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File #: 178012

August 19, 2019

VIA HAND DELIVERY

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

Re: Letter of Notification of PPL Electric Utilities Corporation, Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, for Approval of the Glen Brook Substation 230 kV Connecting Lines Project in Salem Township, Luzerne County, PA
Docket No. P-2019-

Dear Secretary Chiavetta:

Enclosed for filing is the Letter of Notification of PPL Electric Utilities Corporation in the above-referenced proceeding. A CD containing a copy of the Letter of Notification and Attachments in Support of the Letter of Notification is also enclosed.

As indicated on the Certificate of Service, copies of the Letter of Notification are being served by certified mail, return receipt requested, upon the involved governmental agencies, municipalities and property owner.

Construction is scheduled to begin in Fall of 2020 to support an in-service date of Winter 2021.

If you have any questions concerning this matter, please contact me at the address or telephone numbers provided above.

Enclosed please find our firm's check in the amount of $350 representing the filing fee.

Respectfully submitted,

Jessica R. Rogers/LAB

Jessica R. Rogers

JRR/kls
Enclosures

cc: Certificate of Service
Robert F. Young
Paul T. Diskin
Kimberly Hafner
Debra Backer
Jordan Van Order

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Letter of Notification of PPL Electric Utilities Corporation, Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, for Approval of the Glen Brook Substation 230 kV Connecting Lines Project in Salem Township, Luzerne County, PA.	:	Docket No. A-2019-_____

LETTER OF NOTIFICATION

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

PPL Electric Utilities Corporation ("PPL EU" or "the Company") hereby files, pursuant to 52 Pa. Code § 57.72(d), this Letter of Notification to request approval from the Pennsylvania Public Utility Commission ("Commission") to build approximately 0.5 miles of new parallel double circuit 230 kV transmission taps that are necessary to connect the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines to the new Glen Brook substation (the "Project"). The new parallel double circuit 230 kV transmission taps and Glen Brook Substation are located in Salem Township, Luzerne County, approximately 4 miles northeast of Berwick, Pennsylvania.

The proposed Project will address voltage and thermal violations of PPL EU's transmission planning criteria on its 69 kV transmission system in the Berwick area. The Project will be constructed on newly acquired right-of-way ("ROW") and a newly acquired substation parcel. Subject to the Commission's approval, construction is scheduled to begin in Fall of 2020, to support a project in service date of Winter 2021. In support thereof, PPL EU states as follows:

I. INTRODUCTION

1. This Letter of Notification is filed by PPL EU, a public utility that provides electric distribution, transmission, and provider of last resort services in Pennsylvania subject to the regulatory jurisdiction of the Commission.

2. PPL EU's address is PPL Electric Utilities Corporation, Two North Ninth Street, Allentown, Pennsylvania 18101.

3. PPL EU's attorneys are:

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PPL EU's attorneys are authorized to receive all notices and communications regarding this Letter of Notification.

4. PPL EU furnishes electric service to approximately 1.4 million customers throughout its certificated service territory, which includes all or portions of twenty-nine counties and encompasses approximately 10,000 square miles in eastern and central Pennsylvania. PPL EU is a "public utility" and an "electric distribution company" as defined in Sections 102 and 2803 of the Pennsylvania Public Utility Code, 66 Pa.C.S. §§ 102, 2803.

5. PPL EU owns approximately 5,000 miles of transmission lines operating at 69 kV (kilovolts) or higher, approximately 375 substations with a capacity of 10 MVA (megavolt amperes) or more, and approximately 43,000 miles of distribution lines operating at less than 69 kV.

6. This Letter of Notification includes the following accompanying attachments:

- Attachment 1 Necessity Statement.
- Attachment 2 Engineering Description.
- Attachment 3 Description of the Right of Way.
- Attachment 4 PPL EU Design Criteria and Safety Practices.

7. This Letter of Notification and accompanying Attachments, which are incorporated herein by reference, contain all the information required by 52 Pa. Code § 57.72(d)(4).

II. THE PROJECT

A. NEED FOR THE PROJECT

1. Existing System

8. The Berwick area is served by approximately 40 miles of 69 kV network lines from three regional 230/69 kV substations: the Columbia, Hunlock and Harwood substations. The area has approximately 250 MW of load and approximately 46,200 customers. The Berwick area 69 kV network serves eleven (11) PPL EU distribution substations, six (6) transmission customers, one substation owned by UGI Utilities, Inc. – Electric Division (Koonsville substation), and a fly wheel.[1]

9. The eleven (11) PPL EU distribution substations include the Bloomsburg, Scott, West Berwick, Berwick, Benton, Rohrsburg, West-Bloomsburg, East Danville, Danville, Salem and Point Substations.

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[1] A flywheel is an electric energy storage system that uses a large spinning mass to store electricity as a kinetic energy. When power is needed on the transmission system the kinetic energy is converted back to electricity.

10. The six (6) transmission customers served by the Berwick area 69 kV network lines are: Geisinger Medical Center, Magee Carpets, Big Heart Pet Products, Bercon, Williams Gas, and Benton Foundry.

11. The 69 kV network is also connected to the Beacon Power IPP fly wheel.

12. The current system configuration in the Berwick area is shown in Figure 1-1 to the Necessity Statement for the Project, which is Attachment 1 to this Letter of Notification.

2. Need For The Project

13. The current system configuration results in two primary violations of PPL EU's Federal Energy Regulatory Commission ("FERC") Form 715 criteria. These violations were identified by PPL EU and confirmed by PJM Interconnection LLC ("PJM").

14. PPL EU's transmission planning process is described at length in the Necessity Statement. PPL EU, as a Transmission Owner and member of PJM, undertakes an independent analysis of its transmission facilities in concert with the PJM Regional Transmission Expansion Plan ("RTEP") process. The RTEP is a FERC-approved transmission planning process that results from a comprehensive analysis to identify existing and forecasted violations of North American Electric Reliability Corporation ("NERC"), PJM and PPL EU FERC Form 715 criteria within the PJM footprint.

15. PPL EU identifies all conditions where the future system does not meet the NERC criteria, PJM reliability criteria, or PPL EU's FERC Form 715 criteria. PPL EU provides the results of its independent studies to PJM for consideration and inclusion in the PJM RTEP. Failure to plan, design, and operate the transmission system to these standards may lead to reliability issues and PPL EU would then be non-compliant with NERC, PJM and/or its own planning requirements.

16. During the transmission planning process, PPL EU identified two violations of PPL EU's FERC 715 Form Criteria.

17. The first of the two identified violations of the PPL EU FERC Form 715 Criteria in the Berwick area is a voltage drop of more than 8% on the 69 kV voltage system. This will occur if either a 69 kV or 230 kV bus section circuit breaker at the Columbia Substation fails. It will cause an outage for approximately 46,200 customers. The PPL EU 2017 Summer Peak planning studies indicate that Bloomsburg, Scott, Big Heart Pet Products, West Berwick, Bercon, Berwick, and Salem substations will experience a voltage drop of greater than 8% with the most severe being 19.77% if the bus section circuit breaker at the 69 kV Columbia Substation fails. This will also lead to lower than minimum acceptable voltage (0.893 per unit ("PU")). The PPL EU 2017 Summer Peak planning studies show that the 69 kV Columbia Substation bus section breaker failure will also reduce the Bloomsburg, Scott, Big Heart Pet Products, West Berwick, Bercon, Berwick, and Salem bus voltages to lower than the minimum acceptable voltage (0.893 PU) for the 69 kV system post bus section circuit breaker failure contingency, with the most severe low voltage experienced being 0.76 PU.

18. The second of these violations of the PPL EU FERC Form 715 Criteria is a thermal overload greater than 100% of the emergency rating of a 69 kV line, which will cause an outage for approximately 24,000 customers. The PPL EU 2017 Summer Peak planning studies indicate that there are two contingencies that can result in a thermal overload greater than 100% of the emergency rating. The first contingency is a failure of a bus section circuit breaker at the 69 kV Columbia Substation which results in the Hunlock-Berwick 69 kV line experiencing a thermal overload of 107% of the emergency rating of the line. The second contingency is a double-circuit failure on the Susquehanna-Harwood #1 & #2 230 kV lines which results in the

Hunlock-Berwick 69 kV line experiencing a thermal overload of 115% of the emergency rating of the line.

19. If PPL EU does not appropriately resolve the thermal and voltage violations of the FERC Form 715 Planning Criteria, and there is a failure of the 69 kV or 230 kV bus section circuit breaker at the Columbia Substation or a failure on the Susquehanna-Harwood 230 kV Transmission Line, then a local blackout (loss of Columbia, Harwood, and Hunlock sources), as explained above, would result in prolonged outages for approximately 24,000 to 46,200 customers. It would also leave PPL EU at risk of causing low voltage to thousands of customers. Finally, failure to address the violations will expose PPL EU to equipment damage.

20. The proposed Project is necessary in order to address the identified violations of the PPL EU FERC Form 715 Planning Criteria. It was reviewed and approved by PJM in January 2017, and assigned baseline project number b2838.

21. The Necessity Statement for the Glen Brook Project, Attachment 1 to this Letter of Notification, provides a full discussion of the existing safety and reliability concerns associated with the area.

B. THE PROPOSED PROJECT

22. In order to address the voltage and transmission violations of the PPL EU FERC Form 715 Criteria in the Berwick area, PPL EU plans build a new 230/69 kV substation, and approximately 0.5 miles of new parallel double circuit 230 kV transmission taps to connect the new substation to the transmission system. In addition, the Hunlock-Berwick 69 kV Transmission Line will be reconfigured in order to terminate it into the new substation.

23. To resolve the voltage and transmission violations of the PPL EU FERC Form 715 Criteria described in the prior section, above, PPL EU proposes to build a 230/69 kV substation approximately 4.5 miles from the existing Berwick 69 kV Switchyard. PPL EU will

also undertake additional transmission line work to tie the new substation into the existing system. This includes breaking the existing double-circuit Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines and terminating the four lines into the new Glen Brook Substation. PPL EU will also break the Hunlock-Berwick 69 kV Transmission Line and terminate it into the Glen Brook Substation. Finally, the Company will rebuild the section of the Hunlock-Berwick 69 kV Transmission Line going south of the Glen Brook Substation into a double-circuit and tie it into the existing Columbia-Berwick 69 kV Transmission Line and the Harwood-Berwick 69kV Transmission Line.

24. PPL EU considered two alternatives to the proposed Project, but after a thorough analysis of the costs and benefits of each option, concluded that the proposed Project is the most cost effective and best long-term solution to resolve all of the reliability issues in the Berwick area. The other alternatives considered were either more expensive or fail to resolve all of the reliability concerns and violations. PPL EU's analysis is fully described in Attachment 1 to this Letter of Notification.

25. The new Glen Brook Substation is being constructed to avoid reliability violations and reinforce PPL EU's 230 kV and 69 kV systems serving Luzerne County. To interconnect the Glen Brook Substation to the transmission system, the Company will need to construct approximately 0.5 miles of parallel double circuit 230 kV transmission lines on the new Glen Brook Substation parcel and newly acquired ROW between the substation parcel and the existing double-circuit Montour – Susquehanna and Montour – Susquehanna T10 230 kV Transmission Lines.

26. To interconnect the double-circuit Montour – Susquehanna and the Montour – Susquehanna T10 230 kV lines with the Glen Brook Substation, PPL EU proposes to split the lines into two new double circuit 230 kV transmission lines.

27. The resulting new lines will be referred to as the Montour – Glen Brook #1, Montour – Glen Brook #2, Glen Brook – Susquehanna, and Glen Brook – Susquehanna T10 230 kV Transmission Lines. The new Montour – Glen Brook #1 and Montour – Glen Brook #2 230 kV circuits will occupy common double-circuit structures and will enter the Glen Brook Substation on separate structures. The new Glen Brook – Susquehanna and Glen Brook – Susquehanna T10 230 kV circuits will also occupy common double-circuit structures and will enter the Glen Brook Substation on separate structures.

28. The Project will require the installation of 11 new self-weathering steel monopoles equipped with steel arms and glass 230 kV insulator assemblies. All new poles will be self-supported on concrete caisson foundations. The new structures are expected to range between 105 and 145 feet in height, with an average height of approximately 130 feet. There will be six two-pole angle tension structures and five one-pole tangent suspension structures. Three of the angle tension structures and two of the tangent suspension structures are necessary to interconnect the double-circuit Montour – Glen Brook #1 and Montour – Glen Brook #2 230 kV Transmission Lines with the Glen Brook Substation. The other three angle tension structures and three tangent suspension structures are required to interconnect the double-circuit Glen Brook – Susquehanna and Glen Brook Susquehanna T10 230 kV Transmission Lines with the Glen Brook Substation.

29. Each 230 kV circuit will utilize three conductors (one conductor per phase) and the structures will include two 144-fiber-count Optical Ground Wires ("OPGW"). The

conductors will be 1590 kcmil, 45/7 strand, aluminum conductor steel reinforced conductors. The fiber optic ground wires will be 0.791-inch diameter OPGW.

30. The conductors and OPGWs will be strung in a manner that will comply with the National Electrical Safety Code ("NESC") and maintain safe operating conditions.

31. This Project has significant public benefits. These include improving the safety and reliability of the transmission system, and decreasing unplanned outages and voltage concerns. The Project will produce significant long-term reliability benefits to the Berwick area, and is expected to impact approximately 46,200 customers.

32. The total estimated cost of the proposed Project is $65.7 million which includes approximately 7.2 million for the parallel double circuit 230 kV transmission taps, $39 million for the new Glen Brook Substation, $18.4 million of 69 kV transmission line work and $1.1 million for modifications at the Berwick Substation.[2]

33. Upon Commission approval, the Project is scheduled to commence construction in Fall 2020, to support a project in service date of Winter 2021.

34. The Engineering Description of the proposed Project is provided in Attachment 2 accompanying this Letter of Notification.

III. HEALTH AND SAFETY

35. The proposed Project will not create any unreasonable risk of danger to the public health or safety. The Project will be designed, constructed, operated, and maintained in a manner that meets or surpasses all applicable NESC minimum standards and all applicable legal

[2] The estimated cost for the proposed Project is an order-of-magnitude estimate developed using averages of recent costs for similar projects and without an in-depth analysis or filed investigation. The estimated cost is subject to change as the constructability of the project, sequence of construction, and other factors that may affect cost are identified and analyzed as the project progresses.

requirements. Descriptions of the NESC standards, PPL EU's design criteria, and PPL EU's safety practices are provided in Attachment 4 to this Letter of Notification.

36. Attachment 4 accompanying this Letter of Notification also explains PPL EU's standards for Magnetic Field Management. PPL EU will construct the Project consistent with its Magnetic Field Management Program.

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

38. The closest active airport to the Project area is the Hazleton Regional Airport which is located approximately 13 miles southeast of the Glen Brook Substation. PPL EU does not anticipate any interference with airport operations because the Project is located in an area where there are existing electrical facilities and because the new structures will be of similar height as the existing facilities. Nevertheless, PPL EU will file any required documentation with both the Pennsylvania Department of Transportation, Bureau of Aviation, and the Federal Aviation Administration.

IV. RIGHT-OF-WAY STATUS

39. The Project will be located on PPL EU-owned property and in a new ROW that extends from the Glen Brook Substation property to the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines. An aerial map is provided at the end of Attachment 3 to this Letter of Notification, which depicts the proposed line and associated structures.

40. The Project will be constructed on a new 275-foot wide ROW that is approximately 0.3 miles long and on a portion of the substation site. This ROW was amicably acquired from the same landowner that agreed to sell the substation parcel to PPL EU.

41. The substation parcel is located approximately 0.4 miles from the source 230 kV transmission line and is presently being used as farm land. A description of the substation site is provided in Attachment 3.

42. Vegetative cover located within the proposed Project ROW consists of mature second-growth forest. The natural vegetative cover in this area will need to be removed to ensure safe use of the new power line. Vegetation management will be required to prepare the new ROW and to maintain it in the future. This process will be conducted in accordance with PPL EU's Vegetation Management Program. In areas where vegetation management is required, PPL EU will apply its "*Specifications for Transmission Vegetation Management LA-79827*" to minimize potential impacts.

43. The Project will require the construction of 11 new structures in the ROW. A detailed map of the proposed Glen Brook Substation Connecting Lines alignment and associated structures are provided in Attachment 3.

V. LAND USE AND ENVIRONMENTAL EVALUATION

44. As explained above, construction of the proposed Project will take place in a new ROW that is currently forested and the previously cleared substation property. Some vegetation removal will be required to establish the new ROW, but overall effects on land use are anticipated to be moderate. A detailed description of the substation site, the new 230 kV ROW and the surrounding areas is provided in Attachment 3.

45. PPL EU will use a combination of previously established roads and new access roads for construction and will seek to reduce interference with existing uses and minimize land use impacts to the extent practical. Specifically, the Project will be accessed by using the surrounding state and secondary roads at locations where they intersect or approach the ROW. A

few temporary access roads may be necessary outside the ROW to reach several structure locations. If temporary access roads outside the ROW are necessary, PPL EU will obtain additional land rights from the property owners, as needed.

46. PPL EU is in the initial stage of coordination with the Pennsylvania Historical and Museum Commission ("PHMC") on this Project. PPL EU will coordinate with PHMC as necessary to construct the Project.

47. Erosion and Sedimentation ("E&S") control plans will be developed and implemented for the Project to minimize the displacement of soils. Applicable National Pollutant Discharge Elimination System ("NPDES") permits will also be obtained from the Pennsylvania Department of Environmental Protection ("PADEP"). During construction, PPL EU will adhere to all conditions specified in its NPDES permit. Impacts to local soil resources are anticipated to be minimal.

48. The Project will not span any mapped waterways as the transmission lines extend from the Glen Brook Substation to the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Line ROW.

49. Salem Creek, which is located approximately 0.2 miles east of the Glen Brook Substation, has a PADEP designated classification of Cold Water Fishes ("CWF"), which is not an anti-degradation special protection classification for surface waters. This stream also has a PADEP designated classification of Migratory Fisheries ("MF"), which is an anti-degradation special protection classification for surface waters which provide habitat for the passage, maintenance and propagation of anadromous and catadromous fishes and other fishes which move to or from flowing waters to complete their life cycles in other waters. Additionally, this stream is classified as a Wild Trout (Natural Reproduction) Stream, which is a flowing water in

Pennsylvania that supports naturally reproducing populations of trout. This stream will not be crossed by the Project and no impacts are anticipated.

50. The project is in close proximity to potential wetland areas. Should there be any wetlands or streams in the transmission ROW, PPL EU will avoid impacts where possible by aerially spanning these features. PPL EU will obtain all necessary permits from the PADEP and the United States Army Corps of Engineers and will comply with all of the terms and conditions placed on those permits.

51. The National Flood Hazard Layer ("NFHL") for Pennsylvania was obtained through the Pennsylvania Spatial Data Access database and analyzed for 100-year floodplains within the Project and surrounding areas. The NFHL data incorporates all Flood Insurance Rate Map databases published by the Federal Emergency Management Agency, and any Letters of Map Revision that have been issued against those databases since their publication date. Based on review of this data, the Project will not span any 100-year floodplains along the alignment.

52. The proposed Project will not affect any state or conserved lands. No unique geological, scenic, or natural areas will be impacted by the Project. The *Natural Areas Inventory for Luzerne County*, prepared by the Pennsylvania Natural Heritage Program ("PNHP"), indicates that there are no identified sites located within the Project area.

53. A Project Environmental Review of the Project-related Pennsylvania Natural Diversity Inventory ("PNDI") database has not been completed at this time. Evaluation of the PNDI database will allow PPL EU to review threatened and endangered species that may be encountered within and along the new ROW, including responses provided by federal and state agencies that have protective jurisdiction over the surrounding animals, plants, and ecological communities.

54. Based on the results of the PNDI, PPL EU will consult with the jurisdictional agencies regarding potential impacts to protected species, will obtain all approvals and permits necessary for the construction of the Project, and will comply with all conditions placed on those permits.

VI. NOTICE

55. PPL EU has provided information regarding the Project to representatives of Salem Township and Luzerne County. These entities have not objected to the proposed Project.

56. Copies of this Letter of Notification will be served on the governmental agencies, municipalities, and other public entities and organizations in accordance with 52 Pa. Code § 57.72(d)(3). A list of these entities and organizations is provided in the certificate of service.

57. A copy of this Letter of Notification will be served upon the impacted landowner in accordance with 52 Pa. Code § 57.72(d)(3).

VII. LETTER OF NOTIFICATION

58. PPL EU is proceeding by means of a Letter of Notification, instead of a full Application, pursuant to the Commission's regulations at 52 Pa. Code § 57.72(d)(1)(vi).

59. The proposed Project qualifies for use of a Letter of Notification because the proposed transmission line has a route that is less than two miles long.

60. This Letter of Notification is filed on the date set forth below. As provided in 52 Pa. Code § 57.72(d)(5), the Commission will review and, by order, approve or disapprove this Letter of Notification. If the Commission approves this Letter of Notification, the proposed Project will be constructed as provided herein without the formal application process set forth at 52 Pa. Code §§ 57.71, *et seq.*

VIII. CONCLUSION

WHEREFORE, PPL Electric Utilities Corporation respectfully requests that the Pennsylvania Public Utility Commission approve the proposed Project in Salem Township, Luzerne County, Pennsylvania.

Respectfully submitted,

Jessica R. Rogers/LAB

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Date: August 19, 2019

Attorneys for PPL Electric Utilities Corporation

VERIFICATION

I, DAVID A. QUIER being the DIRECTOR OF ASSET MANAGEMENT at PPL Electric Utilities Corporation, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect PPL Electric Utilities Corporation to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Date: 8/16/2019

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List of Figures

1.0 APPLICATION SUMMARY

PPL Electric Utilities Corporation ("PPL EU") is seeking approval from the Pennsylvania Public Utility Commission ("Commission") to build approximately 0.5 miles of new parallel double circuit 230 kV transmission tap lines ("Connecting Lines") that are necessary to connect the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines to the new Glen Brook Substation (the "Project"). The new 230 kV transmission Connecting Lines and Glen Brook Substation are located in Salem Township, Luzerne County, approximately 4 miles northeast of Berwick, Pennsylvania.

The Project is required to address voltage and thermal violations of PPL EU's transmission planning criteria[1] on its 69 kV transmission system in the Berwick area. These violations were identified by PPL EU and confirmed by PJM Interconnection LLC ("PJM"). Failure to complete this project will prevent PPL EU from complying with its transmission planning criteria and expose approximately 46,200 customers to outages and equipment damage. PJM has approved the Project and assigned it baseline project number b2838.

Pending the Commission's approval, construction will begin in Fall of 2020 with a project in service date of Winter 2021. The total estimated cost of the proposed Project is $65.7 million which includes approximately $7.2 million for the 230 kV transmission taps, $39 million for the new Glen Brook Substation, $18.4 million of 69 kV transmission line work and $1.1 million for modifications at the Berwick Substation.[2]

[1] PPL EU's transmission planning criteria are contained in its FERC Form 715, available at: https://www.pjm.com/-/media/planning/planning-criteria/ppl-planning-criteria.ashx?la=en. The PJM RTEP explicitly includes transmission owner criteria driven projects as Baseline projects.

[2] The estimated cost for the Project is developed using averages of costs for recent similar projects and does not incorporate an in-depth analysis of field conditions. The estimated cost is expected to change as the constructability of the Project, sequence of construction, and other factors are identified and analyzed as the Project progresses. The entire cost for this Project will be paid by PPL EU. Cost recovery of the Project is subject to the jurisdiction of FERC.

2.0 TRANSMISSION SYSTEM PLANNING PROCESS

The transmission grid serves as the backbone for the safe, reliable delivery of electricity over substantial distances from generating stations to customers served by the transmission and local distribution system. It is critically important that this interconnected network be planned and designed to be reliable under all operating scenarios, including peak loading conditions and system contingencies such as scheduled maintenance and unplanned outages.

PPL EU's process for transmission planning ensures that the transmission grid can:

- Accommodate forecasted system flows during summer and winter peak load;
- Adequately serve each customer's need regarding capacity, voltage and reliability for all load levels throughout the daily load cycle;
- Withstand probable contingencies and disturbances with minimal customer service interruptions; and
- Maintain compliance with the North American Electric Reliability Corporation ("NERC"), PJM, and PPL EU's transmission planning criteria, contained in the Federal Energy Regulatory Commission ("FERC") Form 715, for all normal and emergency operating conditions.

To ensure a robust regional transmission system, PJM in coordination with Transmission Owners prepares an annual Regional Transmission Expansion Plan ("RTEP") to identify reliability violations and market congestion drivers. The RTEP[3] is a FERC-approved transmission planning process that results from a comprehensive analysis to identify existing and forecasted violations of NERC, PJM and PPL EU's FERC Form 715 criteria within the PJM footprint.

- 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 North

[3] PJM's RTEP process is currently set forth in Schedule 6 of PJM's Amended and Restated Operating Agreement ("Schedule 6"). Schedule 6 governs the process by which PJM's members rely on PJM to prepare an annual regional plan for the enhancement and expansion of the transmission facilities to ensure long-term, reliable electric service consistent with established reliability criteria. In addition, Schedule 6 addresses the procedures used to develop the RTEP, the review and approval process for the RTEP, the obligation of transmission owners to build transmission upgrades included in the RTEP, and the process by which interregional transmission upgrades will be developed.

American power grid. NERC is subject to oversight by FERC and has the legal authority to enforce its reliability standards with monetary fines and increased oversight.

- PJM is a regional transmission organization responsible for certain planning functions. PJM incorporates NERC standards and analyzes thermal, voltage, short circuit, and stability limits on the transmission system.

- PPL EU also incorporates NERC standards in its FERC-filed (Form 715) transmission planning criteria. These criteria also address utility-specific needs such as providing reliable electric service to load and planning for long-term reliability and resiliency issues.

PJM and PPL EU use NERC reliability standards, PJM reliability planning criteria, and the planning criteria contained in PPL EU's FERC Form 715 to analyze the system and determine the specific transmission upgrade projects that are needed to ensure short-term and long-term reliable electric service to customers.

For facilities identified by NERC as Bulk Electric System[4] ("BES") facilities, PJM conducts RTEP studies in conjunction with PPL EU and applies NERC transmission planning standards and/or PJM reliability criteria to specific conditions on the transmission system. These studies which are outlined in PJM Manual 14B[5], include Load Deliverability, Generator Deliverability, Baseline System N-1, N-1-1, Light Load, and Stability analyses that check for both thermal and voltage violations. When any of these analyses show an inability of the transmission system to meet a specific reliability standard under these conditions (e.g. PJM or PPL EU thermal, voltage, or load loss criteria), PJM will document the reliability concern and seek solutions to address the problem per the process documented under Schedule 6.

[4] Bulk Electric System as defined by NERC:
https://www.nerc.com/PA/RAPA/BES%20DL/BES%20DEFINITION%20APPROVED%20BY%20FERC%203-20-14.PDF

[5] PJM Manual 14B is available at http://www.pjm.com/~/media/documents/manuals/m14b.ashx

PJM also conducts a preliminary assessment of the reliability concerns for Non-Bulk Electric (non-BES) facilities. PJM then provides the RTEP cases to the respective local Transmission Owners ("TOs") (such as PPL EU). The TOs are then responsible for verifying any reliability violations identified by PJM, and also any other reliability violations based on their own local Transmission Owner planning criteria contained in FERC Form 715.

PPL EU, as a Transmission Owner and member of PJM, undertakes an independent analysis of both its BES transmission facilities, and its non-BES transmission facilities in concert with the PJM RTEP process. PPL EU identifies all conditions where the future system does not meet the NERC criteria, PJM reliability criteria, or PPL EU's FERC Form 715 criteria. PPL EU provides the results of its independent studies to PJM for consideration and inclusion in the PJM RTEP. Failure to plan, design, and operate the transmission system to these standards may lead to reliability issues and PPL EU would be non-compliant with NERC, PJM and PPL EU's FERC Form 715 criteria requirements.

Projects required to address reliability violations under NERC, PJM and/or a Transmission Owner's FERC Form 715 criteria are called baseline projects.

3.0 THE NEED FOR THE PROJECT

3.1 Project Background

During the transmission planning process, PPL EU identified two violations of PPL EU's FERC 715 Form Criteria. The first of the two identified violations of the PPL EU FERC Form 715 Criteria in the Berwick area is a voltage drop of more than 8% on the 69 kV voltage system. The second of these violations of the PPL EU FERC Form 715 Criteria is a thermal overload greater than 100% of the emergency rating of a 69 kV line. This Project is needed to address those violations.

3.2 Existing System Configuration

The Berwick area is served by approximately 40 miles of 69 kV network lines from three regional 230/69 kV substations: the Columbia, Hunlock and Harwood substations. The area has approximately a 250 MW load and 46,200 customers. The Berwick area 69 kV network serves 11 PPL EU distribution substations, 6 transmission customers, one substation owned by UGI Utilities, Inc. – Electric Division (Koonsville Substation) and a fly wheel.[6] The 11 PPL EU distribution substations include the Bloomsburg, Scott, West Berwick, Berwick, Benton, Rohrsburg, West-Bloomsburg, East Danville, Danville, Salem and Point Substations. The 6 transmission customers served by the Berwick area 69 kV network lines are: Geisinger Medical Centre, Magee Carpets, Big Heart Pet Products, Bercon, Williams Gas and Benton Foundry. The 69 kV network is also connected to Beacon Power Independent Power Producers ("IPP") fly wheel.

A one-line diagram of the existing system is provided as **Figure 1-1**. An overview map of the existing system is provided as **Figure 1-2**.

3.3 PPL EU's FERC Form 715 criteria Violations and Reliability Risks

PPL EU is committed to operating a safe and reliable transmission system. However, the current system configuration results in the following violations of PPL EU's FERC Form 715 criteria:

1. Voltage drops of more than 8% on the 69 kV voltage system if the 69 kV or 230kV bus section circuit breaker at the Columbia Substation fails causing an outage for approximately 46,200 customers.

    a. PPL EU 2017 Summer Peak planning studies indicate that Bloomsburg, Scott, Big Heart Pet Products, West Berwick, Bercon, Berwick, and Salem substations will experience a voltage drop of greater than 8% with the most severe being 19.77% if the 69 kV or 230 kV bus section circuit breaker fails at Columbia Substation.

    b. PPL EU 2017 Summer Peak planning studies show that the 69 kV Columbia Substation bus section breaker failure will also reduce the Bloomsburg, Scott, Big

[6] A flywheel is an electric energy storage system that uses a large spinning mass to store electricity as a kinetic energy. When power is needed on the transmission system the kinetic energy is converted back to electricity.

Heart Pet Products, West Berwick, Bercon, Berwick, and Salem bus voltages to lower than the minimum acceptable voltage (0.893 PU) for the 69 kV system if the 69 kV bus section circuit breaker fails. The most severe low voltage experienced would be 0.76 PU.

2. Thermal overload greater than 100% of the emergency rating of a 69 kV line causing an outage for approximately 24,000 customers.

    a. PPL EU 2017 Summer Peak planning studies indicate that the Hunlock-Berwick ("HUNL-BERW") 69 kV line will experience a thermal overload of 107% of the emergency rating of the line if the bus section circuit breaker at the 69 kV Columbia Substation fails.

    b. PPL EU 2017 Summer Peak planning studies indicate that the HUNL-BERW 69 kV line will experience a thermal overload of 115% of the emergency rating of the line if there were a double-circuit failure on the Susquehanna-Harwood #1 & #2 230 kV lines.

3.4 Public Health and Safety

Failure to appropriately resolve the thermal and voltage violations of PPL EU's FERC Form 715 Criteria in this area would leave PPL EU at risk of causing low voltage to thousands of customers and potentially put PPL EU in violation of its regulatory obligation to adequately plan its transmission system. A local blackout (loss of Columbia, Harwood, and Hunlock sources), as explained above, would result in prolonged outages for 46,200 customers

4.0 FUNCTIONAL ALTERNATIVES

PPL EU analyzed three alternatives to resolve the thermal and voltage transmission violations described above. The three alternatives considered included:

1) Alternative 1: Rebuild approximately 16 miles of the Harwood-Berwick 69 kV line, 15 miles of the Hunlock-Berwick 69 kV line and install 9 miles of a second circuit on the existing Columbia-Berwick 69 kV line. Expand the Berwick 69 kV Switchyard to support an additional line terminal for the future second circuit on the Columbia-Berwick 69 kV line and install a 69 kV capacitor bank at the Berwick Switchyard.

2) Alternative 2: Rebuild approximately 16 miles of the Harwood-Berwick 69 kV line, 15 miles of the Hunlock-Berwick 69 kV line and install 9 miles of a second circuit on the existing Columbia-Berwick 69 kV line. Expand the Berwick 69 kV switchyard to support an additional line terminal for the future second circuit on the Columbia-Berwick 69 kV line and rebuild the Columbia 230-69 kV Substation to a breaker and a half

configuration.

3) Alternative 3: Build a new 230-69 kV substation (Glen Brook), break existing Montour-Susquehanna 230 kV and Hunlock – Berwick 69 kV line to terminate into the Glen Brook Substation, and rebuild a section of an existing 69 kV line.

Detailed analysis of each of the three alternatives is provided below.

4.1 Alternative 1: Rebuild 69 kV lines, install a 69 kV capacitor bank at the Berwick Switchyard and terminate another 69 kV line into the Berwick Switchyard.

This alternative increases the conductor capacity on all three 69 kV circuits that terminate into Berwick Switchyard and provides an additional 69 kV source to the area. This will lessen the voltage drop concerns.

However, this alternative does not resolve all the voltage issues in the area. Additionally, the Berwick switchyard does not have the space to support the addition of a capacitor bank. Furthermore, the right of way limitations in the Berwick urban area limit PPL EU's ability to route a second circuit into the Berwick Switchyard.

The estimated cost for this alternative is approximately $101 million. This alternative is not a preferred solution because it does not fully resolve the reliability violations, and costs more than the preferred solution.

4.2 Alternative 2: Rebuild the Columbia 230-69 kV Substation and terminate another 69 kV line into the Berwick Switchyard.

This alternative increases the conductor capacity on all three 69 kV circuits that terminate into Berwick Switchyard, provides an additional 69 kV circuit in the area, and provides voltage support at the Berwick 69 kV Switchyard. It would mitigate all the concerns driving the need for this project.

However, this alternative has right of way limitations in the Berwick urban area limiting PPL EU's ability to route a second circuit into the Berwick Switchyard. Additionally, reconfiguration of the Columbia Substation would require the acquisition of new land.

The estimated cost for this alternative is approximately $122 million. This alternative is not a preferred solution due to its cost, and for the reasons stated above.

4.3 Alternative 3: Build a new 230-69 kV substation (Glen Brook), break existing

230 kV and 69 kV lines to terminate into the Glen Brook Substation, and rebuild a section of an existing 69 kV line.

This alternative includes building a 230/69 kV substation and completing the following associated transmission line work to tie the new substation into the existing system:

- Breaking the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines and terminating these four lines into the new Glen Brook Substation.
- Breaking the Hunlock-Berwick 69 kV Transmission Line and terminating it into the Glen Brook Substation.
- Rebuilding the section of the Hunlock-Berwick 69 kV line going south of the Glen Brook Substation to a double-circuit and tying it into the existing Columbia-Berwick 69 kV line and the Harwood-Berwick 69 kV line.

The estimated cost for this alternative is approximately $65.7 million. This alternative is the preferred solution, because it resolves all of the identified reliability violations, is a long-term solution, and is the most cost-effective solution.

5.0 PROPOSED SOLUTION

Based on an evaluation of the three alternatives, PPL EU concluded that building the new Glen Brook 230-69 kV Substation represents the most cost effective and best long-term solution to resolve all the reliability issues in the Berwick area. The Project will involve constructing a new 230-69 kV substation (Glen Brook) approximately 4.5 miles from the existing Berwick 69 kV Switchyard. All other alternatives are either more expensive or fail to resolve all the reliability concerns and violations.

A one-line map of the proposed system is provided as **Figure 1-3**. An overview map of the proposed system is provided as **Figure 1-4**.

Figure 1-1: Existing One-Line Diagram

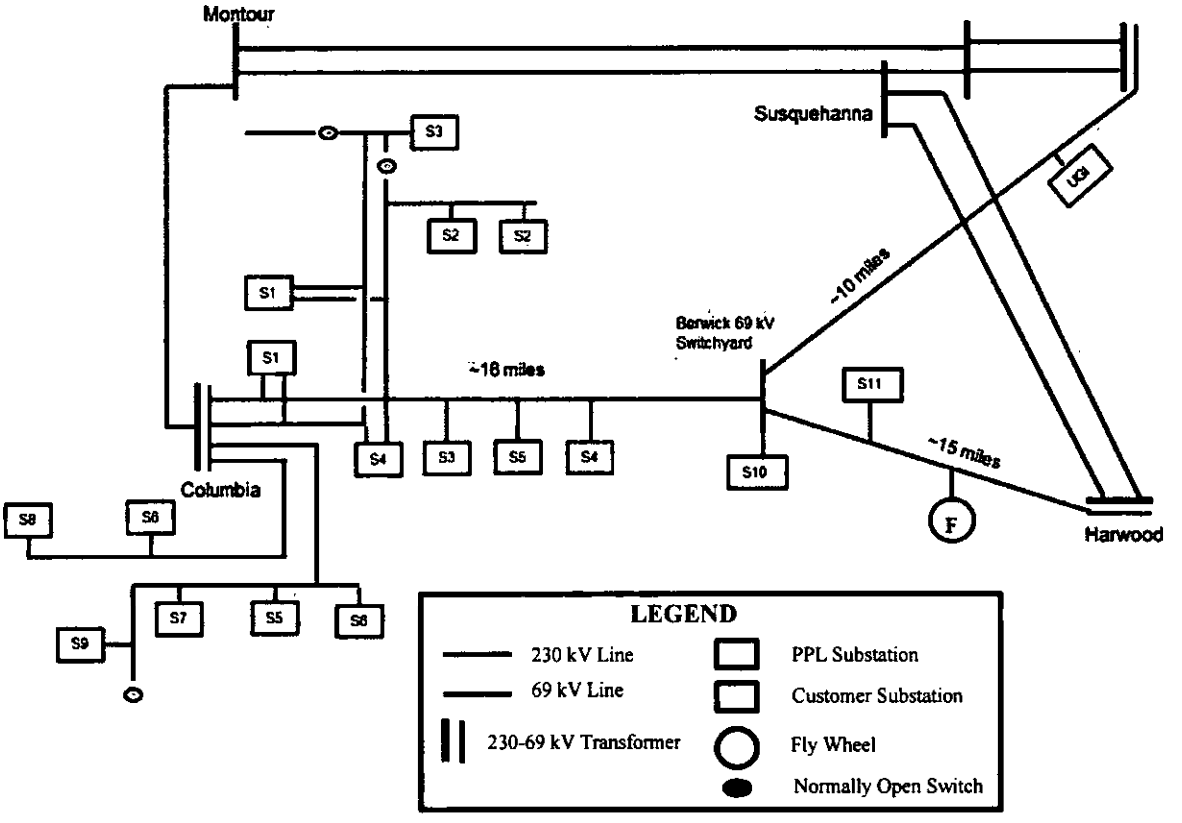


Figure 1-2: Existing System Map

Figure 1-3: Proposed One-Line Diagram

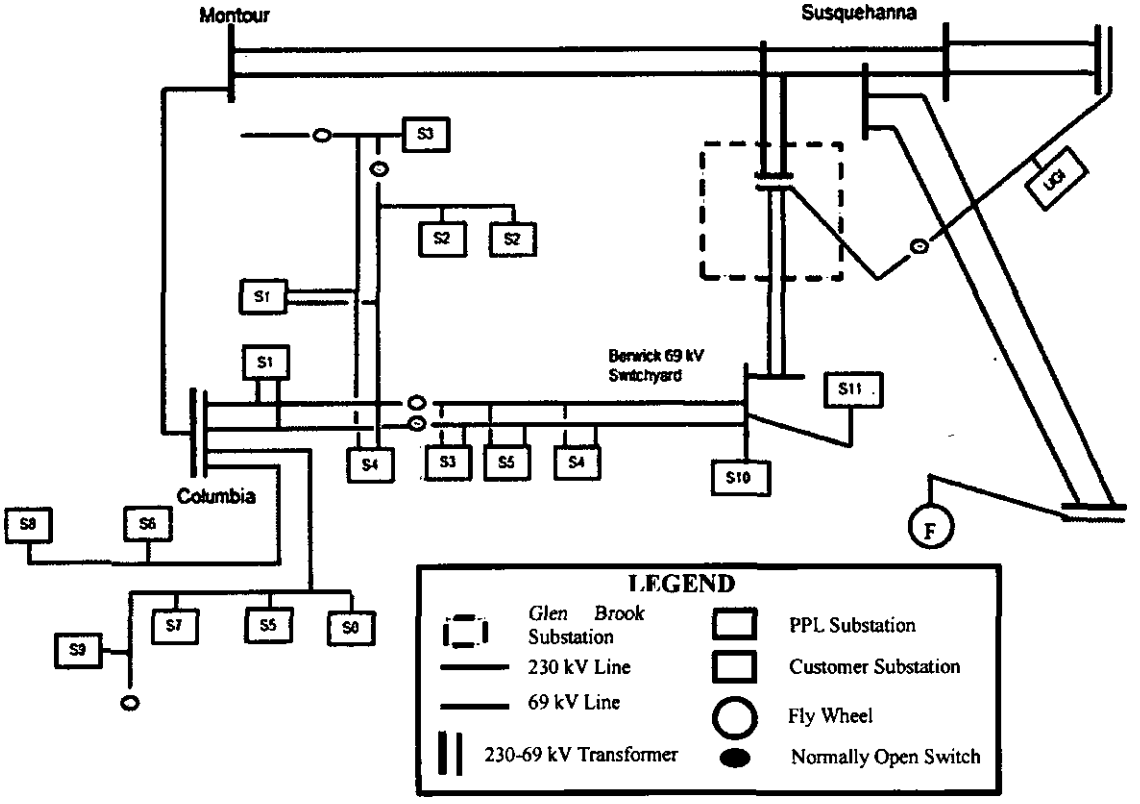
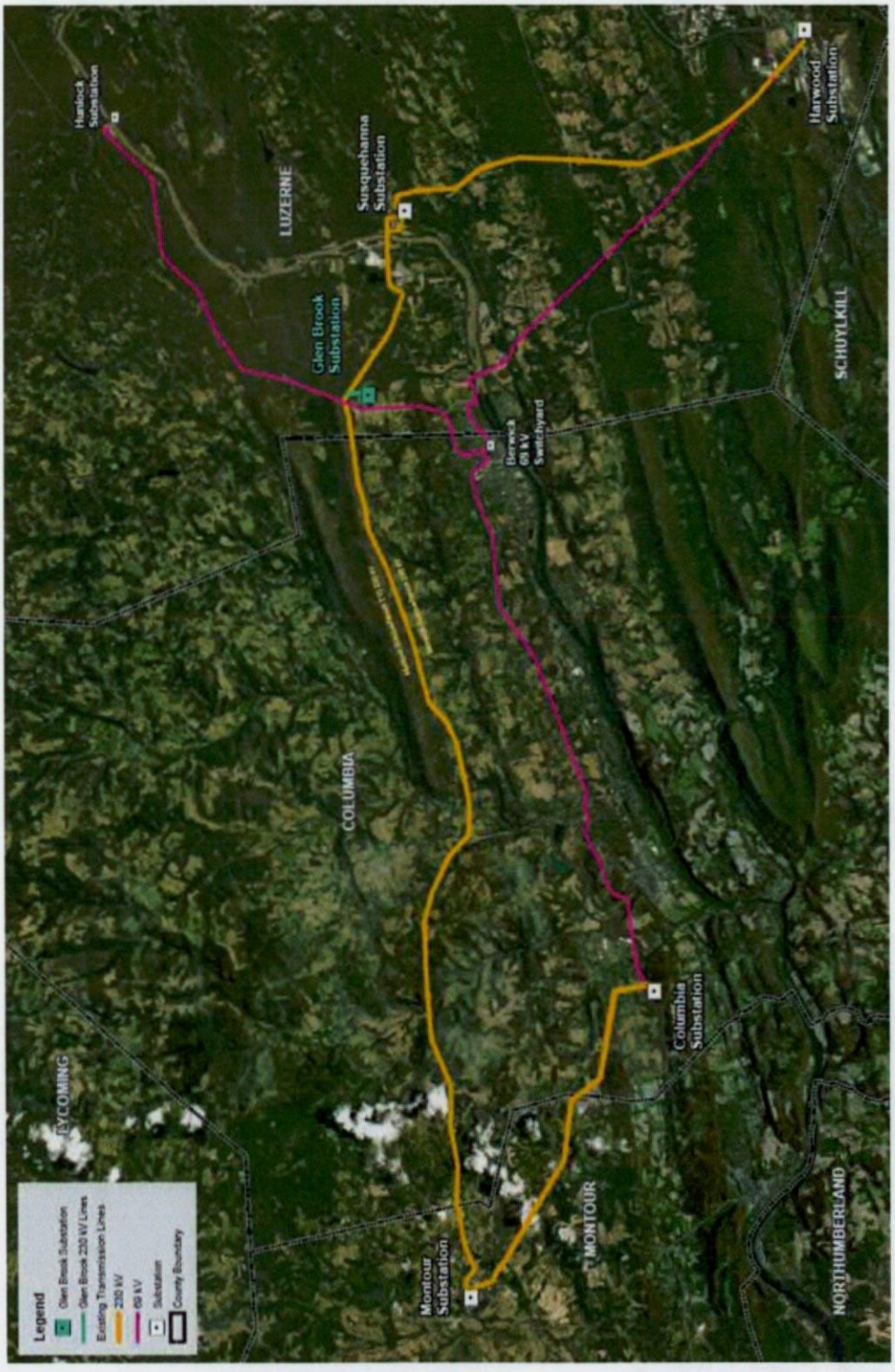


Figure 1-4: Proposed System Map



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1.0 INTRODUCTION

PPL Electric Utilities Corporation ("PPL EU") proposes to construct the new Glen Brook Substation approximately 0.5 miles south of the Montour-Susquehanna 230 kV and the Montour-Susquehanna T10 230 kV lines in Salem Township, Luzerne County, Pennsylvania to address violations of PPL EU's FERC Form 715 criteria. As explained in **Attachment 1**, PPL EU seeks approval from the Pennsylvania Public Utility Commission ("PUC" or the "Commission") to construct approximately 0.5 miles of new parallel double-circuit 230 kV transmission connecting lines to interconnect the Glen Brook Substation with the existing 230 kV transmission lines (the "Project")[1].

An aerial exhibit showing the location of the proposed facilities is provided in **Figure 3-1 to Attachment 3.**

2.0 DESCRIPTION OF THE PROPOSED PROJECT

PPL EU proposes to construct the new Glen Brook Substation to avoid a reliability violation and reinforce its 230 kV and 69 kV systems serving Luzerne County. To interconnect the Glen Brook Substation, PPL EU requests Commission approval to construct approximately 0.5 miles of parallel double-circuit 230 kV transmission lines on the new Glen Brook Substation parcel and in the newly acquired right of way between the substation parcel and the existing double-circuit Montour-Susquehanna and Montour-Susquehanna T10 230 kV Transmission Lines.

To interconnect the double-circuit Montour- Susquehanna and the Montour-Susquehanna T10 230 kV lines with the Glen Brook Substation, PPL EU proposes to split these lines and construct approximately 0.5 miles of two new double-circuit 230 kV transmission lines. The resulting new lines will be referred to as the Montour-Glen Brook #1,

[1] The project also includes breaking the Hunlock-Berwick 69 kV Transmission Line and terminating it into the Glen Brook Substation, and rebuilding the section of the Hunlock-Berwick 69 kV line going south of the Glen Brook Substation to double-circuit and tying it into the existing Columbia-Berwick 69 kV line and the Harwood-Berwick 69 kV line.

Montour-Glen Brook #2, Glen Brook-Susquehanna, and Glen Brook-Susquehanna T10 230 kV Transmission Lines. The new Montour-Glen Brook #1, and Montour-Glen Brook #2 230 kV circuits will occupy common double-circuit structures and will enter the Glen Brook Substation on separate structures. The new Glen Brook-Susquehanna and Glen Brook-Susquehanna T10 230 kV circuits will occupy common double-circuit structures and will enter the Glen Brook Substation on separate structures.

The new 230 kV transmission lines will consist of self-weathering steel monopoles equipped with steel arms and glass 230 kV insulator assemblies. All new poles will be self-supported on concrete caisson foundations. The new structures are expected to range between 105 and 145 feet in height, with an average height of approximately 130 feet. **Figures 2-1 through 2-5** depict typical structure types that will be used for the Project.

The approximately 0.5 miles of new parallel double-circuit 230 kV transmission lines will be located and constructed entirely on the newly acquired PPL EU-owned property and right of way and will require the construction of 11 new structures comprised of six two-pole angle tension structures and five one-pole tangent suspension structures. Three of the angle tension structures and two of the tangent suspension structures are necessary to interconnect the double-circuit Montour-Glen Brook #1 and Montour-Glen Brook #2 230 kV Transmission Lines with the Glen Brook Substation. The other three angle tension structures and three tangent suspension structures are required to interconnect the double-circuit Glen Brook-Susquehanna and Glen Brook-Susquehanna T10 230 kV Transmission Lines with the Glen Brook Substation.

Each 230 kV circuit will utilize three conductors (one conductor per phase) and the structures will include two 144-fiber-count Optical Ground Wires ("OPGW"). The conductors will be 1590 kcmil, 45/7 strand, aluminum conductor steel reinforced ("ACSR") conductors. The fiber optic ground wires will be 0.791-inch diameter OPGW.

The proposed lines will be designed according to, and generally exceed, all National Electrical Safety Code ("NESC") minimum standards. The minimum conductor-to-

ground clearance will be 25.5 feet, which occurs at a maximum conductor temperature of 125°C. The design minimum conductor clearances and conductor thermal ratings for the proposed 230 kV lines are shown in **Tables 2-1 and 2-2.** Design specifications and safety rules practiced by PPL EU are included in **Attachment 4.**

Table 2-1: Design for Minimum Conductor Clearances for 1590 kcmil 45/7 Strand ACSR[2]

Condition	Transmission Double-Circuit Design Clearance-to-Ground
Heavy Ice (1.5" Ice at 0°C ambient temperature)	25.5 feet
Predicted extreme thermal load (125°C conductor temperature)	25.5 feet
Predicted blowout (6 lbs., 16°C, ambient temperature)	25.5 feet

Table 2-2: Conductor Thermal Rating for 1590 kcmil 45/7 Strand ACSR 125°C Maximum Conductor

Condition	Ambient Temperature (°C)	Wind Speed (Ft./sec)	Ampacity (Amps)
Summer Normal	35	0	1671
Winter Normal	10	0	1925
Summer Emergency	35	2.533	2063
Winter Emergency	10	2.533	2323

[2] Clearances based on an initial maximum tension of 6,000-10,000 pounds at ½ inch ice, 0°F, 4# wind and maximum ruling span of 200-1,250 feet.

Figure 2-1. Typical Double-Circuit 230 kV Two-Pole Angle Suspension Structure

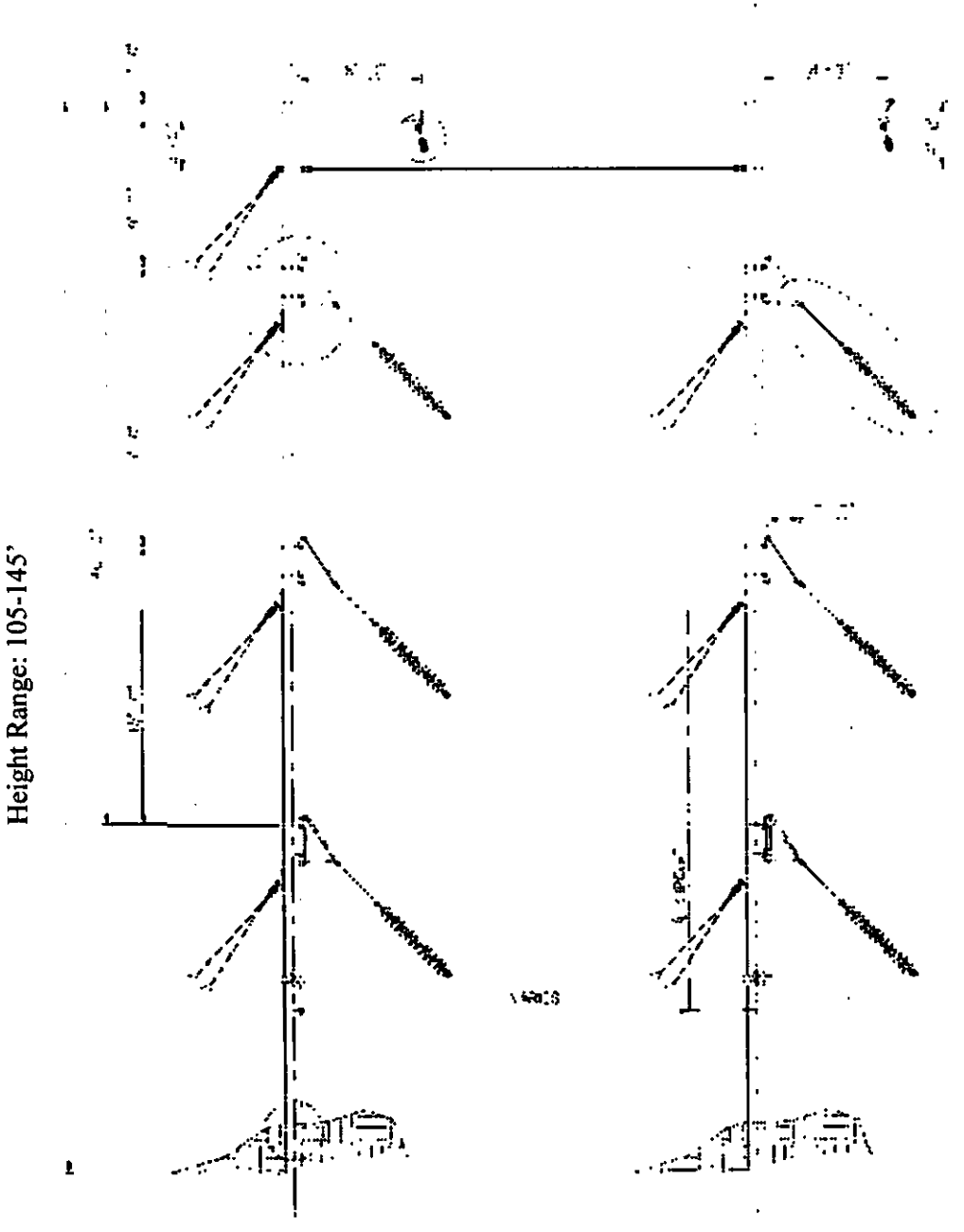


Figure 2-2. Typical Double-Circuit 230 kV Single Pole Angle Suspension Structure

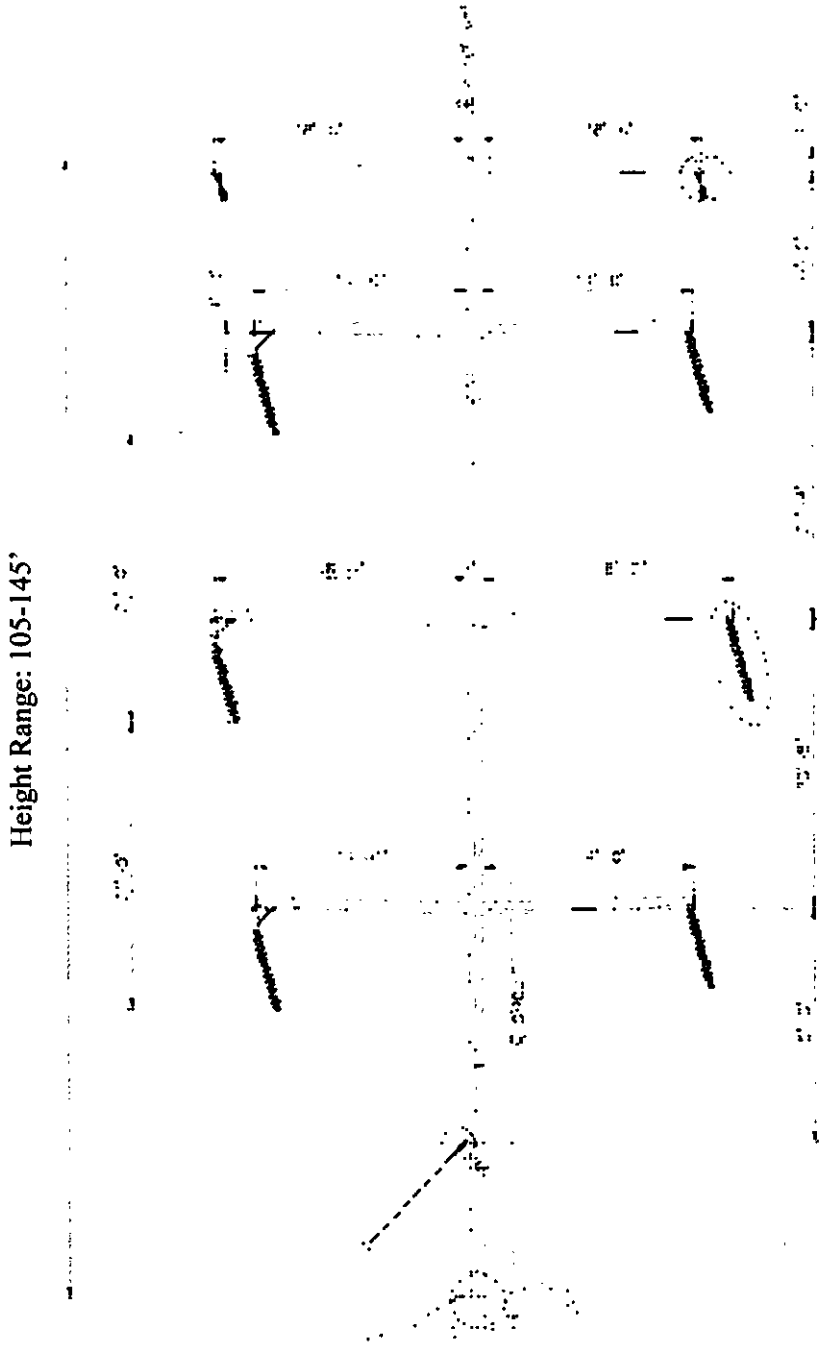


Figure 2-3. Typical Double-Circuit 230 kV Angle Tension Structure

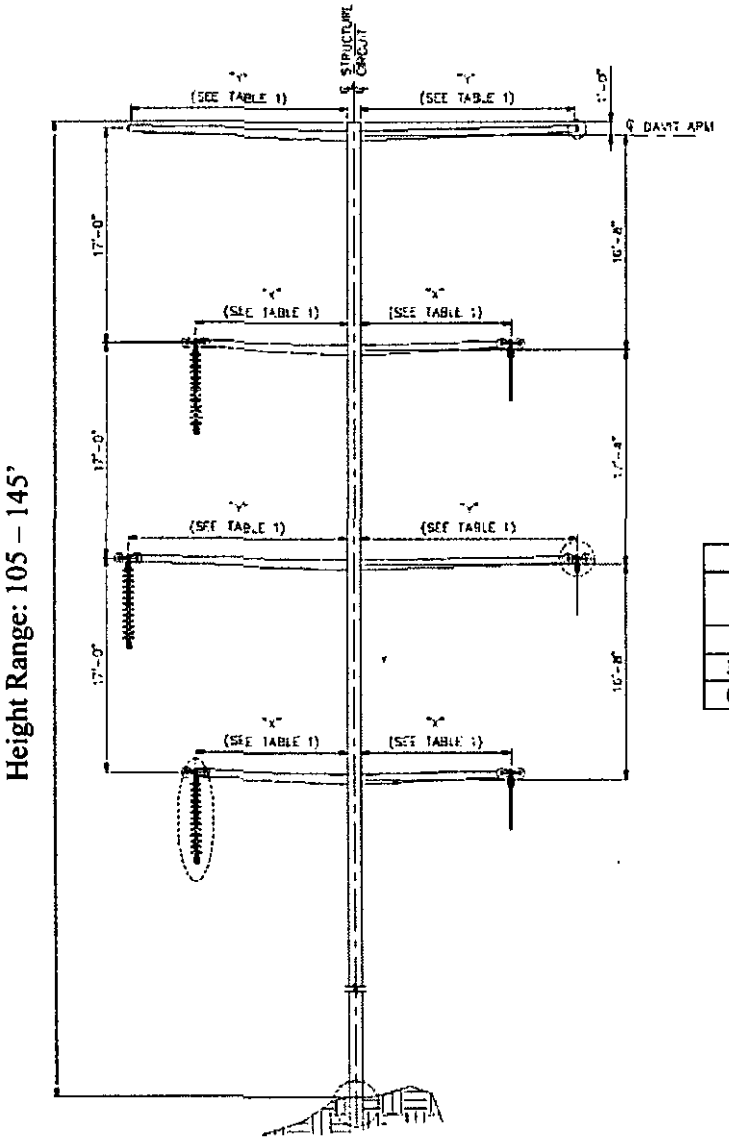
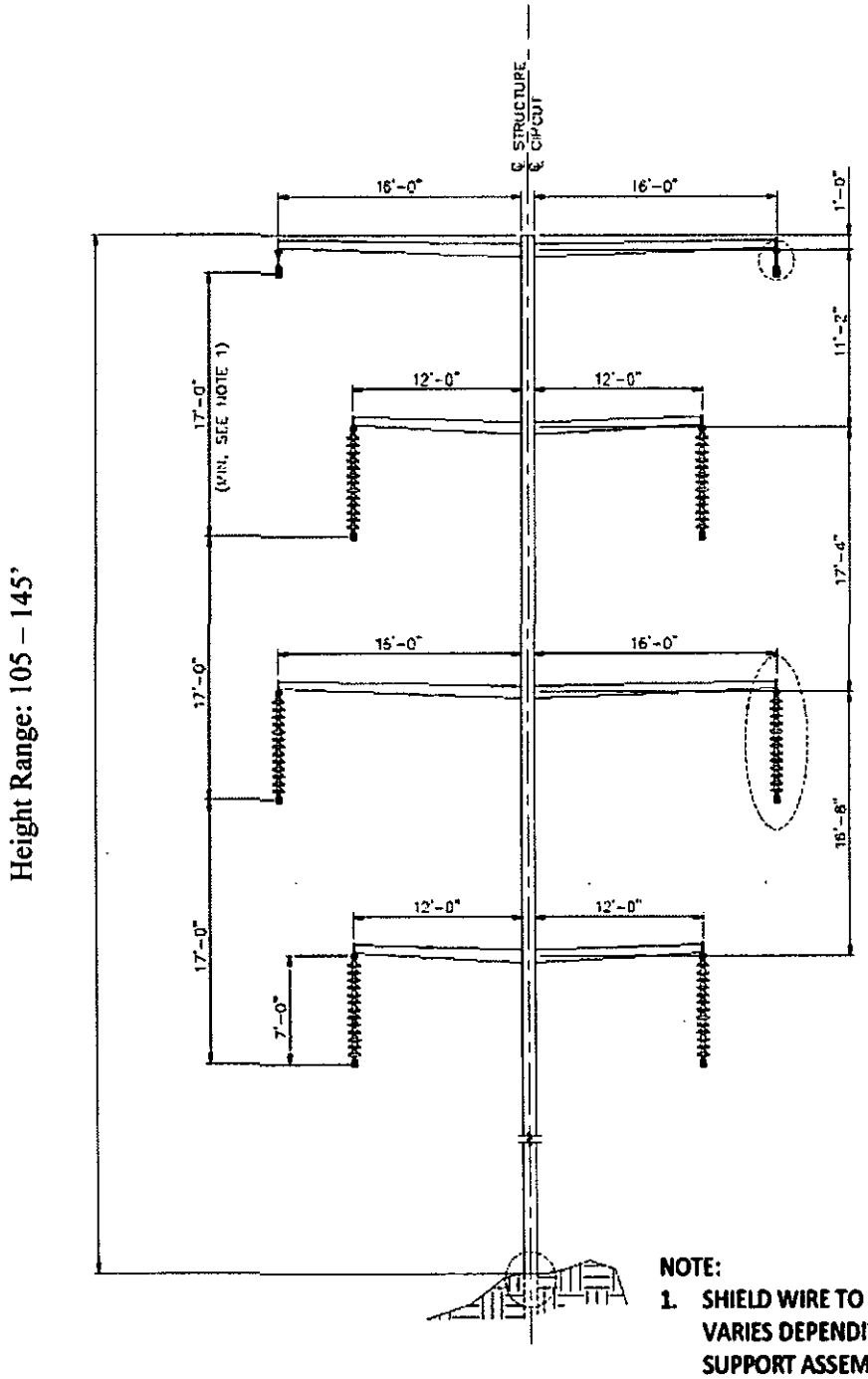


TABLE 1		
LINE ANGLE	DAVIT ARM LENGTH "X"	DAVIT ARM LENGTH "Y"
0° - 30°	12'-0"	16'-0"
31° - 60°	14'-0"	18'-0"
61° - 90°	17'-0"	21'-0"

Figure 2-4. Typical Double-Circuit 230 kV Tangent Suspension Structure



NOTE:

1. **SHIELD WIRE TO CONDUCTOR SPACING VARIES DEPENDING ON SHIELD WIRE SUPPORT ASSEMBLY.**

Figure 2-5. Typical Double-Circuit 230 kV Two-Pole Angle Tension Structure

Height Range: 105 – 145'

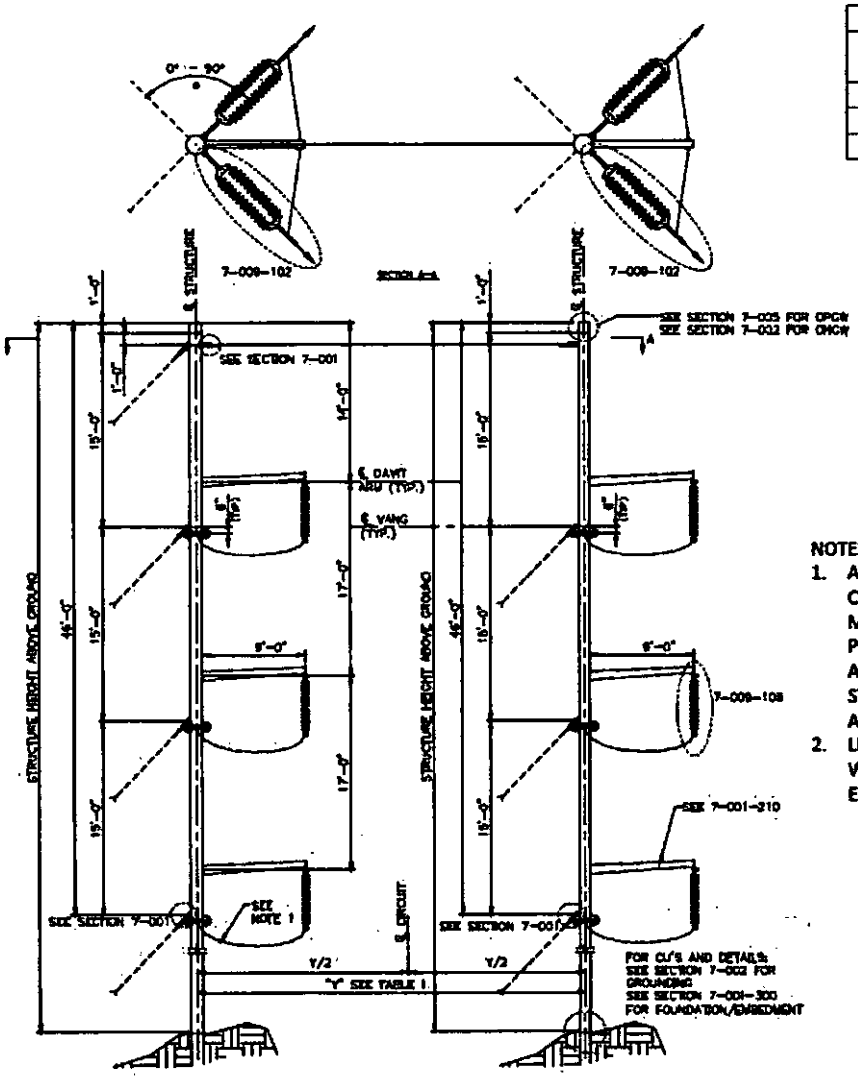


TABLE 1	
LINE ANGLE	POLE SPACING "Y"
0° - 30°	24'-0"
31° - 60°	28'-0"
61° -90°	34'-0"

NOTES:
1. A MINIMUM 74 3/4 INCH CLEARANCE SHALL BE MAINTAINED FROM ANY POINT ON THE JUMPER TO ANY GROUNDED STRUCTURAL COMPONENTS AND HARDWARE.
2. LINE ANGLE MAY EXCEED 90° WITH APPROVAL FROM PPL ENGINEERING/STANDARDS.

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1.0 DESCRIPTION OF PROJECT AREA

As explained in **Attachment 1**, PPL Electric Utilities Corporation ("PPL EU") is seeking approval from the Pennsylvania Public Utility Commission ("Commission") to build approximately 0.5 miles of new parallel double-circuit 230 kV transmission lines ("Connecting Lines") that are necessary to connect the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines to the new Glen Brook Substation (the "Project")[1]. The new 230 kV transmission connecting lines and Glen Brook Substation will be located in Salem Township, Luzerne County, approximately 4 miles northeast of Berwick, Pennsylvania.

The Connecting Lines will be located on PPL EU-owned property and in a new right of way ("ROW") corridor that extends from the Glen Brook Substation property to the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Lines. The Project will require the construction of 11 new structures (see **Attachment 2** for details). A combination of existing access roads and new access roads will be utilized during construction of the Project. A detailed map of the proposed Glen Brook Substation Connecting Lines alignment and associated structures are provided in **Figure 3-1**.

The Glen Brook Substation parcel is located approximately 0.4 miles from the source 230 kV transmission line. The parcel for this project is approximately 30 acres, and is being purchased by PPL EU. The property is presently being used as farm land.

From the Glen Brook 230-69 kV Substation property, the Project travels north for approximately 0.3 miles through a forested area before intersecting with the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Line ROW as shown in **Figure 3-1**.

[1] The project also includes breaking the Hunlock-Berwick 69 kV Transmission Line and terminating it into the Glen Brook Substation, and rebuilding the section of the Hunlock-Berwick 69 kV line going south of the Glen Brook Substation to double-circuit and tying it into the existing Columbia-Berwick 69 kV line and the Harwood-Berwick 69 kV line.

2.0 LAND USE

PPL EU evaluated the existing land uses on the PPL EU-owned Glen Brook Substation property, within the new 275-foot wide ROW, and within 0.25 mile (1,320 feet) of the ROW. These areas were reviewed to provide a general sense of the landscape of the Project area. Land uses were determined based on the 2011 National Land Cover Data ("NLCD") and field reviews.

Assessment of the data shows that agricultural and forested areas are the dominant land uses, accounting for 90% of the review area. Low density development and associated open space is noted across 10% the review area.

Impacts to land use are anticipated to be moderate because the Project will involve creating a new ROW through a forested area that will need to be cleared. The Project will be accessed by using the surrounding state and secondary roads at locations where they intersect or approach the ROW. A few temporary access roads may be necessary outside the ROW to reach several structure locations. Where temporary access roads outside the ROW are necessary, PPL EU will obtain additional land rights from the property owners, as needed. PPL EU will use and update previously established access roads within the ROW for construction to the extent practical to further reduce impacts to existing land uses. Where existing access roads are not available, PPL EU will construct new access roads.

State and Conserved Lands

No state or conserved lands are located in the review area.

Airports

The Hazleton Regional Airport is located approximately 13 miles southeast of the Glen Brook Substation; other smaller private airfields may be located closer. PPL EU does not anticipate any interference with airport operations because the Project is located in an area where there are the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission

Lines and because the new structures will be of similar height as the existing facilities. However, PPL EU will comply with any applicable requirements of the Federal Aviation Administration and the Pennsylvania Department of Transportation, Bureau of Aviation.

Cultural Resources

PPL EU is in the initial stage of coordination with the Pennsylvania Historical and Museum Commission ("PHMC") for the construction of the new Glen Brook Substation and Connecting Lines. PPL EU will coordinate with PHMC, if required as part of the regulatory review process necessary to construct the Project.

3.0 ENVIRONMENTAL FACTORS

Environmental factors reviewed for the Project included unique natural features, soils, waterways, wetlands, 100-year floodplains, vegetation, and threatened and endangered species.

Unique Natural Features

No unique geological, scenic, or natural areas are located within the Project review area.

Soils

Erosion and sedimentation control plans will be developed and implemented for the Project to minimize the displacement of soils. These plans will require prior approval from the local county conservation district. National Pollutant Discharge Elimination System ("NPDES") permits will be obtained from the Pennsylvania Department of Environmental Protection ("PADEP"), as needed. Any conditions of the NPDES permit will be adhered to as part of the construction process. As such impacts to local soil resources are anticipated to be minimal.

Waterways

The Connecting Lines will not span any mapped waterways as they extend from the Glen Brook Substation to the existing Montour-Susquehanna 230 kV and Montour-Susquehanna T10 230 kV Transmission Line ROW.

Salem Creek, which is located approximately 0.2 miles east of the Glen Brook Substation, has a PADEP designated classification of Cold Water Fishes ("CWF"), which is not anti-degradation special protection classification for surface waters. This stream also has a PADEP designated classification of Migratory Fisheries ("MF"), which is an anti-degradation special protection classification for surface waters which provide habitat for the passage, maintenance and propagation of anadromous and catadromous fishes and other fishes which move to or from flowing waters to complete their life cycles in other waters. Additionally, this stream is classified as a Wild Trout (Natural Reproduction) Stream, which are flowing waters in Pennsylvania that support naturally reproducing populations of trout.

This stream will not be crossed by the Project and no permanent impacts are anticipated. Construction activities will be conducted in accordance with an approved erosion and sedimentation control plan to minimize the effects of stormwater runoff. PPL EU will obtain all required approvals and permits necessary for the construction of the Project and will comply with any required conditions placed on those permits.

Wetlands

For federal and state permitting purposes, the wetlands and waterways within the Project area will be delineated, surveyed, and illustrated according to applicable regulatory standards.

PPL EU will avoid impacts to wetlands and streams where possible by aerially spanning these features. PPL EU will obtain all necessary permits from the PADEP and the United States Army Corps of Engineers and will comply with all of the terms and conditions placed on those permits.

100-year Floodplains

The National Flood Hazard Layer ("NFHL") for Pennsylvania was obtained through the Pennsylvania Spatial Data Access ("PASDA") database and analyzed for 100-year floodplains within the Project area and surrounding landscape. The NFHL data incorporates all Flood Insurance Rate Map ("FIRM") databases published by the Federal Emergency Management Agency ("FEMA"), and any Letters of Map Revision ("LOMRs") that have been issued against those databases since their publication date.

The new Glen Brook Substation and Connecting Lines ROW will not span any 100-year floodplains along the alignment.

Vegetation

Vegetative cover located within the proposed Project ROW consists of mature second-growth forest. The natural vegetative cover in this area will need to be removed to ensure safe use of the new power line.

Vegetation management will be required to construct the new double-circuit Connecting Lines ROW. This process will be conducted in accordance with PPL EU's Vegetation Management Program. In areas where vegetation management is required, PPL EU will apply its "*Specifications for Transmission Vegetation Management LA-79827*" to minimize potential impacts.

Natural Areas Inventory

The *Natural Areas Inventory for Luzerne County*, prepared by the Pennsylvania Natural Heritage Program ("PNHP"), indicates that there are no identified sites located within the Project area.

Threatened and Endangered Species

Review of the threatened and endangered species that may be encountered within and along the new Connecting Lines ROW will include evaluation of Project-related Pennsylvania Natural Diversity Inventory ("PNDI") responses provided by federal and state agencies that have protective jurisdiction over the surrounding animals, plants, and ecological communities.

A Project Environmental Review of the PNDI database has not been completed at this time. Based on the results of the PNDI, PPL EU will initiate consultation with the jurisdictional agencies regarding potential impacts to protected species. PPL EU will obtain all approvals and permits necessary for the construction of the Project and will comply with any conditions placed on those permits.

FIGURE 3-1

Legend

- Proposed Pole Location
- Proposed 230 kV ROW
- Existing PPL ROW
- Surveyed Parcel Boundary
- PPL Owned Property
- Proposed Glen Brook Substation

NAD 1983 State Plane
Pennsylvania North FIPS 3701
Projection: Lambert Conformal Conic
Linear Unit: US Foot

References:
Aerial Imagery Basemap (ESRI)
Luzerne Parcel Data (PPL Provided)

0 175 350 700
Feet
1 inch = 350 feet

AECOM

Figure 3-1
Glen Brook Substation
230 kV Connecting Lines
Aerial Map of the Project

Luzerne County, Pennsylvania

PPL Electric Utilities
Allentown, Pennsylvania

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1.0 DESIGN CONSIDERATIONS

PPL Electric Utility Corporation's ("PPL EU") new and rebuilt transmission lines are designed according to, and generally exceed, all National Electric Safety Code ("NESC") minimum standards. The NESC is a set of rules to safeguard people during the installation, operation, and maintenance of electric power lines. The NESC contains the basic provisions considered necessary for the safety of employees and the public. Although it is not intended as a design specification, its provisions establish minimum design requirements. PPL EU has developed design specifications and safety rules which meet or surpass all requirements specified by the NESC.

The NESC includes loading requirements and clearances for the design, construction, and operation of power lines. The "loads" on conductors and supporting structures are the mechanical forces that develop from the weight of the conductors, the weight of ice on the conductors, plus wind pressure on the conductors and supporting structures. Loading requirements are the loads on the conductors and structures that are anticipated assuming certain ice and wind conditions. Loading requirements always contain "safety factors" to allow for unknown or unanticipated contingencies. The clearances and loading requirements contained in the NESC are designed to maintain public safety.

PPL EU's transmission line design standards meet or surpass the NESC clearances and loading requirements.

For example, the NESC specifies strength and loading rules based on three different "grades of construction" for conductors and supporting structures:

- Grade B – This grade of construction provides the highest margin of safety and is required when the pole supports spans that cross limited access highways, railroads, and waterways.
- Grade C – This grade of construction is most common and provides a basic margin of safety. It is often utilized for the typical power and joint-use distribution pole.
- Grade N – This is the lowest grade of construction and is most often used for emergency and temporary construction.

PPL EU designs all of its transmission lines for Grade B construction. The use of Grade B design and construction translates to higher levels of structural reliability and safety to withstand the environmental conditions of ice and/or wind loading, which provides a higher margin of safety.

Another example of PPL EU's rigorous design standards are the parameters utilized to account for ice and wind loadings on the wires and structure. Structure loading and line designs must accommodate a variety of operating conditions as different ice and wind combinations can impact the conductor sags and tensions of the line. PPL EU's transmission lines are designed to exceed NESC requirements by accounting for additional load cases due to various ice and wind loading conditions not required by NESC. This means that PPL EU lines are designed to operate safely and reliably during extreme inclement weather. In addition, PPL EU design standards include a clearance to ground buffer in excess of NESC required clearances to account for construction and design tolerances and the filling or grading of land within the right of way by property owners. This buffer also significantly reduces the risk of a property owner inadvertently contacting a transmission line. This has occurred on PPL's system in the past and higher clearances minimize the likelihood of future occurrences.

TABLE 4-1: 69 kV Vertical Clearance to Ground

Surface Underneath Conductors	NESC Standard Clearance	PPL Conductor Clearances
Roads, streets, alleys	19.2 Ft.	22.2 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	19.2 Ft.	22.2 Ft.
Spaces accessible to pedestrians only	15.2 Ft.	22.2 Ft.
Railroad tracks	27.2 Ft.	30.2 Ft.

TABLE 4-2: 138 kV Vertical Clearance to Ground

Surface Underneath Conductors	NESC Standard Clearance	PPL Conductor Clearances
Roads, streets, alleys	20.6 Ft.	23.6 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	20.6 Ft.	23.6 Ft.
Spaces accessible to pedestrians only	16.6 Ft.	23.6 Ft.
Railroad tracks	28.6 Ft.	31.6 Ft.

TABLE 4-3: 230 kV Vertical Clearance to Ground

Surface Underneath Conductors	NESC Standard Clearance	PPL Conductor Clearances
Roads, streets, alleys	22.5 Ft.	25.5 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	22.5 Ft.	25.5 Ft.
Spaces accessible to pedestrians only	18.5 Ft.	25.5 Ft.
Railroad tracks	30.5 Ft.	33.5 Ft.

TABLE 4-4: 500 kV Vertical Clearance to Ground

Surface Underneath Conductors	NESC Standard Clearance	PPL Conductor Clearances
Roads, streets, alleys	28.4 Ft.	31.4 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	28.4 Ft.	31.4 Ft.
Spaces accessible to pedestrians only	24.4 Ft.	31.4 Ft.
Railroad tracks	36.4 Ft.	39.4 Ft.

A relay protection system is also used on PPL EU's transmission lines to protect the public safety, as well as the equipment on the transmission system. Relay protection is installed for all transmission lines to automatically de-energize the line in the unlikely event that the line or supporting structure fails and the line contacts the ground.

2.0 PERIODIC MAINTENANCE PROGRAM ON ALL TRANSMISSION LINES

To ensure continued public safety and integrity of service, a periodic maintenance and inspection program is implemented for every transmission line. The program is administered through the use of helicopter patrols, with supplemental foot patrols as needed. Helicopter patrols are performed on all lines on a predetermined frequency, depending on voltage level. The two-man helicopter crew flies parallel and above the line so that the observer can look for signs of line damage or deterioration and observe clearances between vegetation and conductors. The observations are included in a report that is forwarded to the appropriate department for corrective action.

3.0 PERSONNEL SAFETY RULES

Overall PPL EU designs and constructs projects with high regard for both public and employee safety, and follows or exceeds all codes and requirements. The following are a few, but not all, of the PPL EU safety rules that demonstrate the Company's dedication to employee and contractor safety:

- Work procedures have been developed to allow work to be performed on energized facilities in a safe manner. When lines or apparatus are removed from service to be worked on, the Energy Control Process system is applied. This system provides that a red tag must be physically placed on the control handle of the de-energized equipment.
- The red tag may be removed only after proper authorization to energize the equipment.
- Various other tags are used for limited operations and informational purposes.
- Employees or contractors will not apply or remove a tag or change the status of tagged equipment unless authorized.

- Temporary safety grounds are used on de-energized facilities for employee lineman safety during maintenance, construction, or reconstruction work. Safety grounds are wires connecting the de-energized facility to an electrical ground. If the facility should be energized, the safety grounds will divert the current directly to ground and reduce the likelihood of personal injury.

- Before applying grounds, a test is done to confirm that the line is de-energized. The voltage test device is checked before and after use to assure reliability.

- Poles or structures are inspected and examined for structural integrity before climbing. If there is any reason to believe that a pole is unsafe, it is stabilized before work is performed. Appropriate safety gear in the form of body belts, safety straps, hard hats, gloves, etc., is worn by linemen during line work activity.

4.0 MAGNETIC FIELD MANAGEMENT PLAN

PPL EU's Magnetic Field Management Program is applied to new and reconstructed transmission line projects. In order to lower magnetic field exposures, the program generally prescribes the use of a line design that provides ground clearances higher than the required minimum NESC ground clearance and reverse phasing of new double circuit lines where it is feasible to do so at low or no cost. The implementation of additional modifications to reduce magnetic field levels, are considered, provided those modifications can be made at low or no cost and will not interfere with the operation of the line.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

VIA CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Mary Canouse
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Berwick, PA 18603

John R. Evans
Small Business Advocate
Office of Small Business Advocate
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Tanya J. McCloskey, Esquire
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PA Department of Environmental Protection
Market Street State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063
Attn: Office of Field Operations

PA Historical and Museum Commission
Bureau of Historic Preservation
Commonwealth Keystone Building, 2nd floor
400 North Street
Harrisburg, PA 17120-0053
Attn: Douglas C. McLearen, Chief

Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
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Attn: Jason D. Sharp, Acting Chief Counsel

PA Department of Conservation and Natural Resources
Rachel Carson State Office Building
400 Market Street
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Attn: Rebecca Bowen

Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110-9797
Attn: Olivia Mowery

Pennsylvania Fish and Boat Commission
450 Robinson Lane
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U.S. Army Corps of Engineers
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Attn: Planning Division

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Pennsylvania Field Office
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Planning Commission
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Salem Township
Board of Commissioners
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Attn: Richard Talanca

Date: August 19, 2019

Jessica R. Rogers/LAB
Jessica R. Rogers