll substations. Additional information related to rebuilding within the existing right-of-way as well as the

assessment of greenfield routing options is further discussed in the direct testimony of Barry Baker (MAIT Statement No. 3).

Q. PLEASE EXPLAIN WHY THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT IS CONSIDERED THE MOST COST-EFFECTIVE SOLUTION BY MAIT.

A. The alternative to the Carroll–Hunterstown Improvements Project is to construct a new, greenfield transmission line, which would include the cost of building the new line, the cost of purchasing and clearing new rights-of-way, and the cost of additional legal and permitting fees. Thus, this greenfield alternative would be significantly higher in cost than rebuilding the existing lines in the existing transmission corridor. Consequently, MAIT considers the Carroll–Hunterstown Improvements Project to be the most cost-effective approach to addressing the issues identified with this line.

VIII. ADVANCED TECHNOLOGY

Q. WILL ADVANCED TECHNOLOGY BE USED AS PART OF THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE?

A. Yes.

Q. PLEASE DESCRIBE THE TECHNOLOGY.

A. MAIT will use Optical Ground Wire ("OPGW") on the Carroll–Hunterstown corridor, which is a type of overhead ground wire integrating optical fibers within

its structure. MAIT will employ Good Utility Practice and efficient engineering design and construction practices in developing the Project.

Q. HOW IS THE TECHNOLOGY USED IN THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT CONSIDERED "ADVANCED"?

A. OPGW is used in transmission line applications as an alternative to traditional static wire. The primary purpose of the OPGW is to shield transmission conductors from lightning. However, the OPGW also provides a telecommunication path with the added benefit of optical fibers, making it a reliable medium for power system communication, protection, and control through high-speed data transmission. This integration of power and communication facilitates advanced communication for power system monitoring, protection, and automation. OPGW enables real-time data exchange for system protection schemes and Supervisory Control and Data Acquisition ("SCADA"), which enhances the power system stability and operational flexibility. The optical fibers provide broadband, low-latency communication, which is essential for modern smart grid applications. OPGW is designed to withstand harsh environmental conditions and is installed at the top of a transmission line structure. The long lifespan of OPGW and the inaccessible installation height makes it one of the most reliable communication media with minimal maintenance needs.

Q. WHAT ADVANTAGES DOES USING THIS TECHNOLOGY PROVIDE?

A. OPGW has several advantages as compared to a standard static wire. It is a low-cost solution to provide a reliable communication path for protection and control of the transmission system, does not require environmental disturbances to bury the cable underground, and is protected from damage by humans or animals due to its inaccessibility. A static wire enhances the reliability of a transmission line by protecting the transmission line from lightning strikes, but the OPGW also facilitates critical power system functions, such as protection scheme communications, remote monitoring, fault detection, and real-time data communication.

IX. ELECTRIC AND MAGNETIC FIELD STUDY FOR THE PROPOSED CARROLL-HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. PLEASE DESCRIBE MAIT'S PROCEDURES TO MITIGATE EMF ALONG THE PROPOSED CARROLL–HUNTERSTOWN CORRIDOR.

A. MAIT's typical transmission line route selection process, which was employed for the Carroll–Hunterstown 230 kV Transmission Line, evaluates a number of factors to identify the least impactful route to the surrounding area. This evaluation process includes considering a proposed route's proximity to residences and locations where large groups of people typically gather, such as schools and places of worship. Although locating the transmission line in close proximity to these types of land uses is not precluded by state or federal rules or guidelines, providing the largest practical distance from residences, schools, places of worship, and similar

facilities is generally more acceptable to the local community and is an effective way to mitigate EMF. Where proximity to densely populated areas cannot be avoided, MAIT will modify the transmission line design having the overall least impactful route to support EMF thresholds for the proposed voltage.

The proposed route associated with the Carroll–Hunterstown 230 kV Transmission Line utilizes existing ROW. The alternate routing solutions to mitigate the proximity to densely populated areas did not minimize the overall impacts in the surrounding Project area. When evaluating the existing Carroll–Hunterstown transmission line corridor, MAIT considered the close proximity of residences to the existing transmission line ROW and utilized specific features to reduce EMF strength in its design process for the proposed double-circuit transmission lines. Those features include conductor arrangement and phasing.

Q. DOES THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE UTILIZE SPECIFIC DESIGN FEATURES TO REDUCE EMF STRENGTH?

A Yes. As part of MAIT's approach to efficiently construct a transmission line project, the design of all or portions of a transmission line project will typically utilize a compact conductor arrangement. This has the added benefit of reducing electric and magnetic field strengths. Further, for multiple-circuit transmission lines, the strength of EMFs can be reduced by selecting conductor phasing that reduces the field strengths. MAIT designs its facilities according to the requirements of the National Electrical Safety Code ("NESC"). The structure

heights and configuration were chosen based on NESC specifications, engineering parameters, and cost. MAIT proposed in this Project to construct a double-circuit steel tangent structure because it is a compact design that reduces EMF field strengths in comparison to other installations.

Q. DID MAIT PREPARE AN EMF STUDY AS PART OF THIS PROJECT?

A. As a point of reference, the Company is providing estimates of the EMF strengths for the Carroll–Hunterstown 230 kV Transmission Line. The estimates have been prepared utilizing the Electric Power Research Institute's EMF Workstation 2015 software program ("Program"). The Program relies on the law of Biot-Savart, an equation describing the magnetic field generated by a constant electric current. The law relates the magnetic field to the magnitude, direction, length, and proximity of the electric current. The EMF strengths directly beneath the centerline at mid-span of the 138 and 115 kV transmission lines and at the edges of the ROW for the transmission lines have been estimated for the normal maximum load of the transmission lines and are provided in Table 1 below. Typical structures, conductor arrangements, and average span lengths of sections of the transmission lines that are greater than one mile in length have been modeled and are reported in Table 1. Graphs of the EMF calculations are attached as **MAIT Exhibits 7 and 8**.

Table 1: Electric and Magnetic Field Calculations: 138 and 115 kV H-Frame Tangent to H-Frame Tangent

EMF CALCULATIONS		Electric Field kV/meter	Magnetic Field mGauss
Existing Hunterstown–Riley 115 kV Transmission Line	Under Lowest Conductors	1.809	350.51
	At Right-of-Way Edge	.031	10.73
Existing Lincoln–Riley 115 kV Transmission Line	Under Lowest Conductors	1.809	350.51
	At Right-of-Way Edge	.031	10.73
Existing Germantown–Lincoln 115 kV Transmission Line	Under Lowest Conductors	1.759	278.45
	At Right-of-Way Edge	.408	50.61
Existing Carroll–Germantown 138 kV Transmission Line	Under Lowest Conductors	2.273	298.17
	At Right-of-Way Edge	.494	50.73

The EMF strengths directly beneath the centerline at mid-span and at the edges of the ROW for the proposed 230/138 and 230/115 kV transmission line within ROW have been estimated for the normal maximum load of the transmission line and are provided in Table 2 below. Typical structures, conductor arrangements, and average span lengths of sections of the transmission lines that are greater than one

mile in length have been modeled and are reported in Table 2. Graphs of the electric and magnetic field calculations are attached as **MAIT Exhibits 9 and 10**.

Table 2: Electric and Magnetic Field Calculations: 230/138 and 230/115 kV tangent monopole to tangent monopole.

EMF CALCULATIONS		Electric Field kV/meter	Magnetic Field mGauss
Proposed Carroll–Hunterstown 230 kV and Hunterstown–Riley 115 kV, Lincoln-Riley 115 kV Transmission Lines	Under Lowest Conductors	3.078	274.04
	At Right-of-Way Edge	.052	13.00
Proposed Carroll–Hunterstown 230 kV and Germantown–Lincoln 115 kV Transmission Lines	Under Lowest Conductors	3.185	276.47
	At Right-of-Way Edge	.202	71.21
Proposed Carroll–Hunterstown 230 kV and Carroll–Germantown 138 kV Transmission Lines	Under Lowest Conductors	3.941	323.80
	At Right-of-Way Edge	.188	115.28

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does. However, I reserve the right to file additional testimony as may be necessary or appropriate.

APPENDIX A

Jacquelyn L. Lojek, P.E.

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FORMAL EDUCATION

University of Pittsburgh, Pittsburgh, PA — April 2014
Master of Science, Industrial Engineering — GPA 3.97

Pennsylvania State University, Erie, PA — May 2011
Bachelor of Science, Electrical Engineering — GPA 3.78

PROFESSIONAL ENGINEER LICENSES

Commonwealth of Pennsylvania – PE087848 — June 2018 – Present
State of Maryland – 63090 — June 2024 – Present
State of West Virginia – 26766 — July 2024 – Present
Commonwealth of Virginia – 068667 — July 2024 – Present
State of Ohio – PE.91692 — December 2024 – Present

PROFESSIONAL EXPERIENCE

FirstEnergy Service Company, 800 Cabin Hill Drive, Greensburg, PA — 2023 – Present
Manager, Transmission Planning

- Manage transmission planning functions for external studies across FirstEnergy.
- Provide technical guidance to staff supervisors and engineers.
- Coordinate transmission projects with other departments and regions to ensure transmission reliability and resiliency.
- Meet with PJM Interconnection, LLC, government officials, regulators and public to exchange information related to planned enhancements on the transmission system.
- Major Projects: 2022 PJM RTEP Open Window 3 – Data Center Projects

FirstEnergy Service Company, 800 Cabin Hill Drive, Greensburg, PA — 2022 – 2023
Manager, Process Control & Continuous Improvement

- Developed, coached, and mentored team of eight continuous improvement professionals.
- Re-wrote the structure of the department by establishing skill sets needed, development plans for each employee, and increase internal team by screening, interviewing, and selecting talent.
- Oversaw and managed the implementation of the Project Lifecycle Management (PLMP) process.
- Executed continuous improvement projects across FirstEnergy.
- Worked across FirstEnergy on improvement efforts and increased collaboration to breakdown silos.
- Improved continuous improvement training statistics from 20 employees to 100+ within six months.

FirstEnergy Service Company, 800 Cabin Hill Drive, Greensburg, PA — 2021 – 2022
Supervisor, Transmission Project Management

- Led and directed team of ten internal project managers in successful execution of projects to contribute to the annual financial goals of the Transmission and Distribution Programs.
- Provided leadership support to external project managers hired from contracted partners.
- Ensured team adherence to FirstEnergy Core Values, PLMP, Manual of Operations, FE Construction Standards, Compliance Ethics and Integrity, Accident Prevention Handbook, and Contractor Sourcing Strategy.
- Developed and maintained training curriculum for onboarding new Project Managers.
- Sourced external support and construction oversight, developed schedule, submitted outages, and oversaw execution of major programs.
- Major Projects: Right of Way Assurance Program, FirstEnergy Priority Repair Program, Rhodes Lane Security Enhancement Program, Penelec and West Penn Power Long Term Infrastructure Improvement Plan

Jacquelyn L. Lojek, P.E.

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FirstEnergy Service Company, 800 Cabin Hill Drive, Greensburg, PA 2017 – 2021
Engineer, Transmission Planning

- Executed annual Summer Assessment and Long-Term Assessment studies on the BES (Bulk Electric System) and non-BES transmission system to ensure compliance with NERC, PJM, and FirstEnergy planning criteria.
- Developed mitigation plans to address planning criteria violations identified in the annual PJM Regional Transmission Expansion Plan (RTEP) process and submitted proposals through the competitive planning open window.
- Performed annual Degraded Grid Study for Davis-Besse, Perry, and Beaver Valley nuclear plants to confirm that FirstEnergy can adequately and safely provide the facility offsite power under emergency conditions.
- Performed system studies associated with the connection of new PJM Generation Queue projects, area economic development opportunities, and retail or wholesale load connections.
- Supported analysis to identify solutions to mitigate identified planning criteria violations due to generator deactivations.
- Major Projects: Beaver Valley, Davis Besse and Perry Nuclear Plant Deactivation Analysis

Westinghouse Electric Company, 5000 Ericsson Drive, Warrendale, PA 2011 – 2017
Senior Engineer, Distributed Control & Information Systems

- Responsible for cross-functional team of union technicians, quality control inspectors, production supervisors, production controllers, quality assurance engineers and project management to achieve critical customer deliveries for relay control enclosures.
- Maintained 100% on time delivery for five-year period by meeting strict customer deadlines.
- Led factory acceptance test program of 75 integrated hardware and software tests by managing 15 test engineers and two technicians to meet accelerated test schedule.
- Developed implementation strategies for complex design changes to reduce errors found during functional testing.
- Maintained configuration control and bill of materials for 406 relay control and network infrastructure enclosures.
- Troubleshot test failures and hardware non-conformances.
- Directed and managed customer quality plan surveillances for manufacturing and testing activities.
- Commissioned relay control equipment at customer sites.
- Major Projects: Shin-Kori Units 3&4 and Barakah Nuclear Power Plant Units 1-4

COMMUNITY INVOLVEMENT

- American Red Cross – Chestnut Ridge Chapter: Board Member
- Westmoreland County Food Bank: Volunteer
- United Way of Southwestern Pennsylvania: Volunteer
- FirstEnergy Ambassador Network Penn State: Engineering Lead
- FirstEnergy Ambassador Network University of Pittsburgh: Member

TESTIMONY AND PROCEEDINGS

Docket No ER24-1998-0000 before Federal Energy Regulatory Commission
Provided written testimony on behalf of FirstEnergy before the Federal Energy Regulatory Commission regarding the abandoned plant incentive. 2024

Docket No ER25-19 before the Federal Energy Regulatory Commission
Provided written testimony on behalf of FirstEnergy before the Federal Energy Regulatory Commission regarding the abandoned plant incentive. 2024

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL– HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

Direct Testimony
of
Barry A. Baker

List of Topics Addressed

Line Route Study and Environmental Assessment for the Proposed Carroll–Hunterstown 230 kV Transmission Line

Dated: August 8, 2025

I. RESPONSIBILITIES, EXPERIENCE, AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Barry Alan Baker. My business address is 625 West Ridge Pike, Suite E-100, Conshohocken, PA 19428.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by AECOM Technical Services Corporation ("AECOM") as a Vice President and Eastern United States ("U.S.") Regional Practice Lead for the Environmental Planning & Permitting Practice. I also serve as a Senior Project Manager and Technical Lead in the AECOM energy market sector.

Q. WHAT ARE YOUR PRINCIPAL RESPONSIBILITIES IN THESE POSITIONS?

A. In these roles, I am a Certified Project Manager and manage projects for siting and permitting of new transmission lines, power plants, and other facilities. I manage a Practice of approximately four hundred individuals who are responsible for environmental, cultural resources, and information technology services. Additionally, I serve as a Technical Lead for transmission and distribution services on the east coast of the United States.

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATION AND PROFESSIONAL WORK EXPERIENCE.

A. I received a Bachelor of Science with Honors degree in Environmental Science from the University of East Anglia in Norwich, England in 1996. A key focus was on the use of geographic information systems ("GIS") and computer applications for environmental

problem solving. My additional, continuing education relevant to my current position includes the following courses and programs:

- Approximately 50 Project Management Classes necessary for formal certification;
- Creating and Integrating Data for Natural Resource Applications (ESRI);
- Geoprocessing with ArcGIS Desktop (ESRI);
- Spatial Hydrology Using ArcView (ESRI);
- Introduction to ArcIMS (ESRI); and
- System Architecture Design for GIS (ESRI).

I have been employed by AECOM for the past twenty years in the roles previously discussed. In these positions, I have been responsible for siting studies both as a Project Manager and as a technical lead for transmission line siting as well as new power development throughout the eastern U.S., including Pennsylvania, New Jersey, Maryland, New York, Connecticut, Ohio, Illinois, Virginia, Delaware, Massachusetts, Rhode Island, and Florida. I also manage the Eastern U.S. Environmental Planning & Permitting Practice, where I am responsible for a team of biologists, ecologists, and GIS specialists. Additionally, I am an AECOM Technical Lead designated for supporting and developing major transmission opportunities on the U.S. East Coast. Prior to joining AECOM, I held GIS and environmental development positions for other environmental and government consultants.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN PUBLIC UTILITY COMMISSION PROCEEDINGS?

A. Yes, I have provided siting testimony before the Pennsylvania Public Utility Commission ("PA PUC" or "Commission") for:

- FirstEnergy: East Germantown–Germantown Project (Docket No. A-2025-3053163);
- PECO: Brandon Shores Project (Docket No. A-2024-3051463);
- FirstEnergy: Hunterstown–Orrtanna Project (Docket No. A-2021-3025450);
- Transource PA, LLC: Independence Energy Connection Project (Docket Nos. A-2017-2640195 and A-2017-2640200);
- FirstEnergy: Bedford North–Central City West Project (Docket No. A-2016-2565296);
- PPL Electric Utilities: Lake Naomi–Lake Harmony Project (Docket No. A-2013-2367521);
- PPL Electric Utilities: Northeast Pocono Project (Docket No. A-2012-2340872);
- PPL Electric Utilities: Blooming Grove - Jackson and Peckville - Jackson Project (Docket No. A-2012-2304631);
- PPL Electric Utilities: Effort Mountain Project (Docket No. A-2010-2152104); and
- PPL Electric Utilities: Appenzell Project (Docket No. A-2010-2164476).

Q. HAVE YOU TESTIFIED IN PROCEEDINGS BEFORE OTHER UTILITY REGULATORY COMMISSIONS?

A. Yes, I have provided siting testimony before the Maryland Public Service Commission ("MD PSC") and the New Jersey Board of Public Utilities ("BPU") for:

- Transource MD, LLC: Independence Energy Connection Project (MD Case No. 9471);
- Public Service Electric & Gas ("PSE&G"): North Central Reliability Project (BPU Docket No. EO11050323); and
- New Jersey Natural Gas: Southern Reliability Link Project (BPU Docket No. GE15040402).

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. My testimony explains the selection of the route for the Carroll–Hunterstown transmission lines, which involves the addition of a 230 kV circuit onto an existing single circuit 115 kV and 138 kV transmission line that extends between the Carroll Substation in Carroll County, Maryland and the Hunterstown Substation in Adams County, Pennsylvania ("Carroll-Hunterstown 230 kV Transmission Line"). My testimony also provides an overview of the environmental review and permitting requirements for the Carroll–Hunterstown 230 kV Transmission Line and the current status of these processes.

Q. WERE ANY PORTIONS OF THE SITING APPLICATION PREPARED BY YOU OR UNDER YOUR SUPERVISION?

A. Yes. I am sponsoring certain documents to Mid-Atlantic Interstate Transmission's **(**"MAIT") Siting Application for the Project. Specifically, I am responsible for portions of the following attachments and exhibits:

- **Attachment A** – PUC Regulation Cross-Reference Matrix;
- **MAIT Exhibit 11** – Route Selection Study;
- **MAIT Exhibit 12** – Topographic Overview Map;
- **MAIT Exhibit 13** – Aerial General Layout Map;
- **MAIT Exhibit 14** – List of Agency & Permit Requirements;
- **MAIT Exhibit 15** – Wetland Delineation Report;
- **MAIT Exhibit 16** – Carroll–Hunterstown Pennsylvania Natural Diversity Inventory ("PNDI") Review and Correspondence; and

I was integrally involved in preparing these documents supporting the Application, or I otherwise provided oversight to AECOM technical staff who prepared them. I also reviewed the complete Application prior to assembly and submission to the Commission.

Q. WHAT ARE YOUR RESPONSIBILITIES IN CONNECTION WITH THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE?

A. I serve as AECOM's Project Manager, on behalf of MAIT, for the siting and permitting components of the Carroll–Hunterstown 230 kV Transmission Line. My responsibilities for the Carroll–Hunterstown Improvements Project began in April 2024 and have involved oversight of the AECOM routing efforts that identified four potential routes for the Carroll–

Hunterstown 230 kV Transmission Line, including three alternative routes (West Route, Central Route, and East Route) (together the "Alternative Routes") and the Proposed Route (Rebuild Route) that is presented for Commission approval. I oversee the scientists, biologists, planners, cultural resource specialists, GIS analysts, and other technical specialists that helped define the routes considered for the proposed transmission line. I also attend numerous teleconferences that take place concerning project-related routing, permitting, and public outreach efforts.

For the Carroll–Hunterstown 230 kV Transmission Line environmental consultation, I reviewed and helped coordinate the initial agency consultation and survey efforts in Pennsylvania on behalf of MAIT. These included submission of a Pennsylvania Natural Diversity Inventory ("PNDI") large project review to the U.S. Fish and Wildlife Service ("USFWS"), Pennsylvania Department of Conservation and Natural Resources ("DCNR"), Pennsylvania Game Commission ("PGC"), and Pennsylvania Fish and Boat Commission ("PFBC"); as well as wetland delineation activities along the Carroll–Hunterstown 230 kV Transmission Line corridor.

III. ROUTE SELECTION STUDY – CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. PLEASE EXPLAIN HOW THE STUDY AREA WAS DETERMINED AND THE DEVELOPMENT OF POTENTIAL AND ALTERNATIVE ROUTES.

A. For the Carroll–Hunterstown 230 kV Transmission Line, the MAIT Routing Team conducted a detailed siting analysis to determine a location for the transmission line that

best balances social, environmental, engineering, and economic considerations. This analysis included the determination of a Study Area, the compilation of an environmental inventory, identification and analysis of alternative line routes, and, finally, selection of a Proposed Route.

The "Study Area" is the region in which transmission line route alternatives could be sited to practicably meet the Carroll–Hunterstown 230 kV Transmission Line's functional requirements and, at the same time, minimize potential environmental impacts and project costs. The Study Area was selected based on professional judgment and the geographic characteristics of the region, as well as the physical endpoints of the Carroll–Hunterstown 230 kV Transmission Line (i.e., substation locations). 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. Constraints such as topography, parks, suburban/developed areas, transportation routes, existing utility corridors, and the locations of the endpoints played key roles in determining the boundaries of the Study Area.

Given these considerations, the Routing Team identified a Study Area encompassing approximately 177,000 acres or 277 square miles within Maryland and Pennsylvania, with the Pennsylvania portion being 67,000 acres or 105 square miles. The Study Area is bounded generally by U.S. Route 15 and Gettysburg National Military Park to the west; suburban development of Hanover, Pennsylvania and Westminster, Maryland to the east; and the existing Carroll and Hunterstown substations to the south and north, respectively. Using this established Study Area, the Routing Team began its efforts to identify Alternative Routes for the line.

Q. WHAT GUIDELINES WERE USED TO ANALYZE POTENTIAL ALTERNATIVE ROUTES?

A. The Routing Team developed basic route selection criteria that would be used to select and analyze potential Alternative Routes. These guidelines included the following criteria:

- Maximize the use of any existing transmission line ROW and seek rebuild options;
- Maximize use of any existing unused ROWs;
- Evaluate potential to parallel existing linear utilities or transportation corridors;
- Avoid or limit circuitous routes and special design requirements;
- Maximize the distance from and/or minimize impact on dwellings, schools, daycare facilities, hospitals, and other community facilities;
- Avoid or minimize visibility from scenic roadways or viewpoints;
- Avoid crossing, or minimize impacts to, designated public resource lands such as national and state forests and parks, recreational lands, nature preserves, designated historic resources and sites, and conservation areas;
- Minimize environmental impact and construction/maintenance cost by selecting shorter, direct routes; route corridors through terrain where economical construction and environmental best management practices can be employed; and where line operational/maintenance is most feasible (e.g., use existing access roads where practicable); and
- Avoid or minimize new crossings of large lakes, rivers and large wetland complexes, critical habitat, and other unique or distinct natural resources.

Using these established routing guidelines, the Routing Team identified opportunity and constraint features within the Study Area that would take advantage of existing corridors to the extent practicable and minimize potential impacts to the natural and human (or built) environment. A key existing corridor for the Carroll–-Hunterstown 230 kV Transmission Line is a network of single circuit 115 kV and 138 kV transmission lines that currently connect the Carroll Substation to the Hunterstown Substation with connections in between with the Germantown Substation (Mount Joy Township, Adams County), the Straban Substation (Straban Township, Adams County), and the Lincoln Substation (Straban Township, Adams County). This network extends generally in a south to north alignment through the center of the Study Area. U.S. Route 15 and the existing Hunterstown–Conastone 500 kV transmission line corridor also provided opportunities to the west and east sides of the Study Area respectively.

The Routing Team used this information to develop alternative routes following the general routing and technical guidelines described above. Details of the opportunity and constraints used to develop the alternative routes are included in the Route Selection Study, which is attached as **MAIT Exhibit 11** to the Application.

Q. CAN YOU DESCRIBE HOW THE ROUTING TEAM IDENTIFIED THE ALTERNATIVE ROUTES?

A. When siting transmission lines, three main routing opportunities are generally focused on where viable. These opportunities include:

- Replacing or upgrading existing transmission lines;

- Corridor sharing/paralleling existing linear utilities or ROWs, or using existing unbuilt ROWs; and
- Crossing undeveloped lands.

Replacing or upgrading existing transmission lines typically minimizes natural and social impacts by using the existing ROW, thus eliminating or reducing additional ROW clearing. For the Carroll–Hunterstown 230 kV Transmission Line, MAIT evaluated upgrading the existing single circuit 115 kV and 138 kV lines to double circuit. MAIT determined that this option was desirable due to the relatively direct alignment of the lines and the ability to complete the upgrade within the existing ROW corridor.

The corridor-sharing scenario pairs the transmission line with an existing linear feature that it can parallel, which can include highways, railroads, gas pipelines, or other existing or unbuilt transmission line ROWs. These corridors are considered "opportunity areas" because locating a new transmission line parallel to them may: (1) require less ROW; concentrate linear land uses, thus reducing fragmentation of the landscape; and (2) create an incremental impact rather than a new impact. Opportunity areas within the Study Area for the development of a new 230 kV transmission line included paralleling U.S. Route 15 and portions of the Hunterstown–Conastone 500 kV transmission line.

Using existing, unbuilt ROWs was also considered as MAIT does own an approximately 5.5-mile length of unused ROW that extends parallel with the Hunterstown–Conastone 500 kV line. This unused ROW is approximately 75 feet in width and is limited to a section of the Hunterstown–Conastone 500 kV line near Littlestown, Pennsylvania, and extends southeast toward the Maryland/Pennsylvania state line.

The fourth opportunity would use undeveloped areas such as forests, fields, and agricultural areas to identify routes that cross open lands. Identifying these routes involves assessment of parcel boundaries and land use practices to define routes that minimize potential impacts to private properties and any agricultural or other farming activities such as orchards. Most of the Study Area consists of agricultural crop lands and fields that provide opportunities for potential cross-country routes. However, the northern portion near Hunterstown is constrained by residential and commercial development that borders U.S. Route 30 and U.S. Route 15. Also, several towns within the Study Area, such as Littlestown, Pennsylvania, and Taneytown and Union Bridge, Maryland, in the southern portion closer to Carroll Substation, are also constrained by development.

Using these fundamental considerations as guidance, information obtained during the environmental field reviews was used to develop an opportunity and constraint map of the Study Area using GIS software. Georeferenced data layers of the identified opportunities and constraints obtained from published state and federal materials and local planning documents were superimposed on available current aerial photography. Evaluation of this desktop data in conjunction with field reviews of the Study Area resulted in the identification of four viable alternative routes that provide the required connectivity between Carroll Substation and Hunterstown Substation. These routes include: a cross-country route that extends partially along U.S. Route 15 (West Route); a cross-country route that extends across agricultural lands in Carroll and Adams counties (Central Route); a rebuild option that includes upgrading existing single-circuit 115 kV and 138 kV transmission lines to double-circuit (Rebuild Route – i.e., Proposed Route); and a cross-

country route that parallels portions of the Hunterstown–Conastone 500 kV transmission line and unused MAIT ROW (East Route).

Q. DID MAIT CONSIDER LOCAL ZONING ORDINANCES AND COMPREHENSIVE PLANS IN SELECTING THE PROPOSED ROUTE?

A. Yes. Preliminarily, I note that public utility facilities, such as transmission lines and substations, are generally exempt from local municipal authority. However, as required by the Commission's interim siting guidelines found at 52 Pa. Code §§ 69.1101(2)(3) and 69.3104(1), local zoning ordinances and comprehensive land use plans were reviewed by MAIT to evaluate the impact of the Proposed Route on these local ordinances and plans. MAIT evaluated the Proposed Route's consistency with the zoning ordinances and comprehensive plans of the government entities through which the Proposed Route would pass. MAIT also provided notice of the Project to representatives of Adams County and the commissioners of the townships through which the Proposed Route would pass. A discussion of MAIT's review of the local zoning ordinances and land use comprehensive plans is provided in Sections 6.3.1 of **MAIT Exhibit 11** (Route Selection Study) to the Application.

Q. PLEASE BRIEFLY DESCRIBE THE ALTERNATIVE ROUTES.

A. The four Alternative Routes are as follows:

Alternative Route 1 (West Route)

- The West Route is approximately 24.83 miles in length. From Carroll Substation, the West Route extends to the northwest for 1.07 miles across forested and agricultural

lands to a crossing of Bucher Jones Road. This section spans Little Pipe Creek and Cherry Branch, which are classified by the Maryland Department of the Environment ("MDE") as Class IV-P streams (Recreational Trout Waters and Public Water Supply); the adjacent Federal Emergency Management Agency ("FEMA") floodplains; and a National Wetland Inventory ("NWI")-listed pond. An active freight railroad (Maryland Midland) is also spanned.

- Turning to the north, the route extends 3.03 miles to a crossing of Crouse Mill Road. This section spans Big Pipe Creek (Class IV-P) and several tributaries as well as associated FEMA floodplains. Land use is predominantly agricultural with some rural residential areas at the crossings of several roads, including Middleburg Road and Hapes Mill Road.
- From this point, the West Route turns to the northwest and extends 3.47 miles to a turning point north of Keysville Road. This section spans several small tributaries to Big Pipe Creek and crosses predominantly agricultural lands. Another section of active freight railroad (Maryland Midland) is also spanned as well as State Route ("SR") 196 (Francis Scott Key Highway). North of the Keysville Road crossing, the route turns sharply north then west to account for new residential development in the area.
- Turning north, the route extends for 4.88 miles across forested and agricultural lands to the Maryland/Pennsylvania state border, located north of Harney Road. Piney Creek and Monocacy River, both Class IV-P streams, are spanned along this section. A Maryland Targeted Ecological Area ("TEA") borders the Monocacy River at the river crossing SR 140 (Taneytown Pike) and several rural residential lines local roads are also spanned.

- Continuing north into Pennsylvania, the West Route extends across agricultural lands for 3.07 miles to Barlow Greenmount Road. This section spans Marsh Creek, which is classified by the Pennsylvania Department of Environmental Protection ("PADEP") as a Cold Water Fishes ("CWF") stream, and tributaries to Rock Creek, which is classified as a Warm Water Fishes ("WWF") stream.
- At this point, the route turns to the northeast and parallels U.S. Route 15 for 7.32 miles to the crossing of U.S. Route 30 near Gettysburg. This section crosses over some agricultural lands that quickly changes to mixed commercial, residential, and forested land uses adjacent to the highway. Focused commercial development is noted at the crossing of several major roadways, including SR 134 (Taneytown Road), SR 97 (Baltimore Pike), SR 116 (Hanover Road), and near U.S. Route 30 (Lincoln Highway). A Columbia gas pipeline is spanned near the SR 134 intersection. Dense areas of residential development border U.S. Route 15 that require the route to cross back and forth across the highway three times (for a total of six crossings). Rock Creek (WWF) and several of its tributaries are also spanned. Elements of Gettysburg National Military Park, specifically the Rock Creek-White Run Union Hospital Complex and the Gettysburg Battlefield Historic District, may be crossed along this section.
- Continuing to the northeast, the West Route crosses U.S. Route 30 and extends 1.99 miles to Hunterstown Substation. The area around U.S. Route 30 is a mix of commercial and residential development that converts to agricultural land uses closer to Hunterstown Substation. Several rural residential lined local roads are spanned as well as an active freight railroad (Western Maryland), a Columbia gas pipeline, and

three existing transmission lines including the Hunterstown–Conemaugh 500 kV line. Tributaries to Rock Creek (WWF) are also spanned along this section.

Alternative Route 2 (Central Route)

- The Central Route is approximately 24.04 miles in length. The initial 2.23 miles mirrors the West Route that extends from Carroll Substation to the north side of Middleburg Road. This section spans Little Pipe Creek and Cherry Branch, which are classified as Class IV-P streams, the adjacent FEMA floodplains, and an NWI-listed pond. An active freight railroad (Maryland Midland) is also spanned.
- From this point, the Central Route continues to the north for 5.47 miles to the SR 140 (Taneytown Pike) crossing located on the west side of the town of Taneytown. This section spans across mostly agricultural lands that become mixed with some denser residential areas close to Taneytown. The route also spans SR 194 (Francis Scott Key Highway), a freight railroad line (Maryland Midland), and a 69 kV transmission line. Big Pipe Creek and Piney Creek (Class IV-P) plus several tributaries are also spanned.
- Turning to the northeast, the route extends 4.50 miles to the Maryland/Pennsylvania state border, located just north of the Frock Road crossing. This section crosses predominantly agricultural lands and several forested stream valleys. The streams spanned include Piney Creek and tributaries to Alloway Creek (Class IV-P). Piney Creek and an Alloway Creek tributary are bordered by Maryland Department of Natural Resources ("MDNR")-identified forested wetlands. One of the parcels crossed is part of the Rural Legacy Program.
- Continuing to the northeast, the Central Route extends 3.55 miles across agricultural and rural residential lands to the SR 97 (Baltimore Pike) crossing. This section spans

Alloway Creek and tributaries to Plum Creek, which are classified by PADEP as WWF streams.

- Turning to the north, the route extends for 3.99 miles to the SR 116 (Hanover Road) crossing. This section is predominantly agricultural. This section will span a Columbia gas pipeline and will cross over an existing 115 kV transmission line. Several rural residential-lined local roads as well as Alloway Creek, and tributaries to White Run (WWF) are also spanned in this section.
- Continuing north, the Central Route extends 2.67 miles to the U.S. Route 30 (Lincoln Highway) crossing. This section crosses over White Run and several of its tributaries as well as an NWI-identified scrub-shrub wetland complex along one of the tributaries.
- After crossing U.S. Route 30, the route extends north for 1.63 miles to Hunterstown Substation. The area around the U.S. Route 30 crossing is predominantly residential with an undeveloped forested area south of the road. This section will span a few tributaries of Rock Creek (WWF), an active freight railroad (Western Maryland), a Columbia gas pipeline, and two existing transmission lines including the Hunterstown–Conemaugh 500 kV line.

Alternative Route 3 (Rebuild Route – Proposed Route)

- The Rebuild Route is approximately 24.21 miles in length. From Carroll Substation, the Rebuild Route follows the existing 138 kV transmission line ROW to the northeast for 2.34 miles to the Middleburg Road crossing. Land use is predominantly agricultural, but some residential development is located near Union Bridge, which is the site of Carroll Substation. This section spans Little Pipe Creek and Cherry Branch

(Class IV-P), the adjacent FEMA floodplains, and an active freight railroad (Maryland Midland).

- Continuing to the northeast, the route extends for 3.84 miles to the SR 140 (Taneytown Pike) crossing located east of Taneytown. Land use is agricultural in the southern half of this section but becomes increasingly residential and commercial in the northern section near Taneytown. Along this section, Big Pipe Creek (Class IV-P) and several of its tributaries are also spanned, as well as SR 832 (Old Taneytown Road), which is located near SR 140.
- After crossing SR 140, the Rebuild Route extends north for 5.14 miles to the Maryland/Pennsylvania border. This section crosses predominantly agricultural land. The route spans Piney Creek (Class IV-P) and several tributaries as well as SR 194 (Francis Scott Key Highway) and a few local roads. An abandoned railroad corridor is crossed just south of SR 194.
- Turning to the northeast, the route extends for 2.80 miles to the SR 97 (Baltimore Pike) crossing located adjacent to Germantown Substation, which is where the 138 kV line changes over to 115 kV. This section spans across a mix of residential and agricultural lands, with one of the agricultural parcels being protected by a land trust easement with the Land Conservancy of Adams County. Alloway Creek (WWF) and a few of its tributaries are spanned in this section.
- At this point, the Rebuild Route crosses SR 97 and turns to the northwest for 7.48 miles to Lincoln Substation located near Gettysburg. Land use is agricultural in the southern half and becomes more residential and commercially developed in the northern half near Gettysburg. This section crosses one farm protected by a Land Conservancy of

Adams County easement. Littles Run and Whites Run (WWF streams), a few of their tributaries, and several tributaries of Rock Creek (WWF) are spanned in this section. Lake Heritage, which is part of Plum Run (WWF), and the densely developed Lake Heritage development are also crossed. The route also spans SR 116 (Hanover Road), U.S. Route 15, and U.S. Route 30. A portion of the Gettysburg Battlefield Historic District may be crossed along this section.

- From Lincoln Substation, the route turns to the east and extends for 2.61 miles to Hunterstown Substation. This section crosses over agricultural and rural residential land uses. The route spans U.S Route 15 again; an active freight railroad (Western Maryland); a Columbia gas pipeline; and two existing transmission lines, including the Hunterstown–Conemaugh 500 kV line. Tributaries to Rock Creek are also spanned in this section.

Alternative Route 4 (East Route)

- The East Route is approximately 31.74 miles in length. From Carroll Substation, the East Route mirrors the Rebuild Route by extending along the existing 138 kV transmission line ROW to the northeast for 2.18 miles to the south side of Middleburg Road. Land use is predominantly agricultural, but some residential development is located near Union Bridge. This section spans Little Pipe Creek and Cherry Branch (Class IV-P), the adjacent FEMA floodplains, and an active freight railroad (Maryland Midland).
- Turning to the northeast, the route extends 4.68 miles to the SR 832 (Old Taneytown Road) crossing located east of Taneytown. The route would span Big Pipe Creek (Class IV-P) and several of its tributaries. Land use along this section is predominantly

agricultural with increasing residential and commercial development closer to Taneytown. One of the farms is protected by an easement with the Nature Conservancy, and a small, forested area adjacent to Big Pipe Creek that is part of the Forest Conservation Act lands (Fiddles Green Forest Bank) would be spanned. The area bordering the Big Pipe Creek crossing area is also part of the Maryland Targeted Ecological Areas ("TEAs") program.

- After spanning SR 832, the East Route turns to the east-northeast for 4.97 miles to the south side of Silver Run (Class IV-P). The route would span Big Pipe Creek (Class IV-P) twice and several of its tributaries, with portions of the route extending through a large Maryland TEA bordering Big Pipe Creek. This stream is also bordered by a MDNR-identified forested wetland at the crossing area. Two Forest Conservation Act lands (John Kirby and Wells Forest Banks) are also crossed along this alignment.
- At this point, the route turns to the east and northeast for 4.30 miles to the Maryland/Pennsylvania border. The route would parallel and then span Silver Run (Class IV-P) as well as cross through several MDNR-identified forested wetlands located adjacent to Silver Run. Most of the land use is agricultural.
- After crossing the state line, the route zigzags to the northwest and northeast for 3.30 miles to the SR 194 (Hanover Pike) crossing located east of Littlestown. This section crosses a mix of agricultural and rural residential lands that become increasingly residential near Littlestown. Several tributaries to the South Branch Conewago Creek (WWF) are also crossed. A 1.64-mile section of the route would be located in a FirstEnergy-owned unused ROW that parallels the west side of the Hunterstown–Conastone 500 kV line that extends along the eastern perimeter of Littlestown.

- Crossing to the east side of the Hunterstown–Conastone 500 kV line and continuing generally to the northwest, the East Route extends for 4.54 miles to the SR 116 (Hanover Street) crossing. This section consists of predominantly agricultural land uses with pockets of congested residential development along some of the local roads. The route crosses several tributaries of Alloway Creek (WWF) and the South Branch Conewago Creek (WWF) as well as a farm protected by a Land Conservancy of Adams County easement.
- After crossing SR 116, the route continues to the northwest for 5.88 miles across agricultural lands to the U.S. Route 30 (Lincoln Highway) crossing. This section crosses Brush Run (WWF), Swift Run (WWF), and White Run (WWF); several of their tributaries; and some tributaries to the South Branch Conewago Creek (WWF). The route crosses back to the west side of the Hunterstown–Conastone 500 kV line close to the U.S. Route 30 crossing.
- From the U.S. Route 30 crossing, the East Route continues in a northwesterly direction for 1.89 miles to Hunterstown Substation. Land use around U.S. Route 30 is a mix of commercial and residential uses that becomes more agricultural closer to the substation. This section mirrors most of the alignment of the Central Route and involves spanning a few tributaries of Rock Creek (WWF), an active freight railroad (Western Maryland), a Columbia gas pipeline, and two existing transmission lines including the Hunterstown–Conemaugh 500 kV line.

Q. WAS OUTREACH PART OF THE ROUTING PROCESS?

A. Yes. MAIT conducted extensive public outreach throughout the siting process, including initial regulatory agency consultation, public notification and open house meetings, and meetings with property owners. Regarding the public open house meetings, due to the potential magnitude of impacts of the East, Central, and West Routes, MAIT decided that the focus of the open house would be on the Rebuild Route (Proposed Route). Information related to the Carroll–Hunterstown 230 kV Transmission Line was provided to the general public through a public open house forum that was conducted at local venues, as well as a virtual open house forum that was accessible via the internet. MAIT accumulated contact information for landowners within 500 feet of the Rebuild Route and sent letters to these landowners to introduce the project, provide information on the open house venue and times, and provide guidance on accessing the virtual open house presentation. Open house information was also publicly advertised in local newspapers including the Carroll County Times in Carroll County, Maryland and the Gettysburg Times in Adams County, Pennsylvania.

Public open houses were conducted on November 20, 2024, at the Northwest Middle School in Taneytown, Maryland and on November 21, 2024, at the Littlestown High School in Littlestown, Pennsylvania. Sixty-five residents attended the open house at Northwest Middle School and fifteen residents attended the open house at Littlestown High School. Residents were informed of the activities involved in rebuilding the existing single-circuit 138 kV or 115 kV lines to be a double-circuit system with a new 230 kV line and that this upgrade will require replacement of the existing wood structures with taller, steel structures. Most residents were interested in understanding what the new structures would

look like, and several residents voiced questions about viewshed changes or electromagnetic fields ("EMF"). Some of the landowners reviewed information on specific structure locations and worked with engineering and real estate members to determine possible shifts on their lands. Comment cards were provided, but none were filled out by the attendees.

On November 20, 2024, MAIT also placed the virtual public open house material on the internet for public review at https://firstenergy.consultation.ai/carroll-hunterstown/. The material included a series of stations that provided information on the need for the Carroll–Hunterstown 230 kV Transmission Line, engineering and design, vegetation management, real estate, environmental permitting, a project schedule, and contact information. Also included was a link to an interactive map illustrating the Proposed Route and parcel boundary information so that landowners could identify their location relative to the proposed Carroll–Hunterstown 230 kV Transmission Line. Other links provided the public with options to download maps and project information as well as leave a comment. No comments were left by any public viewer. The virtual public open house forum remained active for a formal comment period of 60 days extending to January 20, 2025; however, information remains available for the public to view on the website throughout the duration of the construction of the Carroll–Hunterstown 230 kV Transmission Line.

IV. ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. DID THE ROUTING TEAM EVALUATE THE IMPACTS OF THE ALTERNATIVE ROUTES ON THE BUILT ENVIRONMENT?

A. Yes. The Routing Team evaluated the potential impact of the four Alternative Routes on existing residential and commercial development, land uses, archaeological and historical areas, recreational and scenic resources, conserved lands, and terrain and landscape. With the exception of the developed areas near Gettysburg and Littlestown, Pennsylvania and Taneytown and Union Bridge, Maryland, nearly the entire length of the Alternative Routes crosses agricultural and rural residential lands. The Carroll–Hunterstown 230 kV Transmission Line is not anticipated to impact any scenic, geologic, or wilderness areas.

The closest airport to the Hunterstown Substation is the Gettysburg Regional Airport, which is located approximately 5.80 miles west of the substation and approximately 4.00 miles from the West Route. No private airports are located in the Pennsylvania portion of the Study Area. In Maryland, the closest airport to Carroll Substation is the Carroll County Regional Airport in Westminster, Maryland, which is located approximately 9.90 miles east of the substation and 7.80 miles east of the East Route. Several small, privately-owned airstrips are located between Carroll Substation and the Maryland/Pennsylvania state line. The Keymar Airpark is located within 0.65 miles of the East Route, and the Greer Airport is within 0.75 miles of the West Route.

MAIT would need to file the appropriate documentation with both the Federal Aviation Administration and the Pennsylvania Department of Transportation ("PennDOT") Bureau of Aviation to ensure the Carroll–Hunterstown 230 kV Transmission

Line will not be a hazard to the airport's flight operations. No other smaller airports or heliports were identified within 2 miles of the Study Area.

Many of the agricultural parcels located in the Study Area are protected through state-based agricultural conservation easements or land conservation easements that are managed by local conservancies that focus on protecting agricultural and natural lands to preserve the character of the area. Some of the land conservancy parcels also involved forested lands that provide ecological value to the region. Assessment of these conserved lands identified that the Rebuild Route cumulatively crosses the least area across Maryland and Pennsylvania relative to the other options. Lands crossed by this alignment are currently used for agriculture, and the transmission line ROW was in place prior to the land being conserved. The other options would involve new ROW impacts across these protected agricultural and forested lands.

National Register of Historic Places ("NRHP")-listed or -eligible cultural resources within the Study Area include numerous farm houses, buildings, and bridges as well as larger historic districts such as those encompassing portions of the town of Union Bridge, Taneytown, and Uniontown, in Maryland and the Rock Creek-White Run Union Hospital Complex and the Gettysburg Battlefield Historic District near Gettysburg in Pennsylvania. Many of the smaller NRHP sites are not located in close proximity to any of the various Alternative Routes, but each of the route options extends through some portion of an NRHP-listed historic district. The Rebuild Route currently extends across a section of the Union Bridge Historic District and through a nearly 4-mile section of the Gettysburg Battlefield Historic District. As the Project involves rebuilding an existing transmission line corridor, viewshed and physical effects to these culturally sensitive areas by the

Rebuild Route were considered to be less impactful compared to the potential impacts of other route options.

After analyzing and comparing the four Alternative Routes against potential impacts on the built environment, the Routing Team concluded the Rebuild Route is preferred over other alternatives. The entire length of the Rebuild Route can be constructed within an existing 110- to 200-foot-wide ROW in Pennsylvania that currently contains a single-circuit 115 kV or 138 kV system. This route is also one of the shortest, most direct routes of all the alternatives. Other options would require significantly more new ROW easements. Although the Rebuild Route cumulatively crosses more parcels and is in close proximity to more residences, it is noted that the existing line has been in place for decades and that over this time, land subdivision has increased the number of parcels crossed and that expanding residential development has placed more homes up against the line. Therefore, the Rebuild Route is expected to result in minimal incremental impacts to the built environment including residential areas, land use, conserved lands, and cultural resources.

Q. DID THE ROUTING TEAM CONSIDER IMPACTS OF CONSTRUCTING THE TRANSMISSION LINE ON EACH ALTERNATIVE ROUTE ON THE NATURAL ENVIRONMENT?

A. Yes. Natural environment impacts include potential impacts to vegetation and habitat, surface waters, and wetlands. Potential impacts are evaluated based on publicly available maps and data as well as consultation with federal and state agencies.

All four Alternative Routes would extend across several streams that bisect the Study Area. None of the streams in Pennsylvania are classified as High Quality or Exceptional Value ("EV"), or considered Wild Trout Streams, which would classify adjacent wetlands as EV features. Similarly, none of the streams in Maryland are classified as Tier II High Quality waters. The Rebuild Route spans 18 streams in Pennsylvania, which is comparable to most of the alternatives. These Rebuild Route crossings, however, are already cleared of their riparian border, whereas each of the other alternatives would result in new riparian impacts due to the need to clear the forest at the stream crossing location. In some cases, these riparian areas are anticipated to also consist of forested wetlands, which increase the ecological impact of the clearing activity.

Most of the vegetation crossed by the Alternative Routes consists of agricultural land cover. The Rebuild Route will not require any new forest clearing, but each of the other alternatives will cross areas of forested lands across Maryland and Pennsylvania that will cumulatively involve between 12 and 35 acres of forest clearing.

After analyzing and comparing the four Alternative Routes against potential impacts to the natural environment, the Routing Team concluded that the Rebuild Route is preferred over the other alternatives. This alignment will result in significantly less forest clearing and potential impacts to forested wetlands compared to other options. Forest clearing can result in numerous impacts, including forest fragmentation and creation of new edge habitat, wetland function modification, soil erosion, and increased stormwater runoff. The Rebuild Route will also minimize the amount of 100-year floodplain crossed. MAIT will obtain and adhere to all required state and federal permits for all potential project-related resource impacts.

MAIT conducted a delineation of the wetlands and streams along the Rebuild Route alignment in Maryland and Pennsylvania. This effort identified 56 wetlands and 72 intermittent or perennial streams within the ROW. The wetlands accounted for a total area of nearly 29 acres, of which approximately 21 acres were classified as palustrine emergent ("PEM") wetlands, just over 4 acres of palustrine forested ("PFO") wetlands, and almost 2 acres of palustrine scrub/shrub ("PSS") wetlands. The spanning of Lake Heritage in Pennsylvania and other small, open-water ponds along the alignment accounts for the difference.

Using the results of this delineation effort, an engineering review was conducted to avoid or minimize the potential permanent impact to these resources from structure placement. The engineering layout generally involved a structure-for-structure replacement pattern, which would have resulted in the replacement of several structures in a wetland across Maryland and Pennsylvania. However, due to the opportunity to optimize span lengths in some locations, impacts to several resources were reduced. In Pennsylvania, five structures will remain in a wetland, but engineering adjustments enabled the removal of four structures from a wetland. No new wetlands will be impacted by a new structure.

As part of the federal and state permitting process in Pennsylvania, MAIT also conducted a PNDI review of the Proposed Route (Rebuild Route). The PNDI review required correspondence with the DCNR, PGC, USFWS, AND PFBC. From these correspondences, DCNR has required a botanical survey to assess the potential for nine plant species that may be located along the alignment. Surveys for these plant species will be conducted in spring and summer 2025. The PGC noted that habitat for the tri-colored bat (*Perimyotis subflavus*) may be within the Proposed Route corridor. Information on

seasonal restrictions for tree clearing was provided that will allow for the clearing of any trees during specific time frames. USFWS has responded that the Proposed Route will not require any bog turtle (*Glyptemys muhlenbergii*) surveys but is still assessing the need for potential bat surveys. The PFBC response indicated no adverse impact is anticipated to threatened and endangered species and/or special concern species and habitat. The PNDI review and subsequent correspondence letters are enclosed as **MAIT Exhibit 16**.

V. ROUTE SELECTION STUDY CONCLUSION FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. DID THE ROUTING TEAM DECIDE WHICH ALTERNATIVE IS THE PROPOSED ROUTE?

A. Yes. Based on a quantitative and qualitative review of information obtained from GIS data, field reconnaissance, and engineering and constructability considerations for this Project, the Routing Team selected the Rebuild Route as the Proposed Route. A topographic map of the Proposed Route is enclosed as **MAIT Exhibit 12**, and an aerial map depicting the general layout of the Proposed Route is enclosed as **MAIT Exhibit 13**. The Routing Team believes that this route minimizes the social, environmental, and construction impacts associated with constructing this alignment compared to the other Alternative Routes. Specific reasons include the following:

- The alignment involves rebuilding an existing line within an existing ROW;
- The alignment will cross the shortest length of conserved lands (6.04 miles), and the conservation easements across these lands were implemented after the existing line was constructed;

- The alignment will involve minimal, if any, forest clearing;
- The alignment will minimize any forested wetland (PFO) clearing;
- The alignment will be less complex for engineering to design as it will be relatively direct with few heavy-angled turns; and
- The alignment crosses parcels and is close to residential structures that have had an existing line in place for decades. Over this time, land subdivision has increased the number of parcels crossed, and expanding residential development has placed more homes up against the line. However, this route results in less cumulative increase in parcels crossed and residences in close proximity.

Q. DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes, it does. However, I reserve the right to supplement my testimony as additional issues arise during the course of this proceeding.

BEFORE THE
PENNSYLVANIA PUBLIC UTIILTY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL–HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

Direct Testimony
of
Lisa Marinelli

List of Topics Addressed

Real Estate and Property Rights

Dated: August 8, 2025

I. RESPONSIBILITIES, EXPERIENCE AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Lisa Marinelli, and my business address is 800 Cabin Hill Drive, Greensburg, Pennsylvania 15601.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by FirstEnergy Service Company ("FESC") as a Senior Real Estate Representative. My primary responsibility is the acquisition of land rights (by easement or fee) necessary for the construction and maintenance of transmission facilities, and I provide project management oversight for contracted right-of-way ("ROW") acquisition projects. In this proceeding, I am testifying on behalf of the Mid-Atlantic Interstate Transmission, LLC ("MAIT").

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATION AND PROFESSIONAL WORK EXPERIENCE.

A. I graduated from the University of Pittsburgh in Johnstown, Pennsylvania, in 1990 with a Bachelor of Arts in Finance and Accounting. I graduated from Duquesne University, Pennsylvania with a Master's degree in Taxation in 2004. I have been employed with FESC since 2011, when the merger of FirstEnergy Corp. and Allegheny Energy was completed. Prior to the merger and since 2001, I was employed with Allegheny Energy Service Corporation. I worked within its Audit Department from 2001 to 2006, where I was responsible for conducting operational, environmental and financial audits. From 2006, I

worked within its Real Estate Department, where I was responsible for acquisition and divestiture of company-owned assets, and acquisition of ROW for the construction and maintenance of distribution and transmission facilities.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION") OR OTHER REGULATORY AGENCIES?

A. Yes. I have provided siting testimony before the Commission for the Bedford North–Central City West 115 kV HV Transmission Line Project (Docket No. A-2016-2565296) and the Hunterstown–Orrtanna 115 kV Transmission Line Project (Docket No. A-2021-3025450).

II. PURPOSE OF TESTIMONY

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am testifying in support of MAIT's application for approval to locate and construct the Carroll–Hunterstown Improvements Project, which includes the proposed construction of the new double-circuit Carroll-Hunterstown 230/115 and 230/138 kV Transmission Line ("Carroll-Hunterstown 230 kV Transmission Line"),[1] which is the subject of this full siting application.

[1] The portion of the Carroll-Hunterstown 230 kV Transmission Line to be constructed in Maryland will also require the purchase of an exclusive substation easement for the expansion of Carroll Substation in Maryland and the relocation of certain structures ("Carroll Substation Project"). Further discussion of this substation-related work associated with the Maryland rebuild is discussed herein.

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.

A. The purpose of my testimony is to support MAIT's Application for approval of the Carroll–Hunterstown 230 kV Transmission Line. Specifically, I will:

- Describe the process used by MAIT to confirm existing property rights supporting the construction of the proposed new Carroll–Hunterstown 230 kV Transmission Line within the existing 138/115 kV ROW, and the expansion of Carroll Substation and structure relocation as required for the Carroll-Hunterstown 230 kV Transmission Line;
- Describe the process used by MAIT to identify the potentially affected landowners and properties; and
- Describe the Code of Conduct applicable to MAIT's employees, agents, contractors and subcontractors in their respective interactions with impacted property owners.

Q. WHAT ARE YOUR RESPONSIBILITIES IN CONNECTION WITH THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. It is my department's responsibility to identify all property owners along the Proposed Route for the Carroll–Hunterstown Improvements Project. We review and determine the adequacy of easement rights in areas where we plan to use existing ROW and identify any areas where we will require new or enhanced rights for the Proposed Route. For the areas where we may need new or enhanced ROW, we attempt to negotiate with these property owners for the appropriate land rights needed. Section 69.3102 of the Commission's regulations requires utilities to demonstrate efforts to fully notify landowners that will have property acquired or will be subject to easement/ROW requirements; this

demonstration includes submission of the "15-Day Notice Packet." On June 13, 2025, Real Estate mailed this packet of literature concerning the Carroll–Hunterstown Improvements Project to all property owners affected by the Proposed Route, which included: (1) a project fact sheet; (2) a property owner notice required by the Commission; (3) a Code of Conduct for Real Estate Representatives and subcontractor employees; (4) a permission form and a brochure entitled "Maintaining Safe and Reliable Service," which explains FirstEnergy's ROW maintenance practices; and (5) other information to help property owners fully understand the Project. MAIT's Real Estate Representative provides the property owner with information on how he/she can be contacted at any time to answer questions or to address issues or concerns. The Real Estate Representative serves as a direct link for the property owner to communicate with MAIT.

Q. WHAT EXHIBITS DO YOU REFERENCE?

A. I will refer to certain exhibits accompanying MAIT's Application that were prepared under my direction. As part of my testimony, I am sponsoring the following exhibits:

- **MAIT Exhibit 17 -** The List of names and addresses of all known persons, corporations, and other entities of record owning property along the proposed transmission line ROW; and
- **MAIT Exhibit 18** - The 15-Day Landowner Notice Packet.

III. REAL ESTATE AND PROPERTY RIGHTS

Q. HOW HAS MAIT ADDRESSED RIGHT-OF-WAY PROCUREMENT AND RELATED MATTERS SINCE THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT WAS PROPOSED?

A. For the proposed Carroll–Hunterstown 230 kV Transmission Line, MAIT began the process of identifying affected property owners after completing the siting process and selecting a proposed route that would utilize existing ROW on existing transmission line corridors between Hunterstown Substation in Adams County, Pennsylvania and the Pennsylvania-Maryland border. The siting contractor, AECOM, identified the property owners along the Proposed Route using publicly available information, such as tax maps and courthouse records.

Of the 85 tracts reviewed, it was determined that the proposed Carroll–Hunterstown 230 kV Transmission Line occupies existing ROW on all 85 tracts, including land upon which the existing Germantown, Lincoln, Straban, and Hunterstown substations are situated. A property owner list was developed, which is reflected in **MAIT Exhibit 17**, and the property owners were contacted with information pertaining to the Carroll–Hunterstown Improvements Project and MAIT's proposed activities relating to their properties. Of the 85 parcels, new ROW was required for one parcel that currently accommodates the existing Hunterstown Substation in Adams County, Pennsylvania. MAIT will amend a license agreement through negotiation with the affected property owner in order to terminate the proposed new 230 kV at the Hunterstown Substation and an approximate 600-foot segment of the Hunterstown–Riley 115 kV Transmission Line outside the substation. The amended license agreement is needed at the Hunterstown

Substation parcel to accommodate the Hunterstown–Riley 115 kV Transmission Line relocation. The proposed Carroll–Hunterstown 230 kV Transmission Line is addressed by the testimony of Kory Swierczek in MAIT Statement No. 5.

Q. PLEASE DESCRIBE HOW MAIT INTENDS TO INTERACT WITH PROPERTY OWNERS.

A. Throughout the Carroll–Hunterstown Improvements Project, MAIT's Real Estate Representatives will work with the property owners to assure and acquire the necessary rights to construct the Carroll–Hunterstown Improvements Project. These rights include the transmission line easement, vegetation management rights, access roads, and storage yards, as applicable. The Real Estate Representatives describe the work to be conducted on the property and negotiate in good faith using fair market offers for the expansion of the ROW. These offers were based on the current market values, amount and type of ROW needed, and the use of the property.

Q. WHAT IS THE CURRENT STATUS OF NEGOTIATIONS?

A. As noted above, MAIT needs to amend an existing license agreement with the one affected landowner for additional right of way.

Q. IS THERE ANY PENDING OR PRIOR LITIGATION INVOLVING MAIT RELATING TO PROPERTY OR RIGHT-OF-WAY MATTERS WITH RESPECT TO THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. There is no litigation involving MAIT or its affiliates with respect to the Project.

Q. DOES MAIT HAVE A FORM OF NOTICE IT INTENDS TO PROVIDE TO IMPACTED PROPERTY OWNERS ADVISING THEM OF THE COMPANY'S VEGETATION MAINTENANCE PLAN?

A. Yes. A Vegetation Management pamphlet was sent out in the 15-Day Notice Package. In addition, the Real Estate Representative verbally describes the Transmission Vegetation Maintenance plan that governs vegetation management on property during and after construction.

Q. PLEASE DESCRIBE MAIT'S CODE OF CONDUCT RELATED TO PROPERTY RIGHTS.

A. The Code of Conduct outlines MAIT's expectations for its employees, contractors and subcontractors that are interacting with property owners and the general public on the Carroll–Hunterstown Improvements Project. This Code of Conduct applies to all MAIT employees, agents, contractors and subcontractors who have any contact with impacted property owners. This list of "do's and don'ts" clearly communicates to all those who interact with property owners in any aspect of the Project MAIT's expectations of how the process should proceed and, more importantly, how property owners and others should be treated.

Q. WAS THAT CODE OF CONDUCT FOLLOWED RELATIVE TO THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. Yes, the Real Estate Representatives described the work to be conducted on the property and negotiated in good faith using fair market offers for the necessary additional ROW.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does. However, I reserve the right to file such additional testimony as may be necessary or appropriate.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL– HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	**:**	**Docket No. A-2025-_____**

Direct Testimony
of
Kory R. Swierczek

List of Topics Addressed

The Design, Engineering, Construction, Operation, and Maintenance of the Proposed Carroll–Hunterstown 230 Kilovolt ("kV") Transmission Line Project

Dated: August 8, 2025

I. RESPONSIBILITIES, EXPERIENCE AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kory R. Swierczek. My business address is 555 Croton Road, Suite 307, King of Prussia, PA 19406.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by ExecuPOWER, LLC as Director – Transmission Engineering. ExecuPOWER, LLC is a full-service engineering and project management company supporting transmission, substation, and distribution design projects, headquartered in King of Prussia, PA. ExecuPOWER, LLC supports FirstEnergy Service Company ("FESC") via a Master Services Agreement for Professional or Consulting Services. FESC is a subsidiary of FirstEnergy Corp ("FirstEnergy") that provides legal, financial, and other corporate support services to FirstEnergy and its operating and transmission subsidiaries, one of which is Mid-Atlantic Interstate Transmission, LLC ("MAIT").

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATION AND PROFESSIONAL WORK EXPERIENCE.

A. I have earned three degrees from the University of Delaware: a Bachelor's Degree in Civil Engineering in May 2012, a Master's Degree in Civil Engineering in May 2013, and a Master's in Business Administration in August 2015. I obtained my original Professional Engineer's ("PE") license (License #21135) from the State of Delaware in June 2017. I obtained my PE licenses by comity in the Commonwealth of Pennsylvania in May 2019 (License #PE089549) and in the State of Maryland in November 2018 (License #53400).

I started my career in February 2013 working for Delmarva Power & Light ("DPL") as an Engineer supporting transmission line design projects. My responsibilities included: design of transmission lines; preparation and review of engineering and environmental surveys; permit acquisition; construction drawing development, specification and standard development; and project management. In October 2018, I accepted a position at ExecuPOWER, LLC as a Senior Project Engineer. Since that time, my titles have been Manager – Transmission & Distribution Engineering, Director – Transmission & Distribution Engineering, and now Director – Transmission Engineering. My responsibilities include performing and overseeing the civil engineering design of electric transmission lines, including structural design of support structures, foundation design, construction drawing development, routing studies, and project management tasks, as well as overseeing the strategic planning, client relationships, resource management, and financial performance of my department. I maintain and hold this position today.

Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION") OR OTHER REGULATORY AGENCIES?

A. No.

II. PURPOSE OF TESTIMONY

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am testifying in support of MAIT's Application for approval to locate and construct the proposed construction of the new double-circuit Carroll-Hunterstown 230/15 and 230/138 kV Transmission Line ("Carroll–Hunterstown 230 kV Transmission Line"), which is part of the larger Carroll–Hunterstown Improvements Project ("Project").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe the design and construction methodology of the Carroll–Hunterstown 230 kV Transmission Line in the existing 115 kV and 138 kV transmission line corridors between the Pennsylvania-Maryland border and Hunterstown Substation in Adams County, Pennsylvania. I will also provide information on the planned future maintenance of these lines.

Q. PLEASE BRIEFLY OUTLINE YOUR TESTIMONY.

A. My testimony will cover:

- Proposed transmission line configuration;
- Right-of-way ("ROW") details;
- Design criteria;
- Construction activities; and
- Maintenance activities.

Q. DOES YOUR TESTIMONY ADDRESS THE FILING REQUIREMENTS OF 52 PA. CODE §§ 57.71-57.77, CONCERNING THE SITING AND CONSTRUCTION OF HIGH VOLTAGE ("HV") TRANSMISSION LINES?

A. Yes. My direct testimony, together with the Application for authorization to locate and construct a high-voltage transmission line ("Application") filed by MAIT, provides information to respond to the requirements of 52 Pa. Code § 57.72(c)(6) (safety considerations to be incorporated into the design, construction, and maintenance of the proposed HV line); 52 Pa. Code § 57.72(c)(13)(ii) (an engineering and design-based description of the proposed line); and 52 Pa. Code § 57.72(c)(13)(iii) (a simple drawing of a cross section of the ROW of the HV line showing the placement of supporting structures at typical locations, with structure sizes, ROW widths, and the lateral distances between the conductors and the edge of the ROW indicated).

Q. PLEASE IDENTIFY AND DESCRIBE THE EXHIBITS YOU WILL REFER TO IN YOUR TESTIMONY.

A. I will refer to certain exhibits accompanying MAIT's Application that were prepared under my direction. Those exhibits are:

- **MAIT Exhibit 19** depicts the proposed 230 kV transmission line within an existing 115 kV ROW between Germantown Substation and Lincoln Substation;
- **MAIT Exhibit 20** depicts a typical ROW section for the existing 115 kV transmission line between Germantown Substation and Lincoln Substation;

- **MAIT Exhibit 21** depicts the proposed 230 kV transmission line within an existing 115 kV ROW between Lincoln Substation and Hunterstown Substation;
- **MAIT Exhibit 22** depicts a typical ROW section for the existing 115 kV transmission line between Lincoln Substation and Hunterstown Substation;
- **MAIT Exhibit 23** depicts the proposed 230 kV transmission line within an existing 138 kV ROW between the Pennsylvania-Maryland State Line and Germantown Substation; and
- **MAIT Exhibit 24** depicts a typical ROW section for the existing 138 kV transmission line between the Pennsylvania-Maryland State Line and Germantown Substation.

Additional right-of-way will be needed from one landowner:

- **MAIT Exhibit 25** depicts the new ROW needed at the Hunterstown Substation parcel to accommodate the Hunterstown–Riley 115 kV Transmission Line relocation and termination of the new Carroll–Hunterstown 230 kV Transmission Line.

The Carroll–Hunterstown 230 kV Transmission Line will consist of 14 structure exhibit drawings:

- **MAIT Exhibit 26** depicts a 115 kV single-circuit steel pole, with strain insulators on arms in a delta configuration for heavy line angles;
- **MAIT Exhibit 27** depicts an atypical double-circuit steel two-pole structure, with suspension insulators on arms. The 230 kV circuit will be on the left pole and the 115 kV circuit will be on the right pole;

- **MAIT Exhibit 28** depicts a typical 230 kV single-circuit steel three-pole structure, with strain insulators for light line angles ;
- **MAIT Exhibit 29** depicts a typical 230 kV single-circuit steel three-pole structure, with strain insulators for heavy line angles;
- **MAIT Exhibit 30** depicts an atypical double-circuit steel pole structure, with 230 kV strain insulators attaching to the pole and 115 kV insulators attaching to arms below the 230 kV;
- **MAIT Exhibit 31** depicts an atypical double-circuit steel pole structure, with strain insulators attaching to the pole in a vertical configuration with the 230 kV above the 115/138 kV;
- **MAIT Exhibit 32** depicts an atypical double-circuit steel pole structure, with suspension insulators on arms attaching to the pole in a vertical configuration with the 230 kV above the 115/138 kV. This specific configuration will be used to transition between a standard suspension structure and a vertically configured structure. The 230 kV circuit will be on one side of the pole, and the 115/138 kV circuit will be on the other side.
- **MAIT Exhibit 33** depicts a typical double-circuit steel pole structure, with suspension insulators on arms in a vertical configuration for light line angles. The 230 kV circuit will be on one side of the pole and the 115/138 kV circuit will be on the other side. The majority of the line will be this configuration;
- **MAIT Exhibit 34** depicts a typical double-circuit steel pole structure, with strain insulators on arms in a vertical configuration for light to heavy line angles. The

230 kV circuit will be on one side of the pole, and the 115/138 kV circuit will be on the other side;

- **MAIT Exhibit 35** depicts an atypical double-circuit steel two-pole structure, with strain insulators on arms in a delta configuration. The 230 kV circuit will be on the left pole and the 115 kV circuit will be on the right pole. This specific configuration helps minimize structure heights for crossing under other transmission lines;
- **MAIT Exhibit 36** depicts a typical 230 kV single-circuit steel pole structure, with strain insulators in a vertical configuration for heavy line angles;
- **MAIT Exhibit 37** depicts a typical 115 kV single-circuit steel pole structure, with strain insulators in a vertical configuration for heavy line angles;
- **MAIT Exhibit 38** depicts an atypical 115 kV single-circuit steel pole structure, with suspension insulators on arms in a delta configuration for light line angles;
- **MAIT Exhibit 39** depicts a typical 115 kV single-circuit steel pole structure with horizontal post insulators in a delta configuration. Horizontal posts are utilized when span lengths are short;
- **MAIT Exhibit 40** depicts a typical wood H-frame tangent structure, which represents the majority of the structures that support the existing conductors within the Carroll–Hunterstown Transmission corridors. The conductors are aligned in a horizontal configuration, and a shield wire is attached to each pole near the top. This structure type will not be utilized for the rebuild projects.

I am also including exhibits related to FirstEnergy's vegetation management practices:

- **MAIT Exhibit 41** is a "Maintaining a Safe and Reliable Transmission System Vegetation Management for New Transmission Construction Projects" Brochure;
- **MAIT Exhibit 42** is a "Maintaining a Safe and Reliable Transmission System Tree Trimming Comprehensive Vegetation Management" Brochure; and
- **MAIT Exhibit 43** is a Vegetation Management Program Brochure.

III. DESIGN AND CONFIGURATION FOR THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. HAS A GENERAL DESCRIPTION OF THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE BEEN PROVIDED?

Yes, a description of the proposed Carroll–Hunterstown 230 kV Transmission Line has been provided in **Attachment A** to the Application. Additionally, other MAIT witnesses provide a general description of the need for the Carroll–Hunterstown 230 kV Transmission Line, the proposed route, and similar basic information about the Carroll–Hunterstown 230 kV Transmission Line. My discussion of the engineering and construction of the Carroll–Hunterstown 230 kV Transmission Line, which follows, is consistent with those descriptions.

Q. PLEASE DESCRIBE THE GENERAL DESIGN CONFIGURATION PLANNED FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE.

A. The proposed Carroll–Hunterstown 230 kV Transmission Line involves rebuilding approximately 12.9 miles of the existing 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Hunterstown Substation as a double-circuit

transmission line to accommodate the proposed new 230 kV circuit on one side and the 115 kV or 138 kV circuit on the other. This includes approximately 2.8 miles of the Carroll–Germantown 138 kV Transmission Line, approximately 7.5 miles of the Germantown–Lincoln 115 kV Transmission Line, approximately 1.4 miles of the Lincoln–Riley 115 kV Transmission Line, and approximately 1.2 miles of the Riley–Hunterstown 115 kV Transmission Line. The 138 kV circuit extends from Carroll Substation in Maryland to Germantown Substation in Pennsylvania. The 115 kV circuits currently terminate at Germantown Substation, Straban Substation, Lincoln Substation, Riley Substation, and Hunterstown Substation. The existing 138 kV and 115 kV transmission lines will continue to provide service to those substations after the rebuild. The proposed 230 kV line will bypass the intermediate substations and electrically connect Hunterstown Substation in Pennsylvania to Carroll Substation in Maryland. The new 230 kV circuit may be constructed on single circuit structures as it bypasses the intermediate substations while the existing 115 kV and 138 kV circuits terminate into the intermediate substations, similar to the existing configuration. A single-circuit structure portion of the Hunterstown–Riley 115 kV Transmission Line will require new ROW to be obtained, per **MAIT Exhibit 25**.

The configuration for this portion of the Project will primarily consist of two transmission lines, each consisting of three electrical phases, elevated above the ground by self-supporting, double-circuit steel monopole structures. Approximately 106 structures ranging from approximately 56 to 198 feet in height above ground will be installed, with an average height of approximately 120 feet and span lengths of approximately 680 feet.

The existing 115 kV and 138 kV transmission lines are currently supported by 98 wood structures and 1 steel structure that, together, range from 45 to 80 feet in height above the ground, with an average height of approximately 62 feet. Most of the existing 115 kV and 138 kV structures are wood H-Frames, as depicted in **MAIT Exhibit 40**. The existing transmission lines are in a horizontal configuration, with span lengths that are approximately 800 feet. The proposed Project would use steel poles in a vertical configuration as shown in **MAIT Exhibits 26 through 39**.

By using double-circuit steel poles in a vertical configuration, existing ROW widths are adequate for the required clearances. Steel poles have the strength and flexibility in height to accommodate this conductor arrangement while also allowing the structure locations to remain near their current locations. Additionally, galvanized steel poles minimize maintenance and have a longer life span. Woodpecker damage and degradation at the ground line—two common problems with wood—are non-existent for steel poles. The steel poles will utilize concrete pier foundations, which will be single-shaft augured piers with anchor bolts. By using concrete foundations, the poles will be self-supporting; therefore, no guy wires will be required for any steel structures.

The Carroll–Hunterstown 230 kV Transmission Line will primarily utilize existing ROW that varies in width along the existing lines. Due to the increased ground clearance required to account for increased voltage, the Carroll–Hunterstown 230 kV Transmission Line will require structures to be shifted along the centerline. The project will introduce one additional structure to the existing Carroll–Hunterstown 115/138 kV ROW in Pennsylvania. Proposed structure relocations will primarily be located within ten feet of

the existing structures along centerline. In Pennsylvania, due to the structure shifts, the Project will introduce:

- One additional structure to one property that is currently subject to supporting structure(s) for the existing line; and
- One structure to two properties that are not currently subject to a supporting structure.

Q. DO YOU ANTICIPATE THE NEED FOR ANY OTHER TYPES OF STRUCTURES FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE?

A. No. It is possible that detailed design engineering for the Carroll–Hunterstown Improvements Project may reveal the need for other structure types; however, we do not anticipate that any such structures will differ from those depicted in **MAIT Exhibits 26 through 39**.

Q. WHAT IS THE WIDTH OF ROW PLANNED FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE?

A. The proposed new Carroll–Hunterstown 230 kV Transmission Line will utilize the existing ROW on the Carroll–Germantown 138 kV, Germantown–Lincoln 115 kV, Lincoln–Riley 115 kV, and Riley–Hunterstown 115 kV Transmission Line corridors. Typical ROW width for the corridor between Lincoln Substation and the Pennsylvania-Maryland border is 110 feet, while typical ROW width for the corridor between Lincoln Substation and Hunterstown Substation is 200 feet. The existing 115 and 138 kV transmission line

structures on the centerline of the ROW between Germantown Substation and Lincoln Substation are depicted in **MAIT Exhibits 20** and **24**. The existing 115 kV transmission line structures that are offset 40 feet from centerline in the ROW between Lincoln Substation and Hunterstown Substation are depicted in **MAIT Exhibit 22**.

Q. WHERE WILL THE PROPOSED ELECTRIC TRANSMISSION CENTERLINE FALL IN THE EXISTING MAIT ROW FOR THE CARROLL-HUNTERSTOWN 230 KV TRANSMISSION LINE?

A. The proposed double circuit 230/138 kV and 230/115 kV transmission lines will be constructed primarily along the center of the existing 138 and 115 kV ROW, with the exception of an approximately 600-foot segment of relocated Hunterstown–Riley 115 kV Transmission Line outside of Hunterstown Substation. The 230 kV line will continue straight at Germantown, Straban, and Riley substations where the 138 kV circuit terminates, remaining on the center of the ROW. New ROW will be obtained for the final spans of the 230 kV circuit terminating at Hunterstown Substation, per **MAIT Exhibit 25**. The proposed double-circuit transmission line structures that will support both the 115/138 kV and proposed new 230 kV transmission line conductors are depicted within centerline of existing ROW in **MAIT Exhibits 19** and **23**. The proposed double-circuit transmission line structures that will support both the 115 kV and proposed new 230 kV transmission line conductors between Lincoln Substation and Hunterstown Substation will be 40 feet offset from centerline in existing ROW as depicted in **MAIT Exhibit 21**.

Q. WILL THE SUPPORTING STRUCTURES FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE CARRY ANY WIRES OTHER THAN TRANSMISSION CONDUCTORS?

A. Yes. The Carroll–Hunterstown 230 kV Transmission Line will carry two shield wires. One of the shield wires will be 7 No. 8 Alumoweld, which consists of seven strands of No. 8 aluminum-clad steel wire. The main purpose of the shield (or ground) wire is for lightning protection. The other shield wire will be an optical ground wire ("OPGW"). This wire is composed of aluminum and aluminum-clad steel strands surrounding an aluminum tube containing fiber-optic strands. The optical fibers within the cable can be used for high-speed transmission of data for the purpose of protection and control of the transmission line, as well as for voice and other data communication.

Q. DOES THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE MEET MAIT'S EXISTING ENGINEERING AND DESIGN SPECIFICATIONS?

A. Yes. The latest version of the National Electrical Safety Code ("NESC") has been adopted as the standard practice for the Carroll–Hunterstown Improvements Project, which includes the Carroll-Hunterstown 230 kV Transmission Line. MAIT will meet or exceed the NESC standards.

IV. DETAILED ENGINEERING SPECIFICATIONS FOR THE PROPOSED CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE

Q. PLEASE DESCRIBE THE VOLTAGE, TEMPERATURE, AND OTHER ELECTRICAL PARAMETERS FOR WHICH THE CONDUCTORS FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE ARE DESIGNED.

A. The existing conductor type on the 115 kV and 138 kV transmission lines between the Pennsylvania-Maryland border and Lincoln Substation is 556.5 thousand circular mils ("KCM"), 26/7 aluminum conductor steel reinforced ("ACSR"), also known as Dove. The existing conductor type on the 115 kV line between Lincoln Substation and Hunterstown Substation is 795 KCM, 26/7 ACSR, also known as Drake. The size and type of the proposed conductor for the 115 kV, 138 kV, and 230 kV circuits is 1590 KCM, 54/19 ACSR, also known as Falcon. I note that the 138/115 kV conductor is being updated to 230 kV standard simply to increase loadability, and the 138/115 kV lines will still be operated at their assigned respective voltages. The increase in diameter of Falcon over Dove is a little over half an inch: 1.545 inches vs. 0.927 inches, respectively. This increase in diameter results in an ampacity increase of approximately 87% when operated at 138 kV. The summer normal operating capacity of the new 230 kV line will be 726 MVA. For both circuits, each phase of the three-phase line will consist of a single conductor.

Q. PLEASE DESCRIBE HOW THESE PARAMETERS WILL CONFORM TO THE NATIONAL ELECTRICAL SAFETY CODE.

A. The Carroll–Hunterstown 230 kV Transmission Line will be able to operate with a conductor temperature up to 212°F, which will be used for sagging and clearance purposes.

The tension of the line is inversely related to temperature, meaning that as the operating temperature of the line increases, the tension of the line decreases. Therefore, at 212°F, the line will be at its lowest operating tension. Similarly, the tension is also inversely related to conductor sag. As the tension decreases, the sag increases. Consequently, individual structure heights will be designed such that the line will meet or exceed NESC design clearances when at its minimum tension or maximum sag condition along its entire length.

The individual structures are designed to carry the maximum conductor loads anticipated at each structure location for the conductors and line configuration. The structures also are designed to provide sufficient clearances between all conductor phases to allow for the performance of service and maintenance with the conductors energized ("live" line work).

Q. PLEASE DESCRIBE THE RELATIONSHIP OF THE EXISTING ROW WIDTHS TO THE DESIGN AND NESC REQUIREMENTS FOR THE CARROLL–HUNTERSTOWN 230 KV TRANSMISSION LINE.

A. When evaluating transmission design criteria and the location of structures with respect to the edge of the ROW, an array of parameters must be considered. These include structure type, conductor size, stringing tension, conductor motion, line voltage, and NESC-defined weather conditions. As the conductor blows out under specific wind conditions, horizontal clearances must be maintained to the edge of the ROW. The proposed transmission lines

will be designed to ensure that all applicable NESC conductor clearances to the edge of the ROW will be met.

V. CONSTRUCTION ACTIVITIES

Q. PLEASE GENERALLY DESCRIBE THE CONSTRUCTION PROCESS.

A. The Carroll–Hunterstown Improvements Project will be constructed following MAIT's standard construction practices to perform all work safely and in compliance with the Occupational Safety and Health Administration Rules and Regulations, while keeping environmental impact to a minimum. Project activities will include the installation and maintenance of soil erosion and sedimentation control measures, construction of temporary access roads, ROW clearing, installation of foundations, structures and wire, and rehabilitation of all disturbed areas due to the construction process.

Q. WHAT IS THE ESTIMATED COST TO SITE AND CONSTRUCT THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT?

A. The estimated total cost of the Carroll–Hunterstown Improvements Project is approximately $148,450,000[1]. Of that cost, approximately $85,850,000 is associated with work in Pennsylvania. This cost includes approximately $82,090,000 for the transmission line work and approximately $3,760,000 associated with substation upgrades. Of the $82,090,000 in transmission line costs, approximately $71,110,000 is attributed to the

[1] This cost reflects all associated line and substation improvements in Pennsylvania and Maryland.

Carroll–Hunterstown 230 kV Transmission Line and approximately $10,980,000 is attributed to the Lincoln–Orrtanna 115 kV Transmission Line.[2]

Q. OVER WHAT TIME PERIOD WILL THE PROJECT BE CONSTRUCTED?

A. Pending approval of the Project by the Commission, construction is scheduled to commence on April 1, 2027, with a target in-service date of June 1, 2028.

Q. WHAT STEPS ARE PLANNED FOR MINIMIZING THE EFFECTS OF CONSTRUCTION ON AREAS WITHIN AND OUTSIDE OF THE ROW, INCLUDING THINGS SUCH AS TRAFFIC AND OTHER LOCAL COMMUNITY ISSUES?

A. No below-grade work will begin until the necessary permits for that work have been issued. Necessary permits are described in more detail in the direct testimony of Barry Baker (MAIT Statement No. 3). All work will be conducted in accordance with all state and local permits, property releases, and approved special conditions. At all times, MAIT will minimize to the greatest extent practicable the impacts of construction activities on local communities.

[2] Associated upgrades for the Lincoln-Orrtanna 115 kV Transmission Line will be subject to a separate Letter of Notification filing.

VI. ROW CLEARING AND PREPARATION

Q. WHAT METHODS WILL BE USED TO PREPARE THE ROW FOR CONSTRUCTION?

A. The construction specifications adopted for the Carroll–Hunterstown Improvements Project are designed to avoid or minimize impacts to the extent practicable. MAIT's efforts to minimize environmental impacts during the corridor preparation phase of construction will include the following:

(a) The Project will obtain a National Pollutant Discharge Elimination System ("NPDES") permit, approved by the Adams County Conservation District as well as the Pennsylvania Department of Environmental Protection ("PADEP"), as necessary. The NPDES Permit will include an Erosion & Sediment Control Plan as well as other stormwater pollution controls.

(b) Best Management Practices for erosion and sediment control will be put in place prior to commencement of earth disturbance and maintained throughout construction and restoration.

(c) Construction access routes will be installed in accordance with the approved Erosion and Sediment Control Plan and, where possible, will utilize existing roads, private farm lanes, private forest roads and similar paths. It is not typical MAIT practice to install any permanent access roads. Where new access routes are needed for construction, the routes will be re-graded to pre-construction contours and re-vegetated with appropriate vegetation upon completion of construction. If requested by the property owner and permits allow, consideration will be given to allowing the access route improvements to remain in place.

(d) Disturbed work areas will be re-vegetated in accordance with the approved Erosion and Sediment Control Plan.

(e) MAIT previously cleared the corridor to the edge of the ROW. This included trees located adjacent to transmission corridors that are dead, dying, diseased, structurally defective, leaning or significantly encroaching where the transmission facilities are at risk of arcing or failing should the tree or portions of the tree (i) fall near or into the transmission facilities or (ii) grow towards or into the transmission facilities, will be deemed priority trees. These priority (or "danger") trees were identified and removed. Before removing priority trees, MAIT coordinated with applicable property owners.

(f) When required to comply with all terms of the governing permits applicable to construct the Carroll–Hunterstown Improvements Project, MAIT's specifications will be modified and/or amended for construction.

Q. WHAT STEPS WILL BE TAKEN TO UPGRADE, SEED, OR OTHERWISE RESTORE DISTURBED ROW ONCE CONSTRUCTION IS COMPLETE?

A. After construction is complete, the transmission line ROW will be restored in accordance with state, federal and local ordinance requirements. Such restoration work includes restoring drainage ditches and fencing. Non-cultivated areas that are disturbed by construction activities will be fertilized, seeded, and mulched, as needed. Temporary erosion and sediment control measures will be removed after vegetative cover has been established.

Q. PLEASE DESCRIBE THE STEPS THAT WILL BE TAKEN TO CONTROL EROSION AND THE SILTATION OF STREAMS WHERE THE GROUND IS DISTURBED DURING CONSTRUCTION ACTIVITIES ALONG THE ROW.

A. MAIT will follow its approved NPDES Permit and Erosion and Sediment Control Plan, in accordance with the PADEP's Erosion and Sediment Pollution Control Program Manual to control erosion and siltation of streams during construction.

VII. <u>ROW MAINTENANCE</u>

Q. PLEASE DESCRIBE THE PROCEDURES THAT WILL BE EMPLOYED TO MAINTAIN THE CORRIDOR FREE OF INCOMPATIBLE VEGETATION

FOLLOWING THE COMPLETION OF CONSTRUCTION AND THE COMMENCEMENT OF OPERATIONS.

A. The approach MAIT employs is the control or removal of all incompatible vegetation that has the potential to interfere with the safe and efficient operation of the transmission system. The goal is to promote a low-growing plant community of grasses, herbs, and low-growing compatible species within the transmission corridor. MAIT's methods to manage and control vegetation include manual control methods using hand-operated tools and/or mechanical control methods using equipment-mounted saws, mowers, or other devices. Various herbicide application techniques are also used, such as selective basal, stem foliage and cut stubble where necessary to prevent re-sprouting. Where vegetation management rights do not exist, MAIT will negotiate to obtain those rights. Also, adjacent to the transmission corridor, priority trees are identified and removed. Work activities are performed under established maintenance cycles that have been developed based on existing vegetation conditions and species, anticipated growth rates, conductor movement, as well as terrain, state regulatory requirements, easement restrictions, typical corridor widths, and environmental concerns.

Q. UNDER WHAT GENERAL PARAMETERS WILL MAIT MAINTAIN THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT CORRIDOR?

A. MAIT will maintain the Carroll–Hunterstown Improvements Project in accordance with FirstEnergy's Transmission Vegetation Management Program ("TVMP"). I am including the documents entitled "Maintaining a Safe and Reliable Transmission System Vegetation

Management for New Transmission Construction Projects" and "Maintaining a Safe and Reliable Transmission System Comprehensive Vegetation Management," which are attached as **MAIT Exhibits 41 and 42** to the Application, respectively. In addition, a copy of the Vegetation Management Program Document is attached to the Application as **MAIT Exhibit 43**. As described in these documents, the objective of the Transmission Vegetation Management Program is to ensure the continued and safe operation of transmission circuits through the removal and control of all incompatible vegetation that has the potential to interfere with the safe and efficient operation of the transmission system. MAIT's vegetation management practices are designed to prevent vegetation-related outages by creating and sustaining a stable and compatible vegetated community within and along the transmission corridor using various vegetation management techniques, as mentioned previously.

Q. WILL MAIT'S VEGETATION CONTROL PROCEDURES OBSERVE SPECIFIC LEGAL OR REGULATORY STANDARDS?

A. Yes. The vegetation management procedures described above are designed to ensure that MAIT complies with all required federal, state, and local statutes, regulations, ordinances, and vegetation management standards.

Q. PLEASE DESCRIBE THE EXPECTED ROW MAINTENANCE CYCLE FOR THIS PROJECT.

A. The FirstEnergy Transmission Vegetation Management program is currently on a four-year maintenance schedule for all transmission voltages.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does. However, I reserve the right to file such additional testimony or exhibits as may be necessary or appropriate.

MAIT Statement No. 6

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL– HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

Direct Testimony
Of
Andrew Gledhill

List of Topics Addressed

PJM's Load Forecasting Process, The Load Forecast Reports Upon Which PJM Relied To Identify The Reliability Violations For Which PJM Sought Solutions In The 2022 Window 3 Competitive Solicitation Process

Dated: August 8, 2025

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Andrew Gledhill. I am the Manager of the Resource Adequacy Planning department in the System Planning division of PJM Interconnection, L.L.C. ("PJM"). My business address is 2750 Monroe Blvd., Audubon, Pennsylvania, 19403.

Q. WHAT ARE YOUR RESPONSIBILITIES AT PJM?

A. In my current position as Manager of Resource Adequacy, I am responsible for overseeing long-term resource adequacy studies and production of the PJM long-term load forecast. Prior to this role, my primary responsibility at PJM was the development and production of the PJM long-term load forecast.

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATIONAL BACKGROUND.

A. I hold a Bachelor of Science degree in Mathematics from the Pennsylvania State University and a Master's degree in Economics from the North Carolina State University.

Q. ON WHOSE BEHALF ARE YOU SUBMITTING THIS TESTIMONY?

A. I am testifying in this proceeding in support of Mid-Atlantic Interstate Transmission, LLC ("MAIT," or the "Company"). As part of the 2022 Window 3 competitive solicitation process ("2022 Window 3")—which is described in detail in the direct testimony of my colleague Dr. Sami Abdulsalam ("Abdulsalam Direct Testimony")—PJM designated FirstEnergy Corporation ("FirstEnergy") transmission affiliates, MAIT and The Potomac Edison Company ("Potomac Edison") to upgrade a 24-mile transmission line between the

Hunterstown Substation in Adams County, Pennsylvania, and the Carroll Substation in Carroll County, Maryland (the "Carroll–Hunterstown Improvements Project" or the "Project") to address and prevent certain reliability violations forecasted to impact the bulk electric transmission system that serves the PJM Region.[1] This application focuses on the Pennsylvania portion of the Carroll–Hunterstown Improvements Project.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. The purpose of my direct testimony is to support the full siting application ("Application") submitted by the Company for the Project. My direct testimony provides the Pennsylvania Public Utility Commission ("Commission") with information regarding PJM's long-term load forecasting process and the specific long-term load forecasts upon which PJM relied to identify the reliability violations for which PJM sought solutions in the 2022 Window 3 competitive solicitation process.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE ANY REGULATORY AUTHORITIES?

A. Yes. I previously provided testimony in the ongoing Maryland Public Service Commission ("MPSC") proceeding addressing the application of PSEG Renewable Transmission LLC for a Certificate of Public Convenience and Necessity to Construct a New 500 kV

[1] The PJM Region includes all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.

Transmission Line in Portions of Baltimore, Carroll and Frederick Counties, Maryland, docketed as MPSC Case No. 9773.

Q. ARE YOU SPONSORING ANY EXHIBITS ALONG WITH YOUR DIRECT TESTIMONY?

A. Yes, I am sponsoring the following exhibits:

- **MAIT Exhibit 44**: PJM Manual 19: Load Forecasting and Analysis;
- **MAIT Exhibit 45**: PJM 2024 Load Forecast Supplement;
- **MAIT Exhibit 46**: Itron Inc.'s 2022 PJM Model Review Report;
- **MAIT Exhibit 47**: PJM 2022 Load Forecast Report;
- **MAIT Exhibit 48**: PJM 2023 Load Forecast Report;
- **MAIT Exhibit 49**: PJM 2024 Load Forecast Report; and
- **MAIT Exhibit 50**: PJM 2025 Load Forecast Report.

Q. WHAT WAS YOUR ROLE IN THE DEVELOPMENT OF THE LOAD FORECASTS UPON WHICH PJM RELIED TO IDENTIFY THE RELIABILITY VIOLATIONS FOR WHICH PJM SOUGHT SOLUTIONS IN THE 2022 WINDOW 3 COMPETITIVE SOLICITATION PROCESS?

A. The Resource Adequacy Planning department of PJM's System Planning division has overall responsibility for the development of the long-term load forecasts for the PJM Region that are used in the Regional Transmission Expansion Plan ("RTEP") process, including the performance of all analyses, the development and evaluation of sensitivity analyses, interaction with PJM stakeholders, and documentation of the load forecasting

data and results. I was involved in each of these capacities as PJM prepared its 2022 Window 3 solicitation, through which PJM selected the Carroll–Hunterstown Improvements Project as the more efficient or cost-effective solution to address the reliability violations identified as part of that window process.

II. THE PJM LOAD FORECASTING PROCESS

Q. PLEASE PROVIDE AN OVERVIEW OF THE PJM LOAD FORECAST.

A. The PJM long-term load forecast is an independent work product of PJM. It is a report consisting of a range of hourly and expected peak electricity loads over the next fifteen years under a range of historical weather conditions that is produced on an annual basis. The report includes long-term forecasts of peak loads, net energy, load management, and other such information for each PJM zone, region, locational deliverability area, and the total PJM Region.

The purpose of the PJM long-term load forecast is to provide an accurate signal of expected load conditions in the future, taking into consideration such factors as economic growth, distributed generation, electric vehicles, and equipment/appliance usage trends. The PJM long-term load forecast ultimately supports PJM planning and market functions, including, as relevant to this proceeding, the development of the PJM RTEP, which evaluates the need for enhancements to the high-voltage transmission system.

Q. PLEASE EXPLAIN HOW PJM DEVELOPS THE PJM LOAD FORECAST.

A. PJM uses rigorous statistical techniques and procures data from reliable sources to complete its load forecast studies. The PJM long-term load forecast uses estimating practices and modeling methods that are widely employed within the utility industry.

Modeling begins with Statistically Adjusted End-Use ("SAE") models. SAE models forecast energy at a sector level (Residential, Commercial, and Industrial) considering customer behavior, appliance trends, economics, and energy efficiency to help infer present and future weather-sensitive (e.g., space heating and cooling) and non-weather-sensitive demand. Results from the SAE process are then used in hourly models where PJM additionally takes into account weather variables and calendar variables, along with behind-the-meter solar and electric vehicle charging.

Methodological enhancements to the PJM long-term load forecast are made frequently to acknowledge ongoing patterns and best align the forecast with actual load trends or anticipated factors. Improving the PJM long-term load forecast is an iterative process aimed at making the forecast as accurate as possible. As I discuss in further detail below, PJM develops and updates the PJM long-term load forecast in collaboration with PJM stakeholders, including the local Transmission Owners.

The method for developing the PJM long-term load forecast is further described in PJM Manual 19: Load Forecasting and Analysis, which is attached to the Application as **MAIT Exhibit 44.** More detail can be found in the annual Load Forecast Supplement, the most recent version of which is attached to the Application as **MAIT Exhibit 45**.

Q. YOU STATED ABOVE THAT THE PJM LONG-TERM LOAD FORECAST IS AN INDEPENDENT WORK PRODUCT OF PJM. DOES PJM INCORPORATE STAKEHOLDER FEEDBACK ON THE LONG-TERM LOAD FORECAST OR ENGAGE WITH OUTSIDE CONSULTANTS REGARDING POTENTIAL ENHANCEMENTS TO THE LOAD FORECAST PROCESS?

A. Yes. PJM has been performing independent load forecasting for nearly 20 years and regularly seeks and incorporates stakeholder feedback on the load forecast. PJM's methodology and modeling results are discussed and reviewed at various stages of the PJM stakeholder process, primarily through the Load Analysis Subcommittee and Planning Committee. To the extent PJM has contracted with qualified experts to provide data, such as data on behind-the-meter solar and electric vehicle charging trends, PJM circulates the experts' assumptions to stakeholders, including state agencies, and solicits their feedback, which PJM then passes along to the qualified experts. In this way, PJM facilitates an ongoing dialogue between the experts providing the data and PJM's stakeholders.

PJM also engages with outside consultants to help identify potential enhancements to the load forecast process. For example, in 2022, PJM commissioned Itron, Inc. ("Itron") to prepare a publicly available report on the load forecast process to assess then-current forecast models and recommend enhancements.[2] Following publication of the Itron Report, Itron presented its analysis and findings to the Load Analysis Subcommittee and answered stakeholder questions.

[2] Itron's resulting "2022 PJM Model Review" report ("Itron Report") is included as **MAIT Exhibit 46** to this testimony.

Q. PLEASE DESCRIBE THE TECHNICAL ENHANCEMENTS OR OTHER IMPROVEMENTS PJM HAS MADE TO ITS LOAD FORECAST METHODOLOGY AS A RESULT OF THIS INDEPENDENT REVIEW?

A. Itron's recommendations led to several key enhancements:

- Moving to higher frequency data in construction of the SAE sector models. PJM started using SAE models back in 2015, and with Itron's help and recommendations was able to move to using monthly data as opposed to annual data. Incorporating more frequent monthly data into its SAE modeling has resulted in better inferences on trends in weather-sensitive demand and non-weather-sensitive demand.
- Transitioning to an hourly model. Prior to the 2023 load forecast, PJM utilized a daily model. Technologies like behind-the-meter solar and electric vehicles are changing the shape of electricity demand and their impacts are tracked more accurately with hourly modeling. To anticipate how these new technologies will impact peak demand, modeling needs to be more granular than previously.

Q. HAS PJM INCORPORATED ITRON'S RECOMMENDATIONS INTO ITS LOAD FORECASTING MODELING AND METHODOLOGIES?

A. Yes, Itron's recommendations and suggested improvements regarding PJM's load forecasting methodology and modeling were initially incorporated into the 2023 load forecast.

Q. HOW OFTEN DOES PJM UPDATE ITS LONG-TERM LOAD FORECASTS?

A. PJM updates its long-term load forecasts on an annual basis and generally publishes each year's new load forecast in January of each calendar year. PJM also simultaneously publishes a Load Forecast Supplement, which provides additional detail about the load forecast for the relevant year.

III. THE LOAD FORECASTS LEADING TO PJM OPENING THE 2022 WINDOW 3 COMPETITIVE SOLICITATION PROCESS

Q. WERE YOU INVOLVED IN THE DEVELOPMENT OF THE LOAD FORECAST REPORTS THAT WERE USED FOR THE 2022 RTEP WINDOW 3 SOLICITATION?

A. Yes, I was a part of the team that developed, reviewed, and published the "2022 Load Forecast Report" and the "2023 Load Forecast Report," which are included as **MAIT Exhibits 47** and **48**, respectively, and which are both relevant to the 2022 Window 3 competitive window solicitation process.

Q. PLEASE EXPLAIN THE RESULTS OF THE 2022 LOAD FORECAST REPORT.

A. In the 2022 Load Forecast Report, PJM presented the results of its load forecast model for 15 years (*i.e.*, the period 2022 through 2037). Specifically, PJM presented 15 years of forecasted annual summer and winter peaks for the total PJM Region, transmission zones, and select combinations of zones (Locational Deliverability Areas).

The 2022 Load Forecast Report showed that electricity demand in the PJM Region is expected to steadily increase over the next 10 and 15 years. Summer peak load growth for the PJM Region was projected to average 0.4% per year over the reported periods, with

zonal growth rates ranging from -0.3% to 2%. In the 2022 Load Forecast Report, PJM identified several zones, including the Allegheny Power ("APS"), Dominion Virginia Power ("DOM"), American Transmission Systems, Inc. ("ATSI"), and Commonwealth Edison ("COMED") zones, that had to be adjusted to account for large, unanticipated load changes.

Q. DID PJM MODIFY THE 2022 LOAD FORECAST DURING THE 2022 ANNUAL RTEP CYCLE?

A. Yes. As explained in more detail in Dr. Abdulsalam's Direct Testimony, each year, PJM commences an RTEP cycle to determine the needs of the transmission system. PJM develops an RTEP baseline power flow model which incorporates, among other things, the Load Forecast Report for the calendar year in which PJM is commencing the RTEP cycle. In the case of the 2022 RTEP planning cycle, PJM used the 2022 Load Forecast Report, which was issued in January 2022, to develop the 2022 RTEP baseline power flow model.

Throughout 2022, PJM facilitated several competitive windows as part of the 2022 RTEP cycle to address reliability criteria violations and market efficiency congestion needs resulting from the increased load forecast and other drivers necessitating the need for transmission development. These windows are described in Dr. Abdulsalam's Direct Testimony. As part of the 2022 RTEP cycle, PJM also directed that certain Immediate-need Reliability Projects[3] be incorporated into the 2022 RTEP, which were needed to (i)

[3] An "Immediate-need Reliability Project" is a "reliability-based transmission enhancement or expansion that [PJM] has identified to resolve a need that must be addressed within three years or less from the year [PJM] identified the existing or projected limitations on the Transmission System that gave rise to the need for such enhancement or expansion pursuant to the study process described in Operating Agreement, Schedule 6, section 1.5.3." PJM Operating Agreement, Definitions I-L.

enable the integration of the forecasted data center load up in the DOM zone to and including year 2025, and (ii) address reliability violations caused by the proposed deactivation of a number of generation facilities, most notably the Brandon Shores generation units in Maryland (Baltimore Gas & Electric Company ("BGE") zone) (*see* Abdulsalam Direct Testimony).[4]

In late 2022, PJM observed that data center loads within northern Virginia (DOM zone) were projected to continue increasing at an unprecedented rate, and new data center load was being proposed in Maryland near the Doubs substation (APS zone). This was in contrast to the relatively flat demand trends throughout much of PJM for the preceding decade. In an effort to stay ahead of these rapid load increases, rather than wait for the 2023 RTEP cycle, PJM consulted with transmission and distribution owners in the APS and DOM zones to refine the 2022 load forecast and further enhance its need assessment. This effort resulted in a modified 2022 load forecast that PJM used to develop the 2027 study year base case for Window 3 ("Modified 2022 Load Forecast"). As a result of these consultation efforts and in an effort to address the results of the Modified 2022 Load Forecast, PJM decided to open 2022 Window 3 in February 2023 as the final competitive solicitation window in the 2022 RTEP cycle.

As described more fully in Dr. Abdulsalam's Direct Testimony, to develop the base case suite for 2022 Window 3, PJM developed a 2027 study year base case (which was based on the Modified 2022 Load Forecast, as well as additional assumptions as described in Dr. Abdulsalam's Direct Testimony) and a 2028 study year sensitivity analysis (which

[4] A map depicting the transmissions zones in the PJM Region is included in Attachment J of the PJM Open Access Transmission Tariff.

incorporated updated load forecast information from the 2023 Load Forecast, as well as additional assumptions as described in Dr. Abdulsalam's Direct Testimony).

Q. YOU EXPLAIN ABOVE THAT PJM MODIFIED THE 2022 LOAD FORECAST TO REFLECT ADDITIONAL LOAD IN THE APS AND DOM ZONES. CAN YOU PROVIDE ADDITIONAL DETAIL ABOUT THE INCREASED LOAD?

A. Yes, based on the discussions we had with the relevant transmission owners and distribution owners as part of the annual process to update to the 2023 Load Forecast, PJM created a 2022 Modified Load Forecast for 2027 for the Maryland (APS) and DOM (Virginia) zones that considered approximately 1,200 MW and 2,700 MW of additional load, respectively.

Q. PLEASE EXPLAIN THE RESULTS OF THE 2023 LOAD FORECAST REPORT.

A. In the 2023 Load Forecast Report, PJM presented the results of its load forecast model for 15 years (*i.e.*, the period 2023 through 2038). Specifically, PJM presented 15 years of forecasted annual summer and winter peaks for the total PJM Region, transmission zones, and select combinations of zones (Locational Deliverability Areas).

The 2023 Load Forecast Report showed that electricity demand in the PJM Region is expected to steadily increase over the next 15 years. Summer peak load growth for the PJM Region was projected to average 0.8% per year over the reported periods, with zonal growth rates ranging from -0.5% to +4.4%. The DOM and APS zones exhibited the highest growth rates, due to anticipated large growth in data centers over the forecast horizon. The Metropolitan Edison ("Met Ed") service area exhibited a 0.2% projected summer peak load

growth in the 2023 Load Forecast Report. Growth in the PJM Region is driven by large block load additions, electric vehicles, and economic growth, which is partly offset by continued energy efficiency gains and growing penetration of rooftop solar.

Q. WHAT ARE THE KEY FACTORS IN THE PJM LOAD FORECAST REPORTS?

A. There are a variety of factors that PJM's load forecasting model takes into consideration, and which drive the 2022 and 2023 Load Forecast Reports, including:

- **Weather:** Temperature, humidity, cloudiness, and wind conditions are among the most significant components in setting the short-term load forecast. A heat wave will spur consumers to run their air conditioners more and drive up the demand for power. Similarly, a period of extreme cold will prompt consumers' heating equipment to run more often. Moderate weather in the spring and fall tends to minimize the use of such equipment and reduces the demand for power.
- **Day of the Week:** The load forecast can differ significantly between a weekday—when many people are at work or school and electricity usage is high—and a weekend day or holiday, when many businesses are closed and usage is typically lower.
- **Economic Trends:** In preparing the long-term forecast, planners examine the state of the economy. The amount of electricity needed by commercial and industrial users is a major factor in overall demand. In a vigorous economy, manufacturers with electricity-intensive machinery will likely consume more power than when the economy is slack.

- **End-Use Trends:** PJM planners examine the volume and efficiency of electric-powered equipment that consumers have in service and that they plan to install. This includes central air conditioning, heat pumps, lighting, and major appliances – water heaters, refrigerators, freezers, washers, and dryers.
- **Rooftop Solar:** Solar panels and other types of generation installed on the customer's side of the electric meter can reduce the amount of electricity the customer draws from the grid. Knowing this capacity helps PJM develop accurate forecasts.
- **Plug-In Electric Vehicles:** Charging a battery-powered car requires a significant amount of electricity, in some cases the equivalent of half the power needed for an entire home. As consumers buy increasing numbers of plug-in electric vehicles, the bigger impact they have on the grid. As a result, PJM planners factor the proliferation of these vehicles into their forecasts.
- **Large load additions:** PJM annually solicits information from electric distribution companies on trends they are observing that may not be well captured by the suite of models used to forecast load. In recent years this has been largely data centers, and PJM has been taking this input to help generate more accurate peak demand projections.

Q. DID PJM CONDUCT ANY ANALYSES TO VET THE INPUTS TO PJM'S 2022 AND 2023 LOAD FORECAST MODELS?

A. PJM presented the 2022 and 2023 Load Forecast Reports to the PJM Load Analysis Subcommittee and the PJM Planning Committee for PJM Member and stakeholder review and comment. Additionally, for the behind-the-meter solar and storage forecasts, assumptions from our vendor are circulated to stakeholders (including state agencies via the Organization of PJM States Inc.) for review and comment each Summer.

Q. DID PJM CONSULT WITH LOCAL DISTRIBUTION COMPANIES IN THE PJM REGION ON ITS 2022 AND 2023 LOAD FORECAST PROJECTIONS?

A. Yes. In cases where a PJM zone has experienced or is anticipated to experience a load change (beyond the historical norm) that may not be captured in the load forecast, PJM may elect to apply a load forecast adjustment by either adjusting model inputs or by an explicit adjustment to the modeled forecast. These adjustments are based on further PJM assessments and discussions with stakeholders, including the specific transmission owners and electric distribution companies within the zone. In cases where the load change has not yet occurred, PJM will base any adjustment on information received from local electric distribution company load forecasters in response to PJM's annual request for details on large load changes that are known to the local distribution company. PJM will handle these requests on a case-by-case basis and perform (or have performed) whatever analysis is required to establish the degree of certainty and magnitude of the load change.

For the 2022 Load Forecast Report, for example, PJM was informed by local distribution companies in the APS, ATSI, COMED, and DOM zones of needed load

adjustments. For the 2023 Load Forecast Report, PJM was informed by local distribution companies in the American Electric Power, APS, and DOM zones of anticipated growth in data center load. PJM incorporated this information into the 2022 and 2023 Load Forecast Reports as adjustments to the forecasted peak loads in these zones.

Q. CAN THE COMMISSION RELY ON THE 2022 AND 2023 LOAD FORECAST REPORTS AS A REASONABLE FORECAST OF LOAD IN THE PJM REGION?

A. Yes. The 2022 and 2023 Load Forecast Reports were developed using PJM's robust forecasting methodology and vetted through numerous internal reviews and external reviews through PJM's Load Analysis Subcommittee and Planning Committee. The Commission can rely on the 2022 and 2023 Load Forecast Reports as reasonable forecasts of load in the PJM Region for the period 2023 through 2038.

IV. MORE RECENT UPDATES TO LOAD FORECAST

Q. THE PJM BOARD OF MANAGERS APPROVED THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT FOR INCLUSION IN THE RTEP IN DECEMBER 2023. SINCE THAT TIME, HAS PJM PUBLISHED A MORE RECENT LOAD FORECAST REPORT?

A. Yes. Since the PJM Board approved the 2022 Window 3 projects, including the Carroll–Hunterstown Improvements Project, PJM has published two more load forecast reports: (i) the 2024 Load Forecast Report, published in January 2024 and included as **MAIT Exhibit 49**, and (ii) the 2025 Load Forecast Report, published in January 2025 and included as **MAIT Exhibit 50**. Both the 2024 Load Forecast Report and the 2025 Load Forecast

Reports were developed using a load forecasting methodology that is consistent with the methodology used for the 2023 Load Forecast Report that I have discussed previously in my testimony.[5]

Q. WAS THE 2025 LOAD FORECAST MATERIALLY DIFFERENT FROM PREVIOUS LOAD FORECASTS?

A. As reflected in the 2025 Load Forecast Report, PJM continues to see significant load growth in the PJM Region. PJM expects that its summer peak load will increase by 3.1% per year over the next 10-year period and by 2.0% per year over the next 20-year period, whereas its winter peak load will increase by 3.8% per year over the next 10-year period, and 2.4% over the next 20 years, up from the predicted summer peak growth of 1.6% and winter peak growth of 1.8% reflected in the 2024 Load Forecast Report. Growth was broader in the 2025 Load Forecast Report as a result of several anticipated additional large load adjustments across the PJM Region, as well as PJM adopting a vendor-supplied electric vehicle forecast that showed more anticipated electric vehicle growth than PJM had previously included.

IV. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does, although I reserve the right to supplement this testimony as appropriate.

[5] In the 2025 Load Forecast Report, PJM's load forecast covers a 20-year horizon compared with 15 years in previous forecasts. The change reflects the Federal Energy Regulatory Commission's ("FERC") new requirement that transmission providers develop transmission plans on a 20-year planning horizon, whereas PJM had previously based its long-term transmission planning-related analyses on a 15-year planning horizon.

MAIT Statement No. 7

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF MID-ATLANTIC INTERSTATE TRANSMISSION, LLC FILED PURSUANT TO 52 PA. CODE CHAPTER 57, SUBCHAPTER G, FOR APPROVAL OF THE SITING AND CONSTRUCTION OF THE CARROLL–HUNTERSTOWN 230 KILOVOLT TRANSMISSION LINE LOCATED IN STRABAN, MOUNT PLEASANT, MOUNT JOY, AND GERMANY TOWNSHIPS, ADAMS COUNTY, PENNSYLVANIA	:	**Docket No. A-2025-_____**

Direct Testimony
Of
Sami Abdulsalam, Ph.D., P.Eng.

List of Topics Addressed

Description of PJM's RTEP Process, PJM's 2022 Window 3 Process, The Reliability Need for the Carroll–Hunterstown 230 kV Improvements Project

Dated: August 8, 2025

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I. BACKGROUND

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Sami Abdulsalam Ph.D., P.Eng. I am the Director of Transmission Planning for PJM Interconnection, L.L.C. ("PJM"). My business address is 2750 Monroe Boulevard, Audubon, Pennsylvania 19403.

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AT PJM AND ANY OTHER RELEVANT PROFESSIONAL EXPERIENCE.

A. I joined PJM in January of 2022. I have been in my current position as the Director of PJM Transmission Planning since March 2024, and I previously served as the Senior Manager of PJM Transmission Planning. My principal responsibility is to lead the development of PJM's Regional Transmission Expansion Plan ("RTEP").[1] This function centers on the planning of the regional transmission system for the provision of reliable electric service in accordance with North American Electric Reliability Corporation ("NERC") Reliability Standards, as well as PJM and Transmission Owner[2] reliability and operational criteria.

Prior to this position, I served as Senior Manager, Consulting at Siemens PTI where I was responsible for power system analysis, transmission planning, and protection studies; as Principal Engineer at Sustainable Grid Power, Inc.; and, for more than ten years, held various transmission planning positions of increasing responsibility, including Director,

[1] All terms not otherwise defined herein shall have the meaning set forth in the PJM Open Access Transmission Tariff ("Tariff") or the PJM Amended and Restated Operating Agreement ("Operating Agreement").

[2] A "Transmission Owner" is a PJM member that "owns or leases with rights equivalent to ownership Transmission Facilities and is a signatory to the PJM Transmission Owners Agreement." (Operating Agreement, Definitions, S-T). An incumbent Transmission Owner is a Transmission Owner that has signed the Consolidated Transmission Owner Agreement ("CTOA").

Transmission Planning and Director, Transmission System Projects, at the Alberta Electric System Operator, Canada.

Earlier in my career, I held various positions in the oil and gas industry, and I was an Operational Engineer in thermal power plants in Egypt.

My academic research focused on power system performance under voltage stability/high power transfer conditions as well as dynamic and transient behavior of power systems.

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATIONAL BACKGROUND.

A. I hold a Bachelor of Science degree and Master of Science degree in Electrical Engineering received from the University of El-Mansoura in Egypt in 1997 and 2001, respectively. I received a Ph.D. in Electrical Engineering from the University of Alberta in Edmonton, Alberta, Canada in 2007. I also held a post-doctoral fellowship in the Electrical and Computer Engineering Department at the University of Alberta, Edmonton, Canada from 2007 to 2008. In addition, I am a registered Professional Engineer (P.Eng.) in Alberta, Canada. My education, experience and qualifications are fully set forth in **Appendix A** to my testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I am testifying in this proceeding in support of Mid-Atlantic Interstate Transmission, LLC ("MAIT" or the "Company"). As part of PJM's 2022 Window 3 competitive solicitation process ("2022 Window 3") – which I describe in more detail in my testimony below – PJM designated FirstEnergy Corporation ("FirstEnergy") transmission affiliates, MAIT

and The Potomac Edison Company ("Potomac Edison") to upgrade a 24-mile transmission line between the existing Hunterstown Substation in Adams County, Pennsylvania, and the existing Carroll Substation in Carroll County, Maryland, to address and resolve certain reliability violations forecasted to impact the bulk electric transmission system that serves the PJM Region,[3] which includes the state of Pennsylvania ("Carroll-Hunterstown 230 kV Transmission Line"). PJM also designated MAIT to rebuild two miles of the existing Lincoln–Orrtanna 115 kilovolt ("kV") transmission line in Pennsylvania ("Lincoln-Orrtanna Rebuild Project").[4] These projects are collectively referred to herein as the "Carroll–Hunterstown Improvements Project" ("Project").

This application focuses on the Pennsylvania portion of the Carroll–Hunterstown Improvements Project, specifically the Carroll-Hunterstown 230 kV Transmission Line, which includes PJM baseline upgrade project ID numbers b3800.10, b3800.11, b3800.12, b3800.14, b3800.18, b3800.19, b3800.22, b3800.23, and b3800.24.

Q. WERE YOU INVOLVED IN THE 2022 WINDOW 3 COMPETITIVE SOLICITATION PROCESS WHICH RESULTED IN THE SELECTION OF THE PROJECT AS THE MORE EFFICIENT OR COST-EFFECTIVE SOLUTION TO ADDRESS THE RELIABILITY NEEDS PJM IDENTIFIED AS PART OF THAT PROCESS?

[3] The "PJM Region" includes all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia (the "PJM Region").

[4] As explained more fully in the Direct Testimony of Mary Anderson (MAIT Statement No. 1), the Lincoln-Orrtanna Rebuild Project will be the subject of a separate Letter of Notification.

A. Yes, I had primary responsibility for supervising the 2022 Window 3 process, including the performance of all analyses, the evaluation of solution options; interaction with incumbent Transmission Owners, Nonincumbent Developers[5] and PJM stakeholders; documentation of the RTEP; and review with the PJM Board of Managers ("PJM Board").

With respect to the PJM stakeholder process, I led PJM's review of the numerous proposed reliability solutions that were submitted by various incumbent Transmission Owners and Nonincumbent Developers as part of 2022 Window 3 and reviewed with the Transmission Expansion Advisory Committee ("TEAC") in accordance with the provisions of the PJM Operating Agreement, which has been accepted by the Federal Energy Regulatory Commission ("FERC").

I was involved in each of these capacities as PJM selected the Carroll–Hunterstown Improvements Project as part of the overall package of solutions that PJM determined were the more efficient or cost-effective solutions to address the transmission reliability violations PJM identified through the 2022 Window 3 process.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE ANY REGULATORY AUTHORITIES?

A. Yes. Further information on my professional qualifications, including provision of expert witness testimony and professional affiliations, can be found in my curriculum vitae, included here as **Appendix A** to my testimony.

[5] A "Nonincumbent Developer" is "(1) a transmission developer that does not have an existing Zone in the PJM Region as set forth in Tariff, Attachment J; or (2) a Transmission Owner that proposes a transmission project outside of its existing Zone in the PJM Region as set forth in Tariff, Attachment J." Operating Agreement, Definitions, M-N.

Q. ARE YOU SPONSORING ANY EXHIBITS IN THIS PROCEEDING?

A. Yes, I am sponsoring the following exhibits:

- **MAIT Exhibit 51**: Operating Agreement, Schedule 6, PJM's Regional Transmission Expansion Planning Protocol;
- **MAIT Exhibit 52**: PJM Manual 14B – PJM Region Transmission Planning Process (Revision 56);
- **MAIT Exhibit 53**: PJM RTEP – 2022 RTEP Proposal Window 3, Problem Statement and Requirements;
- **MAIT Exhibit 54**: Special TEAC Materials, 2023 RTEP 2028 Preliminary Summer & Winter Generation Deliverability 500 kV and Above Violation Summary (April 27, 2023); and
- **MAIT Exhibit 55**: Reliability Analysis Report, 2022 Window 3 (December 8, 2023).

II. OVERVIEW AND EXECUTIVE SUMMARY

Q. PLEASE PROVIDE AN OVERVIEW OF THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT.

A. The Carroll–Hunterstown Improvements Project (which is described in more detail in the Direct Testimony of MAIT Witness Jacquelyn Lojek), will upgrade the existing 24.2-mile transmission line between the Hunterstown Substation in Adams County, Pennsylvania, and the Carroll Substation in Carroll County, Maryland.[6] Specifically, FirstEnergy

[6] The corridor spans approximately 11.3 miles in Potomac Edison's service territory in Maryland and 12.9 miles in MAIT's service territory in Pennsylvania.

subsidiaries MAIT and Potomac Edison will: (i) retire the existing 115 kV and 138 kV existing lines (or circuits) currently in the corridor, and (ii) rebuild the existing corridor using a double circuit transmission line using 230 kV construction standards (the proposed Carroll-Hunterstown 230 kV Transmission Line). One of the new circuits on the double circuit structures will be operated at 115/138 kV and will connect to all of the existing 115/138 kV substations along the existing corridor. The second new circuit will be operated at 230 kV and will connect the Hunterstown (Pennsylvania) and Carroll (Maryland) substations. MAIT will also be required to rebuild two miles of an existing 115 kV transmission line (Lincoln–Orrtanna) in Pennsylvania (the proposed Lincoln-Orrtanna Rebuild Project), while Potomac Edison will also expand the Carroll Substation in Maryland for upgrades related to the rebuilt Carroll-Hunterstown 230 kV Transmission Line.

The Carroll–Hunterstown Improvements Project was approved by the PJM Board on December 11, 2023, as part of the set of solutions recommended by PJM staff to resolve the reliability violations identified as part of 2022 Window 3 (which I describe in more detail below). PJM determined that the Carroll–Hunterstown Improvements Project was needed by June 1, 2027, and, as relevant here, MAIT committed to an in-service date of June 1, 2027, for some components of the Project, and June 1, 2028, for the remaining components in a Designated Entity Agreement between PJM and the Company.

Q. PLEASE PROVIDE AN OVERVIEW OF THE NEED FOR THE PROJECT.

A. Over the past few years, PJM has observed a significant increase in electric load growth in the PJM Region after a decade or more of flat load growth. Compounding this fact, PJM

had been notified of a total of approximately 11,100 megawatts ("MW") of power generator deactivations, including just shy of 1,300 MW (Brandon Shores) in Maryland (at the time[7]).[8]

As a result of the convergence of these system changes, in February 2023, PJM opened 2022 RTEP Window 3 to address transmission needs directly related to load increase and the cumulative impacts of the generation retirements covering the general area of the Southwest Mid-Atlantic Area Council ("SWMAAC")[9] Locational Deliverability Area ("LDA"),[10] and the APS (Maryland) and Dominion Virginia Power ("DOM") (Virginia) zones.[11] PJM's analysis of the 2027 and 2028 study years showed extensive, severe, and widespread thermal and voltage violations spanning throughout the study area.[12] The system models needed a minimum of 2,600 megavolt amperes reactive ("MVARs") of reactive power compensation added to just allow the system to be operable

[7] The two major power plants deactivating in Maryland are Brandon Shores (approximately 1,300 MW) and Wagner (841 MW) totaling about 2,140 MW, requesting deactivation within the 2025 timeframe.

[8] Generation deactivations have an impact similar to adding an equivalent amount of load inside the area where the generation is being deactivated.

[9] The SWMAAC LDA encompasses the PEPCO (including Southern Maryland Electric Cooperative ("SMECO")) and BGE zones. PEPCO provides service in most of Montgomery County and Prince George's County as well as service in the District of Columbia. SMECO serves its members in Southern Maryland, in Calvert, Charles and St. Mary's Counties. BGE provides service in the central Maryland area, including Baltimore City, Baltimore County, and Anne Arundel Counties, most of Howard, Carroll and Harford Counties, and parts of Prince George's, Montgomery and Calvert Counties.

[10] An LDA is a geographic area within the PJM Region that has limited transmission capability to import capacity to satisfy such area's reliability requirement.

[11] A map depicting the transmissions zones in the PJM Region is included in Attachment J of the PJM Open Access Transmission Tariff.

[12] The 2022 Window 3 study area covered the Mid-Atlantic, including the Metropolitan Edison (MetEd) APS and DOM zones, as well other surrounding regions.

under normal system conditions (*i.e.*, under normal conditions, N-0/P0[13]) from a voltage stability perspective.

After studying dozens of alternatives to resolving these conditions to maintain transmission system reliability, PJM identified a number of backbone solutions[14] – which I refer to in this testimony as the "Needed Regional Transfer Solutions." PJM found that the Needed Regional Transfer Solutions were required to prevent the severe reliability violations identified as part of the 2022 Window 3 process summarized above.

Once PJM identified the Needed Regional Transfer Solutions, PJM conducted further analysis to determine whether there were additional reliability violations in the 2027 and 2028 study years that the Regional Transfers Solutions would not address. As relevant to this proceeding, PJM identified several remaining violations along the existing 115/138 kV transmission corridor connecting the Hunterstown Substation in Pennsylvania and the Carroll Substation in Maryland that would not be addressed by the Needed Regional Transfer Solutions. For the reasons described further below, PJM identified the Carroll–Hunterstown Improvements Project as the more efficient or cost-effective solution to the observed violations on the existing Carroll–Hunterstown corridor.

Q. HOW IS THE REST OF YOUR TESTIMONY ORGANIZED?

A. The remainder of my testimony is organized as follows:

[13] NERC Category P0 is referred to as "n minus 0" or "n-0" criteria. Please see Question # 23, below for more detail.

[14] "Backbone solutions" or "backbone transmission lines," as used herein, refers to transmission lines in the PJM Region that are 500 kV or above and that connect the region's large power generators to substations.

- In this **Section II**, I summarize my testimony and provide a high-level summary of the conclusions that I reach herein regarding the need for the Carroll–Hunterstown Improvements Project;
- In **Section III**, I discuss the relevant and respective roles of FERC, NERC, PJM and the PJM stakeholders in addressing transmission system reliability. Specifically, Section III summarizes the requirements that led to NERC's establishment of mandatory Reliability Standards and FERC's enforcement of those standards. I also describe how PJM complies with NERC Reliability Standards, as well as the additional relevant reliability and planning criteria to which PJM plans the PJM transmission system. I also provide a high-level overview of PJM's planning process, which is referred to as the RTEP process. Finally, in Section III, I provide a high-level explanation of how stakeholders, states, state consumer advocates, and other interested parties participate in the RTEP process.
- In **Section IV**, I explain how PJM conducts the RTEP process to maintain the reliability of the PJM transmission system. Since the Carroll–Hunterstown Improvements Project was selected by PJM as a Reliability Project,[15] I focus my discussion on the analyses PJM performs and the criteria that PJM applies to identify future reliability violations on the PJM transmission system. I also explain what would happen if any of the identified reliability violations were to occur and explain how PJM identifies transmission solutions to avoid the future occurrence of such reliability violations.

[15] Reliability Projects are projects that are designed to address one or more reliability violations or to address operational adequacy or performance issues. *See* Tariff, Schedule 12(b)(i)(A)(2).

- In **Section V**, I explain the development of PJM's RTEP for 2022, including a description of (i) all of the competitive proposal windows that PJM opened as part of the 2022 RTEP cycle, and (ii) the immediate reliability needs for which PJM directed Immediate-need Reliability Projects[16] – all of which have an impact on the 2022 Window 3 process. I also explain in detail PJM's rationale for opening 2022 Window 3 in February 2023. This section also details the severe and widespread reliability violations that PJM observed in the 2027 and 2028 study years, for which PJM sought solutions through the 2022 Window 3 competitive window process.
- In **Section VI**, I explain how PJM analyzed the 72 proposals it received from ten different entities as part of 2022 Window 3 (50 of which were greenfield proposals while the other 22 were upgrades to existing facilities). Specifically, I explain the criteria PJM studied to determine whether proposed transmission enhancements or expansions would be the more efficient or cost-effective solution (which is the standard required by FERC Order No. 1000 and PJM's FERC-accepted Operating Agreement, Schedule 6). I also explain the reasons that PJM ultimately recommended that the Carroll-Hunterstown Improvements Project be included in the RTEP.

III. THE ROLES OF FERC, NERC, PJM, AND PJM STAKEHOLDERS IN ADDRESSING TRANSMISSION SYSTEM RELIABILITY

[16] An "Immediate-need Reliability Project" is a "reliability-based transmission enhancement or expansion that [PJM] has identified to resolve a need that must be addressed within three years or less from the year [PJM] identified the existing or projected limitations on the Transmission System that gave rise to the need for such enhancement or expansion pursuant to the study process described in Operating Agreement, Schedule 6, section 1.5.3." PJM Operating Agreement, Definitions I-L.

Q. PLEASE EXPLAIN THE ROLE OF FERC AND NERC IN ADDRESSING TRANSMISSION SYSTEM RELIABILITY.

A. The Energy Policy Act of 2005 ("EPAct 2005") created a mandatory compliance and enforcement regime for reliability standards governing the nation's bulk electric transmission system under the oversight of FERC. Pursuant to EPAct 2005, FERC designated NERC[17] as the Electric Reliability Organization for the United States. In that capacity, NERC has proposed various Reliability Standards[18] to maintain the continued safe and reliable operation of the nation's bulk electric transmission system, most of which have been adopted by FERC for enforcement, with mandatory compliance that began on June 1, 2007. PJM has been applying the NERC Reliability Standards and the PJM deliverability standards, codified in the PJM Tariff and PJM Transmission Planning Manuals (Manuals 14A through 14H),[19] on a mandatory basis since the initiation of the RTEP process.

Q. ARE ANY OF THE NERC RELIABILITY STANDARDS ENFORCEABLE THROUGH THE IMPOSITION OF MONETARY PENALTIES FOR NON-COMPLIANCE?

A. Yes. Penalties for violation of the Reliability Standards developed by NERC and approved by FERC may be as high as $1 million per violation per day.

[17] NERC is a not-for-profit international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel.

[18] The NERC Reliability Standards are available at https://www.nerc.com/pa/Stand/Pages/ReliabilityStandards.aspx.

[19] The PJM Transmission Planning Manuals are available on PJM's website at https://www.pjm.com/library/manuals.

Q. PLEASE DESCRIBE PJM'S ROLE IN ADDRESSING TRANSMISSION SYSTEM RELIABILITY.

A. PJM is the Regional Transmission Organization ("RTO") responsible for maintaining the reliability of the electric transmission system under its functional control and coordinating the movement of wholesale electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. The PJM system serves approximately 65 million people. PJM dispatches more than 183,000 MW of generation capacity over more than 88,000 miles of transmission lines—a system that serves over 20 percent of the United States economy. PJM presently has more than 1,100 members. These members include power generators, transmission owners, electricity distributors, power marketers and large consumers.

PJM is registered in the ReliabilityFirst and SERC regions[20] for the following reliability functions, as defined in the NERC Reliability Functional Model: Balancing Authority, Interchange Authority, Planning Coordinator, Reliability Coordinator, Resource Planner, Transmission Operator, Transmission Planner, and Transmission Service Provider.

In these roles, PJM acts independently and impartially to develop the RTEP, which identifies the transmission system additions and improvements needed to maintain the reliability of the transmission system in the PJM Region.

[20] NERC oversees six regional reliability entities including, as relevant to the PJM Region, SERC Reliability Corporation ("SERC") and ReliabilityFirst Corporation ("ReliabilityFirst").

Q. PLEASE SUMMARIZE PJM'S RTEP PROCESS.

A. As part of its ongoing responsibilities as an RTO, PJM is charged by FERC with maintaining the safety, reliability and security of the bulk electric transmission system in the PJM Region. As part of its regional transmission planning function, PJM prepares the RTEP each year in order to identify transmission system enhancements or expansions needed for reliable grid operations now and in the future for the 65 million people in the PJM Region. PJM evaluates the aggregate needs across the transmission system, identifying potential needs impacting the transmission system and solutions to those needs on a regional basis.

PJM's FERC-accepted Regional Transmission Expansion Planning Protocol ("RTEP Protocol") incorporates FERC's transmission planning requirements and is set forth in Schedule 6 of the PJM Operating Agreement, attached to the Application as **MAIT Exhibit 51**. The RTEP Protocol describes the requirements for the RTEP to remain compliant with NERC Reliability Standards and other applicable reliability criteria.

Each year, PJM conducts a long-range RTEP process to prepare the high-voltage transmission system to meet the projected demand and supply. As further described in the Direct Testimony of Andrew Gledhill, projected demand comes from the PJM load forecast, which is an independent work product based in statistical modeling that is reviewed by stakeholders.[21] The RTEP process integrates transmission, generation (existing, deactivated and planned), and demand response resources when assessing

[21] The process for developing the PJM Load Forecast is described more fully in the direct testimony of my colleague Andrew Gledhill ("Gledhill Direct Testimony").

transmission system reliability constraints. The result is one process that integrates many system factors as detailed in PJM Manual 14B.

PJM's RTEP process applies NERC's Transmission Planning ("TPL") Standard TPL-001-5[22] through a wide range of reliability analyses, including those listed under the PJM planning criteria (described below). These analyses include load and generation deliverability tests (explained later in further detail below).[23] These tests are applied, and the results are evaluated over a 15-year planning horizon. PJM documents all instances where the transmission system does not meet applicable reliability criteria and develops system reinforcements or upgrades (through the competitive solicitation and/or the immediate need processes) to ensure compliance with the standard and maintain reliability of the bulk electric system.

The RTEP process is further described in extensive detail in the PJM Transmission Planning Manuals. The PJM Transmission Planning Manuals, which are developed through PJM's public stakeholder process, include the technical criteria and procedures used to implement the RTEP. PJM Manual 14B, "PJM Region Transmission Planning Process," details the technical assumptions, procedures and protocol used to evaluate electric system performance and identify reliability violations, including those discussed in my testimony below. PJM Manual 14B is attached to the Application as **MAIT Exhibit 52.**

[22] NERC TPL-001-5 sets the requirements for transmission system planning, ensuring utilities have the redundancy in place to maintain system reliability under any condition. *See* https://www.nerc.com/pa/Stand/Reliability%20Standards/TPL-001-5.pdf.

[23] The PJM Planning Manuals, including Manual 14B, include the processes and procedures PJM uses to comply with applicable NERC standards.

Q. WHAT ARE THE DIFFERENT TYPES OF TRANSMISSION PROJECTS THAT EMERGE FROM PJM'S PLANNING PROCESS?

A. As set forth in PJM Manual 14B, there are three types of transmission projects that emerge from PJM's planning processes. These include:

- *Regional RTEP Projects and Subregional RTEP Projects*, which are also referred to as "baseline upgrades" or "baseline projects." As discussed further below, baseline projects, among other things, ensure compliance with national and regional reliability standards. Specifically, PJM selects RTEP baseline projects as needed to comply and resolve the following reliability criteria: (i) NERC, SERC, ReliabilityFirst, PJM, and other applicable reliability criteria, including operational performance; (ii) individual Transmission Owner planning criteria as filed in the Transmission Owner's respective FERC Form No. 715; (iii) criteria to address economic constraints; and (iv) State Agreement Approach (public policy) expansions or enhancements as set forth in the Operating Agreement at Schedule 6, section 1.5.9. I will refer to these reliability and other planning criteria collectively herein as "Planning Criteria." After PJM identifies a need for a baseline transmission upgrade, PJM may, consistent with the requirements of the RTEP Protocol, open a competitive proposal window that seeks solutions from qualified incumbent Transmission Owners and Nonincumbent Developers[24] to address these

[24] Per the terms of the PJM Operating Agreement, incumbent Transmission Owners and Nonincumbent Developers are required to pre-qualify as eligible to be designated by PJM to develop a baseline project under the RTEP Protocol.

identified reliability needs, depending on a project's required in-service date, voltage level and scope.[25]

- *Network upgrades*, which are transmission system enhancements needed for integrating generation interconnections seeking long-term transmission service and connection to the grid.
- *Supplemental Projects*, which are transmission system enhancements developed through the Subregional RTEP Committees (for below 230 kV transmission facilities) and the TEAC (for 230 kV and above transmission facilities). Supplemental projects are transmission expansions or enhancements by Transmission Owners to address local reliability needs, such as customer service and load growth, equipment condition, operational performance and risk, and infrastructure resilience. PJM evaluates these projects to ensure they do not harm the regional grid from a reliability perspective.

Q. PLEASE DESCRIBE THE ROLE OF THE TEAC IN THE DEVELOPMENT OF THE RTEP.

A. The TEAC is established under the PJM RTEP Protocol. The TEAC is an advisory-only, open PJM stakeholder committee that holds regular (at least monthly) public meetings to review RTEP activities, analyses, and proposed transmission solutions, and to provide advice to PJM regarding the preparation of the PJM RTEP for review and approval by the PJM Board. TEAC activities are at the core of stakeholder input in the RTEP process. The

[25] Baseline projects may include Immediate-need Reliability Projects, which solve more urgent reliability violations or system conditions that need to be addressed in three years or less.

scope of the TEAC's responsibility includes the review of and the provision of comments and input on the following:

- Scope and assumptions of RTEP studies;
- RTEP analyses at defined points during the RTEP process cycle;
- RTEP recommendations to be proposed to the PJM Board for approval; and
- Specified RTEP process matters as requested by the PJM Board.

TEAC participation is open to all Transmission Owners, transmission customers, Nonincumbent Developers, all PJM members, representatives of state commissions, the agencies and offices of state consumer advocates of states in the PJM Region, and any other interested parties. Following the presentation of analyses, assumptions or results to the TEAC, stakeholders are able to provide feedback or ask questions during the meeting itself or provide written comments and or requests. These comments are provided to the PJM Board for their consideration and serve as the basis for ongoing dialogue at subsequent TEAC meetings.[26]

IV. IDENTIFICATION OF RELIABILITY NEEDS IN THE PJM REGION

Q. PLEASE EXPLAIN THE CONCEPT OF "ELECTRIC RELIABILITY."

A. "Electric reliability" or "reliability," as used by industry experts, refers to the ability to continuously deliver electricity to customers in the amounts desired under normal and abnormal (disturbance) conditions within acceptable standards.

[26] As I will discuss in more detail later in my testimony, PJM Staff presented to the TEAC for discussion and comment the Carroll–Hunterstown Improvements Project, along with the other solutions offered in the 2022 RTEP Window 3, throughout the RTEP process and in more detail during the October 2023 and December 2023 TEAC meetings.

Q. PLEASE PROVIDE A HIGH-LEVEL EXPLANATION OF HOW PJM ASSESSES THE RELIABILITY NEEDS OF THE TRANSMISSION SYSTEM THROUGH THE RTEP PROCESS.

A. PJM's reliability planning encompasses a comprehensive series of detailed analyses to ensure reliability under various forecasted operating conditions and using the applicable Planning Criteria that I described earlier. For the near-term, PJM identifies needs for transmission upgrades using a five-year-out system model (base case suite) that incorporates PJM's official load forecast (see further description of the load forecast process in Mr. Gledhill's Direct Testimony). The RTEP five-year-out base case(s) also consider generation additions and announced generator deactivations, local transmission upgrades scheduled to be in service within the five-year timeframe and the forecasted load that is projected to materialize in the next five years. As appropriate, PJM also may utilize various load growth scenarios that represent more recent information (or information that has developed following the release of PJM's annual load forecast).

As I describe in more detail later in my testimony, in the case of 2022 Window 3, PJM supplemented the window base case(s) to include: additional scenarios capturing changes (increases) in the forecasted load; changes to the generation mix and associated flows due to additional announced generation deactivations; and changes to reflect the recently-approved generation deliverability testing procedures. All of these study models are collectively referred to herein as the "base case suite."

Once the base case suite is developed and PJM identifies the reliability violations that need to be addressed pursuant to the Planning Criteria, PJM may open a competitive

window to solicit proposals from qualified Transmission Owners and Nonincumbent Developers to address the identified needs through robust, holistic and expandable solutions that address and resolve the identified reliability violations.

Q. ARE THERE POWER SYSTEM FUNDAMENTALS THAT DRIVE TRANSMISSION SYSTEM RELIABILITY?

A. Yes, transmission system reliability is a function of thermal, voltage, stability, and short-circuit power system fundamentals. The Planning Criteria define the conditions to which the transmission system must be tested against and the associated acceptable performance. The transmission system must be able to operate to the applicable criteria without violating (exceeding) any of the defined reliability fundamental thresholds. I describe each in more detail below:

- **Thermal Overloads:** Power flows through each transmission facility according to the relationship of its impedance (opposition to electrical flow) and the relative location of generation and load to the specific facility with respect to the broader network. Thermal ratings, or the amount of power that can be reliably transmitted through a given facility, are established by examining the most limiting element of a facility: for example, transmission conductors or substation terminal equipment. PJM identifies facilities that have power flow loadings expected to exceed applicable thermal ratings for pre-contingency[27] conditions and for the loss of a

[27] A contingency is an unexpected event that could impact the power system, such as the loss of a generator or transmission facility. Pre-contingency conditions refer to system conditions that exist prior to the contingency taking place.

single or multiple generator(s), transmission line(s), transformer(s), or combinations of those elements which are contingencies evaluated part of the PJM Planning Criteria.

- **Voltage Limits:** Voltage levels are critical to reliable, on-demand electricity delivery. NERC Reliability Standards require that a transmission system remain stable within applicable thermal ratings and within established substation voltage ranges. Both voltage that is too low and voltage that is too high can become a serious concern, depending on the availability of resources—both generation and transmission—to produce or absorb reactive power to aid in voltage support and control. In real time, operators use transmission system equipment to control voltage, up to and including switching transmission lines in and out of service, switching capacitors or reactors, or adjusting voltage set points on static volt ampere reactive ("VAR") compensators.
- **System Stability:** System instability can arise under various conditions. Frequency (or angular stability) condition, however, is when a fault occurs on the transmission system, resulting in a generator going into an over- or under-speed condition, causing it to trip off-line. Under such conditions, if there is insufficient inertia to compensate, or if there is limited transmission transfer capability, that generator may trip, along with additional cascading transmission and generator trippings, up to the point where blackouts can occur. Another form of stability includes voltage stability conditions where the transmission network itself does not have sufficient "transfer capability" to carry the generated power from where it is sourced to where it is consumed. Both angular and voltage stability conditions pose risk to the

reliability of the power system and indicate a need to enhance the transmission system transfer capability to ensure the reliability of the interconnected system (and local load areas) is maintained. PJM performs multiple tiers of stability analysis, consistent with NERC criteria, to develop transmission solutions that ensure generators remain synchronized with the rest of the grid.

- **Short Circuit Limits:** NERC requires that each bulk electric system circuit breaker have adequate fault-interrupting capability to isolate the transmission facility and isolate the fault, and interrupt the high electric current that can negatively influence the broader transmission system. PJM runs short circuit simulations that utilize circuit breaker ratings provided by the transmission owner to evaluate the breaker-interrupting capabilities. Any deficiencies in breaker ratings are identified by PJM, and necessary enhancements are developed. Solutions may require replacing the breaker itself to implement a higher current-interrupting rating, or sometimes even redesigning significant portions of the electrical infrastructure. All breakers whose calculated fault currents exceed breaker-interrupting capabilities are considered over-dutied, or operating in excess of equipment ratings, and are reported to transmission owners for confirmation and solution development where required.

Q. WHAT HAPPENS WHEN A TRANSMISSION LINE OVERLOADS OR EXCEEDS ITS LOADING CAPACITY?

A. The power system is evaluated, planned and operated in a way that, under normal and credible stressed scenario or condition, the transmission network reliability will be maintained and no thermal, voltage or stability limits are violated. Hypothetically, when a

transmission line overloads, the conductor, the hardware securing the conductor and the line terminal equipment are subject to flows beyond their ratings, which will lead to overheating of any or all of these elements. Overheating the conductor may cause the line to sag low enough to bring the line into contact with whatever is underneath it. Under these conditions, the metal in the conductor may also lose its mechanical strength properties, rendering it dangerous to operate. In addition, the line may break and fall to the ground causing a potentially dangerous situation for those near the line, as well as the crews required to respond to the event. In short, overloading transmission lines may cause permanent damage to transmission infrastructure and power outages.

Q. WHAT ACTIONS WOULD PJM TAKE TO TRY TO PREVENT LINE OVERLOADS?

A. As mentioned, PJM plans the transmission system in a way that accounts for all operating conditions as per Planning Criteria requirements. However, in real-time operations, multiple outages may overlap, or abnormal weather conditions may materialize, to push the transmission system beyond the level to which it was planned. The transmission system, however, will always be planned and operated reliably to the next contingency or event. To prevent the consequences of a potential transmission line overload, immediate action must be taken by system operators before the line or related equipment is subject to unacceptable risk (for example unrecoverable stress). The action may include turning specific generating units off or on, opening or closing specific transmission elements, or discontinuing electric service to certain customers or groups of customers in specific areas to reduce the line loading. These are emergency or temporary measures only, which prevent

a specific breakdown on that occasion but do not solve the underlying problem causing the situation, *i.e.*, reliability vulnerability. On a long-term basis, the construction of new transmission lines or enhancements to existing lines is necessary to address such vulnerability or reliability violation. In some cases, where the overload is driven by the load demand downstream and without sufficient generation capacity to offload the transmission element, operators may need to shed load to maintain the overall reliability of the greater area of concern and the overall system.

Q. PLEASE EXPLAIN VOLTAGE STABILITY AND LOW-VOLTAGE CONCERNS.

A. Voltage stability refers to the ability of a power system to maintain steady voltages within prescribed limits at all buses in the system after being subjected to a disturbance from a given initial operating condition. It is normally associated with lack of local reactive power compensation inside the load pocket/area (an area with more load than generation) or the excessive reactive power loss along the transmission network itself due to high flows (although could be below the thermal conductor limits) and long distances with respect to the amount of power being transmitted. This is a serious system performance concern that has led to many voltage collapses and blackout conditions in the past. It is normally addressed through providing sufficient reactive compensation resources locally inside load pockets and transmission system enhancements. When sufficient local reactive power is provided in a load pocket leading to a healthy voltage profile in pre-contingency conditions, while severe and widespread low voltages occur under contingency conditions, transmission enhancements to strengthen the source side or the transmission path carrying the power transfer to the load pocket will be required.

Q. PLEASE DESCRIBE THE PLANNING EVENTS THAT PJM TESTS TO ENSURE THAT THE SYSTEM MEETS THE SPECIFIED PLANNING CRITERIA.

A. Under NERC Reliability Standard TPL-001-5, "planning events" (as NERC refers to them) are categorized as P0 through P7 and defined in the context of system contingency events to be evaluated as part of transmission reliability assessments. PJM studies each event as part of one or more steady-state analyses as described in PJM Manual 14B, which is attached to the Application as **MAIT Exhibit 52**. The planning events are:

- P0 – No Contingency (Normal Condition);
- P1 – Single Contingency;
- P2 – Single Contingency (bus section);
- P3 – Multiple Contingency;
- P4 – Multiple Contingency (fault plus stuck breaker);
- P5 – Multiple Contingency (fault plus relay failure to operate);
- P6 – Multiple Contingency (two overlapping single contingencies); and
- P7 – Multiple Contingency (common structure).

PJM tests for compliance with all Planning Criteria against the NERC Reliability Standards. For instance, NERC Category P0 criteria require that, for all transmission facilities in service, equipment thermal ratings and system voltage limits are respected, and that the system is stable. NERC Category P1 and P2 criteria impose similar requirements with one facility removed from service. This is referred to as the "n minus 1" or "n-1" criteria. NERC Category P4, P5 and P7 criteria impose similar requirements with two facilities removed from service and can be referred to as the "n minus 2" or "n-2" criteria.

NERC Category P3 and P6 criteria again impose similar requirements with two facilities removed from service, however these analyses permit adjustments to the system dispatch between the removal of the first and the second facility from service. This is referred to as the "n minus 1 minus 1" or "n-1-1" criteria.

The PJM Planning Criteria, as described in PJM Manual 14B, defines the conditions to which the PJM transmission system will be tested, and these planning events will be applied. For example, PJM's generation deliverability test evaluates how the system will reliably perform to various flow conditions by varying or "ramping" generation up or down to evaluate the impact of generation dispatch variations on the ability of the system to reliably deliver generated power to load while maintaining the NERC reliability performance standard.

Q. WHAT ANALYSES DOES PJM CONDUCT TO ASSESS COMPLIANCE WITH NERC PLANNING EVENTS?

A. PJM conducts various studies, including load and generation deliverability tests which are discussed below and in more detail in PJM Planning Manual 14B.

NERC Standard TPL-001-5 includes extreme events as well. PJM studies system conditions following several extreme events, also known as maximum credible disturbances, judged to be critical from an operational perspective for risk and consequences to the system (such as equipment damage, cascading loss of system elements, and electric service interruption).

PJM conducts stability studies to ensure that the planned system can withstand NERC criteria disturbances and maintain stable operations throughout PJM's planning

horizon. NERC criteria disturbances are those required by the NERC planning criteria applicable to system-normal (P0), single-element outage (P1 and P2) and common mode, multiple-element outage conditions (P3 through P7).

Q. HOW ARE THE PLANNING CRITERIA THAT YOU JUST DESCRIBED USED TO DETERMINE WHETHER NEW OR ENHANCED TRANSMISSION FACILITIES ARE NEEDED?

A. PJM conducts studies of the PJM transmission system that apply the Planning Criteria to specific conditions on the transmission system. When the studies show that the transmission system is unable to meet a specific Planning Criteria under these conditions, this means that the transmission system cannot be reliably operated under the forecasted and modeled system conditions. System upgrades will therefore be required so that the reliability performance requirements are met. These upgrades could take the form of construction of one or more new transmission elements or one or more enhancements to existing transmission facilities.

Baseline reliability analyses ensure the security and adequacy of the transmission system to serve all existing and projected load and transmission firm services. RTEP baseline reliability analyses include system voltage and thermal analysis, and stability, load deliverability, and generation deliverability testing. These tests variously entail single and multiple contingency testing for violations of established Planning Criteria regarding stability, thermal line loadings and voltage limits.

Q. WHAT STUDIES DOES PJM CONDUCT TO TEST SYSTEM DELIVERABILITY?

A. There are two primary deliverability studies used by PJM to test system conditions: (1) the load deliverability test and (2) the generator deliverability test. These two tests complement each other because to maintain reliability, capacity resources must contribute to the deliverability of energy within PJM in two ways. First, within an area experiencing a localized capacity emergency or deficiency (meaning generation capacity is lower than load in a specific area), energy must be deliverable from the aggregate of the available capacity resources to load. Second, capacity resources within a given electrical area must, in aggregate, be able to be deliverable (transfer out) to other areas of the PJM Region. PJM has therefore developed the load deliverability and generator deliverability tests to verify compliance with each of these deliverability requirements. Planning the PJM transmission system to the unified load and generator deliverability tests as described in PJM Planning Manual M14B ensures that the system is planned consistently to the same, uniform standard of service throughout.

Q. PLEASE DESCRIBE PJM'S LOAD DELIVERABILITY TESTS.

A. The load deliverability tests are a unique set of analyses designed to ensure that the transmission system provides a comparable transmission function throughout the system. These tests ensure that the transmission system is adequate to deliver each load area's requirements from the aggregate of system generation. The purpose of load deliverability test is to ensure there is minimal transmission risk serving each LDA in PJM.

The load deliverability test, as described in more detail in PJM Planning Manual 14B, examines the deliverability under the stressed conditions of a 90/10 summer and winter load forecast. That is, a forecast that only has a 10% chance of being exceeded. The transfer limit to the load is determined for system normal and all single contingencies (NERC P0 and P1 Category criteria) using two separate power flow cases (probabilistic dispatches and deterministic dispatches) created for each LDA. The "Rest of PJM" LDA is assumed to be operating normally, and generation is scaled up uniformly to supply the LDA under emergency.

This results in an expected value of system transfer capability that is compared to the target level to determine system adequacy. As with all thermal transmission and voltage tests applied by PJM, the applicable transmission owner normal and emergency ratings and voltage limits are applied. The steady state and single contingency power flows are solved consistent with the similar solutions described for the baseline thermal and voltage analyses.

Q. PLEASE DESCRIBE PJM'S GENERATION DELIVERABILITY TEST.

A. PJM's generation deliverability testing method is an established means for addressing system deliverability. The testing method conforms to industry standard. Generation deliverability ensures that clusters of capacity resources within PJM have sufficient transmission capability to be delivered to the aggregate of PJM load during circumstances where the capacity of that cluster of resources is needed due to higher-than-normal unavailability of resources elsewhere in PJM. In other words, the generation deliverability test ensures the ability of the transmission system to deliver energy from the aggregate of

generation in one area to the aggregate of load in another under various generation operating conditions.

These tests are periodically reviewed and needed enhancements are evaluated and adopted as system operating characteristics merits change. The latest enhancements to the generation deliverability tests were adopted in the first quarter of 2023, where generation ramping procedures and effective load carrying capacity values were updated to account for the evolving resource mix incorporating renewable generation resources. Further enhancements were also adopted to the generation dispatch of the system models where a generic merit order dispatch is applied to mimic a dispatch profile closer to what would normally occur in day-to-day operations.

Q. IF PJM IDENTIFIES FUTURE RELIABILITY CRITERIA VIOLATIONS THROUGH THE ANALYSES DESCRIBED ABOVE, WHAT IS PJM REQUIRED TO DO?

A. As I previously stated, compliance with NERC Reliability Standards is mandatory. Therefore, if PJM identifies system conditions under which the PJM transmission system will violate NERC Reliability Standards, PJM is obligated to identify a transmission solution that will resolve the identified violation. If PJM does not resolve the identified reliability violation, then PJM could be subject to FERC-imposed penalties as high as $1 million per violation per day in addition to exposing the transmission system to an unnecessary operational risk that may lead to load curtailments (i.e., dropping customers) in real-time.

In addition to compliance obligations, planning the system to the Planning Criteria summarized earlier and in more detail in the PJM Transmission Planning Manuals, ensures a uniform reliability level for all load and generation within the PJM Region. The PJM Planning Criteria are documented in PJM Planning Manual 14B and are transparently vetted and approved by the PJM Planning Committee and the Markets and Reliability Committee as the criteria are updated on an as-needed basis.

Q. IF PJM IDENTIFIES FUTURE RELIABILITY CRITERIA VIOLATIONS THROUGH THE ANALYSES DESCRIBED ABOVE, HOW DOES PJM IDENTIFY SOLUTIONS?

A. As relevant to this proceeding, when PJM identifies a reliability need through its RTEP annual planning cycle, PJM opens a competitive window to solicit proposals from qualified Transmission Owners and Nonincumbent Developers that meet the identified needs through robust, holistic, and expandable solutions that address the identified reliability violations. The PJM competitive planning process encourages innovative, cost-effective, and timely transmission solutions to the challenges of building and maintaining a reliable electric transmission system.

The competitive planning process begins with PJM notifying both incumbent Transmission Owners and Nonincumbent Developers – through a TEAC meeting – of PJM's intention to solicit competitive solutions to the identified planning needs. PJM will then publish a set of specific Planning Criteria violations for which PJM is soliciting solutions. Transmission developers then have a stated period before the window closes to submit their proposed solutions for addressing the identified Planning Criteria violations.

PJM does not itself propose any solutions to address identified reliability needs. PJM, however, may combine and/or stage different proposed solutions based on need in order to develop the more efficient or cost-effective solution to address the identified competitive window needs.

Once the proposal window is closed, PJM engages in a robust process to analyze the submitted solutions based on a variety of criteria as described above. PJM then selects the more efficient or cost-effective solution(s) for potential inclusion in the RTEP, and presents these proposed solutions to PJM stakeholders in a public TEAC meeting for stakeholder input. After the proposed solutions are presented during at least two TEAC meetings, the selected projects are recommended to the PJM Board for approval.

The competitive window process is described more fully in PJM Manuals 14B and 14F.

V. DEVELOPMENT OF THE 2022 RTEP AND 2022 WINDOW 3

Q. PLEASE EXPLAIN THE DEVELOPMENT OF THE 2022 RTEP.[28]

A. Each year, PJM commences an annual RTEP cycle to determine the needs of the transmission system. PJM develops an RTEP baseline power flow model which incorporates, among other things, the Load Forecast Report for the calendar year in which PJM is commencing the RTEP cycle. The January 2022 PJM Load Forecast that PJM used to develop the baseline power flow model for the 2022 annual RTEP cycle included

[28] The "2022 RTEP" refers to the transmission enhancements or expansions that were approved by the PJM Board as part of the 2022 annual RTEP cycle, which I describe in more detail herein.

forecast data for the 2022 through 2037 planning horizon, and indicated high load growth activity, particularly in Maryland and northern Virginia.

Throughout 2022, PJM facilitated several competitive windows as part of the 2022 RTEP cycle to address reliability criteria violations and market efficiency congestion needs resulting from the increased load forecast as modified during 2022 (described in more detail in Mr. Gledhill's Direct Testimony); generation deactivations; generation deliverability testing methodology updates, including a new block dispatch procedure[29] (approved in Q1 2023); and other drivers necessitating the need for transmission development. As part of the 2022 RTEP cycle, PJM also directed that certain Immediate-need Reliability Projects be incorporated into the 2022 RTEP, which were needed to: (i) enable the integration of the forecasted data center load in the DOM (Virginia) zone[30] up to and including year 2025 and (ii) address reliability violations caused by the proposed deactivation of a number of generation facilities, most notably the Brandon Shores generation units in Maryland (BGE zone).[31] Specifically, as relevant to the 2022 RTEP:

- From July 1, 2022 through August 30, 2022, PJM conducted **2022 Window 1** to seek solutions to address thermal and voltage violations identified as part of the 2022 RTEP. As relevant to this proceeding, as part of the 2022 Window 1 study, PJM identified overloads of the Germantown–Straban–Lincoln 115 kV line, and

[29] The block dispatch procedure considers how generation units are dispatched according to their fuel and historical behavior merits, and more accurately reflects real-time operations dispatch.

[30] A map depicting the transmissions zones in the PJM Region is included in Attachment J of the PJM Open Access Transmission Tariff.

[31] On April 6, 2023, Talen Energy Corp. ("Talen Energy") notified PJM that it intended to deactivate the Brandon Shores two-unit, 1,280 MW coal-fired generation facility in Anne Arundel County, Maryland ("Brandon Shores Units") by June 1, 2025.

posted the violations as part of the competitive solicitation process. PJM ultimately selected baseline project b3768[32] to address the violations;

- In July 2022, PJM identified the immediate need to address specific and targeted reliability violations in the DOM (Northern Virginia) zone up to and including 2025 (building on top of already planned supplemental and baseline upgrades);[33]
- From November 1, 2022 through December 1, 2022, PJM conducted **2022 Window 2** to seek solutions to address economic, thermal and voltage reliability criteria violations identified as part of the 2022 RTEP (Multi-Driver window covering both reliability and economic needs), which were not addressed as part of 2022 Window 1;
- From February 24, 2023 through May 31, 2023, PJM conducted **2022 Window 3** (which I will discuss in more detail below) to seek solutions to address additional thermal and voltage reliability criteria violations that were identified using the Modified 2022 Load Forecast (as defined in Mr. Gledhill's Direct Testimony), which violations were not addressed as part of 2022 Windows 1 and 2; and
- In May 2023, PJM identified the immediate need to address severe voltage drop and thermal violations across seven PJM zones in Baltimore, Maryland and the immediate, surrounding areas (*e.g.*, the BGE, DOM, Allegheny Power ("APS"),

[32] As I will discuss below, baseline project b3768, designated to MAIT to rebuild the approximately 7.6-mile Germantown–Lincoln transmission line, with an estimated cost of $17.4 million.

[33] *See* PJM Statement regarding Dominion Northern Virginia Area Violations Immediate Need, July 1, 2022, *available at*: item-08---dominion-northern-virginia-area-violations---need-statement.ashx; and Transmission Expansion Advisory Committee, Reliability Analysis Update Immediate Need, Sept. 6, 2022, *available at*: item-09a---reliability-analysis-update---immediate-need.ashx (further explaining the basis for the PJM's identification of an immediate reliability need and the identification of the transmission solutions to address the Dominion-related immediate reliability need, respectively).

Metropolitan Edison ("MetEd") (in Pennsylvania), PPL Electric Utilities ("PPL"), PECO Energy ("PECO"), and Potomac Electric Power Company ("PEPCO") zones), which PJM determined[34] would occur upon the deactivation of the Brandon Shores generation units without timely, adequate and properly-located replacement generation.[35]

The transmission enhancements or expansions that were ultimately approved by the PJM Board following the competitive solicitation windows and the immediate need reliability processes described above were all included in the 2022 RTEP.

Q. CAN YOU PLEASE EXPLAIN IN MORE DETAIL WHY PJM OPENED 2022 WINDOW 3?

A. Throughout 2022, projected load growth continued to increase rapidly and beyond what was originally anticipated as part of the 2022 PJM Load Forecast published in January 2022. PJM observed that: (i) new data center load was being proposed in Maryland near the Doubs substation (APS zone) and (ii) data center loads within northern Virginia (DOM

[34] *See* PJM Transmission Expansion Advisory Committee, Generation Deactivation Notification Update, May 7, 2023, *available at* https://www.pjm.com/-/media/committees-groups/committees/teac/2023/20230509/20230509-item-02---generation-deactivation-notification-update.ashx; PJM Transmission Expansion Advisory Committee, Generation Deactivation Notification Update, June 6, 2023, *available at* https://www.pjm.com/-/media/committees-groups/committees/teac/2023/20230606/20230606-item-02---generation-deactivation-notification-update.ashx (further explaining the basis for the PJM's identification of an immediate reliability need and the identification of the transmission solutions to address the Brandon Shores-related immediate reliability need, respectively). The transmission solutions identified to address the Brandon Shores-related immediate reliability need are referred to herein as the "Brandon Shores Deactivation Reinforcements."

[35] To be clear, the deactivation of the Brandon Shores Units was not announced when PJM opened 2022 Window 3, so the 2027 base case did not consider those units as deactivated, nor did it include the Brandon Shores Deactivation Reinforcements. However, as I will discuss below, PJM extended 2022 Window 3 and created a supplemental base case for the window that took into consideration the impact of the deactivation of the Brandon Shores Units and other announced deactivations. PJM sought holistic solutions that would address the impact of these deactivations.

zone) were projected to continue to increase significantly. PJM further identified several additional system-wide reliability drivers necessitating the need for transmission development. Specifically, PJM identified the following additional reliability drivers:

- The cumulative impact of generation changes and deactivations, including 11,100 MW of announced deactivations to the west and south of Conastone (including the Brandon Shores Units discussed above[36]);
- Regional constraints to support higher regional transfer flows resulting from imports into load center areas;
- Reactive power needs necessary for the 2027/28 baseline scenario; and
- Recently-approved reliability criteria changes, particularly to the generation deliverability assessment methodology and the introduction of block-dispatch methodology for generation scheduling in planning models.

In addition to the Immediate-need Reliability Projects that PJM directed to ensure reliable transmission service up to and including 2025 (described above), incumbent Transmission Owners also identified numerous supplemental transmission projects to address localized reliability concerns caused by the projected load growth described above through the established process for Transmission Owner supplemental projects. However, these immediate need and supplemental projects would not address the much broader and extensive regional constraints and associated needs in the PJM Region that are caused by

[36] As discussed further below, on October 16, 2023, Talen Energy announced that the three oil-fired steam units and one gas combustion turbine ("CT") (Units 1, 3, 4 and CT) at its H.A. Wagner Generating Station in Anne Arundel County, Maryland, with a combined capacity of 844 MW, would seek deactivation on June 1, 2025 (the "Wagner Units"). Since Talen had not yet submitted the Wagner Units' deactivation notification to PJM at the time PJM opened 2022 Window 3, the impact of the deactivation of the Wagner Units was not considered until after the 2022 Window 3 solutions were selected. PJM subsequently tested the 2022 Window 3 solutions and confirmed they were sufficient to handle the reliability needs associated with the deactivation of the Wagner Units.

the projected sustained load growth, anticipated generation deactivations and other reliability drivers described above. Rather, the projected strong load growth, coupled with the generation deactivations and resulting change in generation profile shifts, all collide to form the need for holistic, Needed Regional Transfer Solutions through the RTEP to address them.

For these reasons, PJM opened 2022 Window 3. *See* **MAIT Exhibit 53** ("PJM RTEP – 2022 RTEP Proposal Window 3, Problem Statement and Requirements").

Q. PLEASE EXPLAIN HOW PJM DEVELOPED THE BASE CASE SUITE USED FOR THE 2022 WINDOW 3 PROCESS.

A. When PJM initially opened 2022 Window 3 on February 24, 2023, the window included two base cases,[37] one of which relied upon the 2022 load forecast (as set forth in the 2022 Load Forecast Report), and the other of which relied on the 2022 Modified Load Forecast (as defined in Mr. Gledhill's Direct Testimony) (these two cases are collectively referred to as the "2027 base case").

Before the 2022 Window 3 competitive proposal submission period ended, PJM recognized the need to supplement the window with an additional base case suite to recognize the impact of both significant generator deactivations and the then-recently-modified block dispatch methodology and generation deliverability testing procedures (which impacts the base case models and analysis procedure). As such, in April 2023, PJM

[37] To conduct power flow analyses of a future study year, PJM develops a study "case" for the specific study year being analyzed that reflects all known transmission upgrades that are expected to be in service by or before that study year.

developed a 2028 base case suite (5-year-out models), which: (i) adopted the updated 2023 load forecast (as set forth in the 2023 Load Forecast Report); (ii) incorporated a total of approximately 11,100[38] MW of generator deactivations (described above); and (iii) implemented the new block dispatch methodology (the "Supplemental 2028 Base Case Suite") (*see* **MAIT Exhibit 54** (materials for the April 27, 2023 Special TEAC where the Supplemental 2028 Base Case Suite was described to stakeholders)). The Supplemental 2028 Base Case Suite analysis results showed an increase in both the number and severity of reliability violations in the PJM Region, as compared to the 2027 base case analysis. PJM decided to extend 2022 Window 3 for an additional 30 days to allow developers to submit proposal adjustments in light of the results of the Supplemental 2028 Base Case Suite analysis.

PJM used the Supplemental 2028 Base Case suite to evaluate the competitive proposals submitted in the 2022 Window 3 competitive window process, and to evaluate and select the final solutions for 2022 Window 3. This process is described more fully in the PJM Reliability Analysis Report, 2022 RTEP Window 3, dated December 8, 2023 ("Reliability Analysis Report"), which is included as **MAIT Exhibit 55**.

It is important to note that PJM also used the Supplemental 2028 Base Case Suite to develop 2023 Window 1, which was open from July 24, 2023 through September 22, 2023. This is relevant because PJM observed the same severe and widespread reliability violations as it developed the 2023 RTEP; however, the 2023 Window 1 solicitation process excluded from consideration proposals to resolve reliability violations that were

[38] *See* Slide 11 of the PJM Reliability Analysis update slide deck; https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20230606/20230606-item-11---reliability-analysis-update.pdf.

already targeted through the 2022 Window 3 study area. I will nonetheless include information below about the violations observed in the 2022 Window 3 study area during the 2023 Window 1 solicitation process, as that confirms the extensive, widespread and severe nature of the reliability needs identified and addressed in 2022 Window 3.

Q. PLEASE EXPLAIN THE RELIABILITY VIOLATIONS THAT PJM IDENTIFIED FOR THE 2027 AND 2028 STUDY YEARS.

A. PJM identified very extensive PJM Region-wide reliability violations occurring in the 2027 and 2028 study years on the bulk 500 kV transmission system, which, if not addressed, would have an impact on regional transfer capability—an important component of transmission system reliability. Specifically, as relevant to this proceeding, PJM identified:

- **Regional Transmission Overloads (Thermal Violations):** The 2027/28 baseline reliability criteria violations include numerous overloaded 500 kV transmission lines (*i.e.*, backbone transmission lines) that serve the District of Columbia-Maryland-Virginia region, the SWMAAC LDA (encompassing the PEPCO, SMECO and BGE zones in Maryland), and the APS and DOM zones. For example, PJM observed that the 500 kV lines located in the SWMAAC area (*i.e.*, the Peach Bottom–Conastone–Brighton–Doubs 500 kV lines)[39] would become severely overloaded, with these lines carrying between 115% to 213% of their rated capacity (which is measured in megavolt-amperes ("MVA")). The most severe overload was observed on the Peach Bottom–Conastone 500 kV line (*i.e.*, from the PECO zone

[39] Conastone, Brighton and Doubs are all major 500 kV substations that are located in Maryland. Peach Bottom is a major substation connecting the Peach Bottom generation facility to the 500 kV transmission system in Pennsylvania (east of Conastone).

in Pennsylvania to the BGE zone in Maryland), with a transmission overload of 213% of the line's 2,920 MVA rating pre-contingency (*i.e.*, under normal conditions, N-0/P0). As noted previously in my testimony, when transmission lines are overloaded, the transmission system is transmitting more power than that for which it was designed; transmission element overloads this severe can lead to cascading outages and system collapse if not addressed.

- **Reactive Power Needs (Voltage Violations):** The 2027/28 baseline reliability criteria violations also demonstrate needed reactive power reinforcements, both static and dynamic. As more fully summarized in the Reliability Analysis Report (**MAIT Exhibit 61**), PJM observed thousands of voltage collapse and extreme low voltage (non-sustainable) violations in various areas (including Maryland, the SWMAAC LDA in general, and the APS and DOM zones). As I previously explained, a voltage collapse condition indicates the inability of the transmission system to deliver the remotely available power to load. It indicates a condition that, if not addressed (by enhancing the transfer capability), the system will become inoperable (blackout) under the identified outage/condition. Low-voltage conditions can lead to lost load and generation, and can lead to cascading transmission outages.

In addition to these substantial reliability violations on the backbone transmission system, PJM also identified significant reliability violations on lower voltage facilities in the 2027 and 2028 study years. As relevant to this proceeding, and as discussed in further detail below, PJM identified:

- **<u>Reliability violations along the Carroll–Hunterstown transmission corridor</u>:** Similar to the regional violations, the Carroll–Hunterstown transmission corridor was severely overloaded. The overloads were as high as 178% pre contingency and up to 199% post contingency.

VI. ANALYSIS OF 2022 WINDOW 3 PROPOSAL SOLUTIONS

Q. HOW MANY PROPOSED SOLUTIONS DID PJM RECEIVE TO ADDRESS THE WIDESPREAD RELIABILITY VIOLATIONS IDENTIFIED IN 2022 WINDOW 3?

A. PJM received 72 proposals from ten different entities as part of 2022 Window 3. Of the ten proposing entities, six were incumbent Transmission Owners and four were Nonincumbent Developers. PJM received 22 proposals that are upgrades to existing facilities and received 50 greenfield proposals. The total cost of all proposals, not all of which were ultimately selected for inclusion in the RTEP, added up to approximately $54.4 billion.

Q. BASED ON WHAT CRITERIA DID PJM STUDY AND SELECT TRANSMISSION ENHANCEMENTS OR EXPANSIONS TO DETERMINE WHETHER THEY ARE THE MORE EFFICIENT OR COST-EFFECTIVE SOLUTION TO ADDRESS THE NEEDS IDENTIFIED IN 2022 WINDOW 3?

A. Per the terms of the RTEP Protocol, set forth in Operating Agreement, Schedule 6, PJM is required to identify the more efficient or cost-effective solution to address identified transmission system needs. In making this determination, PJM seeks to determine the more

efficient, cost-effective, constructible, robust, and scalable set of projects to serve the system reliability needs in a timely fashion.[40]

PJM employs a variety of expertise—including independent outside consultants—to analyze submittals. As part of this review, PJM and its independent outside consultants also analyze any cost containment provisions voluntarily submitted by the developer. PJM is aware of environmental and social impacts and takes them into consideration when evaluating all submitted proposals.[41] PJM also considers future needs, ensuring project selections are expandable and compatible with future and evolving system reinforcement needs so as to minimize incurring sunk cost, negatively impacting rights-of-way, and avoiding difficult-to-schedule outages due to stressed operational conditions.

Specifically, when evaluating the solutions proposed in response to the 2022 Window 3 competitive solicitation, PJM considered several factors, including:

- Performance: the ability of the solution to meet the identified system needs and being flexible to address near-term future needs;
- Scalability: robust design able to scale up and meet future needs;
- Impact: utilizing existing rights of way where possible;
- Cost: validated by third-party benchmarking metrics, including consideration of any cost containment provisions voluntarily submitted by developers;

[40] *See* https://www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20230307/20230307-item-08---reliability-analysis-update.pdf, slide 3.

[41] As described in the Constructability & Financial Analysis Report for 2022 Window 3, PJM conducts a high-level analysis of each project utilizing available public sector data, aerial photographs and internet-based real estate records to determine if the project is feasible and to identify potential regulatory permitting risks. PJM's constructability review is not as extensive as the detailed analysis the transmission developer conducts to determine the proposed project route.

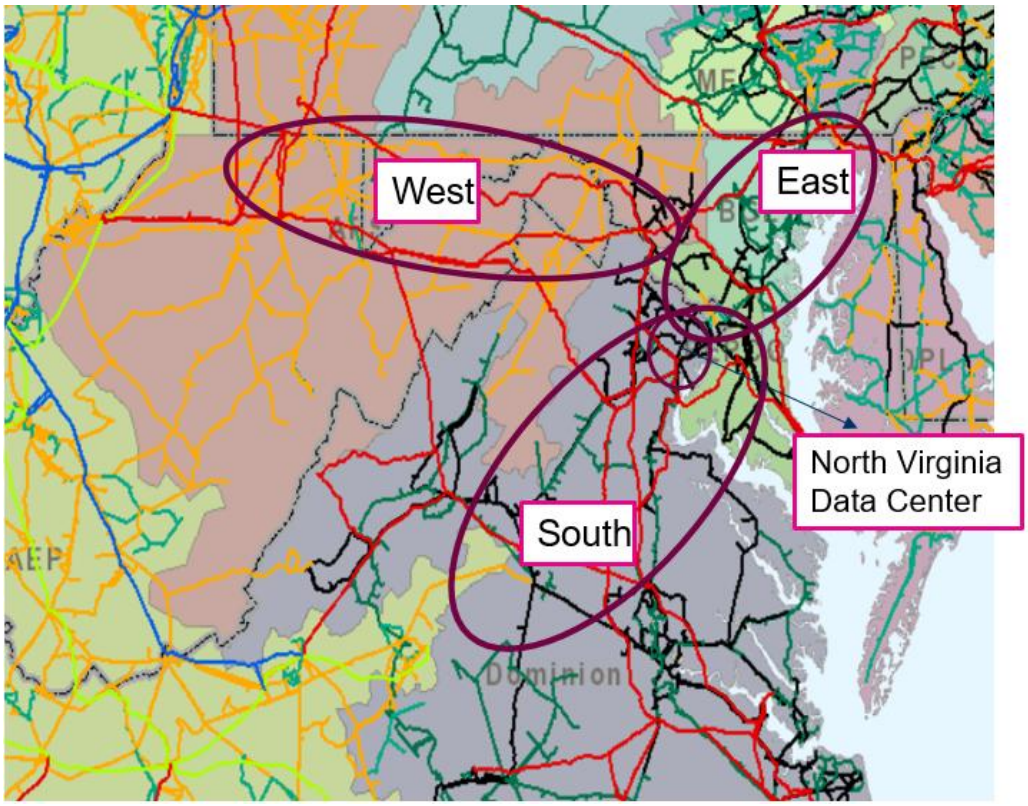
- Risks: factors that might trigger additional costs, such as difficulty securing the number or type of permits required or inability to meet in-service date; and
- Efficiencies: avoidance of redundant capital investment, including recognizing synergies with retiring facilities and overlaps with previously approved or imminent upgrades.

Q. PLEASE EXPLAIN HOW PJM EVALUATED THE PROPOSED 2022 WINDOW 3 SOLUTIONS.

A. When PJM opened 2022 Window 3, PJM made clear that it was seeking solutions to address reliability violations showing up in the 2022 Window 3 study area and the surrounding zones to these areas.[42] PJM divided the 2022 Window 3 study area into four geographic regions (or regional clusters) so that PJM could evaluate proposed solutions that were intended to address reliability issues in each of these four geographic areas. The four regional clusters were: East, West, South, and Northern Virginia/Doubs (MD), as depicted in **Map 1**, below.

[42] As previously explained, the 2022 Window 3 study area encompasses SWMAAC LDA (encompassing the PEPCO, SMECO and BGE zones in Maryland), the APS (Maryland) and DOM (Virginia) zones, as well other surrounding regions.

Map 1: 2022 Window 3 Regional Clusters



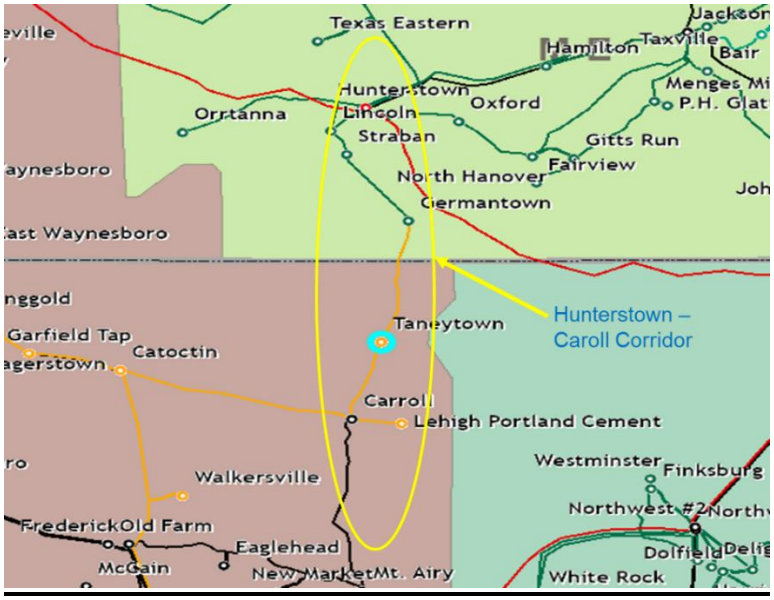
PJM first sought to identify solutions to the region-wide reliability violations impacting the backbone (500 kV and above) transmission system, *i.e.*, regional transfer solutions. To do this, PJM developed scenarios, which were combinations of proposals and/or components from different proposals, addressing all areas of need, and evaluated them against the 2027 and 2028 base case models.[43] PJM evaluated, on a regional cluster-specific basis, the 500 kV and above proposal components to determine the more efficient or cost-effective combination of backbone solution components. PJM ultimately identified several 500 kV solutions (*i.e.*, the Needed Regional Transfer Solutions) to address the

[43] Over 30 scenarios were analyzed for the 2027 base case model, and over 100 scenarios were developed and analyzed for the 2028 base case model. Certain scenarios were full combination scenarios submitted by the proposing entities; PJM also optimized scenarios by using select components from certain proposals by incumbent Transmission Owners and Nonincumbent Developers.

majority of regional reliability violations I described above.[44]

Once PJM identified the Needed Regional Transfer Solutions, PJM conducted further analysis to determine whether there were additional reliability violations in the 2027 and 2028 study years that the Needed Regional Transfers Solutions would not address. As relevant to this proceeding, PJM identified several remaining thermal overload violations along the existing 115/138 kV transmission corridor connecting the Hunterstown Substation in Pennsylvania and the Carroll Substation in Maryland that would not be addressed by the Needed Regional Transfer Solutions. The remaining violations along the Carroll–Hunterstown transmission corridor ("Carroll–Hunterstown Violations") that are not addressed by the Needed Regional Transfers Solution are shown on **Map 2**, below, and listed on **Table 1**, below.

Map 2



[44] A full list of the Regional Solutions that PJM selected to address the 2022 Window 3 reliability violations is included in PJM's Reliability Analysis Report (**MAIT Exhibit 61**) at 35-72.

On **Map 2**, the 138 kV segments of the Carroll–Hunterstown corridor are shown in orange, whereas the 115 kV segments of the corridor are shown in green.

Table 1

Carroll–Hunterstown Violations 2023 W1 Base Case[45] with the Needed Regional Transfers Solutions Assumed to be In-Service				
Segment of Carroll–Hunterstown Corridor	**CKT**	**kV**	**Areas (Zones)**	**(Number of Thermal Overload Violations) and Highest AC % Loading**
Taneytown - Carroll	1	138	201(APS)	**(2) 113**
Germantown - Taneytown	1	138	227(MetEd)/ 201(APS)	**(8) 117**
Hunterstown - AD1-020 Tap	1	115	227(MetEd)	**(11) 114**
Lincoln -Straban	1	115	227(MetEd)	**(2) 111**
Orrtanna - Lincoln	1	115	227(MetEd)	**(10) 116**
Straban - Germantown	1	115	227(MetEd)	**(1) 106**
AD1-020 Tap - Lincoln	1	115	227(MetEd)	**(12) 114**

Table 1 shows the number of thermal violations on each segment of the existing Carroll–Hunterstown transmission corridor, as well as each of the transmission line segments

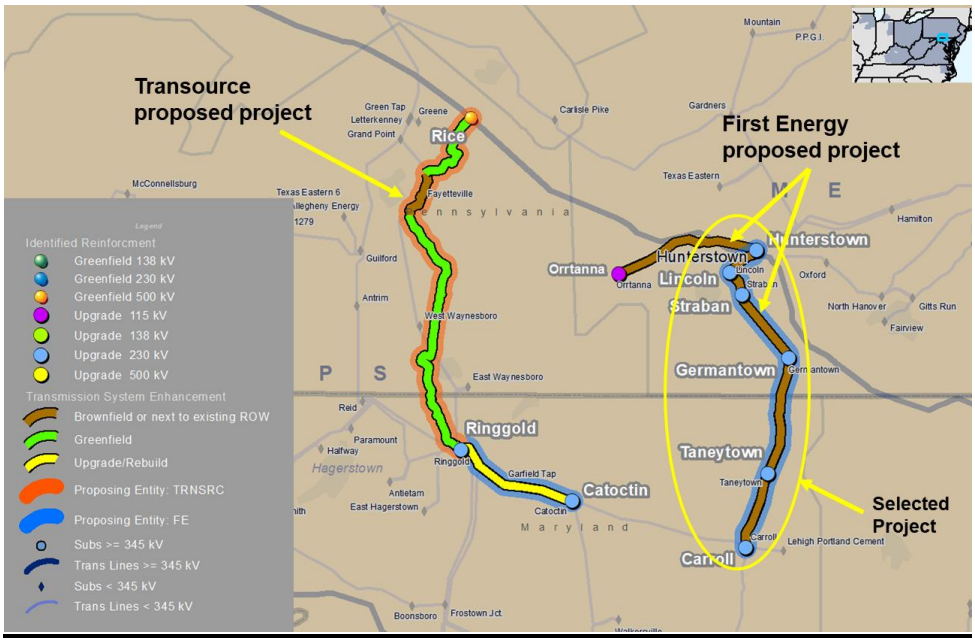
[45] As I explain previously, PJM used the Supplemental 2028 Base Case Suite from 2022 Window 1 to also develop 2023 Window 1. This is relevant because PJM observed the same severe and widespread reliability violations as it developed the 2023 RTEP; however, the 2023 Window 1 solicitation process excluded from consideration proposals to resolve reliability violations that were already targeted through the 2022 Window 3 study area. This table therefore includes information below about the violations observed in the 2022 Window 3 study area during the 2023 Window 1 solicitation process, as that confirms nature of the reliability needs identified and addressed in 2022 Window 3.

overloading percentage (*i.e.*, the power level exceeding its normal rated capacity). As I explain above, transmission line overloading can cause permanent damage to transmission infrastructure and power outages.

Q. PLEASE EXPLAIN THE COMPETITIVE WINDOW PROPOSALS THAT PJM EVALUATED AS POTENTIAL SOLUTIONS TO ADDRESS THE CARROLL–HUNTERSTOWN VIOLATIONS.

A. As shown on **Map 2**, PJM evaluated two proposals as potential solutions to address the Carroll–Hunterstown Violations set forth in **Table 1**, above.

Map 2



- **Transource Energy's ("Transource") 230 kV development between New Rice–Ringgold (IEC West - Component of Proposal ID 487[46]) ("IEC West")**: Transource proposed to: (i) develop a new (greenfield) 500/230 kV Rice substation

[46] Transource's Proposal 487 included numerous components; however the only component that would address the Carroll–Hunterstown Violations is referred to herein as the "IEC West Proposal").

in Franklin County, Pennsylvania ("New Rice"), tying into the existing the Hunterstown–Vinco 500kV line and (ii) construct approximately 29 miles of new (greenfield) double circuit 230 kV alternating current ("AC") overhead transmission line between the New Rice substation and the existing Ringgold substation in Washington County, Maryland. Transource's estimated cost for the IEC-West Proposal was approximately $182 million.

- **FirstEnergy Carroll–Hunterstown 230kV Project (Component of Proposal ID 837[47]) ("FirstEnergy Carroll–Hunterstown Proposal")**: FirstEnergy proposed to: (i) retire the existing 115 kilovolt ("kV") and 138 kV wires (or circuits) currently in the corridor; and (ii) rebuild the existing corridor approximately 24 miles as a double circuit corridor using 230 kV construction standards. One of the new circuits on the double circuit structures will be operated at 115/138 kV and will connect to all of the existing 115/138 kV substations on the existing corridor. The second new circuit will be operated at 230 kV and will connect the Hunterstown (Pennsylvania) and Carroll (Maryland) substations. Additionally, FirstEnergy proposed to construct a new 230 kV ring bus at the Carroll substation (Potomac Edison) and add a new 230 kV breaker to the Hunterstown 230 kV substation (MAIT). FirstEnergy's estimated cost for this proposed project scope was approximately $137 million.

As between the two proposals described above, PJM ultimately selected FirstEnergy's Proposal (Component of ID 837). PJM also identified the need to reconductor the Lincoln–

[47] FirstEnergy's Proposal 837 included numerous components; however, the only component that would address the Carroll–Hunterstown Violations is referred to herein as the "FirstEnergy Carroll–Hunterstown Proposal").

Orrtanna 115 kV line in Pennsylvania. PJM determined that the Carroll–Hunterstown Improvements Project (comprised of FirstEnergy's Proposal (Component of ID 837) and the reconductoring of the Lincoln–Orrtanna 115 kV line) was the more efficient or cost-effective solution to address the Carroll–Hunterstown Violations for the reasons described below.

Q. CAN YOU EXPLAIN WHY PJM SELECTED THE CARROLL–HUNTERSTOWN IMPROVEMENTS PROJECT AS THE MORE EFFICIENT OR COST-EFFECTIVE SOLUTION TO ADDRESS THE CARROLL–HUNTERSTOWN VIOLATIONS?

A. Both the Transource Proposal and the FirstEnergy Proposal involved building new 230 kV lines. PJM's analyses showed that both proposals would resolve the Carroll–Hunterstown Violations, and that either proposal would offer similar reliability performance. PJM also identified that both proposals would require additional upgrades. However, PJM ultimately selected the Carroll–Hunterstown Improvements Project to be the more efficient or cost effective solution to the Carroll–Hunterstown Violations for several reasons. First, the estimated cost of the FirstEnergy Proposal was approximately $45 million less than the estimated cost of the Transource Proposal. Second, the Transource Proposal would be entirely greenfield construction, whereas the FirstEnergy proposal would use existing rights-of-way for the entire project (brownfield). Finally, the Carroll–Hunterstown Improvements Project would eliminate the need for the previously-approved baseline project b3768, which had been estimated to cost $17.4 million.

For these reasons, PJM determined that the Carroll–Hunterstown Improvements Project was the more efficient or cost-effective solution to address the identified reliability needs, and recommended that the PJM Board approve the project for inclusion in the RTEP.

Q. DO THE ANALYSES DESCRIBED ABOVE DEMONSTRATE THAT THE PROJECT IS NEEDED FOR RELIABILITY?

A. Yes, they do.

VII. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does, although I reserve the right to supplement my testimony as appropriate.

APPENDIX A

Sami Abdulsalam, Ph.D. P.Eng
Director – Transmission Planning, PJM

Sami.Abdulsalam@PJM.com
Audubon, PA – 445-942-5834

SUMMARY OF QUALIFICATIONS:

- Transmission Planning expert, with 25+ years of experience in the fields of transmission system planning, long term planning, renewable energy integration, energy transition, project development, grid interconnections and power system dynamic analysis
- Led the transmission planning department in PJM as Sr. Mgr then Director of Transmission planning responsible for the development of the PJM Regional Transmission Expansion Plan.
- Expert witness testifying in public regulatory hearings (with FERC and in Canada) supporting transmission development for load and renewable integration expansion plans for multi-billion dollar utility projects.
- PJM primary representative to the United States DOE National Transmission Planning Study.
- Led the development of the largest Regional Transmission Expansion Plan in PJM (largest competitively solicited transmission development initiative in eastern United Stated and nation-wide) totalling more than $5Bn in 2023.
- Led (Technical Advisory Committee) and managed the Western Regional Electricity Cooperation and Strategic Infrastructure (RECSI) Study (Canada Federal Government Funded) in 2018
- Alberta Electric System Operator (AESO) representative to the Transmission Facilities Cost Monitoring Committee (TFCMC). Alberta-Canada
- Represented the AESO as primary lead to the Western Electricity Coordinating Council (NERC WECC) MVWG and Planning Committee as well as to WIRES (United States / Canada).
- Hands on experience with power system engineering and analysis tools (PSSE and PSLF), power system transients (PSCAD and EMTP), dynamic oscillations/resonance
- Experience with leading transmission planning and cost benefit assessments using production simulations (GE MAPS and AURORA).
- Proven track record in Transmission System projects planning for long and short-term(s) in compliance with NERC TPL standards.
- Institute of Electrical and Electronics Engineers (IEEE) Top-Tier journal paper reviewer on Power Systems and Industry applications with more than 10 highly cited journal and conference papers.
- Solid planning and engineering background in the fields of generation facility integration (850 to 50 MWs scale), Oil and Gas project interconnections, and Renewable Energy integration and enablement.
- Proven experience with transmission system short circuit assessment and mitigation via innovative solutions as well as impacts of low short circuit capability on generator and HVDC (converter-based systems) systems dynamic performance and interactions (SSO/SSR analyses).
- A passionate, effective communicator and collaborator. Ensuring the overall team success through developing strategies and plans aligned with the collective needs/vision via setting SMART goals.
- Ability to build trust and manage relationships with internal and external stakeholders.
- Familiar with the legislative power industry framework in the United States and Canada.
- Skilled in resource planning and budgeting, ensuring successful execution/delivery of the planned target deliverables and timelines.

WORK EXPERIENCE:

March 1st 2024 - Present	**Director, Transmission Planning** **PJM Interconnection**
Jan 1st 2022 - March 2024	**Senior Manager, Transmission Planning** **PJM Interconnection**
June 1st 2020 – Dec. 2021	**Senior Consulting Portfolio Manager** **Siemens PTI, Schenectady, NY, US**
Nov 1st 2019 – May 31st, 2020	**Principal Engineer,** **Sustainable Grid Power Inc., Transmission Division, Calgary, AB**
2017 – Oct 30th, 2019	**Director, Transmission Planning**, **AESO, Transmission Division**
2016 – 2017	**Director, Transmission System Projects** **AESO, Transmission Division**
2015 – 2016	**Manager, Operations Planning** **AESO, Operations Planning and Engineering**
2011 - 2015	**Manager, Projects and System Access Studies** **AESO, Transmission Project Delivery**
2009 - 2011	**Senior Engineer** **AESO, Transmission Project Delivery**
2008 - 2009	**Senior Engineer** **AESO, Transmission-Technical Services**
2007 - 2008	**Post Doctoral Fellow** **ECE Dept., University of Alberta, Edmonton, Canada.** **Main-Project: Determining acceptable synchronization parameters for the Alberta Interconnected Power Systems (AIES).**
2002 - 2007	**Research Assistant (Mitigation of Electromagnetic Transients) ECE Dept., University of Alberta, Edmonton, Canada.** **Thesis Title: Modelling and Mitigation of Transformer Inrush Transients.**
2004 - 2005	**Research Assistant (Power Quality and Harmonics Project) ECE Dept., University of Alberta, Edmonton, Canada.**
2001 - 2002	**Electrical and Instrumentation Engineer**

Enppi, Instrumentation and Control Systems Department, Cairo, Egypt.

2001 **Electrical Engineer (Protection)**
EOMPC/BECHTEL, El-Kureimat, Egypt.

1999 - 2001 **Research Assistant**
Electrical Power and Machines Dept., University of El-Mansoura, Egypt.
Thesis Title: Effect of Protection Performance on Power System Voltage Stability

PUBLIC HEARINGS – EXPERT WITNESS (Regulatory Experience):

2024 **FERC Docket No. ER24-843** – PJM Interconnection, L.L.C., Affidavit in Support of 2022 Window 3 Cost Allocation Assignments (Feb. 2024)

2021 **NCUC (North Carolina Utilities Commission) Docket No. EMP-119, SUB 0 AND EMP-119, SUB 1, PRE-FILE REBUTAL TESTIMONY – MCADAMIA SOLAR LLC – Expert Witness –(Dec 2021) (United States)**

2021 **FERC Docket No. RM21-17-00 – Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection – Expert Witness – Written Testimony on behalf of NextEra Energy (Nov 2021) (United States)**

2021 **FERC Docket No. ER19-2019 and ER19-2023 –** Tucson Electric Company Loss Study **(June 2021) (United States)**

2019 **AUC Application No. 23429-A001 / Proceeding ID 23429** – PENV Transmission Development Project, January 2019 **– (Approved – Under Construction) (Canada)**

2018 **AUC Application No. 23105-A001 / Proceeding ID 23105** – Rycroft Area Transmission Development, December 2018 **– (Approved – Energized) (Canada)**

2018 **AUC Application No. 23339-A001 / Proceeding ID 23339** – Provost Reliability Upgrade Project, October 2018 **– Approved (under construction) (Canada)**

2014 **AUC Application No. 1609123 / Proceeding ID No. 2303 –** South and West Edmonton Area Transmission Reinforcement Needs Identification Document, March 2014 **– Approved (Energized) (Canada)**

2012 **AUC Application No. 1607818/ Proceeding ID No. 1530** - Spruce Grove 595S Substation Connection Needs Identification Document, August 2012 **– Approved (Energized) (Canada)**

2012 **AUC Application No. 1607512/Proceeding ID No. 1363** - Weasel Creek 947S and Abee 993S Substations Needs Identification Document, May 2012 **– Approved (Energized) (Canada)**

TRANSMISSION PROJECTs PORTFOLIO (Key Projects – Transmission Planning – United States and Canada)

PJM Regional Transmission Expansion Plan – RTEP 2022 – Window 3 (United States).	Board Approved	$5,000.0M
PJM Regional Transmission Expansion Plan – RTEP 2022 Window 1 and 2 (United States).	Board Approved	$2,210.0M
PJM Data Center Alley Immediate Need – Dominion – Oct 2022 (United States).	Under Construction	$627.0M
Chapel Rock to Pincher Creek Development - 240-500kV (Canada)	Consultation Completed	$450M
Central East Transfer Out Project - 240kV - (Canada)	Consultation Completed	$500M
Alberta-BC Intertie Restoration Project – 500 kV - (Canada)	Consultation Completed	$100M
PENV Transmission Development – 138-240kV - (Canada)	Approved	$240.0M
Rycroft Transmission Development – 138kV - (Canada)	Approved	$50.0M
Fort McMurray West 500kV Transmission Line – 500kV - (Canada)	Energized	$1,450.0M
South and West of Edmonton Development - 240-138kV - (Canada)	Energized	$280.0M
SATR – CBW 240 kV Transmission Development – 240kV - (Canada)	Energized	$1,000.0M
SATR-South of Foothills Development – 240kV - (Canada)	Energized	$800.0M

PROFESSIONAL ACTIVITY/AFFILIATIONS/VOLUNTEERING:

Chair, IRC Planning Committee (US and Canada) 2018 – Oct 2019
Member, WIRES North America, Alberta Rep 2018 – Oct 2019
Member, AESO TFCMC Representative, 2017 - Oct 2019
Member, IRC Planning Committee (US and Canada)- Alberta Representative 2016 - Oct 2019
Prosci Change Management Certification 2015/16
Chair, IEEE PES/IAS Northern Canada Chapter (2008).
Secretary, IEEE PES/IAS Northern Canada Chapter (2004-2007).
Member, IEEE Power Engineering Society (2003-Present).

Member, IEEE Industry Application Society (2009-Present)
Journal Research Paper Reviewer for the following Publications;

- IEEE Transactions on Power Delivery (2003-Present)
- IEEE Transactions on Power Systems (2003-Present)
- IEEE Transactions on Industry Applications (2003-Present)
- Conferences including IEEE, CIGRE, EPEC, and others (by invitation) Professional Engineer, Egyptian Syndicate of Engineers, (1997-Present).

Project Manager, ESANA Canadian Book Campaign, (2005-2007).
P. Eng (APEGA), Registered Professional Engineer in Alberta
Robot Inspection Manager, First Robotics Canada (2013, 2014, 2015) - Volunteer

EDUCATION:

2002 - 2007	**Doctor of Philosophy**, June 2007, University of Alberta, Edmonton, Alberta. Thesis title "**Modeling and Mitigation of Transformer Inrush Currents**."
1999 - 2001	**Master of Science**, May 2001, University of El-Mansoura, El-Mansoura, Egypt. Thesis title "**Effect of Protection Performance on Power System Voltage Stability.**"
1992 - 1997	**Bachelor of Science,** University of El-Mansoura, El-Mansoura, Egypt. Graduation Project: "**Power System Dynamic Simulation for Voltage Stability Studies**"