EXECUTIVE SUMMARY

This filing is submitted by PPL Electric Utilities Corporation (PPL Electric) 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 rebuild approximately 24 miles of single-circuit 138/69 kV transmission line between the Lake Harmony 69-12 kV Substation and the Lake Naomi Tap Pole ("Lake Harmony-Lake Naomi 138/69 kV Rebuild Project" or "the Project"). The Project will convert the existing line from single-circuit 138/69 kV to double-circuit 138/69 kV operation. The line will be operated at 69 kV until load growth in the area makes if appropriate to increase the operating voltage to 138 kV.

The line must connect to four existing Substations and/or Tap locations (Jack Frost 69-12 kV Substation, Arrowhead Lake Tap Pole, Wagners 69-12 kV Substation, and Lake Naomi 69-12 kV Substation) and one proposed 69-12 kV Substation (Long Pond 69-12 kV Substation (Docket # A-2013-2347931). The proposed new facilities will improve reliability of service for approximately 33,600 customers in the area and will also allow for improved operating flexibility for the Transmission System Operators to restore customer load more promptly after a facility outage. This Project is located in portions of Coolbaugh, Pocono, and Tobyhanna townships, Monroe County and Kidder Township, Carbon County.

In general, the preferred route for the new line will be a replacement of the existing line, within existing PPL Electric right-of-way. The existing right-of-way varies in width generally between a minimum of 70 feet and a maximum of 100 feet, although there is a short section which is 200 feet in width. The preferred route does contain an approximately one mile long re-route, away from the existing line outside of existing PPL Electric right-of-way, near the Wagners Substation. The re-route section requires PPL Electric to acquire a new 100 foot wide right-of-way from two separate property owners. To date, PPL Electric has acquired one of the two required easements and has an agreement in principle with the Pennsylvania Game Commission for the other required easement. PPL Electric does not need to acquire any other land rights in order to construct the Project.

The portion of the newly constructed line from the Lake Harmony Substation to the Wagners Substation will be named the East Palmerton-Wagners #1 and #2 138/69 kV Line while the portion from the Wagners Substation to the Lake Naomi Tap pole will be named the Jackson-Wagners #1 and #2 138/69 kV Line.

The reconstruction of this transmission line will include the removal of the existing structures and conductors, which will be replaced with new single-shaft steel poles and new conductors. The total estimated cost to site, design, and construct this Project is approximately $33.3 million. In order to meet the scheduled in service date of December 2016, subject to the Commission's approval, construction is scheduled to commence by September 2014.

The proposed route for the Project was selected after a detailed siting analysis, which included a comprehensive environmental inventory, identification and analysis of alternative routes, and selection of the preferred route. Factors considered in the siting analysis included functional requirements, environmental impacts, social impacts, cost, and other factors identified in the Commission's siting regulations.

This Application, which describes the need for the Project and explains the engineering and siting analysis for the proposed construction, consists of the following:

Attachment 1	PUC Regulation Cross-Reference Matrix
Attachment 2	Necessity Statement
Attachment 3	Environmental Setting
Attachment 4	Alternatives and Siting Analysis
Attachment 5	Engineering Description
Attachment 6	Vegetation Management
Attachment 7	List of Governmental Agencies, Municipalities and Other Public Entities Contacted
Attachment 8	Property Owner List

Attachment 9	List of Governmental Agencies, Municipalities, and Other Public Entities Receiving a Copy of This Application
Attachment 10	PPL Electric Design Criteria and Safety Practices
Attachment 11	PPL Electric Magnetic Field Management Program
Attachment 12	Agency Coordination
Attachment 13	Public Notice Filing Requirements
Attachment 14	Agency Permit Requirements

PPL ELECTRIC UTILITIES SERVICE TERRITORY



Attachment 1

ATTACHMENT 1
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
PUC REGULATION CROSS-REFERENCE MATRIX

Pennsylvania Code Section*	PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 (c)	Application shall contain		
57.72 (c)(1)	The name of the applicant and the address of its principal business office	• Certification Application	
57.72 (c)(2)	The name, title and business address of the attorney of the applicant and the person authorized to receive notice and communications with respect to the application if other than the attorney of the applicant.	• Certification Application	
57.72 (c)(3)	A general description – not a legal or metes and bounds description – of the proposed route of the HV line, to include the number of route miles, the rights-of-way width and the location of the proposed HV line within each city, borough, town, and township traversed.	• Attachment 4	• Figures 4-5, 4-6, and 4-7
57.72 (c)(4)	A names and addresses of known persons, corporations, and other entities of record owning property within the proposed rights-of-way, together with an indication of HV line rights-of-way acquired by the applicant.	• Attachment 4 • Attachment 8.1 • Attachment 8.2	• Attachment 4 Map Pocket
57.72 (c)(5)	A general statement of the need of the proposed HV line in meeting identified present & future demands for service, how the proposed line will meet that need, and engineering justifications	• Attachment 2 • Attachment 5	• Figure 2-1 • Figure 2-2
57.72 (c)(6)	A statement of the safety considerations that will be incorporated into the design, construction, and maintenance of the proposed HV line.	• Attachment 5 • Attachment 10 • Attachment 11	
57.72 (c)(7)	A description of the studies which had been made as to the projected environmental impact of the HV line as proposed and of the efforts which have been and will be made to minimize the impact of the HV line upon the environment and upon scenic and historic areas, including but not limited to impacts, where applicable, upon land use, soil and sedimentation, plant and wildlife habitats, terrain, hydrology and landscape.	• Attachment 3 • Attachment 4	• Tables 3-2 to 3-5, • Figures 3-2 through 3-12 • Figures 4-1 through 4-7
57.72 (c)(8)	A description of the efforts of the applicant to locate and identify archeological, geologic, historic, scenic, or wilderness areas within 2 miles of the proposed right-of-way and the location and identity of the areas discovered by the applicant.	• Attachment 3 • Attachment 4	• Figures 3-8 and 3-12 • Figure 4-7
57.72 (c)(9)	The location and identity of airports within 2 miles of the nearest limit of the right-of-way of the proposed HV line.	• Attachment 3 • Attachment 4	• Figure 4-7

Pennsylvania Code Section*	PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 (c)(10)	A general description of reasonable alternative routes to the proposed HV line, including a description of the corridor planning methodology, a comparison of the merits and detriments of each route, and a statement of the reasons for selecting the proposed HV line route.	• Attachment 4	• Tables 4-4 through 4-21 • Figures 4-5a-f
57.72 (c)(11)	A list of the local, State, and Federal governmental agencies which have requirements that shall be met in connection with the construction or maintenance of the proposed HV line and a list of documents which have been or are required to be filed with those agencies in connection with the siting and construction of the proposed HV line.	• Attachment 14	
57.72 (c)(12)	The estimated cost of construction of the proposed HV line and the projected date for completion.	• Attachment 2 • Attachment 4 • Attachment 5	
57.72 (c)(13)(i)	A depiction of the proposed route on aerial photographs and topographic maps of suitable detail.	• Attachment 4	• Figures 4-6 and 4-7
57.72 (c)(13)(ii)	A description of the proposed HV line, including the length of the line, the design voltage, the size, number, and materials of conductors, the design of the supporting structures and their height, configuration and materials of construction, the average distance between supporting structures, the number of supporting structures, the line to structure clearances and the minimum conductor to ground clearance at mid-span under normal load and average weather conditions and under predicted extreme load and weather conditions.	• Attachment 5 • Attachment 10	• Tables 5-1 and 5-2 • Figures 5-1, 5-2, 5-3, and 5-4
57.72 (c)(13)(iii)	A simple drawing of a cross section of the proposed rights-of-way of the HV line and any adjoining rights-of-way showing the placement of the supporting structures at typical locations, with the height and width of the structures, the width of the right-of-way and the lateral distance between the conductors and the edge of the right-of-way indicated.	• Attachment 5	• Figures 5-2 to 5-4
57.72 (c)(13)(iv)	A system map which shows in suitable detail the location and voltage of existing transmission lines and substations of the applicant and the location and voltage of the proposed HV line and associated substations	• Attachment 2	• Attachment 2 Map Pocket

Pennsylvania Code Section*	PUC Regulation Requirement	Location in Application	Associated Tables/Figures
57.72 (c)(14)	A statement identifying litigation concluded or in progress which concerns property or matter relating to the proposed HV line, right-of-way route, or environmental matters.	• Certification Application	
Chapter 69	Interim guidelines require		
69.3102 (a)(1)	A Code of Conduct/Internal Practices governing the manner in which public utility employees or their agents interact with landowners along proposed rights of way.	• Attachment 13	
69.3102 (a)(2)	Copies of information provided to landowners by the public utility of any publicly disseminated notices advising landowners to contact the Commission or OCA in the event of improper land agent practices.	• Attachment 13	
69.3102 (a)(3)	Copies of all notices sent pursuant to §57.91 (relating to disclosure of eminent domain power of electric utilities).	• Attachment 13	
69.3102 (b)	Applicants for transmission siting authority should serve a copy of the Code of Conduct on all landowners along the proposed route whose property is to be purchased, subject to easement rights or borders the transmission corridor. The Code of Conduct should also be available on the applicant's website.	• Attachment 13	
69.3102 (c)	Applicants for transmission siting authority should provide prior notice to the Commission's Office of Communications of informational presentations to community groups by the public utility scheduled after the filing of the transmission siting application so that the Commission, OCA and other interested parties can attend meetings or obtain copies of information being disseminated at the presentations.	• N/A	
69.3103	**Eminent domain filing requirements**	• Condemnation Application	
69.3104	**Exemption from municipal zoning standards**	• Attachment 4	
69.3105 (1)	Transmission applicants should utilize a combination of transmission route evaluation procedures including high-level GIS data, traditional mapping (including US Geological Survey data and compilation), aerial maps and analysis of physical site-specific constraints raised by affected landowners.	• Attachment 3 • Attachment 4	• Tables 4-1 to 4-3 • Figures 3-1 through 3-12 • Figures 4-1 through 4-7

Pennsylvania Code Section*	PUC Regulation Requirement	Location in Application	Associated Tables/Figures
69.3105 (2)	Transmission applicants should summarize the status of property acquisitions (including fee simple acquisitions and rights of way/easements) as part of the application. The applicant should provide the current status and continuing updates on property acquisition litigation or settlements during the course of the siting proceeding.	• Attachment 4	
69.3105 (3)(i)	In providing information regarding the reasonable alternative routes the utility actively considered in its final phase of the route selection process, and the relative merits of each, in accordance with §57.72(c)(10), the applicant should include the following information: The environmental, historical, cultural and aesthetic considerations of each route.	• Attachment 4	
69.3105 (3)(ii)	The proximity of these alternative routes to residential and non-residential structures.	• Attachment 4	
69.3105 (3)(iii)	The applicant's consideration of relevant existing rights of way.	• Attachment 4	
69.3105 (3)(iv)	The comparative construction costs associated with each route.	• Attachment 4	• Tables 4-4 to 4-21
69.3105 (4)	With reference to the proposed route, applicants should provide a summary of efforts made to contact and solicit assistance from local governments and non-governmental organizations regarding areas encompassed within the requirement of §57.72(c)(8).	• Attachment 7 • Attachment 12	
69.3106 (1)	A matrix or list showing all expected federal, state and local government regulatory permitting or licensing approvals that may be required for the project at the time the application is filed, the issuing agency, approximate timeline for approval and current status. The applicant should provide an update on the status of the regulatory permitting/licensing approvals as the case progresses.	• Attachment 14	
69.3107(a)(1)	Applicants for transmission line siting authority should provide a detailed vegetation management plan that includes the following components: A general description of the utility's vegetation management plan.	• Attachment 6	
69.3107(a)(2)	Factors that dictate when each method, including aerial spraying, is utilized.	• Attachment 6	
69.3107(a)(3)	Vegetation management practices near aquatic and other sensitive locations.	• Attachment 6	

Pennsylvania Code Section*	PUC Regulation Requirement	Location in Application	Associated Tables/Figures
69.3107(a)(4)	Notice procedures to affected landowners regarding vegetation management practices.	• Attachment 6	
69.3107(a)(5)	Provision of a copy of a landowner maintenance agreement that describes the duties and responsibilities of landowners and the utility for vegetation management to the extent utilized.	• Attachment 6	
69.3107(b)(1)	Transmission siting applications should include the following: A description of the EMF mitigation procedures that the utility proposes to utilize along the transmission line route. This description should include a statement of policy approach for evaluating design and siting alternatives and a description of the proposed measures for mitigating EMF impacts.	• Attachment 11	

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

Attachment 2

ATTACHMENT 2
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
NECESSITY STATEMENT

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2.0 SYSTEM PLANNING PROCESS 2
3.0 PJM'S ROLE IN THE PROJECT 6
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5.0 DEFINITION OF THE PROBLEM 9
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FIGURES

FIGURE 2-1 - ONE LINE DIAGRAM EXISTING TRANSMISSION FACILITIES
FIGURE 2-2 - ONE LINE DIAGRAM PROPOSED TRANSMISSION FACILITIES
MAP POCKET – PPL ELECTRIC SYSTEM MAP

1.0 INTRODUCTION

PPL Electric Utilities Corporation (PPL Electric) proposes to rebuild 24 miles of the existing single-circuit 138/69 kilovolt (kV) transmission line between the existing Lake Harmony 69-12kV Substation and the existing Lake Naomi 138/69 kV Tap pole. The new line will be named the East Palmerton-Wagners #1 and #2 138/69 kV Line from the existing Lake Harmony 69-12 kV Substation to the Wagners 69-12 kV Substation. The section from the Wagners Substation to the Lake Naomi 138/69 kV Tap pole will be named the Jackson-Wagners #1 & #2 138/69 kV Line. The rebuilt line will be constructed for future double-circuit 138 kV but will initially operate as a double-circuit 69 kV transmission line until load growth in the area makes it appropriate to increase the operating voltage.

The newly rebuilt double-circuit line from Lake Harmony 69-12 kV Substation to the Lake Naomi 138/69 kV Tap pole will tie into the existing Peckville-Jackson and Blooming Grove-Jackson 138/69 kV Transmission Lines approximately four (4) miles north of the Jackson Substation. This four (4) mile segment will become part of the new Jackson-Wagners #1 & #2 138/69 kV Line (see Figure 2-2). To replace the four (4) mile segment which will be dedicated to serving the Jackson-Wagners #1 & #2 138/69 kV line, a new four (4) mile double-circuit 138/69 kV line from Jackson Substation will be constructed to serve as part of the Peckville-Jackson and Blooming Grove-Jackson 138/69 kV lines (Subject of Filing Docket #A-2012-2304631). As a result of the proposed newly rebuilt double-circuit transmission lines from Lake Harmony Substation to the Lake Naomi Tap pole, the 33,600 customers served from both the East Palmerton-Wagners #1 & #2 138/69 kV lines and the new Jackson-Wagners #1 & #2 138/69 kV lines will have improved load restoration capability in the event that their normal transmission supply line is interrupted. The new Jackson-Wagners #1 & #2 138/69 kV double-circuit line will also allow for the loads on the existing Wagners and Lake Naomi 69-12 kV substations to have two independent supply lines for improved reliability.

The proposed new facility will provide improved reliability of service for 33,600 customers in Tobyhanna, Coolbaugh, and Pocono Townships in Monroe County, and

Kidder Township in Carbon County. The new line will also allow for improved operating flexibility for the Transmission System Operators to restore customer load more quickly after a facility outage.

This project is required to:

(i) Prevent interrupting an amount of customer load that would exceed PPL Electric's Reliability Principles and Practices (RP&P) if the existing Jackson-Wagners #1 138/69 kV line at Jackson Substation were interrupted.

(ii) Prevent interrupting an amount of customer load that would exceed PPL Electric's RP&P if the existing East Palmerton-Wagners #1 & #2 138/69 kV lines at East Palmerton Substation were interrupted.

The estimated cost to site, design, and construct the proposed overhead double-circuit transmission lines is approximately $33.3 million. Subject to the PUC's approval, construction is scheduled to commence in September 2014 meet the project's scheduled in service date of December 2016.

A PPL Electric system map showing existing transmission facilities with a design voltage of 35 kV or greater is included in the **Attachment 2 map pocket**. This filing addresses only the existing and proposed transmission system in this portion of Monroe County and Carbon County.

2.0 SYSTEM PLANNING PROCESS

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 Bulk Electric System (BES)[1] and non-Bulk Electric System[2] (non-BES) are planned and constructed so that:

[1] Bulk Electric System (BES) - Includes transmission facilities operated at voltages of 100 kV or higher.
[2] Non-Bulk Electrical System (non-BES) - Includes transmission facilities operated at voltages less than 100 kV.

- They are able to accommodate forecasted system flows during summer and winter peak load;

- They can adequately serve each customer's needs with regard to capacity, voltage and reliability for all load levels throughout the daily load cycle;

- They can sustain probable contingencies and disturbances with minimal customer service interruptions;

- They are in conformance with PPL Electric's transmission planning reliability principles, practices and standards for all normal and emergency operating conditions.

The process of planning the transmission system requires PPL Electric to look into the future to develop a reinforcement plan far enough in advance to be able to complete a project when it is needed. Ideally, transmission facility upgrades are planned such that the in-service date corresponds with the time frame that the facility is required to meet the planning criteria established by the RP&P. Significant lead times are needed to design and install new line and substation facilities where new sites and/or rights-of-way must be acquired.

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

- The system expansion should be coordinated to achieve the most economical balance of construction and operating expenditures;

- The system should maintain a proper balance between the degree of risk, amount and type of load interrupted, and the cost of providing the needed expansion; and

- The system reliability should be maintained to prevent large scale, long term, or frequent service interruptions to avoid adverse effects and hazards to the public.

PPL Electric undertakes an independent analysis of both its BES transmission facilities and its non-BES electric transmission system facilities. The PPL Electric planning practices are outlined in the RP&P, which was developed to ensure adequate and appropriate levels of electric service to its customers consistent with good utility practice.

The fundamental purpose of the RP&P is to provide PPL Electric planning engineers with a comprehensive set of planning practices and criteria that enable them to plan for a reliable transmission and distribution system for PPL Electric's customers. The RP&P is reviewed periodically by PPL Electric engineers and planners. The document is updated to reflect current standards and practices. Updates to the document are approved by PPL Electric's senior management. PPL Electric's RP&P is consistent with good utility practices and with the reliability criteria and standards used by similarly situated distribution and transmission utilities.

In accordance with these practices and PPL Electric's Reliability Criteria, PPL Electric transmission system is planned so that it can be operated at all projected load levels and during normal scheduled outages and 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 following unscheduled contingencies and other system conditions:

1. Normal operation of the system will not load any electric facility beyond its normal continuous rating.

2. The loss of any single transmission line, generating unit, power transformer, substation bus, circuit breaker, or double-circuit line due to the outage of a single tower or pole, does not result in any system electric facility being operated beyond its applicable emergency rating.

3. No customer load should remain interrupted for routine maintenance of non-BES transmission facilities.

4. The loss of any single facility should not result in a voltage drop of more than 5% on the non-BES transmission system.

5. Stability of the electric system should be maintained from a permanent three-phase transmission line fault cleared by normal primary relay action. In addition, system stability should be maintained for a permanent single phase to ground line fault and the failure of the protective devices to operate properly resulting in a failed circuit breaker.

6. No large-scale, long-term or frequent interruptions may cause excessive load losses due to their adverse effects on, and hazard to, the public.

7. Excessive load is not interrupted for the loss of a single-circuit 69 kV line or double-circuit 69 kV line, and the lost load is within the specified limits as defined in the RP&P.

These principles are incorporated in the PPL Electric Utilities Transmission Planning RP&P document.

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 Interconnection, LLC ("PJM").

Once the system model is complete, comprehensive power flow simulations are performed to determine the ability of the system to comply with the PPL Electric transmission planning reliability criteria. Compliance is determined by simulating the contingency conditions outlined above. All conditions where the system is not in conformance with the reliability criteria are identified, and system reinforcements are

added to bring the system into compliance. Also identified are estimated costs and lead-times to implement the required reinforcements. Computer simulations of the system with 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.

3.0 PJM'S ROLE IN THE PROJECT

PJM is a Federal Energy Regulatory Commission ("FERC") approved Regional Transmission Organization charged with ensuring the reliability of the electric transmission system under its functional control 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") to identify system reinforcements that are required to, among other things, meet the North American Electric Reliability Corporation ("NERC") Reliability Standards,[3] PJM reliability planning criteria, and transmission owner reliability criteria. The RTEP is a FERC-approved transmission planning process that results from a comprehensive analysis to identify existing and forecasted violations of the NERC, PJM and transmission owner reliability standards on the transmission systems within PJM's service territory.[4]

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 and the transmission

[3] On February 3, 2006, FERC certified the North American Electric Reliability Corporation ("NERC") as the organization required to establish and enforce reliability standards for the bulk electric system. Thereafter, NERC develops and enforces reliability standards, which define the reliability requirements for planning and operating transmission systems in North America. The NERC Reliability Standards apply to all users, owners, and operators of the nation's interconnected transmission grid, including PPL Electric.

[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.

owners 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.

With respect to the BES, PJM conducts RTEP studies in conjunction with its transmission owners and applies NERC or PJM 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. PPL Electric, an owner of transmission facilities in Pennsylvania, is a member of PJM and actively participates in the PJM transmission planning process.

The proposed Lake Harmony to Lake Naomi Rebuild Project will resolve reliability criteria violations of PPL Electric's RP&P, its local planning criteria for non-BES 69 kV transmission systems. For non-BES system reliability violations, the local transmission operator, in this case PPL Electric, is responsible for identifying the reliability violations and correcting any violations to meet its own local transmission planning criteria. PPL's local transmission planning criteria for ensuring the reliability of the non-BES transmission system are based on the principles of the NERC and PJM reliability criteria for the BES. PJM relies on the local transmission owners to ensure the reliability of their non-BES system by meeting their own local transmission planning criteria. 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.

To achieve FERC Order 890's goal of a more open and transparent transmission planning process, PJM has taken a more active role in ensuring that the transmission owners communicate their plans for the development of their lower voltage transmission systems. In order to comply with FERC Order 890, transmission owners began submitting their lower voltage reliability projects to PJM in the 2009 timeframe so that they can be presented before the PJM stakeholders at the Sub-Regional RTEP Committee meetings.

The PJM Sub-Regional RTEP Committee review includes, but is not limited to, the review of the transmission owner criteria, assumptions and models used to identify reliability criteria violations and proposed solutions prior to finalizing the Local Plan. The Committee members are provided an opportunity to review and provide written comments to the transmission owners on the criteria, assumptions, and models used in local planning activities prior to finalizing the Local Plan. Once the Local Plan is finalized, the Committee is provided an opportunity to review and provide written comments to the transmission owners on the Local Plans as integrated into the RTEP. The final draft RTEP, with the transmission owners' Local Plans that were reviewed and recommended by the Committee, is then included in the final version, which is sent to the PJM Board for approval. Once the PJM Board approves the RTEP that includes the transmission owners' Local Plans, the transmission owners then move forward to implement the RTEP BES transmission and the non-BES facility upgrades as they are obligated to do under the PJM Tariff and Operating Agreements.

The purpose of the Lake Harmony to Lake Naomi Rebuild Project is to resolve reliability violations that occur on the non-BES (69 kV) system serving a portion of the Northeast Region of PPL Electric's service territory. PPL Electric submitted the proposed Project to PJM for review and inclusion in the RTEP in May, 2010. The Project was presented before stakeholders at the Mid-Atlantic Sub-Regional RTEP meeting on June 2, 2010, approved by the PJM Board, and included in the 2010 RTEP Report as a baseline project b1203.

4.0 EXISTING SYSTEM

The existing Lake Naomi Tap, off the Blooming Grove-Jackson 138/69 kV Line, is from the Lake Naomi Tap pole to the Lake Naomi 69-12 kV Substation. From the Lake Naomi to the Wagners 69-12 kV Substation is the Lake Naomi-Wagners Tie (approximately 12.5 miles total), which is a single-circuit 69 kV line normally sourced from Jackson 138-69 kV Substation. The existing East Palmerton-Wagners #1 138/69 kV line is from the Lake Harmony 69-12 kV Substation through the Arrowhead 69 kV Taps and up to the normally open switch at the Wagners 69-12 kV Substation

(approximately 11.5 miles). It is a single-circuit 69 kV line normally sourced from East Palmerton 138/69 kV substation. **Figure 2-1** shows the functional arrangement of the existing transmission facilities in the area.

5.0 DEFINITION OF THE PROBLEM

Due to load growth in the area, transmission planning studies project, for 2014 and beyond, that the loss of the Jackson-Wagners #1 138/69 kV line would interrupt 57 MW of load which equates to approximately 9,500 customers. Transferring load from the Jackson Substation to the East Palmerton Substation would be limited due to the resulting low voltage at the end of the abnormally sectionalized (the changing of the normally open and normally closed points on a circuit in order to restore load during an outage or to transfer load during maintenance) East Palmerton-Wagners #1 circuit. In such an outage, the Power Dispatcher would be required to interrupt approximately 35 MW of load (approximately 6,400 customers) served by distribution substations at Wagners and Lake Naomi in order to restore 69 kV voltages along the line to acceptable levels. The RP&P states that the maximum allowable load loss is 30 MW for a single-circuit line outage.

If an outage were to occur on the East Palmerton-Wagners #1 & #2 138/69 kV double-circuit line, 105 MW of load would be interrupted initially. Transferring load from the East Palmerton Substation to the Jackson Substation would be limited due to the resulting low voltage at the end of the abnormally sectionalized Jackson-Wagners #1 circuit. The Power Dispatcher would be have to interrupt customer load of 54 MW (approximately 15,200 customers), served by Weissport, Beltzville, Carbon, Christmans, and Hickory Run 69-12 kV substations along with customer owned Lehighton Borough Substation in order to restore 69 kV voltage along the line to acceptable levels. The RP&P states that the maximum allowable load loss is 45 MW for a double-circuit line outage.

During particular severe weather events which resulted in interrupted transmission facilities, a backup or alternate transmission supply line would have enabled PPL Electric to restore more customer load in a shorter period of time. Load restoration is key to the satisfaction of our customers. The Lake Naomi Tap and East Palmerton-Wagners Line have experienced 10 interruptions and 3 interruptions, respectively, over the past 20 years

which resulted in extended outages for the customers served from these lines. If the second circuit had been available, more customers could have been restored more quickly.

The area served by the East Palmerton-Wagners #1 & #2 69 kV and Lake Naomi 138/69 Tap has experienced a significant population increase from 2000 to 2010. Carbon County has had an 11% increase and Monroe County has had a 22.5% increase in population during this time period. This trend shows that load has been growing significantly and PJM projects a 1.1% annual future winter growth rate for the overall PPL zone for future years. Improvements to the transmission facilities are necessary to maintain reliable service that PPL Electric customers have come to expect.

6.0 PROPOSED SOLUTION

To resolve the issues described above, PPL Electric, with approval from the PUC, plans to construct the following:

- A newly rebuilt double-circuit 138/69 kV line from the existing Lake Harmony 69-12 kV Substation, to the Lake Naomi Tap pole off the Blooming Grove-Jackson 138/69 kV line, a distance of approximately 24 miles. PPL Electric will design the new line to current 138 kV standards, but will operate the line at 69 kV initially.

The first four (4) miles of the existing Peckville–Jackson and Blooming Grove–Jackson 138/69 kV Line heading north from the Jackson Substation will become part of the new Jackson-Wagners #1 & #2 138/69 kV circuits, respectively (Subject of Filing Docket #A-2012-2304631). The Lake Naomi 138/69 kV Tap will become part of the circuit designated as the Jackson – Wagners #1 Line (former Blooming Grove–Jackson 138/69kV). The Jackson–Wagners #2 Line will utilize the existing 4 miles of 138/69kV line of the former Peckville–Jackson 138/69 kV line. The Jackson – Wagners #1 & #2 138/69kV circuits will normally supply the future Long Pond 69-12 kV Substation (Subject of Filing Docket #A-2013-2347931), and the existing Lake Naomi, Wagners, Arrowhead, Jack Frost, and Lake Harmony 69-12kV substations.

The future Long Pond 69-12 kV Substation will tap the proposed Jackson – Wagner #1 circuit. The existing Lake Naomi and Wagners 69-12 kV substations will each have Tap #1 attached to the Jackson-Wagners #1 circuit and Tap #2 attached to the Jackson-Wagners #2 circuit. The Arrowhead Tap will be removed from its current tap location and re-attached to the new circuit designated as the East Palmerton-Wagners #2 138/69 kV circuit. The Jack Frost Tap will not be rearranged and will remain attached to the East Palmerton – Wagners #1 circuit. Lake Harmony Taps #1 & #2 will also not be rearranged. These Tap arrangements will minimize the need for transmission lines to physically cross over/underneath of each other as well as balance the load on the Jackson-Wagners #1 & #2 138/69 kV circuits at the Jackson Substation.

PPL Electric determined that this rebuild and configuration will resolve the two RP&P transmission violations in the area because the new double-circuit line will provide additional load transfer capability. After completion of the project, an outage on the Jackson – Wagners #1 & #2 138/69 kV double-circuit line near the Jackson Substation would initially interrupt 90 MW (approximately 18,300 customers). Transferring load from the Jackson Substation to the East Palmerton Substation will allow for all customer load to be restored while maintaining acceptable voltage limits.

After this reinforcement project, an outage on the East Palmerton – Wagners #1 & #2 138/69 kV double-circuit line near the East Palmerton Substation would initially interrupt 60 MW (approximately 16,000 customers). The Power Dispatcher would be able to restore customer load to within the RP&P standard of 45 MW for an extended period of time after a double circuit 69 kV line outage. PPL Electric has proposed future transmission reinforcement plans for the area, including the West Pocono Substation and Jenkins- West Pocono 230 kV line, which together with this project will allow for all customer load to be restored after loss of this double-circuit line (Subject of Filing Docket #A-2012-2340872). The new Jackson-Wagners #1 & #2 138/69 kV Lines will maximize the effectiveness of the proposed future transmission expansion plans in this area.

Figure 2-2 shows the functional arrangement of the proposed transmission facilities in the area. The total estimated cost for the proposed work is approximately $33.3 million for the transmission line work.

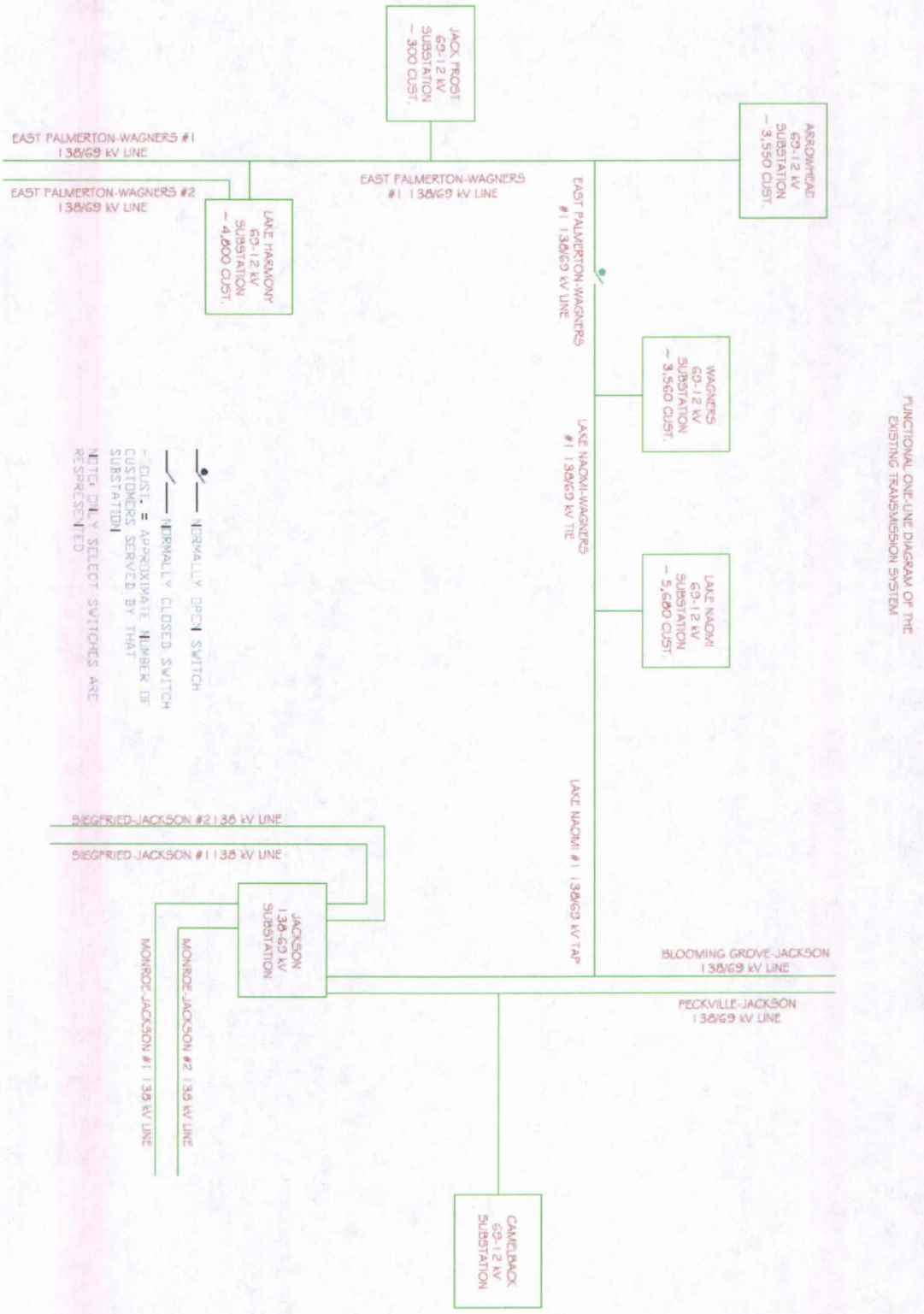


FIGURE 2-1 – ONE LINE DIAGRAM OF EXISTING TRANSMISSION FACILITIES

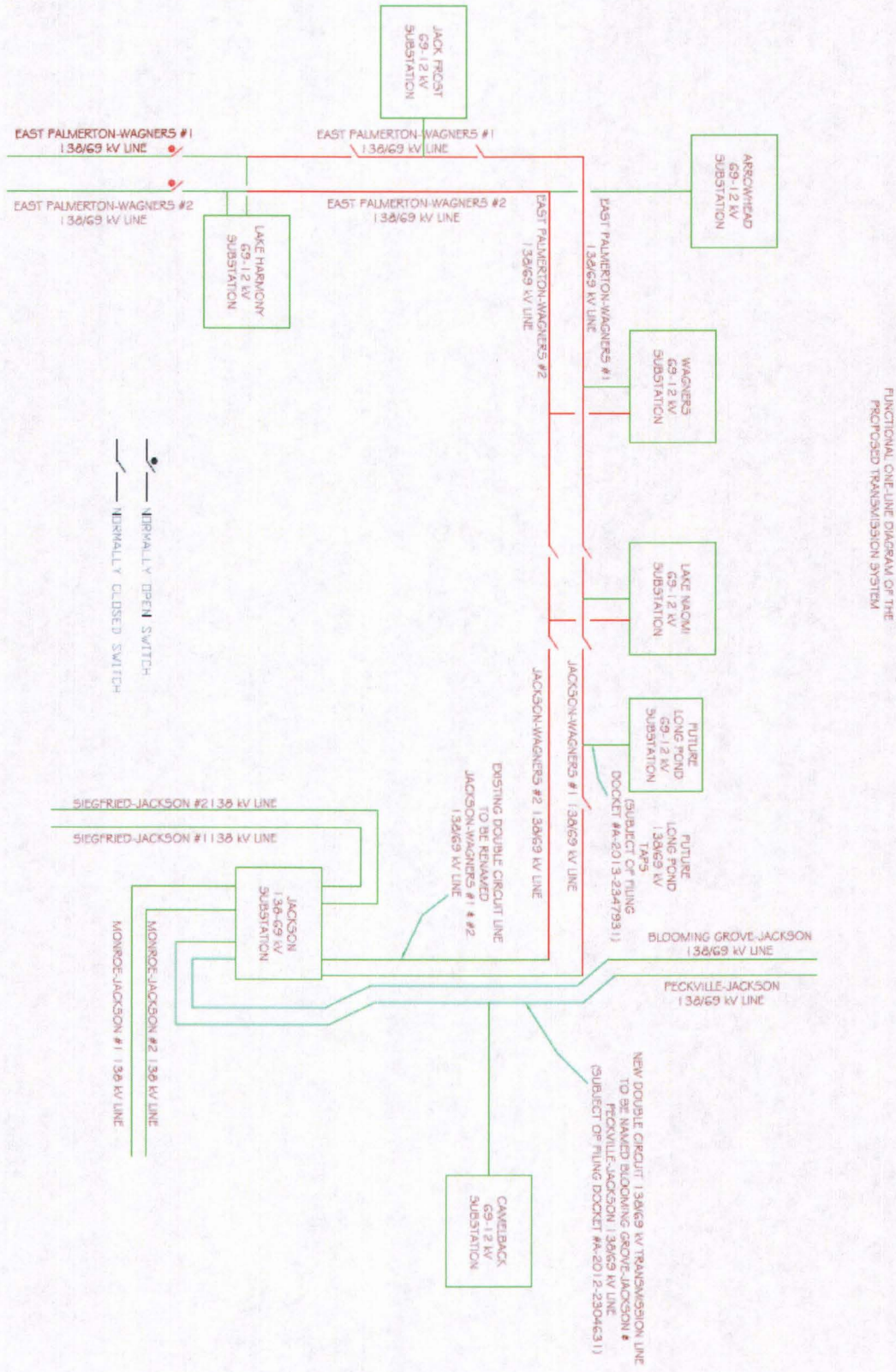


FIGURE 2-2 – ONE LINE DIAGRAM OF PROPOSED TRANSMISSION FACILITIES

Attach. 2 - Figures

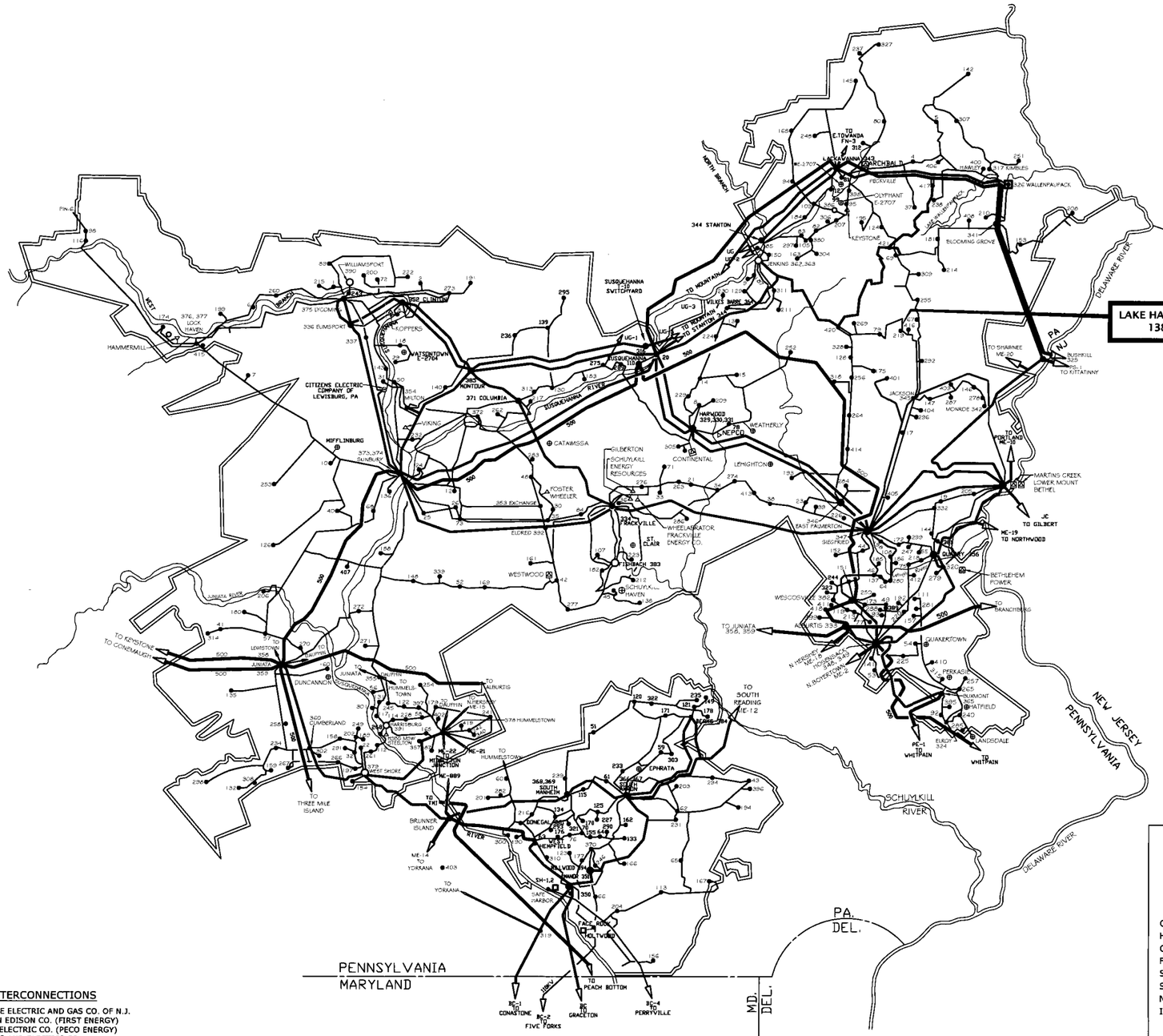
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SUBSTATION LISTING

1. WEST WILLIAMSPORT
2. FAIRFIELD
3. MONTGOMERY
4. VARDEN
5. HONESDALE
6. JERSEY SHORE
7. LOGANTON
8. VALMONT
9. RIVER
10. LIMESTONE
11. *
12. REED
13. WRIGHT
14. ST. JOHNS
15. FREELAND
16. *
17. GILBERT
18. *
19. CHERRY HILL
20. SUSQUEHANNA 230kV
21. TAMANEND
22. WHITE HILL
23. PALMERTON
24. HAMILTON
25. HUNTER
26. FAIRVIEW
27. *
28. *
29. MONTOUR PUMP
30. MT. CARMEL
31. KELLY
32. SPORTING HILL
33. MAHANOY CITY
34. GREENWOOD
35. MOWERY
36. ALTAMOUNT
37. HAMLIN
38. ASHFIELD
39. SOUTH SLATINGTON
40. SOUTH MIDDLEBURG
41. WALKER
42. FRAILEY
43. MORGANTOWN
44. EGYPT
45. CRESSONA
46. SOUTH WHITEHALL
47. *
48. BEAR GAP
49. SALISBURY
50. SOUTH MILTON
51. HEIDELBERG
52. LYKENS
53. UPPER HANOVER
54. RICHLAND
55. MACADA
56. ROCKVILLE
57. THOMPSONTOWN
58. PAXTON
59. COCALICO
60. EAST ELIZABETHTOWN
61. WARWICK
62. EARL
63. HEMPFIELD
64. EAST LANCASTER
65. KINZER
66. MT. NEBO
67. MT. POCONO
68. PENNS
69. GOULDSBORO
70. DILLERVILLE
71. GIRARD MANOR
72. KENMAR
73. GOWEN CITY
74. *
75. ELLIOT HEIGHTS
76. ROHRERSTOWN
77. MACUNGIE
78. EAST HAZLETON
79. WAGNERS
80. EAST CARBONDALE
81. EYNON
82. MINOOKA
83. OLD FORGE
84. FOUNTAIN SPRINGS
85. SULLIVAN TRAIL
86. *
87. SWATARA
88. *
89. HEPBURN
90. *
91. *
92. FRANCONIA
93. EMMAUS
94. MORGAN
95. THROOP
96. *
97. *
98. CHAPMAN
99. SUBURBAN
100. *
101. *
102. *
103. PROVIDENCE
104. *
105. AVOCA
106. *
107. CASS
108. CATASAQUA
109. *
110. SUSQUEHANNA 500kV
111. SEIDERSVILLE
112. ROSEMONT
113. QUARRYVILLE
114. LAWNTON
115. LITITZ
116. RENOVO
117. WALNUT
118. WATSON
119. TREXLERTOWN
120. LAVINO
121. SPRING
122. COLONIAL PARK
123. WEST LANCASTER
124. MADISONVILLE
125. NEFFSVILLE
126. BEAVERTOWN
127. BELMONT
128. LAKE HARMONY
129. GEORGETOWN
130. SCOTT
131. NORTH HARRISBURG
132. MOUNT ROCK
133. GREENLAND
134. LANDISVILLE
135. GREEN PARK
136. SELINSGROVE
137. SUMNER
138. AUBURN
139. ROHRSBURG
140. DERRY
141. EAST GREENVILLE
142. WEST DAMASCUS
143. NEW COLUMBIA
144. FARMERSVILLE
145. GREENVILLE
146. NORTH STROUDSBURG
147. TANNERSVILLE
148. ELIZABETHVILLE
149. WYOMISSING
150. EXETER
151. CRACKERSPORT
152. SCHNECKSVILLE
153. HEMLOCK
154. MT. ALLEN
155. PRINCE
156. WAKEFIELD
157. COOPERSBURG
158. WERTZVILLE
159. WEST CARLISLE
160. BENVENUE
161. HEGINS
162. LEOLA
163. YATESVILLE
164. CENTRAL ALLENTOWN
165. OBERLIN
166. STRASBURG
167. ATGLEN
168. BROOKSIDE
169. WILLIAMSTOWN
170. EAST PETERSBURG
171. WERNERSVILLE
172. NORTH BETHLEHEM
173. WEST ALLENTOWN
174. FLEMINGTON
175. MECKESVILLE
176. DONERVILLE
177. MILLERSVILLE
178. SHILLINGTON
179. DUKE
180. MCALLISTERVILLE
181. NEWFOUNDLAND
182. MARLIN
183. WEST BERWICK
184. KEYSER AVENUE
185. MICKLEYS
186. EAST ALLENTOWN
187. PINE RIDGE
188. DALMATIA
189. PENNSBORO
190. NORTH COLUMBIA
191. HUGHSVILLE
192. SOUTH ALLENTOWN
193. WEISSPORT
194. HONEYBROOK
195. MOSCOW
196. *
197. ROSSMOYNE
198. NORTHAMPTON
199. WOOLRICH
200. FAXON
201. ELIZABETHTOWN
202. ENOLA
203. TERRE HILL
204. BUCK
205. MT. BETHEL
206. RICHFIELD
207. SCRANTON
208. TWIN LAKES
209. HARLEIGH
210. TAFTON
211. BEAR CREEK
212. ORWIGSBURG
213. EAST TEXAS
214. CANDENSIS
215. LINDEN
216. MT. JOY
217. WEST BLOOMSBURG
218. MINSI TRAIL
219. LAKE NAOMI
220. LANARK
221. *
222. MONTOURSVILLE
223. PORT CARBON
224. BLYTHEBURN
225. MILFORD
226. TREICHLERS
227. ROSEVILLE
228. RUTHERFORD
229. HARTLAND
230. PARRISH
231. WEST NEW HOLLAND
232. POINT
233. LINCOLN
234. MIDDLETON
235. STATE HILL
236. MILLVILLE
237. TINKER
238. LAKEVILLE
239. NORTH MANHEIM
240. HATFIELD
241. HERSHEY
242. SOUTH HERSHEY
243. SOUTH WILLIAMSPORT
244. FOGELSVILLE
245. WINDSOR
246. WEST WILLOW
247. WESTGATE
248. EDELA
249. SUMMERDALE
250. DORNEYVILLE
251. BOHEMIA
252. WHITE HAVEN
253. LAURELTON
254. LINGLESTOWN
255. POCONO FARMS
256. HICKORY RUN
257. BLOOMING GLEN
258. SHERMANDSDALE
259. *
260. LARRYS CREEK
261. SPANGLER MILLS
262. EAST DANVILLE
263. DELANO
264. CARBON
265. SELLERSVILLE
266. MECHANICSBURG
267. CARLISLE
268. CEDAR
269. ARROWHEAD
270. NEWPORT
271. HALIFAX
272. MILLERSBURG
273. MUNCY
274. HAUTO
275. BERWICK
276. SHENANDOAH
277. PINE GROVE
278. STROUDSBURG
279. FREEMANSBURG
280. ALLENTOWN
281. BINGEN
282. RHEEMS
283. CLEVELAND
284. LITTLE GAP
285. ORVILLA
286. TUSCARORA
287. BARTONSVILLE
288. ALTON PARK
289. SALEM
290. NORTH BRIDGEPORT
291. HAMPDEN
292. CAMELBACK
293. SILVER SPRING
294. BRECKNOCK
295. BENTON
296. McMICHAELS
297. HUGHSTOWN
298. NEWVILLE
299. POINTE NORTH
300. MARIETTA
301. CENTER CITY
302. NEW KINGSTOWN
303. REAMSTOWN
304. DUPONT
305. HUMBOLT
306. CEDAR AVE.
307. INDIAN ORCHARD
308. NOTTINGHAM
309. NORTH COOLBAUGH
310. LETORT
311. EAST MOUNTAIN
312. JERMYN
313. BLOOMSBURG
314. MIFFLINTOWN
315. RIDGE ROAD
316. SUSQUEHANNA T-10 SW. YARD
317. KIMBLES
318. CHRISTMANS
319. OTTER CREEK
320. STEEL CITY
321. McGOVERNVILLE
322. ROBESONIA
323. SOUTH FOGELSVILLE
324. ELROY
325. BUSHKILL
326. WALLENPAUPACK
327. ELK MOUNTAIN
328. JACK FROST
329. HARWOOD 230/69kv
330. HARWOOD CTG
331. HARWOOD 69/12kV
332. NAZARETH
333. ALBURTIS
334. FRACKVILLE
335. *
336. ELIMSPORT
337. ALLENWOOD
338. *
339. GRATZ
340. HOCKERSVILLE
341. BLOOMING GROVE
342. MONROE
343. LACKAWANNA ##
344. STANTON
345. JACKSON
346. EAST PALMERTON
347. SIEGFRIED
348. HOSENSACK 230/69kV
349. HOSENSACK 500kV
350. CONESTOGA
351. MANOR
352. CLINTON
353. EXCHANGE
354. MILTON
355. DAUPHIN
356. QUARRY SUB.
357. STEELTON
358. JUNIATA 500/230kV
359. JUNIATA 230/69kV
360. CUMBERLAND
361. DONEGAL
362. JENKINS 230/69kV
363. JENKINS CTG
364. WILKES-BARRE
365. BUXMONT
366. SOUTH AKRON 230/138/69kV
367. SOUTH AKRON 69/12kV
368. SOUTH MANHEIM 69/12kV
369. SOUTH MANHEIM 230/69kV
370. ENGLESIDE
371. COLUMBIA
372. DANVILLE
373. SUNBURY
374. HUMMELS WHARF
375. LYCOMING
376. LOCK HAVEN CTG
377. LOCK HAVEN 69/12kV
378. HUMMELSTOWN
379. WEST SHORE
380. MONTAGE
381. SOUTH FARMERSVILLE
382. WESCOSVILLE
383. FISHBACH
384. BERKS
385. MONTOUR
386. SUBURBAN YARD
387. *
388. *
389. MACK
390. WILLIAMSPORT
391. HARRISBURG
392. ELDRED
393. *
394. MILLWOOD
395. TELFORD
396. TWIN VALLEY
397. DEVONSHIRE
398. JESSUP
399. SCHOENECK
400. HAWLEY
401. EFFORT MOUNTAIN
402. COPPERSTONE
403. RED FRONT
404. APPENZELL
405. BLUE MOUNTAIN
406. DAPPERS 69/12kV
407. MEISERVILLE
408. LEDGEDALE
409. EAST TANNERSVILLE
410. TRUMBAUERSVILLE
411. WEST TREXLERTOWN
412. FOUNTAIN HILL
413. LANSFORD
414. BELTZVILLE
415. LOCK HAVEN SWITCHYARD
416. LONG POND
417. PAUPACK
418. BREINIGSVILLE
419. WEST HERSHEY
420. ACAHELA
421. POCONO

* - SUBSTATIONS THAT HAVE BEEN RETIRED.

\## - SITE OF THE EXISTING 230kV SUBSTATION AND PROPOSED 500kV SYBSTATION.


LAKE HARMONY - LAKE NAOMI 138/69KV PROJECT
NEW YORK
NEW JERSEY
PENNSYLVANIA
MARYLAND
DELAWARE RIVER
SCHUYLKILL RIVER
PA. DEL.
M.D. DEL.
NEW JERSEY PENNSYLVANIA
DELAWARE RIVER
SUSQUEHANNA SWITCHYARD
CITIZENS ELECTRIC COMPANY OF LEWISBURG, PA
CATAWISSA
HARWOOD 230/69/12 kV
WEATHERLY
JACKSON
MONROE
LAKE NAOMI
BUSHKILL
TO KITTATINNY
TO SHAWNEE
TO PORTLAND
MARTINS CREEK LOWER MOUNT BETHEL
JC TO GILBERT
MC-19 TO NORTHWOOD
BETHLEHEM POWER
TO BRANCHTOWN
TO JUNIATA
TO KEYSTONE
TO CONEMAUGH
TO SOUTH READING ME-12
TO HUMMELSTOWN
TO YORKANA
TO PEACH BOTTOM
TO GRACETON
TO PERRYVILLE
TO CONASTONE
TO FIVE FORKS
TO WHITPAIN
TO LANDSDALE
TO HATFIELD
TO KIMBLES
TO WALLENPAUPACK
TO OLYPHANT
TO MOUNTAIN
TO STANTON
TO TMI
TO THREE MILE ISLAND
TO SUNBURY
TO MIDDLETOWN
TO HUNTERSTOWN
TO ALBURTIS
TO HUMMELS TOWN
TO LEWISTOWN
TO DUNCANNON
TO NORTH HERSHEY
TO SUSQUEHANNA
TO HARWOOD
TO ENOLA
TO CUMBERLAND
TO WEST SHORE
TO MANOR
TO QUARRY
TO HARRISBURG
TO MILLWOOD
TO ELIMSPORT
TO LYCOMING
TO MONTOUR
TO MILTON
TO WILLIAMSPORT
TO HAMMERMILL
TO ELDRED
TO ALLENWOOD
TO MONTOURSVILLE
TO WESCOSVILLE
TO SIEGFRIED
TO EAST PALMERTON
TO QUAKERTOWN
TO PERKASIE
TO BUXMONT
TO ELKTON

Attachment 3

ATTACHMENT 3
LAKE HARMONY-LAKE NAOMI 138/69 KV REBUILD PROJECT
ENVIRONMENTAL SETTING

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LIST OF ACRONYMS

Acronym	Definition
ACE	Agricultural Conservation Easement
ASA	Agricultural Security Area
CWF	Cold Water Fishery
CRGIS	Cultural Resources Geographic Information System
EV	Exceptional Value
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HQ	High Quality
I	Interstate
IBA	Important Bird Area
kV	Kilovolt
MF	Migratory Fishery
MCPC	Monroe County Planning Commission
NAI	Natural Areas Inventory
NHD	National Hydrography Dataset
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWPS	National Wilderness Preservation System
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish and Boat Commission
PFO	Palustrine Forested
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historical and Museum Commission
PNDI	Pennsylvania Natural Diversity Inventory
PNHP	Pennsylvania Natural Heritage Program
POTC	Pennsylvania Ornithological Technical Committee
PPL Electric	PPL Electric Utilities Corporation
PSS	Palustrine Scrub/Shrub

Acronym	Definition
PUC	Public Utility Commission
RTE	Rare, Threatened, or Endangered
SGL	State Game Land
SR	State Route
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

PPL Electric Utilities Corporation (PPL Electric) seeks approval from the Pennsylvania Public Utility Commission (Commission or PUC) to site and construct transmission line connections between a series of seven 69-12 kV substations and tap pole locations. The siting study identifies alternative routes between each of the following pairs of endpoints:

- Lake Naomi Tap Pole to the Long Pond Tap Pole (Subject of Filing Docket #A-2013-2347931)
- Long Pond Tap Pole to the Lake Naomi Substation
- Lake Naomi Substation to the Wagners Substation
- Wagners Substation to the Arrowhead Lake Tap Pole
- Arrowhead Lake Tap Pole to the Jack Frost Substation
- Jack Frost Substation to the Lake Harmony Substation

This Attachment provides background information describing the environmental setting of the Lake Naomi to Lake Harmony 138/69 Rebuild Project Study Area for the siting of proposed transmission lines in northeast Pennsylvania. Within this Attachment is a contextual discussion of the natural and man-made features within the Project Study Area. These features are used in the detailed siting study process discussed in **Attachment 4**. The siting study methodology involves the development of the Project Study Area (based on Macro Corridors), Alternative Corridors within the Project Study Area, Alternative Routes, and the determination of a Selected Route. The process of determining the Project Study Area boundaries is conducted in the first phase of the siting study, which is discussed in detail in **Attachment 4, Section 1.2.** The Project Study Area is used throughout this Attachment and is illustrated in **Figure 3-1**.

The siting study process was completed independently for each of the six segments of the proposed 138/69 kV transmission line. However, the discussion provided in this Attachment will not be broken down by segment, but will conversely discuss the Project Study Area as a whole.

Information discussed in this Attachment was gathered from numerous sources, including federal, state, and local geographic information system (GIS) databases, published reports and maps, and field reconnaissance surveys. The diverse collection of data sources which was used to produce this Attachment provides a concise, yet thorough, description of the environmental

setting of the Project Study Area. A complete list of data sources is included at the end of the Attachment (**5.0 References**).

The Project Study Area includes areas of Carbon and Monroe Counties, both located in northeastern Pennsylvania (**Figure 3-1**). The Project Study Area includes portions of each of the following municipalities (**Table 3-1**):

Table 3-1: Counties and Municipalities within the Project Study Area

County	Municipality
Carbon	Kidder Township
Monroe	Coolbaugh Township
	Mount Pocono Borough
	Pocono Township
	Tobyhanna Township
	Tunkhannock Township

2.0 NATURAL ENVIRONMENT OF THE PROJECT STUDY AREA

The composition of the natural environment is an important component of the transmission line siting process as it helps define the opportunity and constraint areas within the Lake Naomi to Lake Harmony 138/69 Rebuild Project Study Area. This section provides a description of the environmental setting of the Project Study Area including its physiography, geology, soils, surface water, vegetation and wildlife habitats, and special use areas.

2.1 Physiographic Provinces and Terrain

Pennsylvania physiographic provinces are defined by the geomorphology, underlying bedrock geology, and the glacial signature of the landscape. The Project Study Area in contained almost entirely within the Glaciated Pocono Plateau section of the Appalachian Plateaus Province with a minor portion touching into the Glaciated Low Plateau Section of the Appalachian Plateaus (**Figure 3-2**). The Glaciated Pocono Plateau Section is a broad upland made up predominantly of erosion resistant sandstone. The topography is relatively flat and smooth due to the influence of historic glaciation (PADCNR 2012a). The Glaciated Low Plateau Section, which is only minimally within the Project Study Area, is characterized by the remnants of its once glaciated

landscape. Glacial erosion and deposition have carved the current topography of valleys, smooth hills, and glacial deposits (PADCNR 2012b). Beneath the glacially influenced surficial geology, the bedrock of the Appalachian Plateaus Province is dominated by the Catskill Formation, a Devonian Age sedimentary rock deposited when Pennsylvania was largely covered by the Catskill Delta.

There are relatively few areas of steep slopes within the Project Study Area. Where they do occur is within the river valleys of the Lehigh River in the western portion of the Project Study Area and the Indian Run and Swiftwater Creek systems located in the eastern Project Study Area. These areas are highlighted in **Figure 3-3**.

2.2 Geologic Environment

The position of the Project Study area within the Glaciated Low and Glaciated Pocono Plateau Sections of Appalachian Plateaus Province denotes a distinct bedrock geology. Rock units that underlie the unconsolidated material date from the Devonian Period to Mississippian Epoch, ranging in age from about 385 million to 300 million years ago. The following bedrock geology units and associated map symbol (*e.g.,* Dcd) are listed based on their appearance in the Project Study Area from west to east:

- Spechty Kopf Formation – MDsk
- Catskill Fomation
    - Duncannon Member – Dcd
    - Poplar Gap Member – Dcpg
    - Packerton Member – Dcp
    - Long Run Member – Dclr

The distribution of these rock types is shown in **Figure 3-4**.

This discussion of unconsolidated surficial geology is a summary of available[1] Braun Surficial Geology documents written in 2008. Unconsolidated geologic units overlying the Project Study Area bedrock are glacial, alluvial, and colluvial as defined below. This area is known to have

[1] Surficial Geology Reports are only available for two of the seven USGS 24K Topographic Quads that intersect the Project Study Area. The information from these reports is applicable for the Project Study Area because of the consistent physiographic province throughout.

undergone several glaciations during the Pleistocene Epoch of the Quaternary Period. It is believed that the glaciers advanced into this region generally from the northeast on three separate occasions between 850,000 and 20,000 years ago. Most of the Project Study Area is covered with material carried by and deposited directly from ice sheets, called glacial till and outwash. Sediments transported and deposited by present-day and ancestral streams are called alluvium. Alluvial deposits primarily occur within existing stream banks and in floodplains. Loose rock debris that has accumulated at the base of gently sloping cliffs or slopes through the action of weather or gravity is called colluvium. Due to the variable topography colluvial deposits may be located at various elevations throughout the Project Study Area, as well as along the edge of stream banks and floodplains (Braun 2008a & 2008b).

2.3 Soil Characteristics

The general characteristics of soils that have developed in the Project Study Area correspond closely to the area's physiography and geology (Fisher et al 1962, Lipscomb 1981). The following discussion of soils is based on information provided by the U.S. Department of Agriculture/Natural Resources Conservation Service (USDA/NRCS 2012). Soils in the Glaciated Pocono and Low Plateaus of the Appalachian Plateau Province are somewhat excessively well drained to somewhat poorly drained, typically deep, and are derived from sandstone and siltstone. Many of these soils are characterized as being very stony and having high water tables.

Hydric soils are formed under wet conditions (saturation, flooding, or ponding) sufficient to develop anaerobic conditions in the upper regions of the soil during the growing season and support the growth of hydrophytic vegetation. **Figure 3-5** illustrates and **Table 3-2** lists the soil-mapping units within the Project Study Area that composed of major hydric components or units that may contain hydric inclusions.

Also present within the Project Study Area are prime farmland soils and soils of state importance, which are defined as having a combination of physical and chemical characteristics that make them optimal for producing food and feed. These soil criteria are used to determine if farms are eligible for entry into the County Agricultural Conservation Easement (ACE) program (see **Section 3.1.1**).

Table 3-2: Soils with Hydric Characteristics within the Project Study Area

Soil Map Unit Symbol	Soil Map Unit Name	Soil Map Unit Symbol	Soil Map Unit Name
AcB	Albrights very stony loam, 0 to 8 percent slopes	Ph	Philo silt loam
AcD	Albrights very stony loam, 8 to 25 percent slopes	Po	Pope silt loam
As	Alluvial land	ReA	Rexford gravelly silt loam, 0 to 3 percent slopes
AvB	Alvira gravelly silt loam, 3 to 8 percent slopes	ReB	Rexford gravelly silt loam, 3 to 8 percent slopes
BrA	Braceville gravelly loam, 0 to 3 percent slopes	SmB*	Shelmadine very stony silt loam, 0 to 8 percent slopes
BrB	Braceville gravelly loam, 3 to 8 percent slopes	Tf	Tioga fine sandy loam
BuB	Buchanan loam, 3 to 8 percent slopes	TuB	Tunkhannock gravelly loam, 3 to 8 percent slopes
BxB	Buchanan extremely stony loam, 0 to 8 percent slopes	TuC	Tunkhannock gravelly loam, 8 to 15 percent slopes
CmA*	Chippewa and Norwich silt loams, 0 to 5 percent slopes	VaC	Very stony land and Rock outcrops, sloping
CnB*	Chippewa and Norwich extremely stony soils, 0 to 8 percent slopes	VoA	Volusia gravelly silt loam, 0 to 3 percent slopes
ExB	Empeyville extremely stony sandy loam, 0 to 8 percent slopes	VoB	Volusia gravelly silt loam, 3 to 8 percent slopes
Hy*	Holly silt loam	VsB	Volusia very stony loam, 0 to 8 percent slopes
MbB	Mardin very stony silt loam, 0 to 8 percent slopes	VxB	Volusia extremely stony silt loam, 0 to 8 percent slopes
MdB	Middlebury silt loam, 3 to 8 percent slopes	Wb*	Wayland silty clay loam
MeA3	Middlebury and Tioga silt loams, 0 to 3 percent slopes, severely eroded	WmB	Wellsboro channery loam, 3 to 8 percent slopes
MgB	Morris channery silt loam, 2 to 10 percent slopes	WmC	Wellsboro channery loam, 8 to 15 percent slopes
MoB	Morris extremely stony silt loam, 0 to 8 percent slopes	WpB	Wellsboro extremely stony loam, 0 to 8 percent slopes
MoC	Morris extremely stony silt loam, 8 to 20 percent slopes	WpC	Wellsboro extremely stony loam, 8 to 25 percent slopes
Mp*	Mucky peat, deep	WsB	Wurtsboro channery loam, 2 to 12 percent slopes
MrB	Morris very stony silt loam, 0 to 8 percent slopes	WvB	Wurtsboro very stony loam, 0 to 8 percent slopes
Ms*	Mucky peat, shallow	WxB	Wurtsboro extremely stony loam, 0 to 8 percent slopes
Mu*	Muck and Peat	WxC	Wurtsboro extremely stony loam, 8 to 25 percent slopes
NvB*	Norwich very stony loam, 0 to 8 percent slopes		

*Soils composed of major hydric components; the remaining soils contain minor hydric inclusions.

Erosion potential associated with the Project will be influenced by the clearing of vegetation within the new ROW and construction of the access roads and transmission structures. The potential for erosion and resultant sedimentation is reduced by rebuilding the new line within the existing ROW and following existing access roads where possible. Erosion and sedimentation control plans will be developed to address construction and post-construction storm water concerns. These plans will be reviewed and approved by the individual County Conservation Districts prior to the issuance of other mandatory permits.

2.4 Hydrology

The Project Study Area spans two watersheds of the Central Region of the Delaware River Basin: the majority is within the Lehigh Valley watershed with a small area in the eastern portion within the Upper Central watershed. The western portion of the Project Study Area, within the Lehigh Valley watershed is occupied by the Lehigh River watershed and the Tobyhanna Creek watershed. The eastern portion of the Project Study, which is in the Upper Central watershed of the Delaware River, includes areas of the Paradise Creek and Pocono Creek watersheds. Major streams and lakes found on the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), as well as watershed boundaries, are illustrated in **Figure 3-6** and discussed in more detail below.

2.4.1 Streams

The Pennsylvania Code, Title 25, Chapter 93 (Pennsylvania Department of Environmental Protection [PADEP] 2011) establishes narrative and numeric water quality criteria necessary to support a variety of protected water uses. All surface waters must be protected for aquatic life (cold and warm water fish), water supply (potable, industrial, livestock, wildlife, and irrigation), and recreation (boating, fishing, water contact sports, and aesthetics). PADEP assigns all streams in the Commonwealth a *Designated Use,* which is the water use goal for a particular stream segment, whether or not it is currently being attained. In contrast, a stream's *Existing Use* is the use actually attained by existing water quality. PADEP's antidegradation policy requires existing uses, and the level of water quality necessary to protect existing uses, be maintained and protected. As such, the water quality of a stream segment with an existing use that exceeds its Designated Use may not be degraded below the water quality levels protective of that existing use.

The streams of the Project Study Area can be grouped by their major watershed. The western portion drains to the Lehigh River through one main tributary, Tobyhanna Creek. Tobyhanna Creek and its tributaries have the Chapter 93 Designated Use classification of High Quality Cold Water Fishery (HQ-CWF). All streams within the Project Study Area also have a Migratory Fish (MF) Designated Use for the passage, maintenance, and propagation of migratory fish. The northwestern corner of the Project Study Area drains directly into the Lehigh River. The Lehigh River and its tributaries in this area have a Chapter 93 Designated Use of Exceptional Value (EV). The streams of the eastern portion of the Project Study Area are within the Upper Central Watershed of the Delaware River Basin. They drain to two main tributaries, Paradise Creek and Pocono Creek. All of the streams in this portion have a Designated Use of HQ-CWF. The tributaries of Paradise Creek, including Swiftwater Creek, Indian Run, and two un-named tributaries, have a Chapter 93 Existing Use of Exceptional Value (EV). Due to PADEP's antidegradation policy, the water quality levels of tributaries of Paradise Creek must be upheld to their Existing Use of EV. All of the streams within the Project Study Area, as well as their Chapter 93 Designated/Existing Use, are listed in **Table 3-3**.

Table 3-3: Streams and Chapter 93 Designated/Existing Uses within the Project Study Area

Delaware River Basin	
Lehigh Valley Watershed	
Stream Name	**Designated Use/Existing Use**
Lehigh River	EV
> 5 un-named tributaries	EV
Tobyhanna Creek	HQ-CWF
Beaver Creek	HQ-CWF
Davey Run	HQ-CWF
Deep Run	HQ-CWF
Dotters Run	HQ-CWF
**Kistler Run*	HQ-CWF
Red Run	HQ-CWF
Shingle Mill Run	HQ-CWF
Stony Run	HQ-CWF
Tunkhannock Creek	HQ-CWF
Two Mile Run	HQ-CWF
Upper Tunkhannock Creek	HQ-CWF
Wagner Run	HQ-CWF
Wolfs Spring Run	HQ-CWF
>60 un-named tributaries	HQ-CWF

Upper Central Watershed	
Stream Name	**Designated Use/Existing Use**
Pocono Creek Watershed	
**Transue Run*	HQ-CWF
**Dry Sawmill Run*	HQ-CWF
>5 un-named tributaries	HQ-CWF
Paradise Creek Watershed	
**Swiftwater Creek*	HQ-CWF/EV
Indian Run	HQ-CWF/EV
>2 un-named tributaries	HQ-CWF/EV

*Wild Trout Waters

Several of the streams in the Project Study Area are classified as Wild Trout Waters (Natural Reproduction) by the Pennsylvania Fish and Boat Commission (PFBC). These stream sections support naturally reproducing populations of trout and have been issued additional protection through seasonal restrictions (October 1 to December 31) during which activities cannot be conducted within the stream (PFBC 2013a). Additionally, both the Tobyhanna Creek and the Lehigh River are listed as Approved Trout Streams by the PFBC, meaning the "*waters contain significant portions that are open to public fishing and are stocked with trout* (PFBC 2013b)." Approved Trout Streams have also been issued additional protection through seasonal restrictions (March 1 to June 15) for work within the stream. None of the streams in the Project Study Area are designated as Class "A" Wild Trout or Wilderness Trout Streams (PFBC 2013c/d).

2.4.2 100-year Floodplain

The areas adjacent to streams subject to inundation by a flood elevation with a 1-percent-annual-chance of being equaled or exceeded each year are known as the 100-year floodplains. The Federal Emergency Management Agency (FEMA) delineates the extent of some 100-year floodplains on Flood Insurance Rate Maps. 100-year floodplain extents in the Project Study Area and surrounding landscape were obtained and examined. The floodplain data was adapted by PADEP from the FEMA 100-year floodplains and issued through the Pennsylvania Spatial Data Access (PASDA) database (PADEP 1996). **Figure 3-6** includes the 100-year floodplain boundaries for the Project Study Area.

2.4.3 Lakes

There are numerous open water bodies located within the Project Study Area. Major lakes include Lake Harmony, Lake Naomi, Pocono Lake, Tamaque Lake, and Stillwater Lake (**Figure 3-6**). A complete list of named lakes within the Project Study Area, obtained from the USGS NHD database, is provided in **Table 3-4**. Along with the eighteen named lakes, there are approximately 80 smaller un-named lakes and ponds within the Project Study Area.

Table 3-4: NHD Named Lakes within the Project Study Area

NHD Waterbodies - Lakes (GNIS Name)		
Anglewood Lake	Lake Naomi	Pilgrim Lake
East Lake	Lake Onocup	Pine Tree Lake
Halfmoon Lake	Lake Sinca	Pocono Lake
Jimmy Pond	Little Deer Pond	Ramot Lakes
Lake Guenevere	Lost Lakes	Stillwater Lake
Lake Harmony	Mosey Wood Pond	Tamaque Lake

2.4.4 Wetlands

U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) wetland maps indicated that wetlands throughout the Project Study Area are primarily palustrine (i.e., non-tidal, freshwater) wetlands dominated by trees, shrubs, persistent emergent vegetation, and emergent mosses and lichens. NWI wetlands are classified in accordance with the Cowardin system (Cowardin et al. 1979), which also includes open waters (e.g., streams, ponds, lakes) as wetlands. Numerous areas of NWI wetlands, primarily palustrine forested (PFO) or shrub/scrub (PSS) communities, are present throughout the Project Study Area especially along stream valleys between rounded hills. There are also palustrine emergent (PEM) wetlands scattered throughout the landscape. The Tobyhanna River has an associated riverine wetland system which contours the river though the Project Study Area (**Figure 3-7**) (USFWS 2012a).

The wetlands depicted in the NWI database are not identified or delineated in accordance with methodologies required by regulatory agencies to establish boundaries of wetlands under their jurisdiction. The NWI maps were created based on the analysis of aerial photographs from the 1980's with limited ground verification, and should not be considered an alternative to delineating wetlands using regulatory requirements. An official delineation of the wetlands along the length of the Selected Route will be required prior to issuance of the environmental permits necessary for construction of the project.

2.5 Plant and Wildlife Habitats

The Project Study Area contains unique areas of natural environment composed of native plant and wildlife habitats. Many of these natural areas are preserved for their ecological benefit along with their value as a recreational resource.

2.5.1 Vegetation

Vegetation within the Project Study Area includes both natural undeveloped areas dominated by upland or wetland forests and human influenced plant communities such as landscaped areas, successional meadows, and several agricultural fields.

The Project Study Area lies within the Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Forest ecosystem province (Bailey 1995). This province is temperate with distinct summer and winter seasons and some of the highest precipitation levels in the eastern United States. The vegetation of the Project Study Area can be divided and summarized based on terrestrial and palustrine vegetation. The terrestrial vegetation of the study area falls within one forest type according to Rhoads' and Block's *Trees of Pennsylvania: a complete reference guide* (Rhoads and Block 2005). The entire Project Study Area lies within the Northern Hardwood Forest, which is prevalent throughout the northern third of the Commonwealth. This forest type is characterized by hardwoods and conifers usually containing beech (*Fagus* species), birch (*Betula* species), sugar maple (*Acer saccarum*), Canadian hemlock (*Tsuga candensis*), and white pine trees (*Pinus strobus*). The understory is generally comprised of moosewood (*Acer pensylvanicum*), witch-hazel (*Hamamelis virginiana*), mountain holly (*Ilex montana*), and shadbush (*Amelanchier arborea*).

The palustrine vegetation of the Project Study Area is not constrained to the same boundaries as the terrestrial vegetation. Throughout this region, wetter environments, such as the Boreal Conifer Swamps created by glacial activities, are abundant and include black spruce (*Picea mariana*), larch (*Larix* species), balsam fir (*Abies balsamea*), and red spruce (*Picea rubens*). Some of the common shrubs include swamp azalea (*Rhododendron simsii*), highbush blueberry (*Vaccinium corymbosum*), and mountain holly (*Ilex montana*) (Fike 1999).

2.5.2 Wildlife

Typical wildlife species found within the Project Study Area include a variety of mammals, birds, amphibians, and reptiles. Common mammals include the white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), and chipmunk (*Tamias striatus*); other less common mammals include the black bear (*Ursus americanus*), river otter (*Lutra canadensis*), and beaver (*Castor canadensis*). Bird species range from the robins (*Turdus migratorius*), blue jays (*Cyanocitta crisitata*), red-wing blackbirds (*Agelaius phoenicus*), and house wrens (*Troglodytes aedon*) that are noted in more developed areas to the common yellowthroat (*Geothlypis trichas*), wood ducks (*Aix sponsa*), bobwhite quail (*Colinus virginianus*), and whip-poor-wills (*Caprimulgus vociferous*) that are typically found in specific habitat areas. Common amphibians and reptiles include the northern green frog (*Rana clamitans melanota*), bullfrog (*Rana catesbeiana*), red-spotted newt (*Notophthalmus viridescens*), wood turtle (*Clemmys insculpta*), black rat snake (*Elapha obsoleta*), and northern water snake (*Nerodia sipedon*) (Fergus and Hansen 2000).

2.5.3 Rare, Threatened, and Endangered Species

Based on a search of the (PNDI) database and follow-up consultations with the USFWS (UWFWS 2012b), PFBC (PFBC 2012), PGC (PGC 2012a), and PADCNR (PADCNR 2012c), the following federal and/or state RTE species could potentially occur within the Project Study Area:

- Bog Turtle (*Clemmys muhlenbergii*) – State-listed endangered, Federally-listed threatened reptile (USFWS).
- Timber Rattlesnake (*Crotalus horridus*) – State candidate reptile (PFBC).
- Osprey (*Pandion haliaetus*) – State-listed threatened species (PGC).
- White water crowfoot (*Ranunculus aquatilus var.* diffuses) – State-listed Rare Plant (PADCNR).
- Long's sedge (*Carex longii*) – Proposed Threatened Plant (PADCNR).
- Creeping snowberry (*Gaultheria hispidula*) – State-listed Rare Plant (PADCNR).
- Sweet-gale (*Myrica gale*) – State-listed Threatened Plant (PADCNR).
- Thread rush (*Juncus filiformis*) – State-listed Rare Plant (PADCNR).
- Bog goldenrod (*Solidago uliginosa*) – Proposed Threatened Plant (PADCNR).

- White-fringed orchid (*Plantanthera blephariglottis*) – Proposed Endangered Plant (PADCNR).
- Bog sedge (*Carex paupercula*) – State-listed Threatened Plant (PADCNR).
- Common Labrador tea (*Ledum groendlandicum*) – State-listed Rare Plant (PADCNR).
- Oblong-fruited serviceberry (*Amelanchier bartramiana*) – State-listed Endangered Plant (PADCNR).
- Serviceberry (*Amelanchier* Canadensis) – Proposed Endangered Plant (PADCNR).
- Branching bur-reed (*Sparganium androclatum*) – State-listed Endangered Plant (PADCNR).
- Marsh willow-herb (*Epilobium palustre*) – Undetermined State Status (PADCNR).
- Screw-stem (*Bartonia paniculata*) – Proposed Rare Plant (PADCNR).
- Slender sedge (*Carex lasiocarpa*) – State-listed Rare Plant

Habitat assessments for these RTE species may be required by the jurisdictional agencies as part of the environmental permitting and approval process for the Project. Additional Conservation Measures include the identification of the following species and/or habitat types if encountered during required surveys:

- Red spruce-mixed hardwood palustrine forest
- Leatherleaf-bog rosemary peatland
- Pitch pine-leatherleaf palustrine woodland
- Pink sallow (*Psectraglaea carnosa*) – State terrestrial invertebrate species of Special Concern
- Bog Copper (*Lycaena epixanthe*) – State terrestrial invertebrate species of Special Concern

2.6 Special Use Areas

Special use areas are places recognized by regulatory agencies or local governments as providing habitat characteristics or wildlife management opportunities that indicate a need for preservation. Examples include scenic areas, wilderness areas, wild and scenic rivers, state and conserved lands, priority natural areas, and important bird areas (IBA).

2.6.1 Scenic Areas

The PADCNR provides designations for vistas and overlooks, waterfalls, scenic hikes, and other special use areas. Based on these lists, there are no designated scenic areas within the Project

Study Area (PADCNR 2012d). There are, however, two Heritage Geology Sites designated by the Pennsylvania Natural Heritage Program (PNHP) within the Project Study Area (PADCNR 2012e). The first site is the Hickory Run Boulder Field, in Hickory Run State Park, which is both a National Natural Landmark through the National Park Service (NPS) and a Heritage Geology Site through PADCNR (NPS 2012). The second is Split Rock, which is a unique rock outcrop in the southwestern portion of the Project Study Area (Geyer 1987). There is also a trail within the Project Study Area which is part of the Hickory Run State Park Trails network. All of these scenic features are displayed on **Figure 3-8**.

2.6.2 Wilderness Areas

No portion of the Project Study Area is located within the National Wilderness Preservation System (NWPS 2012).

2.6.3 Wild and Scenic Rivers

No wild or scenic rivers, as designated pursuant to the federal Wild and Scenic Rivers Act or by the Pennsylvania Scenic Rivers Act, are located within the Project Study Area (PADCNR 2012f).

2.6.4 State and Conserved Lands

The Project Study Area includes areas of State Game Land, State Park, and other conserved lands.

Several State Game Lands (SGL), including 26,000-acre SGL #127, 3,500-acre SGL #129, and 870-acre SGL #318, are each located at least partially within the Project Study Area (PGC 2012b). The southwest corner of the Project Study Area falls within the boundary of the 15,990-acre Hickory Run State Park.

Aside from these state owned lands, there are lands conserved by private groups, including The Nature Conservancy, Pine Crest Lake Community Trust, and Bethlehem Area Boy Scouts of America. All of these areas are depicted on **Figure 3-8**.

2.6.5 Priority Natural Areas

The Natural Areas Inventories (NAI) for Monroe and Carbon Counties, conducted by The Nature Conservancy (TNC), indicate that twenty four (24) Priority Natural Areas are partially or wholly located within the Project Study Area (**Figure 3-9**) (TNC 2005 and 1999). These sites are associated with locations of "*rare, threatened, and endangered plant and animal species and the highest quality natural areas*" (TNC 2005). Based on biodiversity and concentration of rare species, TNC has ranked the Statewide Significance of each NAI between one (1), indicating highest priority, and five (5), indicating lowest priority. These rankings as well as the names of the Priority Natural Areas are listed in **Table 3-5.**

Table 3-5: Priority Natural Areas within the Project Study Area

Site Name	Significance State Rank	Significance Local Rank	County	Publication Year
Warnertown Wetlands	5		Monroe	1999
Pocono Lake North	5		Monroe	1999
Scott Property Site	5		Monroe	1999
Eschenbaugh Swamp	4		Monroe	1991
Selfice Swamp		Low	Monroe	1991
SP515	5		Monroe	1991
NC557	5		Monroe	1991
Wagner Way Swamp		Low	Monroe	1991
Two-Mile Run Swamp	2		Monroe	1991
SP516 (Anglewood Lake Swamp)	5		Monroe	1999
Wagners Bog	4		Monroe	1999
Lake Naomi	5		Monroe	1991
Stillwater Lake Swamps	4		Monroe	1991
SP511 SA569	5		Monroe	1991
Sullivan Trail (Lake Naomi Shrub Swamps)	3		Monroe	1999
Pocono Lake Preserve Site	3		Monroe	1999
Tamaque Lake Swamp	4		Monroe	1999
Lost Lakes	3		Monroe	1991
Adams Swamp	3		Monroe	1991
Long Pond Macrosite (Long Pond Macrosite Preserve)	1		Monroe	1999
Lehigh River - Route115 Bridge	5		Monroe	1999
Mosey Wood Wetlands	1		Carbon	2005
Lake Harmony, Big Boulder Lake	3		Carbon	2005
Hickory Run Boulder Field	5		Carbon	2005

2.6.6 Important Bird Areas

Important Bird Areas (IBA) are "*designated by the Pennsylvania Ornithological Technical Committee* (POTC), *as the most critical regions in the Commonwealth for conserving bird diversity and abundance, and are the primary focus of Audubon Pennsylvania's conservation efforts*" (Audubon Pennsylvania Birds Conservation 2012). The POTC identified three Important Bird Areas that intersect the Project Study Area (IBA #63, IBA #64, and IBA #65).

The POTC identified the Pocono Lake Preserve and adjacent SGL #127, located within Coolbaugh Township, Monroe County, as IBA #63. Species identified within IBA #63 include ruffled grouse (*Bonasa umbellus*), spotted sandpiper (*Actitis macularius*), American woodcock (*Scolopax minor*), black-billed cuckoo (*Coccyzus erythropthalmus*), and northern saw-whet owl (*Aegolius acadicus*). This ecosystem also provides habitat for several threatened bird species including the osprey (*Pandion haliaetus*) and the yellow-bellied flycatcher (*Empidonax flaviventris*) (Audubon Pennsylvania Birds Conservation 2012).

The POTC has also identified the Long Pond Macrosite and adjacent SGL #38, located within Jackson Township and Pocono Township, Monroe County, as an Important Bird Area (IBA #64). Species identified in IBA #64 include scarlet tanagers (*Piranga olivacea*), bobolinks (*Dolichonyx oryzivorus*), wood ducks (*Aix sponsa*), and various warblers. This ecosystem also provides habitat for several threatened bird species including the American bittern (*Botaurus lentiginosus*), osprey, and the northern harrier (*Circus cyaneus*)

The last IBA within the Project Study Area is IBA #65 which covers the extent of Hickory Run State Park, which is located in Kidder and Penn Forest Townships, Carbon County. Species identified in IBA #65 include ruffed grouse, wild turkey (*Meleagris gallopavo*), scarlet tanager, and other migrating thrushes and warblers (Audubon Pennsylvania Birds Conservation 2012). These three IBA's are illustrated in **Figure 3-9**.

3.0 HUMAN ENVIRONMENT OF THE PROJECT STUDY AREA

Human influences on the natural environment within the Lake Naomi to Lake Harmony 138/69 kV Rebuild Project Study Area are represented by many development types and patterns. Because the majority of the Project Study Area is within Monroe County, the human environment is discussed within the framework of the Monroe County land use codes.

3.1 Land Use

Land Use codes designated by the Monroe County Planning Department were used as the outline to characterize the Project Study Area (MCPC 2010). These land use codes are discussed below and displayed in **Figure 3-10**.

3.1.1 Agriculture

Relatively few sections of the Project Study Area are used for agricultural purposes and these are located primarily in the central western portion of the study area. There are seven unique agricultural parcels of these lands all of which are privately owned. The primary agricultural use involves row crops such as hay, corn, and soybeans. Other agricultural uses include horse pastures and dairy farms; these are limited in this area compared to row crops. There are no agricultural lands within the Project Study Area in Carbon County.

Monroe County has several mechanisms for protecting farmland, including:

- Agricultural Security Area (ASA)
- Agricultural Conservation Easement (ACE)
- Act 319 ("Clean and Green Act")

The Farmland Preservation Board administers the creation of an ASA and the purchase of an ACE. An ASA is an area of 500 or more semi-contiguous acres that is used for agricultural production. Farmers voluntarily form and/or join an ASA as a means of receiving special consideration with regard to regulations, nuisance complaints, and conflicting land uses.

The ACE purchase program allows counties to use specific state-issued farmland preservation funds to purchase development rights. Qualifying farms must be part of an existing ASA and are rated on the basis of soil quality, proximity to other farms, and other criteria. Once a farm is in

easement, agricultural production must continue every year thereafter, with no new structure permitted except farm accessory buildings. Act 319 provides a means by which landowners whose property meets one of three qualifying uses (farming, forest, or water supply/open space) to have their property assessed, for tax purposes, on the basis of its use rather than on the basis of its fair market value.

Based on review of the Monroe County parcel data, there are no ASA or ACE properties located within the Project Study Area. All seven of the agricultural properties are Act 319 properties. These agricultural preserved lands are illustrated on **Figure 3-8**.

3.1.2 Communication/Transportation/Utilities

Monroe County includes only railroad and airports under transportation land use, and not roadways, which are reviewed in **Section 3.2.1**. There are no active railroads or airports present within the Project Study Area. The closest airport is Pocono Mountains Municipal Airport, which is located approximately 1.5 miles northeast of the Project Study Area. The remaining areas of communication/transportation/utilities are PPL transmission line substations, a FedEx freight location, Commonwealth Telephone Company buildings, Transcontinental Gas Pipe Line Corporation buildings, and a cell tower.

3.1.3 Private/Public Parks and Recreation Facilities

There are no federal or county parks within the Project Study Area. The 15,990-acre Hickory Run State Park is located in the southwestern corner of the Project Study Area. The 26,000-acre State Game Land #127, 3,500-acre State Game Land #129, and 870-acre State Game Land #318 are all located within the Project Study Area. There are other significant areas of public open spaces within the Project Study Area including those owned and maintained by Deer Run Corporation, Pocono Heritage Land Trust, Pocono Manor Investors, The Nature Conservancy, and Wildlands Conservancy. There are also four golf courses present within the Project Study Area boundary. These lands account for 24% of the total Project Study Area.

3.1.4 Educational Services

Three public schools, Pocono Mountain West High School, Pocono Mountain West Junior High School, and Tobyhanna Elementary School, are located in the central eastern portion of the

Project Study Area. There is also a private day care center along State Route (SR) 940 near Lake Naomi. The project study area is within three school districts; the Pocono Mountain School District, Weatherly Area School District, and Jim Thorpe Area School District.

3.1.5 Forest

Forests are a land use/cover type that range from large uninterrupted areas of undeveloped wooded land typically associated with private conservation and real estate entities, to smaller forested areas associated with local residential development that often indicates the presence of steep slopes, rocky soils, or wet areas that could not be developed. Cumulatively, these forested areas account for 35% of the Project Study Area. This category does not include forested areas that are associated with public or private parks or recreation facilities, which are discussed in **Section 3.1.3**.

The largest parcels of forest cover found within the Project Study Area are associated with The Nature Conservancy, Pocono Lake Preserve, Pocono Manor Investors, and Blue Ridge Real Estate Company.

3.1.6 Government Services

Government services within the Project Study Area are spread throughout the region and include the Bethlehem Authority, Tobyhanna Township Board of Supervisors, The Monroe County Municipal Waste Management Authority, The Tobyhanna Township Volunteer Fire Company, the Commonwealth of Pennsylvania, Evangelical Press Building, and the Pocono Mountain Police Commission.

3.1.7 Industrial

There are very few industrial lands within the Project Study Area making up less than 1% of the total area. These lands are owned by a variety of companies including Haines and Kibblehouse Inc. and Monroe County Milk Producers.

3.1.8 Residential

Residential land use, which is composed primarily of single-family residences and vacation rental homes, is a primary land use cover type accounting for 20% of the Project Study Area and. Much of the residential development has occurred within the past 30 years. The majority of the

residential land use is contained within communities centered on the abundant lakes in the region. These communities include Lake Naomi Estates, Emerald Lakes, Pocono Lake Preserve, Split Rock, and Pocono Pines. Also within the Project Study Area are the residential communities of Blakeslee Estates, Wagners Forest Park, Fawn Ridge Estates, Camelot Forest, and Little Summit.

3.1.9 Retail Trade & Hotels

Commercial land use occurs primarily as retail development along SR 940 across the Project Study Area. The highest density of commercial development is in the community of Blakeslee at the intersection of SR 940 and SR 115. Otherwise, most of the commercial sites are situated along SR 940 and include restaurants, hotels, automotive service stations, and a variety of specialty shops.

3.1.10 Resorts and Group Camps

The Inn at Pocono Manor is a four-season resort located within the Project Study Area. Camp Minsi, a 1,200 acre Boy Scout Camp, is located near the Lake Naomi Substation and Camp Mosey Wood, a 425 acre Girl Scout Camp, is located near the Lake Harmony Substation.

3.1.11 Services

Service related land uses identified within the Project Study Area include banks, real estate offices, churches and cemeteries. As with the commercial development, most of these features are concentrated along SR 940. There are nine churches and one cemetery within the Project Study Area.

3.1.12 Vacant

Vacant lands are scattered throughout the Project Study Area and are associated with a wide variety of land cover types and parcel sizes. For example, numerous small parcels (1 to 2 acres) within residential developments are noted as vacant if they are not yet developed. Similarly sized parcels within the commercialized areas along SR 940 are also noted as vacant if unoccupied. Larger parcels of forested or meadowland, ranging from 10 – 200 acres, are also classified as vacant.

3.2 Linear Infrastructure

The linear infrastructure present in the Project Study Area includes roadways, railroads, and existing transmission corridors. All of these features are illustrated in **Figure 3-11** and discussed below.

3.2.1 Roadways

As noted in **Section 3.1.2** (Communication/Transportation/Utilities), the Monroe County transportation land use designation does not include roads. The primary roadway systems within the Project Study Area are I-80 (east to west) and I-380 (north to south). I-380 branches off I-80 just south of the Project Study Area. Remaining road networks are comprised of numerous multiple-lane state routes (SR 115, SR 314, SR 423, and SR 940), numerous local roads, residential streets, and unpaved forest roads.

3.2.2 Railroads

There are no active railroads present within the Project Study Area. An abandoned railroad corridor bisects the Project Study Area from southeast to northwest. Portions of the railroad alignment are used by the existing Lake Naomi 138/69 kV Tap and Lake Naomi-Wagners 138/69 kV Tie transmission line, specifically in Little Summit and near Pocono Lake.

3.2.3 Transmission Line Corridors

Power transmission corridors located within the Project Study Area consist of 138/69 kV lines owned by PPL Electric. Transmission corridors include the Lake Naomi 138/69 kV Tap, the Lake Naomi-Wagners 138/69 kV Tie, and the East Palmerton – Wagners 138/69 kV line.

3.2.4 Other Utility Corridors

There are two gas pipelines within the Project Study Area. The first, owned by Transcontinental Gas Pipe Line Corporation, enters the Project Study Area in the northwest corner and heads southeast across and from the Project Study Area. The other pipeline is owned by UGI Utilities and enters the Project Study Area on the western edge near Jack Frost Substation and heads generally northeast across the Project Study Area before leaving near Warnertown.

3.3 Historic, Cultural, and Archaeological Resources

A review of the cultural resources within the Project Study Area is required by various state agencies to ensure their preservation. A desktop survey of existing historic structures and archaeological resources within the Project Study Area was conducted by accessing the Pennsylvania Historical and Museum Commission's (PHMC) Bureau of Historic Preservation's Cultural Resources Geographic Information System (CRGIS) to review available information on historic structures, archaeological surveys, and previously recorded archaeological sites. This was accomplished by drawing a polygon in CRGIS approximating the limits of the Project Study Area and capturing all data contained within that polygon in the form of spreadsheets generated by CRGIS (PHMC 2013).

3.3.1 Historic Architecture

Four National Register of Historic Places (NRHP)-listed or –eligible historic properties were identified in the Project Study Area (**Figure 3-12**). Historic properties are defined as historic districts, buildings, structures, objects, and sites. There are two historic districts in the Project Study Area: Pocono Manor Historic District, NRHP-listed (PHMC Key No. 104015) and Stoddartsville Historic District, NRHP-eligible (PHMC Key No. 082615). Pocono Manor Historic District reflects the early-20th century resort industry in the Pocono Mountains and Stoddartsville Historic District was settled in the early-to-mid 19th century as a milling center that later grew into a small resort. In addition, there are two historic buildings in the Project Study Area: Beaver Brook Girls Camp, NR-Eligible (PHMC Key No. 106029) and Blue Ridge Real Estate Building, NR-Eligible (PHMC Key No. 038817). The former was found significant as an example of a c. 1900 camp and the latter was found significant for its Colonial Revival-style architecture.

In addition to the NRHP-listed or –eligible resources, there are approximately 27 historic properties in the Project Study Area whose historic status is considered undetermined by PHMC. A status of undetermined indicates that the historic data that is on file with PHMC does not include an indication of National Register eligibility status. Such resources may or may not be eligible for the NRHP. The undetermined properties encompass a variety of dwellings, churches, and schools.

In general, throughout the 19th century, the Project Study Area did not experience much development beyond limited settlement along the rivers and major creeks and at crossroad villages. Settlers were drawn to these locations by early industries, such as milling, lumbering, maple sugar harvesting, and ice harvesting. By the late-19th century, numerous railroads crossed the Project Study Area, primarily to link the anthracite region to the northwest with markets in Philadelphia and New York. The coming of the automobile in the early 20th century spurred the resort industry and resulted in an improved road system and isolated resort developments. The second half of the 20th century saw concentrated residential development in the form of vacation homes around Lake Harmony and Lake Naomi.

3.3.2 Archaeology

The Project Study Area is within the Delaware River watershed, and the major drainages running through it are Tobyhanna Creek and Upper Tunkhannock Creek. Nearly a dozen archaeological surveys were done within the Project Study Area between the years 1979 and 2006, but large portions have not been studied. Most of the surveys occurred on the south side of SR 940, along Tobyhanna Creek at the west end of the Project Study Area, and within the inundated valley of Tobyhanna Creek that is now Pocono Lake. Most of the surveys failed to identify any archaeological sites. The major exception is the 1980s survey for the then-proposed Francis E. Walter Dam, which identified 12 sites along the Lehigh River, all of which are located to the west of the current Project Study Area. A survey in the mid-1980s for the Transco transmission line that runs northwest to southeast through the west end of the Project Study Area identified three sites (two of which are within the Project Study Area). Survey in Kidder Township (circa 2000) for a wetlands mitigation project at the southwestern end of the Project Study Area identified two archaeological sites.

In all, 25 archaeological sites have been identified within the Project Study Area, most of which cluster along Tobyhanna Creek, both at the western end of the Project Study Area and within Pocono Lake. Site types include a historic-period domestic site, a farmstead, several historic sites of unknown function, prehistoric open habitation sites, a lithic reduction site, and two prehistoric sites of unknown function. Most of the prehistoric sites are located on floodplains, though there are sites on a stream bench, terraces, upland flats, and upper slopes. Almost 90% of the sites for which data are available are located within 200 feet or less of water.

None of the recorded sites are listed on the National Register of Historic Places (NRHP). Most of the sites have not been evaluated for NRHP significance. One exception is the historic-period farmstead, which has been determined not eligible in an opinion rendered by the State Historic Preservation Office (SHPO). Three of the prehistoric sites were considered eligible by their submitters and one historic domestic site was considered not eligible by its submitter, but no opinions have been rendered on these sites by SHPO. The remaining sites produced insufficient data to determine National Register eligibility.

The Project Study Area encompasses areas of high, medium, and low sensitivity for pre-contact and historic-period archaeological resources. In general, pre-contact period habitation sites tend to be located within close proximity of a water source while historic-period archaeological sites tend to occur along roadways or at the end of farm lanes extending back from public thoroughfares. In many cases, historic architectural resources also contain an archaeological component

3.4 Local Zoning and Comprehensive Plans

Local zoning ordinances have been adopted in five of the six (none found for Mount Pocono Borough) municipalities located within the Project Study Area. Generally, these ordinances are used to guide future land use in the townships by encouraging development of desirable residential, commercial, agricultural, and industrial areas with appropriate groupings of compatible and related land uses. The various zoning districts outlined in these ordinances reflect the diverse land use character of the region, which consists of dense residential and industrial centers that transition to large areas of rural open space and forest cover. Ordinances defining the allowances and restrictions associated with the various zoning districts typically identify "Essential Services", which include distribution, transmission, or collection systems associated with utilities such as water, gas, and electric, to be conditionally exempt from local regulations, as long as the required actions are approved by the Pennsylvania Public Utility Commission (PUC). In townships that lack local zoning ordinances, specifically Mount Pocono Borough (Monroe County), county-level land use regulations regarding subdivision and land development supervene.

The townships in Monroe County are included in the *Monroe County Comprehensive Plan: Monroe 2020 (Monroe 2020)* developed by the Monroe County Commissioners and Planning

Commission (MCPC); conversely, Carbon County is developing a draft comprehensive plan that has not yet been adopted. In general, comprehensive plans review the assets and pressures within the county and provide guidance for future development and preservation; they are not intended to regulate and have no official authority. According to *Monroe 2020*, the most basic function of a comprehensive plan is "*planning for future economic development and environmental conservation in Monroe* (MCPC 1999)."

In addition to a comprehensive plan, Monroe County has also developed an open space plan, which identifies natural resources within the county and provides strategies for protecting and restoring the environment while increasing opportunities for ecologically sensitive public recreation and education. These ideals are issued by the Monroe County Open Space Advisory Board (MCOSAB) in the *Monroe County Open Space Plan*. Aside from providing a review of the natural resources and enhancement opportunities within the county, the plan was also written "to guide land use, set priorities for open space funds, and provide municipalities with a consistent countywide vision to aid them in local open space planning (Monroe County Open Space Plan 2001)." A similar document, *Top of the Mountain Open Space & Recreation Plan*, was developed at the township level for Coolbaugh, Tobyhanna, and Tunkhannock Townships (Coolbaugh, Tobyhanna, and Tunkhannock Townships 2000).

Monroe 2020 indicates that the surrounding region has been experiencing one of the highest growth rates in Pennsylvania. *Monroe 2020* specifically notes that the population growth over the past decades has been a "*combination of further Metropolitan in-migration and natural increase as county residents form new households and have children* (MCPC 1999)." The comprehensive plan outlines a series of goals for the county and townships as well as an action plan of how to address these goals. These goals include promoting intergovernmental cooperation, updating municipal ordinances, and introducing new administrative action for the protection, preservation, development and enhancement of environmental, agricultural, transportation, economic and community resources. Some of the short-term measures listed to attain these goals include development of a regional water system network, organization of town meetings on community issues, inventory of environmental features that merit preservation.

One theme prevalent in the comprehensive plans is the development of an improved working partnership between the county government and associated municipalities. This is particularly

critical for municipalities that are experiencing increased growth, where land use regulations requiring development to recognize and protect the natural resources are needed. Monroe 2020 notes that one of its key goals is to "*encourage multi-jurisdictional planning and zoning activity (aided by the County) and joint jurisdictional agreements in planning, zoning, and operation of services to form the basis of plan implementation* (MCPC 1999)."

As a result of this initiative, many of the townships within Monroe County have developed or updated municipal zoning ordinances to provide more guidance to local growth and protection of the environment. Some townships have also worked jointly with adjacent townships to develop multi-municipal comprehensive plans (**Table 3-6**). For example Coolbaugh Township, Tobyhanna Township, Tunkhannock Township, and the Borough of Mount Pocono have worked together to develop the *Regional Comprehensive Plan* (Coolbaugh, Tobyhanna, and Tunkhannock Townships 2005). Similarly Pocono Township has coordinated with neighboring municipalities Hamilton Township, Stroud Township and Stroudsburg Borough to develop the *Multi-Municipal Comprehensive Plan* (Hamilton Township, Stroud Township, Pocono Township, Stroudsburg Borough 2005).

Table 3-6: Summary of Zoning and Comprehensive Plans

Township	Zoning	Comprehensive Plans
Carbon County		
Kidder Township	Zoning Map and Ordinances (1991)	• Kidder Township Comprehensive Plan (2012)
Monroe County		
Coolbaugh Township	Zoning Map (2004) and Ordinances	• Monroe County Comprehensive Plan: Monroe 2020 (1999) • Regional Comprehensive Plan (2005)
Mount Pocono Borough	NONE	• Monroe County Comprehensive Plan: Monroe 2020 (1999) • Regional Comprehensive Plan (2005)
Pocono Township	Zoning Map (2003) and Ordinances	• Monroe County Comprehensive Plan: Monroe 2020 (1999) • Multi-Municipality Comprehensive Plan (2005)
Tobyhanna Township	Zoning Map (2004) and Ordinances	• Monroe County Comprehensive Plan: Monroe 2020 (1999) • Regional Comprehensive Plan (2005)
Tunkhannock Township	Zoning Map (2004) and Ordinances	• Monroe County Comprehensive Plan: Monroe 2020 (1999) • Regional Comprehensive Plan (2005)

3.5 Proposed Development

The U.S. Census Bureau reports that the populations in both Carbon and Monroe Counties have increased between 2000 and 2010 (**Table 3-7**). Based on the 2010 Census, the population of Carbon County has risen by 11% and the population of Monroe County has risen by 22.5%. Based on this growth pattern, proposed development within the Project Study Area is anticipated to increase (US Census 2010).

Table 3-7: County Population Change (2000-2010)

County	Census 2000	Census 2010	Percent Change
Carbon	58,802	65,249	+11.0%
Monroe	138,687	169,842	+22.5%

Upon review of the County Parcel Data, areas have been identified where land has been subdivided for future residential development. One such location is in Blakeslee Estates located on the north-side of Route 940. In addition to these proposed development areas, there are many vacant parcels in existing residential developments that have the potential for future home construction.

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Attachment 4

ATTACHMENT 4
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
ALTERNATIVES AND SITING ANALYSIS

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LIST OF ACRONYMS

Acronym	Definition
ALTP	Arrowhead Lake Tap Pole
CWF	Cold Water Fishery
DEM	Digital Elevation Model
EPRI	Electric Power Research Institute
EV	Exceptional Value
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GTC	Georgia Transmission Corporation
HQ	High Quality
I	Interstate
JF	Jack Frost Substation
kV	Kilovolt
LH	Lake Harmony Substation
LN	Lake Naomi Substation
LNTP	Lake Naomi Tap Pole
LP	Long Pond Substation
MF	Migratory Fishery
MPC	Municipality Planning Codes
NAI	Natural Area Inventory
NHS	National Historic Site
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PennDOT	Pennsylvania Department of Transportation
PEM	Palustrine Emergent
PFBC	Pennsylvania Fish and Boat Commission
PFO	Palustrine Forested
PNHP	Pennsylvania Natural Heritage Program
PPL Electric	PPL Electric Utilities Corporation
PSS	Palustrine Scrub/Shrub

Acronym	Definition
ROW	Right-of-Way
RTE	Rare, Threatened, and Endangered
TNC	The Nature Conservancy
UNT	Unknown Tributary
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
W	Wagners Substation
WWF	Warm Water Fishery

1.0 OVERVIEW OF SITING ANALYSIS

PPL Electric Utilities Corporation (PPL Electric) seeks approval from the Pennsylvania Public Utility Commission (Commission or PUC) to rebuild the 138/69 kV transmission line connections between four existing 69-12 kV substations (Lake Harmony, Jack Frost, Wagners, and Lake Naomi), two existing Tap Pole locations (Arrowhead Lake Tap Pole and Lake Naomi Tap Pole), and a new substation (Long Pond 69-12 kV Substation), which are located along the existing 138/69 kV alignment between the Lake Harmony 69-12 kV Substation and the Lake Naomi Tap Pole (Lake Harmony-Lake Naomi 138/69 kV Rebuild Project). The existing transmission line between the Lake Harmony 69-12 kV Substation and the Lake Naomi Tap Pole currently extends for a total of 24.47 miles across the following segments:

- 3.55 miles between the Lake Harmony 69-12 kV Substation and the Jack Frost 69-12 kV Substation,
- 2.72 miles between the Jack Frost 69-12 kV Substation and the Arrowhead Lake Tap Pole,
- 5.69 miles between the Arrowhead Lake Tap Pole and the Wagners 69-12 kV Substation,
- 7.52 miles from the Wagners 69-12 kV Substation to the Lake Naomi 69-12 kV Substation,
- 2.01 miles between the Lake Naomi 69-12 kV Substation and the proposed Long Pond 69-12 kV Substation, and
- 2.98 miles between the proposed Long Pond 69-12 kV Substation and the Lake Naomi Tap Pole.

As explained in **Attachment 2 (Necessity Statement)**, the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project is necessary to resolve projected violations of PPL Electric's "Reliability Principles & Practices" (RP&P) guidelines.

This Attachment describes the methodology used by PPL Electric and URS Corporation (URS) to identify alternative transmission routes (Alternative Routes) and to select the proposed transmission line route (Selected Route) for this Project. The data used in this siting study fall into three broad categories: (1) built environment (land use/cultural); (2) natural environment (ecological): and (3) engineering consideration (engineering design and constructability). Data were obtained from a variety of sources including federal,

state and local Geographic Information System (GIS) databases; field reconnaissance surveys; public agencies; published documents; and other publicly available sources.

The Siting Team was composed of technical experts engaged with transmission line siting, design, and construction, as well as experts in the fields of environmental assessment, permitting, and public outreach. The Siting Team undertook an extensive siting study to identify and evaluate potential alternative routes for the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project. The detailed siting study involved several sequential steps.

The first step identified major opportunities and constraints within the region to establish a Project Study Area. This included extensive background research regarding the overall environmental setting of the Project Study Area, the results of which are described in **Attachment 3 (Environmental Setting)**. The second step of the process identified Alternative Corridors within the Project Study Area. The third step developed the Alternative Routes. These alternative routes provide the necessary substation connections, minimizing potential social, cultural, and natural environment impacts, while still being technically feasible to construct.

The fourth and final step involved both a quantitative and qualitative analysis to determine a Selected Route. The quantitative evaluation scored and ranked the Alternative Routes according to certain selected criteria (described in **Section 2.0**). The qualitative evaluation incorporated the professional judgment of the Siting Team to identify the Selected Route. The qualitative evaluation is an essential step in the selection process because not all criteria can be counted and scored. For example, permitting requirements will be different for alternative routes that cross Exceptional Value (EV) streams or major highways compared to potential routes that avoid these specific features. Similarly, community concerns will vary between the different alternatives based on their proximity to residential neighborhoods, socially sensitive areas, or public open spaces. Qualitative evaluations such as these provide essential insight into the determination of the Selected Route.

The ultimate goal of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study was to identify an overhead electric transmission line alignment that minimizes the

impact to the built and natural environments to the maximum extent practicable, while meeting the functional requirements and maintaining the technical and economic viability of the Project.

1.1 Overview of Quantitative and Qualitative Siting Methodology

The framework used for this siting study is based on the process developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC), which incorporates GIS technology, statistical evaluation, and professional judgment into the decision-making process. The approach formalizes many of the methods and principles used in the industry and by consultants, including URS, over the last several years. It was developed with collaboration and feedback from utility companies; federal, state and local government agencies; and other key stakeholders, such as private landowners. The process was tested and calibrated against previously approved transmission line siting projects that have been successfully completed. A review of the methodology used for this siting study is included in this section. A full discussion of the EPRI-GTC Siting Methodology can be found in the report entitled *EPRI-GTC Overhead Electric Transmission Line Siting Methodology* (EPRI-GTC 2006).

The siting methodology used for determining the Selected Route for the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project was adapted from the EPRI-GTC protocol. The siting method consisted of four fundamental phases:

1) **Generate Macro Corridors:** Macro Corridors were developed to define the outer edges of the Project Study Area from within the larger regional context.
2) **Generate Alternative Corridors:** Alternative Corridors most suitable for transmission line development within the Project Study Area were generated from four perspectives: (i) protection of the built environment, (ii) protection of the natural environment, (iii) engineering considerations, and (iv) a composite of these three.
3) **Generate Alternative Routes:** Alternative Routes most suitable for transmission line alignment were generated within the Alternative Corridors.
4) **Determine Selected Route:** A Selected Route was determined based on the quantitative and qualitative assessment of the Alternative Routes by the Siting Team.

The following sections provide a general discussion of these four phases.

1.2 Overview of Phase I – Macro Corridor Generation

Macro Corridor analysis began after the general start and end points of the new transmission line were established, i.e. the substation locations. The first step in the Macro Corridor development process included the creation of a land use/land cover GIS database to identify some of the key opportunity and constraint areas traditionally reviewed as part of a siting study. Opportunity areas include paralleling or rebuilding existing utility corridors, paralleling primary or secondary roads, or crossing open and undeveloped land.

The next step identifies Avoidance Areas, which, as a general rule, are excluded from the analysis as being viable areas to site a new transmission line. These Avoidance Areas represent features that have typically been identified as requiring maximum protection from a development perspective or represent a significant physical barrier that would be impractical to cross. Examples of these areas include: high/medium density residential areas, federal- or state-listed historic structures or districts, wildlife refuges, mines and quarries, national or state parks, church or cemetery parcels, airports, and military facilities. While it is typical to try to avoid these features, project specific circumstances may require that locations including these features be included in the analysis; for example if an existing transmission or utility corridor already crosses one of these avoidance features then it may be considered a potential option.

A GIS map of the regional area is then created using commercially available land use, land cover data and other feature data including road networks, terrain, and existing transmission line alignments. A Composite Suitability Surface Map, a map composed of these suitable land types, is then developed. The map is comprised of a grid of cells with an assigned value indicating cell areas which are suitable for a transmission line (an opportunity) or less suitable (a constraint). In the next phases of the process, the same method is employed using a smaller cell size to increase data precision.

The quantitative analysis used a series of grid cells across the regional area. Values determined by EPRI-GTC through stakeholder input are assigned to each cell according to its primary use. A value was assigned representing, for example, an opportunity area such as open land or a constraint area such as a residential neighborhood. A "least

impact" corridor was identified by the mathematical addition of the values assigned to each cell between the start and end points. Opportunity areas were assigned low numbers, and constraint areas were assigned a high number. Therefore, the corridor with the lowest value or "least impact" is the corridor or path with the least potentially adverse impacts.

The features of each cell (*e.g.*, commercial land use, transmission line rights-of-way (ROW), agriculture, wetlands, steep slopes) were ranked from one (1), being the most suitable for transmission line development, to nine (9), which is the least suitable. A feature was considered suitable if a transmission corridor through it is possible with minimal adverse impact. An open pasture is an example of a feature that would be considered suitable. A feature was considered less suitable if a transmission line going through it could have adverse consequences. A wetland area is an example of a feature that would be considered less suitable.

Based on the numeric values assigned to each feature, a composite suitability surface was created. This composite suitability surface was used to produce a series of potential broad corridor areas for the following three scenarios:

- Opportunities for rebuilding or paralleling existing transmission lines and other linear features.
- Opportunities to parallel existing road ROWs.
- Opportunities to cross undeveloped land.

The first two corridor scenarios represent corridor sharing opportunities, by paralleling existing linear features such as existing transmission lines, natural gas pipelines, or town and local roads. Corridor sharing is usually encouraged since it minimizes impacts by:

- Reducing the amount of new ROW required
- Concentrating linear land uses and reducing the number of new corridors
- Creating an incremental, rather than a new impact

The third scenario looks at opportunities to cross undeveloped areas. These undeveloped areas are often further away from residential and other human development areas and may include for example, forested areas or agricultural fields. Crossing these areas while

implementing best practices such as careful pole placements typically allows for a reduced impact in areas where corridor sharing opportunities are absent or limited.

The Macro-Corridor process determined the corridor across the suitability surface that minimizes the sum of the values within that corridor. Corridors with the lowest sums have the highest overall suitability. Corridors with a larger suitability sum were considered less optimal.

The lowest sum areas, *i.e.*, the preferred transmission line development areas, were identified as scenario-specific Macro Corridors. After the most suitable scenario-specific Macro Corridor was identified for each of the three scenarios identified above, the three corridors were merged together into a final combined Macro Corridor area. The outer boundaries of the Macro Corridor areas defined the Project Study Area. This Project Study Area provides a refined and focused area in which to acquire more detailed data sets for analysis. The process achieves this by using a GIS based siting method to define the project boundary. This focused Project Study Area represents the most practicable area in which to site the new transmission line.

1.3 Overview of Phase II – Alternative Corridor Generation

In Phase II, Alternative Corridors were generated through GIS analysis from within the Project Study Area based on the following four distinct perspectives:

1) *Built Environment Perspective* – protecting human and cultural resource areas by reducing potential Project conflicts with existing residential neighborhoods and other community-valued features.
2) *Natural Environment Perspective* – protecting plants, animals, aquatic, and other natural resources by minimizing the Project impact to ecological resources and natural habitat.
3) *Engineering Considerations Perspective* – maximizing co-location and minimizing cost and schedule challenges for the Project by seeking the shortest path or using existing ROW, while avoiding areas that pose significant construction obstacles, such as steep slopes or those used for unique agricultural practices.
4) *Simple Composite Perspective* – this perspective uses the same data as the other three, but offers equal consideration and weighting to the three perspectives noted above.

An assessment based on each of these four perspectives was conducted using GIS-based data, which are collections of similar information developed for organization and analysis. Similar, but more refined data, included with the Macro Corridors were used to establish each of the perspective-specific Alternative Corridors. Higher consideration was given to data aligned within each unique perspective. For example, the built environment assessment applied a higher weight to features related to building proximity and building density, whereas the natural environment evaluation applied a higher weight to floodplain and wildlife habitat features. Similarly, the engineering considerations assessment was based on linear infrastructure and slope features. The simple composite Alternative Corridor allows for direct comparison when equal weight is applied to the three primary considerations. The use of four perspectives allowed a comparison of the social, environmental, and engineering costs and benefits of the different Alternative Corridors.

1.4 Overview of Phase III – Alternative Route Generation

The next step in the process, determining the Alternative Routes within the Alternative Corridors, was accomplished by using GIS analyses to identify preferred paths or alignments within each of the Alternative Corridors. A summary of the process used to generate the Alternative Routes is presented below in **Section 2.3** of this Attachment, which provides project-specific detailed information on this process.

Generation of the Alternative Routes for the transmission line used similar data to that used in developing the Alternative Corridors; however, this effort was focused on identifying a single alignment rather than a broader corridor area. Additionally, focus is given to potential pole placement locations that seek to minimize impacts to the surrounding environment.

1.5 Overview of Phase IV – Selected Route Determination

To assess the advantages and disadvantages of the GIS-generated Alternative Routes, feature metrics -- or specific parameters measured for a particular feature (such as the number of residences within a given distance or number of stream crossings per route) -- were considered for each Alternative Route. These quantitative feature metrics were normalized, assigned relative weights, and organized within the three perspectives. The

metrics were normalized to provide a means to compare the data. Using a normalized 0-100 scale allowed the different data values to be mathematically combined and compared without being distorted by differences in measurement scale. Establishing these quantitative values allowed for overall scoring of each Alternative Route. Lower scores are preferred as they indicate potentially less impact along that route. The numerical score provides an objective reference for comparing each of the Alternative Routes.

The final aspect of the evaluation process was to apply expert judgment to rank the Alternative Routes. During this process, Siting Team members qualitatively assessed the Alternative Routes. The routes were then ranked based on several important considerations, such as visual concerns, community concerns, schedule delay risk, special permit issues, and construction, maintenance, and accessibility issues. This process encouraged thorough discussion by Siting Team members as they evaluated and selected the final Selected Route in an objective, consistent and comprehensive manner.

2.0 ALTERNATIVE ROUTE SELECTION PROCESS AND RESULTS

The goal of this siting analysis was to determine the most suitable transmission line route in which to construct a new 138/69 kV transmission line that will provide improved electrical connectivity between the Lake Harmony 69-12 kV Substation and the Lake Naomi Tap Pole, while still providing electrical service to the existing intermediate substations and tap poles including the Jack Frost 69-12 kV Substation, the Arrowhead Lake Tap Pole, the Wagners 69-12 kV Substation, the Lake Naomi 69-12 kV Substation, and the proposed Long Pond 69-12 kV Substation as shown in **Figure 3-1**. Providing 138/69 kV electrical services to these substations and tap locations was identified as a critical step toward resolving regional reliability concerns that make this Project necessary or proper, as described in **Attachment 2 (Necessity Statement)**. The siting analysis for this Project was divided into six segments based on the progression of the existing alignment that provides electrical connectivity between the following:

- Lake Harmony 69-12 kV Substation to Jack Frost 69-12 kV Substation,
- Jack Frost 69-12 kV Substation to Arrowhead Lake Tap Pole,
- Arrowhead Lake Tap Pole to Wagners 69-12 kV Substation,
- Wagners 69-12 kV Substation to Lake Naomi 69-12 kV Substation,
- Lake Naomi 69-12 kV Substation to Long Pond 69-12 kV Substation, and
- Long Pond 69-12 kV Substation to Lake Naomi Tap Pole.

The following sections describe the methodology used to determine the Selected Route for the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project. These sections include the methodology used to generate the Macro Corridors for each of the 138/69 kV segments, which are then collectively combined and used to define the Project Study Area for the entire length of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project (**Section 2.1**). These sections also describe the methodology used to generate Alternative Corridors for each segment (**Section 2.2**), the methodology used to generate Alternative Routes for each segment (**Section 2.3**), and a description of the Alternative Routes for each segment and their subsequent evaluation and selected route determination (**Section 2.4**).

2.1 Generating Macro Corridors and Defining the Project Study Area

The Project Study Area was defined using the progressive process described in **Section 1.1** of this Attachment. Project-specific avoidance areas are located on **Figure 4-1** and include the following:

- Buildings – including residential subdivisions (e.g., Lake Naomi Estates, Timber Trails, and Pocono Lake Preserve) and village centers (e.g., Blakeslee, Pocono Pines, and Little Summit.)
- Mines and Quarries – examples include the Pocono Manor Shale Pit quarry.
- National Register of Historic Places (NRHP)–listed Historic Structures or Districts – Stoddartsville Historic District.
- Non-spannable Water Bodies – examples include Arrowhead Lake, Lake Harmony, Lake Naomi, Pocono Lake, and Stillwater Lake.
- State Parks – Hickory Run State Park.

Portions of the existing transmission line ROW are located within the NHRP-listed Pocono Manor Historic District. For the purposes of this siting study, this specific historic area was not defined as an avoidance area. Other typical avoidance area categories such as airports, national parks, Federally-designated wildlife refuges, Federally-designated scenic rivers, state-designated Wild and Scenic Rivers, military facilities, superfund sites, and U.S. Forest Service Wilderness Areas are not present within the regional area.

The following data were used to create a composite suitability surface with each grid cell classified by its underlying land use:

- *Pennsylvania Land Use/Land Cover dataset* (PSU 2005) – This dataset identifies the land use (residential, commercial, agriculture) and land cover (forest, wetlands, and streams) based on the Anderson Land Use/Land Cover system (Anderson et al., 1976).[1]
- *U.S. Geological Survey* (USGS) *Digital Elevation Model* (DEM) *data* (USGS 2001) – identifies the topography in the regional area. This data was used to process and derive slope information. Slopes were classified into two types: slopes greater than or less than 30 degrees.

[1] This data is based on aerial photographs collected between 2003 and 2007.

- *Pennsylvania Department of Transportation* (PennDOT 2012) – identifies the roadways in the regional area. This data was used to identify Interstate (I), primary, and secondary roads.
- *Existing Transmission Corridors dataset from PPL Electric Utilities* (PPL Electric 2012) – identifies the existing transmission corridors within the regional area.
- *Gas Pipelines* (Platts POWERmap 2011) – identifies the location of existing gas pipelines.

The opportunity/constraint values assigned for the land use surface are provided in **Table 4-1**. Suitability surfaces were then developed and used to create **Macro Corridors** based on three potential scenarios:

- Rebuilding or paralleling existing transmission lines or ROWs.
- Paralleling existing transportation and other utility ROWs.
- Crossing undeveloped land.

Figure 4-2 illustrates each of the three Macro Corridor areas (Existing Transmission Line Macro Corridor, Transportation and Other Utilities Macro Corridor, and Undeveloped Land Macro Corridor) generated for each segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project. The outer extents of the segment-based, individual least-impact Macro Corridors were then combined to define the outer extent of the Project Study Area for the entire Project length. The resulting Project Study Area, shown in **Figure 4-3**, forms the basis for the collection and analysis of more detailed data that are used in the Alternative Corridor analysis conducted for each segment.

The process used in this study provides a quantifiable method for determining the Project Study Area. Traditional methods of defining study areas are sometimes criticized for the apparently arbitrary selection of features, such as nearby roads or rivers, to define the boundaries. The GIS siting tools used for this Project, however, work by effectively reviewing each individual composite surface to determine the areas that can be crossed with the least impact to the identified resources.

TABLE 4-1: Opportunity/Constraint Values* for Study Area Creation

Land Cover Classification	Source	X-Country[1]	Roads[2]	Existing Transmission Lines[3]
Open Water	PA LULC 2005	7	7	7
Urban	PA LULC 2005	9	9	9
Open Land	PA LULC 2005	1	2	2
Surface Mining / Rock Outcrop	PA LULC 2005	9	9	9
Forest	PA LULC 2005	1	2	2
Agriculture	PA LULC 2005	1	2	2
Wetland	PA LULC 2005	9	9	9
Transmission Corridors	PPL Data 2012	5	5	1
Other Utility Corridors	Platts POWERmap 2011	5	5	5
Interstate	PennDOT 2012	9	9	9
Primary Roads	PennDOT 2012	5	1	5
Secondary Roads	PennDOT 2012	5	1	5
Slopes > 30 degrees	USGS 10-meter DEM	9	9	9

*The Opportunity/Constraint Value system is based on a 1-9 scale, with a **rank of 1 being most desirable and a rank of 9 being least desirable.**

1- Route scenario where corridor would cross over undeveloped land

2- Route scenario where corridor would follow existing roadways

3- Route scenario where corridor would follow existing transmission line right-of-ways

(EPRI-GTC 2006)

2.2 Generating and Reviewing Alternative Corridors in the Project Study Area

Alternative Corridors were generated using the same GIS tools as the Macro Corridors, but relied on more detailed data from within the defined Project Study Area. Data added to the evaluation process included:

- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) wetlands are used to identify the location and type of potential wetlands (USFWS).
- 100-year floodplain boundaries are used to define the width of floodplain areas adjacent to major streams. Generally defined by the Federal Emergency Management Agency (FEMA), the specific boundaries for the Project Study Area were obtained through PADEP (PADEP 1996).

- Pennsylvania Department of Environmental Protection (PADEP) Chapter 93 stream classifications are used to illustrate classification status and determine associated levels of protection (PADEP 2012a).
- Tax parcel boundaries are used to define property edges to minimize bisecting a property (Carbon County Planning Commission 2012 and Monroe County Planning Commission 2012).
- Public land classifications (e.g., conservation easements, open space lands, agricultural easements) are used to identify the location and type of land preservation features.

Detailed data within the Project Study Area were used to generate four types of Alternative Corridors within each segment. These corridors were identified as being the most suitable for transmission line development from three distinct perspectives and a fourth that is a composite of the other three:

- Built environment.
- Natural environment.
- Engineering considerations.
- Simple composite – a combination of three perspectives using equal weighting.

As shown in **Table 4-2,** opportunity/constraint values were assigned in the form of feature rankings (yellow cells) and data layer weights (green cells) to the different siting criteria within each perspective. Although many of the values provided for these rankings and weights are from the original EPRI-GTC methodology, some values were refined with respect to specific features and layers. Refinements to the feature ranking values, described below in **Section 2.2.1**, were made by PPL Electric and URS technical experts in environmental, engineering, and public outreach disciplines to better represent conditions within the Project Study Area. Initial steps in this process involved the inclusion of state-specific features, such as priority natural areas and regulated stream classifications, into the appropriate data layer. Ranking values, which were based on the original EPRI-GTC values, were then assigned to these key resources to offer enhanced protection during the siting process. Weights, which are shown as percentages in **Table 4-2,** represent the associated level of influence assigned to each data layer. For example, under the natural environment perspective, the wildlife habitat data layer is given a high level of influence through the assignment of 36% weight, whereas the floodplain data layer, which is not considered as critical due to the ability to span most floodplains, was

given a 6% weight. These weights are used to make sure critical features are considered in the siting process, but that those features needing higher protection are afforded it. Using the previous example – it is important to consider floodplain areas in the analysis, but reducing impact on these features is typically possible with intelligent pole placement. If a transmission line has to cross an important habitat area however, it is usually more challenging to reduce impacts. Once the ranking and weighting values were defined, the data were then used as the basis to generate the Alternative Corridors for each segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project (**Section 2.2.2**).

TABLE 4-2: Opportunity/Constraint Values for Alternative Corridor Generation by Criteria Type

Built Environment		Engineering		Natural Environment	
Proximity to Buildings	**11%***	**Linear Infrastructure**	**80%**	**Floodplain**	**6%**
Background	1	Rebuild Existing Transmission Lines	1	Background	1
900-1200	2	Parallel Existing Transmission Lines	2	100-Year Floodplain	9
600-900	3	Parallel Road ROW	4	**Streams/Wetlands**	**21%**
300-600	4	Parallel Gas/Product Pipelines	4	Background	1
0-300	9	Background	5	Streams classified as CWF/WWF/MF/TSF + 100' buffer	6
Eligible NRHP Historic Structures	**14%**	Parallel Interstate ROW	8	PEM/PSS wetlands + 100' buffer	7
Background	1	Road ROW	8	HQ Streams + 150' buffer	8
900-1200	3			Wild Trout and EV Streams + 150' Buffer	8
600-900	4			Forested Wetlands + 100' buffer	9
300-600	5				
0-300	9				
Building Density	**38%**	**Slope**	**20%**	**Public Lands**	**16%**
0-0.25 Buildings/Acre	1	Slope 0-15%	1	Background	1
0.25-0.50 Buildings/Acre	3	Slope 15-30%	6	Conservation Lands - Open Space, Conservation Easements	5
0.50-1 Buildings/Acre	5	Slope >30%	9	State Game Lands	5
1-4 Buildings/Acre	7			State Forest	9
4-25 Buildings/Acre	9			**Land Cover**	**21%**
Proposed Development	**6%**			Open Land, Pastures, Scrub/Shrub	1
Background	1			Row Crops and Horticulture	2
Proposed Development	9			Developed Land	6
Spannable Lakes and Ponds	**4%**			Hardwood/Natural Coniferous Forests	9
Background	1			**Wildlife Habitat**	**36%**
Spannable Lakes and Ponds	9			Background	1
Land Divisions	**8%**			Important Birding Areas	2
Edge of Field	1			Potential Bog Turtle Habitat	3
Land Lots	8			Priority Natural Areas	9
Background	9				
Land Use	**19%**				
Undeveloped	1				
Nonresidential	2				
Residential	9				

Legend:

Perspective Categories
Layers
Layer Influence Percentages
Value
Features

NOTE: The Opportunity/Constraint Value system is based on a 1-9 scale, with **a rank of 1 being most desirable and a rank of 9 being least desirable**.

*An explanation of the ranks and weights are provided in Section 2.2

2.2.1 Project Specific Data

Environmental data specific to the Project Study Area were added to the analysis. Ranking values assigned to these features were based on the original EPRI-GTC methodology but refined based on input from PPL Electric and URS technical experts. These data included stream and wetland classifications, protective buffer definitions, potential bog turtle habitat, important bird areas, and The Nature Conservancy (TNC) identified Priority Natural Areas, as described below.

Streams

All streams in the Project Study Area were classified in accordance with Pennsylvania Code Title 25, Chapter 93: *Water Quality Standards*, which is coordinated and enforced by the PADEP (PADEP 2012a). Streams with the following classifications are found in the Project Study Area:

Aquatic Life Designations

- *Cold Water Fishery (CWF)* – Maintenance and propagation, or both, of fish species including the family Salmonidae and additional flora and fauna that are indigenous to a cold-water habitat.
- *Migratory Fishery (MF)* – Passage, maintenance, and propagation of anadromous and catadromous fishes and other fishes that move to and from flowing waters to complete their life cycles in other waters.

Special Protection Designations

- *High Quality Waters (HQ)* – Surface waters having quality that exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in or on the water by satisfying 25 PA Code § 93.4b(a).
- *Exceptional Value Waters (EV)* – Surface waters having quality that exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in or on the water by satisfying 25 PA Code § 93.4b(b).

Additionally, the Pennsylvania Fish and Boat Commission (PFBC) have devised several trout water classifications designed to provide additional recognition to the ecological value of specific streams. Trout water classification types identified within the Project Study Area includes:

- *Wilderness Trout Streams* – streams identified based upon the provision of a wild trout fishing experience in a remote, natural and unspoiled environment where man's disruptive activities are minimized. This option was designed to protect

and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams (PFBC 2012a).

- *Class A Wild Trout Streams* – streams that support a population of naturally produced trout of sufficient size and abundance to support a long-term and rewarding sport fishery (PFBC 2012b).
- *Wild Trout Waters (Natural Reproduction)* – stream sections that support naturally reproducing populations of trout. A wild trout stream section is a biological designation that does not determine how it is managed; therefore, these streams may also be stocked with hatchery trout by the commission (PFBC 2012c).

Activities within these wild trout waters have been assigned a seasonal restriction by the PFBC between October 1 and December 31. Stocked trout streams also a have a seasonal restriction of March 1 through June 15. Written approval from the PFBC is required to conduct work in these streams during these restricted time periods.

Further, Pennsylvania Code Title 25, Chapter 102: *Erosion and Sediment Control* states:

> *Riparian buffers consist of permanent vegetation that is predominantly native trees, shrubs and forbs along surface waters that is maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and separate land use activities from surface waters.*

Based on the Chapter 102 regulations, the minimum effective riparian buffer width is 100-feet from the edge of most streams (*i.e.*, those with CWF or WWF designations). A 150-foot-wide riparian buffer is recommended for special protection waters (*i.e.*, those with HQ or EV designations) (PADEP 2010b).

For this study, each of the stream classifications and associated buffer widths was assigned a specific ranking factor, with the most important waters assigned a more protective ranking value.

Wetlands

Wetlands within the Project Study Area are classified based on the Cowardin system (Cowardin et al., 1979). These classifications include:

- *Palustrine Emergent (PEM)* – these wetlands are characterized by erect, rooted, herbaceous hydrophytes not including mosses and lichens. These wetlands are

typically dominated by perennial plants that are present for the majority of the growing season.

- *Palustrine Forested (PFO)* – these wetlands are characterized by woody vegetation that is over 20-feet tall and normally include an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer.
- *Palustrine Shrub-Scrub (PSS)* – these wetlands are generally dominated by woody vegetation under 20-feet tall. These wetlands may represent a successional stage leading to a forested wetland and include shrubs, young trees, and trees or shrubs stunted due to environmental conditions.

Similar to the protection provided to streams, riparian buffers bordering wetlands reduce the potential degradation of water quality caused by the influx of pollutants and sedimentation. Unlike streams, wetlands are typically characterized by their physical composition (*i.e.*, such as PEM or PFO), not by their water quality.

For this study, all wetlands were assigned 100-foot buffers, the minimum effective buffer width according to the PADEP Chapter 102: Erosion and Sediment Control regulations.

Construction of transmission lines across wetlands designated as PEM or PSS is not anticipated to significantly impact them since the lines can often span these wetland types. However, development through wetlands designated as PFO would result in more impacts due to tree removal required in order to develop the ROW area. To minimize the impacts to this wetland type, a greater level of protection was provided to PFO wetlands.

Potential Bog Turtle Habitat

The bog turtle (*Glyptemys muhlenbergii*) is a federally threatened species of concern that is monitored by the USFWS. Preferred habitat for these reptiles is spring-fed wetlands that are composed of soft mud and emergent hydrophytic plants, such as rushes, tussock sedge (*Carex stricta*), and jewelweed (*Impatiens capensis*). It is important for their habitat to have an open canopy, because bog turtles spend a considerable amount of time basking in the sunlight. Although the exact locations of bog turtle populations are not known, the USFWS notes that they may be present only in the Monroe County portion of the Project Study Area. Bog turtle preference for PEM wetland habitats was acknowledged, and these wetlands, specifically in Monroe County, were provided a higher protective ranking value.

Important Bird Areas

As described in **Attachment 3, Section 2.1.6.6**, the Audubon Society has identified several Important Bird Areas (IBAs) that are located within the region. IBA #63 (Pocono Lake Preserve), which incorporates several TNC-identified natural areas and a significant portion of State Game Land #127, is located within central portion of the Project Study Area, and a portion of IBA #65 is located along the western perimeter. IBA #63 and #65 were assigned a more protective ranking value.

Priority Natural Areas

A Natural Area Inventory has been conducted for each of the six counties located within the Project Study Area. These reports were developed by TNC to document the location and importance of specific natural environments and the associated plants and animals that may be located at these sites. Many of these habitats are recognized by the Pennsylvania Natural Heritage Program (PNHP) as rare, and some of the plants and animals within these areas have been identified as species of special concern (rare, threatened, or endangered). Specific Priority Natural Areas within the Project Study Area are reviewed in **Attachment 3, Section 2.1.6.5**. These environmentally sensitive areas were assigned a more protective ranking value.

2.2.2 Review of Alternative Corridors

The data for each of the four perspectives, including the identified weighting factors, were evaluated using GIS analysis to identify the Alternative Corridors for each segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project (**Figure 4-3**). These Alternative Corridors then formed the optimal areas within which to identify Alternative Route alignments for consideration for each segment.

2.3 Generation and Evaluation of Alternative Routes in the Project Study Area

The third phase of the siting analysis was to generate several Alternative Routes for each segment within the Project Study Area (**Figure 4-4**). Several Alternative Routes were generated within the optimal area of the Alternative Corridors for each segment by using standard GIS analysis tools. To complete this task, more refined data were developed and existing data were supplemented to reflect a greater amount of detail. For example,

to avoid routing close to residences, a 100-meter (approximately 328-foot) protective buffer was created adjacent to all residential areas. Refinements made to ensure engineering feasibility are described in **Section 2.3.2**.

2.3.1 Selection of Alternative Route Alignments

Data used to develop the Alternative Routes were weighted in accordance with their importance or sensitivity, as described in **Section 2.2.1**. The Alternative Routes were developed from individual siting models that assessed the region associated with each segment. These segments specifically focused on the following areas:

- Between the existing Lake Harmony 69-12 kV Substation and the existing Jack Frost 69-12 kV Substation,
- Between the existing Jack Frost 69-12 kV Substation and the existing Arrowhead Lake Tap Pole,
- Between the existing Arrowhead Lake Tap Pole and the existing Wagners 69-12 kV Substation,
- Between the existing Wagners 69-12 kV Substation and the existing Lake Naomi 69-12 kV Substation,
- Between the existing Lake Naomi 69-12 kV Substation and the new Long Pond 69-12 kV Substation, and
- Between the new Long Pond 69-12 kV Substation and the existing Lake Naomi Tap Pole.

2.3.2 Engineering Adjustments to Alternative Route Alignments

Based on field observations and assessment of aerial maps, the initial Alternative Routes were modified to reflect more practical alignments within their segment of the Project area. Changes included:

- Straightening the proposed alignments in areas where the generated alignment was irregular (*e.g.*, zigzagged through open areas).
- Setting possible pole sites to minimize potential impact to environmental and sensitive land use features. A 1,000-foot distance was typically used as the longest possible distance for a span between transmission line poles.
- Setting possible pole sites in positions to effectively span some features (roadway intersections) or to make turns that avoid other features (dense development). These modifications were primarily implemented to avoid commercial and residential structures.

- Placing proposed alignments along the edge of open fields or undeveloped lots. These modifications were implemented to decrease the potential impact to either farming activities or potential development of commercial and residential activities.

2.4 Description and Evaluation of Alternative Routes per Project Segment

Descriptions of the resulting Alternative Routes, the subsequent quantitative and qualitative evaluation, and the determination of the Selected Route for each segment are described below.

- Alternative Routes for the Lake Harmony Substation-Jack Frost Substation Segment are reviewed in **Section 2.4.1** and illustrated in **Figure 4-5a**.
- Alternative Routes for the Jack Frost Substation-Arrowhead Lake Tap Pole Segment are reviewed in **Section 2.4.2** and illustrated in **Figure 4-5b**.
- Alternative Routes for the Arrowhead Lake Tap Pole-Wagners Substation Segment are reviewed in **Section 2.4.3** and illustrated in **Figure 4-5c**.
- Alternative Routes for the Wagners Substation-Lake Naomi Substation Segment are reviewed in **Section 2.4.4** and illustrated in **Figure 4-5d**.
- Alternative Routes for the Lake Naomi Substation-Long Pond Substation Segment are reviewed in **Section 2.4.5** and illustrated in **Figure 4-5e.**
- Alternative Routes for the Long Pond Substation-Lake Naomi Tap Pole Segment are reviewed in **Section 2.4.6** and illustrated in **Figure 4-5f.**

2.4.1 Lake Harmony Substation-Jack Frost Substation Segment (LH-JF)

Analysis of the Lake Harmony Substation-Jack Frost Substation Segment resulted in two Alternative Routes: Alternative Route A and Alternative Route B.

2.4.1.1 Alternative Route A

Alternative Route A is 3.55 miles (18,744 feet) in length and is the existing transmission line route between the Lake Harmony and the Jack Frost Substations.

- Starting at the existing Lake Harmony Substation, located in Kidder Township, Carbon County, Alternative Route A heads west for 0.07 miles (400 feet) before intercepting an existing transmission line ROW and heading northwest. The route heads northwest for 0.88 mile (4,657 feet) through undeveloped forest entering State Game Lands #129. The route then turns to the west for 0.40 mile (2,098 feet) exiting State Game Lands #129. From this point, the alignment turns to the north for 1.28 miles (6,758 feet). This section passes through a low-density residential neighborhood along Azalea Road, a forested corridor between the Camp Mosey Wood Girl Scout Camp, crosses Camp Moseywood Road, and traverses uplands and wetlands within the TNC-identified Mosey Wood Wetlands

and Lake Harmony/Big Boulder Lake Natural Areas. The route then travels behind homes located along Moseywood Drive for 0.16 mile (828 feet) to the northwest. At this point the route proceeds to the northeast for 0.20 mile (1,060 feet) traversing a residence lined segment of Moseywood Drive, which is also a main entrance to the Lake Harmony and Split Rock resort area. The alignment then travels for 0.20 mile (1,060 feet) to the north and crosses Interstate (I)-80 before angling for 0.31 mile (1,615 feet) northeast crossing SR 940, which is a primary arterial highway through this section of the Pocono Region that receives heavy local and seasonal traffic. From this point the proposed alignment makes a sharp turn to the northwest for 0.05 mile (268 feet) into the existing Jack Frost Substation, located within Kidder Township.

2.4.1.2 Alternative Route B

Alternative Route B is 3.14 miles (16,579 feet) in length.

- Exiting the Lake Harmony Substation, Alternative Route B proceeds 1.66 miles (8,766 feet) northwest through forested uplands and wetland within the Lake Harmony/Big Boulder Lake Natural Area. The route then follows the existing ROW north for 0.16 mile (837 feet) before turning to the northeast for 0.16 mile (838 feet). The proposed alternative then proceeds in a northerly direction for 0.24 mile (1,240 feet) crossing residential-lined Azalea Road and Moseywood Camp Road, traversing a wetland complex located within the Mosey Wood Wetlands Natural Area, and paralleling the west side of Moseywood Road through a low-density residential area. The line then angles to the northeast for 0.15 mile (816 feet), crossing a residence lined segment of Moseywood Road. From this point the alternative route proceeds north for 0.77 mile (4,082 feet) crossing I-80 and SR 940 and into the Jack Frost Substation.

2.4.1.3 Evaluation of Alternative Routes – LH-JF Segment

The Alternative Routes were evaluated and compared against each other to determine the Selected Route for this segment. Evaluation of the Alternative Routes included a combination of *quantitative analysis* based on weighted metrics, as well as a *qualitative review* by the Siting Team. This section describes the evaluation metrics, weighting procedures, and Siting Team analyses used to evaluate these two Alternative Routes and to determine the Selected Route for the Lake Harmony Substation-Jack Frost Substation Segment. The quantitative analysis included using weighted metrics to assess the potential impacts in accordance with the three perspectives (built environment, natural environment, and engineering considerations). The qualitative analysis performed by the Siting Team included an assessment of visual concerns; community concerns; risk of

schedule delay; special permit requirements; and construction, maintenance, and accessibility issues specific to each Alternative Route.

Evaluation Metrics

As described in the **Section 1.0** overview, the process for identifying the Selected Route involved quantitatively evaluating the advantages and disadvantages of the Alternative Routes per segment. Initial steps in this process required defining the metrics, or constraint data, to be used and then determining the values for each Alternative Route per segment for each metric. These data were summarized in tabular form organized by evaluation metrics for each of the Alternative Routes per segment, and by the three perspectives.

Evaluation metrics were used to factor detailed information on relative lengths, acres of easement, and Project-specific conditions into the selection process. For example, specific evaluation metrics included the number of homes within 300 feet of the route, acres of wetland crossings, and miles paralleling existing utility ROW. The metrics used for this evaluation process are shown in **Table 4-3**. The constraint data use a variety of scales/units, including acres, miles, and number of units. For instance, one Alternative Route may cross 100 linear feet of wetland, while another might cross 10 feet of wetland and be in close proximity to 100 houses.

The resulting constraint data were then normalized. Data normalization is required to allow meaningful comparison of the Alternative Routes using the quantitative values. Normalizing the data allows the underlying characteristic of the data to be compared by removing the units (miles, acres) associated with the various measurements. For each segment of the Project, data normalization was achieved by first comparing a single constraint value for a given Alternative Route within a segment against the same constraint values for the other Alternative Routes within that same segment. For example, the Alternative Routes with the lowest and highest potential wetland impacts were determined by comparing the range of wetland constraint values between the Alternative Routes. As an example, the number of wetland acres for the Lake Harmony Substation-Jack Frost Substation Segment ranges from 0.57 acre for **Alternative Route A** to 1.71 acres for **Alternative Route B**.

A normalization calculation was used to assign each Alternative Route a value based on a scale of 0 – 100. The Alternative Route with no impact or the lowest potential impact was assigned a value of 0 and the Alternative Route with the highest potential impact was assigned a value of 100; other Alternative Routes were assigned a value in between 0 – 100 based on their relative potential impact when compared to the lowest and highest scoring routes. This same process was used to assign a value on the 0 – 100 scale for all the metrics evaluated. **Table 4-4** provides a tabular summary of the raw metrics and corresponding normalized values for the two Alternative Routes identified for the Lake Harmony Substation-Jack Frost Substation (LH-JF) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study.

TABLE 4-3: Metric Definitions of Quantitative Criteria

Built Environment
School, Day Care, Church, Cemetery, or Park Parcels (within 1,000 feet): Identifies the number of areas where the Alternative Route would be within 1,000 feet of any of these sensitive land uses.
NRHP-Listed/Eligible Structures/Districts (within 1,500 feet): Identifies the number of historic structures or districts located within 1,500 feet of the Alternative Route.
Residences (within 300 feet): Residences located in close proximity to the Alternative Route.
Proposed Housing Developments (within 300 feet): Areas that have physical indications of new residential development located in proximity to the Alternative Route.
Commercial Buildings (within 300 feet): Structures in close proximity to the Alternative Route, including retail stores, restaurants, and service garages.
Industrial Buildings (within 300 feet): Structures in close proximity to the Alternative Route, including steel mills, power plants, or quarries.
Within Homes Curtilage: Identifies properties that contain residences that lie within 100-meters (328 feet) of or have their curtilage crossed by the proposed Alternative Route.
Natural Environment
Natural Forests: Acres of forest crossed by the proposed Alternative Route.
Stream/River Crossing: Number of streams that would be crossed by the proposed Alternative Route. Values based on GIS stream data. Smaller tributaries are often not identified in the GIS database, thus the actual number of crossings may be higher than indicated.
NWI Wetlands: Acres of potential wetlands that would be crossed by the proposed Alternative Route. USFWS NWI Wetlands were used as the basis of the analysis.
Floodplain Areas: Acres of floodplains that would be crossed by the proposed Alternative Route. Values based on GIS-mapped FEMA floodplains, as available in state databases.
Engineering Considerations
Miles of Rebuild within the Existing Transmission Line ROW (Inverted): Length of the proposed Alternative Route to be rebuilt within an existing transmission line ROW. These areas have fewer environmental and social impacts compared to developing completely new ROW,
Miles of Co-location with Existing Linear Utilities (Inverted): Length of the proposed Alternative Route to be built parallel to the ROW of an existing transmission line or other linear utility (i.e., water, gas, petroleum). These areas have fewer impacts compared to developing completely new ROW, but require additional coordination and may involve more engineering analysis to ensure safe co-location with the other utility.
Miles of Co-location with a Road or Railroad (Inverted): Length of the proposed Alternative Route adjacent to (within 100 feet) of roadways or railroads. These areas have easier access for construction and maintenance. Conversely, lines routed distant from these features have higher engineering constraints.
Number of Road and Railroad Crossings: Number of times the proposed Alternative Route crosses a public road or railroad alignment. These areas have engineering constraints due to height requirements.
Number of Turns Greater than 60 Degrees: Number of turns (angles) along the proposed Alternative Route greater than 60 degrees. Value provides insight into the engineering and cost aspect of the project because angles of this degree are complex to design and costly to build.
Number of Roads within 500 feet of Transmission Center Line (Inverted): Identifies the number of roads within 500 feet of the proposed Alternative Route centerline. Existing roads close to the alignment provide opportunities for easier and reduced access road development.
Estimated Total Project Costs: Values were estimated based on typical project-specific cost per mile and associated cost of new ROW property acquisition, if relevant. Estimates do not include licensing and permitting and other miscellaneous costs.

TABLE 4-4: Tabular Summary of Alternative Routes (LH-JF)

	METRIC/ROUTE	ROUTE A	ROUTE B
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	0	0
	Normalized		
	Number of NRHP Sites within 1,500 feet of ROW	0	0
	Normalized		
	Number of Residences within 300 feet of Transmission Center Line	6	11
	Normalized	0	100
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	0
	Normalized		
	Number of Commercial Buildings within 300 feet of Transmission Center Line	3	2
	Normalized	100	0
	Number of Industrial Buildings within 300 feet of Transmission Center Line	2	2
	Normalized		
	Number of Homes with Transmission ROW in Curtilage	0	0
	Normalized		
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	0.00	33.70
	Normalized	0	100
	Number of Stream/River Crossings	1	1
	Normalized		
	Acres of NWI Wetlands Areas Crossed	0.57	1.71
	Normalized	0	100
	Acres of FEMA 100-year Floodplain Crossed	0.00	0.00
	Normalized		
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	3.55	0.15
	Normalized	0	100
	Miles of Co-location with a Linear Utility (Inverted)	0.82	0.00
	Normalized	0	100
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00
	Normalized		
	Number of Road and Railroad Crossings	4	4
	Normalized		
	Number of >60 Degree Turns along Route	5	1
	Normalized	100	0
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	7	6
	Normalized	0	100
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$2,664,750	$3,102,950
	Normalized	0	100

2.4.1.4 Weighting Procedures

The normalized metric values derived from **Table 4-4** were further adjusted through a weighting process shown in **Table 4-5**. **Table 4-5** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment. Each of the perspectives was assigned a weighted percentage and the results were normalized to that percentage. The rationale and process for determining the assigned percentages for each perspective are described below.

The Siting Team reviewed the weight criteria and assigned weights based on their analyses. Weights developed from the EPRI-GTC Siting Methodology were used as starting point values for the following reasons:

- The EPRI-GTC weights were developed through significant outreach and collaboration between multiple stakeholders from utilities, government agencies, and the general public.
- They use established collaborative and statistical techniques in their determination.
- They were calibrated against successfully developed transmission line routes.

The ranking, weights, and features considered for analysis were assigned by the Siting Team to address specific Pennsylvania regulations and Project-specific features. For example, items within the natural environment matrix were modified to address protective measures recommended by state regulatory agencies for maintaining the ecological value associated with streams and wetlands.

As shown in **Table 4-5,** for the first step in the weighting process, a relative weight (percentage) was assigned to each specific metric. For example, proximity to *Residences* was assigned a weight of 30.0%, while proximity to *Industrial Buildings* was assigned a weight of 1.5%. This weighting ensures that the features requiring the most protection are assigned a higher relative influence for the ranking process. Relative weights for all the metrics within each perspective category must add up to 100%. The total of the weighted metrics within each perspective are summarized and illustrated on the line entitled "Total" at the bottom of the perspective (*e.g.*, **Alternative Route A** has a total of 3.50 for the built environment perspective).

In the second weighting process shown in **Table 4-5,** each total value was then applied against the assigned weight for the perspective, which was 33% for all three perspectives. The weighted metric total is provided on the line entitled "Weighted Total." The Weighted Total values for the entire process are summed at the bottom of **Table 4-5** on the line entitled "Sum of Weighted Total." The Sum of Weighted Total result effectively compares the cumulative impact of the Alternative Routes on the built and natural environment and shows which has the lowest cumulative impact while being technically feasible to construct from an engineering perspective.

TABLE 4-5: Weighted Metrics and Totals for Alternative Routes (LH-JF)

QUANTITATIVE CRITERIA	Weights	ROUTE A	ROUTE B
BUILT	**33.0%**		
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	0	0
Weighted			
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0
Weighted			
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	0	100
Weighted		0.00	14.00
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	0
Weighted			
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	100	0
Weighted		3.50	0.00
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0
Weighted		0.00	0.00
Number of Homes within Transmission Line ROW in Curtilage	**45.0%**	0	0
Weighted			
TOTAL	**100.0%**	3.50	14.00
WEIGHTED TOTAL		1.16	4.62
NATURAL	**33.0%**		
Acres of Natural Forests Crossed	**23.0%**	0	100
Weighted		0.00	23.00
Number of Stream/River Crossings	**30.0%**	0	0
Weighted			
Acres of NWI Wetlands Areas Crossed	**35.0%**	0	100
Weighted		0.00	35.00
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	0	0
Weighted			
TOTAL	**100.0%**	0.00	58.00
WEIGHTED TOTAL		0.00	19.14
ENGINEERING	**33.0%**		
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	0	100
Weighted		0.00	50.00
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	0	100
Weighted		0.00	20.00
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	0	0
Weighted			
Number of Road or Railroad Crossings	**5.0%**	0	0
Weighted			
Number of >60 Degree Turns along Route	**5.0%**	100	0
Weighted		5.00	0.00
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	0	100
Weighted		0.00	5.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	0	100
Weighted		0.00	7.00
TOTAL	**100.0%**	5.00	82.00
WEIGHTED TOTAL		1.65	27.06
SUM OF WEIGHTED TOTAL		**2.81**	**50.82**

2.4.1.5 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route A (2.81)** would produce significantly fewer impacts when compared to Alternative **Route B (50.82).**

2.4.1.5.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route B (4.62)** and significantly lower for **Alternative Route A (1.16)**. The built environment value for **Alternative Route B** was primarily affected by having the most houses (11) located within 300 feet of the proposed alignment when compared to **Alternative Route A** (6). **Alternative Route A** contained one more commercial building within 300 feet of the ROW centerline (3) than **Alternative Route B**, while both routes had an equal number of industrial buildings within 300 feet of the ROW centerline (2).

2.4.1.5.2 Natural Environment

Values for the natural environment metrics are lowest for **Alternative Route A (0.00)** because of its proposed construction entirely within the existing ROW. **Alternative Route B (19.14)** obtained a higher natural environmental value because of the significant forest clearing (33.70 acres) and impacts to NWI wetlands (1.71 acres) that would be associated with new ROW construction.

2.4.1.5.3 Engineering Considerations

Values for engineering metrics are highest for **Alternative Route B (27.06)** and lowest for **Alternative Route A (1.65).** Engineering values for **Alternative Route B** were influenced by the absence of co-location with the existing transmission ROW or other linear utilities, which led to having a higher overall cost relative to **Alternative Route A.** Engineering value metrics for **Alternative Route A** was affected by having more complex design (5 hard angle turns) relative to **Alternative Route B**.

2.4.1.6 Qualitative Assessment

The last phase in identifying the Selected Route for the Lake Harmony Substation-Jack Frost Substation Segment of the Project involved the Siting Team's qualitative assessment of the two Alternative Routes for this segment. In conjunction with the

review of the quantitative results, the Siting Team assessed the following five qualitative criteria for each alternative:

1) Visual concerns
2) Community concerns
3) Special permit issues
4) Construction, maintenance, and accessibility
5) Schedule delay risk

Each of these qualitative criteria was assigned a weight based on its significance within the scope of the Project as illustrated on **Table 4-6**. Siting Team members then assessed each Alternative Route based on these criteria, ranking each on a 1-5 scale, with one (1) indicating a low impact and five (5) indicating a high impact. A detailed discussion of the Siting Team considerations related to each of the five criteria is provided below.

TABLE 4-6: Siting Team Analysis of Qualitative Concerns (LH-JF)

Qualitative Criteria	Weights	ROUTE A	ROUTE B
Visual Concerns	15%	2	4
Weighted		0.3	0.6
Community Concerns	15%	2	4
Weighted		0.3	0.6
Special Permit Issues	20%	1	3
Weighted		0.2	0.6
Construction, Maintenance, and Accessibility	30%	1	3
Weighted		0.3	0.9
Schedule Delay Risk	20%	1	3
Weighted		0.2	0.6
TOTALS	**100%**	**1.30**	**3.70**

NOTE: The qualitative criteria are ranked on a scale of 1-5, with 1 indicating a low impact and 5 a high impact

2.4.1.6.1 Visual Concerns

The Siting Team noted that the greatest amount of potential visual concern will be generated by **Alternative Route B**. The proposed alignment will require new crossings of SR 940 and I-80 as well as three residential-lined roads. Additionally, the route will require construction of new ROW within a low-density residential neighborhood associated with Moseywood Road, Moseywood Camp Road, and Azaela Road.

Alternative Route A, which proposes construction only within existing ROW, may generate visual concerns where the route passes between the Mosey Wood Girl Scout Camp and the low-density residential areas noted for **Alternative Route B**. In general visual concerns associated with construction within existing ROW are not as great as visual concern associated with construction of new ROW.

Based on these items, the Siting Team concluded that the visual concerns generated by **Alternative Route B** would be relatively higher than concerns raised by the **Alternative Route A** alignment. **Alternative Route B** was therefore, assigned a moderately high visual concern value of 4, and **Alternative Route A** was assigned the moderately low value of 2.

2.4.1.6.2 Community Concerns

Some of the potential concerns that could be raised by the general community were proactively addressed during the initial siting process. During the quantitative analyses process (described in **Section 2.2.1**), specific avoidance areas and buffers were identified to guide the potential Alternative Routes away from high-density areas, as well as maintain required distances from residences, where practicable. The Siting Team reviewed the quantitative assessment and determined that it adequately accounted for these avoidance expectations.

The Siting Team noted that **Alternative Route B** would create concerns with the Lake Harmony community and Split Rock Resort regarding its passage over and along Moseywood Road, which is one of their main entrance ways. Additional concern would be raised by the routes passage near the low-density neighborhoods associated with Moseywood Camp Road and Azalea Road. Additional public concern regarding this proposed route involves new crossings of SR 940 and I-80 where the newly constructed transmission structures would be highly visible to the local population. **Alternative Route B** could also generate concern by environmental and conservation groups as new ROW is proposed within the TNC-identified Mosey Wood Wetlands and Lake Harmony/Big Boulder Lake Natural Areas.

Alternative Route A will involve construction within an existing ROW that is adjacent to the Girl Scout Camp and travels through the residential neighborhood located along

Moseywood Road, Moseywood Camp Road, and Azalea Road. Construction noise and traffic associated with this route may produce community concern, however construction within existing ROW usually generates less community concerns than those raised over development of new ROW. Additional issues over this route could be raised by environmental and conservation groups over construction within an existing ROW that is located within the Mosey Wood Wetlands and Lake Harmony/Big Boulder Lake Natural Areas.

The Siting Team concluded that the level of community concerns raised regarding the social and conservation aspects of the proposed routes would be highest for **Alternative Route B**, which was assigned a moderately high community concern value of 4. **Alternative Route A** would generate comparably less community concerns due to the use of existing ROW, and was therefore assigned a moderately low community concern value of 2.

2.4.1.6.3 Special Permit Requirements

Various types of permits may be required for developing a new transmission alignment or even when re-building transmission lines within an existing ROW. For example, in the Commonwealth of Pennsylvania, freshwater wetlands, open waters, and floodplains are regulated by the PADEP. Impacts on these features would require environmental permits from PADEP, whether related to the complex positioning of a new structure in a large wetland or simply spanning a small tributary.

Additionally, coordination would be required with local county conservation districts, in conjunction with PADEP, to acquire erosion and sediment control permits required under the federal National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The extent of NPDES permitting is determined by the water quality level of the receiving streams. HQ and EV designated streams require the highest level of protection.

In addition, issuance of compulsory federal and state permits usually requires compliance with agency-mandated evaluation of potential environmental or social features. This evaluation includes conducting detailed assessments of rare, threatened, and endangered

(RTE) species habitats, cumulative impact analyses, and/or studies on local cultural resources. Impacts to these features can require mitigation efforts that would need to be addressed prior to obtaining the necessary permits. Furthermore, permits may be required for social safety considerations involving route proximity to highways, airports, or railroad ROWs.

The Siting Team recognized that each of the alternatives would cross environmentally sensitive areas including mature forests, wetland complexes, and two TNC-identified natural areas. Quantitatively, **Alternative Route A** had the least environmental impact of the two alternative routes because of its use of existing ROW along the entire alignment. While this proposed alignment would be slightly longer than the other alternative it will require no forest clearing and have significantly less wetland impact than **Alternative Route B**. Though **Alternative Route A** will traverse a portion of State Game Lands #129, construction within existing ROW will minimize potential impact to public property. Conversely, **Alternative Route B** will require significant amounts of forest clearing to establish the proposed ROW and have a moderate level of wetland impact, thus will require a greater level of environmental analysis and effort relative to **Alternative Route A**.

The Siting Team further acknowledged that each alternative would cross one major highway (I-80), one state route (SR 940), and a similar number of smaller local roads. **Alternative Route B** was deemed to involve more complex permitting due to the need to create new highway crossings, which would increase its coordination effort with PennDOT for highway occupancy permits relative to **Alternative Route A,** which would utilize existing crossings.

The Siting Team concluded that **Alternative Route B** would generate a moderate level of special permit needs due to the environmental and PennDOT coordination that would be required for development of this alignment, and was therefore assigned a moderate special permit requirement value of 3. Because of the use of existing ROW for its entire alignment **Alternative Route A** was assigned a low special permit value of 1.

2.4.1.6.4 Construction, Maintenance, and Accessibility

Risk of schedule delay is directly related to the other qualitative criteria evaluated by the Siting Team. For example, negative community reaction, complicated ROW acquisition, required additional field studies for environmental permit clearance, and construction complexity can all result in delayed schedules. Many of the potential reasons for schedule delays along each of the Alternative Routes can be identified in advance. Some reasons for delay, however, may not be known until additional engineering studies have been completed and therefore may not be realized until later in the process.

The Siting Team considered the variables involved in constructing transmission lines, conducting mandatory routine maintenance of the facilities, and providing appropriate access to all of the required areas. Initial phases of transmission line construction require the use of various types of heavy machinery (bulldozers, cranes, and cement mixers) that need to traverse the landscape to the proposed monopole positions. These vehicles aid in clearing the forest, leveling access roads and footer/pad areas, digging footers or creating the concrete foundations, and erecting monopole structures. Typically, wire installation is conducted by hand, with construction personnel carrying lighter leader lines between monopoles and using small power equipment to pull the line taut and haul the heavier wire into place. This process often allows the lines to be strung over wetlands or stream valleys, thereby decreasing potential impacts to protected features and avoiding areas of steep slopes. Due to the ability to bypass certain complex areas between the monopoles, the access road system does not necessarily need to extend the entire length of the proposed alignment. This decrease in access road length also facilitates the permit process as it minimizes impacts to regulated areas by reducing stream and wetland crossings. The access road system would only need to ensure access to the monopole locations for routine inspections and maintenance requirements.

Siting Team concluded that construction of new ROW areas would be the key construction, maintenance, and access issue within this route segment. Construction of **Alternative Route B** would involve considerable development of new ROW through undeveloped tracts of forests and wetlands. The Siting Team noted that **Alternative**

Route A, constructed entirely within existing ROW, would be associated with the least construction, maintenance, and accessibility issues relative to **Alternative Route B**.

Based on the required length of new ROW traversing forested areas and wetlands **Alternative Route B** was assigned a moderate construction, maintenance, and accessibility value of 3. **Alternative Route A** was assigned a low value of 1 based on limited issues associated with using the existing ROW.

2.4.1.6.5 Risk of Schedule Delay

The Siting Team noted that schedule delay concerns for **Alternative Route B** would be elevated by the considerably high community concerns regarding the construction of new ROW within a low-density residential neighborhood, the new crossings of highways and local roads, and concerns of environmental groups over development of new ROW within TNC-identified natural areas. Additional schedule delay risks are associated with special use permitting of environmental impacts and road crossings as well as construction delays due to development of large segments of new ROW within forests and wetlands.

Alternative Route A would have a decreased risk of schedule delay relative to **Alternative Route B** due to the use of existing ROW for the entire project alignment. Schedule delay risks could be posed by community concern over construction within existing ROW adjacent to a Girl Scout Camp and low-density residential area and construction within TNC-identified natural areas.

The Siting Team concluded that **Alternative Route B** would potentially encounter more schedule delay risks due to these factors and assigned a moderate schedule delay risk value of 3. The Siting Team concluded that the risk of schedule delays for **Alternative Route A** would be relatively low due to use of existing ROW and therefore assigned the route a low value of 1.

2.4.1.7 Determination of Selected Route – LH-JF Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment, discussed in detail in **Section 2.4.1.5** and illustrated in **Table 4-5,** resulted in **Alternative Route A** having the lowest overall weighted total value. This alternative had the lowest

weighted score for all three perspectives of the siting process. Based on the results of the quantitative assessment, the Siting Team concluded that **Alternative Route A** would result in less social and physical impacts relative to the other option.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes for this segment, discussed in detail in **Section 2.4.1.6** and illustrated in **Table 4-6**, indicate that **Alternative Route A** has the lowest weighted scores for all five qualitative aspects reviewed. Therefore, based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route A** for the Lake Harmony Substation-Jack Frost Substation Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project, as illustrated on **Figure 4-5a**.

2.4.2 Jack Frost Substation-Arrowhead Lake Tap Pole Segment (JF-ALTP)

Analysis of the Jack Frost Substation-Arrowhead Lake Tap Pole Segment resulted in four Alternative Routes: Alternative Route C, Alternative Route D, Alternative Route E, and Alternative Route F.

2.4.2.1 Alternative Route C

Alternative Route C is 2.60 miles (13,730 feet) in length.

- Starting at the Jack Frost Substation, located in Kidder Township, Carbon County, Alternative Route C heads north for 1.24 miles (6,547 feet) passing through a large tract of dense undeveloped forest and crossing two unknown tributaries (UNT) to Tobyhanna Creek (both HQ-CWF). The proposed route then turns to the northeast for 0.31 mile (1,639 feet) through undeveloped forest before meeting an existing transmission line ROW. From this point, the route continues to the northeast for 1.05 miles (5,544 feet) along the existing ROW to the Arrowhead Lake Tap Pole, located in Tobyhanna Township, Monroe County. This segment traverses Tobyhanna Creek (HQ-CWF), and then crosses three roads within the Fawn Ridge Estates, an undeveloped section of SR 115, and residential bordered Thomas Road.

2.4.2.2 Alternative Route D

Alternative Route D is 2.72 miles (14,361 feet) in length and is the existing transmission line route between the Jack Frost Substation and the Arrowhead Lake Tap Pole.

- Alternative Route D heads out of the Jack Frost Substation to the southeast for 0.05 mile (268 feet) before turning sharply to the northeast for 0.42 mile (2,191 feet) following an existing transmission line ROW that crosses a PFO-PSS wetland complex associated with an UNT to Tobyhanna Creek (HQ-CWF). Staying within the existing ROW, the route then turns to the north for a distance of 1.20 miles (6,336 feet) crossing a second UNT to Tobyhanna Creek (HQ-CWF) and traveling through dense forest. From this point the proposed route proceeds 1.05 miles (5,544 feet) to the northeast along the existing transmission line ROW, traversing Tobyhanna Creek (HQ-CWF) and crossing three roads within the Fawn Ridge Estates residential development, an undeveloped section of SR 115, and residential-lined Thomas Road before meeting the Arrowhead Lake Tap Pole.

2.4.2.3 Alternative Route E

Alternative Route E is 2.56 miles (13,510 feet) in length.

- Leaving the Jack Frost Substation, Alternative Route E heads in a northerly direction for 1.40 miles (7,355 feet) through undeveloped forest and across two UNT to Tobyhanna Creek (both HQ-CWF). The proposed route then turns to the north east for 0.56 mile (2,956 feet) traversing Tobyhanna Creek (HQ-CWF) and Stony Run (HQ-CWF). The alignment then angles to the north for 0.38 mile (2,006 feet), passing behind residences located within Fawn Ridge Estates, and crossing SR 115 and Poplar Lane, which is the entrance road to the Fawn Ridge Estates development. From this point, the alignment follows the existing transmission line ROW for 0.23 mile (1,193 feet) northeast crossing over the residential-lined Thomas Road and connecting with the Arrowhead Lake Tap Pole.

2.4.2.4 Alternative Route F

Alternative Route F is 2.59 miles 13,675 feet) in length.

- Alternative F leaves the Jack Frost Substation heading north for 1.02 miles (5,398 feet) through the forest crossing an UNT to Tobyhanna Creek (HQ-CWF). At this point the alignment turns to the northeast for 0.70 mile (3,769 feet) while traversing a second UNT to Tobyhanna Creek and Tobyhanna Creek (both HQ-CWF) and crossing undeveloped forest. The proposed alignment then turns north for 0.63 mile (3,315 feet) crossing the private drive of a large wooded property, spanning Stony Run (HQ-CWF) and then crossing SR 115 within a low-density rural residential area. The alternative route then turns to the northeast following the existing transmission line ROW for 0.23 mile (1,193 feet) across residential-lined Thomas Road and extending to the Arrowhead Lake Tap Pole.

2.4.2.5 Alternative Evaluation of Alternative Routes – JF-ALTP Segment

Similar to the prior segment, the Alternative Routes were compared and evaluated against each other to determine the Selected Route for this segment. Evaluation metrics, weighting procedures, and Siting Team analyses used to evaluate these four Alternative Routes and to determine the Selected Route for this segment were the same as reviewed in **Section 2.4.1.5**, **Section 2.4.1.6**, and **Table 4-3**.

Table 4-7 provides a tabular summary of the raw metrics and corresponding normalized values for the four Alternative Routes identified for the Jack Frost Substation-Arrowhead Lake Tap Pole (JF-ALTP) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study. The normalized metric values derived from **Table 4-7** were further adjusted through a weighting process shown in **Table 4-8. Table 4-8** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment.

TABLE 4-7: Tabular Summary of Alternative Routes (JF-ALTP)

	METRIC/ROUTE	ROUTE C	ROUTE D	ROUTE E	ROUTE F
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of NRHP Sites within 1,500 feet of ROW	0	0	0	0
	Normalized				
	Number of Residences within 300 feet of Transmission Center Line	16	16	2	2
	Normalized	100	100	0	0
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Commercial Buildings within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Industrial Buildings within 300 feet of Transmission Center Line	1	1	1	1
	Normalized				
	Number of Homes with Transmission ROW in Curtilage	0	0	0	0
	Normalized				
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	18.27	0.00	25.19	27.12
	Normalized	67	0	93	100
	Number of Stream/River Crossings	4	3	4	4
	Normalized	100	0	100	100
	Acres of NWI Wetlands Areas Crossed	0.32	1.52	1.26	0.35
	Normalized	0	100	79	3
	Acres of FEMA 100-year Floodplain Crossed	0.68	0.68	1.94	1.63
	Normalized	0	0	100	76
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	1.05	2.72	0.22	0.22
	Normalized	67	0	100	100
	Miles of Co-location with a Linear Utility (Inverted)	0.00	0.00	0.00	0.00
	Normalized				
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00	0.00	0.00
	Normalized				
	Number of Road and Railroad Crossings	6	6	3	3
	Normalized	100	100	0	0
	Number of >60 Degree Turns along Route	1	0	0	0
	Normalized	100	0	0	0
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	5	5	4	3
	Normalized	0	0	50	100
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$2,335,100	$2,042,250	$2,502,525	$2,529,925
	Normalized	60	0	94	100

TABLE 4-8: Weighted Metrics and Totals for Alternative Routes (JF-ALTP)

QUANTITATIVE CRITERIA	Weights	ROUTE C	ROUTE D	ROUTE E	ROUTE F
BUILT	**33.0%**				
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	0	0	0	0
Weighted					
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0	0	0
Weighted					
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	100	100	0	0
Weighted		14.00	14.00	0.00	0.00
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	0	0	0
Weighted					
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	0	0	0	0
Weighted					
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0	0	0
Weighted		0.00	0.00	0.00	0.00
Number of Homes within Transmission Line ROW in Curtilage	**45.0%**	0	0	0	0
Weighted					
TOTAL	**100.0%**	14.00	14.00	0.00	0.00
WEIGHTED TOTAL		4.62	4.62	0.00	0.00
NATURAL	**33.0%**				
Acres of Natural Forests Crossed	**23.0%**	67	0	93	100
Weighted		15.41	0.00	21.39	23.00
Number of Stream/River Crossings	**30.0%**	100	0	100	100
Weighted		30.00	0.00	30.00	30.00
Acres of NWI Wetlands Areas Crossed	**35.0%**	0	100	79	3
Weighted		0.00	35.00	27.65	1.05
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	0	0	100	76
Weighted		0.00	0.00	12.00	9.12
TOTAL	**100.0%**	45.41	35.00	91.04	63.17
WEIGHTED TOTAL		14.99	11.55	30.04	20.85
ENGINEERING	**33.0%**				
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	67	0	100	100
Weighted		33.50	0.00	50.00	50.00
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	0	0	0	0
Weighted					
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	0	0	0	0
Weighted					
Number of Road or Railroad Crossings	**5.0%**	100	100	0	0
Weighted		5.00	5.00	0.00	0.00
Number of >60 Degree Turns along Route	**5.0%**	100	0	0	0
Weighted		5.00	0.00	0.00	0.00
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	0	0	50	100
Weighted		0.00	0.00	2.50	5.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	60	0	94	100
Weighted		4.20	0.00	6.58	7.00
TOTAL	**100.0%**	47.70	5.00	59.08	62.00
WEIGHTED TOTAL		15.74	1.65	19.50	20.46
SUM OF WEIGHTED TOTAL		**35.35**	**17.82**	**49.54**	**41.31**

2.4.2.6 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route D (17.82)** would produce significantly fewer impacts relative to the other alternatives. **Alternative Route C (35.35)** is associated with the second lowest level of impacts. **Alternative Route E (49.54)** and **Alternative Route F (41.31)** contain the most potential impacts and challenges to construction.

2.4.2.6.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route D (4.62)** and **Alternative Route C (4.62)** and lowest for **Alternative Route E (0.00)** and **Alternative Route F (0.00)**. Built environment values for both **Alternative Route D** and **Alternative Route C** were primarily affected by having the most houses (16) located within 300 feet of the proposed alignments. In comparison, **Alternative Route E** and **Alternative Route F** have substantially fewer homes (2) located within 300 feet of the proposed alignments.

2.4.2.6.2 Natural Environment

Although **Alternative Route D (11.55)** is associated with the most NWI wetland impacts (1.52 acres), it has the most favorable environmental metrics as construction within the existing ROW avoids clearing of forested land and the alignment crosses fewer streams relative to the other alternatives. Values for the natural environment metrics are highest for **Alternative Route E (30.04)** and **Alternative Route F (20.85)** and moderately lower for **Alternative Route C (14.99)**. The environmental values for **Alternative Route S** and **Alternative Route F** were higher due to these proposed alignments passing through more acres of forested land (25.19 acres; 27.12 acres) and crossing more acres of wetlands and FEMA 100-year floodplains when compared to **Alternative Route C**. Of note, **Alternative Routes C, E, and F** contain the same number of crossings (4) of designated HQ streams along the proposed alignments.

2.4.2.6.3 Engineering Considerations

Values for engineering metrics were lowest for **Alternative Route D (1.65)**, moderately higher for **Alternative Route C (15.74)**, and highest for **Alternative Route E (19.50)**

and **Alternative Route F (20.46)**. The low engineering metric value and lowest estimated overall cost associated with **Alternative Route D** is largely driven by the fact that the alignment will be constructed entirely within existing ROW. While **Alternative Route C** contains a complex turn and a moderately high number of road crossings (6) it has the second lowest overall cost and overall construction complexity when compared to the remaining alternatives because of extensive co-location (1.05 miles) with the existing ROW. Higher engineering metric values and costs associated with **Alternative Routes E and F** are largely related to limited use of the existing ROW, distance from the surrounding roadway network, and the associated requirements for extensive establishment of new ROW through densely forested areas.

2.4.2.7 Qualitative Assessment

The qualitative assessment for the Jack Frost Substation-Arrowhead Lake Tap Pole Segment of the Project involved the same five qualitative criteria used during the analysis of the prior segment. **Table 4-9** provides a summary of the Siting Teams' assessment of each Alternative Route based on these criteria. A detailed discussion of the considerations related to each of these criteria is provided below.

TABLE 4-9: Siting Team Analysis of Qualitative Concerns (JF-ALTP)

Qualitative Criteria	Weights	ROUTE C	ROUTE D	ROUTE E	ROUTE F
Visual Concerns	15%	2	2	4	1
Weighted		0.3	0.3	0.6	0.15
Community Concerns	15%	2	2	3	1
Weighted		0.3	0.3	0.45	0.15
Special Permit Issues	20%	2	1	3	3
Weighted		0.4	0.2	0.6	0.6
Construction, Maintenance, and Accessibility	30%	2	1	3	3
Weighted		0.6	0.3	0.9	0.9
Schedule Delay Risk	20%	2	1	3	2
Weighted		0.4	0.2	0.6	0.4
TOTALS	**100%**	**2.00**	**1.30**	**3.15**	**2.20**

2.4.2.7.1 Visual Concerns

The Siting Team noted that **Alternative Route F** which traverses a predominantly undeveloped landscape would present the least amount of visual impacts when compared to the other three options. **Alternative Route C** and **Alternative Route D**, which propose construction within existing ROW through an established residential neighborhood, may have associated visual concerns, but as existing lines through this area, these routes will not generate the same level of visual concerns as construction of new a ROW. The greatest level of visual concern would be generated by **Alternative Route E** as it passes behind residences located along Scenic Drive within the Fawn Ridge Estates development.

Based on the Siting Teams findings it was concluded that visual concerns generated by **Alternative Route E** was relatively higher than those noted for the other alternatives. **Alternative Route E** was assigned a moderately high visual concern of 4 because of new ROW construction behind existing residences, while **Alternative Route C** and **Alternative Route D** were assigned a moderately low level of visual concern of 2 due to potential visual impacts associated with construction on an existing ROW through an established neighborhood. **Alternative Route F**, which traverses a rural landscape, was assigned a low visual concern value of 1.

2.4.2.7.2 Community Concerns

The Siting Team concluded that the level of community concerns raised regarding the social aspects of the proposed routes would be greatest for **Alternative Route E** due to the reactions of residents living in the Fawn Ridge Estates neighborhood adjacent to the new ROW alignment, specifically along Scenic Drive. **Alternative Route C** and **Alternative Route D** will involve construction within an existing ROW across residential-lined Scenic Drive and Doria Drive within the Fawn Ridge Estates development. Construction noise and traffic associated with these routes may produce community concern, however use of an existing ROW generally produces less concern than construction of a new ROW. The Siting Team noted that **Alternative Route F** would be associated with relatively lower levels of community concern when compared

to the other alternatives as the proposed alignment traverses generally undeveloped parcels.

The Siting Team concluded that **Alternative Route E** would be associated with the highest level of community concern and assigned a moderate community concern value of 3. Because of potential concern over the use of existing ROW through populated areas **Alternative Route C** and **Alternative Route D** were assigned a moderately low community concern value of 2. Due to its avoidance of developed areas **Alternative Route F** was assigned a low community concern value of 1.

2.4.2.7.3 Special Permit Requirements

The Siting Team noted that **Alternative Routes C, E, and F** would require the construction of new ROW through a densely forested area and would generate significantly more forested impacts than **Alternative Route D,** which is constructed entirely within the existing ROW. **Alternative Route C**, which utilizes segments of existing ROW, contains fewer forested impacts relative to **Alternative Routes E** and **F** and subsequently would be associated with fewer special permitting requirements. **Alternative Route D** would have the fewest special permit requirements as environmental impacts generally occurred during construction of the original ROW.

The Siting Team further acknowledged that each alternative would cross one major state route (SR 115), and a similar number of HQ streams and associated wetlands therefore would have a comparable level of PennDOT coordination, and NPDES and wetlands permitting.

Based on these observations the Siting Team assigned **Alternative Route E** and **Alternative Route F** a moderate special permit value of 3 and a moderately low special permit value of 2 to **Alternative Route C**. **Alternative Route D** was assigned the lowest special permit value of 1.

2.4.2.7.4 Construction, Maintenance, and Accessibility

Similar to the previous segment, the Siting Team concluded that construction of new ROW areas would be the key construction, maintenance, and access issue within this route segment. Construction of **Alternative Routes C, E, and F** would involve

considerable development of new ROW through an isolated and dense tract of forest land. The Siting Team noted that **Alternative Route C**, which utilizes of segments of existing ROW, would be less complex to construct than the other two alternatives. **Alternative Route D**, constructed entirely within existing ROW, would be associated with the least construction, maintenance, and accessibility issues when compared to the other three alternatives.

Based on the required length of new ROW traversing densely forested areas **Alternative Route E** and **Alternative Route F** were assigned a moderate construction, maintenance, and accessibility value of 3. Due to the use of sections of existing ROW, **Alternative Route C** was assigned a moderately low construction, maintenance, and accessibility value of 2. **Alternative Route D** was assigned a low value of 1 based on limited issues associated with using the existing ROW.

2.4.2.7.5 Risk of Schedule Delay

The Siting Team concluded that **Alternative Route E** would potentially encounter more schedule delay risks when compared to the other alternatives. Based on the potential for more visual and community related concerns, **Alternative Route E** was assigned a moderate schedule delay value of 3. **Alternative Route F** was assigned a moderately low schedule delay risk value of 2 due to special permit considerations and construction accessibility issues. Similarly, the Siting Team assigned the same moderately low value of 2 to **Alternative Route C** because of associated visual and community concerns. The Siting Team concluded that the risk of schedule delays for **Alternative Route D** would be relatively lower due the use of the existing ROW and was assigned a low value of 1.

2.4.2.8 Determination of Selected Route – JF-ALTP Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment, discussed in detail in **Section 2.4.2.6** and illustrated in **Table 4-8,** resulted in **Alternative Route D** having the lowest overall weighted total value. This alternative had the lowest weighted score for two of the three perspectives of the siting process (natural environment and engineering considerations), and was second lowest in the other perspective (built environment). Based on the results of the quantitative assessment, the

Siting Team concluded that **Alternative Route D** would result in less social and physical impacts relative to the other three options.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes for this segment, discussed in detail in **Section 2.4.2.7** and illustrated in **Table 4-9**, indicate that **Alternative Route D** has the lowest weighted scores for special permit issues, construction issues, and schedule delay risk. This route also achieved moderately low scores for visual and community concerns. This route was achieved low metric values in all categories because of its proposed construction entirely in existing ROW.

Therefore, based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route D** for the Jack Frost Substation- Arrowhead Lake Tap Pole Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project, as illustrated on **Figure 4-5b**.

2.4.3 Arrowhead Lake Tap Pole-Wagners Substation Segment (ALTP-W)

Analysis of the Arrowhead Lake Tap Pole to Wagners Substation Segment resulted in five Alternative Routes: Alternative Route G, Alternative Route H, Alternative Route I, Alternative Route J, and Alternative Route K.

2.4.3.1 Alternative Route G

Alternative Route G is 5.69 miles (30,040 feet) in length and is the existing transmission line route between the Arrowhead Lake Tap Pole and the Wagners Substation.

- Starting at the Arrowhead Lake Tap Pole, located in Tobyhanna Township, Alternative G heads to the west for 0.41 mile (2,176 feet) along the existing transmission line ROW. The alignment then angles to the southeast for 0.99 mile (5,211 feet) through undeveloped forest, spanning Two Mile Run (HQ-CWF), crossing a rural section of Burger Road, and entering an area associated with The Nature Conservancy's 2,500-acre Thomas Darling at Two Mile Run Preserve as well as portions of the Two Mile Run Swamp Natural Area.
- At this point Alternative Route G turns northeast for 1.57 miles (8,290 feet) through undeveloped upland and wetland forest associated with the aforementioned Preserve. The route then turns to the southeast for 0.22 mile (1,162 feet) through a forested low density residential area located along Blackberry Land and Beaver Drive before turning again to the northeast for 0.37 mile (1,965 feet).

- The alignment then turns to the southeast for 0.99 mile (5,304 feet) crossing to the south side of SR 940 in a commercially developed area and spanning Deep Run (HQ-CWF). From this point Alternative Route G turns to the east for 0.97 mile (5,046 feet) along the existing ROW through forest, a low density residential area (Wagner Forest Park), portions of forested wetland associated with the Wagners Bog Natural Area, and crosses Wagners Run (HQ-CWF). The final segment of Alternative Route G is a 0.17 mile (886 feet) span heading north into the existing Wagners Substation located within Tobyhanna Township.

2.4.3.2 Alternative Route H

Alternative Route H is 5.44 miles (28,720 feet) in length.

- Starting at the Arrowhead Lake Tap Pole, Alternative Route H heads southeast for 0.49 mile (2,582 feet) through a sparsely populated community along Edmund Drive and over Stony Run (HQ-CWF). At this point the alignment continues in a southeasterly direction paralleling a natural gas pipeline ROW for 0.29 mile (1,573 feet) and crossing over a rural section of Burger Road. The alignment then turns to the east and proceeds for 1.80 miles (9,491 feet) through forested uplands and wetlands and over Two Mile Run (HQ-CWF), all located within the Thomas Darling at Two Mile Run Preserve. The alignment would border the southern edge of the Two Mile Run Swamp Natural Area.
- From this point, Alternative H makes a turn to the southeast for 0.22 mile (1,146 feet) crossing SR 940 in a moderately dense mixed residential and commercial district. The proposed route then proceeds for 1.13 miles (5,967 feet) northeast paralleling the south side of SR 940, spanning Deep Run and Davey Run (both HQ-CWF), and crossing over an access road to the Pocono Lake Preserve community before meeting up with the existing transmission line ROW. The remaining section of the route follows Alternative Route G to the east for 1.51 miles (7,961 feet) into the existing Wagners Substation.

2.4.3.3 Alternative Route I

Alternative Route I is 6.16 miles (32,520 feet) in length.

- Starting at the Arrowhead Lake Tap Pole, Alternative Route I heads southeast for 0.53 mile (2,789 feet) paralleling an existing gas pipeline ROW, crossing over a pond/wetland complex associated with Stony Run (HQ-CWF), and extending to a point east of Edmund Road. The proposed route then mirrors the Alternative Route H alignment for 2.71 miles (14,316 feet). The proposed route then leaves the Alternative H alignment and travels east for 0.16 mile (854 feet) before turning to the southeast across Deep Run (HQ-CWF) and through undeveloped forest for 0.90 mile (4,745 feet). At this point, Alternative I turns to the east for 0.54 mile (2,841 feet), traveling through a forested area between Wagner Forest Park and Pocono Lake Preserve residential developments.

- From this point the route heads northeast for 0.34 miles (1,800 feet) traversing through a forested wetland associated with the Pocono Lake Preserve Natural Area before angling to the north for 0.33 mile (1,770 feet) passing through Pocono Lake Preserve, a low density residential area. Alternative Route I then heads to the northeast for 0.48 mile (2,519 feet) across Wagners Creek (HQ-CWF) and then north for 0.17 mile (886 feet) into the existing Wagners Substation.

2.4.3.4 Alternative Route J

Alternative Route J is 6.08 miles (32,100 feet) in length.

- The Alternative Route J alignment follows the Alternative Route H alignment from the Arrowhead Lake Tap Pole for 3.02 miles (15,999) heading southeast and east. The route then turns southeast away from Alternative Route H for 0.81 mile (4,249 feet) near SR 940. From this point the route heads east for 0.39 mile (2,032 feet) through forest, across the access road to Pocono Lake Preserve, and then meeting up with Alternative Route I. Alternative Route J then follows the Alternative Route I alignment for 1.86 miles (9,820 feet) to the northeast between Wagner Forest Park and Pocono Lake Preserve residential developments, through Pocono Lake Preserve Natural Area, over Wagners Creek (HQ-CWF) before entering the existing Wagners Substation.

2.4.3.5 Alternative Route K

Alternative Route K is 6.01 miles (31,730 feet) in length.

- Starting at the Arrowhead Lake Tap Pole, Alternative Route K heads southeast, following Alternative Route H for 0.12 mile (633 feet) before turning to the east for 0.39 mile (2,020 feet) and joining the existing transmission line ROW. From this point, Alternative Route K travels southeast in the existing ROW for 0.64 mile (3,358 feet). The route then turns to the east, leaving the existing ROW, for 1.38 miles (7,265 feet) through forested uplands and wetlands, over Two Mile Run (HQ-CWF) and through portions of Two Mile Run Swamp Natural Area, which are located within the Thomas Darling at Two Mile Run Preserve.
- The proposed alignment then mirrors Alternative Route H crossing SR 940 and traveling to the southeast for 0.22 mile (1,146 feet). The route continues heading southeast for 0.71 mile (3,749 feet) crossing a wetland complex associated with Davey Run (HQ-CWF) before turning to the east for 0.30 mile (1,609 feet). At this point the proposed route meets Alternative Route I and follows it for 2.25 miles (11,850 feet) to the northeast to the Wagners Substation.

2.4.3.6 Evaluation of Alternative Routes – ALTP-W Segment

Similar to the prior segment, the Alternative Routes were compared and evaluated against each other to determine the Selected Route for this segment. Evaluation metrics,

weighting procedures, and Siting Team analyses used to evaluate these five Alternative Routes and to determine the Selected Route for this segment were the same as reviewed in **Section 2.4.1.5**, **Section 2.4.1.6**, and **Table 4-3**.

Table 4-10 provides a tabular summary of the raw metrics and corresponding normalized values for the Alternative Routes identified for the Arrowhead Lake Tap Pole-Wagners Substation (ALTP-W) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study. The normalized metric values are located on **Table 4-10**. **Table 4-11** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment.

TABLE 4-10: Tabular Summary of Alternative Routes (ALTP-W)

	METRIC/ROUTE	ROUTE G	ROUTE H	ROUTE I	ROUTE J	ROUTE K
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	1	0	0	0	0
	Normalized	100	0	0	0	0
	Number of NRHP Sites within 1,500 feet of ROW	0	0	0	0	0
	Normalized					
	Number of Residences within 300 feet of Transmission Center Line	28	14	7	6	4
	Normalized	100	42	13	8	0
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	1	1	1	1
	Normalized	0	100	100	100	100
	Number of Commercial Buildings within 300 feet of Transmission Center Line	7	4	9	4	2
	Normalized	71	29	100	29	0
	Number of Industrial Buildings within 300 feet of Transmission Center Line	1	0	0	0	0
	Normalized	100	0	0	0	0
	Number of Homes with Transmission ROW in Curtilage	0	1	0	0	0
	Normalized	0	100	0	0	0
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	0.00	39.27	60.80	63.49	56.95
	Normalized	0	62	96	100	90
	Number of Stream/River Crossings	6	4	6	5	5
	Normalized	100	0	100	50	50
	Acres of NWI Wetlands Areas Crossed	8.08	7.61	12.01	10.00	11.62
	Normalized	11	0	100	54	91
	Acres of FEMA 100-year Floodplain Crossed	1.20	1.06	1.35	1.21	1.25
	Normalized	48	0	100	51	65
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	5.69	1.49	0.14	0.14	0.78
	Normalized	0	76	100	100	89
	Miles of Co-location with a Linear Utility (Inverted)	0.00	0.24	0.71	0.24	0.00
	Normalized	100	66	0	66	100
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00	0.00	0.00	0.00
	Normalized					
	Number of Road and Railroad Crossings	6	10	7	6	6
	Normalized	0	100	25	0	0
	Number of >60 Degree Turns along Route	5	3	2	3	1
	Normalized	100	50	25	50	0
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	14	11	13	11	9
	Normalized	0	60	20	60	100
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$4,267,875	$5,104,800	$6,157,000	$6,078,000	$5,845,675
	Normalized	0	44	100	96	84

TABLE 4-11: Weighted Metrics and Totals for Alternative Routes (ALTP-W)

QUANTITATIVE CRITERIA	Weights	ROUTE G	ROUTE H	ROUTE I	ROUTE J	ROUTE K
BUILT	**33.0%**					
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	100	0	0	0	0
Weighted		16.00	0.00	0.00	0.00	0.00
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0	0	0	0
Weighted						
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	100	42	13	8	0
Weighted		14.00	5.88	1.82	1.12	0.00
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	100	100	100	100
Weighted		0.00	5.00	5.00	5.00	5.00
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	71	29	100	29	0
Weighted		2.49	1.02	3.50	1.02	0.00
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0	0	0	0
Weighted		0.00	0.00	0.00	0.00	0.00
Number of Homes with Transmission Line ROW in Curtilage	**45.0%**	0	100	0	0	0
Weighted		0.00	45.00	0.00	0.00	0.00
TOTAL	**100.0%**	32.49	56.90	10.32	7.14	5.00
WEIGHTED TOTAL		10.72	18.78	3.41	2.35	1.65
NATURAL	**33.0%**					
Acres of Natural Forests Crossed	**23.0%**	0	62	96	100	90
Weighted		0.00	14.26	22.08	23.00	20.70
Number of Stream/River Crossings	**30.0%**	100	0	100	50	50
Weighted		30.00	0.00	30.00	15.00	15.00
Acres of NWI Wetlands Areas Crossed	**35.0%**	11	0	100	54	91
Weighted		3.85	0.00	35.00	18.90	31.85
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	48	0	100	51	65
Weighted		5.76	0.00	12.00	6.12	7.80
TOTAL	**100.0%**	39.61	14.26	99.08	63.02	75.35
WEIGHTED TOTAL		13.07	4.71	32.70	20.80	24.87
ENGINEERING	**33.0%**					
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	0	76	100	100	89
Weighted		0.00	38.00	50.00	50.00	44.50
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	100	66	0	66	100
Weighted		20.00	13.20	0.00	13.20	20.00
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	0	0	0	0	
Weighted						
Number of Road or Railroad Crossings	**5.0%**	0	100	25	0	0
Weighted		0.00	5.00	1.25	0.00	0.00
Number of >60 Degree Turns along Route	**5.0%**	100	50	25	50	0
Weighted		5.00	2.50	1.25	2.50	0.00
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	0	60	20	60	100
Weighted		0.00	3.00	1.00	3.00	5.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	0	44	100	96	84
Weighted		0.00	3.08	7.00	6.72	5.88
TOTAL	**100.0%**	25.00	64.78	60.50	75.42	75.38
WEIGHTED TOTAL		8.25	21.38	19.97	24.89	24.88
SUM OF WEIGHTED TOTAL		**32.04**	**44.86**	**56.07**	**48.04**	**51.39**

2.4.3.7 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route G (32.04)** would produce the fewest impacts relative to the other alternatives. **Alternative Route H (44.86)** and **Alternative Route J (48.04)** have the second fewest associated impacts. The remaining alternatives**, Alternative Route I (56.07) and Alternative Route K (51.39),** contain the most potential impacts and challenges to construction.

2.4.3.7.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route H (18.78)** and **Alternative Route G (10.72)** and relatively lower for **Alternative Route I (3.41), Alternative Route J (2.35) and Alternative Route K (1.65)**. The key factor that affected the built environment value for **Alternative Route H** is that the proposed ROW would be within the curtilage (100 meters; 328 feet) of a home that would require landowner negotiation to possibly acquire the necessary easement. If this negotiation is not successful then this property is considered a non-condemnable property which may impact the ability to construct the transmission line through this section. Built environment values for both **Alternative Route G** and **Alternative Route H** were also affected by having the most houses, 28 and 14 respectively, located within 300 feet of the proposed alignments. The value for **Alternative Route G** was further affected by its proximity (within 1,500 feet) to a sensitive receptor (Community Bible Church of Pocono Lake). The low metric values for **Alternative Routes I, J, and K** were largely influenced by having the fewest number of homes within 300 feet of proposed transmission lines.

2.4.3.7.2 Natural Environment

Values for the natural environment metrics are highest for **Alternative Route I (32.70)** and moderately lower for **Alternative Route J (20.80) and Alternative Route K (24.87)**. **Alternative Route H (4.71)** and **Alternative Route G (13.07)** had the lowest metric value scores. The environmental values for **Alternative Route IN, Alternative Route J, and Alternative Route K** were higher due to these proposed alignments passing through more acres of forested land (55-65 acres) and crossing the most acres of NWI mapped wetlands (10-12 acres). Although **Alternative Route G** has no forest

impacts, the variable score was primarily affected by the number of stream crossings (6) and a moderate level of NWI mapped wetlands crossed. **Alternative Route H** has the lowest value because it would traverse the least amount of streams (4), acres of NWI mapped wetlands, and floodplain areas when compared to the other alternatives.

2.4.3.7.3 Engineering Considerations

Values for engineering metrics are lowest for **Alternative Route G** (8.25) as the entire length of this proposed route would be constructed within existing transmission line ROW thus reducing construction complexity and cost. Engineering values for **Alternative Route J** (24.89) and **Alternative Route K** (24.88) were the greatest while values for **Alternative Route H** (21.38) and **Alternative Route I** (19.97) were incrementally lower. The large difference in the metric scores between these four alternatives and **Alternative Route G** were driven by varying factors. While **Alternative Route H** has the second greatest length of construction within an existing transmission line ROW (1.49 miles) and second lowest cost, it is associated with the most road crossings (10) and moderately high number of complex turns. **Alternative Route I** has the longest length of co-location with a linear utility (0.71 miles), however because of having the longest overall length of all the alternatives, this alternative also had the highest construction cost. **Alternative Route J**, which makes limited use of existing transmission line ROW, has a moderately high number of complex turns (3), is the second longest route, and has the second largest estimated construction cost. While **Alternative Route K** utilizes 0.78 miles of the existing transmission line ROW, there is no planned co-location with other existing linear utilities and the route has the fewest roads within 500 feet of the proposed ROW thus may pose difficulty for construction access

2.4.3.8 Discussion of Qualitative Assessment

The qualitative assessment for the Arrowhead Lake Tap Pole-Wagners Substation-Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project involved the same five qualitative criteria used during analysis of the previous segments. **Table 4-12** provides a summary of the Siting Teams' assessment of each Alternative Route based on

these criteria. A detailed discussion of the considerations related to each of these criteria is provided below.

TABLE 4-12: Siting Team Analysis of Qualitative Concerns (ALTP-W)

Qualitative Criteria	Weights	ROUTE G	ROUTE H	ROUTE I	ROUTE J	ROUTE K
Visual Concerns	15%	2	2	3	3	3
Weighted		0.3	0.3	0.45	0.45	0.45
Community Concerns	15%	2	2	4	4	4
Weighted		0.3	0.3	0.6	0.6	0.6
Special Permit Issues	20%	1	3	4	4	4
Weighted		0.2	0.6	0.8	0.8	0.8
Construction, Maintenance, and Accessibility	30%	1	3	4	4	4
Weighted		0.3	0.9	1.2	1.2	1.2
Schedule Delay Risk	20%	1	3	4	4	4
Weighted		0.2	0.6	0.8	0.8	0.8
TOTALS	**100%**	**1.30**	**2.70**	**3.85**	**3.85**	**3.85**

2.4.3.8.1 Visual Concerns

The Siting Team noted that **Alternative Route G** and **Alternative Route H**, which propose construction wholly or partially within the existing ROW, would present the least amount of visual impacts when compared to the other options. Although **Alternative Route G** crosses a major roadway, SR 940, that consists of mixed commercial/residential development and traverses through two residential areas (Wagners Forest Park and Blackberry Lane), the alignment would be located entirely within an existing ROW and would not raise the same level of visual concerns as construction of a new transmission ROW. Segments of **Alternative Route H** would also use portions of this existing transmission line ROW through Wagners Forest Park, as well as portions of an existing natural gas pipeline ROW near the Arrowhead Lake Tap Pole; new ROW associated with this alignment would be generally located in heavily forested areas where visual impacts would be limited. Visual concerns associated with **Alternative Route H** include crossing the gated access road to Pocono Lakes Preserve and traversing SR 940 in a location different than **Alternative Route G** that also consists of mixed commercial/residential development.

Visual concerns associated with **Alternative Route I**, **Alternative Route J** and **Alternative Route K** would focus on potential effects to the Wagners Forest Park and Pocono Lake Preserve communities. All three routes follow the same proposed alignment through a narrow forested area located between the two communities thus would result in new visual impacts to residences in both neighborhoods. In addition, the three proposed routes cross the gated access road to the Pocono Lake Preserve community. These alignments cross SR 940 at the same proposed location as **Alternative Route H** thus would generate similar visual concerns due to the crossing being located within a new area that consists of mixed commercial/residential development. Additionally, similar to **Alternative Route H**, a large portion of the new ROW associated with these routes would be generally located in densely forested areas where visual impacts are minimized.

Based on the Siting Teams findings it was concluded that visual concerns generated by **Alternative Route I**, **Alternative Route J**, and **Alternative Route K** were relatively higher than those noted for the other alternatives and were assigned a moderate visual concern of 3. **Alternative Route G** and **Alternative Route H** were assigned a moderately low visual concern value of 2.

2.4.3.8.2 Community Concerns

The Siting Team noted that **Alternative Route I**, **Alternative Route J**, and **Alternative Route K** would create similar levels of community concerns regarding their passage between the Wagner Forest Park and Pocono Lake Preserve residential communities, and environmental concern would be raised by the proposed passage through the TNC-identified Pocono Lake Preserve Natural Area. Additional concerns associated with these alignments include new crossings of several local roads and SR 940 where transmission structures would be highly visible, and traversing the undisturbed southern boundary of the TNC-owned Thomas Darling Preserve at Two Mile Run.

Although **Alternative Route G** proposes to reconstruct the transmission line within the existing ROW, the alignment has the potential to produce community concerns due to being located within the low-density residential areas along Blackberry Lane and Beaver Drive or associated with the Wagner Forest Park development. Further community

concern with this alignment may be generated by construction activities within existing ROW sited within the TNC-owned Thomas Darling Preserve at Two Mile Run and TNC-identified Wagners Bog Natural Area. However, the Siting Team noted that this alignment already passes through these residential areas and that potential environmental impacts to the natural areas would be minimal thereby resulting in relatively less community concerns compared to those generated by new ROW construction. **Alternative Route H** may generate similar community concerns due to its location within the existing ROW through the Wagner Forest Park development and Wagners Bog Natural Area, but the proposed new ROW traversing a large undisturbed area of the John Darling Preserve at Two Mile Run, , construction of the new ROW crossing of SR 940 in a mixed commercial/residential district, and additional negotiations for a non-condemnable property would lead to additional public scrutiny of this alignment.

The Siting Team concluded that **Alternative Route I**, **Alternative J**, and **Alternative Route K** would generate the most community concern because of the environmental and social impacts of constructing a new ROW between the Wagner Forest Park and Pocono Lake Preserve residential communities on land located within the TNC-identified Pocono Lake Preserve Natural Area. Additional concern would be raised by the construction of new ROW through the Thomas Darling Preserve at Two Mile Run. Given the potential for concern associated with these three alternatives, they were assigned the moderately high community concern value of 4. **Alternative Route H** was assigned a moderate community concern value of 3 because of the social impacts associated with construction within an existing ROW through established residential communities, as well as new environmental impacts associated with construction of the ROW through the Thomas Darling Preserve at Two Mile Run. **Alternative Route G** were assigned a moderately low community concern value of 2 because proposed construction would be restricted to within an existing ROW.

2.4.3.8.3 Special Permit Requirements

The Siting Team recognized that each of the alternatives would cross environmentally sensitive areas including mature forests, various HQ-designated streams, forested wetland complexes, and TNC-identified natural areas.

Based on the quantitative analysis, **Alternative Route I, Alternative Route J** and **Alternative Route K** would generate comparable environmental impacts that would require similar levels of environmental permitting. For example, these alignments would impact comparable areas of forest and wetlands, which would generate the need for an equal number of RTE surveys and cumulative impact evaluations. Furthermore, these routes traverse a similar number of HQ-designated streams. Construction activities within the new ROWs and long-term stormwater management of these alignments would require similar Individual NPDES permit for any discharges to these streams. As previously noted, Individual NPDES permits involve more complex stormwater analysis and control measures to assure protection of these local resources.

Alternative Route H, which utilizes sections of existing ROW**,** would involve considerably less forested and wetland impacts compared to **Alternative Routes I, J**, and **K** and thus would be associated with fewer environmental investigations and permitting requirements. Because of its construction entirely within an existing ROW, **Alternative Route G** will have the least environmental impacts and permitting requirements. **Alternative Routes G and H** traverse a similar number of HQ-designated streams compared to the other alternatives and would have similar Individual NPDES permit requirements.

The Siting Team further acknowledged that each alternative would cross one state route (SR 940), and a similar number of smaller local roads thus each alternative route would require an identical level of coordination with PennDOT for highway occupancy permits.

Due to the level of proposed forest and wetland impacts the Siting Team has assigned **Alternative Route I**, **Alternative Route J**, and **Alternative Route K** a moderately high special permit value of 4. **Alternative Route H**, which reduces levels of environmental impacts through utilization of sections of existing ROW, was assigned a moderate special permit requirement value of 3. The Siting Team assigned a low special permit requirement of 1 to **Alternative Route G** since special permit requirements would be limited as construction would be entirely within an existing ROW.

2.4.3.8.4 Construction, Maintenance, and Accessibility

The Siting Team concluded that construction of new ROW areas for **Alternative Routes H, I, J, and K** would be the key construction, maintenance, and access issue within this segment of the project. These proposed alignments would involve considerable development of new ROW through large, dense forest areas that also contain extensive forested wetland complexes. The Siting Team noted that **Alternative Route H**, which uses sections of existing ROW, would be less complex to construct than the other three alternatives. **Alternative Route G**, constructed entirely within the existing ROW, would be associated with the least construction, maintenance, and accessibility issues compared to the other four alternatives. None of the five alternative routes would encounter accessibility issues due to the proximity of the available roadway network.

Based on the required length of new ROW traversing densely forested uplands and wetlands, **Alternative Route I**, **Alternative Route J**, and **Alternative Route K** were assigned a moderately high construction, maintenance, and accessibility value of 4. Due to the use of segments of existing ROW, **Alternative Route H**, as assigned a moderate construction, maintenance, and accessibility value of 3. **Alternative Route G** was assigned a low value of 1 based on limited issues associated with using the existing ROW.

2.4.3.8.5 Risk of Schedule Delay

The Siting Team noted that schedule delay concerns for **Alternative Route I, Alternative Route J, and Alternative Route K** would be elevated by concerns of perceived visual and community impacts of the new ROW as it passes between the Wagner Forest Park and Pocono Lake Preserve residential communities. Additional community concern could arise from the fact that these alternatives cross the Pocono Lake Preserve Natural Area, and the new areas of the Thomas Darling Preserve at Two Mile Run. Schedule delay risks for these alternatives may also involve construction constraints, as well as additional special permit requirements, due to their location in dense forested uplands and wetlands.

The Siting Team concluded that schedule delay risks associated with **Alternative Route H** could arise from special permit requirements and construction challenges associated

with development of new ROW within densely forested uplands and wetlands. However the risk of schedule delay is somewhat mitigated by the use of existing ROW for construction of portions of this alignment. The Siting Team has also determined that the risk of schedule delay associated with **Alternative Route G** is minimal since the project will be constructed entirely within existing ROW.

Based on the factors described above the Siting Team has assigned **Alternative Route I**, **Alternative Route J**, and **Alternative Route K** a moderately high risk of schedule delay value of 4. **Alternative Route H** has been assigned a moderate schedule risk of 3 and **Alternative Route G** has been given a low schedule delay risk of 1.

2.4.3.9 Determination of Selected Route – ALTP-W Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment, discussed in detail in **Section 2.4.3.7** and illustrated in **Table 4-11,** resulted in **Alternative Route G** having the lowest overall weighted total value. This alternative had the lowest weighted score for one of the three perspectives of the siting process (engineering considerations), and was second lowest for one other perspective (natural environment). Based on the results of the quantitative assessment, the Siting Team concluded that **Alternative Route G** would result in less social and physical impacts relative to the other four options.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes for this segment, discussed in detail in **Section 2.4.3.8** and illustrated in **Table 4-12**, indicate that **Alternative Route G** has the lowest weighted scores for special permit issues, construction issues, and schedule delay risk. This route scored similar to **Alternative Route H** with regards to visual and community concerns, primarily due to the partial co-location of these two alternatives.

Therefore, based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route G** for the Arrowhead Lake Tap Pole-Wagners Substation Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project, as illustrated on **Figure 4-5c**.

2.4.4 Wagners Substation-Lake Naomi Substation Segment (W-LN)

Analysis of the Wagners Substation-Lake Naomi Substation Segment resulted in four Alternative Routes: Alternative Route L, Alternative Route M, Alternative Route N, and Alternative Route O.

2.4.4.1 Alternative Route L

Alternative Route L is 7.52 miles (39,700 feet) in length.

- Starting at the existing Wagners Substation, located in Tobyhanna Township, Alternative Route L heads south for 0.17 mile (886 feet) along the existing transmission line ROW. Turning to the east along the ROW, the alignment primarily follows the grade of an abandoned railroad for 0.79 mile (4,172 feet). In this section the alignment travels through forest, spans SR 940 in a residential bordered section, crosses a PEM/PSS wetland, and extends across the northern end of Pocono Lake, a man-made lake created at the confluence of the Tobyhanna and Tunkhannock Creeks, both of which are considered HQ-CWF streams. Crossing Pocono Lake is conducted along a man-made berm that once supported the tracks and bridge structure of the former railroad.
- Alternative L then turns north for 1.36 miles (7,186 feet) leaving the abandoned railroad grade and crossing Tobyhanna Creek (HQ-CWF) and passing through a NWI-identified PFO wetland. This segment of the route passes through forested land within the TNC-identified Pocono Lake Natural Area, which is associated with a rare wetland plant as well as feeding and nesting habitat for the state-threatened osprey (*Pandion haliaetus*) and parallels the edge of State Game Lands #127. The last 0.50 miles of this segment also parallels a natural gas pipeline ROW.
- At this point, Alternative Route L turns east and continues through forested lands associated with State Game Lands #127 for 2.77 miles (14,618 feet). This section continues paralleling the gas pipeline ROW until it crosses SR 423 at which point the pipeline ROW turns to the north. Alternative Route L then crosses over Tobyhanna Creek and Kistler Run, both designated HQ-CWF streams and several small wetland areas. The alignment also passes into Coolbaugh Township along this section.
- Turning to the southeast, the alignment extends for 2.43 miles (12,838 feet) through forested lands associated with State Game Lands #127 and Boy Scouts' Camp Minsi. This segment crosses the Upper Tunkhannock Creek (HQ-CWF), travels through several NWI-identified PFO/PSS wetlands and spans an UNT to Upper Tunkhannock Creek (HQ-CWF). The last 0.62 mile (3,295 feet) of this portion passes back into Tobyhanna Township and parallels the eastern edge of the Lake Naomi Club residential development, through an area of a Camp Minsi, a Boy Scouts facility located along the edge of Stillwater Lake, and into the existing Lake Naomi Substation.

2.4.4.2 Alternative Route M

Alternative Route M is 7.31 miles (38,621 feet) in length and follows the same alignment as Alternative Route L except for an approximate 1.00-mile reroute at the western end of the section.

- Starting at the existing Wagners Substation, Alternative Route M heads south and then east for a total of 0.57 mile (3,016 feet) following the existing transmission line ROW, traveling through a forested area and crossing over to the north side of SR 940 in a residential bordered section. Beginning the section of reroute, Alternative Route M then turns off of the existing ROW, and extends north for 0.33 mile (1,734 feet) crossing over a small PEM/PSS wetland and entering State Game Lands #127 before intersecting a natural gas pipeline ROW. The alternative then parallels the gas pipeline ROW through State Game Land #127 for 0.63 mile (3,357 feet) to the northeast meeting back up with the existing transmission ROW and completing the segment of reroute.
- The remainder of the alternative route follows the existing ROW for 5.71 miles (30,164 feet) to the Lake Naomi Substation. This section heads north and then east along the border of State Game Lands #127, parallels a section of natural gas pipeline ROW, crosses to the east side of SR 423 in an undeveloped area, and then extends through forested lands associated with State Game Land #127 and Boy Scouts' Camp Minsi. Along this section the alignment crosses Tobyhanna Creek, Kistler Run, and Upper Tunkhannock Creek as well as several tributaries (all HQ-CWF) and traverses through several NWI-identified wetlands.

2.4.4.3 Alternative Route N

Alternative Route N is 6.70 miles (35,376 feet) in length.

- Starting at the existing Wagners Substation, Alternative Route N follows Alternative Route M for 1.58 miles (8,342 feet) along the existing ROW. At the point where Alternative Route M turns to the north to follow the existing transmission line ROW, Alternative Route N continues to the northeast for 1.63 miles (8,606 feet) out of State Game Lands #127 and through forested lands that, at times, parallels along the northern side of Tobyhanna Creek. The section intersects with the existing transmission line ROW and parallels it to the east for the final 0.24 mile (1,291 feet) and crosses to the east side of SR 423.
- From this point, Alternative Route N leaves the existing ROW and heads east for 1.53 mile (8,078 feet) through forested lands associated with State Game Lands #127, crossing over Kistler Run and Tobyhanna Creek (both designated HQ-CWF streams), through Jimmy Pond, which is part of the TNC-identified Glacial Bog (NC557) Natural Area, and extending to the northeastern edge of the Timber Trails residential development. This section would also cross the existing ROW.

- Turning to the southeast, Alternative Route N extends for 1.67 miles (8,817 feet) crossing through State Game Land #127, traversing through a large NWI identified PFO/PSS wetland associated with an UNT to the Upper Tunkhannock Creek (HQ-CWF), and crossing over the existing ROW. The alignment then turns south for 0.19 mile (1,003 feet) crossing the Upper Tunkhannock Creek (HQ-CWF) and then south west for 0.10 mile (528 feet) through areas associated with the Boy Scouts' Camp Minsi and into the existing Lake Naomi Substation.

2.4.4.4 Alternative Route O

Alternative Route O is 6.90 miles (36,432 feet) in length.

- Starting at the existing Wagners Substation, Alternative Route O follows Alternative Route M for the first 0.74 mile (4,752 feet) section. At this point the proposed alignment turns east for 1.40 miles (7,393 feet) traveling along the southern extent of State Game Lands #127 and spanning Tobyhanna Creek (HQ-CWF) within the boundary of the TNC-identified Pocono Lake Natural Area before extending through forested lands and crossing over the existing ROW.
- Turning to the northeast, Alternative Route O would extend 1.25 mile (6,600 feet), entering State Game Land #127, crossing a forested wetland, passing to the west of western portions of the Lake Naomi Club development and the Timber Trails community center, and crossing SR 423 near the western edge of the Timber Trails development. The proposed alignment would then turn to the east continuing to parallel the boundary of the Timber Trails development for 1.37 miles (7,234 feet).
- At the northeastern corner of the Timber Trails development, Alternative Route O turns to the southeast for 1.38 mile (7,268 feet) through forested lands within State Game Lands #127, across several NWI-identified PFO/PSS wetlands, and spans an UNT to the Upper Tunkhannock Creek (HQ-CWF). The alignment then heads south for 0.60 mile (3,168 feet) crossing the Upper Tunkhannock Creek (HQ-CWF), and paralleling the eastern edge of the Lake Naomi Club residential development into the existing Lake Naomi Substation.

2.4.4.5 Evaluation of Alternative Routes – W-LN Segment

Similar to the prior segment, the Alternative Routes were compared and evaluated against each other to determine the Selected Route for this segment. Evaluation metrics, weighting procedures, and Siting Team analyses used to evaluate these four Alternative Routes and to determine the Selected Route for this segment were the same as reviewed in **Section 2.4.1.5**, **Section 2.4.1.6**, and **Table 4-3**.

Table 4-13 provides a tabular summary of the raw metrics and corresponding normalized values for the four Alternative Routes identified for the Wagners Substation-Lake Naomi

Substation (W-LN) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study. **Table 4-14** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment.

TABLE 4-13: Tabular Summary of Alternative Routes (W-LN)

	METRIC/ROUTE	ROUTE L	ROUTE M	ROUTE N	ROUTE O
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	1	1	1	1
	Normalized				
	Number of NRHP Sites within 1,500 feet of ROW	0	0	0	0
	Normalized				
	Number of Residences within 300 feet of Transmission Center Line	25	25	9	69
	Normalized	27	27	0	100
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Commercial Buildings within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Industrial Buildings within 300 feet of Transmission Center Line	2	2	2	3
	Normalized	0	0	0	100
	Number of Homes with Transmission ROW in Curtilage	0	0	0	0
	Normalized				
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	0.00	8.48	56.75	66.72
	Normalized	0	13	85	100
	Number of Stream/River Crossings	9	6	6	3
	Normalized	100	50	50	0
	Acres of NWI Wetlands Areas Crossed	8.53	4.37	6.44	6.13
	Normalized	100	0	50	42
	Acres of FEMA 100-year Floodplain Crossed	13.46	8.94	11.69	4.54
	Normalized	100	49	80	0
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	7.52	6.30	1.29	1.19
	Normalized	0	19	98	100
	Miles of Co-location with a Linear Utility (Inverted)	1.80	1.17	0.64	0.00
	Normalized	0	35	65	100
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00	0.00	0.00
	Normalized				
	Number of Road and Railroad Crossings	3	5	3	2
	Normalized	33	100	33	0
	Number of >60 Degree Turns along Route	3	4	3	5
	Normalized	0	50	0	100
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	10	10	7	18
	Normalized	73	73	100	0
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$5,637,750	$5,735,000	$6,381,750	$6,600,750
	Normalized	0	10	77	100

TABLE 4-14: Weighted Metrics and Totals for Alternative Routes (W-LN)

QUANTITATIVE CRITERIA	Weights	ROUTE L	ROUTE M	ROUTE N	ROUTE O
BUILT	**33.0%**				
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	0	0	0	0
Weighted					
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0	0	0
Weighted					
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	27	27	0	100
Weighted		3.78	3.78	0.00	14.00
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	0	0	0
Weighted					
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	0	0	0	0
Weighted					
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0	0	100
Weighted		0.00	0.00	0.00	1.50
Number of Homes within Transmission Line ROW in Curtilage	**45.0%**	0	0	0	0
Weighted					
TOTAL	**100.0%**	3.78	3.78	0.00	15.50
WEIGHTED TOTAL		1.25	1.25	0.00	5.12
NATURAL	**33.0%**				
Acres of Natural Forests Crossed	**23.0%**	0	13	85	100
Weighted		0.00	2.99	19.55	23.00
Number of Stream/River Crossings	**30.0%**	100	50	50	0
Weighted		30.00	15.00	15.00	0.00
Acres of NWI Wetlands Areas Crossed	**35.0%**	100	0	50	42
Weighted		35.00	0.00	17.50	14.70
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	100	49	80	0
Weighted		12.00	5.88	9.60	0.00
TOTAL	**100.0%**	77.00	23.87	61.65	37.70
WEIGHTED TOTAL		25.41	7.88	20.34	12.44
ENGINEERING	**33.0%**				
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	0	19	98	100
Weighted		0.00	9.50	49.00	50.00
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	0	35	65	100
Weighted		0.00	7.00	13.00	20.00
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	0	0	0	0
Weighted					
Number of Road or Railroad Crossings	**5.0%**	33	100	33	0
Weighted		1.65	5.00	1.65	0.00
Number of >60 Degree Turns along Route	**5.0%**	0	50	0	100
Weighted		0.00	2.50	0.00	5.00
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	73	73	100	0
Weighted		3.65	3.65	5.00	0.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	0	10	77	100
Weighted		0.00	0.70	5.39	7.00
TOTAL	**100.0%**	5.30	28.35	74.04	82.00
WEIGHTED TOTAL		1.75	9.36	24.43	27.06
SUM OF WEIGHTED TOTAL		**28.41**	**18.48**	**44.78**	**44.62**

2.4.4.6 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route M (18.48)** would produce the fewest impacts relative to the other alternatives. **Alternative Route L (28.41)** has the second fewest associated impacts. The remaining alternatives, **Alternative Route N (44.78)** and **Alternative Route O (44.62)**, contain the most potential impacts and challenges to construction.

2.4.4.6.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route O (5.12),** moderately lower for **Alternative Route L (1.25)** and **Alternative Route M (1.25)**, and lowest for **Alternative Route N (0.00)**. Built environment value for **Alternative Route O** was primarily affected by having the most houses (69) located within 300 feet of the proposed alignments. In comparison, **Alternative Route L** and **Alternative Route M** contained far less (25) homes and **Alternative Route N** had the least (9) homes located within 300 feet of the proposed alignments.

2.4.4.6.2 Natural Environment

Values for the natural environment metrics are highest for **Alternative Route L (25.41)** and **Alternative Route N (20.34),** substantially lower for **Alternative Route O (12.44)**, and lowest for **Alternative Route M (7.88)**. Although **Alternative Route H** (existing route) would not affect any forest cover, this route had the highest environmental value due to spanning the most streams (9), passing through more acres of wetlands (8.53), and spanning the most acres of floodplains (13.46). Environmental values for **Alternative Route N** and **Alternative Route O** were affected by the extent of forest impacts (56.75 and 66.72 acres respectively) and area of wetlands crossed (6.44 and 6.13 acres respectively). **Alternative Route M** (re-route) has the lowest environmental value by minimizing new forest impact, reducing the number of stream crossings, and limiting effects to wetlands and floodplains.

2.4.4.6.3 Engineering Considerations

Values for engineering metrics are substantially higher for **Alternative Route O (27.06)** and **Alternative Route N (24.43)** relative to the value for **Alternative Route M (9.36)**

and **Alternative Route L (1.75)**. The engineering values for **Alternative Routes N and O** were influenced by the limited length of transmission line rebuilding within the existing ROW and by the fewer miles of co-location with existing transmission or other utility ROW. The lower values for **Alternative Route L** and **Alternative Route M** were affected by their extensive use of existing ROW (7.52 miles; 6.30 miles) and co-location with a natural gas pipeline, 1.80 and 1.17 miles respectively. Although **Alternative Route L** has the longest length (7.52 miles) it is associated with the lowest cost of construction ($5.6 million) because of siting of the entire project within existing ROW.

2.4.4.7 Qualitative Assessment

The qualitative assessment for the Wagners Substation-Lake Naomi Substation Segment of the Lake Naomi to Lake Harmony 138/69 Rebuild Project involved the same five qualitative criteria used during analysis of the previous segments. **Table 4-15** provides a summary of the Siting Teams' assessment of each Alternative Route based on these criteria. A detailed discussion of the considerations related to each of these criteria is provided below.

TABLE 4-15: Siting Team Analysis of Qualitative Concerns (W-LN)

Qualitative Criteria	Weights	ROUTE L	ROUTE M	ROUTE N	ROUTE O
Visual Concerns	15%	3	2	3	4
Weighted		0.45	0.30	0.45	0.60
Community Concerns	15%	3	3	3	4
Weighted		0.45	0.30	0.45	0.60
Special Permit Issues	20%	4	3	3	3
Weighted		0.80	0.60	0.60	0.60
Construction, Maintenance, and Accessibility	30%	3	2	4	4
Weighted		0.90	0.60	1.20	1.20
Schedule Delay Risk	20%	3	2	3	4
Weighted		0.60	0.40	0.60	0.80
TOTALS	**100%**	**3.2**	**2.2**	**3.3**	**3.8**

2.4.4.7.1 Visual Concerns

The Siting Team noted that **Alternative Route M**, which proposes construction almost entirely within or adjacent to existing ROW, would present the least amount of visual

impacts when compared to the other options. Though **Alternative Route M** skirts the edge of the Lake Naomi Club residential development and traverses through a Boy Scout Camp, the alignment would be located almost entirely within an existing ROW and would not raise the same level of visual concerns as construction of a new transmission ROW. Additionally, the new ROW re-route section associated with this alignment is limited in length and is located in a forested area where visual impacts would be minimal. **Alternative Route L,** which is located entirely within existing transmission ROW, has identical visual concerns to **Alternative Route M** relative to the Lake Naomi Club and Boy Scout property. Aside from these potential impacts, **Alternative Route L** also spans a portion of Pocono Lake in a location highly visible from SR 940, thus creating an additional level of visual concerns.

Visual concerns associated with **Alternative Route N** would focus on potential effects to the Boy Scout Camp Minsi, and the Lake Naomi Club and Timber Trails residential developments. This alternative would require construction of new ROW within the Boy Scout camp and within sight distance of some residences in Lake Naomi Club and Timber Trails. However, visual impacts to the residential communities are limited by the angle in which the ROW is located in relation to the residences and adjacent forest cover, which will partially shield visual impacts.

Alternative Route O presents the potential for the most visual impacts of all the proposed alignments. Though this alternative is confined to existing ROW through the Boy Scout camp and adjacent to the Lake Naomi Club neighborhood, the proposed ROW parallels the edge of the Timber Trails residential community for a considerable distance and quantitatively is located closer to significantly more homes than the other alternative routes.

Based on the Siting Teams findings it was concluded that visual concerns generated by **Alternative Route O**, was relatively higher than those noted for the other alternatives and was assigned a moderately high visual concern of 4. **Alternative Route L** and **Alternative Route N** were assigned a moderate visual concern value of 3. **Alternative Route M,** which is associated with least potential visual impacts, was assigned a moderately low visual concern value of 2.

2.4.4.7.2 Community Concerns

The Siting Team concluded that the level of community concerns raised regarding the social aspects of the proposed routes would be greatest for **Alternative Route O** due to the reactions of residents living in the Lake Naomi Club and Timber Trails neighborhoods adjacent to the new ROW alignment. Further community concern associated with this alignment could be generated by construction of new ROW through the Pocono Lake Natural Area. Community concern associated with **Alternative Route N** is focused on the construction of new ROW within the Boy Scout Camp Minsi and adjacent to Lake Naomi Club and Timber Trails neighborhoods. Additional concern from environmental and conservation groups could be generated as the proposed alignment passes through Jimmy Pond, which is part of the Glacial Bog Natural Area.

Alternative Route L and **Alternative Route M** would produce similar levels of community concern as they pass through the Boy Scout property and skirt the edge of Lake Naomi Club within existing transmission ROW. Construction noise and traffic associated with these route segments may produce community concern; however use of an existing ROW generally produces less concern than construction of a new ROW. The Siting Team determined that **Alternative Route L** would produce more community concerns relative to **Alternative Route M** because of the route's proposed crossing of Pocono Lake.

The Siting Team concluded that **Alternative Route O** would generate the most community concern because of the environmental and social impacts of constructing a new ROW bordering the Lake Naomi Club and Timber Trails communities and through land located within the Pocono Lake Natural Area. Given the potential for concern associated with this alternative, it was assigned a moderately high community concern value of 4. **Alternative Route L** was assigned a moderate community concern value of 3 because of the social impacts associated with construction within an existing ROW that traverses a Boy Scout camp and borders a residential community, as well as environmental impacts associated with re-construction of the existing ROW crossing of Pocono Lake. **Alternative Route N** was also assigned a moderate community concern value of 3 because of potential social and environmental impacts associated with

construction of new ROW adjacent to established residential communities and within a identified natural area. **Alternative Route M** was assigned a moderately low community concern value of 2 because proposed construction would be restricted to almost entirely within or adjacent to an existing ROW and be located in isolated forested areas.

2.4.4.7.3 Special Permit Requirements

The Siting Team recognized that each of the alternatives would cross environmentally sensitive areas located within the Boy Scout Camp Minsi, SGL #127, or on private property. These sensitive areas include mature forests, various HQ-designated streams, forested, scrub-shrub, and herbaceous wetland complexes, and several TNC-identified natural areas. Quantitatively, **Alternative Route M** had the least environmental impact of the four alternative routes. This proposed alignment, through construction within existing ROW for the majority of its length and a re-route to avoid impacts associated with crossing Tobyhanna Creek and Pocono Lake, would minimize forest clearing and is associated with the least amount of wetland impact. **Alternative Route L**, which mirrors Alternative Route I for most of its length, avoids forest impacts by construction entirely within existing ROW, however is associated with an additional crossing of Tobyhanna Creek and a large, complex crossing of Pocono Lake and therefore has the most acres of wetland and floodplain impacts of all the alternatives.

The Siting Team notes that **Alternative Route N** and **Alternative Route O** are associated with large areas of forest clearing and moderate levels of wetland impacts due to requirements for new ROW construction. The scope of these impacts would generate the need for a larger number of RTE surveys and cumulative impact evaluations relative to the other two alternatives. Of these two routes, **Alternative Route O,** crosses three fewer HQ-designated streams and would be associated with less complex NPDES permitting than **Alternative Route N**, which quantitatively contains the second highest level of environmental impacts of all the proposed alternatives.

The Siting Team concluded that although **Alternative Route L** is confined entirely to existing ROW, it would generate a substantial special permit need due to the regulatory agency coordination required for the complex crossing of Pocono Lake; therefore it was assigned the moderately high special permit requirement value of 4. **Alternative Route**

N and **Alternative Route O** would generate special permit requirements associated with construction of new ROW through large forest tracts and relatively undisturbed wetlands; therefore these proposed alignments were assigned a moderate special permit value of 3. Because of minimization of impacts through the use of existing ROW and avoidance of crossing Tobyhanna Creek and Pocono Lake, **Alternative Route M** was assigned a moderately low special permit value of 2.

2.4.4.7.4 Construction, Maintenance, and Accessibility

The Siting Team concluded that construction of new ROW areas for **Alternative Routes N** and **O** would be the key construction, maintenance, and access issue within this segment of the project. These proposed alignments would involve considerable development of new ROW through large, dense forest areas that also contain extensive forested wetland complexes. The Siting Team noted that **Alternative Route L**, which uses existing ROW for its entire proposed length, would be less complex to construct than **Alternative Routes N** and **O**, however construction and maintenance difficulties related to an additional crossing of Tobyhanna Creek and the crossing of Pocono Lake are associated with this proposed route. **Alternative Route M** constructed almost entirely within the existing ROW and paralleling an existing pipeline ROW for portions of the re-route, would be associated with the least construction, maintenance, and accessibility issues relative to the other three alternatives. None of the four alternative routes would encounter accessibility issues due to the proximity of the available roadway network.

Based on the required length of new ROW traversing densely forested uplands and wetlands, **Alternative Route N** and **Alternative Route O** were assigned a moderately high construction, maintenance, and accessibility value of 4. Due to the complexity of the Tobyhanna Creek and Pocono Lake crossings, **Alternative Route L** was assigned a moderate construction, maintenance, and accessibility value of 3. **Alternative Route M** was assigned a moderately low value of 2 based on limited issues associated with using the existing ROW for most of its proposed length.

2.4.4.7.5 Risk of Schedule Delay

The Siting Team noted that schedule delay concerns for **Alternative Route O** would be elevated by the considerably high visual and community concerns from landowners regarding the construction of new ROW adjacent to the residential communities of Lake Naomi Club and Timber Trails. Additional schedule delay risks are associated with special permit and construction, maintenance, and accessibility issues associated with construction of long segment of new ROW. Similarly, **Alternative Route N** is associated with visual and community concerns from property owners of the Boy Scout Camp Minsi, Lake Naomi Club, and Timber Trails development; however this alignment would be less visible to the residential communities relative to **Alternative Route O.**

Alternative Route L and **Alternative Route M** follow the same existing ROW for most of their respective alignments and would generate similar visual and community concerns from the Boy Scout camp and residents of Lake Naomi Club. However, **Alternative Route L** proposes an additional crossing of Tobyhanna Creek and a complex crossing of Pocono Lake that would require a significantly greater special permit effort relative to **Alternative Route M.**

The Siting Team concluded that **Alternative Route O** would potentially encounter more schedule delay risks due to these factors and assigned this route a moderately high schedule delay risk value of 4. The Siting Team concluded that the risk of schedule delays for **Alternative Route L** and **Alternative Route N** would be relatively lower due to reduced community concerns over visibility of these routes and therefore assigned the route a moderate value of 3. **Alternative Route M**, which minimizes environmental impacts and special permit requirements relative to the other alternatives, was assigned a moderately low risk of schedule delay value of 2.

2.4.4.8 Determination of Selected Route – W-LN Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment, discussed in detail in **Section 2.4.4.6** and illustrated in **Table 4-14,** resulted in **Alternative Route M** having the lowest overall weighted total value. This alternative had the lowest weighted score for one of the three perspectives of the siting process

(natural environment), and was second lowest in the other two perspectives (built environment and engineering considerations). Based on the results of the quantitative assessment, the Siting Team concluded that **Alternative Route M** would result in less social and physical impacts relative to the other two options.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes for this segment, discussed in detail in **Section 2.4.4.7** and illustrated in **Table 4-15**, indicate that **Alternative Route M** has the lowest weighted scores for visual concerns, construction issues, and schedule delay risk. This route scored similar to **Alternative Route L** with regards to community issues, primarily due to the extensive co-location of these two alternatives.

Therefore, based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route M** for the Wagners Substation-Lake Naomi Substation Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project, as illustrated on **Figure 4-5d.**

2.4.5 Lake Naomi Substation-Long Pond Substation- Segment (LN-LP)

Analysis of the Lake Naomi Substation-Long Pond Substation Segment resulted in three Alternative Routes: Alternative Route P, Alternative Route Q, and Alternative Route R.

2.4.5.1 Alternative Route P

Alternative Route P is 2.11 miles (11,131 feet) in length.

- Starting at the Lake Naomi Substation, located in Tobyhanna Township, Alternative Route P heads east for 0.65 mile (3,401 feet) through an area of undeveloped forest and a section of Camp Minsi, a Boy Scouts facility located along the edge of Stillwater Lake.
- Alternative Route P then turns southeast for 0.37 mile (1,974 feet) leaving the Camp Minsi property and crossing over to the south side of SR 940 onto the Pocono Mountain West High School property. The route continues southeast traveling along the edge of a mapped forested wetland behind a group of commercial buildings. At this point, the route turns south for 0.34 mile (1,842 feet) heading away from SR 940 along the edge of another mapped wetland.
- Turning to the southeast and the southwest, the proposed route travels 0.47 mile (2,455 feet) between a trucking storage facility and a school bus maintenance yard and then behind homes on Long Pond Road in the community of Little Summit.

The alignment then turns to the east 0.28 mile (1,459 feet) along an existing transmission line ROW, which at this point is situated on an abandoned railroad grade, into the new Long Pond Substation, located in Tobyhanna Township.

2.4.5.2 Alternative Route Q

Alternative Route Q is 1.89 miles (9,966 feet) in length.

- Starting at the Lake Naomi Substation, Alternative Route Q travels east for 0.65 mile (3,401 feet) through an area of undeveloped forest and a section of the Boy Scouts' Camp Minsi Property along the edge of Stillwater Lake.
- Turning to the southeast, the proposed route travels 0.96 mile (5,106 feet) crossing over to the south side of SR 940 and through a large forested wetland complex on the Pocono Mountain West High School property.
- The proposed route then turns east for 0.28 mile (1,459 feet) along the existing ROW/abandoned railroad grade over Long Pond Road into the new Long Pond Substation.

2.4.5.3 Alternative Route R

Alternative Route R is 2.01 miles (10,600 feet) in length and is the existing transmission line route between the Lake Naomi Substation and the Long Pond Substation.

- Starting at the Lake Naomi Substation, Alternative Route R travels west for 0.51 mile (2,675 feet) within the existing ROW that parallels an undeveloped section of SR 940.
- Turning south, the existing route crosses to the south side of SR 940 onto Pocono Mountain West High School property and extends 0.89 mile (4,692 feet) between sports fields and across the school entrance road.
- Alternative Route R then turns east along the existing ROW/abandoned railroad grade for 0.61 mile (3,233 feet) across the school entrance road again, over Long Pond Road, and into the new Long Pond Substation.

2.4.5.4 Evaluation of Alternative Routes – LN-LP Segment

Similar to the prior segment, the Alternative Routes were compared and evaluated against each other to determine the Selected Route for this segment. Evaluation of the Alternative Routes included a combination of *quantitative analysis* based on weighted metrics, as well as a *qualitative review* by the Siting Team. Evaluation metrics, weighting procedures, and Siting Team analyses used to evaluate these three Alternative

Routes and to determine the Selected Route for this segment were the same as reviewed in **Section 2.4.1.5**, **Section 2.4.1.6**, and **Table 4-3**.

Table 4-16 provides a tabular summary of the raw metrics and corresponding normalized values for the three Alternative Routes identified for the Lake Naomi Substation-Long Pond Substation (LN-LP) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study. **Table 4-17** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment

TABLE 4-16: Tabular Summary of Alternative Routes (LN-LP)

Perspective	METRIC/ROUTE	ROUTE P	ROUTE Q	ROUTE R
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	1	1	1
	Normalized			
	Number of NRHP Sites within 1,500 feet of ROW	0	0	0
	Normalized			
	Number of Residences within 300 feet of Transmission Center Line	22	14	20
	Normalized	100	0	75
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	0	0
	Normalized			
	Number of Commercial Buildings within 300 feet of Transmission Center Line	0	0	2
	Normalized	0	0	100
	Number of Industrial Buildings within 300 feet of Transmission Center Line	1	1	1
	Normalized			
	Number of Homes with Transmission ROW in Curtilage	0	0	0
	Normalized			
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	20.78	16.99	0.00
	Normalized	100	82	0
	Number of Stream/River Crossings	0	0	0
	Normalized			
	Acres of NWI Wetlands Areas Crossed	6.20	6.55	0.79
	Normalized	94	100	0
	Acres of FEMA 100-year Floodplain Crossed	3.14	3.14	0.00
	Normalized	100	100	0
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	0.28	0.28	2.01
	Normalized	100	100	0
	Miles of Co-location with a Linear Utility (Inverted)	0.00	0.00	0.00
	Normalized			
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00	0.00
	Normalized			
	Number of Road and Railroad Crossings	4	5	5
	Normalized	0	100	100
	Number of >60 Degree Turns along Route	2	1	2
	Normalized	100	0	100
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	9	9	10
	Normalized	100	100	0
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$2,039,225	$1,818,225	$1,505,250
	Normalized	100	59	0

TABLE 4-17: Weighted Metrics and Totals for Alternative Routes (LN-LP)

QUANTITATIVE CRITERIA	Weights	ROUTE P	ROUTE Q	ROUTE R
BUILT	**33.0%**			
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	0	0	0
Weighted				
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0	0
Weighted				
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	100	0	75
Weighted		14.00	0.00	10.50
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	0	0
Weighted				
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	0	0	100
Weighted		0.00	0.00	3.50
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0	0
Weighted				
Number of Homes within Transmission Line ROW in Curtilage	**45.0%**	0	0	0
Weighted				
TOTAL	**100.0%**	14.00	0.00	14.00
WEIGHTED TOTAL		4.62	0.00	4.62
NATURAL	**33.0%**			
Acres of Natural Forests Crossed	**23.0%**	100	82	0
Weighted		23.00	18.86	0.00
Number of Stream/River Crossings	**30.0%**	0	0	0
Weighted				
Acres of NWI Wetlands Areas Crossed	**35.0%**	94	100	0
Weighted		32.90	35.00	0.00
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	100	100	0
Weighted		12.00	12.00	0.00
TOTAL	**100.0%**	67.90	65.86	0.00
WEIGHTED TOTAL		22.41	21.73	0.00
ENGINEERING	**33.0%**			
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	100	100	0
Weighted		50.00	50.00	0.00
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	0	0	0
Weighted				
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	0	0	0
Weighted				
Number of Road or Railroad Crossings	**5.0%**	0	100	100
Weighted		0.00	5.00	5.00
Number of >60 Degree Turns along Route	**5.0%**	100	0	100
Weighted		5.00	0.00	5.00
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	100	100	0
Weighted		5.00	5.00	0.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	100	59	0
Weighted		7.00	4.13	0.00
TOTAL	**100.0%**	67.00	64.13	10.00
WEIGHTED TOTAL		22.11	21.16	3.30
SUM OF WEIGHTED TOTAL		**49.14**	**42.90**	**7.92**

2.4.5.5 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route R (7.92)** would produce significantly fewer impacts relative to **Alternative Route Q (42.90)** and **Alternative Route P (49.14).**

2.4.5.5.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route P (4.62)** and **Alternative Route R (4.62)** and lowest for **Alternative Route Q (0.00)**. The key factor that affected the built environment value for **Alternative Route P** was the greater number of homes (22) within close proximity to the ROW. The value for **Alternative Route R** was affected by being within close proximity to a large number of homes (20) and several commercial buildings. **Alternative Route Q** has the least number of homes within 300 feet of the ROW (14) and avoids the commercial buildings. Although not directly affecting the metric values, it was noted that all three alternative routes are located within 1,500 feet of the same public school (Pocono Mountain West High School).

2.4.5.5.2 Natural Environment

Values for the natural environment metrics are highest for **Alternative Route P (22.41)** and **Alternative Route Q (21.73)**, and significantly lower for **Alternative Route R (0.00)**. The environmental value for **Alternative Route P** is the highest due to the proposed alignment passing through the most acres of forested land (20.78 acres) and crossing moderately high areas of NWI-mapped wetlands (6.20 acres) and FEMA floodplains. **Alternative Route Q** has fewer acres of forest impact (16.99 acres) but does intercept the most acres of NWI-mapped wetlands (6.55 acres) and crosses a moderately high area of FEMA floodplains. **Alternative Route R** has the lowest value due to avoiding new forest impacts, minimizing wetland crossings, and circumventing FEMA floodplains.

2.4.5.5.3 Engineering Considerations

Values for engineering metrics are higher for **Alternative Route P (22.11)** and **Alternative Route Q (21.16)** relative to the value for **Alternative Route R (3.30)**. The

engineering values for **Alternative Routes P and Q** were influenced by the limited length of transmission line rebuilding within the existing ROW and by the fewer number of roads within 500 feet of the proposed routes. The value for **Alternative Route P** was further affected by having a more complex design and a higher cost to construct relative to **Alternative Route Q**. Although **Alternative Route R** has the longest length of rebuild within the existing ROW and highest number of roads within 500 feet, its metric value was affected by its complex design and high number of road crossings.

2.4.5.6 Qualitative Assessment

The qualitative assessment for the Lake Naomi Substation-Long Pond Substation Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project involved the same five qualitative criteria used during analysis of the previous segments. **Table 4-18** provides a summary of the Siting Teams' assessment of each Alternative Route based on these criteria. A detailed discussion of the considerations related to each of these criteria is provided below.

TABLE 4-18: Siting Team Analysis of Qualitative Concerns (LN-LP)

Qualitative Criteria	Weights	ROUTE P	ROUTE Q	ROUTE R
Visual Concerns	15%	3	2	1
Weighted		0.45	0.3	0.15
Community Concerns	15%	4	3	2
Weighted		0.6	0.45	0.3
Special Permit Issues	20%	2	3	1
Weighted		0.4	0.6	0.2
Construction, Maintenance, and Accessibility	30%	2	2	1
Weighted		0.6	0.6	0.3
Schedule Delay Risk	20%	3	2	1
Weighted		0.6	0.4	0.2
TOTALS	**100%**	**2.65**	**2.35**	**1.15**

2.4.5.6.1 Visual Concerns

The Siting Team concluded that as new overhead alignments, **Alternative Routes P and Q** would produce an unfavorable visual impact on the landscape relative to **Alternative Route R**, which is an existing ROW. All three alignments would cross the same two local roads, but **Alternative Route P** would have an increased visual effect as it travels behind several homes located along Long Pond Road in the community of Little Summit. **Alternative Routes P and Q** would generate additional visual effects as it travels through administrative areas of the Boy Scout's Camp Minsi and along the shores of Lake Stillwater, which would be visible to the residents of the Stillwater Lake Estates.

Based on these observations, the Siting Team concluded that the visual concerns generated by **Alternative Route P** would be relatively higher than concerns noted for the other alternatives and was assigned a moderate visual concern value of 3. **Alternative Route Q** was assigned a moderately low visual concern value of 2, and **Alternative Route R** was assigned the lowest value of 1.

2.4.5.6.2 Community Concerns

The Siting Team concluded that the level of community concerns raised regarding the social aspects of the proposed routes would be highest for **Alternative Route P** due to the reaction of residents around Stillwater Lake, the leaders of the Boy Scouts Camp Minsi facility, and the residents along Long Pond Road in the community of Little Summit. Additional concerns may be raised by the commercial businesses located along SR 940 behind which **Alternative Route P** would travel. **Alternative Route Q** would raise community concerns from the Boy Scout facility but also may generate concerns from the public school officials due to the need to cross a school road near the bus maintenance area. This alignment would also cross through an undeveloped forested wetland complex, which may produce concerns from local environmental groups. **Alternative Route R** would travel over several school roads and adjacent to school sports areas, which may raise objections from school officials and parents. Although **Alternative Route R** is located in an existing ROW, concerns may be raised over the increased voltage being recommended through this area.

The Siting Team concluded that **Alternative Route P** would generate the most community concerns and assigned the alignment a moderately high community concern value of 4. **Alternative Route Q**, which would generate community concerns based on visual and environmental impact aspects, was assigned a moderate value of 3. Despite possible concerns raised by local school officials and parents, **Alternative Route R** would generate comparably less community concerns due to using an existing ROW and avoiding residential areas, and was therefore assigned a moderately low community concern value of 2.

2.4.5.6.3 Special Permit Requirements

The Siting Team noted that **Alternative Routes P and Q** would be new alignments through a generally forested area and that both would result in more forest impacts relative to **Alternative Route R**. **Alternative Route P** would have less forest impacts as it makes a more direct and shorter path across the forested area, but since this area is a forested wetland, the route would generate more wetland impacts and result in a more fragmented forest. As they skirt the edge of Stillwater Lake, both **Alternative Routes P and Q** would also generate impacts to the floodplain area of this waterbody. None of the alignments would cross any streams and all of the alignments would cross the same public roads.

Due to the degree of forest fragmentation and additional wetland impacts, **Alternative Route Q** was assigned a moderate special permit requirement value of 3. Although **Alternative Route P** is relatively longer than **Alternative Route Q**, it was assigned a moderately low value of 2 because it minimizes forest fragmentation by using the forest edge and avoids the interior wetland areas. The Siting Team assigned the low special permit requirement value of 1 to **Alternative Route R**, which will have minimal environmental impacts.

2.4.5.6.4 Construction, Maintenance, and Accessibility

The Siting Team concluded that construction of new ROW areas for **Alternative Routes P and Q** would be the key construction, maintenance, and access issue for this segment. Both of these alignments would involve the development of a new ROW through forested lands that also contain considerable wetland areas. **Alternative Route R** would use the

existing ROW that bypasses around the wetland areas. Each of the routes is similar in length and neither would encounter issues with accessibility due to the available roadway network.

Due to the additional construction related issues, **Alternative Routes P and Q** were assigned a moderately low construction, maintenance, and accessibility value of 2. **Alternative Route R** was assigned a low value of 1 based on the limited issues associated with using the existing ROW.

2.4.5.6.5 Risk of Schedule Delay

The Siting Team concluded that **Alternative Route P** and **Alternative Route Q** would potentially encounter more schedule delay risks due to the factors explained above. Based on the potential for more visual and community related concerns, **Alternative Route P** was assigned a moderate schedule delay value of 3. Although **Alternative Route Q** would result in less social reaction, this alignment would involve slightly more permitting and was assigned a moderately low value of 2. The Siting Team concluded that the risk of schedule delays for **Alternative Route R** would be relatively lower due the use of the existing ROW and was assigned a low value of 1.

2.4.5.7 Determination of Selected Route – LN-LP Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment, discussed in detail in **Section 2.4.5.5** and illustrated in **Table 4-17,** resulted in **Alternative Route R** having the lowest overall weighted total value. This alternative had the lowest weighted score for two of the three perspectives of the siting process (natural environment and engineering consideration), but was tied for the highest for the third perspective (built environment). Built impacts were elevated by the closeness of this route to the surrounding residential and commercial buildings. Based on the results of the quantitative assessment, the Siting Team concluded that **Alternative Route R** would result in less social and physical impacts than the other two alternative routes.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes, discussed in detail in **Section 2.4.5.6** and illustrated in **Table 4-18**, indicate that

Alternative Route R has the lowest weighted scores for all five qualitative aspects reviewed.

Therefore, based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route R** for the Lake Naomi Substation-Long Pond Substation Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project, as illustrated on **Figure 4-5e**

2.4.6 Long Pond Substation-Lake Naomi Tap Pole Segment (LP-LNTP)

Analysis of the Long Pond Substation- Lake Naomi Tap Pole Segment resulted in four Alternative Routes: Alternative Route S, Alternative Route T, Alternative Route U, and Alternative Route V.

2.4.6.1 Alternative Route S

Alternative Route S is 2.88 miles (15,199 feet) in length.

- Starting at the Long Pond Substation located in Tobyhanna Township, Monroe County, Alternative Route S travels east for 0.36 mile (1,924 feet) along the railroad grade that passes behind homes located along Cricket Lane in the community of Little Summit. It then turns southeast paralleling the abandoned railroad for 0.30 mile (1,564 feet) through forested areas.
- Alternative Route S then turns east through more forested area for 0.78 mile (4,112 feet), passing into Pocono Township, spanning over I-380, traversing north of the active Pocono Manor Shale Pit quarry, and crossing over an UNT to Swiftwater Creek (Designated HQ-CWF; Existing EV). At this point, the proposed route then turns to the southeast for 0.72 mile (3,816 feet) through forested area to the north side of Bear Mountain and closer to the Pocono Manor Resort Area.
- Turning east for 0.23 mile (1,224 feet) and then southeast 0.49 mile (2,559 feet), Alternative Route S traverses a forested area associated with the Pocono Manor Historic District within an existing transmission line ROW and extends to the Lake Naomi Tap Pole located within Pocono Township, Monroe County. No new ROW will be required in this section.

2.4.6.2 Alternative Route T

Alternative Route T is 2.98 miles (15,738 feet) in length and is the existing transmission line route between the Long Pond Substation and the Lake Naomi Tap Pole.

- Starting at the Long Pond Substation, Alternative T travels southeast along an abandoned railroad grade in an existing transmission line ROW for 0.77 mile (4,079 feet) behind the homes located along Cricket Lane in the community of Little Summit.
- Alternative Route T then turns east for 0.12 mile (610 feet) leaving the abandoned railroad grade and crossing over I-380. The route then turns southeast for 0.49 mile (2,593 feet) in the existing ROW traversing through the active Pocono Manor Shale Pit quarry and crossing over an UNT to Swiftwater Creek (HQ-CWF/EV) to a point just north of Sullivan Trail Road.
- The route then travels east 1.12 miles (5,898 feet) and then southeast 0.48 mile (2,558 feet) within the existing transmission line ROW through a forested area associated with the Pocono Manor Historic District and extends to the Lake Naomi Tap Pole.

2.4.6.3 Alternative Route U

Alternative Route U is 2.98 miles (15,726 feet) in length.

- Starting at the Long Pond Substation, Alternative U travels southeast along an abandoned railroad grade in an existing transmission line ROW for 0.63 mile (3,310 feet) behind homes located along Cricket Lane in the community of Little Summit. Turning to the south for 0.10 mile (542 feet) the route leaves the abandoned railroad grade and existing transmission line ROW to parallel a segment of Sullivan Trail Road heading southeast for 0.21 mile (1,100 feet).
- The route continues to parallel Sullivan Trail Road heading east for 0.14 mile (752 feet) across I-380 and across the active Pocono Manor Shale Pit quarry. Continuing to parallel Sullivan Trail Road, the proposed route turns to the southwest for 0.34 mile (1,769 feet) crossing over an UNT to Swiftwater Creek (HQ-CWF/EV). The route continues to parallel the north side of Sullivan Trail Road for 0.54 mile (2,848 feet) along a residential-lined section of the road. Leaving Sullivan Trail Road, the line heads east for 0.43 mile (2,265 feet) through forested area.
- The route then travels southeast for 0.45 mile (2,390 feet) within a forested area associated with the Pocono Manor Historic District and crosses over a pond connected with Dry Sawmill Run (HQ-CWF) before traveling northeast for 0.14 mile (750 feet) to the Lake Naomi Tap Pole.

2.4.6.4 Alternative Route V

Alternative Route V is 3.03 miles (16,007 feet) in length.

- Similar to Alternative Route U, Alternative Route V starts at the Long Pond Substation and travels along an abandoned railroad grade in an existing transmission line ROW for 0.63 mile (3,310 feet) behind homes located along Cricket Lane in the community of Little Summit. It then leaves the abandoned

railroad grade and turns to the south for 0.10 mile (542 feet) adjacent to a residential area to parallel the north side of a segment of Sullivan Trail Road for 0.21 mile (1,100 feet).

- The route continues to parallel Sullivan Trail Road as it turns east for 0.14 mile (752 feet) crossing I-380 and entering the active Pocono Manor Shale Pit quarry before heading southeast for 0.34 mile (1,769 feet) crossing over an UNT to Swiftwater Creek (HQ-CWF/EV). Continuing to parallel Sullivan Trail Road, Alternative V travels for 0.65 (3,442 feet) along a residential-lined section of the road.
- The route then turns off of Swiftwater Trail Road and heads east for 0.23 miles before turning southeast across a pond associated with Dry Sawmill Run (HQ-CWF) for 0.18 mile (843 feet).
- Alternative V then travels northeast for 0.56 mile (2,956 feet) paralleling undeveloped portions of Back Mountain Road and Sullivan Trail Road through a forested area associated with the Pocono Manor Historic District and extends to the Lake Naomi Tap Pole.

2.4.6.5 Evaluation of Alternative Routes – LP-LNTP Segment

Similar to the prior segment, the Alternative Routes were compared and evaluated against each other to determine the Selected Route for this segment. Evaluation metrics, weighting procedures, and Siting Team analyses used to evaluate these four Alternative Routes and to determine the Selected Route for this segment were the same as reviewed in **Section 2.4.1.5**, **Section 2.4.1.6**, and **Table 4-3**.

Table 4-19 provides a tabular summary of the raw metrics and corresponding normalized values for the two Alternative Routes identified for the Long Pond Substation-lake Naomi Tap Pole (LP-LNTP) Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study. The normalized metric values derived from **Table 4-19** were further adjusted through a weighting process shown in **Table 4-20. Table 4-20** shows the total of the weighted metrics within each of the three perspectives and an overall total for each Alternative Route within this segment.

TABLE 4-19: Tabular Summary of Alternative Routes (LP-LNTP)

	METRIC/ROUTE	ROUTE S	ROUTE T	ROUTE U	ROUTE V
BUILT ENVIRONMENT	Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	1	1	1	1
	Normalized				
	Number of NRHP Sites within 1,500 feet of ROW	1	1	1	1
	Normalized				
	Number of Residences within 300 feet of Transmission Center Line	13	21	50	52
	Normalized	0	21	95	100
	Number of Proposed Housing Developments within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Commercial Buildings within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Industrial Buildings within 300 feet of Transmission Center Line	0	0	0	0
	Normalized				
	Number of Homes with Transmission ROW in Curtilage	0	0	0	0
	Normalized				
NATURAL ENVIRONMENT	Acres of Natural Forests Crossed	22.94	0.00	24.87	24.36
	Normalized	92	0	100	98
	Number of Stream/River Crossings	1	1	2	2
	Normalized	0	0	100	100
	Acres of NWI Wetlands Areas Crossed	0.00	0.00	0.43	0.78
	Normalized	0	0	54	100
	Acres of FEMA 100-year Floodplain Crossed	0.00	0.00	0.00	0.00
	Normalized				
ENGINEERING VARIABLES	Miles of Rebuild within Existing Transmission Line ROW (Inverted)	0.85	2.98	0.61	0.61
	Normalized	90	0	100	100
	Miles of Co-location with a Linear Utility (Inverted)	0.00	0.00	0.00	0.00
	Normalized				
	Miles of Co-location with a Road or Railroad (Inverted)	0.00	0.00	1.24	1.77
	Normalized	100	100	30	0
	Number of Road and Railroad Crossings	1	1	1	1
	Normalized				
	Number of >60 Degree Turns along Route	0	3	1	1
	Normalized	0	100	33	33
	Number of Roads within 500 feet of Transmission Center Line (Inverted)	6	6	11	12
	Normalized	100	100	17	0
	Estimated Cost to Site, Design and Construct Transmission Facilities ($)	$2,665,453	$2,235,750	$2,824,900	$2,878,900
	Normalized	67	0	92	100

TABLE 4-20: Weighted Metrics and Totals for Alternative Routes (LP-LNTP)

QUANTITATIVE CRITERIA	Weights	ROUTE S	ROUTE T	ROUTE U	ROUTE V
BUILT	**33.0%**				
Number of Schools, Day Cares, Churches, or Cemeteries within 1,500 feet of Transmission Center Line	**16.0%**	0	0	0	0
Weighted					
Number of NRHP Sites within 1,500 feet of ROW	**15.0%**	0	0	0	0
Weighted					
Number of Residences within 300 feet of Transmission Center Line	**14.0%**	0	21	95	100
Weighted		0.00	2.94	13.30	14.00
Number of Proposed Housing Developments within 300 feet of Transmission Center Line	**5.0%**	0	0	0	0
Weighted					
Number of Commercial Buildings within 300 feet of Transmission Center Line	**3.5%**	0	0	0	0
Weighted					
Number of Industrial Buildings within 300 feet of Transmission Center Line	**1.5%**	0	0	0	0
Weighted					
Number of Homes within Transmission Line ROW in Curtilage	**45.0%**	0	0	0	0
Weighted					
TOTAL	**100.0%**	0.00	2.94	13.30	14.00
WEIGHTED TOTAL		0.00	0.97	4.39	4.62
NATURAL	**33.0%**				
Acres of Natural Forests Crossed	**23.0%**	92	0	100	98
Weighted		21.16	0.00	23.00	22.54
Number of Stream/River Crossings	**30.0%**	0	0	100	100
Weighted		0.00	0.00	30.00	30.00
Acres of NWI Wetlands Areas Crossed	**35.0%**	0	0	54	100
Weighted		0.00	0.00	18.90	35.00
Acres of FEMA 100-year Floodplain Crossed	**12.0%**	0	0	0	0
Weighted					
TOTAL	**100.0%**	21.16	0.00	71.90	87.54
WEIGHTED TOTAL		6.98	0.00	23.73	28.89
ENGINEERING	**33.0%**				
Miles of Rebuild within Existing Transmission Line ROW (Inverted)	**50.0%**	90	0	100	100
Weighted		45.00	0.00	50.00	50.00
Miles of Co-location with a Linear Utility (Inverted)	**20.0%**	0	0	0	0
Weighted					
Miles of Co-location with a Road or Railroad (Inverted)	**8.0%**	100	100	30	0
Weighted		8.00	8.00	2.40	0.00
Number of Road or Railroad Crossings	**5.0%**	0	0	0	0
Weighted					
Number of >60 Degree Turns along Route	**5.0%**	0	100	33	33
Weighted		0.00	5.00	1.65	1.65
Number of Roads within 500 feet of Transmission Center Line (Inverted)	**5.0%**	100	100	17	0
Weighted		5.00	5.00	0.85	0.00
Estimated Cost to Site, Design and Construct Transmission Facilities ($)	**7.0%**	67	0	92	100
Weighted		4.69	0.00	6.44	7.00
TOTAL	**100.0%**	62.69	18.00	61.34	58.65
WEIGHTED TOTAL		20.69	5.94	20.24	19.35
SUM OF WEIGHTED TOTAL		**27.67**	**6.91**	**48.36**	**52.86**

2.4.6.6 Discussion of Quantitative Results

Review of the cumulative values indicates that **Alternative Route T (6.91)** would produce fewer impacts relative to other alternatives thus presenting the least challenging alternative to construct. **Alternative Route S (27.67)** has the second fewest associated impacts among the remaining alternatives while **Alternative Route U (48.36)** and **Alternative Route V (52.86)** present the most impacts and challenges to construction.

2.4.6.6.1 Built Environment

Values for the built environment metrics are highest for **Alternative Route V (14.00)** and **Alternative Route U (13.30)** when compared to **Alternative Route S (0.00)** and **Alternative Route T (2.94)**. The key factor that resulted in higher built environment values for **Alternative Route U and V** is the greater number of homes, 95 and 100 respectively, which would be in close proximity of the ROW when compared to the remaining alternatives. **Alternative Route S** has the least number of homes within 300 feet of the ROW (13), while **Alternative Route T** has 21 homes in close proximity to the ROW. It should be noted that homes in close proximity to **Alternative Routes S and T** are located along the existing ROW (**Alternative Route T**) near Clarks Lane and have fewer impact concerns than homes in close proximity to newly established ROW as would be noted for **Alternative Routes U and V** along Sullivan Trail Road. Although not directly affecting the metric values, it is noted that all four alternatives traverse through the same historic district and are within 1,500 feet of the same public school.

2.4.6.6.2 Natural Environment

Alternative Route T (0.00) has the most favorable natural environment metrics as construction within the existing ROW avoids clearing of forested land and minimizes impacts to existing wetlands. **Alternative Routes U (71.90) and V (87.50)** had the highest natural environment metrics, while **Alternative Route S (21.16)** had a moderately low metric value. One factor affecting the metric values of the three alternatives involving new ROW was the area of natural forest that would be impacted, generally between 90 and 100 acres. All of the routes would cross over the UNT to Swiftwater Creek (Designated HQ-CWF, Existing EV) but **Alternative Routes U and V**

would also cross a NWI-mapped wetland/pond system connected with Dry Sawmill Run (HQ-CWF), which is avoided by **Alternative Routes S and T**.

2.4.6.6.3 Engineering Considerations

Values for engineering metrics are lowest for **Alternative Route T (5.94)** and generally consistent among **Alternative Routes S (20.69), U (20.24), and V (19.35)**. A major factor in the low metric value for **Alternative Route T** is that the entire length (2.98 miles) would be constructed within an existing ROW. Although **Alternative Route T** has the most hard angle turns (3), the use of existing ROW allows for the lowest overall cost. The other alternatives have a less complex design but would be more costly to construct due to the need for new ROW. Other factors affecting the metric values for **Alternative Routes S and T** include having less co-location with existing roads and limited access from the surrounding roadway system. Conversely, **Alternative Routes U and V** are proposed to be co-located along portions of Sullivan Trail Road and Back Mountain Road, and are closer to the surrounding roadway network thus enhancing accessibility to the proposed ROWs.

2.4.6.7 Qualitative Assessment

The qualitative assessment for the Long Pond Substation-Lake Naomi Tap Pole Segment of the Lake Harmony to Lake Naomi 138/69 Rebuild Project involved the same five qualitative criteria used during analysis of the previous segments. **Table 4-21** provides a summary of the Siting Teams' assessment of each Alternative Route based on these criteria. A detailed discussion of the considerations related to each of these criteria is provided below.

TABLE 4-21: Siting Team Analysis of Qualitative Concerns (LP-LNTP)

Qualitative Criteria	Weights	ROUTE S	ROUTE T	ROUTE U	ROUTE V
Visual Concerns	15%	3	1	4	4
Weighted		0.45	0.15	0.6	0.6
Community Concerns	15%	3	1	4	4
Weighted		0.45	0.15	0.6	0.6
Special Permit Issues	20%	2	1	2	2
Weighted		0.4	0.2	0.4	0.4
Construction, Maintenance, and Accessibility	30%	3	1	2	2
Weighted		0.9	0.3	0.6	0.6
Schedule Delay Risk	20%	2	1	3	3
Weighted		0.4	0.2	0.6	0.6
TOTALS	**100%**	**2.60**	**1.00**	**2.80**	**2.80**

2.4.6.7.1 Visual Concerns

The Siting Team noted that all of the alternatives follow the existing ROW along an abandoned railroad grade behind homes located along Cricket Lane in the community of Little Summit. Prior to crossing to the east side of I-380, **Alternative Routes U and V** would also parallel a segment of residential-lined Sullivan Trail Road. **Alternative Route S** would be constructed within a new ROW to the north of the other routes before joining the existing ROW, thus would be visible to relatively fewer homes than the other alternatives within this section.

All alternative routes heading toward the Lake Naomi Tap Pole traverse through a large forested area located within the Pocono Manor Historic District. The Siting Team noted that **Alternative Route T** will be located within the existing transmission line ROW that extends through a densely forested section of the Historic District that is south of the Bear Mountain ridge thus will have minimal visual impact to the viewshed from the Pocono Manor facilities. **Alternative Route S** will be constructed within initial sections of the existing ROW but then extends to the north side of Bear Mountain, which will increase its visibility from the Pocono Manor facilities. Due to the potential effects to the historic viewshed from Pocono Manor, this alignment will initiate a response from the Pennsylvania Historical and Museum Commission (PHMC) in the form of a viewshed analysis and possible mitigation efforts. **Alternative Routes U and V** will follow a more southerly route through the forested area of the Historic District that parallels a residential-lined section of Sullivan Trail Road and presents a heightened visual concern to the local residents.

The Siting Team concluded that all alternatives with the exception of **Alternative Route T**, which would be constructed entirely in an existing ROW, would produce an unfavorable visual effect on the landscape. Based on the issues discussed above, the Siting Team concluded that **Alternative Routes U and V** presented a relatively higher level of visual concern due to the length of new ROW constructed adjacent to existing residences, thus was assigned a moderately high visual concern value of 4. **Alternative Route S** was assigned a moderate visual concern value of 3 due to potential visual

impacts to the Pocono Manor Historic District, while **Alternative Route T** was assigned a low visual concern value of 1.

2.4.6.7.2 Community Concerns

The Siting Team acknowledged that community concerns regarding the change in the local landscape, community character, and the prospect of increased highway activity and noise during construction may be encountered along each of the proposed alignments, specifically in the community of Little Summit. It is noted, however, that **Alternative Routes U and V** present the potential for additional public concern since the alignments would parallel residential-lined portions of Sullivan Trail Road. Conversely, **Alternative Routes S and T** traverse mainly through unpopulated areas and are sited near residential areas only within the existing ROW near Cricket Lane in the community of Little Summit.

As noted all alternatives cross through a forested area located within the Pocono Manor Historic District. The scenic impact of constructing the new ROWs associated with **Alternative Routes S, U, and V** through the Historic District may stimulate reaction from local citizen groups as well as representatives from the National Park Service. Additionally, **Alternative Routes U and V** cross a wetland/pond system within the Historic District, thus natural characteristics of the area could be altered and possibly trigger reaction from local conservation groups.

The Siting Team determined that the level of community concerns based on potential visual and environmental issues were highest for **Alternative Routes U and V** which were assigned a moderately high community concern value of 4. **Alternative Route S**, which would generate new visual concerns primarily within the Pocono Manor Historic District, was assigned a moderate community concern value of 3. **Alternative Route T**, which will be confined to the existing ROW, was assigned a low community concern value of 1.

2.4.6.7.3 Special Permit Requirements

The Siting Team noted that all alternatives will cross I-380, thus requiring some level of coordination with PennDOT for highway occupancy permits. **Alternative Route T**

would cross I-380 in an area of an existing crossing which would require a modification to an existing permit whereas **Alternative Routes S, U, and V** would cross I-380 in a new location requiring a completely new permit. All of the routes will also cross an EV-existing use designated stream that will trigger the need for an individual NPDES permit from PADEP, which requires more complex stormwater analysis and control measures. **Alternative Routes S, U, and V**, however, will generate new forest impacts to create the required ROW. **Alternative Routes U and V** will further impact a wetland/pond complex associated with a HQ stream, and, due to the potential for visual effects to the Pocono Manor Historic District, **Alternative Route S** may also be required by the PHMC to conduct additional visual evaluations and mitigation prior to obtaining the necessary state permits.

Given the relatively limited amount of environmental impacts, the Siting Team has assigned **Alternative Routes S, U, and V** a moderately low special permits requirement value of 2. **Alternative Route T** was assigned a low special permit requirement value of 1 because of the limited environmental impacts anticipated within the existing ROW.

2.4.6.7.4 Construction, Maintenance, and Accessibility

The Siting Team acknowledged that **Alternative Routes S, U, and V** would require the construction of segments of new ROW, which would involve clearing vegetation and creating a new access road network. Variable terrain, isolated sections, and dense forest growth would encumber access and development of each alternative. Once ROW and access roads are completed, they will be maintained for future routine maintenance purposes.

Construction access to the proposed ROWs within the relatively undeveloped forested area lying south of Pocono Manor was determined to be the most critical constructability issue. **Alternative Route S** is the most isolated route with the most feasible construction access limited to the existing transmission ROW through the Lake Naomi Tap Pole location. **Alternative Routes U and V** follow a more southerly route and have potential access road points located along Sullivan Trail and Back Mountain Roads.

The Siting Team assigned **Alternative Route S** a moderate construction, maintenance, and accessibility value of 3 due to its isolation, amount of tree clearing, and lack of

construction access points. **Alternative Routes U and V** have similar amounts of tree clearing to **Alternative Route S**, however contain better potential construction access therefore have been assigned a moderately low construction, maintenance, and access value of 2. **Alternative Route T** is constructed within existing ROW and has been assigned a low value of 1 for this category.

2.4.6.7.5 Risk of Schedule Delay

The Siting Team noted that schedule delays can be expected for most of the alternative routes due to physical and social issues inherent in the project. As previously described **Alternative Routes U and V** have the potential for heightened landowner and community concern primarily due to potential visual impacts to adjacent residences. Additionally, portions of **Alternative Route S** may generate a visual impact to the Pocono Manor Historic District and would be geographically isolated, which could present construction challenges and delays. Furthermore, Alternative **Routes S, U, and V** would require construction of new ROW though undisturbed sections of the Pocono Manor Historic District which may lead to opposition from local citizen groups as well as representatives from the National Park Service.

The Siting Team concluded that **Alternative Routes U and V** would potentially encounter more schedule delay risks due to the factors explained above and assigned them a moderate schedule delay risk value of 3. **Alternative Route S** was assigned a moderately low schedule delay risk value of 2 due to the potential of special permitting and construction access issues. **Alternative Route T** was assigned a low schedule delay risk of 1 because the route is sited entirely within existing ROW.

2.4.6.8 Determination of Selected Route – LP-LNTP Segment

The results of the *quantitative assessment* of the Alternative Routes for this segment show **Alternative Route T** with the lowest overall weighted total value. A detailed discussion is included in **Section 2.4.6.6** and illustrated in **Table 4-20. Alternative Route T** had the lower weighted score for two of the three perspectives of the siting process (natural environment and engineering consideration), and scored relatively low on the third perspective (built environment). Based on the results of the quantitative

assessment, the Siting Team concluded that **Alternative Route T** would result in fewer social and physical impacts than the other three alternatives for this segment.

The results of the *qualitative assessment* conducted by the Siting Team of the Alternative Routes, discussed in detail in **Section 2.4.6.7** and illustrated in **Table 4-21**, show **Alternative Route T** with the lower weighted scores for all five qualitative variables assessed.

Based on the quantitative assessment of the Alternative Routes, in conjunction with a qualitative siting process, the Siting Team selected **Alternative Route T** for the Long Pond Substation-Lake Naomi Tap Pole Segment of the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project, as illustrated on **Figure 4-5f.**

3.0 REVIEW OF COMBINED SELECTED ROUTE

Per Pennsylvania Public Utility Commission (PUC) guidelines found at 52 Pa. Code, § 69.1101 (2)(3) and § 69.3104 (1), a review of the potential effect of the Selected Route on local comprehensive plans and zoning ordinances was conducted (**Section 3.1**). Based on the requirements of § 69.3106 (1), an assessment of the potential environmental and cultural mitigation measures and permit requirements anticipated for the Selected Route is also provided (**Section 3.2**). PUC regulation § 69.3105 (2) also requires that the status of the property acquisition process be provided as part of the siting study (**Section 3.3**). PUC regulation § 57.72 (c)(8) requires that a report of the efforts to locate and identify archaeological, geologic, historic, scenic, and wilderness areas within 2 miles of the Selected Route also be submitted as part of the siting study (**Section 3.4**). PPL Electric has reviewed the Project with Carbon County and Monroe County officials and none have provided any objection to the Project. PPL Electric reviewed the Project with the four municipalities along the length of the Selected Route and none have provided any objection.

3.1 Review of Township Zoning and Comprehensive Plans

Public utility features, such as transmission lines and substations are generally exempt from local municipal authority[2]. To further the Commonwealth's goal of making agency actions consistent with sound land use planning by considering the impact of its decision

[2] The lack of authority for a local municipality to regulate the design, location, or construction of public utility facilities is consistent with the long line of cases holding that public utilities are exempt from local ordinances. *See Duquesne Light Company v. Monroeville Borough*, 449 Pa. 573. 580, 298 A.2d 2352 (1972) ("This Court has consistently held, however, that the Public Utility Commission has exclusive regulatory jurisdiction over the implementation of public utility facilities") (citations omitted). *See, e.g., County of Chester v. Philadelphia Elec. Co.*, 420 Pa. 422, 218 A.2d 331 (1966) (holding that regulation by a multitude of jurisdictions would result in "twisted and knotted" public utilities with consequent harm to the general welfare); *Newtown Twp. v. Philadelphia Elec. Co.*, 594 A.2d 834, 837 (Pa. Cmwlth. 1991) (noting that "it is clear that no 'implied' power exists in the MPC which would allow the Township to regulate [the Philadelphia Electric Company] through its subdivision and land development ordinance"); *Heintzel v. Zoning Hearing Bd. of Millcreek Twp.*, 533 A.2d 832 (Pa.. 1987) (holding that township had no power to regulate, under its zoning ordinance, city's erection of water tower because that power was under the exclusive jurisdiction of the PUC); *South Coventry Twp. v. Philadelphia Elec. Co.*, 504 A.2d 368 (Pa. Cmwlth. 1986) (noting that to possibly subject [the Philadelphia Electric Company] to a miscellaneous collection of regulations upon its system would clearly burden and indeed disable it from successfully functioning as a utility); *Commonwealth v. Delaware and Hudson Railway Co.*, 339 A.2d 155 (Pa. Cmwlth. 1975) (holding that the MPC did not authorize local governments to regulate public utilities in any manner which infringes upon the power of the Commission to so regulate).

upon local zoning ordinances and comprehensive plans, the PUC adopted a new policy on January 11, 2001 that requires the public utility to review local zoning ordinances and comprehensive land use plans to evaluate the impact of proposed projects on these items (*See* 52 Pa. Code § 69.1101, 31 Pa. Bull. 951 (Feb. 17, 2001)). Local zoning ordinances and comprehensive land use plans were reviewed by PPL Electric to evaluate the impact of the proposed Lake Harmony to Lake Naomi 138/69 kV Rebuild Project on these local ordinances and plans.

Based on the Project Need (**Attachment 2**), PPL Electric proposes to reconstruct and upgrade the existing 24-mile long section of single-circuit 69 kV transmission line linking the Lake Naomi Tap Pole, located in Pocono Township, Monroe County, to the existing Lake Harmony 69-12 kV Substation, located in Kidder Township, Carbon County. The project will replace the existing structures with steel mono-poles and upgrade the structures to double-circuit capabilities that will be designed to handle 138 kV but be operated initially for 69 kV. This Project is needed to resolve projected reliability criteria violations along the existing 69 kV transmission line network throughout the Pocono region.

The siting study for the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project concluded that the new 138/69 kV transmission line should generally extend west along the existing ROW from the Lake Naomi Tap Pole to the Lake Harmony Substation (**Figure 4-5**). The new transmission line would be reconstructed within the existing ROW except for a one-mile re-route section located northeast of the existing Wagners Substation that was identified as a means of avoiding wetlands, and stream crossings and minimizing construction and maintenance issues. Construction of the new double-circuit 138/69 kV transmission line will provide a more reliable electrical supply to the surrounding local transmission line network and thereby address the Project's goals.

In adherence to PUC regulations, PPL Electric evaluated the Project's consistency with the zoning ordinances and comprehensive plans of the government entities through which the Selected Route would pass. **Table 4-22** summarizes the presence of township zoning ordinances, as well as township and county comprehensive plans of the government entities along the proposed alignment.

TABLE 4-22: Summary of Zoning and Comprehensive Plans along Selected Route

COUNTY/TOWNSHIP	ZONING	COMPREHENSIVE PLANS
MONROE COUNTY		Monroe County Comprehensive Plan: Monroe 2020 (1999)
Coolbaugh Township	Zoning Map (2004) and Ordinances	Regional Comprehensive Plan (2005)
Pocono Township	Zoning Map (2003) and Ordinances	HSPS Regional Multi-Municipal Comprehensive Plan (2005)
Tobyhanna Township	Zoning Map (2004) and Ordinances	Regional Comprehensive Plan (2005)
CARBON COUNTY		No Comprehensive Plan
Kidder Township	Zoning Map (1991) and Ordinances	Kidder Township Comprehensive Plan (2012)

3.1.1 Township Zoning

PPL Electric collected and reviewed the zoning maps and ordinances of the relevant townships. The proposed line and ROW were assessed relative to the local zoning maps to identify the specific zoning districts through which the line would pass. Ordinances associated with these zoning districts were subsequently evaluated by PPL Electric to determine the proposed transmission line's consistency with their requirements.

The various zoning ordinances or land development ordinances reviewed for all of the relevant townships are comparable. Each of the municipalities has zoning ordinances and zoning districts that were established to guide future land use in the municipality by encouraging development of desirable residential, commercial, agricultural, and manufacturing areas with appropriate groupings of compatible and related uses. The general envisioned goal of these ordinances is to protect and promote the health, morals, safety, and general welfare of the inhabitants of the municipality.

Electric transmission lines used by public utilities are generally referred to in municipal zoning codes as an "essential service," "public utility uses," or similar categorization. Some townships, for example, define high voltage transmission lines, towers, and substations under its Public Utilities Facilities (Essential) category, whereas other townships define electric transmission lines under the Essential Services category, which also includes the provision of gas, telephone, sewer, water, and other similar services.

3.1.1.1 Pocono Township, Monroe County

The proposed Project traverses approximately 1.52 miles of Pocono Township. The route passes through one zoning district within the township: Recreation District. The proposed route in Pocono Township will be located within an existing transmission line ROW.

3.1.1.1.1 Recreation District

Approximately 1.52-mile of the route traverses the Recreation District. The purpose of the Recreation District is to maximize open space while allowing for recreational activities that generate employment, retail trade, retail services, tourism, and related dining/lodging and entertainment uses. According to Section 404 of the Pocono Township zoning ordinances, essential services buildings and structures are permitted by right in the Recreation District. The proposed route would not interfere with any existing recreational facility or activities within the district. Based on this summary, the project would be consistent with the ordinance.

3.1.1.2 Tobyhanna Township, Monroe County

The proposed Project traverses approximately 13.78 miles of Tobyhanna Township. The route passes through four zoning districts within the township: Commercial, Low-Density Residential, Rural Residential, and Open Space/Resource Conservation Districts. The proposed route in Tobyhanna Township will be located almost entirely within an existing transmission line ROW, with the exception of a one mile re-route section near Wagners. Pursuant to Chapter 155.89 of the Tobyhanna Zoning Ordinance, public utility use including construction of high voltage utility lines, towers and substations are permitted in any zoning district by special exception permit.

3.1.1.2.1 Commercial District

Approximately 1.52-miles of the route traverses a Commercial District as the alignment parallels an abandoned railroad grade lying west of I-380 and north of Cricket Road, traverses an area that is occupied by the Pocono Mountain West High School, and crosses a section of SR 940. The purpose of the Commercial District is to provide areas for construction of buildings and the use of parcels for retail, commercial and transient residential uses for the convenience, regular needs, major business and shopping

functions of the Township residents and visitors to the Township. The Tobyhanna Township Zoning Ordinance provides that public utilities are permitted within this district as a special exception use.

3.1.1.2.2 Low Density Residential District

The proposed route would traverse approximate 1.86 miles of Low Density Residential District. The Tobyhanna Township Zoning Ordinance notes that the purpose of this zoning district is to "*provide quality, low-density residential development and at the same time maintain those qualities of the environment which are the desirable characteristics of the Township.*" The Tobyhanna Township Zoning Ordinance provides that public utilities are permitted within this district as a special exception use.

3.1.1.2.3 Rural Residential District

Approximately 5.77 miles of the alignment travels through a Rural Residential District. These areas include an undeveloped forest north of Sullivan Trail Road and the Wagners Forest Park and Pocono Lake Preserve residential areas. This district's purpose is to promote compatible residential activity in accordance with the rural natural of the Township by restricting the density of development and use. The Tobyhanna Township Zoning Ordinance provides that public utilities are permitted within this district as a special exception use.

3.1.1.2.4 Open Space/Conservation District

Approximately 4.63 miles of the proposed route traverses Open Space/Conservation District. Areas crossed by the proposed alignment that fall under this zoning include the TNC owned Thomas Darling at Two Mile Run Preserve and a route segment that fronts the Boy Scout Camp Minsi. The Tobyhanna Township Zoning Ordinance states that the intention of this district is to "*protect fragile environmental and unique natural areas from development. The OS District is a residential district, and shall be considered a residential district for the application of any zoning provision which refers generally to a residential district, including, without limitation, the application of any buffer strip requirements for uses adjacent to a zoning district boundary.*" The Tobyhanna Township

Zoning Ordinance provides that public utilities are permitted within this district as a special exception use.

3.1.1.3 Coolbaugh Township, Monroe County

The proposed Project traverses approximately 3.53 miles of Coolbaugh Township. The route passes through one zoning district within the township: State Preservation District. The proposed route in Coolbaugh Township will be located within an existing transmission line ROW.

3.1.1.3.1 State Preservation District

The approximately 3.53 miles of the proposed alignment that traverses the State Preservation District within the Township is also located entirely within the boundaries of State Game Lands #127. Lands within the State Preservation District are owned and managed by the Commonwealth of Pennsylvania and allowed uses are intended to reflect the existing use and management of the land. According to the Schedule of Uses Tables in Part 4 of the Coolbaugh Township Zoning Ordinance, essential services, including utility wires and towers, are accessory uses that are permitted in all zoning districts. Based on this description, the project would be consistent with this ordinance.

3.1.1.4 Kidder Township, Carbon County

The proposed Project traverses approximately 5.19 miles of Kidder Township. The route passes through five zoning districts within the Township: Resort Commercial, Open Space, Residential Low-Density, Highway Commercial, and Commercial. The proposed route in Kidder Township will located within an existing transmission line ROW.

3.1.1.4.1 Resort Commercial District

Approximately 2.19 miles of the proposed alignment traverses the Resort Commercial District. The Kidder Township Zoning Ordinance states "*The purpose of this district is to provide for resort commercial developments consisting of a combination of transient and permanent housing accommodations and commercial indoor or outdoor recreational and entertainment uses which serve as a destination for vacationers and those attending conferences or conventions.*" The sections of this zoning district crossed are near the Jack Frost Mountain Resort and Split Rock Resort and Golf Club and are presently

composed of undeveloped forest. Essential services provided by public utilities, including the erection of overhead poles and wires, are considered a customary accessory use that are permitted in this zoning district. Based on this description, the project would be consistent with this ordinance.

3.1.1.4.2 Open Space District

Approximately 2.09 miles of the proposed alignment travels through the Open Space District. The Kidder Township Zoning Ordinance states "*The purpose of this district is to provide for the protection and preservation of natural areas such as streams, lakes, river gorges, the boulder field, wooded areas, and wildlife habitats for the use, pleasure and enjoyment of residents and visitors.*" These sections include portions of the Mosey Wood Girl Scout Camp, State Game Lands #129, and undeveloped forest bordering the south side of Tobyhanna Creek. Essential services provided by public utilities are considered a customary accessory use that is permitted in this zoning district. Based on this description, the project would be consistent with this ordinance.

3.1.1.4.3 Residential Low Density

Approximately 0.49 mile of the proposed alignment travels through the Residential Low Density District. The Kidder Township Zoning Ordinance states "*The purpose of this district is to provide for single-family and two-family dwellings at low densities in areas already developed in this manner and in areas where similar development is desirable.*" This section of the proposed route parallels and crosses Moseywood Road near the Split Rock Resort and is bordered by several existing homes. Essential services provided by public utilities are considered a customary accessory use that is permitted in this zoning district. Based on this description, the project would be consistent with this ordinance.

3.1.1.4.4 Highway Commercial

Approximately 0.26 mile of the proposed alignment travels through the Highway Commercial District. The Kidder Township Zoning Ordinance indicates the purpose of this district is "*To delineate highway-oriented shopping areas located with frontage on major thoroughfares and to encourage the development of modern shopping facilities with adequate off-street parking and amenities to serve the customers and employees.*"

This section of the proposed route is located in an undeveloped forest area between SR 940 and I-80. Essential services provided by public utilities are considered a customary accessory use that is permitted in this zoning district. Based on this description, the project would be consistent with this ordinance.

3.1.1.4.5 Commercial

Approximately 0.15 mile of the proposed alignment travels through the Commercial District. The Kidder Township Zoning Ordinance states "*The purpose of this district is to provide the type of commercial facilities which supply goods and services to the community and its environs.*" This section of the proposed route is located in an undeveloped forest north of SR 940. Essential services provided by public utilities are considered a customary accessory use that is permitted in this zoning district. Based on this description, the project would be consistent with this ordinance.

3.2 County and Municipal Plans

PPL Electric acquired and reviewed available county and municipal comprehensive or land use plans covering the areas through which the proposed project would cross. County comprehensive plans include the Monroe County Comprehensive Plan. Municipal-level comprehensive plans were reviewed for Pocono, Coolbaugh, Tobyhanna, and Kidder Townships. All of these plans were developed to guide growth at the county and municipal levels and are summarized below.

3.2.1 Monroe County

The *Monroe County Comprehensive Plan: Monroe 2020* was coordinated by the Monroe County Planning Commission (MCPC) and formulated to address pressures on the county and local municipalities generated by high population growth rates, loss of open space, and strains on the local tax base (MCPC 1999). Goals of the plan are to guide further economic development and environmental conservation in the county and associated municipalities. The Overview Section provides a summary of the challenges, identified patterns, and recommendations for obtaining these goals. Key to this process is the coordination of county and municipal entities to cooperatively make decisions on future development through delineation of growth areas and the identification of

important agricultural and natural resource areas that should be preserved. This cooperative method is envisioned to occur through actions such as county funding of specific municipal open space acquisitions and municipal level planning and zoning processes that guide development at the township level. Concerns regarding utility infrastructure focused primarily on the need to provide adequate supplies of drinking water and proper methods of wastewater processing. Electric utilities were noted to have strong expansion capabilities in the county.

Primary growth issues identified in the *Monroe County Comprehensive Plan* include guiding development and preservation of natural resources. To address the development issues, the plan identified the need to focus growth in specific population centers such as Stroudsburg, Blakeslee, Mount Pocono, and Brodheadsville, and to focus future economic development along specific transportation corridors including SR 209, SR 611, SR 115, and SR 940. Strategies to guide this process include establishing efficient, compact patterns of land use and locating new development on sites served by existing infrastructure. To address the environmental conservation issues, the plan recommends preserving local environmentally valuable resources as identified by the County's Natural Areas Inventory, and providing incentives to protect local agricultural lands. Strategies to guide this process include using various land acquisition methods including capital expenditures, private land donations, and conservation easements that are based on matching state funds.

The proposed Project would cross through portions of Pocono, Tobyhanna, and Coolbaugh Townships, which are located in the northwestern portion of Monroe County. The route would traverse through areas designated as forest, commercial, residential, recreation, and preservation land. The Project will pass through identified growth centers associated with the Mount Pocono and Blakeslee areas and cross economic corridors such as SR 940 and I-380. The alignment will, additionally, traverse natural habitats owned by the Commonwealth of Pennsylvania (State Game Lands #127) and The Nature Conservancy (Thomas Darling at Two Mile Run Preserve), and also cross a TNC-identified natural area (Wagners Bog). Effects to areas within Monroe County were addressed and minimized during the alternative review process through the selection of a route that would avoid construction of new ROW by utilization of existing ROW for the

majority of the alignment. By limiting impacts in growth areas and minimizing the effect to natural resources, this portion of the proposed Project is consistent with the principles of the *Monroe County Comprehensive Plan*.

3.2.2 Carbon County

Carbon County does not have an existing county comprehensive plan. One is in the development stages; however it has not been approved and was not available for review for purposes of this siting study.

3.2.3 Municipal Comprehensive Plans

Municipal-level comprehensive plans relevant to the Project were also reviewed and are discussed below. These include plans from, Pocono Township, Coolbaugh Township, and Tobyhanna Township in Monroe County, and Kidder Township in Carbon County. Most of these comprehensive plans, some of which are multi-municipal based plans, were updated or adopted in response to the coordination efforts recommended by the respective county planning commissions through the county-level comprehensive plans.

3.2.3.1 Pocono Township Regional Comprehensive Plan

Pocono Township is located in northwestern Monroe County at the eastern end of the proposed Project. A Regional Comprehensive Plan was developed between Pocono Township and the neighboring jurisdictions of Hamilton Township, Stroud Township, and Stroudsburg Borough (*HSPS Regional Multi-Municipal Comprehensive Plan*). The plan is based on a shared community vision where growth is managed, balanced, and occurs at designated located locations with adequate infrastructure, environmental and historic resources are protected, open space is preserved, and transportation infrastructure is convenient and well planned (Pocono Township 2005).

Review of the *HSPS Regional Multi-Municipal Comprehensive Plan* in relation to the Selected Route indicates that potential effects on the plan's environmental and historic resource protection objectives have been minimized through the siting process. Goals to achieve these objectives include preserving the natural and cultural heritage of the region, creating greenways, and conserving farmland and scenic areas. Though the selected route traverses portions of the Pocono Manor Historic District and a large, isolated tract

of forest, PPL Electric has minimized the impact to these resources by siting the proposed construction entirely within an existing ROW. Given the limited impact to identified resources the proposed project does not conflict with the objectives of the Multi-Municipal Comprehensive Plan.

3.2.3.2 Tobyhanna and Coolbaugh Townships Regional Comprehensive Plan

Tobyhanna and Coolbaugh Townships are located in the northwestern corner of Monroe County and collectively contain the greatest length of proposed ROW of the entire Selected Route. A regional comprehensive plan was developed between Tobyhanna and Coolbaugh Townships and neighboring municipalities including, Tunkhannock Township and Mount Pocono Borough. The *Regional Comprehensive Plan* is based on a regional vision of the area that preserves the quality of life and diverse natural areas and open spaces while also managing and controlling growth. This vision serves as the basis for the other fundamental plan elements including the goals and objectives and the various sub-plans (*i.e.*, transportation, community facilities, natural resource protection, and economic development) proposed in the *Regional Comprehensive Plan* (Coolbaugh Township 2005).

Review of the *Regional Comprehensive Plan* in relation to the Selected Route indicates that potential effects on the municipal's natural and scenic resource preservation goal have been minimized through the siting process. This goal identifies the need to protect and preserve the ecosystems, natural and scenic resources, and beauty of the region. Project activities in Tobyhanna and Coolbaugh Townships involve construction of the proposed project almost entirely within existing transmission ROW. Although the selected routes will cross identified natural resources located within Tobyhanna and Coolbaugh Townships, the effects to these resources have been minimized through construction within an existing ROW. In general, major environmental impacts were realized during the construction of the original ROW and environmental impacts associated with construction within an existing, maintained ROW will be limited in scope. Permitting of the proposed project through the local conservation districts and PADEP will ensure the protection of the region's water and natural resources.

3.2.3.3 Kidder Township Comprehensive Plan (2012)

Kidder Township is located in the northeastern corner of Carbon County and contains a substantial length of proposed ROW. A comprehensive plan was developed by the township using the Smart Growth concept of encouraging more efficient use of the land by encouraging a larger share of growth within or adjoining areas already served by public infrastructure. This concept serves as the foundation for the elements of the *Kidder Township Comprehensive Plan* including the goals and objectives, which focus on the protection of natural and scenic resources, provision of open space for the preservation of natural resources and development of public use areas, and the management and control of development (Kidder Township 2012).

Review of the *Kidder Township Comprehensive Plan* in relation to the Selected Route indicates that potential effects on the municipal's natural and scenic resource preservation goal have been minimized through the siting process. This goal identifies the need to protect and preserve the natural and scenic resources, watersheds, productive agricultural areas, and natural beauty of the region. Project activities in Kidder Township involve construction of the proposed project entirely within existing transmission ROW. Although the selected routes will cross identified natural resources located within Kidder Township, the effects to these resources have been minimized through construction within an existing ROW. In general, major environmental impacts were realized during the construction of the original ROW and environmental impacts associated with construction within an existing, maintained ROW will be limited in scope. Permitting of the proposed project through the local conservation districts and PADEP will ensure the protection of the township's water and natural resources.

3.3 Compliance with Potential Permit and Mitigation Requirements

The following is a discussion of the anticipated Project impacts and potential permit and mitigation requirements of the proposed Lake Harmony to Lake Naomi 138/69 kV Rebuild Project.

PPL Electric has secured one of the two required ROW easements along the re-route portion near Wagners Substation. In addition, PPL Electric is working and has an agreement in principle with the Pennsylvania Game Commission for the other required

easement. No additional land rights are required for this project. Efforts were made during the transmission line siting process to minimize impacts on existing and future land uses, as well as avoid sensitive natural resources such as wetlands and streams. Where potential impacts are unavoidable, mitigating factors will be employed. As part of the permitting process, any required waterway or floodplain encroachment permits will be obtained from PADEP and the United States Army Corps of Engineers (USACE) prior to construction and PPL Electric will comply with all special conditions placed on the permits. In addition, to address water quality standards within the HQ-designated watersheds along the Project corridor, PPL Electric will comply with the regulations of the NPDES permit program, obtain the required soil erosion and sedimentation control permits, and follow the specified conditions required for the permit.

3.3.1 Land Use

Siting analyses for the Selected Route was conducted with acknowledgement of existing and proposed land uses. Some impact on existing and future land use may occur, including clearing of forest areas and reducing potential areas for residential or commercial development. Establishment of new ROW easement areas also precludes certain uses such as constructing structures or installing swimming pools. PPL Electric is working with property owners to minimize the impact of the ROW easements on existing and future land uses. These property owners will be compensated at present land values for the ROW easement area that crosses their property.

The Selected Route will also be designed to avoid conflicts with the existing transportation network and other utilities currently located along the route. Two major highways, I-380 and I-80, as well as two main state routes, SR 940 and SR 115, will be spanned by portions of the Project. PennDOT Minimum Use Driveway and other Highway Occupancy Permits will be acquired by PPL Electric for temporary or permanent access to these major highways and all other state roads prior to construction. Permit processes include review of the plans to assure that the transmission pole locations and development are in compliance with current safety regulations regarding height and sight clearances. This permit process will also be used to coordinate the actual crossing of the highways with the conductor wires, which may require the temporary closure of

the highway. Aviation coordination will be conducted through the Federal Aviation Association (FAA) and the Pennsylvania Aviation Association (PAA). To assure that the poles are properly recorded by these agencies, information on the location and height of the new poles will be provided to these agencies through use of Form 7460-1 and AV-57 (Notice of Proposed Construction or Alteration), respectively. PPL Electric will comply with any additional lighting or other visual aids that may be required by these agencies to assure aviation safety in the region.

3.3.2 Natural Features

Although most of the Selected Route is located within an existing ROW, the one-mile re-route section would travel through a section of undeveloped forest. Vegetation clearing on the ROW is required to ensure the safe and reliable operation of the line. Vegetation clearing processes and measures are found in PPL Electric's "*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*" (**Attachment 11 – Vegetation Management**). This process will allow for the re-generation of compatible species of low growing trees, shrubs, and grasses where practicable. Herbicides used on the ROW will be EPA-approved and will be applied selectively in accordance with all label instructions. Mitigation for these impacts, primarily to State Game Lands #127, will be required. Determination of the mitigation requirements for the forest impacts, as well as for impacts to the other natural resources, will be part of the permit review process.

Wetland delineations along the Selected Route are in the process of being performed by certified wetland specialists using PADEP and USACE approved methodologies based on the "*Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*" (USACE 2011). To date, this task documented sixty-three (63) wetlands and two ponds/lakes within the ROW of the Selected Route. These wetland areas have been added to the construction drawings and will be used to guide the placement of transmission structures to avoid or minimize wetland impacts. All required permits for the unavoidable wetland impacts will be obtained from the PADEP and the USACE prior to construction. Mitigation in the form

of wetland creation, enhancement, or conservation may be required for these wetland impacts.

Streams along the Selected Route are also in the process of being delineated using PADEP and USACE approved methodologies. To date, this task documented four (4) perennial stream crossings within the ROW of the Selected Route. According to PADEP's Title 25, Chapter 93 *Water Quality Standards*, all of streams crossed by the Selected Route are HQ-designated streams. Long-term impacts to these watercourses are expected to be minimal, as they will be spanned by the proposed transmission line. Due to the water quality level in these watersheds, an Individual NPDES permit will be required to mitigate any potential short-term impacts of erosion and sedimentation during construction. As part of the Individual NPDES process, additional and more sophisticated Best Management Practices (BMPs) may be required during construction to maintain the high water quality standards in the watersheds and obtain the NPDES permit.

FEMA and state-identified floodplains are found adjacent to watercourses and identify the areas that routinely flood during heavy rain events. Encroachment within a floodplain area is discouraged by the regulatory agencies due to the potential of the structure to increase the flooding hazard in the local area. According to PADEP's Title 25, Chapter 106 *Floodplain Management*, floodways are more specifically "*The channel of the watercourse and those portions of the adjoining floodplains which are reasonably required to carry and discharge the 100-year flood. The boundary of the 100-year floodway is as indicated on the maps and flood insurance studies provided by FEMA. In an area where neither FEMA maps nor studies have defined the boundary of the floodway, it is assumed, absent evidence to the contrary, that the floodway extends from the stream to 50 feet landward from the top of the bank of the stream.*" (PADEP 2012c). Where practicable, transmission structures will be constructed outside the floodplain areas. Due to the steep, narrow valleys associated with many of the waterways along the Selected Route, many of the floodplains and floodways will be relatively narrow and can be spanned by the transmission line. For those locations where the floodplains are not avoidable, additional analysis of the proposed structures may be required by PADEP to confirm the activity will not create flooding conditions in the local area.

3.3.3 Rare, Threatened, and Endangered Species

Coordination with state and federal agencies regarding potential rare, threatened and endangered species along the Selected Route were initiated in February 2012 (**Attachment 14**). Responses from the USFWS indicated that federally protected species of concern (SOC) that may occur in the Project area included the federally-threatened bog turtle (*Glyptemys muhlenbergii*). Based on USFWS's request, a Phase I bog turtle habitat survey was conducted by a USFWS-qualified surveyor that did identify three wetlands along the Project alignment that consisted of potential bog turtle habitat, including one wetland within the bypass section near Wagners Substation. A Phase II presence/absence survey of two of these wetlands was completed in spring 2012, whereas a survey of the third wetland in the bypass area is currently under way. A report to USFWS will be submitted by June2013.

In addition to the federal SOC, several state-listed species were identified that may be located within the Project area. The PFBC indicated that the timber rattlesnake (*Crotalus horridus*), a state candidate SOC, is known in the vicinity of the Project area. The PFBC indicated that direct adverse impacts to the species is not anticipated, but did recommend that workers be advised that timber rattlesnakes may be encountered and should be avoided for safety reasons. PFBC also noted that the workers should be advised that the snake is a state protected species and should not be harmed.

Correspondence with the Pennsylvania Game Commission (PGC) noted the presence of the state-threatened osprey (*Pandion haliaetus*) at three specific nesting locations along the existing ROW including:

- The Pocono Lake crossing near the Wagners Substation,
- North of SR 940 near the Thomas Darling Preserve, and
- Near the Lake Harmony Substation.

Coordination between PGC and PPL Electric is on-going regarding the removal of these nests during the construction phase. PGC Conservation Measures stipulate that no construction or maintenance activities shall occur within the predefined nesting areas between March 25 and July 31.

Responses from the Pennsylvania Department of Conservation and Natural Resources (PADCNR) have indicated that the following plants or communities may be present within the Project area:

- White water crowfoot (*Ranunculus aquatilus var.* diffuses) – State-listed Rare Plant.
- Long's sedge (*Carex longii*) – Proposed Threatened Plant.
- Creeping snowberry (*Gaultheria hispidula*) – State-listed Rare Plant.
- Sweet-gale (*Myrica gale*) – State-listed Threatened Plant.
- Thread rush (*Juncus filiformis*) – State-listed Rare Plant.
- Bog goldenrod (*Solidago uliginosa*) – Proposed Threatened Plant.
- White-fringed orchid (*Plantanthera blephariglottis*) – Proposed Endangered Plant.
- Bog sedge (*Carex paupercula*) – State-listed Threatened Plant.
- Common Labrador tea (*Ledum groendlandicum*) – State-listed Rare Plant.
- Oblong-fruited serviceberry (*Amelanchier bartramiana*) – State-listed Endangered Plant.
- Serviceberry (*Amelanchier* Canadensis) – Proposed Endangered Plant.
- Branching bur-reed (*Sparganium androclatum*) – State-listed Endangered Plant.
- Marsh willow-herb (*Epilobium palustre*) – Undetermined State Status.
- Screw-stem (*Bartonia paniculata*) – Proposed Rare Plant.
- Slender sedge (*Carex lasiocarpa*) – State-listed Rare Plant.

Botanical surveys for the Project were conducted in 2012 and a report of the findings was submitted to PADCNR. These surveys identified five plant species of concern (three of the listed species and two additional species not listed) in a total of eight different wetlands. PADCNR accepted the report and provided a clearance letter on May 14, 2013 indicating that no impact is anticipated to the species as long as efforts are followed that avoid or minimize impacts to these wetlands. PPL Electric will comply with these recommended efforts where practicable, which include flagging the wetlands to alert PPL Electric and construction personnel of the ecologically sensitive areas.

3.3.4 Cultural Resources

Cultural resource coordination with the Pennsylvania Historical and Museum Commission (PHMC) was initiated in January 2013 (**Attachment 15**). Initial review of the cultural resources identified in proximity to the Project include the Beaver Brook Girl Scout Camp, Blue Ridge Real Estate Building, Pocono Manor Historic District, and the Stoddartsville Historic District. The alignment of the Selected Route currently crosses lands associated with the Pocono Manor Historic District. PHMC's response regarding historic and archaeological resources, obtained on February 25, 2013, conclude that no archaeological resources will be affected by the Project. PHMC has, however, requested more information regarding the potential visual effects of the Project on the surrounding historic structures. Effect analysis of the Selected Route is in progress and will be provided to PHMC when complete.

3.3.5 Community Features and Conserved Lands

Most community features, including day care centers, churches, and cemeteries, were identified and effectively avoided during the route selection process. The Selected Route will, however, traverse through lands associated with the Pocono Mountain West High School. The alignment through this area will follow the existing ROW, which predates the construction of the school. Monopole structures, to be installed in the ROW, will be different than the existing structures in height and design, but will not infringe upon the school-related activity areas that border the ROW. As such, no impacts to the school are anticipated.

Conserved lands involve areas preserved as private or public open space that are managed by organizations such as land trusts that focus on obtaining parcels of land to preserve based on existing natural or cultural features, or by state agencies including PADCNR and the PGC. Specific private conserved lands identified in the Project area include the Pocono Lake Preserve, which is managed through the local residents. Specific public conserved lands include the 2,200-acre Thomas Darling Preserve at Two Mile Run, which is managed by The Nature Conservancy, as well as State Game Lands #127 and State Game Lands #129, which are managed by the PGC. The alignment of the Selected Route through the Thomas Darling Preserve, which predates the establishment

of the conserved lands, will follow the existing ROW, thereby minimizing any additional impacts to these conserved lands. The Selected Route will also follow the existing alignment through portions of State Game Lands #127 and #129, thereby minimizing impacts in these areas. The alignment re-route near the Wagners Substation, however, will result in additional lands from State Game Lands #127 being converted to ROW. In an effort to minimize impacts to these lands, PPL Electric has coordinated with the PGC to determine the best alignment across the lands. Input from these meetings, which emphasized paralleling the existing gas pipeline ROW, has been incorporated into the Selected Route to the satisfaction of the PGC.

3.3.6 Anticipated Agency Requirements and Permits

In summation of the items reviewed above, many of the required animal and plant surveys have been completed but are still being developed into reports for agency submittal. Specific assessment of the osprey nesting areas and historic or archaeological surveys still need to be conducted that may provide information on possible avoidance and impact areas along the Selected Route. Given the limited natural resource impacts anticipated for the forest clearing and stream and wetland crossings required for the Project, a series of Waivers and General Permits from PADEP is anticipated. As a result of the HQ water standards of the streams crossed by the Selected Route, an Individual NPDES permit is expected from PADEP for erosion and sedimentation control during construction. **Attachment 7** (**Agency Permit Matrix**) provides an overview of the State and Federal permits and associated cultural and environmental compliance measures that will be required.

3.4 ROW Acquisition Status

The majority of the project is being constructed within existing PPL Electric ROW with the exception of the re-route portion near Wagners Substation. PPL Electric requires two new ROW easements to complete the re-route for this Project. To date, PPL Electric has secured one of the two required ROW easements along the re-route. In addition, PPL Electric is working with and has an agreement in principle with the Pennsylvania Game Commission for the other required easement. No additional land rights are required for this project.

3.5 Sensitive Features within 2 Miles

Desktop and field efforts were conducted to locate and identify archaeological, geologic, historic, scenic, and wilderness areas within 2 miles of the Selected Route. Most of the scenic and historic areas were addressed during initial analysis of the Project Study Area and were incorporated into the siting analysis conducted for the Selected Route. **Figure 4-7** provides an overview of these culturally and environmentally sensitive features within 2 miles of the Selected Route.

4.0 PUBLIC OUTREACH OVERVIEW

PPL Electric announced its intent to construct the Project in January 2013. Since then, PPL Electric has undertaken activities to provide information on the Project to the public and government officials and to collect input from those audiences.

4.1 Summary of Outreach Activities

- Calls and e-mails to Government Officials – PPL Electric representatives made phone calls and sent e-mails to local government officials to brief them on the project and invite them to the planned open house.
- Letters – PPL Electric sent notification letters to all property owners within a 1,000-foot corridor of the transmission line.
- Fact Sheet – A fact sheet was developed to provide an overview of the project. This document included information on the planned open house. The fact sheet was distributed to property owners in the 1,000-foot corridor, as well as at the open house.
- News Advertisements – PPL Electric announced the open house in an advertisement that ran in the local newspaper, the Pocono Record, on January 2, 2013.
- Open House – PPL Electric held a public open house on Thursday, January 17, 2013 at the American Legion Wilson Fischer Post in Monroe County. The intent of the open house was to provide information and seek community input on the project. The open house provided detailed information about the project and gave attendees the opportunity to ask questions and provide input and information to representatives of PPL Electric.

An exhibition-style format was employed at the public workshop using a variety of displays to explain various aspects of the Project. Displays were staffed by representatives of PPL Electric and other experts who explained the Project to attendees, received feedback and other input from attendees, and answered questions and/or recorded questions for subsequent follow-up. The displays and the literature covered various subjects, such as the electrical need for the line, engineering and construction requirements, right-of-way acquisition procedures, and route-selection procedures.

5.0 SUMMARY AND CONLCUSIONS

The Lake Harmony to Lake Naomi 138/69 kV Rebuild Project siting study was conducted to identify an overhead transmission line alignment that would result in the least amount of impact to the natural and built environments, while satisfying the functional requirements of the project. The methodology identified major constraints in the Project Study Area to develop Alternative Corridors, used a quantitative and qualitative evaluation process to generate and compare Alternative Routes within those corridors, and provided a framework from which to select the Alternative Route most suited for overhead electric transmission lines.

The Project Study Area, Alternative Corridors, and Alternative Routes were generated based on the quantitative evaluation of a comprehensive spatial database developed for the area. The evaluation was conducted from four primary perspectives: (1) protection of the natural environment, (2) protection of the built environment, (3) engineering considerations, and (4) a simple composite of the three perspectives. The quantitative evaluation was supplemented by a qualitative assessment and review by a Siting Team composed of experts in fields associated with transmission line siting, design and construction, as well as environmental assessments, permitting, and public outreach.

The following alternatives were evaluated for the Project Study Area:

- Two Alternative Routes were identified within the Lake Harmony Substation to Jack Frost Substation Segment,
- Four Alternative Routes were identified within the Jack Frost Substation to Arrowhead Lake Tap Pole Segment,
- Five Alternative Routes were identified within the Arrowhead Lake Tap Pole to Wagners Substation Segment,
- Four Alternative Routes were identified within the Wagners Substation to Lake Naomi Substation Segment,
- Three Alternative Routes were identified within the Lake Naomi Substation to Long Pond Substation Segment, and
- Four Alternative Routes were identified within the Long Pond Substation to Lake Naomi Tap Pole Segment.

Quantitative metrics were calculated and compared for each route within a specific segment. A qualitative assessment was also conducted between each of the routes within

a specific segment. Based on these evaluation processes the Siting Team chose the following alternative routes to collectively be the Selected Route for the Lake Harmony to Lake Naomi 138/69 kV Rebuild Project:

- Alternative Route A for the Lake Harmony Substation to Jack Frost Substation Segment,
- Alternative Route D for the Jack Frost Substation to Arrowhead Lake Tap Pole Section,
- Alternative Route G for the Arrowhead Lake Tap Pole to Wagners Substation Segment,
- Alternative Route M for the Wagners Substation to Lake Naomi Substation Segment,
- Alternative Route R for the Lake Naomi Substation to Long Pond Substation Segment, and
- Alternative Route T for the Long Pond Substation to Lake Naomi Tap Pole Segment.

This alignment is illustrated in **Figure 4-6**.

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Attachment 5

ATTACHMENT 5
LAKE HARMONY-LAKE NAOMI 138/69 KV REBUILD PROJECT
DESIGN & ENGINEERING DESCRIPTION

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1.0 INTRODUCTION

PPL Electric Utilities Corporation ("PPL Electric") seeks approval from the Pennsylvania Public Utility Commission (Commission or PUC) to site and reconstruct approximately 24 miles of single-circuit 138/69 kV transmission line between the Lake Harmony 69-12 kV Substation and Lake Naomi Tap Pole. The Project will convert the existing line from single-circuit 138/69 kV to double-circuit 138/69 kV operation The new transmission line will be designed and constructed for future 138 kV operation, but initially will operate at 69 kV until load growth in the area makes it appropriate to increase the operating voltage.

As explained in **Attachment 2**, the proposed Lake Harmony – Lake Naomi 138/69 kV Rebuild Project is necessary to resolve projected violations of PPL Electric's "Reliability Principles & Practices" ("RP&P") guidelines.

The estimated costs to site, design, and construct the Lake Harmony – Lake Naomi 138/69 kV Rebuild Project is approximately $33.3 million. This cost includes the siting, design, and construction of the proposed 138/69 kV transmission line rebuild. Construction is scheduled to commence in September 2014 to meet the Project's scheduled in service date of December 2016.

2.0 PROPOSED ACTIVITY

PPL Electric proposes to rebuild approximately 24 miles of existing single-circuit 138/69 kV overhead transmission line to improve system reliability in the region. This project is to convert the existing line from single-circuit 138/69 kV to double-circuit 138/69 kV operation between the Lake Harmony 69-12 kV Substation and the Lake Naomi Tap Pole. The pole line will support two (2) circuits and must also connect to four existing Substations and/or Tap locations (Jack Frost 69-12 kV Substation, Arrowhead Lake Tap Pole, Wagners 69-12 kV Substation, and Lake Naomi 69-12 kV Substation) and one proposed 69-12 kV Substation (Long Pond 69-12 kV Substation Docket # A-2013-2347931). In general, the preferred route for the new line will be a replacement of the existing line, within existing PPL Electric right-of-way. The preferred route does contain an approximately one mile long re-route, away from the existing line outside of existing PPL Electric right-of-way, near the Wagners Substation. The re-route section requires PPL Electric to acquire a new 100 foot wide right-of-way.

The proposed line will be designed to accommodate double-circuit 138 kV capability per PPL Electric's current 138 kV line specifications, supporting six (6) 556 kcmil[1] 24/7 ACSR[2] "Parakeet"[3] conductors and two 48 single mode fiber (SMF) optical ground wire (OPGW) that will be supported in a vertical configuration. Based on preliminary engineering, the new line will require the installation of approximately 226 steel mono-pole structures with an average height of 115 feet. The average spans between the structures will be approximately 600 feet. The new structures will be made from self-weathering tubular steel equipped with steel arms and will be either direct embedded or installed on concrete caisson foundations as necessary. The existing line segment consists of 428 structures (see **Figure 5-1** for a photo of a typical existing structure) with an average span length of 290 feet.

3.0 DESIGN CONSIDERATIONS

The proposed line construction described above will be designed to meet, and generally exceed, all National Electric Safety Code standards. Design specifications and safety rules practiced by PPL Electric are described in **Attachment 10**. The minimum conductor to ground clearance for the proposed line will be 30 feet, which occurs at a maximum conductor temperature of 125°C. The design minimum conductor clearances and conductor thermal ratings are set forth in **Table 5-1** and **Table 5-2** below.

[1] kcmil stands for thousand circular mils. kcmil wire size is the equivalent cross sectional area in thousands of circular mils. A circular mil is the area of a circle with a diameter of a thousandth (0.001) of an inch.
[2] ACSR stands for aluminum conductor steel reinforced.
[3] Parakeet is the technical term for a 556 kcmil 24/7 ACSR conductor defined in the American Society for Testing and Materials.

TABLE 5-1
DESIGN MINIMUM CONDUCTOR CLEARANCES
FOR 556.5 KCMIL 24/7 STRANDING ACSR "PARAKEET"

Condition	Double-Circuit Design Clearance-to-Ground
Normal load; average weather (16°C ambient temperature)	35.8 feet
Predicted extreme thermal load (125°C conductor temperature)	30.0 feet
Predicted NESC Extreme wind load (100 mph, 16°C)	32.8 feet
Predicted extreme weather conditions (1/2 inch ice, 8 lbs. wind, -18°C)	35.0 feet

*Clearances based on a maximum tension of 7,000 pounds at 1/2 inch ice, 0° F, 8# wind And a ruling span of 650 feet.

TABLE 5-2
CONDUCTOR THERMAL RATING
556.5 KCMIL 24/7 STRANDING ACSR
(257°F) 125°C MAXIMUM CONDUCTOR

Condition	Ambient Temperature °C	Wind Speed Ft/sec	Ampacity Amps
Summer Normal	35	0	800
Winter Normal	10	0	923
Summer Emergency	35	2.533	1047
Winter Emergency	10	2.533	1180

4.0 MAGNETIC FIELD MANAGEMENT PLAN

PPL Electric's Magnetic Field Management Program, summarized in **Attachment 11**, 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 minimum five feet higher than the required NESC ground clearance and reverses 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.

The company 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. PPL Electric's Magnetic Field Management Program has been developed to implement that policy decision. Consistent with the program, PPL Electric will construct for minimum five feet higher than the required ground clearance for the proposed 138/69 kV line. PPL Electric will select the optimal circuit/phase arrangement to achieve the lowest magnetic field practical. The phasing arrangement may need to match to the existing lines at the connection/tap points. PPL Electric will make all practical attempts for magnetic field reduction.

5.0 SPECIFIC RIGHT OF WAY REQUIREMENTS

Right-of-Way width is determined by structure type, design tensions, span length, and conductor "blowout" (the distance the wires are moved by a crosswind). In general, the route for the new line will be within existing PPL Electric right-of-way. The existing right-of-way varies in width generally between a minimum of 70 feet and a maximum of 100 feet, although there is a short section which is 200 feet in width. The route does contain an approximately one mile long re-route, away from the existing line outside of existing PPL Electric right-of-way, near the Wagners Substation. The re-route section requires PPL Electric to acquire a new 100 foot wide right-of-way from two separate property owners. To date, PPL Electric has acquired one of the two required easements and has an agreement in principle with the Pennsylvania Game Commission for the other required easement. PPL Electric does not need to acquire any other land rights in order to construct the Project.

Cross sectional views of the ROW are illustrated in **Figures 5-2 through 5-4**. Aerial maps of the selected line route (see **Attachment 4 Map Pocket**) show the location of the proposed route, identify the properties that are traversed by the selected route, and show the ROW widths. Additionally, a list of all persons owning property within the ROWs is included in **Attachment 8**.

6.0 CONSTRUCTION TECHNIQUES AND EXECUTION FOR TYPICAL SINGLE POLE 138 KV TRANSMISSION LINES

The following is a summary, non-technical explanation of the typical construction activity that is associated with new transmission line construction for single poles, which are either a direct burial or with a concrete foundation. This is not to be misconstrued as all encompassing and may vary with specific site/service conditions at each project. Each of the steps listed below will not necessarily be in this particular order:

- The project manager will review the construction plans with PPL Electric personnel that would be constructing the line specifically reviewing all permits and conditions that apply such as erosion and sediment control, wetland encroachments and storm water management, as well as any agreements made with specific property owners for work done on their lands.
- Professional land surveyors will stake the locations of all poles to be constructed, as well as the edge of rights of way and locate any wetland or streams previously sited in field work.
- All wetlands/waters would have been previously delineated in the field, located by land surveyors and specifically shown to the construction manager prior to work commencing.
- During the installation of the roads, poles, and hanging of the wire, approved "best management practices" will be implemented to assure that the soil will be stabilized and not erode during storm events while under construction. Any temporary wetland encroachments (usually roads) will be removed according to the permit conditions. Whenever practical PPL Electric will utilize timber matting in wetland areas to minimize disturbance to the wetland vegetation and topography.
- PPL Electric has a vegetation management manual which provides specific direction for tree clearing activities. Not all vegetation will be removed. The manual specifies that only vegetation that will hinder the construction of the line or pose a safety or maintenance issue after the line was constructed be removed. Those trees, shrubs and ground cover located on construction roads as well as those at the location of the poles and the crane pads necessary

for setting them will be removed. Other selected trees that would interfere with operation of the line will be cut to their stumps and stacked upon the edge of the right of way for the landowner. Brush can be chipped and piled on the right of way for use by the landowner, or spread to allow it to decay while serving as wildlife cover. No trees or chips will be stockpiled in any regulated wetlands and no stumps would be pulled.

- Construction roads will be constructed, usually about 14 to 16 feet in width, with a stone surface to support the equipment that will be transporting materials to the pole sites. Those vehicles are usually cranes, concrete trucks (if foundations are involved), boom trucks, and pickups. The roads will be built as provided for in the construction drawings as per the erosion and sediment control plan; the NPDES permit plan, and/or the wetland encroachment permit plan. The plan may require these roads to be temporary in nature, returning back to vegetative cover when the work is complete. Landowners may wish to have the roads remain intact for shared use between PPL Electric for line inspection and maintenance and property owner use. Much of the routine maintenance to the line, once built, will be by helicopter or 4 wheel drive pickup truck.
- The poles will be installed by the use of auger and then crane. After the hole is drilled to it necessary depth, usually less than 12 feet in diameter, the anchor bolts will be set and filled with reinforced concrete. The top of the foundation may extend above the ground an average of 1 foot.
- Once the poles are in place along the line route, the wires will be installed using bucket trucks to attach the wires to each pole and equipment and manpower will be used to pull the wires along from pole to pole. Helicopter stringing/pulling may be utilized in the areas of restricted access or environmental sensitive.
- The project manager will oversee the stabilization of the site including the successful establishment of vegetation on all previously disturbed areas during construction. The regulatory agencies will be kept informed of PPL Electric's progress on the project, and regular inspections by the regulatory agencies will occur.

Typical examples of the proposed structures are depicted on **Figures 5-2** through **5-4** below.

FIGURES

Figure 5-1: This figure shows an example of the existing wood pole framing found on the 24 mile line section. The majority of structures are wood poles with wood upswept arms, framed for single circuit operation.

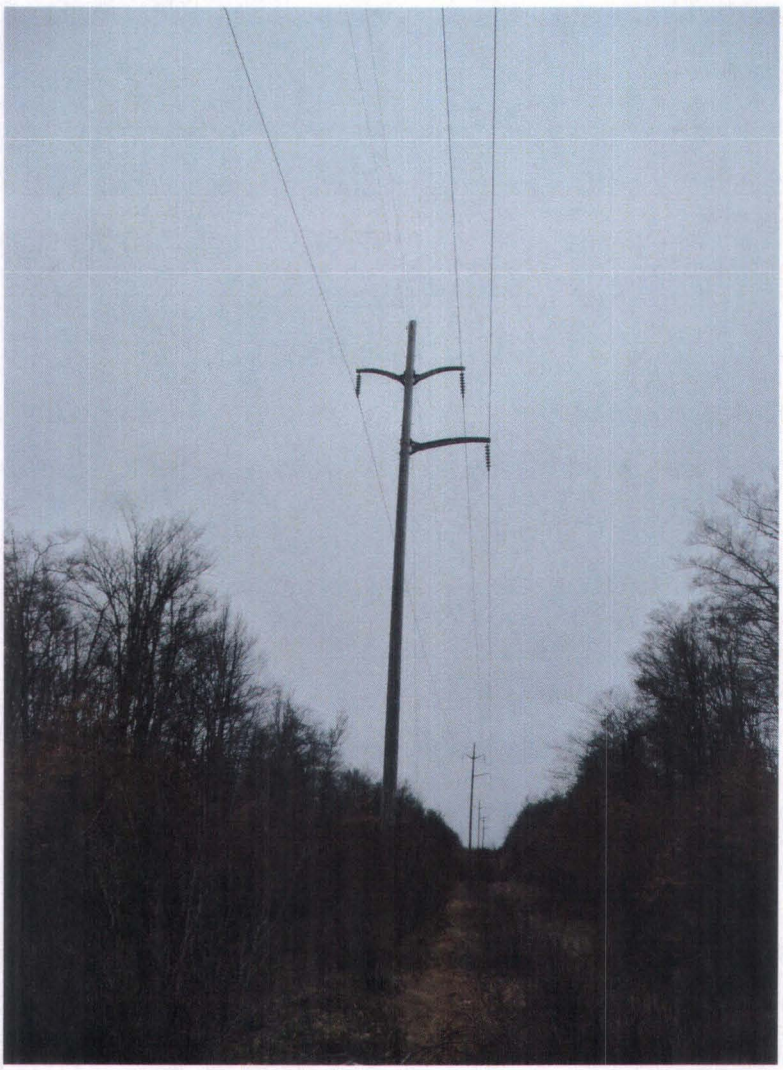


Figure 5-2: This is an example of a typical 138 kV suspension structure that will be installed. This figure also shows the typical cross sectional view of a 100' wide ROW.

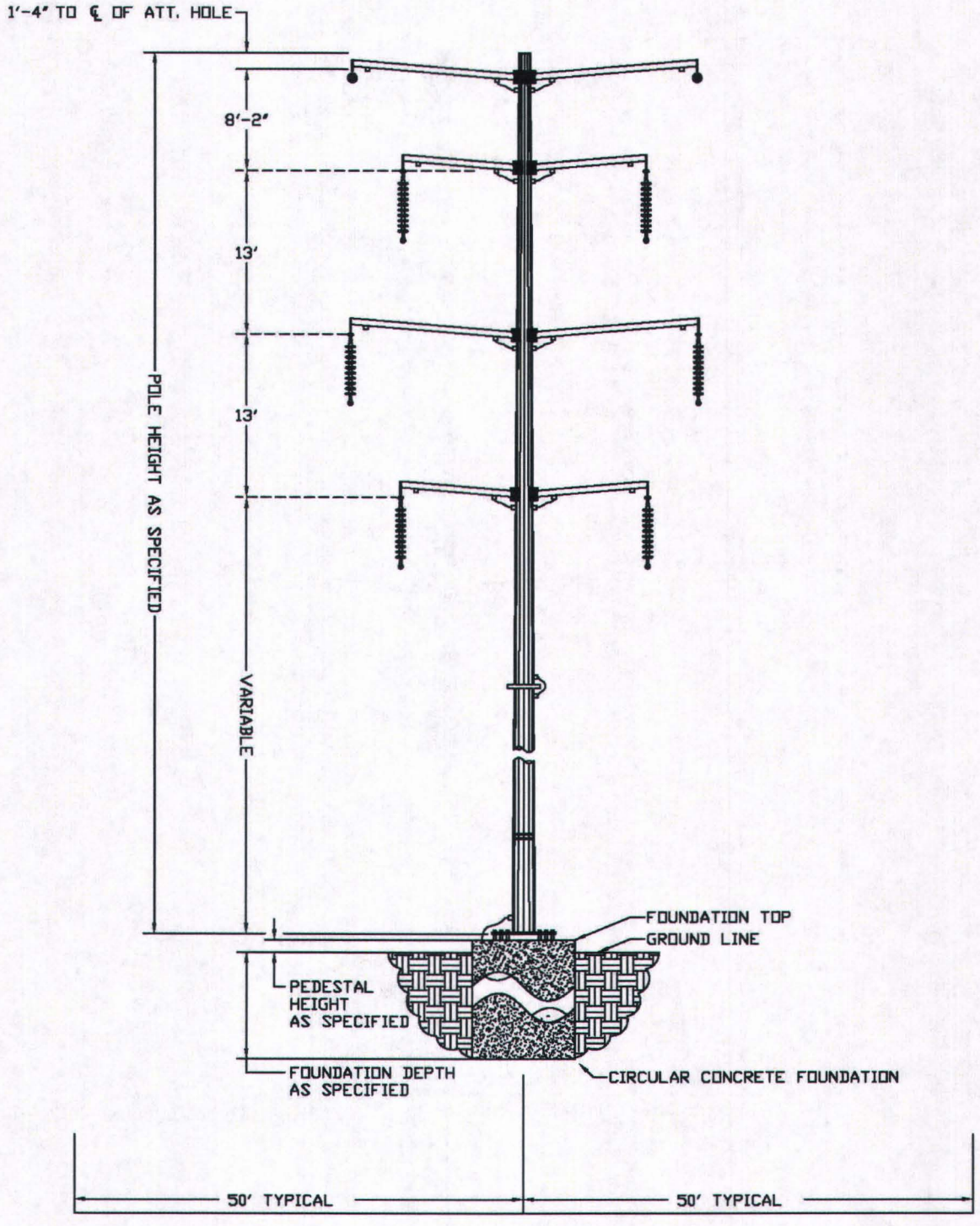


Figure 5-3: This is an example of a typical 138 kV tension structure that will be installed. This figure also shows the typical cross sectional view of a 100' wide ROW.

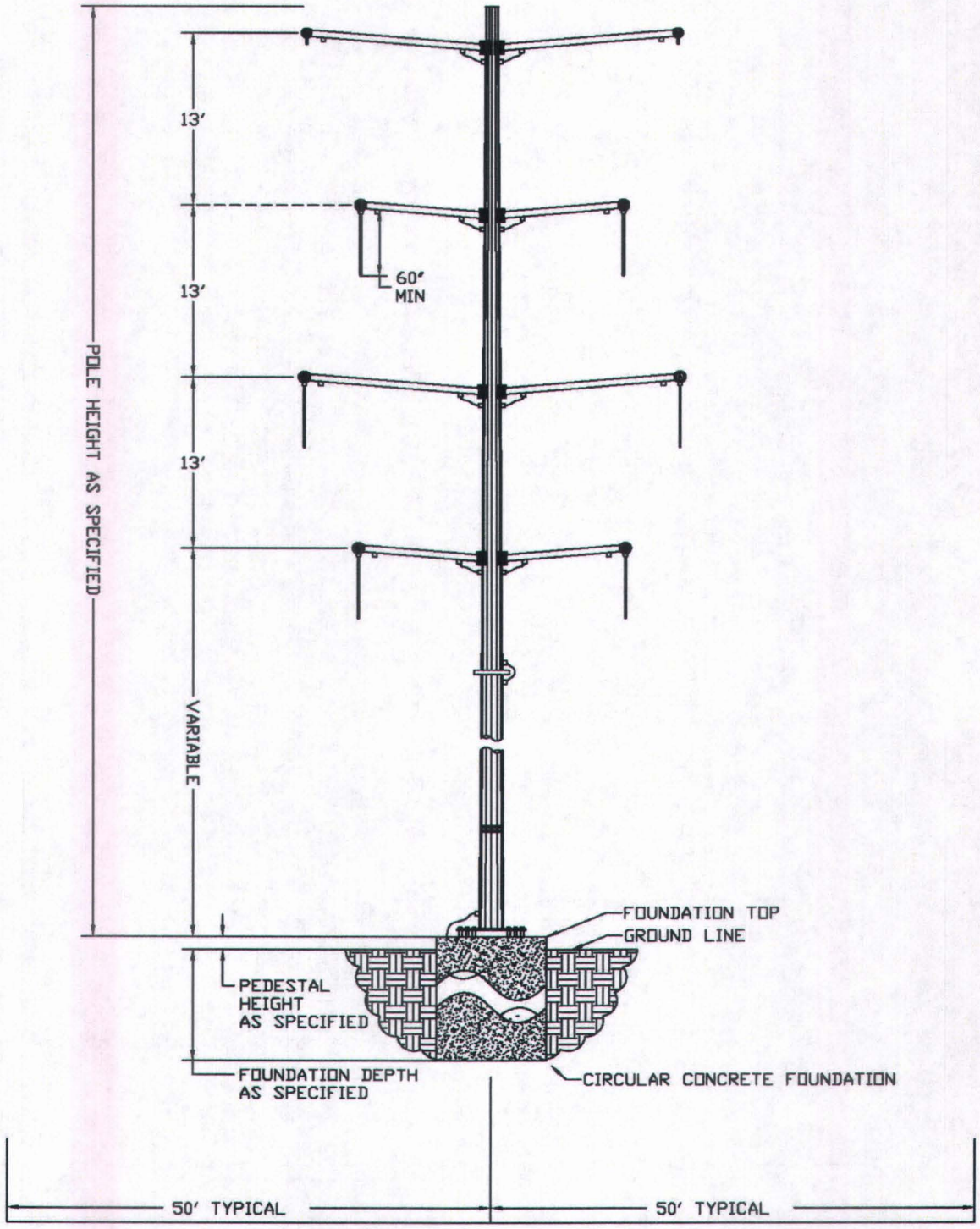
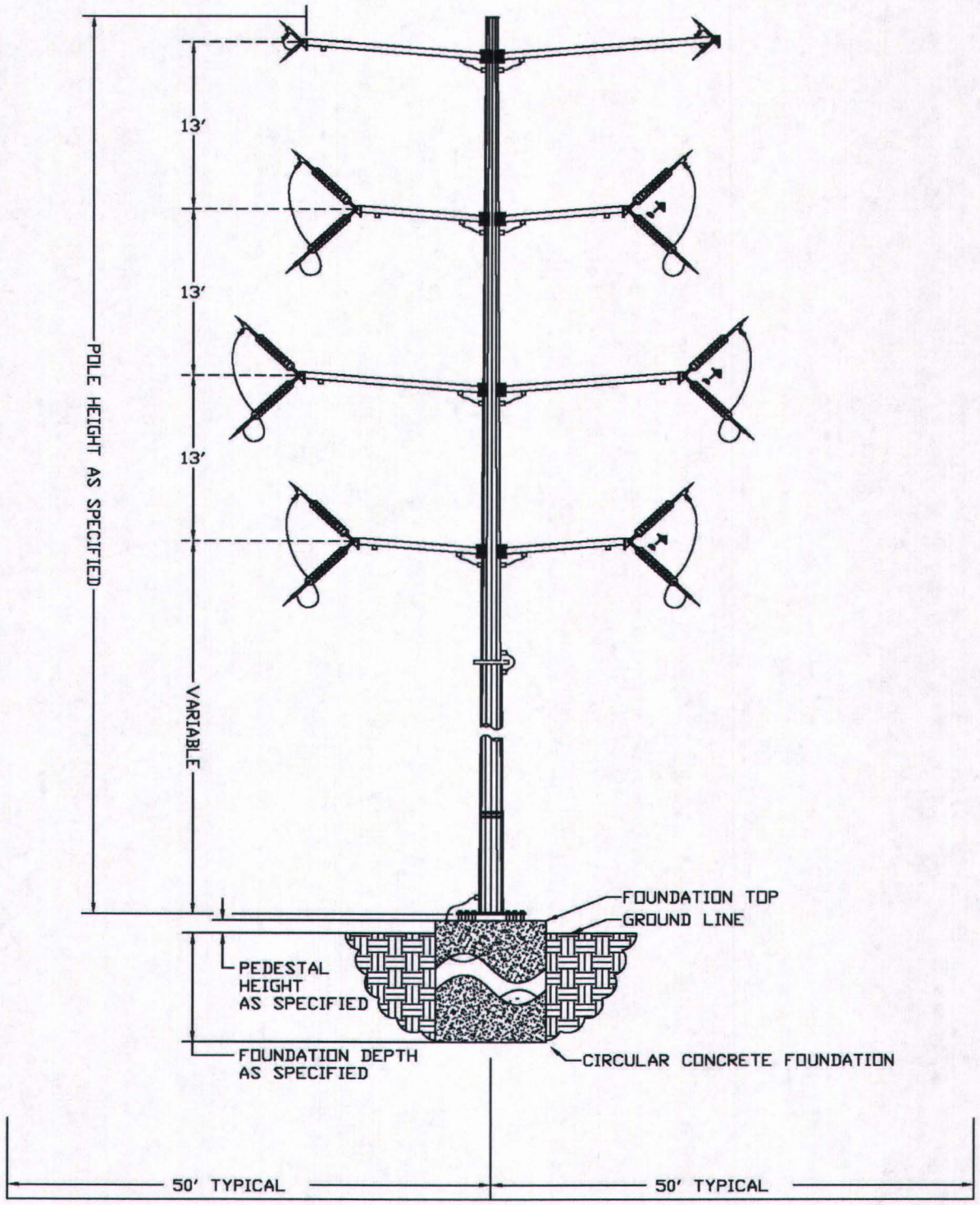


Figure 5-4: This is an example of a typical 138 kV angle tension structure that will be installed. This figure also shows the typical cross sectional view of a 100' wide ROW.



Attachment 6

ATTACHMENT 6
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
VEGETATION MANAGEMENT

Specification For
Initial Clearing and Control Maintenance
Of Vegetation on Or
Adjacent To Electric Line
Right-of-Way through Use Of
Herbicides, Mechanical,
And Hand-clearing Techniques
LA-79827-8

PPL ELECTRIC UTILITIES CORPORATION
Allentown, Pennsylvania

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I. SCOPE

This document describes methods and procedures for all transmission (69 kV and above) line right-of-way vegetation management practices, including: clearing, timber and slash disposal, use of herbicides, and specifying means of line access.

Methods and procedures for transmission line right-of-way erosion control practices, including access road construction, are contained in a separate document; Specification for Soil Erosion and Sedimentation Control on Transmission Line Rights-of-Way (A-118231).

II. CLEARING REQUIREMENTS

A. Conductor-to-Vegetation Clearances and Right-of-Way Widths

PPL Electric Utilities Corporation ("PPL Electric") has established minimum conductor-to-vegetation clearances and right-of-way widths to be cleared for each transmission line voltage (Table 1). These conductor-to-vegetation clearances are defined by the conductor positions between maximum vertical sag ("max sag") and a 30° conductor blowout.

Any clearing or chemical treatment performed on the right-of-way must adhere to these requirements:

1. The entire right-of-way width, as listed in **Table 1**, shall be treated.

2. Any vegetation, which could grow into the wire security zone (defined in **Table 1**), shall be treated to remove this hazard[1]. As more fully discussed in **Section III**, the treatment could involve cutting to ground line, pruning, or applying herbicides, depending on the type of clearing specified. However, in any case, sufficient vegetation shall be removed to create an additional space beneath the wire security zone (defined in **Table 1**) to allow for growth that would occur between scheduled treatments.

   Figure 1 and **Figure 2** illustrate the security zone concept and how the right-of-way should be cleared or maintained to keep the zone intact.

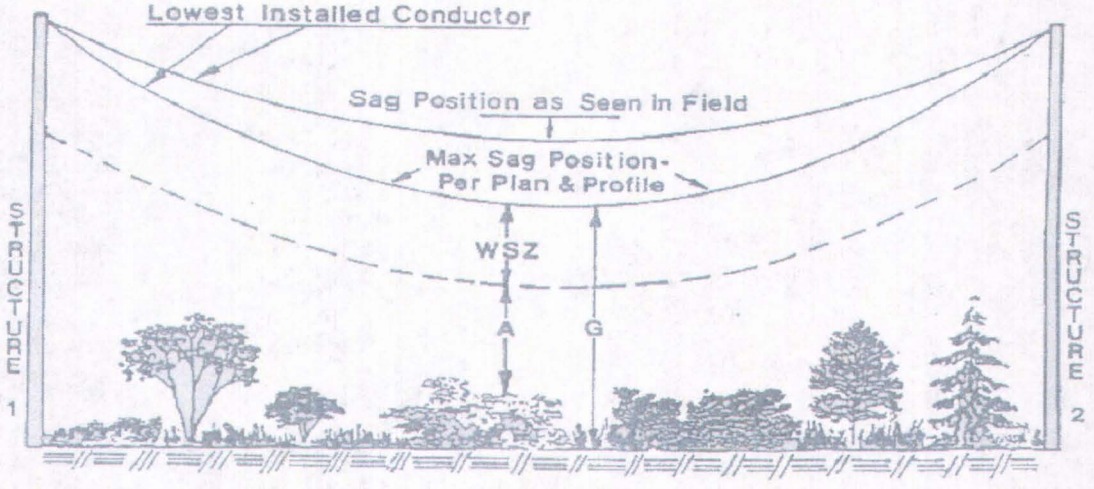
B. Danger Trees (**Figure 2** and **Table 2**)

To ensure line reliability, vegetation management operations must extend to trees located outside the clearing widths given in **Table 1**, which present a hazard to the line. These "danger trees" are those that, in falling, would either strike the conductor or pass within the minimum conductor clearances noted in **Table 2** and

[1] No corrective remediation pruning actions required for encroachments of WSZ (only) where maximum-sag conductor conditions have been identified, species acceptability- per PPL EU Specification LA-79827-8 confirmed, and vegetation growth has been determined to be maximized or vegetation is dead.

shown on **Figure 2**. Danger trees should be removed or pruned as specified at the time of treatment. The PPL Electric representative identifies all danger trees during line clearing/maintenance operations.

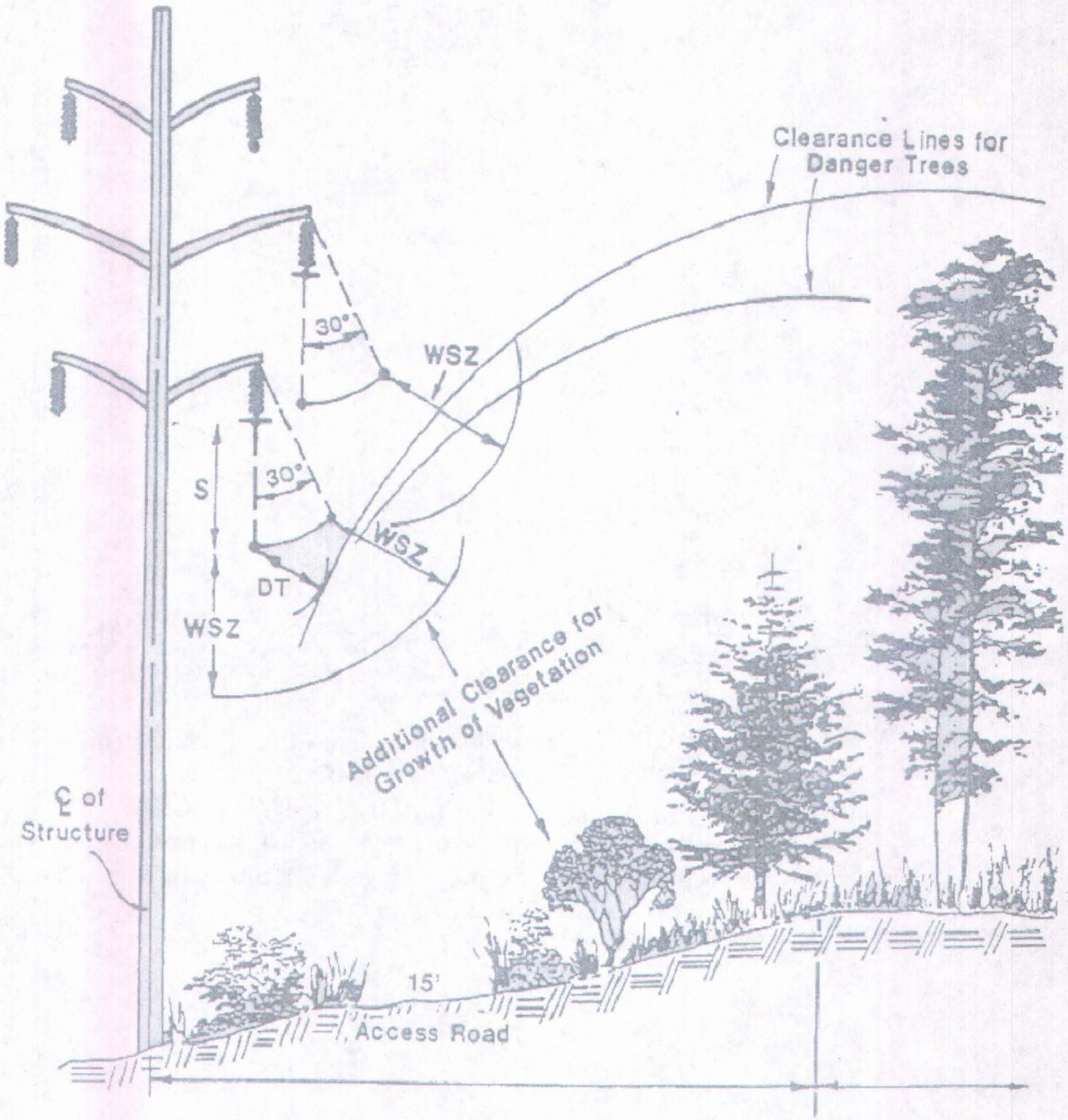
FIGURE 1: TRANSMISSION LINE PROFILE WIRE SECURITY ZONE AND VEGETATION CLEARING



G = Max Sag Ground Clearance – Determined from Line Plan & Profile
WSZ = Wire Security Zone (Table 1)
A = Additional Clearance to allow for Growth of Vegetation
A = 5' per year apical (Under), 2' per year lateral (Around)
(WSZ + A) = Minimal Acceptable Clearance from Vegetation to Conductor at Time of Maintenance (Table 1)

FIGURE 2: TRANSMISSION LINE CROSS SECTION[1]
WIRE SECURITY ZONE AND DANGER TREE CLEARING

S = Maximum Sag of Conductor
WSZ = Wire Security Zone (Table 1)
DT = Danger Tree Clearance (Table 2)



Required R/W Clearing Width (**Table 1**)

[1]To avoid repetition only one-half of the R/W is shown.

Danger Tree Width Limit

TABLE 1: Right-of-Way Clearing Widths And Conductor-to-Vegetation Clearances

Line Voltage	Clearing Width[1]	IEEE Distance[2]	Wire Security Zone (Figure 1, "WSZ)	Minimum Acceptable Clearance from Vegetation to Conductor at Time of Maintenance[3][4] Figure 1, (WSZ + A) Under / Around
69-138 kV	100'		7'	22'/ 13'
230 kV	150'	5.2'	10'	25'/ 16'
500 kV	200'	8.9'	17'	32'/ 23'

(1) Older lines may have right-of-way agreements specifying different widths. These agreements shall either be followed as written or renegotiated to meet the tabled clearing widths given above.

(2) Radial clearance to be maintained between vegetation and conductors under all rated electrical operating conditions.

(3) Clearance to be achieved at the time of vegetation maintenance work wherever possible (see **Table 1**, WSZ and 'A' in **Figure 1**). This distance is necessary to allow for vegetation growth until the next maintenance cycle and to maintain the minimum wire security zone separation. Compatible vegetation (defined in **Table 3**) that will never grow into the Wire Security Zone is excluded from this minimum clearance requirement

(4) No corrective remediation pruning actions required for encroachments of WSZ (only) where maximum-sag conductor conditions have been identified, species acceptability- per PPL EU Specification LA-79827-8 confirmed, and vegetation growth has been determined to be maximized or vegetation is dead.

TABLE 2: Clearance for Danger Trees

Line Voltage	Danger Tree Clearance (Minimum Conductor Clearance – Falling Vegetation)
69-230 kV	5'
500 kV	10'

III. CLEARING PROCEDURES

A. Specific Procedures for Each Clearing Method

Starting in 2010, PPL Electric will be implementing the Wire Zone/ Border Zone (WZ/BZ) method of managing our transmission rights of way. This method of vegetation management is to be applied where practical and is not meant to be the sole management technique used on the transmission facilities.

1. Changes to Incorporate WZ/BZ

Clearing requirements as defined below are to be applied to those Right-of-Way conditions that are currently being treated with herbicide and re-clearing treatment applications.

Wire Zone – **Figure 1&2** (above) and WZ/BZ diagram below

- Defined as that area of the right of way corridor that extends from the centerline to a distance ten (10) feet from the outer most conductors. All species listed in Table 3 under the headings of "Small Shrubs" and "Native Grasses, Ferns, and Herbaceous Plants" shall be preserved to the greatest extent possible in the Wire Zone.

Border Zone – **Figure 1&2** (above) and WZ/BZ diagram below

- Defined as that area of the right of way corridor that extends from the limits of the Wire Zone (see **Section III** Clearing Requirements A.1. Wire Zone) to the cleared limits of the established right of way.

- All compatible species (**Table 3**) or other species noted to not pose a clearance threat shall be preserved where possible. Those, which would violate the wire security zone before the next scheduled treatment, shall be removed.

- As can be seen from **Figures 1 and 2**, in most cases, more of the taller compatible species can be retained at the right-of-way edges and closer to the line structure locations, where distance to the lowest conductor is usually greatest.

- All "noncompatible" or other species that exhibit growth characteristics that pose clearance concerns species shall be removed to the greatest extent possible.

- All trees and brush—both compatible and noncompatible species—shall be removed from access roads (15' width); in work areas (stringing cuts, vegetation disposal areas, structure erection areas); and within a 15' perimeter of a tower or immediately adjacent to any structure location.

Exceptions may occur where landscaped plantings have been propagated adjacent to facilities and these plantings do not interfere with accessibility to such facilities.

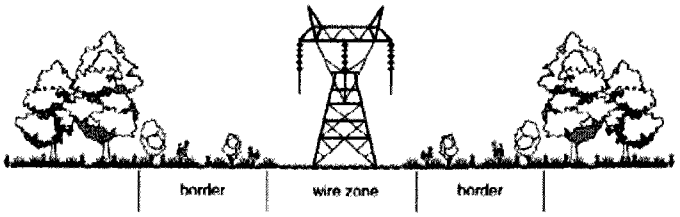
Wire Zone-Border Zone Vegetation Management

- With the Wire Zone-Border Zone VM, the typical right of way is show as below. Two distinct zones are identified:

1. The wire zone is typically defined as that area from centerline to 10' past the outer most set of conductors in either direction. The total width of the wire zone will vary by voltage class and easement definitions.
2. The border zone is that area of the right of way that extends from the wire zone to the limits of the defined width row.
3. The areas outside of the border zone are managed for hazard trees.

UTILITY VEGETATION MANAGEMENT FINAL REPORT

Bramble and Byrnes Wire Zone – Border Zone
(From Yahner, Bramble and Byrnes, 2000)



6

Where wire zone/ border zone is not appropriate as previously described or cannot be applied due to easement restrictions or other limitations such as site or environmental concerns, the follow procedures shall be followed

2. Selective Clearing

- All compatible species (**Table 3**) shall be preserved to the greatest extent possible. Those, which would violate the wire security zone before the next scheduled treatment, shall be removed[1].

- As can be seen from **Figures 1 and 2**, in most cases, more of the taller compatible species can be retained at the right-of-way edges and closer to

[1] No corrective remediation pruning actions required for encroachments of WSZ (only) where maximum-sag conductor conditions have been identified, species acceptability- per PPL EU Specification LA-79827-8 confirmed, and vegetation growth has been determined to be maximized or vegetation is dead.

the line structure locations, where distance to the low conductor is usually greatest.

- All "noncompatible" or other species that exhibit growth characteristics that pose clearance concerns species shall be removed to the greatest extent possible.

- All trees and brush—both compatible and noncompatible species—shall be removed from access roads (15' width); in work areas (stringing cuts, vegetation disposal areas, structure erection areas); and within a 15' perimeter of a tower or immediately adjacent to any structure location.

- Exceptions may occur where landscaped plantings have been propagated adjacent to facilities and these plantings doo not interfere with accessibility to such facilities.

3. Restricted Clearing

- All compatible species shall be preserved, wherever possible. Those which would violate the wire security zone before the next scheduled treatment shall be pruned or removed to obtain required "Desired Clearance from Vegetation to Conductor at Time of Maintenance" (defined in Table 1).

- Any non-compatible species, which have violated or would violate the wire security zone before the next scheduled treatment shall be removed[1].

- The remaining non-compatible species shall be preserved until the time comes when they can be removed without causing adverse impacts. This means that smaller (young) trees of noncompatible species are temporarily retained. As an adequate compatible cover becomes established over time, these non-compatible species may be removed.

- The only exception to the above applies to non-compatible trees growing in ravines or gullies or on side hills, where topography is such that they will never reach the wire security zone. In these areas, the non-compatibles, which are originally preserved, should be retained over the life of the line.

- All trees and brush—both compatible and non-compatible—shall be removed from access roads, work locations, or near structures, as described under Selective Clearing.

[1] No corrective remediation pruning actions required for encroachments of WSZ (only) where maximum-sag conductor conditions have been identified, species acceptability- per PPL EU Specification LA-79827-8 confirmed, and vegetation growth has been determined to be maximized or vegetation is dead.

TABLE 3

Compatible Species List*(does not include Horticultural plant varieties)

1. SMALL TREES

   a) Flowering Dogwood *(Cornus florida)*

   b) Redbud *(Cercis canadensis)*

   c) Hawthorn *(Crataegus spp.)*

   d) Blue Beech (American Hornbeam) *(Carpinus caroliniana)*

   e) Shadbush (Juneberry, Serviceberry) *(Amelanchier spp.)*

   f) Eastern Red Cedar *(Juniperus virginia)*

   g) Northern White Cedar *(Thuja occidentalis)*

   h) American Chestnut *(Castanea dentata)*

   i) Dwarf Willow *(Salix spp.)*

   j) Deciduous Holly (Winterberry) (Ilex *verticillata)*

2. LARGE SHRUBS

   a) Alder (Alnus spp.)

   b) Witch-hazel *(Hamamelis virginiana)*

   c) Spicebush *(Lindera benzoin)*

   d) Common Chokecherry *(Prunus* virginiana)

   e) Elderberry *(Sambucus spp.)*

   f) Rhododendron *(Rhododendron maximum)*

   g) Virburnum *(Viburnum spp.)*

   h) Dogwood *(Cornus spp.)*

   i) Smooth (Dwarf) Sumac *(Rhus glabra)*

j) Staghorn Sumac *(Rhus typhina)*

k) Chokeberry *(Pyrus arbutifolia)*

3. SMALL SHRUBS (does not include horticultural varieties)

a) Mountain Laurel *(Kalmia latifolia)*

b) American Yew-Ground Hemlock (Taxus *canadensis)*

c) Sweetfern *(Comptonia peregrina)*

d) Honeysuckle *(Lonicera spp.)*

e) Huckleberries *(Gaylussacia spp.)*

f) Blueberries *(Vaccinium spp.)*

g) Viburnum *(Viburnum spp.)*

h) Meadowsweet *(Spirea spp.)*

i) Wintergreen *(Gaultheria procumbens)*

j) Trailing Arbutus *(Epigaea repens)*

k) Blackberry *(Rubus allegheniensis)*

l) Raspberry *(Rubus occidentalis)*

m) Hazlenut *(Corylus spp.)*

n) Scrub Oak *(Quercus spp.)*

4. ALL NATIVE GRASSES, FERNS AND HERBACEOUS PLANTS.

*These species are to be preserved wherever possible. Some of the taller trees and shrubs may be removed or pruned to establish the "Minimum Acceptable Clearance from Vegetation to Conductor at Time of Maintenance" as defined in **Table 1**. Woody growth must also be removed around structures, on access roads, and in construction activity areas (e.g., vegetation disposal areas. stringing cuts, structure erection areas).

4. Tree Pruning

Tree pruning is not considered the preferred management technique to provide clearances for vegetation located within an active right of way. Removal of vegetation that poses a clearance concern is the preferred method of management.

All trees will be pruned by the guidelines detailed in the most current revision of the American National Standard for Tree Care Operations-Tree, Shrub and Other Woody Plant Maintenance – Standard Practices (ANSI A300). All pruning cuts should be made back to lateral branches at least one-third the diameter of the limb being removed or to the branch collar at the parent stem.

No dead wood shall be removed unless it either endangers the reliability of the line or such action is authorized by PPL Electric's designated representative.

Every effort shall be made during the pruning process, to prevent damage to surrounding property and/or the tree itself. Tree climbers or hooks will not be permitted in any urban tree to be pruned. They will, however, be permitted in any tree to be removed or in rural trees to be pruned, unless objected to by the property owner.

Every effort shall be made to prune trees by the following acceptable methods:

If pruning is to be considered, the following guidelines are given:

Directional Pruning (only to be completed with PPL EU authorization)
This is the preferred pruning technique to be utilized when a tree is located directly under the conductor or located within the right of way corridor. In order to achieve "Minimum Acceptable Clearance from Vegetation to Conductor at Time of Maintenance" (defined in Table 1), entire branches and/or branches that have laterals growing towards the conductor(s) should be removed. All cuts should be made back to lateral branches that grow away from the conductor(s).

Crown Reduction (only to be completed with PPL EU authorization)
This technique is to be utilized when a tree is located under the conductors and directional pruning is not feasible. In this situation, all top branches must be pruned back to lower the crown of the tree to achieve the "Minimum Acceptable Clearance from Vegetation to Conductor at Time of Maintenance" (defined in Table 1). When feasible, entire branches that have sprouts from old topping cuts growing towards the lines should be removed.

Side Pruning (only to be completed with PPL EU authorization)
This method of pruning is utilized when a tree grows adjacent to the conductors. In this situation, it is necessary to remove the side branches extending into the right of way zone. When the parent stem of a tree is at the edge of the right-of-way, limbs protruding into the right-of-way should be removed at the branch bark collar on the main stem.

Any exceptions to the above methods of pruning will only be performed at the discretion of and with the approval of the appropriate Company representative.

B. General Procedures for All Clearing Methods

For all types of clearing specified, the following procedures should be followed:

- All cutting shall be done selectively
- Trees shall be felled in a manner to minimize damage to those trees or shrubs, which are to be preserved. This is particularly essential in performing Restricted Clearing.
- In cutting, all stumps shall be cut as low as possible to the ground. Stump heights should not exceed 3" for smaller trees (less than 1' diameter), while stump heights of 6" or less are acceptable for larger trees or where physical obstructions prevent cutting next to the ground (e.g., rocks, fencing). Stumps shall be cut parallel to the ground, with no sharp splinters or points remaining.
- Special care shall be taken in clearing near ornamentals or any type of cultivated tree, shrub, or vine.
- If areas are encountered that have already been cut over, any tree stubs of an excessive height shall be re-cut to the heights specified above.
- Danger trees shall be pruned or removed, as previously described under "Clearing Requirements".

IV. DISPOSAL OF CLEARED VEGETATION

In accordance with state and federal environmental regulations and policies, it shall be the policy of PPL Electric that no vegetation disposal (e.g.. piling, drop and lop, chipping, burning, etc.) shall occur in known or suspected wetland areas.

Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

A. Specific Procedures for Each Disposal Method

1. Piling and Slash

(a) Timber (6" or larger in diameter).

- All timber shall be placed in neat piles along the edge of the right-of-way, away from areas of preserved compatible vegetation. Under normal conditions timber piles will be interspersed with slash piles.

- Timber shall be stacked in tree length piles unless otherwise specified, in piles not greater in length than the longest tree length. A separation of at least 10' shall be provided on either side of each pile.

- All access roads, trails and streams (including their banks) shall be kept clear. Piling shall not be done where piles would be highly visible from any improved road.

(b) Slash

- All slash (i.e., trees less than 6" in diameter, tree tops, limbs) shall be stacked in flattened mounds along the edge of the right-of-way, away from areas of preserved compatible vegetation.

- Slash piles shall be dressed of excessively protruding limbs and compacted to keep visual obstruction to a minimum. Generally, they should not exceed 5-6' in height, except where site conditions are such that higher piles are acceptable (e.g., depressions, rough terrain in remote areas). Compaction of piles may be facilitated by use of equipment employed in the associated clearing operation.

- The length of a slash pile should not be any greater than a tree length timber pile, and its width limited so as not to interfere with access road construction or conductor stringing. A separation of at least 10' shall be provided on either side of each pile.

- All roads, trails, and streams (including their banks) shall be kept clear. No piling shall be undertaken where piles would be highly visible from any improved roads, at other locations involving high public visibility, or near tower or pole sites.

2. Drop and Lop

- All noncompatible vegetation shall be cut so that it falls toward the edge of the right-of-way, away from any designated access paths. After trees are felled, all long limbs shall be removed from the trunk, and the tree shall be bucked in order to keep the vegetation as close to the ground as possible.

- If necessary, trees and/or slash shall be moved to create a clear way for access and wire stringing, as needed.

3. Chipping

- All timber shall be stacked, according to the procedure described under "Piling," above.

- All slash shall be fed through a mechanical chipper immediately after cutting.

- Unless otherwise specified, chips shall be randomly scattered on the right-of-way, except in the following areas: fields, along city streets, park areas, or on the banks of streams, or ponds. In such areas, chips must be disposed of at an acceptable site, either on or off the right-of-way.

4. Burning

- All burning shall be undertaken only when safe burning conditions exist. Burning is not permitted within any air basin designated by the Pennsylvania Department of Conservation and Natural Resources. If outside an air basin, local ordinances shall be reviewed for restrictions.

- In starting fires, the use of rubber tires is prohibited. During burning operations, careful watch (patrols) shall be maintained, so long as a fire

hazard exists and hot embers are present in the bum piles. If burning conditions deteriorate, burning operations shall cease.

- When a fire is reduced to charcoal and ash, it shall be raked open to prevent hot embers from *remaining in* the ash piles. This shall only be done when fire danger is low.

B. General Procedures for all Disposal Methods

- The procedure and equipment used should minimize disturbance to both the right-of-way soil cover and to the vegetation that is to remain on the right-of-way.

  Specifically:

  Wheeled or tracked vehicles shall be equipped with brush rakes or forks with teeth protruding at least 8" below any bar or cutting edge. The use of bulldozer blades to handle slash or timber shall not be permitted.

  Track vehicles shall be equipped with grouser pads and operable winches with at least 50' of cable.

- All vehicles shall be equipped with cabs, to protect the operator from falling limbs and trees and to ensure the vehicle can withstand rolling accidents

- All felled trees, logs, slash, brush, and chips shall be removed beyond designated flood areas wherever possible with minimal disturbance to the soil and remaining tree roots. Where not possible, slash will be compacted in such a manner that it will not be carried away by high water. Chips should be spread and covered with soil. Every effort should be made to see that marketable wood is salvaged, and at least moved beyond normal flood areas.

- All disposal operations shall closely follow (by no more than 3 days) clearing operations to keep work confined to one area and to prevent unsightly and unsafe conditions.

V. HERBICIDE APPLICATION

A. Methods of Application

1. Four methods are currently accepted by PPL Electric as tools in its vegetation management program: Stump Treatment, Basal Application, and Foliage Application, and Cut –Stubble application.

B. Procedures

1. Specific Procedures and Precautionary Measures for Each Treatment Method

Stump Treatment

Used for the prevention of re-sprouting, stump treatment involves treating cut stumps with either an oil-based mixture or a ready-mixed non-oil solution. This type of treatment is prescribed when vegetation is cut to ground line. Therefore, its primary use is for initial clearing where it is applied to stumps of selectively cleared noncompatible species. However, it is also used for maintenance clearing, when trees have grown too tall for foliage application, and a decision is made to re-cut them to ground line.

Oil-based Stump Treatment

Using hand-held applicators, all newly cut stumps and all exposed roots shall be thoroughly treated as soon as possible after the tree is cut; or, if the label includes this method, all basal bark and root crowns of the trees shall be treated prior to cutting (at least one hour but not more than one day before the tree is cut). In either case, the stump, bark, and exposed roots shall be thoroughly wet to the ground line, unless the label directs otherwise. This type of stump treatment may be done any time during the year, except when snow or ice prevents contact of the herbicide with the stump as required for effective treatment.

Ready-Mix Non-Oil Stump Treatment

Using a hand-held applicator, the sapwood and cambium area of all newly cut stumps shall be thoroughly wet immediately after the tree is cut.

This type of stump treatment may be done any time during the year, except when snow or ice prevents contact of the herbicide with the stump.

Foliage Treatment

Using hand-held applicators, all foliage and stems of noncompatible vegetation shall be thoroughly wet to the point of runoff, unless the label directs otherwise.

For most applications, treatment must be done from the time the plant is fully developed until it begins dormancy. For any foliage treatment which acts as a growth inhibitor (e.g., prevents budding), treatment must be made during late summer or early fall.

Adequate precautions shall be taken when wind direction is toward non-target vegetation, especially sensitive crops. Foliage application shall not be done during high or gusty winds, which will cause drift problems.

To minimize drift of foliage application the applicator shall:

Stand as close as possible to the target vegetation, keeping the spray gun low. If necessary, the target species should be bent over to avoid applying the herbicide solution high into the air.

Use a thickening agent to produce a coarse spray.

Use a nozzle type and pressure, which produce a coarse spray.

Application will be parallel to or toward the center of the right-of-way, not toward right-of-way edges.

Basal Treatment

The lower 12" to 15" of the stem and all the root crowns of noncompatible vegetation shall be completely saturated with the solution, unless the label directs otherwise.

Basal treatment may be done any time during the year, except when snow or ice prevent contact of the herbicide with the roots or stems as required for effective treatment

Cut-Stubble Treatment

This method of application is primarily applied following mechanical mowing operations, but may follow hand-cutting operation as well. Treatment may include low volume Thinvert applications or low volume basal treatment applications with Brown-Brush monitor type equipment.

2. General Procedures and Precautionary Measures for all Treatment Methods

- To ensure that herbicides are applied correctly and safely, all label instructions and precautions must be followed.
- To ensure effective treatment, the target areas of noncompatible species shall be thoroughly treated, as previously described for each treatment method.

- Herbicides shall not be applied during inclement weather, preventing the need for reapplication and reducing the chance of runoff into non-target areas. If rain does occur, application shall not begin until one hour after runoff has stopped. Early morning dew, when foliage is extremely wet, will be allowed to dry before application.

- Herbicides shall not be applied in the following areas (with the exceptions as noted):

  (1) Pasture areas.

  (2) Within 50' of any water body, except stump treatments and herbicides approved for watershed/aquatic use.

  (3) Within any actively maintained orchard or cultivated planting.

  (4) Near susceptible crops or other non-target vegetation, where drift, runoff, or vapors can cause injury. Exact safety distances shall be determined based on wind conditions, topography, soil type, vegetation (crop) type, and label instructions.

  (5) In cases where weather conditions create excessive drift, applications will be temporarily suspended until improved conditions warrant the continuation of the application.

  (6) On rights-of-way under jurisdiction of the Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, and the U.S. Park Service unless prior approval is granted by the Department or Commission.

  (7) On watershed properties, or in the vicinity of springs, irrigation ditches, or other potable water sources, unless prior approval is granted by the property owner for use of a watershed/aquatic approved herbicide.

  (8) In gullies or ravines where tree clearing is minimal.

- Contractor shall have sample or extra labels and material safety data sheets for all herbicides and surfactants being used at the job site at all times.

- Only herbicide application alternatives approved by PPL EU will be used by the Contractor in any given situation.

- For all treatments, used herbicide containers (other than returnable/refillable containers) shall be properly disposed of, in accordance with label instructions and/or applicable regulations.

- Contractor's personnel shall not be permitted to ride on any vehicles while applying herbicides except with prior approval of PPL Electric's representative.

TABLE 4

Approved Herbicides and Spray Mixtures

I. HERBICIDES

Trade Name	*Common Name*	*Carrier*
Garlon 3A	Triclopyr	Water
Garlon 4 Ultra	Triclopyr	Arborchem Basal Oil or Water
Tordon 101	Picloram/2,4-D	Water
Pathway	Picloram/2,4-D	None (Ready Mix)
Escort XP	Metsulfuron Methyl	Water
Krenite S	Fosamine Ammoniurn	Water
Rodeo	Glyphosate	Water
Accord Concentrate	Glyphosate	Water
Arsenal - Powerline	Imazapyr	Water
Habitat	Imazapyr	Water
Stalker	Imazapyr	Basal Oil or Water
Pathfinder II	Triclopyr	None (Ready Mix)
Milestone	Aminopyralid	Water

II. SPRAY MIXTURE ALTERNATIVES

Alternative 1

- Hydraulic (High Volume stem foliar) Application

Garlon 3A	½% (2 Quarts)
Tordon 101	½% (2 Quarts)
Arborchem Clean Cut or Approved Equivalent	¼% (1 Quart)
Water	98-3/4 Gallons
Drift Control Agent[1]	

or

- Back Pack - Power/Hand Operated (Low Volume) Application

Garlon 3A	3%
Tordon 101	3%
Arborchem Clean Cut or Approved Equivalent	1%
Water	93%
Drift Control Agent[1]	

Approximate Spray Season :[2] on or about first week of June through the middle of September.

Application: Hydraulic - Thorough wetting (leaves, stems, and root collars) to point of runoff, of all undesirable species of trees.

Back Pack - Hand or power operated (low-volume) - Wetting of leaves and stems of all undesirable species of trees.

Alternative 2

- Hydraulic (High Volume) Application

Krenite S	1.5% (6 Quarts)
Arsenal - Powerline	4 Ounces/100 gal
Arborchem Clean Cut or Approved Equivalent	¼% (1 Quart)
Water	98-1/4 Gallons
Drift Control Agent[1]	

or

- Back Pack- Power/Hand Operated (Low Volume) Application

Krenite S	5% (5 Gallons)
Arsenal – Powerline or Habitat	½% (2 Quarts)
Arborchem Clean Cut or Approved Equivalent	1% (4 Quarts)
Water	93-1/2 Gallons

or Ultra Low Volume Thinvert Backpack Application

Krenite S	7% (7 Gallons)
Arsenal – Habitat	1% (4 Quarts)
Escort XP	4 ounces/ 100 gal
Thinvert RTU	92 Gallons

Approximate Spray Season:[2] On or about the first week of June to the beginning of fall leaf coloration.

Application: The foliage of all undesirable species of trees must be thoroughly wet.

Alternative 3

- Low Volume
  Basal Application

Garlon 4 Ultra	25% (25 Gallons)
Stalker	1% (1 Gallon)
Arborchem Basal Oil	74 Gallons

- Low Volume
  Basal Application

Garlon 4	25 Gallons
Arborchem Basal Oil	75 Gallons

Approximate Spray Season [2] Apply at any time during the year except when snow or water prevents spraying to ground line.

Application: Spray the basal parts of all undesirable species of trees to a height of 12-15 inches from the ground. Spray to wet, no run-off.

Alternative 4

- Hydraulic (High Volume) Application

Accord Concentrate	1% (4 Quarts)
Arsenal – Habitat	4 ounces /100 gal
Arborchem Aquatic Surfactant or Approved Equivalent	2 Quarts
Water	98-1/2 Gallons
Drift Control Agent[1]	

or • Back Pack- Power/Hand Operated (Low Volume) Application

Accord Concentrate	5 Gallons
Arsenal – Habitat	½ % (2 Quarts)
Chemsurf 90 Surfactant or Approved Equivalent	1% (4 Quarts)
Water	93-1/2 Gallons
Drift Control Agent[1]	

or • Back Pack- Power/Hand Operated (Ultra Low Volume Thinvert) Application

Accord Concentrate	7% (7 Gallons)
Arsenal – Habitat	1% (4 Quarts)
Escort XP	4 ounces / 100 gal
Thinvert RTU	92 Gallons

Approximate Spray Season [2] Mid to late June until the end of September.

Application: The foliage of all undesirable species of trees must be sprayed to attain uniform coverage, although not necessarily to run-off.

Alternative 5

- Hydraulic (High Volume) Application

Garlon 3A	¾ % (3 Quarts)
Escort XP	1 Ounce/100 gal
Arborchem Clean Cut or Approved Equivalent	¼% (1 Quart)
Water	99 Gallons
Drift Control Agent[1]	

or • Back Pack- Power/Hand Operated (Low Volume) Application

Garlon 3A	4% (4 Gallons)
Escort XP	2 Ounces
Arsenal - Powerline	½% (2 Quarts)
Chemsurf 90 or Approved Equivalent	1% (4 Quarts)
Water	94 -1/2 Gallons
Drift Control Agent[1]	

Approximate Spray Season: On about the first week of June until the beginning of fall leaf coloration.

Application: Apply as a full coverage spray to foliage, stems, and limbs or all undesirable species of trees.

Alternative 6

- Hydraulic (High Volume) Application

Krenite S	1.5% (6 Quarts)
Arsenal - Powerline	4 Ounces/100 gal
Escort XP	1 Ounce/ 100 gal
Arborchem Clean Cut or Approved Equivalent	¼% (1 Quart)
Water	98-1/4 Gallons
Drift Control Agent[(1)]	

- Back Pack - Power/Hand Operated (Low Volume) Application

Krenite S	5% (5 Gallons)
Arsenal – Powerline or Habitat	½% (2 Quarts)
Escort XP	4 Ounces/100 gal
Arborchem Clean Cut or Approved Equivalent	1% (1 Gallon)
Water	93-1/2 Gallons
Drift Control Agent[(1)]	

or

Ultra Low Volume Thinvert Backpack	
Krenite S	7% (7 Gallons)
Arsenal – Habitat	1% (1 Gallon)
Escort XP	4 ounces/100 gal
Thinvert	92 Gallons

Cut-Stubble Applications:

Alternative 7

- Thinvert Application
  (applied at 5 Gallons /ac)

Tordon K	(2 Quarts)
Arsenal - Habitat	1 pint (16 ounces)
Milestone	7 ounces
Thinvert RTU	4.3 Gallons

- Low Volume
  Basal Application

Garlon 4	25 Gallons
Arborchem	75 Gallons
Basal Oil	

Alternative 8

- Thinvert Application
  (applied at 5 Gallons /ac)

Arsenal - Habitat	24 ounces
Milestone	7 ounces
Thinvert RTU	4.75 Gallons

- Low Volume Basal Application

Garlon 4	25 Gallons
Arborchem Basal Oil	75 Gallons

Alternative 9

- Thinvert Application
  (applied at 5 Gallons /ac)

Garlon 4	1.5 Gallons
Tordon K	1 Quart
Milestone	4 ounces
Arsenal - Habitat	12 ounces
Thinvert RTU	3.12 Gallons

- Low Volume Basal Application

Garlon 4	25 Gallons
Arborchem Basal Oil	75 Gallons

Approximate Spray Season [(2)]: On or about the first week of June to the beginning of fall leaf coloration.

Application: The foliage of all undesirable species of trees must be thoroughly wet.

(1) A Drift Control Agent must be added to this alternative at the manufacturer's recommended label rate.

(2) Spray seasons are approximate and subject to change and variation by geographical area.

Note: PPL Electric reserves the right to modify spray formulations within permissible limits set forth in the manufacturer's labeled instructions.

VI CONTRACTOR RESPONSIBILITIES

Contractor shall:

- Conduct all work as specified by PPL Electric (in the Clearing Plan and accompanying information) and as documented in right-of-way agreements.

- Follow the specific procedures contained in both this specification and PPL Electric's Specification for Soil Erosion and Sedimentation Control on Transmission Line Rights-of-Way (A-118231).

- Notify the Company representative of any changes that may be required in the Clearing Plan, including requests made by property owners.

- Make changes to Clearing Plan only upon Company written authorization.

- Provide all supervision, labor and equipment necessary for execution of the work. All equipment must meet PPL Electric specifications as described on page 17. All personnel must be adequately trained in the vegetation management techniques they practice, including species identification skills.

- Notify all property owners prior to start of any work involving initial clearing and maintenance procedures on previously cleared lines.

- Contractor personnel directly involved in contacting customers are required to have identification, complete with photograph, associating them with their employer.

- This identification will be prominently displayed while engaged in customer contact activities.

- Begin operations only after notification to proceed is received from PPL Electric. (The Company representative reserves the right to reject any personnel or equipment that does not meet Company's standards.)

- Maintain copies of all permits required by regulatory agencies at the job site, as provided by PPL Electric.

- Confine all activities to the limits shown on the Clearing Plan, or as detailed by PPL Electric, except for approved off-line access and Company-specified danger tree clearing. This includes storage of

equipment and materials, and exercise of proper care to avoid damage and litter outside these limits.

- Keep all roads open to traffic, as per the Pennsylvania Department of Transportation's "Work Zone Traffic Control" (67 PA Code, Chapter 203).

- Keep PPL Electric apprised of the progress of work on a daily basis, either verbally and/or through a daily work activity report as required by the Company representative.

- Regrade and seed according any deep cuts, ruts, stump holes, mounded areas, or general soil disturbance caused by the vegetation management operations when, in the opinion of the Company representative, they could cause future ground erosion or interfere with line access.

- Clean up all slash and rubbish resulting from work as the work progresses, leaving the area in a condition satisfactory to the Company representative.

- Provide adequate liability coverage, as specified by PPL Electric in the request for bids.

Clearing

- Prune or remove all danger trees as directed by a Company representative.

- Take precautions to preserve all surveyed stakes, hubs, and property comers. Those destroyed shall be replaced at Contractor's expense.

Herbicide Applications

- Possess an appropriate Commercial Applicator/Technician certification and pesticide application business license, in compliance with the Pennsylvania Pesticide Control Act of 1973, amended in 1986, Act 167.

- Maintain a record of all required property owner contacts on log sheets provided by PPL Electric. These records will be submitted to the appropriate Company representative at: (1) his request and (2) the completion of each line.

- Mix the herbicide solution according to Company specifications and label instructions.

- All target species will be adequately treated to produce the necessary control. A responsible Contractor Representative will review all prior year herbicide applications for quality control. The Contractor shall retreat at his own expense until the desired results are obtained.

- Vehicles used for application and property owner contacts must have Contractor identification of suitable size lettering as approved by the Company representative.

- Provide herbicide samples to the Company representative.

Vegetation Disposal

- Haul chips to acceptable disposal sites, either on or off the right-of-way, if specified by the Company.

- Assure that marketable wood is piled on its respective property.

- Assume responsibility for damage or injury resulting from burning operations

- Meet these safety requirements when burning:

  (1) Perform burning only upon Company authorization.

  (2) Notify the local Fire Department, Bureau of Forestry (District Office) of the Pennsylvania Department of Conservation and Natural Resources, and the Company representative prior to conducting a burning operation on a daily basis.

  (3) Provide adequate fire fighting equipment at the site of any burning activity. This equipment shall include Indian Fire Tanks and Rich Fire Rakes (or equivalent) mechanized fire fighting equipment (motor driven high-pressure pump and tank units), and a quantity of water sufficient to extinguish any outbreaks.

  (4) Provide continuous patrolling (day and night) as long as fire danger is high and hot embers exist in any of the bum piles.

  (5) Report to the Company representative any fire which burns beyond the right-of-way limits, and notify the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, (District Office) if additional help is needed to regain control of the fire.

Line Access

- Comply with all pertinent provisions of applicable local, state, and federal environmental regulations whenever using/constructing access roads.

- If access is required through a visual screen, the access road shall cross the screen at an angle to prevent a direct view down the right-of-way.

- Access roads along the right-of-way shall stay as close to the centerline as possible, to avoid clearing larger vegetation that may remain at the right-of-way edges.

- Access roads shall attempt to avoid springs, seeps, or other bodies of water found along the right-of-way.

- If temporary access is required prior to the completion of permanent access construction, all work shall be done so as to minimize erosion, ground disturbance, and siltation. Temporary bridges or culverts shall be constructed across streams, and corduroy roads used in wet areas.

- Review with the Company representative all existing roads, culverts, or bridges (either private or public) that form a portion of Contractor's means of access to the right-of-way. The Contractor shall take whatever steps the Company representative deems necessary to ensure that these facilities are restored to at least as good a condition after the Contractor's use as they were originally. At the request of the Company representative, contractor shall immediately repair damaged roads or bridges that would hinder or prevent the owner's or tenant's use.

- Immediately repair or replace all fences or gates damaged by Contractor at Contractor's expense. Any required addition of fence wire, brace posts, gate posts, or associated fence material shall be of new quality and of similar design as existing fence material. Install gates if so noted in the contract. The type of gate shall be specified by PPL Electric, which shall provide all gates or gate materials. Work shall be done under an hourly rate, according to the specifications provided by PPL Electric.

- Where existing usable fences are attached to trunks of trees to be felled, the trees shall be cut at a length approximately 6" above the top wire strand, unless otherwise specified. The continuity of all electric fences shall be maintained.

- Adequate care shall be taken to assure that gates are not left open or fences left in such condition that the property owner's livestock can

escape. If existing fences or gates along a right-of-way are in a state of disrepair prior to the start of clearing and could allow livestock to escape, the property owner shall be so notified.

- The Contractor will take the necessary safety precautions to prevent injury to human life or damage to property and shall carry on his operations with a minimum of interference to traffic or inconvenience to the public. All applicable rules and regulations of OSHA and the Pennsylvania Department of Transportation shall be strictly adhered to. Any and all accidents or incidents resulting in injury to workmen or the public or damages to Company facilities (whether causing an interruption or not) will be reported to PPL Electric immediately.

- In the event of a work related interruption or upon identification of an imminent threat, the contractor shall:

1. If needed, call 911 for medical assistance.
2. Contact PPL VM, i.e. Forester or LCI with location and nature of event
3. If PPL VM personnel can not be contacted, contact the regional PPL S.O., or P.D.
4. Contact contractor management as needed.
5. If required, keep bystanders out of harms way and remain clear of any downed conductors until PPL crews isolate any safety concerns.

Attachment 7

ATTACHMENT 7
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
LIST OF GOVERNMENTAL AGENCIES, MUNICIPALITIES AND OTHER PUBLIC ENTITIES CONTACTED

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0053
File No. ER 2011-1843-089-A
Contact: Mr. Douglas C. McLearen, Chief

U.S. Fish and Wildlife Service
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850
USFWS Project # 2012-0522
Contact: Pam Schellenberger

Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
P.O. Box 8767
400 Market Street
Harrisburg, Pennsylvania 17105-8767
PNDI # 21735
Contact: Frederick Sechler, Jr.

Pennsylvania Fish and Boat Commission
450 Robinson Lane
Bellefonte, Pennsylvania 16823-9620
SIR # 40135
Contact: Bob Morgan

Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, Pennsylvania 17110-9797
Contact: Olivia A. Mowery

Carbon County Commissioners
P.O. Box 129
Jim Thorpe, Pennsylvania 18229
Contacts: Wayne Nothstein – Chairperson

Carbon County Planning Commission
P.O. Box 210
Jim Thorpe, Pennsylvania 18229-0210
Contact: Judy Borger - Chairperson

Monroe County Commissioners
1 Quaker Plaza, Room 201
Stroudsburg, Pennsylvania 18360-2141
Contacts: Greg Christine – Chief Clerk/Administrator

Monroe County Planning Commission
1 Quaker Plaza, #106
Stroudsburg, Pennsylvania 18360
Contact: Christine Dettore - Director

Kidder Township Board of Supervisors
P.O. Box 576
Lake Harmony, Pennsylvania 18624
Contact: Larry Polansky - Chairperson

Coolbaugh Township Board of Supervisors
5520 Memorial Boulevard
Tobyhanna, Pennsylvania 18466
Contact: James Frutchey – Supervisor

Pocono Township Board of Supervisors
P.O. Box 197
Tannersville, Pennsylvania 18372
Contact: Frank Hess – Supervisor

Tobyhanna Township Board of Supervisors
105 Government Center Way
Pocono Pines, Pennsylvania 18350
Contact: Anne Lamberton – Supervisor
Heidi Pickard – Supervisor

Pennsylvania Game Commission
Northeast Region
P.O. Box 220
Dallas, Pennsylvania 18612-0220
Contact: Michael Beahm

The Nature Conservancy
Northeast Office
Hauser Nature Center
P.O. Box, 55 Long Pond Road
Long Pond, Pennsylvania 18334
Contact: Bud Cook

ELECTED OFFICIALS

State Representative Michael Carroll
42 Center Street
Hughestown, Pa 18640

State Senator John Yudichak
1701 Wyoming Avenue
Exeter, Pa 18640

Attachment 8.1

ATTACHMENT 8.1
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
LIST OF PROPERTY OWNERS WITHIN NEW ROW

Commonwealth of Pennsylvania
C/O: PA Game Commission
PA State Game Land # 127
2001 Elmerton Avenue
Harrisburg, Pennsylvania 17110-9762

Emeline L Kitchen & Ian Diener
C/O: Emeline Diener
HC 87 Box 105
Pocono Lake, Pennsylvania 18347

Attachment 8.2

ATTACHMENT 8.2
LAKE HARMONY-LAKE NAOMI 138/69 KV REBUILD PROJECT
LIST OF PROPERTY OWNERS WITHIN OR ADJACENT TO EXISTING ROW

Monroe County

Marco C & Maria J Acosta
981 Cricket Lane
Long Pond, PA 18334

Raymond J & Patricia H Allen
25 Forest Ln
Bronxville, NY 10708

Homer C & Gloria Argot
542 Route 940
Pocono Lake, PA 18347

Mark W & Margaret Mary Argot
1119 Blackberry Road
Pocono Lake, PA 18347

Mary Catherine Argot
Po Box 381
Pocono Lake, PA 18347

Hailu Assefa
Amine, Almaz
330 West 145Th St #607
New York, NY 10039

Bank of America NA
450 E Boundary St
Chapin, SC 29036

Robert M & Mary Ellen Bankus
Po Box 290
Pocono Lake, PA 18347

Raymond Jr & Alisa J Bellavita
27 Doria Dr
Blakeslee, PA 18610

Bethlehem Area Boy Scouts of America
C/O Minsi Trails
Council Bsa Po Box 20624
Lehigh Valley, PA 18002

Daniel H Bitner Jr
Po Box 396
Willow Grove, PA 19090

Blakeslee Sporting Club
905 Wood Street
Conshohocken, PA 19428

Blue Hills Resort Inc
C/O Baliga B D
2465 Bergen Ave
Brooklyn, NY 11234

Blueberry Mountain Realty LLC
57 Seaview Blvd
Port Washington, NY 11050

Holly Bond
Johnson, Steven
45 Maple Ave
Flemington, NJ 08822-1444

Allan R & Rosemarie Borgersen
6 Wolcott Court
Marlboro, NJ 07746

Joesph & Rosemarie Bosch
321 Middletown St
Riverside, NJ 08075

Robert F Boyle
2 Spruce Lane
North Haledon, NJ 07508

Branjay LLC
Mclaughlin & Stern Llp
M Waldenstin-260 Madison Ave
New York, NY 10016

Paul B & Anita L Brown
Po Box 723
Pocono Summit, PA 18346

Mel A & Susan Burchman
1591 Silo Rd
Yardley, PA 19067-4259

Manuel A & Maria C
Bustamante
121 Glade Drive
Long Pond, PA 18334

Michael Caputo
505 Faith Drive
Norristown, PA 19403

Michael J & Pamela A Casal
54 Pierrepont Street
Brooklyn, NY 11201

Eric A & Doris H Chaffee
Trustees
235 Totem Lake Lane
Wyalusing, PA 18853

Ralph Cipriati
1019 Cricket Lane
Long Pond, PA 18334

Judith & Daniel W Coates
415 Sullivan Trail
Long Pond, PA 18334

Andre & Maryellen Colombo
443 Fairview Ave
Colonia, NJ 07067

Community Bible Church of
Pocono Lake Inc
Hc 88 Box 1694
Pocono Lake, PA 18347

Thomas J Conneally
304 Burger Rd
Po Box 822
Blakeslee, PA 18610

Mark S & Toni L Dally
Po Box 1048
Blakeslee, PA 18610

Allen A Daly
Jaugstetter, Olivia J
Po Box 407
Pocono Lake, PA 18347

Seltha Davis
5 Scenic Drive
Blakeslee, PA 18610-3007

Anthony & Vicki Denicker
21 Orchard Ave
St James, NY 11780

Martha A Depierro
26 Hillwood Ct
Staten Island, NY 10305

April Lynn Dobbs etvir
911 Church Rd
Oreland, PA 19075

Gerard F & Grace A Drach
804 Rowland Ave
Cheltenham, PA 19012

Dream Mile Club Inc
C/O Larry Gallagher
6408 Fir Rd
Allentown, PA 18104

Emerald Lake Association Inc
1 Glade Dr
Long Pond, PA 18334

Fan Dancer LLC
201 Route 940 Ste A
Mount Pocono, PA 18344

Fawn Ridge Estates Inc
39 Scenic Dr
Blakeslee, PA 18610

Diana Fontanez
83 30 98Th St Apt 2K
Woodhaven, NY 11421

Jan H & Cyndi L Freeman
266 N 24Th St
Camp Hill, PA 17011

Charles N & Nancy L Gander
Po Box 893
Pocono Lake, PA 18347-0893

Ana E Garcia-Cannella etal
513 Sullivan Trail
Long Pond, PA 18334

Norma D Gayle
Hc 62 Box 147
Long Pond, PA 18334

Adolph & Rosemary E
Goulbourne
Fawn Ridge Estates
167 Scenic Drive
Blakeslee, PA 18610

Roy B & Diane M Greaux
Hc1 Box 1108
232 Thomas Road
Blakeslee, PA 18610

Robert T & Mary L Guglielmi
285 Scenic Drive
Blakeslee, PA 18610

Haines & Kibblehouse Inc
2052 Lucon Road
Skippack, PA 19474

Laurie Harrison
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Attachment 9

ATTACHMENT 9
LAKE HARMONY- LAKE NAOMI 138/69 kV REBUILD PROJECT
LIST OF GOVERNMENTAL AGENCIES, MUNICIPALITIES AND OTHER PUBLIC ENTITIES RECEIVING A COPY OF THIS APPLICATION

COPY RECIPIENTS:

State Agencies

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

Barry J. Schoch, P.E., Secretary
Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, Pennsylvania 17120
Attn: William J. Cressler, Acting Chief Counsel

Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 2063
400 Market Street
Harrisburg, Pennsylvania 17105-8767
Attn: Secretary's Office of Policy

Counties

Carbon County Commissioners
P.O. Box 129
Jim Thorpe, Pennsylvania 18229

Carbon County Planning Commission
P.O. Box 210
Jim Thorpe, Pennsylvania 18229-0210

Monroe County Commissioners
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Stroudsburg, Pennsylvania 18360-2141

Monroe County Planning Commission
1 Quaker Plaza, #106
Stroudsburg, Pennsylvania 18360

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Tobyhanna, Pennsylvania 18466

Coolbaugh Township Planning Commission
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Pocono Township Board of Supervisors
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Pocono Township Planning Commission
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Tobyhanna Township Board of Supervisors
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Tobyhanna Township Planning Commission
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Kidder Township Board of Supervisors
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NOTICE RECIPIENTS:

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State College, Pennsylvania 16801-4850
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Attn: Rebecca Bowen

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

Pennsylvania Fish and Boat Commission
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Attn: Kathy Gipe

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Lehighton, Pennsylvania 18235

Monroe County Conservation District
8050 Running Valley Road
Stroudsburg, Pennsylvania 18360

Property Owners

See list in **Attachments 8.1 and 8.2**

Attachment 10

Attachment 10

PPL 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

	Vertical Clearance to Ground	
Surface Underneath Conductors	NESC Standard	PPL Design
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

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	PPL Design
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

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	PPL Design
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:

Voltage-kV	Minimum Clearance
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.

Attachment 11



MAGNETIC FIELD MANAGEMENT

PPL Electric Utilities Corporation

Attachment 11

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

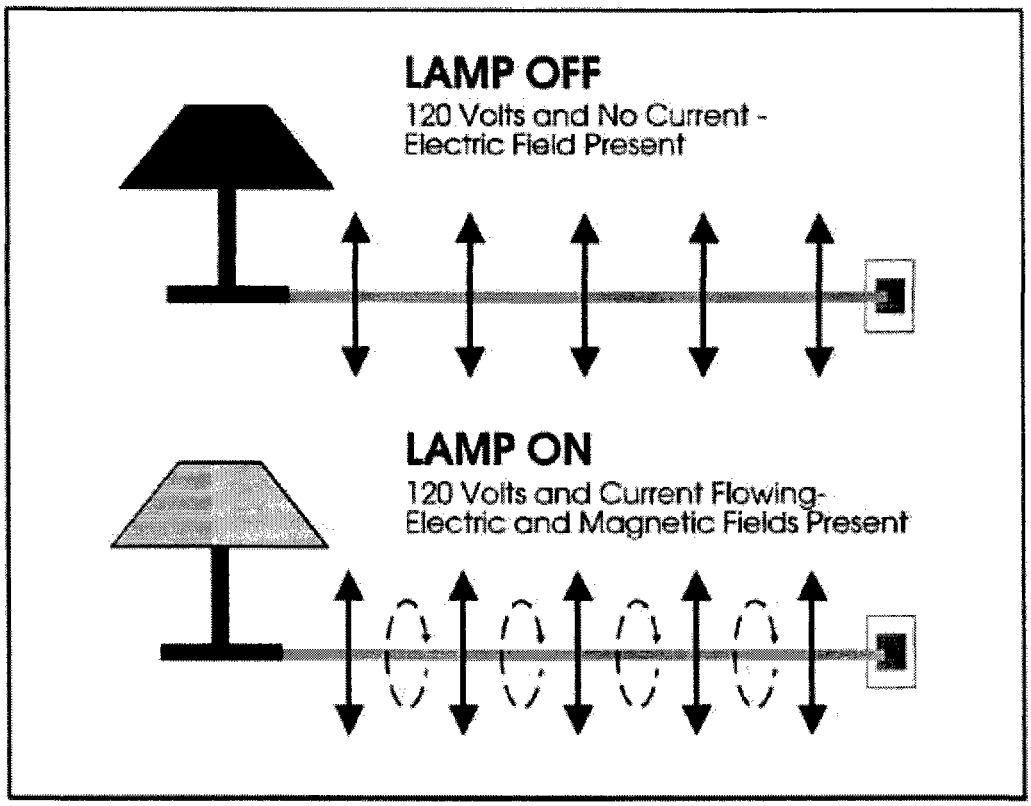

LAMP OFF
120 Volts and No Current -
Electric Field Present
LAMP ON
120 Volts and Current Flowing-
Electric and Magnetic Fields Present

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.

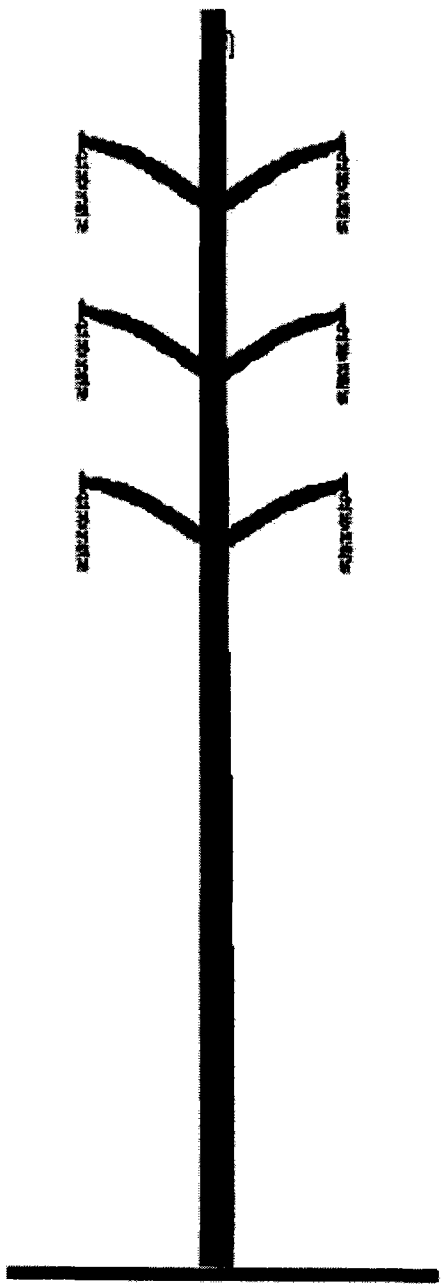
- Main lines are the most heavily loaded sections of a distribution line and therefore have the highest magnetic fields associated with them.
- Increasing the ground clearance by five feet reduces the magnetic field under the line from 14 mG to 11 mG using the standard eight-foot crossarm design. These 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.

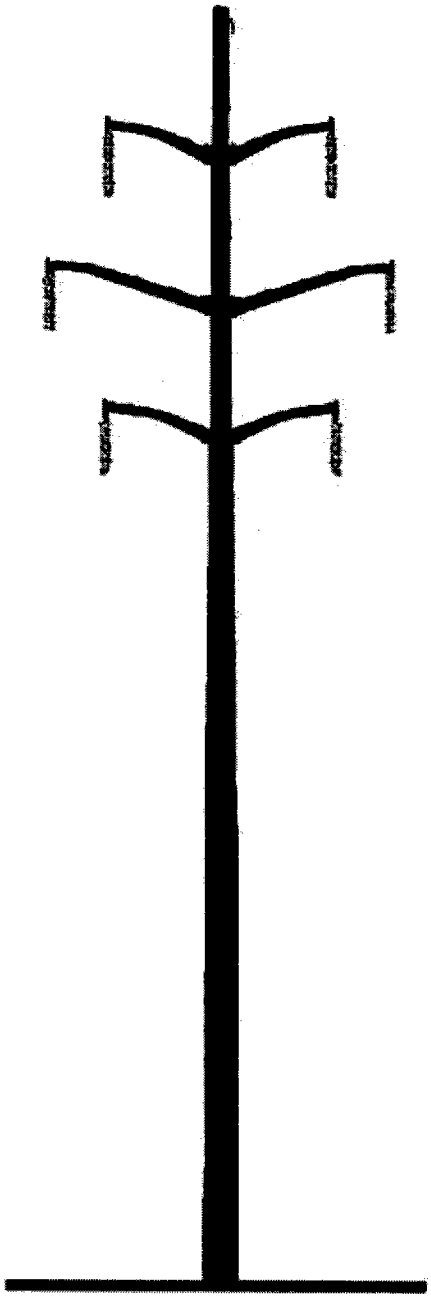
Short-Span Construction



- **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:**

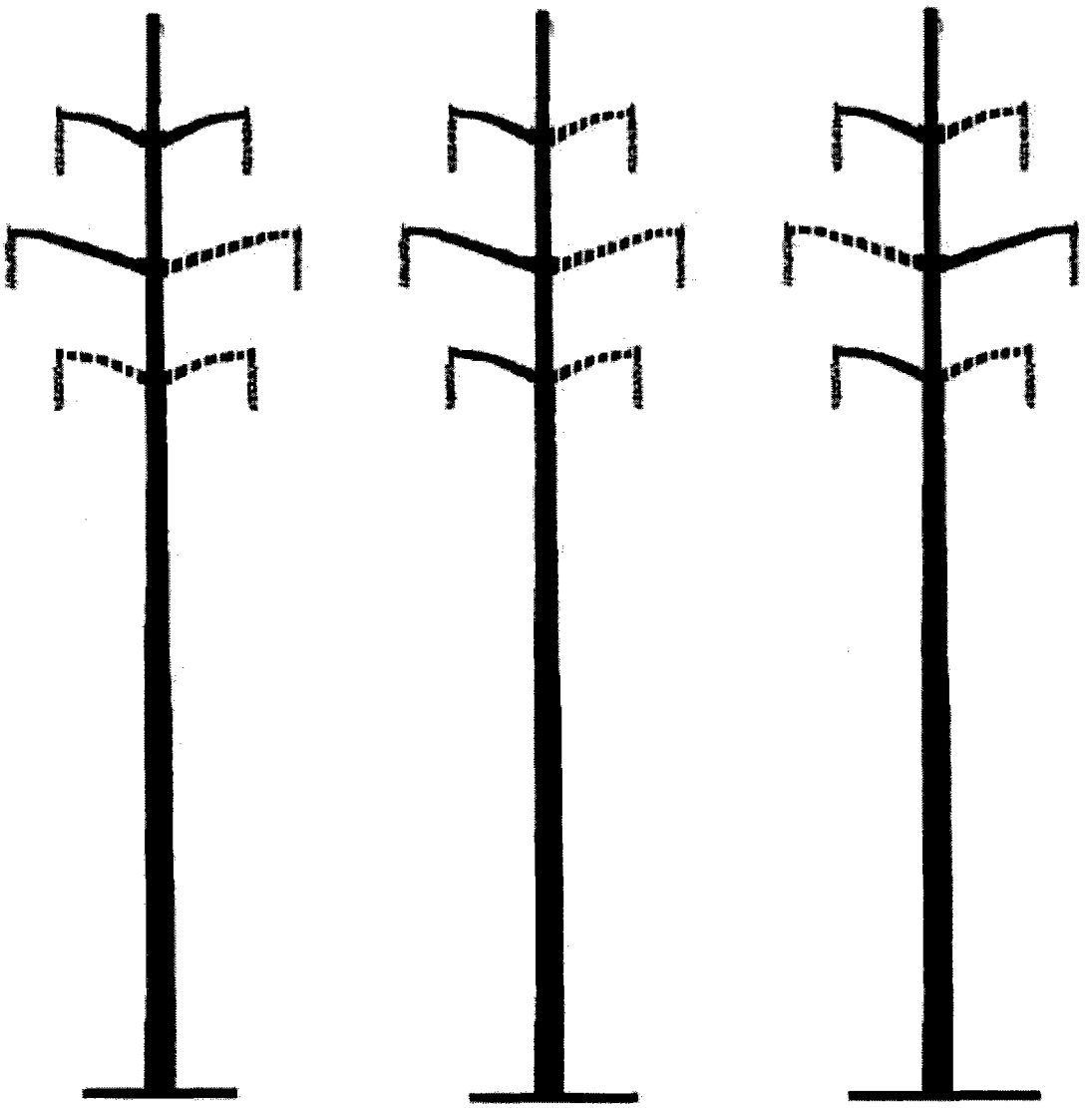
  1 3/8" HS steel overhead ground wire - 17.3 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 23.0 feet sag
  Average span - 600 feet

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

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLLIGAUSS 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



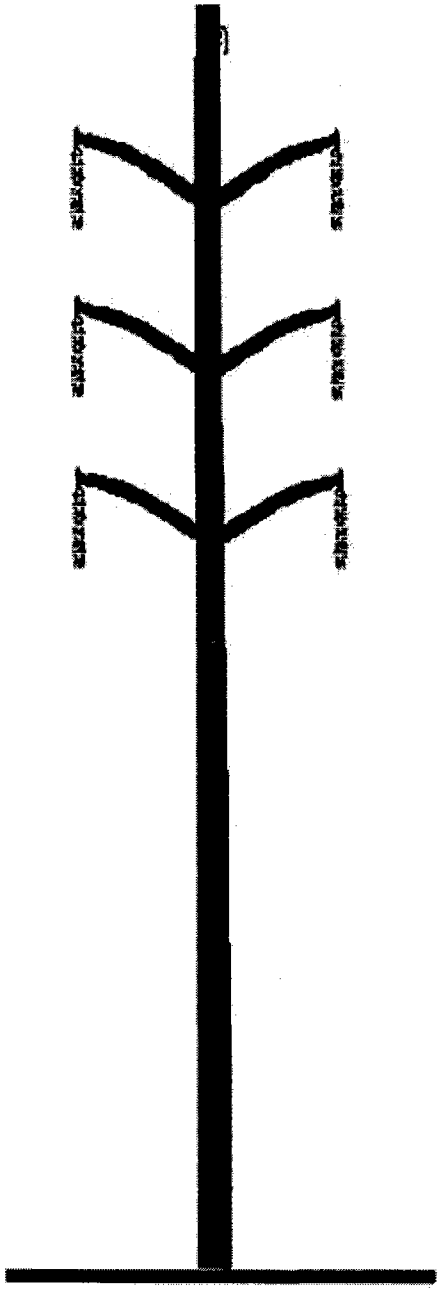
initial single circuit
future second circuit

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.

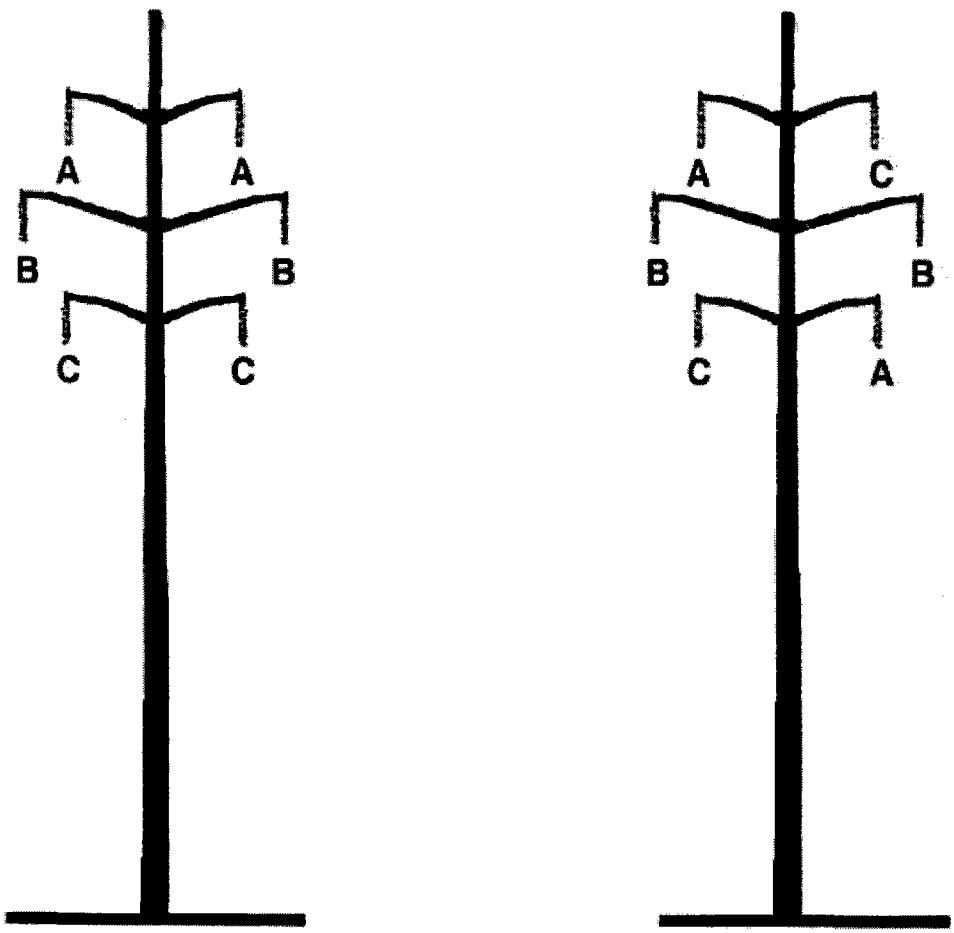
Compact Design Structure



- **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

CHART VIII

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.

CHART IX

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.

CHART X

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.

CHART XI

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.

Siting/Magnetic Field Management.doc/mlt

Attachment 12

ATTACHMENT 12
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
AGENCY COORDINATION

On February 29, 2012, information regarding the Lake Harmony-Lake Naomi 138/69 kV Rebuild Project was provided to the U.S Fish and Wildlife Service (USFWS), the Pennsylvania Fish and Boat Commission (PFBC), the Pennsylvania Game Commission (PGC), and the Pennsylvania Department of Conservation and Natural Resources (PADCNR). This information was submitted in accordance with the Pennsylvania Natural Heritage Program's (PNHP) Pennsylvania Natural Diversity Inventory (PNDI) program, which provides information on the location and status of important ecological resources such as plants, mammals, fish, insects, and natural communities. Correspondences from these agencies regarding the potential presence of these ecological resources within the project area are provided in this attachment. A clearance letter from PADCNR was obtained on May 14, 2013 that acknowledges the presence of five plant species of concern within the Project area but concludes that no impact to these species is anticipated as long as avoidance and minimization efforts are followed.

Information regarding the Project was also provided to the Pennsylvania Historical and Museum Commission (PHMC) in January 2013. The correspondence indicated that the Project would be within close proximity to two National Register-listed sites and two National Register-eligible historic properties. A response from PHMC, dated February 25, 2013, indicates that additional evaluations of potential viewshed concerns will be required. The PHMC further indicated that no archaeological studies are required along the project alignment. During field survey in April 2013, the reviewing architectural historian determined that one of the National Register-eligible buildings (Blue Ridge Real Estate Building) is no longer extant and therefore does not need to be reviewed further for this Project. A letter report documenting this change and addressing the potential viewshed concerns of the other remaining properties will be submitted to PHMC in May 2013.

From: Pamela_Shellenberger@fws.gov
Sent: Wednesday, May 09, 2012 9:13 AM
To: RMellon@mellonbiological.com
Subject: Lake Naomi Tap ; USFWS #2012-0522

Rick,

This email is in regards to the above referenced project. The proposed project is within the known range of the bog turtle (*Clemmys muhlenbergii*), a species that is federally listed as threatened.

If wetlands occur within the project area, their potential suitability as bog turtle habitat should be assessed, as described under "*Bog Turtle Habitat Survey*" (Phase 1 survey) of the enclosed *Guidelines for Bog Turtle Surveys*. This Phase 1 survey should evaluate all wetlands within the project action area. The project "action area" includes all areas that will be directly or indirectly affected by the proposed project (including all phases of multi-phased projects) and all project-associated features, such as roads, water and sewer lines, utility lines, stormwater and sedimentation basins, buildings and other structures, driveways, parking lots, yards/lawns, and wells.

Due to the skill required to correctly identify potential bog turtle habitat, we recommend that the Phase 1 survey be done by a qualified surveyor (see enclosed list). Survey results should be submitted to the Service for review and concurrence. If the Phase 1 survey is done by someone who is not on this list, it is likely that a site visit by a Fish and Wildlife Service biologist will be necessary to verify their findings. Due to the limited availability of staff from this office, such a visit may not be possible for some time. Use of a qualified surveyor will expedite our review of the survey results.

If potential bog turtle habitat is found in the project action area, efforts should be made to avoid any direct or indirect impacts to those wetlands (see enclosed *Bog Turtle Conservation Zones*). Avoidance of direct and indirect effects means no disturbance to or encroachment into the wetlands (e.g., filling, ditching or draining) for any project-associated features or activities. Adverse effects may also be anticipated to occur when lot lines include portions of the wetland; when an adequate upland buffer is not designated around the wetland (see *Bog Turtle Conservation Zones*); or when roads, stormwater/sedimentation basins, impervious surfaces, or wells affect the hydrology of the wetland.

If potential habitat is found, submit (along with your Phase 1 survey results) a detailed project description and detailed project plans documenting how direct and indirect impacts to the wetlands will be avoided. If adverse effects to these wetlands cannot be avoided, a more detailed and thorough survey will be necessary, as described under "*Bog Turtle Survey*" (Phase 2 survey) of the *Guidelines*. The Phase 2 survey should be conducted by a qualified biologist with bog turtle field survey experience (see enclosed list of qualified surveyors). Submit survey results to the Service for review and concurrence.

Due to the location of the project in Carbon County, no bog turtle surveys need to be conducted in this area. However, Phase 1 surveys should be conducted in all of Monroe County.

Thank you,

Pamela Shellenberger
U.S. Fish and Wildlife Service
315 South Allen Street
State College, PA 16803
814-234-4090 x241
814-234-0748 (f)
http://fws.gov/northeast/pafo/index.html

Pennsylvania Fish & Boat Commission

established 1866

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5237 Fax: (814) 359-5175

February 15, 2013

IN REPLY REFER TO
SIR # 40135

RICHARD MELLON
MELLON BIOLOGICAL SERVICES
200 FLINT COURT SOUTH
YARDLEY, PA 19067

RE: Species Impact Review (SIR) - Rare, Candidate, Threatened and Endangered Species
LAKE NAOMI TAP
UPDATE TO SIR #38296
PNDI Search Number (if available): 20130109385713
POCONO TOBYHANNA COOLBAUGH KIDDER Township/Borough, MONROE CARBON County, Pennsylvania

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code.

According to this submission and our records there have been no changes in the on-site biological information; therefore, the Commission's comments regarding potential impacts to rare, candidate, threatened, or endangered species under our jurisdiction, as detailed in our letter of April 10, 2012 for SIR# 38296, remain unchanged.

This response represents the most up-to-date summary of the PNDI data and our files and is valid for two (2) years from the date of this letter. An absence of recorded species information does not necessarily imply species absence. Our data files and the PNDI system are continuously being updated with species occurrence information. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered, and consultation shall be re-initiated.

Thank you in advance for your cooperation and attention to this important matter of species conservation and habitat protection.

SIGNATURE: _____ DATE: February 15, 2013

Christopher A. Urban
Chief, Natural Diversity Section

COMMONWEALTH OF PENNSYLVANIA
Pennsylvania Game Commission

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

"To manage all wild birds, mammals and their habitats for current and future generations."

ADMINISTRATIVE BUREAUS:

ADMINISTRATION.....717-787-5670
HUMAN RESOURCES.....717-787-7836
FISCAL MANAGEMENT.....717-787-7314
CONTRACTS AND PROCUREMENT.....717-787-6594
LICENSING.....717-787-2
OFFICE SERVICES.....717-787-2
WILDLIFE MANAGEMENT.....717-787-5
INFORMATION & EDUCATION.....717-787-6286
WILDLIFE PROTECTION.....717-783-6526
WILDLIFE HABITAT MANAGEMENT.....717-787-6818
REAL ESTATE DIVISION.....717-787-6568
AUTOMATED TECHNOLOGY SERVICES.....717-787-4076

www.pgc.state.pa.us

Division of Environmental Planning and Habitat Protection
717-783-5957

February 11, 2013 **Large Project PNDI Review**

Mr. Richard Mellon
Mellon Biological Services, LLC
200 Flint Court South
Yardley, Pennsylvania 19067

Re: Lake Naomi Tap and Reroute – Replacement and Reroute of Existing Transmission Line
Pocono, Tobyhanna, and Coolbaugh Townships, Monroe County, Pennsylvania
Kidder Township, Carbon County, Pennsylvania

Dear Mr. Mellon,

Thank you for submitting your Pennsylvania Natural Diversity Inventory (PNDI) Large Project Environmental Review request. The Pennsylvania Game Commission (PGC) screened this project for potential impacts to species and resources of concern under PGC responsibility, which includes birds and mammals only.

Potential Impact Anticipated

PNDI records indicate species or resources of concern are located in the vicinity of the project. The PGC has received and thoroughly reviewed the information that you provided to this office as well as PNDI data, and has determined that potential impacts to threatened, endangered, and species of special concern birds and mammals may be associated with your project. Therefore, additional measures are necessary to avoid potential impacts to the species listed below.

Scientific Name	Common Name	PA Status
Pandion haliaetus	Osprey	THREATENED

Next Steps

The following Conservation Measure should be performed to minimize impacts to nesting ospreys located within 800 feet of the project area:

- No construction and/or maintenance activities shall occur within the three red hatched portions of the project area (see attached mapping) during nesting season, March 25 to July 31. All construction and/or maintenance activities shall be completed between August 1 and March 24. No seasonal restriction is necessary for the balance of the project area as these areas are located outside the buffer for nesting ospreys.

Additionally, portions of the above referenced project are located on or adjacent to State Game Lands # 127 and #129. Please contact the Northeast Regional Office at (570) 675-1143 to discuss the project activities and coordinate obtaining the necessary approvals if your project will impact State Game Lands. It is recommended that you coordinate with Game Commission Staff early in your project planning process.

This response represents the most up-to-date summary of the PNDI data files and is valid for two (2) years from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map). If the proposed work has not changed and no additional information concerning listed species is found, the project will be cleared for PNDI requirements under this agency for two additional years.

This finding applies to impacts to birds and mammals only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure that the U.S. Fish and Wildlife Service, the PA Department of Conservation and Natural Resources, and/or the PA Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,

Olivia A. Mowery

Olivia A. Mowery
Environmental Planner
Division of Environmental Planning & Habitat Protection
Bureau of Wildlife Habitat Management
Phone: 717-787-4250, Extension 3128
Fax: 717-787-6957
E-mail: OMowery@pa.gov

A PNHP Partner

Pennsylvania Natural Heritage Program

OAM/oam

cc: Figured
Sussenbach
Librandi Mumma
File

Lake Naomi Tap Project - Seasonal Restriction Areas



N

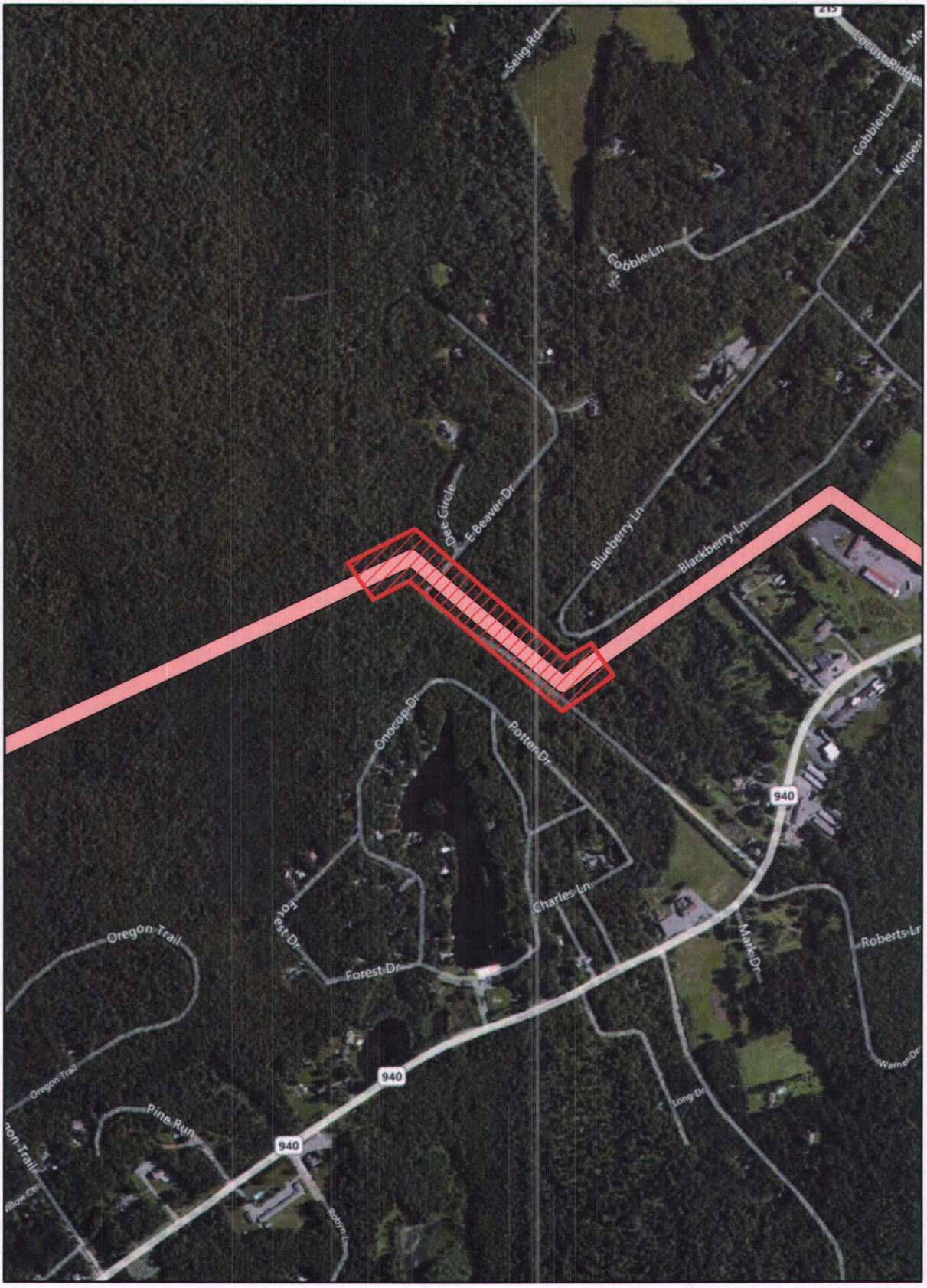
Osprey Seasonal Restriction Area

Lake Naomi Reroute (provided by MBS)

Existing Powerline ROW (provided by MBS)

State Game Lands Boundary

Lake Naomi Tap Project - Seasonal Restriction Areas

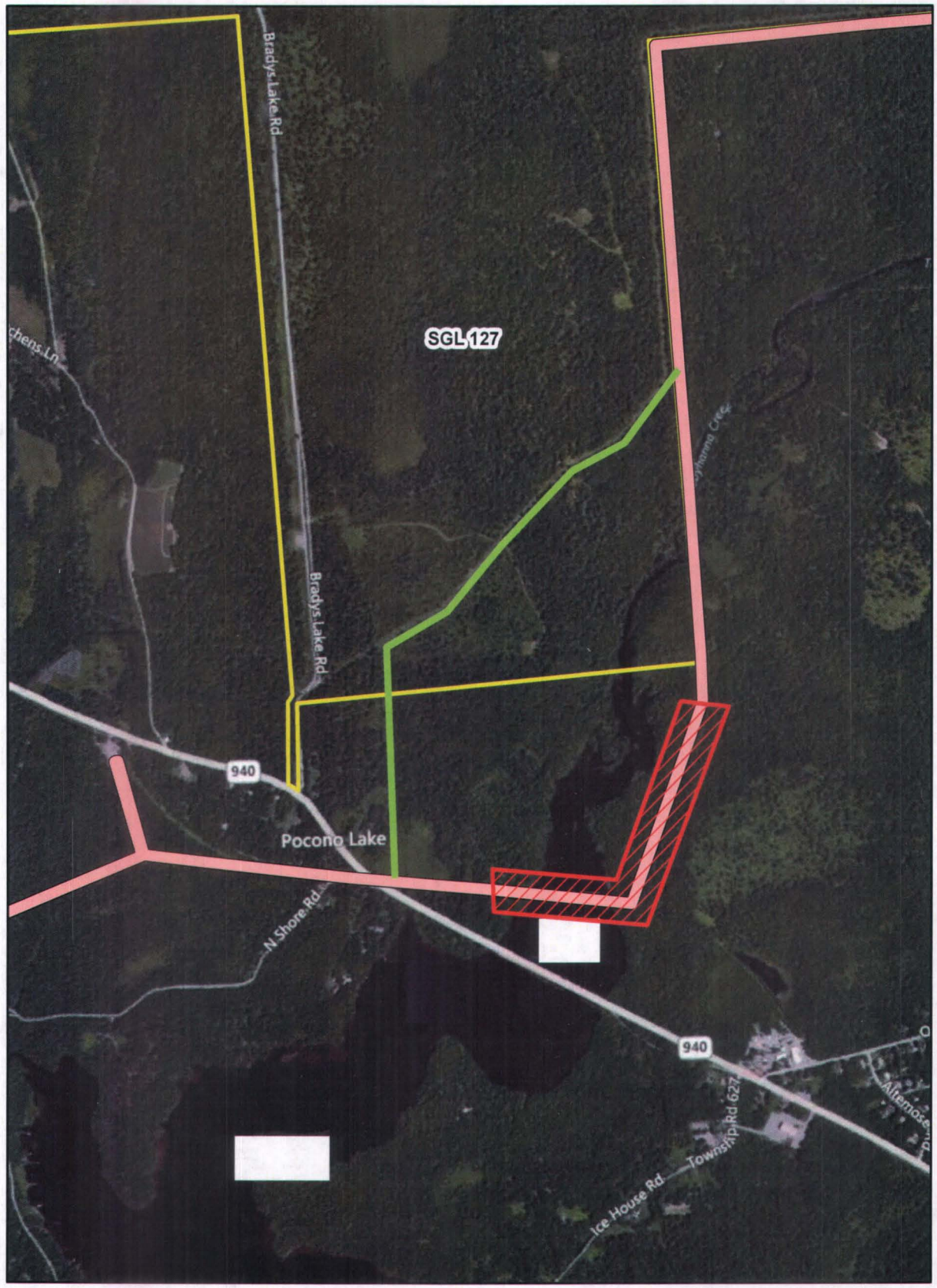


N

- Osprey Seasonal Restriction Area
- Lake Naomi Reroute (provided by MBS)
- Existing Powerline ROW (provided by MBS)
- State Game Lands Boundary

PENNSYLVANIA GAME COMMISSION 1895

Lake Naomi Tap Project - Seasonal Restriction Areas



N

Osprey Seasonal Restriction Area

Lake Naomi Reroute (provided by MBS)

Existing Powerline ROW (provided by MBS)

State Game Lands Boundary

Lake Naomi Tap Project - Seasonal Restriction Areas



N

Legend

- Osprey Seasonal Restriction Area
- Existing Powerline ROW (provided by MBS)

PENNSYLVANIA GAME COMMISSION 1895

Mellon Biological Services LLC
200 Flint Court South • Yardley, PA 19067 • 215-493-0697 • FAX 215-493-0660, call first



MEMORANDUM

To: Ms. Olivia A. Mowery. Environmental Planner
PA Game Commission
Bureau of Wildlife Management
Division of Environmental Planning
2001 Elmerton Avenue
Harrisburg, Pennsylvania 17110-9797

From: Richard Mellon, Professional Wetland Scientist

Re: **PNDI DATABASE SEARCH/REVIEW UPDATE**

Project: **Lake Naomi Tap**
Pocono, Tobyhanna and Coolbaugh Townships, Monroe County, PA
Kidder Township, Carbon County, PA

PNDI#: **021735/20130109385713**

Date: February 7, 2013

cc: Mr. Justin Wehr, Siting Coordinator, PPL Electric Utilities
Mr. Barry Baker, URS

Based on the February 7, 2013, PGC Review of the Lake Naomi Tap, it appears that the Game Commission is unaware of a fourth Osprey Nest within the right-of-way. Attached are an aerial photograph and topographic map showing the location of this osprey nest. Also attached are ArcView/GIS® shape files.

Also, the review states that it is valid for one (1) year from the date of [the] letter. Is this a special case? Recent reviews have been given a two year clearance.

Thank you.

Lake Naomi Tap - Osprey Nest



Legend

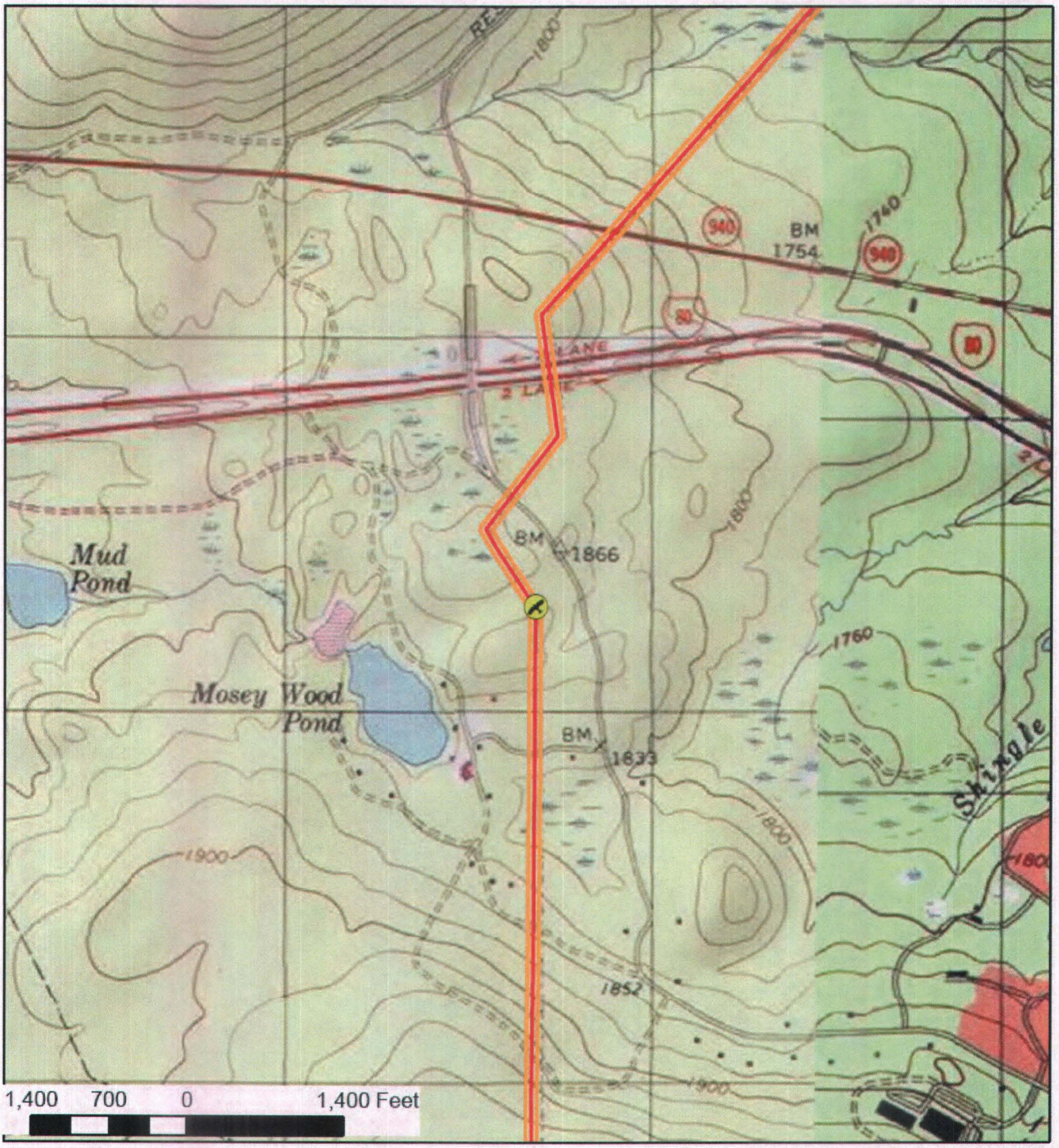
Osprey Nest

ROW

Powerline

Mellon Biological Services LLC
200 Flint Court South • Yardley, PA 19067 • 215-493-0697
RMellon@mellonbiological.com

Lake Naomi Tap - Osprey Nest



Legend

- Osprey Nest
- ROW
- Powerline

Mellon Biological Services LLC
200 Flint Court South • Yardley, PA 19067 • 215-493-0697
RMellon@mellonbiological.com

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

March 23, 2012

PNDI Number: 021735

Rick Mellon
Mellon Biological Services, LLC
200 Flint Court South
Yardley, PA 190067

Re: Lake Naomi Tap
Pocono, Tobyhanna, Coolbaugh, and Kidder Townships, Monroe and Carbon Counties

Dear Mr. Mellon,

Thank you for the submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number 021735 for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only.

Potential Impact Anticipated

PNDI records indicate species or resources of concern are located in the project vicinity. Based on a detailed PNDI review, DCNR determined potential impacts to the following threatened or endangered species or species of special concern. Please note our new survey protocols are available at http://www.gis.dcnr.state.pa.us/hgis-er/Login.aspx.

Scientific Name	Common Name	PA Current Status	PA Proposed Status
Ranunculus aquatilus var. diffuses	White water crowfoot	Rare	Rare
Carex longii	Long's sedge	Undetermined	Threatened
Gaultheria hispidula	Creeping snowberry	Rare	Rare
Myrica gale	Sweet-gale	Threatened	Threatened
Juncus filiformis	Thread rush	Rare	Rare
Solidago uliginosa	Bog goldenrod	Not listed	Threatened
Plantanthera blephariglottis	White-fringed orchid	Not listed	Endangered
Carex paupercula	Bog Sedge	Threatened	Rare
Ledum groendlandicum	Common Labrador-tea	Rare	Rare
Amelanchier bartramiana	Oblong-fruited serviceberry	Endangered	Endangered
Amelanchier canadensis	Serviceberry	Not listed	Endangered
Sparganium androclatum	Branching bur-reed	Endangered	Endangered
Epilobium palustre	Marsh willow-herb	Undetermined	Undetermined
Bartonia paniculata	Screw-stem	Not listed	Rare
Carex lasiocarpa	Slender sedge	Rare	Rare

Survey Request

DCNR requests a survey for the following species:

- *Ranunculus aquatilus* var.*diffusus* (white water crowfoot)—Lakes, Ponds, rivers and streams–survey time is late May – July
- *Carex longii* (Long's sedge) – wet or seasonally wet sandy soils in swamps, thickets and meadows–flowering time is summer.
- *Gaultheria hispidula* (creeping snowberry)–wet woods with sphagnum hummocks, sphagnum bogs
- *Myrica gale* (sweet-gale)–bogs and shallow water of lake stream edges
- *Juncus filiformis* (thread sedge)–moist, sandy old fields, open woods, and gravel pits–flowers in summer
- *Solidago uliginosa* (bog sedge)–bogs, swamps, sedge meadows, and fens–flowers August-October
- *Plantanthera blephariglottis* (white fringed-orchid)–sphagnum bogs and swamps–flowers June-August
- *Carex paupercula* (bog sedge)–sphagnum bogs and boggy woods–flowers June-August
- *Ledum groenlandicum* (Labrador tea)–bogs and peaty wetlands–flowers in June
- *Amelanchier bartramiana* (oblong-fruited serviceberry)–sphagnum bogs and peaty thickets–flowers April-early May
- *Amelanchier canadensis* (Serviceberry)–moist woods and swamps–flowers mid-April –mid May-fruits June-early July
- *Sparganium androclatum* (branching bur-reed)–wet meadows, swales, stream banks/shallow water–flowers July-September
- *Epilobium palustre* (marsh willow-herb)–bogs and wooded swamps–flowers July-September
- *Bartonia paniculata* (screw-stem)–bogs and peaty wetlands–flowers August-October
- A survey for the above species should be conducted by a qualified botanist *at the appropriate time of year and then submitted to our office for review.* **Your botanist should carefully review the new DCNR Botanical Survey Protocols available at http://www.gis.dcnr.state.pa.us/hgis-er/Login.aspx. These protocols are recommended to ensure that the all necessary information is collected and that survey reports are prepared properly. It is the expectation of DCNR that these protocols will be followed when conducting surveys for species under our jurisdiction.**
- Your botanist should *fill out the field survey form while performing their survey*: http://www.gis.dcnr.state.pa.us/hgis-er/hgis/Internet%20Field%20Survey%20Form_2007.pdf. Contact our office prior to the survey for detailed information about the species, or for a list of qualified surveyors.
- Any target and non-target state-listed species found during the site visit should be reported to our office. Mitigation measures and monitoring may be requested if species or communities of special concern are found on or adjacent to site.
- If the land type(s) does not exist onsite a survey may not be necessary; please submit a habitat assessment report which describes the current land cover, habitat types and species found onsite.

Target wetlands for survey- including slow moving areas along Tobyhanna Creek, Kisler Run wetland, Wagner Run Wetland, large wetland west of Wagner Run south of Locust Lakes Village, Stony Run Wetland, Two-mile wetland, Hickory Run Wetland, and Big Boulder Ski Resort Wetland near end of project line, and other areas that seem to contain appropriate habitat for targeted species of concern-

Conservation Measure—Voluntary Action

The following species are currently species/natural communities of concern in PA, but are not target species for a survey. However, because of their ecological significance, please note if the species/natural community type is identified during the required survey and avoid potential impacts to the species and/or habitat type.

- Red spruce-mixed hardwood palustrine forest
- Leatherleaf-bog rosemary peatland
- Pitch pine-leatherleaf palustrine woodland

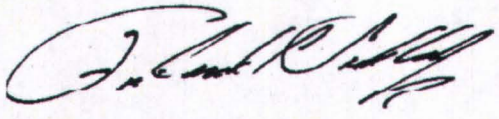
- *Psectraglaea carnosa* (pink sallow)–a noctuid moth usually in unburned sandy pine or oak barrens, possibly bogs–the larval hosts are plants in Ericaceae, Rosaceae, and also small oaks-
- *Lycaena epixanthe* (bog copper) –small butterfly found in bogs-larval host mostly *Vaccinium* sp., especially cranberry species.

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map).

This finding applies to impacts to DCNR only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure the U.S. Fish and Wildlife Service, PA Game Commission, and the Pennsylvania Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,



Frederick Sechler Jr, Environmental Review Specialist FOR Chris Firestone, Wild Plant Program Mgr.
Ph: 717-705-2819 ~ c-frsechle@ pa.gov

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

May 14, 2013

PNDI large project # 021735

Rick Mellon
Mellon Biological Services, LLC.
200 Flint Court
Yardley, PA 19067
Email: rmellon@mellonbiological.com (Hard copy not to follow)

Re: Lake Harmony – Lake Naomi Tap (PPL transmission line maintenance project)
Pocono, Tobyhanna, Coolbaugh, and Kidder Townships, Monroe and Carbon Counties

Dear Mr. Mellon,

Thank you for the submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review large project # **021735** for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only.

No Impact Anticipated per minimizing/avoidance impacts to wetlands

PNDI records indicate species or resources under DCNR's jurisdiction are located in the vicinity of the project. A survey was requested by DCNR for fifteen plant species of concern on March 23, 2012. A botanical survey was conducted by Mellon Biological Services, LLC in spring and summer of 2012. Five plant species of concern, *Muhlenbergii uniflora* (fall dropseed muhly), *Ledum groenlandicum* (Labrador-tea), *Juncus filiformis* (thread rush), *Xyris montana* (northern yellow-eyed grass), and *Bartonia paniculata* (screw-stem) were in eight different wetlands were found within the PPL right-of-way. DCNR recommends avoiding or minimizing impacts to wetlands (**LH-O, LH-P, LH-D, LH-E, E, X, Q, and S**) that contain DCNR plant species of concern whenever possible. DCNR also recommends wetlands that contain these species are flagged along the right–of-way to alert PPL personnel of these ecologically sensitive areas. According to the project description, very little impact will likely occur within these wetlands from the maintenance activities, minimizing impacts and not threatening the populations of these species. In addition, PPL management activities actively promote suitable habitat for this species by keeping the area open and successional. Based on this information, DCNR has determined that no impact is likely. No further coordination with our agency is needed for this project. As a voluntary measure, please clean any construction equipment before it is brought on site; this will remove invasive plant seeds from the equipment that has been picked up from other sites and will help control invasive plant spread into adjacent wetland habitats that may cause indirect impacts to populations of plant species of concern.

This response represents the most up-to-date review of the PNDI data files and is valid for **two years** only. If project plans change or more information on listed or proposed species becomes available, our determination may be reconsidered. For PNDI project updates, please see the PNHP website at www.naturalheritage.state.pa.us for guidance. As a reminder, this finding applies to potential impacts under DCNR's jurisdiction only. Visit the PNHP website for directions on contacting the Commonwealth's other resource agencies for environmental review. Should you have any questions or concerns, please don't hesitate to contact me at 717.705.2819 or c-frsechle@pa.gov.

PNDI large project #: 021735

Sincerely,

Frederick C. Sechler, Jr, Ecological Information Specialist
Pennsylvania Natural Heritage Program
Bureau of Forestry, Ecological Services Section

Rebecca H. Bowen, Section Chief
Pennsylvania Natural Heritage Program
Bureau of Forestry, Ecological Services Section

P.O. Box 8552, Harrisburg, PA 17015-8552 717-787-3444 (fax) 717-772-0271

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Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

25 February 2013

Martin Abbott
URS Corporation
335 Commerce Drive, Suite 300
Fort Washington, PA 19034-2720

Re: 2013-0750-042-A
Lake Harmony – Lake Naomi 138/69-kV Rebuild
Kidder Township, Carbon County and Coolbaugh, Pocono and Tobyhanna Township, Monroe County

Dear Mr. Abbott:

Thank you for submitting information concerning the above referenced project. The Bureau for Historic Preservation (the State Historic Preservation Office) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. The Bureau for Historic Preservation has also under the provisions of the Declaration of Covenants on the property. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Archaeology
In our opinion no archaeological resources will be affected by this project.

Historic Structures
As per our phone conversation on February 13, 2013, we cannot complete our review of the proposed project until additional information is provided.

To assist us in our understanding of the potential for visual effects of the new construction, please provide photographs of a typical current structure and images of the proposed replacement structure. Please map the locations of the existing and proposed structures on current aerials and provide data indicating how much higher than the existing structures the new structures will be. In addition, we require an explanation of the delineation of the Area of Potential Effects (APE) with a justification as to how the re-routed line, increased height of the towers, and/or any new access roads will affect surrounding historic structures. The APE should be delineated with a focus on those resource types for which view shed or setting is a character-defining feature (camps, historic districts, farms, etc.) and can be developed based on distance or changes in topography, elevation, or vegetative cover. We are also concerned with areas that require clear cutting through hedgerows or wooded areas or the introduction of new features on lands associated with farmsteads. In addition to mapping of the APE, please include photographs of resources in the APE that are 50 years in age that would be affected by the proposed new construction.

Please provide information on the age of the existing 24-mile long portion of the line that is proposed for replacement. If the line is 50 years in age, please provide documentation and justification of National Register eligibility of the linear corridor.

Finally, please assess the potential of the project to affect those historic properties for which setting/view shed is a character defining feature. Please include photographs illustrating the view shed of the new structures' locations both to and from National Register listed or eligible resources in the APE, especially the Pocono Manor Historic District.

Please contact Barbara Frederick at (717) 772-0921 for further information regarding this review.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology and Protection

DCM/bcf

Attachment 13

ATTACHMENT 13
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
PUBLIC NOTICE REQUIREMENTS

PPL Electric Utilities Corporation ("PPL Electric") proposes to reinforce the 138/69 kV transmission system in Carbon County and Monroe County, Pennsylvania to resolve identified transmission reliability criteria violations in northeast Pennsylvania, and to ensure reliable long-term service to customers in in these areas. Specifically, and as explained in greater detail in **Attachment 2** (Necessity Statement), PPL Electric's Transmission Planning Department has identified excessive load interruptions under several contingencies. To resolve the identified reliability issues, PPL Electric proposes to rebuild approximately 24-miles of existing transmission lines and incorporate a 1-mile re-route. This rebuild and re-route is referred as the Lake Harmony-Lake Naomi 138/69 kV Rebuild Project (the "Project") and is the subject of this filing.

The total estimated cost to site, design, and construct this project is approximately $33.3 million. Subject to PUC approval, construction of this project is scheduled to begin in September 2014 to meet an in-service date of December 2016.

Pursuant to Subchapters G and I of the Commission regulations, 52 Pa. Code §§ 57.71-57.77, 57.91-57.93, and the Commission's Interim Siting Guidelines, 52 Pa. Code §§ 69.3101-69.3107, PPL Electric has provided packets of information to fully notify landowners that may be affected by the proposed Project. For those landowners that PPL Electric intends to negotiate right-of-way agreements with, the packet of information ("Negotiation Packet") included the following:

- A Cover Letter from a PPL Electric Senior Real Estate Specialist.
- A Disclosure of Eminent Domain Power of Electric Utilities Required by 52 Pa. Code § 57.91.
- Notification of Right-of-Way Maintenance Practices Required by 52 Pa. Code § 57.91.
- PPL Electric's Internal Practices for Dealing with the Public on Power Line Projects Required by 52 Pa. Code § 69.3102.

- Notification to Contact the Commission or Office of Consumer Advocate for Improper Land Agent Practices.
- A Brochure on Electromagnetic Fields.
- A Brochure on Vegetation Management.
- A Glossary of Real Estate Terms.

Those property owners, who own a property within or located adjacent to the right-of-way, but with whom PPL Electric is not attempting to negotiate a right-of-way agreement, received a packet ("Non-negotiating Packet") that includes the following:

- A Cover Letter from a PPL Electric Senior Real Estate Specialist.
- Notification of Right-of-Way Maintenance Practices Required by 52 Pa. Code § 57.91.
- PPL Electric's Internal Practices for Dealing with the Public on Power Line Projects Required by 52 Pa. Code § 69.3102.
- Notification to Contact the Commission or Office of Consumer Advocate for Improper Land Agent Practices.
- A Brochure on Electromagnetic Fields.
- A Brochure on Vegetation Management.
- A Glossary of Real Estate Terms.

Following this Attachment are the forms of the Negotiation and Non-negotiating Packets that were sent to all affected landowners. In addition, copies of the Application and supporting Attachments or Notices are being served in accordance with the provisions of Section 57.74 of the Commission's regulations, 52 Pa. Code 57.74.

NEGOTIATING PACKET

Packet of Information Provided to Landowners that PPL Electric Plans to Negotiate with to Acquire Right-of-Way

Greg Stroude
Senior Right of Way Agent

PPL Electric Utilities
Two North Ninth Street
GENN5
Allentown, PA 18101-1179
Tel. 610.774.5571

December 14, 2012

Property Owner Name
Address

Dear Property Owner:

PPL Electric Utilities Corporation (PPL) is planning to rebuild an existing single-circuit 69-kilovolt transmission line between Lake Harmony Substation and Lake Naomi Tap to a double-circuit 138/69 kV operation. This line runs through Tobyhanna, Coolbaugh, and Pocono townships in Monroe County and Kidder Township in Carbon County, Pennsylvania. Rebuilding this aging line for double-circuit operation will make electric service more reliable for homes and businesses in the region. It will allow PPL better capability to reroute power in the region during power outages, meaning outages should be shorter and affect fewer customers. I am writing to notify you of the proposed project as required by the Pennsylvania Public Utility Commission.

The majority of the new transmission line will replace the existing line following the same route. In areas where the new line will not follow the existing transmission line route, PPL will negotiate with applicable landowners to acquire an additional 100 feet of right-of-way to accommodate the new transmission line.

Since the proposed right-of-way needs of this project may involve your property, enclosed are notices required by the Pennsylvania Public Utility Commission that provide important information regarding eminent domain, right-of-way maintenance practices, and land agents conduct. Also enclosed is PPL's Internal Practices for Dealing with Public on Power Line Projects.

The Pennsylvania Public Utility Commission's regulations require that PPL provide you with this information at least 15 days in advance of our discussions concerning negotiations. For your convenience, also enclosed is information on electromagnetic fields, a brochure on vegetation management, and a glossary of real estate terms.

If you have any questions on any of the enclosed information, please contact me by phone at 610-774-6139 or by email at JGStroude@pplweb.com.

I kindly request that you sign in the space provided below to indicate that you have received this information.

Very truly yours,

Greg Stroude
Senior Right of Way Agent

Enclosures

Greg Stroude
Senior Right of Way Agent

PPL Electric Utilities
Two North Ninth Street
GENN5
Allentown, PA 18101-1179
Tel. 610.774.5571

December 14, 2012

Property Owner Name
Address

By signing this form, I understand that it does not obligate me in any way; this merely acknowledges that I have received the information referenced in the letter above as listed below.

_____

Date _____

Phone _____

Information Received:

Disclosure of Eminent Domain Power
Notification of Right-of-Way Maintenance Practices
Internal Practices for Dealing with the Public on Power Line Project
Notification Regarding Land Agent Practices
Glossary of Real Estate Terms
Brochure on Electromagnetic Fields
Brochure on Transmission Line Vegetation Management

Sincerely,

Greg Stroude
Senior Right of Way Agent

Enclosure

DISCLOSURE of
EMINENT DOMAIN POWER

The Pennsylvania Public Utility Commission requires PPL Electric Utilities Corporation to give you the following information:

PPL Electric Utilities Corporation (PPL) is planning to rebuild an existing single-circuit 69-kilovolt transmission line between Lake Harmony Substation and Lake Naomi Tap to a double-circuit 138/69 kV operation which runs through Tobyhanna, Coolbaugh, and Pocono townships in Monroe County and Kidder Township in Carbon County, Pennsylvania.

Since a field survey and detailed engineering has not been completed, the physical dimensions of the proposed lines and the type and height of supporting structures to be used cannot be precisely determined at this time. However, based on past experience it is expected that the structures normally will be 90 to 100 feet in height. There may be isolated physical conditions that would require either higher or lower structures than those mentioned above. At this time, we do not know the number of structures to be placed on any properties. PPL Electric's current 138/69 kV standard right of way width is 100 feet.

Since the route could affect your property, a representative of the utility will contact you in the near future to discuss the utility's plans as they may affect your property. In order to better prepare you for these discussions and to avoid possible misunderstandings, we want to take this opportunity to inform you of your legal rights and the legal rights of PPL Electric Utilities Corporation with regard to this project. You have the right to have legal counsel represent you in these negotiations. You do not have to sign any agreement without the advice of counsel. If you do not know an attorney, you may contact your local bar association.

MUST YOU ACCEPT AN OFFER MADE BY THE UTILITY FOR YOUR PROPERTY?

No. You may refuse to accept it. However, the utility has the power to take property by eminent domain, subject to the approval of the Public Utility Commission, for the construction of transmission lines if the utility is unable to negotiate an agreement to buy a right of way. If your property is condemned, you must be paid "just compensation". "Just compensation" has been defined by the courts in Pennsylvania as the difference between the fair market value of your property before condemnation, unaffected by the condemnation, and the fair market value of your remaining property after condemnation, as affected by the condemnation.

CAN THE UTILITY CONDEMN YOUR HOUSE?

The company cannot condemn your house or a reasonable "curtilage" around your house. Generally, "curtilage" includes the land or buildings within 100 meters of your house which are used for your domestic purposes. However, the 100 meters limit does not automatically extend beyond the homeowner's property line.

DO YOU HAVE A RIGHT TO A PUBLIC HEARING WHEN THE UTILITY SEEKS TO CONDEMN YOUR PROPERTY?

Yes. When an electric utility seeks to have your property condemned, the utility must first apply to the Pennsylvania Public Utility Commission for a certificate finding the condemnation to be necessary or proper for the service, accommodation, convenience, or safety of the public. The Commission will then hold a public hearing. As the landowner whose property may be condemned, you are a party to the proceeding and may retain counsel, present evidence, and/or testify yourself in opposition to the application for a certificate. If you wish to testify at the public hearing, you should make your intention known by letter to Secretary, Pennsylvania Public Utility Commission, P.O. Box 3265, Harrisburg, PA 17120.

If the Commission approves the utility's application for a certificate finding the condemnation in the public interest, then the utility may proceed before the local Court of Common Pleas to condemn your land. If the Commission denies the utility's application, the utility cannot condemn your land. If you retain an attorney to represent you before the Commission, you must do so at your own expense.

The Commission will not decide how much money you should receive if your land is condemned. The only issue the Commission will decide is whether the condemnation serves the public interest. If the Commission approves the utility's application for condemnation, the amount of money to which you are entitled will be determined by a local Board of View of the Court of Common Pleas. However, you may at any time make an agreement with the utility as to the amount of damages you are to be paid.

NOTIFICATION of
RIGHT-OF-WAY MAINTENANCE PRACTICES

The Pennsylvania Public Utility Commission requires that PPL Electric Utilities Corporation give you the following information on the RIGHT OF WAY MAINTENANCE PRACTICES for the 138/69kV line:

The methods currently used by PPL Electric Utilities Corporation are set forth in PPL Electric Utilities Corporation "Program for Vegetation Management", which will be made available to you for your inspection upon request. If you wish further information concerning right of way maintenance methods, you may contact the person named on the cover letter. You may discuss with this person, either before or during negotiation of the right of way agreement, these methods and any other questions you may have about right of way maintenance.

Once a utility has constructed an electric transmission line on a right of way across your land, the utility must maintain the right of way free of tall growing trees and brush which might impair the reliability of electric service, the safety of the line, and access to the line or its towers. The utility or its contractors may remove and control tall growing trees and brush by several methods: hand cutting of trees, limbs and brush; mechanical cutting with chain saws or motorized cutting machines or application of herbicides. The utility must confine its maintenance activities to the approved right of way across your land, except where tall growing trees or brush or their root systems grow into the right of way from adjoining land and constitute a threat to the electric transmission line and its structures.

If you believe that the maintenance method(s) used by the company would raise problems with your use of your land adjacent to the right of way, it is your responsibility as the landowner to bring this to the attention of the utility before you sign the right of way agreement.

The utility company has the responsibility to maintain its right of way, and regular maintenance must occur. Although you as the landowner cannot determine whether or not maintenance will occur, your right of way agreement may specify certain conditions on the performance of the maintenance program which are important to you. These conditions can be part of the negotiations between you and the utility company for your land, since a right of way agreement is a legal contract between a landowner and a utility company. It is important for you to understand also that the maintenance methods used by the utility company may change over time as the costs of maintenance or the methods of performing maintenance change. You may want to specify in your right of way agreement that the utility company inform you of changes in its maintenance methods or in the maintenance schedule for your land.

The provisions of the right of way agreement are enforceable in the local Court of Common Pleas. The right of way agreement cannot be enforced by the Pennsylvania Public Utility Commission. Any claims for damages resulting from improper maintenance of the right of way must be settled with the utility, its contractors, or in the local Court of Common Pleas at your own expense. The Commission cannot award damages for violations of the right of way agreement.

INTERNAL PRACTICES
for
DEALING WITH THE PUBLIC ON POWER LINE PROJECT

PPL Corporation has a long-standing commitment to conducting business in an honest and ethical manner. Consistent with expectations for our employees and representatives laid out in the PPL Standards of Conduct and Integrity, and the Standards of Conduct and Integrity for Suppliers, PPL Electric Utilities Corporation's employees, contractors and agents who interact with members of the public (including landowners along proposed rights of way) in activities such as planning, real estate and right-of-way transactions, siting, and construction of power lines and other facilities will:

- Act with integrity at all times.
- Treat people courteously and in a professional manner.
- Be forthright and honest in all actions and communications.
- Comply with applicable laws and regulations.
- Seek to avoid conflicts of interest.
- Accept responsibility for actions and decisions.
- Be responsible stewards of the environment.
- Place a high priority on the safety of the public and our representatives and employees.

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NOTIFICATION REGARDING
LAND AGENT PRACTICES

PPL Electric Utilities Corporation is planning to rebuild an existing single-circuit 69-kilovolt transmission line between Lake Harmony Substation and Lake Naomi Tap to a double-circuit 138/69 kV operation. This line runs through Tobyhanna, Coolbaugh, and Pocono Townships in Monroe County and Kidder Township in Carbon County, Pennsylvania. Since the route could affect your property, a representative from PPL Electric Utilities Corporation will contact you in the near future to discuss the utility's plans as they may affect your property.

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James P. Melia
Pennsylvania Public Utility Commission
400 North Street
Harrisburg PA 17105
717-787-1859
jmelia@state.pa.us

Tanya J. McCluskey
Acting Pennsylvania Consumer Advocate
Pennsylvania Office of Consumer Advocate
555 Walnut Street
5th Floor Forum Place
Harrisburg, PA 17101-1923
Phone: 717-783-5048 or toll free 800-684-6560 (PA only)
Fax: 717-783-7152
Email: consumer@paoca.org

GLOSSARY of REAL ESTATE TERMS

ABSTRACT OF TITLE: The condensed history of ownership to a particular parcel of real estate, consisting of a summary of ownership from a given time to the present owner.

ACRE: A measure of land equal to 43,560 square feet.

APPRAISAL: An estimate of the value of property; the process through which conclusions of property value are reached.

APPRECIATION: An increase in the worth or value of a property.

CHAIN OF TITLE: A history of ownership of a particular property (see abstract of title).

CONDEMNATION: A judicial or administrative proceeding to exercise the power of eminent domain through which private property is taken for public use.

CONDUCTOR: The wire which carries electric energy.

CONVEYANCE: A transfer of property ownership.

DEED: A written document that, when executed and delivered, conveys title to or an interest in real estate.

DEED RESTRICTIONS: Clauses in a deed limiting the use of the property.

DEPRECIATION: A loss of value in property.

EASEMENT: A right to use the land of another for a specific purpose. (Such as a right of way for utilities.)

EGRESS: The right to exit a tract of land.

EMINENT DOMAIN: The right of a government, municipal body or public utility to acquire property for public use. (See condemnation)

ENCROACHMENT: An intrusion, such as a house, sign, wall or fence, that intrudes on another's property or right of way.

FAIR MARKET VALUE: The highest price which a willing buyer would pay and the lowest price a willing seller would accept.

FEE OR FEE SIMPLE: The complete and absolute ownership of real estate.

GRANT: The transfer of property rights through a legal document.

GRANTEE: One who acquires property or any property rights from another person.

GRANTOR: One who transfers property or any property rights to another person.

INGRESS: The right to enter a tract of land.

KV: Kilovolt or 1000 volts (138 kV = 138 x 1000)

LIEN: A claim against real or personal property for satisfaction of a debt.

METES-AND-BOUNDS DESCRIPTION: The legal description of a parcel of land that begins at a well-marked point and follows the boundaries, using directions and distances.

MONUMENT: A fixed natural or artificial object used to establish real estate boundaries.

OPTION: The right to purchase a certain property at stated terms, price and time.

RECORDING: The act of entering documents in the Recorder of Deeds office established in each county.

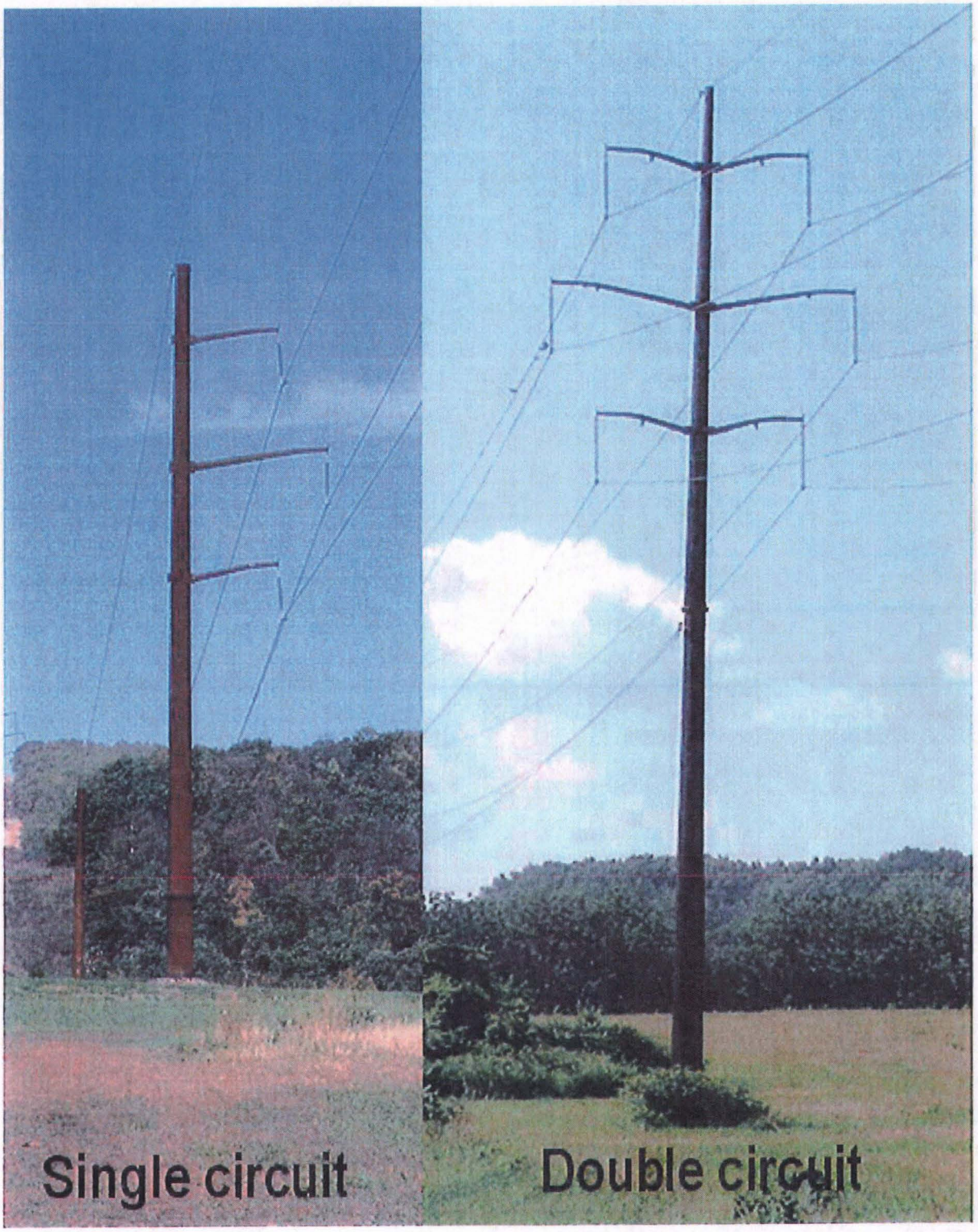
RIGHT OF WAY: Used interchangeably with the word easement. (See easement)

SURVEY: A process of scientifically measuring the quantity and location of a parcel of land.

TAX MAP: Maps used by the county Tax Assessment office showing the locations of properties.

TITLE: Evidence of ownership of land.

ZONING: Regulations pertaining to the use of land and/or buildings.


Single circuit
Double circuit

BROCHURE ON ELECTROMAGNETIC FIELDS

What is PPL Electric Utilities doing about EMF?

PPL Electric Utilities has a magnetic field management program to design and build new lines when practicable in ways that reduce magnetic fields at low or no cost to our customers. For example, the options we will consider for new lines include:

- Reversing the phases of new overhead double-circuit transmission lines, which can result in some cancellation of magnetic fields from the line and lowers the magnetic fields at the edge of the right of way.
- Building new transmission and distribution lines higher than previous designs because the level of magnetic fields at ground level will be lower.

Magnetic field management is considered in the process we use to site new facilities, balancing cost and function with land use and environmental concerns.

PPL Electric Utilities also provides information to customers and others interested in the subject. EMF coordinators have been assigned to serve as local contact points for EMF inquiries. PPL Electric Utilities representatives are available to talk with groups interested in EMF. The company also has an EMF issue manager who directs all aspects of the company's EMF program.

Where can I get additional information on EMF?

PPL Electric Utilities has an EMF coordinator in an area near you who can provide additional technical background. Call 1-800-DIAL-PPL (1-800-342-5775) and you'll be referred to the EMF coordinator in your area or to the company's EMF issue manager. In addition to the U.S. NIEHS website (www.niehs.nih.gov/health/topics/agents/emf), other responsible organizations provide information about EMF, including the World Health Organization (www.who.int/peh-emf).

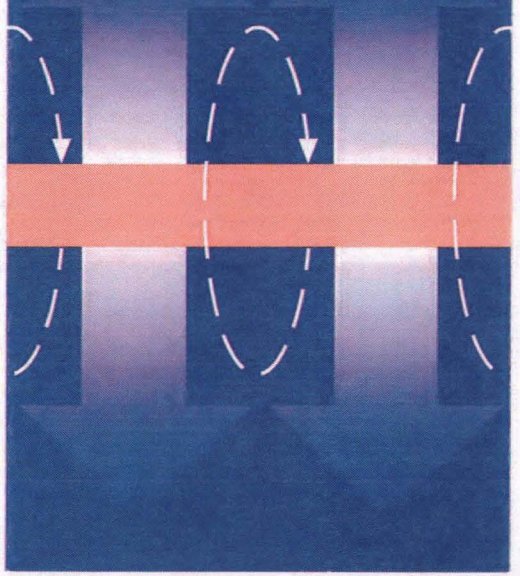
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Questions and Answers about

Electric and Magnetic Fields



What are electric and magnetic fields?

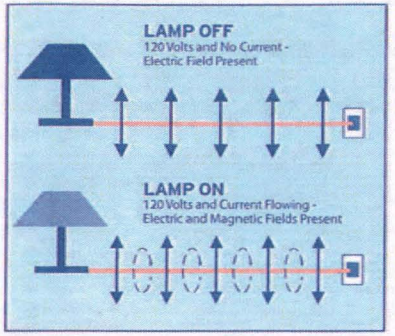
Electric and magnetic fields, also known as EMF, occur in nature and in living things. The Earth, for instance, has a static magnetic field, which makes the needle on a compass point north.

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

- **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. 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** 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. Magnetic fields also diminish with distance, but – unlike electric fields – they are not shielded by common objects such as trees and houses.

What are the typical magnetic field levels in a house?

Magnetic fields usually are measured in a unit called a milligauss (mG). Magnetic field levels found in the living areas of homes away from appliances typically range from less than 1 mG to about 4 mG, according to the U.S. Environmental Protection Agency. They can be higher in some cases. The magnetic fields near appliances can exceed 1,000 mG. The chart below shows examples of magnetic fields near some appliances and how the field levels fall off as you move away from the source.



Magnetic field strengths decrease with distance Magnetic fields are measured in milligauss	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 1 * 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.

Source: National Institute of Environmental Health Sciences (2002)

How do magnetic fields from power lines compare with fields from other sources in our everyday environments?

The chart at right shows some typical magnetic field levels from overhead power lines. If you compare the field levels from power lines with levels from common indoor sources such as appliances, household wiring and currents flowing on water pipes (see Figure 1), you will see that sometimes magnetic field levels from sources inside a home can be much higher than the fields from the power lines outside.

Does the strength of the field from overhead power lines get lower the farther you are from the line?

Yes. The strength of the field becomes significantly lower as the distance from the line increases.

Magnetic fields near overhead electric power lines

For overhead power lines, the strength of the magnetic field is dependent upon a number of factors, such as the height of the wires, current flow, wire configuration and the distance from the lines. These factors produce a magnetic field that drops off rapidly as you move away from the power line.

Type of overhead power line	Distance from the line			
	Under the line	50 feet	100 feet	200 feet
220 and 500 kV	5-400	5-250	1-75	0.5-20
69 and 138 kV	3-80	0.5-25	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.

FIGURE 2 Magnetic fields are measured in milligauss.

Are EMF the same as X-rays or microwaves?

No. EMF are very low in energy compared with much stronger X-rays or microwaves. X-rays have enough power to dislodge electrons, and microwaves can be strong enough to heat objects. Electric power EMF do not have enough energy to do those things.

Does putting power lines underground reduce magnetic field exposures?

Yes and no. It depends on distance from the line and how the line is configured. The earth itself does not shield magnetic fields. Magnetic field levels directly above a typical underground line may be about twice the levels from a typical overhead line carrying the same electrical load. This is because an underground line usually is buried only a few feet below the surface of the ground and is closer than an overhead line that is suspended well above the ground. The wires of an underground line usually are closer to each other than the wires of an overhead line, and thus cancel the magnetic fields to some extent. Some underground designs can reduce magnetic field levels further. However, all underground options are very expensive and can cost up to 10 times more than overhead construction, and customers pay these costs in their electric bills.

What about EMF and health?

Since the 1970s, there have been hundreds of scientific studies on EMF. Many credible scientific panels, government agencies and public health entities have reviewed the scientific research on EMF. For example, evaluations of the research have been conducted by such leading agencies as the U.S. National Institute of Environmental Health Sciences, the U.S. National Academy of Sciences, Health Canada and the World Health Organization. None of these agencies has found that there is a demonstrated cause and effect relationship between exposure to EMF and cancer or any other adverse health effect.

In 1999, the director of U.S. NIEHS sent a detailed report on EMF and health to the U.S. Congress. The NIEHS report concluded that "the scientific evidence suggesting that ELF-EMF exposures pose any risk is weak." The NIEHS report noted that while some epidemiology studies reported associations with some leukemias, there was no support for these findings in laboratory research. The NIEHS report concluded that "this finding is insufficient to warrant an aggressive regulatory concern."

The NIEHS issued updated information on EMF in 2002, which concluded that for most health outcomes there is no evidence of EMF causing adverse effects. The NIEHS said there is some evidence of an association with childhood leukemia, which is difficult to interpret without supporting laboratory evidence. The NIEHS 2002 update concluded that "[a]lthough questions remain about the possibility of health effects related to EMF, recent reviews have substantially reduced the level of concern." NIEHS did not recommend regulatory action to reduce EMF levels. The NIEHS information about EMF can be found on the Internet at www.niehs.nih.gov/health/topics/agents/emf.

In 2007, the World Health Organization issued an extensive review of EMF research. This review concluded that there is "inadequate evidence" that EMF causes or contributes to almost all health outcomes, that based on "limited evidence" of an association from epidemiology studies, there is a "possible" relationship with childhood leukemia, and that a cause and effect relationship has not been established. On its website, WHO emphasizes that: "Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields." The WHO information can be found online at www.who.int/peh-emf/about/WhatisEMF/en/index1.html.

Do EMF affect livestock, wildlife, crops or other plant life?

Many studies have been conducted in the laboratory and in the field to study the effects of EMF exposures on plants and wildlife. Research and years of operating experience have not shown that EMF cause any adverse effects in livestock, wildlife or plants. A group of researchers from Westinghouse Electric Co. and the Pennsylvania State University exposed more than 80 species of plants to power line electric fields at high intensities. No statistically significant differences were found between exposed and unexposed plants in seed germination, seedling emergence, seedling growth, leaf area for plant, flowering, seed production, biomass production and longevity. One response, damage to the leaf tips of sharp-pointed plants, was observed. Near the leaf tip of a sharply pointed plant, an electric field can be very high and can cause drying of the leaf tips. An extensive series of field experiments on plant responses has been carried out near 765 kV transmission lines and a variety of farm crops developed normally.

Why do some high-voltage power lines make noises?

Some power lines make noises because of the effects of electric fields on air molecules around the lines. These effects are more likely to be noticeable on damp days and are not harmful to people or animals under the line.

How can a fluorescent light glow under a transmission line, even if it's not plugged into an electrical source?

A sufficiently strong electric field may stimulate the phosphors from the chemicals that coat the inside of a fluorescent light tube and cause them to glow slightly. A fluorescent tube also will glow when held near a car ignition or a radio transmitter. Fluorescent lights sometimes can be made to glow by rubbing them with a glove or a dry hand, or by carrying them when sliding your feet across a rug in a darkened room.

Are there any exposure limits for EMF in Pennsylvania?

Pennsylvania has not adopted any electric or magnetic field exposure limits.

BROCHURE ON VEGETATION MANAGEMENT

Vegetation management is critical to electric reliability

Millions of people served by PPL Electric Utilities depend on having reliable power for their homes and businesses. Effective vegetation management along high-voltage transmission lines is a critical part of maintaining that reliability.

PPL Electric Utilities operates thousands of miles of high-voltage transmission lines. Our vegetation management program is designed to promote the safe and reliable operation of the electric grid while making sure that we are sensitive to the concerns of property owners and our obligations to electric customers.

PPL Electric Utilities' right to do this work

The vegetation management work we do will depend on the specific rights we have for each property. We will be happy to discuss these rights with you in advance of any work.

To schedule a meeting with a PPL Electric Utilities representative, call 1-877-528-2889 or email us at PPLVegetationManagement@pplweb.com.

For further information, visit www.pplweb.com/vegetation.

An award-winning program

PPL Electric Utilities is a proud recipient of the Tree Line USA award from the Arbor Day Foundation and the National Association of State Foresters. The groups seek to promote proper utility arboriculture and public education through annual worker training, quality tree care, tree planting and public education, energy conservation and collaboration with community groups. For information about planting the right tree in the right place, visit www.arborday.org.

PPL Electric Utilities works with state and local conservation, land management and environmental groups to advance common goals of electric reliability and environmental stewardship.

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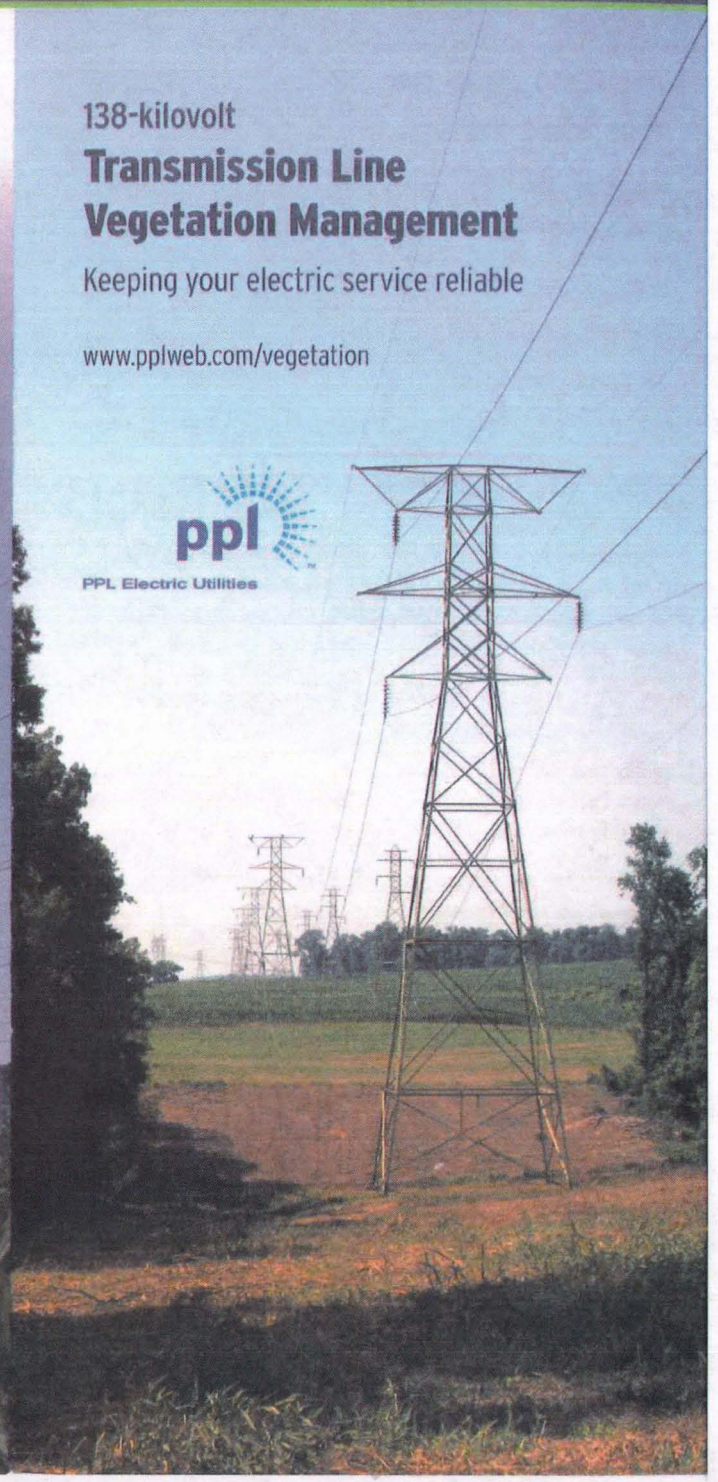
138-kilovolt

Transmission Line Vegetation Management

Keeping your electric service reliable

www.pplweb.com/vegetation

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PPL Electric Utilities



Trees and other tall vegetation must be kept away from power lines.



If they get too close, the result can be a serious power outage. There is also the potential of a significant safety risk to you, and to our employees.

The Northeast Blackout of 2003 provides clear evidence that trees and high-voltage transmission lines do not mix. About 55 million people in eight U.S. states and Canada were without power after a tree touched a transmission line.

In our area, the heavy snowstorm in October 2011 knocked leaf-laden trees into transmission lines and resulted in prolonged power outages for PPL Electric Utilities customers – more proof that trees too close to high-voltage lines can cause reliability problems for homes and businesses.



We take a proactive approach to vegetation management.

This means that we are removing more trees and trimming more trees than we did in the past. We understand that this approach is not always popular with property owners. But it is the right thing to do – to keep our system safe and reliable for everyone.

Our vegetation management program is designed to meet regulatory requirements.

- Federal and state regulators impose obligations on electric utilities based on the voltage of the line.
- The federal government adopted strict new reliability standards for certain higher-voltage transmission lines after the 2003 blackout. PPL Electric Utilities is required to meet these standards. We face stiff fines if we do not.
- Pennsylvania utility regulators require us to keep our electric delivery system reliable.
- In May 2012, the Federal Energy Regulatory Commission and the North American Electric Reliability Corporation, in a review of power outages after the October 2011 snowstorm, recommended that utilities do more to keep trees away from high-voltage transmission lines.

Our pledge to you

We understand that removing or trimming trees may not be popular with many landowners.

- We pledge to communicate with property owners well in advance of regularly scheduled vegetation work.
- We pledge to work in a professional manner, and to work within the limits of the rights we have to perform this work on each property.
- We pledge to treat private property with care.
- We pledge to strike a careful balance – being sensitive to landowner concerns about vegetation management while at the same time doing the work that is needed to improve electric service reliability for customers by keeping trees away from power lines.



Details of the work we will do on 138 kV

In residential areas, our contract tree specialists will selectively remove vegetation that is not compatible from the PPL Electric Utilities right of way on your property. Whenever feasible, we will not disturb trees and other vegetation that are compatible with high-voltage transmission lines.

Compatible vegetation is defined as follows:

- Under the wires, plus an additional 10 feet on each side, grasses and other low-growing plants are the only compatible species.
- In the border area, which includes the rest of the PPL Electric Utilities right of way, the following is a list of vegetation that is compatible in most situations:

Small trees
Flowering Dogwood
Redbud
Hawthorn
American Hornbeam
Shadbush (Juneberry, Serviceberry)
Eastern Red Cedar
Northern White Cedar
Dwarf Willow
Deciduous Holly (Winterberry)

Large shrubs
Alder
Witch-hazel
Spicebush
Common Chokecherry
Elderberry
Rhododendron
Viburnum
Dogwood
Smooth (Dwarf) Sumac
Staghorn Sumac
Chokeberry

Small shrubs
Mountain Laurel
American Yew-Ground Hemlock
Sweetfern
Honeysuckle
Huckleberries
Blueberries
Viburnum
Meadowsweet
Wintergreen
Trailing Arbutus
Blackberry
Raspberry
Hazlenut
Scrub Oak

All native grasses, ferns and herbaceous plants

NON-NEGOTIATING PACKET

Packet of Information Provided to Landowners Adjacent to the Right-of-Way from whom PPL Electric is Not Attempting to Acquire Right-of-Way

Colleen Kester
Manager - Land/Land Rights Acquisition

PPL Electric Utilities
Two North Ninth Street
GENN5
Allentown, PA 18101-1179
Tel. 610.774.5571

February 4, 2013

Property Owner
Address

Dear Property Owner:

PPL Electric Utilities Corporation (PPL) is planning to rebuild an existing single-circuit 69-kilovolt transmission line between Lake Harmony Substation and Lake Naomi Tap to a double-circuit 138/69 kV operation. This line runs through Tobyhanna, Coolbaugh, and Pocono townships in Monroe County and Kidder Township in Carbon County, Pennsylvania.

Rebuilding this aging line for double-circuit operation will make electric service more reliable for homes and businesses in the region. It will allow PPL better capability to reroute power in the region during power outages, meaning outages should be shorter and affect fewer customers.

Since your property is crossed by, adjacent, or in close proximity to the existing right-of-way for this line, PPL is writing to notify you of the proposed project as required by the Pennsylvania Public Utility Commission.

Enclosed for your review are two notices required by the Pennsylvania Public Utility Commission that provide important information regarding Right-of-Way Maintenance Practices and Land Agent Practices. Also enclosed is PPL's Internal Practices for Dealing with the Public on Power Line Projects, a Glossary of Real Estate Terms, a brochure on Electromagnetic Fields, and a brochure on Vegetation Management.

If you have any questions on any of the enclosed information, please contact Greg Stroude by phone at 610.774.6139 or by email at JGStroude@pplweb.com.

Sincerely,

Colleen Kester

Colleen Kester
Manager Land / Land Rights Acquisition

Enclosure

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NOTIFICATION of
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James P. Melia
Pennsylvania Public Utility Commission
400 North Street
Harrisburg PA 17105
717-787-1859
jmelia@state.pa.us

Tanya J. McCluskey
Acting Pennsylvania Consumer Advocate
Pennsylvania Office of Consumer Advocate
555 Walnut Street
5th Floor Forum Place
Harrisburg, PA 17101-1923
Phone: 717-783-5048 or toll free 800-684-6560 (PA only)
Fax: 717-783-7152
Email: consumer@paoca.org

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for
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ACRE: A measure of land equal to 43,560 square feet.

APPRAISAL: An estimate of the value of property; the process through which conclusions of property value are reached.

APPRECIATION: An increase in the worth or value of a property.

CHAIN OF TITLE: A history of ownership of a particular property (See Abstract of Title).

CONDEMNATION: A judicial or administrative proceeding to exercise the power of eminent domain through which private property is taken for public use.

CONDUCTOR: The wire which carries electric energy.

CONVEYANCE: A transfer of property ownership.

DEED: A written document that, when executed and delivered, conveys title to or an interest in real estate.

DEED RESTRICTIONS: Clauses in a deed limiting the use of the property.

DEPRECIATION: A loss of value in property.

EASEMENT: A right to use the land of another for a specific purpose. (Such as a right of way for utilities.)

EGRESS: The right to exit a tract of land.

EMINENT DOMAIN: The right of a government, municipal body or public utility to acquire property for public use. (See Condemnation)

ENCROACHMENT: An intrusion, such as a house, sign, wall or fence, that intrudes on another's property or right of way.

FAIR MARKET VALUE: The highest price which a willing buyer would pay and the lowest price a willing seller would accept.

FEE OR FEE SIMPLE: The complete and absolute ownership of real estate.

GRANT: The transfer of property rights through a legal document.

GRANTEE: One who acquires property or any property rights from another person.

GRANTOR: One who transfers property or any property rights to another person.

INGRESS: The right to enter a tract of land.

KV: Kilovolt or 1000 volts (138 kV = 138 x 1000)

LIEN: A claim against real or personal property for satisfaction of a debt.

METES-AND-BOUNDS DESCRIPTION: The legal description of a parcel of land that begins at a well-marked point and follows the boundaries, using directions and distances.

MONUMENT: A fixed natural or artificial object used to establish real estate boundaries.

OPTION: The right to purchase a certain property at stated terms, price and time.

RECORDING: The act of entering documents in the Recorder of Deeds office established in each county.

RIGHT OF WAY: Used interchangeably with the word easement. (See E asement)

SURVEY: A process of scientifically measuring the quantity and location of a parcel of land.

TAX MAP: Maps used by the county Tax Assessment office showing the locations of properties.

TITLE: Evidence of ownership of land.

ZONING: Regulations pertaining to the use of land and/or buildings.

BROCHURE ON ELECTROMAGNETIC FIELDS

What is PPL Electric Utilities doing about EMF?

PPL Electric Utilities has a magnetic field management program to design and build new lines when practicable in ways that reduce magnetic fields at low or no cost to our customers. For example, the options we will consider for new lines include:

- Reversing the phases of new overhead double-circuit transmission lines, which can result in some cancellation of magnetic fields from the line and lowers the magnetic fields at the edge of the right of way.
- Building new transmission and distribution lines higher than previous designs because the level of magnetic fields at ground level will be lower.

Magnetic field management is considered in the process we use to site new facilities, balancing cost and function with land use and environmental concerns.

PPL Electric Utilities also provides information to customers and others interested in the subject. EMF coordinators have been assigned to serve as local contact points for EMF inquiries. PPL Electric Utilities representatives are available to talk with groups interested in EMF. The company also has an EMF issue manager who directs all aspects of the company's EMF program.

Where can I get additional information on EMF?

PPL Electric Utilities has an EMF coordinator in an area near you who can provide additional technical background. Call 1-800-DIAL-PPL (1-800-342-5775) and you'll be referred to the EMF coordinator in your area or to the company's EMF issue manager. In addition to the U.S. NIEHS website (www.niehs.nih.gov/health/topics/agents/emf), other responsible organizations provide information about EMF, including the World Health Organization (www.who.int/peh-emf).

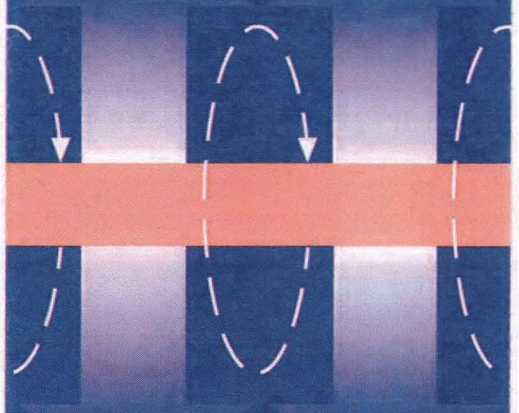
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Questions and Answers about

Electric and Magnetic Fields



What are electric and magnetic fields?

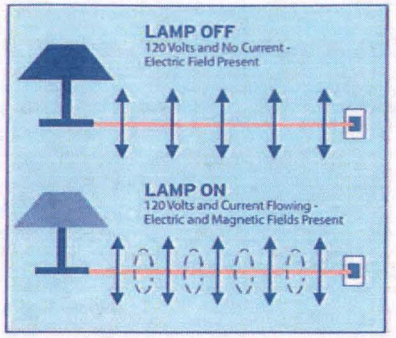
Electric and magnetic fields, also known as EMF, occur in nature and in living things. The Earth, for instance, has a static magnetic field, which makes the needle on a compass point north.

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

- **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. 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** 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. Magnetic fields also diminish with distance, but – unlike electric fields – they are not shielded by common objects such as trees and houses.

What are the typical magnetic field levels in a house?

Magnetic fields usually are measured in a unit called a milligauss (mG). Magnetic field levels found in the living areas of homes away from appliances typically range from less than 1 mG to about 4 mG, according to the U.S. Environmental Protection Agency. They can be higher in some cases. The magnetic fields near appliances can exceed 1,000 mG. The chart below shows examples of magnetic fields near some appliances and how the field levels fall off as you move away from the source.



Magnetic field strengths decrease with distance Magnetic fields are measured in milligauss	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 1 * 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.

Source: National Institute of Environmental Health Sciences (2002)

How do magnetic fields from power lines compare with fields from other sources in our everyday environments?

The chart at right shows some typical magnetic field levels from overhead power lines. If you compare the field levels from power lines with levels from common indoor sources such as appliances, household wiring and currents flowing on water pipes (see Figure 1), you will see that sometimes magnetic field levels from sources inside a home can be much higher than the fields from the power lines outside.

Does the strength of the field from overhead power lines get lower the farther you are from the line?

Yes. The strength of the field becomes significantly lower as the distance from the line increases.

Magnetic fields near overhead electric power lines

For overhead power lines, the strength of the magnetic field is dependent upon a number of factors, such as the height of the wires, current flow, wire configuration and the distance from the lines. These factors produce a magnetic field that drops off rapidly as you move away from the power line.

Type of overhead power line	Distance from the line			
	Under the line	50 feet	100 feet	200 feet
220 and 500 kV	5-400	5-250	1-75	0.5-20
69 and 138 kV	3-80	0.5-25	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.

FIGURE 2 Magnetic fields are measured in milligauss.

Are EMF the same as X-rays or microwaves?

No. EMF are very low in energy compared with much stronger X-rays or microwaves. X-rays have enough power to dislodge electrons, and microwaves can be strong enough to heat objects. Electric power EMF do not have enough energy to do those things.

Does putting power lines underground reduce magnetic field exposures?

Yes and no. It depends on distance from the line and how the line is configured. The earth itself does not shield magnetic fields. Magnetic field levels directly above a typical underground line may be about twice the levels from a typical overhead line carrying the same electrical load. This is because an underground line usually is buried only a few feet below the surface of the ground and is closer than an overhead line that is suspended well above the ground. The wires of an underground line usually are closer to each other than the wires of an overhead line, and thus cancel the magnetic fields to some extent. Some underground designs can reduce magnetic field levels further. However, all underground options are very expensive and can cost up to 10 times more than overhead construction, and customers pay these costs in their electric bills.

What about EMF and health?

Since the 1970s, there have been hundreds of scientific studies on EMF. Many credible scientific panels, government agencies and public health entities have reviewed the scientific research on EMF. For example, evaluations of the research have been conducted by such leading agencies as the U.S. National Institute of Environmental Health Sciences, the U.S. National Academy of Sciences, Health Canada and the World Health Organization. None of these agencies has found that there is a demonstrated cause and effect relationship between exposure to EMF and cancer or any other adverse health effect.

In 1999, the director of U.S. NIEHS sent a detailed report on EMF and health to the U.S. Congress. The NIEHS report concluded that "the scientific evidence suggesting that ELF-EMF exposures pose any risk is weak." The NIEHS report noted that while some epidemiology studies reported associations with some leukemias, there was no support for these findings in laboratory research. The NIEHS report concluded that "this finding is insufficient to warrant an aggressive regulatory concern."

The NIEHS issued updated information on EMF in 2002, which concluded that for most health outcomes there is no evidence of EMF causing adverse effects. The NIEHS said there is some evidence of an association with childhood leukemia, which is difficult to interpret without supporting laboratory evidence. The NIEHS 2002 update concluded that "[a]lthough questions remain about the possibility of health effects related to EMF, recent reviews have substantially reduced the level of concern." NIEHS did not recommend regulatory action to reduce EMF levels. The NIEHS information about EMF can be found on the Internet at www.niehs.nih.gov/health/topics/agents/emf.

In 2007, the World Health Organization issued an extensive review of EMF research. This review concluded that there is "inadequate evidence" that EMF causes or contributes to almost all health outcomes, that based on "limited evidence" of an association from epidemiology studies, there is a "possible" relationship with childhood leukemia, and that a cause and effect relationship has not been established. On its website, WHO emphasizes that: "Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields." The WHO information can be found online at www.who.int/peh-emf/about/WhatisEMF/en/index1.html.

Do EMF affect livestock, wildlife, crops or other plant life?

Many studies have been conducted in the laboratory and in the field to study the effects of EMF exposures on plants and wildlife. Research and years of operating experience have not shown that EMF cause any adverse effects in livestock, wildlife or plants. A group of researchers from Westinghouse Electric Co. and the Pennsylvania State University exposed more than 80 species of plants to power line electric fields at high intensities. No statistically significant differences were found between exposed and unexposed plants in seed germination, seedling emergence, seedling growth, leaf area for plant, flowering, seed production, biomass production and longevity. One response, damage to the leaf tips of sharp-pointed plants, was observed. Near the leaf tip of a sharply pointed plant, an electric field can be very high and can cause drying of the leaf tips. An extensive series of field experiments on plant responses has been carried out near 765 kV transmission lines and a variety of farm crops developed normally.

Why do some high-voltage power lines make noises?

Some power lines make noises because of the effects of electric fields on air molecules around the lines. These effects are more likely to be noticeable on damp days and are not harmful to people or animals under the line.

How can a fluorescent light glow under a transmission line, even if it's not plugged into an electrical source?

A sufficiently strong electric field may stimulate the phosphors from the chemicals that coat the inside of a fluorescent light tube and cause them to glow slightly. A fluorescent tube also will glow when held near a car ignition or a radio transmitter. Fluorescent lights sometimes can be made to glow by rubbing them with a glove or a dry hand, or by carrying them when sliding your feet across a rug in a darkened room.

Are there any exposure limits for EMF in Pennsylvania?

Pennsylvania has not adopted any electric or magnetic field exposure limits.

BROCHURE ON VEGETATION MANAGEMENT

Vegetation management is critical to electric reliability

Millions of people served by PPL Electric Utilities depend on having reliable power for their homes and businesses. Effective vegetation management along high-voltage transmission lines is a critical part of maintaining that reliability.

PPL Electric Utilities operates thousands of miles of high-voltage transmission lines. Our vegetation management program is designed to promote the safe and reliable operation of the electric grid while making sure that we are sensitive to the concerns of property owners and our obligations to electric customers.

PPL Electric Utilities' right to do this work

The vegetation management work we do will depend on the specific rights we have for each property. We will be happy to discuss these rights with you in advance of any work.

To schedule a meeting with a PPL Electric Utilities representative, call 1-877-528-2889 or email us at PPLVegetationManagement@pplweb.com.

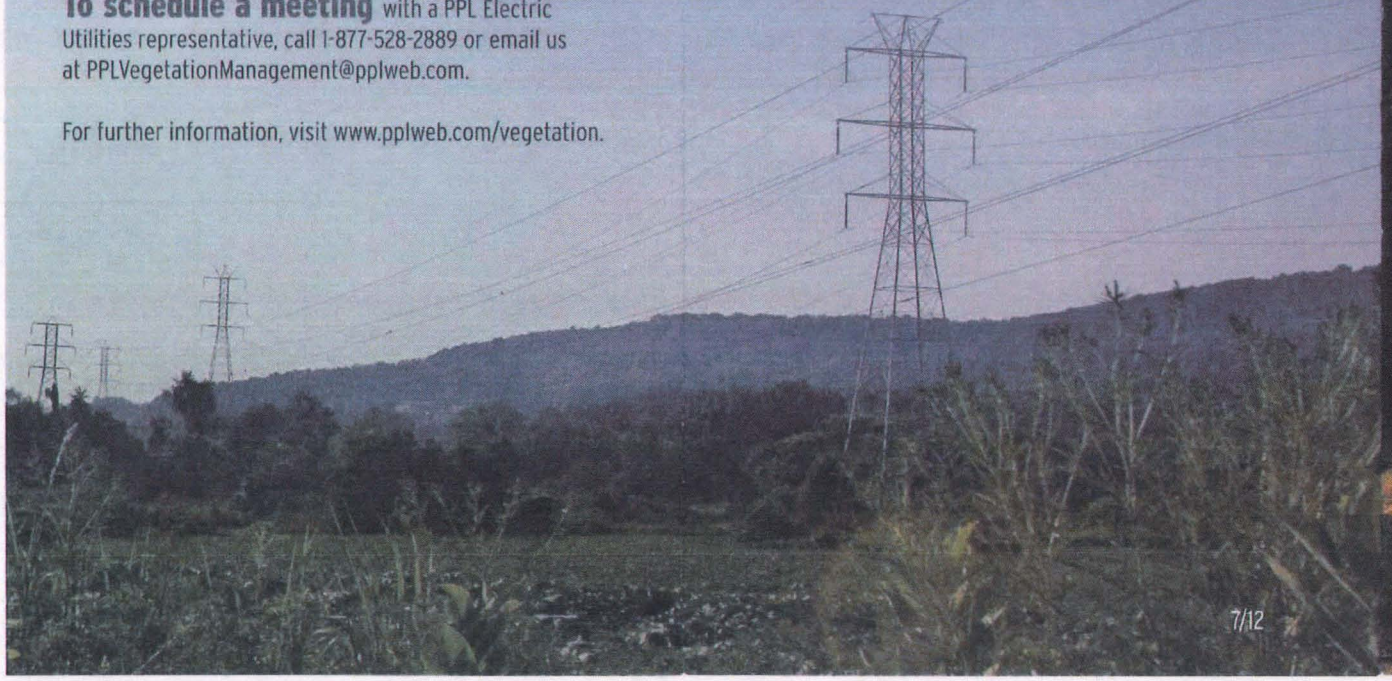
For further information, visit www.pplweb.com/vegetation.

An award-winning program

PPL Electric Utilities is a proud recipient of the Tree Line USA award from the Arbor Day Foundation and the National Association of State Foresters. The groups seek to promote proper utility arboriculture and public education through annual worker training, quality tree care, tree planting and public education, energy conservation and collaboration with community groups. For information about planting the right tree in the right place, visit www.arborday.org.

PPL Electric Utilities works with state and local conservation, land management and environmental groups to advance common goals of electric reliability and environmental stewardship.

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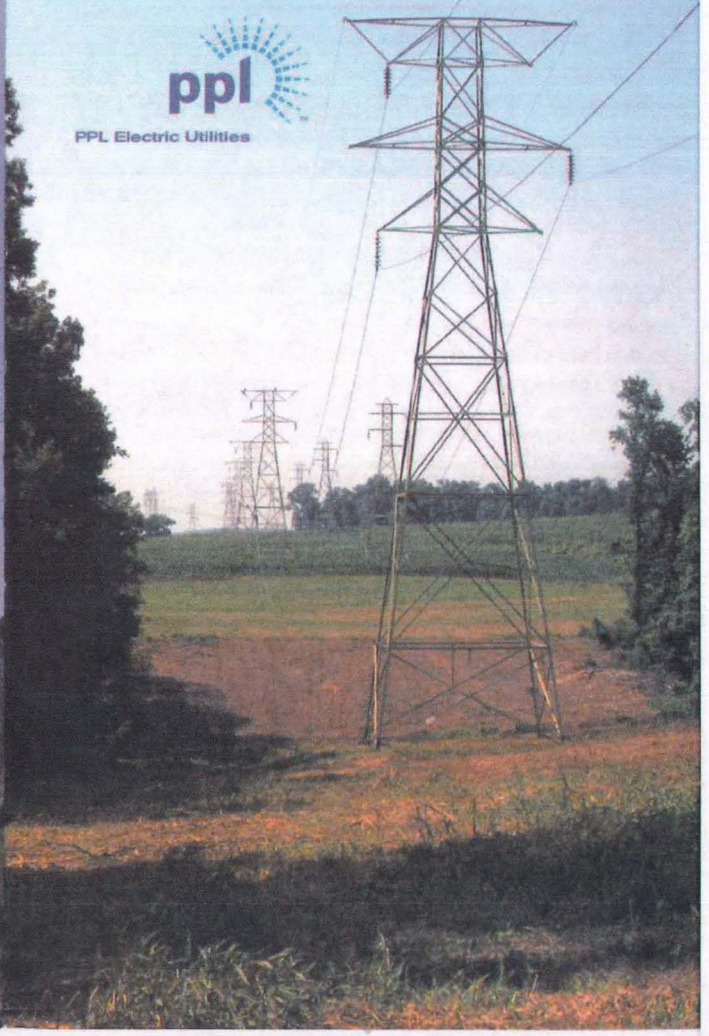
138-kilovolt

Transmission Line Vegetation Management

Keeping your electric service reliable

www.pplweb.com/vegetation

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KEEPING YOUR ELECTRIC SERVICE RELIABLE

Trees and other tall vegetation must be kept away from power lines.



If they get too close, the result can be a serious power outage. There is also the potential of a significant safety risk to you, and to our employees.

The Northeast Blackout of 2003 provides clear evidence that trees and high-voltage transmission lines do not mix. About 55 million people in eight U.S. states and Canada were without power after a tree touched a transmission line.

In our area, the heavy snowstorm in October 2011 knocked leaf-laden trees into transmission lines and resulted in prolonged power outages for PPL Electric Utilities customers – more proof that trees too close to high-voltage lines can cause reliability problems for homes and businesses.



We take a proactive approach to vegetation management.

This means that we are removing more trees and trimming more trees than we did in the past. We understand that this approach is not always popular with property owners. But it is the right thing to do – to keep our system safe and reliable for everyone.

Our vegetation management program is designed to meet regulatory requirements.

- Federal and state regulators impose obligations on electric utilities based on the voltage of the line.
- The federal government adopted strict new reliability standards for certain higher-voltage transmission lines after the 2003 blackout. PPL Electric Utilities is required to meet these standards. We face stiff fines if we do not.
- Pennsylvania utility regulators require us to keep our electric delivery system reliable.
- In May 2012, the Federal Energy Regulatory Commission and the North American Electric Reliability Corporation, in a review of power outages after the October 2011 snowstorm, recommended that utilities do more to keep trees away from high-voltage transmission lines.

Our pledge to you

We understand that removing or trimming trees may not be popular with many landowners.

- We pledge to communicate with property owners well in advance of regularly scheduled vegetation work.
- We pledge to work in a professional manner, and to work within the limits of the rights we have to perform this work on each property.
- We pledge to treat private property with care.
- We pledge to strike a careful balance – being sensitive to landowner concerns about vegetation management while at the same time doing the work that is needed to improve electric service reliability for customers by keeping trees away from power lines.



Details of the work we will do on 138 kV

In residential areas, our contract tree specialists will selectively remove vegetation that is not compatible from the PPL Electric Utilities right of way on your property. Whenever feasible, we will not disturb trees and other vegetation that are compatible with high-voltage transmission lines.

Compatible vegetation is defined as follows:

- Under the wires, plus an additional 10 feet on each side, grasses and other low-growing plants are the only compatible species.
- In the border area, which includes the rest of the PPL Electric Utilities right of way, the following is a list of vegetation that is compatible in most situations:

Small trees
Flowering Dogwood
Redbud
Hawthorn
American Hornbeam
Shadbush (Juneberry, Serviceberry)
Eastern Red Cedar
Northern White Cedar
Dwarf Willow
Deciduous Holly (Winterberry)

Large shrubs
Alder
Witch-hazel
Spicebush
Common Chokecherry
Elderberry
Rhododendron
Viburnum
Dogwood
Smooth (Dwarf) Sumac
Staghorn Sumac
Chokeberry

Small shrubs
Mountain Laurel
American Yew-Ground Hemlock
Sweetfern
Honeysuckle
Huckleberries
Blueberries
Viburnum
Meadowsweet
Wintergreen
Trailing Arbutus
Blackberry
Raspberry
Hazlenut
Scrub Oak

All native grasses, ferns and herbaceous plants

Attachment 14

ATTACHMENT 14
LAKE HARMONY-LAKE NAOMI 138/69 kV REBUILD PROJECT
AGENCY PERMIT REQUIREMENTS

Agency	Permit, Approvals, or Documents	Anticipated Approval Date	Status of Permit or Approval	Regulated Activity
Local Agencies				
County Soil Conservation District (CCD) – Carbon CCD and Monroe CCD	Erosion and Sedimentation Control Plan (E&SC PLAN) approvals (coordinated through PADEP)	CCCD and MCCD Approval anticipated by Winter 2013-14.	Not Yet Submitted	Activities that require earth disturbance must institute practices that minimize accelerated erosion and resulting sediment pollution to the waters of the Commonwealth or US.
Commonwealth of Pennsylvania Agencies				
PA Department of Environmental Protection (PADEP)	Waters/wetlands Obstruction and Encroachment Permits (Chapter 105) and Floodplain Management Permit (Chapter 106) from PADEP State Programmatic General Permit (PASPGP-4) from PADEP for USACE Approval of Coverage under National Pollutant Discharge Elimination System (NPDES) Permit for Stormwater Discharges Associated with Construction Activities (Chapter 102) (likely Individual NPDES due to EV and HQ Watersheds)	Waivers and General Permits (GP), PADEP review 3-4 months; permits anticipated by Winter 2013-14. PADEP NPDES Permit anticipated Winter 2013-14.	Not Yet Submitted PADEP Chapter 105/106 Permit – submit after CCCD and MCCD approval of E&SC Plan and PNDI clearance.	• Activities in watercourses, floodways, bodies of water (incl. wetlands) (25 Pa. Code §105) • Floodplains obstructed by highways and public utilities (25 Pa. Code §106) • Discharge of storm water associated with construction activities (25 Pa. Codes § 92, National Pollutant Discharge Elimination System; § 93, Water Quality Standards; and §102, Erosion and Sediment Control).

Agency	Permit, Approvals, or Documents	Anticipated Approval Date	Status of Permit or Approval	Regulated Activity
PA Department of Conservation & Natural Resources (DCNR) – Bureau of Forestry (plants)	Consultation on-going - State rare, threatened, and endangered (RTE) species consultation and approvals; surveys for rare plants	DCNR Clearance anticipated by Summer 2013.	PNDI response received - Plant survey conducted in Summer 2012. Additional survey of by-pass area being completed.	Determination of potential impact to state listed and candidate threatened & endangered species and habitat if present & impacted
PA Fish & Boat Commission (PFBC) (fish, reptiles, amphibians)	Consultation complete – no impacts (see Attachment 7)	**Approved**	PFBC clearance letter received.	Same as above
PA Game Commission (birds & mammals)	Consultation on-going - State rare, threatened, and endangered (RTE) species consultation and approvals; surveys for osprey nesting habitat	PGC Clearance anticipated by Summer 2013.	PNDI response received – Osprey nesting avoidance discussions with PGC on-going	Same as above
PA Historical & Museum Commission (PHMC)	Consultation initiated	PHMC Clearance anticipated by Summer 2013.	PHMC response letter requested additional survey of historic structures. Letter report to be submitted to PHMC in May 2013.	Historic and cultural resources listed or eligible for listing on the State &/or Federal Natural Register of Historic Places.
PA Department of Transportation (PennDOT)	Various highway occupancy permits	PennDOT Permits anticipated by Summer 2013.	Not Yet Submitted	Access road locations and highway crossings by utilities
PennDOT Bureau of Aviation (BOA)	PennDOT Notice of Proposed Construction or Alteration (Form AV-57)	PennDOT BOA Approval anticipated by Summer 2013.	Not Yet Submitted	Notify BOA of transmission towers greater than 200 feet or within 20,000 feet of airport
PA Public Utility Commission (PUC)	Application for permission to site and construct transmission line	PUC Approval anticipated by May 2014.	To be submitted May 2013	Rebuild within existing transmission line ROW

Agency	Permit, Approvals, or Documents	Anticipated Approval Date	Status of Permit or Approval	Regulated Activity
Federal Agencies				
US Army Corps of Engineers (USACE) – Philadelphia District	Clean Water Act permits for regulated water and wetland encroachments (Section 404) State Programmatic General Permit (PASPGP-4) from PADEP and USACE Bog Turtle screening to be required	USACE Permits via PASPGP-4 anticipated by Winter 2013-14.	Not Yet Submitted	Discharge of dredged or fill material into waters of the US
US Fish & Wildlife Service – State Ecological Services (USFWS)	Consultation on-going - Federal rare, threatened, and endangered (RTE) species reporting and compliance with Section 7 of Endangered Species Act for Federal permits, if necessary; surveys for bog turtle habitat (Phase 1) at minimum	USFWS Clearance anticipated by Summer 2013.	PNDI request received – - Phase I bog turtle habitat survey conducted spring 2012, Phase II presence/absence study conducted spring 2012 for two wetlands along existing ROW. New Phase II being conducted for one wetland along bypass area – report in progress.	Determination of potential impact to Federal listed and candidate threatened & endangered species and habitat if present & impacted
Federal Aviation Administration (FAA)	FAA Notice of Proposed Construction or Alteration (Form 7460-1)	FAA Approval anticipated by Summer 2013.	Not Yet Submitted	Notify FAA of transmission towers greater than 200 feet or within 20,000 feet of airport