

- 1. REPORT DATE: 00/00/00 :
- 2. BUREAU: FUS :
- 3. SECTION(S) : :
- 5. APPROVED BY: : 4. PUBLIC MEETING DATE:
- DIRECTOR: : 00/00/00
- SUPERVISOR: : :
- 6. PERSON IN CHARGE: : 7. DATE FILED: 12/14/06
- 8. DOCKET NO: A-110500 F0387 : 9. EFFECTIVE DATE: 00/00/00

PARTY/COMPLAINANT: NORTH STROUDSBURG/MONROE COUNTY 138 KV

RESPONDENT/APPLICANT: PPL ELECTRIC UTILITIES CORP

COMP/APP COUNTY: MONROE

UTILITY CODE: 110500

ALLEGATION OR SUBJECT

LETTER OF NOTIFICATION OF PPL ELECTRIC UTILITIES CORPORATION FILED PURSUANT TO 52 PA CODE CHAPTER 57 SUBCHAPTER G, WITH RESPECT TO THE JACKSON-STROUDSBURG 138/69 KV TRANSMISSION LINE RELOCATION AND THE CONSTRUCTION OF THE NORTH STROUDSBURG 138 KV TAP, ALL IN MONROE COUNTY.

DOCKETED
DEC 15 2006

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ORIGINAL

John H. Isom

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717-612-6032 Direct
File #: 2507-129711

December 14, 2006

VIA HAND DELIVERY

James J. McNulty
Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
PO 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, With Respect to the Jackson-Stroudsburg 138/69 kV Transmission Line Relocation and the Construction of the North Stroudsburg 138 kV Tap, All in Monroe County - Docket No. A-110500 F0387

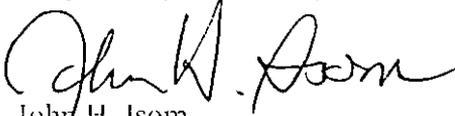
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2006 DEC 14 PM 2:53
PA PUC
SECRETARY'S BUREAU

Dear Secretary McNulty:

Enclosed, for filing, are the original and six (6) copies of the Letter of Notification of PPL Electric Utilities Corporation ("PPL Electric") Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G with Respect to the Jackson-Stroudsburg 138/69 kV Transmission Line Relocation and the Construction of the North Stroudsburg 138 kV Tap, all in Monroe County, together with seven (7) copies of the accompanying exhibits and appendices which are contained in a separately-bound volume.

As indicated in the enclosed certificate of service, copies of the Letter of Notification including the exhibits and appendices are being served by certified mail, return receipt requested upon all affected land owners (other than PPL Electric) and involved governmental agencies and municipalities. If there are any questions concerning this matter, please contact me at the addresses or telephone numbers provided above.

Respectfully submitted,


John H. Isom

JH/ijl

Enclosures

cc: Certificate of Service

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PA PUC SECRETARY'S BUREAU

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Re: Letter Of Notification Of PPL Electric Utilities Corporation, Filed Pursuant To 52 Pa. Code Chapter 57 Subchapter G, With Respect To The Jackson-Stroudsburg 138/69 kV Transmission Line Relocation And The Construction Of The North Stroudsburg 138 kV Tap, All In Monroe County

Docket No. A- 110500 F0387

DOCKETED
DEC 15 2006

LETTER OF NOTIFICATION

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

1. This Letter of Notification is filed by PPL Electric Utilities Corporation ("PPL Electric"), pursuant to 52 Pa. Code §57.72(d)(1), to request the Pennsylvania Public Utility Commission's ("Commission") approval for the relocation of 625 feet of the Jackson-Stroudsburg 138/69 kV transmission line and the construction of 95 feet of 138 kV Transmission Line for the proposed North Stroudsburg 138 kV Tap, which will connect the portion of the Substation to be operated at 138 kV with the existing Monroe-Jackson 138 kV Transmission Line.

2. PPL Electric is upgrading a portion of the North Stroudsburg 69-12 kV Substation to operate at 138 kV instead of 69 kV, by replacing one of the two present 69-12 kV transformers with a 138-12 kV transformer. The proposed North Stroudsburg 138 kV Tap will enable PPL Electric to connect that portion of the North Stroudsburg Substation with the existing Monroe-Jackson 138 kV Transmission Line. The purpose of this project is to reduce loading on the Jackson-Stroudsburg 138/69 kV Line and ultimately to convert the North Stroudsburg Substation entirely to 138 kV operation.

**DOCUMENT
FOLDER**

3. In addition, in conjunction with the plan to convert the North Stroudsburg 69-12 kV Substation entirely to 138 kV operation, the second 69-12 kV transformer at the North Stroudsburg Substation will be replaced with a 138/69-12 kV transformer, which will be operated at 69 kV until the Jackson-Stroudsburg 138/69 kV Line is upgraded to 138 kV in approximately 2010.

4. In order to maintain operation of the 69-12 kV transformer throughout the project and to create room for the proposed North Stroudsburg 138 kV Tap, it is necessary for PPL Electric to relocate 625 feet of the Jackson-Stroudsburg 138/69 kV Line.

5. The total estimated cost for the proposed work at North Stroudsburg Substation is approximately \$1.9 million. Of this total, approximately \$1.4 million is for the substation modifications including the transformers, and \$0.485 million is for the construction of the 95 feet of the 138 kV Line for the North Stroudsburg 138 kV Tap, which will connect the Substation with the existing Monroe-Jackson 138 kV Transmission Line and the relocation of 625 feet of the Jackson-Stroudsburg 138/69 kV Transmission Line to accommodate the North Stroudsburg 138 kV Tap. PPL Electric will bear the cost of this project.

6. This filing covers only the proposed transmission line modifications, which are the only portions of the project that require Commission approval under 52 Pa. Code Chapter 57, Subchapter G.

7. The immediate concern that necessitates this project is that, due to load growth, in the Southern Pocono area demand for electricity is expected to exceed the capacity of the transformers at the North Stroudsburg 69-12 kV Substation by the fall of 2007. This concern will be alleviated by the replacement of an existing 69-12 kV transformer with a 138-12 kV

transformer and the operation of this portion of the North Stroudsburg Substation at 138 kV instead of 69 kV.

8. Additionally, the loading on the Jackson-Stroudsburg 138/69 kV Line must be reduced to avoid conductor overloads and low voltage conditions. Low voltage levels could affect proper operation of residential customers' appliances as well as the operation of equipment supporting commercial and industrial businesses. During periods of high wintertime electrical demand, electric load must be transferred away from the Jackson-Stroudsburg 138/69 kV Line to avoid conductor overload violations and unacceptable low voltage conditions. Without this transfer, the Jackson-Stroudsburg 138/69 kV line is expected to exceed its normal conductor thermal rating by 10 percent. These conditions can cause conductor damage and ultimately failure of the Line. Loss of the Jackson-Stroudsburg 138/69 kV Line would interrupt service to approximately 12,000 customers until repairs are completed. This concern will be alleviated by the connection of the new 138-12 transformer with the Monroe-Jackson 138 kV Transmission Line which will divert load from the Jackson-Stroudsburg 138/69 kV Transmission Line.

9. This project has a scheduled construction start date of April, 2007, which is critical to meeting the required in-service date of November, 2007.

10. The entire project will be located on property owned by PPL Electric or within existing PPL Electric right-of-way.

11. Accompanying this Letter of Notification is a separately bound volume containing Exhibits A-C and Appendices A-D, which provide additional information about the project. This Letter of Notification and the accompanying Exhibits and Appendices, which are incorporated herein by reference, contain all of the information required by 52 Pa. Code § 57.72(d)(4).

12. The name and address of the Applicant are:

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

13. PPL Electric is a Pennsylvania corporation, which provides electric distribution and provider of last resort electric supply services, subject to the Commission's regulatory jurisdiction, to approximately 1.3 million customers in all or portions of twenty-nine counties in eastern and central Pennsylvania.

14. The names, addresses and telephone numbers of PPL Electric's attorneys are:

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

16. 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). This transmission line siting and construction proceeding qualifies for use of a Letter of Notification because it is within an existing PPL Electric transmission line right-of-way or land owned by PPL Electric and because the construction of the North Stroudsburg 138 kV Tap and the relocation of the Jackson-Stroudsburg 138/69 kV Line are less than two miles in length. Further, the project will not substantially alter the existing right-of-way because the proposed North Stroudsburg 138 kV Tap involves the installation of two single-shaft steel poles with one being located within existing PPL Electric right-of-way and one on land owned by PPL Electric. The relocation of the Jackson-Stroudsburg 138/69 kV Line involves the installation of 4 new single-shaft steel poles with one being located within existing PPL Electric right-of-way and three being located on land owned by PPL Electric.

17. The Necessity Statement for the project is provided as Exhibit "A" in the accompanying Exhibits and Appendices to this Letter of Notification.

18. The project will be designed, constructed, operated and maintained in a manner that meets or surpasses National Electrical Safety Code ("NESC") standards and all applicable legal requirements. The proposed project will not create an unreasonable risk of danger to the public health or safety. Descriptions of NESC standards and PPL Electric's design criteria and safety practices are set forth in Appendix A to the accompanying exhibits.

19. The Engineering Description for the project is provided in Exhibit "B" in the accompanying Exhibits and Appendices to this Letter of Notification.

20. The entire project is located on land already owned by PPL Electric or within existing PPL Electric right-of-way. Consequently, no additional impact on land use is anticipated.

21. No nearby railroads, communication towers, pipelines or other utilities will be affected by the proposed project. The nearest aviation facility is the Stroudsburg Pocono Airport which is located 2.0 miles from the project's location and will not be affected by the project.

22. The project has been reviewed by the Pennsylvania Historical and Museum Commission ("PHMC"). The PHMC has determined that due to the close proximity of Broadhead Creek to this project that further Archaeological Investigation is required. PPL Electric has contracted Dr. Frank Vento from the University of Clarion to conduct a Phase I Archaeological Assessment. Initial field investigations conducted by Dr. Vento have revealed no evidence of artifacts. All necessary reports will be filed with the PHMC before construction begins.

23. Based upon a review of registries of historic landmarks, districts and properties, there is one structure of historical interest, the Stites Mountain House, which is located approximately 2.5 miles northwest from the project. No visual or other impacts to the Stites Mountain House are expected due to the small scope of the project, the existing commercial operations around the North Stroudsburg Substation, and the distance of the Stites Mountain House from the project.

24. The project will not affect any unique geological, scenic or natural areas. No National Natural Landmarks, parks, or recreational facilities are located near the project area.

25. Approximately one acre of tree clearing will be required for the relocation of the Jackson-Stroudsburg 138/69 kV Line. To mitigate impacts, all clearing work will be performed according to PPL Electric's "Program for Vegetation Management."

26. PPL Electric retained Woodland Design Associates to identify and delineate any wetlands within the project area. Woodland Design Associates has determined that no wetlands will be affected by the project.

27. In conducting the work necessary for this project, PPL Electric will employ, as appropriate, the mitigating measures set forth in its "Specification for Soil Erosion and Sedimentation Control for Electrical Systems Projects."

28. PPL Electric has coordinated with state and federal agencies to obtain information regarding endangered and threatened species in close proximity to the project. A review of the Pennsylvania Natural Diversity Inventory Records indicates that there are potential impacts on species of special concern and resources within or in close proximity to the project. In order to address these concerns, PPL Electric has retained the services of Mellon Biological Services to survey the project area and determine whether any conflicts exist. Additionally, PPL Electric, as required by DEP, will comply with the bog turtle habitat screening requirements of the Pennsylvania State Programmatic General Permit. In a report based on a field review held on November 7, 2006, Rick Mellon, Professional Wetland Scientist, concluded that no species of special concern nor potential habitat for species of special concern was found in the project area. Specifically, no bog turtles or potential bog turtle habitat was found. Bog turtles need very poorly drained soils with springs and mucky soils. None of these conditions occur in the project area, nor was any habitat visible adjacent to the project area. A Phase 1 Potential Bog Turtle

Study will be submitted to the United States Fish and Wildlife Service and the Pennsylvania Fish and Boat Commission.

In addition, the Department of Conservation and Natural Resources (“DCNR”) notes a potential unidentified conflict under its jurisdiction. Mr. Mellon has requested on behalf of PPL Electric additional information from the DCNR regarding the identification and location of the potential conflict. PPL Electric will resolve this issue prior to the commencement of construction.

29. The Environmental Assessment for the project is provided as Exhibit “C” in the accompanying Exhibits and Appendices to this Letter of Notification.

30. Appendix B in the accompanying Exhibits and Appendices to this Letter of Notification explains PPL Electric’s standards for Magnetic Field Management.

31. Appendix C in the accompanying Exhibits and Appendices to this Letter of Notification contains a list of property owners within PPL Electric’s transmission line right-of-way.

32. The proposed project was reviewed with all of the affected townships and Monroe County. None of these governmental units objects to the project. A list of involved governmental agencies, municipalities and other public entities is presented in Appendix D in the accompanying Exhibits and Appendices.

33. A copy of this Letter of Notification is being served in accordance with 52 Pa. Code §57.72(d)(3).

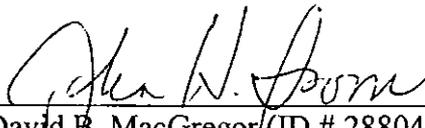
34. As soon as practicable after the filing of this Letter of Notification and the assignment by the Commission of a docket number, PPL Electric will publish notice of the filing in newspapers of general circulation in the area of the proposed project. Such notice will

contain: (a) the date this Letter of Notification was filed with the Commission; (b) a brief description of the project and its location; (c) locations where the complete Letter of Notification may be reviewed by the public; and (d) an instruction that the interested parties should contact, within 15 days, James J. McNulty, Secretary, at the Commission's Harrisburg address.

35. 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.* If the Commission does not approve this Letter of Notification, the Commission's Order shall direct PPL Electric to file for approval to construct the proposed project pursuant to the Commission's formal certification regulations.

WHEREFORE, PPL Electric Utilities Corporation respectfully requests that the Commission approve the relocation of 625 feet of the Jackson-Stroudsburg 138/69 kV Transmission Line and construction of 95 feet of 138 kV transmission line for the North Stroudsburg 138 kV Tap.

Respectfully submitted,



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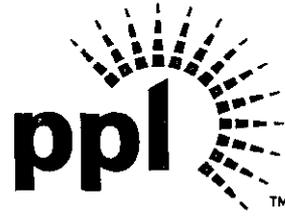
Of Counsel:

Post & Schell, P.C.

Date: December 14, 2006

Attorneys for PPL Electric Utilities Corporation

ORIGINAL



Before the
Pennsylvania Public Utility Commission

DOCKETED
DEC 15 2006

**JACKSON-STROUDSBURG 138/69 kV
Relocation
&
North Stroudsburg 138 kV Tap**

DOCUMENT
FOLDER

EXHIBITS AND APPENDICES IN SUPPORT OF THE

Letter of Notification

Application Docket No. A-110500 F

Submitted by: PPL Electric Utilities Corp.

RECEIVED
2006 DEC 14 PM 2:53
SECRETARY'S BUREAU
PA PUBLIC UTILITIES COMMISSION

SUMMARY

This filing is submitted by PPL Electric Utilities Corporation (PPL EU) pursuant to the Pennsylvania Public Utility Commission's (PUC or the Commission) regulations at 52 Pa. Code §§57.71 through 57.77 for PUC approval to relocate a section of the existing Jackson-Stroudsburg 138/69 kV Line and to construct the North Stroudsburg 138 kV Tap. The proposed project will convert half of the existing North Stroudsburg 69-12 kV Substation to 138-12 kV operation. This project is required to reduce loading on the Jackson-Stroudsburg 138/69 kV Line and to ultimately convert North Stroudsburg Substation to 138kV operation. This project will be located on PPL EU property and existing PPL EU easement.

The estimated cost to design and construct the Jackson-Stroudsburg 138/69 kV relocation and the North Stroudsburg 138 kV Tap is \$485,000. Construction is scheduled to begin in April 2007 to support the project's in-service date of November 2007.

This document, which describes the need for the project and discusses the engineering and siting analysis for the proposed construction, consists of the following exhibits and appendices:

- Exhibit "A" - Necessity Statement
- Exhibit "B" - Engineering Description
- Exhibit "C" - Environmental Assessment

- Appendix A - PPL Design Criteria and Safety Practices
- Appendix B - Magnetic Field Management at PPL
- Appendix C - List of affected property owners
- Appendix D - List of Involved Governmental Agencies, Municipalities, and Other Public Entities

PPL ELECTRIC UTILITIES SERVICE TERRITORY



EXHIBIT "A"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP

NECESSITY STATEMENT

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MAP

MAP 1	PPL EU SYSTEM MAP
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Exhibit "A"
Map Pocket

EXHIBIT "A"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP

NECESSITY STATEMENT

A. INTRODUCTION

PPL EU plans to convert half of the existing North Stroudsburg 69-12 kV Substation to 138 kV operation. The North Stroudsburg Substation currently has two 69-12 kV transformers served from the Jackson-Stroudsburg 138/69 kV Line (currently operated at 69 kV).

Transformer #1 will be upgraded to a 138-12 kV transformer and will be served off the existing Monroe-Jackson 138 kV Line via the proposed North Stroudsburg 138 kV Tap. Transformer #2 will be upgraded to a 138/69-12 kV dual wound transformer and will continue to be operated at 69 kV off the Jackson-Stroudsburg 138/69 kV Line until future conversion to 138 kV operation is required. To accommodate the upgrade of this substation, the Jackson-Stroudsburg 138/69 kV Line will need to be relocated. Therefore, in addition to the proposed North Stroudsburg 138 kV Tap, PPL EU is also requesting PUC approval to relocate several spans of the Jackson-Stroudsburg 138/69 kV Line around the existing North Stroudsburg Substation.

This project is required to reduce loading on the Jackson-Stroudsburg 138/69 kV Line and to ultimately convert North Stroudsburg Substation to 138 kV operation. Conversion of the North Stroudsburg Substation to 138 kV operation was identified as part of an overall long-term transmission plan that will alleviate reliability and overload concerns in the Southern Pocono area.

The estimated cost to design and construct the Jackson-Stroudsburg 138/69 kV Line relocation and the new North Stroudsburg 138 kV Tap is approximately \$485,000. This project has a scheduled construction start date of April, 2007 to meet a required in-service date of November, 2007. The required in-service date is defined as the date that the

proposed facility must be placed in service to prevent overloads that could potentially damage equipment and result in service interruptions to customers.

A PPL EU system map showing the existing transmission line facilities with a design voltage of 35 kV or greater is included in the Exhibit "A" map pocket. This filing addresses only the existing and proposed 138 kV regional transmission system in the Southern Pocono area.

B. EXISTING SYSTEM

The North Stroudsburg 69-12 kV Substation has two 69-12 kV transformers presently supplied from the single circuit Jackson-Stroudsburg 138/69 kV Line. See Figure #1. The Jackson-Stroudsburg 138/69 kV Line is a radial line served out of the Jackson 138-69 kV Substation. Jackson Substation has two 138-69 kV transformers which feed a 69 kV 'breaker and a half' bus design. The Jackson-Stroudsburg 138/69 kV line is tapped off one of the 'breaker and a half' bays at Jackson Substation.

A majority of the Jackson-Stroudsburg 138/69 kV Line is double circuit with the Monroe-Jackson 138 kV Line.

C. DEFINITION OF THE PROBLEM

Due to continued load growth in the Southern Pocono area, the capacity of the transformers at North Stroudsburg 69-12 kV Substation is forecasted to be exceeded by fall 2007. Additionally, the loading on the Jackson-Stroudsburg 138/69 kV Line must be reduced to avoid conductor overloads and low voltage conditions. Low voltage levels could affect proper operation of residential customers' appliances as well as the operation of equipment supporting commercial and industrial businesses. During periods of high wintertime electrical demand, electric load must be transferred away from the Jackson-Stroudsburg 138/69 kV Line to avoid conductor overload violations and unacceptable low voltage

conditions. Without this transfer, the Jackson-Stroudsburg 138/69 kV Line will exceed its normal conductor thermal (heating) rating by 10%. These conditions can cause conductor damage and ultimate failure of the line. Loss of the Jackson-Stroudsburg 138/69 kV Line in periods of high wintertime electrical demand would interrupt more than 80 MW, or approximately 12,000 customers, until repairs could be made.

By the winter of 2007, neighboring 69 kV circuits will be approaching their capacity limits and will no longer be able to accept load transfers from the Jackson-Stroudsburg 138/69 kV Line. Therefore the North Stroudsburg 138 kV Tap to Transformer #1 will be required by winter 2007 to relieve the Jackson-Stroudsburg 138/69 kV Line.

D. PROPOSED SOLUTION

To resolve the issues discussed above, PPL EU, with the PUC's approval, proposes a transfer of substation loads from the existing 69 kV System to the 138 kV system. In 2007, load transfer to the 138 kV system at North Stroudsburg 69-12 kV Substation will be accomplished by tapping the Monroe-Jackson 138 kV line and installing two new spans of 138 kV transmission line, approximately 95 feet, to feed Transformer #1. In order to accept load at 138 kV, the existing Transformer #1 at North Stroudsburg Substation will be replaced with a 138-12 kV, 20/27/34 MVA unit. Figures #2 and #3 show the proposed substation and transmission line arrangements for winter 2007, respectively.

Transformer #2 at North Stroudsburg Substation will be upgraded to a 138/69-12 kV, 20/27/34 MVA dual wound unit. This transformer will continue to be operated at 69 kV from the Jackson-Stroudsburg 138/69 kV Line until it is converted to 138 kV operation in 2010.

The total estimated cost for the proposed work at North Stroudsburg Substation is approximately \$1.9 million, which includes \$1.4 million for the substation modifications and \$485,000 for the transmission work. This filing covers only the proposed transmission

modifications, which is the only part of the project that requires prior PUC approval under 52 Pa. Code, Chapter 57, Subchapter G.

E. FUNCTIONAL ALTERNATIVES

No other reasonably economical functional alternatives were identified that would completely resolve the problems outlined above.

FIGURE #1
EXISTING TRANSMISSION CONFIGURATION

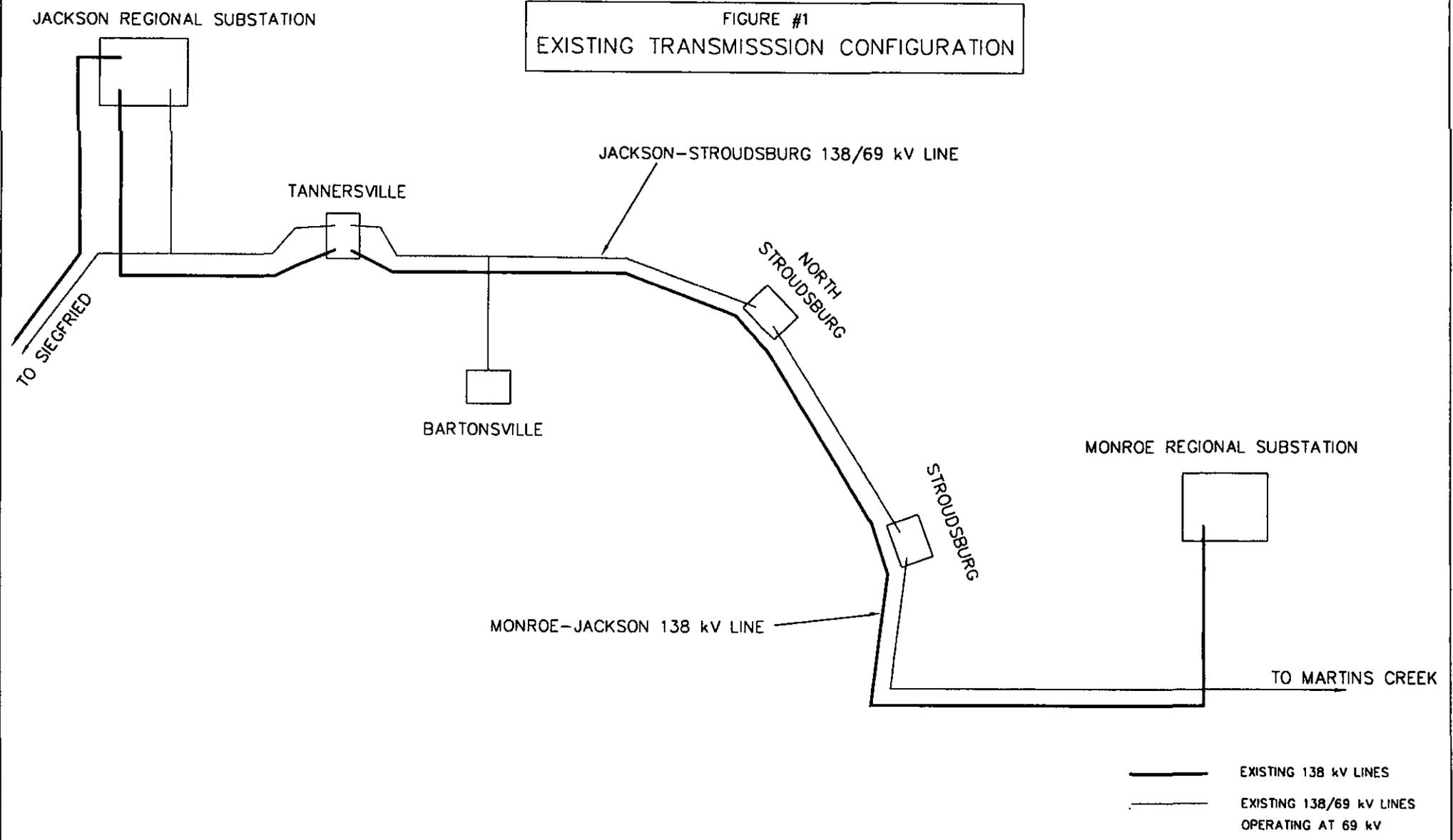


FIGURE #2
MODIFIED NORTH STROUDSBURG SUBSTATION

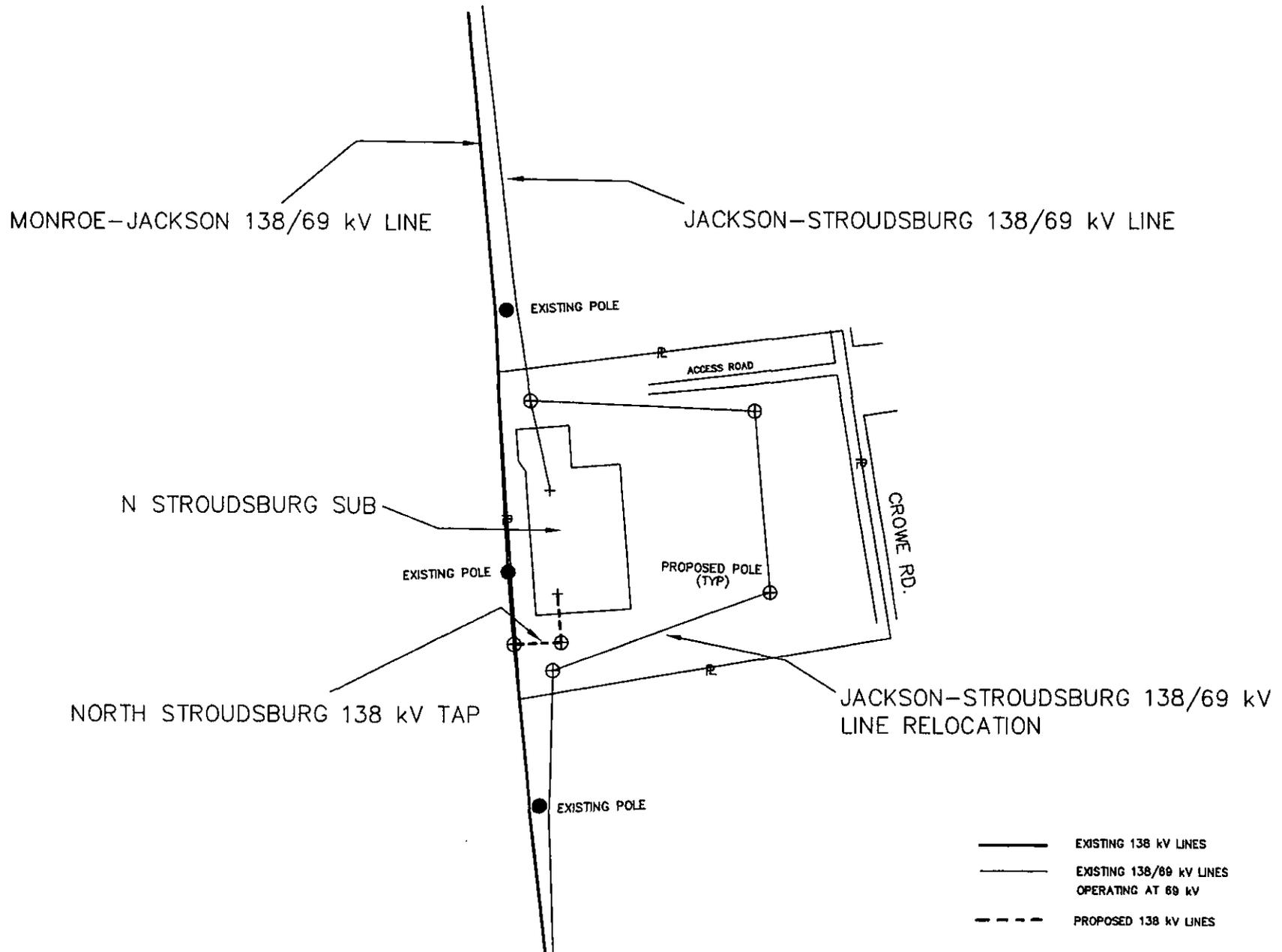


FIGURE #3
PROPOSED TRANSMISSION CONFIGURATION

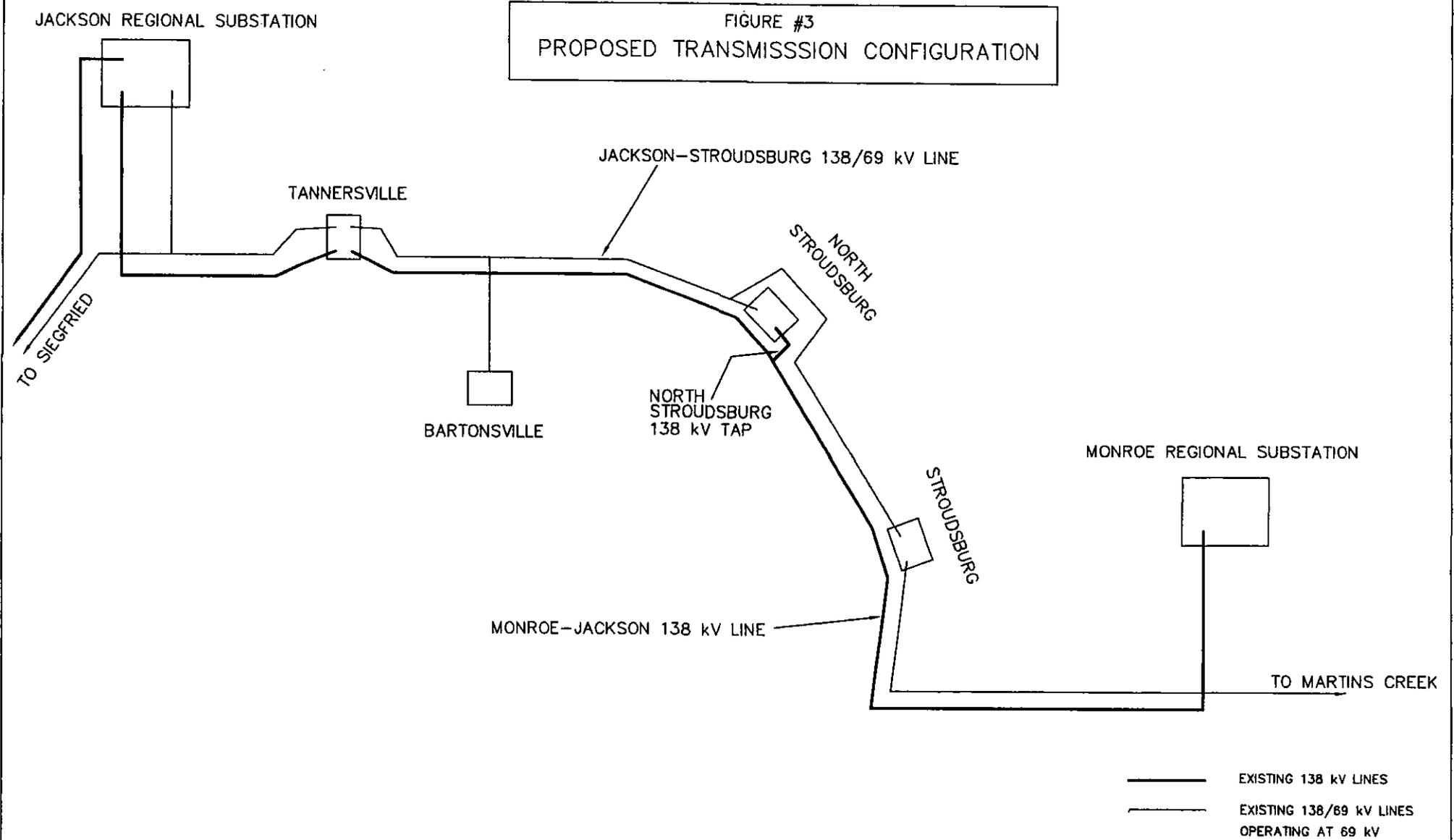


EXHIBIT B

AERIAL EXHIBIT

SHEET 1 OF 1

JACKSON - STROUDSBURG 138/69 KV RELOCATION AND NORTH STROUDSBURG 138 KV TAP

STROUD TWP.
MONROE COUNTY

SCALE: 1" = 200'



PPL ELECTRIC UTILITIES

PREPARED BY:
PPL ELECTRIC UTILITIES CORP.

OVER SIZED DOCUMENTS



PPL ELECTRIC UTILITIES

ACCT- 161621		JACKSON - STROUDSBURG 138/69KV LINE RELOCATION AND NORTH STROUDSBURG 138KV TAP	
SCALE- AS SHOWN			
BY- CDW			
DLH			
REVIEWED		STROUD TWP.	MONROE CO., PA:
		APPROVED	DATE
		PPL ELECTRIC UTILITIES	
PPL DRAWING NO.		SHEET NO.	REV.
SM161621		1	0

APPROVED

, 696-323-N4

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PC CAD

EXHIBIT "B"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP

ENGINEERING DESCRIPTION

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MAP 1	NORTH STROUDSBURG 138 kV TAP & JACKSON-STROUDSBURG 138/69 kV RELOCATION – AERIAL EXHIBIT	Exhibit "B" Map Pocket

EXHIBIT "B"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP

ENGINEERING DESCRIPTION

A. DESCRIPTION OF PROPOSED LINES

North Stroudsburg 69-12 kV Substation contains two 69-12 kV transformers. To maintain reliable service to PPL EU customers, one half of the substation is proposed to be converted to 138-12 kV operation. The existing #1 69-12 kV transformer is being replaced with a 138-12 kV transformer. In order to serve the new 138-12 kV transformer PPL EU proposes to construct a short approximately 95 foot long 138 kV Tap. The proposed tap line will connect to the existing Monroe-Jackson 138 kV Transmission Line. Transformer #2 will continue to operate at 69 kV. To maintain 69 kV operation to transformer #2 and create room for the proposed North Stroudsburg 138 kV Tap a section of the Jackson-Stroudsburg 138/69 kV Line needs to be relocated around North Stroudsburg 69-12 kV Substation. This project is located in Stroud Township, Monroe County. A plot plan for both the proposed 138 kV tap and the 138/69 kV relocation is provided in the Exhibit "B" map pocket.

The proposed North Stroudsburg 138 kV Tap will require the construction of approximately 95 feet of transmission line. Two new poles will need to be installed to construct this new section of line. The proposed relocation of the Jackson-Stroudsburg 138/69 kV line will require the construction of approximately 625 feet of new transmission line. Four new poles will need to be installed to construct this section of line. All proposed poles will be direct embedded, guyed steel poles placed on property that PPL EU already owns in fee and existing strip easement. The proposed line sections will consist of three power conductors and one overhead shield wire. The conductors will be 556.5 KCMIL 24/7 stranding ACSR, and the shield wire will be 3/8 inch high strength steel wire.

The proposed line will be designed to, and generally exceed, National Electrical Safety Code (NESC) standards. Design specifications and safety rules practiced by PPL EU are included

in Appendix A. The minimum conductor to ground clearance will be 30 feet, which occurs at a maximum thermal conductor temperature of 125 degrees Celsius.

The designed minimum conductor clearances and conductor thermal ratings for the line are as follow:

TABLE 1
DESIGN MINIMUM CONDUCTOR CLEARANCES
FOR 556.5 KCMIL 24/7 STRANDING ACSR*

<u>Condition</u>	<u>Transmission Double-Circuit Design Clearance-to-Ground</u>
Normal load; average weather (16°C ambient temperature)	32.7 feet
Predicted extreme thermal load (125°C conductor temperature)	30.0 feet
Predicted extreme weather conditions (1/2-inch ice, 8 lbs. wind, -18°C)	33.2 feet

*Clearances based on a maximum tension of 3540 pounds and a ruling span of 290 feet.

CONDUCTOR THERMAL RATING
556.5 KCMIL 24/7 STRANDING ACSR
(257°F) 125°C MAXIMUM CONDUCTOR TEMPERATURE

Condition	<u>Ambient Temperature °C</u>	<u>Wind Speed Knots</u>	<u>Ampacity Amps</u>
Summer Normal	35	0	810
Winter Normal	10	0	920
Summer Emergency	35	1 1/2	1,030
Winter Emergency	10	1 1/2	1,150

B. MAGNETIC FIELD MANAGEMENT

PPL EU's Magnetic Field Management Program, summarized in Appendix B, is applied to new and reconstructed transmission line projects. To reduce magnetic field exposures, the program generally prescribes the use of a line design that provides five feet higher 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 will be considered, provided those modifications can be made at low or no cost.

Both proposed line routes will be constructed as single circuit transmission lines. Therefore, reduction of the magnetic field through reverse phasing is not possible. Some reduction of magnetic field is anticipated through the use of taller poles.

C. RIGHT-OF-WAY STATUS

All work will be completed on PPL EU fee owned property, and existing strip easement. No additional right-of-way is required.

EXHIBIT "C"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP
ENVIRONMENTAL ASSESSMENT

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EXHIBIT "C"
JACKSON-STROUDSBURG 138/69 kV RELOCATION
&
NORTH STROUDSBURG 138 kV TAP
ENVIRONMENTAL ASSESSMENT

A. INTRODUCTION

PPL EU needs to convert half of the existing North Stroudsburg 69-12 kV Substation to 138-12 kV operation. To accomplish this conversion, PPL EU proposes to relocate 625 feet of the Jackson-Stroudsburg 138/69 kV Line and construct a 95 foot North Stroudsburg 138 kV Tap. This project is required to prevent overload conditions on the existing Jackson-Stroudsburg 138/69 kV Line and the existing 69-12 kV transformers at North Stroudsburg Substation.

The proposed project was reviewed with Stroud Township and Monroe County, and neither the Township nor the County has any objection. A list of involved governmental agencies, municipalities and other public entities is presented in Appendix D.

B. LAND USE

Both the proposed relocation of the Jackson-Stroudsburg 138/69 kV Line and the North Stroudsburg 138 kV Tap are located entirely on PPL EU property and existing strip easement just outside the fence of the North Stroudsburg 69-12 kV Substation. Therefore, no additional impact on existing land use is anticipated.

No nearby railroads, communication towers, pipelines or other utilities will be affected by the proposed project. Stroudsburg – Pocono Airport is located approximately 2.0 miles from the project location. PPL EU will file the appropriate documentation with both the Federal Aviation Administration and the PennDOT Bureau of Aviation to ensure the proposed line section is not a hazard to the airport's flight operations.

C. CULTURAL RESOURCES

This project was reviewed with the Pennsylvania Historical and Museum Commission (PHMC). PHMC has determined that due to the close proximity of Broadhead Creek to this project that further Archaeological Investigation is required. PPL EU has contracted Dr. Frank Vento from the University of Clarion to conduct a Phase I Archaeological Assessment. Initial field investigations have found no evidence of Archeology conducted by Dr. Vento. All necessary reports will be filed with PHMC before construction begins.

The following lists were reviewed for the presence of historical districts and structures in the area:

- National Historic Landmarks in Pennsylvania
- National Register Historic Districts in Pennsylvania
- National Register Individual Properties and Historic Districts in Pennsylvania
- National Register/Listed and Eligible Properties in Pennsylvania

There is one structure of historical interest in the vicinity of the project. The Stites Mountain House is approximately 2.5 miles northwest of the project area. No visual or other impacts to the Stites Mountain House historic structure are expected due to the small scope of the project and the existing commercial operations around North Stroudsburg Substation.

D. NATURAL FEATURES

The proposed project will not affect any unique geological, scenic, or natural areas. A review of the "Outstanding Scenic Geological Features of Pennsylvania" publication revealed the "Centerfield Coral Reef" within approximately 0.30 miles of the project site. This project will have minimal to no impact on this natural feature due to the distance between the project area and the natural feature. No parks or recreational facilities are located near the project area. Approximately 1 acre of tree clearing and low brush removal is required for the relocation of the Jackson-Stroudsburg 138/69 kV Line. To mitigate impacts, all clearing work will be performed according to PPL EU's "Program for Vegetation Management". PPL EU has retained Woodland Design Associates to identify

and delineate any wetlands within the project area. Per a field visit by Woodland Design Associates no wetlands will be impacted by the line construction. PPL EU will employ its "Specification for Soil Erosion and Sedimentation Control on Transmission Line Rights-of-Way" as appropriate.

E. THREATENED AND ENDANGERED SPECIES

PPL EU has coordinated with different state and federal agencies to obtain information regarding endangered and threatened species in close proximity to the project area. A review of the Pennsylvania Natural Diversity Inventory records indicates there are potential impacts on species of special concern and resources within ,or in close proximity to, the project area. PPL EU has retained Mellon Biological Services to survey the project area and determine if any conflicts exist. Additionally PPL EU, as required by DEP, will comply with the bog turtle habitat screening requirements of the Pennsylvania State Programmatic General Permit. In a report based on a field review held November 7, 2006 with Rick Mellon, Professional Wetland Scientist, Rick Mellon offered the following Memorandum; No Species of Special Concern nor potential habitat for Species of Special Concern was found in the area. Specifically, no Bog Turtles or potential Bog Turtle habitat was found. Bog Turtles need very poorly drained soils with springs and mucky soils. None of these conditions occur in the study area, nor was any habitat visible adjacent to the study area. A Phase I Potential Bog Turtle Habitat Study will be submitted to the US Fish and Wildlife Service and the Pennsylvania Fish and Boat Commission.

Finally, the Department of Conservation and Natural Resources (DCNR) notes a potential unidentified conflict, under their jurisdiction. Mr. Mellon, on behalf of PPL EU, has requested additional information from DCNR regarding identification and location of the potential conflict. PPL EU will resolve this issue prior to the start of construction.

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- APPENDIX A - PPL EU Design Criteria and Safety Practices
- APPENDIX B - Magnetic Field Management at PPL EU
- APPENDIX C - List of Involved Property Owners
- APPENDIX D - List of Involved Governmental Agencies, Municipalities, and Other Public Entities

APPENDIX A

PPL EU 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 EU) has developed design specifications and safety rules which meet or surpass all provisions 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 EU 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 EU designs all of its transmission lines for Grade B construction. The use of Grade B design and construction specifies such things 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 EU 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 EU 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 EU lines are designed to operate safely and reliably during inclement weather even more severe than assumed by the NESC. In addition, PPL EU transmission lines are designed with more clearance to the ground than required by the NESC. The tables below compare PPL EU 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 EU 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 EU 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 EU 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 EU 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.



**MAGNETIC
FIELD
MANAGEMENT**
PPL Electric Utilities
Corporation

APPENDIX B

DECEMBER 2004

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INTRODUCTION

At PPL Electric Utilities Corp. (PPL EU), magnetic field management means investigating and implementing methods at low or no cost to reduce magnetic fields in new or rebuilt transmission and distribution lines. This document explains PPL EU's Magnetic Field Management Program, which is part of PPL EU's larger Electric and Magnetic Fields (EMF) policy.

PPL EU's View

Some people are worried that electric and magnetic fields are harming their health. Others think the scientific research does not show a problem at all, and still others believe there's just too much scientific uncertainty to draw any conclusions.

Here's what we do know now. Various panels of scientists that have reviewed the EMF research generally have drawn two main conclusions. First, the large body of evidence does not demonstrate that EMF are harmful. Second, additional research is recommended to explore questions raised in some studies.

Given these conclusions, *PPL EU is taking a reasoned approach in responding to the EMF issue.* PPL EU's approach to the EMF issue consists of five elements:

- Providing EMF information to customers and employees
- Providing magnetic field measurements
- Establishing and implementing a magnetic field management program to reduce magnetic fields in new or rebuilt facilities when it can be done at no, or low, cost
- Integrating EMF in the public involvement process that PPL EU undertakes in the siting of transmission lines
- Have supported additional research

EMF Are All Around Us

Electric and magnetic fields occur in nature and in all living things. The earth, for instance, has a magnetic field, which makes the needle on a compass point north.

Electric fields and magnetic fields of a different type also surround every wire that carries electricity. In everyday life, these EMF arise from several basic sources, including power lines, electrical appliances, home and building wiring, other utility lines and cables, and currents flowing on water pipes. Though they often occur together, EMF are made up of two separate components:

Electric Fields

Electric fields are produced by the voltage—or electrical pressure—on a wire. The higher the voltage, the higher the electric field. As long as a wire is energized—has voltage present—an electric field is present (see Figure 1). In other words, an appliance, or an electric power line, doesn't actually have to be turned on to create an electric field. It just has to be plugged in. Electric fields diminish with distance and can be blocked or partially shielded by objects such as trees and houses.

Magnetic Fields

Magnetic fields are created by the current or flow of electricity through a wire. Generally speaking, the higher the current, the higher the magnetic field. Because they only occur when current is flowing, magnetic fields are present only when the power is turned on (see Figure 1). Magnetic fields also diminish with distance, but—unlike electric fields—are not blocked by common objects. In recent years, public and scientific interest has turned toward the magnetic field component of EMF because of some scientific studies regarding these fields.

Figure 1

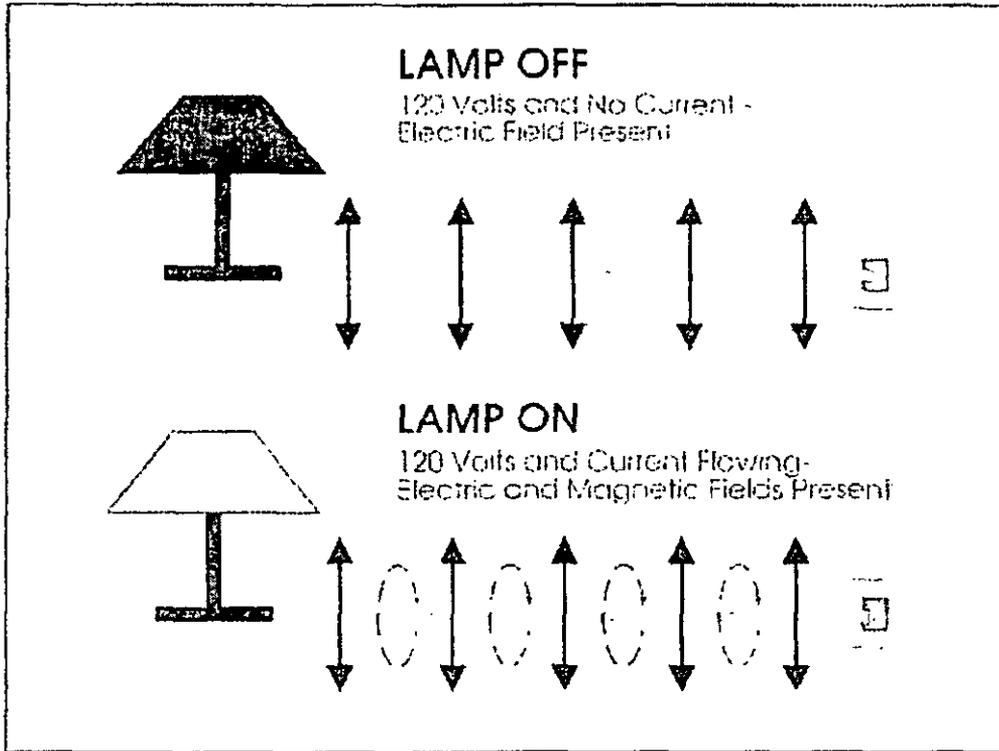


Figure 2

Magnetic field strengths decrease with distance Magnetic fields are measured in milligauss		Source: "EMF in Your Environment", U.S. Environmental Protection Agency 1992		
		At 6 inches	At 1 foot	At 2 feet
Clothes dryer		2 to 10	* to 3	*
Microwave oven		100 to 300	1 to 200	1 to 30
Toaster		5 to 20	* to 7	*
Power drill		100 to 200	20 to 40	3 to 6
Can opener		500 to 1500	40 to 300	3 to 30
Mixer		30 to 600	5 to 100	* to 10
Hair dryer		1 to 700	* to 70	* to 10
Color television		Data not available	* to 20	* to 8

FIGURE 2 * The magnetic field measurement at this distance from the operating appliance could not be distinguished from background measurements taken before the appliance had been turned on.

Measuring Magnetic Fields

Magnetic fields usually are measured in a unit called a milligauss. Magnetic field levels found in the living areas of homes typically range from less than 1 milligauss to about 4 milligauss according to the U.S. Environmental Protection Agency. They can be higher in some cases. The levels next to appliances can exceed 1,000 milligauss (1 gauss). Figures 2 and 3 show how the strength of the field falls off as you move away from the source, just as the heat of a campfire grows weaker as you walk away from it. For overhead power lines, the strength of the magnetic fields is dependent upon a number of factors that will be explained later. Those factors produce a magnetic field that drops off rapidly as you move away from the power line.

Figure 3

Sample Magnetic Field Levels in Milligauss				
Type of Overhead Power Line	Distance from the line			
	Under the line	50 ft.	100 ft.	200 ft.
220 kV and 500 kV	5-400	5-250	1-75	0.5-20
69 kV and 138 kV	3-80	0.5-2.5	0.1-10	0.1-3
12 kV and below	0.4-20	0.1-1	-	-

The magnetic field values provided in this table represent a general range of values associated with the types of overhead power lines listed and are provided for illustration. There will be circumstances in which there will be magnetic field levels above or below the range of values provided due to variations in such factors as height of the wires, current flow and so on.

DEVELOPMENT OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

One element of our response to EMF concerns expressed by some of our customers is PPL EU's Magnetic Field Management Program. The program was initiated in March 1991 because PPL EU believes it makes good sense, as a matter of policy, to respond to the concerns expressed by some of our customers and to reduce magnetic fields in new and rebuilt facilities where it can be done with either no-cost or low-cost design changes.

This document updates the original program which has been revised several times since 1991. These guidelines were developed by PPL EU's EMF Working Group.

VARIABLES THAT AFFECT MAGNETIC FIELDS

Magnetic fields from transmission and distribution lines are a function of a number of design variables. The following parameters affect the magnetic field levels produced by transmission and distribution lines:

- Current
- Height of conductors above ground
- Configuration of conductors
- Distance from the line

EFFECT OF PHASE CURRENT ON MAGNETIC FIELDS

At power frequencies (i.e., 60 hertz), the magnetic field level is a function of the current or flow of electricity through a wire. Keeping all other parameters the same, the magnetic field is proportional to the current. Hence, if the current increases by 25 percent, the resulting magnetic field level will increase by 25 percent.

The overall load current on any line varies with the demand for power. It's usually highest during daytime hours and lowest at night. There also are weekly, monthly, seasonal and yearly variations.

The difference in the currents between each phase in a multiphase line also can affect the magnetic field. This difference is called phase unbalance. For a constant load, a statistical analysis of this phase unbalance can be made to determine its effect on the magnetic field. Close to the line, there is very little effect. However, the phase unbalance slows the rate at which the magnetic field decreases with distance from the line.

EFFECT OF CONDUCTOR CONFIGURATION ON MAGNETIC FIELDS

In the transmission and distribution of power, utilities like PPL EU presently use both three-phase and single-phase lines. Each phase on a three-phase power line has either a single conductor or a bundle of two or more conductors. In a three-phase system, the ground-level magnetic field is a result of the fields produced by the currents in each of the phases. Placing the three phases as close together as possible (compaction) creates some field cancellation, and the ground-level magnetic field is reduced. However, appropriate phase separation is required for the reliable operation of the line. In addition, the arrangement of the phases can create some; field cancellation and reduction of the ground-level magnetic field.

EFFECT OF DISTANCE FROM THE MAGNETIC FIELD SOURCE

Magnetic field strength diminishes with the vertical and lateral distances from the magnetic field source. Increasing the height of the conductors above ground is useful for magnetic field reduction at ground level, but may result in increased structure costs and increased aesthetic impact of the structures. Another possible method of increasing the distance to the magnetic field source is to increase the right-of-way requirements. By keeping buildings off increased rights of way, thereby requiring the public to live and work further away from lines, exposure to magnetic fields produced by the lines can be reduced. Increases in right of way are not always practical and may increase costs significantly, however.

SUMMARY OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

Under its Magnetic Field Management Program, PPL EU has changed the way it builds and rebuilds some of its transmission and distribution lines. These design changes reduce magnetic field levels (assuming balanced circuit loadings and phase currents) by up to 69 percent in most of the company's new transmission lines. These guidelines now are being applied to new and reconstructed transmission facilities, based on this program.

The distribution component of the program focuses on 12 kV lines, the company's standard distribution voltage. It concentrates on the three-phase, primary 12 kV lines, since these are the most heavily loaded facilities and often are located in densely populated areas. The guidelines in this program are being applied to these three-phase, primary 12 kV lines.

A maximum 3-5 percent change in estimated cost was used as the limit for the guidelines since this value is consistent with low cost, is within estimating accuracy and is likely to have little impact on overall line costs.

The magnetic field calculations used in this document for the design of PPL EU's overall magnetic field management plan assume balanced load conditions among the phases and a fixed level of current, not necessarily representative of specific transmission or distribution lines. These levels were calculated using the Electric Power Research Institute's ENVIRO computer program. Under actual operating conditions, the magnetic field levels that result may vary due to such things as actual load per circuit, overall current on each phase conductor and the electrical configuration and operation of each line.

MAGNETIC FIELD MANAGEMENT PROGRAM GUIDELINES

The guidelines for magnetic field management are noted below, with discussion points for each.

OVERHEAD LINES

NEW OR REBUILT TRANSMISSION LINES

1. **Balance transmission circuit loads and phase currents as much as possible.**
 - PPL EU should continue to make every effort to balance loadings between the two circuits of a double circuit line when planning new or rebuilt facilities to maximize the effects of reverse phasing.
 - PPL EU should continue the practice of balancing single-phase loads across the three phases of the distribution system. (Unbalanced phase currents on the distribution system are reflected through to the transmission system.)
 - Unbalanced phase currents result in higher magnetic fields that do not drop off as quickly with distance as do the fields resulting from balanced phase currents.
 - For a 5 percent phase current unbalance, the magnetic field 50 feet from the centerline of a single circuit 138 kV line could be more than twice the value than if the same line had balanced phase circuits.
 - Balanced phase currents on each three-phase distribution circuit also reduce magnetic fields from the distribution circuits themselves. In addition, they reduce magnetic fields on the transmission system from which the distribution system circuits are supplied and connected through substations.
 - Apart from magnetic field considerations, balanced phase currents on each three-phase distribution circuit also reduce line losses and improve the system voltage.

2. Continue with the present practice of using long-span construction as the PPL EU 138/69 kV standard

- Structure designs for short-span and long-span construction are illustrated on Charts I and II, respectively.
 - Short-span design does not significantly reduce magnetic fields when compared to long-span design even though it is more compact than long-span design. Comparison of the magnetic field values from Chart III indicates essentially the same values. Therefore, short-span design should not be used solely to reduce magnetic fields.
 - PPL EU will continue to use long-span construction for 138/69 kV double-circuit lines and for single-circuit/future-double-circuit lines.
 - For single-circuit/future-double-circuit lines, PPL EU will continue to install two conductors on the top positions and one in the middle position as shown in Chart IV.
 - This arrangement minimizes magnetic fields as shown in Chart V by placing the three initial conductors higher on the structure, which *increases the ground clearances, and by placing the conductors in a triangular configuration.*

3. Compact design structures are not a low-cost alternative and should be used for magnetic field reduction only in special applications.

Chart VI illustrates the compact design structure.

- The compact design increases the initial installation costs by 79 percent when compared to the long-span design but *reduces the magnetic field from 9 mG to 3 mG (about 67 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.*

4. Reverse phase new or rebuilt double-circuit transmission lines for all voltage levels.

- Reverse phasing was adopted by PPL EU in March 1991 for double-circuit 138/69 kV transmission lines and in April 1992 for all other double circuit transmission lines. Reverse phasing is shown in Chart VII. Reverse phasing will reduce the magnetic fields when the current flow on both circuits is in the same

direction. Calculated values contained here are based on balanced and equal phase currents on both circuits.

- Reverse phasing reduces the magnetic field of a double circuit 138 kV single pole transmission line from 29 mG to 9 mG (about 69 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.
- Reverse phasing reduces the magnetic field of a double circuit 230 kV single pole transmission line from 49 mG to 16 mG (about 67 percent) at the edge of the 150-foot-wide right of way as shown on Chart VIII.
- Reverse phasing reduces the magnetic field of a double-circuit 500 kV single pole transmission line from 37 mG to 21 mG (about 43 percent) at the edge of the 200-foot-wide right of way as shown on Chart IX.
- When new or rebuilt double-circuit lines require tapping existing double-circuit lines, PPL EU will review the existing lines to determine if reverse phasing can be provided at low cost.
- Computer modeling is required to develop the optimum phasing and overall conductor arrangements for lines added to, or rebuilt in, multiple-line corridors.
 - Merely adding a reverse-phase double-circuit line to an existing transmission line corridor or reverse phasing a rebuilt line in the multiple-line corridor will not necessarily produce lower magnetic field levels at the edge of the corridor right of way.
 - The corridor must be computer modeled with all the lines, existing phase conductor locations and currents. Then, magnetic field calculations must be made varying the phase arrangements of the new or reconstructed line to determine the appropriate phasing arrangement.
 - Current flow direction on a line also must be considered. For example, a reverse-phased line should have the current flowing in the same direction on both circuits. If the current flow is in the opposite direction for one circuit, reverse phasing will not produce the lowest magnetic field and another phase arrangement that produces lower fields may need to be utilized.

5. **Increase the minimum ground clearance for all new transmission lines.**

138/69 kV Transmission Lines

- Increasing the minimum line design ground clearance from 25 feet to 30 feet may add up to about 5 percent to the installed cost of a new double-circuit single pole 138/69 kV line. For a given project, such cost may be substantially less, however. *In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. With long-span reverse-phase design, the magnetic field is reduced from 9 mG to 7 mG (about 22 percent) at the edge of a 100-foot-wide right of way as shown in Chart X.*
 - In the actual design of transmission lines to include higher minimum ground clearances, there may be limited segments (such as highway crossings, severe slopes and transmission line crossing locations) where National Electrical Safety Code (NESC) minimum ground clearances may need to be used. The NESC minimum ground clearances are less than the increased ground clearance discussed previously.

230 kV Transmission Lines

- Increasing the minimum line design ground clearances from 27 feet to 32 feet may add up to about 5 percent to the cost of a single-circuit single-pole line (current standard). For a given project, such cost may be substantially less, however. *In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 30 mG to 28 mG (about 7 percent) at the edge of a 150-foot-wide right of way.*
- Increasing clearances from 27 feet to 32 feet could theoretically add up to about 2.8 percent to the cost of a double-circuit single-pole line (current standard) and reduce the magnetic field of a reverse-phase line from 16 mG to 15 mG (about 6 percent) at the edge of a 150-foot-wide right of way. *Chart XI is a summary of this data.*
- Studies are required for each new 230 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such

studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced phase spacing (a "Delta" configuration on a single-circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

500 kV Transmission Lines

- Increasing ground clearances from 33 feet to 53 feet may add up to about 4.5 percent to the cost of a single-circuit "H-frame" line (current standard). For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 42 mG to 35 mG (about 17 percent) at the edge of a 200-foot-wide right of way.
- Increasing ground clearances from 33 feet to 53 feet could theoretically add up to 2.8 percent to the cost of a double-circuit "H-frame" line (current standard) and reduces the magnetic field of a reverse-phase line from 21 mG to 16 mG (about 24 percent) at the edge of a 200-foot-wide right of way. Chart XII is a summary of this data.
- Studies are required for each new 500 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced-phase spacing (a "Delta" configuration on a single circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

RECONDUCTORING OR ADDING ADDITIONAL CIRCUITS TO EXISTING TRANSMISSION LINES

When reconductoring or adding additional circuits to existing transmission lines, PPL EU will evaluate low-cost or no-cost options for magnetic field management on a case-by-case basis.

When reconductoring existing transmission lines or adding additional circuits, low-cost alternatives may not exist; however, the following steps will be taken:

- For a single-circuit line, the use of a Delta arrangement or other modifications on the existing structure, with reduced-phase spacing, will be evaluated.
- For double-circuit lines, application of reverse phasing may reduce the magnetic field under the line and within the right of way and will be evaluated.
- For single- and double-circuit lines, evaluate using higher conductor tensions that can increase the minimum line design ground clearance.

DISTRIBUTION LINES

At the 12 kV distribution level, new main three-phase lines will continue to be constructed with five feet of additional ground clearance.

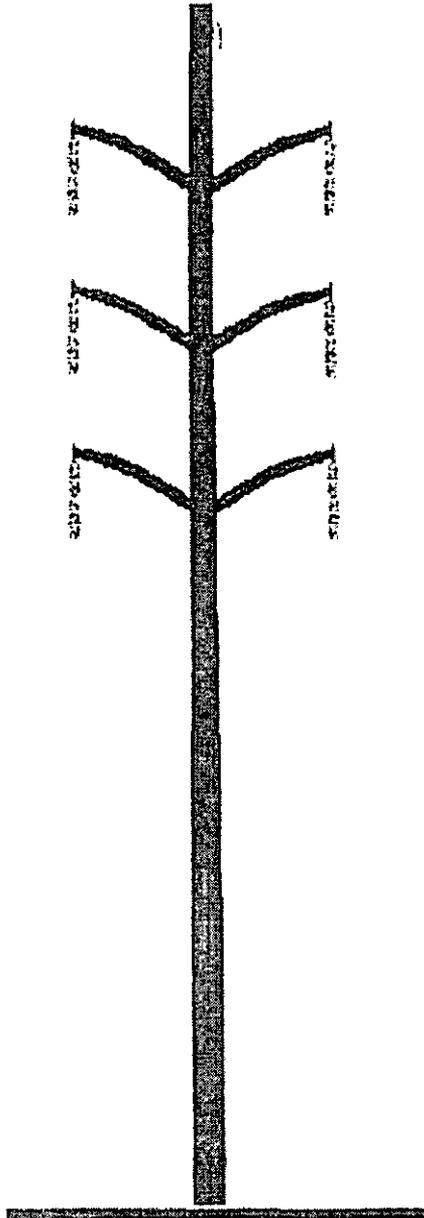
- Main lines are the most heavily loaded sections of a distribution line and therefore have the highest magnetic fields associated with them.
- Increasing the ground clearance by five feet reduces the magnetic field under the line from 14 mG to 11 mG using the standard eight-foot crossarm design. These values are based on increasing pole heights from 45 feet to 50 feet and a typical operating current of 300 amps per phase.
- Chart XIII is a summary of this data. Increasing ground clearance by five feet could theoretically add about 5 percent to the cost of a typical distribution line.

UNDERGROUND TRANSMISSION LINES

Underground transmission lines are required due to environmental or land use factors or restrictions on available clearances, PPL EU will evaluate options for magnetic field management techniques on a case-by-case basis.

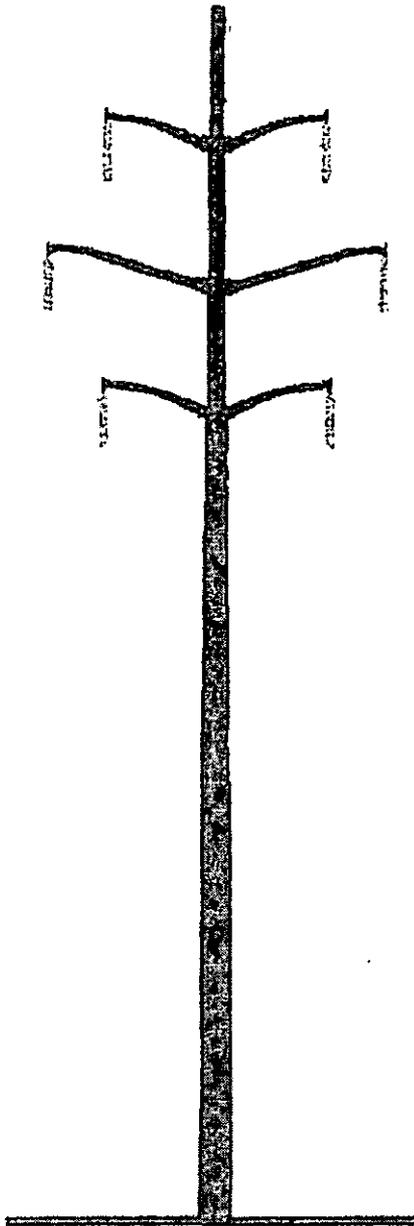
- The phase arrangement that produces the lowest field will be determined.
- The depth of burial of the line will be determined considering the cost of excavation and the location of other buried utilities in the area.
- The use of steel pipe ferromagnetic shielding that reduces magnetic fields will be evaluated.

Short-Span Construction



- More compact design
- Should not be used solely to reduce magnetic fields
- Typical conductor data:
 - 1 3/8" HS steel overhead ground wire - 7.3 feet sag
 - 6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 10.0 feet sag
 - Average span - 400 feet

Long-Span Construction Remains PPL EU 138 kV Standard



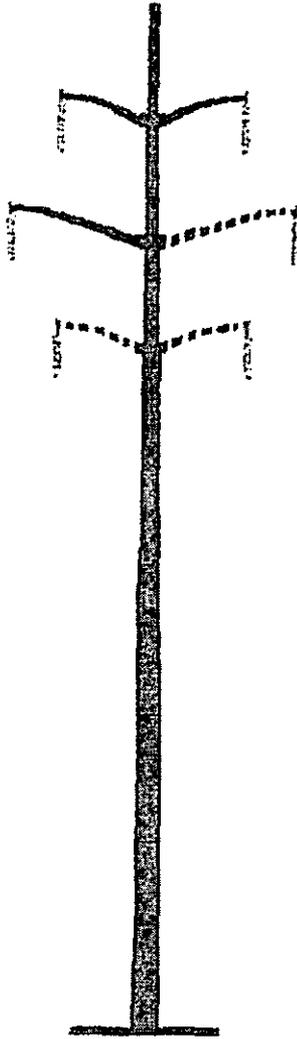
- Lower cost alternative
- Reduces magnetic fields due to higher structures
- Typical conductor data:
 - 1 3/8" HS steel overhead ground wire - 17.3 feet sag
 - 6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 23.0 feet sag
 - Average span - 600 feet

**138/69 kV REVERSE-PHASE TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 400 AMPERES**

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SHORT SPAN (CHART I)	30
SHORT SPAN (REVERSE PHASE)	8
LONG SPAN (CHART II)	29
LONG SPAN (REVERSE PHASE)	9
COMPACT (CHART VI)	14
COMPACT (REVERSE PHASE)	3

The edge of right of way is 50 feet from the line centerline.
 The 400 ampere phase current is balanced between phases.
 Calculations are based on a minimum ground clearance of 25 feet.
 LONG SPAN, SHORT SPAN and COMPACT are double-circuit lines.

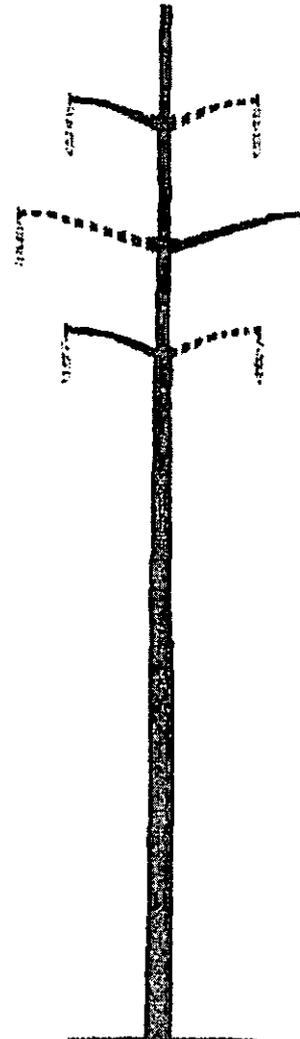
Typical Single-Circuit Structure Designs



Top/Middle



Vertical



Top/Middle/Bottom

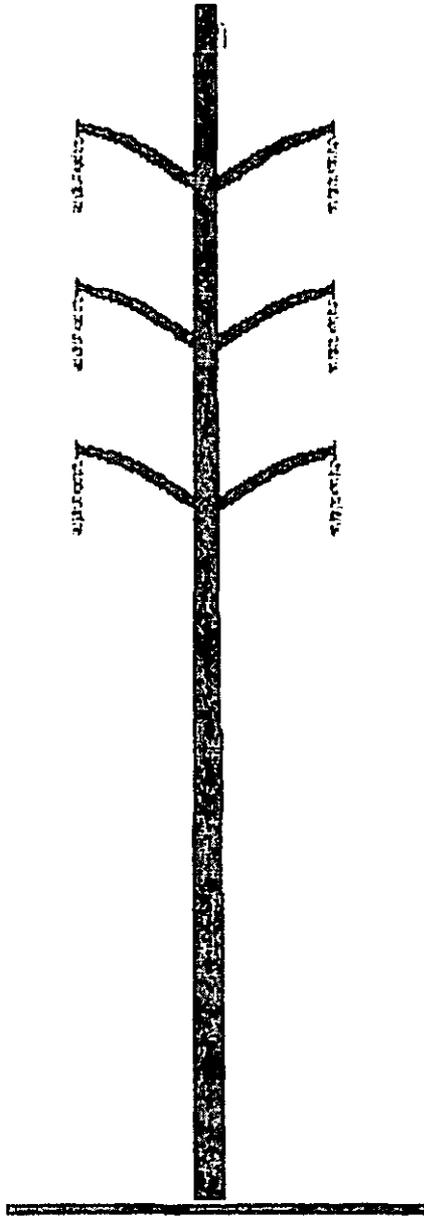
—— initial single circuit
- - - future second circuit

**138/69 kV SINGLE CIRCUIT TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 400 AMPERES**

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
TOP/MIDDLE/BOTTOM	20
VERTICAL	17
TOP/MIDDLE	12

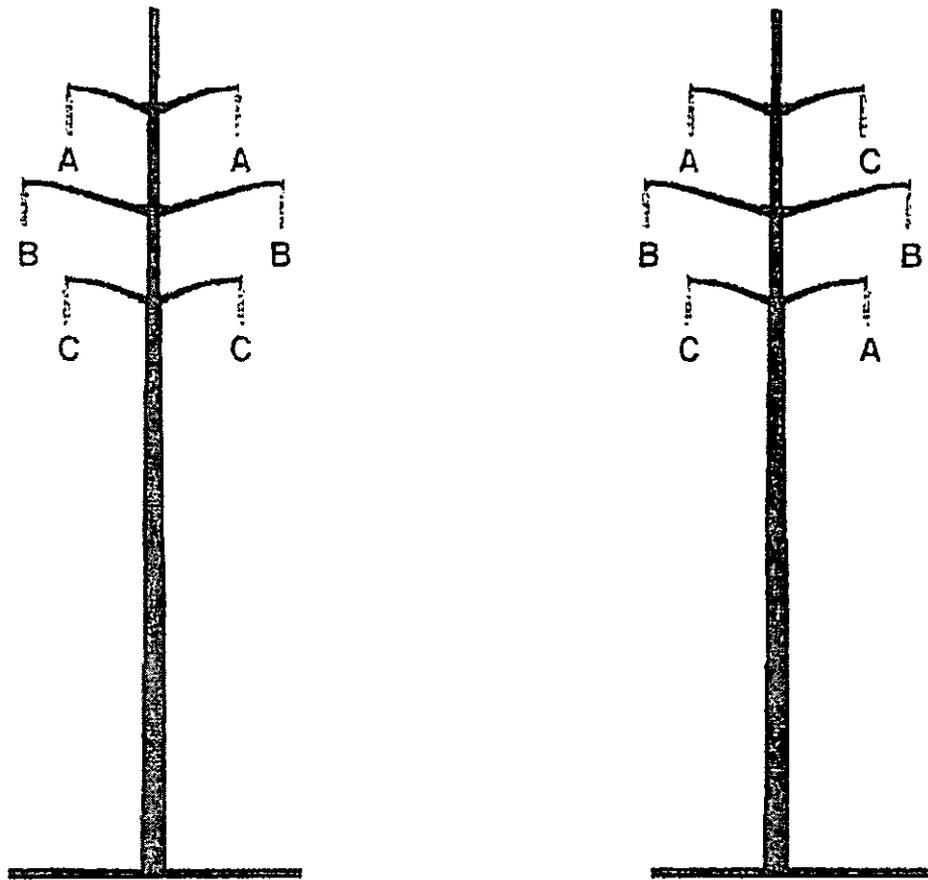
The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.

Compact Design Structure



- Minimize magnetic fields due to compact design
- Not a low-cost alternative
- Typical conductor data:
 - 1 3/8" HS steel overhead ground wire - 9.0 feet sag
 - 6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 9.0 feet sag
 - Average span - 300 feet

Reverse Phasing of Double-Circuit Transmission Lines



From: → → → → To:

Reverse phasing also can be one of the following phase arrangements:

A	B		B	A		B	C		C	A		C	B
C	C	or	C	C	or	A	A	or	B	B	or	A	A
B	A		A	B		C	B		A	C		B	C

**230 kV REVERSE-PHASE TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 800 AMPERES**

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	49
DOUBLE CIRCUIT POLE (REVERSE-PHASE)	16

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 27 feet.

**500 kV REVERSE-PHASE TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 1100 AMPERES**

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	37
DOUBLE CIRCUIT POLE (REVERSE PHASE)	21

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 33 feet.

**INCREASED 138/69 KV MINIMUM GROUND CLEARANCE
CALCULATED MAGNETIC FIELDS AT 400 AMPERES**

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	25	12
SINGLE CIRCUIT TOP/MIDDLE	30	10
LONG SPAN	25	29
LONG SPAN	30	26
LONG SPAN (REVERSE PHASE)	25	9
LONG SPAN (REVERSE PHASE)	30	7

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.

**INCREASED 230 kV MINIMUM GROUND CLEARANCE
CALCULATED MAGNETIC FIELDS AT 800 AMPERES**

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	27	30
SINGLE CIRCUIT TOP/MIDDLE	32	28
DOUBLE CIRCUIT POLE	27	49
DOUBLE CIRCUIT POLE	32	46
DOUBLE CIRCUIT POLE (REVERSE PHASE)	27	16
DOUBLE CIRCUIT POLE (REVERSE PHASE)	32	15

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.

**INCREASED 500 KV MINIMUM GROUND CLEARANCE
CALCULATED MAGNETIC FIELDS AT 1,100 AMPERES**

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT "H" STRUCTURE	33	42
SINGLE CIRCUIT "H" STRUCTURE	53	35
DOUBLE CIRCUIT POLE	33	37
DOUBLE CIRCUIT POLE	53	31
DOUBLE CIRCUIT POLE (REVERSE PHASE)	33	21
DOUBLE CIRCUIT POLE (REVERSE PHASE)	53	16

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.

**12 KV DISTRIBUTION LINES
CALCULATED MAGNETIC FIELDS AT 300 AMPERES**

TYPE CONSTRUCTION	POLE HEIGHT FEET	MAGNETIC FIELD IN MILLIGAUSS*	
		AT CENTERLINE	AT 30 FEET FROM CENTERLINE
STANDARD CROSSARM	45	14	7
STANDARD CROSSARM	50	11	6

* Field level under the line at mid-span based on 300 amps, balanced loading, one meter above ground level.

APPENDIX C

LIST OF INVOLVED PROPERTY OWNERS

1. Mr. Kenneth Brown
Brodhead Creek Regional Authority
410 Stokes Avenue
East Stroudsburg, PA 18301
2. PPL Electric Utilities
2 North 9th St
Allentown, PA 18101

APPENDIX D

LIST OF INVOLVED GOVERNMENTAL AGENCIES, MUNICIPALITIES AND OTHER PUBLIC ENTITIES

1. Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0053
Attn: Mr. Douglas C. McLearen, Chief
2. Endangered Species Biologist
U.S. Fish and Wildlife Service
315 South Allen Street, Suite 322
State College, Pennsylvania 16801
3. Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, Pennsylvania 17105-8552
4. Mr. Edward C. Cramer, Vice Chairman/Secretary/Treasurer
Stroud Township Board of Supervisors
Stroud Township Municipal Center
1211 N Fifth St
Stroudsburg PA 18360
5. Mrs. Donna Asure, Chairwoman
Monroe County Commissioners
Administrative Center
One Quaker Plaza, Room 201
Stroudsburg PA 18360
6. Natural Diversity Section
Division of Environmental Services
Pennsylvania Fish and Boat Commission
450 Robinson Lane
Bellefonte, Pennsylvania 16823

7. Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, Pennsylvania 17120
Attn: The Honorable Allen D. Biehler, P.E., Secretary

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

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copies of the Letter of Notification (including the exhibits and appendices) have been served upon the following persons, in the manner indicated, in accordance with the requirements of § 1.54 (relating to service by a participant).

VIA CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Kenneth Brown
Brodhead Creek Regional Authority
410 Stokes Avenue
East Stroudsburg, PA 18301

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

Endangered Species Biologist
U.S. Fish and Wildlife Service
315 South Allen Street, Suite 322
State College, PA 16801

Ecological Services Section
PA Dept. of Conservation and Natural Resources
Bureau of Forestry
PO Box 8552
Harrisburg, PA 17105-8552

Mr. Edward C. Cramer
Vice Chairmain/Secretary/Treasurer
Stroud Township Board of Supervisors
Stroud Township Municipal Center
1211 N. Fifth Street
Stroudsburg, PA 18360

Mrs. Donna Asure, Chairwoman
Monroe County Commissioners
Administrative Center
One Quaker Plaza, Room 201
Stroudsburg, PA 18360

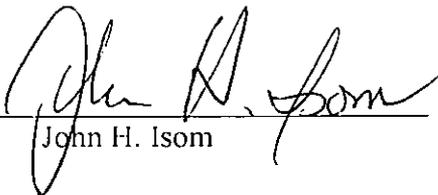
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PA Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, PA 17120
ATTN: Honorable Allen D. Biehler,
P.E., Secretary

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

RECEIVED
2006 DEC 14 PM 2:53
PA PUC
SECRETARY'S BUREAU

Date: December 14, 2006



John H. Isom

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
P. O. BOX 3265, HARRISBURG PA 17105-3265

IN REPLY PLEASE
REFER TO OUR FILE
Secretary
717-772-7777

December 15, 2006

A-110500 F0387

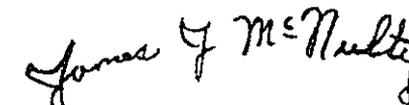
POST & SCHELL, P.C.
JOHN H. ISOM
12TH FLOOR
17 NORTH SECOND STREET
HARRISBURG PA 17101-1601

Dear Mr. Isom:

Receipt is acknowledged of the Letter of Notification of PPL Electric Utilities Corporation, which has been captioned and docketed to the above number.

This matter will receive the attention of the Commission and you will be advised of any further necessary procedure.

Sincerely,



James J. McNulty
Secretary

JJM:jih

DOCKETED
DEC 15 2006

**DOCUMENT
FOLDER**

DATE: December 15, 2006

SUBJECT: A-110500 F0387

TO: Bureau of Fixed Utility Services

FROM:  James J. McNulty, Secretary

Letter of Notification of PPL Electric Utilities Corporation

We attach hereto a copy of the Letter of Notification of PPL Electric Utilities Corporation, which has been captioned and docketed to the above number.

May we have a report prepared by your Bureau for Public Meeting.

Attachment

cc: Law Bureau

jih

DOCKETED
DEC 15 2006

**DOCUMENT
FOLDER**