Coastal Wind Link Project – Sewaren 320kV Collector
Responses to Problem Statements and SAA Bid Data Document
BPU Supplemental Information Proposal Data

Proposing Entity Name:	**PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC**
Company ID:	**Coastal Wind Link – PSEG & Orsted**
Project Title:	**Coastal Wind Link Project – Sewaren 320kV Collector**
PJM Proposal ID:	**2021-NJOSW-899**

Date Submitted:
September 17, 2021

Submitted by:
PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC

Submitted to:
PJM / New Jersey Board of Public Utilities (BPU)

In Response to:
The Request for Proposals issued by PJM and the BPU Supplemental Information Request in Support of Offshore Wind Transmission Projects to be Developed under the 2021 State Agreement Approach

A Note on this BPU Supplemental Information Proposal

The BPU requested that developers "submit additional information concerning their projects that will aid the BPU in evaluating and selecting the projects that best meet New Jersey's needs based on the criteria outlined above." For simplicity, all of information requested by the BPU was included as part of the main response submissions.

Requested information is provided here as an extract from the main proposal document. The BPU requested the following categories of information:

- *Project Proposal Identification (on the cover of this document)*
- *Project Summary*
- *Proposal Benefits*
- *Proposals Costs, Containment, and Recovery*
- *Project Risks and Mitigation Strategy*
- *Environmental Impacts and Permitting*
- *DEP Checklist Items*

This response is organized in that order, with a section cover page explaining the location of the responsive content within that section.

A Note on Organization of These Proposals

To the reviewers of this set of proposals: PSEG Renewable Transmission LLC, an indirect, wholly-owned subsidiary of Public Service Enterprise Group Incorporated (PSEG), and Orsted N.A. Transmission Holding, LLC, an indirect, wholly-owned subsidiary of Ørsted A/S (Ørsted), are submitting seven separate project proposals in response to the State Agreement Approach (SAA) Proposal Window to Support NJ OSW. These seven proposals are in response to Problem Statements 2 and 3.

Together, PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC, leveraging the expertise of their parent companies & affiliates, are collectively referred to as "the Project team" throughout this proposal. Upon award, PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding LLC will form a project company to complete the Project.

This proposal is a single project from the suite of Coastal Wind Link proposals. Four of these proposals can be characterized as single HVDC systems, while the remaining three are multi-system proposals.

Solution	Project Name	Sewaren		Deans	Larrabee		Total
		320kV	*400kV*	*400kV*	*320kV*	*400kV*	
1 HVDC System	**Sewaren 320kV Collector**	1200 MW					1200 MW
	Sewaren 400kV Collector		1400 MW				1400 MW
	Larrabee 320kV Collector				1200 MW		1200 MW
	Larrabee 400kV Collector					1400 MW	1400 MW
2 HVDC Systems	**Sewaren/Deans Twin Collector**		1400 MW	1400 MW			2800 MW
	Sewaren/Larrabee Twin Collector		1400 MW			1400 MW	2800 MW
3 HVDC Systems	**Sewaren/Deans/Larrabee Tri-Collector**		1400 MW	1400 MW		1400 MW	4200 MW

The image below shows the systems that are "building blocks" of the Coastal Wind Link projects.

Table of Contents

List of Appendices

Appendix A	Mapbooks	*These appendices are primarily in support of Sections 3 and 4.*
Appendix B	Technical Specifications and Drawings	
Appendix C	Basis for Design	
Appendix D	Transmission System Final Engineering Design Approach	
Appendix E	Detailed Description of Project Construction and Commissioning Techniques	
Appendix F	Facilities Access Plan	
Appendix G	Procurement Strategy	
Appendix H	O&M Plan	
Appendix I		
Appendix J	Project Schedule	
Appendix K	Additional Environmental Impacts and Permitting Content	*These appendices are a continuation of (and supporting documents for) Section 7: Environmental Impacts and Permitting.*
Appendix L	Air Permitting Analysis and Permit Plan	
Appendix M	Aquatic Resource Characterization and Impact Assessment	
Appendix N	Fisheries Protection Plan	
Appendix O	Draft Incidental Harassment Authorization Application and Draft ROW/RUE Request	
Appendix P		
Appendix R	Shapefiles	
Appendix Q	Letters of Support	
Appendix S	Detailed Community Engagement Content	*This is a continuation of and has additional detail for Section 8: Community Engagement.*
Appendix T	System Availability Study	
Appendix U	Preliminary Power and Energy Loss Assessment	
Appendix V	Detailed Breakdown of O&M Costs	
Appendix W	Detailed Cost Containment Language	
Appendix X		

Abbreviations and Glossary

Word	Description
66-kV	66-kilovolts or 66,000 volts (AC)
115-kV	115-kilovolts or 115,000 volts (AC)
230-kV	230-kilovolts or 230,000 volts (AC)
275-kV	275-kilovolts or 275,000 volts (AC)
345-kV	345-kilovolts or 345,000 volts (AC)
500-kV	500-kilovolts or 500,000 volts (AC)
±320-kV	320-kilovolts or 320,000 volts (DC)
±400-kV	400-kilovolts or 400,000 volts (DC)
±525-kV	500-kilovolts or 500,000 volts (DC)
ACSR	Aluminum conductors with steel reinforcement, a common type of overhead conductor
ACSS	Aluminum Conductor with Steel Support, a common type of overhead conductor
ADD	Acoustic deterrent devices
AIS	Air-insulated substation
AIS	Automatic Identification System (for OCP, monitoring relative to nearby fishing vessels)
Ampere	A unit measure for the flow (current) of electricity
ANSI	American National Standards Institute
BACI	Before-after-control-impact (fisheries study)
BACT	Best Available Control Technology
BAG	Before-after-gradient (fisheries study)
BOEM	Bureau of Ocean Energy Management (US)
BPU	Board of Public Utilities (New Jersey)
Cable	A fully insulated conductor usually installed underground but sometimes installed overhead
CAFRA	Coastal Area Facility Review Act
CCVT	Capacitor coupled voltage transformer
CFR	Code of Federal Regulations
CIR	Capacity interconnection rights
Circuit	A system of conductors (three conductors or three bundles of conductors) through which an electrical current is intended to flow and which may be supported above ground by transmission structures or placed underground
Circuit Breaker	A switch that automatically disconnects power to the circuit in the event of a fault condition Located in substations Performs the same function as a circuit breaker in a home
CLV	Cable laying vessel
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
Conductor	A metallic wire, busbar, rod, tube or cable that serves as a path for electric current flow
Conduit	Pipes, usually PVC plastic, typically encased in concrete, for housing underground power cables
CPS	Cable protection system
CT	Current transformer
CPUS	Catch per unit effort (fisheries data from NEFSC and NEAMAP)
CTV	Crew transfer vessel
dBA	Decibel, on the A-weighted scale
DC	Direct current
DE	Designated Entity
Distribution	The facilities that transport electrical energy from the transmission system to the customer
Disconnect Switch	Equipment installed to isolate circuit breakers, transmission lines or other equipment for maintenance or sectionalizing purposes
DMR	Direct metallic return
DP	Dynamic positioning
DAS	Data Acquisition System
DIFFS	Deck integrated firefighting system (system on helideck on OCP)

Word	Description
DTS	DTS designs and manufactures data acquisition systems
Duct	Pipe or tubular runway for underground power cables (see also Conduit)
Duct Bank	A group of ducts or conduit installed underground and usually encased in concrete
EA	Environmental Assessment
EFH	Essential Fish Habitat
EMF	Electromagnetic field
EYA	Energy yield assessment
FAA	Federal Aviation Administration (US)
FACTS	Flexible alternating current transmission system
FAT	Factory acceptance tests
FEMA	Federal Emergency Management Agency (US)
FFOV	Fundamental frequency and dynamic overvoltage
FHA	Flood Hazard Area (NJ)
FL	Fisheries Liaison
G	Gauss; a unit of measure for magnetic field 1G = 1,000 mG (milliGauss)
GACP	Galvanic anode cathodic protection system
GAP	General Activities Plan
GCC	Ground continuity conductor
GIS	Gas Insulated Substation
Ground Wire	Cable/wire used to connect wires and metallic structure parts to the earth Sometimes used to describe the overhead lightning shield wire
H&S	Health and Safety
HCI	Human/computer interface
HDD	Horizontal directional drill
HDPE	High-density polyethylene
HLT / HTV	Heavy Lift Vessel / Heavy Transport Vessel
HV	High voltage
HVAC	High voltage alternating current
HVDC	High voltage direct current
Hz	Hertz, a measure of alternating current frequency; one cycle/second
ICES	International Committee on Electromagnetic Safety, a committee of the Institute of Electrical and Electronics Engineers)
ICMS	Integrated Control and monitoring system (ICMS) is responsible for the control and monitoring of the Substation auxiliary systems
ICNIRP	International Council on Non-Ionizing Radiation Protection, a specially chartered independent scientific organization
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronics Engineers
ILT	Internal Lifting Tool
iPAC	Information, Planning, and Conservation (USFWS process)
ISO	Independent System Operator
JuB	Jack-up barge
kcmil	1,000 circular mils, approximately 0 0008 sq in
Km	Kilometer
kV	Kilovolt; equals 1,000 volts
kV/m	Kilovolts/meter; electric field unit of measurement
LAER	Lowest Achievable Emission Rate (air quality)
LiDAR	Light detection and ranging (remote sensing technology)
Line	A series of overhead transmission structures that support one or more circuits; or in the case of underground construction, a duct bank housing one or more cable circuits
LLC	Line Commutated Converter
MBES	Multi-beam echo sounder

Word	Description
MF, Magnetic Field	Invisible lines of force produced by the flow of electric currents Typically expressed in units called gauss (G), or in milliGauss (mG)
mG	milliGauss (see Magnetic Field); 1 G = 1,000 mG
MMC	Modular Multilevel Converter
MOU	Memorandum of Understanding
MHW	Mean high water
MHHW	Mean higher high water
MI	Mass impregnated (cable)
MLW	Mean low water
MMC	Multilevel Modular Converter
MMO	Marine mammal observations
MRIP	Marine Recreational Information Program (NOAA)
MVA	Megavolt ampere
MVAR	Megavolt ampere reactive
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum 1988
NC	Normally closed
NEAMAP	Northeast Area Monitoring and Assessment Program
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEFSC	Northeast Fishery Science Center
NFPA	National Fire Protection Association
NJAAQS	New Jersey Ambient air quality standards
NJAC	New Jersey Administrative Code
NJBPU	New Jersey Board of Public Utilities
NJDEP	New Jersey Department of Environmental Protection
NJSA	New Jersey Statutes Annotated
NJSHPO	New Jersey Station Historic Preservation Office
NMFS	National Marine Fisheries Service
NNSR	Nonattainment New Source Review (air quality)
NOAA	National Oceanic and Atmospheric Administration (US)
NPCC	Northeast Power Coordinating Council
NRCS	Natural Resources Conservation Service (United States Department of Agriculture)
NRHP	National Register of Historic Places
NTE	Not to exceed
NWP	Nationwide Permit (USACE)
NYB	New York Bight
O&M	Operations and Maintenance
OCP	Offshore Collector Platform provided by the transmission project The windfarm's offshore substation is connected to the OCP
OCS	Outer Continental Shelf
OEM	Original Equipment Manufacturer
OnSS	Onshore substation (HVDC/HVAC converter station)
OPD	Official Protraction Diagrams
OPGW	Optical groundwire (a shield wire containing optical glass fibers for communication purposes)
OSS	Offshore Substation provided by the windfarm developer; the array cables from the OSS connect directly to the offshore collector platform (OCP)
OSW	Offshore wind
OSWC	Offshore wind collector Refers to the entire span from the topside to the POI Where we have two or three HVDC systems, it is a multi-collector system
Phases	Transmission (and some distribution) AC circuits are comprised of three phases that have a voltage differential between them
PJM	PJM, Inc (ISO for Pennsylvania, New Jersey, Maryland)
POI	Point of Interconnection
PSEG	Public Service Enterprise Group
PSE&G	Public Service Electric and Gas Company; the regulated utility subsidiary of PSEG
PSI	Pounds per square inch
PVC	Polyvinyl chloride (material used in making conduits for XLPE-insulated cable)
RAM	Reliability and availability (studies)
RFCI	Request for Competitive Interest
RODA	Responsible Offshore Development Alliance
ROU	Right of use
ROV	Remotely operated vehicle
ROW	Right of way
RTO	Regional Transmission Organization
RUE	Right of use and easement
SBP	Sub-bottom profiler
SCADA	Supervisory Control and Data Acquisition
SF6	Sulfur hexafluoride; gas used to insulate electrical components such as switches/breakers
SHPO	State Historic Preservation Office
SLP	station, light, and power
SOV	Service Operating Vessel
SS	Substation
SSS	Side-scan sonar
STATCOM	Static synchronous compensator
SVC	Static VAR Compensator
SWA	Steel wire armored (SWA) conductors
TJB	Transition joint bay
UG	Underground
UPS	Uninterrupted power supply
USACE	United States Army Corps of Engineers
USCG	Unites States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded ordinance
VMS	Vessel monitoring system (NOAA)
VSC	Voltage Source Converter
XLPE	Cross-linked polyethylene
XS	Cross-section (drawing)
WTG	Wind turbine generator

PROJECT SUMMARY

The BPU requested items are listed below, and the Project Team's response to those requested are located in the corresponding section on the right on the following section's pages.

BPU Request	**Response is in Section:**
1 - Narrative Description of Proposed Project(s)	Section 1.1
2 - Project Optionality, Flexibility and Modularity	Section 1.2
3 - Interdependency of Options	Section 1.3
4 - Overview of Project Benefits	Section 1.4
5 - Overview of Major Risks and Strategies to Limit Risks	Section 1.6
6 - Overview of Project Costs, Cost Containment Provisions, and Cost Recovery Proposals	Section 1.7

1. Project Summary/Executive Overview

1.1 Narrative Description of Proposed Project

PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC (collectively referred to as "the Project team" throughout this proposal) are excited to offer the **Coastal Wind Link Project – Sewaren 320kV Collector**, the "Project," a proposed offshore transmission solution to facilitate New Jersey's offshore wind (OSW) goals. This Project is one of the unique solutions proposed by the Project team in response to the State Agreement Approach (SAA) Proposal Window to Support NJ OSW.

The Project team supports the state's goal of achieving 7.5GW of offshore wind by 2035 and commend the NJ BPU for issuing the first solicitation for shared transmission infrastructure to support OSW in the US. This solicitation puts New Jersey at the heart of a growing industry and places the Garden State at the forefront of transmission design, planning, and innovation for decades to come.

For the US OSW industry as a whole, the announcement of President Biden's target to achieve 30GW of OSW by 2030 was a momentous event. This goal is ambitious yet achievable, and we believe that holistic transmission planning is required to minimize environmental impacts and prioritize efficiency for ratepayers. Appropriately designing, constructing, and operating a shared transmission system that will maximize the value of OSW will take time, and now is the right time to take this step.

The Sewaren 320kV Collector is an offshore transmission solution designed to deliver up to 1200 MW of clean, reliable OSW energy to the State of New Jersey. The Project is comprised of one HVDC system.

The Project's offshore collector platform (OCP) is designed to serve 1200 MW of OSW generation from future lease areas in the NY Bight.

The Project will construct an overhead connection from the OnSS to PSE&G's Sewaren substation, which will be the POI where generation is injected into the onshore grid. The projected in-service date (ISD) is December 2029.

Figure 1-1: Project Overview

The Project utilizes proven HVDC technology to transfer clean electricity to New Jersey's onshore transmission grid. HVDC systems are optimal for large power transfers over long distances.

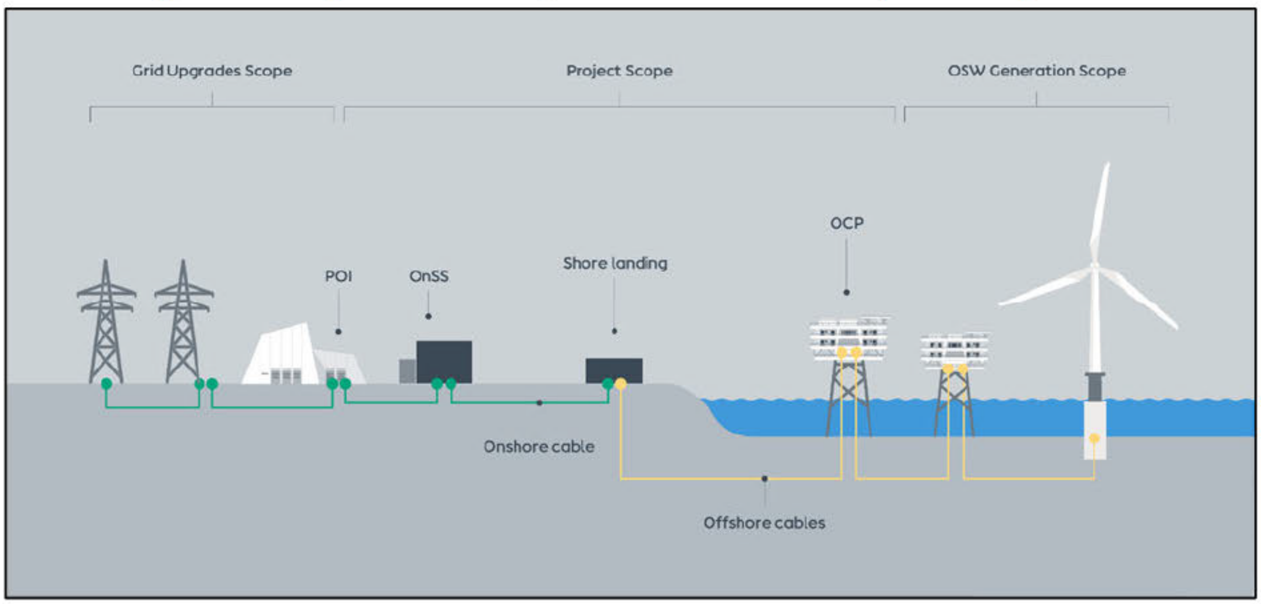
The Project team offers a unique and unparalleled set of end-to-end competencies that will enable successful delivery of the Project. These competencies include:

- Experience in planning, constructing, and operating complex transmission systems, both onshore and offshore;
- Unique technical capabilities and deep relationships across key supply chains; and
- An unmatched familiarity with, and commitment to, the state of New Jersey and it's decarbonization ambitions.

The Project team's efforts towards this proposal include performing extensive diligence over the past several years, ultimately leading to the recommended solution that is proposed herein. Detailed, customized studies performed by global experts and OEMs have enhanced the Project team's understanding of high voltage systems and allowed us to identify optimal solutions for the state. Outcomes from our extensive diligence efforts have informed every major aspect of the Project scope: the OCP, offshore cable, shore landing, onshore underground cable, OnSS, and the tie line to the POI.

References to these studies are included in later sections of the proposal. We believe our extensive diligence efforts confirm that our project is constructible and can be delivered at the price specified in this proposal.

Figure 1-2: Simplified Block Diagram of Standard HVDC System Components



Key Proposal Highlights

The Project team believes that its proposed solutions provide the BPU with the best opportunity to achieve its OSW goals. The Project delivers a number of benefits to NJ, particularly in the areas of constructability and deliverability, developer expertise, cost-benefit optimization, and depth of technical diligence specific to the NJ offshore transmission market.

1. Constructability and deliverability

- **Sewaren is an optimal Point of Interconnection (POI):** Based on a comprehensive analysis of station headroom and network upgrades, the team identified optimal POIs for future phases of OSW generation. Our analysis concluded that Sewaren, although not one of the POIs targeted in the SAA window, has sufficient capacity to accommodate a 1200 MW injection. Compared to more Southern POIs being considered for OSW, an injection at Sewaren will deliver clean energy to New Jersey closer to denser load pockets in the state.

- **Offshore route considers stakeholder input**: Design of the subsea cable route incorporated feedback from the New Jersey Department of Environmental Protection (NJDEP) and the United States Army Corps of Engineers (USACE). The route considers seabed conditions, shipping lanes, fishing areas, crossings with existing cables, construction concerns, known unexploded ordnance (UXO) areas, and known areas of wrecks. Site investigation data from areas off the coast of NJ has allowed the Project team to mature route design prior to detailed surveying.

- **Permitting plan incorporates regulatory guidance:** The Project team has met with various agencies, including NJDEP, to discuss permitting scenarios for this first-of-a-kind offshore transmission system. A comprehensive permitting plan has been created to fast-track project execution, and the team has prepared the Incidental Harassment Authorization (IHA) and Rights-of-Way/Rights-of-Use and Easement (ROW/RUE) applications necessary for offshore work to occur.

- **HVDC design is flexible and modular:** The Project team worked with leading OEMs to design a ±320kV symmetrical monopole system that can deliver a continuous 1200 MW of generation. ±320kV HVDC technology is mature, as it is the standard size for symmetrical monopole systems overseas.

2. Dynamic partnership with unrivaled expertise

- PSEG has been a partner to New Jersey for over a century and has constructed more generation, transmission, and distribution infrastructure in the state than any other entity during that time. PSE&G, an affiliate of PSEG Renewable Transmission LLC, serves 2.3 million electric customers in NJ and maintains over 350 miles of underground transmission. PSEG Renewable Transmission LLC will leverage the experience of its parent and affiliates in the pursuit of this Project. PSEG's experts in permitting, underground construction, outreach, and safety aim to ensure that the Project is delivered on-time, on-budget, and is a reliable resource for the state in the years to come. PSEG, alongside Ørsted, is proudly developing New Jersey's first utility-scale offshore wind farm, Ocean Wind 1.

- Ørsted is the world leader in offshore wind and has been ranked the most sustainable energy company in the world for three years running. Ørsted is committed to establishing a long-term, constructive, and mutually beneficial presence in NJ, and Ørsted will deliver 2,248 MW of OSW to the state through the Ocean Wind 1 & 2 projects. As the world's largest OSW farm operator, and operator of the world's largest OSW transmission asset Hornsea 1 - 1200MW, Ørsted has abundant experience in the construction, operation, and maintenance of offshore transmission assets. Orsted N.A. Transmission Holding, LLC will leverage the experience of its parent and affiliates in the pursuit of this Project.

- Public Service Enterprise Group (PSEG) and its affiliates, namely PSEG Renewable Transmission LLC, have been prequalified by PJM as a Qualified Transmission Developer as of July 12, 2021. Additionally, Orsted N.A. Transmission Holding, LLC has been prequalified by PJM as a Qualified Transmission Developer as of September 14, 2021. If awarded the Project, PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC will form a joint venture to pursue the Project.

3. Optimal balance of cost and benefits for NJ Ratepayers

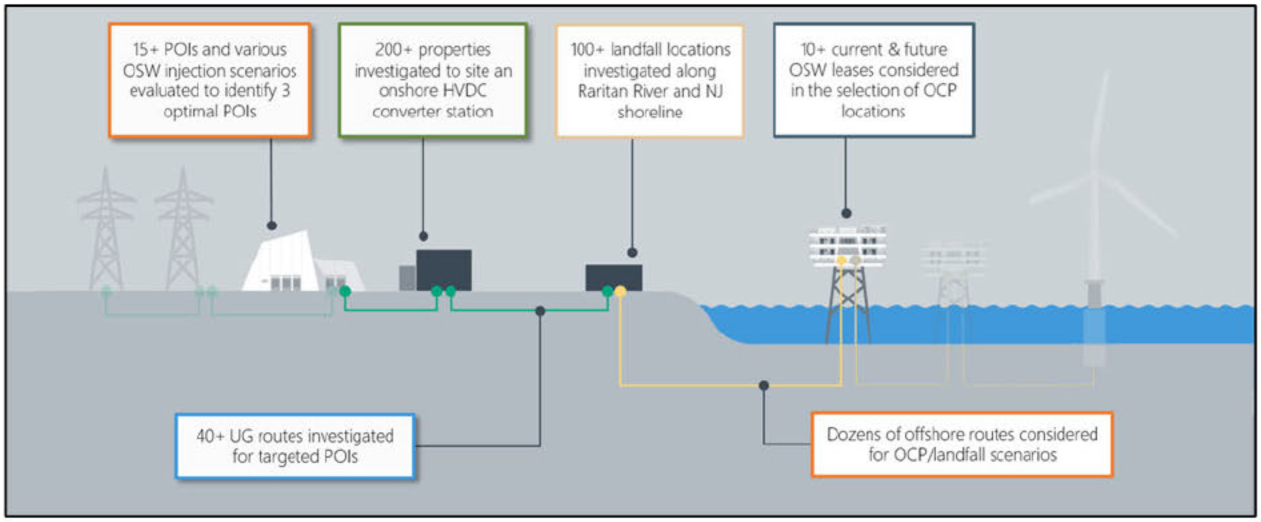
- Through collaboration with prominent vendors in the OSW and transmission industries, the Project offers competitive pricing to the state of NJ, and the Project team is offering binding cost containment measures that reduce risks for NJ ratepayers. Project cost commitments are summarized in Section 1.7 and further detailed in Section 10.

- The Project team is committed to bringing the lowest cost OSW energy to NJ, and a key driver to lowering cost is scale. The Project team is excited to offer various proposals to the BPU, comprised of both single HVDC system proposals and multi-system proposals. The configuration of each project is outlined on the cover page of this proposal. For any offshore transmission solution, access to PSEG and Ørsted's combined knowledgebase of best practices will streamline project execution and ensure the delivery of a project that is on time, on scope, and on budget.

4. Unparalleled depth of development due diligence

- PSEG's deep understanding of NJ's *onshore* transmission system has allowed the Project team to create a vision for the state's future *offshore* transmission system. The Project team has considered a range of interconnection scenarios and has a detailed understanding of the system topology at the proposed POIs.

Figure 1-3: Overview of Extensive Diligence Efforts Performed by Project Team



- The Project reflects detailed studies that were commissioned on unique interconnection opportunities, critical project components, and customized real estate options. The Project team has invested significant time and capital to propose a project that is informed, advanced, and tailored. A representative list of development studies to date is provided below.

Table 1-1: Representative List of Development Studies to Date

Key Activities	Scope/Outcome/Purpose

A key conceptual decision in the suite of proposals offered by the Project team was the selection of the OCP locations. The environmental, stakeholder, and constructability considerations are explained elsewhere in this proposal; however, it is important to highlight upfront the benefits that the Project team's OCP locations offer future users of NJ's offshore transmission system. Simply put, our OCP locations consider needs of the developers that will construct and operate future OSW generation off the coast of NJ.

The Project team's OSW development experience puts us in the best position to identify, and design for, generation developers' needs. When compared to pure play transmission development companies, the Project team's deep understanding of an OSW system in its entirety – from turbine to POI, from project conception to decommissioning – produces a more efficient and cost effective design that will benefit all stakeholders.

Wind farm developers seek to maximize the value of their leases by optimizing turbine array layouts and minimizing losses in the cabling system. The Project team studied future NY Bight lease areas to understand how future OSW farms may be arranged to offer the maximum value to NJ.

1.2 Project Optionality, Flexibility and Modularity

As noted earlier, the Project team is offering various proposals to the BPU, comprised of both single HVDC system proposals and multi-system proposals. It is important to highlight upfront that there is significant flexibility and optionality within all the proposals submitted by the team. This is intentional, as our aim is to provide the BPU the opportunity to tailor final system requirements as needed.

In alignment with the solutions sought by PJM and the BPU, this Project addresses SAA Option 2, the construction of new offshore transmission connection facilities. The 320kV system could be interlink-capable, however would require additional design and equipment that are not included in the scope and cost provided herein. A networked offshore system is identified in SAA Option 3.[2]

Optionality of the Project

[2] The Project team, through the Coastal Wind Link suite of proposals, is not proposing any grid upgrades solutions in response to BPU SAA Option 1a.

With 3,758 MW of OSW awarded to date, NJ seeks just over 3,700 MW of OSW generation in future awards to meet its 7,500 MW goal. The Project team believes that its combined systems achieve economies of scale that will benefit NJ ratepayers through the cost efficiencies, project implementation efficiencies, and phased ISDs as described in those individual proposals. In offering Proposals that include up to three HVDC systems, designed to serve a total of 4,200 MW, the Project team presents flexibility to the BPU in accommodating any future increases in OSW generation above current plans. The project team notes that a modified version of this solution paired with other offerings can serve smaller amounts of generation should that be the desired outcome.

The 2019 Energy Master Plan outlines New Jersey's ambitious goal of achieving 100% clean energy by 2050. The excess capacity offered by our system could facilitate an offshore wind market that attracts customers beyond state OREC contacts, encouraging OSW developers to build merchant tranches of their projects, since the incremental cost is minimal and the project would be de-risked with the transmission already built. In this way, the SAA window offers a unique opportunity for the state to get additional OSW to market to help the state exceed its clean energy goals.

As proposed, all bids offered in our suite of proposals are designed to yield a transmission investment schedule that is optimally aligned with NJ's published schedule of OSW generation procurements. Regardless of which project is awarded to the Project team, we are committed to working with the BPU to design a system that is cost efficient, future proof, and practical in enabling the BPU to fulfill its long-term vision for a shared OSW transmission system.

1.3 Interdependency of Options

The Project is a standalone system and is offered for the price and ISD designated herein. As proposed, the components of the Project cannot be severed. This Project, as outlined in later sections, assumes that OSW is injected into other POIs across the state in alignment with the BPU's vision for an offshore transmission network that meets NJ's 7500 MW OSW goal. The Project is not dependent on any other proposal submitted by the Project team.

1.4 Overview of Project Benefits

The BPU's ambition to build the first shared offshore transmission system in the US requires a partner that is deeply experienced, reliable, and committed. In addition to the unique Project benefits outlined in Section 1.1, the Project team is the best partner for the BPU on this exciting mission because we are:

1. **The best for New Jersey ratepayers**

   - **Unparalleled experience in planning, construction and operation:** Ørsted's current installed OSW capacity is 7.6GW, with another 2.3GW under construction. PSEG's affiliate, PSE&G, has invested nearly $14 billion in electric transmission over the past decade. Our superior knowledge of transmission, both onshore in NJ and for OSW generators globally, has enabled us to propose the optimal balance between cost, system performance, and risk mitigation to protect ratepayers. The Project will have access to a unique, world-class set of O&M capabilities, a global dataset of risk reduction methodologies, specialized technical teams, and an extensive network of US-based suppliers. Based on its local O&M capabilities, the Project will also be able to minimize outages throughout the entire lifetime of the project, providing long-term stability for the grid and decreasing ratepayer costs.

   - **Anchored to NJ:** With awards totaling 2,248 MW of OSW capacity through the Ocean Wind 1 & 2 projects, Ørsted will be a strong local presence in the Garden State for the next 40+ years. PSEG's ongoing commitment to NJ is demonstrated by over a century of service and recent investments to NJ's infrastructure through PSE&G initiatives such as Energy Strong II and the Clean Energy Future (CEF) program. During the last 10 years, PSE&G, an affiliate of PSEG Renewable Transmission LLC, invested billions in transmission upgrades to maintain reliability for NJ Customers and harden transmission facilities. In the aftermath of historic storms like Hurricane Irene and Superstorm Sandy. PSEG also has a continual presence in New Jersey, with its O&M capabilities based exclusively in the State where the company can respond to customer needs on an immediate basis. In addition, because of PSEG's construction experience in the State, the company understands the topography of the area, including all of the environmental sensitives and the needs of relevant communities and stakeholders.

   - **Cost effective solutions:** Through innovation and large-scale deployment of OSW technology, Ørsted has helped bring down the cost of OSW. It is now cheaper than many newly built coal- and gas-fired power plants. Ørsted has elevated a niche market to a rapidly growing industry and will be a reliable partner in driving success and cost efficiencies in the forthcoming US offshore transmission industry.

   - **Active regulatory and RTO presence:** PSEG is a founding member of PJM and has a long history of working within the PJM planning paradigm. PSEG fully understands the complexities associated with the current State Agreement Approach process and future processes, and the related challenges facing PJM and NJ in determining how transmission projects like the current proposals will be planned in both a technically roust and cost-effective manner to support future OSW development. Moreover, in various FERC proceedings, PSEG has demonstrated that it is aligned with the State in ensuring an equitable allocation of transmission costs to NJ customers and will continue to work with the State in achieving this important goal.

2. The best for New Jersey communities

- **Focus on local economic development and labor**: The Project team is committed to engaging the residents, communities and local governments of NJ. The team has already aligned itself with the Southern Chamber of Commerce, Southern Jersey Development Council, and Statewide Hispanic Chamber of Commerce of NJ in order to promote the economic opportunities available in connection with execution of the Project.
- **Local reputation and relationships:** PSEG has an outstanding record of delivering challenging projects within schedule and on budget. The Project will benefit from PSEG's century of experience implementing large-scale transmission solutions for stakeholders state-wide. To date, Project design has progressed with feedback from 25 outreach meetings to environmental stakeholders, municipal groups, academic institutes, and various other stakeholders. We believe that our local engagement and support is essential to project success.
- **Commitment to supplier diversity:** PSEG is committed to doing business with certified minority, women, veteran & LGBT-owned business owners to maintain a supplier diversity process that is fully integrated into our company culture. In 2020, PSEG spent $644 million with minority, women, veteran, and LGBTQ-owned businesses, representing 28% of our investments. This is a tangible demonstration to our commitment to diversity and local spending. Ocean Wind 1 recently laid the foundation for small, women-owned and minority owned businesses to enter the developing OSW industry with its $15 million Pro-NJ Grantor Trust. Ocean Wind 2 expands upon the commitment to ensure a strong and inclusive industry by allocating an additional $8 million for businesses, including veteran-owned businesses, who wish to enter the OSW industry.

3. The best for New Jersey's environment

- **Environmental protection:** The Project team is leading the way for environmental protection in NJ. PSEG's in-house permitting team has led the multiyear creation and maintenance of the largest estuary enhancement project in the US and Ørsted has a history of working in environmentally sensitive areas. The Ocean Wind projects are also implementing innovative monitoring and mitigation methods to protect North Atlantic Whales and other marine mammals during construction and operation phases of its projects. Both PSEG & Ørsted are committed to improving the quality of energy service, while minimizing environmental impacts.
- **PSEG goal for net-zero carbon emissions:** PSEG announced in June 2021 its goal to have net-zero carbon emissions by 2030. PSEG will meet its net-zero ambitions by launching a three-pronged 2030 climate vision that extends across its business — a climate vision that is one of the most aggressive in the country by a large utility and power generator.

PSEG's 2030 climate vision comprises three pillars:

1. Net-zero emissions for PSEG operations, including PSE&G's utility operations (electric and gas)
2. 100% greenhouse gas-free, carbon-free power generation
3. Significant contributions to regional economy-wide decarbonization

- **Ørsted goal for net-positive biodiversity impact:** As of Q2 2020, Ørsted announced that all new projects it develops must have a net-positive biodiversity impact. This means all renewable energy projects that Ørsted commissions will have a net-positive impact on biodiversity by 2030. With this Project, Ørsted will make NJ part of this achievement.

Ørsted's net-positive biodiversity impact:

- Biodiversity is defined as the variety of life in all forms, but is often simplified to diversity within and between species and of ecosystems
- Within renewable energy development, biodiversity impact can be understood as impact on the natural environment, which includes both habitats and species, including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes
- A net-positive impact occurs when the totality of the biodiversity impact, including through measures taken to offset the residual impact of a development project, exceeds the loss, thereby creating an overall benefit

4. The best long-term partners for New Jersey's clean energy agenda

- **Commitment to safety:** Safety is paramount to the successful execution of NJ's clean energy agenda. PSEG's "Our Commitment to Health and Safety" statement unites its employees, unions and company leaders in achieving an accident-free environment where no one gets hurt. Ørsted is an original member of the G+, a global health and safety organization for the OSW industry, which brings together business leaders, health and safety experts, and organizations operating in the industry to establish best management practices and promote world-class safety performance across the sector. Safety is critical to the successful implementation of any energy system, and the Project team has an unmatched commitment to safety that will be critical to successful execution of the US's first OSW transmission system.

- **Reliability benefits:** In offering a suite of proposals, ranging from standalone HVDC systems to three interlinked HVDC systems, the Project team offers flexibility to NJ. Operating multiple networked OCPs provides increased reliability and is expected to reduce the windfarm developer's curtailment. Consequently, the windfarm developer's EYA increases which could result in a reduction in OREC price. If OSW is to represent a significant share of NJ's generation mix over the decades to come, the team agrees that the transmission system developed to serve it must be designed with resiliency in mind.

- **Advancement of OSW agenda:** With appropriate planning that accounts for the needs of both ratepayers and future OSW developers, shared transmission can unlock numerous benefits. The Project team possesses the skills to unlock these benefits, and our vision for shared transmission in the US does not end with this solicitation.

Benefits unlocked by a shared offshore transmission system in the US:

Value of offshore wind: Interlinked offshore collector stations will increase redundancy in the transmission system, making more wind power available to ratepayers and minimizing both losses and curtailment

More resilient grid: A shared offshore transmission system can ease congestion, decrease the burden on existing aging infrastructure, and boost power flows from areas with the highest renewable capabilities to load centers that need green power the most

Modernized power system: Increasing the use of HVDC cables will modernize the grid, enhancing its controllability, enabling more integration of renewable generation, and unlocking new flexibility (ancillary) services that can reduce ratepayer impact if they provide new revenue streams for renewable generators

Environmental justice: A stronger, more modern grid that can integrate more renewable energy will also have direct benefits for environmental justice communities through enabling the closure of dirty peaking plants and reducing the risk of power cuts

Reduced marine impact: A holistically planned offshore grid has the potential to minimize the number of cables and structures needed offshore, reducing the disturbances to marine environments and those who use them most

Additional project-specific benefits are addressed in Section 2. The Project team understands that conceptualizing, procuring, and implementing an offshore transmission system will not be easy, however we believe that the investment of time and resources will offer countless benefits to NJ. The Project team continues to monitor technical and regulatory advancements in the OSW and transmission industries that could make the project more competitive. PSEG and Ørsted are eager to continue collaborating with stakeholders and all interested parties to ensure the success of the Project moving forward.

1.5 Overview of Environmental Impact Minimization/ Permit Approach

A primary driver for renewable energy is the need to displace fossil fuel generation and reduce the emissions that contribute to climate change. Climate change has global, regional and local impacts on the natural environment, and both PSEG and Ørsted recognize the urgent need for action to address the threat of climate change. Climatic changes can affect and destroy habitat conditions, increase ocean temperatures, stress water sources, and contribute to sea level rise. A primary outcome from the project will be a contribution to combatting the current and projected climate change trends and afford protection to the natural environment which would be adversely affected by it.

Project design, as well as planning for project execution in the coming years, considers the unique NJ environment that PSEG has served for the past century. Both PSEG and Ørsted have experience with sensitive offshore and onshore environmental features, and both companies have developed specialized best practices to ensure minimization of environmental impacts. Project siting and design utilized a robust alternatives assessment in order to ensure minimization and avoidance of impacts to the natural environment. The project intends to complete extensive site investigation and characterization activities, including geophysical and benthic and habitat surveys to identify sensitive environmental features. Where necessary, as will be determined in further planning with regulatory agencies, cables will be sited to avoid and minimize conflict and impact to particular features. Installation methodologies, including choice of cable installation tools, will be tailored to local conditions, and installation work will be timed to avoid sensitive time of year periods for particular species. Project-specific permitting and environmental information is provided in Section 7.

1.6 Overview of Major Risks and Strategies to Limit Risks

PSEG and Ørsted's unique blend of development, construction, and operation experience sets us apart from other developers and will minimize risks to New Jersey ratepayers over the lifetime of the project. Both PSEG and Ørsted are in the business of delivering projects to the highest quality standards. In employing reliability-centered maintenance programs, we seek to maximize system performance and availability through appropriate investments in the operation and maintenance of our assets.

The team has considered Project risks for every major aspect of the project scope. A number of key decisions have been made to date in order to limit exposure to key risks. These are illustrated in the table below. Generally speaking, there are a number of risks that are common to any offshore transmission project. The team has considered these high-level risks, as well as project-specific risks. A comprehensive narrative of project-specific risks and the associated mitigation strategies is provided in Section 11.

Table 1-6: Overview of Risks

Category for Major Risks	Strategies to Limit Risks

1.7 Overview of Project Costs, Cost Containment Provisions, and Cost Recovery Proposals

The Construction Cost Cap Amount for the **Sewaren 320kV Collector** is $2,277,092,952 in real 2021 dollars.

If awarded a project, a project company (Coastal Wind Link LLC) will be formed by PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC. This project company is expected to accrue cost-recovery through a hypothetical rate structure filed with FERC, until the project approaches its availability date, at which time it will seek the necessary rate approval from FERC.

PROJECT BENEFITS

The BPU requested items are listed below, and the Project Team's response to those requested are located in the corresponding section on the right on the following section's pages.

BPU Request	Response is in Section:
1 - Reliability Benefits:	Section 2.1
2 - Public Policy Benefits:	Section 2.2
3 - Market Efficiency Benefits:	Section 2.3
Market Benefits	Section 2.3.1 and 2.3.2
Capacity Market Benefits	Section 2.3.3
Other Benefit	Section 2.3.4

2. Benefits

2.1 Reliability Benefits

2.1.1 Reliability Criteria

PSEG and Ørsted, as long-time owners and operators of generation, transmission, and distribution assets, have developed a Project informed by a shared history of power generation and transmission.

Beyond the reliability offerings associated with OCP interlink compatibility that are contemplated in the Project team's suite of proposals, the Project Team has placed a heavy focus on the reliability issues of the onshore grid in order to ensure the Project does not impact the stability of the existing PJM transmission system.

- The Project team identified solutions for all of the grid violations associated with our targeted POIs, and we did not see any new overloads in the system caused by our POI injections.

- The Project team is providing study files that address violation in 1a even though we are not proposing grid upgrade solutions in the suite of Coastal Wind Link proposals.

In maintaining large portfolios of generation and transmission assets, PSEG and Ørsted both have extensive O&M experience for onshore and offshore equipment. The Project will leverage PSEG and Ørsted's O&M practices to decrease the probability of outages and increase system availability throughout the operational lifetime of the asset. Detailed information on O&M capabilities is provided in Section 4.8.In maintaining large portfolios of generation and transmission assets, PSEG and Ørsted both have extensive O&M experience for onshore and offshore equipment. The Project will leverage PSEG and Ørsted's O&M practices to decrease the probability of outages and increase system availability throughout the operational lifetime of the asset. Detailed information on O&M capabilities is provided in Section 4.8.

2.1.2 Ability to Provide Additional Benefits

The following design decisions affect reliability and contribute to the Project's ability to provide additional benefits associated with reliability criteria.

Table 2.1.2-1: Project Design Decisions and Associated Value

2.2 Public Policy Benefits

2.2.1 Ability of the Project to Maximize Energy, Capacity, and REC Values

The Project team has made ±400kV the standard voltage in a majority of solutions in the suite of Coastal Wind Link proposals. When comparing ±320kV and ±400kV symmetric monopole systems, a ±400kV system is more cost effective, as it offers a lower cost/MW. However, the Project team has proposed two individual ±320kV systems in the suite of Coastal Wind Link proposals, in order to offer flexibility to the BPU if they are looking to pursue a system that is lower cost overall. ±320kV technology is a standard size for HVDC systems overseas and is designed to serve up to 1200 MW.

Ørsted's experience as an owner of OSW generation and transmission assets worldwide means that the state will benefit from world-class expertise. Ørsted's Reliability Centered Maintenance (RCM) program will be utilized to control and monitor all offshore equipment, ensuring that the transmission system is operational as often as possible. The RCM program is a superior method for monitoring equipment, with a focus on active monitoring, spare equipment, quantifying reduction in curtailment, and interlinking OCPs to benefit overall EYA. Unlike other single-project developers, Ørsted's global OSW experience and proven standards will enhance the reliability and deliverability of the offshore wind resources that utilize this project.

2.2.2 Ability to Accommodate Future Increases in Offshore Wind Generation Above Current Plans

Based on a comprehensive analysis of station headroom and network upgrade costs, the Project team selected optimal POIs for its proposals.

To supplement the network upgrade analysis, the Project team evaluated CETL and CETO to determine what economic benefit this project can provide, in addition to performing relevant deliverability studies. In choosing to pursue an interlinked solution, the team offers additional benefits associated with transfer of generation into different POIs during times of congestion.

The suite of proposals offered by the Project team allow the BPU flexibility in awarding an offshore transmission system tailored to the distinct needs of NJ. The modular design of the Project described herein offers flexibility in coexisting with the generator lead lines awarded to NJ to date: Ocean Wind 1, Ocean Wind 2, and Atlantic Shores 1. The Project may also coexist with other offshore transmission systems as desired, allowing the BPU to meet NJ's current goals. As desired, the Project team is flexible in working with the BPU to align project schedule or system design to accommodate any future increases in its OSW plan.

2.3 Market Efficiency Benefits

The benefits summarized throughout this section consider all solutions offered by PSEG and Ørsted, in addition to the current OSW generation that has been awarded in NJ to date. This is shown in Table 2.3-1.

Table 2.3-1 : Solution descriptions with Point of Interconnections

2.3.1 Energy Market Benefits

The key benefits from the proposed Coastal Wind Link solutions include:

3. A combined annual reduction in SOX, NOX, and CO2 emissions of tons in the state of New Jersey.
4. Significantly reduces the reliance on energy imports into NJ, amounting to in annual net benefits.
5. Reduces the reliance on dispatch of must run generation within the state.
6. Supports the energy delivery of of OSW generation into the region, with no curtailments to offshore wind farm resources.
7. Relative to the default portfolio proposed by PJM and NJBPU, the proposed solution:

The identified solutions, located in Attachment C.5 of Appendix C, support the full deliverability of of offshore wind into New Jersey's system from the corresponding POIs. Taking advantage of the offshore grid network and the transmission network upgrades, there is zero curtailments observed in the analysis.

Additionally, the combined solution reduces the annual generation from thermal resources in New Jersey by – directly supporting the long-term decarbonization goals in the state of New Jersey and dependence on fossil-based thermal resources.

2.3.2 Transmission System Benefits

A grid reliability analysis was initiated utilizing PJM provided models[4]. The models included only Problem Statement 2 and Problem Statement 3 system configurations. This is herein referred to as "***Basecase***". The studies identified similar and additional violations to those reported by PJM within their proposal package. All violations were observed during generation deliverability studies.

Several solutions were evaluated to address all deficiencies identified in the basecase. Following this, the basecase was updated with Problem Statement 1(a) projects to address the violations. This is herein referred to as the "***Scenario***" case.

The Scenario case was reevaluated by performing all the PJM identified analysis. The analysis confirmed that the solutions address all applicable criteria violations and meet Transmission owner Planning Criteria. The system was evaluated under summer, winter, and light loading conditions, as applicable.

Unless otherwise specified, all results presented in upcoming sections of this report refer to the Scenario case with Problem Statement 1(a), 2 and 3 solutions included.

A summary of findings from various studies is provided below.

Generation Deliverability Studies:

The initial analysis identified multiple constraints in the basecase with the selected POIs and injection MW amounts. Several transmission solutions are proposed to address the violations observed through the analysis. **.** below provides a summary of the overloaded facility and the corresponding highest overload observed under basecase conditions. The proposed solution IDs are provided alongside to complement a description of each solution in the full report. The analysis was repeated with the proposed solutions (Scenario cases) and no incremental reliability criteria violations were observed.

[4] Study Files CEII update 8.20.2021 - Summer_Winter_Light Load_Study Files

Table 2.3.2-2 : List of Generation Deliverability Violations

Long Term Generation Deliverability Studies:

The analysis of the scenario cases did not identify any long-term reliability violations. Table 2.3.2-3 summarizes the worst loading on select facilities from the summer and winter scenarios correspondingly.

Table 2.3.2-3 : Long Term Deliverability Results

Baseline Thermal Voltage Analysis:

The analysis of scenario cases with all projects in service did not result in any incremental reliability criteria violations. The results from generation deliverability represented the worst overload outcomes on existing and planned facilities.

N-1-1 Thermal and Voltage Analysis:

The analysis of scenario cases with all projects in service did not result in any incremental reliability criteria violations. Consistent with the study procedures outlined by PJM, the following adjustments were implemented – Generator redispatch, Shunt switching, PAR adjustments and tap changer adjustments.

Short Circuit Analysis

The analysis of scenario cases with OSW injections and projects in service did not result in any reliability violations i.e., circuit breakers in exceedance of their short circuit interrupting capability. Table 2.3.2-4 reports the contribution to short circuit levels at locations within PJM that recorded the highest change between pre to post project conditions. The table is reported consistent with PJM requirements outlined in the PJM proposal package.

Table 2.3.2-4 : Short Circuit Current Levels

The short circuit currents at onshore and offshore collector platforms were found to be within design criteria rating. Table 2.3.2-4 below reports the maximum fault currents observed for different fault categories.

Table 2.3.2-4: Maximum Fault Currents

Stability Analysis

The stability studies did not identify any adverse impacts from proposed projects and alternative POIs on the onshore and offshore grid system stability.

Availability

. For each of the projects in the Coastal Wind Link suite of proposals, the Project team has considered the availabilities below:

Table 2.3.2-5: Availability for Each Coastal Wind Link Solution

The Project team continues to follow industry progress as a whole, and is engaged in an ongoing effort to identify areas where further, detailed engineering can contribute to an improvement in the proposed project availability. The analysis of system reliability and availability is provided in Appendix T.

As noted previously, in offering a suite of proposals that range from standalone HVDC systems to three interlinked HVDC systems, the Project team offers flexibility to NJ. The single ±400kV HVDC systems with interlink capability – namely the Sewaren 400kV Collector and the Larrabee 400kV Collector – offer the most flexibility for being coupled with other offshore transmission systems to form a networked grid. However, the Project team believes that it offers the most benefit to New Jersey through its solution comprised of three HVDC systems – namely the Sewaren/Deans/Larrabee Tri-Collector.

2.3.3 Capacity Market Benefits

The analysis evaluated all LDAs using the pre-OSW and post-OSW project model and confirmed that the proposed solutions do not deteriorate CETL limits. The analysis evaluated all the LDAs in PJM, however detailed results are provided for the direct LDAs affected by OSW integration (PSEG, PSEG North, EMAAC and MAAC). Three scenarios were evaluated under this construct:

- Scenario 1: Pre – OSW (with and without Problem Statement 1a transmission upgrades)
- Scenario 2: Post – OSW (without Problem Statement 1a transmission upgrades)
- Scenario 3: Post – OSW (with Problem Statement 1a transmission upgrades)

2.3.4 Other Benefits

Through the suite of Coastal Wind Link proposals, PSEG and Ørsted are excited to offer offshore transmission solutions that will facilitate New Jersey's goal of integrating 7,500 MW of OSW into its renewable resource portfolio. The addition of renewable energy into the state's energy portfolio will displace fossil fuel generation and effectively reduce emissions that contribute to climate change. Climate change has impacts to communities near and far, and the Project aims to contribute to the state's clean energy future and combat projected climate change trends.

As mentioned previously, relative to the default portfolio proposed by PJM and NJBPU, the proposed Coastal Wind Link solutions, in addition to the current OSW projects awarded in NJ to date, reduce overall New Jersey emissions by Additionally, the proposed Coastal Wind Link solutions, in addition to the current OSW projects awarded in NJ to date, reduce the annual generation from thermal resources in New Jersey by – directly supporting the state's long-term decarbonization goals and dependence on fossil-based thermal resources.

Generally speaking, a shared offshore transmission system can ease congestion, decrease the burden on existing aging transmission infrastructure, and boost power flows from areas with the highest renewable capabilities to load centers that need green power the most. A stronger, more modern grid that can integrate renewable energy will benefit stakeholders throughout the state. In offering a suite of proposals, ranging from standalone HVDC systems to three interlinked HVDC systems, the Project team offers flexibility to NJ in designing an offshore transmission system that is resilient and reliable. PSEG and Ørsted are excited to continue contributing to New Jersey's energy infrastructure.

Defining the "net OSW transmission costs," as considered in the NJBPU SAA Economic Evaluation Framework, requires a comparison between the transmission component of the awarded OSW projects, and the costs and benefits of the proposed transmission projects in the SAA window.

The equation from PJM below shows a quantitative assessment on the value that can be attained from a coordinated offshore transmission system. A major component contributing to the cost reduction of the the net OSW transmission cost is the OSW generation cost reduction. One of the ways to reduce the generation cost is to increase the CIR percentage of the interconnected generation resource.

Net OSW Transmission Costs = OSW Transmission Project Costs – <u>OSW Generation Cost Reduction</u> – PJM Market Cost Reduction – Risk Mitigation Benefits and Option Values

When compared to generator lead lines (GLLs), Coastal Wind Link significantly increases power deliverability when two or more offshore converter stations are interlinked offshore. Coastal Wind Link has proposed such offshore interlinks with its multi-system projects, but could also construct a single system that could be interlinked with another developer's project.

Additionally, the utilization of an offshore POI through an offshore wind transmission network reduces losses for OSW generators and increases the energy yield assessment of the project, which in turn results in more competitive bids. Under the generator lead line model, OSW developers are not incentivized to propose interlinks between offshore platforms for regulatory, technical, and economic reasons. Given this, Coastal Wind Link, when constructed with multiple HVDC systems, or partnered with another developer's system would be able unleash the full potential of offshore wind generation, capturing higher CIRs that would result a lower cost for ratepayers.

The Project team did a thorough analysis on POIs selection, and that work delivered an extensive quantitative assessment of many parameters (grid performance, offshore cable routes, landfalls, onshore stakeholders and costs) associated with approximately 15 potential POIs (shown in Appendix I). As a result of that analysis, the Project team has found that the use of Sewaren, together with Larrabee and Deans, offers the best value to the State of New Jersey.

2.3.5 Any Relevant Supporting Analysis

Additional supporting information can be found in study files,
and excel spreadsheets that are included as attachments to the Competitive Planner tool.

2.4 Economic Benefits

Through the PSEG and Ørsted partnership in Coastal Wind Link, the Project is well situated to help NJ achieve its OSW goals and bring the following economic benefits to the state of NJ:

- Creating between 2,496 - 8,690 employment years, depending on the project awarded
- Increasing the NJ GDP between $441 million to $1.5 billion, depending on the project awarded
- Bringing between $260 million - $900 million of work to local contractors, depending on the project awarded
- Utilization of NJ ports during construction and O&M
- Further developing the local supply chain by prioritizing companies with NJ presence and MWVBE recognition
- Expanding the offshore wind expertise in the state
- Bringing additional investment to educational institutions and non-profits

PSEG is supporting economic development in NJ through a three-step process:

Clear goals for spending with NJ- based companies: Each year, PSEG establishes goals for local spend. In 2020, PSEG corporate established a target of 59% NJ spend and surpassed that target. Each year's goals continually reinforce the importance of supporting local contractors and encouraging further development of the supply chain in the state.

Rewarding NJ presence and ability to use local workforce: During the RFP process for support on PSEG's utility-scale infrastructure projects, bidders are not only evaluated based on cost and unique proposal offerings, but also their presence in NJ and their ability to meet PSEG's diversity goals.

Ensuring competitive rates: PSEG has several MSAs in places with key civil, electrical, and engineering firms that operate in NJ. These MSAs contain a pre-negotiated set of commercial terms and conditions, streamlining the process for award to the successful bidder and ensure competitive labor rates.

Through its Ocean Wind 1 & 2 projects, Ørsted is expected to inject over $2 billion into the State of New Jersey. These investments are in critical offshore wind infrastructure and manufacturing facilities – the benefits of which will be felt across the state. These include commitments to develop a monopile manufacturing facility, a nacelle assembly facility at the New Jersey Wind Port, O&M facilities in Atlantic City.

To better quantify the economic benefits that Coastal Wind Link will bring the state of NJ, the Project team contracted a third party to perform an economic evaluation using IMPLAN, a widely used industry standard input/output model. Utilizing the estimated local spend of three different options as the input, IMPLAN estimated the direct, indirect and induced impacts on employment, wages, value added, and output. Detailed information on local content and the economic evaluation is provided in Section 6.

2.5 Company Experience

PSEG and Ørsted have formed a complementary relationship to pursue OSW opportunities with the state of New Jersey. Both PSEG and Ørsted bring extensive and unique experiences and qualifications.

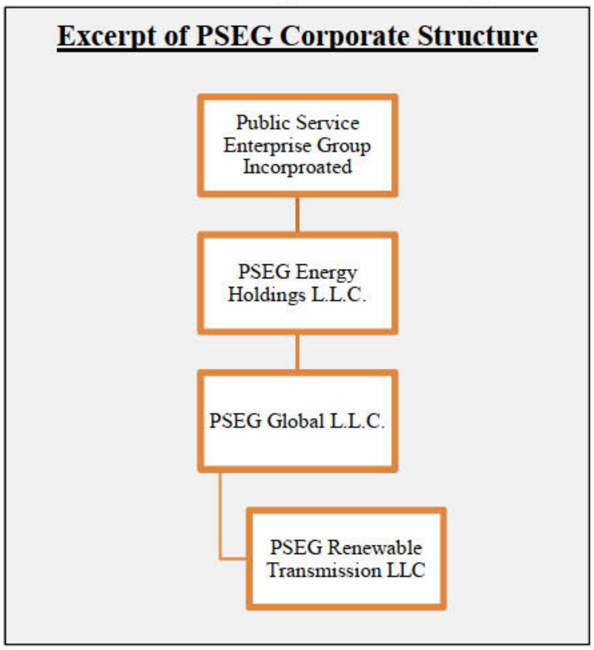
Table 2.5-1: Company Experience

	PSEG	Ørsted
Background	• Public Service Enterprise Group (PSEG) has a century of experience in the development, construction, ownership and operation of large-scale energy infrastructure. • PSEG is the holding company parent of Public Service Electric & Gas Company (PSE&G), which provides electric and gas service to customers in NJ in an area consisting of 2,600-square-miles. PSE&G serves 2.3 million electric customers and 1.9 million gas customers. • PSE&G was recently recognized as the most reliable utility in the Mid-Atlantic region for the 19th year in a row. PSE&G maintains over 350 miles of underground transmission, and since 2010, PSE&G has increased the mileage of the underground fleet by nearly 30%. • PSEG's operations have led to long-standing relationships with contractors, labor unions, and local officials, which will aid in the successful implementation of this project.	• Ørsted is the world leader in OSW, supplying green power to more than 15 million people. • Ørsted is among the world's largest renewable energy companies and the global-leader in establishing utility-scale energy projects at sea, including developing more than 28 offshore wind farms and 17 offshore transmission systems. • Ørsted's OSW leadership is unparalleled, with nearly three times the installed capacity of closest competitors. The lessons learned over Ørsted's 25+ year evolution reflect the very best in OSW design, engineering, finance and construction, and best practices. • With an extensive portfolio of offshore generation, Ørsted has designed and built the associated transmission assets, including on- and offshore substations and converters. • Ørsted's global procurement portfolio and strong relationships with OEMs/suppliers enables the Project to seek synergies and cost savings for the benefit of the ratepayers as well as derisking the impact of supply chain constraints.
Relevant Experience	• PSE&G owns and maintains 834 miles of transmission right-of-way with 1,560.5 miles of transmission lines over 100kV and 484 miles of 500kV transmission lines. • As an infrastructure company, PSEG has an outstanding record of delivering challenging projects within schedule and on budget. • PSEG's experience with overhead, underground, and station work in NJ makes it well-suited to construct transmission solutions in other environmentally sensitive and densely populated areas of the PJM footprint.	• Ørsted's portfolio includes the world's first OSW farm (Vindeby, 1991), America's first OSW farm (Block Island), and the world's largest OSW farm (Hornsea 1). Ørsted will deliver 2,248 MW of OSW to NJ through Ocean Wind 1 & 2. • Ørsted's experts have designed, permitted and constructed over 1,000 miles of subsea export cables, and over 1,700 miles of subsea array cables. • Simply put, Ørsted has more experience installing OSW transmission facilities than any other company in the world. All of Ørsted's experience in development, construction, operation, and decommissioning is relevant to the Project.
Histories of Innovation and Success	Specific examples of the non-traditional construction methods PSEG has recently deployed include: • The utilization of alternative construction techniques (helicopter, wetland matting, etc.) to minimize environmental impacts of projects and optimize construction sequencing • The siting, permitting, and construction of numerous projects, including GIS stations, in concentrated, urban areas • The utilization of HDD under the Newark Bay to accommodate two underground circuits in the Bergen Linden Corridor Upgrade Project • The successful creation of a temporary routing of the Appalachian Trail to minimize trail length through the ROW of the Susquehanna Roseland project; the initiative minimized negative visual impacts and ensured that hikers were separate from the habitats of key endangered species	Specific examples of Ørsted's expertise in OSW development and operation include: • Designed and constructed the largest wind farm in operation today (Hornsea I, 2019) • Competitively awarded a power purchase agreement (PPA) for what will be the largest wind farms in the world once constructed (Hornsea I and II's combined 2,600 MW) • Numerous US projects outside of NJ awarded, including Revolution Wind (700 MW), South Fork Wind (132 MW), Sunrise Wind (880MW) • Designed and planned high-voltage transmission solutions capable of delivering power from OSW farms to POI, from as far away as 88 miles (Walney Extension (45 miles offshore), Race Bank (42 miles offshore) and Hornsea I (88 miles offshore)) • Planned and executed O&M strategy for offshore wind farms, including 4 OSW farms with HVDC connections to shore
Resources	• PSEG and Ørsted's team includes individuals focused on environmental assessment and permitting, project engineering, project management, project controls, procurement, construction, public affairs and community outreach, commissioning, operations and maintenance, and regulatory compliance.	
Summary	• PSEG and Ørsted together offer long-term accountability to New Jersey ratepayers – neither PSEG nor Ørsted will sacrifice its reputation or cut corners to deliver a successful project. • Through the PSEG and Ørsted partnership for Ocean Wind 1, the team is at the forefront of advancing NJ's OSW agenda; the team has already integrated a number of lessons learned from Ocean Wind 1 into the Coastal Wind Link project design and execution plan, and will continue to use its NJ-specific experiences to deliver a successful project. • PSEG and Ørsted have complementary skills and teams of experienced professionals to support the entire project life cycle; the teams will facilitate efficient outreach, construction, and commissioning to deliver a project that is on time, on scope, and on budget. • Ørsted's presence and experience along the East coast would help to facilitate the potential future interconnection of Coastal Wind Link with other RTO/ISOs using offshore transmission and providing the NJ BPU with a full offshore backbone • The team has experience permitting projects in challenging environments; PSEG's NJ transmission expertise, coupled with Ørsted's global experience, offers the BPU a proven set of skills for this first-of-its-kind project.	

Public Service Enterprise Group (PSEG) and its affiliates, namely PSEG Renewable Transmission LLC, have been prequalified by PJM as a Qualified Transmission Developer as of July 12, 2021. Additionally, Orsted N.A. Transmission Holding, LLC has been prequalified by PJM as a Qualified Transmission Developer as of September 14, 2021. If awarded the Project, PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC will form a joint venture to pursue the Project. The joint venture will sign the Designated Entity Agreement.

Each member of the Project company will hold an equal voting share on project decisions. PSEG will be primarily responsible for the development and construction of all onshore scope and Ørsted will be primarily responsible for the development and construction of all offshore scope. The project company (Coastal Wind Link LLC) will be formed upon a successful award from PJM and the NJ BPU. It is expected to accrue cost-recovery through a hypothetical rate structure filed with FERC, until the project approaches in-service date, at which time it will seek the necessary rate approval from FERC. Figure 2.5-1 shows the corporate structure of PSEG & Ørsted, as it relates to the Project.

Figure 2.5-1: Corporate Structure for Proposing Entities



Public Service Enterprise Group Incorporated (PSEG) is a diversified energy company headquartered in Newark, N.J. PSEG Energy Holdings L.L.C operates as a holding company under PSEG. PSEG Global L.L.C. is a direct subsidiary of PSEG Energy Holdings L.L.C., and PSEG Renewable Transmission LLC is a direct subsidiary of PSEG Global L.L.C.

Ørsted A/S (Ørsted) is a global energy company that, either directly or through its affiliates, develops, constructs, owns, and operates offshore and onshore wind resources, solar farms and offshore transmission facilities. Through its wholly owned subsidiaries, Ørsted A/S is the indirect parent company of Orsted N.A. Transmission Holding, LLC.

The technical and engineering experience of PSEG and Ørsted is outlined in the table above, and further information regarding ROW acquisition, financial statements, and more is provided in the pre-qualification packages submitted to PJM.

Further information on PSEG's financial strength is available online: http://investor.pseg.com/

Further information on Ørsted's financial strength is available online: https://orsted.com/en/investors/ir-material/financial-reports-and-presentations#A1

Both PSEG and Ørsted have an outstanding record regarding construction, maintenance, and operation of transmission facilities, in alignment with the scope of the Project proposed.

PROJECT PROPOSAL COSTS, CONTAINMENT AND RECOVERY

The BPU requested items are listed below, and the Project Team's response to those requested are located in the corresponding section on the right on the following section's pages.

BPU Request	Response is in Section:
1 - Additional Cost Information	Section 10.3
2 - Cost Estimate Classification	Section 10.4
3 - Estimated Energy Losses	Section 10.5
4 - Physical or Economic Life	Section 10.6
5 - Description of Each Cost Structure	Section 10.7
6 - Fixed Revenue Requirement	Section 10.8
7 - Project Cost Impacts	Section 10.9
8 - Additional Cost Control Mechanisms	Section 10.10

10. Commercial Strategy and Cost Containment

Note: this section addresses specific BPU SAA requirements; where appropriate and for transparency, that language is shown in orange.

The table below provides a cost and a cost-per-megawatt view of the seven proposals submitted by the Project team. The cost of each proposal is driven by the distance of the onshore and offshore cable routes, as well as the voltage of the converter.

Proposal	Name	2021 Real Capex	MWs	Cost per MW
1	**Sewaren 320kV Collector**	$2,277,092,952	1200	$1.90M
2	**Sewaren 400kV Collector**	$2,427,241,170	1400	$1.70M
3	**Larrabee 320kV Collector**	$2,104,183,929	1200	$1.75M
4	**Larrabee 400kV Collector**	$2,281,228,261	1400	$1.58M
5	**Sewaren/Deans Twin Collector**	$4,806,660,425	2800	$1.72M
6	**Sewaren/Larrabee Twin Collector**	$4,653,993,014	2800	$1.66M
7	**Sewaren/Deans/Larrabee Tri-Collector**	$7,097,863,930	4200	$1.69M

10.1 Overview of Project Costs

10.2 Commercial Strategy

The Project team's bid strategy in the lead up to this RFP was centered on two key principles:

.

10.3 Additional Cost Information

"Any additional cost information not included in PJM's submission forms, including ongoing capital expenditures."

For additional cost information, the Project team is providing the following items, which are focused on operations and maintenances costs. The operations and maintenance plan was developed by partnering with original equipment manufacturers, industry consultants, HVDC system operators, and internal resources to produce an accurate portrayal of the expected annual costs throughout the life of the system. Each area of the O&M budget was carefully detailed using the most accurate information available today which is described in the following sections.

See Appendix V for a detailed breakdown of the O&M costs for the Project over its expected operational life. Cost categories in the detailed O&M plan include:

10.4 Cost Estimate Classification

"Cost Estimate Classification: For the cost estimates submitted via PJM's submission forms, the cost estimate classification and expected accuracy range consistent with AACE International standards."

10.5 Estimated Energy Losses

BPU SAA D3 - Estimated Energy Losses: The estimated energy losses of the proposed facilities

10.6 Physical or Economic Life

"Physical or Economic Life: The physical life and/or economic life (i.e., length over which the facility will request cost recovery) of the facilities."

10.7 Description of Each Cost Structure

"Description of Each Cost Structure: A description of each cost structure proposed for the project, including cost containment mechanisms and cost recovery approach.

The Construction Cost Cap Amount for the **Sewaren 320kV Collector** is $2,277,092,952 in real 2021 dollars.

Below is a summary of the Project team's cost containment commitments. The project team's proposed cost cap language can be found in Appendix W.

If awarded a project, a project company (Coastal Wind Link LLC) will be formed by PSEG Renewable Transmission LLC and Orsted N.A. Transmission Holding, LLC. This project company is expected to accrue cost-recovery through a hypothetical rate structure filed with FERC, until the project approaches its availability date, at which time it will seek the necessary rate approval from FERC.

10.8 Fixed Revenue Requirement

"If a fixed revenue requirement is being requested, files specifying the annual revenue requirements over the economic life of the proposal. Similar to the proposed cost cap mechanisms submitted to PJM, please include proposed contractual revenue requirement commitment language to be included in the Designated Entity Agreement. The Contractual revenue requirement commitment language must be identical to that submitted in the PJM Competitive Proposal Template."

10.9 Project Cost Impacts

"Please explain how the costs of the proposed projects may be impacted by selection of a subset of the options versus the entire proposed project."

The Project team is pleased to produce a solution in Coastal Wind Link that covers all of the problem statements which the NJBPU / PJM has outlined. However, we understand that the NJBPU may want to award subsections of an entire project versus the whole project. Though we believe synergies with the execution come from having a single entity oversee all components of a project, we will support this approach where possible and advantageous for ratepayers.

10.10 Additional Cost Control Mechanisms

"Please explain any additional cost control mechanisms provisions for the BPU to consider that were not included in the PJM submission forms."

All cost control mechanisms proposed are described in 10.7.

PROJECT RISKS AND MITIGATION STRATEGY

The BPU requested items are listed below, and the Project Team's response to those requested are located in the table on the following section's pages.

BPU Request	Response is in Section:
1 - Site Control Plan	Section 11 in table
2 - BOEM ROW/ROU	
3 - Stakeholder Engagement Risk	
4 - Construction Risk	
5 - Time of Year Restrictions	
6 - Outages	
7 - Supply Chain Constraints	
8 - Timing to other Transmission Projects	
9 - Schedule Guarantees	
10 - Other Risks	
11 - Technical Studies	
12 - Wetlands Impacts	

11. Risks and Mitigation Strategy

The Project team performed a comprehensive risk analysis for the project. Risks were identified, evaluated for potential cost and schedule impacts, and assigned a likelihood of the risk occurring. Mitigation plans and costs were created for each risk. A Monte Carlo analysis was performed to understand the combined likelihood of all the risks and identify the top risks affecting the project. As the proposal was developed, the team discussed and proposed mitigation plans and incorporated them into the project plan. Other risks were removed as the design matured.

Table 11-1 describes the project risks and mitigation strategy (and fulfills the BPU SAA requests in order; where applicable, technical studies related to risk mitigation are also mentioned.)

ENVIRONMENTAL IMPACTS AND PERMITTING AND DEP CHECKLIST

The BPU requested items are listed below. ***Please refer to Appendix K's sections, as listed below, for the corresponding information. Information included in the Appendices elsewhere is as noted.***

BPU Request	Response is in …:
1 - Physical Resources	Appendix K, Section 2.1
2 - Biological Resources	Appendix K, Section 2.2
3 - Cultural Resources	Appendix K, Section 2.3
4 - Socioeconomic Resources	Appendix K, Section 2.4
5 - GIS Desktop Study	Appendix K, Section 3.1
6 - Shapefiles:	Explanation Appendix K, Section 3.1
7 - Cable Route Widths	Files attached in Appendix R
8 - Onshore Substation Footprint	Files attached in Appendix R
9 - Cable Installation Methods	Files attached in Appendix R
10 - General Footprint & HDD Boreholes & Landings	Files attached in Appendix R
11 - Construction Footprint	Files attached in Appendix R
12 - Projected Vessel and Vehicle Traffic	Files attached in Appendix R
13 - Exclusion Zones	Files attached in Appendix R
14 - Addressing Identified Impacts and Innovative Measures	Appendix K, Section 3.5
15 - Environmental Benefits Narrative	Appendix K, Section 3.6
16 - Fisheries Protection Plan	Explanation in Appendix K, Section 4; attached as Appendix N
17 - Impact to Overburdened Communities	Appendix K, Section 2.4
18 - Permitting Plan	Explanation in Appendix K, Section 5.
DEP Appendix A Checklist	Appendix K, Section 5.5