

**PSE&G**

# New Transmission Line Proposal B.L. England to Cardiff 230kV



Public Service Electric & Gas

7/28/2014

The enclosed information is proprietary to PSE&G and is provided solely for your use. It should not be copied, reproduced, or shared with others without PSE&G's prior written consent.





## A. Executive Summary

- This report summarizes the conceptual study for the proposed Public Service Electric & Gas (PSE&G) B.L. England to Cardiff New 230kV Transmission Line Project.
- PSE&G's main office is located at 80 Park Plaza in Newark New Jersey 07102 with additional offices, operations and maintenance facilities stretching from the New York to Philadelphia metropolitan areas.
- [REDACTED]
- [REDACTED]
- It is proposed in this solution to install a new 15 mile 230kV Overhead Transmission line from the existing B.L. England Station to the existing Cardiff Station. This will include a new 230kV-138kV Transformer and breaker at the B.L. England Station. All proposed and existing facilities are located along the New Jersey Coast.
- The proposed project cost: Approximately \$134 Million.
- The overall estimated schedule duration for the proposed solution is 4 (four) years.
- PSE&G currently has pre-qualification information on record submitted on June 21, 2013 under PJM ID# 1307.
- PSE&G maintains that the intent of this proposal is to seek designation to construct, own, operate, maintain and finance the proposed project, or some portion, as the designated entity for the proposed project.



## B. Company Evaluation information

### 1. Experience

PSE&G has over 100 years of experience in the planning, construction, operation and maintenance of transmission and distribution system facilities in New Jersey. At present, PSE&G owns, operates and maintains the following existing circuit miles of transmission facilities in PJM:

Transmission Voltage Level	Circuit Miles
500 kV	378
345 kV	19
230 kV	560
138 kV	386
69 kV	115
<b>Total</b>	<b>1,458</b>

In 2013, PSE&G received the prestigious ReliabilityOne Award for the Mid-Atlantic region twelve years in a row by PA Consulting, a national industry benchmarking group. PSE&G was also named America's Most Reliable Electric Utility five out of the past nine years.

PSE&G received an award from the Edison Electric Institute for outstanding restoration efforts after Superstorm Sandy. The award acknowledges PSE&G for restoring power to its nearly 1.9 million customers impacted by Sandy, as well as for its outstanding storm management practices, such as communicating effectively with the public. This is the second year industry peers have honored PSE&G with this award; recognizing the utility each time for its efforts to restore service promptly after a storm or natural disaster. Previously, PSE&G received the award for its response efforts to Hurricane Irene and the subsequent flood that occurred in 2011.

PSE&G performs the required operations and maintenance activities on all of these facilities on a day to day basis.

PSE&G's notable technical qualifications and experience includes the following:

■ [REDACTED]

■ [REDACTED]

- PSE&G developed interconnection arrangements with utilities in other regions that predate PJM's formation as an RTO.

- PSE&G has significant experience in securing the right to build in restricted and/or environmentally sensitive areas: e.g., [REDACTED]
- PSE&G also has significant experience in the Federal Environmental Permitting process [REDACTED]

[REDACTED]  
[REDACTED] In recent years, PSE&G has completed a variety of significant transmission upgrades at various voltage levels.

PSE&G is uniquely qualified to perform this project based on a more than one hundred year track record of excellence in the construction, operations and maintenance of transmission facilities in this environment.

#### Transmission Projects Completed In Last 5 Years

##### 1. Branchburg 500kV Capacitor Bank (b0290)

**Description:** The Branchburg 500kV Capacitor Bank Project consists of installing 400 MVAR capacitor banks at the Branchburg 500kV Switching Station as well as the installation of a new 500kV Gas Insulated Switchgear (GIS) station adjacent to the existing Branchburg Switch.

[REDACTED]

**Status:** The project was placed in-service in May of 2012.

##### 2. Bayonne – Marion Project (b1100)

**Description:** The Bayonne – Marion Project consists of constructing a new 230kV underground pipe-type cable from Bayonne to the Marion substation and reconfiguring the Bayonne substation with new Gas Insulated Switchgear (GIS).

[REDACTED]

**Status:** The new circuit and GIS was placed in-service in December of 2012, and the remaining station reconfiguration was completed by June of 2013.



**3. 5021 Loop Into New Freedom (b0498)**

**Description:** This project provides for the looping of the existing Salem – East Windsor circuit into the New Freedom Substation.

**Status:** The project was placed in-service in March of 2009.

**4. Branchburg-Flagtown-Somerville-Bridgewater C-2203 (b0664) (b0665) (b0668)**

**Description:** This project consists of building a new 230kV transmission line from Branchburg Switching Station to Flagtown Switch Rack, separating the three ended terminal C-2203 line at Flagtown and terminate in a new 230kV bus section at Branchburg Switching Station. The Flagtown-Somerville-Bridgewater line was reconducted to meet the required capacity of the reconfigured C-2203 line.

**Status:** The project was placed in-service in March of 2009.

**5. J-3410 and K-3411 Re-conductoring – Waldwick Switching Station to South Mahwah Substation (b1017) (b1018)**

**Description:** These two projects consist of removal of all previously existing circuit dielectric fluid, splices, terminations, conductors, expansion of manholes, testing pipe section integrity, installation of new copper circuit conductor, terminations, splices and associated anchor joints, skid joints, and stop joints, re-filling dielectric fluid, and repairing necessary pipe corrosion. Existing Waldwick and South Mahwah terminations were removed, and replaced with new terminations to meet the increased required.

**Status:** The project was placed in-service in May and December of 2011.

## ***2. Rights of Way and Property Acquisition***

Moreover, PSE&G has years of experience in undertaking the various processes necessary to secure certificates of public necessity and in acquiring the necessary rights-of-way needed to site facilities, including experience in exercising eminent domain authority.

PSE&G has extensive experience in land acquisition and negotiations associated with all types of utility projects including Transmission. PSEG has an internal Corporate Properties staff responsible for the

oversight and management of the corporation's real estate assets, including the purchase and sale of property rights, leasing or licensing company owned property to or from third parties, and handling day to day property maintenance issues that may arise.

Accordingly, PSEG has extensive in-house expertise to handle acquisition of property for large transmission projects. PSE&G also hires the services of outside vendors

Finally, PSE&G has an in-house Environmental Projects and Permitting group dedicated to gaining approvals and dealing with environmental issues for Electric Transmission and Distribution Projects.

### ***3. Financing***

PSE&G maintains solid investment grade credit ratings. This allows us consistent access to the capital markets on reasonable terms. Our current senior secured credit ratings from S&P and Moody's are A and Aa3 respectively.



## C. Proposed Project Constructability Information

### 1. Project Scope

The proposal includes the installation of a new 15 mile 230kV Overhead Transmission line from the existing B.L. England to the existing Cardiff Station. This will include a new B.L. England 230kV-138kV Transformer.

#### a. New Transmission Line Details

##### Terminal points

Existing Cardiff 230kV station and B.L. England 138kV Station.

##### A general description of alternative routes or routing study area

[REDACTED]

##### Geographic description of any terrain traversed by the proposed new line or the study area

[REDACTED]

##### Route description by segment that includes lengths and widths and that classifies by:

[REDACTED]

- New right of way to be acquired – [REDACTED]
- Expansion of existing right of way – [REDACTED]

##### Electrical characteristics

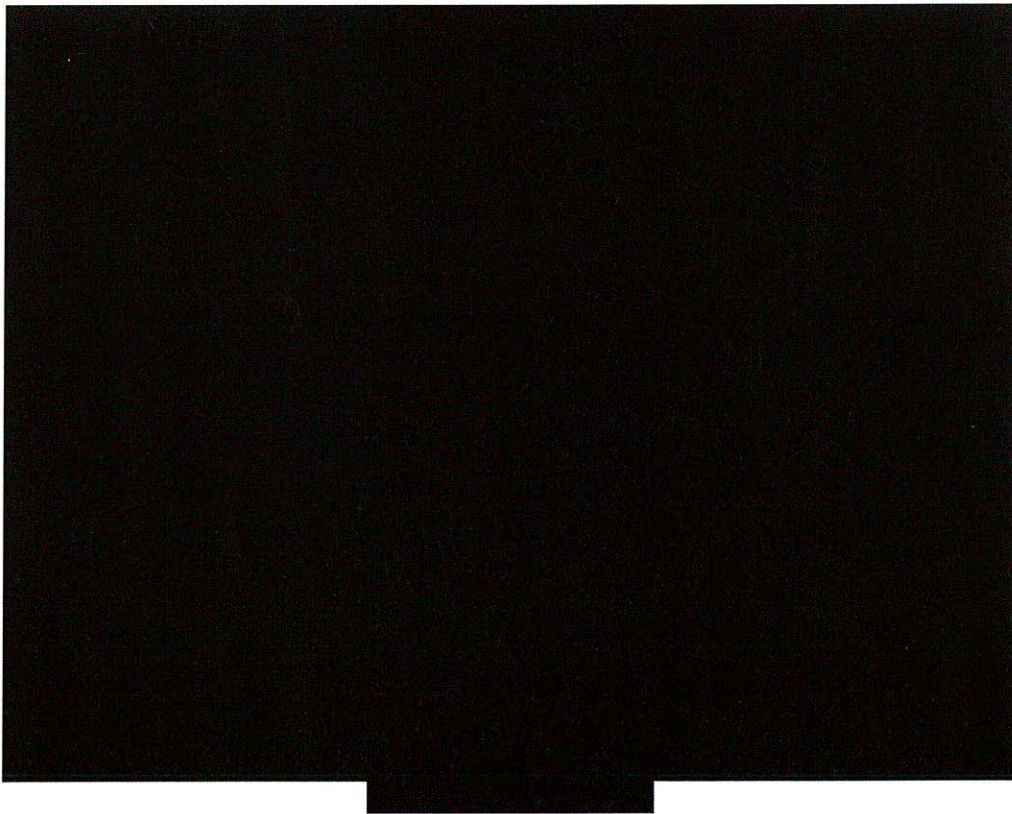
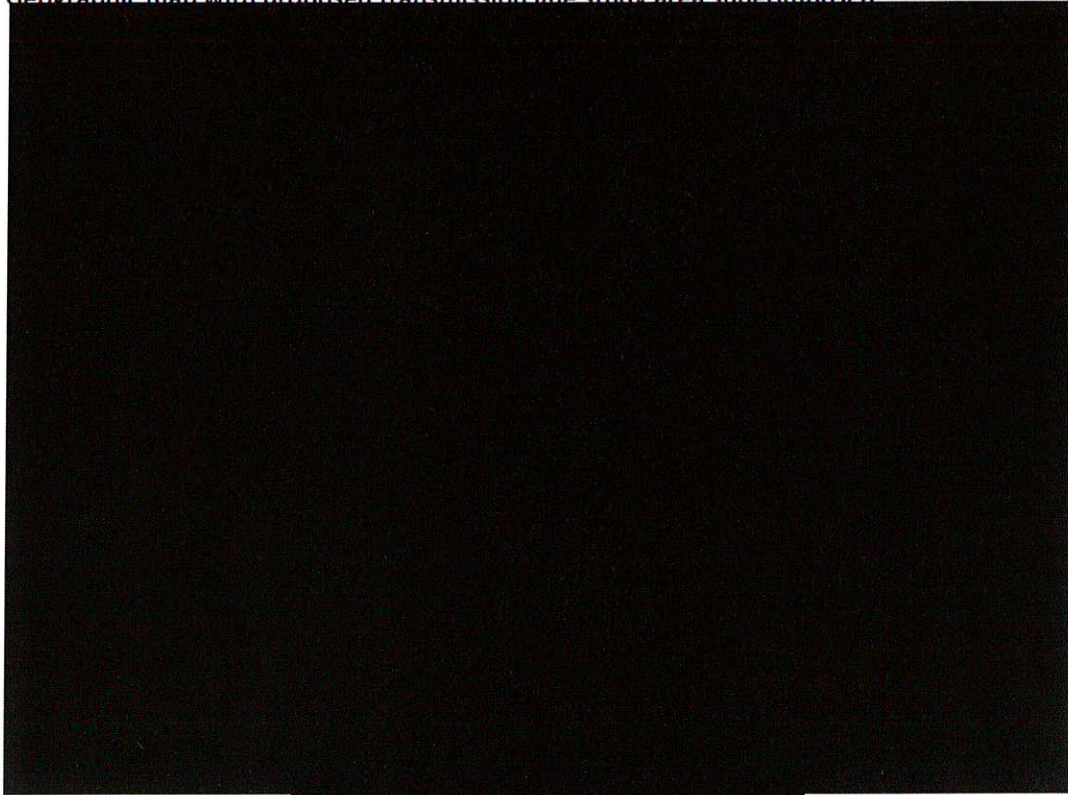
- Nominal voltage rating – 230kV
- AC or DC - AC
- Line MVA normal and emergency rating – [REDACTED]
- Grounding design for underground or submarine circuits - [REDACTED]
- Equipment ratings – [REDACTED]
- Line impedances – [REDACTED]
- Total mileage – approximately 15 miles

##### Physical characteristics

- Line and shield conductor type and size – [REDACTED]
- Overhead or underground/submarine – Overhead
- Single or double circuit towers – Single Circuit



Geographic map with proposed transmission line study area superimposed



[REDACTED]

General description of the proposed location(s)

[REDACTED]

***c. Transmission Facilities to be constructed by others***

[REDACTED]

***c.1. Transmission line relocation***

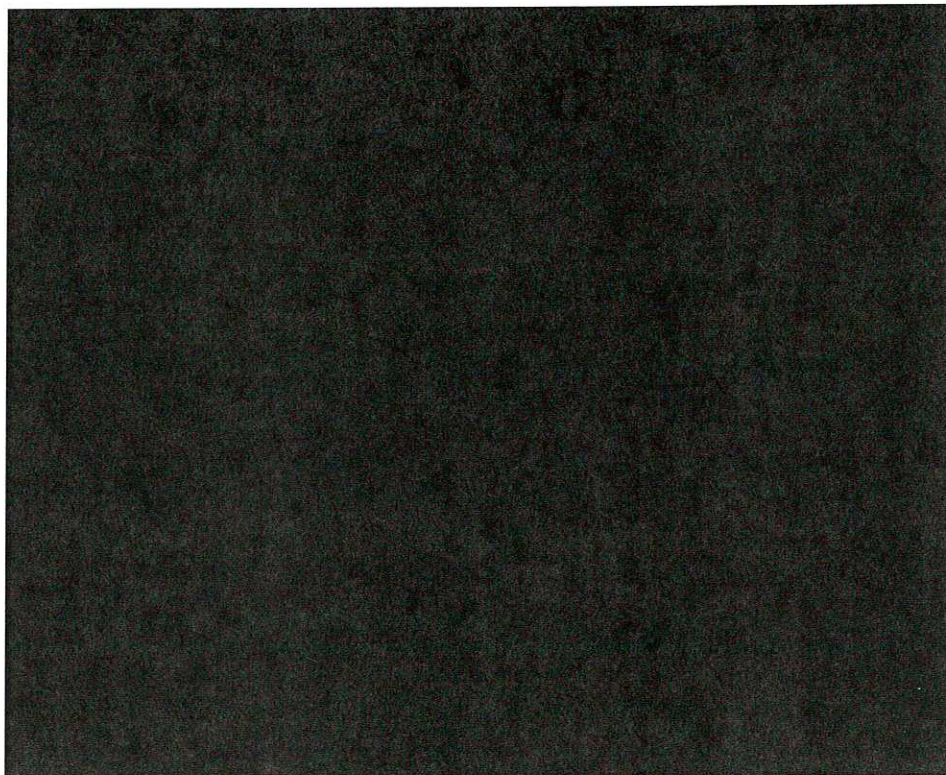
[REDACTED]

***c.2. B.L. England Station Expansion***

[REDACTED]

[REDACTED]





**Protection and controls plan**

Line and transformer protection should be implemented appropriate to the current relay communications and protection standards of both PSE&G and B.L. England owner entity.

**General description of the proposed expansion**

It is proposed that B.L. England Station be modified to accommodate an additional line position holding a 230-138kV transformer and associated breaker. [Redacted]



**Land ownership in vicinity of proposed expansion**

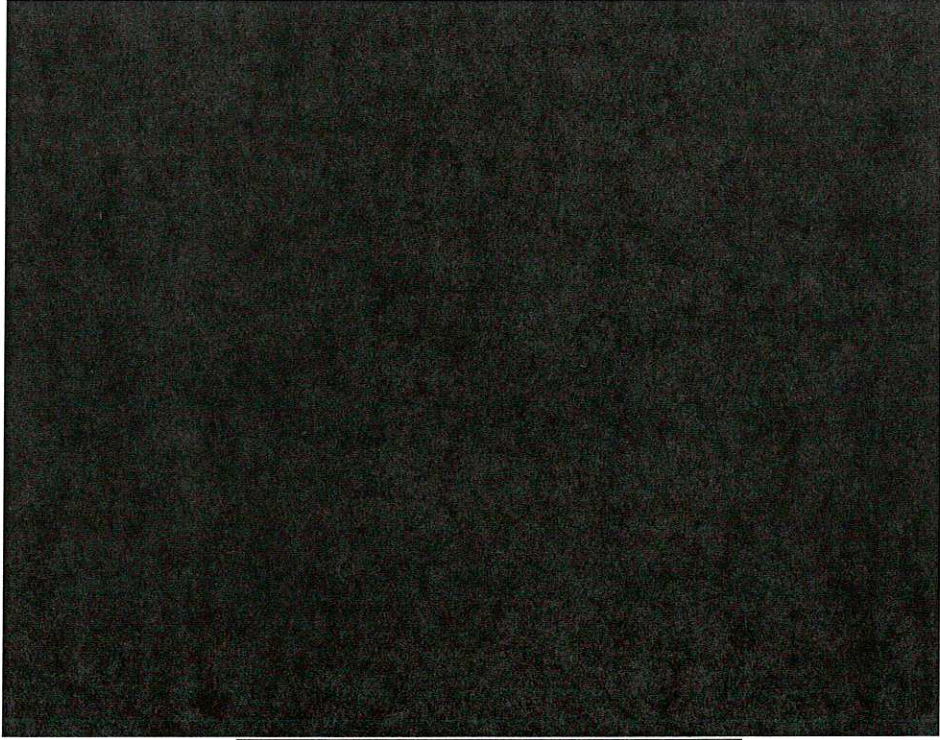
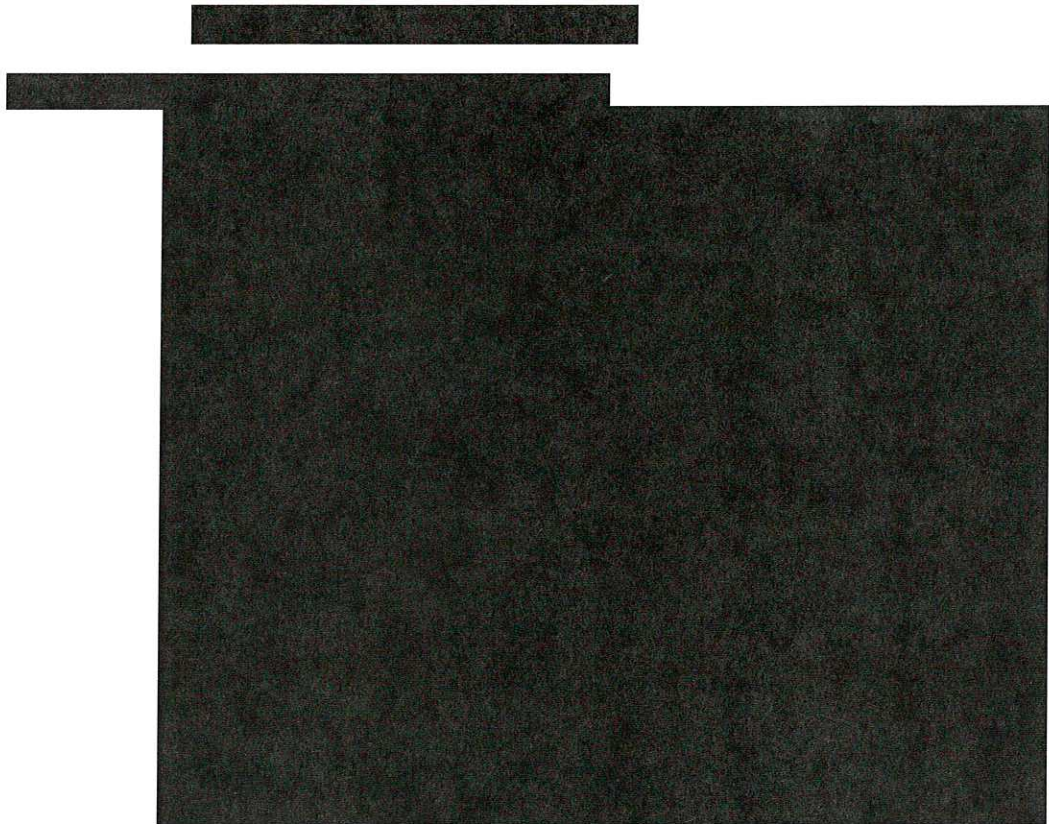


**Electrical design including specifications and ratings for transformers or reactive devices**

Equipment Ratings - [Redacted]

Transformer ratings - [Redacted]







**Protection and controls plan**

Line and transformer protection should be implemented appropriate to the current relay communications and protection standards of both PSE&G and Cardiff owner entity.

**General description of the proposed expansion**

It is proposed that Cardiff Station be modified to accommodate an additional line position. [REDACTED]  
[REDACTED]  
[REDACTED]

**Land ownership in vicinity of proposed expansion**

[REDACTED]  
[REDACTED]

**Electrical design including specifications and ratings for transformers or reactive devices**

Equipment Ratings – [REDACTED]

***d. Environmental, Permitting and Land Acquisition***

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]

- | [REDACTED]  
[REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]

| [REDACTED]

| [REDACTED]

| [REDACTED]

[REDACTED]

| [REDACTED]

| [REDACTED]

| [REDACTED]

## ***2. Project Component Cost estimate***

- i. This document is found as Attachment #1.

## ***3. Schedule***

- ii. This document is found as Attachment #2.



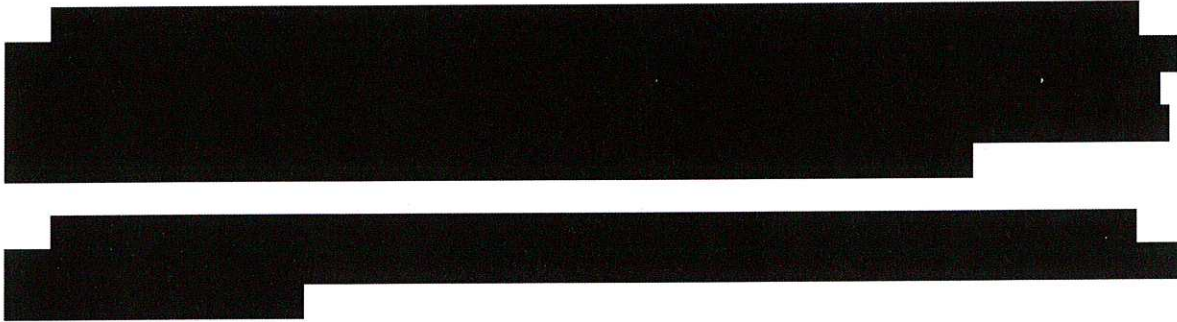
#### **4. On-going Transmission Facility Items**

##### **a. Operational Plan**

PJM is charged with control and operation of the Bulk Electric System (BES) in consultation and coordination with PSE&G's Electric System Operations Center (ESOC). The PSE&G transmission system consists of all equipment operated at 100kV and above that is used to transmit power. PSE&G operates the transmission system in compliance with the PJM Operating Agreement and Manuals. PSE&G will use its existing local control center facility with its current telemetry to communicate with PJM.

##### **b. Maintenance Plan**

PSE&G will incorporate the new transmission facilities into its existing transmission maintenance plan in compliance with organizational standards and regulations.



## 5. Assumptions

### General

- █ [REDACTED]
- █ [REDACTED]
- All acreage impacts for the analysis were calculated based on reuse of existing ROW and the need for additional right-of-way width estimated for each.
- █ [REDACTED]
- █ [REDACTED]
- This project encounters both existing and proposed transmission crossings. It is assumed detailed engineering may provide opportunities to reduce the total number of crossings.

### Permitting

- Property is available for station expansion or new right of way
- Permits are available to construct in environmentally sensitive and other required areas
- No constraints for construction due to endangered or threatened species
- Right of way is available in proximity to existing lines

### Cost

- No new OPGW is required
- Outages are available
- Resources are available
- No construction delays
- No material delays or exceptional cost increases
- No environmental remediation is required
- No litigation
- Space is available in station for line positions, transformer and associated equipment
- Electrical construction costs are based on 2014 labor rates



- Civil construction costs are based on 2014 labor rates

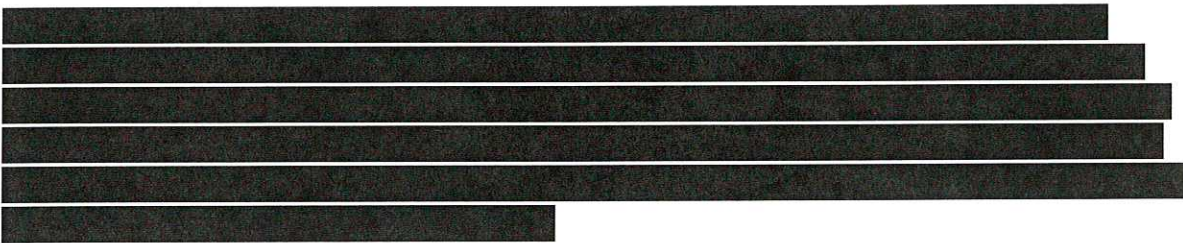
**Work Location**

New Jersey

**Purpose of Estimate**

Provide budget estimates based on a cost per mile for multiple routes; these estimates are to assist in the determination of route selection and further project development feasibility.

- Estimate includes Risk & Contingency
- Estimate does not include escalation
- Estimate does not include sales tax



**Estimated Project Durations**

- The estimated durations are conservative, high-level estimates of the project duration from kickoff to energization.
- Permitting schedule tasks were developed in coordination with PSE&G staff familiar with local and recent projects of similar scope and nature.
- It is assumed that construction resources required for this project will be available. Lack of available construction resources could impact project durations.
- It is assumed that line outages will be available.
- Lack of available outages could impact project durations.
- No input from utilities other than PSE&G or federal, state, or local agencies was available for the study.
- Other potential risks that could affect the schedule might include public opposition and organized opposition groups, state siting approval, NEPA constraints, permit and clearances, construction issues, and mitigation requirements.

## D. Proposed Project Results and Technical Information

### 1. Scope of Project

A range of Generation Deliverability overloads presented in the 2014 RTEP analysis showed outlets of B.L. England being overloaded under various contingencies. Proposal includes a new 230kV O/H line, originating at BLE 138kV and terminating at Cardiff 230kV with one (1) 230-138kV transformer at BLE 230kV.

[Redacted]

### 2. Analysis

[Redacted]

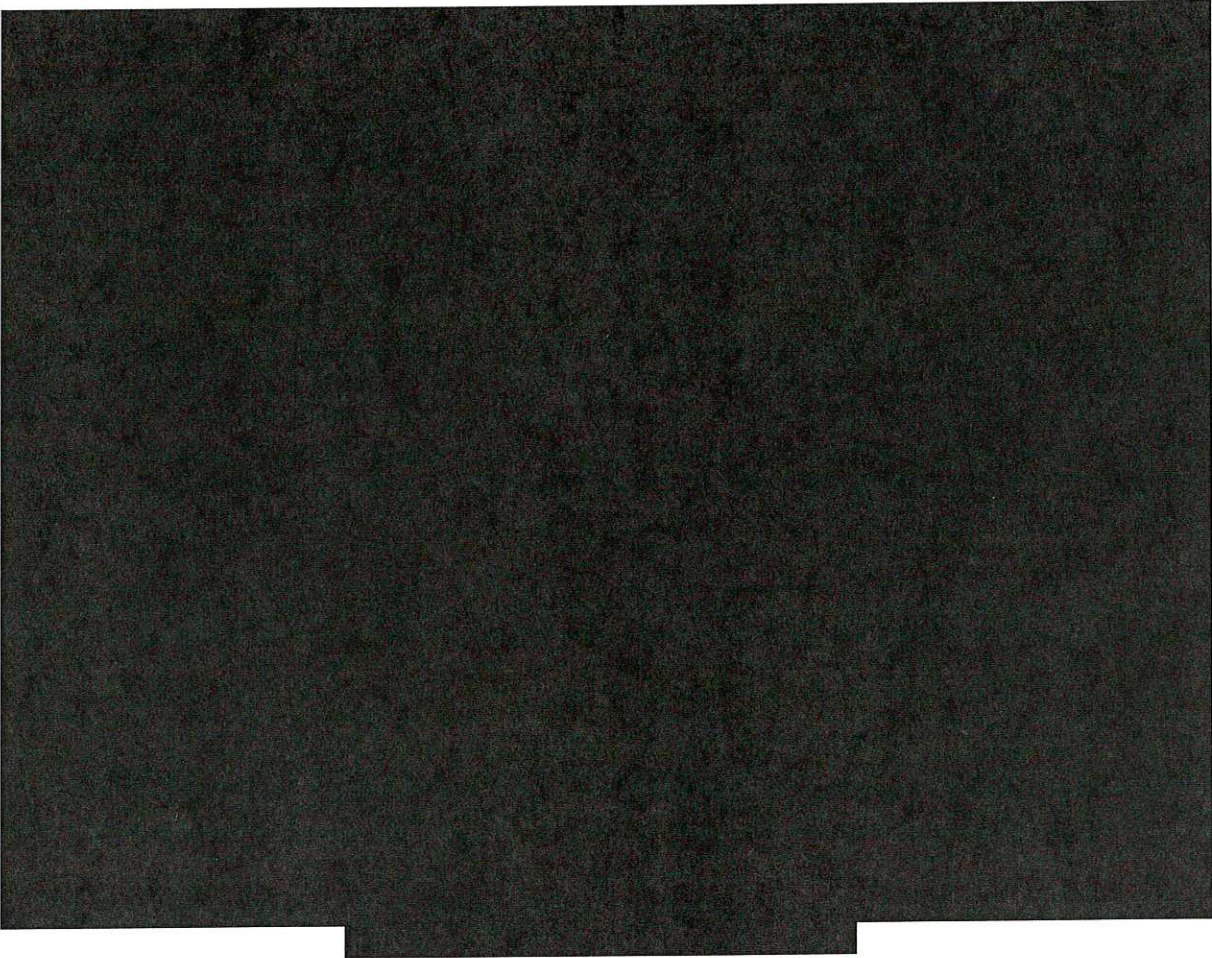
### 3. Additional Benefits

[Redacted]

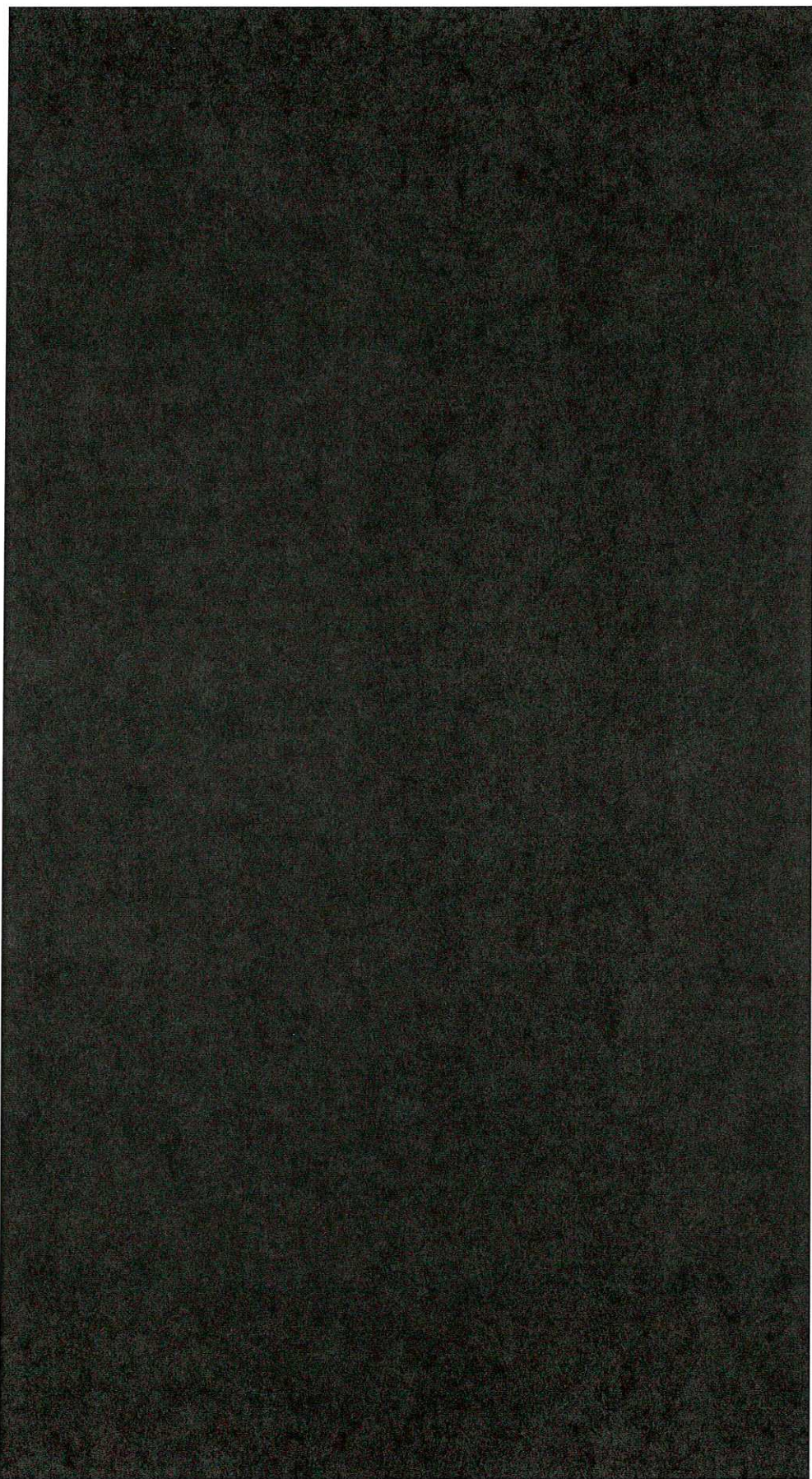
BLE TAP to Cardiff - 230 kV 795 ACSR		
BLE TAP to Cardiff		
R (pu)	X (pu)	B (pu)
0.0034203	0.0229229	0.0441533

Table 1 – BLE to Cardiff 230kV Impedance



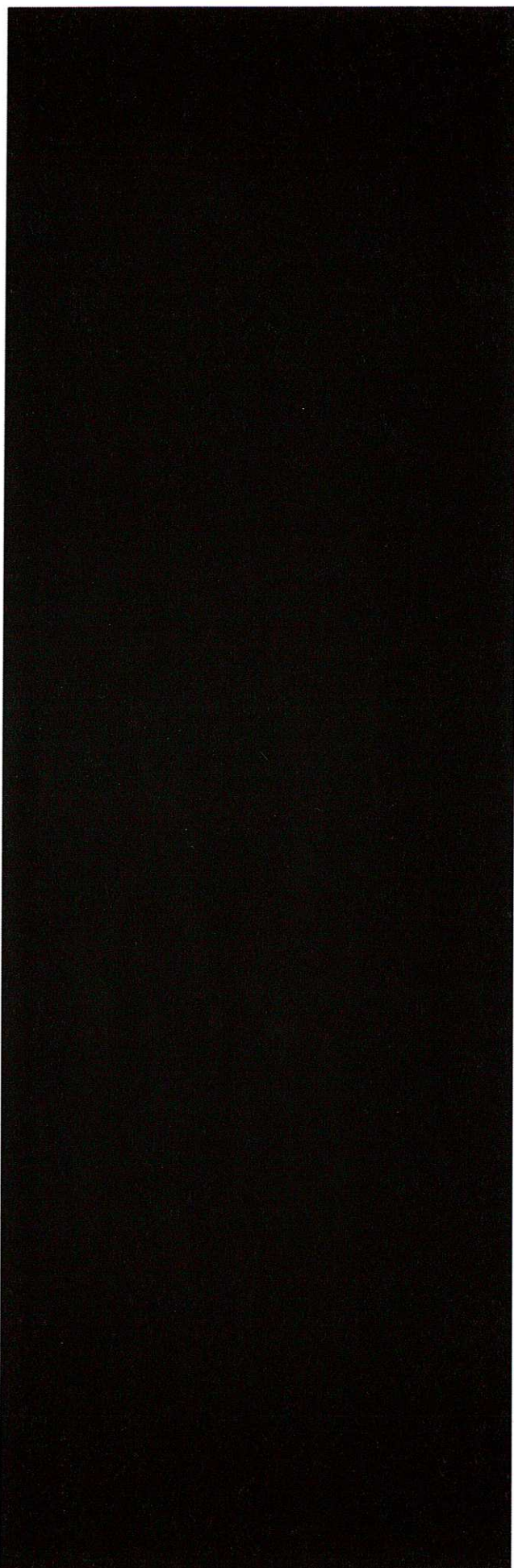









2014 RTEP Results - BLE to Cardiff 230kV



Attachment #1: Cost Estimate



<i>Option Base Total Cost</i>	\$107,353,350
Scope Change Risk & Contingency	\$26,993,672
<i>Total Option Base Cost Total with R&amp;C</i>	\$134,347,022



