PPL Electric Utilities

2014 RTEP Project Proposal Window 1

BL England [BLE] generation deliverability to Atlantic City area

Solution #4: Cardiff-BLE-Dennis Station 230kV Line Addition

Submitted July 28, 2014

REDACTED VERSION

Cardiff-BLE-Dennis Station 230kV Line Addition

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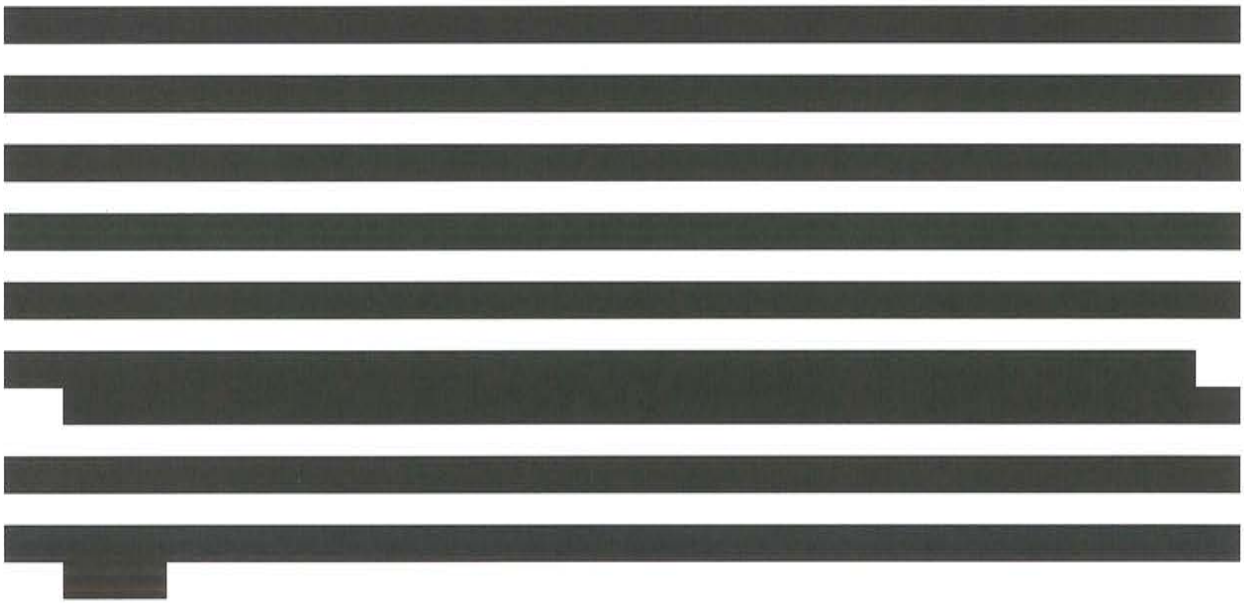

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A Executive Summary

A.1 Name and Address of Proposing Entity

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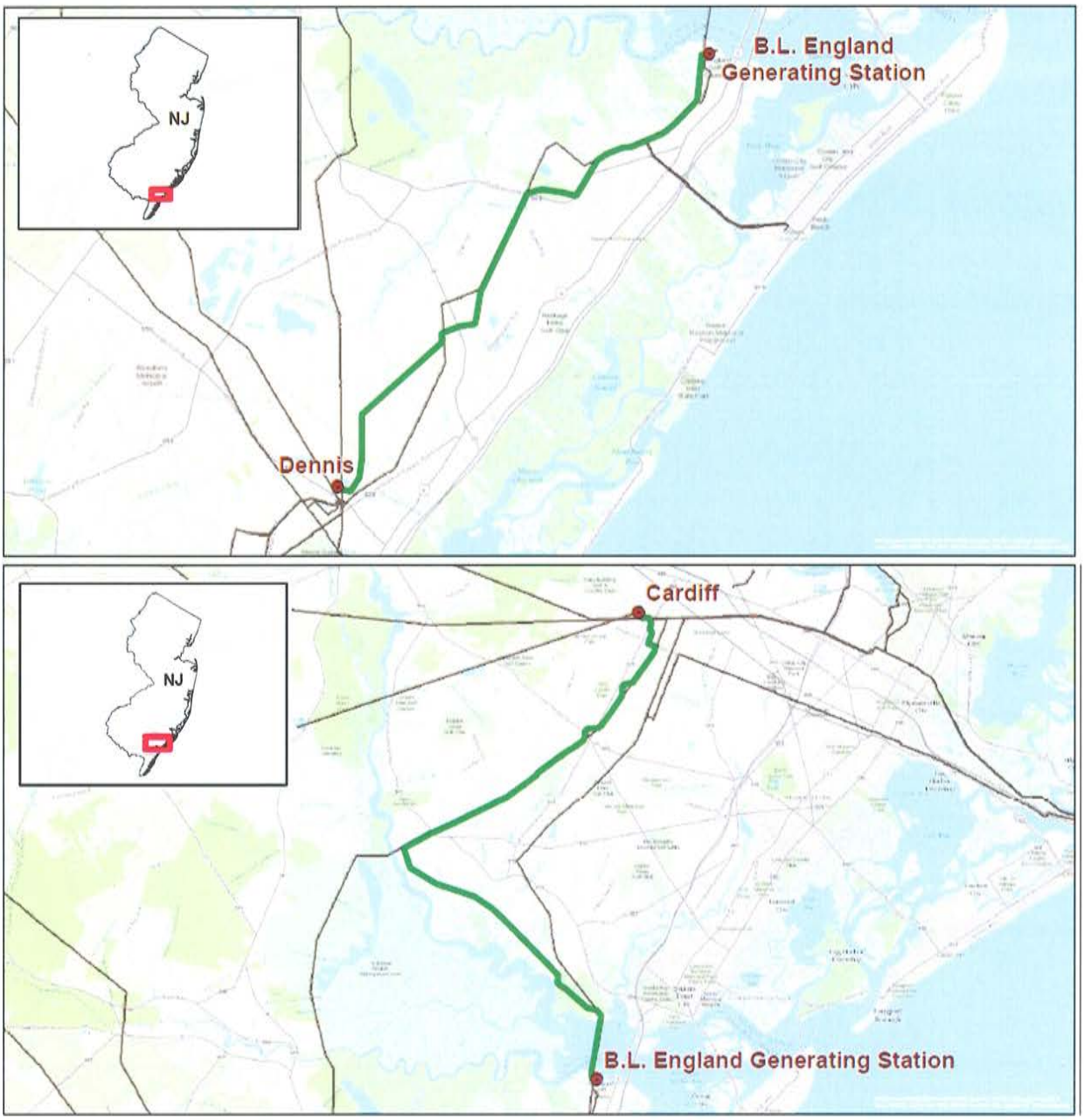
A.2 Description of Problem and Proposed Solution

PPL Electric Utilities (PPL EU) proposes a new single-circuit 25-mile 230kV transmission line from Cardiff Substation to BL England Substation to Dennis Substation in Southeast New Jersey. This solution will relieve 22 Generation Deliverability violations on the 138kV system in Southeast New Jersey, as identified in PJM's 2014 RTEP study results (see Section C.1.a). PPL EU will be responsible for planning, design, right-of-way acquisition, permitting, siting, construction, and maintenance of the entire solution. PPL EU will coordinate with the incumbent utility to support all aspects of the solution. A map of the proposed solution is included in Figure A2-1.

Figure A.2-1 - Map of Proposed Solution Corridor



Why This Solution?

PJM identified five different 138kV lines that overload for a total of 18 outage scenarios, the greatest overload approximately 134% of the summer emergency MVA rating. Implementation of this solution mitigates all 20 of the Southeast New Jersey 138kV system thermal reliability violations and reduces loads to between [redacted] of summer emergency MVA ratings for all critical contingencies. PJM also identified two

230kV lines that overload during a double-circuit outage event. This solution resolves these violations as well by bringing a 230kV line into Dennis substation and completing a 230kV loop.

This solution creates a new 138kV parallel path to these overloaded circuits, allowing for increased power flow from southern area generation to Atlantic City load. Routing the proposed transmission line solution to Cardiff instead of Atlantic City significantly reduces the economic, environmental, and landowner impact by avoiding an otherwise congested region.

Why PPL EU?

PPL EU has successfully developed, operated, and maintained transmission infrastructure throughout its nearly 100 year history and is well positioned to implement the 230kV transmission line from Cardiff Substation to BL England Substation to Dennis Substation. PPL EU focuses on delivery excellence, blending capable people, mature processes, and rich vendor networks. PPL EU is backed by its parent company, PPL Corporation, one of the largest investor owned utilities in the U.S. Both companies maintain "investment grade" credit ratings and conduct business according to a set of business standards codified in the PPL Standards of Conduct and Integrity.

As a developer, PPL EU:

- Acquires right-of-way successfully (e.g., 75% of Northeast Pocono right-of-way acquired in 9 months
- Obtains siting permit approval with state regulators successfully
- Seeks mutually beneficial arrangements with landowners using a formalized siting and right-of-way process that coordinates the planning-permitting-engineering-construction functions
- Employs best-in-class lifecycle approach to transmission asset management (see Section B1)
- Delivers projects on-time and on-budget, e.g., Susquehanna-Roseland and Northeast Pocono (see Appendix A)

As an operator , PPL EU:

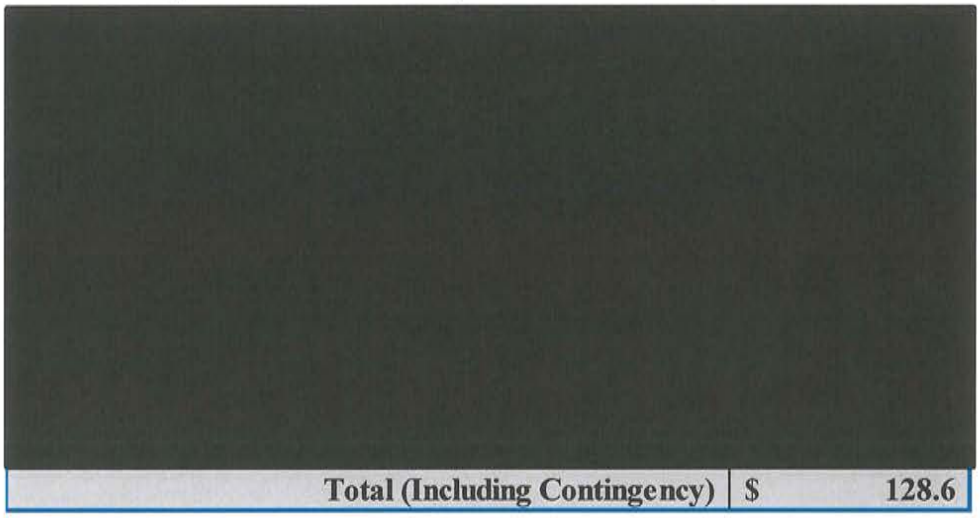
- Conducts business safely with incidence rates lower than industry averages
- Maintains facilities beyond industry standards (top quartile System Average Interruption Frequency Index (SAIFI), multiple awards and recognition for Hurricane Sandy response).
- Builds relationships with local community ($6M raised for charity in 2013)

Further description of PPL EU's capabilities as a transmission developer and operator is presented in Section B.

A.3 Estimated Solution Cost

Addition of a 25-mile transmission line from Dennis Substation to BL England substation to Cardiff substation to Dennis substation to resolve the Generation Deliverability violations described in Section A.2 is estimated at a total cost of $128.6M (see Figure A3-1 for more detail). This estimate is the result of an engineering and design process that considered factors specific to this project, e.g., right-of-way, permits, terrain, existing infrastructure, and is informed by PPL EU's recent transmission development experience.

Figure A.3-1 - Summary of Estimated Project Costs



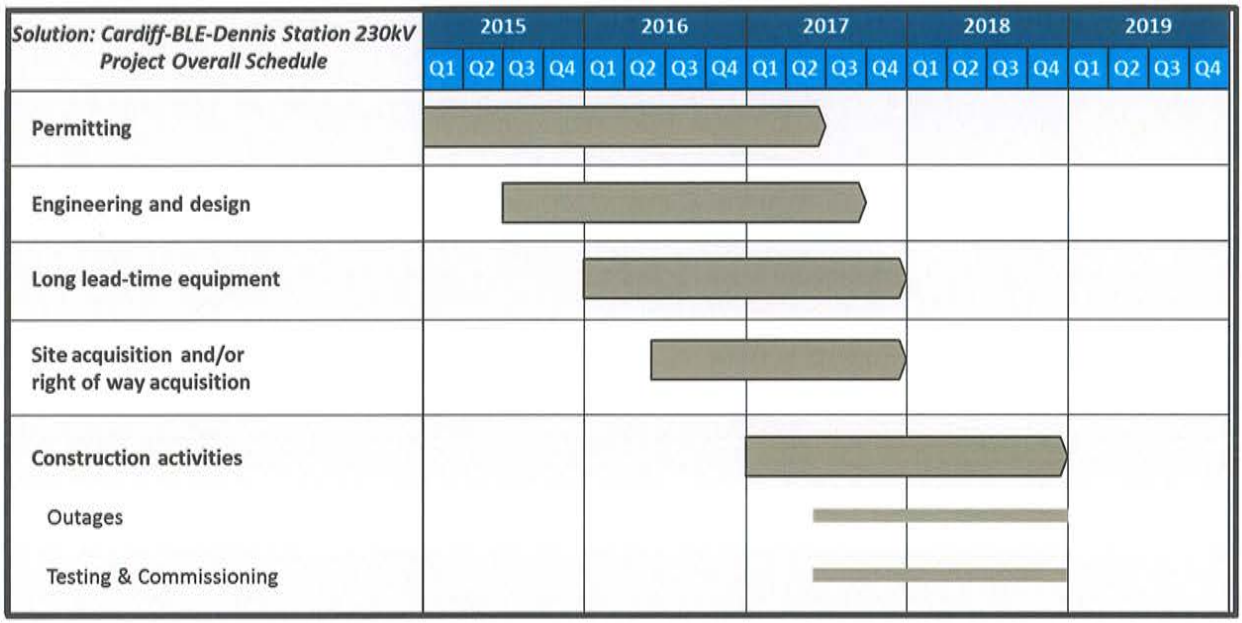
Total (Including Contingency)	**$**	**128.6**

Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

A.4 Project Schedule and Milestones

The solution described in this document will be commissioned and placed into service by the end of 2018 (see Figure A4-1 for a summary), exceeding PJM's target date for Generation Deliverability violation resolution. PPL EU is prepared to begin the planning and coordination required to execute against this timetable following the award of the project. PPL EU integrated planning; permitting, engineering, constructability capabilities allow for efficient execution of the required activities recognizing that multiple stakeholders will be involved across the project lifecycle. The project will be led by the PPL EU Project Management Organization (PMP certified personnel) using repeatable design and streamlined construction processes to meet the targeted completion date as presented in the schedule below.

Figure A.4-1 - Overall Project Schedule and Milestones



A.5 Statement of Designated Entity Consideration

PPL EU seeks, through the proposal herein, to be considered the Designated Entity to construct, own, and finance the proposed solution. PPL EU will coordinate with the incumbent transmission owner(s) (TOs) of those assets outside of PPL's footprint through an O&M contract agreement.

A.6 Affirmation of Pre-Qualification Information

PPL EU's pre-qualification information on record with PJM and as posted on PJM's website, submitted on June 28, 2013 through the Office of the Interconnection prior to the opening of the Market Efficiency project proposal window, reflect the company's current qualifications to be eligible for Designated Entity status as defined in the PJM Amended and Restated Operating Agreement ("PJM OA") in Section 1.5.8(a) (PJM Designation 13-12).

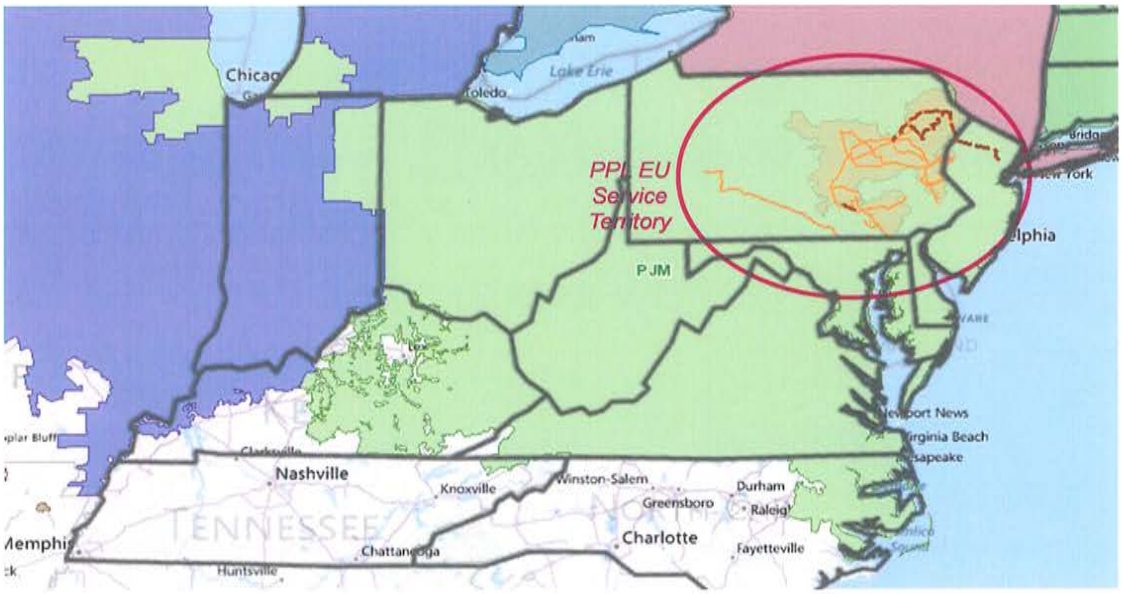
B Company Evaluation Information

B.1 Company Overview

PPL EU engages in the regulated transmission and distribution of electricity, providing high-quality, safe and reliable service to customers across central and eastern Pennsylvania. With the support of its parent company, PPL Corporation, PPL EU has access to the best practices and leading capabilities of one of the largest investor-owned companies in the U.S. utility sector.

PPL EU owns and operates a large transmission system within the PJM footprint, including 62 substations with a total capacity of 18.3 millionkVA and approximately 4,000 transmission pole miles in service. Figure B1-1 depicts PPL EU's existing transmission service territory within the broader PJM footprint.

Figure B.1-1: PPL EU Transmission Footprint in PJM



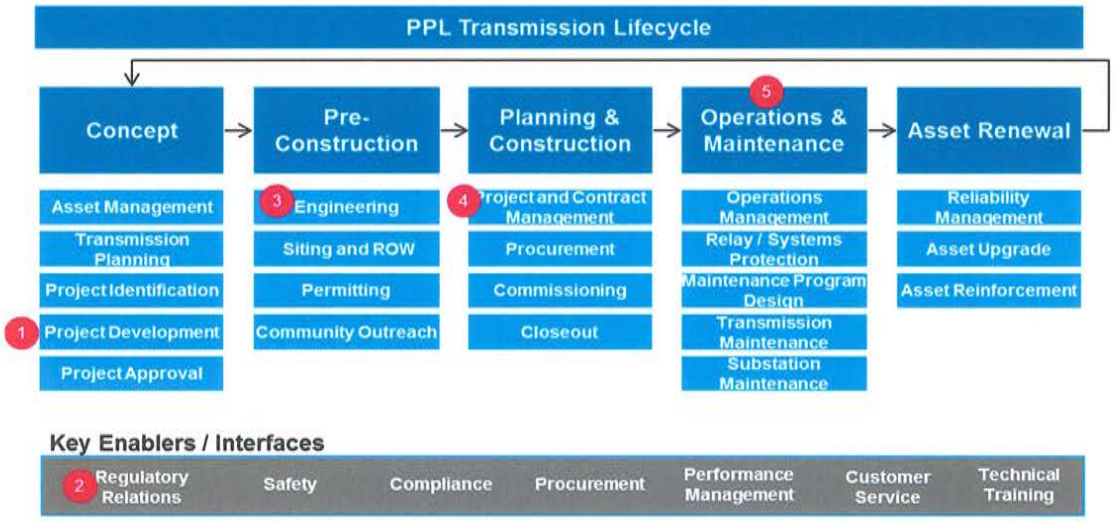
Management of this extensive transmission system and the project experience gained through constructing these assets, has enabled PPL EU to establish unique capabilities that are relevant to the proposed solution to the BL England Generation Deliverability violations. PPL EU not only brings a well-established strong relationship with PJM, strong financial backing, and extensive project experience, but also a scalable contractor model, engineering expertise, and a culture of operational excellence that is required for successful project execution and asset operation.

PPL EU has established an operating model designed to efficiently and effectively invest in, operate and maintain its transmission system. This model establishes clear roles,

responsibilities, processes and procedures to ensure accountability, facilitate timely decision-making, and optimize overall execution. A senior management team with almost 200 years of collective experience is responsible for overseeing an integrated transmission and distribution system. A set of PPL EU-designed operating principles ensure safe and reliable execution of its transmission strategy by aligning and focusing the organization on critical areas for success. Both the management team and the supporting organization have the requisite capabilities to advance transmission as a strategic priority for PPL EU.

Figure B1-2 highlights capabilities particularly relevant for consideration of this proposed solution.

Figure B.1-2: PPL EU Differentiating Capabilities



B.1.1 Project Development

PPL EU has extensive experience identifying and executing transmission projects, ranging from simple upgrades to large scale greenfield development. More than $600 million in transmission grid investment is planned in 2014 alone and $4.7 billion in the transmission and distribution grids over the next five years. Completing these projects requires extensive technical expertise, effective project management capabilities, the ability to work with numerous stakeholders, and effective cost controls over the capital being deployed. The in-flight 500kV new transmission line build Susquehanna-Roseland and 230kV new transmission line build at Northeast Pocono, described in detail in Appendix A, demonstrate PPL EU's ability to successfully execute the complexities of large projects concurrently.

B.1.2 Regulatory Relations

Strong relationships with federal, state and local government and regulatory agencies have facilitated successful development and operation of transmission projects. Throughout PPL EU's nearly 100-year history, PPL EU has worked with agencies, communities and customers to site, permit, and license transmission projects within our transmission service territory. For example, National Park Service was a key stakeholder relationship developed to address the requirements for the Susquehanna-Roseland project to cross three national parks. Additionally, PPL EU has an outstanding success rate with obtaining siting application approvals through Pennsylvania's Public Utility Commission (PUC).

B.1.3 Engineering

With the increase in infrastructure investments, the Engineering department has gained a broad mix of recent design experience including both new capacity additions and upgrades, as well as varied electrical system specifications, weather and geographic topography conditions. PPL EU has designed over 1,000 miles in support of new line builds, existing transmission rebuilds, reconductoring and fiber optic cable additions.

Transmission Engineering utilizes current industry standards and adopts new technologies to improve process efficiency and effectiveness. Updated standards incorporate specifications such as 2-shield wires and high reliability performance lines. New state-of-the-art technology such as a Power Line Computer Aided tool called PLS – CADD acts as a centralized tool for designing and drafting. PPL EU is also a member of key industry forums such as the Electrical Power Research Institute (EPRI) and the EHV Engineering Committee, which build capabilities through collaboration with other members.

PPL EU's Engineering group not only leverages extensive experience in-house, but also has vast experience in managing contracted engineered services with 12+ engineering firms: [redacted], among others. These contractors have extensive knowledge and experience designing all transmission line voltage classes both within PJM as well as outside the PJM territory.

B.1.4 Project and Contract Management

The PPL EU Project Management team ensures that project activities are completed to scope, schedule and budget in order to achieve the business objectives and requirements of the company. The team is part of a dedicated organization using best-in-class process and with employees who maintain the Project Management Professional (PMP) certification. The Project Management team remains connected to projects throughout the entire development lifecycle, beginning with a specific Project Manager assigned to a

project in the early stages of Project Planning and Design. The Project Management team has experience managing projects across all service territories and across all types and sizes of projects. Depending on the size and scope of a particular project, Project Managers are responsible for managing and overseeing anywhere from one to fifteen projects at the same time. For the largest and most complex projects PPL EU will assign the most experienced Project Managers to ensure that the project is handled in the most efficient and effective method possible.

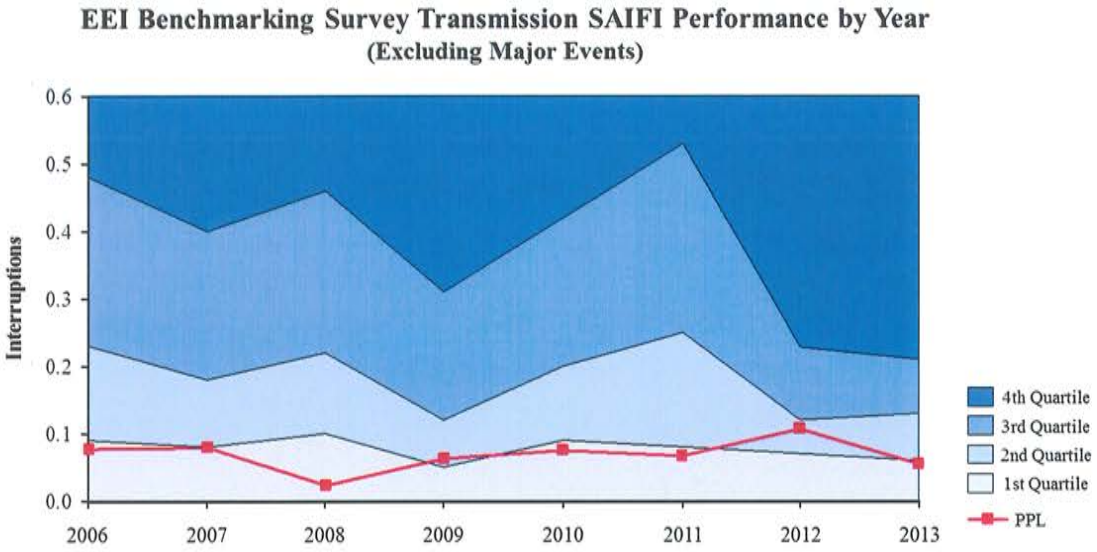
The ability to execute projects both large and small is built on a scalable contractor model across the transmission asset lifecycle, while maintaining stringent standards relating to safety, quality, and delivery. PPL EU has established a preferred set of contractors, Contractors of Choice (COC), through an extensive, formal request-for-proposal (RFP) process. The Contract Management team has established relationships with contractors nationwide, which creates a strong ability to effectively source the best contractor(s) for each piece of work required by PPL EU. This contracting process delivers a best practice contracting approach that complies with the National Contract Management Association standards and processes.

B.1.5 Operations & Maintenance

PPL EU has a strong history of execution excellence, as demonstrated by our exemplary track record of compliance, safety, reliability, and cost containment. Compliance with North American Electric Reliability Corporation (NERC) standards has always been, and continues to be, a high priority and PPL EU has routinely been recognized by ReliabilityFirst (RF) as a benchmark for compliance. In 2012, RF audited PPL EU on behalf of NERC for both Reliability Standards associated with Operations and Critical Infrastructure Protection (CIP) Reliability Standards, the company received high marks for both. PPL EU adopts standards and processes in advance of compliance requirements and offers regular training programs. Safety is a PPL EU core value embedded throughout PPL EU. The Safety program strives to minimize Occupational Safety and Health Administration (OSHA) designated Recordable Events and results are consistently better than industry peers.

Commitment to system performance through effective, preventive and real-time operations and maintenance programs is evidenced in the reliability performance metrics for PPL EU's system. As shown in Figure B1.5-1, Transmission System Average Interruption Frequency Index ("T-SAIFI") performance has been at or near top-quartile performance for the past six years, averaging less than 0.1 interruptions over the period from 2006 through 2013 (excluding major events).

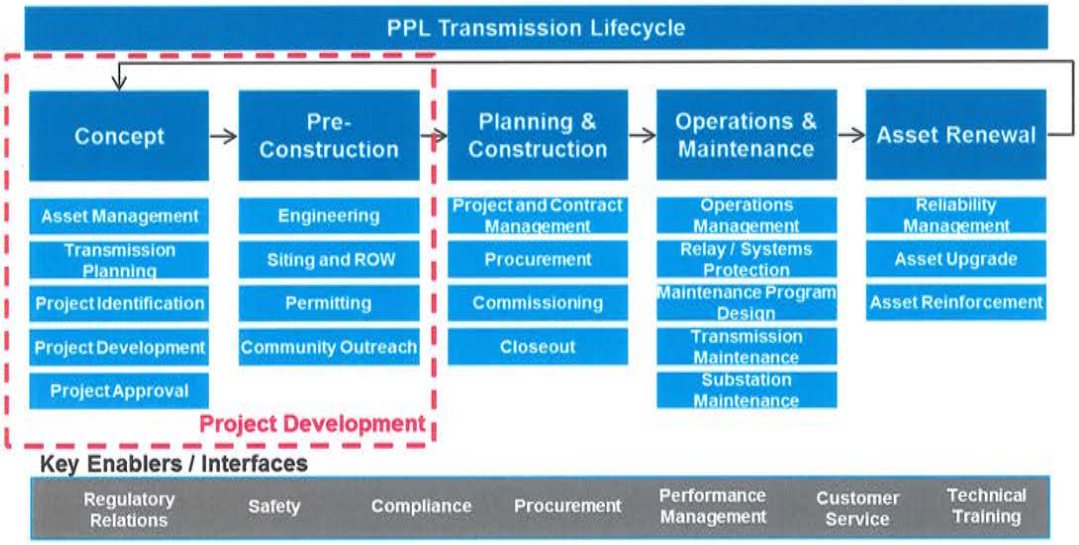
Figure B.1.5-1: PPL EU T-SAIFI Historical Trend (In Interruptions)



B.2 Technical and Engineering Qualifications and Experience

PPL EU has nearly 100 years of experience in transmission development and construction, building everything from core 69kV connection projects to 500kV lines. With refined processes to manage the complexities inherent in all types of transmission projects, PPL EU organizes and operates with project execution in mind. Project control is maintained through strong governance, clear project review processes, and tools for stringent project estimating and control. The early phases are grounded in the principles of constructability, cross-functional collaboration and front-loaded engineering and design to avoid or minimize future scope, schedule or cost changes. For example, during the Concept phase the operations and maintenance teams provide input into new project development on optimal design and construction in terms of ease and cost to maintain the assets. PPL EU uses a blended approach of in-house teams and approved contractor resources to allow for high quality project execution at the lowest overall cost. Regardless of internal or external resources, all projects are delivered through the structured project development model shown in Figure B2-1.

Figure B.2-1: PPL EU Transmission Lifecycle



Proven success in large capital projects such as the recent Susquehanna–Roseland project illustrates PPL EU's effectiveness in executing its end-to-end transmission operating model. Certain elements of this operating model are highlighted below.

Widespread Contractor Support

With recent project experience at Susquehanna–Roseland and Northeast Pocono projects, PPL EU has built strong relationships with many large firms that have nation-wide capabilities. These relationships will allow access to talent with familiarity with the rules and regulations in PJM through the development and construction phase. In the event that the current vendor base cannot adequately support the project needs, the Sourcing organization has developed an extensive RFP process that comprehensively vets potential contractors for safety, performance, quality, Days Away, Restricted, or Transfer (DART) rates, and safety incidents.

Secure and Cost Effective Supply

Due to the significant volume of projects executed over the last several years, PPL EU receives preferred customer prices that are equal to or better than its peers, and has secured supply when others in the industry are unable to find needed resources and / or materials. For example, materials management for Susquehanna–Roseland was outsourced to HD Supply, a model that would likely be replicated for the proposed project. HD Supply's widespread footprint positions this partner to effectively manage equipment purchasing, product tracking, and securing lay-down yard, in the territory.

Siting, Permitting and Right-of-Way

The Siting, Permitting and Right-of-Way departments have built a strong set of capabilities to support the proposed solution. The siting process includes the determination of a Project Study Area, identification of Alternative Corridors, identification of Alternative Routes within these Corridors, and Selection of the Preferred Route. Through early stakeholder engagement and public outreach, PPL EU has been successful at avoiding constraints and leveraging opportunities to minimize impact to the public and environment, while maintaining reasonable costs and preserving engineering and construction feasibility. PPL EU has an excellent success rate for securing approval for siting applications from PA PUC.

The Right-of-Way team is heavily integrated with the Siting team, which facilitates more effective community outreach and greater consensus on route development. In the past six years, PPL EU has successfully acquired over 140 right-of-way miles. PPL EU prides itself on taking a "property owner perspective" when acquiring right-of-way and accommodates landowner requests when practical. Acquiring right-of-way is a complex process necessitating the coordination of many stakeholders. PPL EU Permitting has a track record of successfully obtaining the necessary local, state and federal government permits and licenses for proposed transmission projects. Figure B2-2 is a sample listing of projects and the corresponding permits and/or licenses that have recently been acquired to construct transmission projects:

Figure B.2-2: Example of Recent Permits / Licenses Acquired

Project Name	Permit / License Acquired
Susquehanna – Roseland	License for Right-of-Way – Delaware Forest
Susquehanna – Roseland	Letter of Authorization – Lackawanna Forest
Susquehanna – Roseland	License for Right-of-Way – Game Lands 183 & 300
Susquehanna – Roseland	Special Use Permit – PA Game Commission
Susquehanna – Roseland	PennDOT Permits (Min. Use, HOP, LAP)
Susquehanna – Roseland	DEP – Submerged Land License Agreement
Susquehanna – Roseland	PA Turnpike Commission Access & Restoration
NE Pocono Reliability	Special Use Permits – PA Game Commission
NE Pocono Reliability	NPDES Permit – Peckville-Varden Transmission Line
NE Pocono Reliability	NPDES Permit – Paupack Substation
NE Pocono Reliability	NPDES Permit – Paupack Taps, Transmission Line
NE Pocono Reliability	NPDES Permit – Paupack-Honesdale Transmission Line

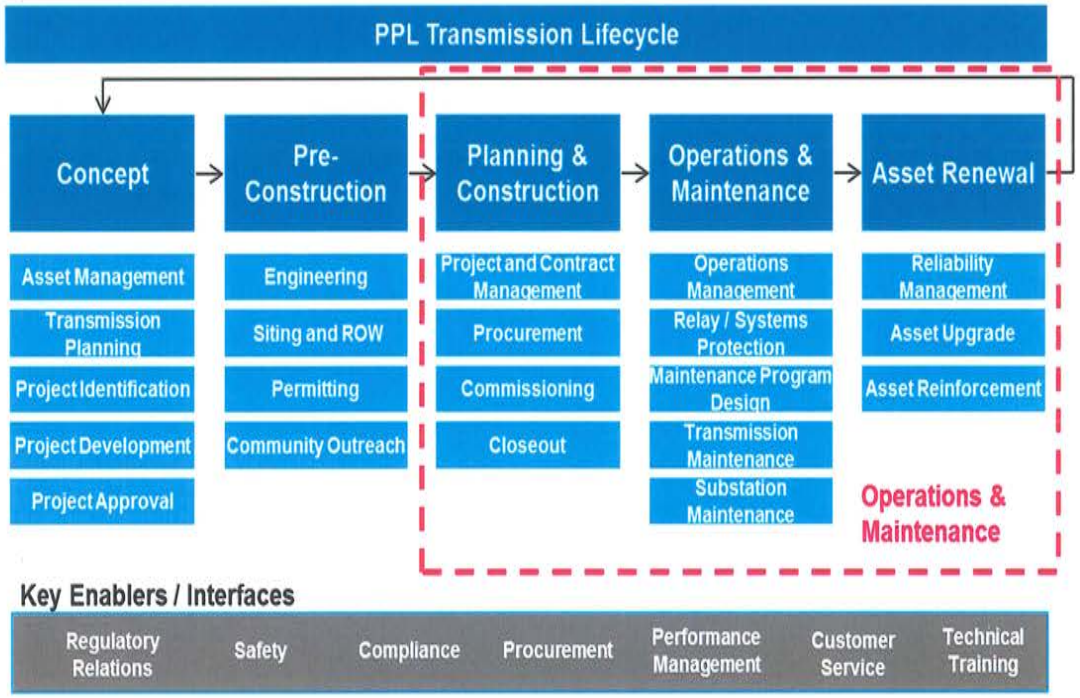
Project Name	Permit / License Acquired
NE Pocono Reliability	NPDES Permit – Pocono Substation
NE Pocono Reliability	NPDES Permit – Pocono to Paupack Transmission Line
NE Pocono Reliability	Two (2) Joint Permits (one per county) – Pocono to Paupack Transmission Line
NE Pocono Reliability	Joint Permits – Peckville-Varden Transmission Line
NE Pocono Reliability	Joint Permits – Paupack-Honesdale Transmission Line
NE Pocono Reliability	I-84 Clearing Permits
NE Pocono Reliability	PennDOT Permits
Blooming Grove – Hemlock	Road Use Agreement – Delaware Forest
Blooming Grove – Hemlock	License for Right-of-Way – Delaware Forest
Blooming Grove – Hemlock	DEP – GP8 Permit
Susquehanna – Harwood Reconductor	DEP – GP8 and GP11 Permit
Blooming Grove – Jackson	DEP – GP8 and GP11 Permit
Sunbury – Dauphin	NPS – Special Use Permit Appalachian Trail

During the development of the Susquehanna-Roseland project, PPL EU developed a strong capability across its Governmental and External Affairs group. In a challenging environment, PPL EU successfully established a process to allow groups to conduct reviews and on-site examinations to promote transparency and cooperation. With the potential for the proposed project to impact environmentally sensitive areas as further detailed in Section C, PPL EU will leverage this capability to coordinate with the appropriate governmental agencies. PPL EU understands the importace of engaging stakeholders and developing relationships and would engage local consultants as needed to augment PPL EU's existing network of relationships with federal, state, and local stakeholders.

B.3 Operations & Maintenance Qualifications and Experience

PPL EU is committed to achieving leading operations reliability and system performance for its transmission system. Figure B3-1 depicts the functions that support the operations and maintenance portion of the transmission asset lifecycle.

Figure B.3-1: PPL EU Transmission Lifecycle



PPL EU, as the owner of the conductor assets will provide all required maintenance at PPL EU's standards. PPL EU's stringent prioritized maintenance programs are developed based on established reliability standards, asset management driven-programs, and overall equipment criticality. While all transmission operators face tradeoffs related to optimizing capital, O&M, reliability and overall value, PPL EU has developed a proactive asset renewal program that carefully weighs the most prudent and cost-effective methods to ensure system performance at a sustainable cost. This focus on reducing the number of degraded elements, as well as reducing system vulnerabilities, identifies the most critical infrastructure and prioritizes the most important renewal work. A programmatic approach to preventive maintenance facilitates improvements to field productivity by reducing emergent work initiated by equipment failures, allowing workers to focus on scheduled work. PPL EU's maintenance model and vegetation management program are well suited to efficiently and effectively maintain the proposed solution.

Maintenance Model

A flexible maintenance model allows PPL EU to provide maintenance support free of geographic constraints. Currently, PPL EU retains asset management responsibilities centrally while using a mix of in-sourcing and outsourcing for in-field maintenance work [redacted] The team relies on electronic communications from inspectors, including detailed inventory and images of each structure, which allows PPL EU to easily scale the operation to any geographic area. This model is utilized across the

PPL EU service territory where pictures are taken to manage the maintenance requirements remotely. Trips to the field are the exception and usually do not extend beyond a detailed walk down of the line at the end of construction. PPL EU is confident that its successful experience managing maintenance contractors will allow it to capably manage the maintenance requirements of the proposed project.

Operations Model

PPL EU facilities will be operated at the direction of PJM and controlled and maintained consistent with the current PPL EU operations and maintenance practices.

To operate and maintain the transmission grid reliably, PPL EU manages a Transmission Control Center (TCC) that adheres to the guiding principles of safety, reliability and production in that order.

In addition to real time operations, PPL EU develops a construction and maintenance outage plan. TCC Planning processes requests to upgrade transmission facilities and translates those to equipment outages using the PJM outage criteria time lines. The TCC plans all outage requests, limits risks to the electric system and PPL EU customer base, and responds to any unplanned events. Transmission outage planning, including risk and conflict analysis, is crucial to promoting safety, preserving the reliability of the bulk and non-bulk transmission system, and eliminating volatility in the work portfolio.

Vegetation Management

PPL EU Vegetation Management leverages "open book," long-term, managed business relationships with two of the largest vegetation management contractors in North America [redacted] Over the last three years, 100% of the vegetation management plan has successfully been completed for 138kV, 230kV and 500kV lines. PPL EU has had zero tree-related events on 230kV or 500kV transmissions facilities during that timeframe. PPL EU will be able to utilize its contractor base to maintain the same high standards for the proposed solution.

B.4 Emergency Response and Restoration

PPL EU has an industry leading emergency preparedness and response program, led by a dedicated Emergency Preparedness group which develops and maintains comprehensive emergency response plans and supports the effective execution of these plans. PPL EU's recent experience in major storms, particularly Hurricane Sandy, Hurricane Isaac, a major snow in October of 2012, and extremely high winds in May 2012 have improved our emergency response processes. We have demonstrated the ability to quickly restore our own assets under various scenarios. PPL EU's award recognition in emergency response can be found in Figure B4-1.

Figure B.4-1: Summary of Major Award Recognition

PPL's Award Recognition
2013 Electric Light and Power Magazine's Utility of the Year Award. Also, won in 2008.
2013 North East PA Manufactures and Employers Association Process Improvement Award for improvements related to storm response processes
J.D. Powers and Associates conducted a national survey of consumers to rate performance of utilities and local, state and federal government actions prior to and following Hurricane Sandy. In February, 2013 J.D. Power recognized PPL as one of only three utilities that performed "Particularly well"
2012 EEI Emergency Recovery Award for Hurricane Sandy
2012 EEI Emergency Assistance Award, for tremendous support in the recovery from Hurricanes Isaac and Sandy

As owners of the proposed Cardiff – BLE – Dennis Station 230kV line, PPL EU will maintain responsibility for executing the emergency response plan. PPL EU is confident that it can successfully execute the response plan as the facilities are proximate to its wide resource network of local contractors, crews, and additional resources gained through participation in mutual assistance groups.

PPL EU is a member of two regional mutual assistance groups, the North Atlantic Mutual Assistance Group (NAMAG) and the Southeastern Electric Exchange (S.E.E.). PPL EU also has access to additional resources through the Contractors of Choice working on PPL EU's transmission and distribution systems and Louisville Gas & Electric and Kentucky Utilities.

Overall, PPL EU has developed a unique network of third party support that will allow it to successfully execute against the emergency response plan. Further detail into PPL EU's emergency preparedness organization and processes can be found in the pre-qualification document for Designated Entity status.

B.5 Cost / Schedule Adherence

PPL EU has implemented processes, governance, and project management tools to ensure projects are delivered on-time and on-budget.

The Project Controls Department is responsible for monitoring project progress to compare actual versus baseline resource usage and analyze project variances utilizing statistical techniques such as Earned Value Metrics and Reporting to identify trends, develop forecasts, and expose potential problems. The Project Controls Department also implements process controls, monitors and audits projects to control project risks, ensures adherence to Generally Accepted Accounting Principles (GAAP), and compliance to

Federal Energy Regulatory Commission (FERC) and Sarbanes Oxley Act (SOX) regulations.

B.6 Proposed Project Financing

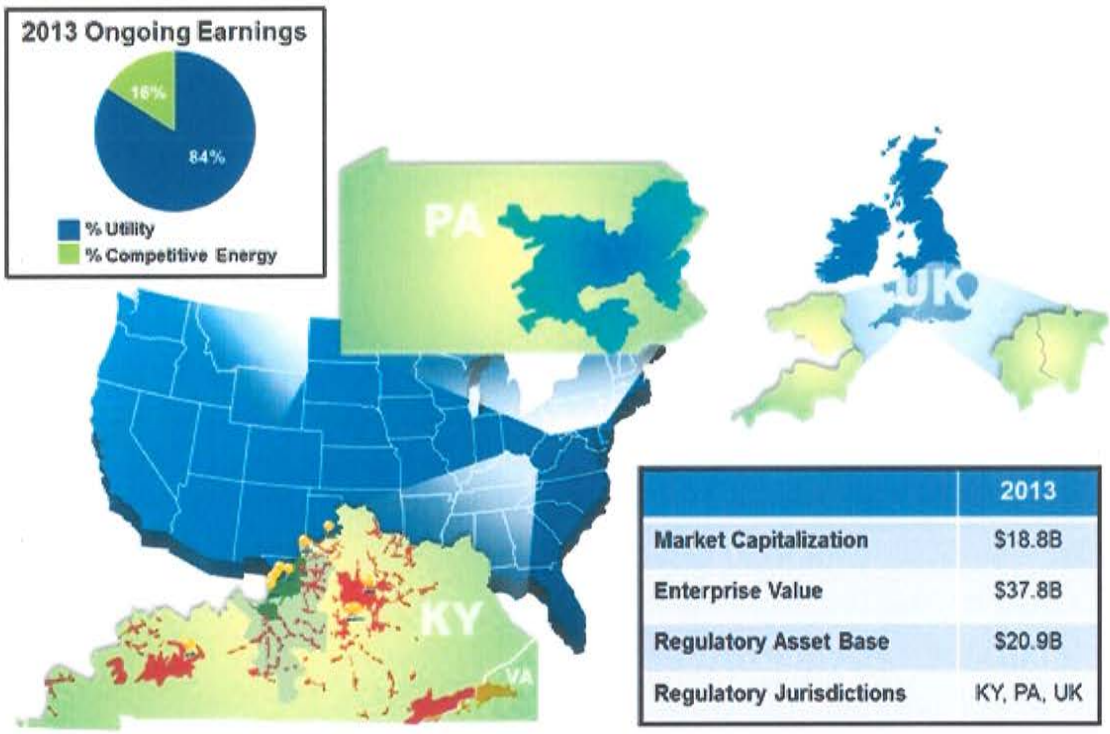
PPL and PPL EU propose to finance the project across its capital structure using approximately 50% debt and equity, including cash from operations. We expect to utilize the commercial bank lending and debt capital markets, using a variety of short-term and long-term securities.

Financial Strength

PPL is one of the largest public utility owners in the US with over $1.5 billion in ongoing earnings and $2.9 billion of cash from operations in 2013. The majority of PPL's ongoing earnings and cash flows stemmed from stable, regulated utility operations in the US and UK with over $20 billion in regulated asset base. This diverse base of regulated cash flows supports PPL's strong balance sheet and enables it to maintain a credit profile that supports consistent access to the equity and debt capital markets and bank markets for additional financing needs at cost effective rates.

PPL EU had over $500 million of cash flow generated from operations during 2013, and $300 million of available liquidity, primarily through its commercial paper program and/or bank syndicated credit facilities. PPL EU also has consistent access to the commercial bank lending markets and debt capital markets. Through its parent, PPL, PPL EU has access to appropriate amounts of equity to provide efficient financing resulting in the lowest cost of capital for the ratepayers.

Figure B6-1: PPL Financial Summary



	2013
Market Capitalization	$18.8B
Enterprise Value	$37.8B
Regulatory Asset Base	$20.9B
Regulatory Jurisdictions	KY, PA, UK

Credit Metrics

PPL Corporation and PPL EU have a strong financial foundation that enables the development, operation and maintenance of transmission facilities. To manage financing costs and access to credit markets, a key objective of PPL's strategy is to maintain a strong investment grade credit profile and strong liquidity position. Additionally, PPL has put in place financial and operational risk management programs that, among other things, are designed to monitor and manage its exposure to earnings and cash flow volatility related to changes in energy and fuel prices, interest rates, counterparty credit quality and the operating performance of its generating units.

PPL EU is focused on timely recovery of costs, efficient operations, strong customer service and constructive regulatory relationships. PPL EU has a low-risk, fully regulated business profile with significant borrowing capacity and stable cash flows. Both PPL and PPL EU maintain investment grade credit ratings from the major credit rating agencies. PPL EU's financing plan would be executed in a manner that does not negatively impact its current credit ratings.

Figure B6-2: Credit Ratings

Issuer	Rating	Moody's	S&P
PPL Corporation	LT Issuer Rating	Baa3	BBB
PPL Electric Utilities Corporation	Senior Secured Debt	A2	A-
PPL Electric Utilities Corporation	Commercial Paper	P-2	A-2

Because of our strong investment grade credit ratings and ability to finance using a wide variety of funding sources, PPL and PPL EU expect the cost of financing to be extremely competitive.

C Proposed Project Constructability Information

C.1 Proposed Solution Scope

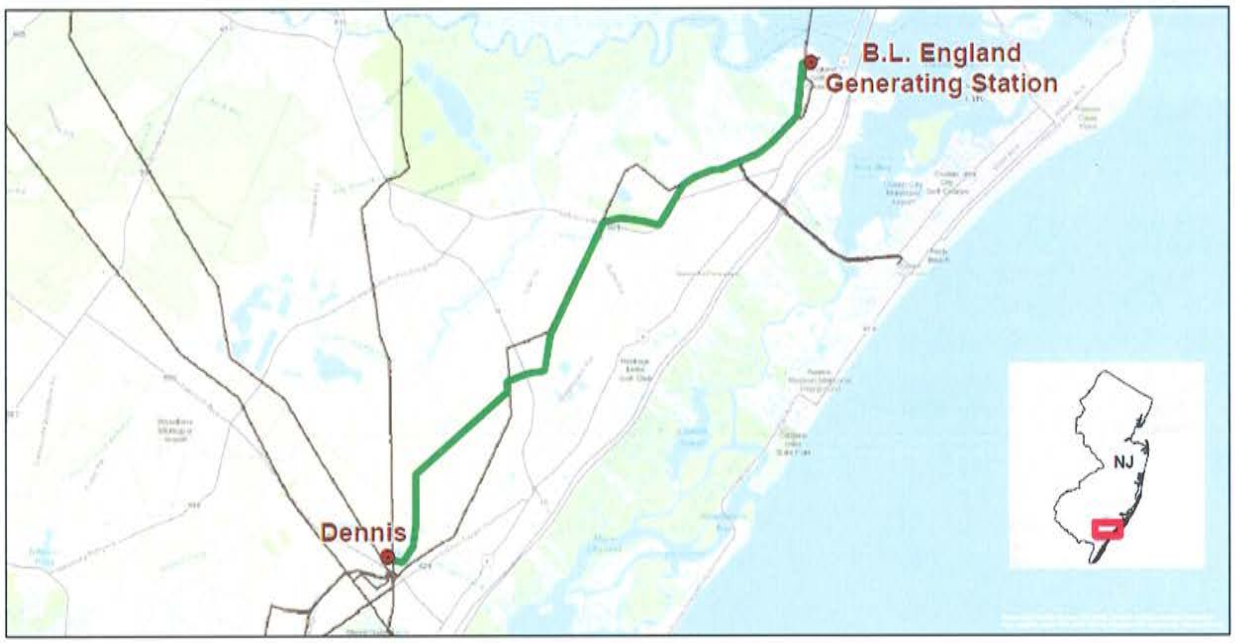
C.1.1 Project Summary: New Cardiff – BL England – Dennis 230kV Line

PPL EU proposes to construct a new single-circuit 25-mile 230kV transmission line from Cardiff to BL England to Dennis Substation in Southeast New Jersey. Between Cardiff and BL England Substation the line will be approximately 15 miles long, and between BL England and Dennis Substation the line will be approximately 10 miles. At BL England, a new 220 MVA, 230/138kV transformer will be added to connect the existing 138kV substation to the new 230kV yard.

PPL EU will be responsible for planning, design, Right-of-Way acquisition, permitting, construction, operation, and maintenance of the entire project.

PPL EU will be responsible for planning, design, Roght-of-Way acquisition, permitting, construction, and maintenance of the entire project. PPL EU will work with the incumbent TO and establish an O&M Agreement defining the operational control of the line.

Figure C.1-1 - Proposed 230kV Transmission Line



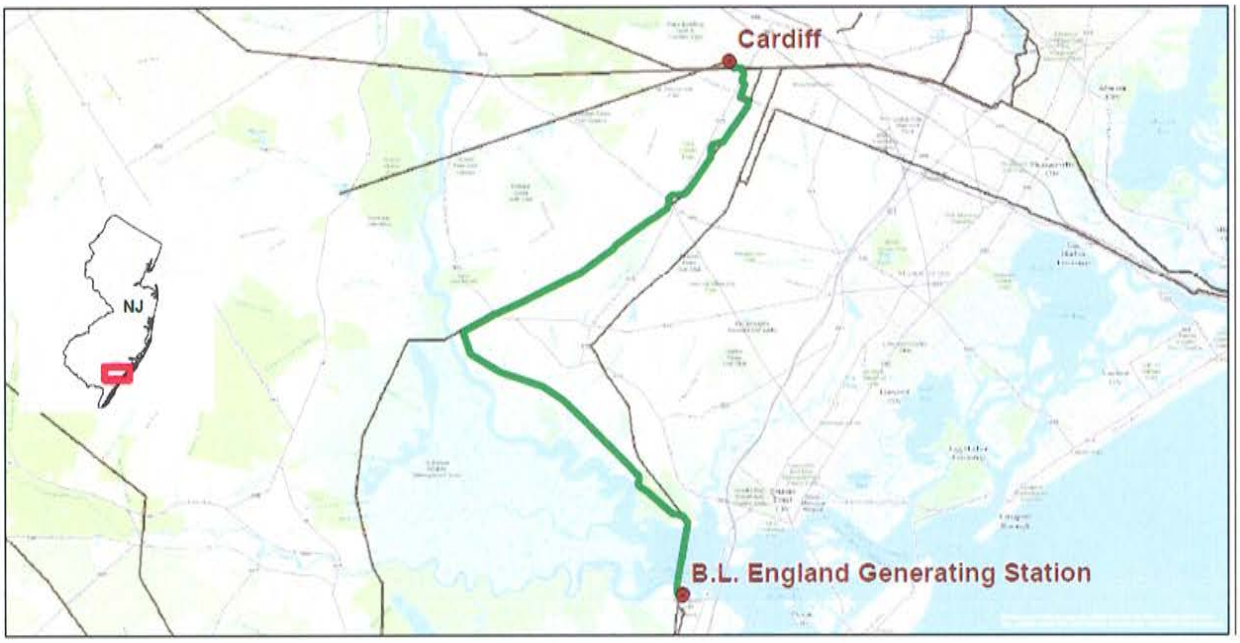
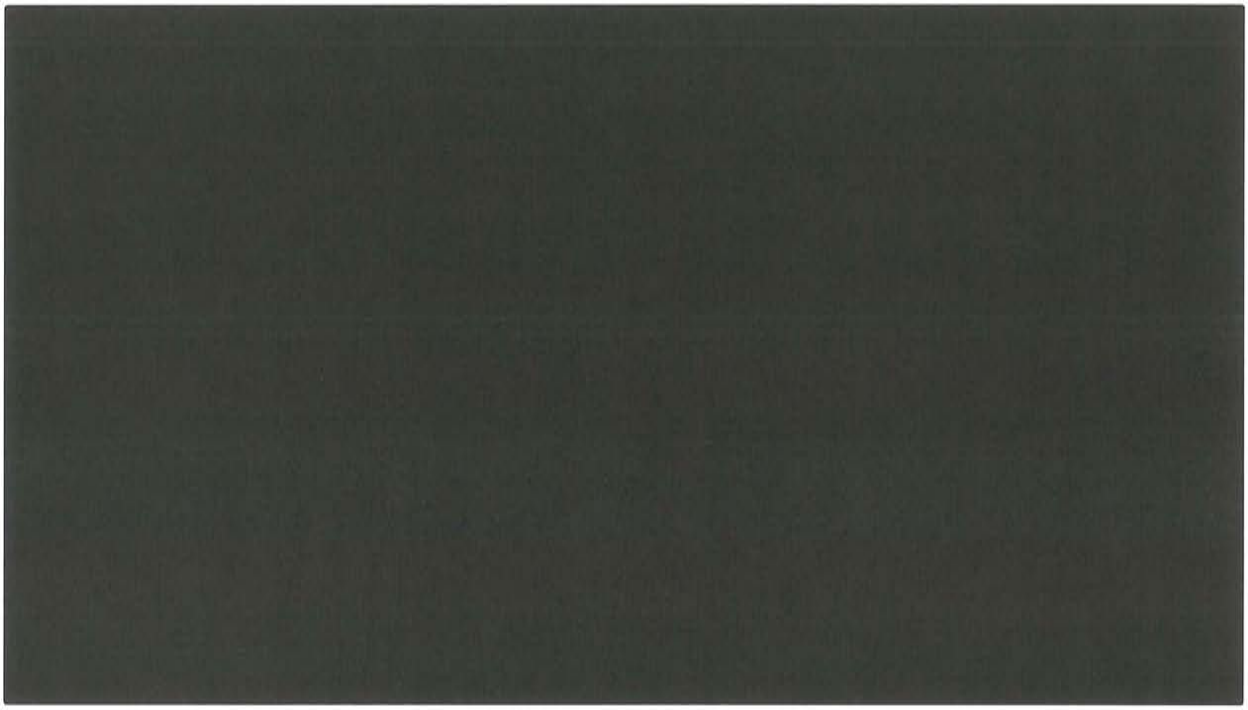


Figure C1.1-2 below provides an overall one-line diagram that illustrates the system topology for the proposed solution.

Figure C.1.1-2 - Solution One-Line Diagram



C.1.2 Area Description and Reliability Concerns Being Addressed:

The transmission system in the area of concern consists primarily of 230kV, 138kV, and 69kV networked lines. Power flow into Atlantic City, NJ can be significant on the various lines that feed that load pocket. Generation at or near the BL England 138kV Substation must travel on these 138kV paths to get to the Atlantic City load center, which creates a south to north power transfer. In RTEP14, PJM identified that two 138kV paths in particular, both of the BL England - Scull - Mill - Lewis 138kV lines, overload for loss of one another, or for loss of any section of the other. Based on PJM's Generation Deliverability dispatch study results, there were 20 thermal overloads on these 138kV paths, and the highest overload on either of these 138kV paths was 134% of the summer emergency rating. In addition to concerns on the 138kV transmission system, PJM identified that loss of a double circuit tower can cause thermal overloads on two 230kV lines from Mickleton to Monroe Substation. Figure C1.2-1 below illustrates the full list of reliability concerns, and how the proposed upgrade mitigates these exposures.

Figure C.1.2-1 - Thermal Reliability Violations Resolved by Upgrade

(Loading in % of Applicable MVA Rating)

FG	Fr B	Name	To B	Name	CK	KVs	Area	Ratir	PJM Study (%) No Upgrade	PPL Study (%) No Upgrade	PPL Study (%) Upgrade In	Cont Label	Cont Typ
81	227905	SCULL#1	227903	MILL #1	1	138/138	234/234	262	123.69	125.0	77.3	'BLE-SC-ML2'	single
83	227905	SCULL#1	227903	MILL #1	1	138/138	234/234	262	121.91	122.5	74.6	'BLE-ML-LEW2'	single
87	228110	BLE	227906	SCULL#2	1	138/138	234/234	307	121.43	130.3	89.7	'BLE-SC-ML1'	single
88	228110	BLE	227906	SCULL#2	1	138/138	234/234	307	120.24	129.1	88.2	'BLE-ML-LEW1'	single
91	228110	BLE	227906	SCULL#2	1	138/138	234/234	219	108.86	113.3	88.0	Base Case	single
116	227906	SCULL#2	227904	MILL #2	1	138/138	234/234	307	115.45	115.9	74.6	'BLE-SC-ML1'	single
117	227906	SCULL#2	227904	MILL #2	1	138/138	234/234	307	114.25	114.1	73.1	'BLE-ML-LEW1'	single
120	227906	SCULL#2	227904	MILL #2	1	138/138	234/234	219	100.53	105.0	79.6	Base Case	single
122	227903	MILL #1	227902	LEWIS #1	1	138/138	234/234	262	115.35	118.8	68.9	'BLE-SC-ML2'	single
124	227903	MILL #1	227902	LEWIS #1	1	138/138	234/234	262	112.98	114.2	66.3	'BLE-ML-LEW2'	single
132	228110	BLE	227905	SCULL#1	1	138/138	234/234	307	114.22	121.6	81.0	'BLE-SC-ML2'	single
134	228110	BLE	227905	SCULL#1	1	138/138	234/234	307	112.18	119.5	78.7	'BLE-ML-LEW2'	single
763	228110	BLE	228111	MOLE TP	1	138/138	234/234	219	133.77	133.4	28.2	'AE7TOWER'	tower
807	228401	MCKLTON	228402	MONROE	2	230/230	234/234	478	105.37	103.6	99.9	'V2274+P2242_LT'	towar
812	228401	MCKLTON	228402	MONROE	1	230/230	234/234	478	105.37	103.6	99.9	'V2274+P2242_LT'	towar
943	227905	SCULL#1	227903	MILL #1	1	138/138	234/234	262	131.85	137.0	81.5	'AE24'	breaker
951	228110	BLE	227906	SCULL#2	1	138/138	234/234	307	127.05	132.8	86.7	'AE23'	breaker
952	228110	BLE	227906	SCULL#2	1	138/138	234/234	307	112.48	117.7	87.6	'AE28'	breaker
964	227903	MILL #1	227902	LEWIS #1	1	138/138	234/234	262	123.51	120.7	73.2	'AE24'	breaker
976	228110	BLE	227905	SCULL#1	1	138/138	234/234	307	121.19	125.6	78.2	'AE24'	breaker
977	227906	SCULL#2	227904	MILL #2	1	138/138	234/234	307	121.07	126.8	86.7	'AE23'	breaker
978	227906	SCULL#2	227904	MILL #2	1	138/138	234/234	307	106.54	111.7	87.6	'AE28'	breaker

Addition of this upgrade project mitigates all 20 of the Southeast New Jersey 138kV system thermal reliability violations described above. Thermal loading is reduced to between [redacted] of applicable emergency ratings for all critical contingencies [redacted] The two 230kV violations were reduced to a thermal loading of [redacted] of emergency rating.

C.1.3 Transmission Line Component(s)

Detailed description:

The new Cardiff – BL England – Dennis 230kV line upgrade will consist of overhead single circuit self-supporting steel monopoles with conductors in a "delta" configuration. The line will carry one (1) circuit of 1590 kcmil 45/7 ACSR conductor, one conductor per phase, with two OPGW shield wires providing lightning shielding protection and communication paths. This new line will have a 648 MVA normal rating and an 802 MVA emergency rating.

[redacted]

[redacted]

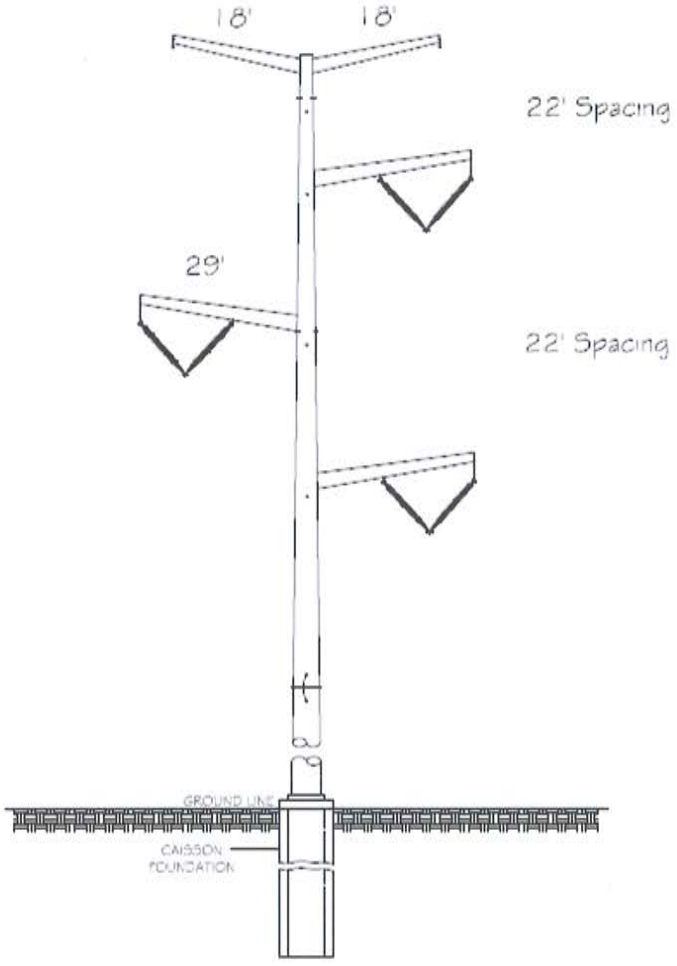
Preliminary list of materials and Structure Type Drawings

The transmission line major materials will include the following:

[redacted]

The proposed 230kV transmission line will use the following typical structure design:

Figure C.1.3-1 - Typical 230kV Structure Type



230kV High-Capacity Typical
Suspension Structure (SC)
Triple-Bundle Conductor

C.1.4 Substation Components

BL England 230kV Substation Addition

Detailed description

[redacted]

Relay and Controls Equipment

[redacted]

Relay Protection Communication Plan

Transmission Line Protection: [redacted]

Substation General Arrangement

The substation aerial map overlay with conceptual design overview for the BL England Substation Station is included in Appendix C1.

Substation Major Equipment:

[redacted]

[redacted]

C.1.5 Transmission Facilities to be constructed by Others

Transmission line relocation

No transmission line relocations will be constructed by others.

BL England 138kV Substation Upgrade

Detailed description

[redacted]

Relay and Controls Equipment

[redacted]

Relay Protection Communication Plan

[redacted]

Transmission Line Protection: [redacted]

Substation General Arrangement

The substation aerial map overlay with conceptual design overview for the BL England Substation Station is included in Appendix C1.

Substation Major Equipment:

[redacted]

Cardiff Substation Upgrade

Detailed Description

[redacted]

Cardiff Substation Relay and Controls

[redacted]

[redacted]

Relay Protection Communication Plan

[redacted]

Relay Protection Communication Plan

[redacted]

Substation General Arrangement

The substation aerial map overlay with conceptual design overview for the Cardiff Substation Station is included in Appendix C2.

Substation Major Equipment:

[redacted]

Dennis Substation Upgrade

Detailed Description

[redacted]

Dennis Substation Relay and Controls

[redacted]

Relay Protection Communication Plan

[redacted]

Substation General Arrangement

The substation aerial map overlay with conceptual design overview for the Dennis Substation Station is included in Appendix C3.

Substation Major Equipment:

[redacted]

C.2 Environmental, Permitting and Land Acquisition

C.2.1 Siting, Right-of-Way, and Permitting Overview

As described in section B, the Siting, Right-of-Way, and Permitting group has built a strong set of capabilities to support the proposed project. The Siting and Right-of-Way department has established relationships with 5 external Right-of-Way contractors and (4) siting contractors. The PPL EU Permitting department has a track record of successfully obtaining the necessary local, state and federal government permits and licenses for proposed transmission projects. PPL EU understands the importance of engaging stakeholders and developing relationships and will engage local consultants as needed to augment the company's existing network of relationships with federal, state, and local stakeholders.

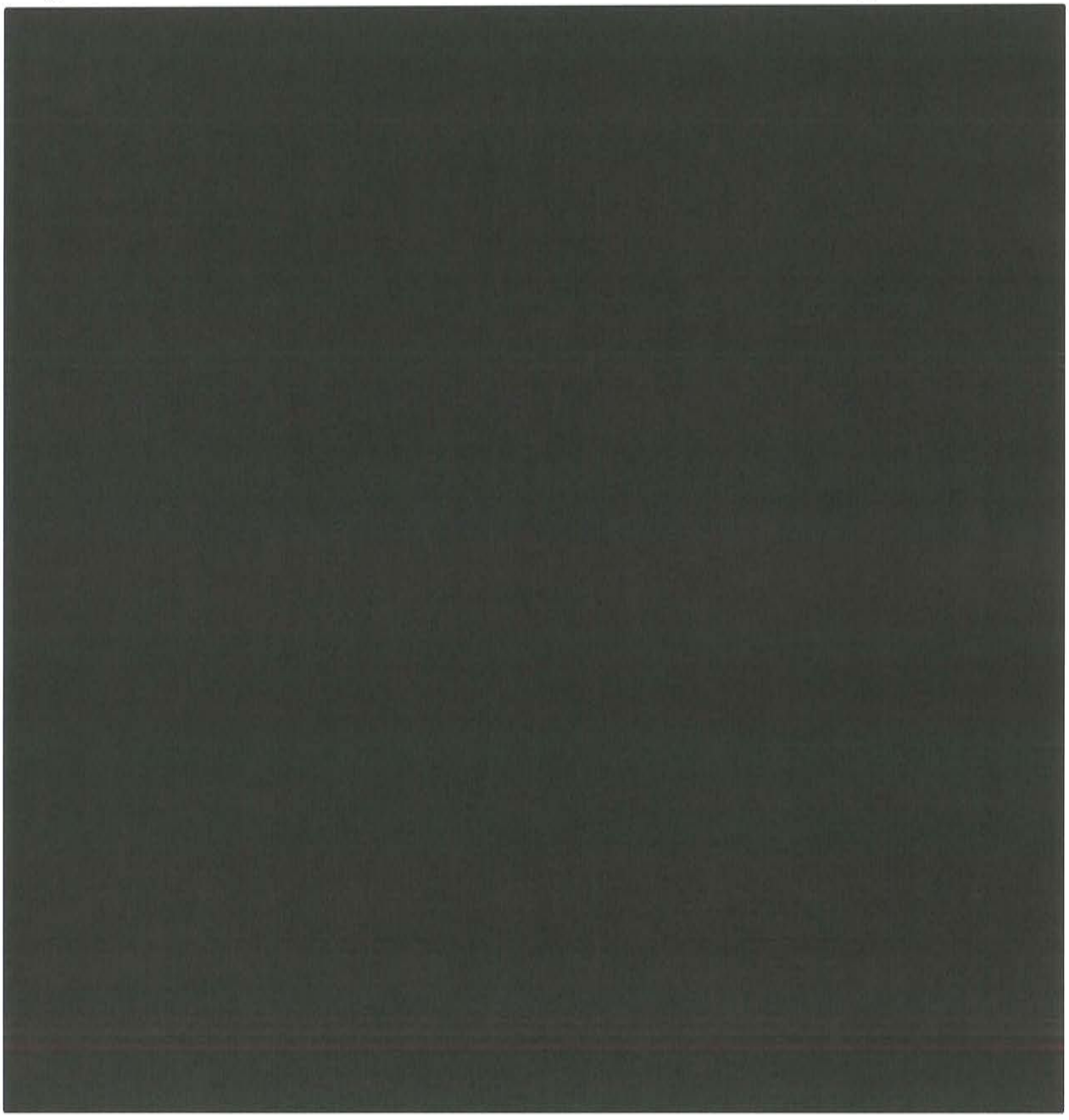
C.2.2 Route Alternative Assessment

When siting high-voltage transmission lines, a balance is struck between multiple objectives, e.g., low environmental impact, high constructability, low cost. The preliminary review conducted evaluated the major opportunities and constraints within the regions between and surrounding the BL England to Cardiff substations. The project configuration review allowed for the development of general assumptions and permitting requirements to complete a full alternatives report for two new 230kV line to connect these three substations.

The review area covers from Dennis to BL England to Cardiff Substation. Two alternative routes were identified (Figure C2.2-1) to connect Dennis substation to BL England substation. Four alternative routes were identified that connect the BL England to Cardiff stations. The "suggested" route was selected as the one best balancing the multiple objectives (see Appendix F for environmental map details).

The Project's suggested route is located in a newly sited Right-of-Way from Dennis to BL England to Cardiff stations ([redacted], respectively), in Atlantic and Cape May Counties, New Jersey (see Appendix F) and is the subject of this review. The suggested route is located adjacent to an existing Atlantic City Electric Right-of-Way with three possible options for electrical configuration (see Appendix F) and is the subject of this review.

Figure C.2.2-1 - Alternative Routes considered between Cardiff & BL England & Dennis



C.2.3 Environmental Impact Review Methodology and Preliminary Results

The project vicinity between Dennis to BL England to Cardiff stations is rural with primarily forested, residential, and wetlands, such as tidal marshes as land use. These land uses, as well as publicly owned land pose significant routing constraints. The major constraints include the National Park Service (NPS) Wild & Scenic-designated Great Egg Harbor River and areas within the state-designated Pinelands Area. [redacted]

Also important to consider are the locations of protected and managed lands including federally, state, and locally owned lands. The challenges associated with the clearing of forest areas within a new Right-of-Way through state and federally regulated areas may not be permitable or may require underground drilling techniques to construct. The use of existing Right-of-Way or opportunity corridors in the vicinity of the Project may be the only viable option. Opportunity corridors within the region are predominantly linear infrastructure features including railroads, highways and existing transmission lines. These features are identified as optimal locations to parallel through corridor sharing, although the locations of sensitive resources may reduce these opportunities but may be available for short sections of the project.

The above constraints will need to be evaluated for possible avoidance or minimize impacts to the natural environment and cultural resources while maintaining reasonable costs and preserving engineering feasibility. Specific mitigation techniques will need to be utilized based on the features and landscape encountered within the region.

The abundance of marshlands within the region dictates a focus on the mitigation of wetland impacts. The siting process will include an emphasis on minimizing pole placement through wetland areas or increasing spans to minimize the number of poles needed. Pole placement in wetlands can negatively affect the construction timing and future maintenance of the line, as well as be a significant permitting challenge.

C.2.4 Right of Way & Land Acquisition Plan & Approach (public & private)

As part of securing the required right of way to accommodate the new line, PPL EU will work with the affected private landowners to acquire permanent irrevocable easements. As further detailed in this section, the project will also be crossing some state land. In this case, PPL EU will work with the affected state agency to obtain licenses to locate required facilities within its land.

PPL EU plans to expand substations within the fence area of the existing substation and therefore the boundary of the current property line, and does not anticipate the need to acquire any additional land.

C.2.5 Permitting Plan and Approach

Project Configuration Preliminary Review

The construction of this project will involve the need to conduct environmental studies to determine the presence of natural or cultural resources such as Threatened and Endangered species (T&E) habitat, streams and wetlands, or archaeological sites. This information will be required by federal, state, and local agencies, which are authorized to issue permits for specific activities that may have an impact on these natural and cultural resources.

As part of the permitting preparation process, PPL EU will initially conduct desktop reviews designed to provide initial insight into potential environmental permitting and agency concerns and to assist in the detailed scoping of ecological and cultural resource field surveys. Geographic Information Systems (GIS) software is often used in these reviews to evaluate multi-disciplinary concerns based on publicly available data. This GIS data typically includes multiple years of aerial photography, United States Geological Survey (USGS) topographic maps, wetlands from the National Wetland Inventory (NWI), United States Department of Agricultural (USDA) hydric soils, and streams from the National Hydrography Dataset (NHD).

The permitting plan also includes review the New Jersey Department of Environmental Protection (NJDEP) Natural Heritage Program's Landscape Project / NJ Geoweb GIS database to assess the potential federal or state T&E species that may be located in or adjacent to the proposed project area. Similarly, access to the New Jersey Historic Preservation Office (NJHO) database will provide information on previously recorded archaeological sites, National Register of Historic Places (NRHP), cemeteries, historic bridges, historic theaters, historic landmarks and historic structures.

Permitting Support Activities

Wetland and Waterway/Stream Delineation

PPL EU is required to evaluate the project area for the presence of wetlands and streams utilizing the methodology identified in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation, 1989) and/or the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory, 1987), and the newly adopted U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont (Version 2.0), where

applicable in NJ. The resulting Wetland and Stream Identification and Delineation Report will be a required component for the federal or state permitting process.

Threatened and Endangered Species

The results of the desktop review will assist in detailing the potential need for additional T&E surveys at the project site. Based on the July 2014 United States Fish and Wildlife Service (USFWS) list of federally listed species, the endangered Indiana bat (Myotis sodalis), the proposed-endangered northern longeared bat (Myotis septentrionalis), threatened swamp pink (Helonias bullata), threatened Knieskern's Beaked-rush (Rhynchospora knieskernii), sensitive joint vetch (Aeschynomene virginica), and threatened bog turtle (Clemmys [Glyptemys] muhlenbergii)may be located within the project area. Initial review of aerial photography suggests that extensive tree clearing will be necessary for the Project and it is likely that species-specific surveys will be required, including but not limited to, bat surveys. With the presence of several forested and tidal wetlands in the Project area, botanical studies for the federal listed plants are also considered likely. PPL EU will coordinate with the NJDEP and USFWS to determine if impacts to these plant species can be avoided through modifications in the work procedures and best management practices. There is also a timing consideration to these studies as the species can only be positively identified at specific times of the year.

A review of NJ Landscape Project data indicates that there are other numerous state-listed species within the project area. There are areas mapped for breeding, wintering, foraging, and nesting. PPL EU will coordinate with the NJDEP and the NJ Natural Heritage Program (NHP) to determine the need to conduct species-specific surveys. Modifications in construction practices and seasonal restrictions could minimize the need for potential presence/absence surveys.

Cultural Resources Phase I

Since the Project will require federal agency involvement, PPL EU will likely be required to conduct a Phase I Archaeological Survey of previously undisturbed portions of the Project area, as required by the NJ-Historic Preservation Office (NJ-HPO) and Section 106 of the National Historic Preservation Act. The Phase I archaeological field reconnaissance will include a desktop and field assessment analysis in which archaeological and architectural APEs will be established and assess the need for further field studies as well as define the necessary agency consultation. Data on previously identified sites will be obtained from the state's on-line resource NJ-GeoWeb, archaeological site files maintained by the New Jersey State Museum, and National Register and historic properties files located at the NJ-HPO. The purpose of the Phase I archaeological assessment will be to delineate and map the Area of Potential Effects (APE) and develop a Phase IB testing plan (as necessary), and present the results in a report suitable for NJ-HPO and USACE review. Project clearances will be required from both NJ-HPO and the USACE.

Migratory Birds

Based on review of the project, limited forested areas are present and similar transmission line infrastructure is already present in adjacent areas. The potential for bird species protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act appears low, but the alignment will need to span the Great Egg Harbor River area, which is a known migratory corridor and home to raptors including the bald eagle (Haliaeetus leucocephalus). PPL EU will also coordinate with the USFWS regarding birds protected under MBTA and may need to submit a project-specific Avian Protection Plan.

Public Lands

State Permitting

New Jersey Department of Environmental Protection (NJDEP) Permits: PPL EU will need to coordinate with NJDEP to determine the level of state permitting required for the project. Based on PPL EU'S review of publicly available GIS data, the Project will temporary and permanently disturb or span regulated areas, including the Great Egg Harbor River and Bay and their tributaries, Powell Creek, Lakes Creek, Tuckahoe River, Nell Run, Mill Branch, English Creek, Blackmans Branch, Cranberry Creek, Patcong Creek, Flat Creek and tidal/non-tidal wetlands associated with these waters.

Depending on the extent of the natural resources encountered within the Project area and the ability of design engineering to avoid or minimize impacts to the resources, there may be the opportunity that the Project can seek exemptions and/or general permits. The following is a list of potential permits required by NJDEP:

NJDEP Coastal Zone Management Rules (Coastal Area Facility Review Act [CAFRA], waterfront Development & Coastal Wetlands): A CAFRA Permit (for development activities within the mapped CAFRA Zone), Waterfront Development Permit (for activities below Mean High Water within the CAFRA Zone as well as activities within 500 feet of Mean High Water outside the CAFRA Zone), Coastal

Wetlands Permit (wetlands mapped pursuant to the Wetlands Act of 1970) and a Federal Coastal Zone Consistency Determination would be required for proposed utility line construction activities in these regulated areas.

NJDEP Freshwater Wetlands Protection Act (FWPA): Based on PPL EU review of publicly available GIS data, the Project will temporary and permanently disturb or span regulated areas, including freshwater wetlands, unmapped coastal wetlands (not mapped by the Wetlands Act of 1970, wetland transition areas and State open waters within the Project area. These activities would likely be authorized by an NJDEP Individual Freshwater Wetlands Permit (FWIP) because of their proximity to regulated areas and the likelihood of temporary and permanent disturbances to exceed the one acre threshold. A 401Water Quality Certification would also be required.

NJDEP Flood Hazard Area Protection Act (FHA): Based on PPL EU review of publicly available GIS data, the Project will temporary and permanently disturb or span flood hazard areas and riparian zones within the Project area. Proposed activities in these regulated areas are anticipated to be authorized by an NJDEP Individual Flood Hazard Area (FHA) Permit because of their proximity to regulated areas and the likelihood of temporary and permanent disturbances within the floodway, flood fringe and extensive vegetation clearing in the riparian zone. A Hardship Waiver is anticipated for exceeded thresholds for clearing, cutting or removing vegetation in a riparian zone. PPL EU assumes all flood hazard areas and elevations are mapped by NJDEP and will be available for permit application purposes.

Note: When the flood hazard area is located in tidal areas and a NJDEP Coastal Zone Management Permit will be obtained, a separate FHA permit is not required.

NJ Tidelands Conveyance: A Tidelands License is required from the State of New Jersey for the use of its currently flowed tidelands, such as utilities or utility-related structures (i.e. pipes, cable lines) that cross over or under state-owned tidelands. A Tidelands Grant is required if any portion of the proposed activities are taking place in an area that is currently landward of the mean high water line and formerly flowed by the tide.

NJ Pinelands Commission: Review of the NJ Pinelands Land Capability Map, indicates that the project crosses areas with the State designated Pinelands Area, including the Regional Growth Area and Forest Area. The NJ Pinelands Commission regulates development activities, including the construction of utility lines. These areas will require coordination and permitting (Certificate of Filing) with the NJ Pineland Commission. It should be noted that transmission projects through the Pinelands are challenging. There may be a potential need for a Memorandum of Agreement (MOA) with the Board of Public Utilities of NJ (BPU) to be approved prior to the Pinelands Commission review and approval of a project outside of allowed land use.

The project also crosses areas outside the State designated Pinelands Area, including Forest Area and Regional Growth Area. These areas will likely require coordination and permitting through the requirements of the NJDEP Coastal Zone Permits as well as at the municipal level.

NJPDES Division of Water Quality (DWQ) – Stormwater for Construction / Dewatering & RFA): The 5G3 general permit authorizes point source discharges from certain construction activities. A soil erosion and sediment plan is required to eliminate the flow of contaminated rainwater into streams and rivers. This general permit is issued through the Local Soil Conservation Districts and NJDEP E-Permitting system.

NJDEP Groundwater Allocation: A Water Allocation Permit is required for the diversion of ground and/or surface water in excess of 100,000 gallons per day for a period of more than 30 days in a 365 consecutive day period, for purposes other than agriculture, aquaculture or horticulture. This includes water diversions for public water supply, industrial processing and cooling, irrigation, sand and gravel operations, remediation, power generation, and other uses. For these use types diversion limits are set within a Water Allocation Permit, Water Use Registration, or Permit-by-Rule. At the 100,000 gallons per day threshold additional approvals for water diversion may be required.

NJDEP Erosion and Sediment Control Design and Permitting: The SE&SC Plan will be prepared consistent with the guidance for best management practices (BMPs) presented in the 'Standards for Soil Erosion and Sediment Control in New Jersey', which reflect the soil erosion and sediment control regulations found at N.J.A.C. 2:90-1.1 et seq. In this regard, each SE&SC plan will, at a minimum, consist of a narrative and drawings that describe and present details for the existing topography and surface features, proposed grading and earth disturbance activities, and the SE&SC BMP measures and their maintenance proposed to address the planned earth disturbance. Supporting calculations and worksheets will also be provided as appropriate.

In conjunction with the SE&SC Plans, a Request For Authorization (RFA) for inclusion of each project under the NJDEP General Permit No. 5G3 (NJ0088323) for Stormwater Discharge Associated with Construction Activity will also be prepared and submitted via the NJDEP's on-line RFA submission process (as stated above).

Earth disturbance associated with each proposed transmission line project is expected to meet the definition of 'major development' and, accordingly, will require stormwater management consistent with the regulations found in N.J.A.C. 7:8, Subchapter 5.

New Jersey Department of Transportation (NJDOT) Permits: PPL EU will need to coordinate with NJDOT to determine the existence and status of permits for temporary and permanent construction entrances. These permits may include.

- Highway Occupancy Permit (HOP) - Utility Crossing: There are several locations where the utility line will span over a state highway, which will require acquisition of a NJDOT Highway Occupancy Permit (HOP).

Federal Permitting

United States Army Corps of Engineers (USACE) – Section 404 Clean Water Act/Section 10 Rivers and Harbors Act: PPL EU will need to coordinate with the USACE to determine the level of federal permitting required for the project. The USACE has jurisdiction over temporary or permanent project activities that place fill materials into waters of the U.S., including wetlands. In NJ, specifically USACE has jurisdiction over navigable waters, tidal wetlands and wetlands within 1000 feet of Mean High Water. Temporary and permanent impacts to wetlands and streams trigger permitting requirements under Section 404 of the Clean Water Act. The potential placement of fill material in waters of the U.S. for the utility line Right-of Way, tower foundations and construction access will likely need to be authorized through an Individual Permit considering the likelihood the Project will permanently impact greater than 0.5 acre of wetland (threshold for Nationwide Permit #12) given the extent of forested wetland clearing/conversion that would be required, as well as permanent pole impacts in wetlands and Waters of the U.S.

Individual permits require an increased permitting effort and a longer review period (6-12 months) based on the evaluation of applications under a public interest review and the environmental criteria set forth in the Clean Water Act Section 404(b)(1) Guidelines.

As part of the USACE 404 permitting process, a restoration or mitigation plan is required for temporary and permanent impacts to wetlands greater than 0.1 acre on a Project. Compensatory mitigation for the USACE is required at a minimum 1:1 ratio for all wetland losses that exceed 0.1 acre. The mitigation ratio could be increased depending on the quality of the wetland impacted, degree of public interest, or other site specific and agency circumstances.

Preliminary Jurisdictional Determination Form will also be required for confirming the locations of Waters of the U.S. within the Project area.

United States Army Corps of Engineers (USACE) - Section 10 Rivers and Harbors Act: Construction within or crossing a navigable waterway, as defined by the Rivers and Harbors Act, requires a Section 10 permit. Section 10 Rivers within the project vicinity include the Great Egg Harbor River and Bay and their tributaries, Powell Creek, Lakes Creek, Tuckahoe River, Nell Run, Mill Branch, English Creek, Blackmans Branch, Cranberry Creek, Patcong Creek and Flat Creek. Some smaller crossings may be

eliminated from Section 10 if they are determined not to be navigable. Crossing at locations adjacent to existing transmission lines typically streamline the Section 10 permit process.

National Park Service (NPS) and U.S. Fish & Wildlife Service (USFWS):

The Project crosses the Great Egg Harbor River and adjacent tributaries, which is listed as a Wild and Scenic River by the National Park Service (NPS). Coordination and approval of the Project will be required by the NPS prior to the approval of permits.

National Marine Fisheries Service (NMFS)

The Project crosses the Great Egg Harbor River and adjacent tributaries, which will require NOAA National Marine Fisheries Service consultation and clearance for threatened and endangered species.

U.S. Coast Guard (USCG)

The Project crosses the Great Egg Harbor River and adjacent tributaries, which will require USCG coordination for the required height of the transmission line wires as it crosses navigable waters.

Federal Aviation Administration (FAA) – Obstruction Determination: As the project involves the installation of new poles, PPL EU will need to coordinate with the FAA regarding potential obstruction to air travel, which will involve completing online forms available on the FAA's Notice Criteria Tool website. This tool allows input of heights, elevations, and location of proposed structures to solicit the need to further coordinate with FAA.

Project Permitting Summary

PPL EU will coordinate pre-application meetings (Joint Permit Process Meeting will be utilized, if possible) with applicable agencies for the project. Including the following agencies:

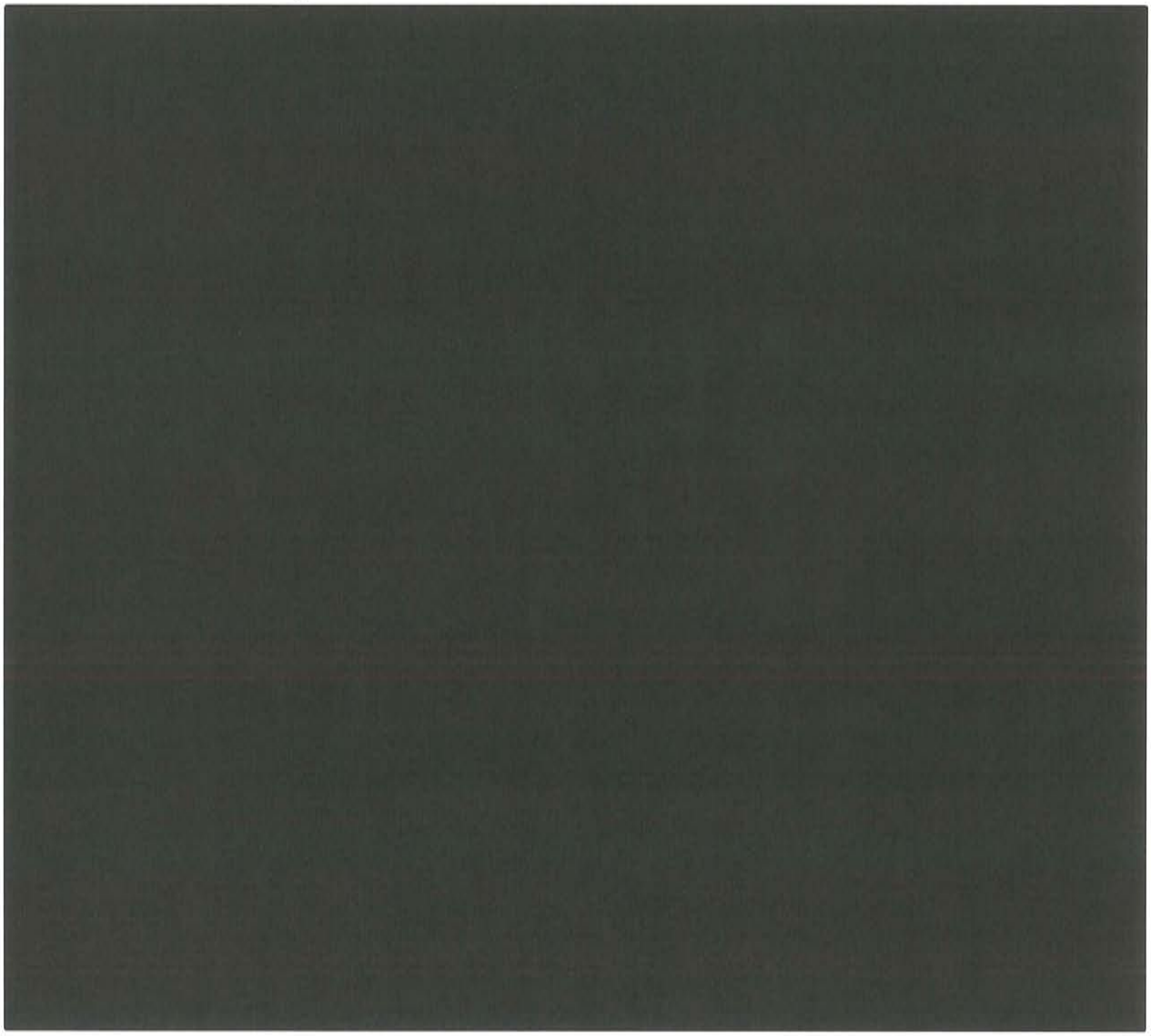
- **US Army Corps of Engineers:** A Pre-application meeting will be coordinated and attended by PPL EU and the USACE to confirm regulated areas and permitting strategies.
- **New Jersey Department of Environmental Protection:** A Pre-application meeting will be coordinated and attended by PPL EU and the NJDEP to confirm regulated areas and permitting strategies. A successful pre-application meeting will have all representatives from necessary NJDEP Divisions attend the meeting to discuss the project. PPL EU envisions coordinating this meeting with: Division of Land Use Regulation (Freshwater Wetlands & Flood Hazard), Coastal Management, Water Quality, Green Acres, State Historic Preservation, Tidelands, Fish & Wildlife, and

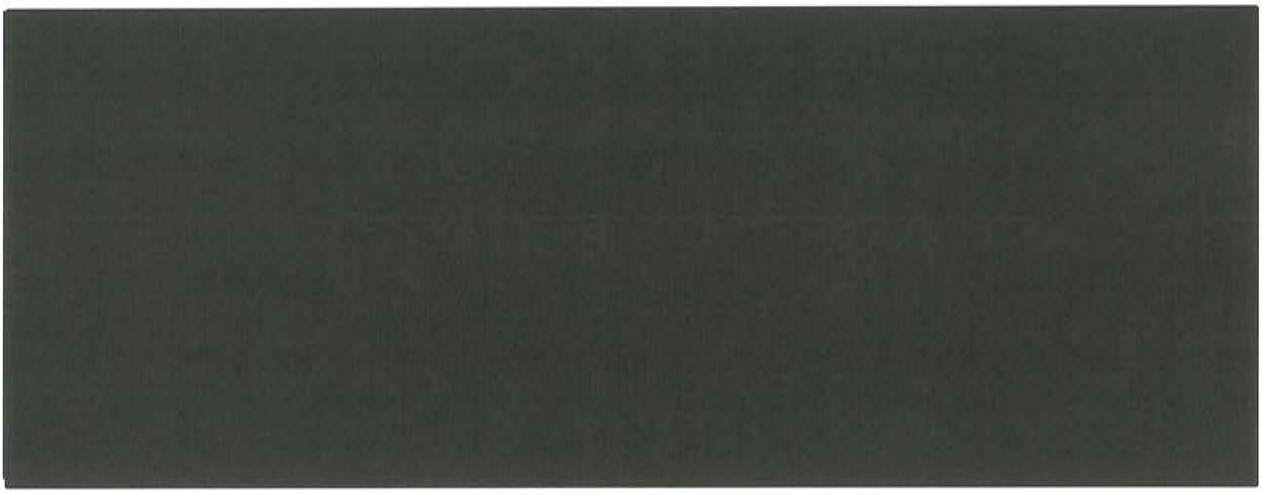
Parks & Forestry. This extensive coordination will allow for a clear path forward in completing project engineering design with agency recommendations, and will reduce the need for a cumbersome agency review period.

- **Cape-Atlantic Soil Conservation Districts (SCD):** A Pre-application meeting will be coordinated and attended by PPL EU with the SCD to confirm regulated areas and permitting strategies.

The permits that may be required by environmental regulatory agencies on the federal, state, and county level for the proposed BL England to Cardiff Project is listed in Figure C2.5-1 below. It should be noted that building permits for utility corridors are often exempted by local municipalities. Local building permits requirements from specific municipalities will be reviewed when the project moves to its development phase.

Figure C.2.5-1 - Potential Environmental Permits





Permitting of transmission line corridors is a complex process with many involved parties. Because of the potential complexity of the proposed project, it is difficult to quantify all the specific risks associated with the environmental permitting process. Some of the potential risks which will need to be addressed during the project development phase include:

- Impacts to cultural resources;
- Need to conduct Phase II and III archaeological studies;
- Significant impacts to wetlands that require mitigation;
- Identification of an approved wetland mitigation site;
- Impacts to T&E habitat;
- Need to conduct Phase II and III T&E survey such as bat surveys;
- Identification of an approved T&E habitat mitigation site;
- Impacts of the project requiring use of the USACE Individual Permits process versus use of Nationwide Permits;
- Extensive Coordination with National Park Service for crossing a Wild & Scenic River corridor – brings risk to the project schedule for lengthy review time and potential opposition;
- Extensive Coordination with Pinelands Commission and potentially the BPU for utility transmission crossing in the state-designated Pinelands area;
- Extensive coordination and risk for impacts to the Cape Map National Wildlife Refuge. It is highly possible that the proposed right-of-way through the Refuge may result in the need for NEPA coordination and approval which is very high risk to the project for a lengthy review time, extensive environmental impact studies, and the potential denial of the project;

- Coordination with NJDEP for impacts to State Wildlife Management Area;
- Impacts to flood plains or flood ways that require additional engineering analysis; and
- Maintenance of water quality during construction activities.

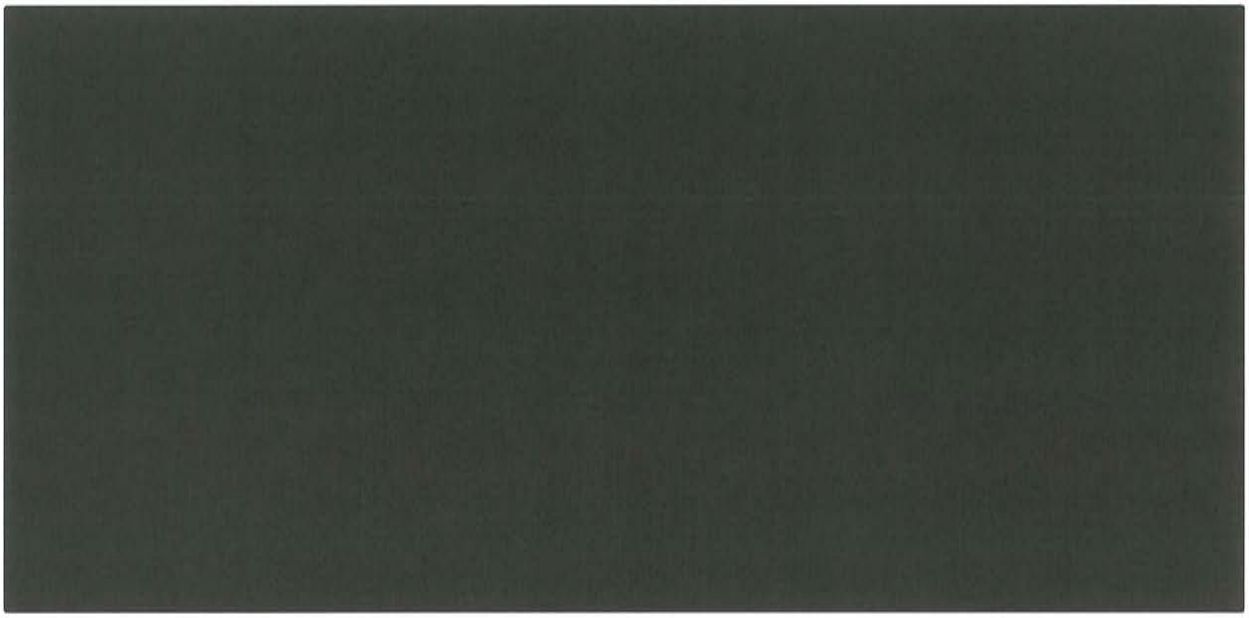
While the general project area traverses mostly forested areas or wetlands crossings there is a significant potential for impacts to habitat for threatened and endangered species. Timing of threatened and endangered species surveys may be seasonally dependent and may cause permit schedule delays.

C.2.6 Public Opposition Review

C.3 Project Component Cost Estimates

The estimated project cost is $128.6M and should be interpreted as a budget estimate. The bottom up development and top down verification provides an [redacted] confidence level in the project estimate based on the baseline scope of work and assumptions.

Figure C.3-1 - Summary of Estimated Project Costs

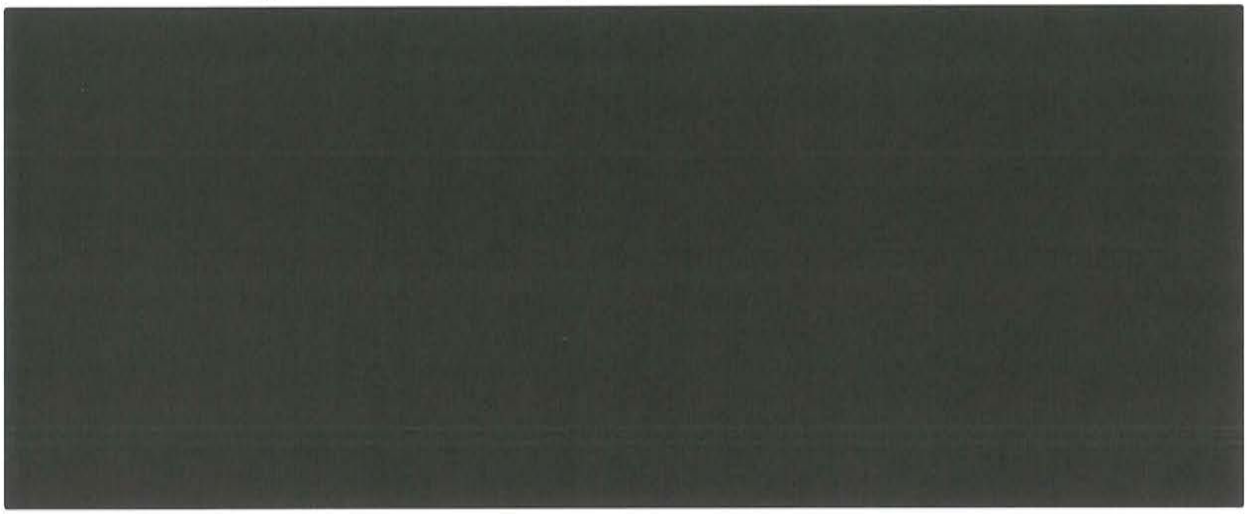


Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.1 Engineering and Design Costs

In order to support the proposed project, engineering will request survey and core borings. These two elements, in addition to the labor required to support the design, will represent the majority of project costs for the proposed project are presented in Figure C3.1-1 below.

Figure C.3.1-1 - Summary of Estimated Engineering Costs

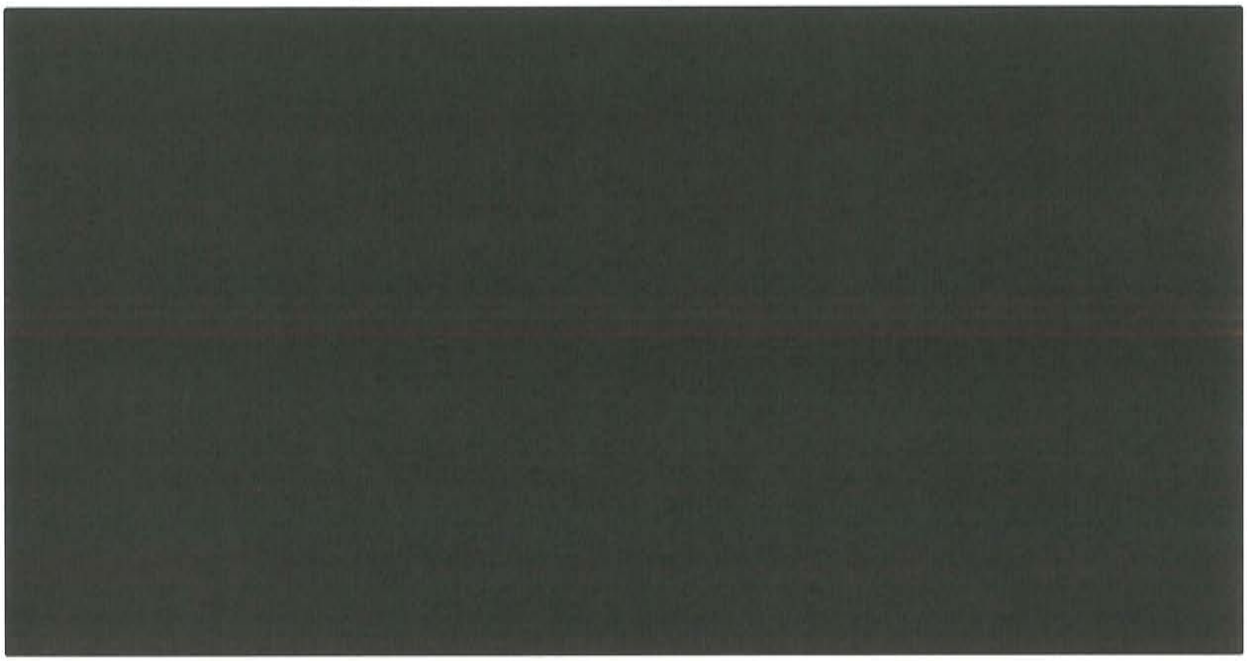


Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.2 Material and equipment costs

Material and equipment cost estimates are based on quantity take-offs for both the transmission and substation scope of work. The pricing for these materials are based on average cost from suppliers utilized in previous PPL EU projects. Material and equipment costs for the proposed project are presented in Figure C3.2-1 below.

Figure C.3.2-1 - Summary of Material Costs



Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.3 Construction and Commissioning Costs

Line construction cost estimates are based on quantity take-offs developed from past experience benchmarking of number of structures per mile multipliers for initial estimation, assuming standard construction designs and construction methods. The transmission line elements include

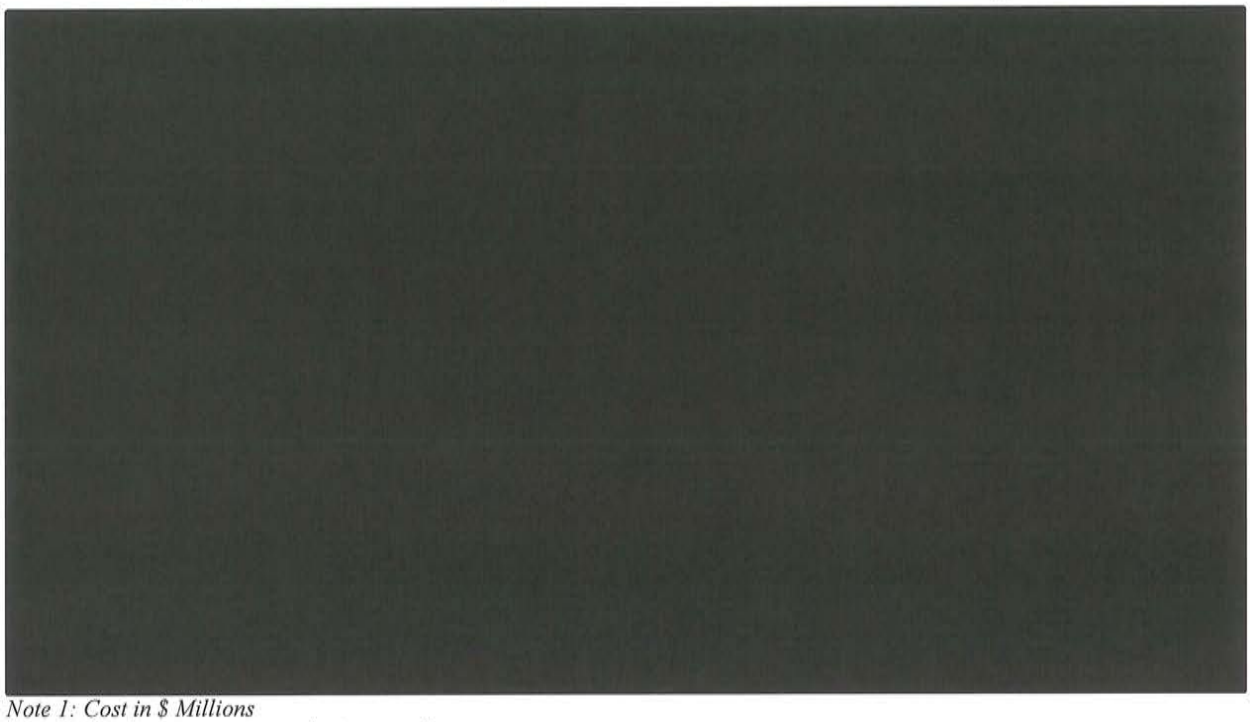
- Below Grade Line Construction: *Foundations for all steel structures including rebar and anchor bolts*
- Transmission Line Structures : *Erection of the steel structures with associated insulators and conductor attachments*
- Conductor Installation: *Stringing, Clipping and sagging the conductor*
- Fiber Optic Installation: *Stringing, sagging and installation of splice cans*
- Access and Crane Pads
- Mobilization, demobilization and Contractor Setup

Substation cost estimates are also based on past experience for similar type of equipment based on anticipated construction take-off commensurable of the current level of definition for the project. Substation construction costs include:

- Substation Steel Structure Construction: S*teel structures assemblies*
- High Voltage Equipment Construction: *Installation of the major substation elements including but not limited to power transformers, breakers, switches.*
- Bus Materials: *Installation of bus related materials including but not limited to bus, insulators, connectors, tap...*
- Conduit: *Installation of conduits in the substation yard*
- Control House: *Installation and dress up of the control house*
- Oil Containment Pit
- Testing and Commissioning
- Mobilization, demobilization and Contractor Setup

Construction and commissioning costs for the proposed project are presented in Figure C3.3-1 below.

Figure C.3.3-1 - Summary of Construction and Commissioning Costs



Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

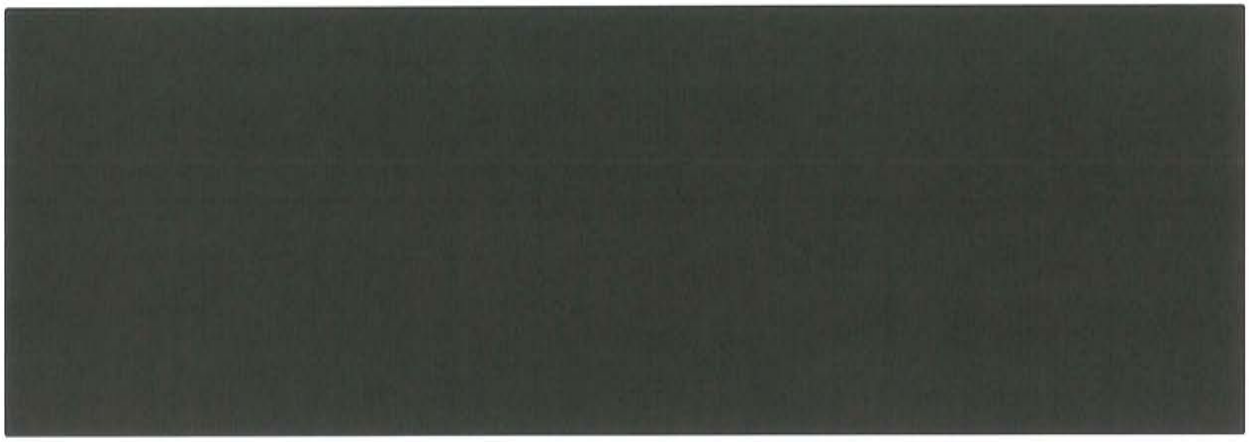
C.3.4 Right-of-Way and Land Procurement Costs

PPL EU conducted a desktop cost analysis for the proposed transmission line regarding the Right-of-Way and land procurement costs

- Labor to Secure the Land Rights: Survey Permissions, Title, Acquisition, Non-Environmental Permitting, Construction Monitoring and Restoration, Access Roads, Recording Costs, Costs Associated with a Field Office
- Land Costs to Secure Easements: Easement Costs for Right-of-Way, Damages for Crops, Access Roads, Staging Yards and Misc. & Temporary Workspace Agreements

Figure C3.4-1 outlines the estimated right-of-way and land procurement costs for the proposed project.

Figure C.3.4-1 - Summary of Estimated Right-of-Way and Land Procurement Costs



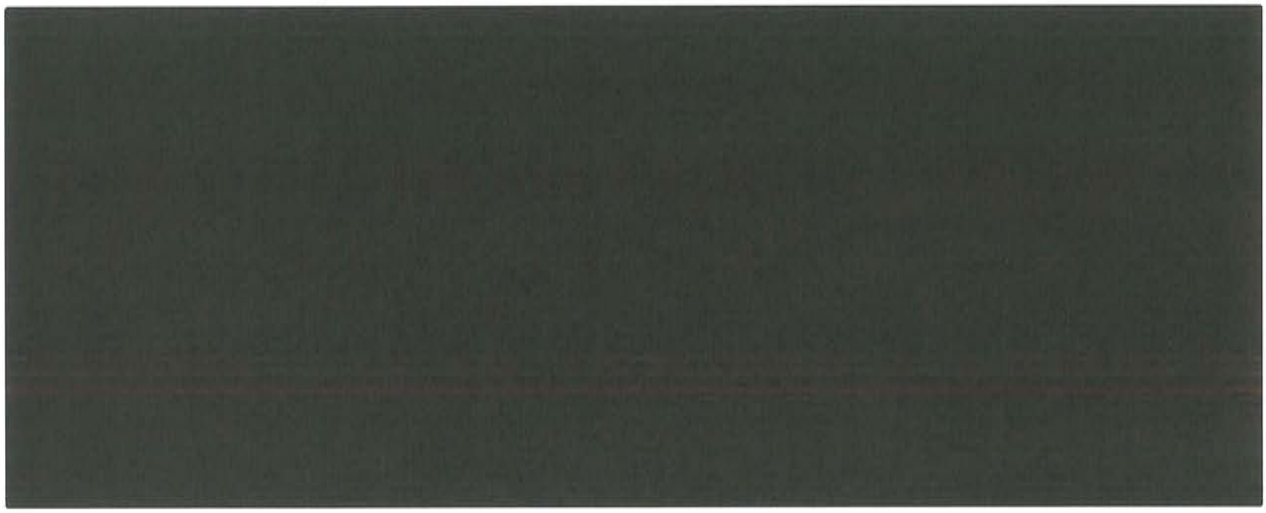
Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.5 Siting & Permitting costs

PPL EU conducted a desktop cost analysis for the solution's siting & permitting costs including: Environmental Permitting, Non Environmental Permits, Siting (Public Outreach, Open House) and Legal Costs.

Figure C3.5-1, outlines the siting and permitting costs for the proposed project

Figure C.3.5-1 - Summary of Siting/Permitting Costs

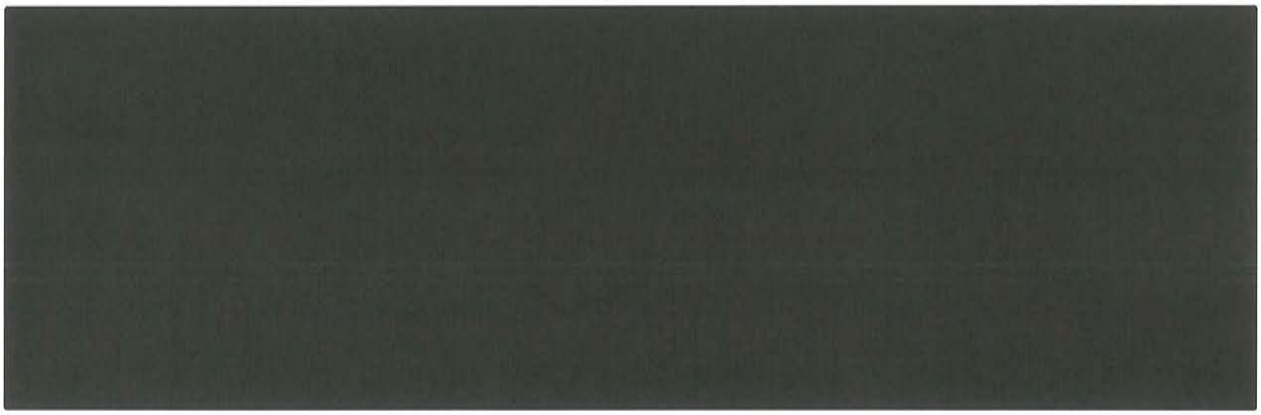


Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.6 Construction Management Costs

PPL EU conducted a desktop cost analysis for the proposed transmission line. Figure C3.6-1 outlines the construction management estimated costs for the proposed project. .

Figure C.3.6-1 - Summary of Construction Management Costs

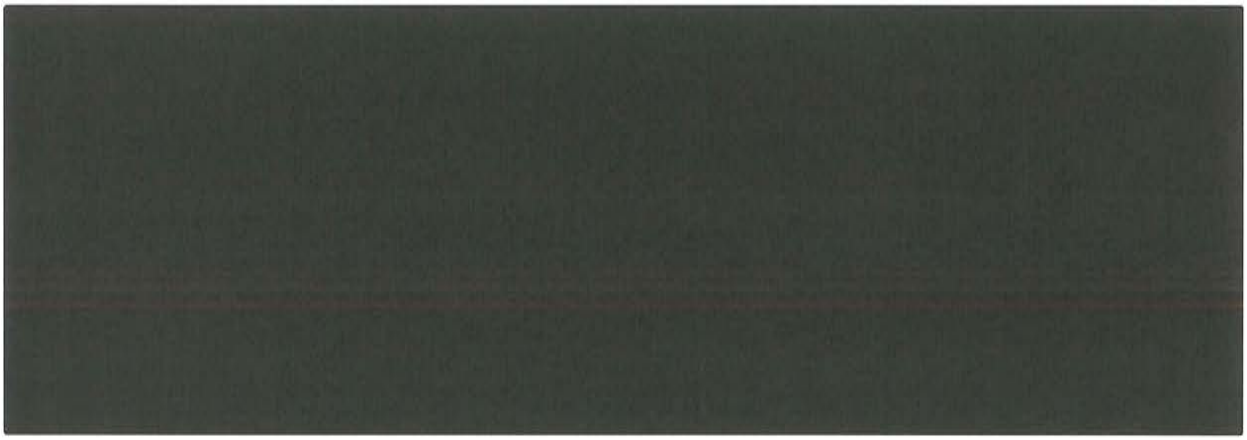


Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.7 Other Costs

The project includes A&G and Allowable Funds Used During Construction (AFUDC) at a rate of [redacted] for each year to account for the cost to borrow capital. Figure C3-7.1 outlines the additional costs adder for the proposed project for these categories.

Figure C.3.7-1 - Summary of Other Costs Adders

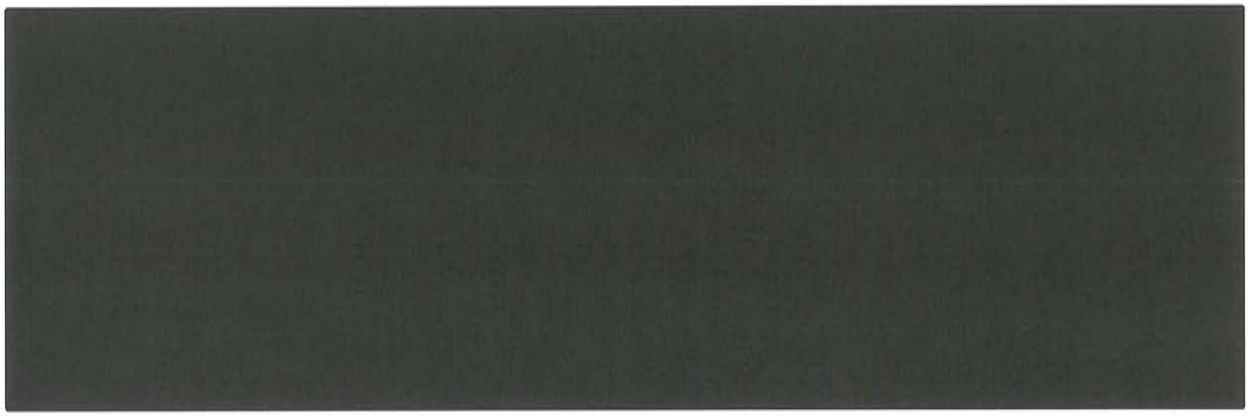


Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to rounding

C.3.8 Contingency

As mentioned earlier in this section. PPL EU has developed a budget level estimate. As such, PPL EU recommends that a contingency be applied to cost estimates to account for the unforeseen costs required to support construction activities. Figure C3.8-1 below presents the contingency costs for the proposed project.

Figure C.3.8-1 - Summary of Contingency



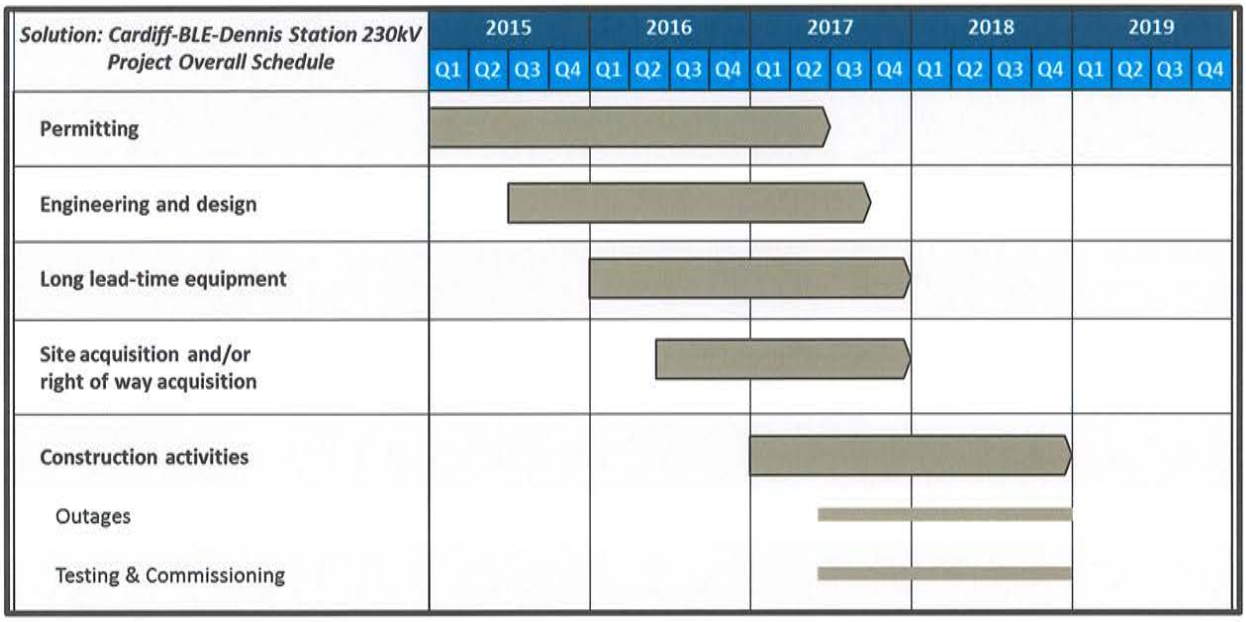
Note 1: Cost in $ Millions
Note 2: Numbers may not sum due to roundinng

C.4 Schedule

C.4.1 Overall Project Schedule

A 4 year project schedule is required to complete the proposed project: 36 months for planning & design, Right-of-Way, siting, & permitting activities and long lead time procurement, and another 24 months for construction and commissioning. An integrated project schedule is provided in Figure C4.1-1.

Figure C.4.1-1 - Project Integrated Schedule



Successful completion of the Cardiff to BL England to Dennis Single Circuit 230kV line addition will require coordination between engineering, Rights-of-Way / land acquisition, long-lead time equipment procurement, CPCN / permitting, and construction activities.

Permitting requirements

This schedule is based on a preliminary understanding of the topographical and ownership variances in the area. [redacted] While it is very difficult to predict the extent of required permits for a new transmission line project prior to the Siting and route selection, field surveys, and agency consultations, PPL EU expects to require a combination of federal, state, and county permits.

Site acquisition and/or Right-of-Way acquisition

Based on an initial review of the proposed project routing, there will be an estimated 21 months schedule for Siting, Permitting, and land acquisition. PPL EU conducted a preliminary review of the transmission line siting considerations in order to develop a high level schedule estimate.

Engineering and design

The proposed solution would require an estimated 27 months of Engineering. Key activities include identifying pole locations, conducting core borings, finalizing steel pole orders, designing the foundation, and finally, completing the engineering release.

Engineering activities will span a variety of disciplines:

- Surveying: *Site selection and physical arrangement utilizing aerial (LiDAR) surveys*
- Civil: *Foundation, ground grid design, water and water retention designs*
    - Environmental: *Environmental effects, access road design, spill response, SPCC plans in close conjunction with the Right-of-Way /Siting/Permitting team*
- Geo-Technical: *Soil investigation and earth resistivity*
- Structural: *Structural loading, component and hardware analysis including equipment standards, procurement, factory acceptance testing, equipment ratings, insulation ratings*
- Mechanical: *Conductor Sag/Tension design*
- Electrical: *Grounding, clearances analysis, insulation design, lightning performance*
- Telecommunication: *Fiber optics design (OPGW)*

Long lead time equipment

PPL EU expects the construction phase to last 24 months with several key long lead items requiring upfront procurement activities. Site clearing, prep and delivery as well as site restoration, crop damage, and landscape work are performed in coordination with the Right-of-Way team.

The proposed project design requires several long lead time materials to be delivered prior to the construction phase. Average lead times range from 12 – 30 weeks for transmission line materials and 12 weeks to a year for substation equipment. The typical long lead time materials include 1590 kcmil ACSR, 0.752 OPGW, steel structures for transmission line construction and Breakers, Switches, Transformers, Steel for substation work.

Construction activities, Outage plan to support construction and energization, testing and commissioning

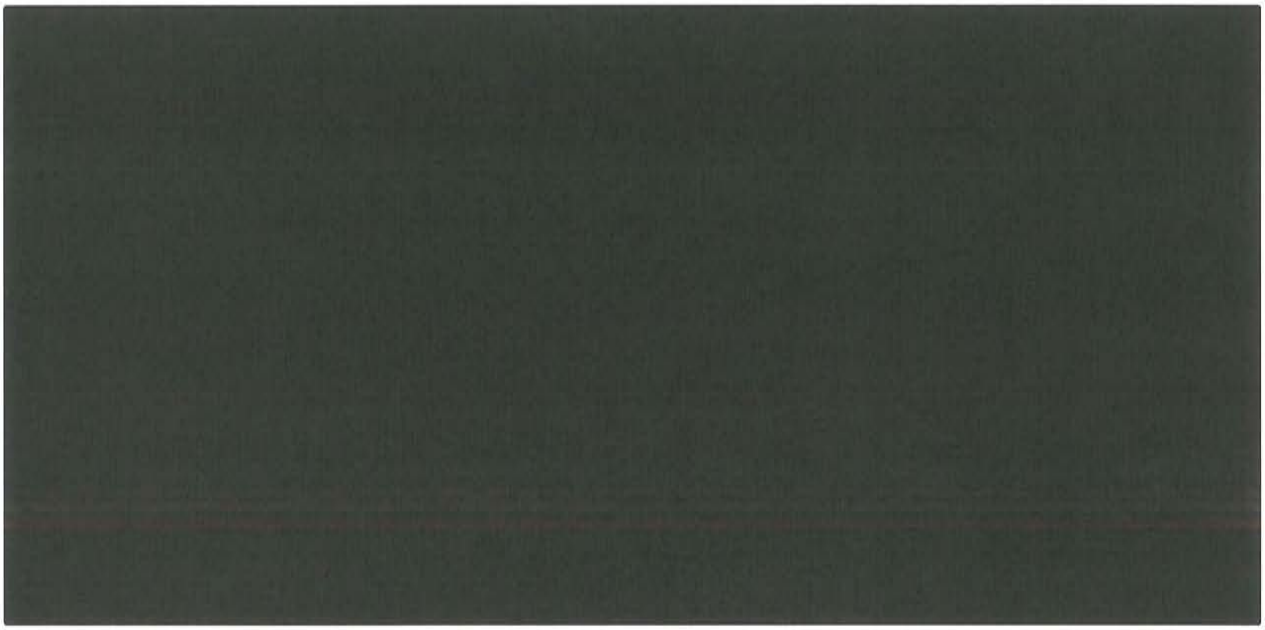
The substation and transmission line schedule includes standard construction activities:

- Site Clearing/Prep/Delivery: *Clearing / grubbing prep, access road completion, site delivery*
- Mechanical: *Site pad construction, mechanical work foundation, below grade work, conduit, ground grid*
- Electrical: *Pole and conductor construction, conductor/device removal, pole testing for ground resistance, structure removal, communication, splicing & testing, substation equipment installation, testing and commissioning*
- Demobilization: *Site restoration, crop damage, landscaping*

C.4.2 Cardiff Substation Schedule

The Cardiff substation expansion will be developed constructed and commissioned as described in the schedule below:

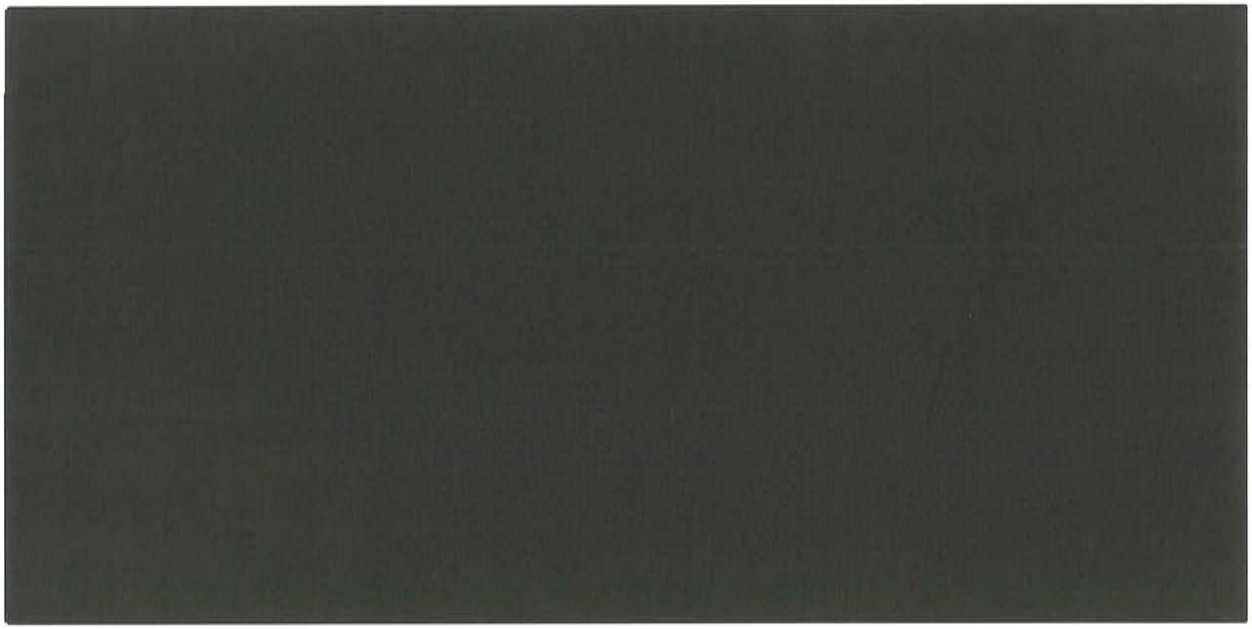
Figure C.4.2-1 - Cardiff Substation Schedule



C.4.3 Cardiff to BL England 230kV Line Addition Schedule

The 230kV line addition will be developed constructed and commissioned as described in the schedule below:

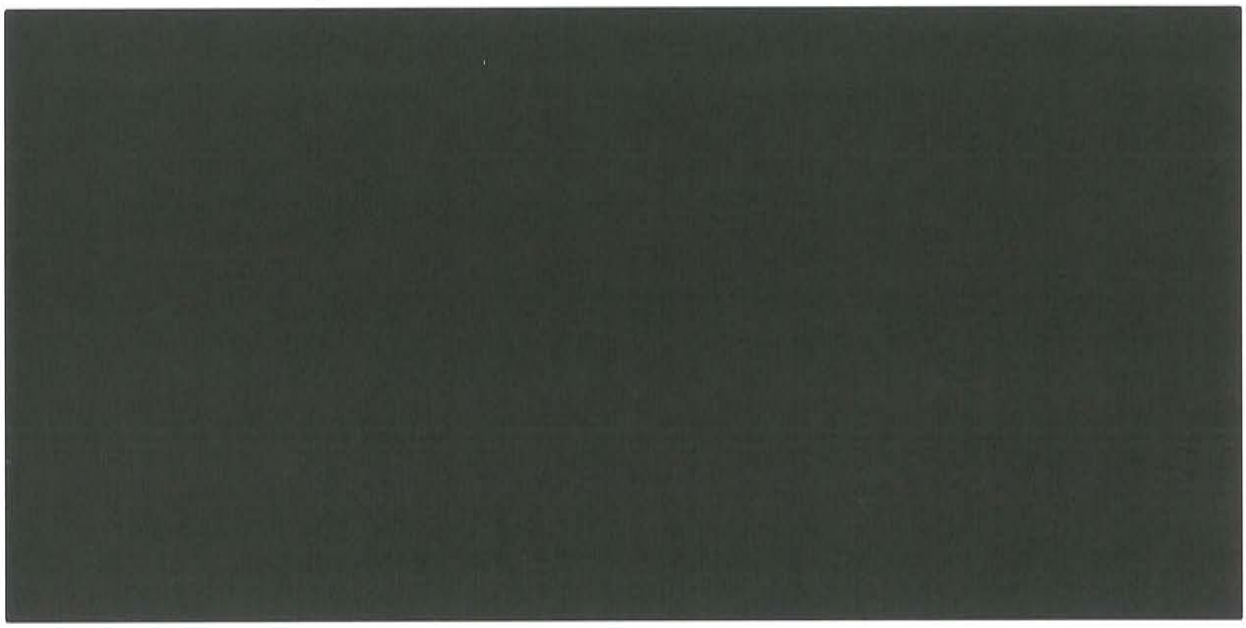
Figure C.4.3-1 – Cardiff to BL England Line Development Schedule



C.4.4 BL England Substation Schedule

The BF England substation expansion will be developed constructed and commissioned as described in the schedule below:

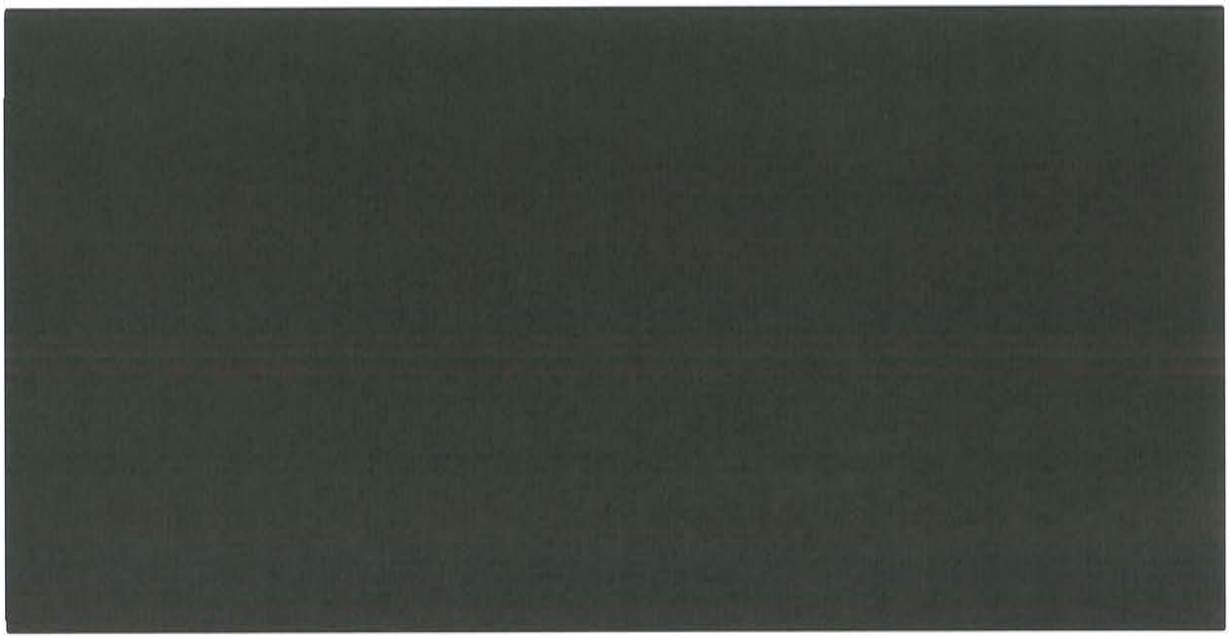
Figure C.4.4-1 – BL England Substation Schedule



C.4.5 BL England to Dennis 230kV Line Addition Schedule

The 230kV line addition will be developed constructed and commissioned as described in the schedule below:

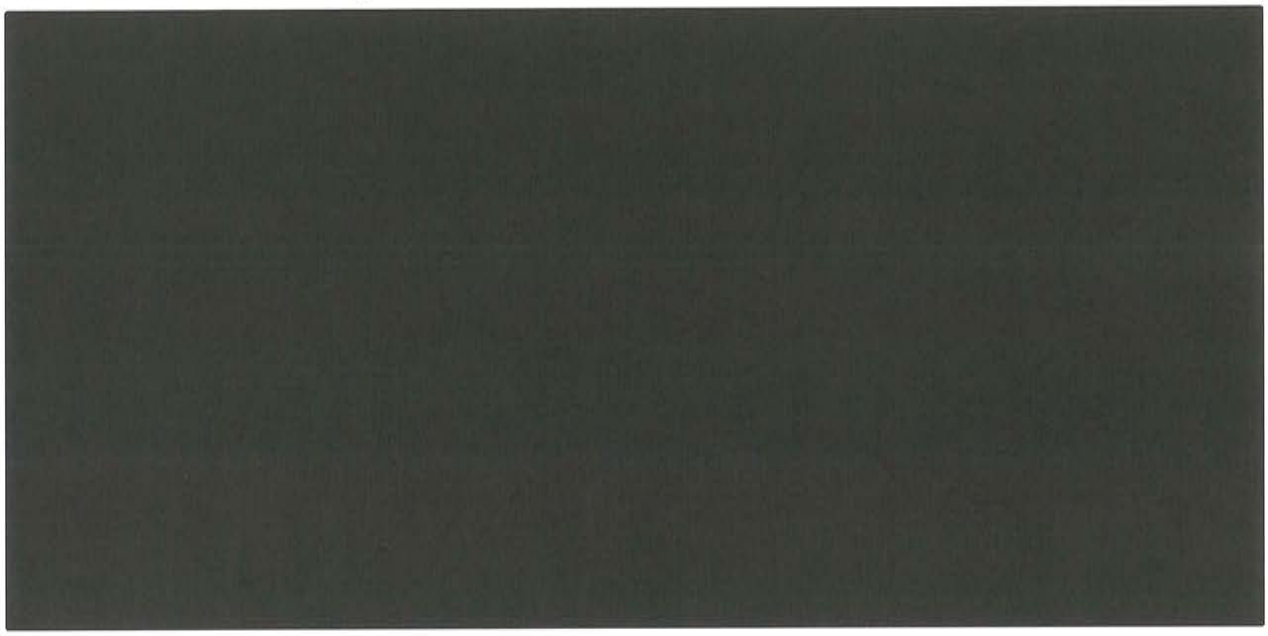
Figure C.4.5-1 – BL England – Dennis Line Development Schedule



C.4.6 Dennis Substation Schedule

The Dennis substation expansion will be developed constructed and commissioned as described in the schedule below:

Figure C.4.6-1 – Dennis Substation Schedule



C.5 On-going Transmission Facility Items

C.5.1 Operational Plan

The parts of the proposed solution located in a non-PPL zone will be built by the incumbent TO's. In accordance with FERC 1000, and similar to a rebuild of an existing line, the terminal facilities within the incumbent TO's substation would be constructed, controlled, and operated by the incumbent (as also indicated in the section: facilities built by others).

Operations of these facilities will be contracted to the incumbent transmission owners who will own the existing terminal facilities at their substations. The affected TO will have the required authority to operate the proposed facilities in PJM territory and have the required telemetry inside PJM and follow all manuals and jurisdictional responsibilities.

Operations Plan Overview

The facilities constructed and owned by PPL EU will be operated at the direction of PJM and controlled and maintained by PPL EU consistent with the current operations and maintenance practices used by PPL EU. PPL EU's Transmission Control Center (TCC) is tasked with the responsibility of monitoring and operating a reliable transmission grid as defined by PJM, RFC and NERC.

Transmission Control Center

In order to operate and maintain the transmission grid reliably, PPL EU manages a Transmission Control Center (TCC) 365 days, 24 hours a day located in the Lehigh Valley. PPL EU has operated a Transmission Control Center since its inception in 1926 and was an original PJM member.

Our current NERC/RF certified control center is a state of the art facility, occupied since early 2014 that is completely secure, has redundant data and communication at both the operations Center and the Disaster Recovery Site that are independent of each other that meet all RFC and NERC criteria. The control center adheres to the guiding principles of safety, reliability and production in that order.

Transmission Control Center Operations

Core responsibilities of the TCC include monitoring and operating the Bulk Electric System and 69kV transmission systems in the PPL EU footprint using an AREVA EMS system, directing the application of the PPL EU Energy Control Process (Permit and Tag) and procedures, using EMS load flow study programs and contingency analysis to control overloads.

The Operations engineering section resolves operational discrepancies with PJM when load flow models provide inconsistent results and requests stability studies from either

Transmission Planning or PJM to maintain a reliable system. A key differentiating attribute of the TCC that sets PPL EU apart from other utilities is its tight linkage and coordination with the Susquehanna nuclear plant, including interface documents and maintenance and outage coordination meetings. This interface demonstrates PPL EU's ability to manage significant and complex interfaces safely and reliably.

Outage Requests

In addition to real time operations, PPL EU develops a construction and maintenance outage plan. TCC Planning processes requests to upgrade transmission facilities and translates those to equipment outages using the PJM outage criteria time lines. The TCC effectively plans all outage requests, limits risks to the electric system and PPL EU customer base, and responds to any unplanned events. Transmission outage planning, including risk and conflict analysis, is crucial to promoting safety, preserving the reliability of the bulk and non-bulk transmission system, eliminating volatility in the work portfolio.

Employee Qualifications

TCC employees seek continuous improvement in technologies and processes, are trained in all operator tasks, and embrace compliance as a measure of our effectiveness. PPL EU TCC follows best-in-class training practices, which increases the effectiveness of the organization, and creates a distinct advantage when dealing with adverse conditions. All Transmission Control Center employees are trained within the TCC by NERC certified trainers and they receive NERC, PJM Transmission Operator, PJM Generation, and PPL EU training certifications. In addition, PPL EU owns an internal simulator that is used for training.

TCC operators have broad experiences across multiple areas of the control center and are well versed on the uses of security-analysis tools. As a result of the training, the operators are all able to take action when necessary and can perform basic trouble shooting on advanced systems. All team members at the TCC participate in system restoration drills, and act as liaisons between PPL EU and PJM for information dissemination. All operators are coached and trained in system restoration drill requirements.

Significant Operating Response Team

The Significant Operating Response (SORT) Team is a joint effort between the Transmission Operations and the Engineering departments, which includes Substation and Relay engineering, Protection analysis, Transmission Engineering, T&S Maintenance Engineering, and Relay Test. This group of engineers is on-call to address any electric system event that may occur. The team is also responsible for conducting root cause investigations. The Significant Operating Response team and subsequent driver analysis allows for PPL EU to successfully translate lessons learned into success for future transmission projects.

C.5.2 Maintenance Plan

PPL EU Transmission Maintenance Group is responsible for the transmission line preventative maintenance program for the PPL EU Transmission System. This includes periodic review and comment on the content of the program with ultimate responsibility for the program residing within the Asset & Strategy Policy Group of T&S Asset Management. The T&S Maintenance Engineering – Transmission Maintenance Group reports to the Manager – T&S Maintenance which reports directly to the Director – Engineering. PPL EU currently groups equipment into functional groups allowing optimum scheduling of equipment maintenance under a single outage window. Inspection activities are timed to maintain the desired performance levels defined for each individual asset.

Transmission Line Maintenance

PPL EU Transmission Maintenance Group is responsible for the transmission line preventative and corrective maintenance program for the PPL EU Transmission System. This includes periodic review and comment on the content of the program with ultimate responsibility for the program residing within the Asset & Strategy Policy Group of T&S Asset Management PPL EU currently groups equipment into functional groups allowing optimum scheduling of equipment maintenance under a single outage window. Inspection activities are timed to maintain the desired performance levels defined for each individual asset. These activities include but are not limited to: comprehensive, routine and emergency helicopter patrols, ohmstick testing and thermovision. Additionally to ensure continued performance and public safety right-of-way encroachments are reviewed to ensure proper clearances.

Substation Maintenance

PPL EU Substation Maintenance Group is responsible for the preventative and corrective maintenance programs for PPL EU substations. This includes periodic review and comment on the content of the program with ultimate responsibility for the program residing within the Asset & Strategy Policy Group of T&S Asset Management. Current maintenance programs employ time-based cycles. The equipment data is kept in a maintenance management system (MMS) that serves dual functions; inventory management and maintenance order generation. The substation maintenance department is responsible for the upkeep of both the maintenance program and the inventory data. Test data is reviewed by the maintenance department and corrective or preventative work is issued as needed.

Project Spare Equipment

PPL EU owns and maintains a fleet of spare substation equipment to include at least one of each major piece of equipment, such as power transformers, CB's, CCVT's, etc…

Items such as spare transformers are kept at strategically located substations based on the location of in-service units. If a piece of equipment were to fail, a cross-functional team evaluates the failure and determines if the system spare is needed. These spares are incorporated into our time-based maintenance program to assure that they are ready when called upon. The proposed project will have equipment specified to match the current standard equipment so that any existing spares would be compatible.

C.6 Assumptions

The project execution model relies upon a set of assumptions described in Figure C6-1.

Figure C6-1: Summary of Major Assumptions

	Key Assumptions
Transmission Design	• No Significant right-of-way or height restrictions which require alternate design • PPL EU designs transmission n facilities to meet or exceed PJM design standards. PPL EU designs transmission structures to have greater resistance to natural elements, e.g., wind loading, ground clearance, lightning protection • Local ground condition assumed based upon typical state geological data
Substation Design	• Design based upon PPL EU's bulk power Substation design standard • Yard and control room capacity sufficient to expand within existing footprint • Relay Protection design coordinated with incumbent utility system protection infrastructure • No detailed engineering design completed addressing existing fault duty, DC systems or protection and control
Planning	• PJM 2019 RTEP base case is the basis for reliability results that determined drivers for potential upgrades • PJM has multiple base cases to represent various flow gates in a region. PPL EU post-solution loading estimates consolidate multiple flow gates in a region
Schedule	• Outages based upon proposed construction sequence and system requirements • Long-lead time items: transformers 12-18 months, steel poles up to 30 weeks • PJM will award a proposal by January 1st, 2015 • Proposed outages will be granted to support construction execution
Siting / Right-of-Way	• PUC will approve selected route and allow PPL EU to exercise eminent domain, if needed • Right of way / land costs based on the scheduled time frame for acquisition
Permitting / Environmental	• Detailed studies of the existing land to confirm transmission line routes • Phase II and III archaeological studies and threatened and endangered (T&E) species studies may be required for the projects, time and costs to conduct studies not included • Impacts to environmentally sensitive lands such as state parks, state wildlife management areas may result from the projects
Financial	[redacted]
Operation & Maintenance	• Assets to be operated and maintained consistent with PPL EU practices, e.g., through TCC and with Lifecycle Asset Management approach • Operation and maintenance requirements of assets not located in PPL EU territory to be coordinated with incumbent utility

ALL APPENDICES ARE REDACTED