



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

Christopher T. Wright

cwright@postschell.com
717-612-6013 Direct
717-731-1985 Direct Fax
File #: 140066

September 3, 2015

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 to Site and Relocate Approximately 0.2 Miles of 230 kV Transmission Lines in Montgomery Borough, Lycoming County, Pennsylvania - Docket No. A-2015-

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 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 owners.


Subject to Commission approval, construction is scheduled to begin in March, 2016 to support an in-service date of May, 2019.

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

RECEIVED
2015 SEP -3 PM 3:09
PA PUC
SECRETARY'S BUREAU

Rosemary Chiavetta, Secretary
September 3, 2015
Page 2

Respectfully submitted,



Christopher T. Wright

CTW/jl
Enclosures

cc: Certificate of Service
Robert F. Young
Paul T. Diskin
Nicholas Okoro
Kimberly Hafner

RECEIVED

2015 SEP -3 PM 3:40
PA PUC
SECRETARY'S BUREAU

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

RECEIVED
2015 SEP -3 PM 3:40
PA PUC
SECRETARY'S BUREAU

Letter of Notification of PPL Electric :
Utilities Corporation, Filed Pursuant to :
52 Pa. Code Chapter 57 Subchapter G, : Docket No. A-2015-_____
for Approval to Site and Relocate :
Approximately 0.2 Miles of 230 kV :
Transmission Lines in Montgomery :
Borough, Lycoming County, :
Pennsylvania :

LETTER OF NOTIFICATION

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

PPL Electric Utilities Corporation (“PPL Electric”) 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 site and relocate approximately 0.2 miles of 230 kV transmission lines to interconnect with a new, upgraded 230 kV switchyard required to resolve identified transmission reliability criteria violations, and to maintain reliable electric service to approximately 45,000 customers in Lycoming County, Pennsylvania (“Project”). The proposed Project is located in Montgomery Borough, Lycoming County, Pennsylvania. PPL Electric has provided information regarding this Project to these political subdivisions, which have not objected to the Project.

Subject to the Commission’s approval, construction is scheduled to begin in March 2016, to support the scheduled in-service date of May 2019. In support thereof, PPL Electric states as follows:

I. INTRODUCTION

1. This Letter of Notification is filed by PPL Electric, 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 Electric's address is PPL Electric Utilities Corporation, Two North Ninth Street, Allentown, Pennsylvania 18101.

3. PPL Electric's attorneys are:

Paul E. Russell (Bar I.D. # 21643)
Associate General Counsel
PPL Services Corporation
Two North Ninth Street
Allentown, PA 18101
Voice: 610.774.4254
Fax: 610.774.6726
E-mail: perussell@pplweb.com

David B. MacGregor (Bar I.D. # 28804)
Christopher T. Wright (Bar I.D. # 203412)
Post & Schell, P.C.
17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
Voice: 717.731.1970
Fax: 717.731.1985
E-mail: dmacgregor@postschell.com
E-mail: cwright@postschell.com

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

4. PPL Electric 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 Electric 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 Electric 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 Electric 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 Clinton 230-69 kV Substation currently serves approximately 28,000 customers.

9. The Clinton 230-69 kV Substation is supplied from two existing 230 kV transmission lines: the Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line. The Clinton-Saegers 230 kV Transmission Line extends approximately 2.4 miles from the Saegers 230 kV Switchyard to the Clinton 230-69 kV Substation. The Clinton-Elimsport 230 kV Transmission Line extends approximately 7.4 miles from the Elimsport 230 kV Switchyard to the Clinton 230-69 kV Substation. Both the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Line currently occupy common tower structures for approximately 300 feet extending in a north-south orientation from an existing 230 kV transmission corridor to interconnect with the 230 kV switchyard at the Clinton 230-69 kV Substation.

10. The 230 kV switchyard at the Clinton 230-69 kV Substation feeds two 230-69 kV transformers, the T1 transformer and the T2 transformer.¹ The 230-69 kV transformers “step down” the voltage from 230 kV to 69 kV and, in turn, feed the 69 kV switchyard.² The 69 kV switchyard feeds five, 69 kV transmission lines serving customers in Lycoming County.³

11. A description, aerial map, and one-line diagram of the existing system is provided in the Necessity Statement included as Attachment 1 to this Letter of Notification.

2. Need for the Project

12. As explained above, the Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line occupy common tower structures for approximately 300 feet and feed the 230 kV switchyard at the Clinton 230-69 kV Substation, which, in turn, feeds the T1 and T2 230-69 kV transformers.

13. PPL Electric’s transmission system planning process determined that, by 2016, the loss of one of the common tower structures for the Saegers-Elimsport 230 kV and Clinton-Elimsport 230 kV Transmission Lines will cause the T2 230-69 kV transformer at the Clinton 230-69 kV Substation to become overloaded to 116% of its emergency rating. The loss of one of the common tower structures for the Saegers-Elimsport 230 kV and Clinton-Elimsport 230 kV Transmission Lines also will remove the T1 230-69 kV transformer at the Clinton 230-69 kV

¹ A switchyard is an interconnection that, unlike a step-up or step-down transformer, maintains voltage.

² The nation’s electric system is comprised of three basic components: generation, transmission, and distribution. Generating plants typically produce electricity at a relatively low voltage. Transformers located adjacent to the generating plants increase or “step up” the voltage to transmission-level voltages such as 230 kV or 500 kV, depending on the size of the generating facility and the distance the electricity must travel for delivery to customers. After the voltage is “stepped up,” the power is transmitted to substations, where the voltage level is sequentially “stepped down” for ultimate delivery into the distribution system.

³ Distribution transformers then further reduce the voltage from primary to secondary distribution levels for ultimate delivery to customers.

Substation from service because this transformer is directly connected to the Clinton-Elimsport 230 kV Transmission line.

14. Currently, sufficient load may be transferred through operational switching to reduce the load on the T2 230-69 kV transformer to below its operational emergency rating. However, if another contingency or unplanned outage were to occur after this operational switching, this would result in the interruption of all customer load in Lycoming County, or up to 45,000 customers.

15. The contingency described above would be a violation of the mandatory North American Electric Reliability Corporation (“NERC”) Standard TPL-001-4 — Transmission System Planning Performance Requirements (“NERC TPL-001-4”), which requires that the system should operate within normal limits for the loss of any two adjacent circuits on a common structure. This contingency also would be a violation of PPL Electric Reliability Principles and Practices (“RP&P”) guidelines. Detailed descriptions of the transmission system planning process and the identified reliability violations are provided in Attachment 1 to this Letter of Notification.

16. In addition, the 230 kV switchyard at the Clinton 230-69 kV Substation was installed in 1993, and is an older single breaker configuration. Section 8.2 of the PJM Interconnection, LLC (“PJM”) Manual 07: Transmission Operations, (November 16, 2011) (“PJM Manual 07”), requires that there must be a protective device (fault-interrupting device) between a bulk electric system⁴ transmission line and the high side of a transformer.⁵ The single

⁴ The bulk electric system (“BES”) transmission facilities include transmission facilities operated at voltages of 100 kV or higher and are under the functional control of PJM.

⁵ The PJM Manual 07 establishes minimum design standards and requirements for bulk power facility protection systems within PJM. Transmission owners within the PJM service territory,

breaker 230 kV switchyard at the Clinton 230-69 kV Substation currently is not in compliance with Section 8.2 of the PJM Manual 07.

17. The need for this Project is further explained in Attachment I to this Letter of Notification.

B. THE PROPOSED PROJECT

18. To resolve the identified transmission reliability criteria violations described above, PPL Electric proposes to install a new 230 kV switchyard at the Clinton 230-69 kV Substation. Specifically, PPL Electric proposes to install a new, upgraded breaker-and-a-half 230 kV switchyard configuration at the Clinton 230-69 kV Substation, which will resolve the NERC TPL-001-4 and PPL Electric RP&P violations. The breaker-and-a-half switchyard configuration meets the requirements of Section 8.2 of the PJM Manual 07, and is the current industry standard design for new or upgraded 230 kV switchyards.

19. The existing Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line currently terminate at the existing 230 kV switchyard. To accommodate the new, upgraded 230 kV switchyard, PPL Electric proposes to relocate and re-terminate the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines into the new 230 kV switchyard at the Clinton 230-69 kV Substation.

20. To interconnect the Clinton-Saegers 230 kV Transmission Line with the new 230 kV switchyard, approximately 318 feet of 230 kV circuit between the 230 kV transmission corridor and the existing 230 kV switchyard will be removed and replaced with approximately 535 feet of new 230 kV circuit. Two existing tower structures will be removed and replaced with two new single-circuit steel monopole angle structures.

such as PPL Electric, are required to operate and design their transmission systems in compliance with the limits set forth in the PJM Manual 07 for protection standards.

21. To interconnect the Clinton-Elimsport 230 kV Transmission Line with the new 230 kV switchyard, approximately 310 feet of 230 kV circuit between the transmission corridor and the existing 230 kV switchyard will be removed and replaced with approximately 570 feet of new 230 kV circuit. Two existing tower structures will be removed and replaced with three new single-circuit steel monopole angle structures.

22. A description and one-line diagram of the proposed Project is provided in the Necessity Statement included as Attachment 1 to this Letter of Notification.

23. The existing tower structures are steel lattice towers with an average height of 125 feet. The new single-circuit steel monopole angle structures will be installed on concrete caisson foundations and will have an average height of approximately 160 feet. A depiction of the type of monopoles used for this Project is provided at the end of Attachment 2 to this Letter of Notification.

24. Both new segments of the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines will utilize three 230 kV power conductors and one fiber optic ground wire. The power conductors will be 1590 kcmil⁶ ACSR conductors.⁷ The overhead ground wire will be 48 count, 0.752-inch diameter fiber optical ground wires and will provide lightning protection and communication between circuit breakers that remove the line from service should a fault on the line be detected. The minimum conductor-to-ground clearance will be 32 feet, which occurs at a maximum conductor temperature of 140° C. An engineering description of the Project is provided in Attachment 2 to this Letter of Notification.

⁶ A kcmil or circular mil is the cross-sectional area of a wire one mil in diameter, where 1 kcmil = 0.5067 mm².

⁷ ACSR stands for aluminum conductor steel reinforced.

25. The total estimated cost of the proposed Project is \$2.2 million.⁸

26. Upon Commission approval, the Project has a scheduled construction start date of March 2016 to support the scheduled in-service date of May 2019.⁹

III. HEALTH AND SAFETY

27. The proposed Project will not create any unreasonable risk of danger to the public health or safety.

28. The Project will be designed, constructed, operated, and maintained in a manner that meets or surpasses all applicable National Electrical Safety Code (“NESC”) minimum standards and all applicable legal requirements. Descriptions PPL Electric’s design criteria and safety practices are provided in Attachment 4 to this Letter of Notification.

29. Consistent with its Magnetic Field Management Program, PPL Electric will construct the Project for ground clearances that are a minimum of five feet higher than the required NESC minimum ground clearance for 230 kV lines in order to reduce the magnetic field

⁸ 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 of 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.

⁹ The scheduled in-service date is the date that the proposed facilities can reasonably be installed based on normal construction schedules. Because this scope of work cannot be completed by the projected 2016 reliability criteria violation date described in Paragraph 13 above, PPL Electric has implemented a temporary measure to mitigate the risk that the T2 230-69 kV transformer at the Clinton 230-69 kV Substation would become damaged due to overloading until the Project is completed. Currently, sufficient load maybe transferred through operational switching to reduce the load on the T2 230-69 kV transformer to below its operational emergency rating. However, if another contingency or unplanned outage were to occur after this operational switching, this would result in interruption of all customer load in Lycoming County, or up to 35,000 customers. Accordingly, this switching measure is not a suitable, long-term resolution to the violations explained above, and will only be used if the T2 230-69 kV transformer at the Clinton 230-69 kV Substation becomes overloaded and exceeds its 2-hour emergency rating.

exposure. A description of PPL Electric's Magnetic Field Management Program is provided in Attachment 2 to this Letter of Notification.

IV. DESCRIPTION OF RIGHT-OF-WAY

30. Both new segments of the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines will be routed around the edge of the existing Clinton 230-69 kV Substation property to interconnect with the new 230 kV switchyard, accommodate construction activities, and avoid interference with other existing transmission facilities at the Substation site. An aerial plot plan is provided at the end of Attachment 3 to this Letter of Notification.

31. The new segments of the Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines will be located entirely within existing PPL Electric transmission line rights-of-way and on property owned in-fee by PPL Electric. As described in Attachment 3, no additional rights-of-way or easements are required for the construction and operation of the new relocated transmission line segments

32. Although the new structures will increase in height, impacts will be minimal because the Project will be rebuilt within the existing right-of-way in close proximity to the existing structures and the Clinton 230-69 kV Substation. In addition, the footprints of the new tower structures will be smaller than the footprints of the existing lattice towers. Further, no new poles will be placed on any property that currently does not have an existing pole.

33. *Land use impacts are anticipated to be minimal due to the fact that the Project will be constructed entirely within the existing right-of-way and on property owned in-fee by PPL Electric for the Clinton 230-69 kV Substation. Where practical, PPL Electric will use previously established access roads for construction to further reduce interference with existing land uses.*

34. The Project area previously has been cleared of vegetation. As a result, limited vegetation management will be required for this project. In areas where vegetation management is required to complete the project, PPL Electric will apply its “Specifications for Initial Clearing and Control of Vegetation On or Adjacent to Electric Line Right-of-Way Through Use of Herbicides, Mechanical and Hand Clearing Techniques” to mitigate any impacts.

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

36. PPL Electric does not anticipate any interference with airport operations because of the distance from the Project area, the presence of existing electrical facilities in the Project area, and the similar height of the new facilities and the existing facilities.

37. The Project area contains no state lands, national parks, state parks, or local parks.

38. The Project will not traverse or affect any unique geological, scenic, or natural areas.

39. The Project will not affect any recreational areas or natural landmarks.

40. PPL Electric currently is coordinating with the Pennsylvania Historical and Museum Commission (“PHMC”) to determine what, if any, impacts the Project may have on cultural and archaeological resources. PPL Electric will continue to work with the PHMC and perform any reviews and field survey/sampling work required to avoid, minimize, and mitigate impacts to archaeological or historic architectural resources located within the Project area.

41. The Project will not cross any streams or other navigable waters.

42. Although wetlands are located near the Project area, PPL Electric does not anticipate any incremental impacts to wetlands because the work will be performed almost entirely within existing transmission line corridor and on PPL Electric’s property owned in fee

for the Clinton 230-69 kV Substation. Nevertheless, PPL Electric will obtain all necessary permits from the Pennsylvania Department of Environmental Protection and the United States Army Corps of Engineers, as needed, and will comply with all of the terms and conditions placed on those permits.

43. PPL Electric will acquire any required soil erosion and sedimentation control permits, as needed, and will comply with any conditions placed on those permits.

44. PPL Electric has consulted with state and federal agencies to obtain information regarding endangered and threatened species in close proximity to the Project. PPL Electric has reviewed the Pennsylvania Natural Diversity Inventory records under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources, the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, and the U.S. Fish and Wildlife Service. Based on this review, these agencies have reported that the Project will not impact any threatened and endangered species and/or special concern species and resources located within the Project area.

V. NOTICE

45. PPL Electric has provided information regarding the Project to representatives of Montgomery Borough and Lycoming County. To date, these entities have not objected to the proposed Project.

46. Copies of this Letter of Notification will be served on the governmental agencies, municipalities, and other public entities agencies in accordance with 52 Pa. Code § 57.72(d)(3).

47. Copies of this Letter of Notification will be served on the owners of land subject to the right-of-way and easement in accordance with 52 Pa. Code § 57.72(d)(3).

VI. LETTER OF NOTIFICATION

48. PPL Electric 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).

49. The proposed Project qualifies for use of a Letter of Notification because the proposed the new segments 230 kV transmission line required to interconnect the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines with the new, upgraded 230 kV switchyard at the Clinton 230-69 kV Substation will total less than two miles, *i.e.*, approximately 0.2 miles.¹⁰

50. 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 proposed herein without the formal application process set forth at 52 Pa. Code §§ 57.71, *et seq.*

VII. CONCLUSION

WHEREFORE, PPL Electric Utilities Corporation respectfully requests that the Pennsylvania Public Utility Commission approve the siting and construction of approximately 0.2 miles of 230 kV transmission lines to interconnect the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines with the new, upgraded 230 kV switchyard at the Clinton 230-69 kV Substation in Montgomery Borough, Lycoming County, Pennsylvania, as explained above and in the Attachments hereto.

¹⁰ The two new segments will require approximately 535 feet of new 230 kV conductor for the Clinton-Saegers 230 kV Transmission Line and approximately 570 feet of new 230 kV conductor for the Clinton-Elimsport 230 kV Transmission Line.

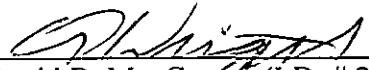
Respectfully submitted,

Paul E. Russell (I.D. # 21643)
Associate General Counsel
PPL Services Corporation
Office of General Counsel
Two North Ninth Street
Allentown, PA 18106
Phone: 610-774-4254
Fax: 610-774-6726
E-mail: perussell@pplweb.com

Of Counsel:

Post & Schell, P.C.

Date: September 3, 2015


David B. MacGregor (I.D. # 28804)
Post & Schell, P.C.
Four Penn Center
1600 John F. Kennedy Boulevard
Philadelphia, PA 19103-2808
Phone: 215-587-1197
Fax: 215-320-4879
E-mail: dmacgregor@postschell.com

Christopher T. Wright (I.D. # 203412)
Post & Schell, P.C.
17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
Phone: 717-731-1970
Fax: 717-731-1985
E-mail: cwright@postschell.com

Attorneys for PPL Electric Utilities Corporation

RECEIVED
2015 SEP -3 PM 3:11
PA PUC
SECRETARY'S BUREAU



Before the
Pennsylvania Public Utilities Commission

Clinton Switchyard Upgrade Project

**ATTACHMENTS IN SUPPORT OF THE
LETTER OF NOTIFICATION**

Submitted by: PPL Electric Utilities Corp.

RECEIVED.
2015 SEP -3 PM 3:41
PA PUC
SECRETARY'S BUREAU

TABLE OF CONTENTS

Attachment 1	Necessity Statement
Attachment 2	<i>Engineering Description</i>
Attachment 3	Environmental Assessment
Attachment 4	PPL Electric Utilities Design Criteria and Safety Practices

Attachment

1

RECEIVED

2015 SEP -3 PM 3:41

PA PUC
SECRETARY'S BUREAU

ATTACHMENT 1
CLINTON SWITCHYARD UPGRADE PROJECT
NECESSITY STATEMENT

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	INTRODUCTION.....	1-1
B.	SYSTEM PLANNING PROCESS AND GUIDELINES.....	1-1
C.	EXISTING SYSTEM.....	1-7
D.	NEED FOR THE PROJECT.....	1-8
E.	PROPOSED SOLUTION.....	1-9

LIST OF FIGURES

- Figure 1-1 – Existing Facilities Aerial
- Figure 1-2 – Present System Configuration One-Line Diagram
- Figure 1-3 – Proposed Facilities Aerial
- Figure 1-4 – Proposed System Configuration One-Line Diagram

ATTACHMENT 1
CLINTON SWITCHYARD UPGRADE PROJECT
NECESSITY STATEMENT

A. INTRODUCTION

PPL Electric Utilities Corporation (PPL Electric) is requesting Pennsylvania Public Utility Commission (PUC or the Commission) approval to relocate and re-terminate the existing Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines into new, upgraded 230 kV switchyards at the Clinton 230-69 kV Substation located in Montgomery Borough, Lycoming County, Pennsylvania (the Project). As explained below, the Project is required to replace the existing, aging 230 kV switchyard at the Clinton 230-69 kV Substation, resolve identified transmission reliability criteria violations, and to maintain reliable electric service to customers in PPL Electric's service territory.

The estimated cost to site, relocate, and re-terminate the existing Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines into the new, upgraded 230 kV switchyard at the Clinton 230-69 kV Substation is approximately \$2.2 million.¹ Subject to the Commission's approval, construction is scheduled to begin in March 1, 2016, to support the Project's scheduled in-service date of May 2019.

¹ 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 of field 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.

B. SYSTEM PLANNING PROCESS AND GUIDELINES

1. Transmission Reliability Standards

The nation's interconnected transmission grid serves as the backbone for the safe and reliable delivery of large amounts of electricity from generating stations over substantial distances to customers served by transmission and local distribution systems. It is critically important that this interconnected transmission system (transmission grid) be planned and designed to be highly reliable so that reliable electric service can be provided under peak and all loading conditions and when certain elements of the system are out of service (system contingencies) due to planned or forced outages.

On February 3, 2006, Federal Energy Regulatory Commission (FERC) certified the North American Electric Reliability Corporation (NERC) as the organization required to establish and enforce reliability standards for the bulk electric system. Pursuant to this certification, NERC develops and enforces reliability standards, which define the reliability requirements for planning and operating certain transmission systems in North America. Pertinent to this Project, on October 17, 2013, FERC approved NERC's Standard TPL-001-4 — Transmission System Planning Performance Requirements (NERC TPL-001-4) to establish transmission system planning performance requirements to ensure that the Bulk Electric System (BES)² that will operate reliably over a broad spectrum of System conditions and following a wide range of probable Contingencies.

The NERC reliability standards apply to all users, owners, and operators of the critical transmission systems on the nation's interconnected transmission grid, including PPL Electric. The NERC reliability standards are monitored and enforced by NERC and the regional reliability organizations that function under its auspices. NERC achieves compliance through monitoring, audits and investigations, the imposition of financial penalties, and other enforcement actions for non-compliance. These FERC-approved NERC reliability standards are mandatory and failure to comply can result in penalties of up to \$1 million per day per violation.

² Bulk Electric System (BES) - Includes transmission facilities operated at voltages of 100 kV or higher.

2. System Planning

System Planning is the process which assures that the transmission system can supply electricity to all customer loads in a manner that is reliable and economic. This System Planning process assures that both the BES and non-Bulk Electric System (“non-BES”)³ transmission systems are:

- Are able to accommodate forecasted system flows during summer and winter peak load;
- Are constructed to adequately serve customers’ needs with regard to capacity, voltage and reliability for all load levels throughout the daily load cycle;
- Can sustain probable contingencies and disturbances with no consequential loss of load; and
- Comply with NERC, PJM Interconnection, LLC (PJM), and PPL Electric’s transmission planning reliability principles, practices and standards (RP&P) for all normal and emergency operating conditions.

The fundamental purpose of the NERC, PJM and RP&P criteria is to provide a set of principles upon which to build a reliable transmission system.

The transmission planning process begins with the development of a computer model of the future system. A specific study year is chosen, and the future system model is developed using the existing system plus any planned modifications to the transmission system scheduled to be completed prior to the study year. Load levels used in the system model are based on the latest forecast prepared annually by PJM. Once the system model is complete, comprehensive power flow simulations are performed to determine the ability of the system to comply with the planning criteria. Compliance is determined by simulating particular contingency conditions. All conditions where the system is not in conformance with the reliability criteria are identified, then system reinforcements are added to the model to bring the system into compliance.

³ Non-Bulk Electrical System (non-BES) - Includes transmission facilities operated at voltages less than 100 kV.

3. PJM Planning Process

PJM is a FERC-approved Regional Transmission Organization (“RTO”) charged with ensuring the reliability of the electric transmission system under its functional control (100 kV and above), and coordinating the movement of electricity in all or parts of thirteen states and the District of Columbia, including most of Pennsylvania. In order to ensure reliable transmission service, PJM prepares an annual Regional Transmission Expansion Plan (“RTEP”)⁴ to identify system reinforcements that are required to, among other things, meet the NERC Reliability Standards, PJM reliability planning criteria, and transmission owner reliability criteria. The RTEP is a FERC-approved transmission planning process that undertakes a comprehensive analysis to identify existing and forecasted violations of the NERC Reliability Standards on the transmission systems within PJM’s service territory. PPL Electric, as an owner of transmission facilities in Pennsylvania, is a member of PJM and actively participates in the PJM transmission planning process.

PJM’s RTEP is an annual process that encompasses a comprehensive series of detailed analyses to ensure power continues to flow reliably to customers under stringent reliability criteria set by NERC. The NERC reliability standards, transmission owner criteria, and PJM reliability planning criteria are used by PJM to analyze the system and to determine the specific transmission upgrade projects, as part of the overall reliability solution, that are needed to ensure long-term reliable electric service to customers and competitive power markets. Based upon this analysis, PJM determines the transmission upgrades that are needed to meet NERC reliability standards.

⁴ 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.

PJM conducts RTEP studies in conjunction with its transmission owners and applies NERC, regional, and transmission owner reliability criteria to specific conditions on the transmission system. When the studies show an inability of the transmission system to meet a specific reliability standard under these conditions, solutions such as construction of one or more new transmission lines or one or more upgrades to existing transmission facilities may be necessary.

PJM has developed the PJM Reliability Planning Criteria as set forth in the PJM Manual 14B. The PJM Reliability Planning Criteria consist of multiple standards and applicable planning principles that include PJM planning procedures, NERC Planning Standards, NERC Regional Council planning criteria, Reliability First Corporation (“RFC”) Standards, and Transmission Owner-defined reliability criteria (in this case, the PPL Electric RP&P). PJM applies all applicable planning criteria when identifying reliability problems and determining the need for transmission system upgrades the PJM service territory. As a transmission owner in the PJM service territory, PPL Electric is required to follow the PJM Reliability Planning Criteria.

PJM also has developed the PJM Manual for protection standards as set forth in the PJM Manual 07: Transmission Operations, (November 16, 2011) (“PJM Manual 07”). The PJM Manual 07 establishes minimum design standards and requirements for bulk power facility protection systems within PJM. Transmission owners within the PJM service territory, such as PPL Electric, are required to operate and design their transmission systems in compliance with the limits set forth in the PJM Manual 07 for protection standards.

When a potential reliability violation is identified, PJM and the affected transmission owner develop specific solutions to resolve the identified violation. PJM presents the results of the analyses to its Transmission Expansion Advisory Committee (“TEAC”) to solicit comments on the violations and recommendations to resolve the identified reliability violations. The TEAC is open to participation by: (i) all transmission customers; (ii) all PJM members; (iii) state commissions and consumer advocates; (iv) any other entity proposing to build Merchant transmission facilities to be integrated into the PJM region; and (v) any other interested entities or persons. The TEAC reviews potential solutions to the identified reliability violations, including transmission line solutions.

4. The PPL Electric Planning Process

The reliable and economical operation of PPL Electric's transmission system requires upholding PPL Electric's planning guidelines for system expansion. The principles upon which these planning guidelines are based recognize that:

- The system expansion should be coordinated to achieve the most economical balance of construction and operating expenditures.
- It should maintain a proper balance between the degree of risk, amount and type of load interrupted, and the cost of providing the needed expansion.
- System reliability should be maintained to prevent large scale, long term, or frequent service interruptions to avoid adverse effects and hazards to the public.

These principles are incorporated in PPL Electric's RP&P.

PPL Electric undertakes an independent analysis of both its bulk electric system (BES) transmission facilities, which include transmission facilities operated at voltages of 100 kV or higher and are under the functional control of PJM, and its non-bulk electric system (non-BES) transmission facilities. The PPL Electric planning guidelines are outlined the RP&P, which was developed to ensure adequate and appropriate levels of electric service to its customers consistent with good utility practice. The PPL Electric RP&P for the bulk electric system is consistent with the limits and procedures established by the PJM Manual for protection standards.

In accordance with the RP&P guidelines, PPL Electric's transmission system is planned so that it can be operated at all projected load levels and during normal and scheduled outages to withstand specific unscheduled contingencies without exceeding the equipment capability, causing system instability or cascade tripping, or exceeding voltage tolerances. The transmission system is required to have adequate capability so that it can be operated normally and can withstand the unscheduled contingencies and other system conditions.

The PPL Electric planning process begins with the development of a computer model of the future system. A specific study year is chosen and the future system model is developed using

the existing system plus any planned modifications to the transmission system scheduled to be in-service prior to the study year. The load forecast is based on recent PJM summer peak loads, winter peak conditions, and on temperature and humidity indices. Once PPL Electric's system model is complete, comprehensive power flow simulations are performed to determine the ability of the system to comply with the NERC criteria, PJM reliability criteria, and RP&P. All conditions where the future system does not meet the NERC criteria, PJM reliability criteria, and RP&P are identified.

Alternatives that can mitigate the reliability criteria violation are then developed and analyzed to ensure that the PPL Electric transmission system meets the reliability criteria. Estimated costs and lead times to implement the reinforcements are prepared. Computer simulations of the system, considering the identified reinforcement alternatives, are completed to identify the best overall reinforcement that will meet the needs of the region in a reliable and economic manner.

As explained below, studies conducted for PPL Electric's transmission system, in conjunction with the PJM RTEP process described above, concluded that the proposed new, upgraded 230 kV switchyards at the Clinton 230-69 kV Substation are necessary to resolve reliability criteria violations of PJM's and NERC planning criteria and to comply with the minimum design standards and requirements of PJM Manual 07. The local transmission operator, in this case PPL Electric, is responsible for confirming the reliability violations and correcting any violations to the aforementioned transmission planning criteria on the BES system. Projects that are necessary to resolve NERC criteria, PJM reliability criteria, or the transmission owners' own local transmission planning criteria are included as baseline projects in PJM's RTEP.

C. EXISTING SYSTEM

The Clinton 230-69 kV Substation is located in Montgomery Borough, Lycoming County. Approximately 28,000 customers in Lycoming County are presently served from the Clinton 230-69 kV Substation.

The Clinton 230-69 kV Substation is supplied by the Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line.⁵ The Clinton-Saegers 230 kV Transmission Line extends approximately 2.4 miles from the Saegers 230 kV Switchyard to the Clinton 230-69 kV Substation. The Clinton-Elimsport 230 kV Transmission Line extends approximately 7.4 miles from the Elimsport 230 kV Switchyard to the Clinton 230-69 kV Substation. Both the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Line currently occupy common tower structures for approximately 300 feet extending in a north-south orientation from an existing 230 kV transmission line corridor to the 230 kV switchyard at the Clinton 230-69 kV Substation.

The 230 kV switchyard⁶ at the Clinton 230-69 kV Substation was installed in 1993, and is an older single breaker configuration. The 230 kV switchyard at the Clinton 230-69 kV Substation feeds two 230-69 kV transformers, the T1 transformer and the T2 transformer. The 230-69 kV transformers, in turn, feed the 69 kV switchyard. The 69 kV switchyard feeds five, 69 kV transmission lines serving customers in Lycoming County.

An aerial map depicting the existing facilities is provided as Figure 1-1 to this Attachment. Figure 1-2 to this Attachment is a one-line diagram depicting the present system configuration of the Clinton 230-69 kV Substation.

D. NEED FOR THE PROJECT

As explained above, the Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line occupy common tower structures for approximately 300 feet and feed the 230 kV switchyard at the Clinton 230-69 kV Substation, which, in turn, feeds the T1 and T2 230-69 kV transformers. Studies conducted for PPL Electric's transmission system, in conjunction with the PJM RTEP process described above, revealed several reliability, violations in Lycoming County by 2016.

⁵ The Clinton 230-69 kV Substation also serves customer load by way of 69 kV circuits.

⁶ A switchyard is an interconnection that, unlike a step-up or step-down transformer, maintains voltage.

Specifically, the 2016 PJM RTEP identified violations of the NERC TPL-001-4 and the PPL Electric RP&P guidelines by 2016 for the following contingency:

- The loss of one of the common tower structures for the Seagers-Elmsport 230 kV and Clinton-Elmsport 230 kV Transmission Lines will cause the T2 230-69 kV transformer at the Clinton 230-69 kV Substation to exceed its 2-hour emergency rating by 116%.
- The loss of one of the common tower structures for the Seagers-Elmsport 230 kV and Clinton-Elmsport 230 kV Transmission Lines also removes the T1 230-69 kV transformer at the Clinton 230-69 kV Substation from service because this transformer is directly connected to the Clinton-Elmsport 230 kV Transmission line.

The contingency described above would be a violation of the “P7 Multiple Contingency” requirement set forth in the NERC TPL-001-4, which requires that the system should operate within normal limits for the loss of any two adjacent circuits on a common structure. This contingency also would be a violation of PPL Electric’s RP&P, which provides that, for the forced outage of a power transformer, loading of the remaining transformer(s) shall be restricted to the 2-hour rating.

In addition to these NERC and RP&P violations, Section 8.2 of the PJM Manual 07 requires that there must be a protective device (fault-interrupting device) between a BES transmission line and the high side of a transformer. The 230 kV switchyard at the Clinton 230-69 kV Substation is an older single breaker configuration that does not satisfy the requirements of Section 8.2 of the PJM Manual 07.

For these reasons, PPL Electric proposes to upgrade the T2 230-69 kV transformer at the Clinton 230-69 kV Substation. Specifically, PPL Electric proposes to install a new upgraded breaker-and-a-half 230 kV switchyard configuration. The breaker-and-a-half is the current industry standard design for new or upgraded 230 kV switchyards.

E. PROPOSED SOLUTION

To resolve the reliability violations explained above, PPL Electric proposes to replace the 230 kV Switchyard at the Clinton 230-69 kV Substation with an upgraded breaker-and-a-half 230 kV switchyard configuration. The installation of the new, upgraded 230 kV Switchyard will resolve the NERC TPL-001-4 and PPL Electric RP&P violations, as well as comply with the design requirements Section 8.2 of the PJM Manual 07.

To accommodate the new, upgraded 230 kV switchyard, the existing Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line must be relocated and re-terminated into the new 230 kV switchyard. Both new segments of the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines will be routed around the edge of the existing Clinton 230-69 kV Substation property to interconnect with the new 230 kV switchyard, to accommodate construction activities, and to avoid interference with other existing transmission facilities at the Substation site.

To interconnect the Clinton-Saegers 230 kV Transmission Line with the new 230 kV switchyard, approximately 318 feet of 230 kV circuit between the transmission corridor and the existing 230 kV switchyard will be removed and replaced with approximately 535 feet of new 230 kV circuit. To interconnect the Clinton-Elimsport 230 kV Transmission Line with the new 230 kV switchyard, approximately 310 feet of 230 kV circuit between the transmission corridor and the existing 230 kV switchyard will be removed and replaced with approximately 570 feet of new 230 kV circuit.

An aerial map depicting the proposed facilities is provided as Figure 1-3 to this Attachment. Figure 1-4 to this Attachment is a one-line diagram depicting the proposed system configuration of the Clinton 230-69 kV Substation.

PPL Electric submitted the proposed Project to PJM on for review and inclusion in the RTEP. The Project was presented before stakeholders at the TEAC meeting on January 7, 2015, and approved by the PJM Board. The Project was included in the 2016 RTEP Report as supplemental project s0858.

Subject to the Commission's approval, construction is scheduled to begin in March 1, 2016 to support the Project's scheduled in-service date of May 2019. The scheduled in-service date is the date that the proposed facilities can reasonably be installed based on normal construction schedules.⁷

Because this scope of work cannot be completed by the required 2016 in-service date, PPL Electric has implemented a temporary measure to mitigate the risk that the T2 230-69 kV transformer at the Clinton 230-69 kV Substation would become damaged due to overloading until the Project is completed. Currently, sufficient load may be transferred through operational switching to reduce the load on the T2 230-69 kV transformer to below its operational emergency rating. However, if another contingency or unplanned outage were to occur after this operational switching, this would result in interruption of all customer load in Lycoming County, or up to 35,000 customers. Accordingly, this switching measure is not a suitable, long-term resolution to the violations explained above, and will only be used if the T2 230-69 kV transformer at the Clinton 230-69 kV Substation becomes overloaded and exceeds its 2-hour emergency rating.

⁷ The required in-service date is the date that the proposed facility must be placed in service to minimize extended service interruptions to customers. In the event that the required in-service date is after the scheduled in-service date, then remedial action is required to mitigate damage caused by the violation.

Attachment

2

RECEIVED

2015 SEP -3 PM 3:11

PA PUC
SECRETARY'S BUREAU

ATTACHMENT 2
CLINTON SWITCHYARD UPGRADE PROJECT
ENGINEERING DESCRIPTION

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	DESCRIPTION OF PROPOSED ALIGNMENT.....	2-1
B.	MAGNETIC FIELD MANAGEMENT.....	2-2

List of Figures

Figure 2-1 Depiction of Monopoles

ATTACHMENT 2
CLINTON SWITCHYARD UPGRADE PROJECT
ENGINEERING DESCRIPTION

A. DESCRIPTION OF THE PROPOSED ALIGNMENT

PPL Electric Utilities Corporation (PPL Electric) is requesting Pennsylvania Public Utility Commission (PUC or the Commission) approval to relocate and re-terminate the existing Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines into the new, upgraded 230 kV switchyards at the Clinton 230-69 kV Substation located in Montgomery Borough, Lycoming County, Pennsylvania (the Project). As explained in Attachment 1, the Project is required to replace the existing, aging 230 kV switchyards at the Clinton 230-69 kV Substation, resolve identified transmission reliability criteria violations, and to maintain reliable electric service to customers in Lycoming County.

To resolve the identified reliability problems, PPL Electric proposes to replace the 230 kV Switchyard at the Clinton 230-69 kV Substation with an upgraded breaker-and-a-half 230 kV switchyard configuration. To accommodate the new, upgraded 230 kV switchyard, the existing Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line must be relocated and re-terminated into the new 230 kV switchyard.

To relocate the Clinton-Saegers 230 kV Transmission Line, PPL Electric proposes to remove two existing tower structures, and install two new single-circuit steel monopole angle structures. Approximately 318 feet of the existing 230 kV circuit between the transmission corridor and the existing 230 kV switchyard will be removed, and approximately 535 feet of new 230 kV circuit will be installed to interconnect the Clinton-Saegers 230 kV Transmission Line with the new 230 kV switchyard.

To relocate the Clinton-Elimsport 230 kV Transmission Line, PPL Electric proposes to remove two existing tower structures and install three new single-circuit steel monopole angle structures. Approximately 310 feet of 230 kV circuit between the transmission corridor and the existing 230

kV switchyard will be removed, and approximately 570 feet of new 230 kV circuit will be installed to interconnect the Clinton-Elimsport 230 kV Transmission Line with the new 230 kV switchyard

The existing tower structures are steel lattice towers with an average height of 125 feet. The new single-circuit steel monopole angle structures will be installed on concrete caisson foundations and will have an average height of approximately 153 feet. A depiction of the type of monopoles used for this Project is provided in Figure 2-1 the end of this Attachment.

The new segments of the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines will each utilize three power conductors and one overhead ground wire. The power conductors will be 1590 kcmil⁸ ACSR conductors.⁹ The overhead ground wire will be 48 count, 0.752-inch diameter fiber optical ground wires and will provide lightning protection and communication between circuit breakers that remove the line from service should a fault on the line be detected. The minimum conductor-to-ground clearance will be 32 feet, which occurs at a maximum conductor temperature of 140° C.

The estimated cost to site to relocate and re-terminate the existing Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines into the new, upgraded 230 kW switchyards at the Clinton 230-69 kV Substation is approximately \$2.2 million.

B. MAGNETIC FIELD MANAGEMENT

PPL Electric's Magnetic Field Management Program is applied to new and reconstructed transmission line projects. PPL Electric does not believe that the current scientific evidence demonstrates that magnetic fields cause any adverse health effects or pose a health or safety danger to the public. Nevertheless, PPL Electric has determined, as a matter of policy, to design its new and rebuilt transmission lines to reduce magnetic fields when that can be done at low or no cost and consistent with functional requirements.

⁸ A kcmil or circular mil is the cross-sectional area of a wire one mil in diameter, where 1 kcmil = 0.5067 mm².

⁹ ACSR stands for aluminum conductor steel reinforced.

PPL Electric's Magnetic Field Management Program has been developed to implement that policy decision. To reduce magnetic field exposures, the program generally prescribes the use of a line design that provides five feet higher ground clearance than NESC standards and reverse phasing of new double-circuit lines where it is feasible to do so at low or no cost.

Consistent with its Magnetic Field Management Program, PPL Electric will construct the new 230 kV transmission lines for ground clearances that are a minimum of five feet higher than the required NESC minimum ground clearance for 230 kV lines. Because the new segments of the Clinton-Saegers and Clinton-Elmsport 230 kV Transmission Lines will be constructed as single-circuits, these new segments will not be reversed phased. However, the remaining portions of the existing new segments of the Clinton-Saegers and Clinton-Elmsport 230 kV Transmission Lines currently are reverse phased, and will continue to be reversed phased after completion of the Project.

Attachment

3

RECEIVED

2015 SEP -3 PM 3:11

PA PUC
SECRETARY'S BUREAU

ATTACHMENT 3
CLINTON SWITCHYARD UPGRADE PROJECT
DESCRIPTION OF THE RIGHT OF WAY

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	INTRODUCTION.....	3-1
B.	THE RIGHT-OF-WAY DESCRIPTION.....	3-1
C.	LAND USE AND ENVIRONMENTAL.....	3-2
D.	VEGETATION MANAGEMENT.....	3-4

A. INTRODUCTION

PPL Electric Utilities Corporation (PPL Electric) is requesting Pennsylvania Public Utility Commission (PUC or the Commission) approval to relocate and re-terminate the existing Clinton-Elimsport 230 kV and Clinton-Saegers 230 kV Transmission Lines into the new, upgraded 230 kV switchyards at the Clinton 230-69 kV Substation located in Montgomery Borough, Lycoming County, Pennsylvania (the Project). As explained in Attachment 1, the Project is required to replace the existing, aging 230 kV switchyards at the Clinton 230-69 kV Substation, resolve identified transmission reliability criteria violations, and to maintain reliable electric service to customers in Lycoming County.

To resolve the identified reliability problems, PPL Electric proposes to replace the 230 kV Switchyard at the Clinton 230-69 kV Substation with an upgraded breaker-and-a-half 230 kV switchyard configuration. To accommodate the new, upgraded 230 kV switchyard, the existing Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line must be relocated and re-terminated into the new 230 kV switchyard.

As explained in Attachment 2, the Clinton-Saegers 230 kV Transmission Line will be interconnected with the new 230 kV switchyard by construction of approximately 535 feet of new 230 kV circuit. The Clinton-Elimsport 230 kV Transmission Line will be interconnected with the new 230 kV switchyard by construction of approximately 570 feet of new 230 kV circuit. Both new segments of the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines will be routed around the edge of the Clinton 230-69 kV Substation property to properly interconnect with the new 230 kV switchyard, to accommodate construction activities, and to avoid interference with other existing transmission facilities.

An aerial plot plan is provided at the end of Attachment 1.

B. THE RIGHT-OF-WAY DESCRIPTION

The new segments of the Clinton-Elimsport and Clinton-Saegers 230 kV Transmission Lines will be located entirely within existing PPL Electric transmission line rights-of-way and on

property owned in-fee by PPL Electric. As explained in Attachment 1, the Clinton-Saegers 230 kV Transmission Line and the Clinton-Elimsport 230 kV Transmission Line currently occupy common tower structures for approximately 300 feet and feed the 230 kV switchyard at the Clinton 230-69 kV Substation. See Figure 1-3 to Attachment 1.

The existing rights-of-way and property owned in fee by PPL Electric for the Clinton 230-69 kV Substation are sufficient to accommodate the construction, operation, and maintenance of the proposed new segments of the Clinton-Elimsport and Clinton-Saegers 230 kV Transmission Lines. Therefore, no additional rights-of-way or easements are required for the construction and operation of the new relocated transmission line segments.

C. LAND USE AND ENVIRONMENTAL

Impacts to land use are anticipated to be minimal because the work will be performed almost entirely within existing transmission line corridor and on PPL Electric's property owned in fee for the Clinton 230-69 kV Substation. Interference with existing land uses will be further minimized because, where possible, PPL Electric will use previously established access roads for construction.

Although the new structures will increase in height as explained in Attachment 2, impacts will be minimal because the Project will be rebuilt within the existing right-of-way in close proximity to the existing structures and the Clinton 230-69 kV Substation. In addition, the footprints of the new tower structures will be smaller. Further, no new poles will be placed on any property that currently does not have an existing pole.

No nearby communication towers, pipelines, or other utilities will be affected by the proposed Project. The closest airports include the Williamsport Regional Airport, a public facility, which is located approximately 3.8 miles northwest of the project area, and the Hackenburg-Penny Hill Airport, a private facility, which is located about 3 miles southwest of the project area. PPL Electric does not anticipate any interference with airport operations because of the distance from the project area, the presence of existing electrical facilities in the Project area, and the similar height of the new facilities and the existing facilities. However, PPL Electric will file any

required documentation with both the Federal Aviation Administration and the Pennsylvania Department of Transportation Bureau of Aviation.

PPL Electric has been in consultation with the Pennsylvania Historical and Museum Commission (PHMC) for the construction of the new 230 kV switchyard upgrade and the new 230 kV segments required to interconnect the Clinton-Saegers and Clinton-Elimsport 230 kV Transmission Lines with the new 230 kV switchyard. PPL Electric will continue to work with the PHMC and perform any reviews and field survey/sampling work required to avoid, minimize, and mitigate impacts to archaeological or historic architectural resources located within the project area.

The proposed Project will not affect any unique geological, scenic or natural areas. Further, there are no state lands, national parks, state parks, local parks, recreational areas or natural landmarks located within the project area.

The proposed Project will cross no streams. Although wetlands are located in the vicinity of the proposed Project, PPL Electric does not anticipate any incremental impacts to wetlands because the work will be performed almost entirely within existing transmission line corridor and on PPL Electric's property owned in fee for the Clinton 230-69 kV Substation, and due to the presence of existing electrical facilities in the Project area. Nevertheless, PPL Electric will obtain permits from the County Conservation District, Pennsylvania Department of Environmental Protection and the United States Army Corps of Engineers, as needed, and will comply with all of the terms and conditions placed on those permits. PPL Electric also will comply with soil erosion and sedimentation control permits, as needed, and will comply with any conditions placed on those permits.

PPL has been coordinating with state and federal agencies to obtain information regarding threatened and endangered species within or in close proximity to the project area. In late 2014, PPL Electric reviewed the Pennsylvania Natural Diversity Inventory (PNDI) records under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources, the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, and the U.S. Fish and Wildlife Service. Based on this review, the proposed Project is not anticipated to have

any impacts to any threatened and endangered species and/or special concern species and resources. Notwithstanding, PPL Electric will, to the extent required, coordinate with these jurisdictional agencies, acquire any required permits, and comply with any conditions placed on those permits.

D. VEGETATION MANAGEMENT

The Project is being completed almost entirely within existing transmission line corridor and on PPL Electric's property owned in fee for the Clinton 230-69 kV Substation. These areas have already been cleared of vegetation for the existing electrical facilities. However, in order to accommodate the relocation and construction of the new segments of the Clinton-Elmsport and Clinton-Saegers 230 kV Transmission Lines and to maintain proper clearances between the 230 kV conductors and vegetation in the area, limited vegetation management will be required on the Clinton 230-69 kV Substation site owned in fee by PPL Electric. In areas where vegetation management is required to complete the transmission line relocation, PPL Electric will apply its "Specifications for Initial Clearing and Control of Vegetation On or Adjacent to Electric Line Right-of-Way Through Use of Herbicides, Mechanical and Hand Clearing Techniques" to mitigate any impacts.

Attachment

4

ATTACHMENT 4
CLINTON SWITCHYARD UPGRADE PROJECT
PPL ELECTRIC UTILITIES DESIGN CRITERIA
AND SAFETY PRACTICES

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	DESIGN CRITERIA AND SAFETY PRACTICES...	4-1

ATTACHMENT 4
CLINTON SWITCHYARD UPGRADE PROJECT
PPL DESIGN CRITERIA AND SAFETY PRACTICES

A. DESIGN CRITERIA AND SAFETY PRACTICES

The National Electrical Safety Code (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 Electric Utilities Corp. (PPL) has developed design specifications and safety rules which meet or surpass all requirements specified by the NESC.

Engineering Design Criteria and Parameters

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 were developed to ensure public safety and welfare.

PPL transmission line design standards meet or surpass the NESC standards. For example, the relative order of grades of construction for conductors and supporting structures is B, C, and N; Grade B being the highest. According to the NESC standards, construction Grades B, C, or N may be used for transmission lines (except at crossings of railroad tracks and limited access highways where Grade B construction is specified). However, PPL designs all of its transmission lines for Grade B construction. The use of Grade B design and construction specifies

enhancements such as larger-minimum crossarm dimensions, larger-minimum conductor size, and increased safety factors.

Another example is the design parameters utilized to account for ice and wind loadings on the overhead ground wire (OHGW) and power conductors. The NESC standard ice and wind design magnitudes for the PPL territory are 0.5 inch thickness of radial ice combined with four pounds per square foot horizontal wind pressure (equivalent to 40-mile per hour wind velocity). The conductor sags and tensions used in line designs are the result of various ice and wind combinations, depending on the elevation at the line location and line design voltage. The conductor sags and tensions used in the design of all PPL transmission lines are at least 0.5-inch ice combined with eight pounds wind pressure (equivalent to 57 miles per hour wind velocity). This means that PPL lines are designed to operate safely and reliably during inclement weather even more severe than assumed by the NESC. In addition, PPL transmission lines are designed with more clearance to the ground than required by the NESC. The tables below compare PPL and NESC ground clearances for lines of various voltages.

138 kV

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Design</u>
Roads, streets, alleys	21 Ft.	30 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	21 Ft.	30 Ft.
Spaces accessible to pedestrians only	17 Ft.	30 Ft.
Railroad tracks	31 Ft.	35 Ft.

230 kV

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Design</u>
Roads, streets, alleys	23 Ft.	32 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	23 Ft.	32 Ft.
Spaces accessible to pedestrians only	19 Ft.	32 Ft.
Railroad tracks	31 Ft.	36 Ft.

500 kV

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Design</u>
Roads, streets, alleys	28 Ft.	53 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	28 Ft.	53 Ft.
Spaces accessible to pedestrians only	24 Ft.	53 Ft.
Railroad tracks	38 Ft.	53 Ft.

A relay protection system is used to protect the public safety and welfare as well as equipment and 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.

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 and structure climbing patrols. A number of helicopter patrols are performed on all lines annually. The two-man helicopter crew flies parallel, to the left, 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. Foot and structure climbing patrol programs for a transmission line begin approximately three to five years after the line is energized, unless a helicopter patrol reports a need for earlier action. The frequency of foot patrols varies from once every year to once every several years depending on line type and age.

An assigned foot patroller checks right-of-way conditions, including access roads, bridges, pole washouts, tower footers, vegetation height and clearance to conductors, pole and tower deterioration and, with the use of binoculars, insulators, and condition of hardware. Identified problems are included in a report that is forwarded to the appropriate department for corrective action.

A scheduled line outage is required to perform an overhead patrol because of "hands-on" inspection of hardware. Overhead patrols are conducted on a schedule determined by line age, operating record, and observed general condition. The necessary repairs are also done during the inspection outage.

Personnel Safety Rules

The following are a few of the PPL safety rules that demonstrate the Company's concern for employee 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 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 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. The conductor size and attachment clamps of temporary safety grounds must be capable of conducting anticipated fault currents. Rubber gloves, rubber sleeves, and additional rubber protective equipment are used as required when applying or removing temporary safety grounds to or from the lines or apparatus to be grounded. An approved nonconductive working stick of sufficient length to allow workers to maintain the following required minimum clearances is used to test that the line has been de-energized and to apply temporary safety grounds:




<u>Voltage-kV</u>	<u>Minimum Clearance</u>
138	3' – 7"
230	5' – 3"
500	11' – 3"

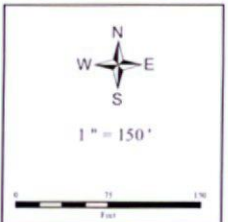
Before applying grounds, a test is done to confirm that the line is de-energized. The voltage test device is checked before and after use to assure reliability. When ground pins are used to establish proper ground points, they are driven to a depth of not less than *four feet as near vertical as possible*.

- 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.

Path: C:\Workspace\Projects\136802_Clinon\SS230k_VR\build\GIS\ProjOverview_136802_ClinonSS230k_VR\build_Existing_TLine_85x11.mxd



-  Existing Alignment
-  Existing Alignment to be Removed
-  Existing Fence





The State of Pennsylvania
Lycoming County

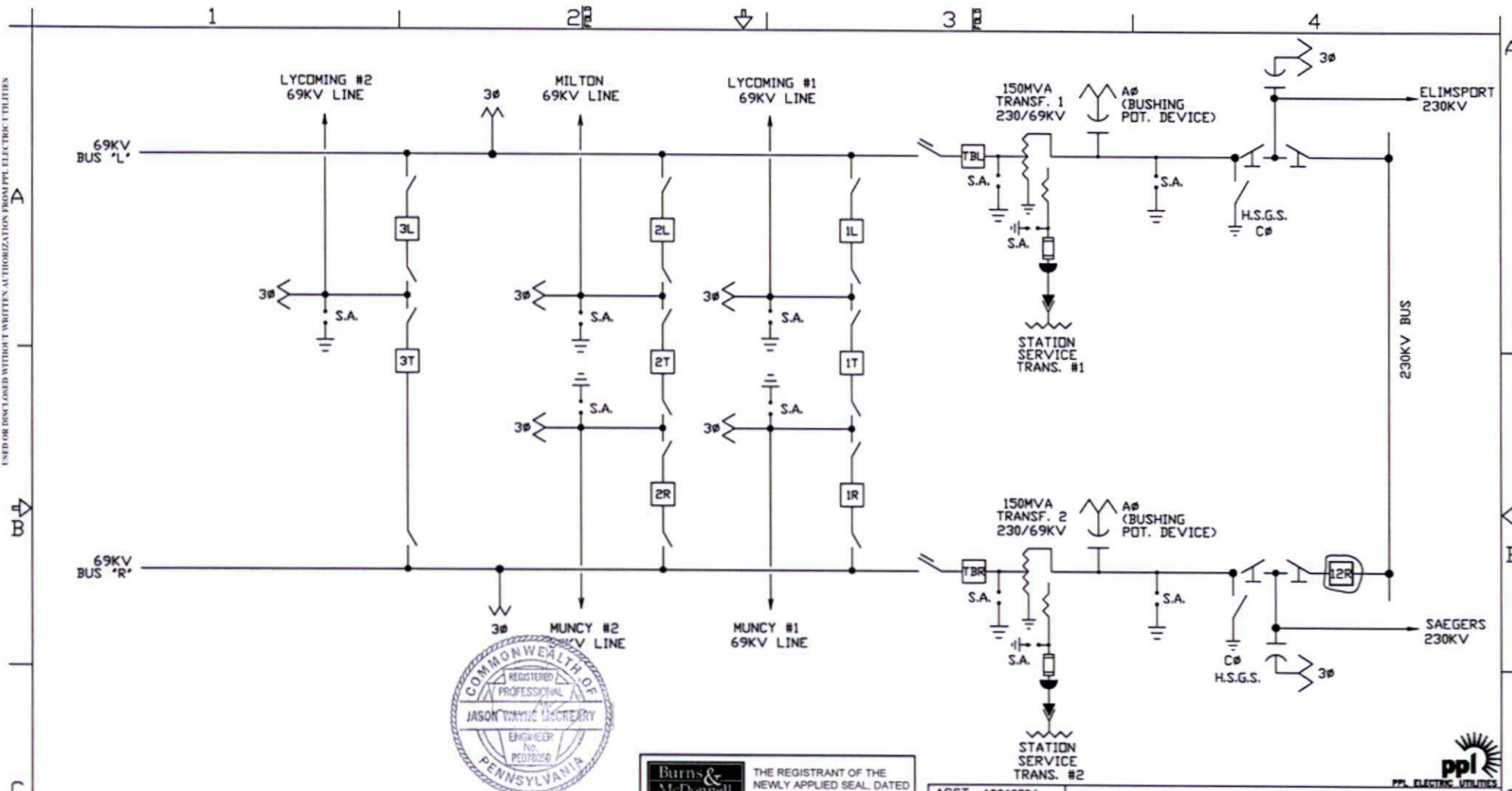
NAD 1983 StatePlane Pennsylvania North FIPS 3701 Feet
Foot US
Lambert Conformal Conic
North American 1983

Date: 5/20/2015
Author: KK
POWER 136802

Clinton Substation
Figure I-1
Project Overview
Existing Transmission Line



© 2012 PPL Electric Utilities Corporation. All rights reserved. THIS DRAWING IS THE PROPERTY OF PPL ELECTRIC UTILITIES AND CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH MUST NOT BE REPLICATED, COPIED OR DISTRIBUTED WITHOUT WRITTEN AUTHORIZATION FROM PPL ELECTRIC UTILITIES.



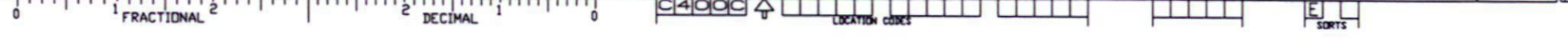
Burns & McDonnell
 THE REGISTRANT OF THE NEWLY APPLIED SEAL, DATED 12/16/14, ONLY ASSUMES RESPONSIBILITY FOR THE CHANGES AS INDICATED BY THE FOLLOWING REVISION(S) 2.

ACCT- 10019894
 SCALE- NONE
 BY- ITN/SECc
 REVIEWED
CEI Confidential
 AC PPL DRAWING NO.
 CAD ID

CLINTON 230/69KV SUBSTATION
ONE LINE DIAGRAM
 APPROVED DATE
 PPL ELECTRIC UTILITIES
 SHEET NO. REV.
 EU00501991 1 2

THREE LINE DIAGRAM - EU00501995 Approved E186314 Fedna, Edwin 2
 This document has been digitally sealed. Dec. 17 2014.

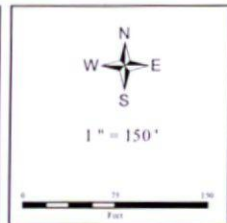
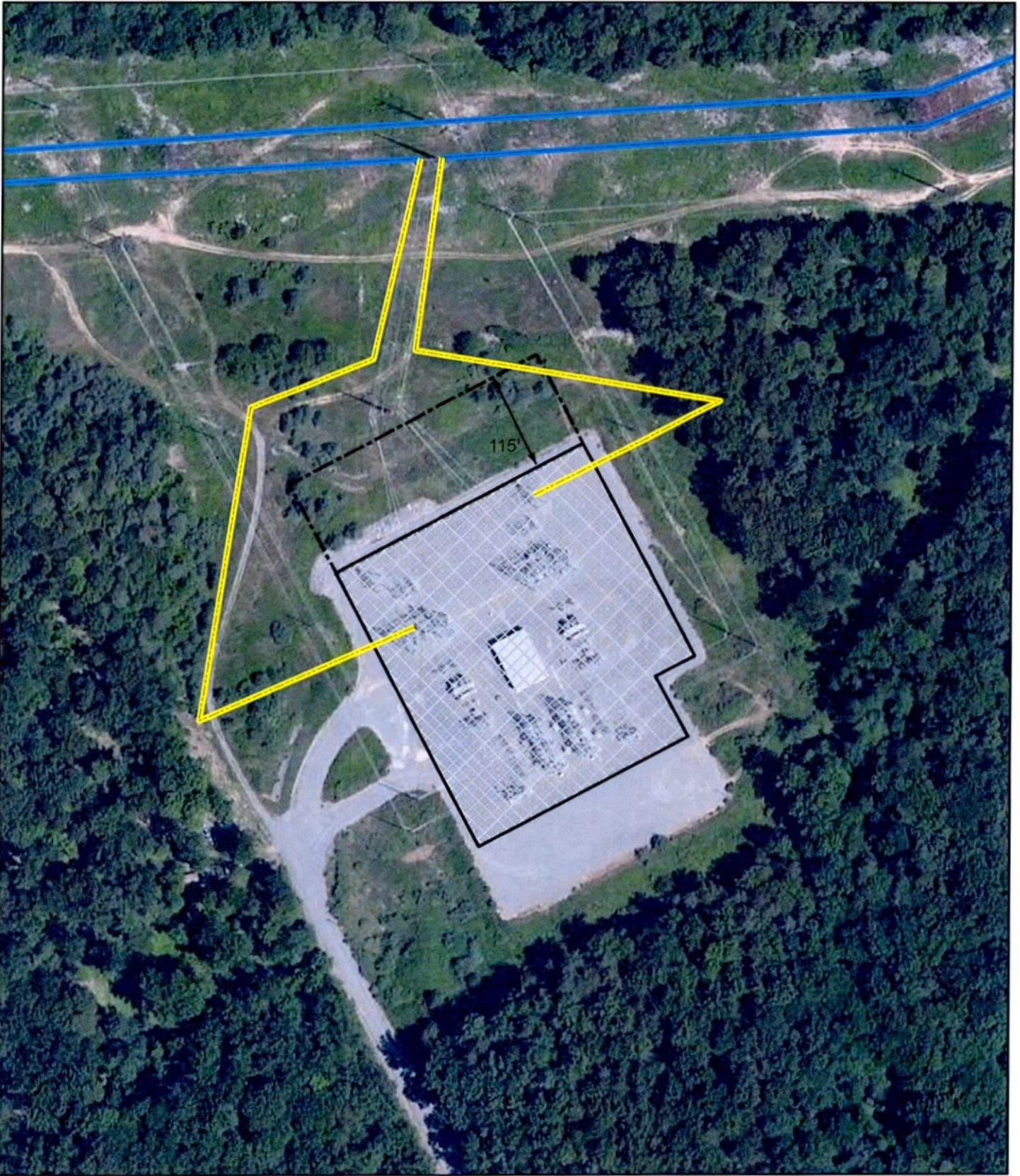
NO.	DATE	ACCT.	REVISION	BY	REVIEWED	APPROVED
2	12/16/14	10015887	REPLACED CB-12R	TC	JRC	BMcD/JWM
1	7/3/14	10020582	RENAMED CLINTON LINE TO SAEGERS.	MESA (KDP)	MESA (CCS)	E. FEDNA



PPL EU FORM 4873 (08/10)

PC-CAD B-Size

Path: C:\Workspace\Projects\136802_Clinton\SS210\VR\Rebuild\GIS\Proj\Overview_136802_Clinton\SS210\VR\Rebuild_136802_Clinton\SS210\VR\Rebuild_Line_85x11.mxd



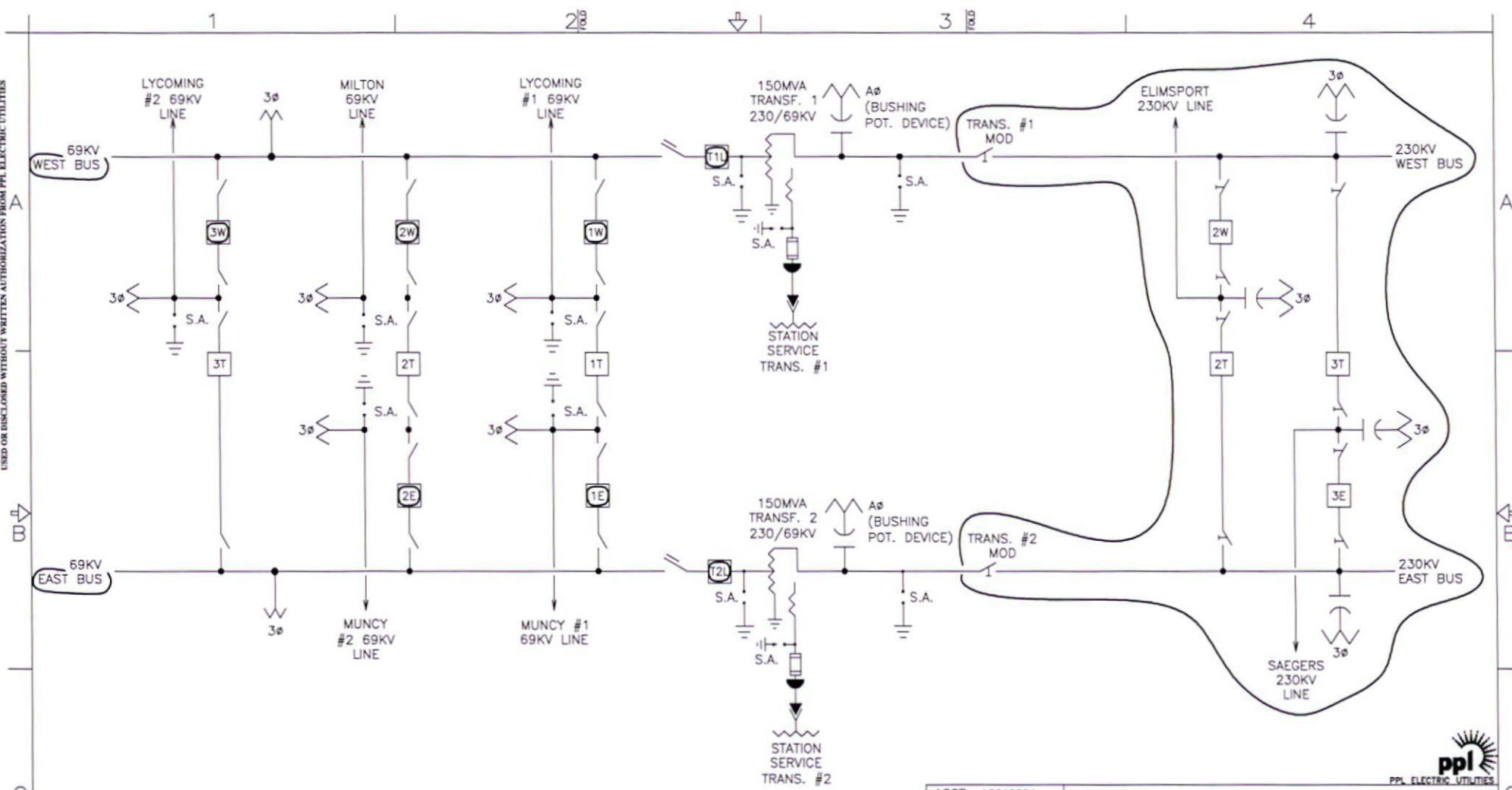
The State of Pennsylvania
Lycoming County

NAD 1983 StatePlane Pennsylvania North FIPS 3701 Feet
Foot US
Lambert Conformal Conic
North American 1983

Date: 5/20/2015
Author: KK
POWER 136802

Clinton Substation
Figure 1-3
Project Overview
Proposed Transmission Line

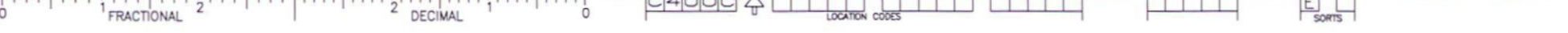
© 2012 PPL Electric Utilities Corporation. All rights reserved.
 THIS DRAWING IS THE PROPERTY OF PPL ELECTRIC UTILITIES AND CONTAINS
 PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH MUST NOT BE DUPLICATED,
 REPRODUCED OR DISCLOSED WITHOUT WRITTEN AUTHORIZATION FROM PPL ELECTRIC UTILITIES



THREE LINE DIAGRAM - EU00501995

ACCT- 10019894	CLINTON 230/69KV SUBSTATION	
SCALE- NONE		
BY- ITN/SEC	ONE LINE DIAGRAM	
REVIEWED	APPROVED	DATE
CEI Confidential	PPL ELECTRIC UTILITIES	
AC	PPL DRAWING NO.	SHEET NO.
CAD ID	EU00501991	1 3

NO.	DATE	ACCT.	REVISION	BY	REVIEWED	APPROVED
3	10/30/15	10021962	-	JOS	JAM	-
2	12/16/14	10015887	REPLACED CB-12R	TC	JRC	BMCD/JWM
1	7/3/14	10020582	RENAMED CLINTON LINE TO SAEGERS.	MESA (KDP)	MESA (CCS)	E. FEDNA

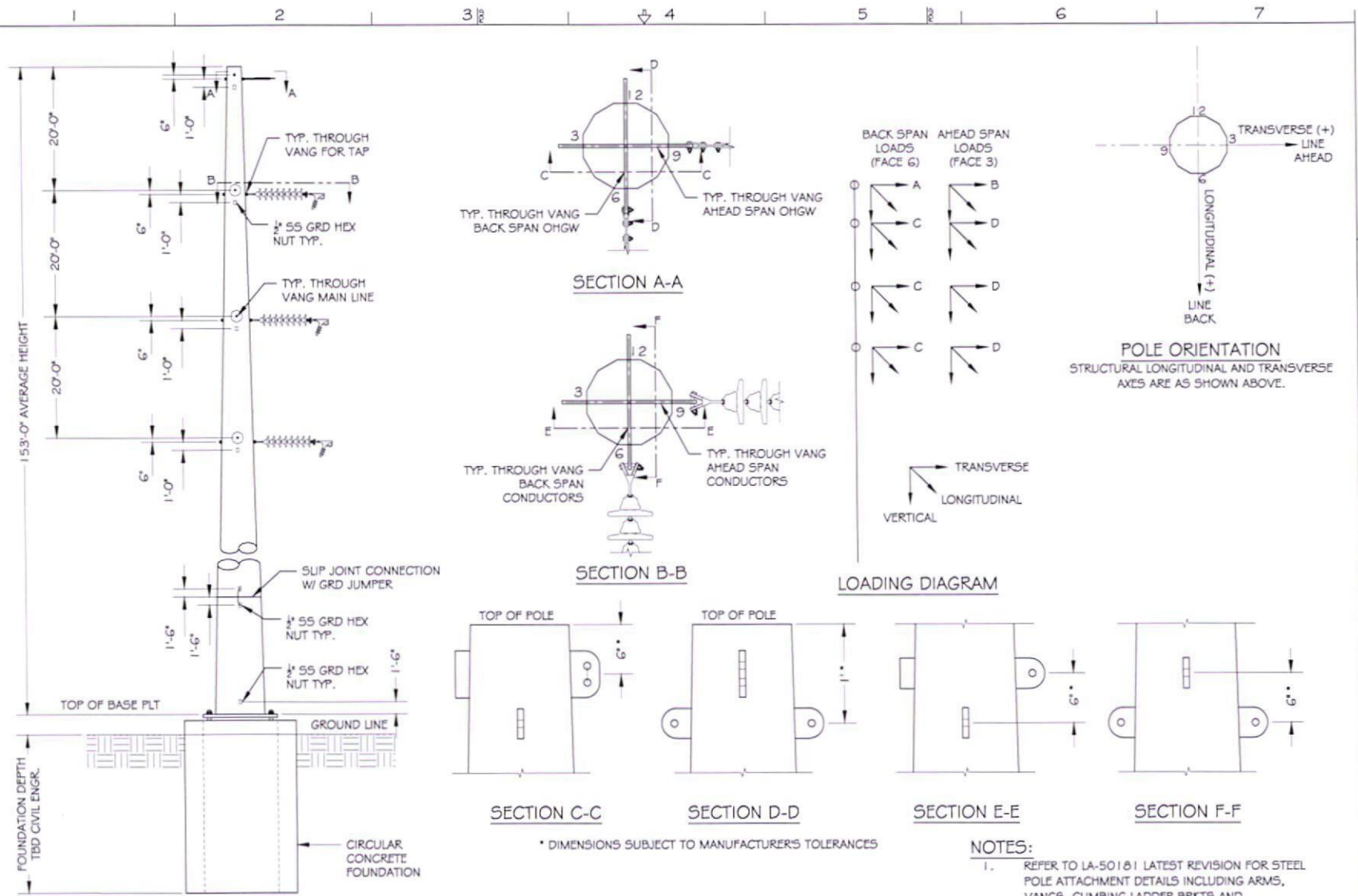


PPL EU FORM 4873 (06/10)

PC CAD B-Size

THIS DRAWING IS THE PROPERTY OF PPL ELECTRIC UTILITIES AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF PPL ELECTRIC UTILITIES.

PPL ELECTRIC UTILITIES
700610 08/11



NOTES:
1. REFER TO LA-50101 LATEST REVISION FOR STEEL POLE ATTACHMENT DETAILS INCLUDING ARMS, VANGS, CLIMBING LADDER BRKTS AND GROUNDING.

CONCEPTUAL
May 15, 2015

DRAWN BY: MJK	DIGIOIA GRAY & ASSOCIATES DIGIOIA, GRAY & ASSOCIATES, LLC 570 BEATTY ROAD MONROEVILLE, PA 15146 PHONE: (412) 372-4500 FAX: (412) 372-1972
DESIGNED BY: AGB	
CHECKED BY: AVZ	
APP. BY: AVZ X/X/2015	
DGA PROJ. NO.: 2015-419	

ACCT: 10022920	CLINTON SUBSTATION REARRANGEMENTS CONCEPTUAL MONOPOLE FRAMING TYPE 25PATTU, 90° ANGLE	
SCALE: NTS		
REV: DIGIOIA GRAY	CLINTON TWP	LYCOMING COUNTY, PA
REVISED	APPROVED	DATE
CEI Confidential	PPL ELECTRIC UTILITIES	
AC PPL DRAWING NO.	SHEET NO.	REV.
CAD ID: EU00XXXXXX	I	A

REFERENCE TITLE	NUMBER	NO	DATE	ACCT	REVISION	BY	REVIEWED	APPROVED

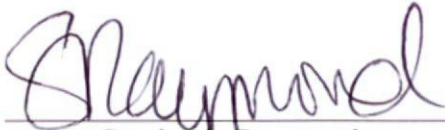
0	1	2	3	4	5	6	7	8	9	10
FRACTIONAL					DECIMAL					

LOCATION CODES	PLAN & PROFILE NO.	TRANSMISSION MAP NO.	SORTS

VERIFICATION

I, Stephanie Raymond, being the Vice President-Transmission and Substations 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: 9/02/15


Stephanie Raymond

RECEIVED
2015 SEP -3 PM 3:11
PA PUC
SECRETARY'S BUREAU

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

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

Pennsylvania Department of Transportation
Honorable Barry Schoch, P.E., Secretary
c/o Office of Chief Counsel
Commonwealth Keystone Building
400 North Street, 9th Floor
Harrisburg, PA 17120
Attn: William J. Cressler

Pennsylvania Department
of Environmental Protection
P.O. Box 2063
Market Street State Office Building
Harrisburg, PA 17105-2063
Attn: Office of Field Operations

Office of Small Business Advocate
Commerce Building
300 North Second Street, Suite 202
Harrisburg, PA 17101

Office of Consumer Advocate
555 Walnut Street
Foran Place, 5th Floor
Harrisburg, PA 17101-1923

Bureau of Investigation & Enforcement
PO Box 3265
Commonwealth Keystone Building
400 North Street, 2nd Floor West
Harrisburg, PA 17105-3265

Lycoming County Commissioners
48 West Third Street
Williamsport, PA 17701

Lycoming County Planning Commission
48 West Third Street
Williamsport, PA 17701
Attn: Howard Fry, III, Chairman

Montgomery Borough
Planning Commission
35 South Main Street
Montgomery, PA 17752
Attn: Gary Yocum, Chairman

Montgomery Borough Council
35 South Main Street
Montgomery, PA 17752
Attn: Andrew Onufrak, II, Mayor

Lewis R. Bingaman
1900 Ravine Road
Williamsport, PA 17701-2064

Jeffrey A. Churba
2820 Lincoln Drive
Montoursville, PA 17754-9517

PPL Electric Utilities Corporation
Two North Ninth Street
Allentown, PA 18101

RECEIVED
2015 SEP -3 PM 3:40
PA PUC
SECRETARY'S BUREAU

Kenneth W. Blessing
610 S. Market Street
Muncy, PA 17756-1628

Nelson R. Cameron
200 Jay Street
Danville, PA 17821

Lori A. Noll
33 Kinsey Street
Montgomery, PA 17752-1015

Date: September 3, 2015



Christopher T. Wright

RECEIVED
2015 SEP -3 PM 3:10
PA PUC
SECRETARY'S BUREAU